Florida Department of Transportation

CHARLIE CRIST
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

STEPHANIE KOPELOUSOS
INTERIM SECRETARY

February 6, 2007

Mrs. Leslie McCarthy, PhD, P.E.
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 929
Proposed Specification: 9290000.D01

Dear Mrs. McCarthy:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Pozzolans and Slag.

This change was proposed by Tom Malerk of the State Materials Office to remove requirements that are not necessary in less critical operations and allow more liberal use of available materials and innovation for appropriate situations.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/dr
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

POZZOLANS AND SLAG.
(~~REV11-20-06~~REV *2-05-07*)

SECTION 929 (Pages 804 – 807) is deleted and the following substituted:

SECTION 929
POZZOLANS AND SLAG

929-1 Basis for Source Approval.

929-1.1 General: The cementitious materials supplier shall submit the proposed quality control plan, certified test reports from an approved independent laboratory acceptable to the State Materials Office, and a sample of the material for Department verification. The quality control program of a cementitious materials supplier shall conform to 6-8. Continuance of Department Qualifications is subject to satisfactory results from periodic verification evaluations. A verification sample may be taken at the manufacturer's plant, distribution facility or at the concrete producer's plant.

Upon review of the quality control plan and satisfactory verification of the test results, the plant will be placed on the Department's list of ~~active~~ cementitious materials sources *with accepted Quality Control Programs*. The cementitious materials supplier shall utilize a quality control plan ~~approved~~ *accepted* by the State Materials Office. The Department reserves the right to withdraw quality control plan ~~approval~~ *acceptance* and to require cementitious material shipments to be individually tested prior to incorporation into Department work. Quality control plan*s* ~~approvals~~ may be ~~rescinded~~ *suspended* when the performance of cementitious material is in question, including problems with concrete quality, inconsistent quality control data, or failure of quality control or verification test results.

Repulpable bags may be accepted by the Engineer, provided a successful demonstration by the producer has indicated complete degradation of the repulpable bags during the mixing operation and before the ~~concrete~~mix ~~is~~ is discharged.

929-1.2 Approved Laboratory: The cementitious materials supplier's testing laboratory must meet and maintain, at all times, the qualification requirements as described in 6-9. The producer's laboratory shall authorize the inspecting laboratory to send a copy of the inspection report to the State Materials Office.

929-2 Fly Ash.

929-2.1 Class C or Class F: Fly ash derived from the combustion of ground or powdered coal shall meet the requirements of ASTM C 618, Class C or Class F Fly ash. Sampling and testing of fly ash shall follow the requirements of ASTM C 311.

929-2.2 Petroleum Coke Class F: Fly ash resulting from the combustion of coal and petroleum coke shall meet the physical and chemical requirements of ASTM C 618 Class F fly ash. When petroleum coke Class F fly ash is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties and other durability requirements of concrete, as compared to ASTM C 618 Class F fly ash concrete. The strength and durability tests of concrete shall be performed in accordance with ASTM C 39, ASTM C 157, ASTM C 1012, ASTM C 1202, ASTM G 109, FM 5-516 and FM 5-522. Fly ash shall not include the residue resulting

from the burning of municipal garbage or any other refuse with coal, or the burning of industrial or municipal garbage in incinerators. Sampling and testing of fly ash shall follow the requirements of ASTM C 311.

929-2.3 Bark Ash Class F: Fly ash resulting from the combustion of timber bark ash and coal shall meet the physical and chemical requirements of ASTM C 618 Class F fly ash. When bark ash is used in concrete, the strength and durability of the bark ash concrete shall be improved or comparable to the strength and the durability properties of ASTM C 618 Class F fly ash concrete. The tests shall be performed as specified in 929-2.2. Sampling and testing of fly ash shall follow the requirements of ASTM C 311.

929-2.4 Special Requirements:

929-2.4.1 Fly Ash (Class C): When a Class C fly ash is used in moderately or extremely aggressive environments, tests made by the CCRL approved independent laboratory shall verify improved sulfate resistance of the concrete in accordance with ASTM C 1012, and improved or comparable corrosion protective properties measured by FM 5-522, as compared to similar concrete made with Class F fly ash..

929-2.4.2 Petroleum Coke and Bark Ash (Class F): For sources where the fly ash is not derived solely from ground or powdered coal combustion, certified test results performed by an independent approved laboratory, shall be submitted by the supplier. The performance-based comparison test results shall meet the requirements of 929-2.2 and 929-2.3 for petroleum coke and bark ash fly ashes, respectively.

929-2.5 Exceptions: Fly ash shall not be used in conjunction with Type IP or Type IS cements.

929-2.6 Acceptance Testing of Fly Ash: Acceptance of fly ash from sources operating under an approved quality control plan shall be based on the monthly certified quality control tests meeting the chemical (Supplementary Optional included) and physical requirements of ASTM C 618. When the loss on ignition exceeds 5%, the Uniformity Requirements in the Supplementary Optional Physical Requirements shall be mandatory. An approved laboratory shall perform the monthly quality control tests and a copy of their mill certificates shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request.

929-3 Silica Fume.

929-3.1General: Silica Fume shall meet the requirements of ASTM C 1240 using the referenced test methods and frequencies. ~~Repulpable bags may be accepted by the Engineer, provided a successful demonstration by the producer has indicated complete degradation of the repulpable bags during the mixing operation and before the concrete is discharged.~~

929-3.2 Acceptance Testing of Silica Fume: Acceptance of silica fume from sources operating under an approved quality control plan shall be based on the monthly certified quality control tests meeting the chemical (Supplementary Optional included) and physical requirements of ASTM C 1240. An approved laboratory shall perform the monthly quality control tests and a copy of their mill certificates shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the silica fume meets the requirements of this Specification. Also, the

corresponding samples along with mill certificates shall be submitted to the Department, upon request.

929-4 Metakaolin.

929-4.1General: Metakaolin shall meet the requirements of ASTM C 618 Class N with the following modifications:

1. The sum of $SiO_2 + Al_2O_3 + Fe_2O_3$ shall be at least 85%. The Material Safety Data Sheet shall indicate that the amount of crystalline silica, as measured by National Institute of Occupation Safety and Health (NIOSH) 7500 method, after removal of the mica interference, is less than 1.0%.
2. The loss on ignition shall be less than 3.0%.
3. The available alkalies, as equivalent Na_2O, shall not exceed 1.0%.
4. The amount of material retained on a No. 325 mesh sieve shall not exceed 1.0%.
5. The strength activity Index, at 7 days, shall be at least 85%.
6. When metakaolin is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties and other durability performance properties of concrete, as compared to the performance of silica fume concrete. The comparison strength and durability tests shall be performed in accordance with ASTM C 39, ASTM C 157, ASTM C 1012, ASTM C 1202, ASTM G 109, FM 5-516 and FM 5-522, by an approved independent testing laboratory. Sampling and testing of metakaolin shall follow the requirements of ASTM C 311.

929-4.2 Acceptance Testing of Metakaolin: Acceptance of metakaolin from sources operating under an approved quality control plan shall be based on the monthly certified quality control tests meeting the chemical (Supplementary Optional included) and physical requirements of ASTM C 618 Class N, as modified herein. An approved laboratory shall perform the monthly quality control tests and a copy of their mill certificates shall be sent to the State Materials Office, when the material is in use on Department projects. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request. The certification shall indicate that the metakaolin meets the requirements of this Specification.

929-5 Slag.

929-5.1General: Slag shall meet the requirements of ASTM C 989. Sampling and testing procedures shall follow the requirements of ASTM C 989.

929-5.2 Special Requirements: Only Ground Granulated Blast-Furnace Slag Grade 100 and 120 will be permitted.

929-5.3 Exceptions: Slag shall not be used in conjunction with Type IP or Type IS cements.

929-5.4 Acceptance Testing: Acceptance of slag from sources operating under an approved quality control plan shall be based on the monthly certified quality control tests meeting the chemical and physical requirements of ASTM C 989. An approved laboratory shall perform the monthly quality control tests and a copy of their mill certificates shall be sent to the State Materials Office when the material is in use on Department projects. Reference Cement used for determination of Slag Activity shall meet the requirements of ASTM C 989. The certification shall indicate that the slag

meets the requirements of this Specification. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request.

929-6 Ultra Fine Fly Ash

929-6.1 General: *Sampling and testing of the ultra fine fly ash shall follow the requirements of ASTM C 311. Ultra fine fly ash derived from the combustion of ground or powdered coal shall meet the requirements of ASTM C 618 as a Class F fly ash with the following modifications:*

1. The pozzolanic activity index, at 7 days, shall be at least 85% of the control and the pozzolanic activity index, at 28 days, shall be at least 95% of the control.

2. Particles less than 3.25 microns shall be at least 50% of the particle size distribution, as measured by laser particle size analyzer. Particles less than 8.50 microns shall be at least 90% of the particle size distribution, as measured by laser particle size analyzer.

3. The amount of material retained when wet-sieved on a 45-µm sieve shall be less than 6.0%.

4. The moisture content shall be less than 1.0%.

5. The loss on ignition shall be less than 2.0%.

929-6.2 Exceptions: *Ultra Fine Fly ash shall not be used in conjunction with Type IP or Type IS cements.*

929-6.3 Acceptance Testing of Ultra Fine Fly Ash: *Acceptance of fly ash from sources operating under an approved quality control plan shall be based on the monthly certified quality control tests meeting the chemical (Supplementary Optional included) and physical requirements of ASTM C 618. When the loss on ignition exceeds 2.0%, the Uniformity Requirements in the Supplementary Optional Physical Requirements shall be mandatory. An approved laboratory shall perform the monthly quality control tests and a copy of their mill certificates shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request.*

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industrial or municipal garbage in incinerators. Sampling and testing of fly ash shall follow the requirements of ASTM C 311.

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929-2.4 Special Requirements:

929-2.4.1 Fly Ash (Class C): When a Class C fly ash is used in moderately or extremely aggressive environments, tests made by the CCRL approved independent laboratory shall verify improved sulfate resistance of the concrete in accordance with ASTM C 1012, and improved or comparable corrosion protective properties measured by FM 5-522, as compared to similar concrete made with Class F fly ash..

929-2.4.2 Petroleum Coke and Bark Ash (Class F): For sources where the fly ash is not derived solely from ground or powdered coal combustion, certified test results performed by an independent approved laboratory, shall be submitted by the supplier. The performance-based comparison test results shall meet the requirements of 929-2.2 and 929-2.3 for petroleum coke and bark ash fly ashes, respectively.

929-2.5 Exceptions: Fly ash shall not be used in conjunction with Type IP or Type IS cements.

929-2.6 Acceptance Testing of Fly Ash: Acceptance of fly ash from sources operating under an approved quality control plan shall be based on the monthly certified quality control tests meeting the chemical (Supplementary Optional included) and physical requirements of ASTM C 618. When the loss on ignition exceeds 5%, the Uniformity Requirements in the Supplementary Optional Physical Requirements shall be mandatory. An approved laboratory shall perform the monthly quality control tests and a copy of their mill certificates shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request.

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6. When metakaolin is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties and other durability performance properties of concrete, as compared to the performance of silica fume concrete. The comparison strength and durability tests shall be performed in accordance with ASTM C 39, ASTM C 157, ASTM C 1012, ASTM C 1202, ASTM G 109, FM 5-516 and FM 5-522, by an approved independent testing laboratory. Sampling and testing of metakaolin shall follow the requirements of ASTM C 311.

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929-5 Slag.

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