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New York State Department of Transportation
ENGINEERING INSTRUCTION

EI 96-046

Title: **STANDARD SPECIFICATION SECTION 584 - SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS, COARSE AGGREGATE REQUIREMENTS**

Distribution:
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Approved:

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Deputy Chief Engineer (Structures)

9.24.96
Date

EFFECTIVE DATE. This Engineering Instruction is effective with department contracts let on or after March 27, 1997.

PURPOSE. Eliminate the high friction coarse aggregate requirement for Item 584 - Specialized Concrete Overlays for Structural Slabs.

BACKGROUND. Although high friction coarse aggregates are not routinely required in PCC pavement and bridge deck riding surfaces, high friction coarse aggregate requirements were originally included in Item 584 to establish a conservative aggregate requirement for bridge deck friction and because:

1. Item 584 originally specified either Latex Modified or High Density Concrete, both of which required project mobile mixing, batching, and job site aggregate stockpiling.

2. Item 584 overlays are placed in 1½" to 2" thicknesses which limit the quantities of needed premium high friction coarse aggregate.

Recent activity with reclassifying dolomite coarse aggregate high friction status resulted in a reassessment of the high friction requirements of Item 584. Item 584 was revised in the mid 1980s to include microsilica concrete and this material has become the predominant contractor's choice under the 584 item. Since the microsilica concrete is produced at a conventional concrete plant, in lieu of project mobile mixers, and plant aggregates may or may not meet high friction requirements, the issue of requiring high friction coarse aggregate was revisited.

The National Cooperative Highway Research Program (NCHRP), Synthesis 14 - SKID RESISTANCE states that the fine aggregate in the mortar has the greatest influence on concrete pavement friction and should, therefore, be of the highest friction quality. The Department's fine aggregate requirements have been established to assure a high quality friction sand-mortar.

The NCHRP Synthesis also states that the coarse aggregate is less critical, however, if a poor quality concrete results the surface will wear and the coarse aggregate will soon be exposed to traffic in sufficient large amounts to overshadow the dominating role of the sand-mortar. It further states, if a quality-controlled mix is placed,

the rate of wear of the sand-mortar component will be such that the coarse aggregate will not be exposed in sufficient quantity to unduly affect the resulting friction.

Department PCC pavement and bridge deck friction inventory data was analyzed to evaluate the long term friction properties of these sites. The analysis identified considerable friction number variation early in the life and within project limits. These differences are likely due to variation in surface texture within a project. To improve bridge deck overlay surface texturing, an astro turf-drag finish and mechanical saw groove requirement was added in 1980. This combination results in a significantly improved sand-mortar surface texture that produces a uniform high quality friction surface with reduced potential for hydroplaning. The friction inventory data analysis did not identify a reduction in friction over time for PCC pavement surfaces containing non high friction coarse aggregates. Experience and data have demonstrated that wear of the sand-mortar matrix is not a problem. The concrete mixtures' quality is providing a durable, wear resistant sand-mortar that is providing acceptable surface friction.

Based upon this review, the high friction coarse aggregate requirement is being eliminated from Item 584. This provides consistent aggregate requirements for all PCC riding surface items and reserves premium high friction coarse aggregate for asphalt pavements where its use is critical.

TRANSMITTED MATERIAL. Attached are specification shelf notes revising the coarse aggregate requirements for SECTION 584 - SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS for the January 2, 1990 and January 2, 1995 Specification books.

COST IMPACT. This will result in more cost effective use of coarse aggregates. This change will not result in a cost increase; for those concrete plant facilities not routinely using a high friction coarse aggregate source, a cost savings will result because special ordering, shipping, and stockpiling will be eliminated.

ACTIONS BY THE MAIN OFFICE DQAB. The attached shelf notes will be incorporated into the next update of the Standard Specifications. Until that time, the shelf notes will be inserts into contract proposals, beginning with the effective date, containing specialized concrete overlays for structural slab items with a 584.xxxx pay item series.

USE ON EXISTING CONTRACTS. This coarse aggregate substitution is acceptable on existing contracts where it is anticipated that a significant cost reduction can be achieved by deleting the coarse aggregate high friction requirement. The contractor should be requested to submit a price for the new specification and an order on contract prepared. Where a cost savings is not achieved the coarse aggregate high friction aggregate requirement should be retained.

CONTACT. Questions regarding this Engineering Instruction should be directed to William Snyder of the Materials Bureau's Field Engineering I Section at (518) 457-5956.

SECTION 584 - SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

Make the following changes to the Standard Specifications of January 2, 1990:

Page 5-107

Under 584-2.01C. Coarse Aggregate, delete the subsection and replace it with the following:

C. Coarse Aggregate. * The coarse aggregate shall comply with 501-2.02, B., 2. Coarse Aggregate except that the aggregate size shall be Type CA 1 meeting the General Limits % Passing shown in Table 501-2 and the maximum percent by weight of material passing the No. 200 sieve (wet) shall be 0.7%.

* Fine and coarse aggregates shall be stockpiled in accordance with the requirements of 584-3.01.

SECTION 584 - SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

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

Page 5-155

Under 584-2.01C. Coarse Aggregate, delete the subsection and **replace** it with the following:

C. Coarse Aggregate. The coarse aggregate shall comply with 501-2.02, B., 2. Coarse Aggregate except that the aggregate size shall be Type CA 1 meeting the General Limits % Passing shown in Table 501-2 and the maximum percent by weight of material passing the 75 µm sieve (wet) shall be 0.7%. Coarse aggregates shall be stockpiled in accordance with the requirements of §584-3.01.