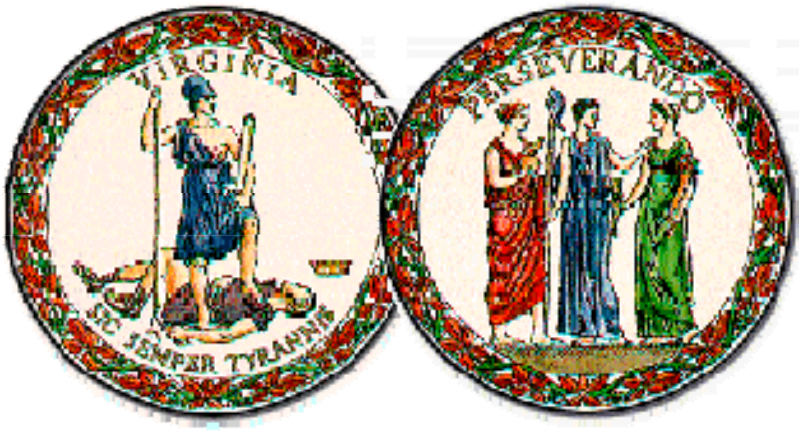
MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

PART 12

SOUND WALLS – ARCHITECTURAL TREATMENT



VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT GOVERNANCE DOCUMENT

VDOT Manual of the Structure and Bridge Division: Part 12: Sound Walls – Architectural Treatment

OWNING DIVISION: Structure and Bridge

DATE OF ISSUANCE: 6/26/2013

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, 23219-2000

Gregory A. Whirley
COMMISSIONER

June 26, 2013

SUBJECT: Manual of the Structure and Bridge Division
Volume V – Part 12
Sound Walls – Architectural Treatment (Standards)

MEMORANDUM

TO: Holders of Manual

NEW ISSUE:

Manual of the Structure and Bridge Division, Volume V – Part 12 – Sound Walls – Architectural Treatment is new issue. This manual provides options for the architectural treatment of sound walls. The designer/architect may modify these standards as needed either to conform to existing sound wall patterns or to meet the needs of stakeholders. Modifications should be approved by the Environmental Division prior to advertisement.

RETAIN THIS MEMO IN FRONT OF INDEX TO VOLUME V – PART 12

/original signed/
Julius F. J. Völgyi, Jr., P.E.
Assistant State Structure and Bridge Engineer

For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer

VOLUME V – PART 12
SOUND WALLS – ARCHITECTURAL TREATMENT

TABLE OF CONTENTS

*Indicates 11x17 sheet, all others are 8 ½ x 11.

VOLUME V – PART 12
SOUND WALLS – ARCHITECTURAL TREATMENT

TABLE OF CONTENTS

*Indicates 11x17 sheet, all others are 8 ½ x 11.

VOLUME V – PART 12
SOUND WALLS – ARCHITECTURAL TREATMENT

TABLE OF CONTENTS

*Indicates 11x17 sheet, all others are 8 ½ x 11.

VOLUME V – PART 12
SOUND WALLS – ARCHITECTURAL TREATMENT

TABLE OF CONTENTS

*Indicates 11x17 sheet, all others are 8 ½ x 11.

MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

VOLUME V – PART 12
SOUND WALLS - ARCHITECTURAL TREATMENT

This volume includes standards for aesthetic treatment to be applied to sound walls.

These drawings are to be used for the development of an architectural (aesthetic) treatment layout from beginning to end of the sound wall. This layout should typically be developed either by an in-house architect or consultant firm.

The patterns shown in this volume are representative of various options available to provide architectural treatment on sound walls. The designer/architect may modify these standards as needed either to conform to existing sound wall patterns or to meet the needs of stakeholders. Modifications should be approved by the Environmental Division prior to advertisement.

Refer to NOTES TO DESIGNER for specific comments on each standard sheet.

A sample special provision is also included for reference. The actual project specific special provision should be developed and approved by the Environmental Division.

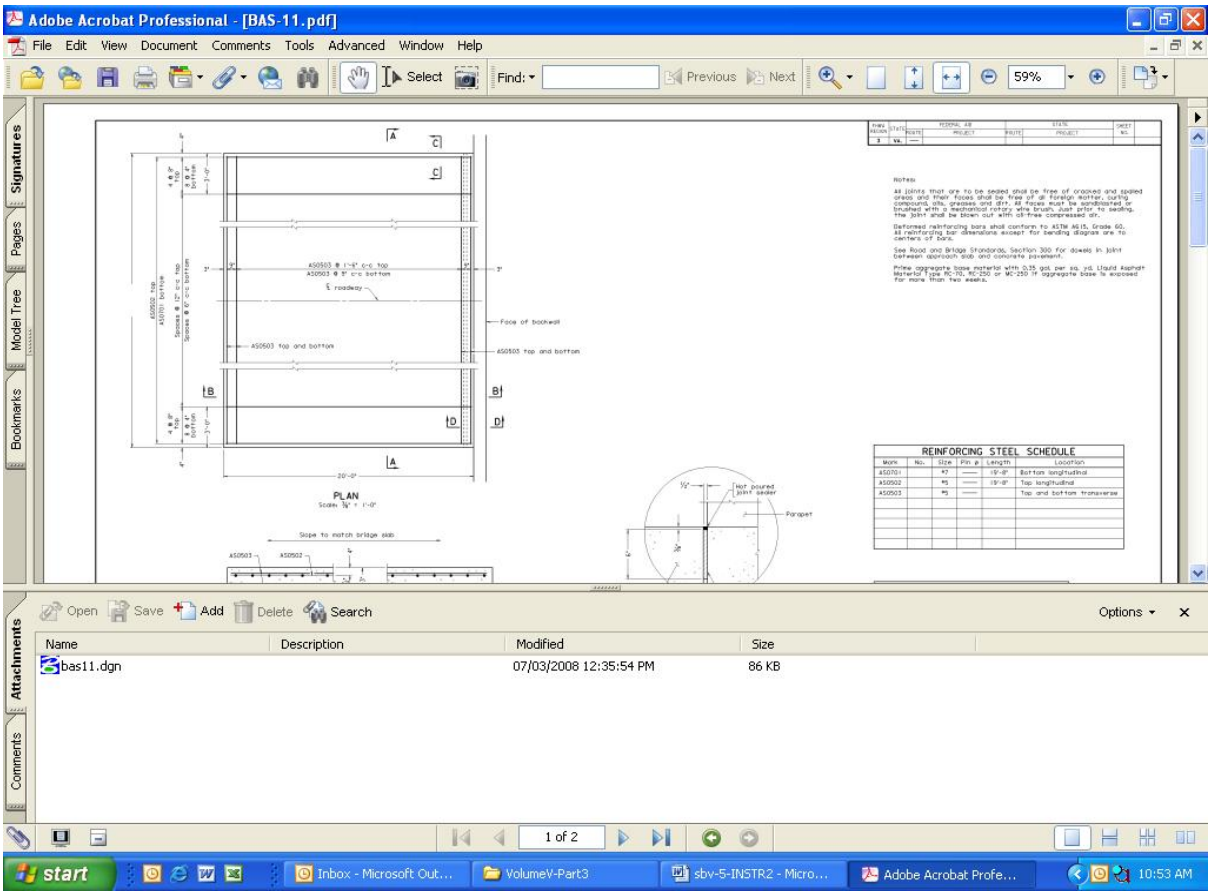
Completion of the project block, title block and lower left corner shall be in accordance with the requirements of File Nos. 04.04-1 thru -2 of the Manual of the Structure and Bridge Division, Volume V - Part 2 and as specified herein.

The CADD standard detail sheets are located in Falcon […\PROJECTS\br-stand\sbr\soundwall] directory (central office environment). The drawing file name for the standard sheet corresponds with the file number (name of standard sheet) as listed in the Table of Contents (minus the dash). For example, standard BSW-1 is drawing bsw1.dgn.

Some of the MicroStation files have raster file image attachments attached to the drawing files. The image files required are provided as file attachments with the DGN files and should be downloaded and located in the same directory as the DGN file.

For external users, the CADD standard detail sheets are attached to the PDF files for each drawing located on VDOT's Structure and Bridge Division website. The user will need Adobe Reader version 7.0 or higher to be able to access the files. Either click on the DGN link in the table of contents or click on the attachment tab in the PDF file for each standard sheet.

Using either method, the screen will appear similar to that shown below.



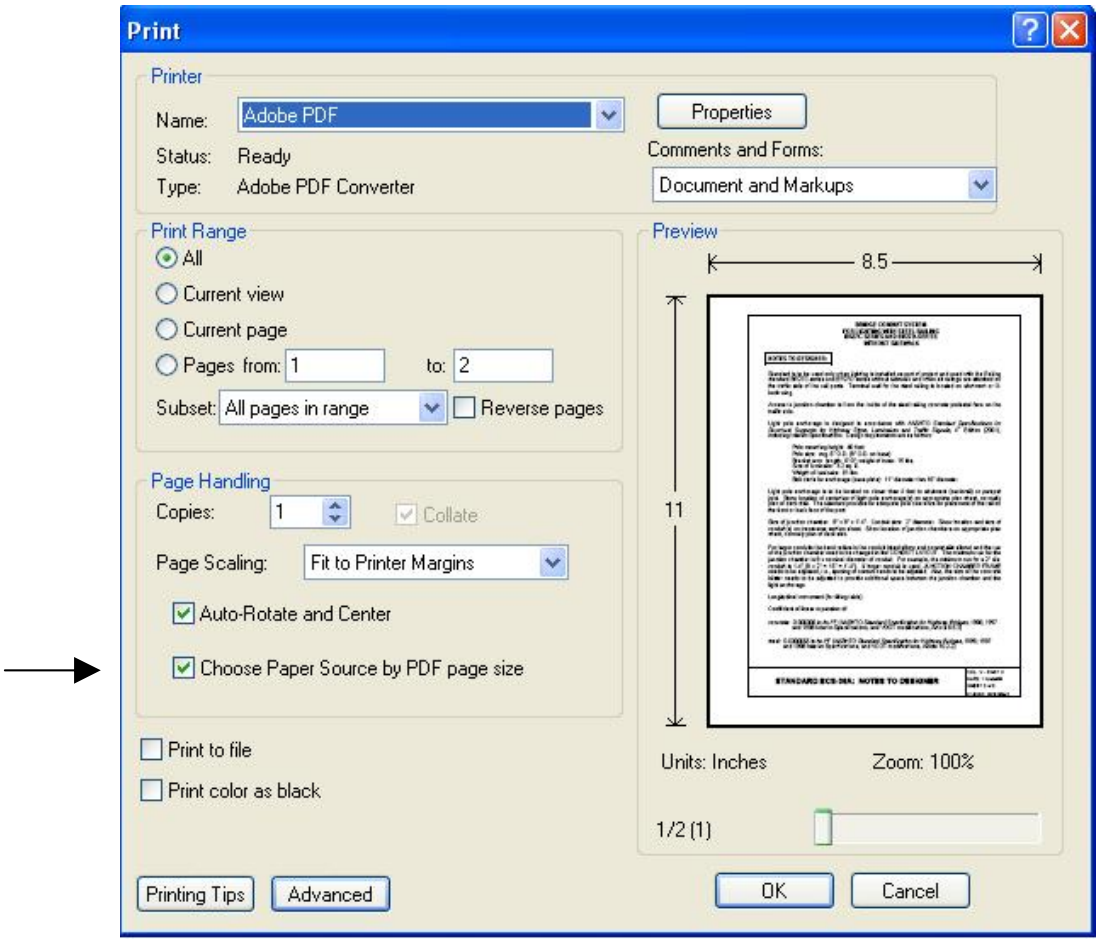
By left clicking on the icon(s), the following menu will appear:

Users may then save the file(s) to their computer.

To simplify printing of this manual, a PDF of the complete manual in one PDF file with no links may be accessed by clicking on the link below.

Full manual no links

If the printer has both 8 ½ x 11 and 11 x 17 paper sizes available, the drawings and notes to designer may be printed on the correct paper size by placing a check next to the item “Choose Paper Source by PDF page size” as shown in the dialog below:



If the printer only has 8 ½ x 11 paper, the drawings will default to the reduced paper size.

Depending on the printer margins, the 11 x 17 drawing(s) may not be true half-size drawing(s).

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
SOUND BARRIER WALLS / ARCHITECTURAL FINISHES
Project XXXX-XXX-XXX, C501, P101, R201, (UPC XXXXX)

Month XX, 20XX

SECTION 519 – SOUND BARRIER WALLS of the Specifications is amended as follows:

Section 519.01 Description is amended to include the following:

Sound barrier walls shall conform to the plans, Section 519 of the Specifications, and the provisions herein.

Section 519.01 (a) Acoustic Performance Standards is amended to include the following:

4. Ground-mounted sound barrier walls shall be precast concrete with a sound absorptive finish on the roadway side. Structure mounted sound barrier walls shall be lightweight material with a sound absorptive finish on the roadway side. ((Remove structure mounted walls if not applicable.))

Section 519.01 (b) Design Standards is amended to include the following:

13. Failure on the part of the Contractor to acknowledge and address the requested changes after the second review request by the Department may result in the Department assessing further review costs to the Contractor and deducting such costs from monies due the Contractor on the next progress estimate.

14. The height of the sound barrier walls shall meet but not exceed the elevation of sound attenuation line depicted in the plans except as may be minimally necessary to "step" panels due to changes in grade at wall locations.

Section 519.03 – Procedures is amended as follows:

Section 519.03 (a) Foundations is amended to include the following:

The Contractor is advised that the Department has not performed subsurface investigation to locate existing utilities on this project. Therefore, it shall be the Contractor's responsibility to perform this work so as to avoid utility conflicts with the construction associated with the proposed sound barrier wall.

The geological data and soil parameters to be used for foundation design are shown on the plans.

Relative to the proposed sound barrier, the Contractor shall provide written notice to the Department of any anticipated utility impacts prior to performing the affected work.

Relative to the proposed Sound Barrier, the Department will not be responsible for any claims for additional compensation from the Contractor resulting from delays, inconvenience, or damage sustained by him attributable to interference by utility appurtenances or the operation of moving the Utilities.

Section 519.03 (b) Piles and Post is amended to include the following:

Posts for ground-mounted sound barrier walls shall be structural concrete with a concrete cap or steel columns with a steel cap. Welding of reinforcing steel to base plates will not be allowed.

Concrete posts if applicable shall be color #36424.

Section 519.03 (c) Panels is amended to add the following:

1. **General Requirements**

Finish on the roadway side of the precast concrete absorptive barrier shall be as shown in the contract drawing. The Architectural Finish on the roadway side shall have a San Diego Dry Stack finish, or equivalent, with the battleship medallion. Finish on the landowner's side shall also have a San Diego Dry Stack finish, or equivalent, with no medallion. VDOT approval must be acquired for equivalent finish. Panels shall be colored on both the roadway and landowner sides. Sound barrier panels for both roadway and landowner sides shall be color #36424.

Medallion Spacing: Medallions shall be placed at a specific interval along the wall. Medallions shall be placed every four panels for the entire length of the wall. VDOT approval must be given to modify the medallion spacing. ((The spacing should be developed based on the actual project. Spacing required will vary based on length and profile of wall.))

The top 12" of the top panel shall be smooth formed (i.e. minus either finish on both sides) so as to give the appearance of a "cap", though still maintaining the same width (depth) of the panel.

The Contractor shall endeavor to design the wall when traversing a grade in such a manner that the finish profile of the top panels shall be as uniform in height as possible.

The Contractor shall not proceed with production fabrication of panels or posts until such items are reviewed and accepted by the Engineer.

2. **Structure-Mounted Barriers** ((Remove structure mounted walls if not applicable.))

a. Metallic panel systems, or any other material vulnerable to retained water, shall be detailed to eliminate this possibility in order to minimize the consequences of freeze-thaw, corrosion and other adverse effects that result from retained water.

b. The use of absorptive perforated metal sound barrier panels shall not be used within 22 feet from the nearest travel lane (horizontal).

c. For bridge crossings, the use of absorptive perforated metal sound barrier panels shall not be used within 14 feet from the bridge deck (vertical).

d. The use of absorptive perforated metal or reflective metal sound barriers manufactured or erected with dissimilar metals in contact with each other shall not be used on VDOT projects unless the intent of the dissimilar metals is to use one as a sacrificial component protecting the primary component such as the application of zinc to protect steel. Primary components should not be constructed in a manner that results in the dissimilar metals having a corrosion potential that promotes a galvanic reaction that causes a reduction in service life.

e. During the manufacturing process for sound absorptive perforated coated metal sound barrier panels shall be perforated and cut, then galvanized, and then coated for maximum corrosion protection that achieves a service life of not less than 50 years.

f. The manufacturer or supplier shall include Quality Assurance/Quality Control process steps documenting these requirements.

Architectural Treatments

1. General Requirements

a. **Description**: This section covers the construction of textured and colored formed concrete surfaces using designed form liners, and color stain system designed to duplicate the appearance of standard architectural designs. The work covered by this special provision consists of constructing textured surfaces on formed concrete surfaces as indicated on the Plans and in this Special Provision. The Contractor shall furnish all materials, labor, equipment, and incidentals necessary for the construction of sound barrier wall panels and one standard federal color stain.

b. **Quality Assurance**: A Pre-Installation Meeting shall be scheduled with manufacturer(s) representative to assure understanding of proprietary-themed form liners use, color application, requirements for construction of mockup, and to coordinate the work.

c. **Submittals**: Shop drawings, including plans, elevations and details to show overall pattern, joint locations, and end, edge and other special conditions shall be submitted. Shop Drawings shall also indicate the Form Liner Supplier and Stain Supplier. Form ties, sample and description, showing method of separation when forms are removed shall be displayed on the shop drawings.

d. **Job Conditions (Environmental requirements)**: Apply color stain when ambient temperature is between 50 and 100 degrees F. Manufacturer shall be consulted if conditions differ from this requirement.

e. Schedule color stain application with earthwork and back-filling of any wall areas making sure that all simulated stone texture is colored. Delay adjacent plantings until color application is completed. Coordinate work to permit coloring applications without interference from other trades. Design and pattern of the concrete surface shall follow VDOT's architectural treatments standard drawings. Seam lines or match lines caused from two or more form liners coming together will not be apparent when viewing final wall.

2. Concrete Form Liners

a. Suppliers are subject to compliance with requirements, suppliers offering products that may be incorporated into the Work include but are not limited to, the following:

Hunt Valley Contractors, Inc.
3705 Crondall Lane
Owings Mills, MD 21117
Telephone: (410) 356-9677
http://www.huntvalleycontractors.com/

Greenstreak
3400 Tree Court Industrial Boulevard
St. Louis, Missouri 63122
Telephone: (800) 325-9504
http://www.greenstreak.com/

Symons Corporation
200 E. Touhy Avenue
Des Plaines, Illinois 60018
Telephone: (847) 298-3200
http://www.symons.com/index.htm

b. The materials used in construction of the architectural treatment shall comply with Section 519 for concrete materials and form work. Furnish, store, prepare, apply, and cure all materials according to manufacturers' directions specified for the intended use.

i. **Form Liners**: The form liners shall be a high quality re-usable product manufactured of high strength urethane, which attaches easily to the forming system. Single use form liners will not be acceptable for this project. The liners shall be capable of withstanding anticipated concrete pour pressures without leakage causing physical or visual defects. The liners shall be removable without causing concrete surface deterioration.

The Contractor is cautioned that the form oil shall be worked into all areas, especially pattern recesses. Form stripping methods and patching materials shall be compatible with the color system and be submitted to the Engineer for approval.

ii. **Form Liner Theme Patters**: The pattern for the architectural treatment for sound barrier walls for this project is shown in the project drawings. The dimension of form liners reveal from the outermost face of stone to the inside face of the grout joint shall be 2" on average with a 3" maximum. Specific form liner designs vary in finish pattern relief from ½" to 1 ½". The form liners are designed to provide an architectural treatment to a sound wall or as determined by project requirements. Any proposed segments shall be shown on shop drawing submittals. Any variation in the length of the form liner modules shown on the Contract Documents shall be accommodated by adjusting (splicing in a matching textured liner or removing a segment and blending the joint) of the form liner without impacting the overall appearance of the pattern. Any field adjustment shall be done within the body of the pattern and not allow joints to line up between modules.

iii. **Form Release Agents**: The form release agent shall be a non-staining petroleum distillate free from water, asphaltic and other insoluble residue, or equivalent product. Form release agents shall be mutually compatible with the color system to be applied.

3. Construction

General: Construct architectural treatment where shown in accordance with Section 519.03.

Maintain consistency of appearance among all surfaces treated according to this Section. The Engineer will visually inspect the element of work to which the architectural finish is applied, and upon the Engineer's approval of the appearance, that element of work will become the standard to which all other treated surfaces will be compared for acceptance.

The Engineer may reject any article whose appearance does not, in the sole judgment of the Engineer, provide the required level of visual consistency with the initially approved work.

a. **Shop drawings**: Prior to beginning any work for the concrete to receive the simulated stone finish, working drawings representing the full size of the unit shall be provided for the simulated stone form liner pattern. The working drawings shall be drawn at a scale sufficient to show the detail of all stone and joint patterns, and the layout of the finish pattern.

   The working drawings shall be submitted to the Engineer for approval. Any revisions to the working drawings shall be performed at no additional cost to the Department.

b. **Sample panel**: Once the representative working drawings have been approved, the Contractor shall then provide and erect on site a 8'-0" high x 24'-0" long x 8" thick sample panel for specified theme form liner pattern. The sample panel shall be unreinforced and shall be constructed with all materials including form or wall ties proposed for use for constructing the predetermined architectural finish. Sample panels deemed unacceptable by the Engineer shall be removed from the project and replaced by additional sample panels at no additional cost to the Department.

   The location of the sample panel shall be readily visible from the proposed work where possible and placed as approved by the Engineer. The sample panel approved by the Engineer shall remain on the site as a basis for comparison for the work constructed on the project. All work constructed on the project shall duplicate this sample panel in form, architectural surface treatments, and appearance (texture, size, joint dimension and stone size). The Contractor shall dispose of the sample panel at the completion and acceptance of all work pertaining to the architectural treatment as determined by the Engineer.

c. **Architectural finish**: Form liners shall be installed, prepared, stripped, handled or otherwise utilized in conformance with the manufacturer's recommendations, or as directed by the Engineer.

d. **Form Liner Preparation**: Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a ¼" seam. Blend form liner butt joints into the concept-themed pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the concept-themed pattern. The Contractor shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners. Unless directed by the Engineer, installation and removal of form liners shall not be permitted if the technical representative is not present.

   Form stripping and related construction shall avoid creating defects in finished surface.

e. **Form Release**: Form release agent should be worked into all areas, especially pattern recesses.

f. **Finishing**: All form tie holes and other defects in finished uncolored surface shall be repaired in accordance with Section 519.03.

   Reinforced concrete shall be finished in accordance with the VDOT Road and Bridge Specifications except that curing of concrete should been done to accommodate the application of coloring and surface finish treatment.

g. **Grout Pattern Joints**: Grout pattern joints shall be constructed to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.

4. Color Stain Coating

a. **Description**: This work shall consist of furnishing and applying color stain coating in accordance with this provision and in conformity with the details and locations indicated on the plans

b. Detail Requirements

i. **Locations**: Except as otherwise specified on the plans, the color stain coating shall be applied to all sound wall architectural treatments. Copings, parapets, overhangs, decks, barriers, etc. shall NOT have the color stain coating applied unless otherwise specified on the plans.

ii. **Procedures**: The concrete stain coating shall be applied in accordance with the manufacturer's recommendations, except as otherwise specified. The color 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.

All architectural treatment surfaces that are to be stained and any patching that have been done in these areas shall be at least 30 days old.

Clean surface prior to application of stain materials to assure that surface is free of latency, dirt, dust, grease, efflorescence, paint, or other foreign material, following manufacturer's instructions for surface preparation. Do not sandblast. Preferred method to remove latency is pressure washing with water, minimum 3000 psi (a rate of three to four gallons per minute), using fan nozzle perpendicular to and at a distance of one or two feet from surface. Completed surface shall be free of blemishes, discoloration, surface voids, and unnatural form marks.

iii. **Protection**: Where exposed soil or pavement is adjacent which may spatter dirt or soil from rainfall, or where surface may be subject to over spray from other processes, provide temporary cover of completed work.