

SUPPLEMENTAL SPECIFICATIONS
INDIANA DEPARTMENT OF TRANSPORTATION
1999 STANDARD SPECIFICATIONS

REVISION TO 1999 STANDARD SPECIFICATIONS

SECTION 206, BEGIN LINE 52, DELETE AND INSERT AS FOLLOWS:

If the class X material encountered is in accordance with the definition 1 of 206.02(a)1 is encountered, the rock material shall be excavated to allow the foundation to be embedded a distance that is equal to 1/2 of the remaining depth of the foundation before rock the material was encountered, except for overhead sign structure and highmast lighting foundations.

SECTION 206, AFTER LINE 62, INSERT AS FOLLOWS:

Overhead sign structure foundations and highmast lighting foundations shall be excavated to allow the foundation to be embedded as shown on the plans or as directed.

SECTION 211, AFTER LINE 23, INSERT AS FOLLOWS:

(c) Coarse Aggregate For End Bent Backfill. Coarse aggregate used for backfilling end bents on beam structures shall be No. 8 or No. 9 crushed stone or BF slag, class D or higher, in accordance with 904.02.

(e) (d) Flowable Mortar Substitution. When B borrow or B borrow for structure backfill is specified, the Contractor may substitute flowable mortar in accordance with 213. However, flowable mortar shall not be placed into or through standing water, unless approved in writing.

SECTION 211, BEGIN LINE 56 DELETE AND INSERT AS FOLLOWS:

Unless otherwise specified, all spaces excavated for and not occupied by bridge abutments, and piers, and wingwalls, if within embankment limits, shall be backfilled to the original ground line with B borrow, and placed in accordance with 211.04.

SECTION 211, AFTER LINE 96, INSERT AS FOLLOWS:

211.07.1 Aggregate For End Bent Backfill. When specified, coarse aggregate in accordance with 211.02(c) shall be placed behind end bents as shown on the plans. The material shall be deposited in lifts not to exceed 300 mm (12 in.) loose measurement, and each layer shall be mechanically compacted using a hand held vibratory plate compactor having a plate width of 425 mm (17 in.) or larger that delivers 13.3 to 40 kN (3000 to 9000 lb) per blow. Each layer shall be compacted with two passes of the compactor.

Prior to placing the aggregate, a geotextile in accordance with 913.18 shall be installed in accordance with 616.10.

SECTION 211, BEGIN LINE 102, DELETE AND INSERT AS FOLLOWS:

211.09 Method of Measurement. B borrow, and B borrow for structure backfill, and aggregate for end bent backfill will be measured by the cubic meter (cubic yard) as computed from the neat line limits shown on the plans, or as adjusted. If cubic meters (cubic yards) are set out as the pay

SECTION 211, AFTER LINE 124, INSERT AS FOLLOWS:

Geotextiles will be measured in accordance with 616.11.

SECTION 211, AFTER LINE 143, INSERT AS FOLLOWS:

Aggregate for end bent backfill will be paid for at the contract unit price per cubic meter (cubic yard), based on the neat line limits shown on the plans or as adjusted by authorized changes.

Geotextiles will be paid for in accordance with 616.12.

SECTION 211, AFTER LINE 155, INSERT AS FOLLOWS:

Aggregate For End Bent Backfillm3 (CYS)

SECTION 215, BEGIN LINE 1, INSERT AS FOLLOWS:

SECTION 215 -- CHEMICAL MODIFICATION OF SUBGRADE SOILS

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

MATERIALS

10 **215.02 Materials.** Materials shall be in accordance with the following:

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

CONSTRUCTION REQUIREMENTS

20 **215.03 Testing and Mix Design.** The Contractor shall be responsible for all tests required to determine the optimum chemical modifier content for modification of the soils. The modifier selection, laboratory testing, and mix design shall be performed by an approved geotechnical consultant in accordance with criteria contained in the Department's guidelines, Soil Modification/Stabilization Utilizing Chemicals. Test results, recommendations, and material compliance certifications shall be submitted to the Materials and Tests Division for approval at least five days prior to use.

30 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.

215.04 Storage and Handling. The chemical modifier shall be stored and handled in accordance with the manufacturer's recommendations.

215.05 Weather Limitations. The chemical-soil modification shall be performed when the soil has a minimum temperature of 7°C (45°F), measured 100 mm (4 in.) below the surface of the subgrade, and with the air temperature rising. The chemical modifier shall not be mixed with frozen soils or with soil containing frost.

40 **215.06 Preparation Of Subgrade.** The subgrade shall be prepared in accordance with 207. All aggregates which are larger than approximately 75 mm (3 in.) encountered before or after mixing the soils and chemical modifiers shall be removed.

50 **215.07 Spreading of Chemical Modifiers.** The subgrade shall be scarified or disked to the specified depth prior to distribution of the chemical modifier. The chemical modifier shall be distributed uniformly over the subgrade by a cyclone, screw-type, or pressure manifold type distributor. The chemical modifier shall not be applied when wind conditions create problems in adjacent areas or create a hazard to traffic on any adjacent roadway. The spreading of the chemical modifier shall be limited to an amount which can be incorporated into the soil within the same work day. If weather causes stoppage of work or exposes the chemical modifier to washing or blowing, additional chemical modifier may be spread when the work resumes.

60 **215.08 Mixing.** The chemical modifier, soil, and water when necessary, shall be thoroughly mixed by rotary speed mixers or a disc harrow. The mixing shall continue until a homogenous layer of the required thickness has been obtained. One hundred percent of the material, exclusive of rock particles, shall pass a 25 mm (1 in.) sieve and at least 60% shall pass a 4.75 mm (No. 4) sieve. The loose thickness of a single chemical modified layer shall not exceed 200 mm (8 in.) if a disc harrow is used and 400 mm (16 in.) if a rotary speed mixer is used.

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

(a) Cement modified soils shall be compacted within 30 min.

(b) Fly ash modified soils shall be compacted within 4 h.

(c) Lime modified soils shall be compacted within three days.

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If compaction of lime modified soils is delayed, the surface of the lime modified soils shall be crown graded and primed in accordance with 405. When compaction is resumed, it shall be continued until the upper 150 mm (6 in.) of the chemical modified layer has the soil density determined by mix design.

Maximum dry densities will be determined in accordance with AASHTO T 272 at the same time and location as each in-place density test is performed. The field in-place dry density shall be in accordance with AASHTO T 191 or AASHTO T 238.

80 Aeration or drying by further mixing, or the addition of water and further mixing, may be required to obtain the optimum moisture in order to achieve the required compaction. The final compaction acceptance will be in accordance with 203.26. The Contractor is fully responsible for achieving the required compaction.

215.10 Method of Measurement. The accepted quantity of modified subgrade will be measured by the cubic meter (cubic yard), complete in place. All excavation required to modify the soils below the specified depth will be measured in accordance with 203.27(b).

90 **215.11 Basis of Payment.** The accepted quantity of modified subgrade will be paid for by the cubic meter (cubic yard), complete in place. All excavation required to modify the soils below the specified depth will be paid for in accordance with 203.28.

Payment will be made under:

Pay Item	Metric Pay Unit Symbol (English Pay Unit Symbol)
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Subgrade, Modified	m3 (CYS)
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100 The costs of performing the laboratory tests, providing an approved geotechnical consultant, scarification of the subgrade, spreading and mixing of the chemical modifier and soil, priming of the surface of the chemically modified soils, compaction of the resultant mixture, shaping the subgrade, work required due to adjustments of modifier proportioning, additional modification required due to weather conditions, correction of deficient areas, water required for the modification process, modified subgrade trimming, and all other materials and operations needed to meet the requirements of this specification shall be included in the costs of the pay item.

SECTION 216, BEGIN LINE 1, INSERT AS FOLLOWS:

SECTION 216 –CELLULAR CONCRETE FILL, CCF

216.01 Description. This work shall consist of furnishing and placing a light weight, low absorbability cellular concrete fill in accordance with 105.03.

MATERIALS

216.02 Materials. Materials shall be in accordance with the following:

10	Cement	901.01(b)
	Fly Ash.....	901.02
	Water	913.01

An admixture in accordance with 912.03 may be used as recommended by the CCF manufacturer.

20 A foam liquid concentrate in accordance with ASTM C 796 shall be used to produce the CCF properties in accordance with 216.04. The concentrate shall be chosen from those shown on the Department's Approved List of CCF Manufacturers/Installers.

CONSTRUCTION REQUIREMENTS

216.03 Mix Design. A mix design prepared in accordance with the geotechnical report shall be submitted to the Materials and Tests Division for approval at least five work days before the CCF operations begin. A cellular concrete manufacturer shall be chosen from those shown on the Department's Approved List of CCF Manufacturers/Installers.

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216.04 Properties and Tests. The CCF shall be in accordance with the manufacturer's recommendations and the minimum physical properties as follows:

PROPERTIES	CLASS II	CLASS III	CLASS IV
Cast Density Mix	480 kg/m ³ (810 lb/cyd)	580 kg/m ³ (972 lb/cyd)	670 kg/m ³ (1134 lb/cyd)
Minimum Compressive Strength, ASTM C 495 *	375 kPa (40 psi)	550 kPa (80 psi)	825 kPa (120 psi)
Freeze-thaw resistance minimum at relative E = 70%, ASTM C 666 Modified		80 Cycles	300 Cycles
Water Absorption Maximum **	20%	16%	14%
Shear Modulus, G, ASTM D 4015	172,000 kPa (25,000 psi)	231,000 kPa (34,000 psi)	
Young Modulus, E, ASTM D 4015	469,000 kPa (67,000 psi)	772,000 kPa (102,000 psi)	

* Specimens shall not be oven dried for the compressive strength test.

** Percentage after 120 days. Long term total immersion as a percent of cast density in accordance with ASTM C 796.

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(a) CCF Cast Density. The density shall be monitored at the point of placement at hourly intervals during placement. Adjustments shall be made as necessary to maintain the specified cast density, $\pm 10\%$. If two consecutive test results are failing, operations shall cease and corrective action taken before placement of the CCF resumes.

(b) Foam Density. Foam density shall be tested twice during each 24 h period for each mixer. The foam density shall be within 10% of the target provided in the approved mix design.

216.05 Storage and Handling. Protection of the material during and after placement shall be in accordance with the manufacturer's recommendations.

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216.06 Weather Limitations. CCF shall be placed when the ambient temperature is 0EC (32EF) or above. CCF shall not be placed on frozen subsoil. The installation procedure shall not begin if a temperature of less than 0EC (32EF) is expected within a 10 h time period from the completion of the CCF placement, unless recommended by the manufacturer.

216.07 Preparation of Subgrade. The subgrade shall be prepared in accordance with 207. All standing water shall be removed prior to placement of CCF.

60 **216.08 Installation.** CCF shall be proportioned, mixed, and placed in lifts as recommended by the manufacturer. Transit mixers will not be acceptable for mixing the CCF. The CCF shall not be subjected to load nor disturbed by construction activities until a minimum compressive strength of 175 kPa (25 psi) has been achieved.

The final surface finish shall be within ± 30 mm (0.1 ft) of the plan elevation.

70 **216.09 Lots.** Lots will be defined as 250 m³ (300 cyd) of CCF placed. A partial lot equal to or less than 50 m³ (60 cyd) shall be included in the previous lot. A partial lot greater than 50 m³ (60 cyd) but less than 250 m³ (300 cyd), will be considered a full lot.

216.10 Testing. Acceptance of the work will be based on successful test results for compressive strength. The Contractor shall cast four specimens for each lot. Testing of the specimens will be in accordance with ASTM C 495, except test specimens shall be covered immediately after casting. The specimens shall be moist cured for 26 days and then air cured for two days prior to the compressive strength testing. The specimens shall not be oven dried. Test specimens will become the property of the Department after curing and will be tested at 28 days.

80 **216.11 Method of Measurement.** CCF will be measured by the cubic meter (cubic yard) for each class as computed from the neat line limits shown on the plans, or as adjusted.

216.12 Basis of Payment. CCF will be paid for at the contract unit price per cubic meter (cubic yard) of the class specified.

Payment will be made under:

Pay Item	Metric Pay Unit Symbol (English Pay Unit Symbol)
Cellular Concrete Fill _____	m3 (CYS)
class	

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Water, curing, molds, equipment, materials, and other incidentals necessary for finishing CCF specimens shall be included in the cost of CCF.

No payment will be made for replacement of damaged CCF.