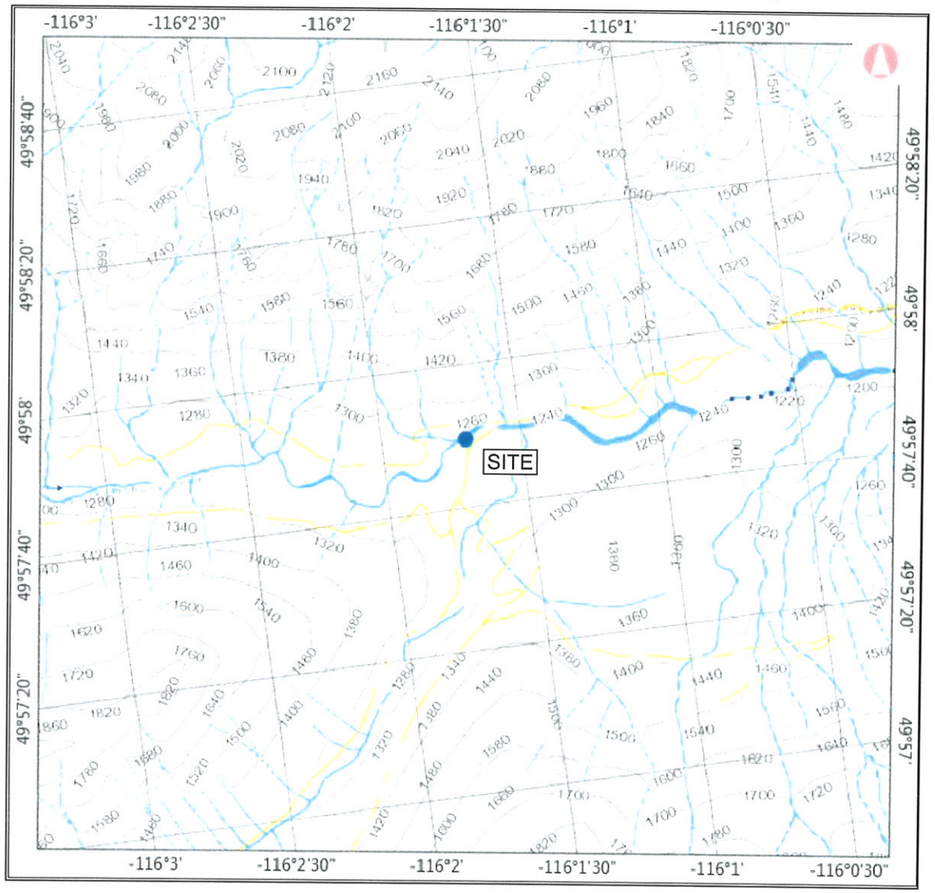
PROPOSED PERMANENT 33.528m (110') O/A LENGTH STEEL GIRDER WITH CONCRETE COMPOSITE DECK BRIDGE FOR: SKOOKUMCHUK FSR

SITE ID: N2-108 STRUCTURE ID: N2-108A

(49° 57' 50" N , 116° 01' 42" W)



N

NOT TO SCALE

DWG No: 343-6-N2-108- 001	SHEET: 1 OF 8	DESIGN BY: MICHAEL FOSTER, P.ENG. DESIGN DATE: JANUARY 18, 2017 REVIEWED BY: JEAN-GUY BERNAT, P.ENG. DRAWN BY: TODD FORBES SITE VISIT: ONSITE ENGINEERING LTD. SITE VISIT DATES: OCTOBER 20, 2016 FILE NAME: N2-108.DWG SCALE: AS NOTED REVISION NUMBER: REVISION DATE: ALL MEASUREMENTS IN m UNLESS OTHERWISE NOTED.
PREPARED FOR: BRITISH COLUMBIA Ministry of Forests, Lands and Natural Resource Operations	PREPARED BY: **ONSITE** **ENGINEERING LTD.** **INTERIOR OPERATIONS** 330 42nd STREET SW SALMON ARM, BC, V1E 4R1 PH.: 250-832-3366 FAX: 866-235-6943	

DRAWING INDEX:

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SHEET 3 OF 8 - PLAN VIEW
SHEET 4 OF 8 - PLAN VIEW
SHEET 5 OF 8 - ELEVATION AND ROAD PROFILE VIEWS
SHEET 6 OF 8 - ABUTMENT CROSS SECTIONS AND STREAM PROFILE VIEW
SHEET 7 OF 8 - VEHICLE TRACKING
SHEET 8 OF 8 - SITE PHOTOS

NOTES:

1. DURATION:

1.1. FOR THE PURPOSES OF THIS DESIGN THE TERM PERMANENT AS IT REFERS TO DURATION OF THIS INSTALLATION MEANS FORTY FIVE (45) YEARS OR LESS.

2. DESIGN LIVE LOAD:

2.1. DESIGN VEHICLE: BCFS L-100 AS PER MOFLNRO.

3. STRUCTURE:

3.1. SUPERSTRUCTURE TO BE PROVIDED BY OTHERS. SUPERSTRUCTURE DESIGN TO BE IN ACCORDANCE WITH CAN/CSA-S6 (MODIFIED AS PER MOFLNRO INTERIM BRIDGE DESIGN GUIDELINES JULY 23-2010) AND IS TO TAKE INTO ACCOUNT LOGGING TRUCKS WITH UNBALANCED LOADS AND OFF-CENTER DRIVING.

3.2. EXCEPT AS NOTED, SPECIFICATIONS TO BE AS PER MOFR STANDARD DRAWINGS FOR CONCRETE COMPOSITE BRIDGES (STD-EC-030-01 TO 06), SPREAD FOOTINGS, STEEL PIPE RISERS, BEARING SANDWICHES (STD-EC-050-06 TO 08), HSS RAIL CL-3 (STD-EC-010-03), AND NO POST BARRIERS/GUIDE LOGS (STD-E-010-05).

3.3. IF SUPERSTRUCTURE HAS BEEN USED PREVIOUSLY AT ANOTHER LOCATION IT MUST BE INSPECTED BY A PROFESSIONAL ENGINEER PRIOR TO USE AT THIS SITE.

3.4. CHECK REQUIRED BEARING TO BEARING DISTANCE AND DEPTH OF ACTUAL STRUCTURE PRIOR TO CONSTRUCTION OF THE ABUTMENTS. BOTTOM OF GIRDER ELEVATIONS TO GOVERN.

3.5. GENERAL ARRANGEMENT DRAWING. SOME SUPERSTRUCTURE COMPONENTS NOT SHOWN. REFER TO FABRICATION DRAWINGS.

4. DESIGN OF ROAD APPROACHES AND DECK WIDTH:

4.1. HORIZONTAL ALIGNMENT AND ROAD WIDTHS TO PERMIT W-19 TRUCKS WITH 0.5m CLEARANCE INSIDE CURBS.

4.2. DESIGN ROAD WIDTH: 5m UNLESS NOTED OTHERWISE.

4.3. ROAD GRADE: DESIGN PARAMETERS

- SAG K = 25m < LVC < 95m; CREST K = 5.1 ; MAX ADVERSE = 10% ; MAX FAVORABLE = 18.%

5. CREEK NOTES:

5.1. DESIGN FLOOD: Q100 EST. = 70m³/s @ 2m/s. PEAK FLOW FOR DESIGN PURPOSES WAS DETERMINED BASED ON 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.

5.2. STREAM RIPARIAN CLASS IS S2 (MFLNRO).

5.3. STREAM BED MATERIAL CONSISTS OF GRAVEL, COBBLES AND BOULDERS UP TO 1.5m

5.4. MODERATE LIKELIHOOD OF WOODY DEBRIS MOVEMENT.

6. GEOTECHNICAL:

6.1. FOUNDATION DESIGN REFERENCES THE CANADIAN FOUNDATION ENGINEERING MANUAL. SUBSURFACE INFORMATION HAS BEEN INFERRED FROM SITE OBSERVATIONS OF SOIL EXPOSURES IN ROAD CUTS AND ALONG STREAMBANKS AND FROM SHALLOW HAND DUG TEST PITS AND PROBES (SEE DESCRIPTION ON SHEET 4). NO DETAILED SUBSURFACE FIELD INVESTIGATION WAS CONDUCTED (LARGE TEST PITS OR BORE HOLES). FIELD CONDITIONS MAY VARY FROM THOSE INFERRED. IF, UPON EXCAVATION, FIELD CONDITIONS VARY FROM THOSE INFERRED, THEN CHANGES TO THE FOUNDATION DESIGN OR INSTALLATION MAY BE REQUIRED.

6.2. FOOTING DESIGN BASED ON ASSUMED SOIL BEARING CAPACITY OF 200kPa.

7. FIELD REVIEWS:

7.1. A PROFESSIONAL ENGINEER OR THEIR DESIGNATE IS REQUIRED TO INSPECT THE FOLLOWING ACTIVITIES PRIOR TO PROVIDING RECORD DRAWINGS AND A CROSSING ASSURANCE STATEMENT:

- LAYOUT OF RIPRAP/ABUTMENT LOCATION PRIOR TO INITIAL EXCAVATION
- FOUNDATION SOILS FOLLOWING EXCAVATION
- RIPRAP AND ABUTMENT CONSTRUCTION
- BACKFILL MATERIAL AND TECHNIQUE
- SAMPLE AND POURING OF DECK GROUT
- GROUT SAMPLES TO BE TESTED FOR STRENGTH
- OTHER SITE INSPECTIONS AT THE DISCRETION OF THE PROFESSIONAL

8. INSTALLATION NOTES:

8.1. RIPRAP SOURCE HAS NOT BEEN IDENTIFIED, BUT EXPECTED WITHIN Xkm OF THE SITE.

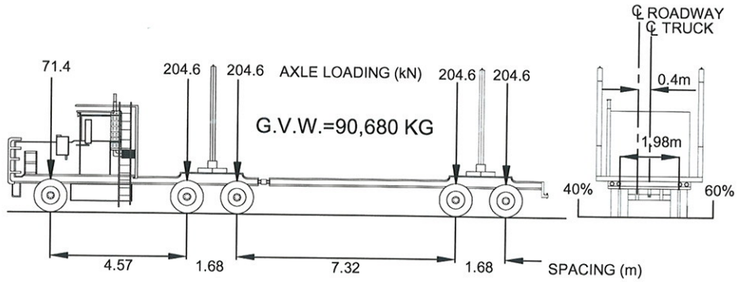
8.2. NOTE THAT WHERE EXCAVATION SPECIFICATIONS ON THESE DRAWINGS CONFLICT WITH WORKSAFEBC REGULATIONS, WORKSAFEBC REGULATIONS ARE TO GOVERN.

8.3. PLAN TO DEWATER FOOTING AREAS.

ENVIRONMENTAL NOTES:

1. WORK TO PROCEED IN ACCORDANCE WITH DFO AND BCMOE CONDITIONS NOTED AT THE WEB SITE: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html THE BCMOE REGIONAL TERMS AND REGIONAL PERIODS OF LEAST RISK TO RESIDENT FISH SPECIES AND FISH REMOVAL/RELOCATION FOR IN-STREAM WORK ALSO APPLY IF THE STREAM HAS FISH PRESENT OR IS CLASSIFIED AS S1 THROUGH S4.
2. A SEDIMENT MANAGEMENT PLAN WITH SPECIFIC MITIGATION MEASURES TO MINIMIZE SILTATION MUST BE ON SITE. MACHINE CROSSINGS MUST BE LIMITED TO 2 UNLESS OTHERWISE INCREASED OR DECREASED BY A QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP).
3. ALTERATION TO STREAM BANKS AND IN-STREAM WORK (EXPECTED) SHOULD BE SUPERVISED BY AN ENVIRONMENTAL MONITOR.
4. REMOVE THE MINIMUM AMOUNT OF RIPARIAN VEGETATION NECESSARY TO INSTALL A SAFE STRUCTURE. VEGETATE DISTURBED SLOPES AS SOON AS PRACTICABLE.
5. MACHINERY IS TO BE CLEAN AND LEAK FREE WHILE ON SITE. PETROLEUM PRODUCTS MUST BE CAREFULLY MONITORED WITH NO FUELING WITHIN THE RIPARIAN MANAGEMENT AREA.
6. DIRECT SURFACE WATER AWAY FROM WORK SITE DURING CONSTRUCTION. ENSURE DITCH WATER AND SURFACE RUNOFF FROM THE ROAD DOES NOT FLOW DIRECTLY INTO THE STREAM. INSTALL CROSS DRAIN CULVERTS ON THE APPROACHES AND CONSTRUCT SUMPS AS REQUIRED.

PARTIAL MATERIALS LIST	
QTY	ITEM DESCRIPTION
1	ROLL NON-WOVEN GEOTEXTILE: MIRAFI 180N OR EQUIVALENT
7m³	LEVELING COURSE (SANDY GRAVEL OR 19mm TO 25mm CLEAR CRUSH) - COMPACTED TO 95% SPMDD. ENSURE THERE IS NO ORGANIC MATERIAL UNDER THE FOOTINGS.
4	PIPE RISERS (TO BE PROVIDED 4.5m LONG) COLUMN DIAMETER TO BE DETERMINED BY STRUCTURAL ENGINEER
4	PRECAST S4 SPREAD FOOTINGS
4	S-PL5 BEARING SANDWICH
4	SETS OF CONCRETE NO-POST APPROACH BARRIERS: 690-CRB-H, CTB-1E, CBN-H
2	CONCRETE BALLAST WALL
4	W-054 SERIES DELINEATORS (2 LEFT, 2 RIGHT)
2	W-051 SERIES NARROW STRUCTURE SIGNS
2	POSTS FOR NARROW STRUCTURE SIGNS: 0.2m X 4.0m LENGTH LOG POSTS OR 0.1m X 0.1m X 3.0m LENGTH TREATED TIMBERS
1	BAG ROADSIDE GRASS SEED MIX
	RIPRAP: SEE SPECIFICATIONS ON SHEET 4



BCFS L-100 OFF HIGHWAY LOADING DIAGRAM
SCALE 1:200

DWG No: 343-6-N2-108- 002

SHEET: 2 OF 8

PREPARED FOR:

BRITISH COLUMBIA
Ministry of
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PREPARED BY:

ONSITE
ENGINEERING LTD.
INTERIOR OPERATIONS
330 42nd STREET SW
SALMON ARM, BC, V1E 4R1
PH.: 250-832-3366 FAX: 866-235-6943

DESIGN BY: MICHAEL FOSTER, P.ENG.
DESIGN DATE: JANUARY 18, 2017
REVIEWED BY: JEAN-GUY BERNAT, P.ENG.
DRAWN BY: TODD FORBES
SITE VISIT: ONSITE ENGINEERING LTD.
SITE VISIT DATES: OCTOBER 20, 2016
FILE NAME: N2-108.DWG
SCALE: AS NOTED
REVISION NUMBER:
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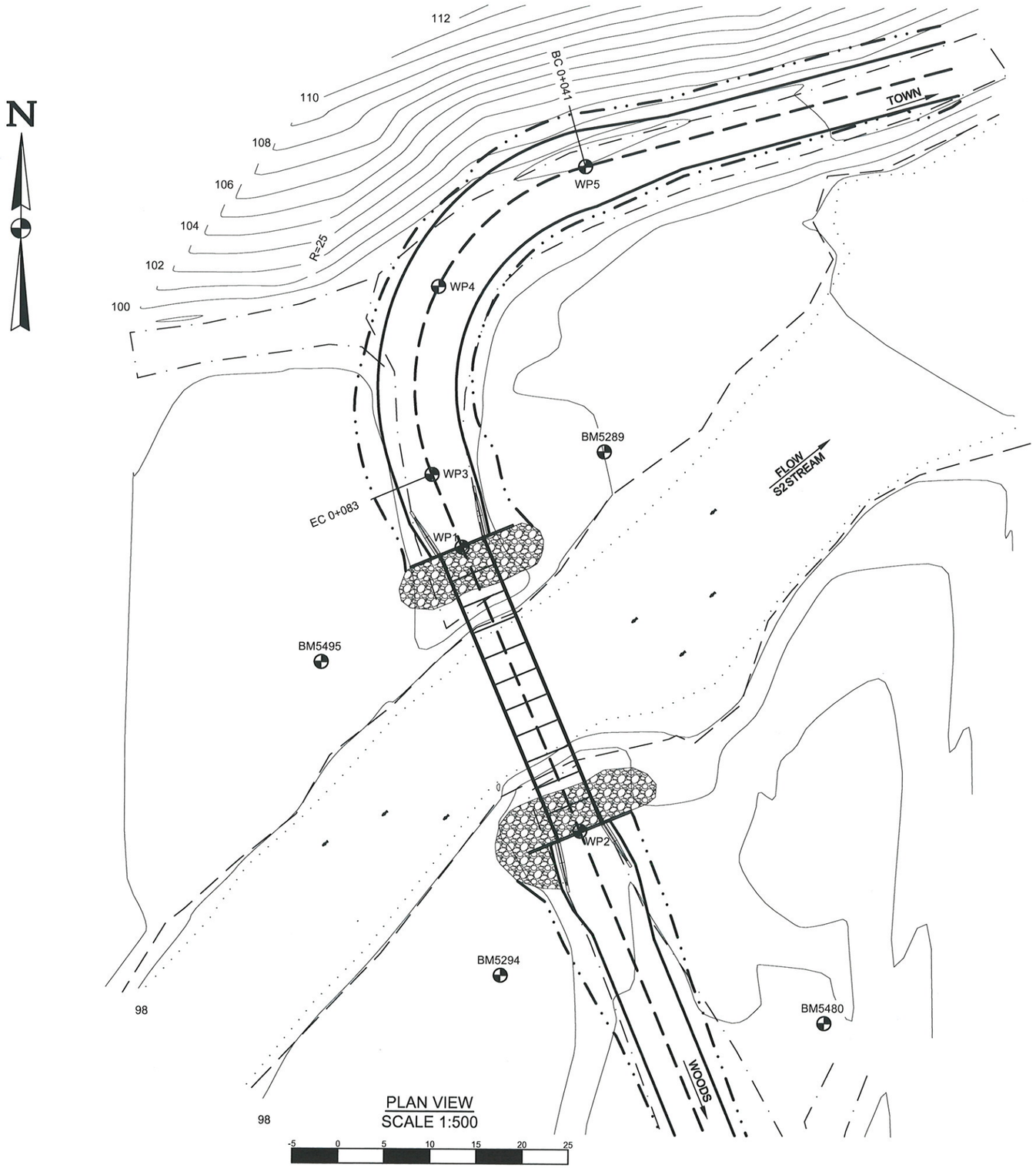
PROPOSED PERMANENT 33.528m (110') O/A LENGTH
STEEL GIRDER WITH CONCRETE COMPOSITE DECK
BRIDGE FOR: SKOOKUMCHUK FSR
SITE ID: N2-108 STRUCTURE ID: N2-108A
(49° 57' 50" N , 116° 01' 42" W)

SEAL OF B.C. P.ENG.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M. J. FOSTER
30461
FEB 2/17



WORKPOINTS 1 AND 2 ARE LOCATED AT UNDERSIDE ENDS OF STEEL GIRDERS.

ELEVATIONS SHOWN HAVE AN ARBITRARY DATUM AND SHOULD ONLY BE USED TO ESTABLISH RELATIVE ELEVATION WITHIN THE CROSSING FOR CONSTRUCTION PURPOSES.

WORKPOINT LOCATION TABLE				
WP	OC	BS	ANG R	HD
			(deg ' ")	(m)
1	BM5495	BM5289	357°33'40"	19.73
	BM5289	BM5480	76°53'07"	18.58
	BM5480	BM5294	44°27'32"	65.17
	BM5294	BM5495	24°28'52"	46.93
2	BM5495	BM5289	70°10'49'	33.64
	BM5289	BM5480	24°37'22"	41.51
	BM5480	BM5294	29°50'35"	33.84
	BM5294	BM5495	58°15'57"	17.96

WP	N	E	ELEV
WP1	5025.66	4989.67	99.35
WP2	4994.73	5002.62	99.35
WP3	5033.58	4986.35	101.20
WP4	5054.15	4986.92	101.10
WP5	5067.33	5002.72	100.84
BM5495	5013.11	4974.45	99.36
BM5289	5036.17	5004.99	99.19
BM5480	4973.94	5029.32	100.85
BM5294	4978.93	4994.09	98.66

CAUTION:

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(49° 57' 50" N , 116° 01' 42" W)

DWG No: 343-6-N2-108- 003

SHEET: 3 OF 8

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REVIEWED BY: JEAN-GUY BERNAT, P.ENG.
DRAWN BY: TODD FORBES
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SITE VISIT DATES: OCTOBER 20, 2016
FILE NAME: N2-108.DWG
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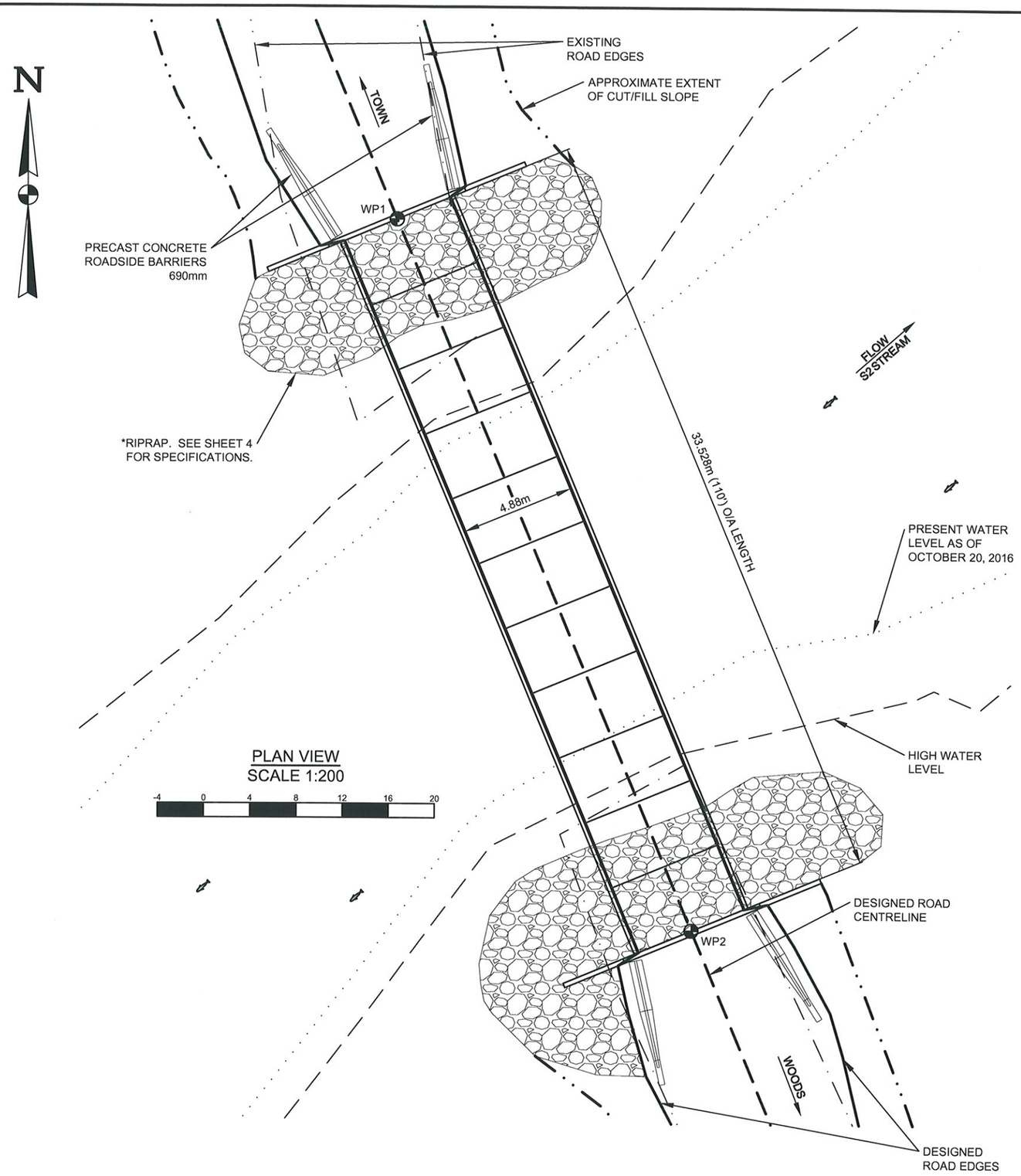
FEB 2/17

DESIGNED ROAD EDGES
DESIGNED ROAD CENTRELINE
APPROXIMATE EXTENT OF CUT/FILL SLOPE
EXISTING ROAD EDGES
BENCH MARK BM1
HIGH WATER LEVEL
PRESENT WATER LEVEL
WORKPOINT WP1



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SITE ID: N2-108 STRUCTURE ID: N2-108A

(49° 57' 50" N , 116° 01' 42" W)

DWG No: 343-6-N2-108- 004

SHEET: 4 OF 8

DESIGN BY: MICHAEL FOSTER, P.ENG.
DESIGN DATE: JANUARY 18, 2017
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DRAWN BY: TODD FORBES
SITE VISIT: ONSITE ENGINEERING LTD.
SITE VISIT DATES: OCTOBER 20, 2016
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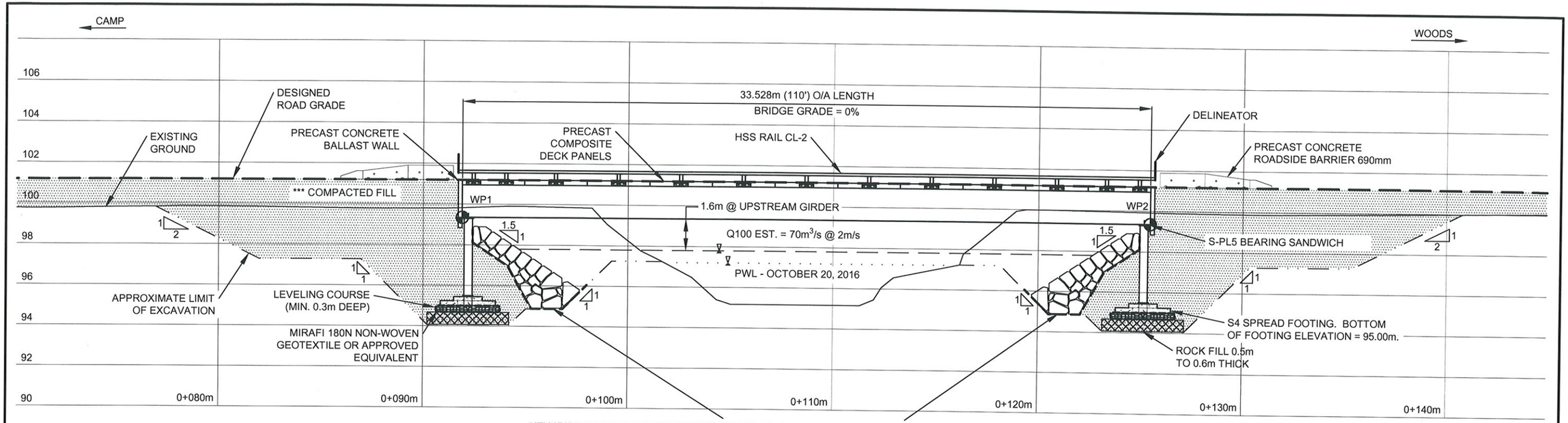
FEB 2/17

DESIGNED ROAD EDGES
DESIGNED ROAD CENTRELINE
APPROXIMATE EXTENT OF CUT/FILL SLOPE
EXISTING ROAD EDGES
BENCH MARK BM1
HIGH WATER LEVEL
PRESENT WATER LEVEL
WORKPOINT WP1



KEY *RIPRAP TO ELEVATION SHOWN. RIPRAP TO SERVE AS PROTECTION OF FOUNDATION FROM EROSION. ALL RIPRAP TO BE UNDERLAIN WITH MIRAFI 180N OR APPROVED EQUIVALENT NON-WOVEN GEOTEXTILE. FOR APPROXIMATE RIPRAP SIZES USE GRADATION TABLE ON THIS SHEET.

PLACE RIPRAP ON STRIPPED OR EXCAVATED GROUND DIRECTLY IN FRONT OF THE PROPOSED SPREAD FOOTINGS. PLACE ROCK ON GEOTEXTILE ON MINERAL SOIL. EXPECT UNDERLYING SOIL TO BE ** *COMPACT SILTY* SAND WITH SOME GRAVEL. RIPRAP IS TO BE CAREFULLY PLACED (NOT DUMPED) TO CREATE AN INTERLOCKING SURFACE. SOILS UNDER FOOTINGS ARE EXPECTED TO BE FULLY SATURATED AND SOFT. IMPORTED ROCK FILL 0.5m TO 0.6m THICK IS EXPECTED TO BE REQUIRED UNDER FOOTINGS.

ELEVATION VIEW
SCALE 1:200

-2 0 2 4 6 8 10

*RIPRAP: CLEAN ANGULAR ROCK

CLASS 700kg RIPRAP
ROCK GRADATION
PERCENT SMALLER THAN GIVEN ROCK MASS kg(mm)

15%	125(400)
50%	700(800)
85%	1300(1000)

NOMINAL THICKNESS OF RIPRAP 1000mm

ALL ROCK TO BE PLACED TO MAXIMIZE INTERLOCKING BETWEEN PIECES. ALL ROCK TO BE UNDERLAIN WITH MIRAFI 180N OR APPROVED EQUIVALENT NON-WOVEN GEOTEXTILE. APPROXIMATELY 330m³ OF RIPRAP REQUIRED.

***COMPACTED FILL GRANULAR FILL TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.

**SOIL DENSITY	
VERY LOOSE	EASILY EXCAVATED WITH A SPADE
LOOSE	SOME RESISTANCE TO SPADE
COMPACT	CONSIDERABLE RESISTANCE TO SPADE
DENSE	REQUIRES PICK FOR EXCAVATION
VERY DENSE	HIGH RESISTANCE TO PICK

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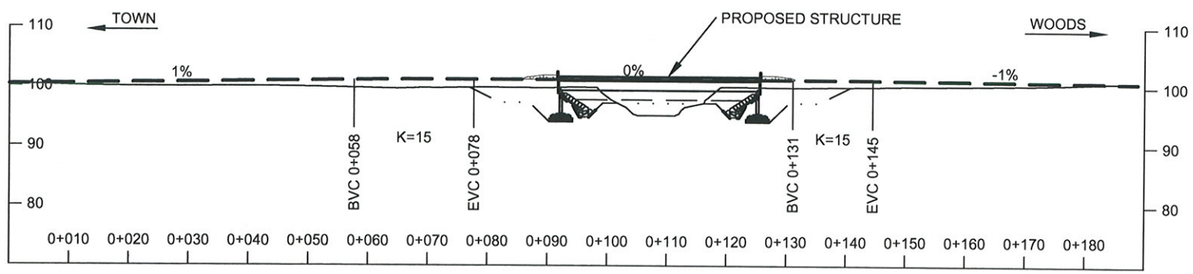

ROAD PROFILE VIEW
SCALE 1:1000

-10 0 10 20 30 40 50

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SITE ID: N2-108 STRUCTURE ID: N2-108A
(49° 57' 50" N , 116° 01' 42" W)

DWG No: 343-6-N2-108- 005

SHEET: 5 OF 8

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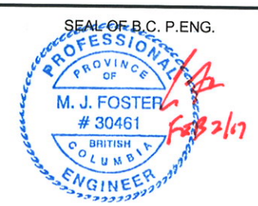
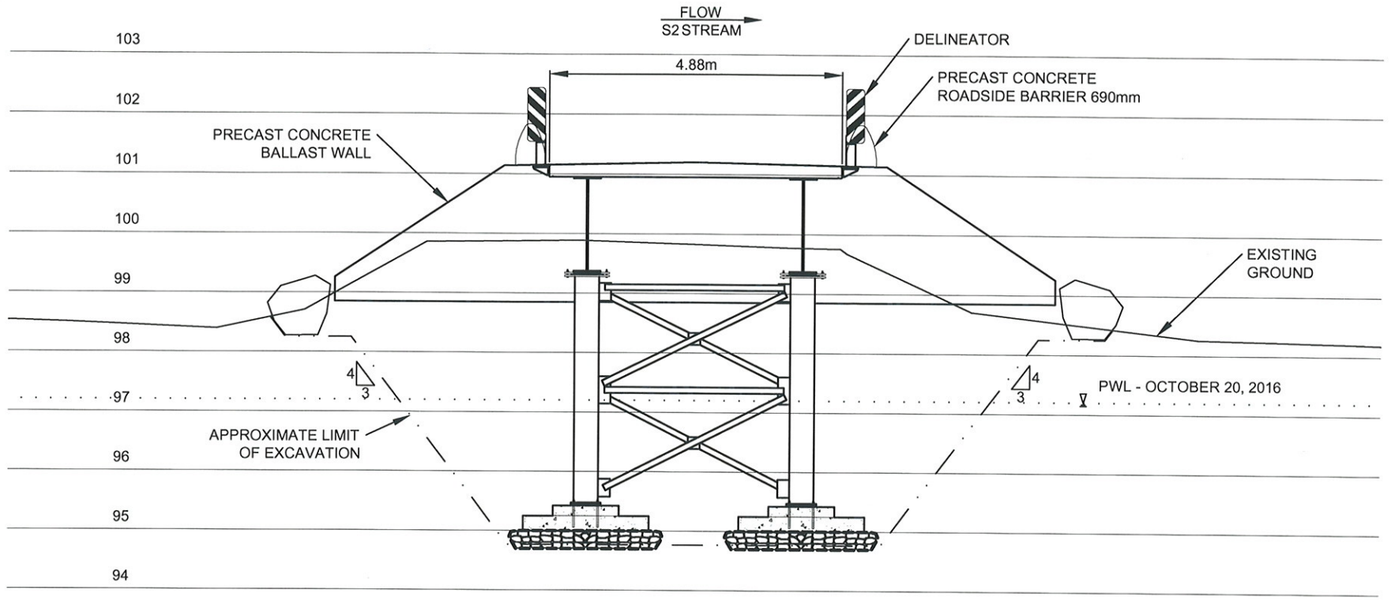


DESIGNED ROAD GRADE
APPROXIMATE LIMIT OF FILL SLOPE
APPROXIMATE LIMIT OF EXCAVATION
HIGH WATER LEVEL
MIRAFI 180N GEOTEXTILE (OR APPROVED EQUIVALENT)



TOWN ABUTMENT CROSS SECTION
SCALE 1:100

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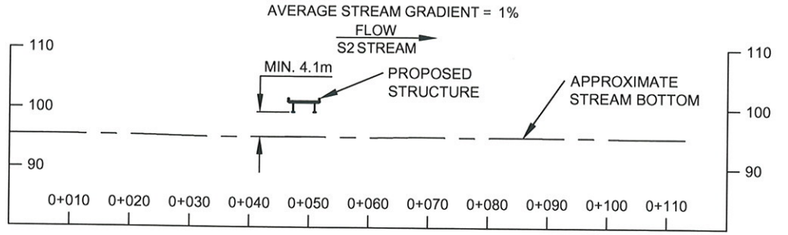
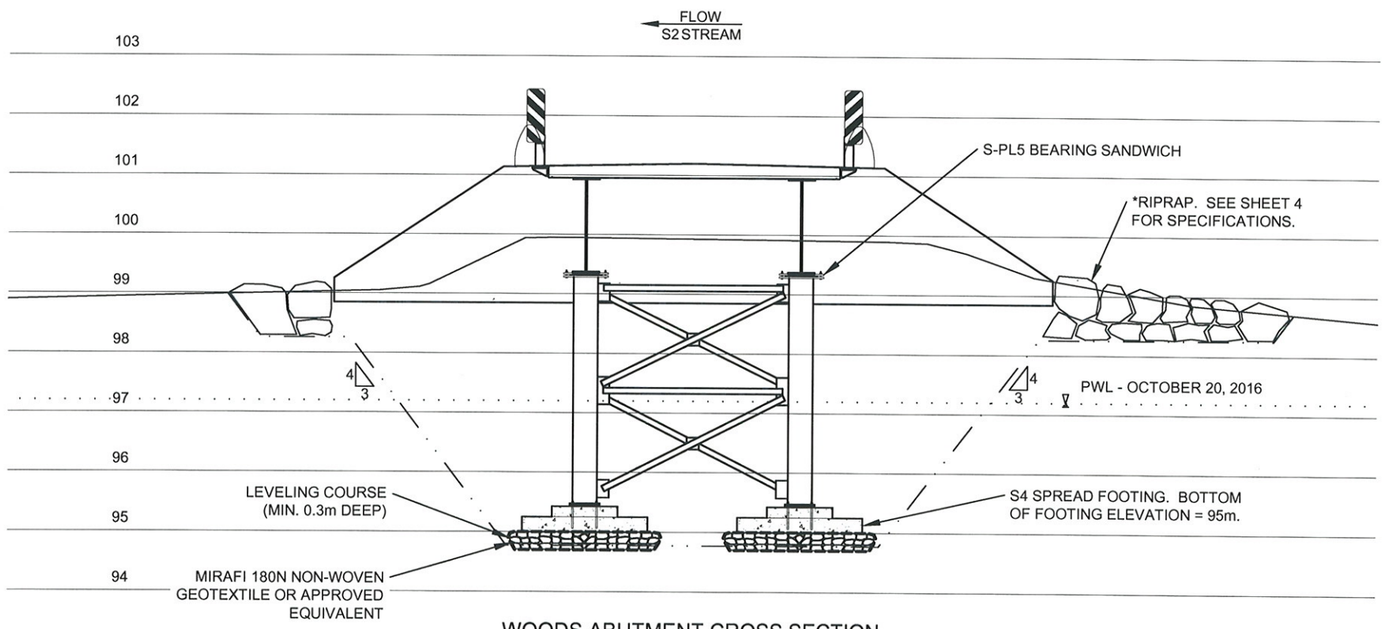


STREAM PROFILE VIEW
SCALE 1:1000

-10 0 10 20 30 40 50



WOODS ABUTMENT CROSS SECTION
SCALE 1:100

-1 0 1 2 3 4 5

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DWG No: 343-6-N2-108- 006

SHEET: 6 OF 8

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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M. J. FOSTER
30461

Feb 2/17

DESIGNED ROAD GRADE	— — —	MIRAFI 180N GEOTEXTILE (OR APPROVED EQUIVALENT)	- - - - -
APPROXIMATE LIMIT OF FILL SLOPE	— · · —	PRESENT WATER LEVEL	. . . . .
APPROXIMATE LIMIT OF EXCAVATION	— · · —	STREAM THALWEG	— — —

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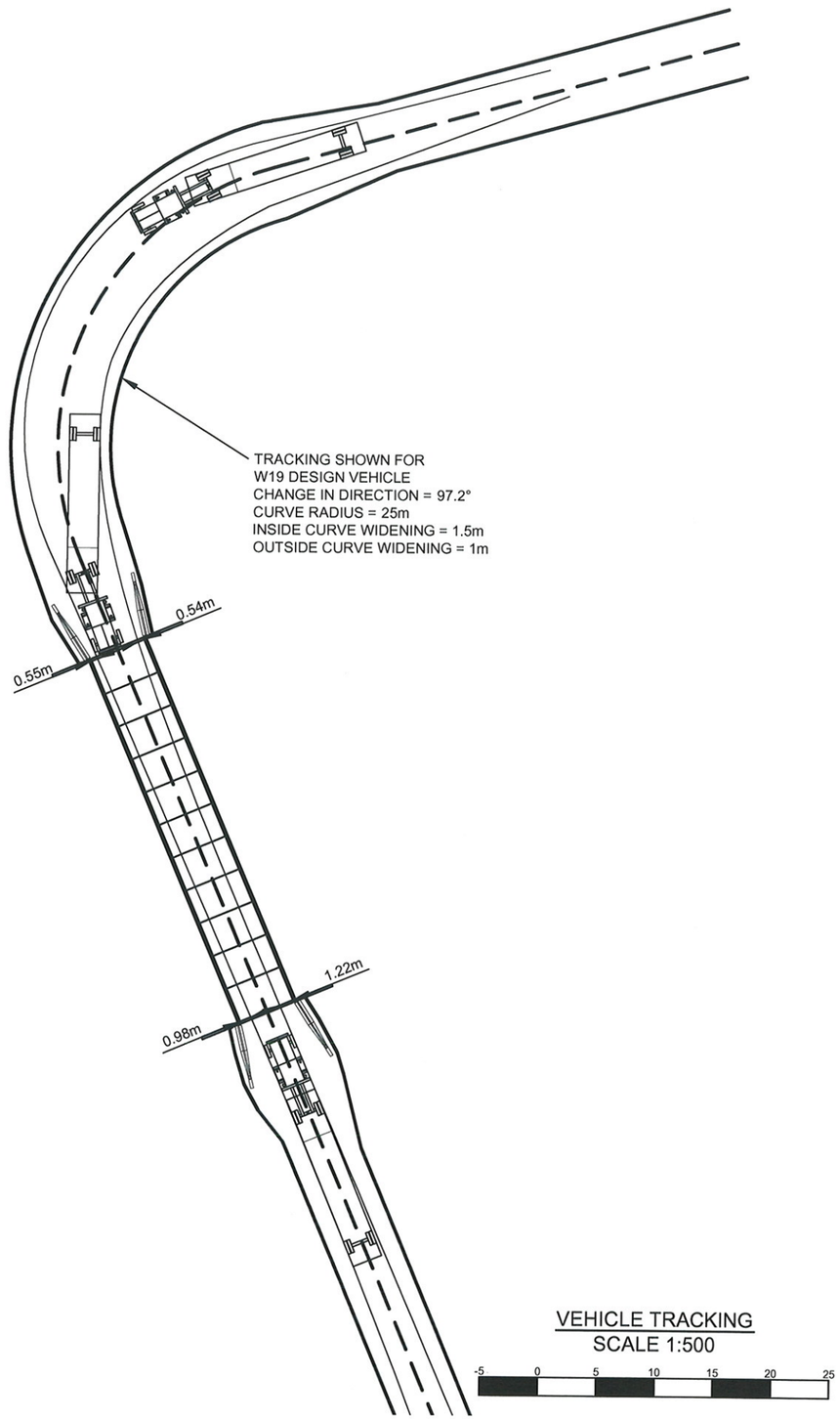

VEHICLE TRACKING
SCALE 1:500

-5 0 5 10 15 20 25

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SHEET: 7 OF 8

DESIGN BY: MICHAEL FOSTER, P.ENG.
DESIGN DATE: JANUARY 18, 2017
REVIEWED BY: JEAN-GUY BERNAT, P.ENG.
DRAWN BY: TODD FORBES
SITE VISIT: ONSITE ENGINEERING LTD.
SITE VISIT DATES: OCTOBER 20, 2016
FILE NAME: N2-108.DWG
SCALE: AS NOTED
REVISION NUMBER:
REVISION DATE:
ALL MEASUREMENTS IN m UNLESS OTHERWISE NOTED.

SEAL OF B.C. P.ENG.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M. J. FOSTER
30461
Feb 2/17

DESIGNED ROAD EDGES
DESIGNED ROAD CENTRELINE
EXISTING ROAD EDGES
HIGH WATER LEVEL
STREAM THALWEG
PRESENT WATER LEVEL

PHOTO #1 - VIEW OF CROSSING LOCATION-WOODS ON LEFT

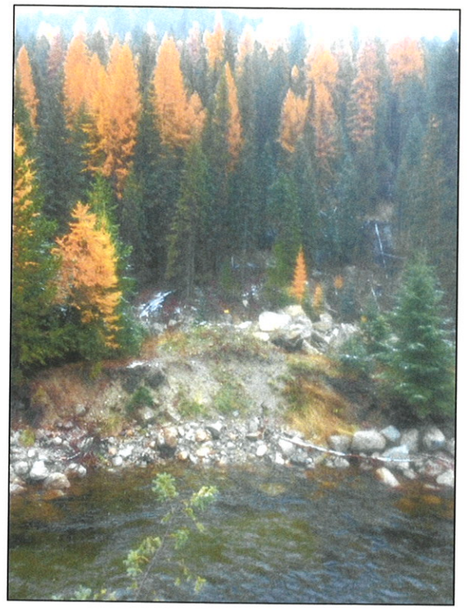

PHOTO #2 - VIEW OF TOWN EMBANKMENT

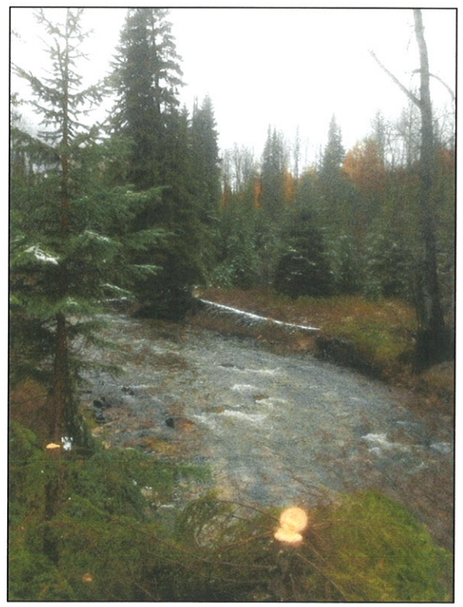

PHOTO #3 - VIEW UPSTREAM

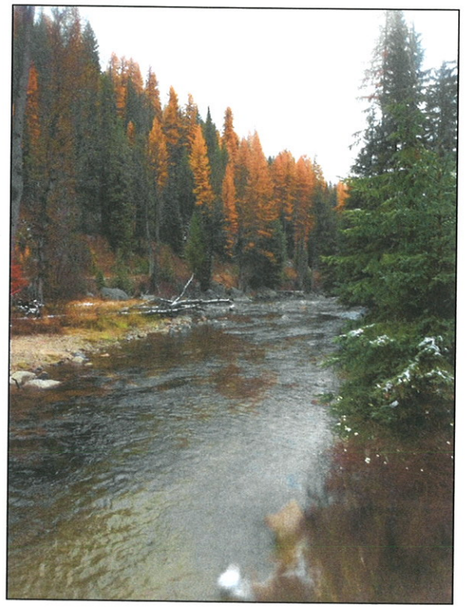

PHOTO #4 - VIEW DOWNSTREAM

PREPARED FOR:

BRITISH COLUMBIA
Ministry of
Forests, Lands and
Natural Resource Operations

PREPARED BY:

ONSITE
ENGINEERING LTD.

INTERIOR OPERATIONS
330 42nd STREET SW
SALMON ARM, BC, V1E 4R1
PH.: 250-832-3366 FAX: 866-235-6943

PROPOSED PERMANENT 33.528m (110') O/A LENGTH
STEEL GIRDER WITH CONCRETE COMPOSITE DECK
BRIDGE FOR: SKOOKUMCHUK FSR
SITE ID: N2-108 STRUCTURE ID: N2-108A
(49° 57' 50" N , 116° 01' 42" W)

DWG No: 343-6-N2-108- 008

SHEET: 8 OF 8

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