

SECTION 610

RIP RAP TREATMENT

INDEX

- 610.01 TYPES OF RIP RAP TREATMENT**
- 610.02 SCOPE**
- 610.03 MATERIALS**
 - 610.03.01 Rock**
 - 610.03.02 Sod**
 - 610.03.03 Grout**
- 610.04 EXCAVATION**
- 610.05 PLACING**
- 610.06 MEASUREMENT FOR PAYMENT**
 - 610.06.01 Measurement for Payment by Volume**
 - 610.06.02 Measurement for Payment by Weight**
- 610.07 BASIS OF PAYMENT**

610.01 TYPES OF RIP RAP TREATMENT

- (a) Rip Rap – Hand Laid Dry Wall
- (b) Rip Rap – Hand Laid With Sod
- (c) Rip Rap – Grouted
- (d) Rip Rap – Random

610.02 SCOPE

This specification covers the requirements for the various types of rip rap treatment listed above. The work consists of constructing a protective covering of approved stone, with or without mortar or sod as required on an earth bed; at the ends of culverts, on the sides of slopes or in the beds of channels or at other places as directed by the Owner's Representative. The work also includes such fine grading and tamping of slopes to be rip rapped and backfilling and tamping of foundation trenches, as may be required.

610.03 MATERIALS

Rip rap shall consist of clean, hard, durable rock, having a density not less than 2.6 tonnes per cubic metre. The rock material, if subjected to the Los Angeles Abrasion Test (ASTM C131), shall have a loss not greater than 35%. When tested for soundness, five cycles of magnesium sulphate, ASTM C88, the rock material shall have a loss not greater than 15%.

610.03.01 Rock

Stones for use in rip rap shall consist of clean, hard, durable rock, free of cracks. Rock subject to marked deterioration by water or weather will not be accepted. Only those stones meeting the requirements of this specification shall be used.

The largest rocks procurable shall be supplied and in no case shall any fragment measure less than 0.0035 cubic metres in volume. In hand laid dry wall rip rap, spalls shall be supplied to fill open joints. Field stones or boulders may be used when approved by the Owner's Representative.

610.03.02 Sod

Sod shall consist of a dense well-rooted growth of permanent and desirable grasses. When sod is lifted it shall be covered with grass recently mowed to a length not more than 75 millimetres. Sod shall be in widths not less than 300 millimetres nor more than 450 millimetres with a thickness not less than the depth of the fibrous roots and in no case less than 25 millimetres.

All sod shall be taken from good loamy soil. It shall be well permeated with roots; be uniform in texture and free from weeds; be in a good healthy condition with no sign of decay, and contain sufficient moisture to maintain its vitality during transportation and placing.

610.03.03 Grout

Grout shall consist of a cement mortar composed of one part Portland Cement and three parts fine aggregate.

610.04 EXCAVATION

Should the Owner's Representative require that excavation be carried out to prepare a foundation for the rip rap, then the work shall be carried out in accordance with Section 403.

a) Rip Rap - Hand Laid Dry Wall

On slopes to be rip rapped the slopes shall be fine graded to a uniform surface. Depressions shall be filled and thoroughly compacted.

b) Rip Rap - Hand Laid With Sod

Same as for (a) above.

c) Rip Rap – Grouted

Same as for (a) above.

d) Rip Rap – Random

Where required by the Owner's Representative, excavation for foundation shall be performed to provide a shelf or ledge to retain the rock so dumped as permitted under the paragraph "Placing Random Rip Rap".

610.05 PLACING

Rip rap shall be placed to the grades and within the lines staked by the Owner's Representative.

a) Rip Rap - Hand Laid Dry Wall

Unless laid to form a flat apron, the rip rap shall commence in a trench below the toe of the slope. Stones shall be placed by derrick or by hand. Stones shall be set normal to the slope, and placed so that the largest dimension is perpendicular to the face of the wall, unless such dimension is greater than the specified thickness of the wall.

The required thickness of rip rap is dependent on the proposed height and slope of the rip rap and on the expected force of the stream flow.

The Contractor shall construct the rip rap to the thickness stipulated in the contract documents or as directed by the Owner's Representative.

The largest stones shall be placed in the bottom courses and for use as headers through subsequent courses. No shaping of stones will be required; but the Contractor shall build to reasonable semblance of courses with stones laid closely and voids chinked with spalls.

Stones shall be placed in the wall in such a way that the rear of each stone shall be embedded into the slope of the embankment.

On the completion of laying of rip rap operations any open foundation trenches bordering the rip rap shall be backfilled and tamped.

b) Rip Rap - Hand Laid With Sod

The placing of stones and the backfilling and tamping of trenches shall be as required under (a) above.

However, as the placing of stones proceeds sod shall be placed so that sod separates the stones from each other, both horizontally and vertically. The sod shall be placed so that there are no voids between stones.

Sod shall not be placed upside down.

The sodding shall be trimmed so that the exposed edges of the sods are flush with the exposed face of the rip rap.

c) Rip Rap – Grouted

The placing of stones shall be as required under (a) above. Before applying mortar the surfaces of the stones shall be amply wetted. The spaces between the stones shall be filled with mortar, starting from the bottom and working to the top. The mortar shall be worked with suitable tools to completely fill all voids except that the outer faces of the stones shall be exposed. Excess mortar shall be removed with a stiff brush. Grouted rip rap shall be cured in accordance with the requirements for curing concrete sidewalk as stipulated in Section 570.

After the mortar has set any foundation trenches bordering the rip rap shall be backfilled and tamped.

d) Rip Rap – Random

Rock material may be placed by dumping it into position over the surface to be rip rapped.

The Owner's Representative shall indicate whether the larger stones should be placed near the bottom of the slope, or near the top of the treated area to protect against scour.

The Contractor shall make a reasonable endeavour to dump the larger stones where required. Placing shall be done in such a manner that the surface of the finished rip rap shall have a uniform appearance.

610.06 MEASUREMENT FOR PAYMENT

Measurement for Payment for rip rap will only include measurement of materials which meet the specifications for the type of rip rap treatment in question. Materials placed outside of the limits as staked by the Owner's Representative will not be included in measurement for payment.

610.06.01 Measurement for Payment by Volume

For rip rap for which the contract unit price is stated in terms of the price per cubic metre, then such rip rap shall be measured for payment in terms of the net nominal volume of the rip rap structure comprising rip rap of the type in question. This net nominal volume shall be computed in cubic metres rounded to one decimal place. The net nominal volume of the rip rap structure shall be calculated as the product of: the net surface area of the rip rap structure, times the mean thickness of the rip rap structure.

The net surface area of the rip rap structure shall be defined as the net area given by mean length of the rip rap structure, times the mean width of the rip rap structure; less the area of such objects as culvert ends around which the rip rap is placed.

610.06.02 Measurement for Payment by Weight

For rip rap for which the contract unit price is stated in terms of the price per tonne, then only the stones to be used in the rip rap treatment shall be weighed on scales. The weighing of materials shall be in accordance with the requirements of Section 501. Only loads certified by the Department personnel as being placed in the works shall be included in the measurement for payment. The weight shall be computed in tonnes, rounded to one decimal place.

610.07 BASIS OF PAYMENT

Payment at the Contract Unit Price per cubic metre, or per tonne, for the type of rip rap specified shall be compensation for all labour, materials and equipment-use to supply stones and sod or mortar as required, haul the materials to the site, provide such necessary dewatering as may be required, trim and tamp ground that is to receive rip rap treatment, construct the required rip rap treatment according to these specifications, cure mortar if used, backfill and tamp any open foundation trenches, together with the provision for weighing (if appropriate).

Excavation for foundation shall be paid for in accordance with Section 403, but the additional requirements for the fine grading and the tamping of depressions in slopes to be rip rapped, together with the backfilling and tamping of any foundation trenches, shall be considered compensated for in the contract price for rip rap treatment.

The occasional manual handling of rocks or stones which may occur during placing Random Rip Rap, shall in no manner be construed as transforming the classification of Random Rip Rap to that of Hand Laid Dry Wall Rip Rap.