



NOT TO SCALE

PROPOSED PERMANENT 15.240m (50') L-100  
POST AND PAD STEEL GIRDER BRIDGE WITH  
MODULAR TIMBER DECK PANELS FOR:  
707km ON THE LEO MIDDLE FSR

PREPARED FOR:



**BCTS**  
BC Timber Sales

PREPARED ON:  
August 22, 2019

| Sheet Number | Sheet Name                     |
|--------------|--------------------------------|
| 1            | Cover Sheet                    |
| 2            | Road and Crossing Plan         |
| 3            | Road/Crossing/Thalweg Profiles |
| 4            | Abutment Sections              |
| 5            | Notes                          |
| 6            | Site Photos                    |



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SHEET  
**1**  
OF 6

|                                                                                                       |                  |  |
|-------------------------------------------------------------------------------------------------------|------------------|--|
| DWG #: 111-026-004<br>INTENDED TO BE PRINTED ON 11"X17" PAPER. ANY COPIES OF PDFS MAY NOT BE TO SCALE | CURRENT REVISION |  |
|                                                                                                       | REVISION DATE    |  |
|                                                                                                       | REVISION DESC.   |  |

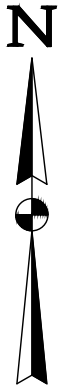
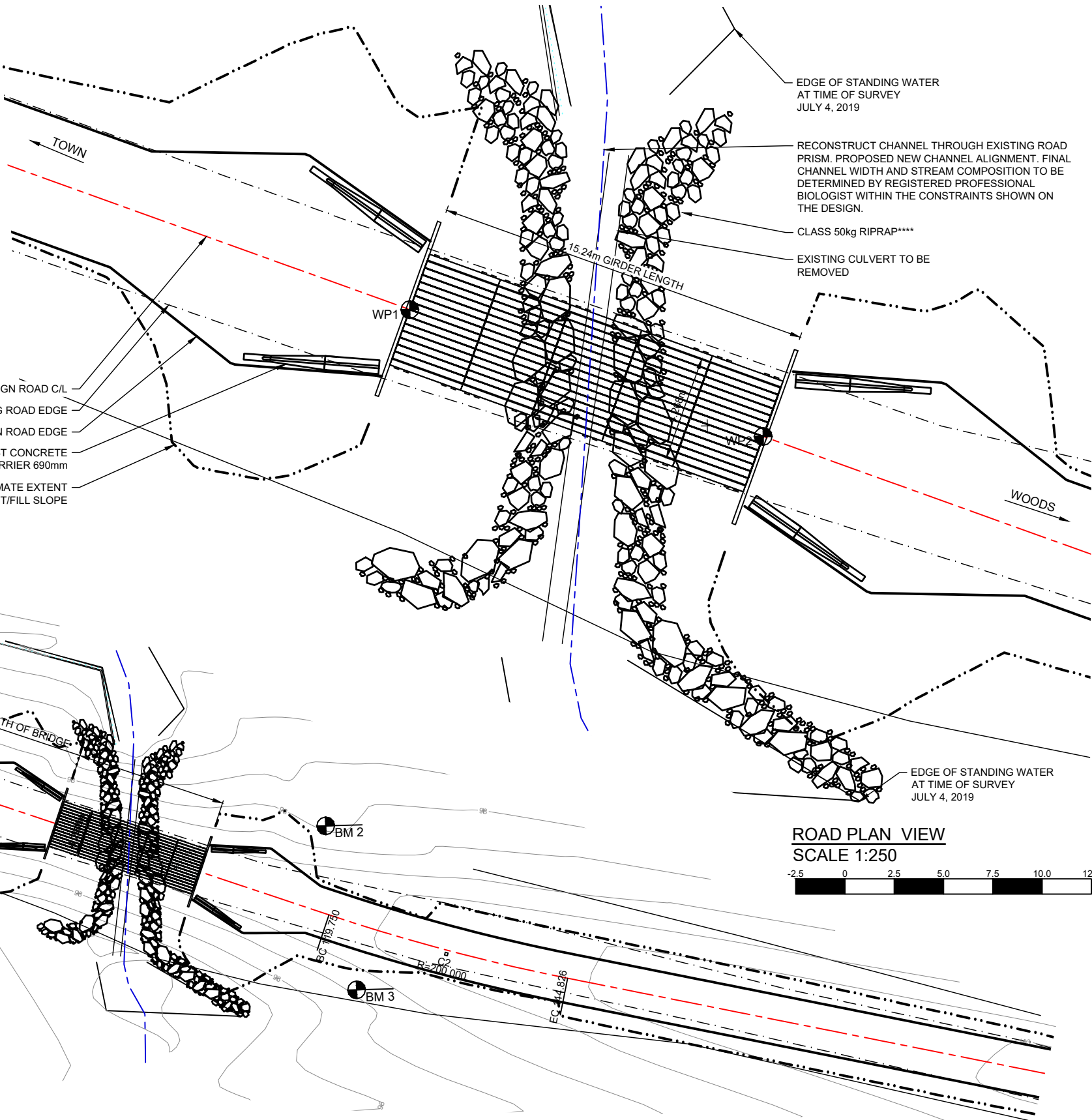
| WORKPOINT TABLE |           |          |
|-----------------|-----------|----------|
| Point           | BENCHMARK | DISTANCE |
| WP1             | BM1       | 26.580   |
|                 | BM2       | 27.301   |
|                 | BM3       | 34.780   |
|                 | BM4       | 24.552   |
| WP2             | BM1       | 41.220   |
|                 | BM2       | 13.652   |
|                 | BM3       | 19.987   |
|                 | BM4       | 39.070   |

WORKPOINTS ARE LOCATED UNDERSIDE ENDS OF BRIDGE.

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

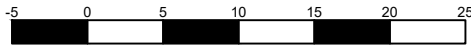
| REFERENCE TABLE |             |              |               |
|-----------------|-------------|--------------|---------------|
| Point           | Easting (m) | Northing (m) | Elevation (m) |
| BM1             | 967.702     | 1022.011     | 97.955        |
| BM2             | 1015.241    | 1003.809     | 98.020        |
| BM3             | 1017.892    | 987.091      | 99.929        |
| BM4             | 963.427     | 1003.781     | 99.137        |
| WP1             | 987.958     | 1004.801     | 98.779        |
| WP2             | 1002.268    | 999.556      | 99.161        |

SURVEY CONTROL BASED ON COORDINATES ESTABLISHED LOCALLY. WORKPOINTS ARE AT THE CENTER OF UNDERSIDE OF GIRDER ENDS.

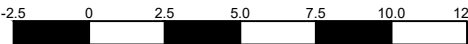


| SITE INFORMATION       |              |
|------------------------|--------------|
| Creek Name             | UNNAMED      |
| Classification         | S4           |
| Tributary to           | Middle River |
| Est. Installation Date | July 2019    |
| Est. Removal Date      | >45 years    |
| Est. Total m³          | 150,000 m3   |
| Season of use          | All Season   |

CROSSING PLAN VIEW  
SCALE 1:500



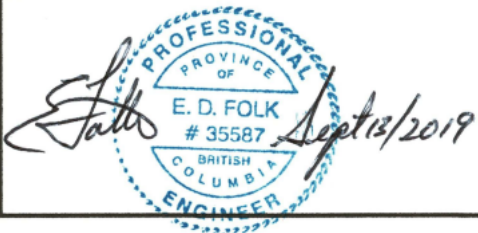
ROAD PLAN VIEW  
SCALE 1:250



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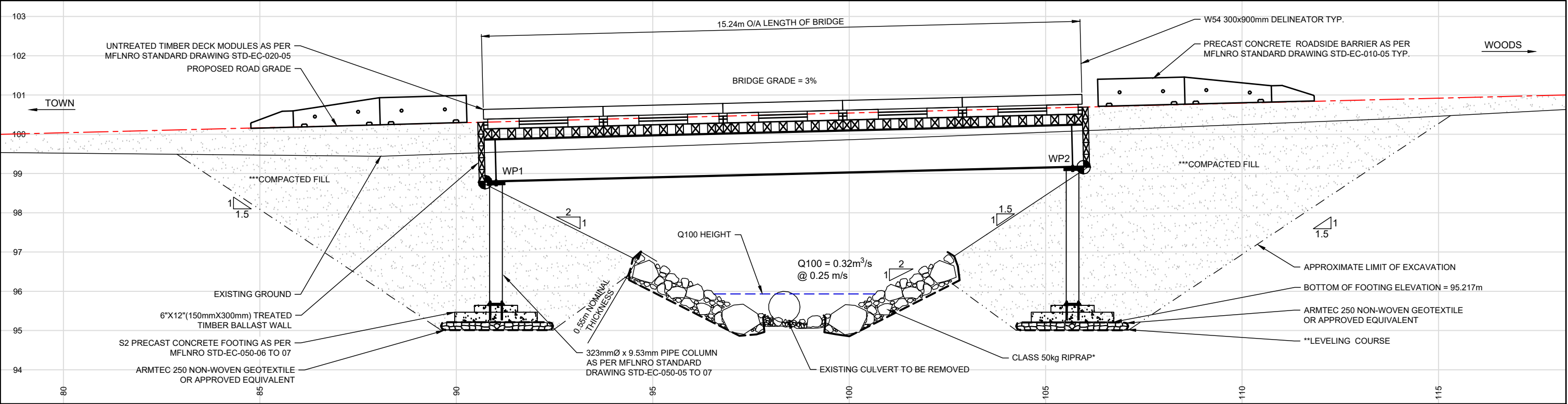
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SHEET NAME:  
ROAD AND CROSSING PLAN VIEW

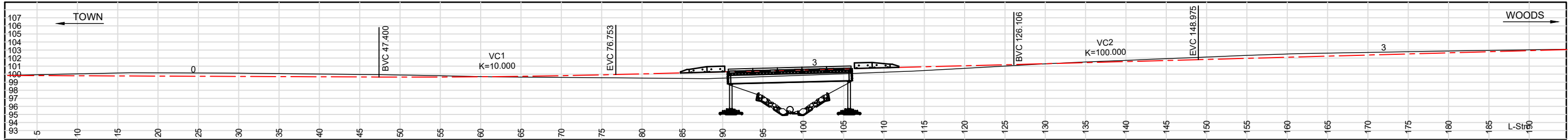
SCALE: As Indicated  
DESIGN BY: Edward Folk, P.Eng, RFT  
DRAWN BY: NH  
REVIEWED BY: Daryl Taylor, P.Eng, RPF  
SITE SURVEY: July 4, 2019

SURVEY CREW: DT, DF  
DATE: August 22, 2019  
REVISION NUMBER:  
REVISION DATE:  
DWG #: 111-026-004

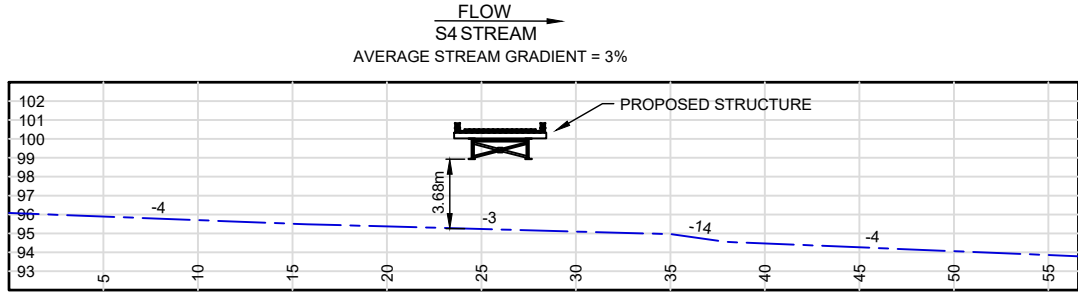
SHEET  
**2**  
OF 6



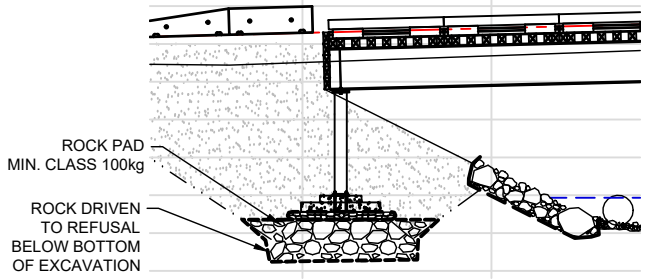
CROSSING PROFILE - PROPOSED STRUCTURE  
SCALE 1:100



ROAD PROFILE VIEW WITH PROPOSED STRUCTURE  
SCALE 1:500



STREAM THALWEG PROFILE  
SCALE 1:400

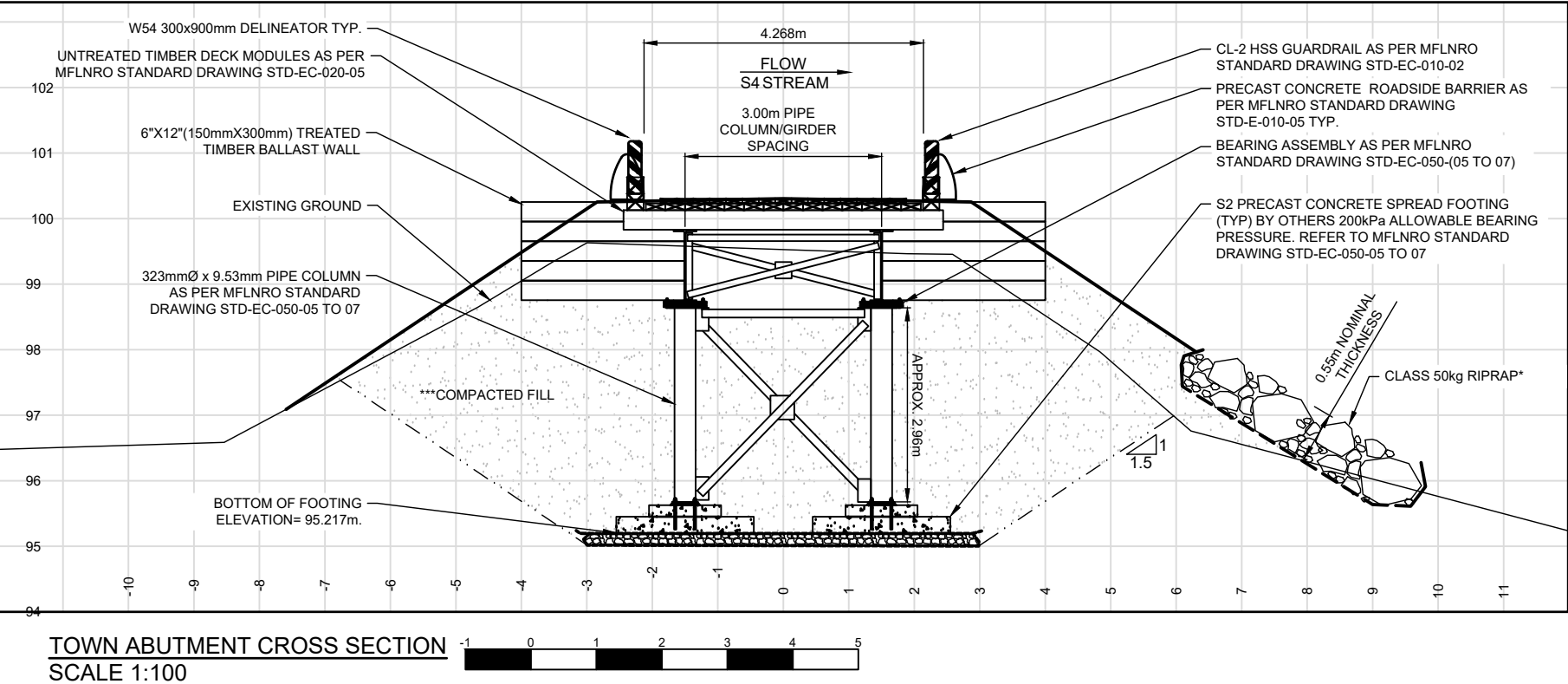
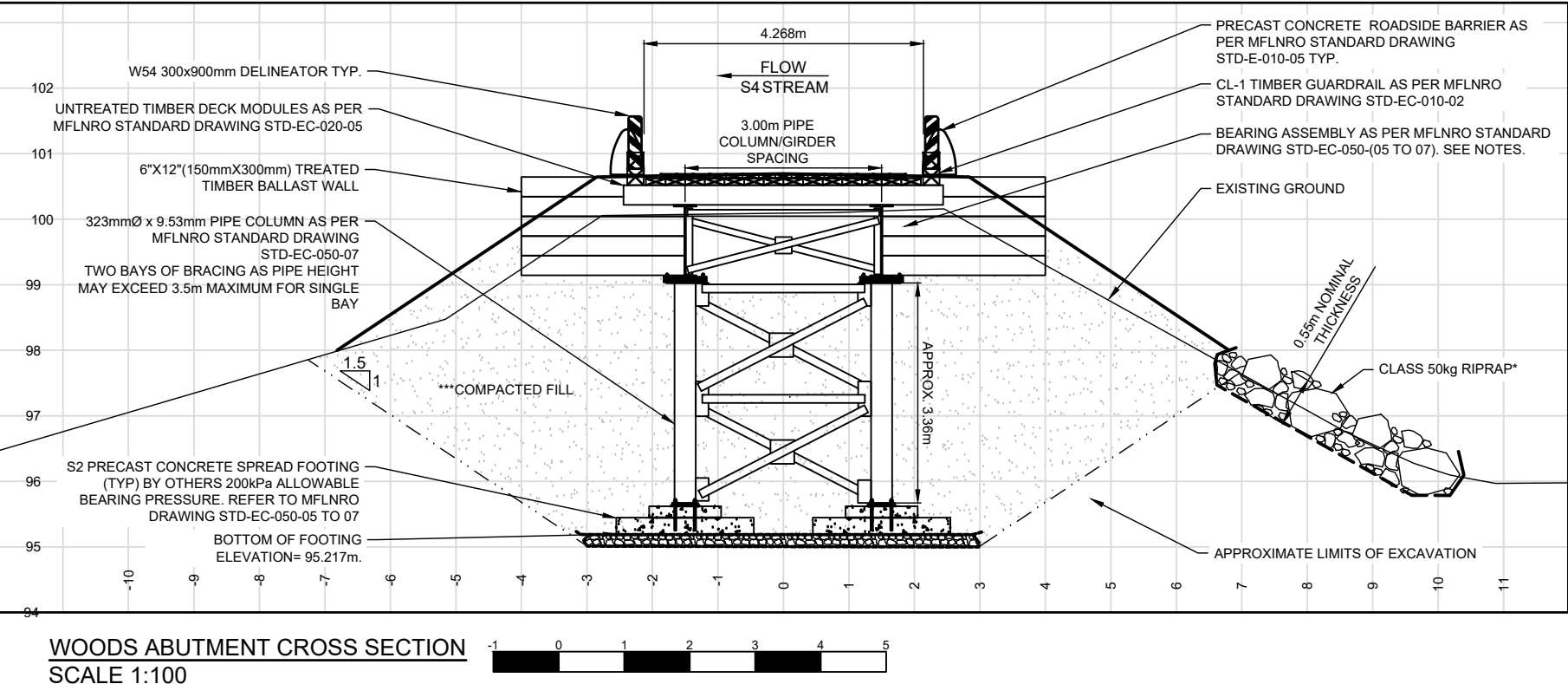


ALTERNATE FOOTING DETAIL  
SCALE 1:200

1. IF FOUNDATION SOILS ARE FOUND UNSUITABLE, MAY HAVE TO DRIVE ROCK TO REFUSAL
2. IF EXCAVATION CANNOT BE DEWATERED UNDER NORMAL OPERATION, BUILD ROCK PAD FOR FOUNDATION PRIOR TO PLACING LEVELLING COURSE

\*\*\*COMPACTED FILL IS A WELL DRAINED GRANULAR MATERIAL, TO BE PLACED IN LIFTS OF 0.3m MAXIMUM (MEASURED LOOSE). WATER MAY NEED TO BE ADDED (PRIOR TO COMPACTION AND DURING THE SPREADING OF THE LIFTS) TO THE MATERIAL TO ACHIEVE THE REQUIRED COMPACTION, MULTIPLE PASSES WITH A 1000lb VIBRATING COMPACTOR TO 95% STANDARD PROCTOR OF THE MODIFIED DRY DENSITY (SPMDD)

\*\*LEVELLING COURSE TO BE A WELL DRAINED GRANULAR MATERIAL COMPACTED TO 95% SPMDD AND WRAPPED IN ARMTEC 250 NON-WOVEN GEOTEXTILE OR APPROVED EQUIVALENT.



|                                                                                                                                                      |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| *RIPRAP: CLEAN ANGULAR ROCK                                                                                                                          |          |
| CLASS 50kg RIPRAP                                                                                                                                    |          |
| ROCK GRADATION                                                                                                                                       |          |
| PERCENT SMALLER THAN GIVEN                                                                                                                           |          |
| ROCK MASS kg(mm)                                                                                                                                     |          |
| 15%                                                                                                                                                  | 5(155)   |
| 50%                                                                                                                                                  | 50(330)  |
| 85%                                                                                                                                                  | 150(475) |
| NOMINAL THICKNESS OF RIPRAP                                                                                                                          |          |
| 550mm                                                                                                                                                |          |
| ALL ROCK TO BE PLACED TO MAXIMIZE INTERLOCKING BETWEEN PIECES. ALL ROCK TO BE UNDERLAIN WITH ARMTEC 250 OR APPROVED EQUIVALENT NON-WOVEN GEOTEXTILE. |          |

1 - GEOTECHNICAL

FOUNDATION DESIGN REFERENCES THE CANADIAN ENGINEERING FOUNDATION MANUAL. SUBSURFACE INFORMATION HAS BEEN INFERRED FROM SITE OBSERVATIONS OF ROAD CUTS AND ALONG STREAMBANKS AND FROM SHALLOW HAND DUG TEST PITS. NO DETAILED SUBSURFACE INVESTIGATION WAS PERFORMED (LARGE MACHINE DUG 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. SOILS ARE ANTICIPATED TO BE \*LOOSE TO COMPACT SILTY SANDS AND GRAVELS.

2 - HYDROLOGY AND HYDRAULIC ASSESSMENT

HYDRAULIC ANALYSIS BASED ON CURRENT CHANNEL. CONDITIONS COULD VARY OVER TIME

FREE BOARD HEIGHT REQUIREMENT SHOWN REFERS TO UPSTREAM UNDERSIDE OF THE GIRDER OF BRIDGE

THE EXTENT OF THE RIPRAP IS BASED ON AVAILABLE INFORMATION. THE EXTENTS SHOULD BE ADJUSTED IN THE FIELD TO ENSURE ADEQUATE SCOUR PROTECTION IS PROVIDED TO THE BRIDGE SUBSTRUCTURE AND ABUTMENTS.

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 DETERMINE PEAK FLOW. Q100=0.32m³/s @ 0.25m/s LOW LIKELIHOOD OF COARSE WOODY DEBRIS MOVEMENT

3 - BRIDGE DESIGN

CONFORM TO CAN/CSA-S6-36 (MODIFIED) AND THE MINISTRY OF FORESTS AND RANGE, "FOREST SERVICE BRIDGE DESIGN AND CONSTRUCTION MANUAL" 1999.

ALL BRIDGE COMPONENTS SHALL CONFORM TO THE MINISTRY OF FORESTS AND RANGE STANDARD DRAWINGS UNLESS APPROVED BY OWNER.

LOADING: L-100 (90,680 KG G.V.W.) ECCENTRICITY IN ACCORDANCE WITH S6-06.

FATIGUE: DESIGN TO BE COMPLETED IN ACCORDANCE WITH CAN/CSA-S6-06 - 500,000 CYCLES.

GUARD RAIL - CL-1 TIMBER BRIDGE GUARD RAIL AS PER MFLNRO STANDARD DRAWING STD-EC-010-01.

FOR THE PURPOSES OF THIS DESIGN THE TERM PERMANENT REFERS TO DURATION OF THIS INSTALLATION MEANS FORTY-FIVE (45) YEARS OR MORE. DURATION WILL BE DETERMINED IN THE END BY ROUTINE INSPECTIONS.

SUPERSTRUCTURE SUPPLIED BY OTHERS. CONFIRM ALL DIMENSIONS PRIOR TO FIELD LAYOUT. IF SUPERSTRUCTURE USED PREVIOUSLY AT ANOTHER LOCATION IT MUST BE INSPECTED BY A QUALIFIED REGISTERED PROFESSIONAL PRIOR TO USE AT THIS SITE.

CHECK REQUIRED BEARING TO BEARING DISTANCE AND DEPTH OF ACTUAL STRUCTURE PRIOR TO INSTALLATION OF THE FOUNDATION.

4 - CONSTRUCTION NOTES

THE PROFESSIONAL OF RECORD OR THEIR DESIGNATE IS REQUIRED TO INSPECT / CARRY OUT THE FOLLOWING ACTIVITIES PRIOR TO PROVIDING SUBSTANTIAL CONFORMANCE DOCUMENTATION:

- INSPECT FOUNDATION SOILS FOLLOWING EXCAVATION
- INSPECT LAYOUT AND LOCATION OF FOOTINGS
- LAYOUT RIPRAP PLACEMENT
- BACKFILL MATERIAL AND TECHNIQUE
- OTHER SITE INSPECTIONS AT THE DISCRETION OF THE PROFESSIONAL

5 - MATERIALS

ENDFILL MATERIAL - ENDFILL SHALL CONSIST OF WELL GRADED, SELECT, GRANULAR MATERIAL (<75MM), PLACED IN LIFTS OF 300mm MAXIMUM (MEASURED LOOSE), WATER MAY NEED TO BE ADDED (PRIOR TO COMPACTION AND DURING THE SPREADING OF LIFTS) TO THE MATERIAL TO ACHIEVE THE REQUIRED COMPACTION. MULTIPLE PASSES WITH A 1000-LB VIBRATING COMPACTOR, COMPACTED TO 95% STANDARD PROCTOR OF THE MODIFIED DRY DENSITY (SPMDD).

6 - ABUTMENTS

ENSURE ALL WORKS COMPLY WITH MINISTRY OF FORESTS AND RANGE STANDARDS

7 - SAFETY

WHERE EXCAVATION SPECIFICATIONS ON THESE DRAWINGS CONFLICT WITH WORKSAFEBC REGULATIONS, WORKSAFEBC REGULATIONS ARE TO GOVERN

8 - ENVIRONMENT

STREAM REBUILDING TO BE SUPERVISED BY A QUALIFIED REGISTERED ENVIRONMENTAL PROFESSIONAL

ALTERATION TO STREAM BANKS AND IN-STREAM WORK MUST BE SUPERVISED BY QUALIFIED PERSON. SEDIMENT MANAGEMENT TO REDUCE SILTATION IS REQUIRED. IN-STREAM MACHINE CROSSINGS ARE NOT PERMITTED WITHOUT PROPER APPROVAL.

REMOVE THE MINIMUM AMOUNT OF RIPARIAN VEGETATION NECESSARY TO INSTALL A SAFE STRUCTURE. DIRECT SURFACE WATER AWAY FROM WORK SITE. ENSURE MACHINERY IS CLEAN PRIOR TO ENTERING WATERCOURSE. SILT FENCING, GEOTEXTILE CLOTH FABRIC AND A ROLL OF PLASTIC SHOULD BE ON SITE. STOP WORK DURING EXTREME ADVERSE WEATHER CONDITIONS. SEED AND STRAW DISTURBED SLOPES AS SOON AS POSSIBLE.

ENSURE DITCH WATER AND SURFACE RUNOFF FROM THE ROAD DOES NOT FLOW DIRECTLY INTO STREAM. CONSTRUCT SUMPS AS REQUIRED. EXACT LOCATIONS ARE TO BE FIELD DETERMINED UPON CONSTRUCTION.

ON SITE PRESCRIPTIONS MAY HAVE TO BE MODIFIED TO ACCOMMODATE ACTUAL ROAD VERTICAL/HORIZONTAL ALIGNMENT, SLOPE ANGLES ON FILL AND CUT SLOPES, MATERIAL COMPOSITION AND WEATHER.

9 - SITE CONDITIONS

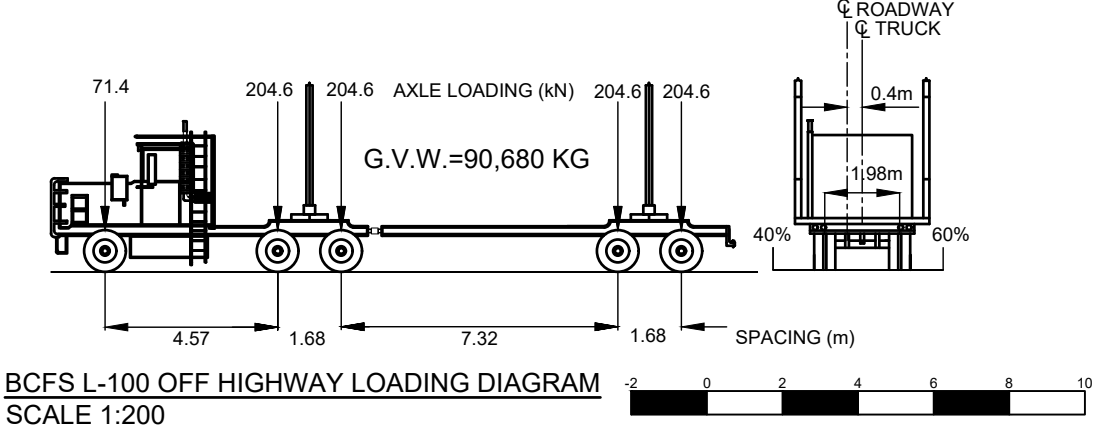
DUE TO THE NATURE OF THE SITE, CONDITIONS MAY VARY FROM THE FIELD INFORMATION GATHERED. ON SITE PRESCRIPTIONS MAY HAVE TO BE MODIFIED TO ACCOMMODATE ACTUAL ROAD HORIZONTAL/VERTICAL ALIGNMENT, SLOPE ANGLES ON FILL AND CUT SLOPES, MATERIAL COMPOSITION AND WEATHER.

ENVIRONMENTAL FISH STREAM 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 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 POSSIBLE.
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.

ENVIRONMENTAL ROAD AND RUNOFF NOTES:

1. IF POSSIBLE, APPROACHES TO BE CROWNED AND GRAVELED.
2. ENSURE SUMPS ARE INSTALLED IN THE DITCHLINE AN ADEQUATE DISTANCE FROM CREEK.
3. INSTALL SILT FENCE ALONG BASE OF EXPOSED FILL IF WARRANTED. REMOVE SILT FENCE AFTER 1 GROWING SEASON.
4. ALL EXPOSED MINERAL SOILS WITHIN 50m OF CROSSING ARE TO BE GRASS SEEDED AND COVERED WITH STRAW TO PROTECT GROWTH.



| **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          |

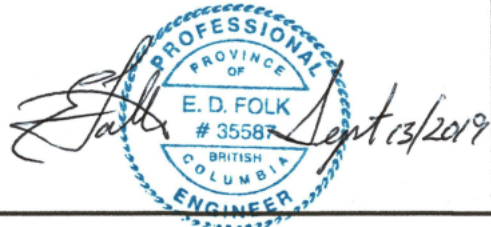
| PARTIAL MATERIALS LIST (EXCLUDING THE BRIDGE SUPER STRUCTURE AND HARDWARE) |                                                                            |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 1                                                                          | ROLL NON-WOVEN GEOTEXTILE: ARMTEC 250 OR EQUIVALENT                        |
| 5 pcs.                                                                     | UNTREATED TIMBER DECK MODULES AS PER MFLNRO STANDARD DRAWING STD-EC-020-05 |
| 4 pcs.                                                                     | W-054 SERIES DELINEATORS (2 LEFT, 2 RIGHT)                                 |
| 2 pcs.                                                                     | W-051 SERIES NARROW STRUCTURE / BRIDGE AHEAD SIGNS                         |
| 10                                                                         | 6"X12"(150mmX300mm) TREATED TIMBER BALLAST BOARDS                          |
| 4                                                                          | 323mmØ x 9.53mm PIPE COLUMN, CUT TO LENGTH                                 |
| 4                                                                          | PRECAST S2 CONCRETE FOOTINGS                                               |
| 12                                                                         | PRECAST CONCRETE NO-POST BARRIERS                                          |

| ESTIMATED EARTHWORKS VOLUMES |                                                   |
|------------------------------|---------------------------------------------------|
| 1100m³                       | CUT MATERIAL (INCLUDES ROAD APPROACHES)           |
| 700m³                        | GRANULAR FILL MATERIAL (INCLUDES ROAD APPROACHES) |
| 70m³                         | APPROXIMATE VOLUME OF CLASS 50KG RIP RAP          |

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

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SHEET NAME:  
  
NOTES

SCALE: As Indicated

DESIGN BY: Edward Folk, P.Eng, RFT

DRAWN BY: NH

REVIEWED BY: Daryl Taylor, P.Eng, RPF

SITE SURVEY: July 4, 2019

SURVEY CREW: DT, DF

DATE: August 22, 2019

REVISION NUMBER:

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SHEET  
5  
OF 6



Crossing Approach from Woods



Crossing Approach from Town



Sinkhole in Road



Existing Culvert Inlet



Existing Culvert Outlet



Stream Channel