

Appendix C

Specifications referenced in bid documents

APWA Standard Specification 603 – Rip Rap Surface Treatment

Supplemental Technical Specification 1507 – Surveying

SECTION 603

RIPRAP SURFACE TREATMENT

603.1 GENERAL

The construction of riprap surface treatment shall consist of furnishing and placing stone, with or without grout, with or without wire mesh, or sacked concrete riprap. The depth and type of riprap shall be as shown on the construction plans.

603.2 REFERENCES

603.2.1 ASTM

C 143

603.2.2 This publication:

SECTION 101

SECTION 109

603.3 MATERIAL

603.3.1 Riprap stone shall be as specified in Section 109 of these specifications.

603.3.2 Other materials necessary for completion of various types of Riprap Surface Treatments shall be as specified in the following subsections.

603.4 PREPARATION OF GROUND SURFACES

603.4.1 The bed for the riprap shall be shaped and trimmed to provide even surfaces. A footing trench shall be excavated along the toe of the slope as shown on the plans.

603.4.2 Specified filter cloth shall be placed on earth bed prior to placement of stone.

603.4.3 Earth surface shall be shaped and trimmed to conform to the construction plans prior to the placement and compaction of the gravel type of filter material.

603.5 PLACING RIPRAP STONE

603.5.1 When the required riprap is less than 20 inches in depth, stone shall be placed by hand unless otherwise authorized by the ENGINEER. Stone shall be placed to provide a minimum of voids. The larger stone shall be placed in the toe return, foundation course, and on the outer surface of the riprap. Stones shall be placed with their longitudinal axis normal to the face of the embankment and so arranged that each rock above the foundation course has at least a 3 point bearing on the

underlying stones. Bearing on smaller stones used to chink voids will not be acceptable. Interstices between stones shall be chinked with small stones and spalls. The finished surface shall be even and tight and shall not vary from the planned surface by more than 3 inches per foot of depth. When the required riprap is 20 inches or more in depth, the stone may be placed by dumping and spread in layers by bull-dozers or other suitable equipment.

603.5.2 Riprap shall be placed to its full design thickness (depth) in one operation.

603.6 GROUTED RIPRAP

603.6.1 Riprap shall be placed as specified and grouted with Portland cement mortar. The grout shall consist of one part cement and 3 parts by volume of aggregate. The Portland cement shall be Type I or Type II as specified in Section 101 and the aggregate shall be 2 parts sand and 1 part gravel passing a 3/8 inch square mesh screen. The amount of water shall be such as to permit gravity flow into the interstices with limited spading and brooming. The consistency of the grout shall be as approved by the ENGINEER.

603.6.2 Except when hand mixing is permitted by the ENGINEER, grout shall be mixed in an approved machine mixer for not less than 1 1/2 minutes. Should hand mixing be permitted, the cement and aggregate shall be thoroughly mixed in a clean, tight mortar box until the mixture is of uniform color after which clean water shall be added in such quantity as to provide a grout of the specified consistency.

603.7 SACKED CONCRETE RIPRAP

603.7.1 The Portland cement, aggregates, and mixing shall be as specified in Section 101 and as herein specified. The aggregate may be pit-run material, at least 80 percent of which shall pass a 1 1/2 inch square mesh screen. Separating aggregates by primary sizes will not be required. Los Angeles abrasion tests and soundness tests will not be required.

603.7.2 The mixed concrete shall contain 376 pounds (4 sacks) of Portland cement per cubic yard.

603.7.3 The amount of water shall be such as to produce a mixture with a slump of 3 to 5 inches when tested in accordance with ASTM C 143.

603.7.4 Sacks shall be made of at least 10 ounce burlap and shall be approximately 19 1/2 inches by 36 inches measured inside the seams when the sack is laid flat.

603.7.5 Slopes on which the sacked concrete riprap is to be placed shall be finished within 0.2 foot of the designated grades. The first course shall be a double row of stretchers laid in a neatly trimmed trench. The second course shall be a single row of headers. The third and remaining courses shall be stretchers or headers as shown on the plans and shall be placed so that joints between courses are staggered. Dirt and debris shall be removed from the tops of sacks before the next course is laid thereon. Headers shall be placed with the folds upward. Not more than 4 vertical courses shall be placed in any tier until the initial set has taken place in the first course of any such tier.

603.7.6 When, in the opinion of the ENGINEER, there will not be proper bearing or bond due to delays in placing succeeding layers or the hampering of work by storm, mud, or for any cause, a small trench shall be excavated back of the row of sacks already in place and this trench filled with fresh concrete before more sacks are placed. Payment for the concrete in the trenches shall be at the price per cubic yard for sacked concrete riprap. Payment for excavating the trenches shall be considered as included in the payment for the concrete in the trench.

603.7.7 Sacked concrete riprap shall be cured by sprinkling with a fine spray of water every 2 hours during daylight for not less than 3 days.

603.8 WIRE ENCLOSED RIPRAP

603.8.1 Wire enclosed riprap shall consist of a layer of rock of the required thickness enclosed on all sides in wire fabric in conformity with the details shown on the plans. The wire fabric shall be drawn tightly against the rock on all sides and tied with galvanized wire of the required gauge. The ties shall be spaced approximately 2 feet on centers and shall be anchored to the bottom layer of wire fabric, extended through the rock layer, and tied securely to the top layer of wire fabric. When indicated on the plans, wire enclosed riprap shall be anchored to the slopes by steel stakes driven through the riprap into the embankment. Stakes shall be spaced as shown on the plans. Wire fabric used for riprap shall conform to the mesh, gauge, and weight shown on the plans. Tie wire shall be galvanized and of the gauge shown on the plans. Wire fabric shall be furnished in such lengths and widths as to reduce

the number of splices to a minimum.

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603.8.2 Steel stakes shall be cut to the required length from steel railroad rails, galvanized steel pipe, or steel angles of the dimension and weight shown on the construction plans.

603.9 FILTER CLOTH

603.9.1 MATERIAL: The filter cloth shall be a non-woven polyester geotextile, such as: Mirafi No. 140N drainage Fabric, Mirafi Inc., Charlotte, North Carolina, or approved equal.

603.9.2 INSTALLATION: The surface to receive the cloth shall be prepared to a relatively smooth condition free of obstructions, depressions, and debris. The cloth shall not be laid in a stretched condition but shall be laid loosely with a long dimension perpendicular to the channel centerline. The cloth shall be placed so the upstream edge overlaps the downstream edge a minimum of 12 inches, with securing pins inserted through both layers at no greater than two-foot intervals. Cloth damaged or displaced before or during installation or placement of the overlaying riprap shall be replaced or repaired to the satisfaction of the ENGINEER at the CONTRACTOR'S expense.

603.10 GRAVEL TYPE OF FILTER MATERIAL

603.10.1 MATERIAL: Filter material shall be comprised of sand, gravel, and cobble in mixes as specified on the plans. Alternate materials such as milled Portland cement concrete, concrete wash, or reclaimed material may be substituted with the ENGINEER'S approval.

603.10.2 INSTALLATION: Filter material shall be used as a subbase for riprap as shown on the plans. The minimum depth of filter material shall be one foot unless the plans provide an alternate detail for filter blanket construction.

603.11 MEASUREMENT AND PAYMENT

603.11.1 Riprap, such as: plain stone, grouted, wire enclosed, or sacked concrete, shall be measured by the cubic yards placed to the lines and grades shown on the construction plans. Payment for riprap will be made at the unit price per cubic yard for the type of riprap as specified in the Bid Proposal and shall include materials, labor, and equipment necessary to complete the work.

603.11.2 Filter cloth shall be measured by the square foot and overlaps shall be measured as a

single layer of cloth. Payment shall be made at the unit price per square foot as per Bid Proposal, and shall include shipping, handling, storage, seams, special fabrication, securing pins, and/or installation.

603.11.3 Gravel type filter material shall be measured by the cubic yard of material in place, in accordance with the construction plans. Payment will be made at the unit price per cubic yard as per Bid Proposal and shall include all materials, labor, and equipment necessary for the installation of the material.



SUPPLEMENTAL SPECIFICATION 1507

CONSTRUCTION STAKING – SIMPLIFIED VERSION

Revised 08/20/2020

1507.1 DESCRIPTION

This work consists of construction staking lines, grades, and layouts by the Contractor in accordance with the plans and specifications and as directed by the Engineer for the control and completion of the project.

1507.2 MATERIALS

The Contractor shall furnish all stakes, templates, straightedges, surveying equipment and other devices necessary for establishing, checking, marking, and maintaining points, including P.I.'s, P.C.'s, P.T.'s, and lines, grades and layouts. As directed by the Engineer, points shall be referenced so that they may later be re-established.

1507.3 CONSTRUCTION REQUIREMENTS

The Contractor shall be responsible for all control, slope stakes, cut stakes, offset stakes, benchmarks, blue tops or other staking necessary for proper execution of the work, or as requested by the Project Manager, to assure compliance with the plans.

1507.4 CONSTRUCTION SURVEYS

The contractor shall obtain and pay for the services of a Professional Surveyor registered in the State of New Mexico to perform surveys consisting of the following phases:

Phase 1: A cross-section survey, with no greater than 50 foot spacing, to determine the Project Site (including Borrow Area, if applicable) existing ground elevations prior to construction, after clearing and grubbing and after removal of trash and debris. Data collected shall be of sufficient detail, including all breaks in the terrain, to be able to create an original ground digital terrain model (DTM). The Project Site & Borrow Area "original ground" DTM shall be submitted to the Engineer for review and acceptance prior to proceeding with excavation and export of material. Survey data must be sufficient to determine future earthwork quantities.

Phase 2: A cross-section survey, with no greater than 50 foot spacing, to determine the Borrow Area (if applicable) finished ground elevations post-construction, after all required borrow material is removed. Data collected shall be of sufficient detail, including all breaks in the terrain,



to be able to create a finished ground digital terrain model (DTM). The Borrow Area “finished ground” DTM shall be submitted to the Engineer for review and acceptance prior to payment for “Borrow” Bid Item. Survey data must be sufficient to determine earthwork quantities.

Phase 3: A cross-section survey, with no greater than 50 foot spacing, will be completed for the project site (excluding borrow area) after construction to demonstrate compliance with the design grades, structure elevations, inverts, alignments/profiles, etc. shown on the plan set. Phase 3 Survey will also include the update and completion of as-built survey for the project. It is the responsibility of the contractor to coordinate with the surveyor on a regular basis to provide as-built information to incorporate in the survey.

All surveys must be certified by the Professional Surveyor and include complete documentation. Borrow Area surveys (Phases 1 and 2) must be used by the Professional Surveyor to compute the quantity of excavation, subject to the provisions for measurement in Section 203. Volume shall be based on the “average end area” computation. All computations of excavation must be submitted to the Engineer in sufficient detail. This submittal shall be such that methods and computations can be fully verified and are subject to approval by the Engineer. The Contractor shall also submit the electronic survey point files, including break lines, in a format compatible with AutoCAD Civil3D such that the Engineer can use the data for verification of cut/fill quantities.

At the end of the Project, the Engineer will transcribe the as-built information provided by the Contractor onto the Record Drawing. The Contractor’s Professional Surveyor will be required to stamp, sign and certify the information shown on the As-Built drawings.

1507.5 METHOD OF MEASUREMENT

Submit a construction-staking schedule of values as part of each Pay Application to the Project Manager for approval.

1507.6 BASIS OF PAYMENT

<u>Pay Item</u>	<u>Pay Unit</u>
Construction Staking	Lump Sum

SSCAFCA will make partial payments in accordance with the approved construction-staking schedule of values.

END OF SECTION