



SPECIFICATIONS

PART 1: GENERAL

1.1 SCOPE

- A. This work includes the furnishing and installing of precast segmental retaining wall units to the lines and grades supplied on the plans and specified herein.

1.2 REFERENCES

CHBDC - Canadian Highway Bridge Design Code
ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate
ASTM C1372 – Segmental Retaining Wall Units
ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort

1.3 SUBMITTALS

- A. The Contractor shall submit working drawings for *Retain-A-Rock™* RSS. The submission shall bear the seal and signature of the Design Engineer and the Design Check Engineer. The RSS superintendent shall have a copy of the working drawings in his possession at all times. At least two weeks prior to commencement of construction of the RSS, the Contractor shall submit to the Contract Administrator, three sets of working drawings. The shop drawings shall indicate the layout, height, and geo grid reinforcement (if applicable) of the RSS. Design shall conform to the Canadian Highway and Bridge Design Code. Upon request, design calculations shall also be submitted.
- B. The Contractor or Owner's Representative shall establish the alignment of the bottom of the wall, the top wall elevations and final ground line elevations at the bottom of the wall. The manufacturer shall use these elevations to develop the layout and fabrication drawings including elevations of each wall indicating top and bottom of wall elevations. The final ground elevations and wall alignments established in the field shall be protected by the Contractor for the duration of the project and shall not be adjusted without prior approval of the Engineer.
1. The Contractor or Owner's Representative shall carry out site inspections to determine soil parameters, water tables, location of underground services and above grade obstructions.
 2. The contractor shall submit to the contract Administrator a Certificate of Conformance sealed and signed by the project Quality Verification Engineer upon completion of each of the following milestones, and prior to commencement of subsequent operations on the RSS:
 - A. Layout and marking of all lines and grades needed to construct the RSS; and construction of the alignment elements where applicable.
 - B. Delivery and storage on site of product and reinforcing elements (where applicable).



- C. Installation of product; placement and compaction of the backfill for RSS; and reinforcing elements (where applicable).
- D. Completion of the RSS

C. The certificate of Conformance shall state that the work has been carried out in general conformance with the contract documents and stamped drawings. For RSS where the design height is greater than 3.0 m, the contractor shall submit a series of Certificates of Conformance for milestones corresponding to the constructed height of the RSS at 3m, 6m, 9m, 12m and 15m as applicable up to and including the design height.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Contractor shall check the materials upon delivery to assure proper material has been received.
- B. Contractor shall prevent excessive mud, concrete and like materials from coming into contact with the materials.
- C. Contractor shall protect materials from damage. Damaged material shall not be incorporated in the project.

1.5 QUALITY ASSURANCE

- A. Any visual blemishes shall be repaired as per Manufacturer's specifications.
- B. The owner is responsible to engage testing and inspection services to provide independent quality assurance if required.
- D. Compaction testing shall be done a minimum of every 1 foot of vertical fill and every 100 lineal feet along the wall, or as per project engineer's requirements
- E. Testing shall be done at a variety of locations to cover the entire backfill zone.
- F. The independent inspection professional should perform tests to the satisfaction of the project engineer to verify that wall installation conforms to the design drawings and specifications.

1.6 CONSTRUCTION QUALITY CONTROL

- A. The contractor is responsible to ensure that all materials and installation meet the quality specified in the approved drawings.
- B. The contractor shall verify that installation is performed in accordance with the specifications and construction drawings.

~ END OF SECTION ~



PART 2: MATERIALS

2.1 WALL UNITS

- A. Segmental units shall be *Retain-A-Rock*TM units manufactured under license from Design Concrete Systems Ltd. Units shall be made in accordance with CAN/CSA A23.3-04, and designed in accordance with the Canadian Highway Bridge Design Code.
- B. Concrete for segmental units shall have minimum 28-day strength of 35 MPA. Entrained air content shall be between 5-7% unless otherwise specified on drawings.
- C. Reinforcing steel shall have minimum yield strength of 400 MPa and conform to CAN/CSA-G30.18-M92. Galvanized reinforcing shall be hot dip galvanized after fabrication in accordance with CSA Standard G164-M.
- D. Block design shall be sealed by a Professional Engineer. The color of the units shall be concrete gray and the finish shall be a “rock pattern”.

2.2 BLOCK FILL

NOTE: Aggregate type and gradation should be adjusted based on design and engineer’s recommendations.

- A. Fill should be a clean coarse aggregate with high angularity. The unit shall be screened 100 percent crushed aggregate meeting the following gradation.

<u>Standard Sieve Size</u>	<u>Percent Passing</u>
38mm	100
19mm	60-100
#4	0-40
#200	0-5

2.3 BACKFILL

- A. If a select granular reinforced zone is indicated, it shall consist of fill sand or other clean aggregate meeting the following gradation.

<u>Standard Sieve Size</u>	<u>Percent Passing</u>
19mm	100
#200	0-5

- B. All other backfill behind and in front of the wall shall consist of suitable on-site soil or imported borrow approved by the Geo Technical Engineer. Backfill shall generally consist of sands, silts, or lean clays with a liquid limit less than 45 and a plasticity index less than 20. Fat clay soils, cobbles, and large rock should generally be avoided unless approved by the Geo Technical Engineer based on local practices. Frozen soils, excessively wet or dry soils, debris and deleterious materials should not be used.

2.4 DRAIN TILE

- A. Drain tile should be used if shown on the plans or if indicated by local practices and conditions. If used, the drain tile should be perforated or slotted PVC or corrugated HDPE pipe complete with geo textile sock. The drain tile should be connected to storm drains or “day lighted” at low points and/or periodically along the wall alignment.



2.5 GEO GRID

- A. If geo grid reinforcement is required it shall be shown in the plans or as detailed in the shop drawings.
- B. Substitution of a different type of geo grid shall not be allowed unless approved by the site engineer, after submittal of shop drawings and test data.

2.6 GEO TEXTILE FABRIC

- A. If shown on the plans or the shop drawings provide a geo textile filter for separation from backfill at the tails of the blocks. The geo textile shall be a needle punched non-woven fabric with a minimum grab tensile strength of 120 pounds according to ASTM D4632.

~ END OF SECTION ~



PART 3: EXECUTION

3.1 EXCAVATION

- A. Excavate as required for installation of the retaining wall system. Excavate to the base level for a sufficient distance behind the face to permit installation of the base and geo grid reinforcement (if applicable).
- B. Slope or shore as necessary for safety and conformation to applicable Health and Safety Standards.

3.2 WALL BASE

- A. Foundation soils shall be excavated to grades shown on approved plans. Soils shall be investigated by a geotechnical engineer to confirm soils conform to the design conditions or assumptions.
- B. Wall base shall be constructed to the lines and grades shown on the approved plans. Base may be lean concrete or compacted granular, as required by the project engineer.
- C. If granular base is used, compact granular base material to provide a hard and level surface to support the wall units. Base material shall be compacted to a minimum of 95% Standard Proctor.
- D. Granular base material may be substituted with concrete in accordance with the geotechnical engineer's recommendations.

3.3 UNIT INSTALLATION

- A. Place the first course directly on the wall base. Check units for level and alignment. Adjacent units should be in contact. If possible, begin setting the units at the lowest part of the wall.
- B. Fill voids between and within the blocks with granular block fill. The block fill shall extend behind the block to the desired distance as recommended by the Geotechnical Engineer.
- C. Place backfill behind the units in maximum loose lifts of 203mm and compact. If select granular fill is required, it should extend the full length of the geo grid reinforcement. Compact all fill to a minimum of 95% Standard Proctor. Place backfill in successive lifts until it is level with the top of the facing unit.
- D. Remove all excess aggregate and other materials from the top of the units before setting the next course.
- E. For geo grid reinforced walls, place the correct geo grid at the locations and elevations shown on the plans or the shop drawings. Geo grid reinforcement shall be placed horizontally on compacted backfill. The length of the geo grid is measured from the front face of the wall. Extend the grid onto the front face flange of the facing unit. Orient the geo grid with the strong axis (machine direction) placed perpendicular to the wall face. Geo grid shall not be spliced by any means in the roll direction.
- F. Geo grids shall be placed side by side to provide complete coverage along the wall face. No overlap is required between adjacent grids on straight sections of wall. On convex curves, place a minimum of 76mm of backfill material between overlapping geo grid layers.



- G. Place the next course of segmental units in running bond with the previous course. Place the web notch over the alignment hoop protruding from the unit below, and pull the unit forward to contact the hoop.
- H. For geo grid reinforced walls, pull geo grids taught and stake the loose end before placing the next course of backfill. Backfill shall be placed, spread and compacted in such a manner as to minimize the development of wrinkles or movement in the geo grid. A minimum back fill depth of 152mm should be placed before operating equipment over the grids.
- I. Continue placing successive courses to the elevations as shown on the plans. Construct the wall levels in stages, placing the units at each course for the entire length of the wall whenever possible. **Block fill and backfill should be placed to the level of the top of the facing unit before placing the next course.**
- J. Provide temporary swales to divert runoff away from wall excavation and away from face. Final grade above and below the retaining wall shall provide for positive drainage and prevent ponding. It is a good practice to ensure a minimum of half of the base course block is buried, or as per project engineer. Protect completed wall from other construction. Do not operate large equipment or store materials above the wall that exceed the design surcharge loads.

~ END OF SECTION ~