



## **CONSTRUCTION SPECIFICATION FOR RIP-RAP, ROCK PROTECTION, AND GRANULAR SHEETING**

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### **511.01 SCOPE**

This specification covers the requirements for the installation of rip-rap, rock protection, granular sheeting, and geotextile.

#### **511.01.01 Specification Significance and Use**

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be as specified in the Contract Documents.

## **511.01.02 Appendices Significance and Use**

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

## **511.02 REFERENCES**

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

### **Ontario Provincial Standard Specifications, Material**

OPSS 1004	Aggregates - Miscellaneous
OPSS 1860	Geotextiles

## **511.05 MATERIALS**

### **511.05.01 Rip-Rap, Rock Protection, and Granular Sheeting**

Rip-rap shall be according to OPSS 1004 and as specified in the Contract Documents.

Rock protection and granular sheeting shall be according to OPSS 1004.

### **511.05.02 Geotextile**

Geotextile shall be nonwoven, Class II according to OPSS 1860, with an FOS of 75-150 µm, unless otherwise specified in the Contract Documents.

## **511.07 CONSTRUCTION**

### **511.07.01 Excavation**

Prior to placing any material, the area shall be excavated or filled or both to the lines and dimensions specified in the Contract Documents and fine graded to a uniform even surface.

**511.07.02                      Placing Material**

**511.07.02.01                  General**

Material shall be placed to the lines and dimensions specified in the Contract Documents.

When rip-rap or rock protection is being placed on slopes, the rock shall commence at the toe of the slope and progress up the slope.

When geotextile is specified in the Contract Documents, rip-rap, rock protection, and granular sheeting shall be placed in a manner so as not to damage the geotextile.

**511.07.02.02                  Rip-Rap**

Rip-rap shall be placed in a set and stable manner, flat on the slope with the largest dimension parallel to the slope contours. The larger pieces of rip-rap shall be placed in the bottom courses. The rip-rap shall be laid closely so that a reasonable semblance of courses is achieved. Smaller pieces of rip-rap shall be used to fill the voids.

**511.07.02.03                  Rock Protection**

Rock protection shall be placed in a random, but stable manner.

**511.07.02.04                  Granular Sheeting**

Granular sheeting operations shall follow earth excavation operations as closely as practical and possible.

Compaction of granular sheeting material is not required.

**511.07.02.05                  Geotextile**

Geotextile shall be free of folds, tears, and punctures and as specified in the Contract Documents. The geotextile shall be joined so that the material overlaps a minimum of 500 mm and shall be pinned together. Alternatively, the geotextile shall be joined to conform to the seam requirements of OPSS 1860.

Geotextiles shall be fixed to prevent movement during installation. Geotextile shall be wrapped down into the ground a minimum 300 mm at termination points.

**511.07.03                      Management of Excess Material**

Management of excess material shall be according to the Contract Documents.

**511.09                          MEASUREMENT FOR PAYMENT**

**511.09.01                      Actual Measurement**

**511.09.01.01                  Rip-Rap**

Measurement of rip-rap shall be by area in square metres following the contour of the ground.

**511.09.01.02                      Rock Protection**

Measurement of rock protection shall be by volume in cubic metres. The volume is a product of the area of the rock protection measured following the contour of the ground by its depth.

Truck box measurement shall be used when it is not possible to take an in place measurement.

**511.09.01.03                      Granular Sheeting**

Measurement of granular sheeting shall be by area in square metres following the contour of the ground.

**511.09.01.04                      Geotextile**

Measurement of geotextile shall be by area in square metres following the contour of the ground, without any allowance made for overlaps.

**511.09.02                      Plan Quantity Measurement**

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

**511.10                      BASIS OF PAYMENT**

**511.10.01                      Rip-Rap - Item  
Rock Protection - Item  
Granular Sheeting - Item  
Geotextile - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

When there is not a separate tender item for geotextile, payment for the geotextile shall be included in the tender item for rip-rap, rock protection, or granular sheeting, as appropriate.

## **Appendix 511-A, November 2019 FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

**Note:** This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

### **Designer Action/Considerations**

The designer should specify the following in the Contract Documents:

- Gradation requirements of rip-rap as per Tables 7 and 8 of OPSS 1004. (511.05.01)
- Use of alternate geotextile requirements for site or project specific applications. (511.05.02)
- Lines and dimensions for excavation of rip-rap, rock protection, or granular sheeting areas. (511.07.01)
- Lines and dimension for placement of material. (511.07.02.01)
- Geotextile locations, if required. (511.07.02.01)
- Placement requirements for geotextile. (511.07.02.05)

The designer should determine if fish and fish habitat are present when placement of rip-rap, rock protection, or gravel sheeting in a watercourse is being considered. When fish and fish habitat are present, the designer should consider other options such as bioengineering techniques in consultation with relevant experts.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

### **Related Ontario Provincial Standard Drawings**

OPSD 810.010	General Rip-Rap Layout for Sewer and Culvert Outlets
OPSD 810.020	General Rip-Rap Layout for Ditch Inlets