Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

DENVER J. STUTLER, JR.
SECRETARY

February 6, 2006

Mr. Donald Davis
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 530
Proposed Specification: 5300000.D01

Dear Mr. Davis:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Riprap.

This change was proposed by John Shoucair of the State Materials Office to waive the Sodium Soundness Test and add a Drop Test requirement to ease the use of Riprap in river environments that are non-corrosive.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Signature on file

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/jf
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

**RIPRAP.**
**(REV 1-6-06)**

SECTION 530 (Pages 598-603) is deleted and the following substituted:

## SECTION 530
## RIPRAP

### 530-1 Description.

Construct riprap composed of sand-cement or rubble (consisting of broken stone or broken concrete) as shown in the plans. When specified in the plans, place bedding stone under the rubble riprap.

### 530-2 Materials.

**530-2.1 Sand-Cement:**

(1) Portland Cement: ~~Do not subject the *P*portland cement used in sand-cement riprap to the tests required under the provisions of Section 921, provided the *P*portland cement is from an approved source.~~*Provide cement from an approved source meeting the requirements of Section 921. Certify that cement meets the requirements of the Contract Documents.*

(2) Fine Aggregate: Meet the requirements of 902-3.3.

(3) Sacks: Provide sacks made of jute, cotton, or scrim reinforced paper capable of holding the sand-cement mixture without leakage. Ensure that sack material is permeable and absorptive enough to permit passage of water to provide for hydration of the cement. Ensure that paper used in sacks is non-asphalt laminated with a polyester fiber scrim reinforcement in a three-way directional pattern, has an embossed finish, and is perforated approximately 3/32 inch [2.5 mm] in approximate 1 inch [25 mm] centers. Extend perforations continuously through the entire wall.

Provide sacks of uniform size and dimensions, in order to provide uniformity of lines in the completed work. Use sacks that are free from holes and strong enough to withstand handling without ripping or splitting. Use only one type and size of sack at any one structure.

(4) Grout: ~~The Contractor need not test the cement or sand between the sacks in accordance with Section 346, provided the cement is of a type and quality appropriate for this work as determined by the Engineer, and the sand is a clean commercial sand meeting the approval of the Engineer for this particular use.~~*Provide sand from an approved source meeting the requirements of 902-3.3. Provide cement from an approved source meeting the requirements of Section 921.*

(5) Geotextile Fabric: Meet the requirements of Section 514.

**530-2.2 Rubble:**

**530-2.2.1 Rubble (Bank and Shore Protection):** Provide sound, hard, durable rubble, free of open or incipient cracks, soft seams, or other structural defects, consisting of broken stone with a bulk specific gravity of at least 2.30. Ensure that stones are rough and angular.

For this application, use broken stone meeting the following gradation and thickness requirements:

| Weight Maximum Pounds [Kilograms] | Weight 50% Pounds [Kilograms] | Weight Minimum Pounds [Kilograms] | Minimum Blanket Thickness in Feet [Thickness in Meters] |
|---|---|---|---|
| 700 [320] | 300 [135] | 60 [25] | 2.5 [0.75] |
| Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds [kilograms].<br>Ensure that at least 50% of the material by weight is greater than Weight 50% pounds [kilograms].<br>Ensure that at least 85% of the material by weight is greater than Weight Minimum pounds [kilograms]. | | | |

**530-2.2.2 Rubble (Ditch Lining):** Use sound, hard, durable rubble, free of open or incipient cracks, soft seams, or other structural defects, consisting of broken stone or broken concrete with a bulk specific gravity of at least 1.90. Ensure that stones or broken concrete are rough and angular.

Use broken stone or broken concrete meeting the following gradation and thickness requirements:

| Weight Maximum Pounds [Kilograms] | Weight 50% Pounds [Kilograms] | Weight Minimum Pounds [Kilograms] | Minimum Blanket Thickness in Feet [Thickness in Meters] |
|---|---|---|---|
| 75 [35] | 30 [15] | 4 [2] | 1.5 [0.45] |
| Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds [kilograms].<br>Ensure that at least 50% of the material by weight is greater than Weight 50% pounds [kilograms].<br>Ensure that at least 90% of the material by weight is greater than Weight Minimum pounds [kilograms]. | | | |

**530-2.2.3 Physical Requirements of Broken Stone and Broken Concrete:** Use broken stone and broken concrete meeting the following physical requirements:

| | |
|---|---|
| Absorption<br>*(FM 1-T85)* | Maximum 5% |
| Los Angeles Abrasion<br>(FM 1-T 096) | maximum loss 45%* |
| Soundness (Sodium Sulphate)<br>(AASHTO T 104) | maximum loss 12%** *(after five cycles)* |
| Flat and elongated pieces | materials with least dimension less than one third of greatest dimension not exceeding 10% by weight. |
| Dirt and Fines | materials less than 1/2 inch [13 mm] in maximum dimension accumulated from interledge layers, blasting or handling operations not exceeding 5% by weight. |

| | |
|---|---|
| *Drop Test***(EM 1110-2-2302)* | *No new cracks developed, or no existing crack widened additional 0.1 inch, or final largest dimension greater than or equal to 90% original largest dimension of dropped piece.* |

* Ensure that granite does not have a loss greater than 55% *and that broken concrete does not have a loss greater than 45%*.

** The Engineer may accept rubble exceeding the soundness loss limitation if performance history shows that the material will be acceptable for the intended use. *The Engineer will waive the soundness specification for rubble riprap (broken stone and broken concrete) when project documents indicate it will be placed in or adjacent to water or soil with a sulfate content less than 150 parts per million and a pH greater than 5.0.*

****The ~~e~~Engineer will waive the Drop Test unless required to ensure structural integrity. Provide all equipment, labor and testing at no expense to the Department. EM refers to the US Army Corps of Engineer's Specification Engineering Method which can be found at http://www.usace.army.mil/inet/usace-docs/eng-manuals/em1110-2-2302/c-6.pdf*

**530-2.2.4 Source Approval and Project Control:** The Engineer will approve mineral aggregate sources in accordance with 6-3.3 as amended by the following:

(1) The Engineer ~~will~~ *may perform Independent Verification tests on all materials placed on the project.*~~subject all materials placed on the project to inspection confirmation~~*Independent Verification* ~~tests. Perform such tests at no expense to the Department.~~

(2) The Engineer ~~may control~~*will check* the gradation of the riprap by visual inspection ~~either~~ at ~~the source or~~ the project site. Resolve any difference of opinion with the Engineer in accordance with the method provided in FM 5-538. Provide all equipment, labor, and the sorting site at no expense to the Department.

~~**530-2.2.5 Geotextile Fabric:** Meet the requirements of Section 514.~~

*(3) The Engineer may test components in a blend of rubble processed from different geologic formations, members, groups, units, layers or seams. The Engineer may select components based on like color, surface texture, porosity, or hardness. The Engineer ~~shall~~will reject any blend if a component that makes up at least five percent by volume of the blend does not meet these specifications.*

**530-2.3 Bedding Stone:** Use Bedding Stone of either a durable quality limestone or other quarry run stone, with a bulk specific gravity of not less than 1.90 and that is reasonably free from thin, flat and elongated pieces. Ensure that the bedding stone is also reasonably free from organic matter and soft, friable particles. Meet the following gradation limits:

| Standard Sieve Sizes | | Individual Percentage by Weight Passing |
|---|---|---|
| Inches | [millimeters] | |
| 12 inches | [305 mm] | 100 |
| 10 inches | [254 mm] | 70 to 100 |
| 6 inches | [152 mm] | 60 to 80 |
| 3 inches | [75 mm] | 30 to 50 |
| 1 inch | [25 mm] | 0 to 15 |

The Engineer will conduct source approval and project control of bedding stone as specified in 530-2.2.4. In lieu of limestone or other quarry run stone, the Contractor may substitute non-reinforced concrete from existing pavement that is to be removed and which meets the above requirements for commercial bedding stone.

***530-2.4 Geotextile Fabric:*** *Meet the requirements of Section 514.*

**530-3 Construction Methods.**

**530-3.1 Sand-Cement:**

**530-3.1.1 Mixing Materials:** Proportion sand and cement in the ratio of 5 cubic feet [0.14 $m^3$] of sand to 94 lbs. [43 kg] (1 bag) of cement. If proportioning the materials by ~~weight~~*mass*, use a ~~unit weight~~*density* of 85 lbs\$ft^3$ [1,360 kg/$m^3$] (loose volume) for sand. The Contractor may batch sand at the moisture content occurring in the stockpile.

Mix the sand and cement until the mixture is of uniform color.

**530-3.1.2 Filling Sacks:** Accurately measure the mixed material into each sack, taking care to place the same amount of material in each sack; keep at least the top 6 inches [150 mm] of the sacks unfilled to allow for proper tying or folding and to ensure against breaking of the sack during placing.

**530-3.1.3 Placing:** Place the filled sacks with their tied or folded ends all in the same direction. Lay the sacks with broken joints, in a regular pattern. Ram or pack the sacks against each other so as to form a close and molded contact after the sand and cement mixture has set up. Remove and replace sacks ripped or torn in placing with sound, unbroken sacks. Then, thoroughly saturate all sacks with water.

**530-3.1.4 Grouting:** Immediately after watering, fill all openings between sacks with dry grout composed of one part *P*~~p~~ortland cement and five parts sand.

**530-3.1.5 Toe Walls:** The Contractor may construct toe walls of riprap for fill slopes of poured in place concrete in lieu of sand cement in sacks. Meet the concrete requirements specified in Section 347 for Class I Concrete. If using sand cement in sacks for the toe walls, fill the entire trench excavated for the toe walls with sand cement in sacks.

**530-3.2 Rubble:** Dump rubble in place forming a compact layer conforming to the neat lines and thickness specified in the plans. Ensure that rubble does not segregate so that smaller pieces evenly fill the voids between the larger pieces.

**530-3.3 Bedding Stone:** Place bedding stone without puncturing or tearing the geotextile fabric. Remove and replace geotextile fabric damaged as a result of operations at no expense to the Department.

The Engineer will allow an in place thickness tolerance of ±1 inch [25 mm].

**530-4 Method of Measurement.**

**530-4.1 Sand-Cement:** The quantity to be paid for will be the volume, in cubic yards [cubic meters], of sand actually used in the sand cement mixture and grout, satisfactorily placed and accepted.

If sand cement is proportioned by volume, the sand will be measured loose in an approved measure prior to mixing with cement. If sand cement is proportioned by

weight, approved scales will be used for this purpose and the volume will be calculated using a standard conversion factor for sand of 85 lbs./ft$^3$ [1,360 kg/m$^3$]. No adjustment of batch weights to allow for varying moisture content of the sand will be made.

For toe walls, the quantity to be paid for will include only the volume of sand cement in sacks or concrete placed within the neat lines shown in the plans for the toe walls.

**530-4.2 Rubble and Bedding Stone:** The quantities to be paid for will be the weight, in tons [metric tons], in surface dry natural state, by railroad scales, truck scales, or barge displacement. The Contractor shall determine the weights as follows:

(1) Railroad Weights: The Contractor shall weigh railroad cars on railroad scales, before and after loading or before and after unloading. If weighed by other than the Engineer, a certified statement of weights will be required. Certificates of weight, furnished by the railroad company, will be acceptable without further certification.

(2) Truck Weights: The Contractor shall weigh trucks on certified scales, loaded and empty, as prescribed above for railroad weights. The Contractor shall weigh trucks in the presence of the Engineer, or furnish certificates of weights.

(3) Barge Displacement: The Engineer will measure each barge. The Contractor shall fit each barge with gauges graduated in tenths of a foot [30.48 mm] increments. The Contractor shall locate a gauge at each corner of the barge near the lower end of the rake. The Contractor shall furnish additional gauges amidships if the Engineer deems necessary. The Engineer will compute all weights.

**530-5 Basis of Payment.**

**530-5.1 Sand-Cement:** Price and payment will be full compensation for all work specified in this Section, including all materials, labor, hauling, excavation, and backfill.

~~The Contractor shall i~~*I*nclude the cost of dressing and shaping the existing fills (or subgrade) for placing riprap in the Contract unit price for Riprap (Sand-Cement).

**530-5.2 Rubble:** Price and payment will be full compensation for all work specified in this Section, including all materials, hauling, excavation, and backfill.

~~The Contractor shall i~~*I*nclude the cost of dressing and shaping the existing fills (or subgrade) for placing riprap in the Contract unit price for Riprap (Rubble).

As an exception to the above, concrete that is shown to be removed from an existing structure and subsequently disposed of by being used in the embankment as riprap will not be paid for under this Section. ~~The Contractor shall i~~*I*nclude the cost of such work under Removal of Existing Structures.

**530-5.3 Bedding Stone:** Price and payment will be full compensation for all work specified in this Section, including all materials and hauling.

~~The Contractor shall i~~*I*nclude the cost of dressing and shaping the existing fills (or subgrade) for placing bedding stone in the Contract unit price for Riprap (Rubble).

**530-5.4 Payment Items.** Payment will be made under:

| | | |
|---|---|---|
| Item No. | 530- 1- | Riprap (Sand-Cement) - per cubic yard. |
| Item No. | 2530- 1- | Riprap (Sand-Cement) - per cubic meter. |
| Item No. | 530- 3- | Riprap (Rubble) - per ton. |
| Item No. | 2530- 3- | Riprap (Rubble) - per metric ton. |

Item No. 530- 74- Bedding Stone - per ton.
Item No. 2530- 74- Bedding Stone - per metric ton.

**RIPRAP.**
**(REV 1-6-06)**

SECTION 530 (Pages 598-603) is deleted and the following substituted:

## SECTION 530
## RIPRAP

### 530-1 Description.

Construct riprap composed of sand-cement or rubble (consisting of broken stone or broken concrete) as shown in the plans. When specified in the plans, place bedding stone under the rubble riprap.

### 530-2 Materials.

**530-2.1 Sand-Cement:**

(1) Portland Cement: Provide cement from an approved source meeting the requirements of Section 921. Certify that cement meets the requirements of the Contract Documents.

(2) Fine Aggregate: Meet the requirements of 902-3.3.

(3) Sacks: Provide sacks made of jute, cotton, or scrim reinforced paper capable of holding the sand-cement mixture without leakage. Ensure that sack material is permeable and absorptive enough to permit passage of water to provide for hydration of the cement. Ensure that paper used in sacks is non-asphalt laminated with a polyester fiber scrim reinforcement in a three-way directional pattern, has an embossed finish, and is perforated approximately 3/32 inch [2.5 mm] in approximate 1 inch [25 mm] centers. Extend perforations continuously through the entire wall.

Provide sacks of uniform size and dimensions, in order to provide uniformity of lines in the completed work. Use sacks that are free from holes and strong enough to withstand handling without ripping or splitting. Use only one type and size of sack at any one structure.

(4) Grout: Provide sand from an approved source meeting the requirements of 902-3.3. Provide cement from an approved source meeting the requirements of Section 921.

(5) Geotextile Fabric: Meet the requirements of Section 514.

**530-2.2 Rubble:**

**530-2.2.1 Rubble (Bank and Shore Protection):** Provide sound, hard, durable rubble, free of open or incipient cracks, soft seams, or other structural defects, consisting of broken stone with a bulk specific gravity of at least 2.30. Ensure that stones are rough and angular.

For this application, use broken stone meeting the following gradation and thickness requirements:

| Weight Maximum Pounds [Kilograms] | Weight 50% Pounds [Kilograms] | Weight Minimum Pounds [Kilograms] | Minimum Blanket Thickness in Feet [Thickness in Meters] |
|---|---|---|---|
| 700 [320] | 300 [135] | 60 [25] | 2.5 [0.75] |
| Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds [kilograms].<br>Ensure that at least 50% of the material by weight is greater than Weight 50% pounds [kilograms].<br>Ensure that at least 85% of the material by weight is greater than Weight Minimum pounds [kilograms]. | | | |

**530-2.2.2 Rubble (Ditch Lining):** Use sound, hard, durable rubble, free of open or incipient cracks, soft seams, or other structural defects, consisting of broken stone or broken concrete with a bulk specific gravity of at least 1.90. Ensure that stones or broken concrete are rough and angular.

Use broken stone or broken concrete meeting the following gradation and thickness requirements:

| Weight Maximum Pounds [Kilograms] | Weight 50% Pounds [Kilograms] | Weight Minimum Pounds [Kilograms] | Minimum Blanket Thickness in Feet [Thickness in Meters] |
|---|---|---|---|
| 75 [35] | 30 [15] | 4 [2] | 1.5 [0.45] |
| Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds [kilograms].<br>Ensure that at least 50% of the material by weight is greater than Weight 50% pounds [kilograms].<br>Ensure that at least 90% of the material by weight is greater than Weight Minimum pounds [kilograms]. | | | |

**530-2.2.3 Physical Requirements of Broken Stone and Broken Concrete:** Use broken stone and broken concrete meeting the following physical requirements:

| | |
|---|---|
| Absorption (FM 1-T85) | Maximum 5% |
| Los Angeles Abrasion (FM 1-T 096) | maximum loss 45%* |
| Soundness (Sodium Sulphate) (AASHTO T 104) | maximum loss 12%** (after five cycles) |
| Flat and elongated pieces | materials with least dimension less than one third of greatest dimension not exceeding 10% by weight. |
| Dirt and Fines | materials less than 1/2 inch [13 mm] in maximum dimension accumulated from interledge layers, blasting or handling operations not exceeding 5% by weight. |
| Drop Test***(EM 1110-2-2302) | No new cracks developed, or no existing crack widened additional 0.1 inch, or final largest dimension greater than or equal to 90% original largest dimension of dropped piece. |

* Ensure that granite does not have a loss greater than 55% and that broken concrete does not have a loss greater than 45%.
** The Engineer may accept rubble exceeding the soundness loss limitation if performance history shows that the material will be acceptable for the intended use. The Engineer will waive the soundness specification for rubble riprap (broken stone and broken concrete) when project documents indicate it will be placed in or adjacent to water or soil with a sulfate content less than 150 parts per million and a pH greater than 5.0.
***The Engineer will waive the Drop Test unless required to ensure structural integrity. Provide all equipment, labor and testing at no expense to the Department. EM refers to the US Army Corps of Engineer's Specification Engineering Method which can be found at http://www.usace.army.mil/inet/usace-docs/eng-manuals/em1110-2-2302/c-6.pdf

**530-2.2.4 Source Approval and Project Control:** The Engineer will approve mineral aggregate sources in accordance with 6-3.3 as amended by the following:

(1) The Engineer may perform Independent Verification tests on all materials placed on the project.

(2) The Engineer will check the gradation of the riprap by visual inspection at the project site. Resolve any difference of opinion with the Engineer in accordance with the method provided in FM 5-538. Provide all equipment, labor, and the sorting site at no expense to the Department.

(3) The Engineer may test components in a blend of rubble processed from different geologic formations, members, groups, units, layers or seams. The Engineer may select components based on like color, surface texture, porosity, or hardness. The Engineer will reject any blend if a component that makes up at least five percent by volume of the blend does not meet these specifications.

**530-2.3 Bedding Stone:** Use Bedding Stone of either a durable quality limestone or other quarry run stone, with a bulk specific gravity of not less than 1.90 and that is reasonably free from thin, flat and elongated pieces. Ensure that the bedding stone is also reasonably free from organic matter and soft, friable particles. Meet the following gradation limits:

| Standard Sieve Sizes | | Individual Percentage by Weight Passing |
|---|---|---|
| Inches | [millimeters] | |
| 12 inches | [305 mm] | 100 |
| 10 inches | [254 mm] | 70 to 100 |
| 6 inches | [152 mm] | 60 to 80 |
| 3 inches | [75 mm] | 30 to 50 |
| 1 inch | [25 mm] | 0 to 15 |

The Engineer will conduct source approval and project control of bedding stone as specified in 530-2.2.4. In lieu of limestone or other quarry run stone, the Contractor may substitute non-reinforced concrete from existing pavement that is to be removed and which meets the above requirements for commercial bedding stone.

**530-2.4 Geotextile Fabric:** Meet the requirements of Section 514.

**530-3 Construction Methods.**

**530-3.1 Sand-Cement:**

**530-3.1.1 Mixing Materials:** Proportion sand and cement in the ratio of 5 cubic feet [0.14 $m^3$] of sand to 94 lbs. [43 kg] (1 bag) of cement. If proportioning the materials by mass, use a density of 85 lbs\$ft^3$ [1,360 $kg/m^3$] (loose volume) for sand. The Contractor may batch sand at the moisture content occurring in the stockpile.

Mix the sand and cement until the mixture is of uniform color.

**530-3.1.2 Filling Sacks:** Accurately measure the mixed material into each sack, taking care to place the same amount of material in each sack; keep at least the top 6 inches [150 mm] of the sacks unfilled to allow for proper tying or folding and to ensure against breaking of the sack during placing.

**530-3.1.3 Placing:** Place the filled sacks with their tied or folded ends all in the same direction. Lay the sacks with broken joints, in a regular pattern. Ram or pack the sacks against each other so as to form a close and molded contact after the sand and cement mixture has set up. Remove and replace sacks ripped or torn in placing with sound, unbroken sacks. Then, thoroughly saturate all sacks with water.

**530-3.1.4 Grouting:** Immediately after watering, fill all openings between sacks with dry grout composed of one part Portland cement and five parts sand.

**530-3.1.5 Toe Walls:** The Contractor may construct toe walls of riprap for fill slopes of poured in place concrete in lieu of sand cement in sacks. Meet the concrete requirements specified in Section 347 for Class I Concrete. If using sand cement in sacks for the toe walls, fill the entire trench excavated for the toe walls with sand cement in sacks.

**530-3.2 Rubble:** Dump rubble in place forming a compact layer conforming to the neat lines and thickness specified in the plans. Ensure that rubble does not segregate so that smaller pieces evenly fill the voids between the larger pieces.

**530-3.3 Bedding Stone:** Place bedding stone without puncturing or tearing the geotextile fabric. Remove and replace geotextile fabric damaged as a result of operations at no expense to the Department.

The Engineer will allow an in place thickness tolerance of ±1 inch [25 mm].

**530-4 Method of Measurement.**

**530-4.1 Sand-Cement:** The quantity to be paid for will be the volume, in cubic yards [cubic meters], of sand actually used in the sand cement mixture and grout, satisfactorily placed and accepted.

If sand cement is proportioned by volume, the sand will be measured loose in an approved measure prior to mixing with cement. If sand cement is proportioned by weight, approved scales will be used for this purpose and the volume will be calculated using a standard conversion factor for sand of 85 lbs./$ft^3$ [1,360 $kg/m^3$]. No adjustment of batch weights to allow for varying moisture content of the sand will be made.

For toe walls, the quantity to be paid for will include only the volume of sand cement in sacks or concrete placed within the neat lines shown in the plans for the toe walls.

**530-4.2 Rubble and Bedding Stone:** The quantities to be paid for will be the weight, in tons [metric tons], in surface dry natural state, by railroad scales, truck scales, or barge displacement. The Contractor shall determine the weights as follows:

(1) Railroad Weights: The Contractor shall weigh railroad cars on railroad scales, before and after loading or before and after unloading. If weighed by other than the Engineer, a certified statement of weights will be required. Certificates of weight, furnished by the railroad company, will be acceptable without further certification.

(2) Truck Weights: The Contractor shall weigh trucks on certified scales, loaded and empty, as prescribed above for railroad weights. The Contractor shall weigh trucks in the presence of the Engineer, or furnish certificates of weights.

(3) Barge Displacement: The Engineer will measure each barge. The Contractor shall fit each barge with gauges graduated in tenths of a foot [30.48 mm] increments. The Contractor shall locate a gauge at each corner of the barge near the lower end of the rake. The Contractor shall furnish additional gauges amidships if the Engineer deems necessary. The Engineer will compute all weights.

**530-5 Basis of Payment.**

**530-5.1 Sand-Cement:** Price and payment will be full compensation for all work specified in this Section, including all materials, labor, hauling, excavation, and backfill.

Include the cost of dressing and shaping the existing fills (or subgrade) for placing riprap in the Contract unit price for Riprap (Sand-Cement).

**530-5.2 Rubble:** Price and payment will be full compensation for all work specified in this Section, including all materials, hauling, excavation, and backfill.

Include the cost of dressing and shaping the existing fills (or subgrade) for placing riprap in the Contract unit price for Riprap (Rubble).

As an exception to the above, concrete that is shown to be removed from an existing structure and subsequently disposed of by being used in the embankment as riprap will not be paid for under this Section. Include the cost of such work under Removal of Existing Structures.

**530-5.3 Bedding Stone:** Price and payment will be full compensation for all work specified in this Section, including all materials and hauling.

Include the cost of dressing and shaping the existing fills (or subgrade) for placing bedding stone in the Contract unit price for Riprap (Rubble).

**530-5.4 Payment Items.** Payment will be made under:

| | |
|---|---|
| Item No. 530- 1- | Riprap (Sand-Cement) - per cubic yard. |
| Item No. 2530- 1- | Riprap (Sand-Cement) - per cubic meter. |
| Item No. 530- 3- | Riprap (Rubble) - per ton. |
| Item No. 2530- 3- | Riprap (Rubble) - per metric ton. |
| Item No. 530- 74- | Bedding Stone - per ton. |
| Item No. 2530- 74- | Bedding Stone - per metric ton. |