

RETAINING WALL

****From Cavendish RREW12K**

****From Hartland BHF BPNT(12)**

- xx. DESCRIPTION. This work shall consist of detailing, fabricating, furnishing, and erecting a retaining wall at the location(s) specified and in conformance with the lines and grades shown on the Plans or as directed by the Engineer.
- xx. DESIGN REQUIREMENTS. Alternate designs shall be performed in accordance with the AASHTO LRFD Bridge Design Specifications and the design criteria specified in the Plans.

Acceptable earth retaining systems are those included in the "VAOT Earth Retaining System Selection Chart", available on the Agency's website at the following address:

http://www.aot.state.vt.us/matres/Documents/ACROBAT.pdf/VAOT%20APPROVED%20Retaining%20Walls%202-2010_Final.pdf

Prefabricated earth retaining systems shall employ concrete facing.

All wall components shall have a minimum design life of 75 years.

- xx. MATERIALS. Materials shall meet the following requirements:
- (a) Precast Concrete. Precast concrete for retaining wall blocks shall meet the requirements of Section 540. Precast concrete for deadmen blocks shall meet the requirements of Section 541 for Concrete, Class B.
 - (b) Cast-in-Place Concrete. Cast-in-place concrete shall meet the requirements of Section 501 for Concrete, High Performance Class B, unless otherwise specified in the Contract Documents.
 - (c) Concrete Color. Concrete color for precast concrete retaining wall blocks shall meet the requirements of INTEGRATED COLOR CONCRETE PIGMENT of Section 900.
 - (d) Reinforcing Steel. Reinforcing Steel shall meet the requirements of Section 507.
 - (e) Backfill. Backfill shall meet the following requirements:
 - (1) Gradation Limits. Select granular backfill material used in walls shall be reasonably free from organic and otherwise deleterious materials, and shall conform to the following gradation limits as determined in accordance with AASHTO T 27:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
101.6 mm (4 inch)	100
75 mm (3 inch)	75 - 100
0.425 mm (40)	0-60
75 µm (200)	0 - 12

- (2) Plasticity Index. The Plasticity Index (P.I.), as determined in accordance with AASHTO T 90, shall not exceed six.
- (3) Soundness. The material shall be substantially free of shale or other soft particles with poor durability characteristics. The material shall have a sodium sulfate soundness loss of less than 8 percent after five (5) cycles, as determined in accordance with AASHTO T104.

Select granular backfill shall have a minimum uniformity coefficient, Cu, of 2.

In addition to these requirements, backfill for walls using metallic soil reinforcing shall meet the following:

<u>PROPERTY</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>
Resistivity at 100% saturation	Minimum 3000 ohm-cm	AASHTO T 288
pH	Acceptable Range 5 - 10	AASHTO T 289
Sulfates	Maximum 200 ppm	AASHTO T 290
Chlorides	Maximum 100 ppm	AASHTO T 291
Organic Content	< 1%	AASHTO T 267

Backfill not conforming to this specification shall not be used unless approved in writing by the Engineer and wall supplier.

Backfill material shall be compacted in accordance with the manufacturer's recommendations and Contract specifications.

- (f) Geotextile. Geotextile shall be a non-woven fabric meeting the requirements of Section 649 for Geotextile for Roadbed Separator, unless otherwise specified by the wall supplier.
- (g) Wall Tie-Back System and Accessories. All tie-back bars shall consist, at a minimum, of Grade 150, galvanized, continuous thread bar with a nominal diameter of 25 mm (1 inch). The bars shall consist of pre-stressing steel conforming to ASTM A 722.

Tie-back steel shall be handled and stored in such a manner as to avoid damage or corrosion. Damage to the rock anchor steel as a result of abrasion, cuts, nicks, welds, and weld splatter will be cause for rejection by the Engineer.

Tie-back steel shall be protected from dirt, rust, and deleterious substances. All exposed parts of the rock anchor,

bearing plate, and spherical nuts shall be galvanized in accordance with ASTM A 123/ASTM A 153. Bar ends, where cut, shall be painted with a cold galvanizing compound following installation.

Bearing plates shall be of steel conforming to the requirements of ASTM A 36 and be as detailed in the Plans.

Beveled or spherical washers shall be steel or malleable iron. Flat washers shall be quenched and tempered steel and shall conform to the requirements of ASTM F 436.

Anchor nuts shall be the manufacturer's standard heavy-duty hexagon head type designed for use with continuous thread bar and shall be galvanized in accordance with ASTM A 153. Anchor nuts shall conform to ASTM A 436.

xx. SUBMITTALS. Working Drawings shall be submitted to the Structures Engineer in accordance with Section 105. The submittal shall include all details, dimensions, quantities and cross sections necessary to construct the wall. In addition, the submittal shall include, but not be limited to, all of the following that apply to the particular wall system being constructed:

- (a) A plan view of the wall showing the limit of the widest module, tiebacks, nails, mesh, or strip and the centerline of any drainage pipe which is behind or passes under or through the wall.
- (b) An elevation view of the wall which shall include the elevation at the top of the wall at all horizontal and vertical break points and at least every 15 m (50 ft) along the face of the wall, all steps in the leveling pads, the designation as to the type of panel, the length of soil reinforcing elements, the distance along the face of the wall to where changes in length of the soil reinforcing elements occur, and an indication of the final ground line and maximum calculated bearing pressures.
- (c) A typical cross section or cross sections showing the elevation relationship between ground conditions and proposed grades.
- (d) All details for foundations and leveling pads, including details for steps in the footings or leveling pads, as well as design maximum and minimum bearing pressures.
- (e) Details of the drainage systems or other facilities required to accommodate the system.
- (f) The details for connection between the wall and the tie backs.
- (g) The details for diverting tieback elements around obstructions such as piles, catch basins, and other utilities.
- (h) All reinforcing details, including reinforcing bar bending details.

- (i) Any general notes required for the construction of the wall.
- (j) A listing of the summary of quantities on the elevation sheet for each wall.

Any construction drawings required for elements meeting the requirements of Section 540 shall be submitted and shall meet the requirements of Subsection 540.04.

All design and construction details will be checked by the Agency's Structures and Materials and Research Sections. Approval of the detailed design and plans, and notification to begin the work, will be made by the Structures Section. The Contractor shall allow the Agency 30 calendar days to review and approve the Working Drawings.

Approval of the Contractor's Working Drawings shall not relieve the Contractor of any responsibility under the Contract for the successful completion of the work.

- xx. PRECAST CONCRETE INSPECTION. Precast concrete inspection will be in accordance with Subsection 540.06.

The Fabricator shall provide a tentative casting schedule to the Engineer and Structural Concrete Engineer for the following casting week a minimum of 3 calendar days prior (a casting week will be Sunday to Saturday). The Fabricator shall maintain a Quality Control file that shall contain at a minimum the piece identification, date and time cast, concrete test results, quantity of concrete used per element, batch quantity printout, cylinder results, and aggregate gradation and moisture.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Retaining Wall) to be measured for payment will be on a lump sum basis in the complete and accepted work.

- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Retaining Wall) will be paid for at the Contract lump sum price.

Payment will be made as follows:

- (a) When required Working Drawings have been submitted and approved in accordance with Section 105, a payment of 15 percent of the Contract lump sum price will be allowed.
- (b) Further payments totaling 70 percent of the Contract lump sum price will be made on a pro-rated basis for the duration of the work.
- (c) The remaining 15 percent of the Contract lump sum price will be paid when the retaining wall has been fully constructed and accepted by the Engineer.

Payment will be full compensation for detailing, fabricating, and installing the materials specified, including but not limited to the tieback system, geotextile fabric, concrete, bar reinforcement and welded steel wire fabric, drainage pipe, drainage aggregate, precast concrete blocks, soil reinforcements, attachment devices, fasteners,

geotextile, and expansion material; preparing and submitting Working Drawings; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Any grouting work, such as fairing out unevenness between adjacent concrete pieces and filling leveling screw holes, shear keys, transverse anchor recesses, and dowel holes, is considered incidental to the work for Special Provision (Retaining Wall).

Excavation will be paid separately under Contract item 204.25.

Backfill will be paid separately under Contract item 204.30.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Retaining Wall)	Lump Sum
900.670 Special Provision (Retaining Wall)	Square Foot
900.675 Special Provision (Retaining Wall)	Square Meter