



Ministry of  
Forests, Lands, Natural  
Resource Operations  
and Rural Development



# TWO HIGH SEGMENTAL CONCRETE BLOCK RETAINING WALL (SRW2) DESIGN AID

| DRAWING SCHEDULE |                           |      |            |
|------------------|---------------------------|------|------------|
| DRAWING NUMBER   | DESCRIPTION               | REV. | DATE       |
| STD-RW-010-01    | GENERAL NOTES             | 0    | 10/29/2021 |
| STD-RW-010-02    | CROSS SECTION AND PROFILE | 0    | 10/29/2021 |



**NOTES: TWO HIGH SEGMENTAL CONCRETE BLOCK RETAINING WALL (SRW2) DESIGN AID**

**1. DEFINITIONS:**

- 1.1. MINISTRY REFERS TO BRITISH COLUMBIA MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
- 1.2. PROFESSIONAL OF RECORD (POR) REFERS TO A PROFESSIONAL ENGINEER (P.ENG.), PROFESSIONAL GEOSCIENTIST (P.GEO.) REGISTERED FOREST TECHNOLOGIST (RFT), REGISTERED PROFESSIONAL FORESTER (RPF), OR APPLIED SCIENCE TECHNOLOGIST (ASCT) RESPONSIBLE FOR THE DESIGN OF A SEGMENTAL CONCRETE BLOCK RETAINING WALL UTILIZING THE SRW2 DESIGN AID.
- 1.3. COORDINATING REGISTERED PROFESSIONAL (CRP) OR COORDINATING MEMBER (CM) REFERS TO THE INDIVIDUAL RESPONSIBLE FOR PLANNING AND COORDINATING ALL PROFESSIONAL SERVICES FOR THE PROJECT IN ACCORDANCE WITH EGBC AND ABCFP GUIDELINES.

**2. THE SRW2 DESIGN AID IS INTENDED FOR USE BY A SUITABLY QUALIFIED POR FAMILIAR AND KNOWLEDGEABLE WITH THE FOLLOWING:**

- FOREST ROAD STANDARDS
- MINISTRY ENGINEERING MANUAL
- FOREST ROAD ENGINEERING GUIDEBOOK
- FOREST AND RANGE PRACTICES ACT
- FOREST PLANNING AND PRACTICES REGULATION
- ENGINEERS & GEOSCIENTIST BC (EGBC) AND ASSOCIATION OF BC FOREST PROFESSIONAL (ABCFP) GUIDELINES FOR PROFESSIONAL SERVICES IN THE FOREST SECTOR - ROADS
- EGBC PROFESSIONAL PRACTICE GUIDELINES RETAINING WALL DESIGN
- TYPICAL INDUSTRIAL HAUL ROAD REQUIREMENTS
- IDENTIFICATION OF FREE DRAINING AND GRANULAR SOILS
- IDENTIFICATION OF STABLE (LONG-TERM) CUT SLOPES AND RESPECTIVE CUT SLOPE ANGLES
- IDENTIFICATION OF DRAIN ROCK

**3. THE POR FOR EACH WALL INSTALLATION PREPARED USING THIS DESIGN AID IS RESPONSIBLE FOR ENSURING THE WALL DESIGN UTILIZES PARAMETERS THAT DO NOT EXCEED THE DESIGN PARAMETERS OF THIS DESIGN AID. EACH POR, FOR EACH WALL DESIGN PREPARED USING THIS DESIGN AID MUST DECIDE FOR THEMSELVES WHEN LOCAL SITE CONDITIONS MEET, OR EXCEED, THE CRITERIA OF THIS DESIGN AID.**

**4. SITE SPECIFIC DESIGN DRAWINGS: THE POR SHALL UTILIZE THE SRW2 DESIGN AID TO PREPARE SITE SPECIFIC RETAINING WALL DESIGN DRAWINGS. THE DRAWINGS SHALL STATE THE SRW2 DESIGN AID WAS USED AS THE BASIS FOR THE DESIGN. THE POR SHALL SIGN AND SEAL THE SITE SPECIFIC RETAINING WALL DESIGN DRAWINGS.**

**5. ASSURANCE STATEMENT: THE POR MUST COMPLETE AND SIGN AN FS 1461 - RETAINING WALL STRUCTURE FIELD REVIEWS CONSTRUCTION ASSURANCE STATEMENT. THE POR MUST INDICATE THEY ARE THE DESIGN PROFESSIONAL - WITH A NOTE THAT THE SRW2 DESIGN AID WAS USED AS THE BASIS FOR DESIGN. THE POR ALSO STATES HE/SHE IS THE POR RESPONSIBLE FOR FIELD REVIEWS DURING CONSTRUCTION. THE CRP OR CM MUST ENSURE APPROPRIATE POR INVOLVEMENT AND SIGN OFF.**

**6. DESIGN AID LIMITATIONS:**

- 6.1. THE SRW2 DESIGN AID ONLY APPLIES TO SITES WHERE IN-SITU SOILS OR FILLS ARE CLASSIFIED AS SANDS AND GRAVELS AS PER THE UNIFIED SOIL CLASSIFICATION SYSTEM (USCS). FINE GRAINED SOILS CLASSIFIED AS SILTS OR CLAYS REQUIRE SITE SPECIFIC DESIGN AND THE DESIGN AID SHOULD NOT BE USED FOR SUCH SOILS OR SITES.
- 6.2. THE SRW2 DESIGN AID IS INTENDED FOR USE WHERE THE CONSEQUENCES OF WALL FAILURE ARE CONSIDERED LOW. FOR SITES OF MODERATE TO HIGH CONSEQUENCE OR RISK REVIEW BY A GEOTECHNICAL ENGINEER IS REQUIRED.
- 6.3. DRAINS ARE REQUIRED FOR ALL SITES WHERE IN-SITU SOILS OR FILL ARE NOT FREE DRAINING. FREE DRAINING SITES ARE DEFINED AS SITES HAVING SOILS WITH LESS THAN 5% BY MASS PASSING 0.075MM SIEVE ON THE FRACTION SMALLER THAN 2MM.
- 6.4. THE SRW2 WALL BATTER MUST BE NO LESS THAN 9.5° (1H:8V).
- 6.5. THE SOIL FILL SLOPE ANGLE BEHIND THE SRW2 SHALL BE A MINIMUM OF 3 DEGREES FLATTER THAN LOCAL STABLE CUT SLOPE ANGLES AND SHALL NOT BE GENERALLY STEEPER THAN 33° (66%). HOWEVER, IN SPECIAL CIRCUMSTANCES (ANGULAR BLOCKY COLLUVIUM COBBLES) SOIL FILL SLOPE ANGLES COULD BE UP TO 37°.
- 6.6. THE FRONT BLOCK MUST BE EMBEDDED A MINIMUM OF 300MM.
- 6.7. WHERE THIS DESIGN AID CONFLICTS WITH EITHER EGBC GUIDELINES OR OCCUPATIONAL HEALTH AND SAFETY (OHS) LEGISLATION OR REGULATIONS THEN THE EGBC AND OHS REQUIREMENTS WILL GOVERN UNTIL DISCREPANCIES ARE RECONCILED.

**7. RETAINED SOIL FILL:**

- 7.1. RETAINED SOIL FILL WILL USUALLY BE LOCALLY SOURCED CUT MATERIALS (NOT SILT OR CLAY). GENERALLY RETAINED SOIL WILL BE FREE OF EXCESS MOISTURE, ROOTS, MUCK, SOD, SNOW, FROZEN LUMPS, ORGANIC MATTER, OR OTHER DELETERIOUS MATERIALS. ALL ROCK PARTICLES AND HARD EARTH CLODS SHALL BE LESS THAN 150 MM IN THE LONGEST DIMENSION. FILL WHICH DOES NOT MEET THESE CRITERIA SHALL BE CONSIDERED UNSUITABLE AND SHALL BE REMOVED. FILL WILL BE APPROVED BY THE POR. WHERE IMPORTED SOIL IS REQUIRED, THE CONTRACTOR MAY BE REQUIRED TO SUBMIT GRADATION TESTING SPECIFICATIONS TO THE POR FOR CERTIFICATION THAT THE SOILS PROPOSED FOR USE HAVE PROPERTIES MEETING OR EXCEEDING THE DESIGN REQUIREMENTS.

**8. DRAIN (WHERE REQUIRED) AND LEVELLING PAD:**

- 8.1. 75 MM DRAIN GRAVEL: MATERIAL SHALL BE A 300 MM MINIMUM HORIZONTAL THICKNESS. DRAIN GRAVEL WILL BE 75 MM MINUS GRAVEL.
- 8.2. 75 MM DRAIN GRAVEL (MINIMUM 60% FRACTURE) IS TO BE IMPORTED FROM AN APPROVED SOURCE.
- 8.3. A DRAIN IS REQUIRED WHERE THE RETAINED SOIL GRADATION HAS GREATER THAN 5% OF THE SAMPLE FRACTION SMALLER THAN 2MM THAT IS LESS THAN 0.075MM PARTICLE SIZE.
- 8.4. DRAIN MATERIAL SHALL BE WRAPPED AND SEPARATED WITH NON-WOVEN GEOTEXTILE.

| 75 MM DRAIN GRAVEL GRADATION REQUIREMENTS: |                 |
|--|-----------------|
| SIEVE SIZE                                 | PERCENT PASSING |
| 75 MM                                      | 100             |
| NO. 4 SIEVE (4.8 MM)                       | 0-5             |

**9. SEGMENTAL CONCRETE BLOCKS USED IN THE SRW2 SHALL HAVE SHEAR KEYS ON TOP AND RECESSES ON THE BOTTOM TO ACCEPT THE SHEAR KEY AND SHALL BE IN ACCORDANCE WITH THE MINISTRY SPECIFICATION FOR PRECAST CONCRETE UNREINFORCED INTERLOCKING BLOCKS SPECIFIED IN THE MINISTRY BRIDGE COMPONENT CONCRETE STANDARD.**

**10. NON-WOVEN GEOTEXTILE (WHERE REQUIRED AS SHOWN ON THE DRAWING): NILEX 4552 OR EQUIVALENT - ADJACENT SHEETS OF NON-WOVEN GEOTEXTILE ARE TO HAVE A MINIMUM OVERLAP OF 500 MM.**

**11. DRAINAGE PIPE: PERFORATED PVC OR GALVANIZED STEEL DRAIN PIPE IS TO HAVE A MINIMUM OF TWO HOLES PER 150MM OF PIPE LENGTH ORIENTATED DOWNWARDS. THE PIPE IS TO BE OF SUFFICIENT STRENGTH TO WITHSTAND THE PRESSURES OF THE BACKFILL MATERIAL AND OVERLYING SEGMENTAL CONCRETE BLOCKS WHERE APPLICABLE.**

**12. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL CLEAR AND GRUB THE RETAINING WALL FOOTPRINT, REMOVING TOP SOIL, BRUSH, SOD OR OTHER ORGANIC OR DELETERIOUS MATERIAL. ANY UNSUITABLE SOILS SHALL BE OVER-EXCAVATED, REPLACED WITH COMPACTED BACKFILL MATERIAL TO PROJECT SPECIFICATIONS OR AS OTHERWISE DIRECTED BY THE POR.**

**13. SUB-GRADE PREPARATION:**

**13.1. WALL CONSTRUCTION SHALL NOT BEGIN UNTIL EXCAVATION TO THE FOUNDATION ELEVATION HAS BEEN COMPLETED AND THE SUB-GRADE PROPERLY PREPARED.**

**SUB-GRADE SOIL PREPARATION:**

- SUB-GRADE SOILS SHALL BE DEFINED AS UNDISTURBED NATURAL SOILS LOCATED BENEATH THE LEVELLING PAD.
- SUB-GRADE SOILS WHERE NOT CONSISTING OF COMPACT SANDS AND GRAVELS SHALL BE EXCAVATED, REPLACED, AND COMPACTED AS APPROVED BY THE POR ON SITE PRIOR TO PLACEMENT OF ANY FILL MATERIALS AND/OR SEGMENTAL CONCRETE BLOCKS.

**13.2. THE PROFESSIONAL OF RECORD WILL INSPECT THE SUB-GRADE UNDER THE LEVELING PAD TO ENSURE IT MEETS THE DESIGN REQUIREMENTS.**

**LEVELLING PAD:**

- THE LEVELLING PAD SHALL BE LOCATED AS INDICATED ON THE CONSTRUCTION DRAWINGS AND SHALL HAVE A MINIMUM THICKNESS OF 150 MM.
- A LEVELLING PAD IS NOT REQUIRED WHERE THE IN-SITU SOILS AND FILLS ARE FREE DRAINING AND THE LOCAL SOILS HAVE A COBBLE/BOULDER CONTENT LESS THAN 10% SUCH THAT THEY CAN EASILY BE DISCARDED DURING PREPARATION OF THE SUB-BASE TO ACHIEVE THE DESIGN BATTER AND LONGITUDINAL PROFILE.
- THE LEVELLING PAD SHALL BE COMPACTED TO PROVIDE A SMOOTH, HARD SURFACE ON WHICH TO PLACE THE FIRST ROW OF SEGMENTAL CONCRETE BLOCK UNITS.
- THE LEVELLING PAD SHALL BE PREPARED TO ENSURE FULL CONTACT OF THE SEGMENTAL CONCRETE BLOCK UNIT WITH BASE MATERIAL. SPACING AND/OR GAPS BETWEEN UNITS SHALL NOT EXCEED 12 MM.
- LEVELLING PAD WILL BE PLACED AND COMPACTED TO MATCH REQUIRED GRADES AND BATTERS.

**14. INSTALLATION OF SEGMENTAL CONCRETE BLOCKS:**

- 14.1. NO WORK WILL OCCUR ON FROZEN OR SATURATED SOILS.
- 14.2. SURVEY: THE CONTRACTOR IS RESPONSIBLE TO SURVEY AND LAYOUT THE FOUNDATION, WALL, DRAIN, FINISHED SURFACE AND OTHER DESIGN ELEMENTS AS PER DESIGN DRAWINGS.
- 14.3. SEGMENTAL CONCRETE BLOCKS WILL BE PLACED AS SHOWN ON THE DRAWINGS. BLOCKS WILL BE PLACED STAGGERED AND IN AN INTERLOCKING MANNER. THE UNITS WILL BE LAID PLUMS (WITH THE APPROPRIATE BATTER) AND TRUE AND ALL JOINT GAPS BETWEEN BLOCKS WILL BE MINIMIZED. EACH COURSE OF THE SRW2 WILL BE BACKFILLED TO THE TOP OF THE PREVIOUS COURSE PRIOR TO PLACING THE NEXT COURSE. ENSURE THAT UNITS ARE IN FULL CONTACT WITH BASE. PROPER CARE SHALL BE TAKEN TO DEVELOP STRAIGHT LINES AND SMOOTH CURVES ON BASE COURSE AS PER WALL LAYOUT.  
SEGMENTAL CONCRETE BLOCK INSTALLATION:
  - FIRST ROW OF SEGMENTAL CONCRETE BLOCK UNITS SHALL BE BASE BLOCK UNITS AND SHALL BE PLACED IN FULL CONTACT WITH THE BASE MATERIAL.
  - CHECK SEGMENTAL CONCRETE BLOCK UNITS FOR LEVEL FROM SIDE-TO-SIDE, FRONT-TO-BACK, AND CHECK TO MAINTAIN 9.5° UNIT BATTER FRONT-TO-BACK.
  - PLACE SEGMENTAL CONCRETE BLOCK UNIT FACES IN CONTACT SIDE TO SIDE AND AVOID ANY GAPS GREATER THAN 12 MM.
  - FILL AND COMPACT FILL TO GRADE IN FRONT OF EMBEDDED UNITS PRIOR TO COMPACTION BEHIND THE SEGMENTAL CONCRETE BLOCK UNITS.
  - CHECK AND MAINTAIN LEVEL AND WALL BATTER.
  - HANDLE UNITS WITH PROPER LIFTING DEVICES THAT HAVE BEEN CERTIFIED FOR THE LOADS ASSOCIATED WITH THE WEIGHTS OF THE UNITS.

**14.4. SEGMENTAL CONCRETE BLOCK UNITS WHICH ARE TO BE EXPOSED IN FINISHED WALLS WILL BE CAREFULLY SELECTED. EXPOSED FACES WILL BE FREE OF ALL CHIPS OR MARKS AND MEET SPECIFICATION OF NOTE 9.**

**14.5. WHERE THE RETAINED AND IN-SITU SOILS ARE NOT FREE DRAINING A DRAINAGE SYSTEM IS REQUIRED CONSISTING OF GRAVEL DRAIN AND DRAIN PIPES AS SHOWN ON THE DRAWINGS. THE HOLES OF THE DRAIN PIPE ARE TO BE ORIENTATED DOWNWARDS. THE DRAIN PIPE SHOULD DAYLIGHT AT A LOCATION APPROVED BY THE POR. LIGHT RIPRAP ARMOURING SHOULD PROTECT THE OUTLET. THE DRAINAGE SYSTEM SHOULD BE INSTALLED AT THE ELEVATION AND ORIENTATIONS SHOWN ON THE DESIGN DRAWINGS OR AS DIRECTED BY THE POR. THE DRAIN IS TO BE ENTIRELY WRAPPED IN NON-WOVEN GEOTEXTILE (NILEX 4552 OR EQUIVALENT). THE DRAIN PIPE SHALL BE DISCHARGED INTO THE DITCH DOWNGRADE OF THE SRW2 OR WHERE THERE IS NO DITCH A SOLID OFFTAKE DRAIN PIPE IS TO BE LOCATED A MINIMUM 600 MM BELOW FINISHED GRADE AND BEDDED WITH 150 MM OF CLEAN SAND WHERE IT CROSSES THE ROAD AND DISCHARGED TO AN APPROPRIATE STABLE LOCATION.**

**14.6. RETAINED SOIL FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 300 MM IN UNCOMPACTED THICKNESS FOR HEAVY COMPACTION EQUIPMENT. FOR ZONES WHERE COMPACTION IS ACCOMPLISHED WITH HAND-OPERATED EQUIPMENT, FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 200 MM IN UNCOMPACTED THICKNESS. ONLY HAND OPERATED EQUIPMENT SHALL BE ALLOWED WITHIN ONE METER OF THE WALL FACE. THE COMPACTION REQUIREMENTS WILL BE DETERMINED BY THE POR AND WILL DEPEND ON LOCAL SITE CONDITIONS, SOILS, AND LOCAL MOISTURE CONTENT. A MINIMUM OF 3 PASSES WITH COMPACTION EQUIPMENT IS RECOMMENDED. THE POR SHALL REVIEW THE EFFECTIVENESS OF THE COMPACTION METHODOLOGY IN THE FIELD TO DETERMINE IF ALTERNATIVE OR ADDITIONAL COMPACTION IS REQUIRED.**

**14.7. CONTRACTOR MUST ENSURE WORKERS AND EQUIPMENT ARE NOT EXPOSED TO HAZARDS RELATED TO OVER-STEEPENED TEMPORARY CUT SLOPES. CONTRACTOR SHALL FOLLOW ALL BC OHS REGULATIONS AND GUIDELINES AND MAY BE REQUIRED TO RETAIN A GEOTECHNICAL ENGINEER TO ENSURE SAFE SUBEXCAVATION CUT SLOPES ARE MAINTAINED DURING CONSTRUCTION ACTIVITIES.**

**15. FIELD REVIEWS:**

**15.1. FIELD REVIEWS ARE TO BE COMPLETED BY A QUALIFIED POR AT A MINIMUM AT THE FOLLOWING STAGES OF CONSTRUCTION:**

- UPON SITE SUB-EXCAVATION TO GRADE BEFORE PLACEMENT OF LEVELLING PADS OR DRAINS.
- DURING OR UPON COMPLETION OF THE DRAINAGE SYSTEM.
- DURING OR UPON COMPLETION OF THE FIRST ROW OF BLOCKS WITH A REVIEW OF FILL COMPACTION PROCEDURES AND REQUIREMENTS.
- UPON COMPLETION OF THE SRW2.

**16. QUALITY CONTROL:**

**16.1. THE CONTRACTOR IS RESPONSIBLE FOR QUALITY CONTROL SUCH THAT THE WALL INSTALLATION MEETS DESIGN SPECIFICATION. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE POR ANY CHANGES EITHER IN THE CONSTRUCTION OR TO ASSUMED SUBSURFACE SOIL CONDITIONS BEFORE PROCEEDING.**

**16.2. A COMPLETE SET OF APPROVED CONSTRUCTION DRAWINGS AND CONTRACT SPECIFICATIONS SHALL BE ON-SITE AT ALL TIMES DURING CONSTRUCTION OF THE RETAINING WALL.**

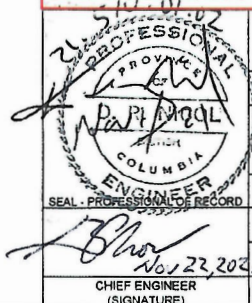
**17. SPECIAL PROVISIONS:**

**17.1. GEOMETRY AND LOCATIONS OF SLOPES AND WALLS, AND GEOMETRY AND LOCATION OF EXISTING AND NEW STRUCTURES AND SERVICES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.**

FOR DESIGN AID RATIONALE SEE REPORT TITLED "DEVELOPMENT OF STANDARD TWO HIGH SEGMENTAL CONCRETE BLOCK RETAINING WALL DESIGN AID" BY SNTG DATED NOVEMBER 1, 2021.

**NOT FOR CONSTRUCTION  
ASSUME NOT TO SCALE**

SNTG Permit 1001083



| REV # | DATE         | REVISION DESCRIPTION | DRAFTING              | DESIGN            | CHECK             | PROF. OF RECORD   |
|-------|--------------|----------------------|-----------------------|-------------------|-------------------|-------------------|
| 0     | NOV. 1, 2021 | ORIGINAL DRAWING     | N. HARVEY (CREEKSIDE) | DOUG NICOL (SNTG) | MIKE WALSH (SNTG) | DOUG NICOL (SNTG) |
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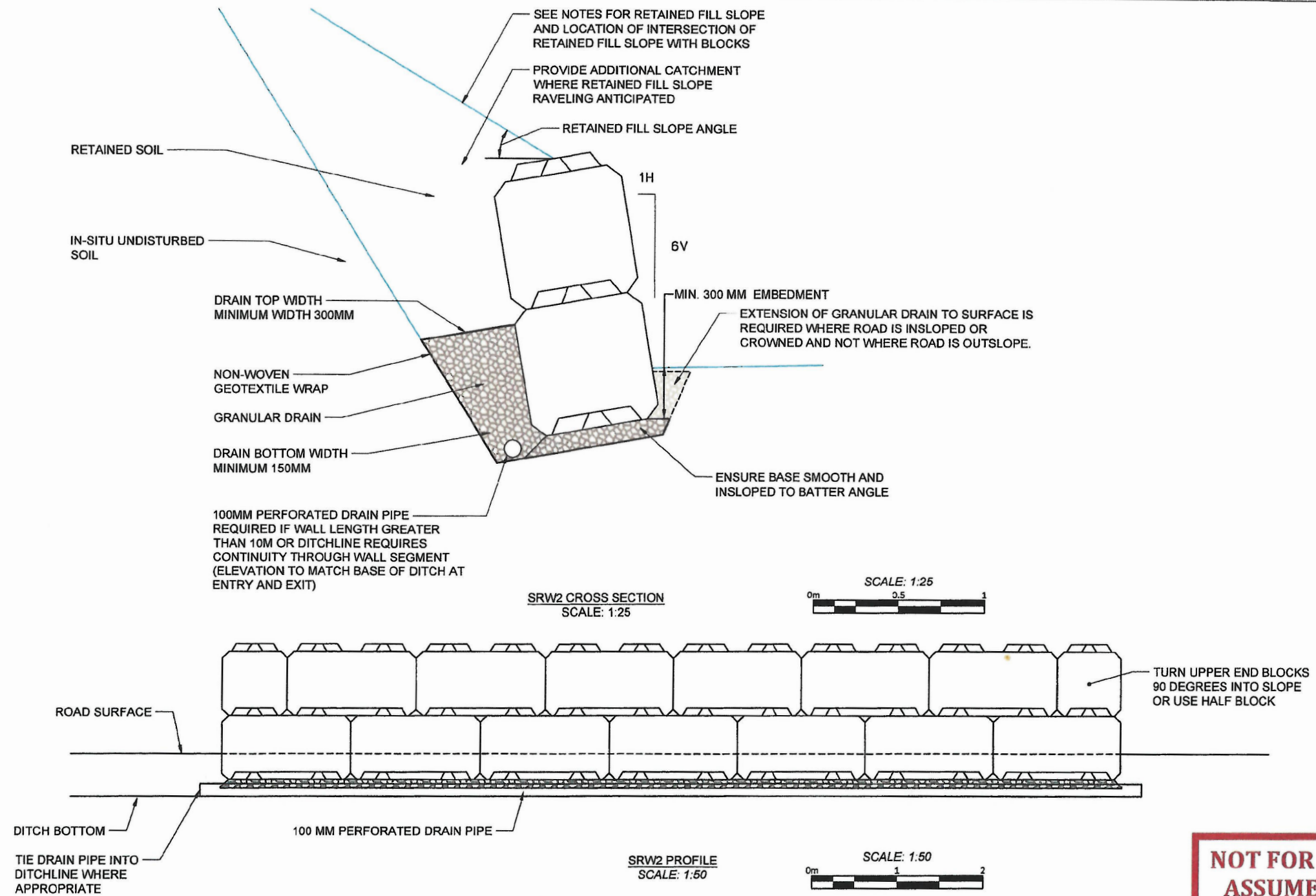
**TWO HIGH SEGMENTAL CONCRETE  
BLOCK RETAINING WALL (SRW2)  
DESIGN AID**

**SHEET 01 OF 02**

**GENERAL NOTES**

**DWG #: STD-RW-010-01**

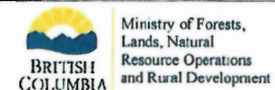




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BLOCK RETAINING WALL (SRW2)  
DESIGN AID  
SHEET 02 OF 02  
CROSS SECTION AND PROFILE  
DWG #: STD-RW-010-02