

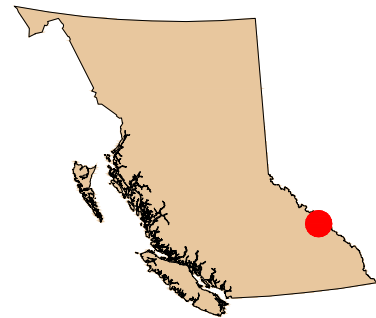


BRITISH
COLUMBIA

Ministry of Forests, Lands, Natural
Resource Operations & Rural Development
General Arrangement / Conceptual Design
Southern Engineering Group



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PROJECT LOCATION
BUSH RIVER FSR 7.75km

N3-021A BLACKWATER CREEK
67.06 m BRIDGE

SITE INFORMATION	
DISTRICT	SELKIRK NATURAL RESOURCE DISTRICT
SITE No.	N3-021
STRUCTURE No.	N3-021A
FSR NAME & KM	BUSH RIVER FSR 7.75km
LATITUDE	51°31'50.5"N
LONGITUDE	117°15'34.6"W
DESIGN SUMMARY	67.06m CONCRETE/STEEL COMPOSITE BRIDGE ON STEEL TOWERS AND PRECAST CONCRETE SPREAD FOOTINGS

DRAWING SCHEDULE			
DRAWING NUMBER	DESCRIPTION	REV.	DATE
11250-55-N3-021-01	GENERAL NOTES - SHEET 1	0	01/09/2018
11250-55-N3-021-02	GENERAL NOTES - SHEET 2	0	01/09/2018
11250-55-N3-021-03	EXISTING PLAN VIEW	0	01/09/2018
11250-55-N3-021-04	EXISTING PROFILE & SECTION VIEWS	0	01/09/2018
11250-55-N3-021-05	PROPOSED PLAN VIEW	0	01/09/2018
11250-55-N3-021-06	PROPOSED PLAN VIEW	0	01/09/2018
11250-55-N3-021-07	PROPOSED PROFILE VIEWS & MISC DETAILS	0	01/09/2018
11250-55-N3-021-08	PROPOSED ABUTMENT VIEWS & DETAILS	0	01/09/2018
11250-55-N3-021-09 to 11	PROPOSED ROAD SECTIONS	0	01/09/2018
11250-55-N3-021-12	PROPOSED WB-19 VEHICLE TRACKING	0	01/09/2018
11250-55-N3-021-13	EXISTING PHOTOS	0	01/09/2018



Key Plan

PLOT DATE: December 12, 2019

Paper Size: ANSI expand B (17.00 x 11.00 inches) , Plot Date: December 12, 2019

1. GENERAL

- 1.1. PROFESSIONAL OF RECORD (POR) FOR COMPLEX CROSSINGS SHALL BE A PROFESSIONAL ENGINEER
- 1.2. EXPECTED LIFE OF THE STRUCTURE IN PLACE IS 45 YEARS
- 1.3. DESIGN & CONSTRUCTION TO BE IN ACCORDANCE WITH THE MINISTRY BRIDGE DESIGN & CONSTRUCTION MANUAL
- 1.4. LEFT/RIGHT CONVENTION: DETERMINED WHEN FACING DOWNSTREAM
- 1.5. ALL REFERENCE POINTS (RP) ARE REBAR IN GROUND

2. SITE SURVEY

SURVEY TABLE	
DATE OF SURVEY	16/11/2017
SITE LOCATION	51°31'50.5"N , 117°15'34.6"W
SURVEYOR	Geoff Shimmins
COMPANY	Allnorth Consultants Ltd.

3. GEOTECHNICAL

- 3.1. A FORMAL GEOTECHNICAL ASSESSMENT WAS NOT CARRIED OUT. THE SITE APPEARS TO BE COMPOSED OF A BLANKET OF GRANULAR COLLUVIUM. IF EXCAVATION OF FOUNDATIONS REVEALS DEVIATIONS, THE PROFESSIONAL OF RECORD IS TO BE ADVISED PRIOR TO CONTINUATION OF WORK. SUBSURFACE INFORMATION HAS BEEN INFERRED FROM THE SITE OBSERVATIONS OF SOIL EXPOSURES IN ROAD CUTS AND ALONG STREAM BANKS
- 3.2. FOUNDATIONS HAVE BEEN DESIGNED WITH THE MINISTRY ASSUMED STANDARD 200 kPa MAXIMUM ALLOWABLE SOIL BEARING PRESSURE
- 3.3. FOUNDATION DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL.

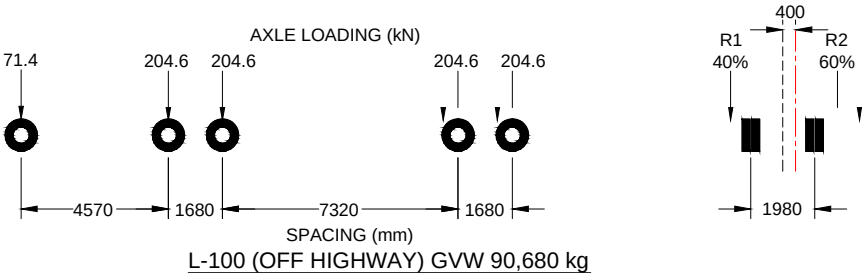
4. HYDROLOGY AND HYDRAULIC ASSESSMENT

- 4.1. A PEAK FLOW FOR DESIGN PURPOSES WAS DETERMINED BASED ON A REVIEW OF CHANNEL CHARACTERISTICS, PREVIOUS HIGH FLOW EVIDENCE, AND REVIEW OF THE RESULTS OF APPLYING SEVERAL PEAK FLOW EMPIRICAL MODELS. THESE EMPIRICAL MODELS EMPLOY ESTIMATES OF TIME OF CONCENTRATION, HYDROMETRIC STATISTICS, WATERSHED CHARACTERISTICS, AND OTHER RELEVANT INFORMATION TO ESTIMATE PEAK FLOW.
- 4.2. FREEBOARD HEIGHT REQUIREMENT SHOWN REFERS TO UPSTREAM FACE OF STRUCTURE.
- 4.3. LANDSLIDE AND DEBRIS FLOWS HAVE BEEN CONSIDERED BASED ON NO EVIDENCE BEING FOUND ON SITE.

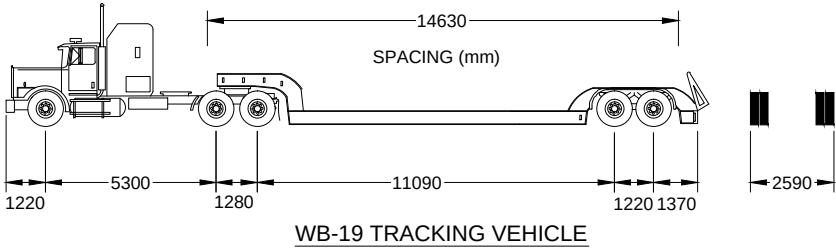
HYDRAULIC ASSESSMENT DATA	
WATERSHED DRAINAGE AREA	XXX Ha.
STREAM RIPARIAN CLASS	S-3
STREAM BED MATERIAL	BEDROCK - XX%, GRAVEL - XX%, COBBLES - XX%, BOULDER - XX%
BANK FULL STREAM CHANNEL WIDTH	XX m
STREAM GRADIENT (AT CROSSING)	3 %
STREAM GRADIENT (OVERALL)	4 %
Q ₁₀₀ FLOW	XXXX m³/s
Q ₁₀₀ VELOCITY (AVE)	XX m/s
DEBRIS FLOW POTENTIAL	LOW
ANALYSIS PERFORMED BY	
ANALYSIS DATE	

5. BRIDGE DESIGN

- 5.1. LOADING: L-100 (90 680 KG G.V.W.) IN ACCORDANCE WITH MINISTRY STANDARD BRIDGE DESIGN VEHICLES - DWG. STD-EC-000-01 TO 02



- 5.2. HORIZONTAL ALIGNMENT TRACKING VEHICLE: LOW-BED WB-19m AASHTO 2004



6. FURTHER DESIGN WORK

- 6.1. ALL COMPONENTS REQUIRE STRUCTURAL DESIGN
- 6.2. IF THE DEPTH OF THE GIRDERS IS 100mm DEEPER THAN IS SHOWN ON THE DRAWINGS THE PROFESSIONAL OF RECORD MUST BE ADVISED

7. SITE PREPARATION AND INSTALLATION GENERAL

- 7.1. REPRESENTATIVE OF THE PROFESSIONAL OF RECORD TO BE ON-SITE FOR THE FOLLOWING PHASES AND CONTRACTOR REQUIRES APPROVAL FROM THE REP. PRIOR TO CONTINUING TO THE NEXT PHASE:
- 7.1.1. PREPARATION OF FOUNDATION.
- 7.1.2. PLACEMENT OF RIP RAP.
- 7.1.3. REVIEW OF SUBSTRUCTURE PRIOR TO BEING COVERED.
- 7.1.4. REVIEW OF FINAL SUPERSTRUCTURE INSTALLATION.
- 7.2. CHECK REQUIRED BEARING DISTANCE AND DEPTH OF ACTUAL STRUCTURE PRIOR TO CONSTRUCTION.

8. CLEARING AND GRUBBING

- 8.1. REMOVE TREES, STUMPS, LOGS, BRUSH, SHRUBS, BUSHES, VINES, UNDERGROWTH, ROTTEN WOOD, DEAD PLANT MATERIAL, EXPOSED BOULDERS AND DEBRIS WITHIN AREAS DESIGNATED ON DRAWINGS.
- 8.2. REMOVE STUMPS AND TREE ROOTS BELOW FOOTINGS, SLABS, AND PAVING.
- 8.3. DISPOSE OF CLEARED AND GRUBBED MATERIAL OFF SITE DAILY TO DISPOSAL AREAS ACCEPTABLE TO AUTHORITY HAVING JURISDICTION.

9. RIP RAP AND GRANULAR MATERIAL

- 9.1. RIP RAP SHALL BE SUPPLIED AND PLACED IN ACCORDANCE WITH THE MINISTRY "BRIDGE DESIGN AND CONSTRUCTION MANUAL". SOURCES FOR GRAVEL AND RIP RAP SHALL BE APPROVED BY THE MINISTRY PRIOR TO SOURCE DEVELOPMENT. PERMITS FROM OTHER REGULATORY AGENCIES MAY ALSO BE REQUIRED. FOLLOWING THE REMOVAL OF MATERIAL FROM AN APPROVED SITE, SIDE SLOPES MUST BE DRESSED TO THE NATURAL ANGLE OF REPOSE OF THE MATERIAL, BUT IN NO CASE GREATER THAN 45 DEGREES, UNLESS THE MATERIAL IS SOLID ROCK.
- 9.2. RIP RAP GRADATION AND THICKNESS SHOWN ON DRAWINGS.

10. FOOTING EXCAVATIONS

- 10.1.EXCAVATIONS FOR ALL FOOTINGS SHALL BE KEPT FREE OF WATER DURING CONSTRUCTION. FOR EXCAVATION IN MATERIAL OTHER THAN ROCK, CARE SHALL BE TAKEN NOT TO DISTURB THE BOTTOM OF THE EXCAVATION.
- 10.2.WHERE FOUNDATION MATERIALS ENCOUNTERED DO NOT MEET THE DESIGN ASSUMPTIONS SHOWN ON THE DRAWINGS OR IN THE CONSTRUCTION SPECIFICATIONS, THE PROFESSIONAL OF RECORD SHALL BE CONSULTED PRIOR TO INSTALLATION OF FOUNDATIONS. THE PROFESSIONAL OF RECORD SHALL BE RESPONSIBLE TO STIPULATE MEASURES TO MEET DESIGN REQUIREMENTS AND CONSULT THE STRUCTURE DESIGN ENGINEER AS REQUIRED. THE PROFESSIONAL OF RECORD SHALL INCLUDE THE PRESCRIBED MEASURES IN THE CERTIFICATION DOCUMENT.
- 10.3. ALL EXCAVATIONS TO COMPLY WITH WORKSAFE BC REGULATIONS. WHERE THE INFORMATION ON THESE DRAWINGS DOES NOT MEET OR EXCEED WORKSAFE BC REGULATIONS, THE WORKSAFE BC REGULATIONS SHALL GOVERN.

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MINISTRY OF FORESTS, LANDS, NATURAL
RESOURCE OPERATIONS & RURAL DEVELOPMENT
SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR	DRAWING TITLE: GENERAL NOTES	
				PROFESSIONAL OF RECORD (POR): J. RUPAR GILLIATT P.ENG. FLNRORD	CHECKED BY: XXXXX XXXXX
				DRAWN BY: N. HARVEY CREEKSIDE DRAFTING	DRAWING NUMBER: 11250-55-N3-021-01
0	1/9/2018	ISSUED FOR DISCUSSION	XX		

PROFESSIONAL SEAL

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11. FILL PLACEMENT (INCL. BACKFILLING)

- 11.1.REMOVE SNOW, ICE, CONSTRUCTION DEBRIS, ORGANIC SOIL AND STANDING WATER FROM SPACES TO BE FILLED.
- 11.2.LATERAL SUPPORT: MAINTAIN EVEN LEVELS AROUND STRUCTURES AS WORK PROGRESSES, TO EQUALIZE EARTH PRESSURES.
- 11.3.FILL MATERIAL: CLEAN FREE DRAINING SAND AND GRAVEL WITH A MAXIMUM AGGREGATE SIZE OF 100mm AND A MAXIMUM FINES CONTENT (SILT/CLAY PARTICLES) OF 5%; OR OTHER MATERIAL PRE-APPROVED BY POR.
- 11.4.PLACING: PLACE FILL MATERIAL IN 300mm LIFTS. ADD WATER AS REQUIRED TO ACHIEVE SPECIFIED DENSITY.
- 11.5.COMPACTION: EACH LAYER OF MATERIAL AND EXISTING SUBGRADE UNDER FOOTING TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY (ASTM D698). COMPACTED WITH A MIN. 1000lb VIBRATORY COMPACTOR. ANY ALTERNATIVE COMPACTION SPECIFICATION TO BE PRE-APPROVED BY POR.

12. GRADING

- 12.1.GRADE SO THAT WATER WILL DRAIN AWAY FROM THE STRUCTURE APPROACHES TO CATCH BASINS OR OTHER DISPOSAL AREAS APPROVED BY THE MINISTRY REPRESENTATIVE.
- 12.2.CONSTRUCT APPROACH FILLS TO LINES AND GRADES SHOWN ON DRAWINGS.

13. SITE CLEANUP

- 13.1.CLEANUP OF THE SITE MUST BE COMPLETED IMMEDIATELY FOLLOWING CONSTRUCTION. THIS SHALL INCLUDE THE PICKUP AND REMOVAL OF ALL EQUIPMENT, MATERIALS, TRASH, EQUIPMENT REFUSE AND CONSTRUCTION DEBRIS, AND CLEANING THE BRIDGE GIRDERS, DECKS AND BEARINGS TO THE SATISFACTION OF THE PROFESSIONAL OF RECORD.
- 13.2.ALL DISTURBED AREAS SHALL BE SEEDED WITH AN APPROVED EROSION CONTROL SEED MIX AT THE COST OF THE CONTRACTOR.

14. ENVIRONMENTAL MANAGEMENT PLAN

ALL INSTREAM WORKS SHALL COMPLY TO A SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN (EMP) MEETING ALL APPROPRIATE ENVIRONMENTAL PROTECTION LEGISLATION. IN THE ABSENCE OF A FORMAL EMP, THE FOLLOWING IS REQUIRED:

- 14.1.1. CONSTRUCTION SHALL BE CARRIED OUT IN SUCH A MANNER AS TO ENSURE WATER QUALITY IS MAINTAINED BY KEEPING SOIL EROSION AND RUN-OFF TO A MINIMUM DURING INCLEMENT WEATHER AND BY TAKING MEASURES TO PREVENT SEDIMENTATION, LEACHATE, FRESH CONCRETE AND DEMOLITION AND CONSTRUCTION DEBRIS FROM ENTERING THE WETTED PERIMETER, INCLUDING THE FOLLOWING:
- 14.1.1.1. MACHINES THAT ENTER THE WATER MUST NOT HAVE FLUID LEAKS;
- 14.1.1.2. COMPONENTS SHALL BE THOROUGHLY CLEANED PRIOR TO LAUNCHING OR ERECTION;
- 14.1.1.3. EXCAVATIONS SHALL BE ISOLATED FROM RUNNING WATER USING TEMPORARY SEDIMENT CONTAINMENT METHODS; SEDIMENT LADEN WATER SHALL BE PUMPED OUT OF THE CONTAINMENT AREAS TO THE BUSH WHERE SEDIMENT WILL SETTLE AND FILTER PRIOR TO ENTERING ANY WATERCOURSE, PRIOR TO BACKFILLING OR REMOVAL OF CONTAINMENT MEASURES. IF NECESSARY, A SETTLING AREA SHALL BE CONSTRUCTED TO PREVENT SEDIMENT-LADEN WATER RETURNING TO THE STREAM;
- 14.2.ANY UNDUE DISTURBANCE TO THE STREAM CHANNEL OR BANKS AS A RESULT OF CONSTRUCTION ACTIVITIES SHALL BE CORRECTED TO THE SATISFACTION OF THE REGULATORY AGENCY AND MINISTRY REPRESENTATIVE

15. SIGNS

- 15.1.W-054 DELINEATORS SHALL BE MOUNTED AT EACH CORNER OF THE BRIDGE.
- 15.2.W-051 NARROW STRUCTURE AHEAD SIGN SHALL BE INSTALLED APPROXIMATELY 50m FROM EACH STRUCTURE END.

16. ESTIMATED EARTHWORKS VOLUMES

- 16.1.EXCAVATION INCLUDING SUBEXCAVATION ON EXISTING ROADWAYS: XXXm³
- 16.2.FILL REQUIRED: XXXm³
- 16.3.ROADWAY SURFACING: XXXm³
- 16.4.PLACED RIP RAP: XXXm³
- 16.5.NOTE THE ABOVE VOLUMES ARE ESTIMATES ONLY AND DO NOT ACCOUNT FOR UNEXPECTED CONDITIONS.

MATERIAL LIST	
QUANTITY	DESCRIPTION
1	39.624m o/o STEEL GIRDER COMPOSITE BRIDGE BRIDGE c/w 4.876m WIDE CONCRETE DECK
1	DECK OVER BALLAST WALL
4	XXm LONG STEEL TOWERS c/w BRACING
4	PRECAST CONCRETE FOOTINGS
12	PRECAST CONCRETE NO-POST BARRIERS
1	ROLL NILEX 4553 NON WOVEN GEOTEXTILE OR EQUIVALENT
4	W-054 DELINEATORS (2 LEFT, 2 RIGHT)
2	W-051 NARROW STRUCTURE SIGN c/w TREATED POST & HARDWARE
2	20kg BAGS EROSION CONTROL SEED MIX

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SOUTHERN ENGINEERING GROUP

SITE #: N3-021

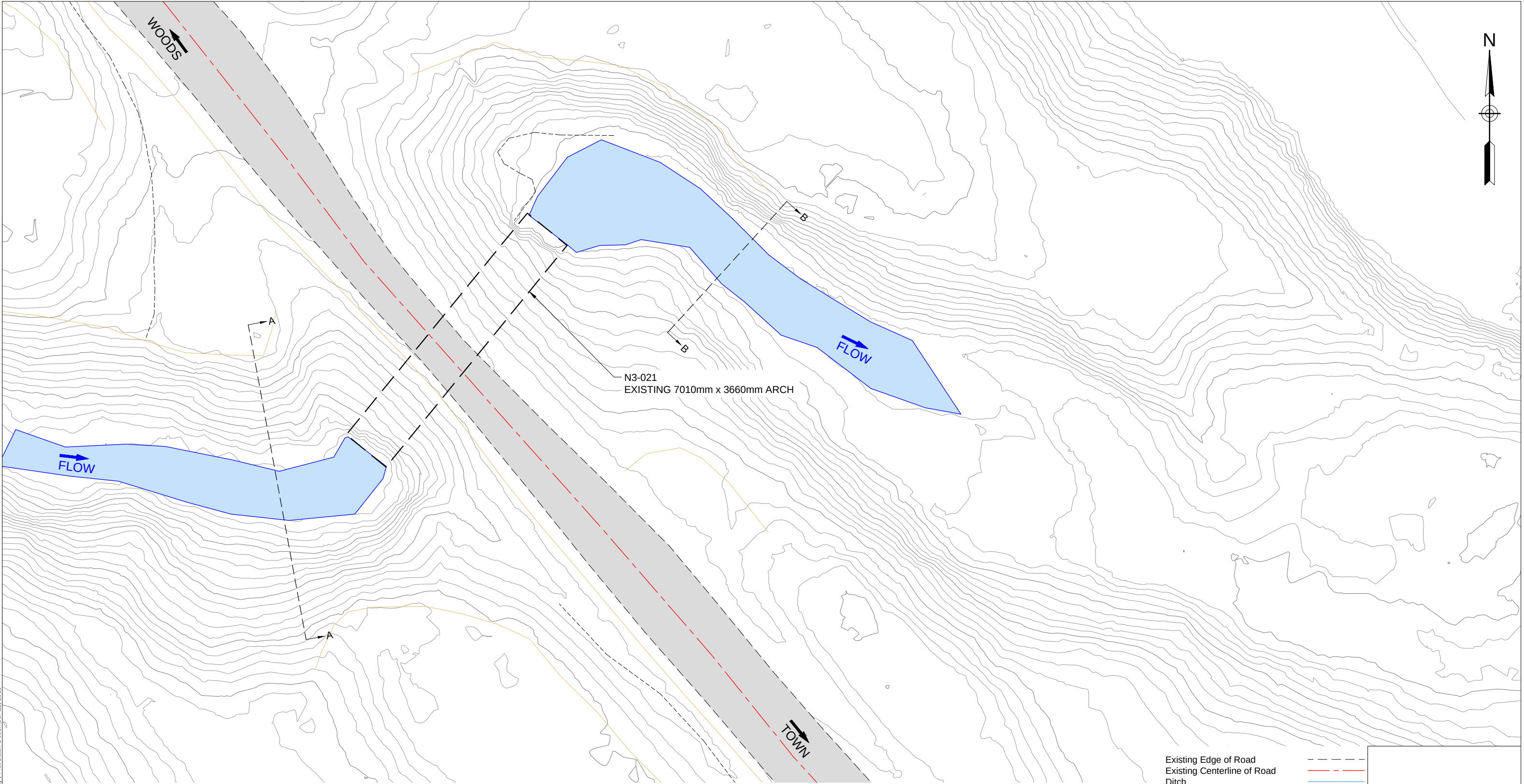
LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR	DRAWING TITLE: GENERAL NOTES	
				PROFESSIONAL OF RECORD (POR): J. RUPAR GILLIATT P.ENG. FLNRORD	CHECKED BY: XXXXX XXXXX
				DRAWN BY: N. HARVEY CREEKSIDE DRAFTING	DRAWING NUMBER: 11250-55-N3-021-02
0	1/9/2018	ISSUED FOR DISCUSSION	XX		

PROFESSIONAL SEAL

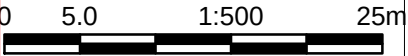


EXISTING STRUCTURE PLAN VIEW
1:500

- Existing Edge of Road
- Existing Centerline of Road
- Ditch
- Top of Bank
- Bottom of Bank
- Present Water on Date of Survey
- High Water Observed in Field

Paper Size: ANSI expand B (17.00 x 11.00 inches), Plot Date: December 12, 2019

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SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION
0	1/9/2018	ISSUED FOR DISCUSSION

POR
XX

DRAWING TITLE: EXISTING STRUCTURE PLAN VIEW

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD

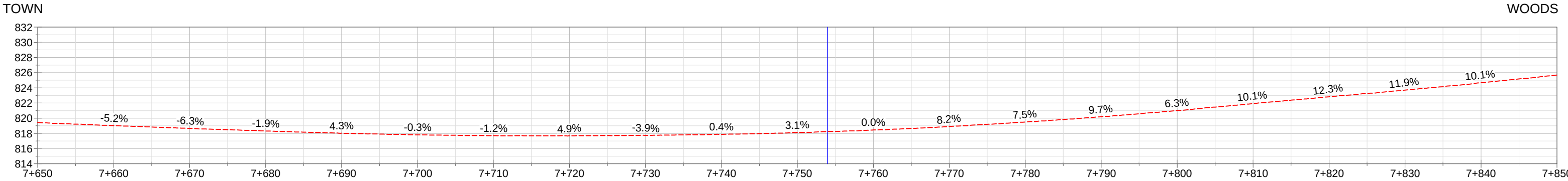
DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX

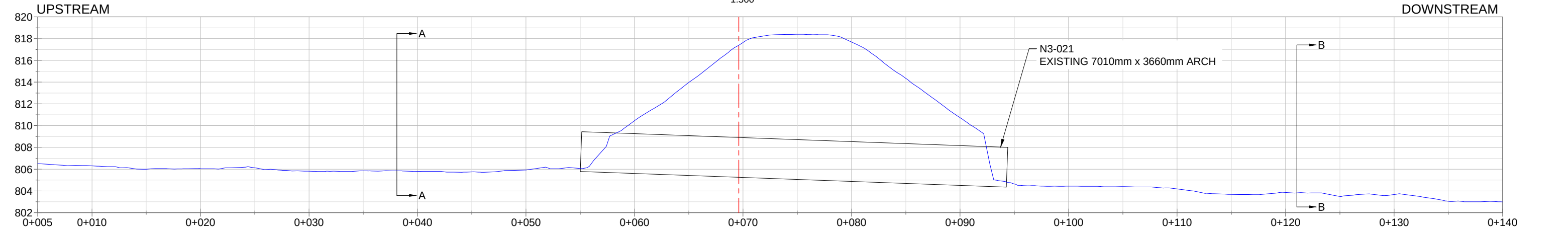
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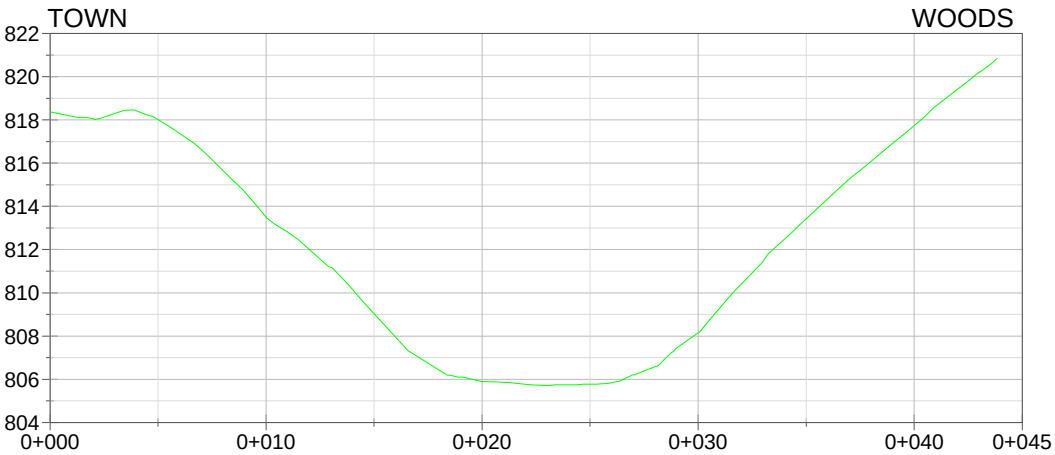
PROFESSIONAL SEAL



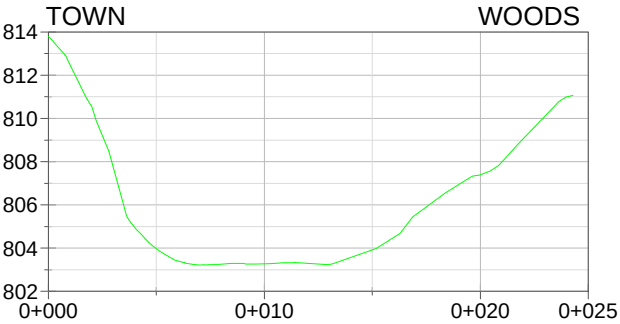
EXISTING ROAD PROFILE (LOOKING UPSTREAM)
1:500



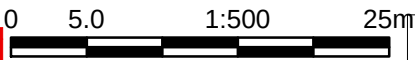
CREEK PROFILE
1:350



CREEK SECTION A-A (LOOKING DOWNSTREAM)
1:350



CREEK SECTION B-B (LOOKING DOWNSTREAM)
1:350



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STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: EXISTING PROFILE & SECTION VIEWS

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD

DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX

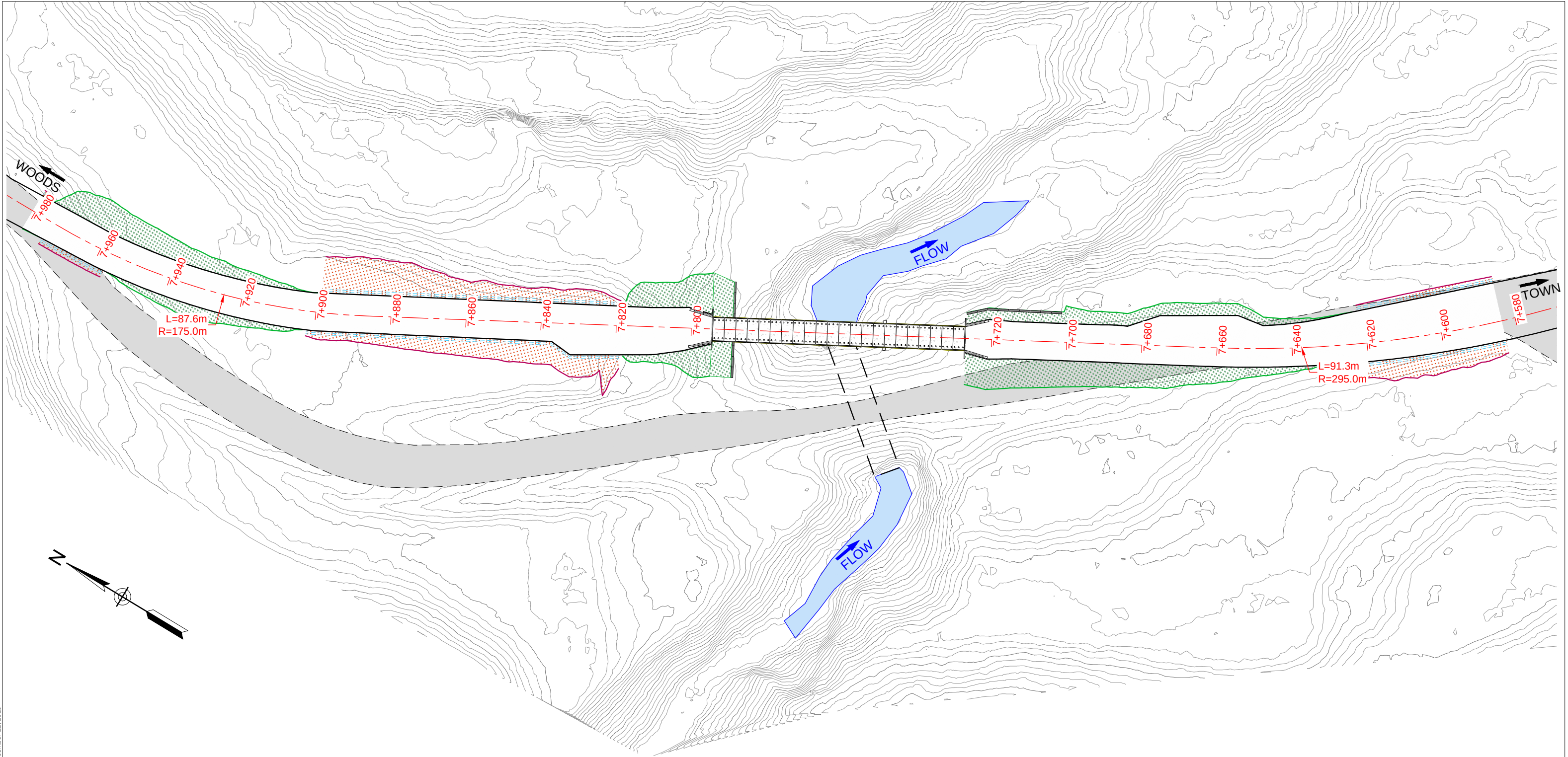
DRAWING NUMBER:

11250-55-N3-021-04

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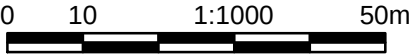
Estimated Q₁₀₀ Flow
Center of Creek Bed
Existing Ground



Paper Size: ANSI expand B (17.00 x 11.00 inches), Plot Date: December 12, 2019

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PROPOSED STRUCTURE PLAN VIEW
1:1000



- Existing Edge of Road
- Present Water on Date of Survey
- High Water Observed in Field
- Toe of Design Fill
- Top of Design Cut
- Design Edge of Road
- Design Centerline of Road
- Area to be Filled
- Area to be Cut

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STRUCTURE #: N3-021A CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED STRUCTURE PLAN VIEW

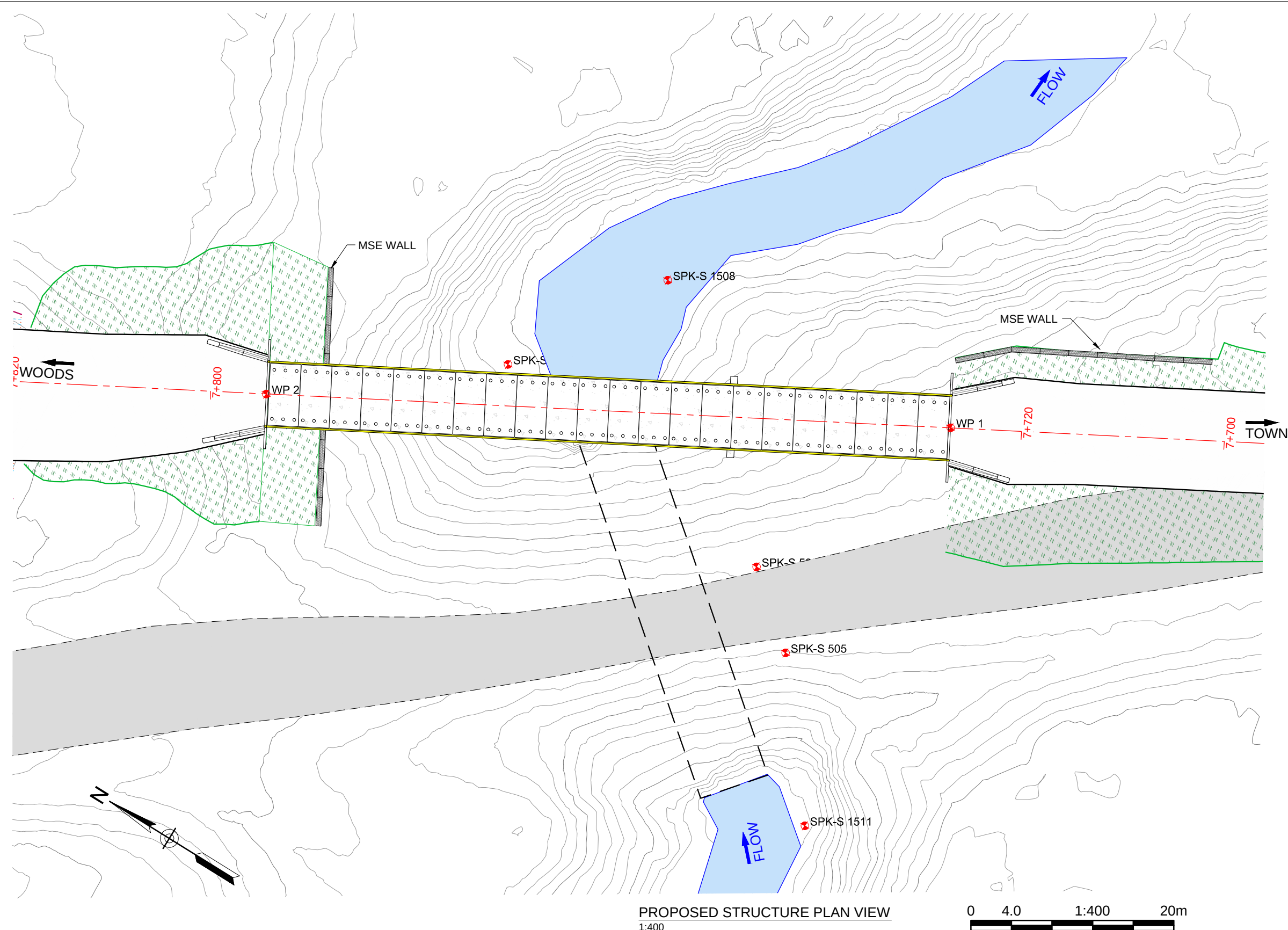
PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD
DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX
DRAWING NUMBER:

11250-55-N3-021-05

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LOCATION TABLE (LOCAL COORDINATES)			
DESCRIPTION	EASTING (X)	NORTHING (Y)	ELEVATION (Z)
REB-S 501	482051.611	5709540.150	879.697
REB-S 502	482100.202	5708733.882	822.073
REB-S 504	481915.079	5708987.887	828.958
SPK-S 505	481990.707	5708864.271	817.658
SPK-S 506	481996.395	5708871.167	817.922
SPK-S 1507	482000.418	5708902.492	805.405
SPK-S 1508	482015.774	5708893.497	803.743
SPK-S 1509	482025.171	5708839.774	817.550
SPK-S 1511	481977.237	5708853.663	805.800
WP 1	482018.130	5708862.150	823.410
WP 2	481985.368	5708921.196	825.432

LAYOUT SCHEDULE			
RP#273 TO WP 1		RP#275 TO WP 1a	
RP#274 TO WP 1		RP#276 TO WP 1a	
RP#275 TO WP 1		RP#278 TO WP 1a	
RP#276 TO WP 1		RP#273 TO WP 2a	
RP#273 TO WP 2		RP#274 TO WP 2a	
RP#274 TO WP 2		RP#277 TO WP 2a	
RP#275 TO WP 2		WP 1 TO WP 1a	
RP#276 TO WP 2		WP 2 TO WP 2a	
WP 1 TO WP 2		WP 1a TO WP 2a	
WP 1 & 2 ARE ϵ AT TOP OF BRIDGE DECK AND END OF BRIDGE WP 1a & 2a ARE REFERENCE TO CENTER OF BRIDGE (ALL DISTANCES ARE HORIZONTAL)			

EXTENT OF RIP RAP	
TOWN (RIGHT) BANK - UPSTREAM SIDE	
TOWN (RIGHT) BANK - DOWNSTREAM SIDE	
WOODS (LEFT) BANK - UPSTREAM SIDE	
WOODS (LEFT) BANK - DOWNSTREAM SIDE	
IN FRONT OF BALLAST WALL	
MEASURED FROM WORKING POINTS. (ALL DISTANCES ARE HORIZONTAL)	

Existing Edge of Road	---
Present Water on Date of Survey	---
High Water Observed in Field	---
Toe of Design Fill	---
Top of Design Cut	---
Design Edge of Road	---
Design Centerline of Road	---
Area to be Filled	---
Area to be Cut	---

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SITE #: N3-021 LOCATION: BUSH RIVER FSR 7.75km
STRUCTURE #: N3-021A CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

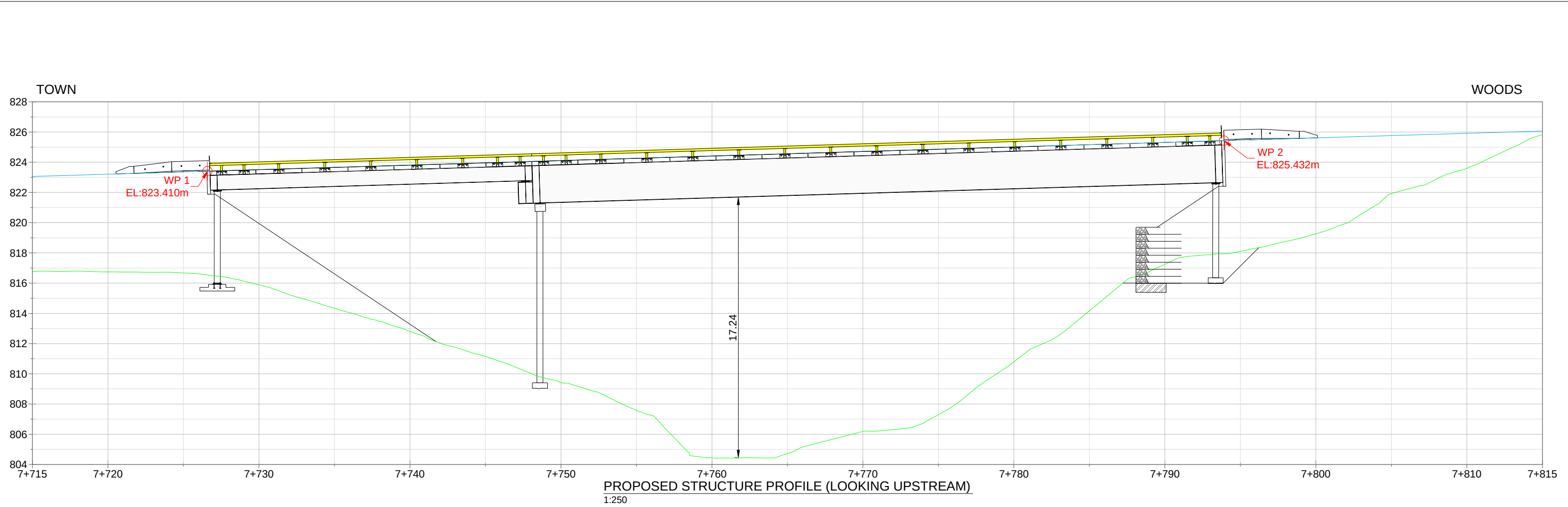
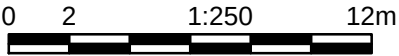
DRAWING TITLE: PROPOSED STRUCTURE PLAN VIEW

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD
DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX
DRAWING NUMBER:
11250-55-N3-021-06

PROFESSIONAL SEAL

Paper Size: ANSI expand B (17.00 x 11.00 inches) , Plot Date: December 12, 2019



Estimated Q₁₀₀ Flow ---
Center of Creek Bed ---
Design Grade ---
Existing Ground ---
Limit of Excavation ---

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STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED PROFILE VIEWS & MISC DETAILS

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD

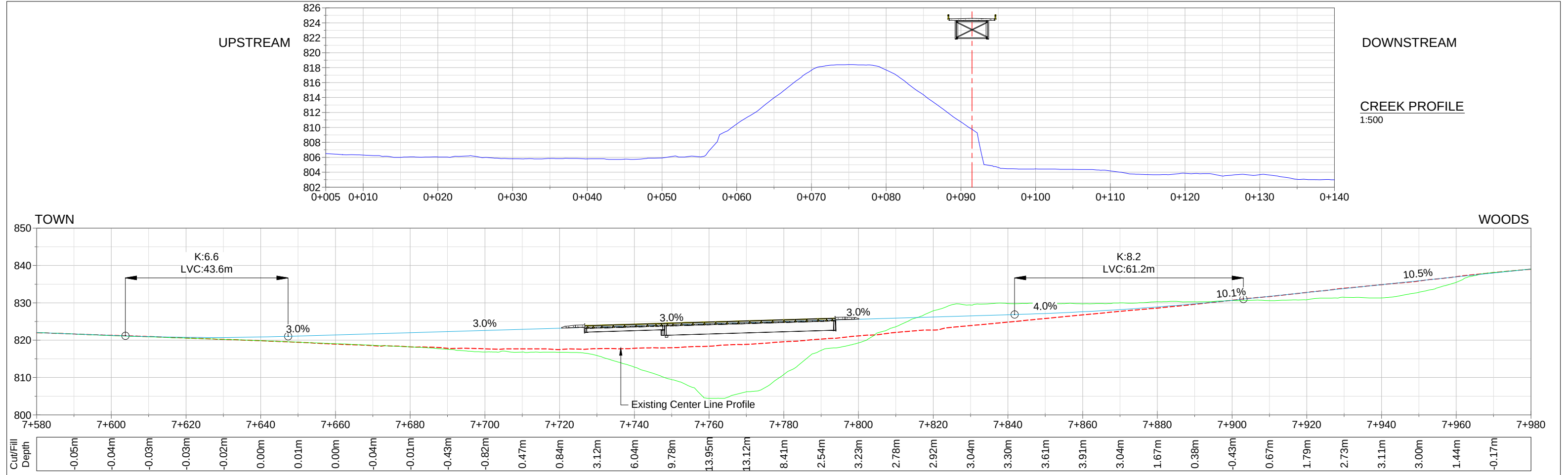
DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX

DRAWING NUMBER:

11250-55-N3-021-07

PROFESSIONAL SEAL



PROPOSED ROAD PROFILE (LOOKING DOWNSTREAM)
1:1000

RIP RAP TOE DETAIL
NTS

CLEAN GRAVELS
RIPRAP
CREEK BED
NON-WOVEN GEOTEXTILE UNDERLAY
MIN. 0.2m
1.5x"T"
"T"
NOTE: "T" REFERS TO THE NOMINAL THICKNESS

RIPRAP TABLE						
CLASS OF RIPRAP (kg)	NOMINAL THICKNESS OF RIPRAP (mm)	ROCK GRADATION: PERCENT SMALLER THAN GIVEN ROCK MASS (kg)				
		15%	50%	85%		

0 5.0 1:500 25m

0 1 1:100 5m

Estimated Q₁₀₀ Flow
Center of Creek Bed
Design Grade
Existing Ground
Limit of Excavation

WORKING DRAFT

BRITISH COLUMBIA

MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS & RURAL DEVELOPMENT
SOUTHERN ENGINEERING GROUP

SITE #: N3-021
STRUCTURE #: N3-021A

LOCATION: BUSH RIVER FSR 7.75km
CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED PROFILE VIEWS & MISC DETAILS

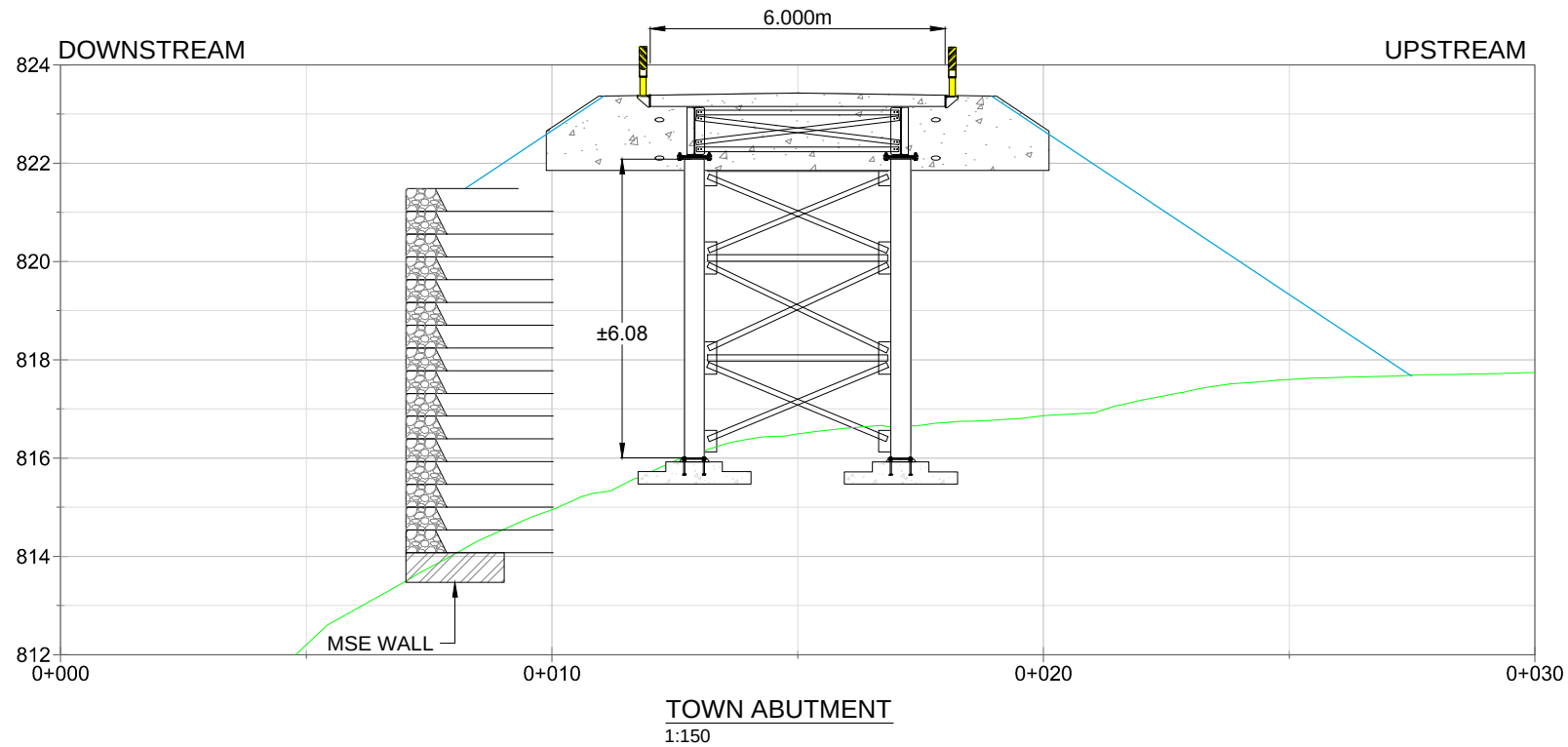
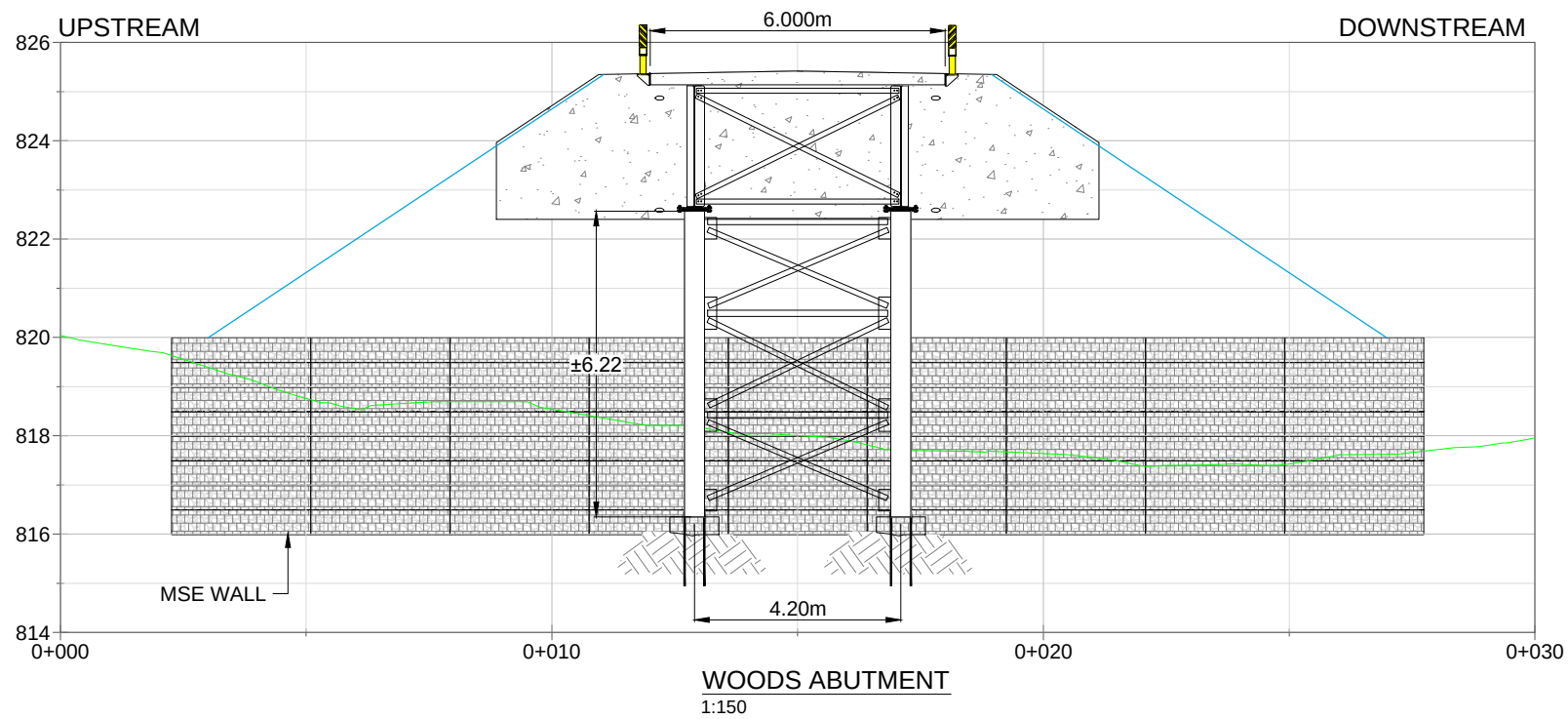
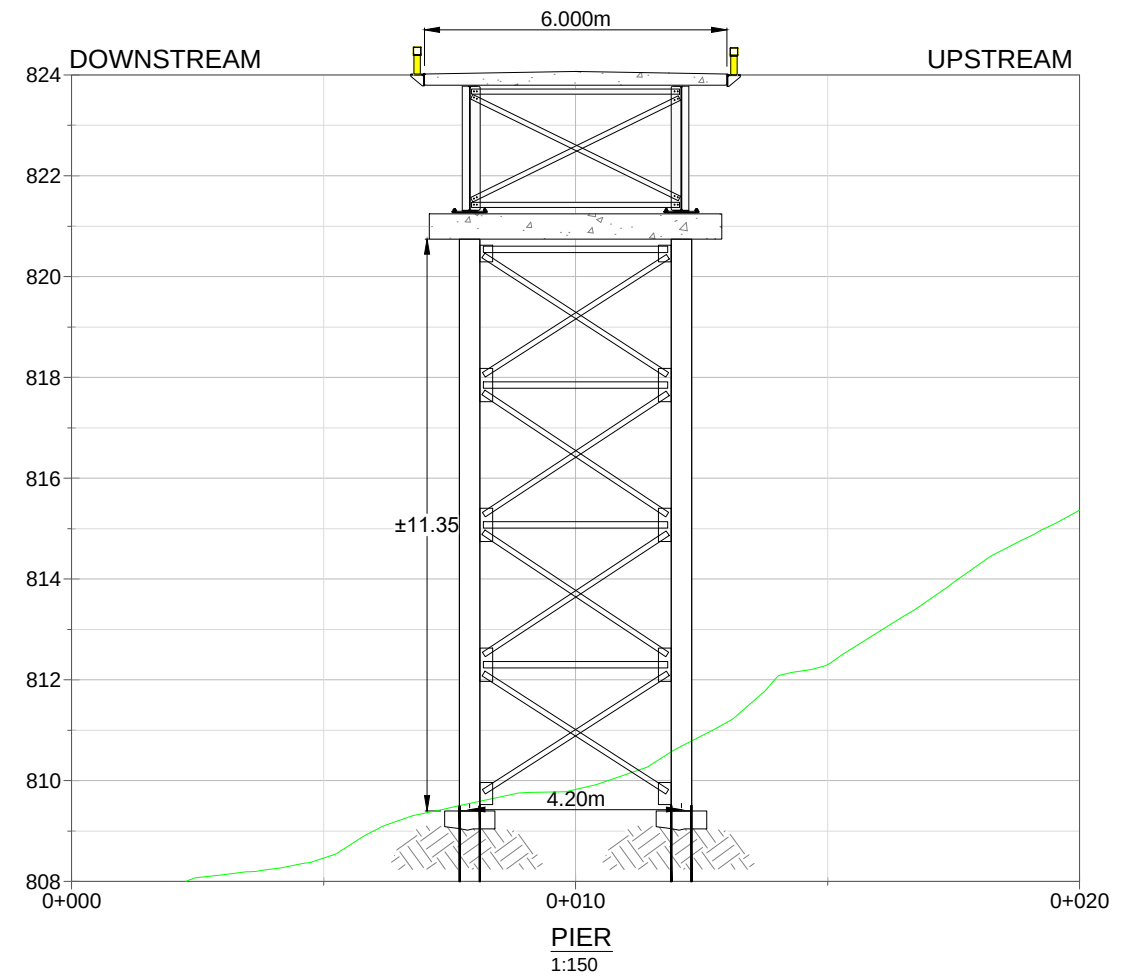
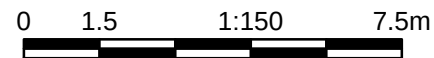
PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD
DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX
DRAWING NUMBER:
11250-55-N3-021-07

PROFESSIONAL SEAL

Paper Size: ANSI expand B (17.00 x 11.00 inches), Plot Date: December 12, 2019

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Center of Creek Bed ———
Design Grade Existing ———
Ground Limit of Excavation ———



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SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED ABUTMENT VIEWS & DETAILS

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.

FLNRORD

DRAWN BY:
N. HARVEY

CREEKSIDE DRAFTING

CHECKED BY:

XXXXX

XXXXX

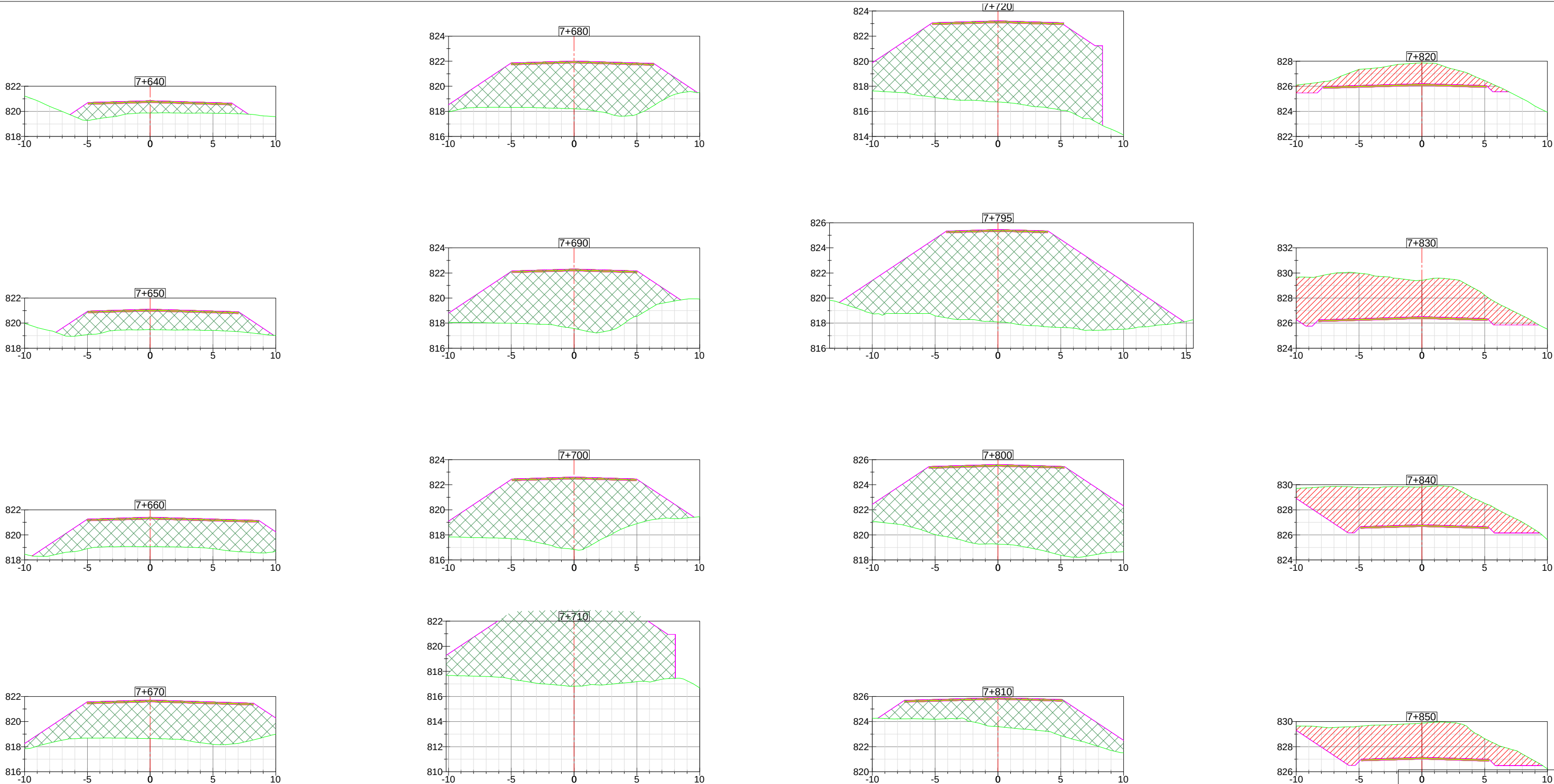
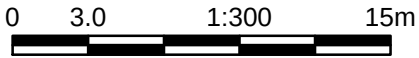
DRAWING NUMBER:

11250-55-N3-021-08

PROFESSIONAL SEAL

Paper Size: ANSI expand B (17.00 x 11.00 inches) , Plot Date: December 12, 2019

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Design Grade
Existing Ground
Area to be Cut
Area to be Filled



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MINISTRY OF FORESTS, LANDS, NATURAL
RESOURCE OPERATIONS & RURAL DEVELOPMENT
SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED ROAD SECTIONS

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.

FLNRORD

DRAWN BY:

N. HARVEY

CREEKSIDE DRAFTING

CHECKED BY:

XXXXX

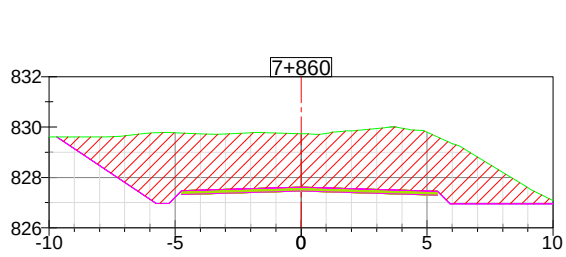
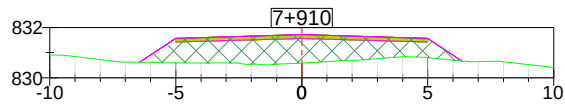
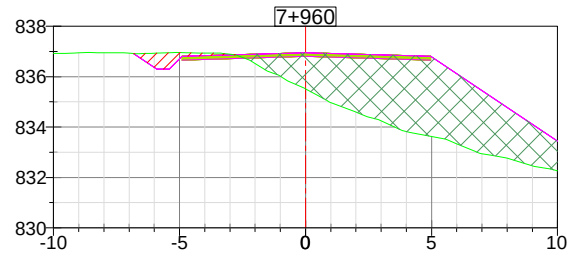
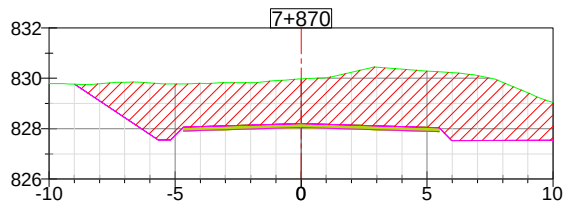
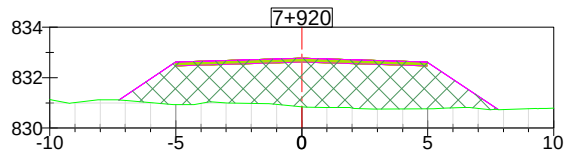
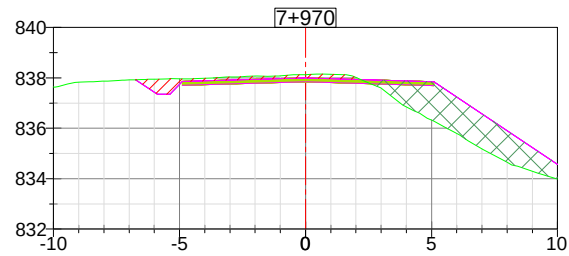
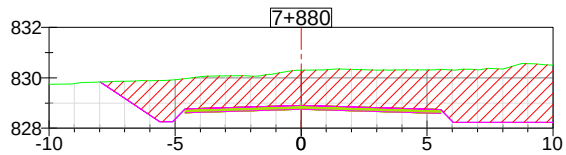
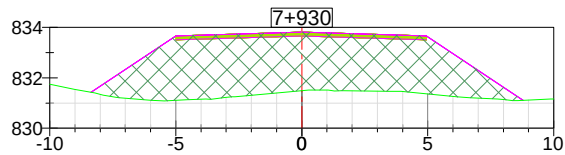
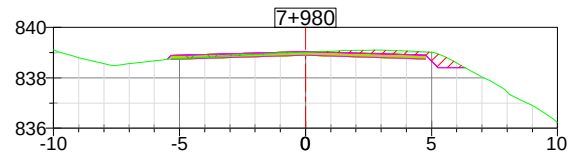
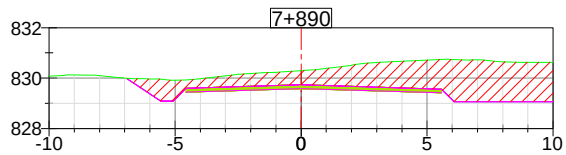
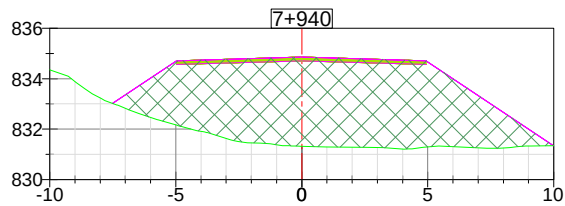
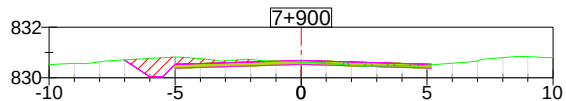
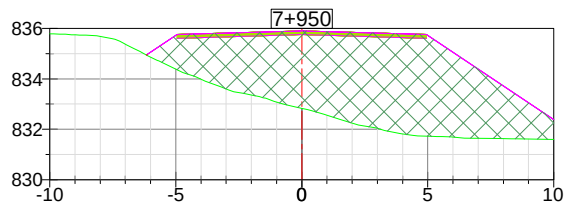
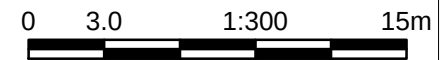
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DRAWING NUMBER:

11250-55-N3-021-09

PROFESSIONAL SEAL

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Design Grade
Existing Ground
Area to be Cut
Area to be Filled



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RESOURCE OPERATIONS & RURAL DEVELOPMENT
SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED ROAD SECTIONS

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.
FLNRORD

DRAWN BY:
N. HARVEY
CREEKSIDE DRAFTING

CHECKED BY:
XXXXX
XXXXX

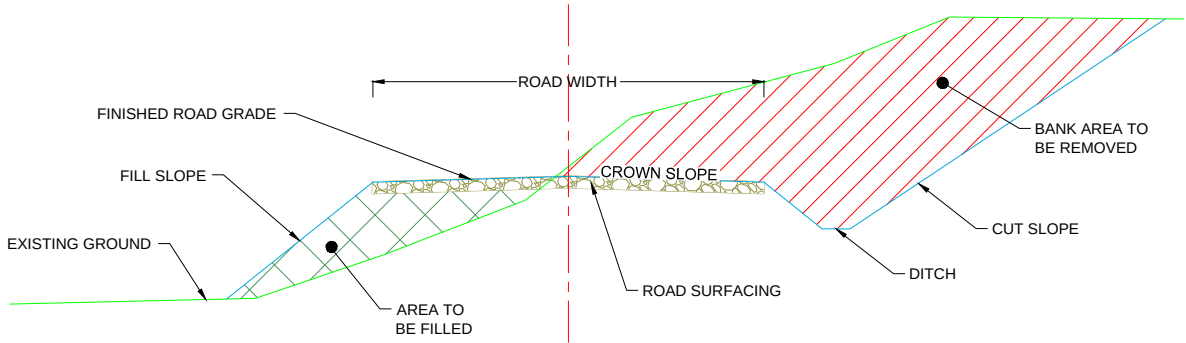
DRAWING NUMBER:
11250-55-N3-021-10

PROFESSIONAL SEAL

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Paper Size: ANSI expand B (17.00 x 11.00 inches) , Plot Date: December 12, 2019

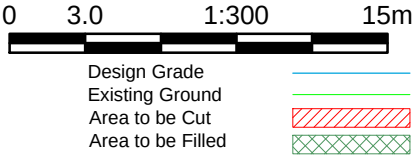
ROAD SECTION SPECIFICATIONS	
ROAD WIDTH (m)	10.0
CROWN SLOPE	2.0%
ROAD SURFACING DEPTH (m)	0.2
DITCH DEPTH (m)	0.5
DITCH BOTTOM WIDTH (m)	0.5
FILL SLOPE (HORZ. to VERT.)	1.5:1.0
CUT SLOPE (HORZ. to VERT.)	1.5:1.0
CUT SLOPE IN SOLID ROCK (HORZ. to VERT.)	0.25:1.0



Estimated Total Volume Table				
Station	Fill Volume (m³) In Place	Cut Volume (m³) In Bank	Cumulative Fill Vol (m³) In Place	Cumulative Cut Vol (m³) In Bank
7+640	0	0	0	0
7+650	184	0	184	0
7+660	322	0	506	0
7+670	465	0	971	0
7+680	554	0	1525	0
7+690	605	0	2130	0
7+700	676	0	2806	0
7+710	807	0	3613	0
7+720	977	0	4590	0
7+795	0	0	4590	0
7+800	603	0	5193	0
7+810	693	0	5886	0
7+820	123	59	6009	59
7+830	0	340	6009	399
7+840	0	500	6009	899
7+850	0	438	6009	1337
7+860	0	391	6009	1728
7+870	0	366	6009	2094
7+880	0	314	6009	2408

Estimated Total Volume Table				
Station	Fill Volume (m³) In Place	Cut Volume (m³) In Bank	Cumulative Fill Vol (m³) In Place	Cumulative Cut Vol (m³) In Bank
7+890	0	211	6009	2619
7+900	2	73	6011	2692
7+910	47	5	6058	2697
7+920	165	0	6223	2697
7+930	274	0	6497	2697
7+940	387	0	6884	2697
7+950	439	0	7323	2697
7+960	336	3	7659	2701
7+970	160	13	7818	2714
7+980	35	13	7853	2727

TYPICAL ROAD SECTION
N.T.S.



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SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED ROAD SECTIONS

PROFESSIONAL OF RECORD (POR):
J. RUPAR GILLIATT P.ENG.

FLNRORD

DRAWN BY:

N. HARVEY

CREEKSIDE DRAFTING

CHECKED BY:

XXXXX

XXXXX

DRAWING NUMBER:

11250-55-N3-021-11

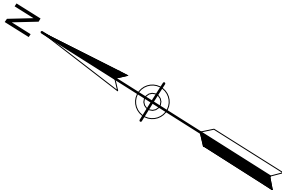
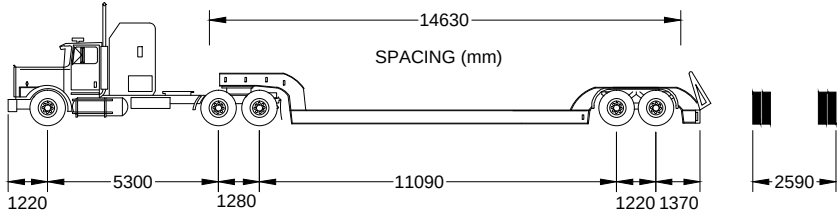
PROFESSIONAL SEAL

Paper Size: ANSI expand B (17.00 x 11.00 inches) , Plot Date: December 12, 2019

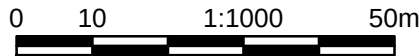
WOODS

TOWN

PROPOSED VEHICLE TRACKING
TOWN TO WOODS
1:1000



WB-19 TRACKING VEHICLE



PROPOSED VEHICLE TRACKING
WOODS TO TOWN
1:1000

Vehicle Envelope Woods to Town
Vehicle Envelope Town to Woods
Design Edge of Road

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SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR
0	1/9/2018	ISSUED FOR DISCUSSION	XX

DRAWING TITLE: PROPOSED WB-19 VEHICLE TRACKING	
PROFESSIONAL OF RECORD (POR): J. RUPAR GILLIATT P.ENG. FLNRORD	CHECKED BY: XXXXX XXXXX
DRAWN BY: N. HARVEY CREEKSIDE DRAFTING	DRAWING NUMBER: 11250-55-N3-021-12

PROFESSIONAL SEAL



LOOKING AT TOWN ABUTMENT FROM WOODS ABUTMENT



LOOKING AT WOODS ABUTMENT FROM TOWN ABUTMENT



LOOKING TOWARDS TOWN ABUTMENT



LOOKING TOWARDS WOODS ABUTMENT



TOWN ABUTMENT ON SLOPE LEFT OF PHOTO

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SOUTHERN ENGINEERING GROUP

SITE #: N3-021

LOCATION: BUSH RIVER FSR 7.75km

STRUCTURE #: N3-021A

CROSSING: BLACKWATER CREEK

REV #	DATE	DESCRIPTION	POR	DRAWING TITLE: PHOTOS	
				PROFESSIONAL OF RECORD (POR): J. RUPAR GILLIATT P.ENG. FLNRORD	CHECKED BY: XXXXX XXXXX
				DRAWN BY: N. HARVEY CREEKSIDE DRAFTING	DRAWING NUMBER: 11250-55-N3-021-13
0	1/9/2018	ISSUED FOR DISCUSSION	XX		

PROFESSIONAL SEAL