PGL ENVIRONMENTAL CONSULTANTS
1500 - 1185 West Georgia Street
Vancouver, BC V6E 4E6
604 682 3707
pggroup.com

Memo

PGL File #: 0346-65.01

DATE: July 28, 2023

TO: FrontCounter BC

FROM: Stewart Brown, R.P.Bio, P.Ag.

Re: Change Approval Application Number 100403524 for Day Road Culvert and Bank Stabilization Works

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PGL Environmental Consultants (PGL) previously submitted a Change Approval application for Changes In and About a Stream (Tracking Number 100403524) on behalf of the Ministry of Transportation and Infrastructure (MOTI) for permanent culvert replacement and stream bank stabilization works at two roadway stream crossing sites (Table A) within the Sunshine Coast Regional District (SCRD) in response to widespread flooding from an atmospheric rain event in November 2021. The sites include:

- Where Gough Creek crosses under Day Road; and
- Where Clack Creek crosses under Day Road.

Table A: Road Names (Site Names), Stream Names, Municipality within the SCRD, and Site Coordinates

Road Name (Site Name)	Stream Name	Location within SCRD	Site Coordinates
Day Road	Gough Creek	Roberts Creek	UTM Zone 10U 0453805, 5476772
Day Road	Clack Creek	Roberts Creek	UTM Zone 10U 0451567, 5475649

Permanent instream works were initially scheduled for the 2023 least-risk window but have been postponed until 2024. Urban Systems Ltd. (Urban) conducted site inspections on June 5, 2023, for the MOTI to assess current instream and infrastructure conditions at each crossing location and determine whether additional works would be required to reduce the risk of additional damage to infrastructure or wash-out during the winter and spring of 2023/2024 prior to the completion of permanent repair works in the fall of 2024. If the inspection found there were vulnerabilities, Urban determined the nature of "Phase 1" works to be required. Urban's findings are summarized in the following memos and included in Appendix 1:

- Urban Systems Ltd. July 24, 2023. *Memorandum Project 14005 - Sunshine Coast DFAA – Day Rd – Phase 1 Work.*

Urban identified risks and vulnerabilities to roadway and drainage components of the sites, which require measures to be completed in the 2023 least-risk window (Appendix 1). Works have been summarized in Phase 1 (2023) and Phase 2 (2024) for each crossing for your reference. Proposed Phase 1 works are limited to debris removal from the instream channel and are located within the project footprint of the previously submitted Change Approval Amendment (Appendix 2).

1.1 Day Road Scope of Work

1.1.1 Day Road Phase 1 (2023)

Phase 1 Day Road design work proposed for the 2023 least-risk window includes the following scope of work:

- Removing all sections of the washed-out culverts that remain in the downstream channel on Clack Creek; and
- Removing downstream large woody debris/tree limbs that accumulated on Clack Creek from the atmospheric river flooding event. Limbs to be disposed offsite.

All works are to be completed without machinery entering below the high-water mark. Clearing and grubbing will be avoided in this area.

1.1.2 Day Road Phase 2 (2024)

The permanent Day Road design includes the following scope of work:

- Removing anthropogenic debris, specifically the damaged, rusted, washed-out CSP culverts from the downstream habitat at Gough Creek;
- Removing the downstream debris jam ("log jam", large woody debris/tree limbs) accumulated from the atmospheric river flooding event;
- Removing accumulated debris and gravel upstream of the culvert on Gough Creek to direct stream flow to the culvert, to a maximum of 150mm depth;
- Clearing and grubbing the Day Road shoulders for temporary equipment access (to be revegetated);
- Removing the emergency works temporary culverts (1.8m-diameter CSP at Gough Creek and 1.5m-diameter CSP at Clack Creek);
- Installing a single, 20m-long, concrete box culvert measuring 2.7m width by 2.7m height, complete with a concrete headwall and fish baffles (spacing of fish baffles is to be determined) at Gough Creek;
- Installing two-barrel (twin-barrels), 15m-long concrete box culverts, each barrel measuring 2.4m width by 2.4m height, complete with concrete headwall and fish baffles (spacing of fish baffles is to be determined) at Clack Creek;
- Stripping surface materials and installing non-woven geotextile fabric. To be covered with 1.5m thickness of 50kg class riprap at the inlet and outlet of Gough Creek (approximately 9m-long riprap apron at inlet, and 14m long riprap apron at outlet);
- Stripping surface materials and installing non-woven geotextile fabric. To be covered with 1.5m thickness of 50kg class riprap at the inlet and outlet of Clack Creek (approximately 6m-long riprap apron at inlet, and 10m long riprap apron at outlet);
- Installing pre-cast headwalls with concrete footings at the inlet and outlet of the Clack Creek twin box culverts;
- Constructing cast-in-place headwalls with concrete footings at the inlet and outlet of the Gough Creek box culvert;
- Adding fisheries gravels overtop the riprap along the stream channel bottom at both creek crossings;
- Installing a pedestrian walkway and walkway fencing along the upstream (northern) edge at both creek crossings;
- Excavating, stripping, rebuilding, grading, and paving 70m of Day Road surrounding the Gough Creek crossing, and 50m of Day Road surrounding the Clack Creek crossing;
- Removing trees determined likely to fail, as described in the Arborist Summary Report; and
- Seeding and/or planting any disturbed vegetated areas from construction works.

1.2 FISH AND FISH HABITAT PROTECTION MEASURES AND BEST MANAGEMENT PRACTICES FOR INSTREAM WORKS

Phase 1 works will be subject to the same environmental mitigation measures as already provided as part of original application package to the Ministry of Forests detailed in PGL's March 16, 2023, *Supplementary Information to Support Change Approval Amendment Application Number 100403524 for Day Road Culvert and Bank Stabilization Works* and summarized below for Phase 1 instream works to avoid contravention of the *Fisheries Act*.

Environmental Mitigation Measure Required for Phase 1 Works	Document Section Reference (where the relevant mitigation has already been provided in previous application package)
Erosion and Sediment Control	• Appendix 5 of March 16, 2023, Supplementary Information document (MOTI's Sunshine Coast Construction Environmental Management Plan) • Section 5 of March 16, 2023, Supplementary Information document
Protection of Riparian Zone	• Section 5 of March 16, 2023, Supplementary Information document
Spill Response	• Emergency Spill Response Plan provided within the Construction Environmental Management Plan of March 16, 2023, Supplementary Information document (MOTI's Sunshine Coast Construction Environmental Management Plan) • Section 5 of March 16, 2023, Supplementary Information document

STATEMENT OF LIMITATIONS AND CONDITIONS FOR REPORT

Complete Report

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to PGL by the Client, communications between PGL and the Client, and any other reports, proposals or documents prepared by PGL for the Client relative to the specific site described herein, all of which together constitute the Report.

In order to properly understand the suggestions, recommendations and opinions expressed herein, reference must be made to the whole of the Report. **PGL is not responsible for use by any part of portions of the Report without reference to the whole report.**

Basis of Report

The Report has been prepared for the specific site and purposes that are set out in the contract between PGL and the Client. The findings, recommendations, suggestions, or opinions expressed in the Report are only applicable to the site and purposes in relation to which the Report is expressly provided, and then only to the extent that there has been no material alteration to or variation from the information provided or available to PGL.

Use of the Report

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report or any portion thereof without PGL's written consent, and such use shall be on terms and conditions as PGL may expressly approve. Ownership in and copyright for the contents of the Report belong to PGL. Any use which a third party makes of the Report, is the sole responsibility of such third party. **PGL accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report.**

CLOSING

We trust that this meets your needs. If you have any questions or require clarification, please contact Stewart Brown or Bruce Nidle at 604-895-7612 and 604-895-7609, respectively.

Attachments: Appendix 1 – Phase One Work Memo (Urban Systems Ltd.)
Appendix 2 – Change Approval Amendment

Appendix 1

Phase One Work Memo (Urban Systems Ltd.)

PGL ENVIRONMENTAL CONSULTANTS

URBAN SYSTEMS

DATE	July 24, 2023	FROM	Cody Bagg, P.Eng.
TO	Stacie Crane	FILE	1961.0480.13
CC	Gundula Brigl	SUBJECT	Project 14005 - Sunshine Coast DFAA – Day Rd – Phase 1 Work

1.0 BACKGROUND

On June 5th, 2023, Urban Systems Ltd. (Urban), conducted a site inspection for the BC Ministry of Transportation and Infrastructure (MoTI) on the Sunshine Coast DFAA – Day Road project which includes the culvert crossings of Gough Creek and Clack Creek. The purpose of the site inspection was to assess the risks and vulnerabilities of roadway design as well as the drainage components of the site relating to postponement of the permanent replacement of the temporary culverts which had been installed in response to the atmospheric river events in November 2021. In addition to the site inspection, Urban was requested to provide recommendations to mitigate the risks and vulnerabilities that were identified on site. While there is overlap, the recommendations have been broken down into three categories: Roadway, Drainage, and Maintenance.

2.0 SITE OBSERVATIONS

Attendance: Cody Bagg (Urban), Sam Roosma (Urban), Tim Barnes (MOTI), Eric Corrigan (Stantec)

Site Photos:

Figure 1: Day Rd – Gough Creek Inlet

Figure 2: Day Rd – Gough Creek Upstream

Figure 3: Day Rd – Gough Creek Outlet

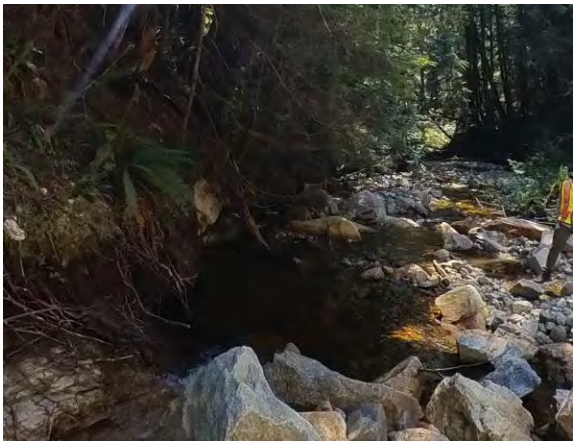


Figure 4: Day Rd – Gough Creek Downstream

Figure 5: Day Rd at Gough Creek - Looking West

Figure 6: Day Rd at Gough Creek Looking East

Figure 7: Day Rd – Clack Creek Inlet

Figure 8: Day Rd – Clack Creek Upstream

Figure 9: Day Rd – Clack Creek Outlet

Figure 10: Day Rd – Clack Creek Downstream

Figure 11: Day Rd at Clack Creek - Looking West

Figure 12: - Day Rd at Clack Creek Looking East

Site Notes:

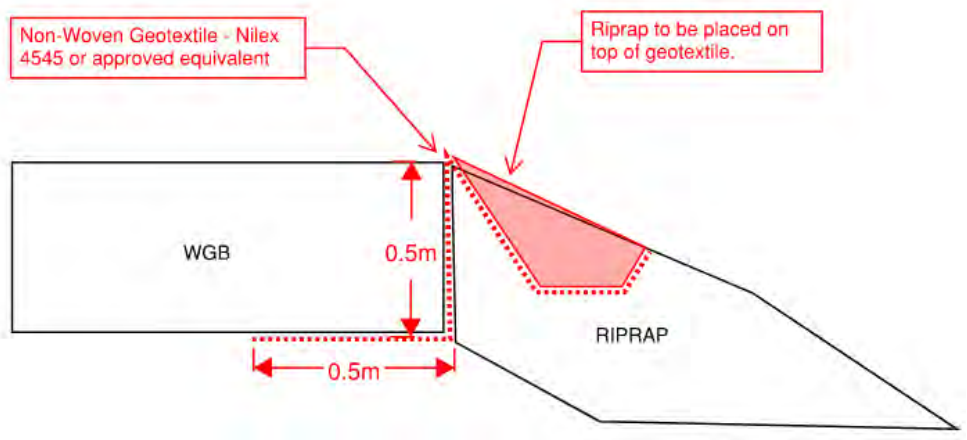
- Gough Creek crossing appeared stable with no visible changes in condition after placement of additional riprap.
- Seepage through embankment that was noted during previous site inspections appeared to have similar flows compared to previous site visit. No visible signs of changes in condition or new erosion.
- No build up of debris visible at the inlet or in the downstream channel.
- Minor shoulder erosion on Day Road near Gough Creek crossing. Material being lost due to voids in riprap. Significant reduction in shoulder erosion after placement of additional riprap.
- Minor potholes along Day Road.
- Clack Creek crossing appeared stable with no visible changes in condition since previous site visit.
- No build up of debris at inlet of culvert.
- Washed out culverts and fallen trees are still in the downstream channel. Some debris constricting the downstream channel. No backwatering noted due to constriction during site visit.
- Minor shoulder erosion from roadway runoff on Day Road near Clack Creek crossing.

3.0 RECOMMENDATIONS

Below are the recommendations to minimize risk and address vulnerabilities with the existing roadway, drainage, and maintenance practices. Schematic drawings have been appended to this memo for additional details.

3.1 ROADWAY

- Gough Creek and Clack Creek – Install flexible delineator posts on Day Road for the full extent of the gravel portions on each side of the road. Delineator posts to have white reflectors to drivers' right side and yellow reflectors to the left side.
- Gough Creek and Clack Creek – Maximize available roadway width by addressing shoulder erosion. Restructure gravel surface. Remove 100-200mm of well-graded base (WGB) surface, place non-woven geotextile along shoulders and lay overtop of riprap. Replace WGB on top of geotextile and compact. Geotextile to create a barrier to minimize the loss of gravel surface through riprap.



3.2 DRAINAGE

- Clack Creek Only. Remove all sections of the washed-out culverts that remain in the downstream channel.
- Clack Creek Only. Fallen tree within outlet channel to be limbed and left in place. Limbs to be disposed of offsite.

*NOTE: All works to be completed without machinery entering below high-water mark. Avoid clearing and grubbing the area. Prior to commencement of work, advise myself (Cody Bagg) and the Project Manager (Stacie Crane) if clearing or grubbing is required.

3.3 MAINTENANCE

- Increase the frequency of routine site inspections. Determining a specific frequency is difficult so a practical approach should be taken to determine the appropriate frequency. After prolonged rainfalls or high intensity storms, site inspections should be completed. Visual inspection of the inlet and outlet of each culvert should be completed. Ensure no debris is blocking or has the potential to block the culverts.
- Repair roadway shoulders if erosion occurs. Minor patching of the shoulders may be required to ensure the roadway width is maximized.

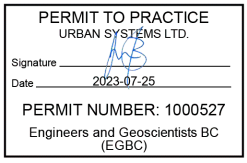
4.0 CONCLUSION

I trust that the content of this memorandum satisfies your expectations and requirements. Please notify the undersigned of plans to implement these recommendations and if any issues are experienced at these sites until the permanent replacement can occur.

Sincerely,

URBAN SYSTEMS LTD.

2023-07-24

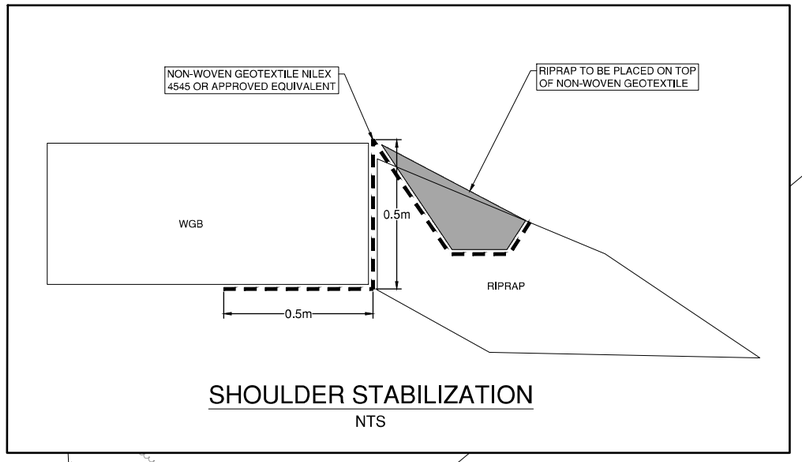


Cody Bagg, P.Eng.
Transportation Design Engineer

/cb
Enclosure
Appendix – A – Schematic Design Drawings

file://usl.urban-systems.com/projects/Projects_SUR/1961/0480/13/R-Reports-Studies-Documents/R1-Reports/Day%20Rd/Phase%201%20Works%20Memo/2023-06-12%20Day%20Rd%20-%20Phase%201%20Works-DRAFT.docx

APPENDIX A – SCHEMATIC DESIGN DRAWINGS



SHOULDER STABILIZATION
NTS

Plan EPS4580
Building Strata

N 453800 476800 E

N 453800 476800 E

PLAN 13713 (COVENANT) GOUGH CR.

SHOULDER STABILIZATION (TYP.)

FLEXIBLE DELINEATOR POSTS 5m SPACING (TYP.)

CL&GR

OIP

TREELINE

WIRE HEIGHT=5.21m

WIRE HEIGHT=10.77m

WIRE HEIGHT=6.74m

DP

CN 1002

CN 1001

DAY ROAD

160.03

LOG JAM

EW

Lot 12
Plan VAP14932
007-798-172

DL 3376, GROUP 1
NEW WESTMINSTER DISTRICT

Lot 13
Plan VAP14932
007-798-211

101 102

SURVEY NOTE:
COORDINATES ARE AT GROUND LEVEL AND BASED ON THE FOLLOWING CONVERSION FACTORS FROM UTM Z10 NAD 83 (CSRS), CGVD28 (HT2.0):
- -TACK POINT: GCM 314369
- -ADJUSTED COORDINATES WERE DIVIDED BY GIVEN SCALE FACTOR OF : 0.9996343
- -ROTATION: NOT APPLIED
- -TRANSLATION: SHIFT NORTH (-5000000.000), SHIFT EAST (0.000)

THE LOCATION OF EXISTING UNDERGROUND UTILITIES SHOWN HEREON IS APPROXIMATE ONLY AND PREDOMINANTLY BASED ON AS-BUILT INFORMATION. THE CONTRACTOR WILL CONFIRM THE FIELD LOCATIONS OF THESE UTILITIES WITH THE UTILITY STAKEHOLDERS.

URBAN SYSTEMS

SCALE 0 2 1:250 12m

CAD FILENAME DAY RD - PHASE 1 TEMP. WORK PLAN
PLOT DATE 2023-07-24

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

CODY BAGG, P.ENG.
SENIOR DESIGNER
DATE

DESIGNED	C.BAGG	DATE	2023-07-21
QUALITY CONTROL	S. CAVASINNI	DATE	2023-07-21
QUALITY ASSURANCE	C.BAGG	DATE	2023-07-21
DRAWN	E.PROULX	DATE	2023-07-21

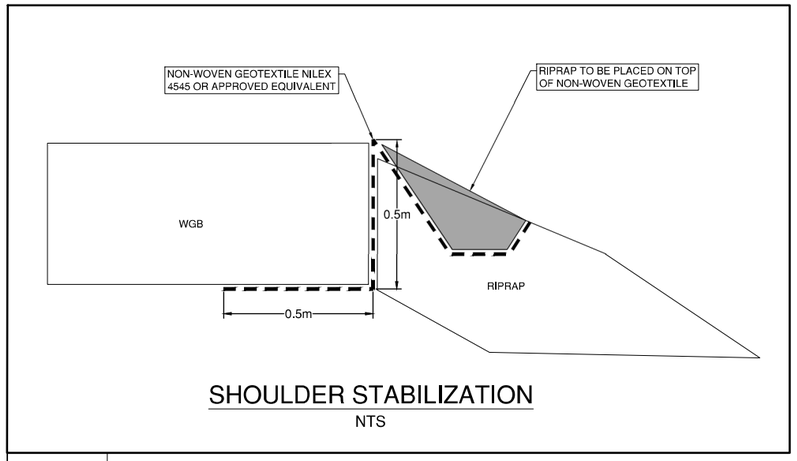
ISSUED FOR INFORMATION
2023-07-21
urbansystems.ca

PHASE 1 - TEMP WORK
DAY ROAD
DFAA FLOOD DAMAGE

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	PHASE 1 - 101	---

MATCH LINE SEE DWG No. R1-1026-102

PLOT DATE: 2023/07/24 U:\Projects_SUR\1961\0480\13\D-Design\CAD\30_WORKING_SKETCHES\2023-07-19 Memo for Temp Work\Phase 1\Day Rd - Phase 1 Temp. Work Plan.dwg



SHOULDER STABILIZATION
NTS

DL 3376, GROUP 1
NEW WESTMINSTER DISTRICT

N 454000
E 476800

N 454100
E 476800

CLACK CR.

Lot A
Plan VAP17074
007-325-126

SHOULDER STABILIZATION (TYP.)

FLEXIBLE DELINEATOR
POSTS 5m SPACING (TYP.)

CL&GR

DAY ROAD

OIP

TREELINE

WIRE HEIGHT=5.76m

WIRE HEIGHT=4.89m

WIRE HEIGHT=10.38m

WIRE HEIGHT=5.71m

CI
167.91

CO
167.93

1800ø CSP
L=9.974m

DP

EW

IN

G7040
RP
N 476760.047
E 453931.531
EL 174.561

APPROX. AREA OF
CULVERT REMOVAL

Lot 13
Plan VAP14932
007-798-211

Lot 14
Plan VAP14932
007-798-237

Lot 15
Plan VAP14932
007-798-261

MATCH LINE SEE DWG No. R1-1026-101

101 | 102

ISSUED FOR
INFORMATION
2023-07-21
urbansystems.ca

SURVEY NOTE:
COORDINATES ARE AT GROUND LEVEL AND BASED ON THE FOLLOWING CONVERSION FACTORS FROM UTM Z10 NAD 83 (CSRS), CGVD28 (HT2.0):
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URBAN SYSTEMS

SCALE 0 2 1:250 12m

CAD FILENAME DAY RD - PHASE 1 TEMP. WORK PLAN
PLOT DATE 2023-07-24

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

CODY BAGG, P.ENG.
SENIOR DESIGNER
DATE

DESIGNED C.BAGG DATE 2023-07-21
QUALITY CONTROL S. CAVASINNI DATE 2023-07-20
QUALITY ASSURANCE C.BAGG DATE 2023-07-21
DRAWN E.PROULX DATE 2023-07-21

PHASE 1 - TEMP WORK

DAY ROAD
DFAA FLOOD DAMAGE

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	PHASE 1 - 102	---

PLOT DATE: 2023/07/24 U:\Projects_SUR\1961\0480\13\D-Design\CAD\30_WORKING_SKETCHES\2023-07-19 Memo for Temp Work. Phase 1\Day Rd - Phase 1 Temp. Work Plan.dwg

Appendix 2

Change Approval Amendment

PGL
ENVIRONMENTAL CONSULTANTS

LOCATION MAP
N.T.S

BRITISH COLUMBIA | Ministry of Transportation and Infrastructure

PROJECT NO. 14007

DAY ROAD

DFAA FLOOD DAMAGE ENVIRONMENTAL PERMITS

STA. 100+08.000- STA. 103+30.000

0.322 km

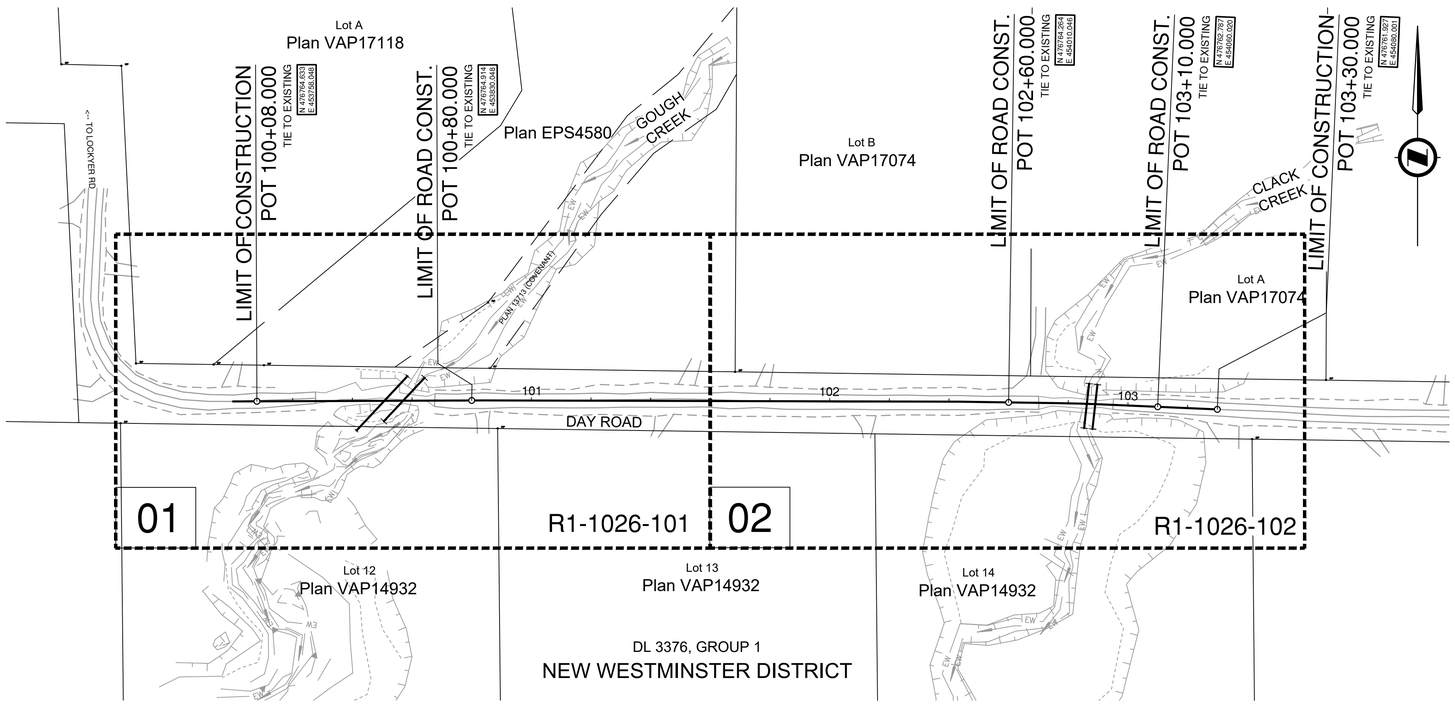
GOUGH CREEK: N: 476764.8236, E: 453810.048

CLACK CREEK: N: 476763.810, E: 454035.616

GRADING AND DRAINAGE CONTRACT

DRAWING INDEX

R1-1026-001	KEY PLAN
R1-1026-002	LEGEND
R1-1026-101 & 102	PLAN
R1-1026-701 & 702	DRAINAGE AND DETAILS



KEY PLAN

0 10 1:1000 50m

URBAN SYSTEMS

DRAWING NUMBER REV
R1-1026-001-ENVIRO

PLOT DATE: 2023/03/01 U:\Projects_SUR\1961\0480\13\D-Design\CAD\DrawingProduction\EnviromentDrawing\R1-1026-000-Enviro.dwg

LEGEND

SYMBOLS (EXISTING)

AERIAL UTILITIES

- POWER POLE
- POWER POLE WITH TRANSFORMER
- POWER / TELEPHONE POLE WITH TRANSFORMER
- POWER GUY POLE
- POWER / TELEPHONE POLE
- POWER / TELEPHONE GUY POLE
- ANCHOR OR GUY WIRE
- DEADMAN
- TELEPHONE POLE
- TELEPHONE GUY POLE
- HIGH TENSION POLE
- HIGH TENSION TOWER (HT)
- UTILITY POLE (UP)

SURVEY

- CONTROL POINT
- CONTROL MONUMENT
- LEGAL MONUMENT (MON)
- STANDARD IRON PIN FOUND (OIP)
- CAPPED IRON PIN (CIP, OIP)
- LEAD PLUG
- BENCHMARK
- SPOT ELEVATION

GEOTECHNICAL

- TESTPIT
- TESTHOLE (TH)
- OBSERVATION WELL (OW)

DETAIL

- GATE POST (GP)
- MAILBOX (MB)
- OLD POST (Post)
- DELINEATOR POST (DP)
- FLAGPOLE (FP)
- DECORATIVE TREE
- TREE
- PILING (Piling)
- CONCRETE PILLAR
- WELL
- SWAMP
- DIRECTIONAL ARROW

DRAINAGE & UTILITIES

- STORM MANHOLE (MH Storm)
- STANDARD CATCH BASIN
- ROUND CATCH BASIN
- DRYWELL (MH/CB Drywell)
- CB MANHOLE
- CULVERT INLET (CI)

DRAINAGE & UTILITIES

- CULVERT OUTLET (CO)
- SANITARY MANHOLE (MH San)
- UTILITY MANHOLE (MH Vault)
- WATER MANHOLE (MH Water)
- MANHOLE UNKNOWN (MH Unk)

ELECTRICAL

- JUNCTION BOX (JB)
- UTILITY VAULT (JB)
- LAMP STANDARD (LS)
- UTILITY KIOSK
- UTILITY PEDESTAL (PED)
- TRAFFIC COUNTER
- TRAFFIC SIGNAL
- TRAFFIC SIGNAL CONTROLLER

METERS

- VALVE (V)
- WATER VALVE (WV)
- WATER METER (WM)
- FIRE HYDRANT (FH)
- WELL
- STANDPIPE / WATER BLOW OFF (SD)
- AIR VALVE (AIR)
- GAS VALVE (GV)
- SERVICE METER (SV)

UNDERGROUND

- VENT/BREATHER PIPE (BP)
- FILLER CAP (FC)
- FUEL / GAS PUMP (FP)
- FUEL TANK (FT)
- SEPTIC TANK (ST)
- UNDERGROUND MARKER (MISC) (UM)
- IRRIGATION JUNCTION BOX (IJ)
- IRRIGATION SPRINKLER HEAD (IS)

ROAD SIGNS

- STANDARD SIGN
- COMMERCIAL SIGN
- SIGN BRIDGE STRUCTURE
- CANTILEVER STRUCTURE
- TWO POST SIGN
- TWO POST SIGN (BREAKAWAY)
- STANDARD DAVIT POLE - TYPE 3
- STANDARD COMBINATION POLE - TYPE 1
- HEAVY DUTY DAVIT POLE - TYPE 6
- HEAVY DUTY COMBINATION POLE - TYPE 7
- HEAVY POLE - TYPE H
- HEAVY COMBINATION POLE - TYPE H

LINE TYPES (EXISTING)

LOT BOUNDARIES

- SECTION LINE / DISTRICT LOT
- 1/4 SECTION BOUNDARY
- LOT BOUNDARY
- EASEMENTS

LINE TYPES (EXISTING)

MAN-MADE FEATURES

- RAILWAY TRACKS
- RAILWAY BALLAST
- ROAD MARKING - YELLOW
- ROAD MARKING - WHITE
- ROAD MARKING - BROKEN
- CROSSWALK
- STOP LINE
- EDGE OF ROAD - PAVED
- EDGE OF ROAD GRAVEL
- GRAVEL SHOULDER
- DIRT ROAD
- GRAVEL ROAD
- EDGE OF GRAVEL
- SIDEWALK
- CONCRETE PAD
- FENCE
- TOP OF CURB
- CL OF GUTTER
- CONCRETE ROAD BARRIER
- TOP OF FILL
- RIP RAP
- BUILDING
- TREE LINE
- LAWN LINE

HYDRAULIC

- CULVERT
- DITCH CENTER
- DITCH EDGE
- CENTER OF CREEK
- HIGH WATER (HWM)
- EDGE OF WATER (EW)
- HIGH WATER MARK (EXTREME)
- SEEPAGE LINE

TOPOGRAPHY

- BASE OF SLOPE
- MARSH
- TOP OF ROCK
- SLIDE
- TALUS
- TRAIL
- TOP OF SLOPE

UTILITIES

- OVERHEAD UTILITY
- PIPELINE (GAS) (G)
- UG ELECTRIC (UE)
- UG COMMUNICATION (UT)
- STORM SEWER (S)
- SANITARY SEWER (SAN)
- WATER MAIN (W)
- MISCELLANEOUS UNDERGROUND (UG)

SYMBOLS (PROPOSED)

AERIAL UTILITIES

- POWER POLE
- POWER POLE WITH TRANSFORMER
- POWER / TELEPHONE POLE WITH TRANSFORMER
- POWER GUY POLE
- POWER / TELEPHONE POLE
- POWER / TELEPHONE GUY POLE
- ANCHOR OR GUY WIRE
- DEADMAN
- TELEPHONE POLE
- TELEPHONE GUY POLE
- HIGH TENSION POLE
- HIGH TENSION TOWER (HT)

DETAIL

- GATE POST (GP)
- MAILBOX (MB)
- POST (Post)
- POST MOUNTED DELINEATOR (DP)
- FLAGPOLE (FP)
- DIRECTIONAL ARROW

DRAINAGE & UTILITIES

- MANHOLE
- STORM MANHOLE (MH Storm)
- STANDARD CATCH BASIN
- VARIABLE DEPTH CATCH BASIN
- SPILLWAY
- HEADWALL
- DRYWELL (MH/CB Drywell)
- TELEPHONE MANHOLE (MH Tel)
- POWER MANHOLE (MH Power)
- SANITARY MANHOLE (MH San)
- UTILITY MANHOLE (MH Vault)
- WATER MANHOLE (MH Water)
- MANHOLE UNKNOWN (MH Unk)

ELECTRICAL

- JUNCTION BOX (JB)
- UTILITY VAULT (JB)
- LAMP STANDARD
- UTILITY KIOSK
- UTILITY PEDESTAL (PED)
- TRAFFIC SIGNAL
- TRAFFIC SIGNAL CONTROLLER
- UNDERGROUND ELECTRICAL TRANSFORMER (XF)

METERS

- VALVE (V)
- WATER VALVE (WV)
- WATER METER (WM)
- FIRE HYDRANT (FH)
- STANDPIPE / WATER BLOW OFF (SD)
- AIR VALVE (AIR)
- GAS VALVE (GV)
- SERVICE METER (SV)

UNDERGROUND

- VENT/BREATHER PIPE (BP)
- FILLER CAP (FC)
- FUEL / GAS PUMP (FP)
- FUEL TANK (FT)
- SEPTIC TANK (ST)
- UNDERGROUND MARKER (MISC) (UM)

ROAD SIGNS

- STANDARD SIGN
- BARRIER MOUNTED DELINEATOR
- RELOCATED OVERHEAD SIGN
- TWO POST SIGN
- TWO POST SIGN (BREAKAWAY)
- STANDARD DAVIT POLE - TYPE 3
- STANDARD COMBINATION POLE - TYPE 1
- HEAVY DUTY DAVIT POLE - TYPE 6
- HEAVY DUTY COMBINATION POLE - TYPE 7
- HEAVY POLE - TYPE H
- HEAVY COMBINATION POLE - TYPE H
- SIGN BRIDGE STRUCTURE
- CANTILEVER STRUCTURE

PATTERNS

- LEVELLING COURSE
- PAVEMENT REMOVAL
- RIPRAP
- TURF REINFORCEMENT MATTING

REMOVALS / RELOCATES

- POWER POLE
- TELEPHONE POLE
- HIGHWAY SIGNS

LINE TYPES (PROPOSED)

FEATURES

- HIGHWAY CONTROL LINE (100+000)
- MINOR CONTROL LINE (100+000)
- CLEARING AND GRUBBING (CL. & GR.)
- PAVEMENT EDGE
- SHOULDER EDGE
- CURB AND GUTTER
- RAISED ISLAND
- SAWCUT
- RUMBLE STRIP
- RETAINING WALL
- FENCE
- TOP OF CUT / BOTTOM OF FILL (TOES) (CUT, C/F, FILL)
- 100mm - YELLOW PAINT LINE (SOLID)
- 100mm - WHITE PAINT LINE (SOLID)
- 100mm - CONTINUITY PAINT LINE (BROKEN) (3, 3, 3)
- 100mm - LANE PAINT LINE (BROKEN) (8, 5, 8)
- CONCRETE BARRIER
- DITCH CENTER / ADDITIONAL DITCHING
- DITCH EDGE

BOUNDARIES

- RIGHT OF WAY
- TEMPORARY LICENCE TO CONSTRUCT (T.L.T.C.)

UTILITIES

- OVERHEAD UTILITY
- PIPELINE (GAS) (G)
- SERVICE LINE (GAS)
- UG ELECTRIC (UE)
- UG COMMUNICATION (UT)
- STORM SEWER (S)
- SUB DRAIN (SD)
- CULVERT
- SANITARY SEWER (SAN)
- WATER MAIN (W)
- MISCELLANEOUS UNDERGROUND (UG)

NOTE:
NOT ALL SYMBOLS AND LINE TYPES ILLUSTRATED IN THIS LEGEND ARE UTILIZED IN THE FOLLOWING DESIGN

FOR ENVIRONMENTAL PERMITTING

URBAN SYSTEMS

SCALE

CAD FILENAME R1-1026-000-ENVIRO
PLOT DATE 2023-03-01

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

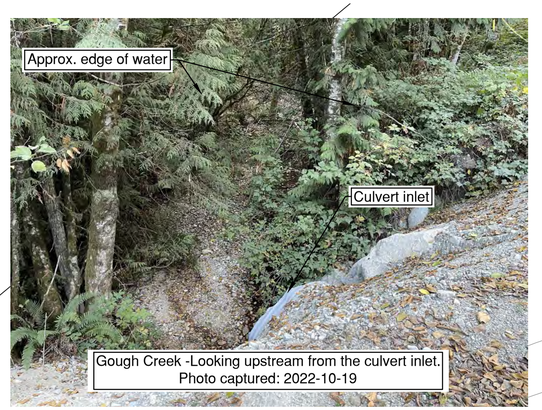
CODY BAGG, P.ENG.
SENIOR DESIGNER
DATE

DESIGNED S.FUOCO DATE 2022-02-10
QUALITY CONTROL C.BAGG DATE 2022-02-10
QUALITY ASSURANCE J.BORCH DATE 2022-02-10
DRAWN S.FUOCO DATE 2022-02-10

PLAN
DAY ROAD
DFAA FLOOD DAMAGE

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-002-ENVIRO	

PLOT DATE: 2023/03/01 U:\Projects_SUR\1961\0480\13\D-Design\CAD\DrawingProduction\EnvironmentDrawing\R1-1026-000-Enviro.dwg



Gough Creek -Looking upstream from the culvert inlet.
Photo captured: 2022-10-19

Lot A
Plan VAP17118
007-291-051

Plan EPS4580
Building Strata

LIMIT OF CONSTRUCTION
POT 100+08.000
TIE TO EXISTING
N 476764.633
E 453758.048

LIMIT OF ROAD CONST.
POT 100+80.000
TIE TO EXISTING
N 476764.914
E 453850.048

PLAN 13713 (COVENANT)
GOUGH CR.

N 453900
E 476800

POTENTIAL CRANE PAD LOCATION

CONCRETE HEADWALL (TYP.)

INLET HIGHWATER MARK ELEVATION
161.6m

81.17m²
26.31m²
38.51m²
99.18m²
124.27m²
309.07m²
72.95m²
55.99m²
129.76m²

POTENTIAL TEMPORARY DIVERSION LOCATION

101
DAY ROAD

PAVEMENT EDGE
EDGE OF GRAVEL

OUTLET HIGHWATER MARK ELEVATION
160.3m

PERMANENT MAINTENANCE DIVERSION CULVERT
25.0m 1400 DIA CSP
STA. 100+50.732, SKEW 133°
N. INV. 161.37
S. INV. 159.75

20.0m W2700xH2700 CONC
STA. 100+57.000, SKEW 133°
c/w FISH BAFFLES DESIGN TBD
N. INV. 160.300
S. INV. 159.000

Gough Creek -Looking downstream from the culvert outlet.
Photo captured: 2022-10-19

Lot 12
Plan VAP14932
007-798-172

DL 3376, GROUP 1
NEW WESTMINSTER DISTRICT

Lot 13
Plan VAP14932
007-798-211

MATCH LINE SEE DWG No. R1-1026-102

RETAINED AND ENHANCED INSTREAM AREA = 83 m²
WORK BELOW HWM = 211 m²
PERMANENT DISTURBANCE ON WASHED OUT AREAS = 125 m²
PERMANENT RIPARIAN DISTURBANCE = 112 m²
TEMPORARY RIPARIAN DISTURBANCE = 409 m²
TOTAL PROJECT AREA = 2051 m²
CL & GR TOTAL THIS DWG = 1275 m²

FOR DRAINAGE AND UTILITIES
SEE DWG R1-1026-701 to R1-1026-702

LEGEND
RIPRAP
CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS
HIGH WATERMARK — HWM —

101 102

PERMIT TO PRACTICE
URBAN SYSTEMS LTD.
Signature
Date 2023-03-03
PERMIT NUMBER: 1000527
Engineers and Geoscientists BC (EGBC)

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. D. W. BAGG
48107

FOR ENVIRONMENTAL PERMITTING

SCALE 0 2 1:250 12m
CAD FILENAME R1-1026-100-ENVIRO
PLOT DATE 2023-03-01

REV	DATE	REVISIONS	NAME

URBAN SYSTEMS

BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS
2023-03-02

CODY BAGG, P.ENG.
SENIOR DESIGNER
DATE

DESIGNED	S.FUOCO	DATE	2022-02-10
QUALITY CONTROL	C.BAGG	DATE	2022-02-10
QUALITY ASSURANCE	J.BORCH	DATE	2022-02-10
DRAWN	E.PROULX	DATE	2022-02-10

PLAN
DAY ROAD
DFAA FLOOD DAMAGE
STA. 100+08.000 TO 101+60.000

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-101-ENVIRO	

PLOT DATE: 2023/03/01 U:\Projects_SUR\1961\0480\13\D-Design\CAD\DrawingProduction\EnvironmentDrawing\R1-1026-100-Enviro.dwg

DL 3376, GROUP 1

NEW WESTMINSTER DISTRICT

N 454000 E 476800

N 454100 E 476800

CLACK CR.

LIMIT OF ROAD CONST. POT 102+60.000 TIE TO EXISTING N 476764.264 E 454610.645

LIMIT OF ROAD CONST. POT 103+10.000 TIE TO EXISTING N 476762.787 E 454600.026

LIMIT OF CONSTRUCTION POT 103+30.000 N 476761.992 E 454580.091

INLET HIGHWATER MARK ELEVATION 169.1m

CONCRETE HEADWALL (TYP.)

OUTLET HIGHWATER MARK ELEVATION 168.3m

POTENTIAL CRANE PAD LOCATION

POTENTIAL TEMPORARY DIVERSION LOCATION

PAVEMENT EDGE

EDGE OF GRAVEL

238.07m²
46.93m²
22.39m²
48.56m²
30.22m²
63.80m²
283.39m²
77.62m²
66.34m²
162.60m²

CL&GR
LTC
OIP
DAY ROAD
102
103

15.0m W2400xH2400 CONC
STA. 102+85.527, SKEW 95°
c/w FISH BAFFLES DESIGN TBD
N. INV. 168.300
S. INV. 167.850

15.0m W2400xH2400 CONC
STA. 102+88.337, SKEW 95°
c/w FISH BAFFLES DESIGN TBD
N. INV. 168.300
S. INV. 167.850

Lot A
Plan VAP17074
007-325-126

Lot 13
Plan VAP14932
007-798-211

Lot 14
Plan VAP14932
007-798-237

Lot 15
Plan VAP14932
007-798-261

MATCH LINE SEE DWG No. R1-1026-101

RETAINED AND ENHANCED INSTREAM AREA = 89 m²

WORK BELOW HWM = 210 m²

PERMANENT DISTURBANCE ON WASHED OUT AREAS = 95 m²

PERMANENT RIPARIAN DISTURBANCE = 127 m²

TEMPORARY RIPARIAN DISTURBANCE = 522 m²

TOTAL PROJECT AREA = 1409 m²

CL & GR TOTAL THIS DWG = 1231 m²

FOR DRAINAGE AND UTILITIES SEE DWG R1-1026-701 to R1-1026-702

LEGEND

RIPRAP

CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS

HIGH WATERMARK — HWM —

101 | 102

PERMIT TO PRACTICE
URBAN SYSTEMS LTD.
Signature
Date 2023-03-03
PERMIT NUMBER: 1000527
Engineers and Geoscientists BC (EGBC)

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA C. D. W. BAGG # 48107

FOR ENVIRONMENTAL PERMITTING

SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-100-ENVIRO

PLOT DATE 2023-03-01

REV	DATE	REVISIONS	NAME

URBAN SYSTEMS

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

2023-03-02

CODY BAGG, P.ENG.
SENIOR DESIGNER
DATE

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QUALITY CONTROL	C.BAGG	DATE	2022-02-10
QUALITY ASSURANCE	J.BORCH	DATE	2022-02-10
DRAWN	E.PROULX	DATE	2022-02-10

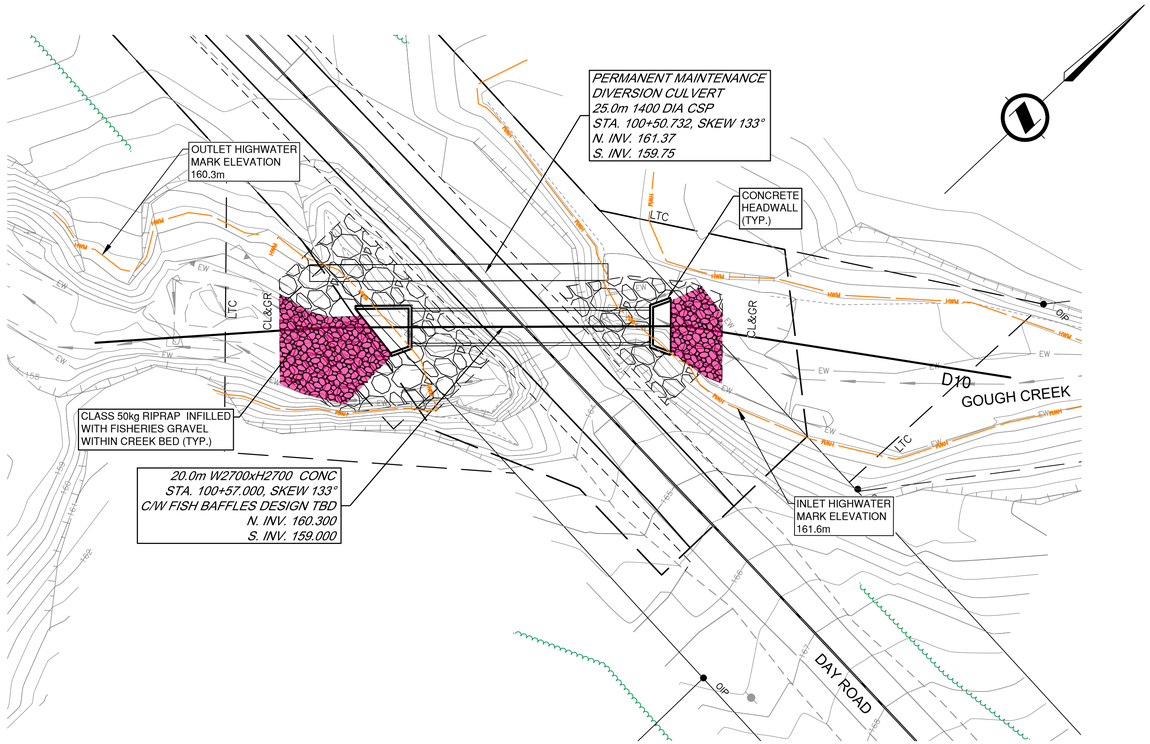
PLAN

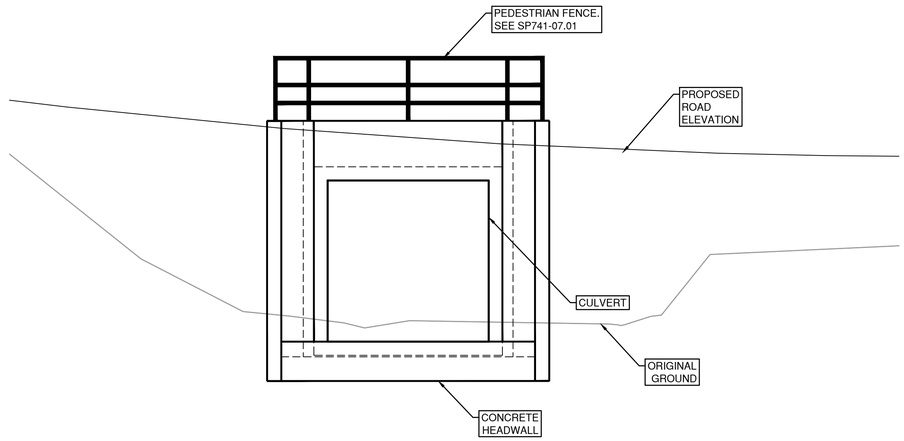
DAY ROAD
DFAA FLOOD DAMAGE

STA. 100+08.000 TO 103+30.000

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-102-ENVIRO	

PLOT DATE: 2023/03/01 U:\Projects_SUR\1961\0480\13\D-Design\CAD\DrawingProduction\EnvironmentDrawing\R1-1026-100-Enviro.dwg





INLET SECTION

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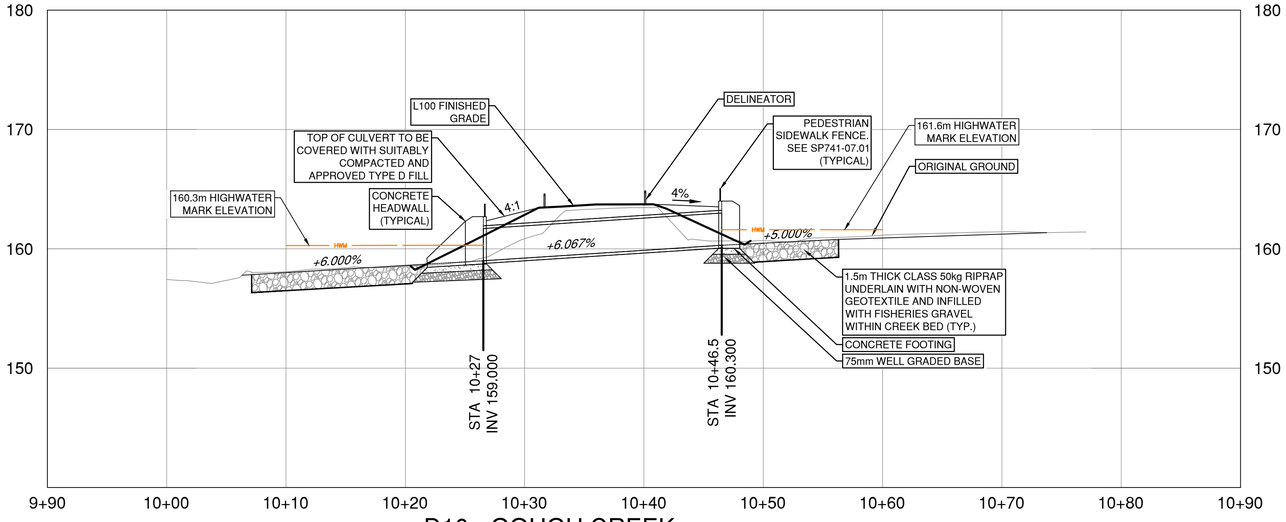

D10 - GOUGH CREEK

LEGEND

- RIPRAP
- CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS
- HIGH WATERMARK — HWM —

PERMIT TO PRACTICE
URBAN SYSTEMS LTD.
Signature
Date 2023-03-03
PERMIT NUMBER: 1000527
Engineers and Geoscientists BC (EGBC)

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — C. D. W. BAGG # 48107

FOR ENVIRONMENTAL PERMITTING

SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-700-ENVIRO
PLOT DATE 2023-03-01

REV	DATE	REVISIONS	NAME

URBAN SYSTEMS

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

2023-03-02

CODY BAGG, P.ENG.
SENIOR DESIGNER
DATE

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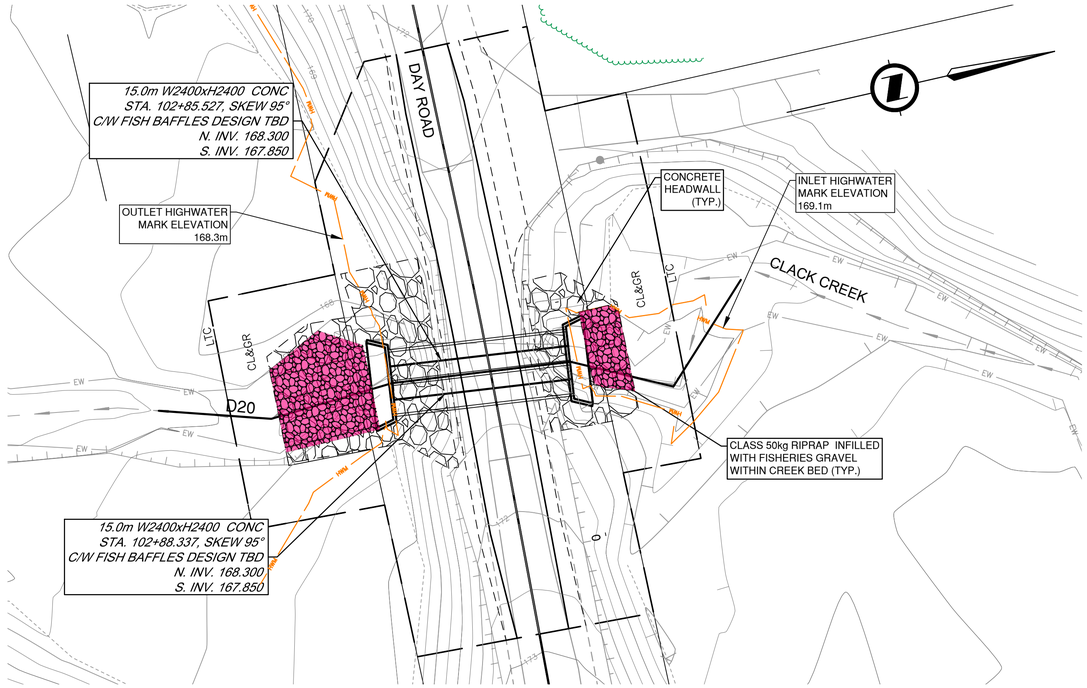
QUALITY CONTROL C.BAGG DATE 2022-02-10
QUALITY ASSURANCE J.BORCH DATE 2022-02-10
DRAWN E.PROULX DATE 2022-02-10

DRAINAGE DETAILS

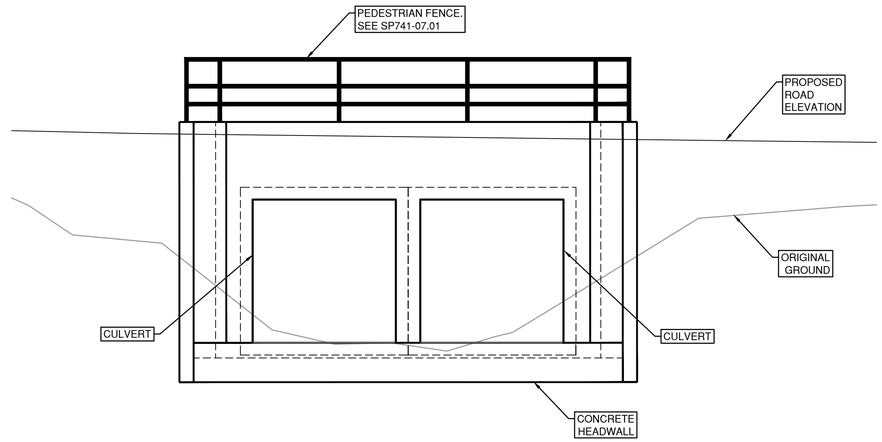
DAY ROAD
DFAA FLOOD DAMAGE

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-701-ENVIRO	

PLOT DATE: 2023/03/01 U:\Projects_SUR\1961\0480\13\D-Design\CAD\DrawingProduction\EnviromentDrawing\R1-1026-700-Enviro.dwg



D20 - CLACK CREEK



INLET SECTION

0 0.5 1:50 2.5m

D20 - CLACK CREEK

LEGEND

RIPRAP

CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS

HIGH WATERMARK — HWM —

PERMIT TO PRACTICE
URBAN SYSTEMS LTD.
Signature
Date 2023-03-03
PERMIT NUMBER: 1000527
Engineers and Geoscientists BC (EGBC)

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — C. D. W. BAGG # 48107

FOR ENVIRONMENTAL PERMITTING

URBAN SYSTEMS

SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-700-ENVIRO

PLOT DATE 2023-03-01

REV	DATE	REVISIONS	NAME

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QUALITY ASSURANCE	J.BORCH	DATE	2022-02-10
DRAWN	E.PROULX	DATE	2022-02-10

DRAINAGE DETAILS

DAY ROAD
DFAA FLOOD DAMAGE

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-702-ENVIRO	

PLOT DATE: 2023/03/01 U:\Projects_SUR\1961\0480\13\D-Design\CAD\DrawingProduction\EnviromentDrawing\R1-1026-700-Enviro.dwg