



# DIVISION IV – BRIDGES AND STRUCTURES

## SPECIAL PROVISION COPIED NOTES (SPCNs), SPECIAL PROVISION (SPs) and SUPPLEMENTAL SPECIFICATIONS (SSs)

VDOT web file users (“pdf”) may obtain more information and other resources by downloading the accompanying “zip” file (compressed WORD® files).

<http://www.virginiadot.org/business/resources/const/07ImpRev.zip>

These sheets may also be found at the following locations:

Global Web Access: <http://www.virginiadot.org/business/const/spec-default.asp>

VDOT Only Access: [https://outsidedot.cov.virginia.gov/POJQP/2007\\_Standard\\_Specifications/Forms/AF.aspx](https://outsidedot.cov.virginia.gov/POJQP/2007_Standard_Specifications/Forms/AF.aspx)

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\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

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**———— STANDARD 400 SERIES SPCNs, SPs and SSs ————**

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**GUIDELINES- FOR ALL BRIDGE PROJECTS INVOLVING DISMANTLING, REMOVING, OR MOVING, AN EXISTING STRUCTURE. ALSO RECONSTRUCTING/REPAIRING WORK INVOLVING REPLACEMENT OF LOAD-BEARING COMPONENTS OF AN EXISTING STRUCTURE.**

(c413d01-0416)

**SECTION 413—DISMANTLING AND REMOVING EXISTING STRUCTURES OR REMOVING PORTIONS OF EXISTING STRUCTURES** of the Specifications is amended to include the following:

**Section 413.02—Procedures** is amended to include the following:

- (d) The Contractor shall submit demolition notification to the United States Environmental Protection Agency (USEPA) and the Virginia Department of Labor and Industry a minimum of ten (10) business days prior to starting work on the following bridge activities:
1. Dismantling and removing existing structures;
  2. Moving an entire structure;
  3. Reconstruction and repairs involving the replacement of any load-bearing component of a structure.

Address notifications to:

Virginia Department of Labor and Industry  
Asbestos Program  
Powers-Taylor Building  
13 South Thirteenth Street  
Richmond, VA 23219

Land and Chemical Division  
EPA Region III  
Mail Code LC62  
1650 Arch St.  
Philadelphia, PA 19103-2029

The Contractor shall provide written notification to the Engineer a minimum of three (3) full business days prior to work being performed.

9-10-15 (SPCN)

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**GUIDELINES — FOR PROJECTS REQUIRING DYNAMIC PILE TESTING FOR FRICTION PILES.**

S403B01-0714

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**DYNAMIC PILE TESTING FOR FRICTION PILES (LRFD)**

February 7, 2014

**I. DESCRIPTION**

This work shall consist of dynamic testing of piles by the use of electronic monitoring equipment, reprocessing the data and furnishing a written report of the results.

**II. EQUIPMENT**

All equipment necessary for the dynamic monitoring, including but not limited to the gages and cables, shall be furnished by the Dynamic Testing Consultant. Embedded Data Collector (EDC) gauges shall be embedded in the concrete piles during casting at the casting yards and supplied to Contractors at the project sites. A detailed drawing that clearly illustrates the manner in which the EDC equipment will be incorporated into the piles shall be provided to the Engineer for approval. All the equipment shall conform to the requirements of ASTM-4945-08, Standard Test Method for High Strain Dynamic Testing of Piles.

**III. PERSONNEL**

The Contractor shall employ a Dynamic Testing Consultant to install or supervise the installation of the necessary equipment, to perform the dynamic monitoring and to prepare the Dynamic Testing Report.

The dynamic monitoring operator shall have a minimum of two years experience, at least one of which shall have been in data acquisition from high strain dynamic pile testing and successful performance on at least two projects in similar geotechnical conditions, or who has a Certificate of Testing: Basic Level or better on the Foundation QA Examination for Providers of Pile Dynamic Analyzer (PDA) Testing Services. When the EDC will be used to monitor piles and/or test piles, EDC monitoring shall be performed by an Operator who has successfully completed the SmartPile EDC training course and has been certified.

The Dynamic Pile Testing Report shall be prepared by a Registered Professional Engineer with a minimum of five years experience, at least two of which shall have been in data interpretation from high strain dynamic pile testing and successful completion of at least five projects in similar geotechnical conditions, or who has a Certificate of Interpretation: Advanced Level or better on the Foundation QA Examination for Providers of PDA Testing Services. When EDC is utilized, the Registered Professional Engineer who prepares the test report shall have successfully completed the SmartPile EDC training course level 1 or higher, including signal matching if applicable.

**IV. TESTING**

Dynamic testing shall be conducted in the presence of the Engineer and during the entire time piles are initially driven or redriven and during pile restrrike testing.

The Contractor shall notify the Engineer of the date and time for dynamic testing at least 48 hours prior to testing. Such notice shall be given during the normal work hours of the Department. If

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

additional dynamic testing is ordered by the Engineer, the Contractor shall schedule the tests in cooperation with the availability of the Engineer.

Where possible, splices to the pile(s) shall be made prior to the start of driving so that dynamic testing can be performed without interruption.

The Contractor shall fasten a pair of transducers and a pair of accelerometers in place prior to testing or the Contractor shall have the gauges internally mounted during the casting of the pile, at the top and tip, or at the top only, by properly trained and certified installers at the discretion of the Engineer. Piles shall be driven until the soil resistance measured is 80 percent of the Nominal Pile Resistance shown on the plans and the required minimum tip elevation and penetration have been obtained or as directed by the plans, approved wave equation analysis or as approved by the Engineer. Any pile not developing the specified end of initial drive Mobilized Pile Resistance shall be left at least one foot above cut off grade to allow for restrike testing. Unless EDC is used, the Contractor shall remove the transducers and accelerometers after the dynamic testing is completed.

Pile restrike testing shall be conducted no sooner than 120 hours after the pile, or any pile within a 25 foot radius, has been driven. Restrike testing shall include dynamic testing of the pile when it is redriven. The pile shall be redriven with the same pile hammer used for initial driving. The restrike driving sequence shall be performed with a warmed up hammer and shall consist of striking the pile for 20 blows or until the pile penetrates an additional 3 inches, whichever occurs first. If the soil resistance measured on restrike is less than the Nominal Pile Resistance shown on the plans, the Engineer may direct the Contractor to drive all or a portion of the remaining test pile length and repeat the restrike testing. The Contractor will be notified by the Engineer of the necessity to perform a second restrike test within 3 days of the receipt of the results from a signal-matching analysis that estimates static soil resistance and simulates static load test results from the initial restrike.

All signals resulting from initial testing and any restrike testing shall be recorded and made available upon the request of the Engineer.

## **V. REPORTS**

If requested by the Engineer, the following information shall be provided within 24 hours after completion of the testing: for each blow from the Dynamic Driving Records provide the Depth, Maximum Transferred Energy, Blows per Minute (including strokes, fuel settings, bounce chamber pressures, etc. as applicable), Maximum Tensile Stress, Maximum Compressive Stress and Pile Resistance.

The Contractor shall furnish the Engineer a Dynamic Pile Testing Report with the production pile order list.

The Dynamic Pile Testing Report shall include the following information for each pile tested:

Project identification and location

Location of test,

Date of test,

Description of the subsurface soil condition including log of nearest boring

Description of the test pile

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Description of pile installation equipment, the lead type and any special installation equipment

Description of dynamic testing equipment, including model and software version(s) utilized in obtaining, evaluating and reporting dynamic data.

A copy of the Pile Driving Record

Pile Installation Details and Comments

Discussion of the hammer performance

Discussion of pile integrity

For at least every fifth blow from the Dynamic Driving Records: the Depth, Maximum Transferred Energy, Blows per Minute (including strokes, fuel settings, bounce chamber pressures, etc. as applicable), Maximum Tensile and Compressive Stress and Pile Resistance.

A graphical presentation of the following: Pile Penetration versus Maximum Transferred Energy, Maximum Compressive Stress, Maximum Tension Stress and Mobilized Pile Resistance.

The results from a signal-matching program that estimates static soil resistance and simulates static load test results for both the end of initial drive conditions and the beginning of restrrike conditions including Mobilized Pile Resistance for the shaft and toe with the associated parameters used in the estimation. The skin friction distribution along the pile shall also be presented. EDC signal matching shall be validated using EDC tip gauges measured results.

When Dynamic Pile Testing is followed by a pile load test include a summary of soil resistance from both Load and Dynamic Testing, including an evaluation of the correlation between the two approaches and discussion of any discrepancies, if applicable. Plot of applied load versus average butt settlement, with determination of the nominal resistance required by the specifications, shall be provided.

A summary tabulation of the following information for both Initial Drive and Restrike: Pile Location and Designation, Date Driven, Pile Tip Elevation, Visual Blow Count Rate, Transferred Energy, Hammer Efficiency, Maximum Driving Stresses, Dynamic Testing Mobilized Pile Resistance, Signal-Matched Mobilized Pile Resistance for Shaft, Toe and Combined.

**Recommendations for production pile driving criteria** based on the results of the testing program. Driving criteria shall include: blow count to obtain the required Mobilized Pile Resistance for both initial drive and the restrrike of a production pile that does not meet initial criteria (include: stroke(s), fuel setting(s), bounce chamber pressure(s), etc. as applicable), criteria for controlling driving stresses in the pile (including maximum allowable hammer strokes, recommendations for preboring or jetting that might be required, cushion material, thickness and replacement, etc. as applicable) to control driving stresses in the pile and criteria for terminating driving in the event of high blow count before reaching the approved tip elevation. Pile driving criteria shall be approved by the Engineer

#### **IV. MEASUREMENT AND PAYMENT**

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Dynamic pile testing (Friction Piles) will be measured and paid for at the contract unit price per each, which price shall be full compensation for providing all services of the testing consultant and dynamic monitoring operator as specified herein including providing, installing, monitoring the dynamic testing equipment, removing the dynamic test equipment (unless EDC is used), providing the data and preparing the written documentation specified, and for all tools, labor, materials, and incidentals necessary to complete the work. This price shall also include all work and equipment necessary to drive the pile during restrike testing, and any additional driving required should the required soil resistance not be obtained.

A second restrike test, if required, will be paid for at 2/3 of the contract unit price of the Dynamic Pile Test (Friction Piles).

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Dynamic Pile Test (Friction Piles)	Each

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**GUIDELINES — FOR PROJECTS REQUIRING DYNAMIC PILE TESTING FOR END BEARING PILES.**

S403C01-0714

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**DYNAMIC PILE TESTING FOR END BEARING PILES (LRFD)**

February 7, 2014

**I. DESCRIPTION**

This work shall consist of dynamic testing of piles by the use of electronic monitoring equipment, reprocessing the data and furnishing a written report of the results.

**II. EQUIPMENT**

All equipment necessary for the dynamic monitoring such as gages, cables, etc. shall be furnished by the Dynamic Testing Consultant. The equipment shall conform to the requirements of ASTM-4945-08, Standard Test Method for High Strain Dynamic Testing of Piles.

**III. PERSONNEL**

The Contractor shall employ a Dynamic Testing Consultant to install or supervise the installation of the necessary equipment, to perform the dynamic monitoring and to prepare the Dynamic Testing Report.

The dynamic monitoring operator shall have a minimum of two years experience, at least one of which shall have been in data acquisition from high strain dynamic pile testing and successful performance on at least two projects in similar geotechnical conditions, or who has a Certificate of Testing: Basic Level or better on the Foundation QA Examination for Providers of Pile Dynamic Analyzer (PDA) Testing Services.

The Dynamic Pile Testing Report shall be prepared by a Registered Professional Engineer with a minimum of five years experience, at least two of which shall have been in data interpretation from high strain dynamic pile testing and successful completion of at least five projects in similar geotechnical conditions, or who has a Certificate of Interpretation: Advanced Level or better on the Foundation QA Examination for Providers of PDA Testing Services.

**IV. TESTING**

Dynamic testing shall be conducted in the presence of the Engineer and during the entire time piles are initially driven or redriven and during pile restrrike testing.

The Contractor shall notify the Engineer of the date and time for dynamic testing at least 48 hours prior to testing. Such notice shall be given during the normal work hours of the Department. If additional dynamic testing is ordered by the Engineer, the Contractor shall schedule the tests in cooperation with the availability of the Engineer.

Where possible, splices to the pile(s) shall be made prior to the start of driving so that dynamic testing can be performed without interruption.

The Contractor shall fasten a pair of transducers and a pair of accelerometers in place prior to testing. Piles shall be driven until the soil resistance measured is equal to or greater than the Nominal Pile Resistance as measured during driving shown on the plans and the required minimum tip elevation and penetration have been obtained or as directed by the plans, approved

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wave equation analysis or as approved by the Engineer. The Contractor shall remove the transducers and accelerometers after the dynamic testing is completed.

All signals resulting from initial testing and any restrike testing shall be recorded and made available upon the request of the Engineer.

## **V. REPORTS**

If requested by the Engineer, the following information shall be provided within 24 hours after completion of the testing: for each blow from the Dynamic Driving Records provide the Depth, Maximum Transferred Energy, Blows per Minute (include strokes, fuel settings, bounce chamber pressures, etc. as applicable), Maximum Tensile Stress, Maximum Compressive Stress and Pile Capacity.

The Contractor shall furnish the Engineer a Dynamic Pile Testing Report with the production pile order list.

The Dynamic Pile Testing Report shall include the following information for each pile tested:

Project identification and location

Location of test,

Date of test,

Description of the subsurface soil condition including log of nearest boring

Description of the test pile

Description of pile installation equipment, the lead type and any special installation equipment

Description of dynamic testing equipment, including model and software version(s) utilized in obtaining, evaluating and reporting dynamic data.

A copy of the Pile Driving Record

Pile Installation Details and Comments

Discussion of the hammer performance

Discussion of pile integrity

For at least every fifth blow from the Dynamic Driving Records: the Depth, Maximum Transferred Energy, Blows per Minute (including strokes, fuel settings, bounce chamber pressures, etc. as applicable), Maximum Tensile and Compressive Stress and Pile Capacity

A graphical presentation of the following: Pile Penetration versus Maximum Transferred Energy, Maximum Compressive Stress, Maximum Tension Stress and Mobilized Pile Capacity

The results from a signal-matching program that estimates static soil resistance and simulates static load test results including Mobilized Pile Capacity for the shaft and toe with the associated parameters used in the estimation

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A summary tabulation of the following information: Pile Location and Designation, Date Driven, Pile Tip Elevation, Visual Blow Count Rate, Transferred Energy, Hammer Efficiency, Maximum Driving Stresses, Dynamic Testing Mobilized Pile Capacity, Signal-Matched Mobilized Pile Capacity for Shaft, Toe and Combined.

**Recommendations for production pile driving criteria** based on the results of the testing program. Driving criteria shall include: blow count to obtain the required Mobilized Pile Capacity (include: stroke(s), fuel setting(s), bounce chamber pressure(s), etc. as applicable), criteria for controlling driving stresses in the pile including maximum allowable hammer stroke to control driving stresses in the pile and criteria for terminating driving in the event of high blow count before reaching the approved tip elevation. Pile driving criteria shall be approved by the Engineer.

#### **IV. MEASUREMENT AND PAYMENT**

Dynamic pile testing (End Bearing) will be measured and paid for at the contract unit price per each, which price shall be full compensation for providing all services of the testing consultant and dynamic monitoring operator as specified herein including providing, installing, monitoring and removing the dynamic testing equipment, for providing the data and preparing the written documentation specified, and for all tools, labor, materials, and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Dynamic Pile Test (End Bearing)	Each

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — FOR PROJECTS REQUIRING DYNAMIC PILE TEST (ONLY WITH THE PAY ITEM).****S403D01-0714**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**WAVE EQUATION ANALYSIS (LRFD)**

February 7, 2014

**SECTION 403.06 (d) 1. and 2.** of the Specifications is replaced by the following:

Pile driving equipment furnishing by the Contractor shall be subject to the approval of the Engineer.

Prior to driving test piles, the Contractor shall furnish the Engineer the following information pertaining to the proposed pile driving equipment:

1. Completed Pile and Driving Equipment Data Form for each proposed pile hammer and pile type combination (Attachment 1).
2. At each driving test location, where different subsurface conditions exist, the Contractor shall furnish a Wave Equation Analysis of pile driving performed by a Professional Engineer experienced in such work, demonstrating that the piles can be driven with reasonable effort to the required penetration, length and capacity without damage. This analysis shall include the following:

Copies of computer input and output sheets and graphs showing soil resistance versus blow count as well as maximum tensile and compressive stresses versus blow count. Analyses shall be run at the estimated tip elevation as well as other higher elevations to define maximum stress levels in the pile during driving or a drivability analysis can be performed.

The Contractor shall use a hammer of suitable size and type for the indicated pile and subsurface conditions at the structure site. Unless documentation supporting other values can be provided, the following hammer efficiencies shall be used in a wave equation analysis:

<u>Hammer Type</u>	<u>Efficiency in Percent</u>
Single acting air/steam	67
Double acting air/steam	50
Diesel	80
Hydraulic	90

The criteria which the Engineer will use to evaluate the driving equipment will include both the required number of hammer blows per inch and the pile stresses at the required Nominal Pile Resistance as measured during driving. The required number of hammer blows indicated by calculations at the required Nominal Pile Resistance as measured during driving shall be a maximum of 6 per inch for the driving equipment to be acceptable and shall be on the rising (or linear) portion of the resistance versus blow count curve.

Should the Wave Equation Analysis indicate the possibility of excessive driving stresses, the Contractor shall submit to the Engineer proposed corrective measures (modification of hammer stroke or other appropriate action) for approval.

Soil setup (pile freeze effect) may be considered when establishing initial driving criteria. If soil setup is considered, two wave equation analyses, one modeling the end of initial drive conditions and the second modeling the beginning of restrike conditions, must be performed. In lieu of performing the

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two additional wave equation analyses, a pile drivability analysis may be performed when considering soil setup. However, hammers requiring the consideration of soil setup for approval may require restrikes of the driving test piles, at the Contractors expense, for verification purposes.

Contractor notification of acceptance or rejection of pile driving equipment will be made within 20 days of receipt of the data form and Wave Equation Analysis.

After the driving test piles have been installed, if initial parameters selected are judged to be inappropriate, the Contractor may be required to submit a refined wave equation analysis along with the pile order list. The refined analysis shall include any modifications or changes deemed appropriate from the results of any Dynamic Pile Testing and/or pile load test that are required to be performed.

The Engineer will determine driving resistance criteria and/or minimum tip elevations to be used for production piles from the above information.

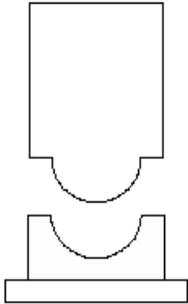
During production pile driving operations, the Contractor shall use the approved system. Any change in the driving system will only be considered after the Contractor has submitted revised pile driving equipment data and wave equation analysis.

Approval of pile driving equipment shall not relieve the Contractor of the responsibility to drive piles, free of damage, to the bearing and tip elevation shown on the plans, specified in the special provisions, or mandated by the Engineer. In addition, approval of pile driving equipment relative to driving stress damage shall not relieve the Contractor of responsibility for piles damaged because of misalignment of the leads, failure of capblock or cushion material, failure of splices, malfunctioning of the pile hammer, or other improper construction methods.

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**VIRGINIA DEPARTMENT OF TRANSPORTATION  
PILE AND DRIVING EQUIPMENT DATA FORM**

Project: \_\_\_\_\_  
 Pile Driving Contractor Or Subcontractor (Driven by): \_\_\_\_\_



**HAMMER** Manufacture: \_\_\_\_\_ Model: \_\_\_\_\_  
 Type: \_\_\_\_\_  
 Rated Energy: \_\_\_\_\_ @ \_\_\_\_\_ Length of Stroke  
 Modifications: \_\_\_\_\_

**RAM** Ram Mass: \_\_\_\_\_

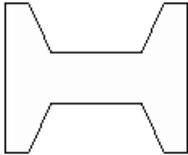
**ANVIL OR BASE** Mass: \_\_\_\_\_



**STRIKER PLATE** Material: \_\_\_\_\_  
 Thickness: \_\_\_\_\_ Area: \_\_\_\_\_  
 Modulus of Elasticity - E: \_\_\_\_\_ (p.s.i.)  
 Coefficient of Restitution: \_\_\_\_\_



**CAP BLOCK** Material: \_\_\_\_\_  
 Thickness: \_\_\_\_\_ Area: \_\_\_\_\_  
 Modulus of Elasticity - E: \_\_\_\_\_ (p.s.i.)  
 Coefficient of Restitution: \_\_\_\_\_



**PILE CAP** Helmet \_\_\_\_\_ Mass: \_\_\_\_\_  
 Bonnet \_\_\_\_\_ Materials: \_\_\_\_\_  
 Anvil Block \_\_\_\_\_  
 Remarks: \_\_\_\_\_  
 Drive head \_\_\_\_\_  
 Accessories \_\_\_\_\_



**CUSHION** Cushion Material: \_\_\_\_\_  
 Thickness: \_\_\_\_\_ Area: \_\_\_\_\_  
 Modulus of Elasticity - E: \_\_\_\_\_ (p.s.i.)  
 Coefficient of Restitution: \_\_\_\_\_



**PILE** Type: \_\_\_\_\_  
 Pile Size: \_\_\_\_\_ Length: \_\_\_\_\_ Diameter: \_\_\_\_\_  
 Cross Sectional Area: \_\_\_\_\_  
 Material: \_\_\_\_\_ Mass/m: \_\_\_\_\_  
 Nominal Pile Resistance \_\_\_\_\_ (tons)  
 Description of Splice: \_\_\_\_\_

Tip Treatment Description: \_\_\_\_\_

Remarks: \_\_\_\_\_

Submitted By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Company: \_\_\_\_\_ Phone: \_\_\_\_\_

Cc: District Bridge Engineer  
 State Bridge Engineer  
 Construction Manager

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**GUIDELINES — FOR PROJECTS REQUIRING CONCRETE SURFACE COLOR COATING****S404B00-0708****VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
CONCRETE SURFACE COLOR COATING**August 1, 1991cc  
Reissued July 2008c**I. DESCRIPTION**

This work shall consist of furnishing and applying concrete surface color coating in accordance with this provision and in conformity with the details and locations indicated on the plans. The color of the coating shall be similar to the Federal Standard Color Number specified on the plans or as approved by the Engineer.

**II. MATERIALS**

Concrete surface color coating shall be from the Department's current list of approved concrete surface color coatings.

**III. DETAILED REQUIREMENTS**

Except as otherwise specified on the plans, the concrete surface color coating shall be applied to the following surfaces of the bridge structure:

- a. Pier stems and caps from 6 inches below finished grade to the upper limits of the pier caps but excluding the top of the cap.
- b. Exposed surfaces of abutment walls from finished grade of adjacent concrete slab slope protection or 6 inches below finished grade of embankment to and including the top of the wingwall, excluding bridge seats and portion of back wall between limits of exterior structural members.
- c. All surfaces of parapet walls, the edge of deck slab and the underside of the bridge deck overhangs from the deck edge to the structural member.

Concrete surface color coating shall be applied to exposed surfaces of other concrete structures as specified on the plans.

The concrete surface color coating shall be applied in accordance with the manufacturer's recommendations, except as otherwise specified. The concrete surface color coating shall not be applied until all concrete placement operations for the particular structure have been completed. The concrete surface shall be clean, free of any curing agents, form release agents, foreign substances or signs of efflorescence at the time of application.

All work shall be performed by experienced workmen familiar with concrete finishing work and with the materials specified. Surfaces not to be treated shall be protected from splatter.

Materials shall be delivered to the job site in sealed containers bearing the manufacturer's labels. Materials shall be mixed and applied in accordance with the manufacturer's printed instructions of which two copies shall be furnished the Engineer.

**IV. MEASUREMENT AND PAYMENT**

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Concrete Surface Color Coating will be paid for on a lump sum basis per structure wherein no other measurement will be made and will be paid for at the contract lump sum price per structure which price shall be full compensation for preparation of surfaces and for applying coating.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Concrete Surface Color Coating (Br. or Str. No.)	Lump Sum

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**GUIDELINES — USE WHEN REQUESTED BY THE DESIGNER.****S404C00-0708**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**GRAVITY FILLED POLYMER CRACK SEALING**

August 8, 1995cc  
Reissued July 2008c

**I. DESCRIPTION**

This work shall consist of filling concrete cracks with a polymer crack sealer, in accordance with the plan details and as directed by the Engineer.

**II. MATERIALS**

Gravity fill polymer crack sealers shall be a high molecular weight methacrylate, epoxy or urethane conforming to the following:

<b>PROPERTY</b>	<b>TEST METHOD</b>	<b>REQUIREMENT</b>
Gel Time 50 ml sample 75 ± 5° F	ASTM C881	6 hrs. max.
Tensile Strength 75 ± 5° F	ASTM D638	1,500 psi. min.
Sand Penetration MX-45 sand 75 ± 5° F	VTM 101	80% min.

**III. SURFACE PREPARATION AND APPLICATION**

Concrete cracks to be filled shall have reached the 28-day design requirement, shall be dry and free of dust, dirt and other debris prior to filling, and shall be air blasted with oil free compressed air prior to application of the sealer. The concrete surface temperature shall not be less than 55 degrees F when the sealer is applied. The sealer shall be applied during the lowest temperature period of the day, usually between 1 a.m. and 9 a.m., when the cracks are open to the greatest extent. Cracks wider than 1/25 inch shall be filled with dry No. 50 sieve size silica sand prior to placement of the polymer. The polymer shall then be applied directly to the cracks allowing time for the polymer to seep down into the cracks, then making additional applications until cracks are filled. The polymer material may also be spread over designated crack areas and worked into the cracks with a broom or squeegee. Excess polymer shall be brushed off the surface prior to the polymer hardening. Regardless of the application method used, the polymer shall be applied in sufficient quantity and applications to fill cracks level. An application rate of 1 gallon per 100 linear feet or 100 square feet is usually adequate. Application of the polymer crack sealer shall be completed prior to grooving of the deck surface and grooving shall not be performed until the polymer has cured a minimum of 48 hours.

The Contractor shall plan and prosecute the work in such a manner to protect persons, vehicles and the bridge structure from injury or damage. Armored joints shall be covered, scuppers plugged and cracks sealed from underneath or other protective measures necessary to protect traffic, waterways

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

and bridge components shall be implemented. In the event polymer materials or solvents harm the appearance of bridge components, removal of such materials will be required as directed by the Engineer. Traffic will not be permitted on the treated surface until tacking will not occur as determined by the Engineer.

**IV. MEASUREMENT AND PAYMENT**

Gravity fill polymer crack sealing will be measured and paid for at the contract unit price per linear foot or square yard as specified. The price bid for such work shall be full compensation for furnishing and applying the silica sand and polymer crack sealer, for vehicular and pedestrian protection, for crack preparation, for protection of waterways and bridge surfaces and for all labor, tools and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Gravity fill polymer crack sealing	Linear foot or Square yard

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**S404D01-0815**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**SEALING EXPANSION JOINTS**

June 15, 2015

**I. DESCRIPTION**

This work shall consist of cleaning and resealing expansion joints in accordance with the contract documents and as directed by the Engineer.

**II. MATERIALS**

Expansion joint filler and sealer materials shall conform to the requirements of Section 212 of the Specifications.

**III. PROCEDURES**

Expansion joints shall be cleaned and shall be free of oil, grease, existing joint material or any other foreign material. Loose material shall be removed from the joint with oil-free compressed air delivered with not less than 120 cubic feet of air per minute and a nozzle pressure of not less than 90 pounds per square inch and not more than 200 pounds per square inch.

The Contractor shall protect the edges of pavement adjacent to the joints to be cleaned.

The Contractor shall install joint filler and sealer materials in strict accordance with the manufacturer's written instructions.

Expansion joints shall be filled and sealed in accordance with the requirements of Section 404.05 of the Specifications. Joints to be filled shall be completely dry and the ambient air temperature shall be at least 45 degrees F. The applied sealer and finished joint shall be free of entrapped air. Finished sealer shall conform to the lines and grades of existing pavement surfaces.

**IV. MEASUREMENT AND PAYMENT**

**Clean and reseal expansion joints** will be measured in linear feet and will be paid for at the contract unit price per linear foot. This price shall be full compensation for cleaning joints, furnishing and installing joint filler, joint sealer, removal and disposal of debris, and for all material, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Clean and reseal expansion joint	Linear foot

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — FOR PROJECTS REQUIRING CONCRETE SURFACE PENETRANT SEALER****S404F00-0708**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**CONCRETE SURFACE PENETRANT SEALER**

August 1, 1991cc  
Reissued July 2008c

**I. DESCRIPTION**

This work shall consist of furnishing and applying a water repellent concrete surface penetrant in accordance with this provision and in conformity with the details and locations indicated on the plans. The color of the penetrant sealer shall be clear.

**II. MATERIALS**

The penetrant sealer used in the performance of this work shall be a product as listed on the Department's current list of approved penetrating sealers.

**III. PROCEDURES**

The penetrant sealer shall be applied in accordance with the manufacturer's recommendations, except as otherwise specified herein. The penetrant sealer shall not be applied until all adjacent or superimposed concrete placements have been completed. All surfaces to receive the penetrant sealer shall be sandblasted to provide a clean uniform texture free of foreign substances such as oils, release agents, curing agents or efflorescence. All sandblasting residue shall be completely removed prior to application of the penetrant sealer.

Each container of penetrant sealer material shall be thoroughly mixed in strict compliance with the manufacturer's recommendations. The penetrant sealer material shall be applied by experienced persons using spray, brush or roller and shall not be thinned or reduced, except as may be specifically required by the manufacturer.

The rates of application and number of coats shall be in accordance with the manufacturer's recommendations.

**IV. MEASUREMENT AND PAYMENT**

Concrete surface penetrant sealer will be measured in square yards and will be paid for at the contract unit price per square yard, which price shall be full compensation for surface preparation and for applying sealer.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Concrete Surface Penetrant Sealer	Square Yard

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — USE WHEN REQUESTED BY THE DESIGNER.****S404G01-0412**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**FILLING AND SEALING PATTERN CRACKS IN CONCRETE DECKS AND OVERLAYS**

May 17, 2010c

**I. DESCRIPTION**

This Special Provision specifies the requirements for filling and sealing pattern cracks in hydraulic cement concrete bridge decks and overlays with a polymer as directed by the Engineer. Examples of pattern cracking that are defined and pictured in ACI 201.1R-08 *Guide for Conducting a Visual Inspection of Concrete in Service*, include checking, craze cracks, map cracking, pattern cracking, plastic cracking, shrinkage cracking and temperature cracking.

Pattern cracks may originate as plastic shrinkage cracks that are caused by the surface of the concrete drying before the curing material is applied. The cracks typically get wider with age as the concrete under goes drying shrinkage. Pattern cracking that is not identified for filling and sealing prior to the final acceptance of the project or prior to placing traffic on the surface is not covered by this special provision. This special provision does not apply to decks constructed with solid stainless reinforcing steel.

**II. MATERIALS**

Gravity fill polymer crack sealers shall be a high molecular weight methacrylate, epoxy or urethane conforming to the following:

<b>PROPERTY @ 75 ± 5° F</b>	<b>TEST METHOD</b>	<b>REQUIREMENT</b>
Gel Time, 50 ml sample	ASTM C881	6 hrs. max.
Tensile Strength	ASTM D638	1,500 psi. min.
Sand Penetration, MX-45 sand	VTM 101	80% min.

**III. CONCRETE AGE AT TIME OF CRACK FILLING AND SEALING**

Cracks shall be located, filled and sealed at the oldest age that is practical as determined by the Engineer and prior to the final acceptance of the project and prior to opening the surface to traffic.

**IV. LOCATING CRACKS THAT SHALL BE FILLED and SEALED**

Crack width shall be measured using a transparent crack comparator placed on the surface of the concrete. The width shall be at the oldest age that is practical as determined by the Engineer and prior to the final acceptance of the project and prior to opening the surface to traffic. The width shall be measured and recorded prior to 3 hours past sun rise. Cracks with a width equal to or greater than 0.2 millimeter shall be marked for filling and sealing.

**V. SURFACE PREPARATION AND APPLICATION**

Prior to filling and sealing, the cracks shall be protected from materials that can interfere with the filling of the crack and the curing of the polymer crack filling material.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Cracks to be filled shall be dry and free of dust, dirt and other debris prior to filling, and shall be air blasted with oil free compressed air prior to application of the polymer. The concrete surface temperature shall not be less than 55 degrees F when the polymer is applied. The polymer to be applied shall be suitable for use at the concrete temperature at the time of the application. The polymer shall be applied during the lowest temperature period of the day, usually between 1 a.m. and 9 a.m., when the cracks are open to the greatest extent. Cracks wider than 1.5 millimeters shall be filled with dry Grade E sand as prescribed in Table II-22 of the Road and Bridge Specifications prior to placement of the polymer. The mixed polymer shall be applied directly to the areas of the deck that are cracked allowing time for the polymer to seep down into the cracks, making additional applications until cracks are filled. The polymer shall be worked into the cracks with a broom or squeegee. Excess polymer shall be brushed off the surface prior to the polymer hardening. Mixed polymer shall be applied as soon as practical and polymer that exhibits an increase in viscosity and temperature shall not be placed on the concrete surface. Grade D sand as prescribed in Table II-22 of the Road and Bridge Specifications shall be broadcast over the applied polymer at the minimum rate of 0.5 pound per square yard. The sand shall be broadcast as soon as practical and before the viscosity of the polymer begins to increase. Regardless of the application method used, the polymer shall be applied in sufficient quantity and applications to fill cracks level. An application rate of one gallon per 100 square feet of deck is usually adequate. When practical, application of the polymer crack sealer shall be completed prior to grooving of the deck surface and grooving shall not be performed until the polymer has cured a minimum of 48 hours.

The Contractor shall plan and prosecute the work in such a manner to protect persons, vehicles and the bridge structure from injury or damage. Armored joints shall be covered, scuppers plugged and cracks sealed from underneath or other protective measures necessary to protect traffic, waterways and bridge components shall be implemented. In the event polymer materials or solvents harm the appearance of bridge components, removal of such materials will be required as directed by the Engineer. Traffic will not be permitted on the treated surface until tracking will not occur as determined by the Engineer.

## **VI. MEASUREMENT AND PAYMENT**

When a pay item, gravity fill polymer crack sealing will be measured and paid for at the contract unit price per square yard as specified. The price bid for such work shall be full compensation for furnishing and applying the silica sand and polymer crack sealer, for vehicular and pedestrian protection, for crack preparation, for protection of waterways and bridge surfaces and for all labor, tools and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Gravity fill polymer crack sealing	Square yard

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — USE WHEN REQUESTED BY THE DESIGNER. When this provision applies include the following in the proposal: SU404000A Epoxy Concrete Overlay.**

**S404H01-0412**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**SEALING LINEAR CRACKS IN CONCRETE DECKS and OVERLAYS USING EPOXY AND CARBON  
FIBER MESH**

September 16, 2009c

**I. DESCRIPTION**

This Special Provision specifies the requirements for sealing linear cracks and construction joints in hydraulic cement concrete bridge decks and overlays with epoxy and open grid carbon fiber mesh as directed by the Engineer.

Linear cracks, particularly transverse cracks, can be caused by thermal contraction, drying shrinkage, construction loads, continuous span deck construction sequence and live load induced tensile stress. The width of the cracks may be a function of thermal contraction, drying shrinkage, crack spacing, concrete age, and loads applied to the deck.

The cracks get wider with age as the concrete under goes drying shrinkage. This special provision does not apply to decks constructed with solid stainless reinforcing steel.

**II. MATERIALS**

Epoxy and aggregate materials shall meet the requirements in the VDOT Special Provision for Epoxy Concrete Overlay. Carbon Fiber Mesh Materials shall conform to the following:

**4-inch Carbon Fiber Strip Specs:**

The carbon fiber mesh is comprised of a high tensile strength carbon fiber. The mesh is not impregnated and is wet out and cured in place in epoxy resin overlay.

<b>General Information:</b>	
Constituent Materials:	6K Carbon Fiber unidirectional tows
Primary Fiber Directions	Closed knit 0° X 90°
Color	Black
Packaging	4" X 200 linear ft rolls

<b>Carbon Material Properties</b>		
Nominal Thickness	0.030 inches	
Nominal Tensile Strength per unit width	400,000 psi	ASTM D3039-08
Nominal Tensile Modulus	33,000,000 psi	ASTM D3379-75(R-89)
Failure Strain	1.3%	ASTM D3379-75(R-89)
Grid Spacing	1/4" x 1/4" (inch) (longitudinal x transverse)	

**III. CONCRETE AGE AT TIME OF CRACK FILLING AND SEALING**

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Cracks shall be located and sealed at the oldest age that is practical as determined by the Engineer and prior to the final acceptance of the project and prior to opening the surface to traffic.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**IV. LOCATING CRACKS THAT SHALL BE FILLED AND SEALED**

Crack width shall be measured using a transparent crack comparator placed on the surface of the concrete. The width shall be at the oldest age that is practical as determined by the Engineer and prior to the final acceptance of the project and prior to opening the surface to traffic. The width shall be measured and recorded prior to 3 hours past sun rise. Cracks with a width equal to or greater than 0.2 millimeter shall be marked for sealing.

**V. SURFACE PREPARATION AND APPLICATION**

The surface of the concrete on which the carbon fiber mesh will be placed shall be cleaned in accordance with the VDOT Special Provision for Epoxy Concrete Overlay. The epoxy and aggregate shall be placed in accordance with the requirements for the first layer in the VDOT Special Provision for Epoxy Concrete Overlay. Dump and spread the mixed epoxy resin on the designated area for the placement of the 4-inch Carbon Fiber strip. Apply the epoxy at a minimum rate of 2 ½ gallons per 100 square feet. Immediately place the 4-inch Carbon Fiber strip precut to the required length into the placed epoxy allowing the epoxy to wet into the carbon strip and to penetrate through the openings in the carbon strip and to thoroughly encapsulate the strip. A roller or squeegee may be used to assist penetration and to ensure the strip is pressed to the substrate and the epoxy is evenly spread. Use a squeegee to move adjacent epoxy over the strip for complete encapsulation. Broad cast aggregate to excess over all surfaces covered with epoxy.

The Contractor shall plan and prosecute the work in such a manner to protect persons, vehicles and the bridge structure from injury or damage. In the event epoxy materials or solvents harm the appearance of bridge components, removal of such materials will be required as directed by the Engineer. Traffic will not be permitted on the treated surface during the curing period which is specified in the VDOT Special Provision for Epoxy Concrete Overlay.

**VI. MEASUREMENT AND PAYMENT**

Crack sealing will be measured and paid for at the contract unit price per linear foot as specified. The price bid for such work shall be full compensation for surface and crack preparation, for furnishing and applying the epoxy, carbon fiber mesh and aggregate, for vehicular and pedestrian protection, for protection of waterways and bridge surfaces and for all labor, tools and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Crack sealing using epoxy and carbon fiber mesh	Linear foot

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — FOR PROJECTS REQUIRING TOOTH EXPANSION JOINTS. WHEN THIS SECTION APPLIES INCLUDE THE FOLLOWING IN THE PROPOSAL: SS22601 Structural Steel.**

**S407B00-0708**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**TOOTH EXPANSION JOINT**

January 14, 2008c

**I. DESCRIPTION**

This work shall consist of furnishing and installing tooth expansion joints in accordance with these specifications and in conformity with the lines, grades and locations shown on the plans or established by the Engineer.

**II. MATERIALS**

Materials shall conform to the requirements of Sections 212 and 226 of the Specifications.

**III. PROCEDURES**

Working drawings showing complete details and dimensions of the tooth expansion joint and other pertinent information, shall be submitted to the Engineer for review in accordance with Section 105.10 of the Specifications.

Fabrication shall conform to the requirements of Section 407 of the Specifications.

Tooth expansion joints shall seal the deck surface, gutters, curbs, and parapets to prevent water and other contaminants from seeping onto the substructure.

Final sealing of the finished joint shall be completed as soon as practicable after installation.

Surfaces exposed to roadway traffic shall have antiskid provisions.

**IV. MEASUREMENT AND PAYMENT**

Tooth expansion joint will be paid for in linear feet measured along the pavement surface from out to out of the deck slab, complete-in-place for the tooth thickness specified.

Payment shall be full compensation for furnishing and installing tooth expansion joint and all necessary components and anchoring devices and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Tooth Expansion Joint (Tooth thickness)	Linear Foot

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — USE WHEN REQUESTED BY THE DESIGNER.****S407D00-0708**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**METALLIZATION OF FERROUS METAL SURFACES**

January 5, 1998c  
Reissued July 2008c

**SECTION 407—STEEL STRUCTURES** of the Specifications is amended as follows:

**Section 407.01—Description** is amended to include the following:

All non-stainless ferrous metal, unless galvanized or protected with other specified coatings, shall be metallized as specified herein.

**Section 407.02—Materials** is amended to include the following:

Wire material for metallizing shall be zinc, or 85/15 zinc/aluminum alloy as certified by the manufacturer. The materials shall conform to the following quantitative requirements:

Zinc:

Element	Content (%)
Iron (Fe)	0.0015% max.
Cadmium (Cd)	0.0015% max.
Lead (Pb)	0.003% max.
Copper (Cu)	0.004% max.
Zinc (Zn)	Balance

85/15 zinc/aluminum:

Element	Content (%)
Iron (Fe)	0.020% max.
Copper (Cu)	0.004% max.
Cadmium (Cd)	0.004% max.
Lead (Pb)	0.004% max.
Titanium (Ti)	0.002% max.
Aluminum (Al)	14.0%-16.0%
Zinc (Zn)	Remainder

The manufacturer shall furnish a Certificate of Analysis for each batch of material supplied. Each container or coil wrapping shall be properly labeled to identify component type, supplier, size, batch number and wire lot number.

The size of wire material shall be in accordance with the manufacturer's recommendations for the Flame or Arc Sprayed method. Powder material shall not be used.

All bolts, nuts, and washers shall be hot dipped galvanized, in accordance with ASTM A153.

Sealers and topcoats, if specified on the plans, shall be selected from one of the following systems:

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Manufacturer	DFT, mils
Carboline:	
Rustbond Penetrating Sealer	1.0-2.0
or Rustbond LT	1.0-2.0
Carboline 133 HB topcoat	2.0-3.0
ICI Devoe Coatings:	
Pre-Prime 167	0.5-1.5
Devthane 378 topcoat	2.0-3.0
Xymax:	
Monolock PP	1.5-2.5
Bridge Finish topcoat	1.0-2.0

Material as applied shall not exceed 3.5 pounds per gallon VOC.

**Section 407.04—Fabrication Procedures** is amended to include the following:

Surface preparation for, and application of, metallizing shall be performed in accordance with ANSI/AWS C2.18-93. Flame cut edges shall be ground to remove the carburized surface prior to blasting. Blasting or metallizing shall not be performed when the surface temperature of or metallizing shall not be performed when the surface temperature of the steel is less than 5 degrees F above the dew point as determined by a surface thermometer. Surfaces to be metallized shall be blast cleaned with a grit abrasive to provide a surface profile of 2.0-4.0 mils with an anchor tooth profile that is sharp, clean and free of embedded friable material with minimal peening effect. Steel shot and silica sand shall not be used. Surfaces shall be metallized within 8 hours after blasting. If flash rusting should occur prior to metallizing, the metal surface shall be reblasted. Surfaces shall be metallized to a thickness of at least 5 mils in accordance with the wire manufacturer's recommendation.

Before starting work, the Applicator shall apply the recommended thickness of the coating to a 2-inch by 4-foot 8-inch by 0.05-inch steel coupon and bend it 180 degrees around a 0.5-inch mandrel to demonstrate the quality and adherence of the coating. Any disbonding or delamination of the coating which exposes the substrate shall require corrective action and additional testing before the metallizing process may continue.

If a sealer is specified, after metallization, bolted surfaces shall be masked off and all other surfaces shall be sealed within 8 hours of metallizing. Sealer and topcoat shall be applied in accordance with the manufacturer's recommendations with regard to application temperature and humidity.

All fully coated and cured assemblies shall be protected from handling and shipping damage with the prudent use of padded slings, dunnage, separators and tie downs. Loading procedures and sequences shall be designed to protect all coated surfaces. Any damaged areas shall be repaired in accordance with the manufacturer's recommendations. Where sealer and/or topcoating is specified, all bolts and areas that were not sealed or topcoated in the shop shall be prepared and sealed or topcoated after erection in accordance with the manufacturer's recommendations.

The Contractor shall provide the Engineer with documentation, which indicates that the applicator has performed successful metallizing work for the last three years.

**Section 407.07—Measurement and Payment** is amended to include the following:

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

No separate measurement and payment will be made for metallization of surfaces; therefore, the cost for all labor, materials, transportation, blasting, cleaning, metallizing, sealing and topcoating to the proper completion of the work shall be included in the lump sum price bid for structural steel.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — PROJECTS REQUIRING BACKFILLING OF STRUCTURES.**

SS40102-0912

April 17, 2012c

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS**SUPPLEMENTAL SECTION 401—STRUCTURE EXCAVATION****SECTION 401—STRUCTURE EXCAVATION** of the Specifications is amended as follows:**Section 401.02(a) Backfill** is replaced with the following:

- (a) **Earthen or other backfill** shall be approved by the Engineer and shall be free from large or frozen lumps, wood, or rocks more than 3 inches in their greatest dimension or other extraneous material. Porous backfill shall conform to the requirements of Section 204.02(c) or as specified herein.

**Section 401.03(i) Backfilling** is replaced with the following:

- (i) **Backfilling:** Excavated spaces that are not occupied by wingwalls, abutments, piers, or other permanent work not specifically addressed herein shall be backfilled with soil to the surface of the surrounding ground.

Select backfill material shall be used behind all abutments. A detail indicating the limits (zone) of the select backfill will be included in the plans on the abutment detail sheet(s). Select backfill material shall be No. 21A or 21 B stone conforming to Section 208 or Select Material Type I, Min. CBR 30 conforming to Section 207 and shall be compacted in accordance with Sections 305 and 303 respectively. The top surface of the backfill material shall be neatly graded.

The earthen fill around the perimeter of the select material zone in abutments, wingwalls, and retaining walls shall be placed in horizontal layers not more than 6 inches in loose thickness and compacted at  $\pm 20$  percent of optimum moisture to a density of at least 95 percent as compared to the theoretical maximum density as defined in Division I. Tests for compliance with density requirements will be performed in accordance with the requirements of VTM-12. As the work progresses, backfill in front of units shall be placed and compacted in horizontal layers to the same elevation as the layers behind units until the final elevation in front is reached. Backfill shall be placed in a manner to prevent wedging action against the concrete. Slopes bounding excavation for abutments, wingwalls, or retaining walls shall be modified to lock in adjacent backfill material by stepping or serrating the existing soils. Jetting of the fill behind abutments, wingwalls, or retaining walls will not be permitted.

Fills and backfills around piers not included in the roadway prism shall be constructed in uniformly compacted layers and placed alternately to maintain a uniform elevation on both sides of the structure. However, the density requirement will be waived.

Provisions shall be made for the draining of backfill material. Geocomposite Wall Drains shall be used to drain the select backfill material in all abutments. Porous backfill shall be used in to drain backfill material in retaining structures unless otherwise stated on the plans. In the event the Contractor requests to substitute geocomposite wall drain in lieu of porous backfill in retaining structure and the Engineer approves such a request, the geocomposite wall drain shall be provided at no additional cost.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Geocomposite Wall Drains shall meet the requirements of Section 245.03 (f) and shall be installed in accordance with the manufacturer's recommendations. A minimum three (3) inch joint overlap of geotextile fabric at the top, bottom, ends, and at adjoining panels shall be provided. The geocomposite wall drain shall be connected to an outlet drain pipe or weephole of at least 6 inches in diameter. The outlet drain shall be completely wrapped by the bottom fabric flap of the geocomposite wall drain. The Contractor shall provide a detailed sketch of the outlet drain pipe connection as well as connections to any special drainage systems associated with the structure for the Engineer's approval prior to installation.

Porous backfill for draining backfill material behind retaining structures shall consist of crusher run aggregate, conforming to the requirements of Section 205 unless stated otherwise on the plans. Porous backfill shall be placed at the back of weep holes to extend 18 inches behind the entrance to the hole, 18 inches above the elevation of the bottom of the hole, and 18 inches laterally on each side of the centerline of the hole. Where crushed glass is used as porous backfill, No. 78 and/or No. 8 aggregate and an 18-inch by 18-inch swatch of drainage fabric meeting the requirements of Section 245.03(c) shall be used to cover the #4 mesh at each weep hole opening exposed directly to crushed glass, or as otherwise approved by the Engineer.

Backfill shall not be placed against abutments or wingwalls until concrete has been in place 14 days, exclusive of days on which the average high-low air temperature is below 40 degrees F in the shade or until test cylinders have attained a compressive strength equal to 93 percent of the required 28-day design compressive strength, except in cases where completion of grading in the area in front of an abutment is desired. In those circumstances, backfill and/or fill may be placed against abutments or wingwalls to a point no higher than the elevation necessary to complete grading in front of the abutment, provided:

1. The concrete has been in place 7 days, exclusive of days on which the average high-low air temperature is below 40 degrees F in the shade, or
2. Test cylinders have attained a compressive strength greater than or equal to 900 psi and the concrete has been in place a minimum of 2 days, exclusive of days on which the average high-low air temperature is below 40 degrees F in the shade. The Contractor shall take additional cylinders at the time of concrete placement and use a calibrated machine or an independent lab to test the cylinders and verify the compressive strength prior to backfilling.

Backfill shall be placed as soon as practicable following attainment of the required compressive strength but not later than 30 days after concrete placement. Excavation openings shall be maintained as dry as practicable at the time of backfilling. Backfill shall be placed in a manner to deter impoundment of water and facilitate existing drainage.

**Section 401.04—Measurement and Payment** is amended to add the following:

**Select backfill (Abutment zone)** will be measured in tons and paid for at the contract unit price per ton. This price shall include furnishing, placing, compacting and grading backfill material.

**Geocomposite Wall Drain** will be measured in square yards and will be paid for at the contract unit price per square yard. This price shall include furnishing and placing the wall drain, complete-in-place. Overlaps will not be measured for payment.

Payment will be made under:

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**Pay Item**

Geocomposite Wall Drain  
Select Backfill (Abutment Zone)

**Pay Unit**

Square Yard  
Ton

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — PROJECTS REQUIRING HYRAULIC CEMENT CONCRETE OPERATIONS. Include SS21706 Hydraulic Cement Concrete.**

SS40404-0714

February 19, 2014

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS**SUPPLEMENTAL SECTION 404—HYDRAULIC CEMENT CONCRETE OPERATIONS**

**SECTION 404—HYDRAULIC CEMENT CONCRETE OPERATIONS** of the Specifications is amended as follows:

**Section 404.02(e) Prestressed concrete deck panels** is deleted.

**Section 404.03(a) Forms** is amended to replace the first paragraph with the following:

- (a) **Forms:** On concrete beam bridges, the Contractor shall have the option of using corrugated metal bridge deck forms or wood forms to form that portion of bridge decks between beams unless otherwise specified on the plans. On steel beam bridges, the Contractor shall have the option of using corrugated metal bridge deck forms or wood forms to form that portion of bridge decks between beams or girders unless otherwise specified on the plans. However, corrugated metal forms shall not be used to form overhangs or portions of slabs where a longitudinal joint occurs between beams or girders.

The Contractor shall submit calculations and layout details of the overhang supports and formwork, including fabrication and erection details, to the Engineer for review in accordance with the requirements of Section 105.10. Overhang formwork details shall be signed and sealed by a Professional Engineer, holding a valid license to practice engineering in the Commonwealth of Virginia.

**Section 404.03(a)2 Prestressed deck panel forms** is deleted.

**Section 404.03(j) Removing Formwork and Forming for and Placing Superimposed Elements** is amended to replace “1. **Formwork**” with the following:

1. **Formwork** may be removed as follows:
  - a. **Side forms or elements not immediately subjected to loading** (for example: footings and walls or columns with height to width ratios less than 10:1 [h/w < 10:1]): 48 hours or 30 percent concrete strength ( $f'_c$ ). For the purposes herein, width will be considered the narrowest portion of the element measured horizontally across its surface.

The time period noted for form removal shall begin at the completion of the concrete placement and is exclusive of hours when any portion of the surface of the concrete element is below 40 degrees F.
  - b. **All other elements** (for example: soffits of pile caps, bent caps and pier caps): 60 percent concrete strength ( $f'_c$ ).

**Section 404.04—Bridge Deck Construction** of the Specifications is amended to replace the first paragraph with the following:

Prior to the beginning of deck placement, screeds shall be approved by the Engineer. Fogging or misting devices attached to the screed shall not be permitted. No fogging or misting above

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

concrete shall be permitted prior to the screeding operation. Fogging or misting shall only be permitted immediately after the screeding operation and any hand-finishing that has been completed to the concrete surface, and prior to applying the wet-curing mechanism.

**Section 404.08—Measurement and Payment** is amended to replace the second paragraph with the following:

The volume of bridge deck slab concrete allowed for payment will be computed using the actual thickness of the slab, not to exceed the plan thickness plus 1/2 inch, for the area between faces of sidewalks, curb lines, railings, or parapets. The area beneath sidewalks, curbs, railings, or parapets will be based on the plan thickness.

**Section 404.08—Measurement and Payment** is amended to replace the fourth paragraph with the following:

If corrugated metal bridge deck forms are used in lieu of removable forms, the price for concrete shall include furnishing and placing metal forms, additional concrete required to fill corrugations, work necessary to facilitate inspection of the underside of the deck, repairing deficiencies, and strengthening beams or girders to maintain the design live-load rating of the bridge.

**GUIDELINES — FOR PROJECTS REQUIRING PRESTRESSED CONCRETE. Include SS21706 Hydraulic Cement Concrete.**

SS40502-0211

December 20, 2010cc

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS**SUPPLEMENTAL SECTION 405—PRESTRESSED CONCRETE****SECTION 405—PRESTRESSED CONCRETE** of the Specifications is amended as follows:**Section 405.02(a) Concrete** is amended to replace 3. with the following:

3. Fully or partially embedded attachments to the prestressed concrete members required for supporting forms shall be galvanized in accordance with Section 233 of the Specifications.

**Section 405.03—Plant Review** is amended to replace the first paragraph with the following:

Plants that manufacture precast, prestressed concrete elements shall have PCI certification for applicable product groups and categories except that plants supplying only piles will not be required to be certified. PCI inspection reports shall be on file at the plant and available for review by the Department. Plants that have not previously produced products for the Department will be inspected by the Engineer prior to commencement of production. The Contractor shall provide suitable office space for use by the Engineer's representatives.

**Section 405.05(e) Finishing** is amended to delete the fifth paragraph.**Section 405.05 (h) Handling, Storing, and Erecting** is amended to replace the fourth paragraph with the following:

Lifting and support points for units other than piles shall be as shown on the plans or not less than 6 inches or more than 2/3 of the depth of the unit from the end of the unit. Piles shall be supported and lifted at points shown on the plans. The Contractor shall be responsible for the design and safety of the lifting device used.

**Section 405.05(h) Handling, Storing and Erecting** is amended to add the following:

Continuity diaphragms for prestressed beams shall not be cast until at least 90 days after the strands in the beams have been detensioned.

**Section 405.06(c) Prestressed Deck Panels** is deleted.**Section 405.07—Measurement and Payment** is amended to delete the "Prestressed concrete panels" paragraph, pay item and pay unit.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — USE WHEN REINFORCING STEEL IS REQUIRED.****SS40604-0714**

February 19, 2014

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS**SUPPLEMENTAL SECTION 406—REINFORCING STEEL****SECTION 406—REINFORCING STEEL** is completely replaced by the following:**406.01—Description**

This work shall consist of furnishing; coating, if required, and placing reinforcing steel or wire mesh used in concrete operations, except prestressed strands and wires, in accordance with these specifications and in conformity to the lines and details shown on the plans.

**406.02—Materials**

- (a) **Steel used for reinforcement** shall conform to the requirements of Section 223 of the Specifications. Except for spiral bars, bars more than 1/4 inch in diameter shall be deformed bars.
- (b) **Welded wire fabric** shall conform to the requirements of Section 223 of the Specifications.
- (c) **Bar mat reinforcement** shall conform to the requirements of Section 223 of the Specifications.
- (d) **Corrosion resistant steel used for reinforcement** shall conform to the requirements of Section 223 of the Specifications.

**406.03—Procedures**

- (a) **Order Lists and Bending Diagrams:** Copies of order lists and bending diagrams shall be furnished the Engineer when required.
- (b) **Protecting Material:** Reinforcing steel shall be stored on platforms, skids, or other supports that will keep the steel above ground, well drained, and protected against deformation.

When placed in the work, steel reinforcement shall be free from dirt, paint, oil, or other foreign substances. Steel reinforcement with rust or mill scale will be permitted provided samples wire brushed by hand conform to the requirements for weight and height of deformation.

- (c) **Fabrication:** Bent bar reinforcement shall be cold bent to the shape shown on the plans. Fabrication shall be in accordance with the requirements of the *Manual of Standard Practice for Detailing Reinforced Concrete Structures* (ACI 315).

Spiral bars shall be fabricated to have the proper diameter when placed in position at the pitch shown on the plans. Each end of a spiral bar shall have 1 1/2 finishing turns at each end in a plane perpendicular to the axis of the spiral.

- (d) **Placing and Fastening:** Steel reinforcement shall be firmly held during the placing and setting of concrete. Bars, except those to be placed in vertical mats, shall be tied at every intersection where the spacing is more than 12 inches in any direction. Bars in vertical mats and in other mats where the spacing is 12 inches or less in each direction shall be tied at every intersection

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

or at alternate intersections provided such alternate ties accurately maintain the position of steel reinforcement during the placing and setting of concrete.

Tie wires used with corrosion resistant reinforcing steel shall be solid stainless or plastic coated.

The minimum clear distance from the face of the concrete to any reinforcing bar shall be maintained as specified herein. In superstructures, the cover shall be at least 2 1/2 inches except as follows:

1. **Bottom of slab:** 1 1/4 inches.
2. **Stirrups and ties in T-beams:** 1 1/2 inches.
3. **Rails, rail posts, curbs, and parapets:** 1 inch.

In substructures, the cover shall be at least 3 inches except as follows:

1. **Abutment neat work and pier caps:** 2 1/2 inches.
2. **Spirals and ties:** 2 inches.

In corrosive or marine environments or under other severe exposure conditions, the minimum cover shall be increased 1 inch. Bars that must be positioned by maintaining clearances from more than one face shall be centered so that clearances indicated by the plan dimension of bars are equalized.

Bars shall be placed so that the concrete cover as indicated on the plans will be maintained within a tolerance of 0 to +1/2 inch in the finally cast concrete.

Where anchor bolts interfere with reinforcing steel, the steel position shall be adjusted without cutting to permit placing anchors in their proper locations.

Reinforcement in bridge deck slabs and slab spans shall be supported by standard CRSI metal or precast concrete bar supports. Bar supports shall be spaced as recommended by CRSI but not more than 4 feet apart transversely or longitudinally. Precast concrete supports shall be less than 1 foot in length and staggered so as not to form a continuous line. The lower mat of steel reinforcement shall be supported by a bolster block or individual chair bar supports and the upper mat can be supported by individual high chair bar supports or continuous bar supports placed between the upper and lower mats. Bar supports shall be firmly stabilized so as not to displace under construction activities. Reinforcing bar supports (Standees) may be used for the top mat of steel of simple slab spans provided they hold the reinforcing steel to the requirements specified herein and are firmly tied to the lower mat to prevent slippage. The use of standees will not be permitted for the top mat of steel on any continuous slab spans.

Precast concrete bar supports shall have a 28-day design compressive strength of at least 4,500 pounds per square inch and shall be from the Department's list of approved products for the use specified. Supports shall be furnished with plastic ties or shaped to prevent slippage from beneath the reinforcing bar. Metal bar supports shall be fabricated from one of the following: (1) stainless steel wire conforming to the requirements of ASTM A493, or (2) cold-drawn wire protected by plastic coating conforming to CRSI standards, or other protective coating as approved by the Engineer.

In reinforced concrete sections other than bridge slabs, the specified clear distance from the face of concrete to any reinforcing bar and the specified spacing between bars shall be maintained by

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

means of approved types of stays, ties, hangers, or other supports. The use of pieces of gravel, stone, brick, concrete, metal pipe, or wooden blocks will not be permitted as supports or spacers for reinforcing steel. The use of precast concrete block supports will be permitted provided blocks are furnished in correct thicknesses and are shaped or tied to prevent slippage from beneath reinforcing bars. The clear distance between bars shall be at least 1 1/2 times the specified maximum size of coarse aggregate but not less than 1 1/2 inches. Before concrete is placed, reinforcing steel will be inspected and approved for proper position and the adequacy of the method for maintaining position.

- (e) **Splicing and Lapping:** Reinforcement shall be furnished in full lengths as indicated on the plans. Except where shown on the plans, splicing bars will not be permitted without the written approval of the Engineer. Splices shall be as far apart as possible.

In lapped splices, bars shall be placed in contact and wired together. Lap lengths shall be as indicated on the plans. When reinforcing bars cannot be fabricated with the lengths shown on the plans, the bars may be lapped at no additional cost to the Department. Lap lengths shall be in accordance with the AASHTO *LRFD Bridge Design Specifications*.

Mechanical butt splicing will be permitted at locations shown on the plans. The mechanical connection shall develop in tension or compression, as required, 125 percent of the specified yield strength of the bar. The total slip of the bar within the splice sleeve of the connector after loading in tension to 30.0 ksi and relaxing to 3.0 ksi shall not exceed the following measured displacements between the gage points clear of the splice sleeve:

For bar sizes up to No. 14: 0.01 inch  
For No. 18 bars: 0.03 inch

For corrosion resistant reinforcing bars, mechanical butt splicers shall be of the same material as the bars being spliced except for stainless clad bars for which the splicers shall be stainless steel.

Reinforcing steel shall be welded only if specified on the plans. Welding shall be in accordance with the requirements of Section 407.04(a) of the Specifications. Reinforcing steel conforming to ASTM A615 Grade 60 shall not be welded. Corrosion resistant reinforcing steels shall not be welded.

Lap lengths for welded wire fabric or bar mat reinforcement shall be in accordance with the current AASHTO *LRFD Bridge Design Specifications*.

#### **406.04—Measurement and Payment**

**Reinforcing steel** will be measured in pounds of steel placed in the structure as shown on the plans. The weight of **welded wire fabric** will be computed from the theoretical weight per square yard placed, including allowance for laps not to exceed 8 percent of the net area. Reinforcing steel or welded wire fabric will be paid for at the contract unit price per pound. These prices shall include furnishing, fabricating, and placing reinforcement in the structure. In structures of reinforced concrete where there are no structural steel contract items, expansion joints, plates, rockers, bolts, and similar minor metal parts will be paid for at the contract unit price for reinforcement.

**Corrosion resistant reinforcing steel**, when a pay item, will be measured in pounds and paid for at the contract unit price per pound of the designated type of steel indicated and placed in the structure in the location(s) shown on the plans. This price shall include fabricating, shipping, furnishing and placement.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

No payment will be made for fastening devices that may be used by the Contractor for keeping reinforcing bars in their correct position. When the substitution of larger bars than those specified is allowed, payment will be made for only the amount of metal that would have been required if the specified size of bar had been used. When full-length bars are shown on the plans and the Contractor obtains approval to use short bars for his convenience, the weight paid for will be based on the full-length dimensions with no allowance made for splices.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Reinforcing steel	Pound
Welded wire fabric	Pound
Corrosion resistant reinforcing steel, Class I	Pound
Corrosion resistant reinforcing steel, Class II	Pound
Corrosion resistant reinforcing steel, Class III	Pound

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — FOR USE WHEN STEEL STRUCTURES WITH HIGH STRENGTH BOLTS ARE REQUIRED.** Include SS40404 Hydraulic Cement Concrete Operations. When Prestressed Concrete is used include SS40502 Prestressed Concrete.

SS40703-0912

January 2, 2012

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

**SUPPLEMENTAL SECTION 407—STEEL STRUCTURES**

**SECTION 407—STEEL STRUCTURES** of the Specifications is amended as follows:

**Section 407.04(d) Bolt Holes** is amended to replace the second paragraph with the following:

Finished holes shall be 1/16 inch larger than the nominal bolt size. Oversized holes will be permitted only with the permission of the Engineer or in accordance with the requirements of Section 407.06(b). Finished holes shall be within 1/16 inch of the plan gage and match-mating holes, with no offset greater than 1/16 inch. Holes varying more than 1/16 inch from the plan gage will be rejected.

**Section 407.06(c)3.b. Direct tension indicators** is amended to replace the first paragraph with the following:

- b. **Direct tension indicators:** When direct tension indicators are used, installation shall be in accordance with the requirements of Section 407.06(c)3 of the Specifications. However, the indicator washer shall not be considered a substitute for the required hardened washer under the turned element but may be considered a substitute for the hardened washer required under the unturned element when bolts conforming to the requirements of ASTM A 490 are used with steel conforming to the requirements of ASTM A 709, Grade 36. Direct tension-indicator washers shall not be painted or coated with any epoxy or similar material prior to installation. The normal installation shall consist of the load indicator being placed under the unturned bolt head or unturned nut. However, if conditions required installation under the turned bolt portion, a hardened flat washer or nut face washer shall be fitted against the tension-indicating protrusions. Tension-indicating washers shall not be substituted for the hardened washers required with short-slotted or oversized holes but may be used in conjunction with them.

**Section 407.04(j) Stud Shear Connectors** is replaced with the following:

(j)**Stud Shear Connectors:** The diameter of the connectors shall be 7/8 inch, and the length shall be at least 4 inches. Heads shall project at least 2 inches above the plane of the bottom of the deck slab and shall be 3 inches below the plane of the top of the deck slab. In determining the required length, the computed dead-load deflection, vertical curve correction, and actual (measured) camber of the fabricated beam shall be taken into consideration. Studs 3/4 inch in diameter may be substituted for 7/8-inch studs, or vice versa, by making an adjustment in the pitch proportionally to the cross-sectional area of the studs with a spacing of not more than 24 inches. Studs shall be adjusted as necessary to provide clearance for bolts in bolted splices. The fabricator's shop plans shall show the location (spacing) and heights of the stud shear connectors regardless of whether they will be welded in the shop or in the field. Studs shall be end welded automatically or semi-automatically to the steel beams. The method and equipment used shall be as recommended by the manufacturer of the studs and shall be approved by the Engineer. Studs shall be field welded after structural steel is erected and metal decking or other walking or working surface is in place; however, structural steel with shop-applied studs may be erected provided erection is performed in accordance with the requirements of Section 107.17 of the Specifications.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — FOR USE WHEN BEARING PLATES, PADS, ROCKERS, EXPANSION DEVICES, ANCHORS, OR OTHER DEVICES USED IN CONJUNCTION WITH BEARINGS OR ANCHORAGES AT SUPERSTRUCTURE SUPPORTS ARE REQUIRED. Include SS40404 Hydraulic Cement Concrete Operations, SS40703 Steel Structures. When Prestressed Concrete is used include SS40502 Prestressed Concrete.**

**SS40801-0211**

December 20, 2010c

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

**SUPPLEMENTAL SECTION 408—BEARING DEVICES AND ANCHORS**

**SECTION 408—BEARING DEVICES AND ANCHORS** of the Specifications is amended as follows:

**Section 408.04—Measurement and Payment** is amended to replace the first paragraph with the following:

**Metal bearing and expansion plates and anchors** will be measured by shop scales in pounds of actual material placed in accordance with the plans. When not a separate pay item, the Department will include the weights of plates and anchors in the weight of structural steel or reinforcing steel for payment. When a pay item, bearing plates will be paid for at the contract unit price per pound and shall include elastomeric and other flexible bearing pads. The cost of bedding and preparation for metal bearing plates shall be included in the prices for superstructure items. This price shall include furnishing material, galvanizing, painting, and lubricating.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — PROJECTS REQUIRING WIDENING, REPAIRING, AND RECONSTRUCTING OF EXISTING STRUCTURES.**

**SS41201-0609**

August 5, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

**SUPPLEMENTAL SECTION 412—WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES**

**SECTION 412—WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES** of the Specifications is amended as follows:

**Section 412.03—Procedures** is amended to replace the fourth paragraph with the following:

Loose and unsound materials shall be removed by the use of hand tools or pneumatic hammers weighing a nominal 35 pounds or less. Hammer weight applies to the weight of the pneumatic hammer alone. Pneumatic hammers shall be worked at an angle of 45 to 60 degrees to the plane of the concrete surface being removed. The surface shall be sounded with a masonry hammer to determine the relative concrete strength.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — USE WHEN DISMANTLING AND REMOVING ALL OR PORTIONS OF EXISTING STRUCTURES IS REQUIRED.**

SS41301-0609

August 5, 2008

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS**SUPPLEMENTAL SECTION 413—DISMANTLING AND REMOVING EXISTING STRUCTURES OR REMOVING PORTIONS OF EXISTING STRUCTURES****SECTION 413—DISMANTLING AND REMOVING EXISTING STRUCTURES OR REMOVING PORTIONS OF EXISTING STRUCTURES** of the Specifications is amended as follows:**Section 413.02(b) Removing Portion of Existing Structure** is replaced with the following:

- (b) **Removing Portion of Existing Structure:** The portions to be removed shall be the areas designated on the plans. No portion of the structure shall be removed by blasting or other methods that may damage any portion of the structure that will remain in place. When pneumatic hammers are used to remove concrete, the weight of the hammer alone shall be not more than a nominal 90 pounds for widening work or a nominal 35 pounds for deck repair work. The use of tractor-mounted demolition hammers with a maximum manufacturer's rated striking energy of 1,000 foot-pounds will be permitted for the removal of concrete parapets down to the top of deck and for that portion of the deck where the reinforcing steel will be removed. The use of tractor-mounted demolition hammers or pneumatic hammers weighing more than a nominal 35 pounds shall not be allowed for the removal of that portion of the deck that is within 6 inches of the top flange of the beams/girders to remain in the structure. With the written approval of the Engineer, hydraulically actuated, jaw type, concrete crushers may be used for the removal of concrete parapets down to the top of the deck. The approval of hydraulically actuated, jaw type, concrete crushers shall be contingent upon continuous satisfactory results with no damage to any portion of the structure that is to remain in place. The removal of concrete parapet on prestressed concrete slab spans or prestressed concrete box beam spans shall be limited to nominal 35-pound pneumatic hammers within 2 inches of the deck and not more than nominal 90-pound pneumatic hammers for the remainder of the parapet unless otherwise approved by the Engineer.

Disturbed areas shall be uniformly graded to natural ground contours in a manner that will facilitate drainage and prevent impoundment of water.

Materials or portions of existing structures removed shall be handled in accordance with the requirements of (a)1. herein.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — FOR USE WHEN RIPRAP IS REQUIRED.**

**SS41401-0310**

January 25, 2010

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

**SUPPLEMENTAL SECTION 414—RIPRAP**

**SECTION 414—RIPRAP** of the Specifications is amended as follows:

**Section 414.04—Measurement and Payment** is amended to replace the ninth and tenth paragraphs with the following:

**Riprap** will be paid for at the contract unit price. This price shall include furnishing and placing riprap, including welded wire fabric, mortar, or grout; excavation; and riprap bedding. These prices shall include geotextile bedding material when required. The price bid shall include preparing the surface, furnishing and installing geotextile bedding material, overlaps, repair work, and excavating and backfilling toe-ins.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**GUIDELINES — PROJECTS REQUIRING BRIDGE WORK INVOLVING NEW CONSTRUCTION OR SUBSTRUCTURE/SUPERSTRUCTURE REPAIR OR REHABILITATION. (CONTACT BRIDGE ENGINEER TO DETERMINE APPLICABILITY IF IT IS UNCLEAR).**

SS42300-1112

April 16, 2012c

VIRGINIA DEPARTMENT OF TRANSPORTATION  
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

**SUPPLEMENTAL SECTION 423—NBIS INSPECTION USING UNDER BRIDGE INSPECTION DEVICE**

**SECTION 423.01—Description**

This work shall consist of furnishing an under bridge inspection device to safely facilitate the full and proper inspection of bridge structure prior to releasing such structures to public traffic. In accordance with the provisions of Section 105.17 and the requirements of the National Bridge Inspection Standards (NBIS) the Contractor shall provide VDOT inspectors full and safe access to bridge structures for the NBIS bridge inspection before public traffic is released on the structure(s). In order to accomplish such inspection of the specified bridge(s) on this contract the Department has determined that such inspection shall require access be provided to Department inspectors by the Contractor furnishing an OSHA compliant under bridge inspection device including operator. The vehicle shall be of sufficient size, capacity and reach to safely access all areas of the specified bridge(s) for inspection purposes.

**SECTION 423.02—Notification Requirements**

The Contractor shall notify the Engineer at least 1 month (30 days) in advance of the date he desires the Engineer to arrange the NBIS inspection. This advance notice is necessary so the Department can arrange to have qualified bridge inspection personnel available at the site to conduct the inspection. In the event the Department is able to arrange to supply its under bridge inspection device once the request for the NBIS inspection is received from the Contractor, the Contractor will be notified by the Engineer and this pay item will be deleted from the Contract in accordance with the provisions of Section 109.07. Due to the lead time necessary to reserve some under bridge inspection devices and their rental cost, and the Department's responsibility to inspect the work with competent personnel, advance notice and coordination of each party to a mutually agreeable date and time is essential.

**SECTION 423.03—Rescheduling of Inspection**

In the event the NBIS bridge inspection must be rescheduled, the Contractor's request for the NBIS inspection will be subject to the next available date of the bridge inspection team, but not later than 10 calendar days from the originally scheduled date of the NBIS inspection.

If either party must reschedule the inspection, they must furnish the other party at least seven (7) days advance notice.

The under bridge inspection device and operator shall also be available for any subsequent re-inspection (including mobilization) for corrective measures identified in the NBIS bridge inspection, and will be subject to the next available date the bridge inspection team can perform the inspection. If necessary, subsequent re-inspection costs will be in accordance with the pay item listed herein for the first re-inspection only. Re-inspections required after the first re-inspection will be at the Contractor's expense.

A delay in the NBIS bridge inspection attributable to the Contractor will in no way relieve the Contractor from his obligation under the terms of the Contract nor obligate the Department to consider an extension of time in accordance with the provisions of Section 108.04.

**SECTION 423.04—Traffic Control During Inspection**

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

When the Contract has individual pay items to address maintenance of traffic operations, these items may be adjusted to accommodate traffic control necessary for the NBIS bridge inspection. In contracts where maintenance of traffic is specified for Lump Sum payment, the Contractor shall plan the work so that the cost for maintenance of traffic for the NBIS bridge inspection is covered in the final percentage of the lump sum payment. Therefore, the final percentage of the lump sum amount bid will not be submitted for payment until after the NBIS inspection has been satisfactorily completed.

#### **SECTION 423.05—Measurement and Payment**

**NBIS access, under bridge (Str. No.)** will be measured and paid for at the contract unit price per day for the bridge structure specified. This price shall be full compensation for furnishing an under bridge inspection device and operator, mobilization/demobilization, development of a traffic control plan for the NBIS inspection and for all labor, tools, other equipment, materials and incidentals required to perform and fully complete the inspection.

Time governing payment will commence once the under bridge inspection device and operator are at the inspection location based upon a mutually agreed schedule (date and time) between the Engineer and the Contractor and proper notification in accordance with the requirements here has been made.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
NBIS access, under bridge (Str. No.)	Day

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**———— CNSP SELECT USE 400 SERIES SPCNs and SPs ————**

The following are Select Use Special Provisions. None have been through the Department's complete Specifications Committee review/comment/acceptance process and are not part of the Standard Specifications. They are to be considered as project-specific and may be subject to modifications required to meet specific project conditions or requirements for Federal funding. Anyone making modifications is responsible for obtaining the appropriate expertise in the discipline applicable to the modification. If modifications are made the date must also be changed to reflect the current date. Please send a copy of the modified special provision with the new date and specific project number to [David.Gayle@VDOT.Virginia.gov](mailto:David.Gayle@VDOT.Virginia.gov) so it may be added to the Specifications Stockpile.

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

**SU404000A Epoxy Concrete Overlay**

**GUIDELINES – FOR PROJECTS REQUIRING EPOXY AS AN OVERLAY OVER CONCRETE BRIDGE DECKS.**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**EPOXY CONCRETE OVERLAY**

May 31, 2001a

**I. DESCRIPTION**

This work shall consist of furnishing and applying epoxy as an overlay over concrete bridge decks in accordance with this Specification, and within the specified tolerances for the lines, grades and details shown on the plans.

**II. MATERIALS**

**A.** The epoxy shall be modified type EP-5 conforming to Section 243 of the Specifications with the following exceptions:

Property	Requirement	Test Method
Pot life	15 to 45 minutes at 75°F	ASTM C881 (50 ml sample in paper cup)
Tensile strength	2,000 to 5,000 psi at 7 days	ASTM D638
Tensile Elongation	30 to 70 percent at 7 days	ASTM D638
Viscosity	7 to 25 poises	ASTM D2393 (Model RVF Brookfield, Spindle No. 3 at 20 rpm)
Minimum compressive strength at 3 hrs.	1,000 psi at 75°F	ASTM C109 (Use plastic inserts)
Minimum compressive strength at 24 hrs	5,000 psi at 75°F	ASTM C109
Minimum adhesion strength at 24 hrs	250 psi at 75°F	VTM-92

**B.** Aggregate shall be angular grained silica sand or basalt having less than 0.2 percent moisture, and free of dirt, clay, asphalt and other foreign or organic materials.

The silica sand and basalt shall have a minimum Mohs' scale hardness of 7. Unless otherwise approved, silica sand and basalt shall conform to the following gradation:

Percent by Weight of Material Passing			
No. 4	No.8	No. 16	No. 30
Sieve	Sieve	Sieve	Sieve
100	30-75	Max. 5	Max. 1

**III. CONSTRUCTION METHODS**

**A. Safety Provisions**

\*These SPECIFICATIONS REVISIONS are subject to change on short notice.

Personnel shall be thoroughly trained in the safe handling of materials in accordance with the Manufacturer's recommendations.

**B. Storage of Materials**

Materials shall be stored in accordance with the requirements of Section 243 of the Specifications. MSDS and other information pertaining to the safe practices for the storage, handling and disposal of the materials, and to their health hazards shall be obtained from the manufacturer and posted at storage areas. A copy of such information shall be provided to the Engineer.

**C. Surface Preparation**

Prior to placing the first course, the Contractor shall determine the bridge deck cleaning method in accordance with VTM-92 to obtain the size of shot, flow of shot, forward speed of shotblast machine, and number of passes necessary to provide a tensile rupture strength greater than or equal to 250 psi or a failure area, at a depth of 1/4 inch or more into the base concrete, greater than 50 percent of the test area. A test result shall be the average of three tests on a test patch of at least 1.5 feet by 3 feet consisting of two courses. One passing test result must be obtained for each span or 300 square yard, whichever is the smaller area. Test patches shall be placed in wheel paths, the area between wheel paths or in other areas that represent a worst surface condition as determined by the Engineer. To provide assurance that the cleaning procedure, materials, installation procedure, and curing period will provide the desired overlay, test patches shall be installed with the same materials, equipment, personnel, timing, sequence of operations, and curing period prior to opening to traffic that will be used for the installation of the overlay. The cleaning method, materials, and installation procedure will be approved if one passing test result is obtained from each test area.

If the cleaning method, materials and installation procedure are not acceptable, the Contractor must remove failed test patches and make the necessary adjustments, and retest all test areas at no additional cost to the Department until satisfactory test results are obtained.

Before placement of the epoxy concrete overlay, the entire deck surface shall be cleaned by shotblasting and other means, using the approved cleaning method to remove asphaltic material, oils, dirt, rubber, curing compounds, paint carbonation, laitance, weak surface mortar and other potentially detrimental materials, which may interfere with the bonding or curing of the overlay. Acceptable cleaning is usually recognized by a significant change in the color of the concrete and mortar, and the beginning exposure of coarse aggregate particles. Mortar, that is sound and soundly bonded to the coarse aggregate, must have open pores due to cleaning to be considered adequate for bond. Areas of asphalt larger than one inch in diameter, or smaller areas spaced less than six inches apart, shall be removed. Traffic paint lines shall be considered clean when the concrete has exposed aggregate showing through the paint stripe. A vacuum cleaner shall be used to remove all dust and other loose material. Brooms shall not be used and will not be permitted.

If the Engineer determines that an approved cleaning method has changed prior to the completion of the job, the Contractor must return to the approved cleaning methods and reclean the suspect areas or verify through tests at no additional cost to the Department that the altered method is acceptable.

Epoxy concrete overlay shall not be placed on hydraulic cement concrete that is less than 28 days old. Patching and cleaning operations shall be inspected and approved prior to placing

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each layer of the overlay. Any contamination of the deck or intermediate courses, after initial cleaning, shall be removed. Both courses shall be applied within 24 hours following the final cleaning and prior to opening the area to traffic.

There shall be no visible moisture present on the surface of the concrete at the time of application of the epoxy concrete overlay. Compressed air may be used to dry the deck surface.

#### **D. Equipment**

For mechanical applications, equipment shall conform to the requirements of Section 243 of the Specifications, and shall consist of no less than a epoxy distribution system, fine aggregate spreader, application squeegee and vacuum trucks, and a source of lighting if work will be performed at night. The distribution system or distributor shall accurately blend the epoxy resin and hardening agent, and shall uniformly and accurately apply the epoxy materials at the specified rate to the bridge deck in such a manner as to cover 100 percent of the work area. The fine aggregate spreader shall be propelled in such a manner as to uniformly and accurately apply the dry silica sand or basalt to cover 100 percent of the epoxy material. The vacuum truck shall be self-propelled.

For hand applications, equipment shall consist of calibrated containers, a paddle type mixer, squeegees, rollers and brooms, which are suitable for mixing the epoxy and applying the epoxy and aggregate in accordance with the requirements of Section 243 of the Specifications.

#### **E. Application**

Handling and mixing of the epoxy resin and hardening agent shall be performed in a safe manner to achieve the desired results in accordance with the requirements of Section 243 of the Specifications, and the manufacturer's recommendations as approved or directed by the Engineer. Epoxy concrete overlay materials shall not be placed when weather or surface conditions are such that the material cannot be properly handled, placed, spread and cured within the specified requirements of traffic control.

The epoxy overlay shall be applied in 2 separate courses in accordance with the following rate of application, and the total of the 2 applications shall not be less than 7.5 gals. per 100 square feet

<b>Course</b>	<b>Rate Gal./100 sq.ft.</b>	<b>Aggregate Lbs./Sq.Yd</b>
1	No less than 2.5	10+
2	No less than 5.0	14+

\*Application of aggregate shall be of sufficient quantity to completely cover the epoxy.

After the epoxy mixture has been prepared for the epoxy concrete overlay, it shall be immediately and uniformly applied to the surface of the bridge deck with a squeegee or paint roller. The temperature of the bridge deck surface and all epoxy and aggregate components shall be 60 °F or above at the time of application. Epoxy shall not be applied if the air temperature is expected to drop below 55 °F within 8 hours after application, or the gel time is less than 10 minutes. The dry aggregate shall be applied in such a manner as to cover the epoxy mixture completely within 5 minutes. First course applications, which do not receive enough sand prior to gel, shall be removed and replaced. A second course insufficiently sanded may be left in place, but will require additional applications before

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opening to traffic. Each course of epoxy concrete overlay shall be cured until vacuuming or brooming can be performed without tearing or damaging the surface. Traffic or equipment shall not be permitted on the overlay surface during the curing period. After the course one curing period, all loose aggregate shall be removed by vacuuming or brooming and the next overlay course applied to completion. The minimum curing periods shall be as follows:

Course	Average temperature of deck, epoxy and aggregate components in °F					
	60-64	65-69	70-74	75-79	80-84	85+
1	4 hrs.	3 hrs.	2.5 hrs.	2 hrs.	1.5 hrs.	1 hr.
2	6.5 hrs.*	5 hrs.	4 hrs.	3 hrs.	3 hrs.	3 hrs.

\*Course 2 shall be cured for 8 hrs. if the air temperature drops below 60 °F during the curing period.

The Contractor shall plan and prosecute the work to provide the minimum curing periods as specified herein, or other longer minimum curing periods as prescribed by the manufacturer prior to opening to public or construction traffic, unless otherwise permitted. Course 1 applications shall not be opened to traffic.

Unless otherwise specified, the epoxy concrete overlay courses shall be applied over the expansion joints of the bridge deck. The expansions joints shall be provided with a bond breaker. Within 12 hours of application and prior to opening to traffic, the overlay shall be removed over each joint by removal of the bond breakers, or by scoring the overlay prior to gelling or by saw cutting after cure.

In the event the Contractor's operation damages or mars the epoxy concrete overlay, the Contractor shall remove the damaged areas by saw-cutting in rectangular sections to the top of the concrete deck surface and replacing the various courses in accordance with this Specification at no additional cost to the Department.

For each batch provided, the Contractor shall maintain and provide to the Engineer records including, but not limited to, the following:

1. Batch numbers and sizes
2. Location of batches as placed on deck, referenced by stations
3. Batch time
4. Gel time (50 ml sample)
5. Temperature of the air, deck surface, epoxy components, including aggregates
6. Loose aggregate removal time
7. Time open to traffic

**IV. MEASUREMENT AND PAYMENT**

Epoxy concrete overlay will be measured and paid for in square yards, which price shall be full compensation for deck preparation and testing, for furnishing and applying the overlay courses including saw cutting joints and any incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Epoxy Concrete Overlay	Square Yard

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**SU421000A Elastic Inclusion (EPS)**

**GUIDELINES — USE WHEN REQUESTED BY THE DESIGNER.**

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION FOR  
**ELASTIC INCLUSION**

June 24, 2003a

**I. DESCRIPTION**

Elastic Inclusion work shall consist of installation of an elasticized Expanded Polystyrene (EPS) and geotextile separation fabric between the back of concrete surfaces and backfill material, in accordance with these specifications and in conformity with manufacturer's recommendations, the lines shown on the plans or as established by the Engineer.

**II. MATERIALS**

- (a) **Elasticized Expanded Polystyrene (EPS):** EPS shall have a size tolerance of 1/8 inch for each dimension and conform to the following:

Physical Property	Test Method	Requirements
Compressive strength	D-1621	720 psf +/-60 psf @10% strain
Water absorption	C-272	Max. 3% by volume
Insect Resistance	D-3345-74	Resistance to ants, termites, etc.

The EPS shall be elasticized, with a linear-elastic stress-strain behavior up to 10 percent strain and linear proportional stress-strain behavior up to 30 percent strain.

The EPS shall contain no chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) or formaldehyde. It shall be chemically and biologically inert when in contact with acidic and alkaline soils. It shall be treated to prevent insect attack.

Materials shall withstand temperature variations from 0°F to 140°F without deforming and shall maintain their original dimensions and placement without chipping, spalling, or cracking. Material shall not deteriorate because of contact with sodium chloride, calcium chloride, mild alkalis and acids, or other ice control materials.

The EPS shall contain a flame retardant additive.

- (b) **Geotextile Separation Fabric:** A non-woven geotextile separation fabric shall be placed between the EPS and the backfill material. Fabric joints shall have a minimum overlap of twelve inches. Fabric shall extend a minimum of twelve inches beyond the EPS surface and overlap with adjacent concrete surface.

The separation fabric shall have the following properties:

Physical Property	Test Method	Requirements
Grab Strength	D-4632	Min. 250 lb
Puncture Strength	D-4833	Min. 112 lb
Tear Strength	D-4533	Min. 90 lb
Permittivity	D-4491	Min. 0.5 sec <sup>-1</sup>
Apparent Opening Size	D-4751	Max. No. 50 sieve

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Geotextile separation fabric shall be protected from mud, dirt, dust, sunlight, and debris during transport and storage. Material shall be inert to commonly encountered chemicals; resistant to mildew, rot, insects, and rodents; and biologically and thermally stable. Geotextile separation fabric for subsurface installation shall not be exposed to direct sunlight for more than 24 hours during installation.

Tensile strength requirements are in the machine and cross-machine directions.

- (c) **Adhesive:** Adhesive shall be used to bond the EPS to concrete surfaces and the separation fabric to the EPS. It shall be applied in accordance with the EPS manufacturer's recommendations.
- (d) **Backfill Material:** Backfill material adjacent to the separation fabric shall be as specified in the contract documents.

### III. PROCEDURES

- (a) **Preparation of Concrete Surface:** Before placement of EPS, concrete surfaces shall be abrasive blast cleaned with a positive contact sandblaster or adhesives manufacturer's recommendation and approved by the Engineer to remove all non-adherent laitance, oil, grease or other foreign or deleterious matter.
- (b) **Installation of Material:**

The EPS shall be attached to the back of the concrete surfaces with an adhesive compatible with the material.

The concrete surface must be thoroughly dry and clean for adhesive for the application of the EPS. Adhesive shall be applied in accordance with the adhesive manufacturer's recommendation or approval.

The separation fabric may be installed after the EPS has been installed or it may be pre-attached to the EPS. The separation fabric shall cover all exposed surfaces of the EPS.

EPS and separation fabric shall be installed in accordance with the manufacturer's recommendations.

### IV. TESTING

Elasticized EPS shall be tested by an independent commercial laboratory, to verify the material requirements specified herein. The Contractor shall provide written documentation of all tests specified. Documentation shall include style, lot, roll numbers, and actual results of each test. In addition, the name, address, phone number of the testing laboratory, and date of testing shall be provided.

Geotextile separation fabric shall be tested by an independent commercial laboratory, to verify the material requirements specified herein. The Contractor shall provide written documentation of all tests specified. Documentation shall include style, lot, roll numbers, and actual results of each test. In addition, the name, address, phone number of the testing laboratory, and date of testing shall be provided.

After the EPS has been installed and before the work has been accepted, the Contractor and Inspector shall perform a visual inspection of EPS coverage and adhesion to the concrete surface. Any area deemed unacceptable and questionable as to remaining in position during the placement of the backfill material shall be replaced or repaired, as required.

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**REPAIR OF FAILED AREA OF EPS:** Unacceptable portion of the EPS shall be removed and the concrete surface shall be prepared and the EPS installed in accordance with this special provision. New EPS in the repair areas shall be visually inspected after curing. The cost of all additional work for repairing or replacing of the defective joint material shall be borne by the Contractor.

#### **IV. MEASUREMENT AND PAYMENT**

Elastic inclusion, when a pay item, will be measured in square yards along the back of backwall surface area, complete-in-place, and will be paid for at the contract unit price per square yard. Such price shall be full compensation for cleaning surface, for furnishing and installing the EPS material in accordance with these Specifications and the manufacturer's recommendations, separation fabric, testing, and for all material, labor, tools, equipment and incidentals necessary to complete the work. When not a pay item, the cost thereof shall be included in the price for other appropriate pay items.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Elastic Inclusion (Thickness)	Square Yard

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