

BRITISH Ministry of Forests, Lands, Natural COLUMBIA Resource Operations & Rural Development



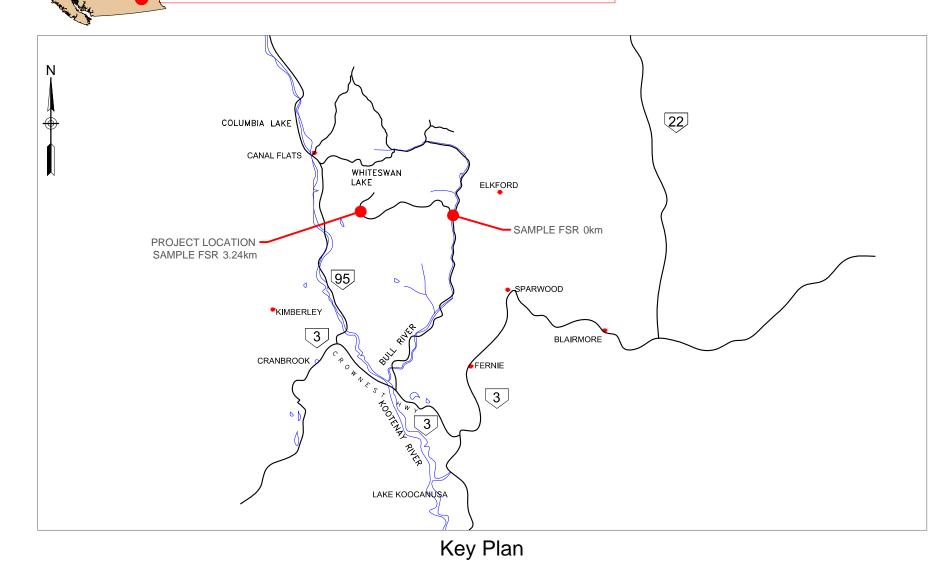
General Arrangement / Conceptual Design

NOTE: THIS SAMPLE DWG. PROVIDES ONE EXAMPLE OF A TYPICAL BRIDGE DWG. WITH TYPICAL NOTES.

A PROFESSIONAL OF RECORD (POR) MUST DEVELOP SPECIFIC NOTES AND DWGS. APPROPRIATE FOR A PARTICULAR SITE AND MUST ENSURE ALL MINISTRY AND PROFESSIONAL STANDARDS ARE MET

Southern Engineering Group

SAMPLE STANDARD DRAWING COMPLEX BRIDGE



| SITE INFORMATION | | | | | | | |
|------------------|--|--|--|--|--|--|--|
| DISTRICT | ROCKY MOUNTAIN DISTRICT | | | | | | |
| SITE No. | RM-1234 | | | | | | |
| STRUCTURE No. | RM-1234A | | | | | | |
| FSR NAME & KM | SAMPLE FSR 3.24km | | | | | | |
| LATITUDE | 49°41'17.37"N | | | | | | |
| LONGITUDE | 115°43'37.22"W | | | | | | |
| DESIGN SUMMARY | 27.832m o/o CONCRETE/STEEL COMPOSITE BRIDGE ON STEEL TOWERS AND PRECAST CONCRETE SPREAD FOOTINGS | | | | | | |

| | DRAWING SCHEDULE | | | | | | | | |
|---------------------|---------------------------------------|---|---------------|--|--|--|--|--|--|
| DRAWING NUMBER | DRAWING NUMBER DESCRIPTION | | | | | | | | |
| 11250-55-RM-1234-01 | GENERAL NOTES - SHEET 1 | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-02 | GENERAL NOTES - SHEET 2 | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-03 | EXISTING PLAN VIEW | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-04 | EXISTING PROFILE & SECTION VIEWS | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-05 | PROPOSED PLAN VIEW | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-06 | PROPOSED PLAN VIEW | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-07 | PROPOSED PROFILE VIEWS & MISC DETAILS | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-08 | PROPOSED ABUTMENT VIEWS & DETAILS | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-09 | PROPOSED ROAD SECTIONS | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-10 | PROPOSED WB-19 VEHICLE TRACKING | 0 | July 10, 2018 | | | | | | |
| 11250-55-RM-1234-11 | EXISTING PHOTOS | 0 | July 10, 2018 | | | | | | |

PLOT DATE: July 30, 2018

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 HEAD OF THE NAIL IN A BLAZED TREE

2. SITE SURVEY

| SURVEY TABLE | | | | | |
|----------------|--------------------------------|--|--|--|--|
| DATE OF SURVEY | 2017-05-14 | | | | |
| SITE LOCATION | 49°41'17.37"N , 115°43'37.22"W | | | | |
| SURVEYOR | MP & PK | | | | |
| COMPANY | FLNRORD | | | | |

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.

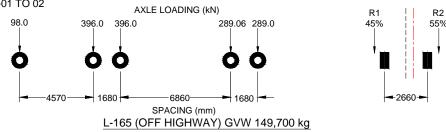
4. HYDROLOGY AND HYDRAULIC ASSESSMENT

- 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.

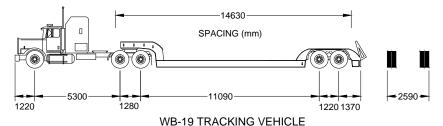
| HYDRAULIC ASSESSMENT DATA | | | | | | | |
|---------------------------------|---|--|--|--|--|--|--|
| WATERSHED DRAINAGE AREA | 1137 Ha. | | | | | | |
| STREAM RIPARIAN CLASS | S-1 | | | | | | |
| STREAM BED MATERIAL | BEDROCK - 0%, GRAVEL - 60%, COBBLES - 20%, BOULDER - 20% | | | | | | |
| BANK FULL STREAM CHANNEL WIDTH | 14.2 m | | | | | | |
| STREAM GRADIENT (AT CROSSING) | 3 % | | | | | | |
| STREAM GRADIENT (OVERALL) | 14 % | | | | | | |
| Q ₁₀₀ FLOW | 127.6 m³/s | | | | | | |
| Q ₁₀₀ VELOCITY (AVE) | 5.6 m/s | | | | | | |
| DEBRIS FLOW POTENTIAL | LOW | | | | | | |
| ANALYSIS PERFORMED BY | Erik Karlsson P.Eng., FLNRORD | | | | | | |
| ANALYSIS DATE | May 18, 2017 | | | | | | |

5. BRIDGE DESIGN

5.1. LOADING: L-165 (149 700 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 BOOK
- 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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AND PROFESSIONAL STANDARDS ARE MET

| BRITISH | MINISTRY OF FORESTS, LANDS, NATURAL | REV | DATE | DESCRIPTION | POR | DRAWING TITLE: GENERAL NOTES | |
|---------------------|---|-----|---------------|-------------------------|-----|---|--------------------------------|
| COLUMBIA | RESOURCE OPERATIONS & RURAL DEVELOPMENT | | | | | | |
| | SOUTHERN ENGINEERING GROUP | | | | | PROFESSIONAL OF RECORD (POR): VICTOR HEDMAN P.ENG | CHECKED BY: DREW DOUGHTY P.ENG |
| SITE #: RM-1234 | LOCATION: SAMPLE FSR 3.24km | | | | | - FLNRORD | FLNRORD |
| 311L #. KW-1234 | LOCATION. SAMELL FOR 3.24kill | | | | | DRAWN BY: | DRAWING NUMBER: |
| STRUCTURE # RM-12 | 234A CROSSING: SAMPLE CREEK | | | | | SHEA WEBER | |
| OTTOOTORE #: TOM 12 | 10-77 OROGONIO. OF WILL DIVIDER | 0 | July 10, 2018 | ISSUED FOR CONSTRUCTION | VH | FLNRORD | 11250-55-RM-1234-01 |

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. 1000Ib 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

14.1.ALL INSTREAM WORKS SHALL COMPLY TO A SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN (EMP) MEETING ALL APPROPRIATE ENVIRONMENTAL PROTECTION LEGISLATION.

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: 100m3

16.2.FILL REQUIRED: 815m3

16.3.ROADWAY SURFACING: 200m³

16.4.PLACED RIP RAP: 140m3

16.5.NOTE THE ABOVE VOLUMES ARE ESTIMATES ONLY AND DO NOT ACCOUNT FOR UNEXPECTED CONDITIONS.

| | 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 | | | | | | | | |
| 3+210 | 0 | 0 | 0 | 0 | | | | | | | | |
| 3+220 | 119 | 0 | 119 | 0 | | | | | | | | |
| 3+230 | 128 | 0 | 247 | 0 | | | | | | | | |
| 3+243 | 128 | 0 | 374 | 0 | | | | | | | | |
| 3+249 | 58 | 0 | 432 | 0 | | | | | | | | |
| 3+284 | 0 | 0 | 432 | 0 | | | | | | | | |
| 3+290 | 52 | 0 | 484 | 0 | | | | | | | | |
| 3+300 | 82 | 0 | 565 | 0 | | | | | | | | |
| 3+310 | 81 | 0 | 647 | 0 | | | | | | | | |
| 3+320 | 71 | 0 | 718 | 0 | | | | | | | | |
| 3+330 | 54 | 0 | 772 | 0 | | | | | | | | |
| 3+340 | 43 | 0 | 815 | 0 | | | | | | | | |

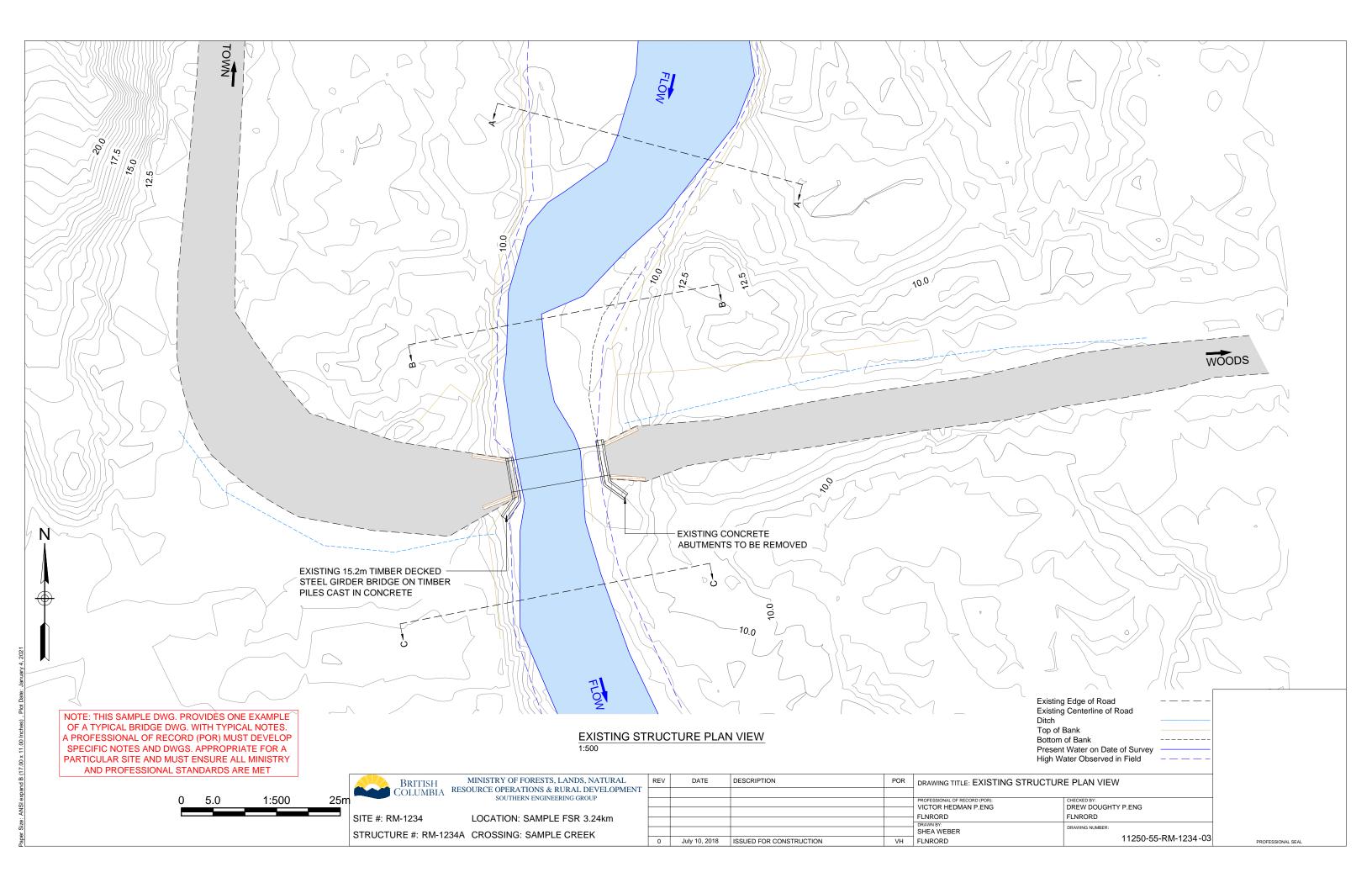
| | MATERIAL LIST | | | | | | | | |
|---------|--|--|--|--|--|--|--|--|--|
| QUANITY | QUANITY DESCRIPTION | | | | | | | | |
| 1 | 27.832m o/o STEEL GIRDER COMPOSITE BRIDGE BRIDGE c/w 4.876m WIDE CONCRETE DECK | | | | | | | | |
| 1 | DECK OVER BALLAST WALL | | | | | | | | |
| 4 | 3m LONG STEEL TOWERS 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 | | | | | | | | |
| | | | | | | | | | |

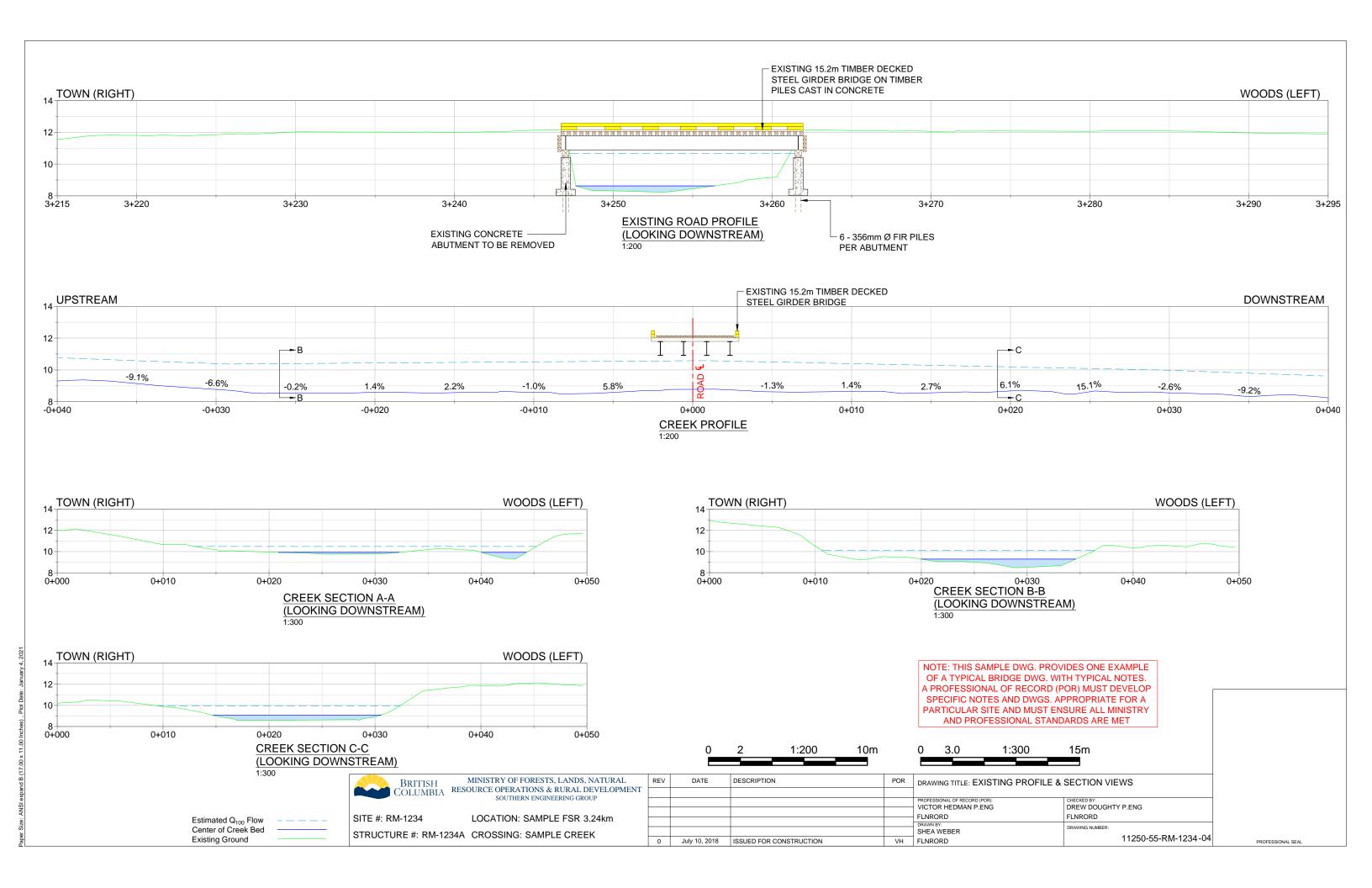
17. SUPPLEMENTAL DOCUMENTATION

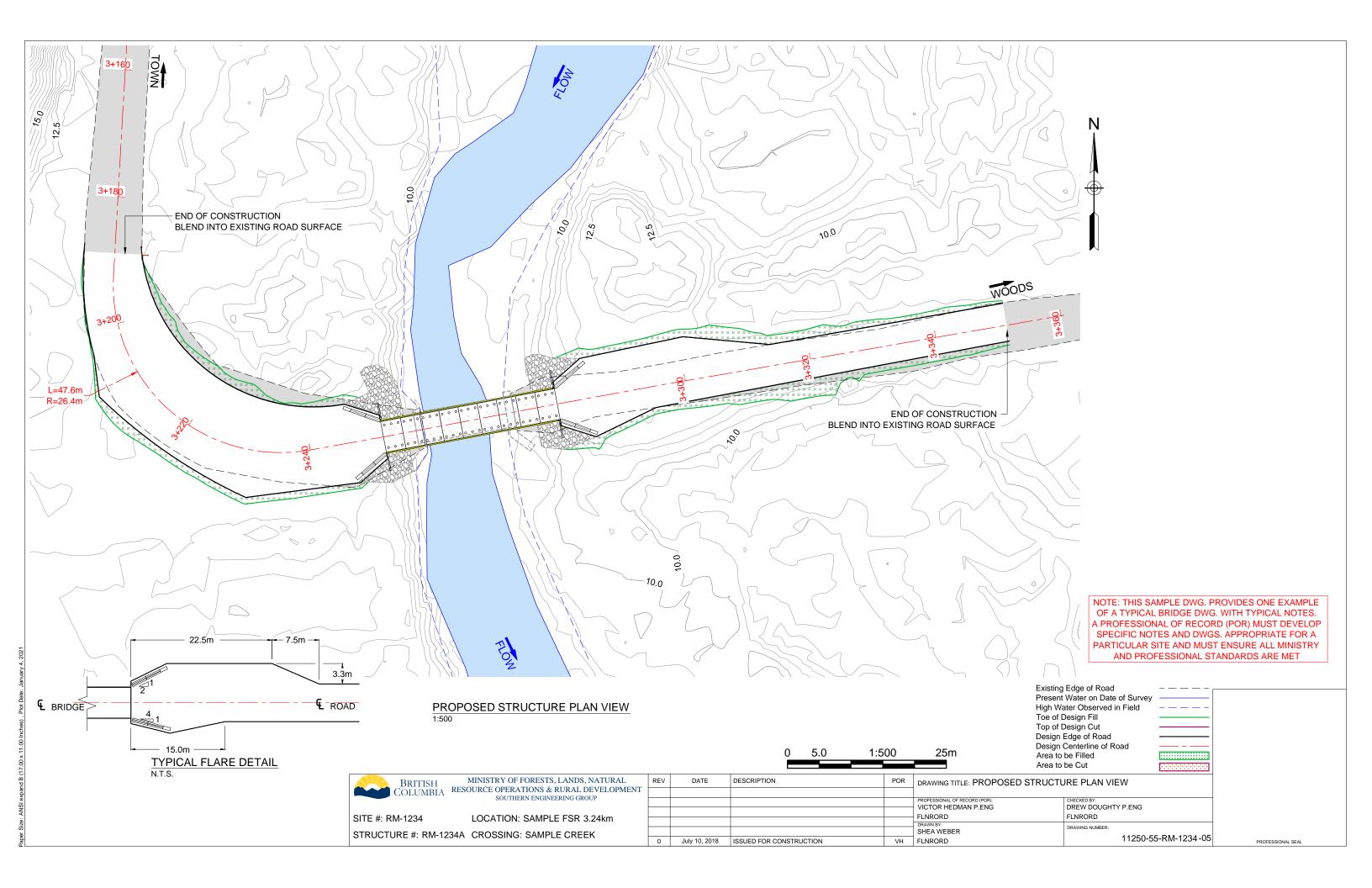
17.1.ENVIRONMENTAL MANAGEMENT PLAN (ATTACHED)

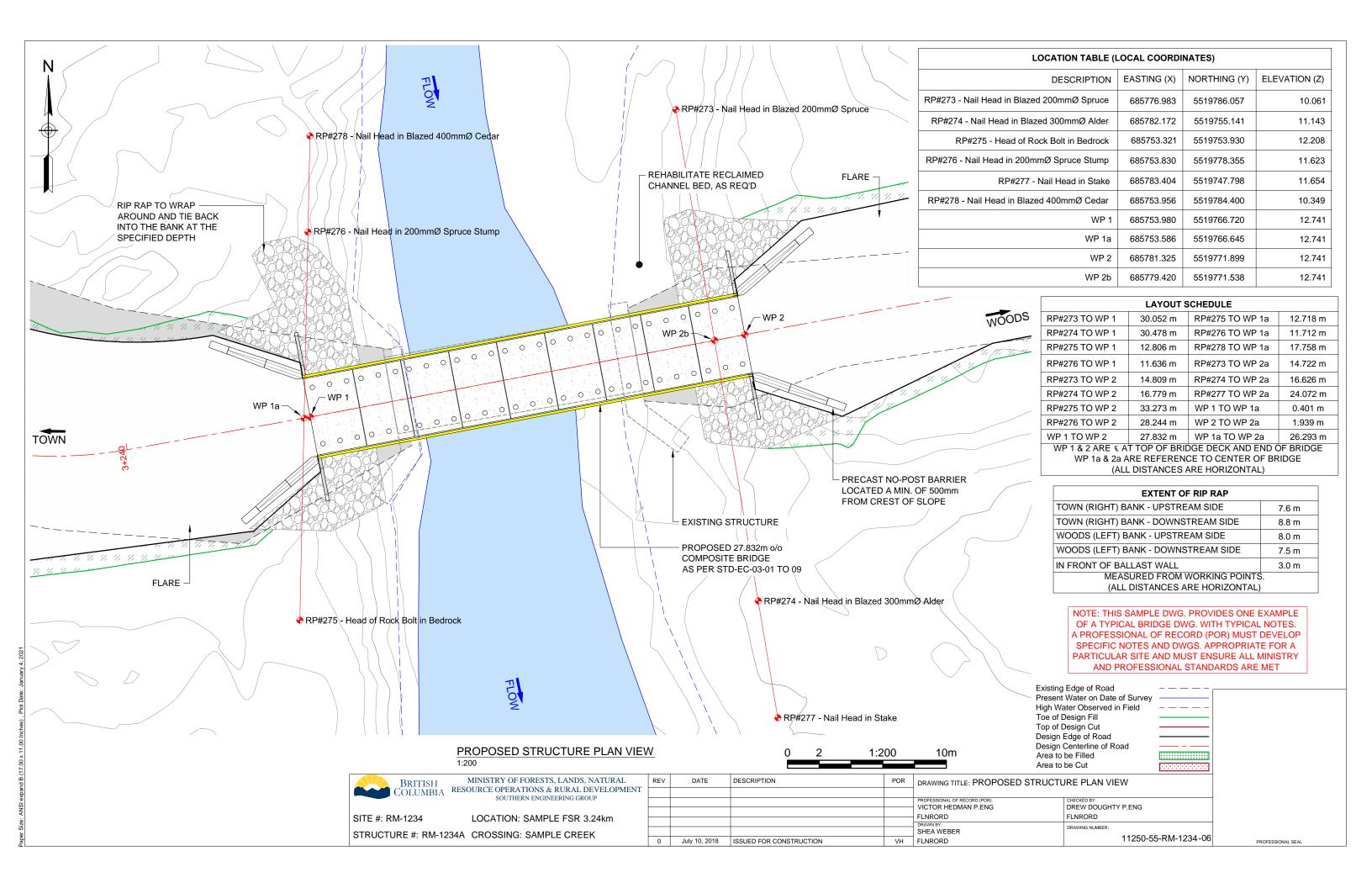
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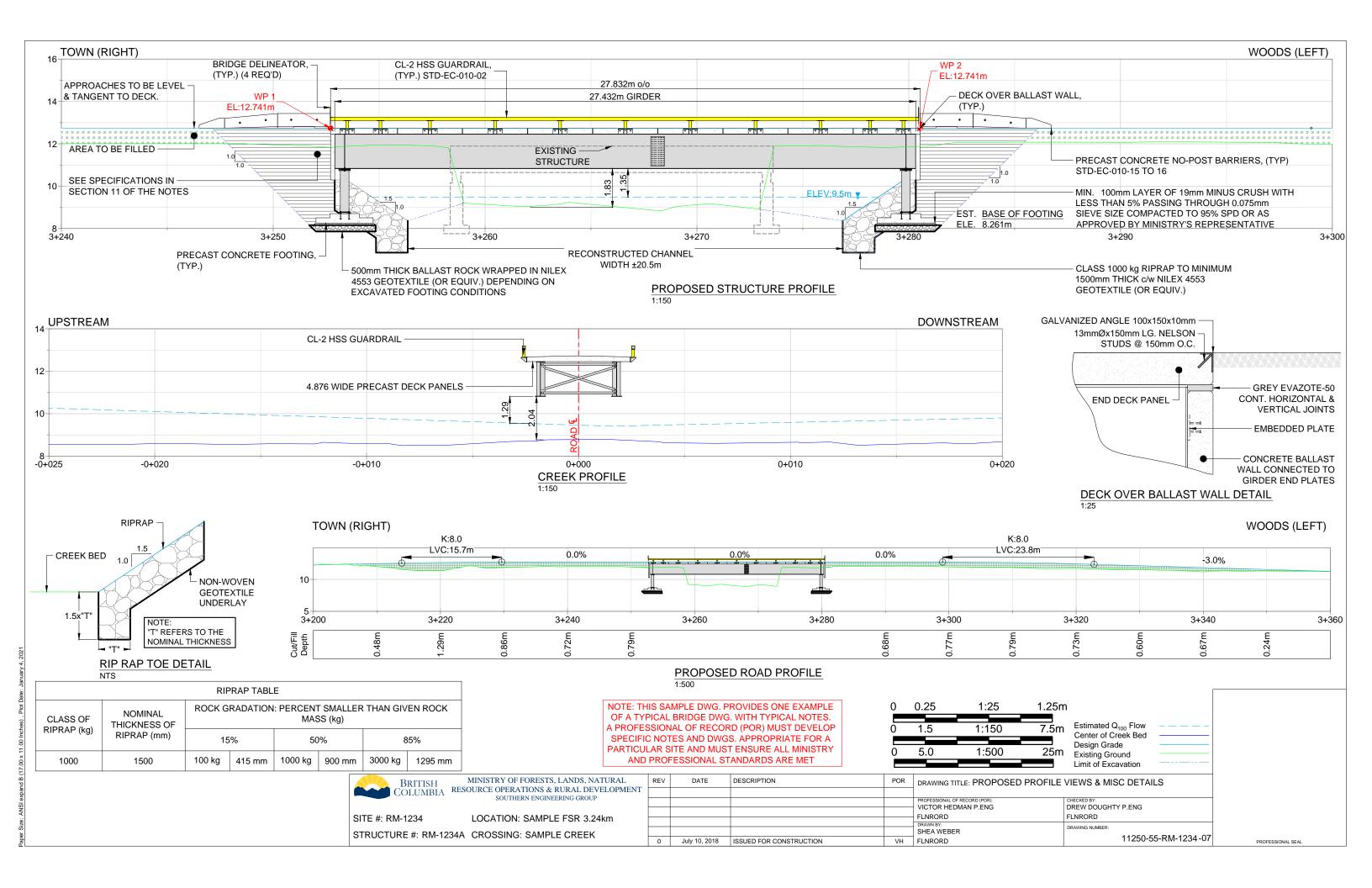
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|-------------------------|--|----------|---------------|-------------------------|-----|------------------------------|----------------------|
| BRITISH _ | MINISTRY OF FORESTS, LANDS, NATURAL | REV | DATE | DESCRIPTION | POR | DRAWING TITLE: GENERAL NOTES | |
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| | SOUTHERN ENGINEERING GROUP | | | | | | CHECKED BY: |
| | | | | | | | DREW DOUGHTY P.ENG |
| SITE #: RM-1234 | LOCATION: SAMPLE FSR 3.24km | | | | | FLNRORD | FLNRORD |
| | | \vdash | | | | DRAWN BY: | DRAWING NUMBER: |
| STRUCTURE # RM-1234 | A CROSSING: SAMPLE CREEK | | | | | SHEA WEBER | 44050 55 584 4004 00 |
| 3111331311L //. 11W 120 | Creconto. Cr. iiii El Ortelit | 1 0 | July 10, 2018 | ISSUED FOR CONSTRUCTION | \/⊔ | EI NDODD | 11250-55-RM-1234-02 |

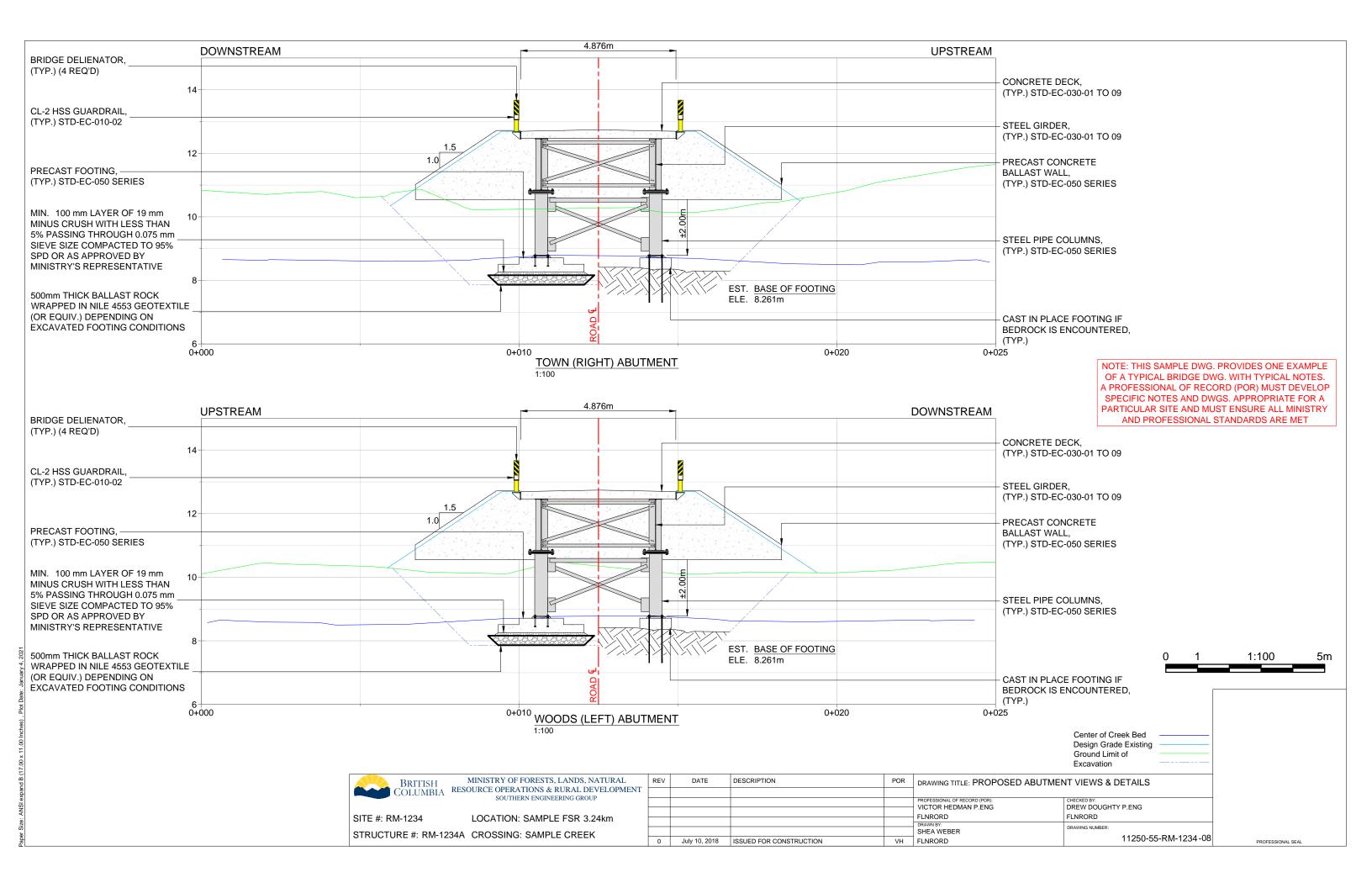


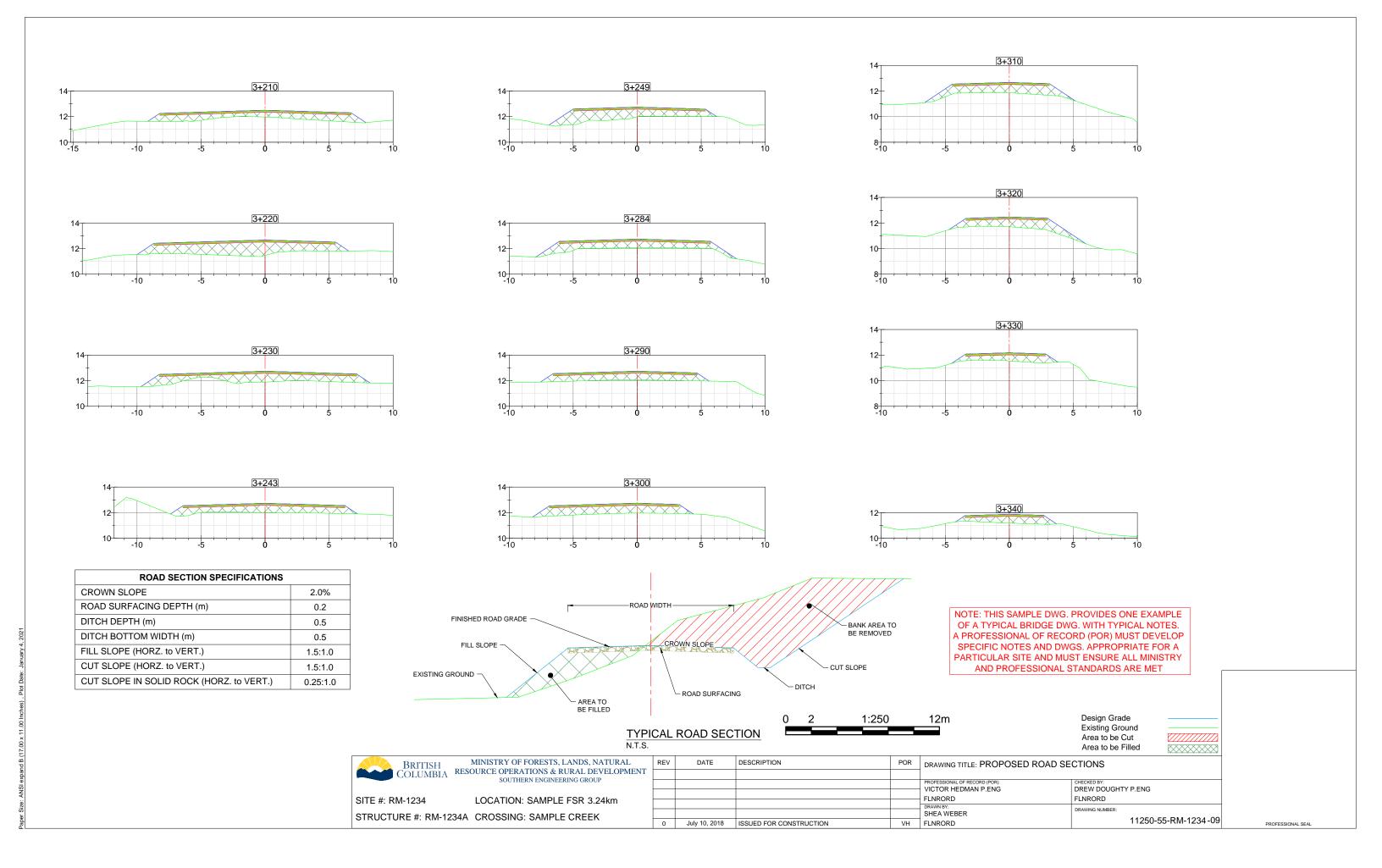


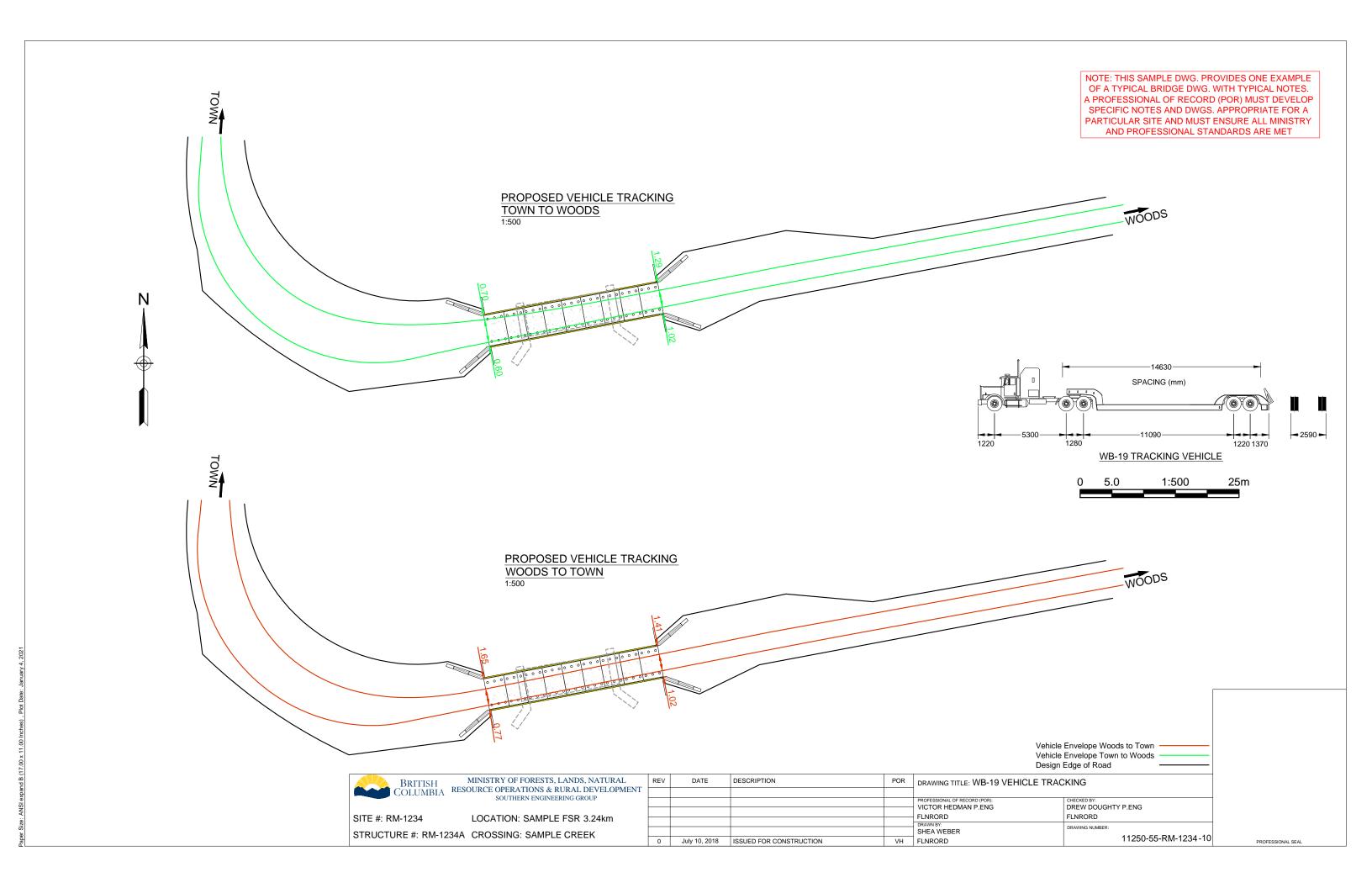
















APPROACH FROM WOODS (LEFT) SHOWING CHIP SEALED RUNNING SURFACE



APPROACH FROM TOWN (RIGHT) SHOWING CHIP SEALED RUNNING SURFACE



LOOKING UPSTREAM FROM CROSSING



LOOKING DOWNSTREAM FROM CROSSING



UPSTREAM PROFILE



TOWN (RIGHT) ABUTMENT SHOWING EXISTING CONCRETE TO BE REMOVED

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| | | SOUTHERN ENGINEERING GROUP | | | | | | HECKED BY: DREW DOUGHTY P.ENG |
| 01- | FF " DM 4004 | LOCATION CAMPLE FOR COM | | | | | | LNRORD |
| SI | ΓΕ #: RM-1234 | LOCATION: SAMPLE FSR 3.24km | | | | | DRAWN BY: | LINKORD |
| | DUIGTURE # DM 400 | 44 ODOOONIO OAMBI E ODEEK | | | | | SHEA WEBER | PRAWING NUMBER: |
| SI | RUCTURE #: RM-1234 | 4A CROSSING: SAMPLE CREEK | 0 | July 10, 2018 | ISSUED FOR CONSTRUCTION | VH | FLNRORD | 11250-55-RM-1234-11 |

PROFESSIONAL SEA