



Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

September 2, 2025

Daniel Holt, PE, PTOE
Director, Project Delivery
Director, Technical Services
FHWA
400 West Washington Street, Suite 4200
Orlando, FL 32801

Re: State Specifications Office
Section: 530
Proposed Specification: **5300201 Revetment System**

Dear Mr. Holt:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Kelly Shishlova to change "Filter Fabric" to "geotextile," add reference to Section 145 for handling, certification, and sampling of the geogrid, and reorganize language.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on File

Daniel Strickland, P.E.
State Specifications Engineer

DS/jb

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

REVETMENT SYSTEMS (REV 6-3-25)

SUBARTICLE 530-1.2 is deleted and the following substituted:

530-1.2 Articulating Concrete Block (ACB) Revetment Systems: Furnish and install an ACB revetment system in accordance with this Section and in conformance with the lines, grades, design, and dimensions shown in the Plans. Submit vendor drawings for review and approval by the Engineer. Submit signed and sealed calculations of the block and cable sizing design for approval. Comply with the National Concrete Masonry Association's Design Manual for Articulating Concrete Block Revetment Systems, Second Edition, or the National Highway Institute, Hydraulic Engineering Circular (HEC) No. 23, Publication No. FHWA NHI 09-110. Use a minimum Factor of Safety of 1.5 and 0.5 inch for the block projection.

Blocks must be open cell and non-tapered unless otherwise stated in the Plans. Revetment cabling must be bi-directional or, for mono-directional cabling, the block installation must include a permanent mechanism within the block matrix to prevent lateral displacement of the installed blocks. Cabling must be polyester and free to move within the block.

Use only ACB revetment systems currently listed on the Department's Approved Product List (APL). Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6, and include certified test reports from an independent test laboratory certifying the ACB revetment system meets the requirements of this Section.

If the ACB revetment system is intended for use as bridge abutment protection, include the following drawings with the APL submittal:

1. At the corner transition between the front and side slopes.
2. For anchorages, geotextile ~~fabrie~~, treatment of voids between adjacent blocks, limits on void size between adjacent blocks and other special details required to successfully install the ACB.
3. For areas adjacent to bridge abutments, detail mat placement around open in curves, connections, protection of mat ends, and splicing of mat.

ARTICLE 530-2 is deleted and the following substituted:

530-2 Materials.

530-2.1 Riprap:

530-2.1.1 ~~Filter Fabric~~ Geotextile: Meet the following requirements:

~~Type D-2~~ **Drainage** Geotextile ~~Fabric~~ **Type D-1 or D-2*** Section 985-3

*Use products listed on the Department's APL.

~~Schedule work so that covering the fabric with the specified material does not exceed the manufacturer's recommendations for exposure to ultraviolet light or five days, whichever is less. If the Engineer determines the exposure time was exceeded, the Contractor shall replace the fabric at no expense to the Department.~~

~~Place the filter fabric (fabric) at locations as shown in the Plans, in accordance with the manufacturer's directions. Place the fabric on areas with a uniform slope that are reasonably smooth, free from mounds, windrows, and any debris or projections which might damage the fabric.~~

~~Loosely lay the material. Do not stretch the material. Replace or repair any fabric damaged or displaced before or during placement of overlying layers. Repair in accordance with the manufacturer's instructions.~~

~~The Contractor may sew the seams to reduce overlaps as specified in 985-3. Follow the manufacturer's instructions for all seams and overlaps.~~

530-2.1.2 Prepackaged Sand-Cement Bags: Provide prepackaged sand-cement bags that meet the following requirements:

1. Evenly proportioned sand and cement in the ratio of five cubic feet of sand to 94 pounds of cement. Material proportioned by mass shall use a sand density of 85 pounds per cubic foot.
2. Sealed package of 80 pounds of sand-cement in a bag.
3. Bag made of scrim-reinforced paper capable of holding the sand-cement without leakage.
4. Sand meets requirements of Section 902-3.3 **“Sand-Cement Riprap.”**
5. Type I/II cement meets requirements of Section 921.

Prepackaged Sand-Cement Bags shall be one of the products listed on the Department's Approved Product List. Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6. Include with the submittal a product data sheet, safety data sheet, product label, and a self-certified statement the product meets the requirements of this Section.

530-2.1.3 Rubble:

530-2.1.3.1 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 2.20. Ensure that stones are rough and angular.

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

Weight Maximum Pounds	Weight 50% Pounds	Weight Minimum Pounds	Minimum Blanket Thickness in Feet
670	290	60	2.5
Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds.			
Ensure that at least 50% of the material by weight is greater than Weight 50% pounds.			
Ensure that at least 85% of the material by weight is greater than Weight Minimum pounds.			

530-2.1.3.2 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	Weight 50% Pounds	Weight Minimum Pounds	Minimum Blanket Thickness in Feet
75	30	4	1.5
Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds. Ensure that at least 50% of the material by weight is greater than Weight 50% pounds. Ensure that at least 90% of the material by weight is greater than Weight Minimum pounds.			

530-2.1.3.3 Physical Requirements of Broken Stone and Broken

Concrete: Use broken stone and broken concrete meeting the following physical requirements:

Absorption (FM 1-T 85)	Maximum 5%
Los Angeles Abrasion (ASTM C535)	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 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) 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. Soundness is not required for broken concrete. *** 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.	

530-2.1.3.4 Source Approval and Project Control: The Engineer will

approve construction aggregate sources in accordance with 6-2.3 **“Construction Aggregates.”**

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.

530-2.1.4 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 - Inches	Individual Percentage by Weight Passing
12 inches	100
10 inches	70 to 100
6 inches	60 to 80
3 inches	30 to 50
1 inch	0 to 15

The Engineer will conduct source approval and project control of bedding stone as specified in 530-2.1.3.4. 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.

530-2.2 Articulating Concrete Block (ACB) Revetment Systems: Obtain all precast block, cabling, anchors, and necessary incidental materials from the same manufacturer. ACB revetment systems must meet the requirements of ASTM D6684, ASTM D7276 and ASTM D7277. Submit to the Engineer certification from the manufacturer that the ACB revetment system meets the requirements of this Section.

ACB system components must meet the following requirements:

ConcreteSection 347, ASTM D6684

Cables and Fittings.....ASTM D6684

Drainage Type D-2 Geotextile Fabric Type D-2 *Section 985-3

Granular UnderlaySection 901

*Use products listed on the Department's APL.

Cables must maintain at least 85% of original tensile strength (ASTM D638) after 1,000 hours exposure to a saturated solution of calcium hydroxide (pH greater than or equal to 11) at 73°F, plus or minus three degrees. Cables must not exceed a maximum of 0.5% moisture absorption at seven days, per ASTM D570. Cable crimps must be aluminum or stainless steel Type 304 or 316.

530-2.3 Gabions:

530-2.3.1 General: Provide gabions meeting the requirements of ASTM A974 and ASTM A975 as modified herein.

Allowable Gabion Wire and Connector Material	Substructure Environmental Classification
Polymeric	Any
Metallic	Slightly Aggressive
Metallic – Galvanized and PVC coated	Slightly Aggressive Moderately Aggressive
Metallic – Type 304 Stainless Steel, Size W1.4 (MW10) or larger	Slightly Aggressive Moderately Aggressive Extremely Aggressive (< 2,000 ppm Chlorides)
Metallic – Type 316 Stainless Steel, Size W1.4 (MW10) or larger	Any

530-2.3.2 Metallic Gabions: The components of metallic gabions must meet the following requirements:

Wire Mesh and Fabric*ASTM A974 and A975
Spiral Binders, Lacing Wire, Stiffeners, and Ring Wire
FastenersASTM A974 and A975
Stainless Steel Wire, Wire Fabric, and Lacing Wire
.....ASTM A1022

*Wire mesh must be Style 1 or Style 3. Wire fabric must be Style 1 or

Style 5.

530-2.3.3 Polymeric Gabions: Polymeric gabions must be constructed in general accordance with ASTM A974 using a single layer of structural geogrid instead of welded wire, and polymeric braid instead of ring wire fasteners. The structural geogrid must be Type R-1, 2, 3, 4, or 5 meeting the requirements of [Section 985-145-3.1 “Geosynthetic Materials,” 145-5 “Certification,” the requirements of 145-6.1.3 “Geosynthetic,”](#) and the following:

Tensile Strength @ 2% strain MD*575 lb/ft
Tensile Strength @ 2% strain XD**575 lb/ft
Junction Strength (% of Tensile Strength)..... 90%
Min UV Stability..... 85%
Min. Carbon Black Content (by Weight)..... 2%
*MD = machine direction
**XD = cross direction

Polymeric braid for seaming polymeric gabions or connecting metallic gabions must have a minimum tensile strength of 400 pounds for a 36 inch long specimen and contain at least 2% carbon black by weight.

530-2.3.4 Gabion Rock: Use rock meeting the requirements of ASTM D6711 to fill gabions. The rock must be reasonably free from thin, flat or elongated pieces. Rock size must be at least 1.25 times greater than the aperture size of the wire mesh or fabric. Each range of sizes may allow for a variation of 5% oversize rock by weight, 5% undersize rock by weight, or both.

Physical Property Requirements	Acceptable Range
Los Angeles Abrasion and ASTM C535	Maximum loss 40%
Bulk Specific Gravity	Minimum 2.20

Absorption, ASTM C127 and ASTM C128	Maximum 3%
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530-2.3.5 Miscellaneous Components: Miscellaneous components for gabion installations must meet the following requirements:

Drainage Geotextile Type D-2 ~~Geotextile-Fabrie~~ *Section 985-3

Granular UnderlaySection 901

AnchorsSection 451 or manufacturer's recommendations

*Use products listed on the Department's APL.

SUBARTICLE 530-3.1 is deleted and the following substituted:

530-3.1 Geotextile-Fabrie: Schedule work so that covering the ~~fabrie~~geotextile with the specified material does not exceed the manufacturer's recommendations for exposure to ultraviolet light or five days, whichever is less. If the Engineer determines the exposure time was exceeded, the Contractor shall replace the ~~fabrie~~geotextile at no expense to the Department.

Place the ~~filter fabric (fabrie)~~geotextile at locations as shown in the Plans, in accordance with the manufacturer's directions. Place the ~~fabrie~~geotextile on areas with a uniform slope that are reasonably smooth, free from mounds, windrows, and any debris or projections which might damage the fabric.

Loosely lay the material. Do not stretch the material. Replace or repair any ~~fabrie~~geotextile damaged or displaced before or during placement of overlying layers. Repair in accordance with the manufacturer's instructions.

The Contractor may sew the seams to reduce overlaps as specified in ~~985-3~~514-4 "Construction Methods." Follow the manufacturer's instructions for all seams and overlaps.

Overlap adjacent strips of ~~fabrie~~geotextile a minimum of 24 inches, and anchor them with securing pins (as recommended by the manufacturer) inserted through both strips of ~~fabrie~~geotextile along a line through the midpoint of the overlap and to the extent necessary to prevent displacement of the ~~fabrie~~geotextile.

Place the ~~fabrie~~geotextile so that the upstream (upper) strip of ~~fabrie~~geotextile overlaps the downstream (lower) strip.

Stagger vertical laps a minimum of 5 feet. Use full rolls of ~~fabrie~~geotextile whenever possible in order to reduce the number of vertical laps.

Do not drop bedding stone or riprap from heights greater than 3 feet onto the ~~fabrie~~geotextile.

SUBARTICLE 530-3.4 is deleted and the following substituted:

530-3.4 Bedding Stone: Place a minimum one foot thick layer of bedding stone under all rubble riprap without puncturing or tearing the geotextile ~~fabrie~~. The Engineer will allow an in place thickness tolerance of plus or minus one inch.

Remove and replace geotextile ~~fabrie~~ damaged as a result of operations at no expense to the Department.

SUBARTICLE 530-3.5 is deleted and the following substituted:

530-3.5 Articulating Concrete Block (ACB) Revetment System: Install the ACB revetment system in accordance with ASTM D6884 and the manufacturer's recommendations, unless directed otherwise by the Engineer.

Prior to installation, construct the area to be stabilized to an elevation such that, upon completion of stabilizing operations, the completed stabilized subgrade will conform to the lines, grades and cross slope shown in the Plans. Bring the subgrade surface to a plane approximately parallel to the plane of the proposed finished surface, such that, upon placement of the mat, no individual block within the ACB mat will protrude more than one-half inch from any adjacent block. Uniformly compact each subgrade layer to achieve the density required in the Plans. If the Plans do not provide for stabilizing, compact the subgrade in both cuts and fills, to the density specified in ASTM D6884.

Embed anchors at least six feet into the subgrade at a 45 degree angle into the bank with a minimum pullout resistance of 875 pounds. In the presence of the Engineer, perform on-site anchor strength testing to verify the required pull out resistance is achieved. Anchor strength testing must be performed on the first two and final two installed anchors, and randomly throughout the installation operation such that 5% of all installed anchors are tested for pullout resistance. If any anchor fails to meet the pullout resistance requirement, test every subsequent installed anchor until a revised installation plan is proposed and approved by the Engineer. Anchor spacing cannot exceed four feet.

Immediately prior to placing the geotextile ~~fabrie~~ and ACB system, inspect the prepared subgrade to ensure it is free of loose material and the surface is smoothly compacted. Place the geotextile ~~fabrie~~ directly on the prepared area, in intimate contact with the subgrade and free of folds or wrinkles. Do not glue or physically bond the geotextile ~~fabrie~~ to the ACB mat. Install a six inch thick layer of bedding stone under the geotextile ~~fabrie~~, when called for in the Plans.

When installing ACB systems around curves, the mats shall be matched up to the greatest extent possible. Gaps greater than one block size shall be filled with a block and grouted the depth of the block with non-structural grout.

Do not install blocks with chips that result in any block weighing less than 95% of the manufacture specified weight.

SUBARTICLE 530-4.3 is deleted and the following substituted:

530-4.3 Articulating Concrete Block (ACB) Revetment System: The quantity to be paid for will be the plan quantity, in square yards, completed and accepted, subject to the provisions of 9-3.2 "Payment Based on Plan Quantity." No allowance will be made for ACB placed outside the Plan dimensions, unless the additional placement is ordered by the Engineer.

SUBARTICLE 530-5.4 is deleted and the following substituted:

530-5.4 Geotextile ~~fabrie~~: Include the cost of materials and installation of the geotextile ~~fabrie~~, including any repairs or replacement, in the Contract unit price for riprap or ACB revetment system.

REVETMENT SYSTEMS

(REV 6-3-25)

SUBARTICLE 530-1.2 is deleted and the following substituted:

530-1.2 Articulating Concrete Block (ACB) Revetment Systems: Furnish and install an ACB revetment system in accordance with this Section and in conformance with the lines, grades, design, and dimensions shown in the Plans. Submit vendor drawings for review and approval by the Engineer. Submit signed and sealed calculations of the block and cable sizing design for approval. Comply with the National Concrete Masonry Association's Design Manual for Articulating Concrete Block Revetment Systems, Second Edition, or the National Highway Institute, Hydraulic Engineering Circular (HEC) No. 23, Publication No. FHWA NHI 09-110. Use a minimum Factor of Safety of 1.5 and 0.5 inch for the block projection.

Blocks must be open cell and non-tapered unless otherwise stated in the Plans. Revetment cabling must be bi-directional or, for mono-directional cabling, the block installation must include a permanent mechanism within the block matrix to prevent lateral displacement of the installed blocks. Cabling must be polyester and free to move within the block.

Use only ACB revetment systems currently listed on the Department's Approved Product List (APL). Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6, and include certified test reports from an independent test laboratory certifying the ACB revetment system meets the requirements of this Section.

If the ACB revetment system is intended for use as bridge abutment protection, include the following drawings with the APL submittal:

1. At the corner transition between the front and side slopes.
2. For anchorages, geotextile, treatment of voids between adjacent blocks, limits on void size between adjacent blocks and other special details required to successfully install the ACB.
3. For areas adjacent to bridge abutments, detail mat placement around open in curves, connections, protection of mat ends, and splicing of mat.

ARTICLE 530-2 is deleted and the following substituted:

530-2 Materials.

530-2.1 Riprap:

530-2.1.1 Geotextile: Meet the following requirements:

Drainage Geotextile Type D-1 or D-2*Section 985-3

*Use products listed on the Department's APL.

530-2.1.2 Prepackaged Sand-Cement Bags: Provide prepackaged sand-cement bags that meet the following requirements:

1. Evenly proportioned sand and cement in the ratio of five cubic feet of sand to 94 pounds of cement. Material proportioned by mass shall use a sand density of 85 pounds per cubic foot.
2. Sealed package of 80 pounds of sand-cement in a bag.
3. Bag made of scrim-reinforced paper capable of holding the sand-cement without leakage.

4. Sand meets requirements of Section 902-3.3 “Sand-Cement Riprap.”

5. Type I/II cement meets requirements of Section 921.

Prepackaged Sand-Cement Bags shall be one of the products listed on the Department’s Approved Product List. Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6. Include with the submittal a product data sheet, safety data sheet, product label, and a self-certified statement the product meets the requirements of this Section.

530-2.1.3 Rubble:

530-2.1.3.1 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 2.20. Ensure that stones are rough and angular.

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

Weight Maximum Pounds	Weight 50% Pounds	Weight Minimum Pounds	Minimum Blanket Thickness in Feet
670	290	60	2.5
Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds. Ensure that at least 50% of the material by weight is greater than Weight 50% pounds. Ensure that at least 85% of the material by weight is greater than Weight Minimum pounds.			

530-2.1.3.2 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	Weight 50% Pounds	Weight Minimum Pounds	Minimum Blanket Thickness in Feet
75	30	4	1.5
Ensure that at least 97% of the material by weight is smaller than Weight Maximum pounds. Ensure that at least 50% of the material by weight is greater than Weight 50% pounds. Ensure that at least 90% of the material by weight is greater than Weight Minimum pounds.			

530-2.1.3.3 Physical Requirements of Broken Stone and Broken Concrete: Use broken stone and broken concrete meeting the following physical requirements:

Absorption (FM 1-T 85)	Maximum 5%
Los Angeles Abrasion (ASTM C535)	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 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.
<p>* Ensure that granite does not have a loss greater than 55% and that broken concrete does not have a loss greater than 45%.</p> <p>** 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) 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. Soundness is not required for broken concrete.</p> <p>*** 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.</p>	

530-2.1.3.4 Source Approval and Project Control: The Engineer will approve construction aggregate sources in accordance with 6-2.3 "Construction Aggregates. "

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.

530-2.1.4 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 - Inches	Individual Percentage by Weight Passing
12 inches	100
10 inches	70 to 100
6 inches	60 to 80
3 inches	30 to 50
1 inch	0 to 15

The Engineer will conduct source approval and project control of bedding stone as specified in 530-2.1.3.4. 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.

530-2.2 Articulating Concrete Block (ACB) Revetment Systems: Obtain all precast block, cabling, anchors, and necessary incidental materials from the same manufacturer. ACB revetment systems must meet the requirements of ASTM D6684, ASTM D7276 and ASTM D7277. Submit to the Engineer certification from the manufacturer that the ACB revetment system meets the requirements of this Section.

ACB system components must meet the following requirements:

ConcreteSection 347, ASTM D6684

Cables and Fittings.....ASTM D6684

Drainage Geotextile Type D-2* Section 985-3

Granular UnderlaySection 901

*Use products listed on the Department's APL.

Cables must maintain at least 85% of original tensile strength (ASTM D638) after 1,000 hours exposure to a saturated solution of calcium hydroxide (pH greater than or equal to 11) at 73°F, plus or minus three degrees. Cables must not exceed a maximum of 0.5% moisture absorption at seven days, per ASTM D570. Cable crimps must be aluminum or stainless steel Type 304 or 316.

530-2.3 Gabions:

530-2.3.1 General: Provide gabions meeting the requirements of ASTM A974 and ASTM A975 as modified herein.

Allowable Gabion Wire and Connector Material	Substructure Environmental Classification
Polymeric	Any
Metallic	Slightly Aggressive
Metallic – Galvanized and PVC coated	Slightly Aggressive Moderately Aggressive
Metallic – Type 304 Stainless Steel, Size W1.4 (MW10) or larger	Slightly Aggressive Moderately Aggressive Extremely Aggressive (< 2,000 ppm Chlorides)
Metallic – Type 316 Stainless Steel, Size W1.4 (MW10) or larger	Any

530-2.3.2 Metallic Gabions: The components of metallic gabions must meet the following requirements:

Wire Mesh and Fabric*ASTM A974 and A975
Spiral Binders, Lacing Wire, Stiffeners, and Ring Wire
FastenersASTM A974 and A975
Stainless Steel Wire, Wire Fabric, and Lacing Wire
.....ASTM A1022

*Wire mesh must be Style 1 or Style 3. Wire fabric must be Style 1 or

Style 5.

530-2.3.3 Polymeric Gabions: Polymeric gabions must be constructed in general accordance with ASTM A974 using a single layer of structural geogrid instead of welded wire, and polymeric braid instead of ring wire fasteners. The structural geogrid must be Type R-1, 2, 3, 4, or 5 meeting the requirements of 145-3.1 “Geosynthetic Materials,” 145-5 “Certification,” the requirements of 145-6.1.3 “Geosynthetic,” and the following:

Tensile Strength @ 2% strain MD*575 lb/ft
Tensile Strength @ 2% strain XD**575 lb/ft
Junction Strength (% of Tensile Strength)..... 90%
Min UV Stability..... 85%
Min. Carbon Black Content (by Weight)..... 2%

*MD = machine direction

**XD = cross direction

Polymeric braid for seaming polymeric gabions or connecting metallic gabions must have a minimum tensile strength of 400 pounds for a 36 inch long specimen and contain at least 2% carbon black by weight.

530-2.3.4 Gabion Rock: Use rock meeting the requirements of ASTM D6711 to fill gabions. The rock must be reasonably free from thin, flat or elongated pieces. Rock size must be at least 1.25 times greater than the aperture size of the wire mesh or fabric. Each range of sizes may allow for a variation of 5% oversize rock by weight, 5% undersize rock by weight, or both.

Physical Property Requirements	Acceptable Range
Los Angeles Abrasion and ASTM C535	Maximum loss 40%
Bulk Specific Gravity	Minimum 2.20
Absorption, ASTM C127 and ASTM C128	Maximum 3%

530-2.3.5 Miscellaneous Components: Miscellaneous components for gabion installations must meet the following requirements:

Drainage Geotextile Type D-2 * Section 985-3

Granular UnderlaySection 901

AnchorsSection 451 or manufacturer’s recommendations

*Use products listed on the Department’s APL.

SUBARTICLE 530-3.1 is deleted and the following substituted:

530-3.1 Geotextile: Schedule work so that covering the geotextile with the specified material does not exceed the manufacturer’s recommendations for exposure to ultraviolet light or

five days, whichever is less. If the Engineer determines the exposure time was exceeded, the Contractor shall replace the geotextile at no expense to the Department.

Place the geotextile at locations as shown in the Plans, in accordance with the manufacturer's directions. Place the geotextile on areas with a uniform slope that are reasonably smooth, free from mounds, windrows, and any debris or projections which might damage the fabric.

Loosely lay the material. Do not stretch the material. Replace or repair any geotextile damaged or displaced before or during placement of overlying layers. Repair in accordance with the manufacturer's instructions.

The Contractor may sew the seams to reduce overlaps as specified in 514-4 "Construction Methods." Follow the manufacturer's instructions for all seams and overlaps.

Overlap adjacent strips of geotextile a minimum of 24 inches, and anchor them with securing pins (as recommended by the manufacturer) inserted through both strips of geotextile along a line through the midpoint of the overlap and to the extent necessary to prevent displacement of the geotextile.

Place the geotextile so that the upstream (upper) strip of geotextile overlaps the downstream (lower) strip.

Stagger vertical laps a minimum of 5 feet. Use full rolls of geotextile whenever possible in order to reduce the number of vertical laps.

Do not drop bedding stone or riprap from heights greater than 3 feet onto the geotextile.

SUBARTICLE 530-3.4 is deleted and the following substituted:

530-3.4 Bedding Stone: Place a minimum one foot thick layer of bedding stone under all rubble riprap without puncturing or tearing the geotextile. The Engineer will allow an in place thickness tolerance of plus or minus one inch.

Remove and replace geotextile damaged as a result of operations at no expense to the Department.

SUBARTICLE 530-3.5 is deleted and the following substituted:

530-3.5 Articulating Concrete Block (ACB) Revetment System: Install the ACB revetment system in accordance with ASTM D6884 and the manufacturer's recommendations, unless directed otherwise by the Engineer.

Prior to installation, construct the area to be stabilized to an elevation such that, upon completion of stabilizing operations, the completed stabilized subgrade will conform to the lines, grades and cross slope shown in the Plans. Bring the subgrade surface to a plane approximately parallel to the plane of the proposed finished surface, such that, upon placement of the mat, no individual block within the ACB mat will protrude more than one-half inch from any adjacent block. Uniformly compact each subgrade layer to achieve the density required in the Plans. If the Plans do not provide for stabilizing, compact the subgrade in both cuts and fills, to the density specified in ASTM D6884.

Embed anchors at least six feet into the subgrade at a 45 degree angle into the bank with a minimum pullout resistance of 875 pounds. In the presence of the Engineer, perform

on-site anchor strength testing to verify the required pull out resistance is achieved. Anchor strength testing must be performed on the first two and final two installed anchors, and randomly throughout the installation operation such that 5% of all installed anchors are tested for pullout resistance. If any anchor fails to meet the pullout resistance requirement, test every subsequent installed anchor until a revised installation plan is proposed and approved by the Engineer. Anchor spacing cannot exceed four feet.

Immediately prior to placing the geotextile and ACB system, inspect the prepared subgrade to ensure it is free of loose material and the surface is smoothly compacted. Place the geotextile directly on the prepared area, in intimate contact with the subgrade and free of folds or wrinkles. Do not glue or physically bond the geotextile to the ACB mat. Install a six inch thick layer of bedding stone under the geotextile, when called for in the Plans.

When installing ACB systems around curves, the mats shall be matched up to the greatest extent possible. Gaps greater than one block size shall be filled with a block and grouted the depth of the block with non-structural grout.

Do not install blocks with chips that result in any block weighing less than 95% of the manufacture specified weight.

SUBARTICLE 530-4.3 is deleted and the following substituted:

530-4.3 Articulating Concrete Block (ACB) Revetment System: The quantity to be paid for will be the plan quantity, in square yards, completed and accepted, subject to the provisions of 9-3.2 "Payment Based on Plan Quantity." No allowance will be made for ACB placed outside the Plan dimensions, unless the additional placement is ordered by the Engineer.

SUBARTICLE 530-5.4 is deleted and the following substituted:

530-5.4 Geotextile: Include the cost of materials and installation of the geotextile, including any repairs or replacement, in the Contract unit price for riprap or ACB revetment system.