

To: SUPERSEDED BY EI 10-027 EFFECTIVE 1/6/11		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 06-020
Title: REVISION TO STANDARD SPECIFICATION 608 SIDEWALKS, DRIVEWAYS AND BICYCLE PATHS; AND ISSUANCE OF STANDARD SPECIFICATION 711-01 FIBERS FOR CONCRETE REINFORCEMENT			
Distribution: ☐ Manufacturers (18) ☒ Local Govt. (31) ☒ Agencies (32) ☐ Surveyors (33) ☒ Consultants (34) ☒ Contractors (39) ☐ _____ ()		Approved:  R. L. Sack, Deputy Chief Engineer Technical Services 22 AUG 06 Date	

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with the letting of January 11, 2007.
- The revisions transmitted by this EI will be incorporated into a future revision of the Standard Specifications.
- These revisions may be incorporated into existing contracts at no additional cost to the state.
- Superseded issuances: This EI does not supersede any current issuances.

PURPOSE: This EI transmits a revision to Volume II of the Standard Specifications of January 2, 2002, Section **608 SIDEWALKS, DRIVEWAYS AND BICYCLE PATHS**. This EI also transmits a new Standard Specification **§711-01 FIBERS FOR CONCRETE REINFORCEMENT** as an addition to Volume III of the Standard Specifications of January 2, 2002.

TECHNICAL INFORMATION:

- The overall cost of portland cement concrete (PCC) sidewalks and driveways will either remain the same or increase slightly. Any cost increase will be justified by the increased durability of the PCC.
- The revisions to Section 608 include the use of fibers for concrete. The new **§711-01 FIBERS FOR CONCRETE REINFORCEMENT** specification was created for this use.
- The revisions to Section 608 include the option for machine formed sidewalks, changing the concrete used from Class A to Class D with water reducer, better definition of the methods for placement and curing sidewalks in particular as related to cold weather; and the addition of vibration and finishing tool requirements.

The revisions to Section 608 include adding item 608.0102 Accelerated Cure Sidewalks and Driveways.

IMPLEMENTATION: Beginning with projects submitted for the letting of January 11, 2007, the Design Quality Assurance Bureau (DQAB) will insert the shelf notes into all contract proposals.

In conjunction with the changes transmitted by this EI, DQAB will be issuing a minor revision to standard sheet M 608-6.

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The following specifications are disapproved by this EI:

608.0102 08M	Removal and Replacement of Concrete Sidewalk and Sub-base Course
608.0101 09M	Fiber Reinforced Portland Cement Concrete Sidewalk
608.0101 03M	Fiber Reinforced Portland Cement Concrete Sidewalk
608.0103 03M	Portland Cement Concrete Sidewalks & Driveways
608.0101 04M	Concrete Sidewalks and Driveways, Class D
608.0101 06M	Concrete Sidewalk and Subbase
608.0120 10M	Concrete Driveways – Class F
608.0125 10M	Concrete Driveways – Class F (Grading Included)

When situations at commercial driveways warrant accelerated cure for the sidewalk and/or driveway, designers should specify the new Item 608.0102 Accelerated Cure Sidewalks and Driveways which is transmitted with this EI. Situations which would warrant using the accelerated cure item would include; a business which has only one driveway access, or provisions for driveway access cannot be made which would not adversely impact the ability to conduct business.

TRANSMITTED MATERIALS: This EI transmits a shelf note which revises Volume II of the Standard Specifications, Section **608 SIDEWALKS, DRIVEWAYS AND BICYCLE PATHS**. This EI also transmits a shelf note adding **711-01 FIBERS FOR CONCRETE REINFORCEMENT** to Volume III of the Standard Specifications.

BACKGROUND: There have been several instances of sidewalk scaling in recent years. Many of the changes made are to reduce the occurrence of sidewalk scaling. The Materials Bureau did extensive testing of the Class A mix that is currently being used, as well as the Class D mix that will be used in the future. The Class D mix was found to have a better potential for resisting scaling. The use of a Class D mix will have an added benefit due to the smaller stone in a Class D as compared to a Class A. This will make the concrete easier to place which will lead to improved durability.

The curing of sidewalks is better defined, especially in colder weather. This will lead to concrete that is more durable due to better curing methods.

Allowing the use of fibers as a substitute to welded wire fabric as reinforcement in sidewalks was based on the evaluation of several trial projects. Welded wire fabric cannot be used when constructing sidewalks with machine forming so fibers are needed for reinforcement. The purpose of the reinforcement in sidewalks is to bridge cracks at construction joints and random cracks that may develop.

When situations warrant, accelerated cure concrete may be used at commercial driveways. Both the sidewalk and driveway need to be constructed of accelerated cure concrete at these locations. Specifications and an item number have been added for the construction of accelerated cure sidewalks and driveways.

CONTACT: David Graves of the Field Engineering 1 office of the Materials Bureau at dzgraves@dot.state.ny.us or (518)457-4592.

SECTION 608 – SIDEWALKS, DRIVEWAYS AND BICYCLE PATHS

Make the following changes to the Standard Specifications of January 2, 2002, Section 608 – Sidewalks, Driveways and Bicycle Paths:

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Lines 23 and 24; under **§608-2 MATERIALS**, *insert* the following as lines 24 and 25:

"Fibers for Concrete Reinforcement	711-01
Form Insulating Materials for Winter Concrete (Blankets)	711-07"

Lines 25-28; under **§608-2.01 Portland Cement Concrete Sidewalk and Driveways**, *delete* the following:

"The material requirements and composition shall comply with the specifications for Class A concrete in §501-2 under "Portland Cement Concrete—General." Concrete shall be proportioned in accordance with the aggregate weights specified for Class A concrete in Table 501-3, Concrete Proportions."

and *replace* it with the following:

A. Reinforcement. Welded wire fabric reinforcement shall be made of MW19 or MW20 wire at 150 mm centers transversely and longitudinally.

B. Conventionally Formed Concrete. Conventionally formed concrete shall meet the requirements for Class D in accordance with Section 501 "Portland Cement Concrete--General." All concrete shall contain a water-reducing admixture meeting the requirements of §711-08 in such a quantity as to provide a minimum 10% reduction of the design water content by using a normal range water-reducer.

C. Machine Formed Concrete Sidewalks. Machine formed concrete shall meet the requirements for Class J in accordance with Section 501 "Portland Cement Concrete--General" with the exception that fibers shall be incorporated in the mix.

D. Accelerated Cure Sidewalks and Driveways. When specified in the plans that an accelerated cure sidewalk and/or driveway is required at a commercial driveway, a mix design must be submitted to the Materials Bureau by the Contractor for approval a minimum of 14 days prior to anticipated sidewalk or driveway construction. Supply data the mix achieves a compressive strength of 14 MPa in less than 24 hours. Also supply data the mix will have a scaling rating of one or less when tested in accordance with ASTM C 672."

Lines 27-42; under **\$608-3 CONSTRUCTION DETAILS, \$608-3.01 Concrete Sidewalk and Driveways**, *delete* the following:

"The general construction details.... A premoulded resilient joint filler, §705-07, shall be installed at all joints between sidewalk and curb, pavement, building, etc."

and *replace* it with the following:

"When the contract includes 50 m³ or more of sidewalk and driveway concrete, provide an American Concrete Institute (ACI) certified concrete flatwork finisher to supervise all finishing. Provide proof of ACI flatwork certification to the Engineer prior to concrete placement. The general construction details for manufacturing and transporting concrete shall meet the requirements of Section 501, Portland Cement Concrete- General. Concrete placement operations may be started when the ambient air temperature is 4° C or higher when measured in the shade within an accuracy of ± 1° C. Discontinue placement when the air temperature falls below 4° C. The temperature of the base material must be 4° C or higher. The base material shall not have any snow, ice, frost, or standing water on its surface. The use of insulating materials and heating equipment may be required before concreting begins. Do not place concrete in the rain.

Install a premoulded resilient joint filler, §705-07, at all joints between sidewalk and curb, pavement, building, etc.

Sidewalks and driveways may be conventionally formed or machine formed.

Concrete reinforcement shall be welded wire fabric or fiber reinforcement except, at all commercial driveways both the sidewalk and the driveway must be reinforced with welded wire fabric. They may be additionally reinforced with fiber reinforcement.

When using fiber reinforcement it shall be added to the concrete at a rate of 0.9 kg of fibers per m³ of concrete. Fibers shall be added to the concrete during batching under supervision of the Regional Materials Engineer, or using a method approved by the Director, Materials Bureau. Batch an appropriate volume of concrete such that whole standard size bags or packages of fibers are used. It is the responsibility of the producer to indicate on each delivery ticket the amount of fibers added to the concrete.

A. Conventionally Formed Sidewalks and Driveways. Forms shall be free from warp, extend to the full depth of the sidewalk or driveway, and be secured so no displacement will occur during the placement of concrete. Reinforcement may be either fiber or wire fabric. When using wire fabric for concrete reinforcement, embed it at mid-depth in the slab.

Place the concrete in one course to the full depth shown in the contract documents. Immediately after placement of the concrete thoroughly compact the concrete with internal mechanical vibrating equipment. Internal mechanical vibrators shall be adequately powered, capable of transmitting vibration to the concrete in frequencies of not less than

5,000 vibrations per minute while inserted in concrete and shall produce a vibration of sufficient intensity to consolidate the concrete into place without separation of the ingredients. The vibrating element shall be vertically inserted in the concrete mass at a depth

sufficient to vibrate the entire depth. It shall be withdrawn completely from the concrete before being advanced to the next point of application. Vibrate at evenly spaced intervals not farther apart than the radius over which the vibration is visibly effective and at a distance close enough to the forms to effectively vibrate the surface concrete. The time of vibration shall be of sufficient duration to accomplish thorough consolidation, produce dense, smooth surfaces free from aggregate pockets, honeycombing, and air bubbles; and to work the concrete into all angles and corners of the forms, however, over-vibration shall be avoided. Vibration shall be continued in one place until the concrete has become uniformly plastic, but not to the extent that pools of grout are formed. Vibration shall be supplemented by working or spading by hand in the corners and angles of forms and along form surfaces while the concrete is plastic. Vibrators shall not be used to push or distribute the concrete laterally.

The use of mechanical screeding or finishing equipment (such as a jitterbug) shall not be allowed. Only hand screeding and finishing shall be allowed.

B. Machine formed Sidewalk. Machine formed paving consists of a single paver capable of placing, spreading, consolidating, screeding, and finishing the concrete such that hand finishing is kept to a minimum. Use equipment guided by a reference system that ensures the pavement is placed to the specified line, grade, and cross section. Use a self-propelled machine formed paver equipped with rigid side forms that laterally support the concrete and minimize edge slumping, a full-width finishing pan, and attached internal vibrators capable of consolidating the entire concrete placement. The equipment proposed for use by the Contractor shall demonstrate the capability of placing the concrete in accordance with these specifications.

The reinforcement must be fibers.

C. Finishing. Only magnesium floats and trowels are allowed. The use of aluminum or steel finishing trowels and tools is prohibited. The concrete shall be finished to produce a smooth surface and then lightly broomed to a uniform texture. The edges and scored joints of all sidewalk slabs shall be tooled with an edging tool having a 6 mm radius.

Unless otherwise specified in the contract documents, the concrete surface shall be scored and tooled at intervals of 1.5 m. Score the concrete a minimum 3 mm to a maximum 6 mm in width and to a minimum depth of one-third the total thickness.

D. Curing. Immediately after finishing, and not more than 30 minutes after concrete placement, apply a clear with fugitive dye membrane curing compound at a rate of 1 liter per 3.5 square meters. Do not apply curing compound in the rain. If rain damages the curing compound before it sets, reapply curing compound immediately after the concrete surface dries. Alternative curing methods shall be approved by the Director, Materials Bureau.

Concrete must be cured for a minimum of six days in colder weather. Colder weather and the methods of curing during colder weather are described as follows: If the ambient air temperature falls, or is expected to fall below 4° C anytime during the curing period of the concrete placement, a supply of blankets meeting §711-07 Form Insulating Materials for Winter Concreting must be provided at the work site that is sufficient to cover all concrete placed. Use material capable of maintaining a surface temperature of 13° C. Apply the insulating material to prevent the newly placed concrete from being exposed to ambient air temperatures at the surface below 2° C during the curing period. Secure and overlap the

insulation tight to the concrete surface to prevent air intrusion beneath the insulation. Extend these materials a minimum of 300 mm beyond the edge of the concrete. Place recording surface thermometers between the concrete surface and the insulating material and 300 mm from the outside edge of concrete wherever insulation is used. Use four equally spaced thermometers for each day's placement. When insulation is needed it must remain in place for the curing period. Do not subject the concrete to a temperature drop in excess of 10° C during the first 24 hours after removing the insulation. If the concrete temperature falls below 0° C or the concrete is damaged by cold weather as determined by the Engineer it shall be removed and replaced at the Contractor's expense.

Cure all driveways and sidewalks at driveways for a minimum of three days prior to opening to vehicle traffic. In colder weather, as defined above, extend the curing period to six days unless other provisions to determine strength are provided and approved by the Director, Materials Bureau.

If saw cutting is necessary use diamond blade saws capable of making straight cuts to the dimensions required. Saws must be equipped with cutting guides, blade guards, water cooling systems, dust controls, and cut depth control.

E. Accelerated Cure Sidewalks and Driveways. When specified in the plans that an accelerated cure sidewalk and/or driveway is required at a commercial driveway all the provisions for constructing sidewalks and driveways outlined above shall apply with the following exceptions: Only conventional forming with wire fabric reinforcing is allowed. Apply curing compound as outlined in "D" above. To reduce the time needed to reach the required opening compressive strength the concrete must be covered with blankets meeting §711-07, Form Insulating Materials for Winter Concreting such that the concrete curing temperature reaches a minimum 15° C above ambient air temperature. Secure the insulation tight to the concrete surface to prevent air intrusion beneath the insulation. Extend these materials a minimum of 300 mm beyond the edge of the concrete. Place recording surface thermometers between the concrete surface and the insulating material and 300 mm from the edge of concrete wherever insulation is used. Use four thermometers for each day's placement. These thermometers may be equally spaced at one location or placed at separate locations depending on the nature of the placements. Also, use one recording thermometer for ambient air temperature. At the request of the Contractor external heat meeting the requirements of 555-3.08, C.,2. Provision of External Heat may be applied to the concrete.

Compressive strength cylinders for determining strength gain must be cast at the time of placement. These cylinders must be kept insulated with the placement. Cylinders shall be broken at times requested by the Contractor until the minimum compressive strength of 14 MPa is reached. Alternate means to determine concrete maturity may be considered with approval of the Director, Materials Bureau by coordinating cylinder compressive strengths to concrete curing temperature."

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Between lines 19 & 20; under **§608-5 BASIS OF PAYMENT**, *Payment will be made under*, *insert* the following:

"608.0102 M Accelerated Cure Sidewalks and Driveways

Cubic Meter"

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Line 7, *delete* "711-01 (VACANT)", and *replace* it with the following:

"711-01 FIBERS FOR CONCRETE REINFORCEMENT

SCOPE. This specification covers the material requirements for fibers for concrete reinforcement.

MATERIAL REQUIREMENTS. Synthetic, fibrillated fibers, specifically engineered and manufactured for use as secondary concrete reinforcement meeting ASTM C1116 Type III.

BASIS OF ACCEPTANCE. Acceptance will be based on the product name and manufacturer appearing on the Department's Approved List and material certification that states the product conforms to this specification."