

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			1. CONTRACT ID CODE J	PAGE OF PAGES 1   3
2. AMENDMENT/MODIFICATION NO. 0003	3. EFFECTIVE DATE 24-Sep-2004	4. REQUISITION/PURCHASE REQ. NO. W16ROE-4099-7667	5. PROJECT NO.(If applicable)	
6. ISSUED BY USA ENGINEER DISTRICT, NEW YORK ATTN:CENAN-CT ROOM 1843 26 FEDERAL PLAZA NEW YORK NY 10278	CODE W912DS	7. ADMINISTERED BY (If other than item 6) <b>See Item 6</b>		
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		X	9A. AMENDMENT OF SOLICITATION NO. W912DS-04-B-0018	
		X	9B. DATED (SEE ITEM 11) 01-Sep-2004	
			10A. MOD. OF CONTRACT/ORDER NO.	
			10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE			
<b>11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS</b>				
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.				
12. ACCOUNTING AND APPROPRIATION DATA (If required)				
<b>13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.</b>				
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.				
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).				
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:				
D. OTHER (Specify type of modification and authority)				
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.				
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) The purpose of this amendment is to change solicitation W912DS-04-B-0018 as follows:  1. To incorporate the attached changes to the plans and specifications (SEE SF 30 Continuation Page). The bid due date remains the same - 30 September 2004 at 1:00 P.M. local time. 2. All other terms and conditions shall remain the same and unchanged.  This amendment shall be attached to the specifications and shall be a part thereof. NOTE: Bidders must acknowledge receipt of this amendment by the date specified in the solicitation (or as amended) by one of the following methods: in the space provided on the SF 1442, by separate letter, or by telegram, or by signing block 15 below. FAILURE TO ACKNOWLEDGE AMENDMENTS BY THE DATE AND TIME SPECIFIED MAY RESULT IN REJECTION OF YOUR BID IN ACCORDANCE WITH THE LATE BID, LATE MODIFICATIONS OF BIDS OR LATE WITHDRAWAL OF BID (FAR 14.304)				
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.				
15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
		TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  BY _____ (Signature of Contracting Officer)	16C. DATE SIGNED 24-Sep-2004	

## SECTION SF 30 BLOCK 14 CONTINUATION PAGE

**SUMMARY OF CHANGES**

## SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:

AMED # 0003

**NOTICE TO BIDDERS**

Failure of the bidder to  
Acknowledge receipt of  
this Amendment in  
Item 19 of Standard Form  
1442 (Pg. 00010-2) may  
result in REJECTION of  
the bid.

IFB NO. W912DS-04-B-0018

Amendment No. 3

Department of the Army, NYD  
Corps of Engineers  
New York, NY 10278-0090

**AMENDMENT NO. 3: TO PLANS & SPECIFICATIONS FOR GREEN BROOK SUB BASIN OF THE  
RARITAN RIVER GREEN BROOK FLOOD CONTROL PROJECT SEGMENT R1 BOROUGH OF  
BOUNDBROOK NEW JERSEY**

**TO BIDDERS**

**1. Bid Opening:** No change.

**2. Specifications:**

**Section 01501:**

Has been updated and replaced.

**Section 02380:**

Has been updated and replaced.

**Section 05490:**

Has been updated and replaced.

**3. Plans – Narrative Changes**

**Sheet 16:**

Replace 26a 30" X 36" Aluminum Hatch Frame and Cover  
With 26c 30" X 54" Aluminum Hatch Frame and Cover

**Sheet 17:**

Replace 26a 30" X 36" Aluminum Hatch Frame and Cover  
With 26b 30" X 42" Aluminum Hatch Frame and Cover

**Sheet 18:**

On type 'E' Inlet, Top of Grate Elevation should read '31.5'

**Sheet 42:**

At Entrance to Shop Rite Plaza, there is a depressed curb, not a white line. Add "Remove depressed curb" to Demolition Plan.

- 3) This Amendment shall be attached to the specifications and shall be a part thereof.

(End of Summary of Changes)

## SECTION 01501

## PROTECTION AND MAINTENANCE OF TRAFFIC

## Item No. 1 - Maintenance and Protection of Traffic

## PART 1 GENERAL

## 1.1 PROTECTION AND MAINTENANCE OF TRAFFIC

## 1.1.1 General Requirements

During construction the Contractor shall provide a right-of-way for roads and intersecting access roads. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise directed by the contracting officer. All measures for the protection and diversion of traffic, including the provision of watchman and flag men, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by state and local authorities having jurisdiction. Traffic will be maintained continuously for the duration of the contract and the travelling public shall be protected from all damage to person and property.

## 1.1.2 Haul Roads

The Contractor's traffic on roads that he may elect to use for hauling material to and from the site, shall interfere as little as possible with public traffic. The Contractor shall make his own investigation of the adequacy of existing roads and the allowable load limit on these roads. He shall be responsible for the repair of any damage to roads caused by his operations without expense to the Government.

## 1.1.3 Maintenance of Traffic

Traffic shall be maintained continuously on all roads during the construction period except as otherwise specifically directed by the Contracting Officer.

## 1.2 MEASUREMENT AND PAYMENT

## 1.2.1 Measurement

No measurement as such will be made for the work specified in this section.

## 1.2.2 Payment

The lump sum price for Item No. 1 - Maintenance and Protection of Traffic, will be prorated by the Contracting Officer in each payment in accordance with a schedule of payment mutually agreed upon subsequent to the submission of a schedule for this item. In the event that the lump sum price is, in the opinion of the Contracting Officer, not commensurate with the work to be done, or if a mutually satisfactory progress payment schedule is not adopted, the Contracting Officer may require the Contractor to produce cost data on this item to justify this portion of the bid. Failure to justify such prices to the satisfaction of the Contracting

Officer, will result in payment of actual costs of this item, as determined by the Contracting Officer, with payment of the remainder of this item in the final payment under this contract.

-- End of Section --

## SECTION 02380A

## STONE PROTECTION

10/01

- Item No. 11 - Riprap
- Item No. 12 - Crushed Stone
- Item No. 13 - Bedding Material

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(2003) Standard Specification for Concrete Aggregates
ASTM C 127	(2001) Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate
ASTM C 136	(2001) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 295	(2003) Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM D 75	(2003) Standard Practice for Sampling Aggregates
ASTM D 653	(2003) Standard Terminology Relating to Soil, Rock, and Contained Fluids
ASTM D 2487	(2000) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 3740	(2004) Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D 4791	(1999) Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4992	(1994; R 2001) Standard Practice for Evaluation of Rock to be Used for Erosion Control

ASTM D 5312	(2003) Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
ASTM D 5313	(2004) Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions
ASTM D 5519	(1994; R 2001) Standard Test Method for Particle Size Analysis of Natural and Man-Made Riprap Materials
ASTM E 548	(1994; E 1995) Standard Guide for General Criteria Used for Evaluating Laboratory Competence

## CORPS OF ENGINEERS (COE)

COE CRD-C 144	(1992) Resistance of Rock to Freezing and Thawing
COE CRD-C 148	(1969) Testing Stone for Expansive Breakdown on Soaking in Ethylene Glycol
COE CRD-C 169	(1993) Resistance of Rock to Wetting and Drying

## ENGINEERING MANUALS (EM)

EM 1110-2-1601	(1994) Hydraulic Design of Flood Control Channels
EM 1110-2-1906	(1986) Laboratory Soils Testing

## NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1997) NIST Handbook 44: Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices
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## 1.2 GOVERNMENT TESTING AND STUDIES

## 1.2.1 Stone

## 1.2.1.1 Sources

Stone shall be furnished from any of the sources at the option of the Contractor subject to the conditions herein stated, or as determined that acceptable stone can be produced from the proposed source and all as accepted by the Contracting Officer. Satisfactory service records on other work may be acceptable. In order for stone to be acceptable on the basis of service records, stone of a similar size must have been placed in a similar thickness and exposed to weathering under similar conditions as are anticipated for this contract, and must have satisfactorily withstood such weathering for a minimum of 5 years. If no such records are available, the Government will require the contractor to conduct tests to assure the acceptability of the stone. In addition to an acceptable 5 year service record, the Contracting Officer has the option to elect to have

representative samples taken and tested at Contractor's expense and at no additional cost to the Government.

#### 1.2.1.2 Evaluation Testing of Stone

Tests. The tests will be conducted in accordance with applicable Corps of Engineers methods of tests given in the Handbook for Concrete and Cement or ASTM methods of tests.

#### 1.3 SUBMITTALS

Government approval is required for all submittals with a "G" designation. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

##### SD-03 Product Data

Riprap; G, RO.  
Bedding Material; G, RO.

Submit the source for materials used in riprap, crushed stone, and bedding.

##### SD-06 Test Reports

Gradation Test; G, RO.

Submit the gradation tests using the GRADATION TEST DATA SHEET enclosed at end of this section for riprap or stone.

Evaluation Tests; G, RO.

Quality test on the stone in accordance with PART 2 paragraph EVALUATION TESTING OF STONE shall be the responsibility of the Contractor. Prior to delivery of such material to the worksite, submit a copy of the laboratory inspection report along with actions taken to correct deficiencies. Submit a copy of the test reports.

Bedding Material; G, RO.

Submit test reports attesting that the bedding material.

##### SD-13 Certificates

Stone; G, RO.

Bedding Material; G, RO.

Submit certificates of compliance attesting that the materials meet specification requirements.

Laboratory; G, RO.

Submit a copy of the documents, provided by the Materials Testing Center (MTC) at CEWES, that validates that the laboratory can perform the required tests. The individual tests shall be listed for which the validation covers along with the date of the inspection.

Weigh Scale Certification; G, RO.

Submit a copy of the certification from the regulation agency attesting to the scale's accuracy.

Certified Weight Scale Tickets; G, RO.

Submit a copy of each certified weight scale ticket 15 working day(s) after weighing.

SD-04 Samples

Stone; G, RO.

Submit suitable stone samples prior to delivery of any such material to the worksite if stone is not from one of the stone sources listed at the end of this section.

SD-01 Preconstruction Submittals

Bulk Specific Gravity; G, RO.

At least 60 calendar days in advance of shipment of stone to the work site, submit a copy of bulk specific gravity test results for each gradation range of stone proposed to be furnished. The information shall be furnished prior to preparation of pre-production demonstration stockpiles.

1.4 REGULATORY REQUIREMENTS

The regulatory requirements listed below form a part of this specification to the extent referenced. The regulatory requirements are referred to in the text by basic designation only.

NJ STATE HIGHWAY AND TRANSPORTATION DEPARTMENT (DOT)

(2000) Standard Specifications for Highway Construction

1.5 CONSTRUCTION TOLERANCES

The finished surface and stone layer thickness shall not deviate from the lines and grades shown by more than the tolerances listed below. Tolerances are measured perpendicular to the indicated neatlines. Extreme limits of the tolerances given shall not be continuous in any direction for more than five (5) times the nominal stone dimension nor for an area greater than 1000 square feet of the structure surface.

NEATLINE TOLERANCES

MATERIAL	ABOVE NEATLINE inches	BELOW NEATLINE inches
Foundation	0.5	0.5
Bedding	2	2
Riprap	4	4

The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Contracting Officer. Payment will not be made for excess material which the Contracting Officer permits to remain in place.

## 1.6 TERMINOLOGY

### 1.6.1 Bank Stabilization

This paragraph explains certain terminology which is common to construction of bank stabilization work on the slopes channel bottom and which may not be self explanatory in the subsequent applicable provisions of the technical specifications and on the drawings.

### 1.6.2 Stone Protection

Stone Protection is defined as a system which includes a layer of bedding material or layers of filter material beneath a layer or layers of riprap. Stone protection is placed around structures in slack water or within a dewatered site. Stone protection may also be used to protect channel banks when it is placed in the dry or in slack water.

### 1.6.3 Riprap

Riprap is defined as a material having a gradation band similar to those specified in EM 1110-2-1601, Chapter 3, uniform graded material. Riprap is normally produced by mechanical methods, with a jaw crusher and grizzly after the stone has been mined by blasting in a quarry. Riprap gradations have a maximum top size of 3.5 tons.

## PART 2 PRODUCTS

### 2.1 BEDDING MATERIAL

#### 2.1.1 General

Bedding material shall consist of gravel and crushed stone.

#### 2.1.2 Material

Bedding material shall be composed of tough, durable particles, adequately free from thin, flat and elongated pieces, and shall contain no organic matter nor soft, friable particles in quantities considered objectionable by the Contracting Officer. Objectionable material are quantities of organic matter or soft, friable particles greater than 1% by weight. The aggregates shall meet the quality requirements of ASTM C 33 or paragraph REGULATORY REQUIREMENTS. Gradation shall conform to the following requirements:

#### BEDDING STONE NO. 1 GRAVEL OR CRUSHED STONE

5 in.	70-100
3 in.	50-70
1 1/2 in.	5-50
1/2 in.	0-35
3/8 in.	0-13

## BEDDING STONE NO. 1

## GRAVEL OR CRUSHED STONE

The bedding material shall be well-graded between the limits shown. At least one test shall be performed on each 100 cubic yards. A representative sample weighting not less than 100 pounds shall be removed from the bedding layer placed at locations directed by the Contracting Officer. All points on individual grading curves obtained from representative samples of bedding material shall lie between the boundary limits as defined by smooth curves drawn through the tabulated gradation limits plotted on ENG FORM 2087 or similar form. The individual gradation curves within these limits shall not exhibit abrupt changes in slope denoting either gap grading or scalping of certain sizes or other irregularities which would be detrimental to the proper functioning of the bedding layers.

## 2.2 STONE

## 2.2.1 General

## 2.2.1.1 Evaluation Testing of Stone

The Contractor shall have evaluation tests performed on stone samples collected from the proposed source. The quarry investigation shall be performed by a registered geologist or registered engineer with expertise in geotechnical engineering. The engineer shall be registered in the State of New Jersey. The tests to which the stone shall be subjected include petrographic examination (ASTM C 295), bulk specific gravity (SSD), unit weight, absorption (ASTM C 127), resistance of stone to freezing and thawing (COE CRD-C 144 and ASTM D 5312), and if argillaceous limestone and sandstone are used, resistance to wetting and drying (COE CRD-C 169 and ASTM D 5313).

The laboratory to perform the required testing shall be validated based on compliance with ASTM E 548 and relevant paragraphs of ASTM D 3740, and no work requiring testing shall be permitted until the laboratory has been inspected and validated subject to the approval of the Contracting Officer.

The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection shall be at the expense of the Contractor.

- a. Bulk Specific Gravity Range. All stone shall have a minimum bulk specific gravity, saturated surface dry (SSD), of 2.50 and a maximum bulk specific gravity of not more than 2.90 based upon water having a unit weight of 62.4 pounds per cubic foot. The method of test for bulk specific gravity (SSD) shall be ASTM C 127.
- b. Unit Weight and Absorption. Stone shall weigh more than 155 pounds per cubic foot have a bulk specific gravity, saturated surface dry, greater than 2. The stone shall have an absorption less than 2 percent unless other tests and service records show that the stone is satisfactory. The method of test for unit weight and absorption shall be ASTM C 127, except the unit weight shall be calculated in accordance with Note No. 5 using bulk specific gravity, saturated surface dry.
- c. Petrographic Examination. Stone shall be evaluated in accordance with ASTM C 295 which shall include information required by ASTM D 4992, paragraph 10. COE CRD-C 148 shall be used to perform Ethylene glycol

tests required on rocks containing smectite as specified in ASTM D 4992 and on samples identified to contain swelling clays.

d. Resistance to Freezing and Thawing. Stone shall have a maximum loss of 10 percent after the number of cycles specified in ASTM D 5312, Figure 1, when determining the durability of stone when subjected to freezing and thawing in accordance with COE CRD-C 144 and ASTM D 5312, except the surface area of one side of the sample shall be between 144 square inches and 2304 square inches.

e. Resistance of Rock to Wetting and Drying. Stone shall have a maximum loss of 1 percent when determining the durability of stone when subject to wetting and drying in accordance with COE CRD-C 169 and ASTM D 5313, except the surface area of one side of the sample shall be between 144 square inches and 2304 square inches.

f. Samples. Samples of stone shall be taken by a representative of the Quarry under the supervision of the Contracting Officer for testing and acceptance prior to delivery of any stone from this source to the site of the work. Information provided with the samples shall include the location within the quarry from which the sample was taken along with a field examination of the quarry. The field examination shall include the information outline in ASTM D 4992, paragraph 7. Samples shall consist of at least three pieces of stone, roughly cubical in shape and weighing not less than 150 pounds each from each unit that shall be used in the production of the required stone. If the source is an undeveloped quarry, or if the operation has been dormant for more than one year such that fresh samples are not available, the Contractor shall expose fresh rock for 20 feet horizontally and for the full height of the face proposed for production, prior to the field evaluation. The Contracting Officer may also require documentation of subsurface exploration of an undeveloped quarry in order to determine whether or not sufficient reserves are available. The samples shall be shipped at the Contractor's expense to a laboratory validated by the government to perform the required tests.

g. Tests. The tests shall be conducted by the Contractor in accordance with applicable ASTM and Corps of Engineers methods of tests given in the Handbook for Concrete and Cement, and shall be performed at a laboratory validated by the government. The cost of testing shall be borne by the Contractor.

#### 2.2.1.2 Quarry Operations

Quarry operations shall be conducted by the Contractor in a manner that shall produce stone conforming to the requirements specified and may involve selective quarrying, handling, processing, blending, and loading as necessary, all of which shall be as specified in Section 01451 CONTRACTOR QUALITY CONTROL. Blasting and handling of rock shall be controlled by the Contractor to produce rock of the size ranges and quality specified. Techniques such as the use of proper hole diameter, hole depth, hole angle, burden and spacing distances, types and distribution of explosives. delay intervals and sequence, removal of muck piles between each shot, and special handling techniques are required as necessary to produce the specified materials. All aspects of blasting operations shall be specifically designed so that the end product is not damaged from the blasting technique and that the stone is suitable for the intended purpose.

### 2.2.1.3 Curing Stone

The Contractor shall conduct curing operations on freshly quarried stone to allow it to release stored energy and moisture and to allow the stone to demonstrate that it will not fracture during the energy release and drying-out phase. Stones of sizes which are individually picked shall be temporarily stockpiled at the quarry site a minimum of 60 calendar days before being shipped to the project site, unless this requirement is waived by the Contracting Officer. Such waiver will be granted only if the stone has characteristics that make curing unnecessary as approved by the Contracting Officer.

### 2.2.1.4 Temporary Storage at Quarry

Storage of stone materials subsequent to shipment from the quarry and prior to permanent placement in the required work shall be subject to approval of the Contracting Officer.

### 2.2.1.5 Gradation Test

The Contractor shall perform a gradation test or tests on the riprap, stone, or at the quarry in accordance with paragraph Gradation Tests for Stones. The sample shall be taken by the Contractor in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer not less than 3 days in advance of each test. In the event of the Contracting Officer opts out of observing the tests, the Contractor shall perform the tests and certify to the Contracting Officer that the riprap and stone comply with the specifications. One gradation test shall be performed per 50 tons of each size of riprap or stone to be placed, but not less than one test shall be performed. The gradation tests shall be reported using the forms, GRADATION TEST DATA SHEET and ENG FORM 4794-R, attached at end of this section. The Contractor shall designate on the test form that portion in tons of the lot tested which is applicable to this contract. Any deviation from the reported tonnage shall be corrected and recorded on a revised GRADATION TEST DATA SHEET. The sample shall consist of not less than 25 tons of riprap or stone and shall be collected in a random manner which will provide a sample which accurately reflects the actual gradation arriving at the jobsite. Failure of the test on the initial sample and on an additional sample will be considered cause for rejection of the quarry and/or quarry process, and all riprap or stone represented by the failed tests shall be set aside and not incorporated into the work. Any additional tests required because of the failure of an initial test sample will not be considered as one of the other required tests. If collected by the truckload, each truckload shall be representative of the gradation requirements. The Contracting Officer may direct additional testing of the riprap or stone at the project site if the riprap, stone, appears, by visual inspection, to be out of gradation. The additional tests shall be performed on in-place materials at the locations directed, or on random loads selected by the Contracting Officer. In-place test areas shall be not less than 12 feet by 12 feet and shall include the full thickness of the placed riprap or stone, or layer, without disturbing or including the underlying material and shall meet the minimum sample size specified above. Each pit excavated for an in-place test sample shall be refilled and reworked to provide a surface void of signs of disturbance. One in-place gradation shall be performed on each 500 cubic yards or portion thereof placed. If the gradation test fails, additional gradation tests will be required at the Contractor's expense to delineate the limits of unacceptable stone. The additional gradation tests shall not count as part of the minimum number of gradation tests required. The unacceptable

stone shall either be reworked to bring the stone within the specified gradation or the stone shall be removed from the project site as determined by the Contracting Officer. The Contracting Officer may direct this testing under the Contract Clause INSPECTION OF CONSTRUCTION. The Contractor shall provide all necessary screens, scales and other equipment, and operating personnel, and shall grade the sample. Certification and test results shall represent riprap or stone, shipped from the quarry. Certification and tests results must be received by the Contracting Officer at the jobsite before the riprap or stone is used in the work.

#### 2.2.1.6 Proportional Dimension Limitations

The maximum aspect ratio (greatest dimension:least dimension) of any piece of stone for size ranges which are not graded with a screen or grizzly, shall be not greater than 3:1 when measured across mutually perpendicular axis. Not more than 25 percent (25%) of the stones within a gradation range shall have an aspect ratio greater than 2.5:1. A maximum of 10 percent flat and elongated pieces by weight will be acceptable. A flat and elongated piece of riprap is defined as having a ratio of width to thickness or length to width greater than 3:1. ASTM D 4791 shall be used as a guide to perform the test.

#### 2.2.1.7 Riprap Stone Stockpile

Storage of riprap stone at the worksite is not to be confused with off-site stockpiling of riprap or stone. If the Contractor elects to provide off-site stockpiling areas, the Contracting Officer shall be notified by the Contractor of all such areas. The Contractor's stockpile shall be a maximum of 12 feet high and formed by a series of layers of truckload dumps, where the rock essentially remains where it is placed. Subsequent layers shall be started 10 feet from the edge of the previous layer so that the rock will not roll down the edges of the previous layers. The first layer shall not exceed a maximum of 6 feet high. After being stockpiled, any riprap or stone, which has become contaminated with soil or refuse shall not be put into the work unless the contaminating material has been removed from the riprap or stone prior to placement.

#### 2.2.1.8 Worksite Stockpile

Riprap or stone or bedding material delivered to the work sites, which requires temporary storage shall be placed in a container suitable for storing the riprap or stone without waste, or a crushed stone pad may be constructed for the storage area and removed upon completion of the work. If the crushed stone pad method is used, the pad shall have a minimum thickness of at least 6 inches. The container or crushed stone pad method shall be subject to approval prior to delivery of the riprap or stone. Upon completion of the work, the storage areas shall be cleaned of all storage residues and returned to their natural condition. Temporary storage of riprap or stone at the worksite will be allowed, provided the stockpile toe of the riprap or stone be no closer than 60 linear feet from the closest edge of the stream's top slope, and the amount shall not exceed 200 tons unless otherwise approved.

#### 2.2.1.9 Off-site Stockpile

In areas where riprap or stone is stockpiled for placement, the area shall have excess rock removed prior to completion of work. All rock and spalls greater than 3 inches in diameter shall be removed. Where rocks may have become buried due to soft ground or operation of the equipment, the rock

shall be disposed of as directed by the Contracting Officer. After the rock has been removed, the storage area shall be graded, dressed, and filled to return the ground surface as near as practical to the condition that existed prior to construction.

### 2.2.2 Riprap

Only quarried stone shall be used. Riprap quality shall be as specified in paragraph GOVERNMENT TESTING AND STUDIES, subparagraph Stone. Stone shall be well graded and shall conform to the table(s) below.

TABLE 1  
(FOR RIPRAP 54" LAYER)  
(To be used under Union Avenue Bridge (4.4' Layer))

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	7873
100-85	5529
85-55	2333
50-20	1350
35-5	691.2
15-0	400

TABLE 2  
(FOR RIPRAP 36" LAYER)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	2333
100-82	1350
82-60	691
60-40	532
40-15	291
15-0	137

TABLE 3  
(FOR RIPRAP 18" LAYER)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	290
75-100	150
40-65	70
10-35	40
0-15	20

TABLE 4  
(FOR RIPRAP 12" LAYER)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	86
75-100	40
40-65	20
15-45	13
0-15	5

### PART 3 EXECUTION

#### 3.1 BASE PREPARATION

Areas on which geotextile bedding material and riprap are to be placed shall be graded and/or dressed to conform to cross sections shown on the contract drawings within an allowable tolerance of plus 2 inches and minus 4 inches from the theoretical slope lines and grades. The prepared base shall be approved by the Contracting Officer. Where such areas are below the allowable minus tolerance limit they shall be brought to grade by fill with earth similar to the adjacent materia and then compacted to a density equal to the adjacent in place material. As an alternative, these areas may be filled with bedding material. No payment will be made for any material thus required. Immediately prior to placing the geotextile and bedding layers, the prepared base will be inspected by the Contracting Officer and no material shall be placed thereon until that area has been approved.

##### 3.1.1 Placement of Geotextile

Installation of geotextile shall be as specified in Section 02378a GEOTEXTILES USED AS FILTERS. The geotextile may be placed in shallow still water of one foot depth or less.

#### 3.2 PLACEMENT OF BEDDING LAYERS

##### 3.2.1 General

A bedding layer, consisting of a 6-inch layer of crushed stone, shall be placed on the prepared base as described below, in accordance with the details shown on the contract drawings, and within the limits shown on the contract drawings or staked in the field.

A tolerance of plus 2 inches and minus 1 inch from the slope lines and grades shown on the contract drawings will be allowed in the finished surface of the bedding, except that the extreme of this tolerance shall not be continuous over an area greater than 200 square feet and no more than a total of 1000 square feet for the entire project. Extreme shall be known as within 1/2 inch of the maximum limits.

##### 3.2.2 Placement of Bedding Material on Prepared Base

Bedding material shall be spread uniformly on the geotextile over the prepared base to the slope lines and grades as indicated on the contract drawings and in such manner as to avoid damage to the prepared base.

Placing of crushed stone by methods which tend to segregate the particle sizes within the bedding layer or cause mixing of the separate layers will not be permitted. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. Any damage to the surface of the prepared base during placing of the material shall be repaired before proceeding with the work. Compaction of material placed on the prepared base will not be required, but the material surface shall be finished to present an adequately even surface, free from mounds or windrows. The bedding layers may be prepared in shallow still water of one foot depth or less provided the required placement can be obtained without segregation of the particle sizes.

### 3.3 PLACEMENT OF CRUSHED STONE LAYER

Crushed stone shall be spread uniformly on the geotextile to the slope lines and grades as indicated on the contract drawings and in such manner as to avoid damage to the geotextile. The crushed stone may be placed in shallow still water of one foot depth or less. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. Placing of crushed stone by methods which tend to segregate the particle sizes within the filter layer will not be permitted. Any damage to the surface of the geotextile during placement of crushed stone filter stone shall be repaired before proceeding with the work. Compaction of material placed on the geotextile will not be required, but shall be finished to present an adequately even surface, free from mounds or windrows.

### 3.4 PLACEMENT OF RIPRAP

#### 3.4.1 General

Riprap shall be placed on the bedding layer specified in paragraph(s) BEDDING MATERIAL or geotextile as specified in Section 02378 GEOTEXTILE USED AS FILTERS within the limits shown on the contract drawings.

#### 3.4.2 Placement

Riprap may be placed in still shallow water with flow velocities of approximately 3 feet per second or less and of depth approximately 2 feet or less, so as to provide visual inspection of proper placement. Riprap shall be placed in such manner as to produce a well graded mass of rock with the minimum practicable percentage of voids, and shall be constructed within the specified tolerances to the lines and grades shown on the drawings. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. A tolerance of plus 2 inches or minus 2 inches from the slope lines and grades shown on the drawings will be allowed in the finished surface of the riprap, except that either extreme of such tolerance shall not be continuous over an area greater than 200 square feet. The average tolerance of the entire job shall have no more than 50 percent of the tolerance specified above. No stone shall be dropped through air from a height greater than 3 feet and stones heavier than 500 pounds shall not be dropped from a height greater than 2 feet. The drop height of riprap with a top size greater than 500 pounds shall be less than 1 foot, but can be increased by placing a cushioning layer of sand. The larger

stones shall be well distributed and the entire mass of stones in their final position shall be roughly graded to conform to the gradation specified in paragraph RIPRAP, subparagraph GENERAL. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Placing riprap in layers will not be permitted. Placing riprap by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted. Placing riprap by dumping it at the top of the slope and pushing it down the slope will not be permitted. No equipment shall be operated directly on the completed stone protection system. The desired distribution of the various sizes of stones 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. All dump trucks used in placing the riprap shall be equipped with bottom hinged tailgates. The gate releasing mechanism shall be arranged so that it may be operated only from, at, or near the front of the truck. Rearranging of individual stones will be required to the extent necessary to obtain a well-graded distribution of stone sizes as specified above. The Contractor shall maintain the stone protection until accepted by the Contracting Officer and any material displaced by any cause shall be replaced to the lines and grades shown on the drawings at no additional cost to the Government.

### 3.5 EARTHWORK

#### 3.5.1 Grading

All grading and filling shall be done to the lines and grades as staked in the field or as specified. Material used in making fills or restoring the subgrade shall be free from roots, brush or other debris; and shall be placed in layers not to exceed 1 foot in thickness. Each layer shall be thoroughly compacted to a density at least equal to that of the adjacent undisturbed earth. Excess material shall be spread on the slope adjacent to the area of repair.

#### 3.5.2 Excavation

Excavation shall be required in some failure locations where protrusion of stone is above specified subgrade. When excavation is specified by the Contracting Officer, the subgrades shall be excavated 10 to 12 inches below the specified surface of the subgrade or 3 inches below the specified surface of the subgrade or 3 inches below the protrusion stone(s), whichever is greater. Large areas may not require excavating throughout, but excavation to the depths specified above will be required only for a distance of 5 feet beyond the limits of the perimeter of the failure. Most of the excavation can be accomplished by mechanical means, but some hand work around the edges will be required. All work shall be to the lines and grades as staked in the field or as specified. Material resulting from the operation shall be used for making fills where required as specified in paragraph Grading.

### 3.6 TESTS AND INSPECTIONS

#### 3.6.1 Placement Control

The Contractor shall establish and maintain quality control for all work performed at the job site under this section to assure compliance with contract requirements. He shall maintain records of his quality control tests, inspections and corrective actions. Quality control measures shall

cover all construction operations including, but not limited to, the placement of all materials to the slope and grade lines shown and in accordance with this section.

3.6.1.1 Check Surveys

Surveys made by the Contractor are required on each material placed for determining that the materials are acceptably placed in the work. The Contractor shall make checks as the work progresses to verify lines, grades and thicknesses established for completed work. At least one (1) check survey as specified below shall be made by the Contractor for each twenty-five (25) foot section as shown as practicable after completion. Following placement of each type of material, the cross section of each step of the work shall be approved by the Contracting Officer before proceeding with the next step of the work. Approval of cross sections based upon check surveys shall not constitute final acceptance of the work.

Cross sections shall be taken by the Contractor on lines 25 feet apart, measured along the structure reference line, with readings at 5-foot intervals and at beaks along the lines. However, other cross section spacing and reading intervals may be used if determined appropriate by the Contracting Officer. Additional elevations shall be taken as the Contracting Officer may deem necessary or advisable. The surveys shall be conducted in the presence of an authorized representative of the Contracting Officer, unless this requirement is waived by the Contracting Officer.

3.6.2 Bedding Layers

3.6.2.1 General

The Contractor shall perform gradation tests to assure compliance with contract requirements and shall maintain detailed records. The bedding material shall be sampled in accordance with ASTM D 75 and tested in accordance with ASTM C 136. The Contractor shall perform the tests before and after surveys of each layer of stone protection material placed.

3.6.2.2 Reporting

Reporting shall be in accordance with paragraph 2.2.1.3 Gradation Test.

3.6.3 Gradation Tests for Stone

Examples of the test sheets are shown below:

G R A D A T I O N      T E S T      D A T A      S H E E T

EXAMPLE GRADATION  
SPECIFICATIONS

PERCENT LIGHTER BY WEIGHT	STONE WEIGHT IN LBS.
100	400 - 160
50	160 - 80
15	80 - 30

EXAMPLE WORKSHEET

STONE SIZE LBS.	INDIVIDUAL WT. RETAINED	INDIVIDUAL PERCENT RETAINED	CUMULATIVE RETAINED	PERCENT PASSING
400	0	0	0	100
160	9,600	30	30	70
80	11,200	35	65	35
30	8,000	25	90	10
<30	3,200	10	100	-

TOTAL 32,000 pounds

NOTE: Largest stone 251 pounds

GRADATION TEST DATA SHEET

Quarry \_\_\_\_\_ Type of Stone Tested \_\_\_\_\_  
 Date of Test \_\_\_\_\_ Testing Rate \_\_\_\_\_

TEST REPRESENTS

Contract No.	District	Tons
TOTAL		

GRADATION

Stone Size (lbs)	Weight Retained	Individual % Retained	Cumulative % Ret. % Pass	Specification % Finer by wt

	G R A D A T I O N	T E S T	D A T A	S H E E T
Total Weight				
Max Size Stone =				

Remarks:

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I certify that the above stone sample is representative of the total tonnage covered by this test report.

Contractor Representative \_\_\_\_\_  
Government Representative \_\_\_\_\_

--End of Section--

SECTION 05490

ELASTOMERIC CHECK VALVES AND FLAP GATES

Item No. 36 - Elastomeric Check Valve  
Item No. 36a - Automatic Drainage Gates

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 126 (1995; R 2001) Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

1.3 SUBMITTALS

Government approval is required for all submittals with a "G" designation. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Manufacturer's Instructions

Descriptive Data and Technical Literatures; G, RO.

Manufacturer's descriptive data and technical literature, catalog cuts, installation instructions, and operation and maintenance manual.

SD-02 Shop Drawings

Detail Drawings for Automatic Drainage Gates and Elastomeric Check Valves; G, RO.

Detail drawings consisting of a complete list of equipment and materials. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

1.3 QUALIFICATIONS

1.3.1 Manufacturers

The manufacturers shall have at least five (5) years experience in the manufacturer of the product being supplied under this specification, and shall provide references and a list of installation upon request.

1.3.2 Manufacturer's Representative

Manufacturer's authorized representative, who is experienced in the installation, operation and maintenance of the product, shall be provided. The representative will assist in the installation and train Somerset County personnel in the operation, maintenance, and trouble-shooting of the product.

## PART 2 PRODUCTS

### 2.1 ELASTOMERIC CHECK VALVES

Check valves are to be all rubber of the flow operated check type with a slip-on connection. The check valve is designed to slip over the pipe outside diameter and attached by means of vendor furnished stainless steel clamps. The port area shall contour down to a duckbill which shall allow passage of flow in one direction while preventing reverse flow. The valve shall be one piece rubber construction with nylon reinforcement. In sizes 20" and larger, the bill portion shall be thinner and more flexible than the valve body, and formed into a curve of 180 degrees. Manufacturer must have available flow test data from an accredited hydraulic laboratory to confirm pressure drop data. Company name, plant location, valve size and serial number shall be bonded to the check valve.

### 2.2 FLAP VALVES; FRAMES, DOORS, SEALS, AND HINGES

Flap valves shall be of the sizes indicated and shall conform to the requirements specified. The Flap valves will be either the cast iron or the reinforced plastic type.

#### 2.2.1 Cast Iron Flap Valves

The flap valve will be flange-framed with resilient seal. It will be specifically designed for pump discharge service. The body will be cast iron ASTM A-126B. The flange will be faced and drilled for pipe flange mounting. A resilient seat, neoprene will be bonded in a groove machined in the body to provide a wide contact surface for the seat machined in the cover. The cover, or flap, will be cast iron, ASTM A126-B, with spherically dished design to withstand maximum operating loads. Severe pump discharge applications may require high-test cast iron, ASTM A126-C, or ductile iron, ASTM A536 for the cover. The hinge arms will be high-tensile bronze ASTM B584-CA865. The hinge pins, designed in double shear, will be silicon bronze, ASTM B98-CA655 or Type 304 stainless steel. Each hinge arm will have two pivot points, an adjustable lower pivot with limited rotation and a threaded upper hinge post to adjust flap valve sensitivity. A lubrication fitting will be supplied for each pivot.

#### 2.2.2 Reinforced Plastic Flap Valves

##### 2.2.2.1 Reinforced Plastic Frames

Carbon steel, flame zinc sprayed (4 to 6 mils) and epoxy coated (minimum 14 mils DFT) or 316L stainless steel frames. Sizes 24 inches and smaller shall be non-metallic frames.

##### 2.2.2.2 Reinforced Plastic Doors

Door shall be constructed from a reinforced rigid composite plastic

material, having a minimum thickness of 1/8 inch. Slide (disc) shall have internal matrix of carbon steel of suitable strength for the specified service. The door outer surface skins shall be a homogeneous plastic material having extremely high tensile and impact strength, be nontoxic and shall be stabilized against ultraviolet light. The plastic material shall be an Aramid fiber from the Kevlar family of fibers, and have the following minimum properties:

Properties Table	
Tensile Strength	12,500 psi
Young's Modulus	1,200,000 psi
Flexural Strength	18,000 psi
Flexural Modulus	1,400,000 psi
Compressive Strength	11,000 psi
Impact Strength	40.3 x 1,000,000 erg
Water Absorption	0.38%
Specific Gravity	1.72
Coefficient of Thermal Expansion	0.000016 per C
Heat Distortion Point	80 degrees C ASTM D648
Low Temperature Impact Strength	93% @-20C
Notch Sensitivity	Not notch sensitive
Weathering Properties	Excellent
Fire Resistance	Class 1 spread of flame, Rating BS476: Part 1: 1953 self-extinguishing, ASTM D 635 - 56R
Chemical Resistance	Organics, Alkalines, Ozone (2 to 3 PPM)

Rigid polyurethane foam shall be used as filler between the steel grid reinforcing system and shall be a minimum of 7 lb density per cubic foot. The gate shall be designed to limit the deflection to a maximum of 1/1000 of the span under design head conditions based upon horizontal support members only. The Contractor shall submit drawings and comprehensive design criteria from manufacturer to substantiate that the required deflection figure for each door has been achieved. Comprehensive safety factor calculations shall include bending moments, buckling stress, bonding stress with thermal expansion factors suitable for referenced in NASA CR-1457, "Manual for Plates and Shells", et. al. Safety factors shall be calculated for the door under maximum head. Sizes 24 inches and smaller shall be all reinforced plastic doors per specification.

### 2.2.2.3 Seals

Resilient seals for flap valves shall be of natural or synthetic rubber. Reclaimed rubber shall not be used. Rubber compounds shall contain not more than 1.5 parts of wax per 100 parts of rubber hydrocarbon. Rubber compounds shall be free of vegetable oils, vegetable-oil derivatives, animal fats, and animal oils. Rubber seals shall be resistant to microbiological attack, copper poisoning, and ozone attack. The design of the seal shall be such as to provide for the minimum leakage as specified. Seals shall be mounted on the frame and shall be held securely in place with a retainer bar bolted to the frame.

#### 2.2.2.3.1 Material Tests

Rubber compounds shall be capable of withstanding an ozone resistance test when tested in accordance with ASTM D 1149. The tests shall be conducted on

an unstressed sample for 70 hr at 104 degrees F without visible cracking in the surfaces of the test samples after the tests. Rubber compounds shall have less than 2 percent volume increases when tested in accordance with ASTM D 471 after being immersed in distilled water at 73.4 degrees F, plus or minus 2 degrees F for 70 hr.

#### 2.2.2.4 Hinge Assemblies

- a. Rectangular Hinge Assemblies: Double hung arrangement, 304 stainless steel adjustable brackets, links and pins, oilite bronze bushes and washers.
- b. Circular Hinge Assemblies: Single hinge arrangement, composite plastic materials for hinge bodies, 304 stainless steel pin, washers and split pins.

#### 2.2.5 Manufacturer's Guarantees

The Manufacturer shall guarantee trouble-free operation for a period of (10) years. If the Owner and his engineer are not completely satisfied with the performance of the products, the Manufacturer shall remedy the problem at no cost or refund the purchase cost upon return of the equipment. When installed and operated as recommended by the manufacturer.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

The elastomeric check valves shall be installed in accordance with the manufacturer's written installation and operations manual and approved submittals.

#### 3.2 PAINTING AND FINISHING

Unless otherwise specified, all exposed ferrous metal not factory finished shall be painted as specified in Section 09900 PAINTING, GENERAL. No factory finished equipment or appurtenance shall be painted except that damaged factory finishes shall be retouched in an acceptable manner with paint obtained from the manufacturer. Nameplates shall not be covered with paint but shall be cleaned and legible at completion of the work.

#### 3.3 FIELD LEAKAGE TEST - FLAP VALVES

A field leakage test shall be performed after installation of the flap valves. The manufacturer shall be notified of the test in sufficient time to enable him to have a representative present at the test site. After all adjustments have been made and the mechanisms properly lubricated, each gate slide shall be operated through one complete cycle as a final check on proper operation before starting the leakage test. Seating and unseating

heads shall be measured from the top surface of the water to the center of the gate.

-- End of Section --