SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15		*New York State Department of Transportation* **ENGINEERING INSTRUCTION**	**EI** **10-015**

Title: **SECTION 620 – BANK AND CHANNEL PROTECTION**

Distribution:

- ☒ Manufacturers (18)
- ☒ Local Govt. (31)
- ☒ Agencies (32)
- ☐ Surveyors (33)
- ☒ Consultants (34)
- ☒ Contractors (39)
- ☐ _____( )

Approved:

Robert L. Sack, P.E.,
Deputy Chief Engineer (Research)

17 MAY 10
Date

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of January 6, 2011.
- Superseded issuance(s): This EI does not supersede any previous issuances.
- The information transmitted by this issuance will be incorporated into a future revision to the Standard Specifications.

PURPOSE: The purpose of this EI is to revise Standard Specifications Section 620.

TECHNICAL INFORMATION:

- EI 09-027 assigned the material specifications related to stone filling to Specification §733-21, the material specifications related to dry and grouted rip-rap to Specification §733-22, and the material specifications related to bedding material to Specification §733-23. To complete the specification change, the material requirements are being removed from Section 620, which will now reference the appropriate subsections of Section 700. This will align the specification with SiteManager's methodology in defining its Material Codes and Pay Items, with Items referring to one or many materials.

IMPLEMENTATION:

- The Main Office Design Quality Assurance Bureau will insert these standard specification shelf notes beginning with projects submitted for the letting of January 6, 2011.

TRANSMITTED MATERIALS:

- Standard Specification shelf notes of revised *Section 620 Bank and Channel Protection.* Both metric and US Customary shelf notes are attached.

BACKGROUND: To embrace the future that is SiteManager, the Geotechnical Engineering Bureau is changing how some of its specifications are written to align them with most Standard Specifications, which separate materials from pay items.

CONTACT: Questions or comments regarding this issuance should be directed to Randall J. Romer, P.E., of the Geotechnical Engineering Bureau at (518) 457-4714, rromer@dot.state.ny.us.

Make the following changes to the Standard Specifications dated May 1, 2008:

Pages 601 through 606, **Delete** SECTION 620 and **Replace** it with the following:

SECTION 620 – BANK AND CHANNEL PROTECTION

620-1 DESCRIPTION. This work shall consist of furnishing all labor, equipment, and materials to place a protective covering of erosion-resistant material in the locations indicated in the contract documents or as directed by the Engineer. The work shall be done in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical sections shown in the contract documents or established by the Engineer.

620-1.01 Vacant.

620-1.02 Stone Filling. Stone filling shall consist of a layer of well graded stone.

620-1.03 Dry Rip-Rap. Dry rip-rap shall consist of a fitted layer of shaped and graded stone.

620-1.04 Grouted Rip-Rap. Grouted rip-rap shall consist of a layer of stone, similar to dry rip-rap, with the spaces between the stones filled with cement grout.

620-1.05 Bedding Material. Bedding material shall consist of a layer of granular material placed to prevent underlying finer material from passing into and through the stone filling or rip-rap.

620-1.06 Concrete Block Paving. Concrete block paving shall consist of concrete blocks placed on embankment slopes under structures as protection against erosion.

620-1.07 Gabions. Gabions shall consist of open wire mesh baskets, filled with stones.

620-2 MATERIALS

620-2.01 General. The requirements for bank and channel protection materials are described below. The procedure for acceptance or rejection of stone filling and rip-rap materials shall be in conformance with the procedures contained in the geotechnical control procedure "*Procedure for the Control of Stone Filling and Rip-Rap Items*".

620-2.02 Stone Filling. Provide material meeting the requirements of §733-21 *Stone Filling* for the type of stone filling specified in the contract documents.

620-2.03 Dry Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap,* except for §733-22D *Grout.*

620-2.04 Grouted Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap.*

620-2.05 Bedding Material. Provide material meeting the requirements of §733-23 *Bedding Material.*

620-2.06 Concrete Block Paving. Provide concrete blocks meeting the requirements of §704-04 *Concrete Block (Slope Paving).* The blocks shall conform to the dimensions identified in Table 620-1 *Concrete Block Dimensions*:

TABLE 620-1 CONCRETE BLOCK DIMENSIONS		
	Nominal Dimension	**Standard Dimension**
Length	16 to 20 in.	15 ⅝ to 19 ⅝ in. (± ⅛ in.)
Thickness	6 in. (solid)	5 ⅝ in. (± ⅛ in.)
Width	8 in.	7 ⅝ in. (± ⅛ in.)

The size of block used shall be consistent throughout any continuously paved area, and only one nominal length shall be used in any contract. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the blocks or impair the strength, permanence and appearance of the construction.

Cushion sand for concrete block paving shall meet the requirements of §703-06 *Cushion Sand*. Grout, where used, shall conform to Table 620-2 *Concrete Block Grout Requirements*.

TABLE 620-2 CONCRETE BLOCK GROUT REQUIREMENTS		
Material	**Subsection**	**Grout Mix**
Portland Cement Type 2	§701-01	1 part
Mortar Sand	§703-03	2 parts

620-2.07 Gabions. Provide materials meeting the requirements of §712-15 *Gabions*.

620-3 CONSTRUCTION DETAILS

620-3.01 General. The ground surface on which bank or channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. All soft or spongy material shall be removed to the depth shown in the contract documents and replaced with approved material. Filled areas shall be compacted in accordance with applicable provisions of Section 203. Protection for structure foundations shall be provided as early as the foundation construction permits. The type of protection shall be placed in accordance with these specifications and the contract documents.

620-3.02 Stone Filling. Stone filling shall be placed in a manner that will produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids. The final section of stone filling shall be in conformance with the lines, grades, and thicknesses shown in the contract documents. Stone filling used for bank or channel protection shall be placed to its full course thickness in one operation, unless specified in the special provisions, and in such a manner that the underlying material will not be displaced or worked into the layer of stone filling. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placing; or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to secure the specified results. When stone filling is dumped under water, methods shall be used that will minimize segregation.

620-3.03 Dry Rip-Rap. The stones shall be placed so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface and that the weight of the stone is carried by the underlying material and not by the adjacent stones. On slopes, the largest stones shall be placed at the bottom of the slope. The dry rip-rap shall be properly aligned and placed so as to minimize void spaces between the adjacent stones. The spaces between the stones shall be filled with spalls of suitable size.

620-3.04 Grouted Rip-Rap. The procedure of placing the stones shall be the same as described in §620-3.03 *Dry Rip-Rap* except that the space between stones shall be filled with grout rather than spalls. Material upon which the grouted rip-rap is laid shall not be allowed to occupy the space between the stones.

When the stones are in place, the spaces between them shall be completely filled with grout and the surface of the stones cleaned to remove accumulation of grout. Rip-rap shall not be grouted in freezing weather. The grouted rip-rap shall be kept moist for seven days after grouting. A suitable curing compound may be employed, if approved by the Engineer.

The Engineer may direct that occasional spaces be left ungrouted for relief of hydrostatic pressure. The ungrouted spaces shall be chinked with spalls of suitable size.

620-3.05 Bedding Material. Where called for in the contract documents, stone filling and dry rip-rap shall be placed on bedding material. The bedding material shall be placed on the prepared area to the full specified thickness of each layer in one operation, using methods which will not cause segregation of particle sizes. Contamination of bedding material by natural soils or other materials shall be prevented. Bedding material that becomes contaminated shall be removed and replaced with uncontaminated bedding material at no additional cost to the State.

620-3.06 Concrete Block Paving. Blocks shall be laid on a 3 in. bed of cushion sand in running bond with the long dimension transverse to the slope and all joints tight. Blocks shall be set slightly higher than their final position and carefully hand tamped into their final position to provide a uniformly even surface and solid bedding under each block.

In the areas where grouting is called for, the block shall be laid in running bond with the length parallel to the slope and with ¼ in. joints. Following the laying of blocks, in the area to be grouted, sufficient mortar sand shall be spread over the surface and swept into the joints to fill the latter to 4 in. from the surface. The block shall be wetted before any grout is placed. The joints shall be filled with grout from the bottom flush with the top of the block.

After grouting has been completed and the grout has sufficiently hardened, the blocks shall be wetted, covered and cured with curing covers for the first seven days after grouting. Grout shall not be poured during freezing weather.

620-3.07 Gabions. Each gabion unit shall be assembled by binding together all vertical edges with wire ties on approximately 6 in. spacing or by a continuous piece of connecting wire stitched around the vertical edges with a coil about every 4 in. Empty gabion units shall be set to line and grade as shown in the contract documents. For structural integrity, wire ties or connecting wire shall be used to join the gabions together along the perimeter of all contact surfaces according to the manufacturer's instructions. Internal tie wires shall be uniformly spaced and securely fastened in each outside cell of the structure in accordance with the manufacturer's instructions or where ordered by the Engineer. When gabions are being placed as slope protection, the cross-connecting wire may be deleted if directed by the Engineer.

A fence stretcher, chain fall, or iron rod may be used to stretch the wire baskets and hold alignment.

The gabions shall be filled with stone, carefully placed by hand or machine, to ensure alignment and avoid bulges with a minimum of voids. After a gabion has been filled, the lid shall be bent over until it meets the side and edges. The lid shall then be secured to the sides, ends, and diaphragms with wire ties or connective wire in the same manner described above for assembly.

620-4 METHOD OF MEASUREMENT

620-4.01 General. Vacant.

620-4.02 Stone Filling. Stone filling will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.03 Dry Rip-Rap. Dry rip-rap will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.04 Grouted Rip-Rap. Grouted rip-rap will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.05 Bedding Material. Bedding material will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-4.06 Concrete Block Paving. Concrete block paving will be measured in square yards, measured to the nearest whole square yard, computed from the payment lines shown in the contract documents.

620-4.07 Gabions. Gabions will be measured in cubic yards, measured to the nearest whole cubic yard, computed from the payment lines shown in the contract documents.

620-5 BASIS OF PAYMENT

620-5.01 General. Vacant.

620-5.02 Stone Filling. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.03 Dry Rip-Rap. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.04 Grouted Rip-Rap. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.05 Bedding Material. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.06 Concrete Block Paving. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.07 Gabions. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

Payment will be made under:

Item No.	Item	Pay Unit
620.02	Stone Filling (Fine)	Cubic Yard
620.03	Stone Filling (Light)	Cubic Yard
620.04	Stone Filling (Medium)	Cubic Yard

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620.05	Stone Filling (Heavy)	Cubic Yard
620.06	Dry Rip-Rap	Cubic Yard
620.07	Grouted Rip-Rap	Cubic Yard
620.08	Bedding Material	Cubic Yard
620.09	Concrete Block Paving	Square Yard
620.10	Galvanized Gabions	Cubic Yard
620.11	P.V.C. Coated Galvanized Gabions	Cubic Yard

Make the following changes to the Standard Specifications dated May 4, 2006:

Pages 584 through 588, **Delete** SECTION 620 and **Replace** it with the following:

SECTION 620 – BANK AND CHANNEL PROTECTION

620-1 DESCRIPTION. This work shall consist of furnishing all labor, equipment, and materials to place a protective covering of erosion-resistant material in the locations indicated in the contract documents or as directed by the Engineer. The work shall be done in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical sections shown in the contract documents or established by the Engineer.

620-1.01 Vacant.

620-1.02 Stone Filling. Stone filling shall consist of a layer of well graded stone.

620-1.03 Dry Rip-Rap. Dry rip-rap shall consist of a fitted layer of shaped and graded stone.

620-1.04 Grouted Rip-Rap. Grouted rip-rap shall consist of a layer of stone, similar to dry rip-rap, with the spaces between the stones filled with cement grout.

620-1.05 Bedding Material. Bedding material shall consist of a layer of granular material placed to prevent underlying finer material from passing into and through the stone filling or rip-rap.

620-1.06 Concrete Block Paving. Concrete block paving shall consist of concrete blocks placed on embankment slopes under structures as protection against erosion.

620-1.07 Gabions. Gabions shall consist of open wire mesh baskets, filled with stones.

620-2 MATERIALS

620-2.01 General. The requirements for bank and channel protection materials are described below. The procedure for acceptance or rejection of stone filling and rip-rap materials shall be in conformance with the procedures contained in the geotechnical control procedure "*Procedure for the Control of Stone Filling and Rip-Rap Items*".

620-2.02 Stone Filling. Provide material meeting the requirements of §733-21 *Stone Filling* for the type of stone filling specified in the contract documents.

620-2.03 Dry Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap,* except for §733-22D *Grout.*

620-2.04 Grouted Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap.*

620-2.05 Bedding Material. Provide material meeting the requirements of §733-23 *Bedding Material.*

620-2.06 Concrete Block Paving. Provide concrete blocks meeting the requirements of §704-04 *Concrete Block (Slope Paving).* The blocks shall conform to the dimensions identified in Table 620-1 *Concrete Block Dimensions*:

TABLE 620-1 CONCRETE BLOCK DIMENSIONS		
	Nominal Dimension	**Standard Dimension**
Length	400 mm to 500 mm	397 mm to 499 mm (± 3 mm)
Thickness	150 mm (solid)	143 mm (± 3 mm)
Width	200 mm	194 mm (± 3 mm)

The size of block used shall be consistent throughout any continuously paved area, and only one nominal length shall be used in any contract. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the blocks or impair the strength, permanence and appearance of the construction.

Cushion sand for concrete block paving shall meet the requirements of §703-06 *Cushion Sand*. Grout, where used, shall conform to Table 620-2 *Concrete Block Grout Requirements*.

TABLE 620-2 CONCRETE BLOCK GROUT REQUIREMENTS		
Material	**Subsection**	**Grout Mix**
Portland Cement Type 2	§701-01	1 part
Mortar Sand	§703-03	2 parts

620-2.07 Gabions. Provide materials meeting the requirements of §712-15 *Gabions*.

620-3 CONSTRUCTION DETAILS

620-3.01 General. The ground surface on which bank or channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. All soft or spongy material shall be removed to the depth shown in the contract documents and replaced with approved material. Filled areas shall be compacted in accordance with applicable provisions of Section 203. Protection for structure foundations shall be provided as early as the foundation construction permits. The type of protection shall be placed in accordance with these specifications and the contract documents.

620-3.02 Stone Filling. Stone filling shall be placed in a manner that will produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids. The final section of stone filling shall be in conformance with the lines, grades, and thicknesses shown in the contract documents. Stone filling used for bank or channel protection shall be placed to its full course thickness in one operation, unless specified in the special provisions, and in such a manner that the underlying material will not be displaced or worked into the layer of stone filling. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placing; or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to secure the specified results. When stone filling is dumped under water, methods shall be used that will minimize segregation.

620-3.03 Dry Rip-Rap. The stones shall be placed so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface and that the weight of the stone is carried by the underlying material and not by the adjacent stones. On slopes, the largest stones shall be placed at the bottom of the slope. The dry rip-rap shall be properly aligned and placed so as to minimize void spaces between the adjacent stones. The spaces between the stones shall be filled with spalls of suitable size.

620-3.04 Grouted Rip-Rap. The procedure of placing the stones shall be the same as described in §620-3.03 *Dry Rip-Rap* except that the space between stones shall be filled with grout rather than spalls. Material upon which the grouted rip-rap is laid shall not be allowed to occupy the space between the stones.

When the stones are in place, the spaces between them shall be completely filled with grout and the surface of the stones cleaned to remove accumulation of grout. Rip-rap shall not be grouted in freezing weather. The grouted rip-rap shall be kept moist for seven days after grouting. A suitable curing compound may be employed, if approved by the Engineer.

The Engineer may direct that occasional spaces be left ungrouted for relief of hydrostatic pressure. The ungrouted spaces shall be chinked with spalls of suitable size.

620-3.05 Bedding Material. Where called for in the contract documents, stone filling and dry rip-rap shall be placed on bedding material. The bedding material shall be placed on the prepared area to the full specified thickness of each layer in one operation, using methods which will not cause segregation of particle sizes. Contamination of bedding material by natural soils or other materials shall be prevented. Bedding material that becomes contaminated shall be removed and replaced with uncontaminated bedding material at no additional cost to the State.

620-3.06 Concrete Block Paving. Blocks shall be laid on a 75 mm bed of cushion sand in running bond with the long dimension transverse to the slope and all joints tight. Blocks shall be set slightly higher than their final position and carefully hand tamped into their final position to provide a uniformly even surface and solid bedding under each block.

In the areas where grouting is called for, the block shall be laid in running bond with the length parallel to the slope and with 6 mm joints. Following the laying of blocks, in the area to be grouted, sufficient mortar sand shall be spread over the surface and swept into the joints to fill the latter to 100 mm from the surface. The block shall be wetted before any grout is placed. The joints shall be filled with grout from the bottom flush with the top of the block.

After grouting has been completed and the grout has sufficiently hardened, the blocks shall be wetted, covered and cured with curing covers for the first seven days after grouting. Grout shall not be poured during freezing weather.

620-3.07 Gabions. Each gabion unit shall be assembled by binding together all vertical edges with wire ties on approximately 150 mm spacing or by a continuous piece of connecting wire stitched around the vertical edges with a coil about every 100 mm. Empty gabion units shall be set to line and grade as shown in the contract documents. For structural integrity, wire ties or connecting wire shall be used to join the gabions together along the perimeter of all contact surfaces according to the manufacturer's instructions. Internal tie wires shall be uniformly spaced and securely fastened in each outside cell of the structure in accordance with the manufacturer's instructions or where ordered by the Engineer. When gabions are being placed as slope protection, the cross-connecting wire may be deleted if directed by the Engineer.

A fence stretcher, chain fall, or iron rod may be used to stretch the wire baskets and hold alignment.

The gabions shall be filled with stone, carefully placed by hand or machine, to ensure alignment and avoid bulges with a minimum of voids. After a gabion has been filled, the lid shall be bent over until it meets the side and edges. The lid shall then be secured to the sides, ends, and diaphragms with wire ties or connective wire in the same manner described above for assembly.

620-4 METHOD OF MEASUREMENT

620-4.01 General. Vacant.

620-4.02 Stone Filling. Stone filling will be measured in cubic meters, measured to the nearest whole cubic meter, computed from the payment lines shown in the contract documents.

620-4.03 Dry Rip-Rap. Dry rip-rap will be measured in cubic meters, measured to the nearest whole cubic meter, computed from the payment lines shown in the contract documents.

620-4.04 Grouted Rip-Rap. Grouted rip-rap will be measured in cubic meters, measured to the nearest whole cubic meter, computed from the payment lines shown in the contract documents.

620-4.05 Bedding Material. Bedding material will be measured in cubic meters, measured to the nearest whole cubic meter, computed from the payment lines shown in the contract documents.

620-4.06 Concrete Block Paving. Concrete block paving will be measured in square meters, measured to the nearest whole square meter, computed from the payment lines shown in the contract documents.

620-4.07 Gabions. Gabions will be measured in cubic meters, measured to the nearest whole cubic meter, computed from the payment lines shown in the contract documents.

620-5 BASIS OF PAYMENT

620-5.01 General. Vacant.

620-5.02 Stone Filling. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.03 Dry Rip-Rap. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.04 Grouted Rip-Rap. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.05 Bedding Material. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.06 Concrete Block Paving. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

620-5.07 Gabions. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work except that any necessary excavation will be paid for separately.

Payment will be made under:

Item No.	Item	Pay Unit
620.02	Stone Filling (Fine)	Cubic Meter
620.03	Stone Filling (Light)	Cubic Meter

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620.04	Stone Filling (Medium)	Cubic Meter
620.05	Stone Filling (Heavy)	Cubic Meter
620.06	Dry Rip-Rap	Cubic Meter
620.07	Grouted Rip-Rap	Cubic Meter
620.08	Bedding Material	Cubic Meter
620.09	Concrete Block Paving	Square Meter
620.10	Galvanized Gabions	Cubic Meter
620.11	P.V.C. Coated Galvanized Gabions	Cubic Meter