



INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

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Mitchell E. Daniels, Jr., Governor
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August 24, 2011

CONSTRUCTION MEMORANDUM 11-08

TO: District Deputy Commissioners
District Construction Directors
District Testing Engineers
District Area Engineers
Field Engineers
Technical Services Directors
Project Engineers/Supervisors
Office of Materials Management

FROM: Mark A. Miller, Director *Ma Miller*
Division of Construction Management

SUBJECT: Chemical Soil Modifiers, Sections 207, 215 and 913

Previously, modifications were made to Standard Specifications Sections 207, 215 and 913 to allow the use of cement by-products for chemical modification of soils and those revisions were incorporated into the 2012 book.

Recent severe problems have occurred using cement kiln dust on a contract, creating the need to revise these standard specifications and then learn more about this product before utilizing it on future contracts.

Please refer to the attached Recurring Special Provision 207-R-584, deleting the use of cement by-products in 207.02, 215 and 913.05.

The effective date of this Recurring Special Provision is August 24, 2011. This RSP shall be implemented on all contracts containing 207 or 215 pay items. **Contracts with letting dates occurring before the date of this memo will be handled on a case by case basis.**

MAM/STT

207-R-584 CHEMICAL MODIFIERS FOR SOILS

(Adopted 08-24-11)

The Standard Specifications are revised as follows:

SECTION 207, BEGIN LINE 9, DELETE AS FOLLOWS:

207.02 Materials

Materials shall be in accordance with the following.

Chemical Modifiers

Cement By Products	913.05
Fly Ash.....	901.02
Lime.....	913.04(b)
Portland Cement, Type I.....	901.01(b)

SECTION 215, BEGIN LINE 1, DELETE AS FOLLOWS:

SECTION 215 – CHEMICAL MODIFICATION OF SOILS**215.01 Description**

This work shall consist of the modification of soils by uniformly mixing portland cement, fly ash, lime, ~~cement by product~~ or a combination of the materials with soil to aid in achieving the workability of soils having excessive moisture content.

MATERIALS**215.02 Materials**

Materials shall be in accordance with the following:

Cement By Products	913.05
Fly Ash.....	901.02
Lime.....	913.04(b)
Portland Cement, Type I.....	901.01(b)
Water.....	913.01

SECTION 215, BEGIN LINE 37, DELETE AND INSERT AS FOLLOWS:

The quantities for hydrated lime, quicklime, or portland cement shall be based on $4.0 \pm 0.5\%$ by dry unit weight (mass) of the soils. The quantities for lime ~~and cement by products~~ shall be based on $5.0 \pm 1.0\%$ by dry unit weight (mass) of the soils. The quantities for fly ash class C shall be based on $12.0 \pm 2.0\%$ by dry unit weight (mass) of the soils. Class F fly ash shall not be used except in combination with lime or cement.

If hydrated lime, quick lime, or portland cement are used, test results and the geotechnical consultant recommendations shall be submitted to the Engineer prior to use. If fly ash, lime by-products, ~~cement by products~~ or any combination of chemical modifiers are used, the test results and the geotechnical consultant recommendations shall be submitted to the Engineer and to the Office of Geotechnical Services for approval at least 5 business days prior to use. If the modifier as bid is not appropriate for the soils encountered ~~and was not a cement by product, then a cement by product shall be tested. If the cement by product is not appropriate,~~ portland cement shall be used. Portland

cement, fly ash, ~~and lime and cement by products~~ shall be from the Department's list of approved sources.

The quantity of chemical modifier may be adjusted for different soil types. However, the source or type of chemical modifier shall not be changed during the progress of the work without approval. A change in source or type shall require a new mix design.

SECTION 215, BEGIN LINE 103, DELETE AS FOLLOWS:

Compaction of the mixture shall begin as soon as practicable after mixing. Compaction after mixing shall be as follows:

- (a) For portland cement modified soils, mixing shall be completed within 30 min of portland cement placement and compaction shall be completed within 3 h after mixing.
- (b) Fly ash ~~or cement by product~~ modified soils shall be compacted within 4 h.
- (c) Lime modified soils shall be compacted within 24 h.

Compactive efforts shall be in accordance with 203 or 207.03 as applicable.

SECTION 215, BEGIN LINE 147, DELETE AS FOLLOWS:

Adjustment of materials for chemical modification that exceeds the limits of 215.03 will be included in a change order for materials only and paid for as chemical modifier adjustments. If mix design test results show that the chemical modifier as bid by the Contractor is not appropriate and the strength of the modified soil can not be achieved, a price adjustment will be made for the use of ~~a cement by product or portland cement, whichever is appropriate~~. The price adjustment will be calculated at a cost equal to the difference in the invoice cost of the chemical modifier found to be appropriate for use and the invoice or quoted delivered cost of the chemical modifier as bid by the Contractor. This adjustment will be included in a change order and will be paid for as chemical modifier adjustments. Payment for chemical modifier adjustments will be made for direct delivered material costs incurred by the Contractor and shall not include any other markups.

SECTION 913, BEGIN LINE 68, DELETE AS FOLLOWS:

~~913.05 Cement By Products~~Blank

~~Cement by products used for soil modification shall be approved in accordance with ITM 806, Procedure P and shall meet the following requirements.~~

- ~~(a) The cement by product shall contain a minimum of 50% calcium oxide as reported.~~
- ~~(b) Available free lime (CaO) shall be a minimum of 5%.~~
- ~~(c) Loss on ignition shall be a maximum of 30%.~~

Sieve analysis shall be performed in accordance with ASTM C 110. The cement by products gradation shall be as follows:

Sieve	% Retained (Max)
No. 4 (4.75 mm)	5
No. 30 (600 μm)	10
No. 100 (150 μm)	25
