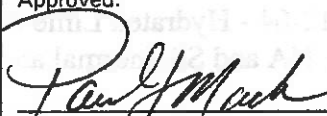
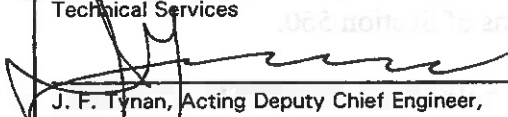


SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 00-027
Title: REVISIONS TO SECTION 560; REVISION OF MATERIAL ITEM 701-02, MASONRY CEMENT, TO ITEM 701-02, MASONRY AND MORTAR CEMENT; REVISION OF MATERIAL ITEM 705-21, MORTAR FOR CONCRETE MASONRY, TO ITEM 705-21, MASONRY MORTAR			
Distribution: ☐ Manufacturers (18) ☐ Surveyors (33) ☒ Main Office (30) ☒ Consultants (34) ☒ Local Govt. (31) ☒ Contractors (39) ☒ Regions/Agencies (32) ☐ _____ ()		Approved:  P. J. Mack, Deputy Chief Engineer, Technical Services 10/28/00 Date  J. F. Tynan, Acting Deputy Chief Engineer, Construction 11-6-00 Date	

EFFECTIVE DATE: This Engineering Instruction is effective for projects submitted for the letting of 5/3/01. The material transmitted within will be incorporated into the next Addendum or Specification Book. See **IMPLEMENTATION** for contracts let earlier.

PURPOSE: To modify Item 705-21 to address and identify proper use of masonry mortar; to expand use of this mortar to all types of masonry construction (precast concrete, clay brick, natural and imitation stone, bedding material, etc.) instead of just block; to add Mortar Cement to 701-02 and 705-21; and add tuck pointing mortar to Item 705-21 and Section 560, Masonry, for masonry repair.

BACKGROUND: The current Item 705-21 does not specify which of the 3 types of masonry mortar (N, S or M - strong, stronger, strongest) should be used in New York State. It calls for 1 part portland to 1 part masonry cement (no type specified). One part Type N Masonry Cement combined with 1 part portland yields a Type M masonry mortar, the strongest of the three. One part Type S or M masonry cement combined with 1 part portland yields mortar strengths exceeding recommendations.

The reason for strength limitations is that the mortar strength should always be weaker than the masonry strength. Then, if cracks do occur, they will pass through the mortar and not crack the masonry units, thus making repairs easier and more aesthetically pleasing.

Proposed changes to Item 705-21 are based on ASTM and Masonry Industry recommendations:

ASTM C 270 - Type N mortar for exterior construction above grade (buildings), with Type S as an alternative, and Type S mortar for exterior construction at or below grade. (Since Type S is suitable for above and below grade construction, we are specifying Type S for both.)

Masonry Industry - Type M mortar for exterior mortared brick paving on rigid base, such as brick on a portland cement concrete road or bridge deck. Type N mortar for tuck pointing of fired clay brick structures.

Mortar cement is a relatively new product designed for more earthquake resistant, masonry structures. Masonry mortars made with mortar cement have 6% less air entrainment and subsequent higher bond strengths than those made with masonry cements.

Historic and other old masonry structures were usually made with soft hydrated lime mortars which predate the use of harder masonry cement mortars. The Designer should investigate the "hardness" of these mortars and specify a repair mortar to duplicate the existing mortar. Show this special mortar on the plans, and allow the Engineer to make changes based on field conditions during repair.

Also, the specification for 712-04 - Hydrated Lime is being updated to eliminate Type N (normal, non-air-entrained) to the current Type NA and SA (normal and special, air-entrained) Hydrated Lime.

TRANSMITTED MATERIAL: A shelf note to change the Standard Specifications to revise Items 701-02, 705-21 and portions of Section 560.

DISAPPROVED SPECIAL SPECIFICATIONS: A review of all special specifications on the Server containing the words "pointing, masonry or mortar" resulted in our disapproving the following 28 special specifications:

01560.9903 M	Tuck Point Masonry (Square Meters)
01560.9904 M	Tuck Point Masonry (Linear Meters)
03608.0103 M	PORTLAND CEMENT CONCRETE SIDEWALKS & DRIVEWAYS
06609.17 M	POINTING BRIDGE CURB JOINTS
07560.11 M	STONE WALL (Region has newer version.)
07608.4008 M	REMOVE, STORE, AND RESET STONE PAVING WALK (SAND SETTING BED)
07608.4009 M	REMOVE, STORE, AND RESET STONE PAVING WALK (MORTAR SETTING BED)
08560.30 M	POINTING JOINTS IN EXISTING MASONRY
10560.1009 M	POINT EXISTING STONE AND DIMENSION MASONRY
10560.80 M	BRICK FACING
11560.1720 M	REPOINTING STONE MASONRY
11560.30 M	REPOINTING EXISTING STONE MASONRY

The mortar section of the following disapproved specifications may be revised to call for Masonry Mortar §705-21 and resubmitted for approval, if warranted.

01560.96 M	STONE COPING (Linear Meter)
01560.97 M	STONE COPING (Square Meter)
03560.01 M	REPAIRING ERIE CANAL STONE WALL WITH LIMESTONE CAP
04560.1305 M	INSTALL STORED STONE AS PAVING
06634.07 M	CONCRETE BLOCK BUILDING
07560.1320 M	REMOVE AND RESET STONE WALL
07560.132201 M	REMOVE AND RESET STONE PILLARS
07560.132202 M	REMOVE AND RESET DRY STONE WALLS
07560.1396 M	NON-STRUCTURAL STONE MASONRY VENEER

07560.98 M	REPAIRING MASONRY PIERS
08560.70 M	BRICK FACING
10615.9988 M	BRICK PLANTER
11560.8080 M	REHABILITATE BRICK FACING
11608.03 M	NORTH ARROW PAVER - PRECAST CONCRETE (NYCDPR)
11608.50 M	Park Identification Plaque
11615.8085 M	STEEL FLAGPOLE WITH YARDARM (NYCDPR)

COST IMPACT: None anticipated.

IMPLEMENTATION: For contracts let on or after the effective date, the Design Quality Assurance Bureau will insert the transmitted material into the contract.

For applicable on-going contracts let earlier, implement this specification revision upon receipt in accordance with the Department's Manual For Uniform Record Keeping (MURK Part 1A), Contract Administration Manual, Section 104-03 I.4. Include a copy of this Instruction as part of the project records where the change is implemented. No order-on-contract is required and no change in cost will be allowed.

SECTION 609 - CURBING, CURB AND GUTTER, AND CONCRETE MALL: Changes to the masonry mortar in this specification and Standard Sheet M609-2 are included as part of a revised Section 609 done by the Design Quality Assurance Bureau under another EI titled "Curb".

ADDITIONAL CONSIDERATION: Where masonry is subject to splash from chloride contaminated water, such as from roadway vehicles, tide water, etc., or other types of pollution that could cause surface distress, Designers should consider specifying a penetrating type protective sealer (Approved List Item 717-03) as per EI 95-053, DESIGN GUIDELINES FOR THE USE OF PENETRATING AND COATING TYPE SEALERS FOR CONCRETE. This application will have to be paid for separately. Contact the Materials Bureau for appropriate specifications. Refer to the guidelines for a chloride environment (relative to the Use of Epoxy-Coated Reinforcement in Substructures) in the NYSDOT Bridge Manual, Section 15.12.

CONTACT PERSON: Sam Candib, Field Engineering I, Materials Bureau at 518-457-5956.

REVISIONS TO SECTION 560;

REVISION OF MATERIAL ITEM 701-02, MASONRY CEMENT, TO ITEM 701-02, MASONRY AND MORTAR CEMENT;

REVISION OF ITEM 705-21, MORTAR FOR CONCRETE MASONRY, TO ITEM 705-21, MASONRY MORTAR

Make the following changes to the Standard Specifications of January 2, 1995:

REVISIONS TO SECTION 560

Page 5-78, lines 7 - 11, (under **560-2 MATERIALS**), *delete* the first five items starting with "Portland Cement 701-01 and ending with Mortar Sand 703-03" and *replace* with "Masonry Mortar 705-21".

Page 5-79, lines 21 - 37, *delete everything after 560-2.06 Mortar, and replace with "Use 705-21 Masonry Mortar."*

Page 5-80, lines 24 - 37, *delete* "E. Pointing" and *replace* with the following:

"E. Pointing (new construction) and Tuck Pointing (raking out and repointing)."

1. Pointing. Tool the face joints with a pointing tool before the mortar sets, as approved by the Engineer. Avoid smearing the masonry surfaces with excess mortar forced out of joints. For joints not pointed when the masonry is laid, prepare the joints for pointing by following the tuck pointing procedures. There will be no separate payment for this work.

2. Tuck Pointing (Repointing). Repoint the joints in masonry where indicated on the Contract Plans or directed by the Engineer. Use an Item 705-21 Type M, S or N masonry or mortar cement, tuck pointing mortar (or a specially designed one) with the same or weaker strength than the original mortar, as approved by the Engineer.

Remove soft, loose, cracked and deteriorated mortar to a minimum depth (measured from the wall face) of twice the average joint width, and remove all deteriorated mortar beyond the minimum depth, as ordered by the Engineer. Do not damage the masonry during the removal process. Clean all contamination from the prepared joints.

Prior to repointing, flush with water and leave all surfaces to be re-mortared in a dampened, surface dry state. Pack the prepared joints in layers with mortar that closely matches the original color and texture, allowing each layer to become thumb-print hard before the next. Use at least two layers when the joint depth is twice the joint width. Apply a final layer thickness that does not exceed the joint width. When the final layer is thumb-print hard, finish with a pointing tool that recreates the original joint shape, or as approved by the Engineer.

Perform pointing when the ambient temperature is 5°C or above, and the masonry is frost free. Avoid recessed joints that hold water.

After the mortar sets, clean all mortar and cement stains from other surfaces. In direct sunlight, keep the newly pointed masonry moist for at least 3 days. In shade, moisten 2 to 3 times a day for at least 3 days."

**REVISIONS TO SECTION 560;
REVISION OF MATERIAL ITEM 701-02, MASONRY CEMENT, TO ITEM 701-02,
MASONRY AND MORTAR CEMENT;
REVISION OF ITEM 705-21, MORTAR FOR CONCRETE MASONRY, TO ITEM 705-
21, MASONRY MORTAR**

Page 5-83, after line 39, add the following subsection after 560-3.07 Precast Concrete Coping:

"560-3.08 Tuck Pointing. Apply the provisions of §560-3.02E2. Tuck Pointing. For re-caulking work, rake out any old caulking to a minimum 25 mm depth and follow the provisions of §560-3.03K. Caulking. Do not damage the masonry during the removal and cleaning process."

Page 5-84, after line 22, add the following subsection after 560-4.06 Precast Concrete Coping:

"560-4.07 Tuck Pointing. The Engineer will measure this work in the field as the number of square or linear meters of masonry pointed and cleaned, as bid. Linear measurements will be made along the joint centerline."

Page 5-85, after line 10, add the following subsection after 560-5.06 Precast Concrete Coping:

"560-5.07 Tuck Pointing. Include all labor, material (including any re-caulking material), and equipment to complete this work in the item unit bid price."

Page 5-85, line 11, change "560-5.07" to "560-5.08"

Page 5-85, line 22, add the following to the list:

"560.08 M	Tuck Pointing	Meter
560.09 M	Tuck Pointing	Square Meter"

**REVISION OF MATERIAL ITEM 701-02, MASONRY CEMENT,
TO ITEM 701-02, MASONRY AND MORTAR CEMENT**

Make the following change to Addendum 2 of the Standard Specifications of January 2, 1995:

Page VI-1, line 12 - delete " Masonry Cement 701-02", and replace with "Masonry and Mortar Cement 701-02."

Make the following changes to the Standard Specifications of January 2, 1995:

Page 7-2, lines 13 - 18, delete "701-02 Masonry Cement", and replace it with 701-02 Masonry and Mortar Cement as follows:

"701-02 MASONRY AND MORTAR CEMENT

SCOPE. Masonry and mortar cement, used to make masonry mortar.

MATERIALS.

Masonry Cement
Mortar Cement

ASTM C91
ASTM C1329

REVISIONS TO SECTION 560;

REVISION OF MATERIAL ITEM 701-02, MASONRY CEMENT, TO ITEM 701-02, MASONRY AND MORTAR CEMENT;

REVISION OF ITEM 705-21, MORTAR FOR CONCRETE MASONRY, TO ITEM 705-21, MASONRY MORTAR

BASIS OF ACCEPTANCE. The Engineer will base acceptance on each package being labeled to show ASTM conformance and its contents being in good condition."

**REVISION OF ITEM 705-21, MORTAR FOR CONCRETE MASONRY,
TO ITEM 705-21, MASONRY MORTAR**

Page 6-11, line 42, delete "Mortar For Concrete Masonry 705-21", and **replace** with "Masonry Mortar 705-21."

Page 7-54, line 29 through page 7-55, line 9, delete "Item 705-21 Mortar For Concrete Masonry", and **replace** with Item 705-21 Masonry Mortar as follows:

"705-21 MASONRY MORTAR

SCOPE. Requirements for the 3 common types of masonry mortar (N, S and M - increasing in strength, respectively). Use these mortars to bind masonry units together to construct masonry structures, repair masonry structures (tuck pointing), or bed and bond masonry or concrete units together. For historic masonry structures made with soft hydrated lime mortars, use a specially designed lime mortar as shown in the Contract Documents or as approved by the Engineer.

Type N Masonry Mortar - for tuck pointing repair of structures made with fired clay bricks

Type S Masonry Mortar - for new structures made with all types of masonry, including brick

" " " " - for tuck pointing repair of structures made with masonry other than clay brick

Type M Masonry Mortar - for new and tuck pointing repair of rigid masonry riding surfaces, such as bridge decks, pavements, sidewalks, and other roadway areas subject to severe weathering and abrasion conditions

MATERIALS.

Portland Cement, Type II or VI

§701-01

Masonry or Mortar Cement, Type N, S or M

§701-02

Blended Portland Cement

§701-03

Mortar Sand

§703-03

Concrete Sand

§703-07

Water

§712-01

Proportion the N, S or M mortar type by loose volume parts as follows:

**REVISIONS TO SECTION 560;
 REVISION OF MATERIAL ITEM 701-02, MASONRY CEMENT, TO ITEM 701-02,
 MASONRY AND MORTAR CEMENT;
 REVISION OF ITEM 705-21, MORTAR FOR CONCRETE MASONRY, TO ITEM 705-
 21, MASONRY MORTAR**

Portland or Blended Portland Cement	Masonry or Mortar Cement	Sand
Type N Mortar (make with Type N Masonry or Mortar Cement)		
0	1 (Type N)	2¼ to 3
Type S Mortar (make with Type S or N Masonry or Mortar Cement)		
0	1 (Type S)	2¼ to 3
½	1 (Type N)	3¾ to 4½
Type M Mortar (make with Type M or N Masonry or Mortar Cement)		
0	1 (Type M)	2¼ to 3
1	1 (Type N)	4¼ to 6

After adding all ingredients (including water) to a mechanical mixer, mix for 3 to 5 minutes to entrain air and produce a workable and uniform consistency. Discard all unused mortar 2½ hours after initial mixing. Mortar that has stiffened may be re-tempered up to 2½ hours after initial mixing by adding water to restore the original workable consistency.

Use a uniform layer of mortar, 6 to 18 mm thick, for joints between uniform masonry units.

For a tuck pointing (raking out and repointing) mortar, add the minimum water to the dry ingredients to produce a mortar that retains its form when hand squeezed and released. Allow this mortar to stand covered (prehydrate) for 1 to 1½ hours to greatly reduce shrinkage. Then mix with sufficient water to produce a stiff, but workable consistency, and use within 2½ hours of initial mixing.

Avoid re-tempering the mortar when tuck pointing, matching a color, or to avoid color variations between batches (mix smaller quantities, if needed).

No admixtures, except for mortar coloring agents made from light-fast, durable, alkali resistant minerals, will be permitted without written permission of the Director, Materials Bureau. If colored mortar is specified, submit samples of hardened mortar to the Engineer. Upon approval, use the same, uniform, mortar color throughout the work.

BASIS OF ACCEPTANCE. Inspection and approval by the Engineer."

Page 7-63, line 41, *delete* "Mortar for Concrete Masonry", and *replace* with "Masonry Mortar".

Page 7-66, line 28, *delete* "Mortar for Concrete Masonry", and *replace* with "Masonry Mortar".

Page 7-125, line 31 (After Hydrated Lime for Masonry Purposes), *delete* "Type N", and *replace* with "Type NA or SA".