



Iowa Department of Transportation

SPECIAL PROVISION FOR STONE VENEER

Pottawattamie County
IM-080-1(308)2--13-78

Effective Date
October 16, 2007

**THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING
MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL
PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

010315.01 DESCRIPTION

1.01 General

A. This Special Provision specifies requirements for natural stone composite veneer to be placed on the bridge abutments including but not limited to, the following:

1. Limestone veneer for composite wall construction.
2. Masonry anchors, ties and accessories.
3. Portland Cement-Lime (PCL) Mortar

1.02 Submittals

- A. Shop Drawings: Provide shop drawings showing general setting layout including pertinent dimensions, anchorages and jointing methods.
- B. Samples: Submit representative samples for each material as follows. Delivered materials shall closely match accepted samples.

1. Limestone veneer: Submit a minimum of four samples showing extreme variation which may reasonably occur in each kind of stone regarding size, color, texture and quality.
- C. Product Data: Submit product data of materials and systems to be used as masonry accessories. Include manufacturer's test data, installation instructions, use limitations, and recommendations for each material used.
- D. Submit certifications of compliance demonstrating that limestone veneer meets or exceed the requirements of this specification. Provide a letter of acceptance from the stone supplier confirming that the proposed anti-graffiti product is compatible for use on stone veneer.
- E. Test Results: Submit certified test results of ASTM standards specified prior to commencing associated work. Submit mortar mix design report including description of contents, proportions and results of tests specified. Provide independent laboratory analysis of mortar materials.
- F. Proposed Construction Practices: If cold weather or hot weather masonry work is anticipated, submit methods proposed to show compliance with cold-weather and hot-weather procedure requirements of ACI 530.1/ASCE 6.
- G. Mock-up: Prior to commencing primary work of this Special Provision, construct a 4' x 4' square mock-up of a composite wall and obtain Engineer's acceptance of visual qualities. Mockup shall include an 8 inch thick concrete back-up wall with 4 inch composite limestone veneer, including ties and anchors. The top 1' of the wall shall consist of a 12 inch thick concrete wall with no stone veneer to provide a test area for color testing of compatible colored concrete sealers. Mock-up shall be constructed at a location acceptable to Engineer. Protect and maintain mock-up throughout construction of abutments to serve as criteria for acceptance of work.
 1. The mock-up shall demonstrate the coursing, anchorage and placement of the composite limestone veneer to the concrete back-up wall. Mock-up wall shall also be used to demonstrate application of anti-graffiti coating.
 2. Demolish and remove the mock-up sample from the site when directed to do so by the Engineer.
- H. Installer Qualifications: Submit a list and photographs of five similar projects completed in the last three years with project names, locations, names and addresses of project architects and owners to demonstrate capabilities and expertise installing stone masonry veneer similar in material, design and extent.

1.03 Standards

- A. Limestone veneer required by this Special Provision shall be the product of a single quarry. Provide secondary materials which are acceptable to the stone supplier. Unless in conflict with these special provisions, limestone shall comply with the standards of the Indiana Limestone Institute.
- B. Engage an experienced installer who has completed stone masonry veneer similar in material, design and extent to that indicated for this Project and with a record of successful in-service performance.

1.04 Testing

- A. Limestone Veneer: Contractor is responsible for testing and quality control implementation of limestone materials as specified herein.
- B. Mortar:
 - 1. Perform mortar testing in accordance with ASTM C 270, Method A-7, 2 inch cubes.
 - 2. Perform retest if initial test fails.

1.05 Project Conditions

- A. Hot Weather Protection: Hot weather construction is defined as occurring when ambient temperatures exceed 100°F or 90°F when wind velocity is greater than 8 mph. Monitor mortar temperature and maintain it between 70°F and 120°F. Use mortar within 2-1/2 hours after mixing. Discard mortar over 2-1 /2 hours old and mortar stiffened due to hydration (setting). Limit spreading of bed mortar to 4 feet (maximum) and place units within 1 minute of spreading mortar.
- B. Cold Weather Protection: Cold weather construction is defined as occurring when ambient temperatures fall below 40°F or when the temperature of masonry units is below 40° F. Strictly comply with Cold Weather Masonry Construction and Protection Recommendations, and Recommended Practices & Guide Specifications for Cold Weather Masonry Construction, Portland Cement Association.
- C. Protection: As the work progresses, continuously protect stonework and items which could be stained by mortar. Cover walls at end of each day's work. Extend cover 24 in. down sides of walls and hold securely in place. Turn scaffold boards on edge at end of day and protect base of wall to prevent rain splashed mud or mortar from contacting masonry.
- D. Loading: Do not apply loads until work has set and cured and is ready to accept loading.

1.06 Product Delivery, Storage and Handling

- A. Materials shall be delivered, stored, and handled fully protected from wetting, staining, chipping, and other damage. Store masonry materials on raised timber or platforms, above ground, under weather tight covers or indoors, and keep clean and dry. Separate units from one another by wood strips or wedges. Store limestone veneer so that markings corresponding to the setting drawings are easily discernable.
- B. Deliver and store cement, lime, and other perishable materials in their original containers, plainly marked with brand name and manufacturer's name, indoors or in weather tight sheds.
- C. Protect metal accessories from elements. Immediately before placing, remove loose rust, dirt, and other foreign materials.

010315.02 MATERIALS

2.01 Limestone Veneer

- A. Provide Category II (medium density) dolomitic limestone veneer conforming to the requirements of ASTM C 568 except as follows:
 - 1. The minimum abrasion resistance hardness shall be 8.0 when tested in accordance with ASTM C 241.
- B. Size: 3 inch x 6 inch minimum to 14 inch x 28 inch maximum.
- C. Type: The stone selection for the abutments shall have the following characteristics:
- D. Limestone veneer
 - 1. Color: The basis for design shall be E W Gold, Saginaw Blend as supplied by Earthworks Group Inc, Perryville, Missouri
 - 2. Cut: Dimensional stone.
 - 3. Finish: Exposed surface shall be a split or snapped face.

Other potentially acceptable sources of stone subject to sample submittal and acceptance by the Engineer are Vetter Stone (Kasota, MN), Weber Stone (Anamosa, IA), Mankato-Kasota Stone Inc. (Mankato, MN) and Bayer Stone, Inc. (St. Mary's, KS). Acceptance of alternate sources of stone shall require that the submitted color blend closely matches the color listed as a basis for design.
- E. Limestone veneer shall be completely cut and finished before delivery, except as necessary for final fitting.

2.02 Portland Cement-Lime (PCL) Mortar

- A. Portland cement: ASTM C 150, Type I, II or III except if used for cold weather conditions. Utilize Type III cement for cold weather conditions. The maximum percent of alkalies shall be 0.60. Air-entraining cement is not permitted. The use of blended cements, including: Portland blast-furnace slag cement, Portland-pozzolan cement, slag cement and natural cement is not permitted..
- B. Hydrated Lime: ASTM C 207, hydrated, Type S.
- C. Mortar Aggregate: Complying with ASTM C 144, well graded and free of gypsum.
- D. Water: Clean, potable.
- E. The following ingredients shall not be used:
 - 1. Antifreeze additives.
 - 2. Calcium Chloride, Thyocyanates or other materials containing chloride ions.
 - 3. Ready mix mortar (ASTM C 1142).
 - 4. Masonry Cement.

5. Other admixtures without the prior approval of the Engineer.
- F. Factory Pre-blended PCL mortar mixes shall comply with ASTM C 270, Type M, Property Method using component materials listed above. Limit air content to 10% (Maximum). Blend cementitious materials, aggregate, and admixtures under factory controlled conditions, which require only the addition of water at the project site. Oven dry aggregates prior to measuring and inclusion in the pre-blended mix.

2.03 Ties and Anchors

- A. Limestone veneer to Concrete back-up wall: Provide vertically adjustable dovetail type units for limestone veneer/concrete composite wall construction.
 1. Dovetail triangular ties shall consist of a 12 gage dovetail clip with a 3/16 inch pivoting wire tie. Corrugated dovetail ties shall not be used. Wire ties shall be produced from cold drawn stainless steel wire conforming to ASTM A 580, Type 304. Wire tie length shall be as recommended by manufacturer for wall which gives minimum of 5/8 in. cover on exterior face of stone veneer.
 2. Dovetail anchor slots shall be minimum 20 gage stainless steel plate conforming to ASTM A 167, Type 304. Slots shall be supplied foamed filled to protect slot during concrete forming and placement.

2.04 Miscellaneous Materials

- A. Masonry Cleaning Materials: Provide one of the following products as applicable for cleaning mortar stains, job dirt, and job stains from masonry work:
 1. Cleaning Material for Dark Colored Masonry:
 - a. Sure Klean 600 Detergent; ProSoCo, Inc., Kansas City, KS
 - b. New Masonry Detergent, Diedrich Technologies Inc., Oak Creek, WI
 - c. NMD-80, EaCO Chem Inc., New Castle, PA
 2. Cleaning Material for Light Colored Masonry:
 - a. Sure Klean 101 Lime Solvent; ProSoCo, Inc., Kansas City
 - b. 200 Lime Solv, Diedrich Technologies Inc., Oak Creek, WI
 - c. SafeRestore, EaCO Chem Inc., New Castle, PA
- B. Ant-Graffiti Coating: Anti-graffiti coating shall be permanent and invisible. Coating shall dry to a matte or satin, not glossy finish. Anti-graffiti coating product shall be compatible with the stone veneer used on the abutment wings.

010315.03 CONSTRUCTION METHODS

3.01 Masonry Construction, General

- A. Masonry work shall be done by skilled masons, fully instructed as to requirements of this Specification, and adequately supervised during Work.

B. Cold weather masonry shall conform to Cold Weather Masonry Construction and Protection Recommendations, and IMI Recommended Practices & Guide Specifications for Cold Weather Masonry Construction and the following:

1. Do no masonry work when outdoor temperature is less than 40°F unless provisions are made to adequately protect materials and finished work from frost by heating materials, enclosing work, and heating enclosed spaces.
2. If masonry work must be done when ambient temperature is freezing or below, all masonry material must be at temperature between 50°F and 90°F, and mortar, when used, shall have a temperature between 60°F and 80°F. In addition, all masonry shall be protected from temperatures below 40°F for at least 48 hours after being laid.

C. Verify substrate that will accept stone work is true and plumb and constructed to the specified dimensions prior to beginning installation of stone veneer.

3.02 Mortar

- A. Mix mortar materials a minimum of 5 minutes, but not more than 10 minutes. Adjust consistency to satisfaction of mason subject to compliance with specified criteria. Comply with Brick Industry Association Standard M1-88.
- B. If mortar begins to stiffen, it may be re-tempered in accordance with ASTM C 270, Subparagraph 7.4.

3.03 Limestone Veneer Work

- A. Erect stone in accordance with stone supplier's instructions and shop drawings. Lay masonry plumb, true to line, and with level courses, with straight, clean, uniform joints, and true surfaces, and plumb corners. Maintain vertical alignment of joints as required by bond patterns indicated. Lay units in solid partitions to provide same evenness of surface on each side. Head and bed joints shall be approximately 3/8 inches wide
- B. Place setting buttons and set stone in full mortar setting bed to support stone over full bearing surface and to establish joint dimensions.
- C. Adjust each masonry unit in final position while mortar is still soft and plastic. Remove units disturbed after mortar has stiffened. Clean off original mortar and re-lay with fresh mortar.
- D. To accommodate pointing mortar, rake out joints 5/8 inch to 3/4 inch. Brush mortar joints clean.
- E. Fill joints with pointing mortar. Pack and work into voids. Neatly tool surfaces to a concave, joint.
- F. Provide chases, slots, and recesses as required to accommodate work of other trades. Close only after such work has been installed, tested, and approved. As work progresses, set anchors, bolts, frames required to be built into masonry. No cutting and patching of completed masonry will be permitted except as acceptable to Engineer.

- G. Install flashing of longest possible lengths at base course of limestone veneer on interior face of abutment wingwalls and at first coarse above grade for exterior face of abutment wingwalls. Lap end joint a minimum of 6 inches and seal to a watertight condition.
- H. Install cavity vents in vertical joints immediately above horizontal flashing and at top of cavity spaces to provide cavity venting.
- I. Do not use installed masonry work to support or in any way receive scaffolding or other temporary supports.
- J. Maintain masonry clean as work progresses. Exercise extreme care at exposed work to prevent smearing or staining with mortar.
- K. At completion of work, cut out and rejoin holes and defective joints, leaving entire work free of blemishes.
- L. Contractor is responsible for adequately bracing all masonry work during construction.

3.06 Tie and Anchor Installation

- A. General: Provide at least one tie for every 2.66 sq. ft. of wall area unless more frequent spacing is indicated or required. Do not space ties more than 2 ft. on center vertically or horizontally. Provide ties within 12 in. of wall openings and within 12 in. of wall perimeters and corners. Seal all penetrations with mastic.
- B. Install dovetail anchor slots into formwork for concrete back-up wall prior to placing concrete. After concrete placement and removal of forms, remove foam fill in anchor slots as required to allow installation of dovetail triangular ties. Adjust triangular ties vertically to correspond with horizontal mortar joints of stone work.

3.07 Stoning and Cleaning

- A. Soon after masonry work is completed, lightly stone down exposed surfaces of masonry to remove excess mortar and aggregate projections.
- B. Upon completion, thoroughly clean exposed exterior masonry with a solution of specified detergent and water, using stiff fiber brushes. Rinse surfaces cleaned with detergent as recommended by detergent manufacturer. Protect adjacent surfaces that are not to be cleaned. Cleaners or other solutions which may cause discoloration or damage will not be permitted. Muriatic acid is not permitted.
 - 1. Prior to applying any cleaning materials on finished masonry work, provide a test cleaning mock-up on masonry mock-up at locations acceptable to the Engineer.
 - 2. Test the cleaning techniques and solutions to determine the best methods for the conditions encountered. Demonstrate Contractor's quality control system to ensure uniform final appearance. Test adjacent non-masonry surfaces for possible adverse reactions to cleaning methods. Use all cleaning products in strict compliance with the manufacturers' instructions and recommendations. Keep accurate, detailed records of concentrations, solutions, and techniques used to assist in replicating satisfactory results.
- C. Rake out imperfect mortar joints of masonry work and repoint to match appearance of surrounding acceptable work. Leave entire work free of defects.

3.08 Tolerances

- A. Maximum variation from plumb for vertical lines and surfaces of abutments:
 - 1. 1/4 inch in 10 feet but not to exceed 3/8 inch in overall height of abutment wing walls.
- B. Maximum variation in cross section dimensions and thicknesses of walls from plan dimensions shown:
 - 1. Minus 1/4 inch; plus 1/2 inch.
- C. Maximum variation from joint thickness:
 - 1. Minus 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.
- D. Maximum variation from level coursing:
 - 1. Minus 1/8 inch in 3 feet or 1/4 the joint width, whichever is less.

3.09 Anti-Graffiti Coating Application

- A. Follow manufacturer's recommendations for surface preparation, application rate and methods. Do not damage stone veneer.
- B. Do not allow drips or overspray to contaminate untreated surfaces adjacent to treated surfaces.

010315.04 MEASUREMENT AND PAYMENT

4.01 Method of Measurement

- A. Stone veneer will be measured by the square foot of acceptable stone installed.

4.02 Basis of Payment

- A. Payment of stone veneer as measured shall be full compensation for all materials, labor tools, equipment, testing, inspection, services and incidentals necessary to perform the work of this section. Payment for stone veneer shall also include furnishing and installing Portland cement-lime mortar, all masonry accessories and anti-graffiti coating.