[MICHIGAN](http://mdotcf.state.mi.us/public/design/englishroadmanual/)

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**LIMESTONE CAP**

OAK:KAH 1 of 4 APPR:TES:JLB:10-08-21

**a. Description.** This work consists of removing and resetting existing caps; furnishing and setting new caps; and preparing the wall for a new cap. This work also consists of furnishing all materials, equipment, and labor as needed to clean joints and install sealant and backer rod. The location for the work is as shown on the plans or as directed by the Engineer.

**b. Materials.** Acceptance of materials will be based on general certifications in accordance with the *MQAP Manual*.

1. Limestone. Furnish medium density select grade cut limestone with a smooth surface texture in accordance with *ASTM C568/C568M*. The limestone must match the existing limestone. Submit a color sample to the Engineer for approval not less than14 days prior to beginning work.

2. Mortar. Furnish Type N mortar in accordance with *ASTM C270* using the following proportions:

A. One part Type 1 grey Portland cement conforming to *ASTM C150/C150M*.

B. One part masonry cement conforming to *ASTM C91/C91M*.

C. Four and one half to six parts coarse sand conforming to *ASTM C33/C33M*.

3. Backer rod. Furnish round closed cell polyethylene foam rod conforming to *ASTM D5249, Type 3* sized 25 percent larger than the joint width.

4. Joint Cleaner. Provide non-corrosive and non-staining type joint cleaner recommended by the joint sealant manufacturer that is compatible with joint forming materials.

5. Joint Sealant. Provide polyurethane sealant conforming to *ASTM C 920, Grade NS, Type S, Class 25*. Ensure the sealant is single component, chemical curing, non-staining, non-bleeding, capable of constant water immersion, non-sagging type; color to match adjacent surfaces; selected from the Qualified Products List (713.02B). Ensure the sealant is used as the general sealant throughout the work. Ensure the sealant meets the following:

A. Elongation Capability. Minimum 25 percent.

B. Service Temperature Range. -40 to 180 degrees Fahrenheit (F)

C. Shore A Hardness (after aging). 30 ±5

6. Dowels. Provide 3/8-inch diameter, 6-inch long horizontal joint anchors and vertical dowels, fabricated from *ASTM A 580, Type 302/304* stainless steel.

7. Shims and Spacers. Provide plastic setting shims and spacers.

**c. Construction.** Complete this work in accordance with the *International Masonry Industry All-Weather Council Recommended Practices and Guide Specifications for Cold Weather Masonry Construction* and *Indiana Limestone Institute of America, Inc.* standards.

1. Submittals.

A. Shop Drawings. Field measure areas of installation to locate wall expansion joints and detailed wall lengths and prepare shop drawings. Submit shop drawings to the Engineer for review and approval not less than 10 work days prior to beginning the work. Indicate layout dimensions, pertinent dimensions, anchorages, and joint details, including joint dimensions. Layout caps so that cap joints line up with existing joints. Detail horizontal and vertical intersections for the limestone units where the wall changes height.

B. Qualifications. Submit references and documentation of the stone supplier’s and stone installer’s experience to the Engineer for review and approval at least 10 work days prior to starting the shop drawings. Ensure the cap segments are supplied by a company specializing in quarrying cut stone with a minimum of 10 years of experience. Ensure the cap is installed by a company specializing in performing work similar in nature and scope to the specified work with a minimum of 3 years of experience.

2. Fabrication. Complete the cap fabrication in accordance with *Indiana Limestone Institute of America, Inc.* - *Indiana Limestone Handbook*. Protect the limestone from chipping during fabrication. Chipped limestone cap segments will not be accepted by the Engineer.

A. Ensure thickness and face size is as shown on plans.

B. Ensure limestone cap segment lengths are based on existing cap size.

C. Ensure fabrication tolerances are in accordance with *Indiana Limestone Institute of America, Inc. Standards*.

D. Fabricate units for uniform coloration with adjacent units and over the full area of the installation.

E. Slope exposed top surfaces of stone for natural wash.

F. Cut a drip slot or “V” notch in the underside of cap segments not less than 3/8 inch wide and 1/4 inch deep; full width of projection over base block masonry.

G. Obtain the Engineer’s approval prior to on-site cutting or fitting any item not shown on, or not in conformance with, the shop drawings. Do not impair appearance or strength of stonework by cutting.

3. Delivery, Storage, and Handling. Ship and store cap segments on pallets. Protect caps from discoloration. During temporary storage on site, at the end of working day, or during rainy weather, cover stonework exposed to weather with securely anchored non-staining waterproof coverings. Protect caps from chipping during shipping, storage, and on-site handling before and during installation. Chipped limestone cap segments will not be accepted by the Engineer.

4. Preparation.

A. Verify that support work is complete and site conditions are such that work can begin on a section of wall.

B. Establish lines, levels, and coursing. Protect from disturbance.

C. Verify that built-in items, specified elsewhere in the contract, are properly located and sized.

D. Remove previous mortar and wire reinforcement/pins and clean the surface.

E. Clean limestone cap segments and wall area that the cap is to be placed upon prior to installation. Do not use wire brushes or implements which will mark or damage exposed surfaces. Refer to cleaning requirements herein for additional requirements.

5. Installation. Install caps in accordance with stone supplier's instructions and shop drawings.

A. Place setting buttons and set cap in full mortar setting bed to support cap over full bearing surface. Ensure joint dimensions are as shown on the plans.

B. Drill 3/4 inch diameter vertical holes to accept vertical anchor dowels. Drill holes 1 inch deeper than dowel penetration. Install two 6-inch vertical dowels for each cap segment, so that each dowel extends 2 inches downward into the brick masonry/concrete and 4 inch upward into the cap. Drill vertical holes not less than 1½ inch from the end of limestone cap segments.

Place mortar mesh or other approved filler material in block masonry core, as needed to hold mortar in core where dowel will be placed. Set dowel into mortared core and allow mortar to cure, stabilizing dowel, before setting stone cap.

Fill dowel holes in limestone with mortar while setting the limestone caps.

C. Shore up limestone cap segments until setting bed will maintain the segments in position without movement.

D. Ensure the joint at limestone setting bed is clean and is ready to receive material. Ensure surfaces to receive sealant are dry, free of contamination, all foreign matter, laitance, and efflorescence.

(1) Backer Rod. Install backer rod to depth of 1/2 inch, uniform and consistent along entire length of joint, in preparation for sealant material.

(2) Sealant. Verify that backer rod is at proper depth, clean and ready to receive sealant. Install sealant in accordance with manufacturer’s instructions and at the proper ambient temperatures for the actual material being installed.

6. Tolerances. Position limestone cap segments not greater than 1/4 inch from position shown on shop drawings. Ensure the maximum variation from the plane of the wall is not greater than 1/4 inch in 10 feet or 1/2 inch in 50 feet, whichever is less. Ensure the maximum variation between the face plane of adjacent cap segments is not greater than 1/16 inch.

7. Cleaning. Use non-metallic tools in cleaning operations. Remove excess mortar and clean soiled surfaces with cleaning solution upon completion of work.

8. Damaged Caps.

A. New Caps. Replace caps damaged during fabrication, handling, transportation, and installation at no additional cost to the project.

B. Existing Caps. Replace caps damaged during removal, handling, cleaning and reinstallation at no additional cost to the project.

**d. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

**Pay Item Pay Unit**

Limestone Cap Foot

Limestone Cap, Reinstall Each

1. **Limestone Cap** includes all labor, equipment, and materials required to remove existing caps, and furnish and install new caps.

2. **Limestone Cap, Reinstall** includes all labor, equipment, and materials required to remove, salvage and reinstall existing caps. If a cap is damaged during removal and resetting, furnishing a new limestone cap will not be paid for separately but is included in the payment for **Limestone Cap, Reinstall**.