



INDIANA DEPARTMENT OF TRANSPORTATION

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Michael R. Pence, Governor
Brandye L. Hendrickson,
Commissioner

AGENDA

June 16, 2016 Standards Committee Meeting

MEMORANDUM

June 01, 2016

TO: Standards Committee

FROM: Scott Trammell, Secretary

RE: Agenda for the June 16, 2016 Standards Committee Meeting

A Standards Committee meeting is scheduled for 09:00 a.m. on June 16, 2016 in the N955 Bay Window Conference Room. Please enter meeting through the double doors directly in front of the conference room.

The following items are listed for consideration:

A. GENERAL BUSINESS ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

1. *Approval of the Minutes from the May 19, 2016 meeting*

B. CONCEPTUAL PROPOSAL ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

(No items on this agenda)

C. STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
PROPOSED ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

Item No. 01 (2016 SS) Mr. Beeson pg 4
SECTION 401 QUALITY CONTROL/QUALITY ASSURANCE,
QC/QA, HOT MIX ASPHALT, HMA,
PAVEMENT

Item No. 02 (2016 SS) Mr. Beeson pg 35
402.04 Design Mix Formula
402.06 ~~Job Mix Formula~~ Blank
402.07 Mix Criteria
402.08 Recycled Materials
402.09 Acceptance of Mixtures
402.13 Spreading and Finishing

Item No. 03 (2016 SS) Mr. Beeson pg 43
SECTION 410 QUALITY CONTROL/QUALITY ASSURANCE,
QC/QA, HMA SURFACE - SMA PAVEMENT
(VARIOUS SECTIONS)

Item No. 04 (2016 SS) Mr. Beeson pg 53
414.02 Materials
414.03 ~~Job~~ Design Mix Formula
414.04 Mix Design
414.05 Use of Recycled Materials
414.06 Quality Control
414.13 Smoothness

Item No. 05 (2016 SS) Mr. Beeson pg 60
502.04(a) Portland Cement Concrete
702.02 Classes of Concrete

Item No. 06 (2016 SS) Mr. Beeson pg 64
507.05 PCCP Patching
604.07 HMA Sidewalk
610.03 General Requirements

Item No. 07 (2016 SS) Mr. Beeson pg 68
702.05 Proportioning

<u>Item No. 08</u> (2016 SS)	<u>Mr. Beeson</u>	<u>pg 74</u>
808.11(e)	Removal of Markers	
<u>Item No. 09</u> (2016 SS)	<u>Mr. Beeson</u>	<u>pg 78</u>
901.03(b)1	Requirements	
<u>Item No. 10</u> (2016 SS)	<u>Mr. Beeson</u>	<u>pg 82</u>
902.01(b)	Asphalt Emulsions	
902.02	Sampling and Testing Asphalt Materials	
<u>Item No. 11</u> (2016 SS)	<u>Mr. Beeson</u>	<u>pg 89</u>
904.01	Aggregates	
904.02(a)	For HMA Mixtures	
904.02(c)	For SMA Mixtures	
904.03(a)	Classification of Aggregates	
904.03(b)	Coarse Aggregate Angularity for HMA and SMA	
<u>Item No. 12</u> (2016 SS)	<u>Mr. Beeson</u>	<u>pg 98</u>
Recurring Special Provision:		
203-R-628	COMPACTION ACCEPTANCE WITH LWD	
<u>Item No. 13</u> (2016 SS)	<u>Mr. Dave</u>	<u>pg 103</u>
718.05	Underdrains Outlets	
Standard Drawing:		
718-UNDR-02	UNDERDRAINS DETAILS	
<u>Item No. 14</u> (2016 SS)	<u>Mr. Boruff</u>	<u>pg 108</u>
Recurring Special Provision:		
922-T-XXX	TETHER BRACKETS	
Standard Drawings:		
805-SGSC-01	POLE ALIGNMENT	
805-SGSC-02	STEEL SIGNAL STRAIN POLE FOUNDATION DETAILS	
805-SGSC-03	CABLE SPAN ATTACHMENT	
805-SGSC-04	SPAN, CATENARY & TETHER DETAIL	

cc: Committee Members
FHWA
ICI

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Potential exploitation of weaknesses in the spec. Pay factors not evenly weighted. RAP content too high.

PROPOSED SOLUTION: Revise pay factors, eliminate superfluous language, reduce ESAL categories, reduce number of binder grades, remove JMF concept, reduce RAP allowance, increase conditioning time

APPLICABLE STANDARD SPECIFICATIONS: 401

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: 304-15A

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: HMA, base, intermediate, surface cat 1 or 5

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x 204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval. Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? N

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? Y

Construction time? Y

Customer satisfaction? Y

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? Y

Will this item improve safety:

For motorists? Y

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? Y

Asset preservation? Y

Design process? Y

Will this change provide the contractor more flexibility? Y

Will this proposal provide clarification for the Contractor and field personnel? Y

Can this item improve/reduce the number of potential change orders?
Y

Is this proposal needed for compliance with:

Federal or State regulations? Y

AASHTO or other design code? N

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: This is a culmination of collaboration of INDOT and INDUSTRY partners over the last 5 months.

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 401, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 401 – QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

401.01 Description

This work shall consist of one or more courses of QC/QA HMA base, intermediate, or surface mixtures constructed on prepared foundations in accordance with 105.03.

401.02 Quality Control

The HMA shall be supplied from a certified HMA plant in accordance with ITM 583; Certified Hot Mix Asphalt Producer Program. The HMA shall be transported and placed according to a Quality Control Plan, QCP, prepared and submitted by the Contractor in accordance with ITM 803; Contractor Quality Control Plans for Hot Mix Asphalt Pavements. The QCP shall be submitted to the Engineer at least 15 days prior to commencing HMA paving operations.

When a safety edge is required for a project, the QCP shall identify the device or devices in accordance with 409.03(c) to be used for constructing the safety edge.

MATERIALS

401.03 Materials

Materials shall be in accordance with the following:

Asphalt Materials	
PG Binder.....	902.01(a)
Coarse Aggregates	904
Base Mixtures – Class D or Higher	
Intermediate Mixtures – Class C or Higher	
Surface Mixtures* – Class B or Higher	
Fibers.....	AASHTO M 325
Fine Aggregates	904

*Surface aggregate requirements are listed in 904.03(d).

401.04 Design Mix Formula

A design mix formula, DMF, shall be prepared in accordance with 401.05 and submitted in a format acceptable to the Engineer one week prior to use. *The DMF shall be based on the ESAL category identified in the pay item and shall state the mixture designation and maximum particle size in the mixture. No mixture will be accepted for use until the DMF has been assigned a mixture number by the Engineer.*

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

~~The DMF shall state the maximum particle size in the mixture.~~ The DMF shall state the calibration factor, test temperature, and absorption factors to be used for the determination of binder content using the ignition oven in accordance with ITM 586, the binder content by extraction in accordance with ITM 571, *the ΔPb determined in accordance with ITM 591* and a Mixture Adjustment Factor, MAF. The DMF shall state the source, type, and dosage rate of any stabilizing additives. ~~Approval of the DMF will be based on the ESAL and mixture designation. A mixture number will be assigned by the Engineer. No mixture will be accepted until the DMF has been approved.~~

The ESAL category identified in the pay item correlates to the following ESAL ranges.

ESAL CATEGORY	ESAL
1	< 300,000
2*	300,000 to < 3,000,000
3	3,000,000 to < 10,000,000
4*	≥10,000,000 to < 30,000,000
5	≥ 30,000,000

**A category 2 mixture shall replace a category 1 mixture and a category 4 mixture shall replace a category 5 mixture.*

The plant discharge temperature for any mixture shall not be more than 315°F whenever ~~PG 58-28, PG 64-22, PG 64-28~~ or PG 70-22 binders are used or *not more than 325°F whenever PG 70-28 or PG 76-22 binders are used.* QC/QA HMA may be produced using a water-injection foaming device. The DMF shall list the minimum and maximum plant discharge temperatures as applicable to the mixture.

401.05 Volumetric Mix Design

The DMF shall be determined for each mixture from a volumetric mix design by a design laboratory selected from the Department's list of approved Mix Design Laboratories. A volumetric mixture shall be designed in accordance with AASHTO R 35 and the respective AASHTO reference as listed below. *All loose mixture shall be conditioned for 4 h in accordance with AASHTO R 30 prior to testing. Steel furnace slag coarse aggregate, when used in an intermediate or base mixture application, shall have a deleterious content less than 4.0% as determined in accordance with ITM 219.*

Bulk Specific Gravity and Density of Compacted Asphalt
 Mixtures Using Automatic Vacuum SealingAASHTO T 331

The single percentage of aggregate passing each required sieve shall be within the limits of the following gradation tables:

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

Dense Graded, Mixture Designation – Control Point (Percent Passing)					
	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm**
Sieve Size					
50.0 mm					
37.5 mm	100.0				
25.0 mm	90.0 - 100.0	100.0			
19.0 mm	< 90.0	90.0 - 100.0	100.0		
12.5 mm		< 90.0	90.0 - 100.0	100.0	100.0
9.5 mm			< 90.0	90.0 - 100.0	95.0 - 100.0
4.75 mm				< 90.0	90.0 - 100.0
2.36 mm	19.0 - 45.0	23.0 - 49.0	28.0 - 58.0	32.0 - 67.0*	
1.18 mm					30.0 - 55.0
600 µm					
300 µm					
75 µm	1.0 - 7.0	2.0 - 8.0	2.0 - 10.0	2.0 - 10.0	3.0 - 8.0
* The mix design gradation shall be less than or equal to the PCS control point for <i>all</i> 9.5 mm category 3, 4 and 5 surface mixtures. <i>The mix design gradation can be greater than the PCS control point when used on non-Department maintained facilities.</i>					
** The total blended aggregate gradation for the 4.75 mm mixture shall have a fineness modulus greater than or equal to 3.30 as determined in accordance with AASHTO T 27.					

PCS Control Point for Mixture Designation (Percent Passing)					
Mixture Designation	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm
Primary Control Sieve	4.75 mm	4.75 mm	2.36 mm	2.36 mm	n/a
PCS Control Point	40	47	39	47	n/a

Open Graded, Mixture Designation – Control Point (Percent Passing)			
	OG9.5 mm	OG19.0 mm	OG25.0 mm
Sieve Size			
37.5 mm			100.0
25.0 mm		100.0	70.0 – 98.0
19.0 mm		70.0 – 98.0	50.0 – 85.0
12.5 mm	100.0	40.0 – 68.0	28.0 – 62.0
9.5 mm	75.0 – 100.0	20.0 – 52.0	15.0 – 50.0
4.75 mm	10.0 – 35.0	10.0 – 30.0	6.0 – 30.0
2.36 mm	0.0 – 15.0	7.0 – 23.0	7.0 – 23.0
1.18 mm		2.0 – 18.0	2.0 – 18.0
600 µm		1.0 – 13.0	1.0 – 13.0
300 µm		0.0 – 10.0	0.0 – 10.0
150 µm		0.0 – 9.0	0.0 – 9.0
75 µm	0 – 6.0	0.0 – 8.0	0.0 – 8.0
% of Binder	> 3.0	> 3.0	> 3.0

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

Dust/Calculated Effective Binder Ratio shall be ~~taken from 0.6 to 1.2~~ ~~1.4~~, ~~when the aggregate gradation passes above the primary control sieve, PCS, control point and 0.8 to 1.6 when the aggregate gradation is less than or equal to the PCS.~~ The Dust/Calculated Effective Binder Ratio for 4.75 mm mixtures shall be ~~0.8 to 2.0~~ in accordance with AASHTO M 323.

The optimum binder content shall produce $a \Delta Pb \leq 0.20$ as determined in accordance with ITM 591 and the following air voids at N_{des} :

AIR VOIDS AT OPTIMUM BINDER CONTENT								
	Dense Graded					Open Graded		
Mixture Designation	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm	25.0 mm	19.0 mm	9.5 mm
Air Voids	4.0%	4.0%	4.0%	4.0%	5.0%	15.0% - 20.0%		10.0% - 15.0%

The design for dense graded mixtures shall have at least four points, including a minimum of two points above and one point below the optimum. A one point design may be used for open graded mixtures.

The maximum specific gravity shall be mass determined in water in accordance with AASHTO T 209. The bulk specific gravity of the gyratory specimens shall be determined in accordance with AASHTO T 166, Method A or AASHTO T 275, if required, for dense graded mixtures and AASHTO T 331 for open graded mixtures.

The percent draindown of open graded mixtures shall not exceed 0.30% in accordance with AASHTO T 305. Open graded mixtures may incorporate recycled materials and fibers. The recycled materials shall be in accordance with 401.06, and the fiber type and minimum dosage rate shall be in accordance with AASHTO M 325. The binder for open graded mixtures may have the upper temperature classification reduced by 6°C from the specified binder grade if fibers are incorporated into the mixture or if a ~~minimum of 3.0%~~ reclaimed asphalt shingles by weight of the total mixture ~~are~~ used.

Dense graded mixture shall be tested for moisture susceptibility in accordance with AASHTO T 283 except that the loose mixture curing shall be replaced by mixture conditioning for ~~2-4 h~~ in accordance with AASHTO R 30. The minimum tensile strength ratio, TSR, shall be 80%. The 6 in. mixture specimens shall be compacted in accordance with AASHTO T 312. If anti-stripping additives are added to the mixture to be in accordance with the minimum TSR requirements, the dosage rate shall be submitted with the DMF.

A PG binder grade or source change will not require a new mix design. If the upper temperature classification of the PG binder is lower than the original PG grade, a new TSR value is required.

REVISION TO STANDARD SPECIFICATIONS

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The MAF equals the Gmm from the mixture design divided by the following: 2.465 for 9.5 mm mixtures and 2.500 for 12.5 mm, 19.0 mm, and 25.0 mm mixtures. If the MAF calculation results in a value where $0.980 \leq \text{MAF} \leq 1.020$, then the MAF shall be considered to be 1.000. If the MAF is greater than 1.020, the calculated MAF value shall have 0.020 subtracted from the value. If the MAF is less than 0.980, the calculated MAF value shall have 0.020 added to the value. The MAF does not apply to OG mixtures.

Changes in the source or types of aggregates shall require a new DMF. ~~A new DMF shall be submitted to the District Testing Engineer for approval one week prior to use.~~

The mixture design compaction temperature for the specimens shall be $300 \pm 9^\circ\text{F}$ for dense graded mixtures and 260°F for open graded mixtures.

Design criteria for each mixture shall be based on the ESAL shown in the contract documents and shall be as follows:

GYRATORY COMPACTION EFFORT					
ESAL	N_{ini}^*	N_{des}^*	N_{max}^*	Max. % Gmm @ N_{ini}	Max. % Gmm @ N_{max}
Dense Graded					
< 300,000	6	50	75	91.5	98.0
300,000 to < 3,000,000	7	75	115	90.5	98.0
3,000,000 to < 10,000,000	8	100	160	89.0	98.0
$\geq 10,000,000$ to < 30,000,000	8	100	160	89.0	98.0
$\geq 30,000,000$	9	125	205	89.0	98.0
Open Graded					
All ESAL	n/a	20	n/a	n/a	n/a

* N_{ini} , N_{des} , N_{max} - definitions are included in AASHTO R 35

VOIDS IN MINERAL AGGREGATE, VMA, CRITERIA @ N_{des}	
Mixture Designation	Minimum VMA, %
4.75 mm	16.0 17.0
9.5 mm	15.0
12.5 mm	14.0
19.0 mm	13.0
25.0 mm	12.0
OG19.0 mm	n/a
OG25.0 mm	n/a

VOIDS FILLED WITH ASPHALT, VFA, CRITERIA @ N_{des}	
ESAL	VFA, %

REVISION TO STANDARD SPECIFICATIONS

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< 300,000	70 - 80
300,000 to < 3,000,000	65 - 78
3,000,000 to < 10,000,000	65 - 75
≥ 10,000,000 to < 30,000,000	65 - 75
≥ 30,000,000	65 - 75

Notes: 1. For 9.5 mm mixtures, the specified VFA range shall be 73% to 76% for design traffic levels ≥ 3 million ESALs.
 2. For 25.0 mm mixtures, the specified lower limit of the VFA shall be 67% for design traffic levels < 0.3 million ESALs.
 3. For 4.75 mm mixtures, the specified VFA range shall be 66 67% to 79%.
 4. For OG9.5 mm, OG19.0 mm, OG25.0 mm mixtures, VFA is not applicable.

401.06 Recycled Materials

Recycled materials may consist of reclaimed asphalt pavement, RAP, or reclaimed asphalt shingles, RAS, or a blend of both. RAP shall be the product resulting from the cold milling or crushing of an existing HMA pavement. *Before entering the plant, The RAP shall be processed so that 100% will pass the 2 in. (50 mm) sieve and RAS shall be processed so that 100% will pass the 3/8 in. (9.5 mm) sieve when entering the HMA plant.* The RAP coarse aggregate shall pass the maximum size sieve for the mixture being produced and the RAS shall be 100% passing the 1/2 in. (12.5 mm) sieve. RAP for the ESAL category 3, 4 and 5 3 and 4 surface mixtures shall be 100% passing the 3/8 in. (9.5 mm) sieve and 95 to 100% passing the No. 4 (4.75 mm) sieve.

Recycled materials may be used as a substitute for a portion of the new materials required to produce HMA mixtures. The amount of total binder replaced by binder in the recycled material shall be computed as follows:

$$\text{Binder Replacement, \%} = \frac{(A \times B) + (C \times D)}{E} \times 100\%$$

where:

- A = RAP, % Binder Content by Mass of RAP
- B = RAP, % in Mixture by Total Mass of Mixture
- C = RAS, % Binder Content by Mass of RAS
- D = RAS, % in Mixture by Total Mass of Mixture
- E = Total, % Binder Content in Mixture by Total Mass of Mixture

RAS may be obtained from either pre-consumer or post-consumer asphalt shingles but the two RAS types shall not be blended together for use in HMA mixtures. Post-consumer asphalt shingles shall be in accordance with AASHTO MP 15 and prepared by a processing company with an IDEM Legitimate Use Approval letter. A copy of this letter shall be submitted to the Engineer. Deleterious material present in post-consumer asphalt shingles shall be limited to the percentages stated in AASHTO MP 15. Pre-consumer and post-consumer asphalt shingles shall not be blended for use in HMA mixtures.

REVISION TO STANDARD SPECIFICATIONS

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Post-consumer asphalt shingles shall be in accordance with the following:

- (a) *post-consumer asphalt shingles shall be essentially nail-free*
- (b) *extraneous metallic materials retained on or above the No. 4 (4.75 mm) sieve shall not exceed 0.5% by mass*
- (c) *extraneous non-metallic materials such as glass, rubber, soil, brick, paper, wood and plastic retained on or above the No. 4 (4.75 mm) sieve shall not exceed 1.5% by mass.*
- (d) *post-consumer shingles shall be prepared by a processing company with an IDEM Legitimate Use Approval letter. The approval letter shall be submitted to the Engineer.*

The recycled material percentages shall be as specified on the DMF. HMA mixtures utilizing recycled materials shall be limited to the binder replacement percentages in the following table:

HMA mixtures utilizing RAP or RAS or a blend of RAP and RAS:

MAXIMUM BINDER REPLACEMENT, %									
Mixture Category	Base and Intermediate					Surface			
	Dense Graded				Open Graded		Dense Graded		
	25.0 mm	19.0 mm	12.5 mm	9.5 mm	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm
1	40.0*				25.0		40.0*		
2	40.0 25.0 *				25.0*		40.0 25.0 *		
3	40.0 25.0 *				25.0*		25.0*		
4	40.0 25.0 *				25.0*		25.0*		
5	40.0*				25.0		25.0		

* RAS materials shall not contribute more than 25% by weight of the total binder content for any HMA mixture. The contribution of RAS to any HMA mixture shall be ≤ 3.0% by total mass of mixture and ≤ 15.0% binder replacement.

The combined aggregate properties shall be in accordance with 904. The combined aggregate bulk specific gravity shall be determined in accordance with ITM 584 and the combined aggregate gradation shall be in accordance with 401.05 for the HMA mixture specified.

~~HMA mixtures with a binder replacement less than or equal to 25.0% by weight of the total binder content by utilizing RAP or RAS or a blend of RAP and RAS materials shall use the specified binder grade.~~

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX
ASPHALT, HMA, PAVEMENT

~~HMA mixtures with a binder replacement greater than 25.0% and less than or equal to 40.0% by weight of the total binder content by utilizing RAP or a blend of RAP and RAS shall use a binder grade with upper and lower temperature classifications reduced by 6°C from the specified binder grade. RAS materials shall not contribute more than 25.0% by weight of the total binder content for any HMA mixture.~~

401.07 Lots and Sublots

Lots will be defined as 5,000 t of base or intermediate mixtures or 3,000 t of surface mixture. Lots will be further sub-divided into sublots not to exceed 1,000 t of base or intermediate mixtures or 600 t of surface mixture. Partial sublots of 100 t or less will be added to the previous subplot. Partial sublots greater than 100 t constitute a full subplot. Partial lots of four sublots or less will be added to the previous lot, if available.

401.08 Job Mix Formula

~~A job mix formula, JMF, shall be developed by a certified HMA producer. A JMF used in the current or previous calendar year that was developed to N_{des} will be allowed. The mixture compaction temperature shall be $300 \pm 9^{\circ}\text{F}$ for dense graded mixtures and $260 \pm 9^{\circ}\text{F}$ for open graded mixtures. The JMF shall list the minimum and maximum plant discharge temperatures as applicable to the mixture. The JMF for each mixture shall be submitted to the Engineer and shall use the same MAF as the DMF. A JMF of the same gyratory compactive effort ESAL category or higher approved in the current calendar year may be submitted for use.~~

401.09 Acceptance of Mixtures

Acceptance of mixtures for ~~binder content~~ VMA at N_{des} and air voids at N_{des} for each lot will be based on tests performed by the Engineer for dense graded 9.5 mm, 12.5 mm, 19.0 mm and 25.0 mm mixtures with original contract pay item quantities greater than or equal to 300 t. Acceptance of mixtures for binder content and air voids at N_{des} will be based on a type D certification in accordance with 402.09 for dense graded mixtures with original contract pay item quantities less than 300 t. Acceptance of mixtures for binder content and air voids at N_{des} for each lot will be based on a type D certification in accordance with 402.09 for dense graded 4.75 mm mixtures.

Acceptance of mixtures for binder content and air voids at N_{des} for each lot will be based on tests performed by the Engineer for open graded mixtures with original contract pay item quantities greater than or equal to 300 t. Acceptance of mixtures for binder content and air voids at N_{des} will be based on a type D certification in accordance with 402.09 for open graded mixtures with original pay item quantities less than 300 t, except the air voids tolerance shall be $\pm 3.5\%$ from the DMF ~~or JMF~~.

The Engineer will randomly select the location within each subplot for sampling in accordance with ITM 802. The first 300 t of the first subplot of the first lot for each mixture pay item will not be sampled. An acceptance sample will consist of plate samples obtained

REVISION TO STANDARD SPECIFICATIONS

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in accordance with ITM 802 and ITM 580. The Engineer will take immediate possession of the samples.

Acceptance samples will be reduced to the appropriate size for testing in accordance with ITM 587. The binder content *and gradation* will be determined in accordance with ITM 586 or ITM 571 as directed by the Engineer. The maximum specific gravity will be mass determined in water in accordance with AASHTO T 209.

The effective specific gravity, G_{se} , of the mixture will be determined in each subplot and reported from the acceptance sample testing.

The air voids will be determined in accordance with AASHTO R 35 based on the average bulk specific gravity from two gyratory specimens and the MSG for the subplot. The VMA will be determined in accordance with AASHTO R 35 based on the average bulk specific gravity from two gyratory specimens, the percent aggregate in the mixture from the subplot and the BSG of the aggregate blend from the DMF/JMF as applicable. The gyratory pills will be prepared in accordance with AASHTO T 312.

The dust/calculated effective binder ratio and the volume of effective binder in the mixture will be determined and reported from the acceptance sample testing conducted in each subplot. The volume of effective binder will be the difference between VMA and air voids. The Contractor shall take action in accordance with ITM 583 to address a dust/calculated effective binder ratio greater than 1.4 or a volume of effective binder in the mixture below design minimums.

The bulk specific gravity of gyratory specimens for dense graded mixtures will be determined in accordance with AASHTO T 166, Method A or AASHTO T 275, if required, except samples are not required to be dried overnight. The bulk specific gravity of gyratory specimens for open graded mixtures, OG19.0 mm, OG25.0 mm will be determined in accordance with AASHTO T 331.

A binder draindown test in accordance with AASHTO T 305 for open graded mixtures shall be completed once per lot in accordance with 401.07 and shall not exceed 0.50%.

~~The Engineer's acceptance test results for each subplot will be available after the subplot and testing are complete.~~ *The Engineer will make available the subplot acceptance test results after receiving the subplot quality control results from the Contractor.*

Air voids, binder content and VMA values will be reported to the nearest 0.01%. Draindown test results will be rounded to the nearest 0.01%. Rounding will be in accordance with 109.01(a).

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Pay factors for dense graded mixtures with original contract pay item quantities greater than or equal to one lot will be determined in accordance with 401.19(a). Partial lots of four sublots or less will have pay factors determined in accordance with 401.19(b) if the previous lot is not available.

Pay factors for dense graded mixtures with original contract pay item quantities greater than or equal to 300 t and less than one lot and open graded mixtures will be determined in accordance with 401.19(b).

The Contractor may request an appeal of the Engineer's test results in accordance with 401.20.

Fibers incorporated into the mixture will be accepted on the basis of a type A certification for the specified material properties for each shipment of fibers. Fibers from different manufacturers and different types of fibers shall not be intermixed.

In the event that an acceptance sample is not available to represent a subplot, all test results of the previous subplot will be used for acceptance. If the previous subplot is not available, the subsequent subplot will be used for acceptance.

Samples shall not be obtained from areas placed with paving equipment in accordance with 409.03(c)2 or 409.03(c)3. If a random location falls within this area, the Engineer will randomly select another location within the subplot for sampling. If an entire subplot falls within this area, test results from the previous subplot will be used for acceptance. If the previous subplot is not available, the subsequent subplot will be used for acceptance.

CONSTRUCTION REQUIREMENTS

401.10 General

Equipment for HMA operations shall be in accordance with 409. The Contractor shall submit to the Engineer written documentation that includes the manufacturer's make, model, serial number, manufactured year, and the manufacturer's literature with pictures. The documentation shall be submitted prior to use and shall certify that the paving equipment proposed for the project is new and includes the modifications or have been modified in accordance with the following.

The paver shall be equipped with means of preventing the segregation of the coarse aggregate particles when moving the mixture from the paver hopper to the paver augers. The means and methods used shall be in accordance with the paver manufacturer's instructions and may consist of chain curtains, deflector plates, or other such devices, or any combination of these.

The following specific requirements shall also apply to identified HMA pavers:

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1. Blaw-Knox HMA pavers shall be equipped with the Blaw-Knox Materials Management Kit, MMK.
2. ~~Cedarapids~~ Cedarapids HMA pavers shall be those that were manufactured in 1989 or later.
3. Barber-Green/Caterpillar HMA pavers shall be equipped with deflector plates as identified in the December, 2000 Service Magazine entitled "New Asphalt Deflector Kit {6630-DFL, 6631-DFL, or 6640-DFL}".

The Contractor is also required to demonstrate to the Engineer prior to use, that the modifications to the paving equipment have been implemented on all pavers to be used on the project.

Fuel oil, kerosene, or solvents shall not be transported in open containers on equipment. Cleaning of equipment and small tools shall not be accomplished on the pavement or shoulder areas.

Segregation or flushing or bleeding of HMA mixtures will not be allowed. Corrective action shall be taken to prevent continuation of these conditions. Segregated or flushed or bleeding HMA mixtures shall be removed if directed. All areas showing an excess or deficiency of binder shall be removed and replaced.

All mixtures that become loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced.

401.11 Preparation of Surfaces to be Overlaid

The subgrade shall be shaped to the required grade and sections, free from all ruts, corrugations, or other irregularities, and uniformly compacted and approved in accordance with 207. Milling of an existing pavement surface shall be in accordance with 306. Surfaces on which a mixture is placed shall be free from objectionable or foreign materials at the time of placement.

Prior to placing an open graded mixture, the underlying HMA course shall have a full width base seal applied in accordance with 415. The base seal materials shall be applied within three calendar days after all density cores in accordance with 401.16 have been obtained.

Rubblized concrete pavements shall be primed in accordance with 405. PCCP, milled asphalt surfaces, and asphalt surfaces shall be tacked in accordance with 406. Contact surfaces of curbing, gutters, manholes, and other structures shall be tacked in accordance with 406.

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All partially completed sections of roadway that are 8 in. or less in thickness shall be proofrolled prior to the placement of additional materials unless otherwise directed by the Engineer. Proofrolling shall be accomplished in accordance with 203.26. The contact pressure shall be 70 to 80 psi. Soft yielding areas shall be removed and replaced.

401.12 Process Control

The Engineer and Contractor will jointly review the operations to ensure compliance with the QCP. Continuous violations of compliance with the QCP will result in suspension of paving operations.

401.13 Weather Limitations

HMA courses of less than 138 lb/sq yd shall be placed when the ambient temperature and the temperature of the surface on which it is to be placed is 45°F or above. No mixture shall be placed on a frozen subgrade.

401.14 Spreading and Finishing

The mixture shall be placed upon an approved surface by means of laydown equipment in accordance with 409.03(c). Prior to paving, both the planned quantity and lay rate shall be adjusted by multiplying by the MAF. When mixture is produced from more than one DMF ~~or JMF~~ for a given pay item, the MAF will be applied to the applicable portion of the mixture for each. The temperature of each mixture at the time of spreading shall ~~not be more less than 18°F below the minimum mixing temperature as shown on the JMF for mixtures compacted in accordance with 402.15~~ 315°F whenever PG 64-22 or PG 70-22 binders are used or less than 325°F whenever PG 76-22 binders are used.

Planned HMA courses greater than 220 lb/sq yd placed under traffic, shall be brought up even with each adjacent lane at the end of each work day. Planned HMA courses less than or equal to 220 lb/sq yd shall be brought forward concurrently, within practical limits, limiting the work in one lane to not more than one work day of production before moving back to bring forward the adjacent lane. Traffic shall not be allowed on open graded mixtures.

Hydraulic extensions on the paver will not be allowed for continuous paving operations. Fixed extensions or extendable screeds shall be used on courses greater than the nominal width of the paver except in areas where the paving width varies. Hydraulic extensions may be used in tapers and added lanes less than 250 ft in length.

Automatic slope and grade controls shall be used as outlined in the QCP.

HMA mainline and HMA shoulders which are 8 ft or more in width shall be placed with paving equipment in accordance with 409.03(c)1.

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When laying mixtures with density not controlled by cores, the speed of the paver shall not exceed 50 ft per minute. Rollers shall be operated to avoid shoving of the HMA and at speeds not to exceed 3 mph. However, vibratory rollers will be limited to 2.5 mph.

The finished thickness of any course shall be at least two times but not more than four times the maximum particle size as shown on the DMF, except 4.75 mm mixtures shall be at least 1.5 times but not more than 3 times the maximum particle size shown on the DMF.

A safety edge shall be constructed at locations where a dense graded intermediate mixture or a surface mixture is constructed adjacent to an aggregate or earth shoulder.

Vibratory rollers in accordance with 409.03(d)4 shall not be operated in the vibratory mode at locations indicated on the plans. Oscillatory rollers in accordance with 409.03(d)5 will be allowed for use but the vertical impact force capability shall not be used. Density acceptance shall be in accordance with 401.16.

401.15 Joints

Longitudinal joints in the surface shall be at the lane lines of the pavement. Longitudinal joints below the surface shall be offset from previously constructed joints by approximately 6 in., and be located within 12 in. of the lane line.

Hot poured joint adhesive in accordance with 906 shall be applied to longitudinal joints constructed between two adjacent HMA courses in the top course of dense graded intermediate mixtures and all 4.75 mm, 9.5 mm and 12.5 mm surface mixture courses. This includes joints within the traveled way as well as between any of the following: traveled way and an auxiliary lane; traveled way and a paved shoulder; and auxiliary lane and a paved shoulder.

The material shall be heated in a jacketed, double boiler melting kettle. The kettle shall have an attached pressure feed wand system with applicator shoe.

The joint adhesive shall be applied to the face of the previously constructed edge at the joint using a wand applicator. Prior to application of the joint adhesive, the joint face shall be dry and free of loose material and foreign objects. The adhesive shall be applied on the joint face 1/8 in. thick at the temperature recommended by the manufacturer. Excess joint adhesive shall not be allowed to pool on the top of the previously constructed pavement course or the pavement to be overlaid. The application of the adhesive shall be made within the same day, but at least 30 minutes prior to construction of the longitudinal joint.

All 9.5 mm and 12.5 mm surface mixture longitudinal joints that have the joint adhesive applied shall be sealed using SS-1h or AE-NT asphalt emulsion in accordance with 902.01(b). The sealing operation shall not begin until all density cores in accordance

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with 401.16 and 401.20 have been obtained and the installation of pavement corrugations, when specified in accordance with 606, has been completed.

The liquid asphalt sealant shall be a minimum width of 24 in., centered on the joint line, and shall be extended, when necessary, to provide coverage beyond the edge of the pavement corrugation. The sealant shall be applied at an application rate of 0.03 ±0.01 gal./sq yd onto a dry surface, free of any foreign or loose material, using a distributor in accordance with 409.03(a). Areas receiving greater than 0.04 gal./sq yd shall be lightly broomed to reduce the effects of excess sealant on the pavement surface. The sealant temperature at the time of application shall be at least 135°F and shall not exceed 180°F. The ambient air and pavement temperatures at the time of application shall be greater than 32°F.

Temporary pavement markings in accordance with 801.12 shall be offset a sufficient distance from the longitudinal joint so as not to obstruct the installation of the pavement corrugations or the application of the liquid asphalt sealant. The sealant shall be cured a minimum of five days prior to applying the permanent pavement traffic markings in accordance with 808.

Transverse joints shall be constructed by exposing a near vertical full depth face of the previous course. For areas inaccessible to rollers, other mechanical devices shall be used to achieve the required density.

If constructed under traffic, temporary transverse joints shall be feathered to provide a smooth transition to the driving surface.

401.16 Density

Acceptance will be based on lots and sublots in accordance with 401.07.

Density of the compacted dense graded mixture will be determined from cores except where:

- (a) the total planned lay rate to be placed over a shoulder existing prior to the contract award is less than 385 lb/sq yd; or
- (b) the first lift of material placed at less than 385 lb/sq yd over a shoulder existing prior to the contract award.

Density of any random core location in these areas will be assigned a value of 92.0% MSG and compaction shall be in accordance with 402.15.

Open graded mixtures shall be compacted with six passes of a static tandem roller and will be assigned a value of 84.0% MSG. Vibratory rollers shall not be used on open graded mixtures.

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Compaction of 4.75 mm mixtures shall be in accordance with 402.15, except vibratory rollers shall be operated in static mode and the vertical impact force capability of oscillatory rollers shall not be used.

Compaction of mixtures with original contract pay item quantities less than 300 tons shall be in accordance with 402.15.

Density acceptance by cores will be based on samples obtained from two random locations selected by the Engineer within each subplot in accordance with ITM 802. One core shall be cut at each random location in accordance with ITM 580. The transverse core location will be located so that the edge of the core will be no closer than 3 in. from a confined edge or 6 in. from a non-confined edge of the course being placed. The maximum specific gravity will be determined from the samples obtained in 401.09.

The Contractor shall obtain cores in the presence of the Engineer with a device that shall produce a uniform 6 in. diameter pavement sample. Coring shall be completed prior to the random location being covered by the next course. Surface courses shall be cored within two work days of placement. Damaged core shall be discarded and replaced with a core from a location selected by adding 1 ft to the longitudinal location of the damaged core using the same transverse offset.

The Contractor and the Engineer shall mark the core to define the course to be tested. If the core indicates a course thickness of less than two times the maximum particle size, the core will be discarded and a core from a new random location will be selected for testing.

Cores shall not be obtained from areas placed with paving equipment in accordance with 409.03(c)2 or 409.03(c)3. If a random location falls within this area, the Engineer will randomly select another location within the subplot for coring. If an entire subplot falls within this area, test results from the previous subplot will be used for acceptance. If the previous subplot is not available, the subsequent subplot will be used for acceptance.

The Engineer will take immediate possession of the cores. If the Engineer's cores are subsequently damaged, additional coring will be the responsibility of the Department. Subsequent core locations will be determined by subtracting 1 ft from the random location using the same transverse offset.

The density for the mixture will be expressed as the percentage of maximum specific gravity, % MSG, obtained by dividing the average bulk specific gravity by the maximum specific gravity for the subplot, times 100. Samples for the bulk specific gravity and maximum specific gravity will be dried in accordance with ITM 572. The Engineer will determine the bulk specific gravity of the cores in accordance with AASHTO T 166,

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Method A or AASHTO T 275, if required. The maximum specific gravity will be mass determined in water in accordance with AASHTO T 209.

Within one work day of coring operations the Contractor shall clean, dry, and refill the core holes with HMA of similar or smaller size particles.

The Engineer's acceptance test results for each subplot will be available when the subplot testing is complete. Acceptance of the pavement for density (% MSG) will be reported to the nearest 0.01%. Rounding will be in accordance with 109.01(a).

401.17 Pavement Corrugations

Pavement corrugations shall be in accordance with 606.

401.18 Pavement Smoothness

Pavement smoothness will be accepted by means of a profilograph, a 16 ft long straightedge, or a 10 ft long straightedge as described below.

(a) Profilograph

When a pay item for Profilograph, HMA is included in the contract, the Contractor shall furnish, calibrate, and operate an approved profilograph in accordance with ITM 912 on the mainline traveled way and ramps, including adjacent acceleration or deceleration lane, where all of the following conditions are met:

1. The design speed is greater than 45 mph.
2. The traveled way or ramp lane width is constant and is 0.1 mi in length or longer.
3. The HMA is placed on a milled surface or the total combined planned lay rate of surface, intermediate, and base courses is 385 lb/sq yd or greater.

The profilogram produced shall become the property of the Department. The profilograph shall remain the property of the Contractor.

The project area, less paving exceptions and areas exempt from profilograph operation in accordance with ITM 912, will be divided into individual smoothness sections measuring 0.1 mi in length for each lane. Partial length smoothness sections adjacent to project limits, paving exceptions, or areas exempt from profilograph operation will be considered in accordance with ITM 912.

If the original contract pay item quantity for a surface mixture is less than or equal to one subplot, the item will be exempt from profilograph operation and the smoothness will be accepted in accordance with 401.18(b).

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If the posted speed limit for an entire smoothness section is less than or equal to 45 mph, the section will be exempt from profilograph operation and the smoothness within the section will be accepted in accordance with 401.18(b).

If the posted speed limit is greater than 45 mph for a portion of a smoothness section and is less than or equal to 45 mph for the remainder, the section smoothness acceptance will be as follows:

1. By profilograph for the portion of the section with a posted speed limit greater than 45 mph.
2. In accordance with 401.18(b) for the portion of the section with a posted speed limit less than or equal to 45 mph.

At locations where the profilograph is required, it shall be used on the surface course and on any dense graded intermediate course immediately below the surface course.

(b) 16 ft Straightedge and 10 ft Straightedge

The Department will furnish and operate 16 ft and 10 ft straightedges as described below. The 16 ft straightedge is used to accept smoothness along the direction of mainline traffic and the 10 ft straightedge is used to accept smoothness transverse to the direction of mainline traffic. This includes longitudinal smoothness on public road approaches and median crossovers.

For contracts which include the Profilograph, HMA pay item, the 16 ft long straightedge will be used to accept longitudinal smoothness on surface courses at the following locations:

1. All mainline traveled way lanes shorter than 0.1 mi.
2. All mainline traveled way lanes within smoothness sections with posted speed limits less than or equal to 45 mph throughout the entire section length.
3. All mainline traveled way lanes at locations exempted from profilograph operation in accordance with ITM 912.
4. All tapers.
5. All turn lanes, including bi-directional left turn lanes.
6. All ramps with design speeds of 45 mph or less.

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7. All acceleration and deceleration lanes associated with ramps with design speeds of 45 mph or less.
8. All shoulders.

For contracts where the profilograph is not used for smoothness acceptance, the 16 ft straightedge will be used to accept longitudinal smoothness on all dense graded courses at the above locations as well as all mainline travel way lanes and ramps with design speeds of greater than 45 mph. Smoothness acceptance on ramp acceleration or deceleration lanes will also be based on operation of the 16 ft straightedge.

The 10 ft long straightedge shall be used to check transverse slopes, across travel lanes and shoulders, approaches, and crossovers.

(c) Smoothness Correction

At locations where the profilograph is being used on an intermediate course, all areas having a high or low point deviation in excess of 0.3 in. shall be corrected. After corrective action is taken on an intermediate course, a 16 ft straightedge may be used to verify the adequacy of the corrective action.

At locations where the profilograph is being used on a surface course, all areas having a high or low point deviation in excess of 0.3 in. shall be corrected. All smoothness sections with a deficient profile index in accordance with 401.19(c) shall be corrected. Underlying courses that are exposed by corrective action shall be milled to a depth of 1 1/2 in and replaced with surface course. After the corrective action is taken on a surface course, the profilograph shall be operated throughout the entire affected smoothness section to verify the adequacy of the corrective action.

At locations where the 16 ft straightedge is used, the pavement variations shall be corrected to 1/4 in. or less. When the 10 ft straightedge is used, the pavement variations shall be corrected to 1/8 in. or less.

If grinding of an intermediate course is used for pavement smoothness corrections, the grinding shall not precede the surface placement by more than 30 calendar days if open to traffic.

401.19 Pay Factors

(a) Dense Graded Mixture \geq One Lot

Pay factors, PF, are calculated for the ~~binder content~~, air voids at N_{des} VMA at N_{des} and in-place density, % Gmm. The Percent Within Limits, PWL, for each lot will be determined in accordance with ITM 588. The appropriate pay factor for each property is calculated as follows:

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Estimated PWL greater than 90:

$$PF = (105.00 - 0.50 \times (100.00 - PWL)) / 100$$

$$PF = (0.50 \times PWL) + 55.00$$

Estimated PWL greater than or equal to 50 and equal to or less than 90:

$$PF = (100.00 - 0.000020072 \times (100.00 - PWL)^{3.5877}) / 100$$

$$PF = (0.625 \times PWL) + 43.75$$

If the Lot PWL for any one of the properties is less than 50 or a subplot has an air void content less than 1.0% or greater than 7.0%, the lot will be referred to the Office of Materials Management for adjudication as a failed material in accordance with normal Department practice as listed in 105.03.

~~Binder content~~, Air voids, VMA, and in-place density, % Gmm, PF values will be reported to the nearest 0.01. Rounding will be in accordance with 109.01(a).

A composite pay factor for each lot based on test results for mixture properties and density is determined by a weighted formula as follows:

$$\text{Lot PF} = 0.20(PF_{\text{BINDER}}) + 0.35(0.30(PF_{\text{VOIDS}}) + 0.10(0.35(PF_{\text{VMA}}) + 0.35(PF_{\text{DENSITY}})))$$

where:

- Lot PF = Lot Composite Pay Factor for Mixture and Density
- ~~PF_{BINDER}~~ = Lot Pay Factor for Binder Content
- PF_{VOIDS} = Lot Pay Factor for Air Voids at N_{des}
- PF_{VMA} = Lot Pay Factor for VMA at N_{des}
- PF_{DENSITY} = Lot Pay Factor for In-Place Density, %Gmm

The lot quality assurance adjustment for mixture properties and density is calculated as follows:

$$q = L \times U \times (\text{Lot PF} - 1.00) / \text{MAF}$$

where:

- q = quality assurance adjustment for mixture properties and density of the lot
- L = Lot quantity
- U = Unit price for the material, \$/ton
- Lot PF = Lot Pay Factor

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Lot test results for ~~binder content~~, air voids at N_{des} , VMA at N_{des} , and density will be used to determine the Lot Pay Factors.

The specification limits for ~~binder content~~, air voids at N_{des} , VMA at N_{des} , and density will be as follows:

SPECIFICATION LIMITS			
MIXTURE			
	LSL*		USL**
Binder Content, %	-0.40 from JMF		+ 0.40 from JMF
Air Voids at N_{des} , %	2.60		5.40
Voids In Mineral Aggregate at N_{des} , %	Greater of		Lesser of
	Spec -0.50	JMF -1.20	Spec + 2.00 JMF +1.20
DENSITY			
	LSL*		USL**
Roadway Core Density (% Gmm), %	91.00		n/a
* LSL, Lower Specification Limit			
** USL, Upper Specification Limit			

(b) Dense Graded Mixture < One Lot and Open Graded Mixture

A composite pay factor for each subplot based on test results for mixture properties and density is determined in a weighted formula as follows:

Dense Graded Mixture:

$$SCPF = 0.20(PF_{BINDER}) + 0.35(0.30)(PF_{VOIDS}) + 0.10(0.35)(PF_{VMA}) + 0.35(PF_{DENSITY})$$

Open Graded Mixture:

$$SCPF = 0.20(PF_{BINDER}) + 0.35(PF_{VOIDS}) + 0.45$$

where:

SCPF = Sublot Composite Pay Factor for Mixture and Density

PF_{BINDER} = Lot Pay Factor for Binder Content

PF_{VOIDS} = Sublot Pay Factor for Air Voids at N_{des}

PF_{VMA} = Sublot Pay Factor for VMA at N_{des}

$PF_{DENSITY}$ = Sublot Pay Factor for Density

If the SCPF for a subplot is less than 0.85, the Office of Materials Management will evaluate the pavement. If the Contractor is not required to remove the mixture, quality assurance adjustments of the lot will be assessed or other corrective actions taken as determined by the Office of Materials Management.

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The subplot quality assurance adjustment for mixture properties and density is calculated as follows:

$$q = L \times U \times (\text{SCPF} - 1.00) / \text{MAF}$$

where:

- q = quality assurance adjustment for the subplot
- L = subplot quantity
- U = unit price for the material \$/ton
- SCPF = subplot composite pay factor

Sublot test results for mixture properties will be assigned pay factors in accordance with the following:

BINDER CONTENT		
Dense Graded	Open Graded	Pay Factor
Deviation from JMF (± %)	Deviation from JMF DMF (± %)	
≤ 0.2	≤ 0.2	1.05
0.3	0.3	1.04
0.4	0.4	1.02
0.5	0.5	1.00
0.6	0.6	0.90
0.7	0.7	0.80
0.8	0.8	0.60
0.9	0.9	0.30
1.0	1.0	0.00
> 1.0	> 1.0	Submitted to the Office of Materials Management*
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

VMA		
Dense Graded	Open Graded	Pay Factor
Deviation from JMF (± %)	Deviation from JMF (± %)	
≤ 0.5		1.05
> 0.5 and ≤ 1.0	AH	1.00
> 1.0 and ≤ 1.5		0.90
> 1.5 and ≤ 2.0		0.70
> 2.0 and ≤ 2.5		0.30

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> 2.5	Submitted to the Office of Materials Management*
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.	

VMA		
<i>Dense Graded</i>	<i>Open Graded</i>	<i>Pay Factor</i>
<i>Deviation from Spec Minimum</i>	<i>Deviation from Spec Minimum</i>	
$> + 2.5$		<i>Submitted to the Office of Materials Management*</i>
$> + 2.0 \text{ and } \leq + 2.5$		0.25
$> + 1.5 \text{ and } \leq + 2.0$		0.65
$> + 0.5 \text{ and } \leq + 1.5$		1.05
$\geq 0.0 \text{ and } \leq + 0.5$	<i>All</i>	1.00
$\geq - 0.5 \text{ and } < 0.0$		0.85
$\geq - 1.0 \text{ and } < - 0.5$		0.65
$\geq - 1.5 \text{ and } < - 1.0$		0.45
$\geq - 2.0 \text{ and } < - 1.5$		0.25
$\geq - 2.5 \text{ and } < - 2.0$		0.00
$< - 2.5$		<i>Submitted to the Office of Materials Management*</i>
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

AIR VOIDS		
<i>Dense Graded</i>	<i>Open Graded</i>	<i>Pay Factor</i>
<i>Deviation from JMF DMF (\pm %)</i>	<i>Deviation from JMF DMF (\pm %)</i>	
≤ 0.5	≤ 1.0	1.05
$> 0.5 \text{ and } \leq 1.0$	$> 1.0 \text{ and } \leq 3.0$	1.00
1.1	3.1	0.98
1.2	3.2	0.96
1.3	3.3	0.94
1.4	3.4	0.92
1.5	3.5	0.90
1.6	3.6	0.84
1.7	3.7	0.78
1.8	3.8	0.72
1.9	3.9	0.66
2.0	4.0	0.60
> 2.0	> 4.0	<i>Submitted to the Office of Materials Management*</i>

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* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.

For mixtures produced during a plant's adjustment period, pay factors based on the ~~JMFDMF~~ with the above tolerances will be used to compute quality assurance adjustments.

Sublot test results for density will be assigned pay factors in accordance with the following:

DENSITY		
Percentages are based on %MSG		Pay Factors, %
Dense Graded	Open Graded	
≥ 97.0		Submitted to the Office of Materials Management*
95.6 - 96.9		1.05 - 0.01 for each 0.1% above 95.5
94.0 - 95.5		1.05
93.1 - 93.9		1.00 + 0.005 for each 0.1% above 93.0
92.0 - 93.0	84.0	1.00
91.0 - 91.9		1.00 - 0.005 for each 0.1% below 92.0
90.0 - 90.9		0.95 - 0.010 for each 0.1% below 91.0
89.0 - 89.9		0.85 - 0.030 for each 0.1% below 90.0
≤ 88.9		Submitted to the Office of Materials Management*
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

The pay factors will be rounded to the nearest 0.01.

(c) Smoothness

Smoothness pay adjustments will only be applied when the smoothness is measured by a profilograph. The pay adjustment will be based on the profile index generated on the surface course only.

At locations where a profilograph is used to accept smoothness, a quality assurance adjustment will be determined for each 0.1 mile section of each lane. This adjustment will be applied to all QC/QA HMA pay items within the pavement section. The adjustment for each section will be calculated using the following formula:

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

$$q_s = (PF_s - 1.00) \sum_{i=1}^n \left(A \times \frac{S}{T} \times U \right)$$

where:

- q_s = quality assurance adjustment for smoothness for one section
- PF_s = pay factor for smoothness
- n = number of layers
- A = area of the section, sq yd
- S = planned spread rate for material, lb/sq yd
- T = conversion factor: 2,000 lb/ton
- U = unit price for the material, \$/ton.

For smoothness sections that are less than 0.1 mile in length or require profilograph operation along both lane edges, the profile index used to obtain the smoothness pay factor used in the above formula will be determined in accordance with ITM 912.

The quality assurance adjustment for smoothness, Q_s , for the contract will be the total of the quality assurance adjustments for smoothness, q_s , on each section by the following formula:

$$Q_s = \sum q_s$$

When smoothness is measured by a profilograph, payment adjustments will be made based on a zero blanking band on the final profile index in accordance with the following table. Regardless of the tabulated value, the maximum pay factor for a smoothness section where corrective action has been performed will be 1.00.

PAY FACTORS FOR SMOOTHNESS (PI _{0.0}) ZERO BLANKING BAND	
Design Speed greater than 45 mph	
Profile Index in./0.1 mi.	Pay Factor, PFs
Over 0.00 to 1.20	1.06
Over 1.20 to 1.40	1.05
Over 1.40 to 1.60	1.04
Over 1.60 to 1.80	1.03
Over 1.80 to 2.00	1.02
Over 2.00 to 2.40	1.01
Over 2.40 to 3.20	1.00
Over 3.20 to 3.40	0.96
All pavement with a profile index (PI _{0.0}) greater than 3.40 in. shall be corrected to a profile index less than or equal to 3.40 in.	

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

The total quality assurance adjustment is calculated as follows:

$$Q = Q_s + (\sum q)$$

where:

Q = total quality assurance adjustment

Q_s = quality assurance adjustment for smoothness

q = lot or subplot quality assurance adjustment.

401.20 Appeals

If the QC test results do not agree with the acceptance test results *in a subplot*, a request, along with *a comparison of the QC and acceptance* test results, may be made in writing for additional testing *of that subplot*. The appeal sample will be analyzed in a lab different than the lab that analyzed the original sample ~~when requested by the Contractor at the discretion of the Engineer.~~

The Contractor may appeal an individual subplot for the binder content, the MSG, the BSG of the gyratory specimens or the BSG of the density cores when the QC results are greater than one standard deviation from the acceptance test results as follows: 0.25 for binder content, 0.010 for the MSG and 0.010 for both the BSG of the gyratory specimens and the density cores.

A \$500.00 credit adjustment will be included in a quality adjustment pay item in accordance with 109.05.1(e) for each appealed subplot that did not result in an improvement to the SCPF or LCPF.

~~Additional testing may be requested for one or more of the following tests: MSG, BSG of the gyratory specimens, binder content, or BSG of the density cores.~~

~~The request for the appeal for MSG, BSG of gyratory specimens, binder content or BSG of the density cores of a subplot shall be submitted within seven calendar days of receipt of the Department's written results for the lot accepted under 401.19(a) or the subplot accepted under 401.19(b). The subplot and specific test(s) shall be specified at the time of the appeal request. Only one appeal request per lot for mixture accepted under 401.19(a) or subplot for mixture accepted under 401.19(b) is allowed. Upon approval of the appeal, the Engineer will perform additional testing as follows subplot.~~

The backup ~~or new~~ sample will be tested in accordance with the applicable test method for the ~~test subplot~~ requested *for all tests exceeding the subplot standard deviation criteria.*

(a) MSG

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX
ASPHALT, HMA, PAVEMENT

The backup MSG will be dried in accordance with ITM 572 and mass determined in water in accordance with AASHTO T 209.

(b) BSG of the Gyratory Specimen

New gyratory specimens will be prepared and tested in accordance with AASHTO T 312 from the backup sample.

(c) Binder Content

The backup binder content sample will be prepared and tested in accordance with the test method that was used for acceptance or as directed by the Engineer.

(d) BSG of the Density Core

Additional cores shall be taken within seven calendar days unless otherwise directed. Additional core locations will be determined by adding 1 ft longitudinally of the cores tested using the same transverse offset.-The appeal density cores will be dried in accordance with ITM 572 and tested in accordance with AASHTO T 166, Method A or AASHTO T 275, if required.

The appeal results will replace all previous test result for acceptance of mixture in accordance with 401.09 and density in accordance with 401.16. The results will be furnished to the Contractor.

401.21 Method of Measurement

HMA mixtures will be measured by the ton of the type specified, in accordance with 109.01(b). The measured quantity will be divided by the MAF to determine the pay quantity.

Milled shoulder corrugations will be measured in accordance with 606.02.

Joint adhesive will be measured by the linear foot in accordance with 109.01(a). Liquid asphalt sealant will be measured by the linear foot.

401.22 Basis of Payment

The accepted quantities for this work will be paid for at the contract unit price per ton for QC/QA-HMA, of the type specified, complete in place.

Payment for furnishing, calibrating, and operating the profilograph, and furnishing profile information will be made at the contract lump sum price for profilograph, HMA.

Adjustments to the contract payment with respect to mixture, density, and smoothness for mixture produced will be included in a quality adjustment pay item in accordance with 109.05.1.

Milled shoulder corrugations will be paid for in accordance with 606.03.

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

Joint adhesive will be paid for at the contract unit price per linear foot, complete in place. Liquid asphalt sealant will be paid for at the contract unit price per linear foot.

Payment will be made under:

Pay Item	Pay Unit Symbol
Joint Adhesive, _____ course type	LFT
Liquid Asphalt Sealant	LFT
Profilograph, HMA	LS
QC/QA-HMA, _____, _____, _____, _____mm (ESAL ⁽¹⁾) (PG ⁽²⁾) (Course ⁽³⁾) (Mix ⁽⁴⁾)	TON

- (1) ESAL Category as defined in 401.04
- (2) Number represents the high temperature binder grade. Low temperature grades are - 22
- (3) Surface, Intermediate, or Base
- (4) Mixture Designation

Preparation of surfaces to be overlaid shall be included in the cost of other pay items.

Coring and refilling of the core holes shall be included in the cost of other pay items within this section.

No payment will be made for additional anti-stripping additives, appeal coring or traffic control expenditures related to coring operations.

The cost of removing and replacing soft and yielding areas shall be included in the cost of other pay items in this section.

Corrections for pavement smoothness shall be included in the cost of other pay items within this section.

The price for Profilograph, HMA will be full compensation regardless of how often the profilograph is used or how many profilograms are produced.

If QC/QA-HMA intermediate over QC/QA-HMA base mixtures are specified, QC/QA-HMA intermediate mixture may be considered as a substitute for the QC/QA-HMA intermediate and QC/QA-HMA base mixtures upon a written request by the Contractor. The request for the substitution shall be prepared in advance of the work. A computation will be made in order to obtain a unit price for the QC/QA-HMA intermediate mixture. The quantity and amount for QC/QA-HMA intermediate mixture shall equal the sum of the contract quantities and amounts shown for QC/QA-HMA intermediate and

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX
ASPHALT, HMA, PAVEMENT

QC/QA-HMA base mixtures. The unit price for QC/QA-HMA intermediate mixture shall be equal to the sum of contract amounts divided by the sum of contract quantities. Payment for the QC/QA-HMA intermediate mixture will be made at the unit price per ton for QC/QA-HMA intermediate mixture. No payment will be made for additional work or costs which may result due to this change.

COMMENTS AND ACTION

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: <input type="checkbox"/> Passed as Submitted <input type="checkbox"/> Passed as Revised <input type="checkbox"/> Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: Section 401 pg 251 thru 275.</p>	<p><input type="checkbox"/> 2018 Standard Specifications <input type="checkbox"/> Revise Pay Items List</p>
<p>Recurring Special Provision affected: NONE</p>	<p><input type="checkbox"/> Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Standard Drawing affected: NONE</p>	<p><input type="checkbox"/> Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Design Manual Sections affected: 304-15A.</p>	<p><input type="checkbox"/> Standard Drawing Effective</p>
<p>GIFE Sections cross-references: NONE</p>	<p><input type="checkbox"/> Create RPD (No. _____) Effective _____ Letting <input type="checkbox"/> GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: In revamping the 401 spec, it was determined the 402 spec could similarly be updated and simplified to eliminate confusion and abuse.

PROPOSED SOLUTION: eliminate superfluous language, reduce mixture types, remove JMF concept, reduce RAP allowance

APPLICABLE STANDARD SPECIFICATIONS: 402, 507, 604, 610

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: 304-15a, 304-15b, 304-8.02(02)

APPLICABLE SECTION OF GIFE: 13-4

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: HMA base, intermediate, surface_Type A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report): 

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? Y

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? Y

Construction time? Y

Customer satisfaction? Y

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? Y

Will this item improve safety:

For motorists? Y

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? Y

Asset preservation? Y

Design process? Y

Will this change provide the contractor more flexibility? Y

Will this proposal provide clarification for the Contractor and field personnel? Y

Can this item improve/reduce the number of potential change orders?
Y

Is this proposal needed for compliance with:

Federal or State regulations? Y

AASHTO or other design code? N

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

REVISION TO STANDARD SPECIFICATIONS

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT

- 402.04 DESIGN MIX FORMULA
- 402.06 JOB MIX FORMULA
- 402.07 MIX CRITERIA
- 402.08 RECYCLED MATERIALS
- 402.09 ACCEPTANCE OF MIXTURES
- 402.13 SPREADING AND FINISHING

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 402, BEGIN LINE 32, DELETE AND INSERT AS FOLLOWS:

402.04 Design Mix Formula

A DMF shall be prepared in accordance with ~~402.05~~ 401.04 and submitted in a format acceptable to the Engineer one week prior to use. ~~The DMF shall state the maximum particle size in the mixture, the calibration factor and test temperature to be used for the determination of binder content using ITM 586 or ITM 571, and a MAF. Approval of the~~

~~The DMF will be based on the ESAL and mixture designation as follows:~~

Mixture Type	Type A	Type B	Type C	Type D
Design ESAL	200,000	2,000,000 <3,000,000	9,000,000 3,000,000 to <10,000,000	11,000,000 ≥10,000,000
Surface	4.75 mm	4.75 mm	4.75 mm	4.75 mm
	9.5 mm	9.5 mm	9.5 mm	9.5 mm
	12.5 mm	12.5 mm	12.5 mm	12.5 mm
Surface – PG Binder	64-22	64-22	70-22	70-22
Intermediate	9.5 mm	9.5 mm	9.5 mm	9.5 mm
	12.5 mm	12.5 mm	12.5 mm	12.5 mm
	19.0 mm	19.0 mm	19.0 mm	19.0 mm
	25.0 mm	25.0 mm	25.0 mm	25.0 mm
Intermediate – PG Binder	64-22	64-22	64-22	70-22
Base	19.0 mm	19.0 mm	19.0 mm	19.0 mm
	25.0 mm	25.0 mm	25.0 mm	25.0 mm
Base – PG Binder	64-22	64-22	64-22	64-22

Surface 4.75 mm mixtures shall not be used when the required lay rate shown on the plans is greater than 100 lb/sq yd. Surface 12.5 mm mixtures shall not be used when the required lay rate shown on the plans is less than 195 lb/sq yd.

The plant discharge temperature for any mixture shall not be more than 315°F whenever ~~PG 58-28, PG 64-22, PG 64-28~~ or PG 70-22 binders are used ~~or 325°F whenever PG 70-28 or PG 76-22 binders are used~~. HMA may be produced using a water-injection foaming device. The DMF shall list the minimum and maximum plant discharge temperatures as applicable to the mixture.

REVISION TO STANDARD SPECIFICATIONS

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT

- 402.04 DESIGN MIX FORMULA
- 402.06 JOB MIX FORMULA
- 402.07 MIX CRITERIA
- 402.08 RECYCLED MATERIALS
- 402.09 ACCEPTANCE OF MIXTURES
- 402.13 SPREADING AND FINISHING

~~The Engineer will assign a mixture number. No mixture will be accepted until the DMF has been approved. No mixture will be accepted for use until the DMF has been assigned a mixture number by the Engineer.~~

SECTION 402, BEGIN LINE 69, DELETE AND INSERT AS FOLLOWS:

402.06 Job Mix Formula~~Blank~~

~~The job mix formula, JMF, shall be an approved JMF in accordance with 401.08 of the same gyratory compaction effort ESAL category or higher, and submitted in a format acceptable to the Engineer and shall use the same MAF as the DMF. The JMF shall state the maximum particle size in the mixture and the calibration factor and test temperature to be used for the determination of binder content using the ignition oven. Approval of the JMF will be based on the ESAL and mixture designation. No mixture will be accepted until the JMF has been approved.~~

~~All changes in the type or source of aggregate shall require the submittal of a new DMF for approval.~~

SECTION 402, BEGIN LINE 81, DELETE AND INSERT AS FOLLOWS:

402.07 Mix Criteria

(a) Composition Limits for HMA Transverse Rumble Strip Mixtures

Transverse rumble strip mixtures shall be ~~type A~~ *type B* surface in accordance with 402.04. A MAF in accordance with 402.05 will not apply. Aggregate requirements of 904.03(d) do not apply.

(b) Composition Limits for HMA Wedge and Leveling Mixtures

The mixture shall consist of surface or intermediate mixtures in accordance with 402.04. Aggregate requirements of 904.03(d) do not apply when the wedge and leveling mixture is covered by a surface or intermediate mixture.

(c) Composition Limits for Temporary HMA Mixtures

Temporary HMA mixtures shall be the type specified in accordance with 402.04. A MAF in accordance with 402.05 will not apply.

(d) Composition Limits for HMA Curbing Mixes

The mixture shall be HMA surface ~~type A~~ *type B* in accordance with 402 except 402.05 shall not apply and RAP shall not be used. The binder content shall be 7.0% and the gradations shall meet the following.

SECTION 402, BEGIN LINE 108, DELETE AND INSERT AS FOLLOWS:

REVISION TO STANDARD SPECIFICATIONS

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT

- 402.04 DESIGN MIX FORMULA
- 402.06 JOB MIX FORMULA
- 402.07 MIX CRITERIA
- 402.08 RECYCLED MATERIALS
- 402.09 ACCEPTANCE OF MIXTURES
- 402.13 SPREADING AND FINISHING

402.08 Recycled Materials

Recycled materials may consist of reclaimed asphalt pavement, RAP, or reclaimed asphalt shingles, RAS or a blend of both. RAP shall be the product resulting from the cold milling or crushing of an existing HMA pavement. The RAP shall be processed so that 100% will pass the 2 in. (50 mm) sieve when entering the HMA plant. The RAP coarse aggregate shall pass the maximum size sieve for the mixture being produced and the RAS shall be 100% passing the 1/2 in. (12.5 mm) sieve. RAP for the type C and D surface mixtures shall be 100% passing the 3/8 in. (9.5 mm) sieve and 95 to 100% passing the No. 4 (4.75 mm) sieve shall be in accordance with 401.06 except type B mixtures shall correspond to category 2 mixtures, type C mixtures shall correspond to category 3 mixtures and type D mixtures shall correspond to category 4 mixtures.

Recycled materials may be used as a substitute for a portion of the new materials required to produce HMA mixtures. The amount of total binder replaced by binder in the recycled material shall be computed as follows:

$$\text{Binder Replacement, \%} = \frac{(A \times B) + (C \times D)}{E} \times 100\%$$

where:

- A = RAP, % Binder Content
- B = RAP, % in Mixture
- C = RAS, % Binder Content
- D = RAS, % in Mixture
- E = Total, % Binder Content in Mixture

RAS may be obtained from either pre-consumer or post-consumer asphalt shingles. Post-consumer asphalt shingles shall be in accordance with AASHTO MP 15 and prepared by a processing company with an IDEM Legitimate Use Approval letter. A copy of this letter shall be submitted to the Engineer. Deleterious material present in post-consumer asphalt shingles shall be limited to the percentages stated in AASHTO MP 15. Pre-consumer and post-consumer asphalt shingles shall not be blended for use in HMA mixtures and shall be stockpiled separately from other materials.

The recycled material percentages shall be as specified on the DMF. HMA mixtures utilizing recycled materials shall be limited to the binder replacement percentages in the following table:

HMA mixtures utilizing RAP or RAS or a blend of RAP and RAS

REVISION TO STANDARD SPECIFICATIONS

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT

402.04 DESIGN MIX FORMULA

402.06 JOB MIX FORMULA

402.07 MIX CRITERIA

402.08 RECYCLED MATERIALS

402.09 ACCEPTANCE OF MIXTURES

402.13 SPREADING AND FINISHING

MAXIMUM BINDER REPLACEMENT, %							
Mixture Category	Base and Intermediate				Surface		
	Dense Graded				Dense Graded		
	25.0 mm	19.0 mm	12.5 mm	9.5 mm	12.5 mm	9.5 mm	4.75 mm
A	40.0*				40.0*		
B	40.0*				40.0*		
C	40.0*				25.0		
D	40.0*				25.0		

* RAS materials shall not contribute more than 25% by weight of the total binder content for any HMA mixture.

The combined aggregate properties shall be in accordance with 904. The combined aggregate bulk specific gravity shall be determined in accordance with ITM 584 and the combined aggregate gradation shall be in accordance with 401.05 for the HMA mixture specified.

HMA mixtures with a binder replacement less than or equal to 25.0% by weight of the total binder content by utilizing RAP or RAS or a blend of RAP and RAS materials shall use the specified binder grade.

HMA mixtures with a binder replacement greater than 25.0% and less than or equal to 40.0% by weight of the total binder content by utilizing RAP or a blend of RAP and RAS shall use a binder grade with upper and lower temperature classifications reduced by 6°C from the specified binder grade. RAS materials shall not contribute more than 25.0% by weight of the total binder content for any HMA mixture.

SECTION 402, BEGIN LINE 164, DELETE AS FOLLOWS:

402.09 Acceptance of Mixtures

Acceptance of mixtures will be in accordance with the Frequency Manual on the basis of a type D certification in accordance with 916. The test results shown on the certification shall be the quality control tests representing the material supplied and include air voids and binder content. Air voids tolerance shall be ± 1.5% and binder content tolerance shall be ± 0.7% from DMF ~~or JMF~~.

SECTION 402, BEGIN LINE 233, DELETE AND INSERT AS FOLLOWS:

402.13 Spreading and Finishing

The mixture shall be placed upon an approved surface by means of laydown equipment in accordance with 409.03(c). Prior to paving, both the planned quantity and lay rate shall be adjusted by multiplying by the MAF. When mixture is produced from more

REVISION TO STANDARD SPECIFICATIONS

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT

- 402.04 DESIGN MIX FORMULA
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- 402.09 ACCEPTANCE OF MIXTURES
- 402.13 SPREADING AND FINISHING

than one DMF ~~or JMF~~ for a given pay item, the MAF will be applied to the applicable portion of the mixture for each. Mixtures in areas inaccessible to laydown equipment or mechanical devices may be placed by other methods.

The temperature of each mixture at the time of spreading shall ~~not be more less~~ than ~~18°F below the minimum mixing temperature as shown on the DMF or JMF~~ *315°F whenever PG 64-22 or PG 70-22 binders are used.*

SECTION 402, BEGIN LINE 272, DELETE AS FOLLOWS:

The finished thickness of each course shall be at least two times but not more than four times the maximum particle size as shown on the DMF ~~or JMF~~. The finished thickness of wedge and level mixtures shall be at least 1 1/2 times but not more than six times the maximum particle size as shown on the DMF ~~or JMF~~. Feathering may be less than the minimum thickness requirements.

COMMENTS AND ACTION

- 402.04 DESIGN MIX FORMULA
- 402.06 JOB MIX FORMULA
- 402.07 MIX CRITERIA
- 402.08 RECYCLED MATERIALS
- 402.09 ACCEPTANCE OF MIXTURES
- 402.13 SPREADING AND FINISHING

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: ____ Passed as Submitted ____ Passed as Revised == __ Withdrawn
Standard Specifications Sections referenced and/or affected: 402 pg 276 thru 282.	____ 2018 Standard Specifications ____ Revise Pay Items List
Recurring Special Provision affected: NONE	____ Create RSP (No. ____) Effective ____ Letting RSP Sunset Date:
Standard Drawing affected: NONE	____ Revise RSP (No. ____) Effective ____ Letting RSP Sunset Date:
Design Manual Sections affected: 304-15a, 304-15b, 304-8.02(02.)	____ Standard Drawing Effective
GIFE Sections cross-references: 13-4.	____ Create RPD (No. ____) Effective ____ Letting ____ GIFE Update

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: In revamping the 401 spec, it was determined the 410 spec could similarly be updated and simplified to eliminate confusion and abuse.

PROPOSED SOLUTION: eliminate superfluous language, reduce ESAL categories, reduce number of binder grades, remove JMF concept, reduce RAP allowance, increase conditioning time and reduce design gradations

APPLICABLE STANDARD SPECIFICATIONS: 410

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: 304

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: SMA, surface cat 1 or 5

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval. Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? N

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? Y

Construction time? Y

Customer satisfaction? Y

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? Y

Will this item improve safety:

For motorists? Y

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? Y

Asset preservation? Y

Design process? Y

Will this change provide the contractor more flexibility? Y

Will this proposal provide clarification for the Contractor and field personnel? Y

Can this item improve/reduce the number of potential change orders?
Y

Is this proposal needed for compliance with:

Federal or State regulations? Y

AASHTO or other design code? N

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: This is a culmination of collaboration of INDOT and INDUSTRY partners over the last 5 months.

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA PAVEMENT (VARIOUS SECTIONS)

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 410, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 410 – QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE – SMA PAVEMENT

410.01 Description

This work shall consist of one course of QC/QA HMA Surface – SMA mixture constructed on prepared foundations in accordance with 105.03.

SECTION 410, BEGIN LINE 32, DELETE AND INSERT AS FOLLOWS:

410.04 Design Mix Formula

A design mix formula, DMF, shall be prepared in accordance with 410.05 and submitted in a format acceptable to the Engineer one week prior to use. The DMF shall state the maximum particle size in the mixture. The DMF shall state the calibration factor, test temperature and absorption factors to be used for the determination of binder content using the ignition oven in accordance with ITM 586, the binder content by extraction in accordance with ITM 571, ΔP_b , determined in accordance with ITM 591, the aggregate degradation loss value in accordance with ITM 220 and a Mixture Adjustment Factor, MAF. The DMF shall state the source, type dosage rate of any stabilizing additives. Approval of the DMF will be based on the ESAL and mixture designation. A mixture number will be assigned by the Engineer. No mixture will be accepted until the DMF has been approved. No mixture will be accepted for use until the DMF has been assigned a mixture number by the Engineer.

The ESAL category identified in the pay item correlates to the following ESAL ranges.

ESAL CATEGORY	ESAL
1	< 300,000
2	300,000 to < 3,000,000
3	3,000,000 to < 10,000,000
4	$\geq 10,000,000$ to $\leq 30,000,000$
5	$\geq 30,000,000$

The plant discharge temperature for any mixture shall not be more than 315°F whenever PG 58-28, PG 64-22, PG 64-28 or PG 70-22 binders are used or not more than 325°F whenever PG 70-28 or PG 76-22 binders are used. SMA may be produced using a water-injection foaming device. The DMF shall list the minimum and maximum plant discharge temperatures as applicable to the mixture.

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA PAVEMENT (VARIOUS SECTIONS)

SECTION 410, BEGIN LINE 54, DELETE AND INSERT AS FOLLOWS:

410.05 SMA Mix Design

The DMF shall be determined for each mixture from a SMA mix design by a design laboratory selected from the Department's list of approved Mix Design Laboratories. A SMA mixture shall be designed in accordance with *ITM 220*, AASHTO M 325 and R 46 *except the design gyrations shall be 75 for all ESAL categories. All loose mixture shall be conditioned for 4 h in accordance with AASHTO R 30 prior to testing. Steel furnace slag coarse aggregate, when used in an intermediate mixture application, shall have a deleterious content less than 4.0% as determined in accordance with ITM 219.*

The single percentage of aggregate passing each required sieve shall be within the limits of the following gradation table.

SMA GRADATION CONTROL LIMITS (Percent Passing By Volume)						
Sieve Size	Mixture Designation					
	9.5 mm		12.5 mm		19.0 mm	
	Lower	Upper	Lower	Upper	Lower	Upper
37.5 mm					100.0	100.0
25.0 mm			100.0	100.0	100.0*	100.0
19.0 mm	100.0	100.0	100.0*	100.0	90.0	99.0
12.5 mm	100.0*	100.0	90.0	99.0	50.0	88.0
9.5 mm	70.0	95.0	50.0	85.0 80.0	25.0	60.0
4.75 mm	30.0	50.0	20.0	40.0 35.0	20.0	28.0
2.36 mm	20.0	30.0	16.0	28.0 24.0	16.0	24.0
1.18 mm	---	21.0	---	---	---	---
600 µm	---	18.0	---	---	---	---
300 µm	---	15.0	---	---	---	---
75 µm	8.0	12.0	8.0	11.0	8.0	11.0

* The lower % passing gradation may be 98.0% when SMA RAP material in accordance with 410.06 is used in the SMA mixture.

The optimum binder and aggregate gradation content shall produce a $\Delta Pb \leq 0.20$ as determined in accordance with *ITM 591* and 4.0% air voids. The maximum specific gravity shall be mass determined in water in accordance with AASHTO T 209. The percent draindown for SMA surface mixture shall not exceed 0.30% in accordance with AASHTO T 305.

SECTION 410, BEGIN LINE 76, DELETE AND INSERT AS FOLLOWS:

The mixture shall be tested for moisture susceptibility in accordance with AASHTO T 283 except that the loose mixture curing shall be replaced by mixture conditioning for ~~2-4~~ 4 h in accordance with AASHTO R 30. The minimum tensile strength ratio, TSR, shall be 70%. The 6 in.

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA PAVEMENT (VARIOUS SECTIONS)

mixture specimens shall be compacted to $6.0 \pm 1.0\%$ air voids in accordance with AASHTO T 312. Specimens shall be prepared using freeze-thaw preconditioning. If anti-stripping additives are added to the mixture to be in accordance with the minimum TSR requirements, the dosage rate shall be submitted with the DMF.

SECTION 410, BEGIN LINE 99, DELETE AND INSERT AS FOLLOWS:

VOIDS IN MINERAL AGGREGATE, VMA, CRITERIA	
Mixture Designation	Minimum VMA, %
19.0 mm	15.0
12.5 mm	17.0 16.0
9.5 mm	17.0

410.06 Recycled Materials

Recycled materials shall be in accordance with 401.06 for dense graded mixtures except non-SMA RAP material for use in the SMA mixture may consist of reclaimed asphalt pavement, RAP, or reclaimed asphalt shingles, RAS or a blend of both. RAP shall be the product resulting from the cold milling or crushing of an existing HMA pavement. The RAP shall be processed so that 100% will pass the 2 in. (50 mm) sieve when entering the HMA plant. RAS shall be 100% passing the 1/2 in. (12.5 mm) sieve. RAP shall be 100% passing the 3/8 in. (9.5 mm) sieve and 95 to 100% passing the No. 4 (4.75 mm) sieve.

SMA RAP material shall be the product derived by exclusively milling an existing SMA mixture. The SMA RAP material shall pass the maximum size sieve for the mixture being produced as follows:

SMA RAP GRADATION						
Sieve Size	Mixture Designation					
	9.5 mm		12.5 mm		19.0 mm	
	Lower	Upper	Lower	Upper	Lower	Upper
1 1/2 in. (37.5 mm)					100.0	100.0
1 in. (25 mm)			100.0	100.0	95.0	100.0
3/4 in. (19 mm)	100.0	100.0	95.0	100.0	---	---
1/2 in. (12.5 mm)	95.0	100.0	---	---	---	---

The Contractor may request the use of SMA RAP material in the SMA mixture provided the material is stockpiled separately at the plant and the material properties were determined in accordance with ITM 584 during stockpile construction. The request shall include all QC test results describing the stockpile composition. The Engineer will obtain a representative sample of the SMA RAP material in accordance with ITM 207 for testing in accordance with ITM 590 to verify the proposed design value.

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA PAVEMENT (VARIOUS SECTIONS)

Recycled materials may be used as a substitute for a portion of the new materials required to produce SMA mixtures. The amount of total binder replaced by binder in the recycled material shall be computed as follows:

$$\text{Binder Replacement, \%} = \frac{(A \times B) + (C \times D)}{E} \times 100\%$$

where:

- A = RAP, % Binder Content
- B = RAP, % in Mixture
- C = RAS, % Binder Content
- D = RAS, % in Mixture
- E = Total, % Binder Content in Mixture

RAS may be obtained from either pre-consumer or post-consumer asphalt shingles. Post-consumer asphalt shingles shall be in accordance with AASHTO MP 15 and prepared by a processing company with an IDEM Legitimate Use Approval letter. A copy of this letter shall be submitted to the Engineer. Deleterious material present in post-consumer asphalt shingles shall be limited to the percentages stated in AASHTO MP 15. Pre-consumer and post-consumer asphalt shingles shall not be blended for use in SMA mixtures and shall be stockpiled separately from other materials.

The recycled material percentages shall be as specified on the DMF. SMA mixtures utilizing recycled materials shall be limited to the binder replacement percentages in the following table:

SMA mixtures utilizing RAP or RAS or a blend of RAP and RAS

MAXIMUM BINDER REPLACEMENT, %		
SMA Surface		
Mixture Category	12.5 mm	9.5 mm
1	40.0*	40.0*
2	40.0*	40.0*
3	25.0	25.0
4	25.0	25.0
5	25.0	25.0

* RAS materials shall not contribute more than 25% by weight of the total binder content for any HMA mixture.

The combined aggregate properties shall be in accordance with 904. The combined aggregate bulk specific gravity shall be determined in accordance with ITM 584 and the combined aggregate gradation shall be in accordance with 410.05 for the SMA mixture specified.

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA PAVEMENT (VARIOUS SECTIONS)

~~SMA mixtures with a binder replacement less than or equal to 25.0% by weight of the total binder content by utilizing RAP or RAS or a blend of RAP and RAS materials shall use the specified binder grade.~~

~~SMA mixtures with a binder replacement greater than 25.0% and less than or equal to 40.0% by weight of the total binder content by utilizing RAP or a blend of RAP and RAS shall use a binder grade with upper and lower temperature classifications reduced by 6°C from the specified binder grade. RAS materials shall not contribute more than 25.0% by weight of the total binder content for any SMA mixture.~~

SECTION 410, BEGIN LINE 156, DELETE AND INSERT AS FOLLOWS:

410.07 Lots and Sublots

Lots will be defined as ~~4,000 t of SMA intermediate mixture or~~ 2,400 t of SMA surface mixture. Lots will be further sub-divided into sublots not to exceed ~~1,000 t of SMA intermediate mixture or~~ 600 t of SMA surface mixture. Partial sublots of 100 t or less will be added to the previous subplot. Partial sublots greater than 100 t constitute a full subplot.

410.08 Job Mix Formula

A job mix formula, JMF, shall be developed by a certified HMA producer in accordance with ITM 583. A JMF used for SMA mixture ~~in the current or previous~~ calendar year will be allowed.

The aggregate and recycled materials blend percentage and the amount passing all sieves on the DMF may be adjusted provided the gradation limits do not exceed the requirements of 410.05. Adjustments to the aggregate and recycled materials blend percentage, gradation and the new combined aggregate bulk specific gravity shall be included on the JMF.

The total binder content on the JMF may be determined by adjusting the DMF a maximum of ±0.2 percent. The recycled materials binder content may be adjusted as part of the total binder content provided the binder replacement percentage is in accordance with 410.06.

SECTION 410, BEGIN LINE 190, DELETE AND INSERT AS FOLLOWS:

~~The Engineer's acceptance test results for each subplot will be available after the subplot and testing are complete. During the adjustment period the test results will be made available after testing is complete. The Engineer will make available the subplot acceptance test results after receiving the subplot quality control results from the Contractor.~~

ACCEPTANCE TOLERANCE FOR MIXTURES (Percent Mass)									
Mixture	Number of Tests	Sieve Size							
		*25.0 mm	*19.0 mm	*12.5 mm	*9.5 mm	*4.75 mm	2.36 mm	600 µm	75 µm

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA
 PAVEMENT (VARIOUS SECTIONS)

Surface	1	---	---	---	---	---	8.0	4.0	2.5
	2	---	---	---	---	---	5.7	2.8	2.1
	3	---	---	---	---	---	4.6	2.3	1.8
	4	---	---	---	---	---	4.0	2.0	1.5
Intermediate	1	---	---	---	---	---	10.0	6.0	2.0
	2	---	---	---	---	---	7.0	4.2	1.4
	3	---	---	---	---	---	5.8	3.5	1.2
	4	---	---	---	---	---	5.0	3.0	1.0

* The acceptance tolerance for this sieve shall be the applicable composition limits specified in 410.05.

ACCEPTANCE TOLERANCE FOR BINDER				
Binder Content	Number of Tests			
	1	2	3	4
% Binder	0.7	0.5	0.4	0.3

Acceptance of mixtures for range will be determined using the results of subplot tests performed by the Engineer from each lot. If the range is not in accordance with the requirements, adjustment points will be assessed in accordance with 410.19(a).

ACCEPTANCE TOLERANCE FOR RANGE (\pm Percent Mass)		
Sieve Size and Binder Content	Percentage Points	
	Surface	Intermediate
2.36 mm	12.0	15.0
600 μ m	6.0	9.0
75 μ m	2.0	3.0
% Binder	1.0	1.0

SECTION 410, BEGIN LINE 276, INSERT AS FOLLOWS:

410.14 Spreading and Finishing

The mixture shall be placed upon an approved surface by means of a paver or other mechanical devices in accordance with 409.03. Mixtures in areas inaccessible to mechanical devices may be placed by other methods. *The temperature of mixture at the time of spreading shall be less than 315°F whenever PG 70-22 binders are used or less than 325°F whenever PG 76-22 binders are used.*

SECTION 410, BEGIN LINE 304, INSERT AS FOLLOWS:

The rollers shall be operated to avoid shoving of the SMA and at speeds not to exceed 3 mph. Rollers shall be in accordance with 409.03(d)1, 2, or 7. Vibratory rollers meeting the requirements of 409.03(d)4 may be used but shall not be operated in vibratory mode. *Oscillatory rollers in accordance with 409.03(d)5 will be permitted for use but the vertical impact force capability shall not be used.*

REVISION TO STANDARD SPECIFICATIONS

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE - SMA PAVEMENT (VARIOUS SECTIONS)

SECTION 410, BEGIN LINE 315, DELETE AS FOLLOWS:

410.15 Joints

Longitudinal joints in the surface shall be at the lane lines of the pavement.

Hot poured joint adhesive in accordance with 906 shall be applied to longitudinal joints constructed between two adjacent HMA courses in the top course of dense graded intermediate mixtures and all 9.5 mm and 12.5 mm SMA surface mixture courses. This includes joints within the traveled way as well as between any of the following: traveled way and an auxiliary lane; traveled way and a paved shoulder; and auxiliary lane and a paved shoulder.

SECTION 410, BEGIN LINE 441, INSERT AS FOLLOWS:

(a) Mixture

When test results for the mixture furnished exceeded the allowable tolerances, adjustment points will be assessed as follows:

ADJUSTMENT POINTS FOR GRADATION								
Adjustment Points	Sieve Size							
	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm	2.36 mm	600 µm	75 µm
For each 0.1% up to 1.0% out of tolerance	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
For each 0.1% > 1.0% out of tolerance	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.6

SECTION 410, BEGIN LINE 539, INSERT AS FOLLOWS:

Pay Item	Pay Unit Symbol
Joint Adhesive, _____ course type	LFT
QC/QA-HMA, _____, _____, _____, _____ mm, - SMA (ESAL ⁽¹⁾) (PG ⁽²⁾) (Course ⁽³⁾) (Mix ⁽⁴⁾)	TON
Quality Assurance Adjustment	DOL

- (1) ESAL Category as defined in 410.04
- (2) Number represents the high temperature binder grade. Low temperature grades are - 22
- (3) Surface *or Intermediate*
- (4) Mixture Designation

COMMENTS AND ACTION

SECTION 410 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HMA SURFACE -
SMA PAVEMENT (VARIOUS SECTIONS)

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: SECTION 410 pg 300 thru 314.</p>	<p>_____ 2018 Standard Specifications _____ Revise Pay Items List</p>
<p>Recurring Special Provision affected: NONE</p>	<p>_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Standard Drawing affected: NONE</p>	<p>_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Design Manual Sections affected: 304.</p>	<p>_____ Standard Drawing Effective</p>
<p>GIFE Sections cross-references: NONE</p>	<p>_____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Many of the improvements suggested with the 401 section are applicable here. It also came to attention that the binder specifications for UBWC were not appropriate. Straightedge requirements were not clear.

PROPOSED SOLUTION: eliminate superfluous language, correct binder grades, remove JMF concept, and reduce design gradations, increase conditioning time

APPLICABLE STANDARD SPECIFICATIONS: 414

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: N/A

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x 204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? N

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? N

Construction time? N

Customer satisfaction? Y

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? Y

Will this item improve safety:

For motorists? N

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? N

Asset preservation? Y

Design process? N

Will this change provide the contractor more flexibility? N

Will this proposal provide clarification for the Contractor and field personnel? Y

Can this item improve/reduce the number of potential change orders?

N

Is this proposal needed for compliance with:

Federal or State regulations? N

AASHTO or other design code? N

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

REVISION TO STANDARD SPECIFICATIONS

SECTION 414 - ULTRATHIN BONDED WEARING COURSE, WARRANTED

- 414.02 MATERIALS
- 414.03 JOB MIX FORMULA
- 414.04 MIX DESIGN
- 414.05 USE OF RECYCLED MATERIALS
- 414.06 QUALITY CONTROL
- 414.13 SMOOTHNESS

(Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 414, BEGIN LINE 16, DELETE AND INSERT AS FOLLOWS:

414.02 Materials

Materials shall be in accordance with the following:

- Asphalt Emulsion414.02(a)
- Asphalt Materials
 - PG Binder, PG 64-22, PG ~~70-22~~ 76-22 902.01(a) ~~and 414.02(b)~~
 - PG Binder Grade.....414.02(b)
 - Coarse Aggregates, Class A or Higher904.03 and 414.02(c)
 - Fine Aggregates904.02
 - Mineral Filler904.02(f)

SECTION 414, BEGIN LINE 32, DELETE AND INSERT AS FOLLOWS:

(b) Asphalt Materials

The PG binder grade shall be selected based on the following requirements:

PG BINDER	ESAL
64-22	< 10,000,000
70-22 76-22	≥ 10,000,000

Additional requirements for the PG ~~70-22~~ 76-22 binder as follows:

CHARACTERISTIC	TEST METHOD	MIN.	MAX.
Separation, % prepared by ASTM D 7173	AASHTO T 53		6°C
Elastic Recovery, @ 39°F (4°C), %	AASHTO T 301	60	

SECTION 414, BEGIN LINE 45, DELETE AND INSERT AS FOLLOWS:

414.03 ~~Job~~Design Mix Formula

The ~~job~~design mix formula, ~~JMF~~ DMF, shall be determined for each mixture prepared by an Approved Mix Design Laboratory ~~in accordance with 414.04~~ *selected from the Department's list of approved Mix Design Laboratories.* The Contractor shall submit a ~~JMF~~ DMF for each mixture to the Engineer one week prior to use. The ~~JMF~~ DMF shall state the maximum particle size in the mixture, *the mixture gradation, the total aggregate bulk specific gravity, the maximum*

REVISION TO STANDARD SPECIFICATIONS

SECTION 414 - ULTRATHIN BONDED WEARING COURSE, WARRANTED

- 414.02 MATERIALS
- 414.03 JOB MIX FORMULA
- 414.04 MIX DESIGN
- 414.05 USE OF RECYCLED MATERIALS
- 414.06 QUALITY CONTROL
- 414.13 SMOOTHNESS

and bulk specific gravity of the UBWC mixture and the application rate for any anti-stripping additives. No mixture will be accepted until the ~~JMF DMF~~ is approved.

SECTION 414, BEGIN LINE 59, INSERT AS FOLLOWS:

The maximum specific gravity of the UBWC mixture shall be mass determined in water in accordance with AASHTO T 209.

The bulk specific gravity of the UBWC mixture shall be determined in accordance with AASHTO T 331.

SECTION 414, BEGIN LINE 70, DELETE AND INSERT AS FOLLOWS:

(1) Follow AASHTO T 283 with the following exceptions:

- (a) Condition the mixture for ~~2 h~~ *4 h* in accordance with AASHTO R 30, Section 7.1.
- (b) Compact the Superpave Gyratory Compactor, SGC, specimens to 100 gyrations.
- (c) Extrude the samples as soon as possible without damage to the sample.
- (d) Use AASHTO T 269 to determine the void content.
- (e) Record the void content of the specimens.
- (f) If less than 55% saturation is achieved, the procedure does not need to be repeated unless the difference in tensile strength between duplicate specimens is greater than 25 lbs/sq in.

SECTION 414, BEGIN LINE 83, DELETE AND INSERT AS FOLLOWS:

414.05 Use of Recycled Materials

Recycled materials *shall be in accordance with 401.06 for dense graded surfaces except RAP for use in the UBWC mixture may consist of reclaimed asphalt pavement, RAP, or reclaimed asphalt shingles, RAS or a blend of both. RAP shall be the product resulting from the cold milling or crushing of an existing HMA pavement. The RAP shall be processed so that 100% will pass the 2 in. (50 mm) sieve when entering the HMA plant. RAP shall be 100% passing the 3/8 in. (9.5 mm) sieve and 95 to 100% passing the No. 4 (4.75 mm) sieve.*

~~Recycled materials may be used as a substitute for a portion of the new materials required to produce UBWC mixtures. The amount of total binder replaced by binder in the recycled material shall be computed as follows:~~

$$\text{Binder Replacement, \%} = \frac{(A \times B) + (C \times D)}{E} \times 100\%$$

~~where:~~

REVISION TO STANDARD SPECIFICATIONS

SECTION 414 - ULTRATHIN BONDED WEARING COURSE, WARRANTED

- 414.02 MATERIALS
- 414.03 JOB MIX FORMULA
- 414.04 MIX DESIGN
- 414.05 USE OF RECYCLED MATERIALS
- 414.06 QUALITY CONTROL
- 414.13 SMOOTHNESS

- ~~A = RAP, % Binder Content~~
- ~~B = RAP, % in Mixture~~
- ~~C = RAS, % Binder Content~~
- ~~D = RAS, % in Mixture~~
- ~~E = Total, % Binder Content in Mixture~~

~~RAS may be obtained from either pre-consumer or post-consumer asphalt shingles.~~

~~Post-consumer asphalt shingles shall be in accordance with AASHTO MP 15 and prepared by a processing company with an IDEM Legitimate Use Approval letter. A copy of this letter shall be submitted to the Engineer. Deleterious material present in post-consumer asphalt shingles shall be limited to the percentages stated in AASHTO MP 15. Pre-consumer and post-consumer asphalt shingles shall not be blended for use in UBWC mixtures and shall be stockpiled separately from other materials.~~

~~The recycled material percentages shall be as specified on the JMF. UBWC mixtures utilizing recycled materials shall be limited to 25% binder replacement and shall use the specified binder grade.~~

~~The combined aggregate properties shall be in accordance with 904. The combined aggregate bulk specific gravity shall be determined in accordance with ITM 584 and the combined aggregate gradation shall be in accordance with 414.04.~~

SECTION 414, BEGIN LINE 122, DELETE AND INSERT AS FOLLOWS:

414.06 Quality Control

The Contractor shall produce a mixture in compliance with the ~~JMF~~DMF within the limits of the quality control tolerances. The Contractor shall maintain all quality control documentation and make a copy available to the Engineer upon request or at completion of work.

The Contractor shall sample the mix a minimum once per day in accordance with ITM 580, section 8.6 Truck Samples, Dense Graded HMA Mixture. The sample shall be tested for binder content and gradation prior to the next day's production.

The Contractor shall take corrective action when the binder content exceeds $\pm 0.5\%$ from that stated in the ~~JMF~~DMF as tested in accordance with ITM 586.

The Contractor shall take corrective action when the aggregate gradation exceeds the following values from that stated in the ~~JMF~~DMF as tested in accordance with AASHTO T 30.

REVISION TO STANDARD SPECIFICATIONS

SECTION 414 - ULTRATHIN BONDED WEARING COURSE, WARRANTED

- 414.02 MATERIALS
- 414.03 JOB MIX FORMULA
- 414.04 MIX DESIGN
- 414.05 USE OF RECYCLED MATERIALS
- 414.06 QUALITY CONTROL
- 414.13 SMOOTHNESS

SECTION 414, BEGIN LINE 196, DELETE AND INSERT AS FOLLOWS:

414.13 Smoothness

~~All finished surface irregularities in excess of 1/8 in. measured with a 10 ft straightedge shall be corrected.~~ *A straightedge in accordance with 409.03(f) will be used to determine smoothness. The 16 ft straightedge will be used to accept smoothness along the direction of mainline traffic and the 10 ft straightedge will be used to accept smoothness transverse to the direction of mainline traffic. Smoothness correction shall be in accordance with 401.18(c).*

COMMENTS AND ACTION

- 414.02 MATERIALS
- 414.03 JOB MIX FORMULA
- 414.04 MIX DESIGN
- 414.05 USE OF RECYCLED MATERIALS
- 414.06 QUALITY CONTROL
- 414.13 SMOOTHNESS

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn
Standard Specifications Sections referenced and/or affected: Section 414 pg 323 thru 332.	_____ 2018 Standard Specifications _____ Revise Pay Items List
Recurring Special Provision affected: NONE	_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:
Standard Drawing affected: NONE	_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:
Design Manual Sections affected: NONE	_____ Standard Drawing Effective
GIFE Sections cross-references: NONE	_____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:

Over the past several years excessive deterioration has been observed in concrete used in some miscellaneous applications including sidewalks, curb ramps, curbs and approaches. The exact cause of the deterioration is unknown, but it is generally attributed to poor finishing practices and quality control. The issue was discussed at the INDOT/IRMCA working committee in April 2016 and there is consensus that revising the maximum water-cement ratio to 0.450 for standard concrete per section 502.04(a) and class A concrete per 702.02 will improve overall concrete quality and mitigate durability problems. The change also aligns the 502 specification with 501.05 which has a maximum water-cement ratio of 0.450.

PROPOSED SOLUTION:

Revise sections 502.04(a) and 702.02 to require a maximum water/cementitious ratio of 0.450

APPLICABLE STANDARD SPECIFICATIONS: 502.04(a) & 702.02

APPLICABLE STANDARD DRAWINGS: none

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

APPLICABLE RECURRING SPECIAL PROVISIONS: none

PAY ITEMS AFFECTED: none

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT-IRMCA working committee

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT Office of Materials Management

Phone Number: 317-610-7251 x 204

Date: 5/8/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? Yes

Construction time? N/A

Customer satisfaction? N/A

Congestion/travel time? N/A

Ride quality? N/A

Will this proposal reduce operational costs or maintenance effort? Yes

Will this item improve safety:

For motorists? N/A

For construction workers? N/A

Will this proposal improve quality for:

Construction procedures/processes? Yes

Asset preservation? Yes

Design process? N/A

Will this change provide the contractor more flexibility? N/A

Will this proposal provide clarification for the Contractor and field personnel? N/A

Can this item improve/reduce the number of potential change orders? Yes

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: N/A

REVISION TO STANDARD SPECIFICATIONS

SECTION 502 - PORTLAND CEMENT CONCRETE PAVEMENT, PCCP
 502.04(a) PORTLAND CEMENT CONCRETE
 SECTION 702 - STRUCTURAL CONCRETE
 702.02 CLASSES OF CONCRETE

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 502, BEGIN LINE 62, DELETE AND INSERT AS FOLLOWS:

(a) Portland Cement Concrete

The CMD shall produce workable concrete mixtures, with the minimum amount of water, and having the following properties.

Portland cement content.....	564 lbs/cu yd
Maximum water/cementitious ratio	0.48 0.450
Maximum cement reduction for GGBFS replacement	30%
Fly Ash/portland cement substitution ratio.....	1.25 by weight
Maximum cement reduction for fly ash replacement	20%
GGBFS/portland cement substitution ratio.....	1.00 by weight
Slump, formed.....	2 to 4 in.
Slump, slipformed.....	1.25 to 3 in.
Air	5.0% to 8.0%
Minimum flexural strength, third point loading, with fly ash	550 psi at 28 days
Relative yield	0.98 to 1.02

SECTION 702, BEGIN LINE 7, DELETE AND INSERT AS FOLLOWS:

702.02 Classes of Concrete

The following classes of concrete shall be used where specified.

Class of Concrete	A	B	C
Cement content in lbs/cu yd	564	470	658
Maximum water/cement ratio in lbs of water per lbs of cement	0.49 0.450	0.620	0.443

COMMENTS AND ACTION

502.04(a) PORTLAND CEMENT CONCRETE

702.02 CLASSES OF CONCRETE

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: <input type="checkbox"/> Passed as Submitted <input type="checkbox"/> Passed as Revised <input type="checkbox"/> Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 502.04 pg 353; 702.01 pg 517.</p> <p>Recurring Special Provision affected: NONE</p> <p>Standard Drawing affected: NONE</p> <p>Design Manual Sections affected: NONE</p> <p>GIFE Sections cross-references: NONE</p>	<p><input type="checkbox"/> 2018 Standard Specifications</p> <p><input type="checkbox"/> Revise Pay Items List</p> <p><input type="checkbox"/> Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p> <p><input type="checkbox"/> Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p> <p><input type="checkbox"/> Standard Drawing Effective</p> <p><input type="checkbox"/> Create RPD (No. _____) Effective _____ Letting</p> <p><input type="checkbox"/> GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: In revamping the 402 spec, other sections that reference the 402 section needed to be revised. Also allow fine graded surface mixtures for HMA sidewalk

PROPOSED SOLUTION: Replace references to Type A with Type B, allow fine graded mixtures for HMA sidewalk applications

APPLICABLE STANDARD SPECIFICATIONS: 507, 604, 610

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: 304-15a, 304-15b, 304-8.02(02)

APPLICABLE SECTION OF GIFE: 13-4

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x 204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? Y

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? Y

Construction time? Y

Customer satisfaction? Y

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? Y

Will this item improve safety:

For motorists? Y

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? Y

Asset preservation? Y

Design process? Y

Will this change provide the contractor more flexibility? Y

Will this proposal provide clarification for the Contractor and field personnel? Y

Can this item improve/reduce the number of potential change orders?

Y

Is this proposal needed for compliance with:

Federal or State regulations? Y

AASHTO or other design code? N

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

REVISION TO STANDARD SPECIFICATIONS

SECTION 507 - PCCP RESTORATION

507.05 PCCP PATCHING

SECTION 604 - SIDEWALKS, CURB RAMPS, STEPS, AND HANDRAILS

604.07 HMA SIDEWALK

SECTION 610 - APPROACHES AND CROSSOVERS

610.03 GENERAL REQUIREMENTS

(Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 507, BEGIN LINE 114, DELETE AND INSERT AS FOLLOWS:

The milled areas shall be filled with HMA partial depth patching. Partial depth patches shall consist of HMA Surface, ~~type A~~ *type B* in accordance with 402.04. MAF in accordance with 402.05 will not apply. The mixture shall be compacted by a vibratory roller in accordance with 409.03(d). A minimum of four passes of the rollers shall be completed. Partial depth patches shall be completed during work hours and opened to traffic at the close of the workday. Mixtures will be accepted in accordance with 402.09.

SECTION 604, BEGIN LINE 196, DELETE AND INSERT AS FOLLOWS:

HMA sidewalk material shall be placed on a compacted bed course in one or more courses. The mixture shall consist of HMA base, intermediate, or surface, ~~type A~~ *type B* in accordance with 402 *except the 9.5 mm surface gradation can go above or below the PCS control point in accordance with 401.05.* A MAF in accordance with 402.05 will not apply. Aggregate requirements of 904.03(d) do not apply. Compaction shall be accomplished by means of a hand operated or power roller of an acceptable type and weight in accordance with 402.15. In areas inaccessible to the roller, hand tamping will be allowed. In any case, the HMA sidewalk material shall be uniformly compacted.

SECTION 610, BEGIN LINE 26, DELETE AND INSERT AS FOLLOWS:

Subgrade for approaches shall be prepared in accordance with 207. Aggregate base shall be constructed in accordance with 301. HMA for approaches shall be constructed in accordance with 402. HMA mixture for approaches shall be HMA surface or intermediate, type ~~A~~, B, C, or D in accordance with 402.04. A MAF in accordance with 402.05 will not apply.

COMMENTS AND ACTION

507.05 PCCP PATCHING

604.07 HMA SIDEWALK

610.03 GENERAL REQUIREMENTS

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 507.05 pg 384; 604.07 pg 411 and 610.03 pg 429. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: 304-15a, 304-15b, 304-8.02(02). GIFE Sections cross-references: 13.04.</p>	<p>_____ 2018 Standard Specifications _____ Revise Pay Items List _____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date: _____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date: _____ Standard Drawing Effective _____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update</p>

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:

Section 702.05 currently requires that a trial batch be conducted only for mixes that include fly ash or GGBFS. However, the only parameter being formally evaluated is if the mix is able to achieve 550 psi flexural strength at 28 days. No other mixes defined in the 702 section require a trial batch. The specification is antiquated and dates back to a time when fly ash was much less understood and deemed to be a waste product. Further, INDOT districts are not consistently enforcing the trial batch requirement which creates uncertainty for producers. There are instances when producers have opted to use straight cement mixes in order to avoid the need for a trial batch. This is counter to current research and INDOT's desire to incorporate more supplementary cementitious materials (SCMs) into concrete in order to produce more durable mixes. This issue was discussed at the INDOT/IRMCA working committee in April 2016.

Section 702 does not contain clear guidance on an actual mix design submittal or approval. The only language in the section requiring a mix design submittal timeframe is associated with the use of fly ash.

Section 702 contains requirements for sampling and testing that do not comply with current practice.

PROPOSED SOLUTION:

Revise section 702.05 to eliminate the requirement for trial batches associated with fly ash/GGBFS. Remove references to acceptance testing procedures that do not comply with current practice.

Add clarification for job control and acceptance testing that will bring the specification into sync with 502.05.

Add requirements for a mix design submittal.

APPLICABLE STANDARD SPECIFICATIONS: 702.05

APPLICABLE STANDARD DRAWINGS: none

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

APPLICABLE RECURRING SPECIAL PROVISIONS: none

PAY ITEMS AFFECTED: none

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

(CONTINUED)

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT-IRMCA working committee

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT Office of Materials Management

Phone Number: 317-610-7251 x 204

Date: 5/20/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval. Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? Yes

Construction time? Yes

Customer satisfaction? N/A

Congestion/travel time? N/A

Ride quality? N/A

Will this proposal reduce operational costs or maintenance effort? No

Will this item improve safety:

For motorists? N/A

For construction workers? N/A

Will this proposal improve quality for:

Construction procedures/processes? Yes

Asset preservation? Yes

Design process? N/A

Will this change provide the contractor more flexibility? Yes

Will this proposal provide clarification for the Contractor and field personnel? Yes

Can this item improve/reduce the number of potential change orders? No

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: N/A

REVISION TO STANDARD SPECIFICATIONS

SECTION 702 - STRUCTURAL CONCRETE

702.05 PROPORTIONING

The Standard Specifications are revised as follows:

SECTION 702, BEGIN LINE 67, INSERT AS FOLLOWS:

702.05 Proportioning

Control of PCC for air content, slump, or relative yield will be determined on the basis of tests performed by the Engineer. Concrete and necessary labor for sampling shall be furnished by the Contractor as required by the Engineer. Testing will be in accordance with the Frequency Manual.

A CMDS shall be submitted seven calendar days prior to production and be approved by the Engineer except utilization of the Department provided spreadsheet is not required for the CMDS. The absolute volume of the mix design shall be 27.0 cu ft at the design air content of 6.5%.

The proportion of ingredients of each batch shall be within the following limits, and shall be approved.

SECTION 702, BEGIN LINE 103, DELETE AS FOLLOWS:

~~When fly ash or ground granulated blast furnace slag is used, an acceptable concrete mix design shall be submitted. Fly ash or ground granulated blast furnace slag and all other material sources proposed for portland cement concrete mix designs shall be furnished at least 15 days prior to the initiation of work. Prior to use, it shall be demonstrated by trial batch that the concrete mix design will produce concrete complying with all requirements. A concrete mix design will not be considered approved until this trial batch demonstration is successfully completed, including flexural strength data. The required minimum 550 psi flexural strength shall be obtained at an age consistent with the contract work schedule, but not to exceed 28 days.~~

~~Once a mix design has demonstrated for the contract that the concrete mix design with a specific fly ash source or a specific ground granulated blast furnace slag source produces a concrete which is in accordance with the mix design requirements, further trial batch demonstration will be at the Engineer's discretion for this contract and subsequent contracts.~~

All concrete shall have an air content of 6.5% ± 1.5% by volume. Air content shall be determined in accordance with 505. ~~When fly ash is used, the first concrete truck on the contract will be tested by the Department for complete compliance with plastic concrete requirements for air content, slump, and yield. If not in complete compliance, the concrete will be rejected and no further concrete with fly ash in it will be considered on the contract until it is demonstrated by an additional trial batch that the concrete mix design, or modification thereof, complies. All demonstration testing shall be conducted by the Contractor. During the placement of concrete containing fly ash, the air content of the concrete shall be determined to be at least equal to the testing requirements set out in the~~

REVISION TO STANDARD SPECIFICATIONS

SECTION 702 - STRUCTURAL CONCRETE

702.05 PROPORTIONING

~~Department's Manual for Frequency of Sampling and Testing and Basis for Use of Materials. Additional testing may be required, as conditions warrant. All such air content testing of the concrete shall be performed by a certified technician. A certified technician must have successfully completed a concrete course offered by the Department's Human Resources Division, the National Ready Mix Concrete Association, the American Concrete Institute, or approved equal.~~

~~Portland cement concrete with fly ash or ground granulated blast furnace slag which does not consistently comply with Department concrete requirements will be grounds for rejection of its further use. In the event of such a rejection of further use, all unsatisfactory work shall be corrected with no additional payment and the contract shall be completed using portland cement without fly ash or ground granulated blast furnace slag.~~

COMMENTS AND ACTION

702.05 PROPORTIONING

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 702.05 pg 518, 519 and 520.</p>	<p>_____ 2018 Standard Specifications _____ Revise Pay Items List</p>
<p>Recurring Special Provision affected: NONE</p>	<p>_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Standard Drawing affected: NONE</p>	<p>_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Design Manual Sections affected: NONE</p>	<p>_____ Standard Drawing Effective</p>
<p>GIFE Sections cross-references: NONE</p>	<p>_____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:

Section 808.11(e) requires the use of a magnesium phosphate patching material instead of requiring a product from the INDOT approved list of materials. Magnesium phosphate is no longer considered to be appropriate for patching concrete pavements.

PROPOSED SOLUTION:

Eliminate the reference to magnesium phosphate in 808.11(e) and add a requirement that the concrete patching material be selected from the approved list for Rapid Setting Patch Materials.

APPLICABLE STANDARD SPECIFICATIONS: 808.11(e)

APPLICABLE STANDARD DRAWINGS: none

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

APPLICABLE RECURRING SPECIAL PROVISIONS: none

PAY ITEMS AFFECTED: none

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Michael Prather

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT Office of Materials Management

Phone Number: 317-610-7251 x 204

Date: 5/8/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? N/A

Construction time? N/A

Customer satisfaction? N/A

Congestion/travel time? N/A

Ride quality? N/A

Will this proposal reduce operational costs or maintenance effort? N/A

Will this item improve safety:

For motorists? N/A

For construction workers? N/A

Will this proposal improve quality for:

Construction procedures/processes? N/A

Asset preservation? N/A

Design process? N/A

Will this change provide the contractor more flexibility? N/A

Will this proposal provide clarification for the Contractor and field personnel? N/A

Can this item improve/reduce the number of potential change orders? N/A

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: N/A

REVISION TO STANDARD SPECIFICATIONS

SECTION 808 - PAVEMENT TRAFFIC MARKINGS

808.11(e) REMOVAL OF MARKERS

The Standard Specifications are revised as follows:

SECTION 808, BEGIN LINE 544, DELETE AND INSERT AS FOLLOWS:

The resulting holes shall be filled with the appropriate patching material as described herein or as otherwise directed. Concrete pavement which is to be overlaid as part of the contract and HMA pavement shall be patched with HMA intermediate materials. Concrete pavement which is not to be overlaid as part of the contract and concrete bridge decks shall be patched with ~~magnesium phosphate~~ concrete patching material *from the Department's approved list for Rapid Setting Patch Materials*. Overlaid bridge decks and bridge decks which are to be overlaid as part of the contract shall be patched with patching material which is compatible with the deck overlay material. All patching material shall be placed in accordance with the appropriate specifications for the patching material.

COMMENTS AND ACTION

808.11(e) REMOVAL OF MARKERS

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 808.11 pg 830.</p>	<p>_____ 2018 Standard Specifications _____ Revise Pay Items List</p>
<p>Recurring Special Provision affected: NONE</p>	<p>_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Standard Drawing affected: NONE</p>	<p>_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Design Manual Sections affected: NONE</p>	<p>_____ Standard Drawing Effective</p>
<p>GIFE Sections cross-references: NONE</p>	<p>_____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:

The testing frequency for ground granulated blast furnace slag (GGBFS) per section 901.03(b)1 is one test per 2000 tons produced. This is inconsistent with ASTM C 989 which states one test per 2500 tons. Industry's processes are generally set to comply with ASTM C 989 and the current frequency creates a discrepancy that must be managed by both INDOT and producers when they want to supply to INDOT. It will benefit INDOT to adjust to the ASTM frequency by requiring less INDOT personnel time to manage the program and encourage slag producers to supply to INDOT contracts.

PROPOSED SOLUTION:

Revise the testing frequency to one test per 2500 tons produced.

APPLICABLE STANDARD SPECIFICATIONS: 901.03(b)1

APPLICABLE STANDARD DRAWINGS: none

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

APPLICABLE RECURRING SPECIAL PROVISIONS: none

PAY ITEMS AFFECTED: none

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Michael Prather

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT Office of Materials Management

Phone Number: 317-610-7251 x 204

Date: 5/8/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? Yes

Will this proposal improve:

Construction costs? N/A

Construction time? N/A

Customer satisfaction? Yes

Congestion/travel time? N/A

Ride quality? N/A

Will this proposal reduce operational costs or maintenance effort? Yes

Will this item improve safety:

For motorists? N/A

For construction workers? N/A

Will this proposal improve quality for:

Construction procedures/processes? N/A

Asset preservation? N/A

Design process? N/A

Will this change provide the contractor more flexibility? N/A

Will this proposal provide clarification for the Contractor and field personnel? N/A

Can this item improve/reduce the number of potential change orders? N/A

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: N/A

REVISION TO STANDARD SPECIFICATIONS

SECTION 901 - PCC MATERIALS

901.03(b)1 REQUIREMENTS

The Standard Specifications are revised as follows:

SECTION 901, BEGIN LINE 286, DELETE AND INSERT AS FOLLOWS:

1. Requirements

The ground granulated blast furnace slag shall be in accordance with ASTM C 989 for grade 100 or 120.

For each ~~2,000~~2,500 t produced, a complete ASTM C 989 analysis shall be performed on a sample composited randomly from the daily samples. The method of randomization shall be subject to approval by the Department.

COMMENTS AND ACTION

901.03(b)1 REQUIREMENTS

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 901.03 pg 842.</p>	<p>_____ 2018 Standard Specifications _____ Revise Pay Items List</p>
<p>Recurring Special Provision affected: NONE</p>	<p>_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Standard Drawing affected: NONE</p>	<p>_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Design Manual Sections affected: NONE</p>	<p>_____ Standard Drawing Effective</p>
<p>GIFE Sections cross-references: NONE</p>	<p>_____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Asphalt emulsion requirements are too restrictive, outdated AASHTO references

PROPOSED SOLUTION: reduce requirements in table, eliminate unnecessary minimums, update references

APPLICABLE STANDARD SPECIFICATIONS: 902

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: N/A

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? N

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? Y

Construction time? N

Customer satisfaction? N

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? N

Will this item improve safety:

For motorists? N

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? N

Asset preservation? N

Design process? N

Will this change provide the contractor more flexibility? N

Will this proposal provide clarification for the Contractor and field personnel? N

Can this item improve/reduce the number of potential change orders?
N

Is this proposal needed for compliance with:

Federal or State regulations? N

AASHTO or other design code? Y

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

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REVISION TO STANDARD SPECIFICATIONS

SECTION 902 - ASPHALT MATERIALS

902.01(b) ASPHALT EMULSIONS

902.02 SAMPLING AND TESTING ASPHALT MATERIALS

(Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 902, BEGIN LINE 120, DELETE AND INSERT AS FOLLOWS:

Characteristic ⁽¹⁾⁽²⁾	AASHTO Test Method	RS-2	HFRS-2	AE-90	AE-90S	AE-T	AE-NT	AE-F	SS-1h	AE-150	AE-150L	AE-PL	AE-PMT ⁽⁶⁾	AE-PMP ⁽⁶⁾
Test on Emulsion														
Viscosity, Saybolt Furol at 25°C, min.	T 59			50			15		20	50				20+
Viscosity, Saybolt Furol at 25°C, max.	T 59					100	100	100	100		100	115	100	
Viscosity, Saybolt Furol at 50°C, min.	T 59	75	75		50					75				
Viscosity, Saybolt Furol at 50°C, max.	T 59	400	400							300				
Demulsibility w/35 mL, 0.02N CaCl ₂ , % min.	T 59	50	50		30			25						
Demulsibility w/50 mL, 0.10N CaCl ₂ , % min.	T 59			75		75							25+	25+
Oil Distillate by Distillation, mL/100 g Emul ⁽³⁾ max.	T 59	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	7.0	7.0	3.0	3.0	3.0
Residue by Distillation, % min.	T 59	68 65	68 65	68 65	65 ⁽⁵⁾	54	50	27	57	68 65	60	30		
Residue by Distillation, % max.	T 59					62		35			65			
Sieve Test, % max.	T 59	0.10	0.10	0.10	0.10	0.10	0.30	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Penetrating Ability, mm, min.	902.02(w)											6		
Stone Coating Test, %	902.02(t)3a			90						90	90			
Settlement, % max.	T 59	5	5	5			5							
Storage Stability, % max.	T 59				1									
Asphalt Content by Distillation at 204°C, % min.													54	45
Asphalt Content by Distillation at 204°C, % max.													62	
Tests on Residue														
Penetration (0.1 mm) at 25°C, 100g, 5 s, min. ⁽⁴⁾	T 49	100	100	100	90	50		40	40				50	300+
Penetration (0.1 mm) at 25°C, 100g, 5 s, max. ⁽⁴⁾	T 49	200	200	200	150	200	40	90	90				200	
Penetration (0.1 mm) at 25°C, 50g, 5 s, min. ⁽⁴⁾	T 49									100	100			
Penetration (0.1 mm) at 25°C, 50g, 5 s, max. ⁽⁴⁾	T 49									300	300			
Ductility at 25°C, mm, min.	T 51	400	400	400		400			400					
Solubility in Org. Sol., % min.	T 44	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Float Test at 60°C, s, min. ⁽⁴⁾	T 50		1200	1200	1200	1200				1200	1200			
Force Ratio	T 300				0.3									
Elastic Recovery, at 4°C	T 301				58									
Polymer Content by Infrared													1.5+	1.5+

Notes: (1) Broken samples or samples more than 10 days old will not be tested.

REVISION TO STANDARD SPECIFICATIONS

SECTION 902 - ASPHALT MATERIALS

902.01(b) ASPHALT EMULSIONS

902.02 SAMPLING AND TESTING ASPHALT MATERIALS

- | |
|--|
| <ul style="list-style-type: none">(2) Combined percentage of the residue and oil distillate by distillation shall be at least 70% (note the different units – ml for oil and % for residue).(3) Oil distillate shall be in accordance with ASTM D 396, table 1, grade no. 1(4) The Engineer may waive the test.(5) Maximum temperature to be held for 15 minutes at $200 \pm 5^{\circ}\text{C}$.(6) Asphalt shall be polymerized prior to emulsification. |
|--|

REVISION TO STANDARD SPECIFICATIONS

SECTION 902 - ASPHALT MATERIALS

902.01(b) ASPHALT EMULSIONS

902.02 SAMPLING AND TESTING ASPHALT MATERIALS

SECTION 902, BEGIN LINE 154, DELETE AND INSERT AS FOLLOWS:

902.02 Sampling and Testing Asphalt Materials

The tests and AASHTO references are as follows:

- (a) Sampling Bituminous Materials AASHTO ~~T-40 R 66~~

The following exceptions to AASHTO ~~T-40 R 66~~ shall apply:

COMMENTS AND ACTION

902.01(b) ASPHALT EMULSIONS

902.02 SAMPLING AND TESTING ASPHALT MATERIALS

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: <input type="checkbox"/> Passed as Submitted <input type="checkbox"/> Passed as Revised <input type="checkbox"/> Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 902 pg 857 and 861.</p> <p>Recurring Special Provision affected: NONE</p> <p>Standard Drawing affected: NONE</p> <p>Design Manual Sections affected: NONE</p> <p>GIFE Sections cross-references: NONE</p>	<p><input type="checkbox"/> 2018 Standard Specifications</p> <p><input type="checkbox"/> Revise Pay Items List</p> <p><input type="checkbox"/> Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p> <p><input type="checkbox"/> Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p> <p><input type="checkbox"/> Standard Drawing Effective</p> <p><input type="checkbox"/> Create RPD (No. _____) Effective _____ Letting</p> <p><input type="checkbox"/> GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: outdated ESAL references, unnecessary clay content requirements, confusing tables/notes

PROPOSED SOLUTION: update ESAL table, eliminate unnecessary requirements, eliminate tables and put in paragraph form

APPLICABLE STANDARD SPECIFICATIONS: 904

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: N/A

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/APAI technical committee.

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x 204

Date: 4/22/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? N

Will approval of this item affect the Approved Materials List? N

Will this proposal improve:

Construction costs? N

Construction time? N

Customer satisfaction? N

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? N

Will this item improve safety:

For motorists? N

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? N

Asset preservation? N

Design process? N

Will this change provide the contractor more flexibility? N

Will this proposal provide clarification for the Contractor and field personnel? N

Can this item improve/reduce the number of potential change orders?

N

Is this proposal needed for compliance with:

Federal or State regulations? N

AASHTO or other design code? N

Is this item editorial? Y

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

REVISION TO STANDARD SPECIFICATIONS

SECTION 904 - AGGREGATES

- 904.01 AGGREGATES
- 904.02(a) FOR HMA MIXTURES
- 904.02(c) FOR SMA MIXTURES
- 904.03(a) CLASSIFICATION OF AGGREGATES
- 904.03(b) COARSE AGGREGATE ANGULARITY FOR HMA AND SMA

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 904, BEGIN LINE 87, DELETE AND INSERT AS FOLLOWS:

Composite stockpiling of natural sand fine aggregate from multiple sources into one stockpile will be allowed provided the fine aggregates are within a range of ~~0.10~~ **0.030** for the bulk specific gravity (dry) and a range of ~~1.0%~~ **0.5%** for the absorption. The range of bulk specific gravity (dry) and absorption values shall be the difference between the ~~highest and lowest value, respectively,~~ **average values for each** of the fine aggregate sources within the stockpile **as determined by the Office of Materials Management**. A written request for the composite stockpiling shall be made to the Office of Materials Management.

SECTION 904, BEGIN LINE 123, DELETE AND INSERT AS FOLLOWS:

The fine aggregate angularity value of the total blended aggregate material from the fine and coarse aggregates, and recycled materials shall meet or exceed the minimum values for the appropriate ESAL category and position within the pavement structure as follows:

FINE AGGREGATE ANGULARITY		
TRAFFIC ESAL	DEPTH FROM SURFACE	
	≤ 4 in.	> 4 in.
< 300,000	(Note 1)	
300,000 to < 3,000,000	40 (Note 1)	40
3,000,000 to < 10,000,000	45	40
≥ 10,000,000 to < 30,000,000	45	40
≥ 30,000,000	45	45
Note 1: For 4.75 mm mixtures, the fine aggregate angularity shall be 40 for < 300,000 ESAL and 45 for 300,000 to < 3,000,000 ESAL.		

Fine Aggregate Angularity, Method AAASHTO T 304

The fine aggregate angularity value shall not apply to OG mixtures.

~~The clay content of the blended aggregate material from the fine and coarse aggregates shall meet or exceed the minimum values for the appropriate ESAL category as follows:~~

CLAY CONTENT

REVISION TO STANDARD SPECIFICATIONS

SECTION 904 - AGGREGATES

904.01 AGGREGATES

904.02(a) FOR HMA MIXTURES

904.02(c) FOR SMA MIXTURES

904.03(a) CLASSIFICATION OF AGGREGATES

904.03(b) COARSE AGGREGATE ANGULARITY FOR HMA AND SMA

TRAFFIC ESAL	SAND EQUIVALENT, MINIMUM
< 300,000	40
300,000 to < 3,000,000	40
3,000,000 to < 10,000,000	45
10,000,000 to < 30,000,000	45
≥ 30,000,000	50

Clay Content, Sand Equivalency..... AASHTO T 176

SECTION 904, BEGIN LINE 146, DELETE AND INSERT AS FOLLOWS:

(f) Mineral Filler for SMA

Mineral filler shall consist of dust produced by crushing stone, portland cement, or other inert mineral matter having similar characteristics. Mineral filler shall be in accordance with the gradation requirements of 904.02(h) for size No. 16 *or as approved by the Engineer*. Mineral filler shall be in accordance with ITM 203 or from an ~~ABF~~ *ACBF* slag source. The sieve analysis of mineral filler shall be conducted in accordance with AASHTO T 37 except as noted in 904.06. Mineral filler shall be non-plastic in accordance with AASHTO T 90.

SECTION 904, BEGIN LINE 210, DELETE AS FOLLOWS:

(a) Classification of Aggregates

Characteristic Classes	AP	AS	A	B	C	D	E	F
Quality Requirements:								
Freeze and Thaw Beam Expansion, % max. (Note 1).....	.060							
Los Angeles Abrasion, % max. (Note 2).....	40.0	30.0	40.0	40.0	45.0	45.0	50.0	
Freeze and Thaw, AASHTO T 103, Procedure A, % max. (Note 3).....	12.0	12.0	12.0	12.0	16.0	16.0	20.0	25.0
Sodium Sulfate Soundness, % max. (Note 3).....	12.0	12.0	12.0	12.0	16.0	16.0	20.0	25.0
Brine Freeze and Thaw Soundness, % max. (Note 3).....	30	30	30	30	40	40	50	60
Absorption, % max. (Note 4).....	5.0	5.0	5.0	5.0	5.0			
Additional Requirements:								
Deleterious, % max.								
Clay Lumps and Friable Particles.....	1.0	1.0	1.0	1.0	2.0	4.0		
Non-Durable (Note 5).....	4.0	2.0	4.0	4.0	6.0	8.0		
Coke					(See Note 6)			
Iron					(See Note 6)			
Chert (Note 7)	3.0	3.0	3.0	5.0	8.0	10.0		
Weight per Cubic Foot for Slag, lbs, min.	75.0		75.0	75.0	70.0	70.0	70.0	
Crushed Particles, % min. (Note 8)								
Asphalt Seal Coats			70.0	70.0				
Compacted Aggregates			20.0	20.0	20.0	20.0		
Additional SMA Mixture Requirements:								

REVISION TO STANDARD SPECIFICATIONS

SECTION 904 - AGGREGATES

904.01 AGGREGATES

904.02(a) FOR HMA MIXTURES

904.02(c) FOR SMA MIXTURES

904.03(a) CLASSIFICATION OF AGGREGATES

904.03(b) COARSE AGGREGATE ANGULARITY FOR HMA AND SMA

Micro Deval Abrasion, %, max.....	(Note 9)						
Aggregate Degradation, %, max.....	(Note 10)						

Notes:

1. Freeze and thaw beam expansion shall be tested and re-tested in accordance with ITM 210.
2. Los Angeles abrasion requirements shall not apply to BF.
3. Aggregates may, at the option of the Engineer, be accepted by the Sodium Sulfate Soundness or Brine Freeze and Thaw Soundness requirements.
4. Absorption requirements apply only to aggregates used in PCC and HMA mixtures except they shall not apply to BF. When crushed stone coarse aggregates from Category I sources consist of production from ledges whose absorptions differ by more than two percentage points, the absorption test will be performed every three months on each size of material proposed for use in PCC or HMA mixtures. Materials having absorption values between 5.0 and 6.0 that pass AP testing may be used in PCC. If variations in absorption preclude satisfactory production of PCC or HMA mixtures, independent stockpiles of materials will be sampled, tested, and approved prior to use.
5. Non-durable particles include soft particles as determined by ITM 206 and other particles which are structurally weak, such as soft sandstone, shale, limonite concretions, coal, weathered schist, cemented gravel, ocher, shells, wood, or other objectionable material. Determination of non-durable particles shall be made from the total weight (mass) of material retained on the 3/8 in. (9.5 mm) sieve. Scratch Hardness Test shall not apply to crushed stone coarse aggregate.
6. ACBF and SF coarse aggregate shall be free of objectionable amounts of coke, iron, and lime agglomerates.
7. The bulk specific gravity of chert shall be based on the saturated surface dry condition. The amount of chert less than 2.45 bulk specific gravity shall be determined on the total weight (mass) of material retained on the 3/8 in. (9.5 mm) sieve for sizes 2 through 8, 43, 53, and 73 and on the total weight (mass) of material retained on the No. 4 (4.75 mm) sieve for sizes 9, 11, 12, and 91.
8. Crushed particle requirements apply to gravel coarse aggregates used in compacted aggregates, and seal coats except seal coats used on shoulders. Determination of crushed particles shall be made from the weight (mass) of material retained on the No. 4 (4.75 mm) sieve in accordance with ASTM D 5821.
- ~~9. Micro Deval Abrasion testing will be required for each coarse aggregate. A coarse aggregate or a blend of coarse aggregates shall have a maximum Micro Deval Abrasion loss value of 18.0% as determined in accordance with ITM 220.~~
- ~~10. A coarse aggregate or a blend of coarse aggregates shall have a maximum Aggregate Degradation loss value of 3.0% as determined in accordance with ITM 220.~~

SECTION 904, BEGIN LINE 214, DELETE AND INSERT AS FOLLOWS:

(b) Coarse Aggregate Angularity for HMA and SMA

The coarse aggregate angularity, CAA of the total blended aggregate, including recycled materials, shall meet or exceed the minimum values for the appropriate ESAL category and position within the pavement structure as follows.

COARSE AGGREGATE ANGULARITY		
TRAFFIC ESAL	DEPTH FROM SURFACE	
	≤ 4 in.	> 4 in.
< 300,000	55	
300,000 to < 3,000,000	75	50
3,000,000 to < 10,000,000	85/80*	60
≥ 10,000,000 to < 30,000,000	95/90*	80/75* 95/90*

REVISION TO STANDARD SPECIFICATIONS

SECTION 904 - AGGREGATES

904.01 AGGREGATES

904.02(a) FOR HMA MIXTURES

904.02(c) FOR SMA MIXTURES

904.03(a) CLASSIFICATION OF AGGREGATES

904.03(b) COARSE AGGREGATE ANGULARITY FOR HMA AND SMA

$\geq 30,000,000$	100/100*	100/100*
* Denotes two faced crush requirements.		

SECTION 904, BEGIN LINE 243, DELETE AND INSERT AS FOLLOWS:

1. HMA Coarse Aggregate

Coarse Aggregate Type	Traffic ESALs		
	$\leq 3,000,000$	$\leq 10,000,000$	$\geq 10,000,000$
Air Cooled Blast Furnace Slag	Yes	Yes	Yes
Steel Furnace Slag	Yes	Yes	Yes
Sandstone	Yes	Yes	Yes
Crushed Dolomite	Yes	Yes	(Note 1)
Polish Resistant Aggregates	Yes	Yes	(Note 1)
Crushed Stone	Yes	(Note 2)	(Note 2)
Gravel	Yes	(Note 2)	(Note 2)
Note 1. Polish resistant aggregates or crushed dolomite may be used when blended with ACBF or sandstone but cannot exceed 50% of the coarse aggregate by weight or cannot exceed 40% of the coarse aggregate by weight when blended with steel furnace slag.			
Note 2. Crushed stone or gravel in accordance with ITM 221 may be used.			

a. Category 2 and type B surface mixtures. All coarse aggregate types including ACBF slag, SF slag, sandstone, crushed dolomite, polish resistant aggregate, crushed stone and gravel may be used.

b. Category 3 and type C surface mixtures. ACBF slag, SF slag, sandstone, crushed dolomite, polish resistant aggregate or any combination thereof shall be used. Crushed stone or gravel shall not be used unless the aggregate is classified as a crushed dolomite or polish resistant aggregate.

c. Category 4 and type D surface mixtures. High friction aggregates including ACBF slag, SF slag, sandstone or aggregates in accordance with ITM 221 shall be used.

Crushed dolomite and polish resistant aggregates may be used up to a maximum 50% by volume of material retained on the No. 4 (4.75 mm) sieve when blended with a high friction aggregate.

REVISION TO STANDARD SPECIFICATIONS

SECTION 904 - AGGREGATES

904.01 AGGREGATES

904.02(a) FOR HMA MIXTURES

904.02(c) FOR SMA MIXTURES

904.03(a) CLASSIFICATION OF AGGREGATES

904.03(b) COARSE AGGREGATE ANGULARITY FOR HMA AND SMA

Crushed stone and gravel may be used up to a maximum 20% by volume of material retained on the No. 4 (4.75 mm) sieve when blended with a high friction aggregate.

2. SMA Coarse Aggregate

Coarse Aggregate Type	Traffic ESALs		
	< 3,000,000	< 10,000,000	≥ 10,000,000
Air Cooled Blast Furnace Slag	No	No	No
Steel Furnace Slag	(Note 1)	(Note 1)	Yes
Sandstone	(Note 1)	(Note 1)	Yes
Crushed Dolomite	(Note 1)	(Note 1)	(Note 2)
Polish Resistant Aggregates	(Note 1)	(Note 1)	(Note 2)
Crushed Stone	No	No	No
Gravel	No	No	No

Notes: 1. Steel furnace slag, sandstone, crushed dolomite, polish resistant aggregates or any blend of these aggregates may be used provided the aggregates are in accordance with 904.03(a).
 2. Polish resistant aggregates or crushed dolomite may be used when blended with sandstone but shall not exceed 50% of the coarse aggregate by weight (mass), or shall not exceed 40% of the coarse aggregate by weight (mass) when blended with steel furnace slag. The aggregates shall be in accordance with 904.03(a).

SF slag, sandstone, crushed dolomite and polish resistant aggregates in accordance with 904.03(a) may be used in SMA mixtures provided the mixture is designed in accordance with ITM 220.

BACKUP 01

RECURRING SPECIAL PROVISION 904-R-626 COARSE AGGREGATE (AFFECTED BY THE PROPOSED CHANGES)

(Note: Approved by the Standards Committee on the June 18, 2015 meeting.
 Basis for Use: Required for all contracts with 401, 402, 404, 410 or 414 pay items)

904-R-626 COARSE AGGREGATE

(Adopted 06-18-15)

The Standard Specifications are revised as follows:

SECTION 904, BEGIN LINE 241, INSERT AS FOLLOWS:

(d) Surface Aggregate Requirements

The surface mixture aggregates selection shall be based on the ESAL category as follows.

1. HMA Coarse Aggregate

Coarse Aggregate Type	Traffic ESALs		
	< 3,000,000	< 10,000,000	≥ 10,000,000
	<i>ESAL Categories 1 & 2</i>	<i>ESAL Category 3</i>	<i>ESAL Categories 4 & 5</i>
Air-Cooled Blast Furnace Slag	Yes	Yes	Yes
Steel Furnace Slag	Yes	Yes	Yes
Sandstone	Yes	Yes	Yes
Crushed Dolomite	Yes	Yes	(Notes 1 & 2)
Polish Resistant Aggregates	Yes	Yes	(Notes 1 & 2)
Crushed Stone	Yes	(Note 2)	(Notes 2 & 3)
Gravel	Yes	(Note 2)	(Notes 2 & 3)
<p>Note 1. Polish resistant aggregates or crushed dolomite may be used when blended with ACBF or sandstone but cannot exceed 50% of the coarse aggregate by weight or cannot exceed 40% of the coarse aggregate by weight when blended with steel furnace slag. <i>When also blended with crushed stone or gravel, the combined aggregates cannot exceed 50% of the coarse aggregate by weight when blended with ACBF or sandstone or cannot exceed 40% of the coarse aggregate by weight when blended with steel furnace slag.</i></p> <p>Note 2. Crushed stone or gravel Aggregates in accordance with ITM 221 may be used.</p> <p>Note 3. <i>Crushed stone or gravel may be used when blended with ACBF or sandstone but cannot exceed 20% of the coarse aggregate by weight or cannot exceed 15% of the coarse aggregate by weight when blended with steel furnace slag.</i></p>			

COMMENTS AND ACTION

904.01 AGGREGATES

904.02(a) FOR HMA MIXTURES

904.02(c) FOR SMA MIXTURES

904.03(a) CLASSIFICATION OF AGGREGATES

904.03(b) COARSE AGGREGATE ANGULARITY FOR HMA AND SMA

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 904 pg 870, 871, 872, 873, 875, 877 and 878.</p> <p>Recurring Special Provision affected: 904-R-626 COARSE AGGREGATE</p> <p>Standard Drawing affected: NONE</p> <p>Design Manual Sections affected: NONE</p> <p>GIFE Sections cross-references: NONE</p>	<p>_____ 2018 Standard Specifications</p> <p>_____ Revise Pay Items List</p> <p>_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p> <p>_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p> <p>_____ Standard Drawing Effective</p> <p>_____ Create RPD (No. _____) Effective _____ Letting</p> <p>_____ GIFE Update</p>

Mr. Beeson
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO SPECIAL PROVISIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Aggregate moisture content requirements are unclear, and difficult to achieve as written.

PROPOSED SOLUTION: Separate aggregate moisture requirements for delivery of aggregate to the project and acceptance testing. The moisture requirements for delivery will be a wider band than when the testing actually occurs.

APPLICABLE STANDARD SPECIFICATIONS: N/A

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: N/A

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: 203-R-628

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: INDOT/IMAA technical committee,
INDOT Geotech

IMPACT ANALYSIS (attach report):

Submitted By: Matt Beeson

Title: State Materials Engineer

Organization: INDOT

Phone Number: 317-610-7251 x204

Date: 5/23/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO SPECIAL PROVISIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? N

Will approval of this item affect the Approved Materials List? N
Will this proposal improve:

Construction costs? Y

Construction time? N

Customer satisfaction? N

Congestion/travel time? N

Ride quality? N

Will this proposal reduce operational costs or maintenance effort? N

Will this item improve safety:

For motorists? N

For construction workers? N

Will this proposal improve quality for:

Construction procedures/processes? Y

Asset preservation? N

Design process? N

Will this change provide the contractor more flexibility? Y

Will this proposal provide clarification for the Contractor and field personnel? Y

Can this item improve/reduce the number of potential change orders?
N

Is this proposal needed for compliance with:

Federal or State regulations? N

AASHTO or other design code? Y

Is this item editorial? N

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

REVISION TO SPECIAL PROVISIONS
203-R-628 COMPACTION ACCEPTANCE WITH LWD

(Note: Proposed changes shown highlighted gray.
Basis For Use: Required for all contracts except mowing or herbicide contracts.)

203-R-628 COMPACTION ACCEPTANCE WITH LWD

(Revised 11-09-15)

The Standard Specifications are revised as follows:

SECTION 203, AFTER LINE 971, INSERT AS FOLLOWS:

The compaction of chemically modified soils and coarse aggregates will be determined by Light Weight Deflectometer, LWD, testing in accordance with ITM 508. The moisture content will be determined in accordance with AASHTO T 255 or ITM 506. The compaction procedures shall be in accordance with 203.23, 215, 301, 302, and 303.

The maximum allowable deflection will be determined from a test section or will be specified. Acceptance testing with a LWD will be in accordance with ITM 508. The optimum moisture content and gradation will be determined by performing AASHTO T 99 Method C, AASHTO T 11, and AASHTO T 27 on representative samples of the aggregates.

The moisture content of the aggregate shall be ~~within 3 percentage points of the optimum moisture content~~ between 4% and the optimum moisture content ~~prior to placement~~ when the aggregate is delivered to the project. The frequency of the moisture content test for aggregates will be one test for each day of aggregate placement. ~~Water shall be added only to the stockpiles if the moisture is below 4%.~~

The maximum allowable deflection for chemically modified soils and aggregate over chemically modified soils shall be in accordance with the following:

<i>Material Type</i>	<i>Maximum Allowable Deflection, mm</i>
<i>Lime Modified Soil</i>	<i>0.30</i>
<i>Cement Modified Soil</i>	<i>0.27</i>
<i>Aggregates over Lime Modified Soil</i>	<i>0.30</i>
<i>Aggregates over Cement Modified Soil</i>	<i>0.27</i>

Table 1

Test sections shall be constructed in accordance with ITM 514 in the presence of a representative of the Office of Geotechnical Services for other materials not included in Table 1 to determine the maximum allowable deflection.

Acceptance of the compaction of chemically modified soils or aggregates will be determined by averaging three LWD tests obtained at a random station determined in accordance with ITM 802. The location of the three tests will be at 2 ft from each edge of

REVISION TO SPECIAL PROVISIONS
203-R-628 COMPACTION ACCEPTANCE WITH LWD

the construction area and at 1/2 of the width of the construction area. The moisture content of the aggregate shall be between 4% and 6% prior to LWD acceptance testing. The average deflection shall be equal to or less than the maximum allowable deflection allowed in Table 1 or determined by the test section. The frequency of the LWD testing will be three tests for each 800 t for compacted aggregate and three tests for each 1,400 cu yd of chemically modified soil.

If the average deflection is not equal to or less than the maximum allowable deflection for aggregates, a sample of the aggregate shall be obtained in accordance with AASHTO T 2 and a moisture content test shall be performed in accordance with AASHTO T 255 to determine if the moisture content is within the acceptable limits. If the moisture content is not within the acceptable limits, additional LWD tests may be taken at the same locations after 24 h if the moisture content is within the acceptable limits at the time of testing. The aggregate will be accepted if the LWD tests are equal to or less than the maximum allowable deflection.

COMMENTS AND ACTION

203 R-628 COMPACTION ACCEPTANCE WITH LWD

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: _____ Passed as Submitted _____ Passed as Revised = _ = Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 203.25 pg 167.</p>	<p>_____ 2018 Standard Specifications _____ Revise Pay Items List</p>
<p>Recurring Special Provision affected: 203-R-628 COMPACTION ACCEPTANCE WITH LWD.</p>	<p>_____ Create RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Standard Drawing affected: NONE</p>	<p>_____ Revise RSP (No. _____) Effective _____ Letting RSP Sunset Date:</p>
<p>Design Manual Sections affected: NONE</p>	<p>_____ Standard Drawing Effective</p>
<p>GIFE Sections cross-references: NONE</p>	<p>_____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update</p>

Mr. Dave
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: When the longitudinal run of underdrain pipe is 4 inch in diameter and the underdrain outlet pipe is 6 inches in diameter there is a need to transition from the smaller size pipe to the larger. Currently this is being done with an increaser fitting between the transition pipe and the 45 degree elbow. The problem this creates is when the pipe is being cleaned. The tools used for cleaning the pipes gets caught up between the elbow and the increaser.

PROPOSED SOLUTION: A 2 foot section of pipe will be placed between the elbow and the increaser. This will give the cleaning tools a small space to straighten out prior to having to navigate into the smaller pipe.

APPLICABLE STANDARD SPECIFICATIONS: 718.05

APPLICABLE STANDARD DRAWINGS: E 718-UNDR-02

APPLICABLE DESIGN MANUAL SECTION: N/A

APPLICABLE SECTION OF GIFE: N/A

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: None.

APPLICABLE SUB-COMMITTEE ENDORSEMENT: No sub-committee was involved with this recommendation. A contractor that does underdrain cleaning made the recommendation. The idea was presented to Greg Pankow of construction and Todd Shields of Maintenance and there was no objections to the idea.

IMPACT ANALYSIS (attach report): Report attached.

Submitted By: Kumar Dave

Title: Pavement Design Manager

Organization: INDOT

Phone Number: 317-233-5279

Date: 5/23/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? No

Construction time? No

Customer satisfaction? No

Congestion/travel time? No

Ride quality? No

Will this proposal reduce operational costs or maintenance effort? Yes

Will this item improve safety:

For motorists? No

For construction workers? No

Will this proposal improve quality for:

Construction procedures/processes? No

Asset preservation? Yes

Design process? No

Will this change provide the contractor more flexibility? No

Will this proposal provide clarification for the Contractor and field personnel? Yes

Can this item improve/reduce the number of potential change orders? No

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: N/A

REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

SECTION 718 - UNDERDRAINS

718.05 UNDERDRAINS OUTLETS

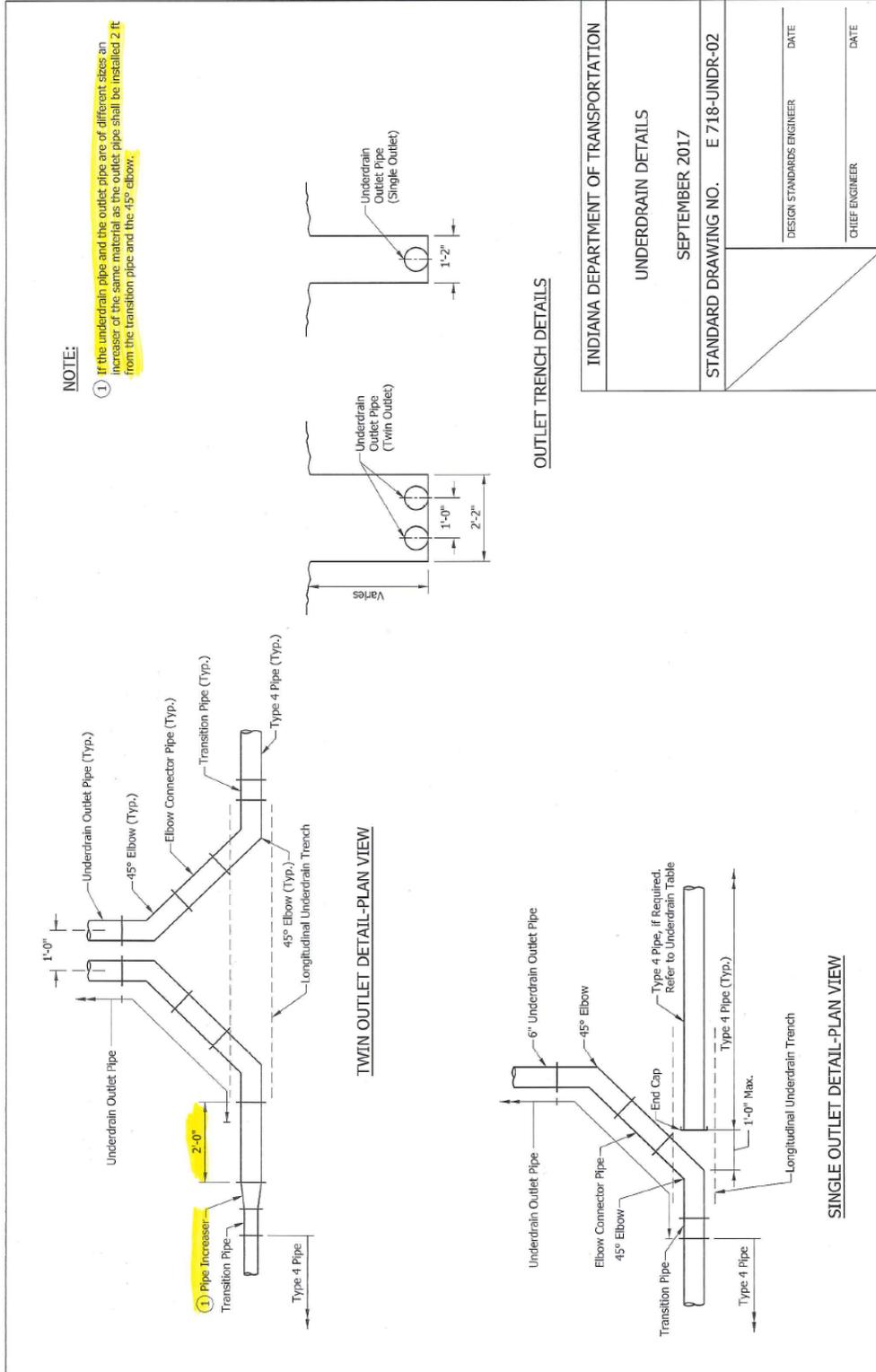
The Standard Specifications are revised as follows:

SECTION 718, BEGIN LINE 71, DELETE AND INSERT AS FOLLOWS:

718.05 Underdrain Outlets

If the underdrain pipe and the outlet pipe are of different sizes, an increaser of the same material as the outlet pipe shall be installed ~~between the transition pipe and~~ *2 ft from* the 45° elbow *and prior to the transition pipe*. If a single outlet pipe is to be skewed at 45°, a second 45° elbow and an elbow-connector pipe are not required.

REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS
 PROPOSED REVISION TO 718-UNDR-02 UNDERDRAINS DETAILS (DRAFT)



COMMENTS AND ACTION

718.05 UNDERDRAINS OUTLETS

718-UNDR-02 UNDERDRAINS DETAILS

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: ____ Passed as Submitted ____ Passed as Revised ____ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 718.05 pg 655.</p> <p>Recurring Special Provision affected: NONE</p> <p>Standard Drawing affected: 718-UNDR-02 UNDERDRAINS DETAILS.</p> <p>Design Manual Sections affected: NONE</p> <p>GIFE Sections cross-references: NONE</p>	<p>____ 2018 Standard Specifications ____ Revise Pay Items List ____ Create RSP (No. ____) Effective ____ Letting RSP Sunset Date: ____ Revise RSP (No. ____) Effective ____ Letting RSP Sunset Date: ____ Standard Drawing Effective ____ Create RPD (No. ____) Effective ____ Letting ____ GIFE Update</p>

Mr. Boruff
Date: 06/16/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: The hardware specifications for the signal tether brackets are not well defined. Some of the hardware being used has sharp edges, which is causing many signal tethers to break a few months after a signal modernization or signal visibility improvement project.

PROPOSED SOLUTION: Specify that a wire rope clamp or a tether plate must be used to secure the tether bracket to the tether. Also increase the diameter of the tether cable from 3/16 to 1/4 inches.

APPLICABLE STANDARD SPECIFICATIONS: §922

APPLICABLE STANDARD DRAWINGS: 805-SGSC-03, 805-SGSC-04

APPLICABLE DESIGN MANUAL SECTION: No

APPLICABLE SECTION OF GIFE: No

APPLICABLE RECURRING SPECIAL PROVISIONS: No

PAY ITEMS AFFECTED: No

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Ad hoc review by district traffic engineers and district signal tech supervisors.

IMPACT ANALYSIS (attach report): Yes, attached.

Submitted By: Dave Boruff

Title: Traffic Administration Manager

Organization: INDOT

Phone Number: (317) 234-7975

Date: 5/23/2016

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS
REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval.
Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? No

Construction time? No

Customer satisfaction? Yes

Congestion/travel time? No

Ride quality? No

Will this proposal reduce operational costs or maintenance effort? No

Will this item improve safety:

For motorists? Yes

For construction workers? No

Will this proposal improve quality for:

Construction procedures/processes? No

Asset preservation? Yes

Design process? No

Will this change provide the contractor more flexibility? No

Will this proposal provide clarification for the Contractor and field personnel? Yes

Can this item improve/reduce the number of potential change orders? Yes

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: N/A

REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

PROPOSED NEW RSP 922-T-XXX TETHER BRACKETS
(SECTION 922 -TRAFFIC SIGNAL MATERIALS AND EQUIPMENT)
(922.07(d) TETHER BRACKET)
(922.10(e) SUPPORT CABLE)

922-T-XXX TETHER BRACKETS

(Adopted xx-xx-16)

The Standard Specifications are revised as follows:

SECTION 922, BEGIN LINE 896, DELETE AS FOLLOWS:

922.07 Free Swinging Signal Support Assemblies

SECTION 922, BEGIN LINE 925, DELETE AND INSERT AS FOLLOWS:

(d) Tether Bracket

The tether bracket shall attach to a ~~1/8 in. to~~ 1/4 in. ~~messenger cable~~ *tether* and prevent the bottom of the head from moving side-to-side on the ~~cable~~ *tether*. Where backplates are installed on the signal heads, the tether bracket shall be of the proper length for the backplate so that the cable is mounted below the bottom of the backplate to avoid interference with head alignment and damage to the backplate. *Three bolts, nuts, and washers, shall be used to secure the tether bracket to a three section or four section signal head. A wire rope clamp in accordance with 922.10(e)4c, shall be used to secure the tether bracket to the tether and the tether bracket shall have predrilled 1/2 in. diameter holes. In lieu of the wire rope clamp and 1/2 in diameter holes, a beveled tether plate that completely fills in the extruded portion of the tether bracket may be used to secure the tether bracket to the tether. The tether bracket shall not extend more than 2 in. below the tether.*

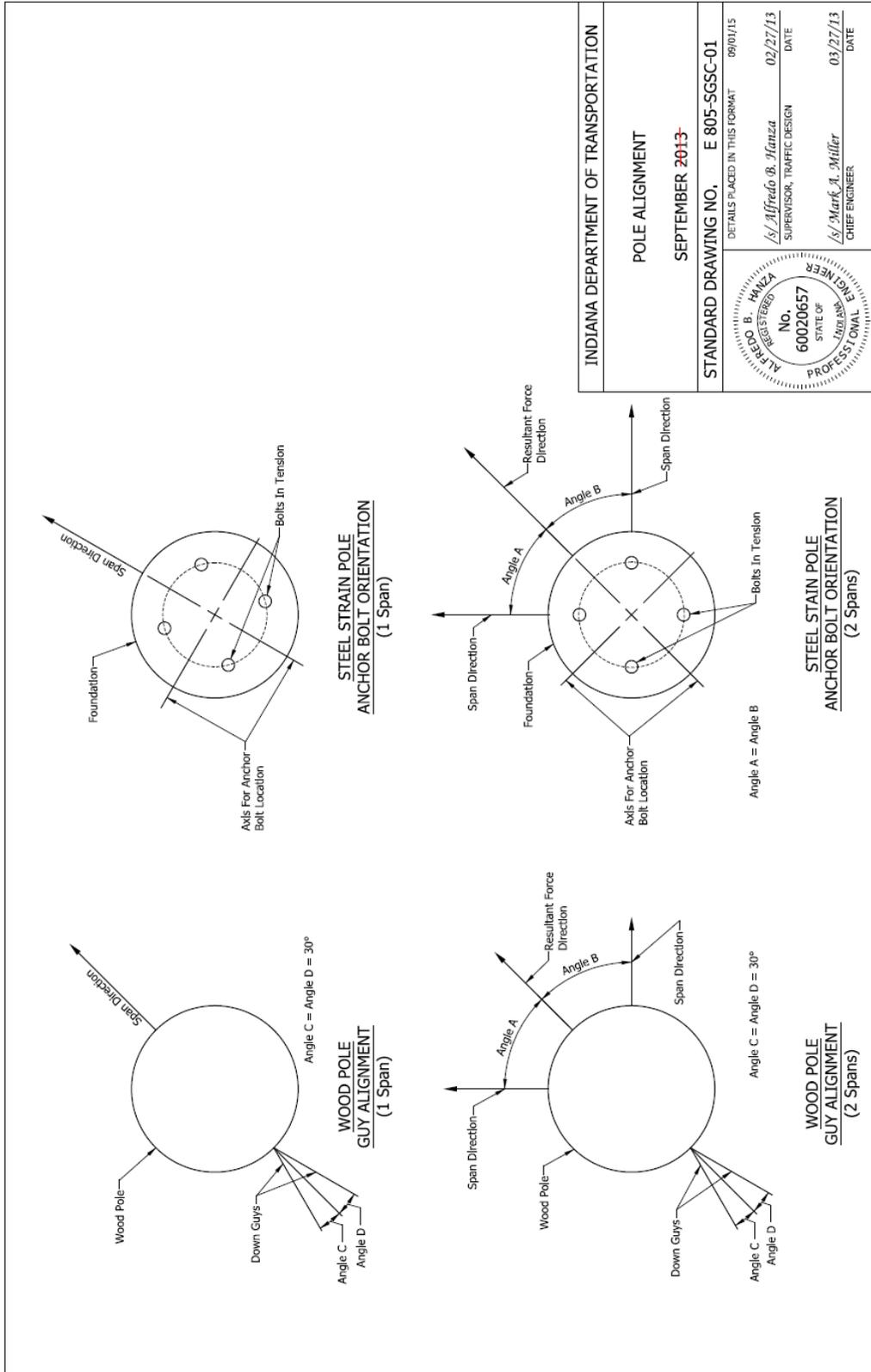
SECTION 922, BEGIN LINE 1233, REVISE AS FOLLOWS:

3. Tether and Support Cable

Tether and support cable shall be aircraft cable, for non-aircraft, and shall be ~~3/16~~ *1/4* in. nominal diameter, made of stainless steel wire, and consist of seven, ~~seven~~ *19*-wire flexible steel strands. The ~~3/16~~ *1/4* in. cable shall have a minimum breaking strength of ~~3,700~~ *3,840* lbs. It shall be in accordance with Military Specifications MIL-W-83420D.

REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

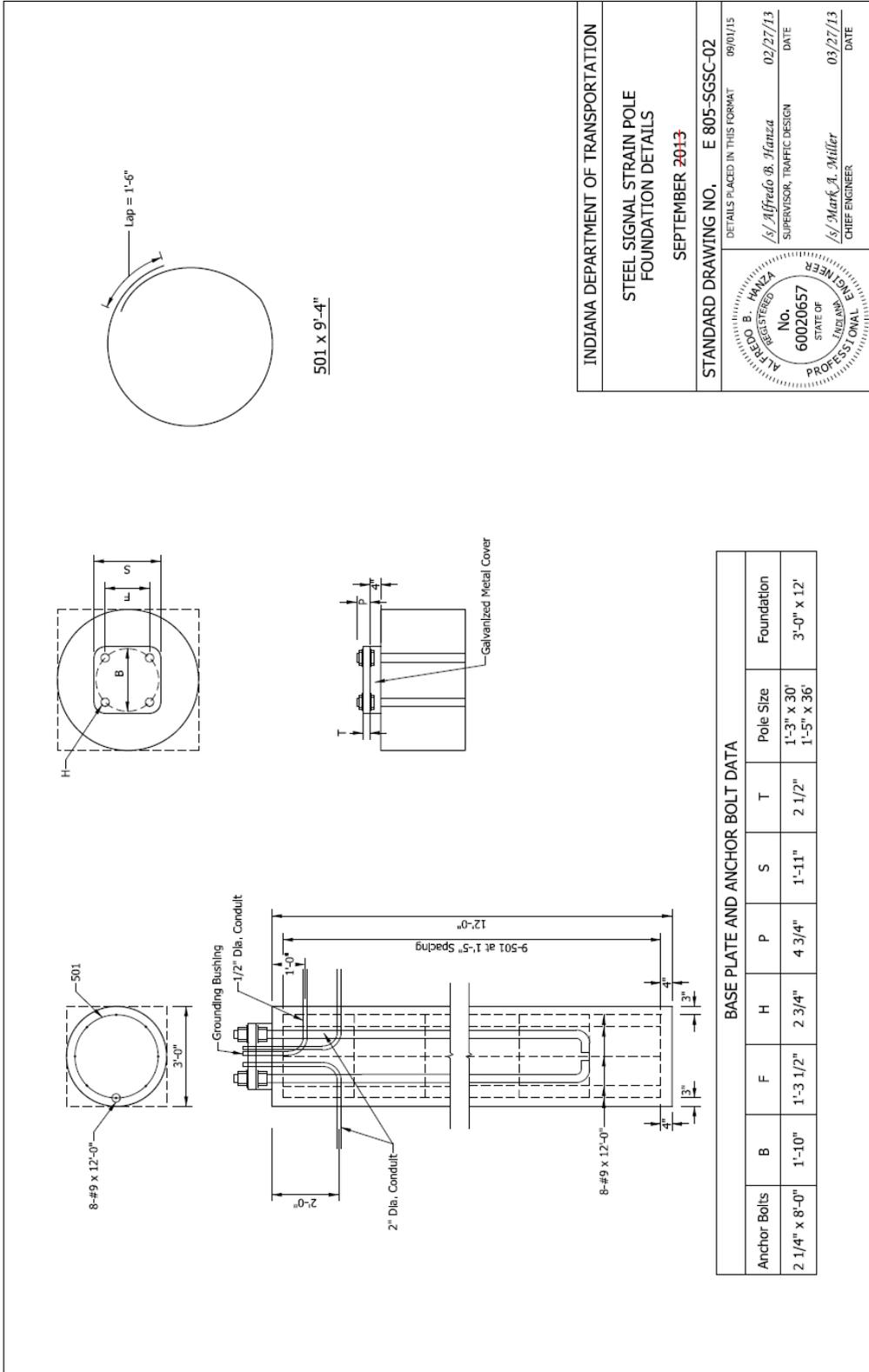
805-SGSC-01 POLE ALIGNMENT (WITH MARKUPS, SEE SIGNATURE BOX)



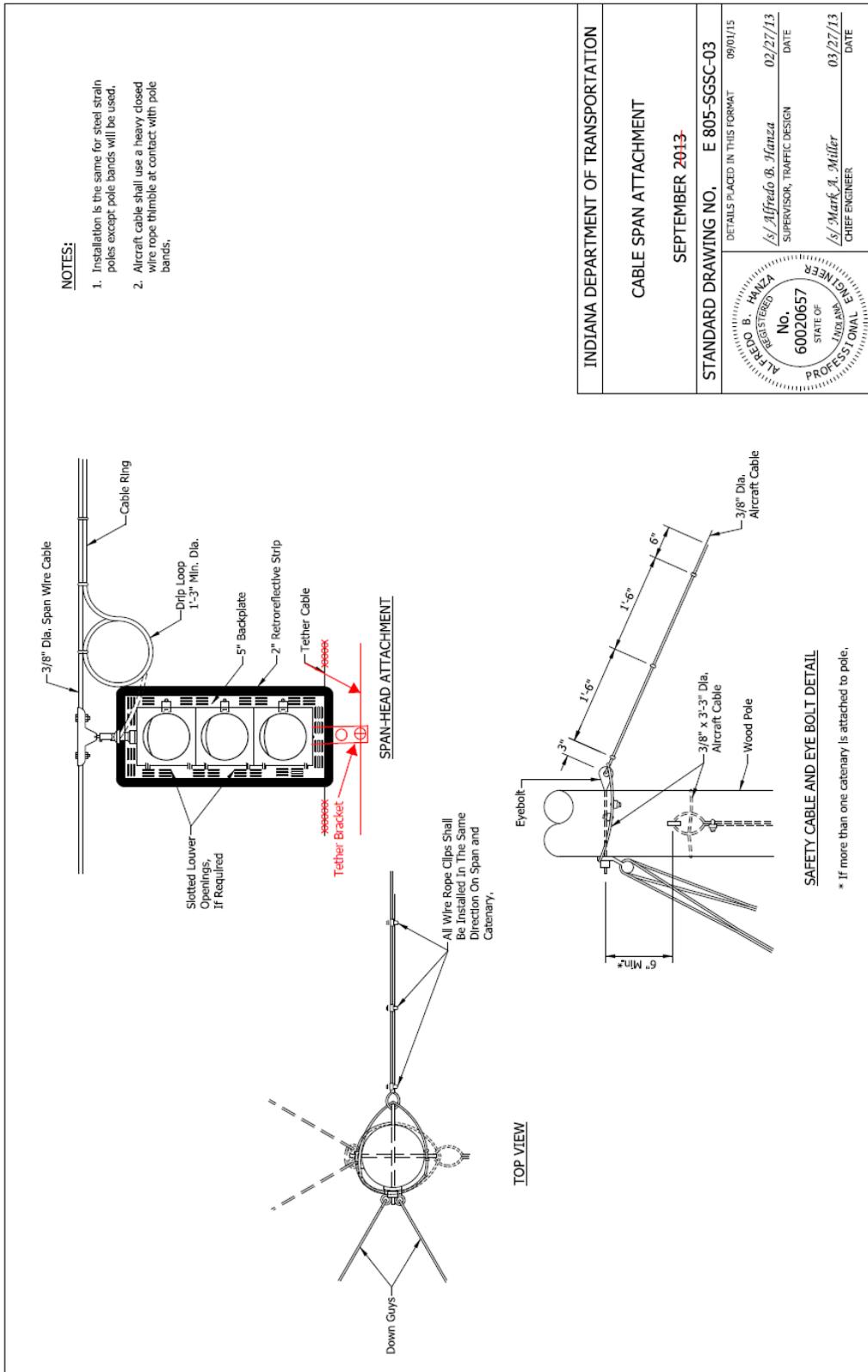
INDIANA DEPARTMENT OF TRANSPORTATION	
POLE ALIGNMENT	
SEPTEMBER 2013	
STANDARD DRAWING NO. E 805-SGSC-01	
DETAILS PLACED IN THIS FORMAT 09/01/15	
ALFREDO B. HANZA REGISTERED No. 60020657 STATE OF INDIANA PROFESSIONAL ENGINEER	02/27/13 DATE /s/ Alfredo B. Hanza SUPERVISOR, TRAFFIC DESIGN
03/27/13 DATE /s/ Mark A. Miller CHIEF ENGINEER	

REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

805-SGSC-02 STEEL SIGNAL STRAIN POLE FOUNDATION DETAILS ((WITH MARKUPS, SEE SIGNATURE BOX))



REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS
 805-SGSC-03 CABLE SPAN ATTACHMENT (WITH MARKUPS)



NOTES:

1. Installation is the same for steel strain poles except pole bands will be used.
2. Aircraft cable shall use a heavy closed wire rope thimble at contact with pole bands.

INDIANA DEPARTMENT OF TRANSPORTATION

CABLE SPAN ATTACHMENT

SEPTEMBER 2013

STANDARD DRAWING NO. E 805-SGSC-03

DETAILS PLACED IN THIS FORMAT 09/01/15

/s/ Alfredo B. Manza
 SUPERVISOR, TRAFFIC DESIGN DATE 02/27/13

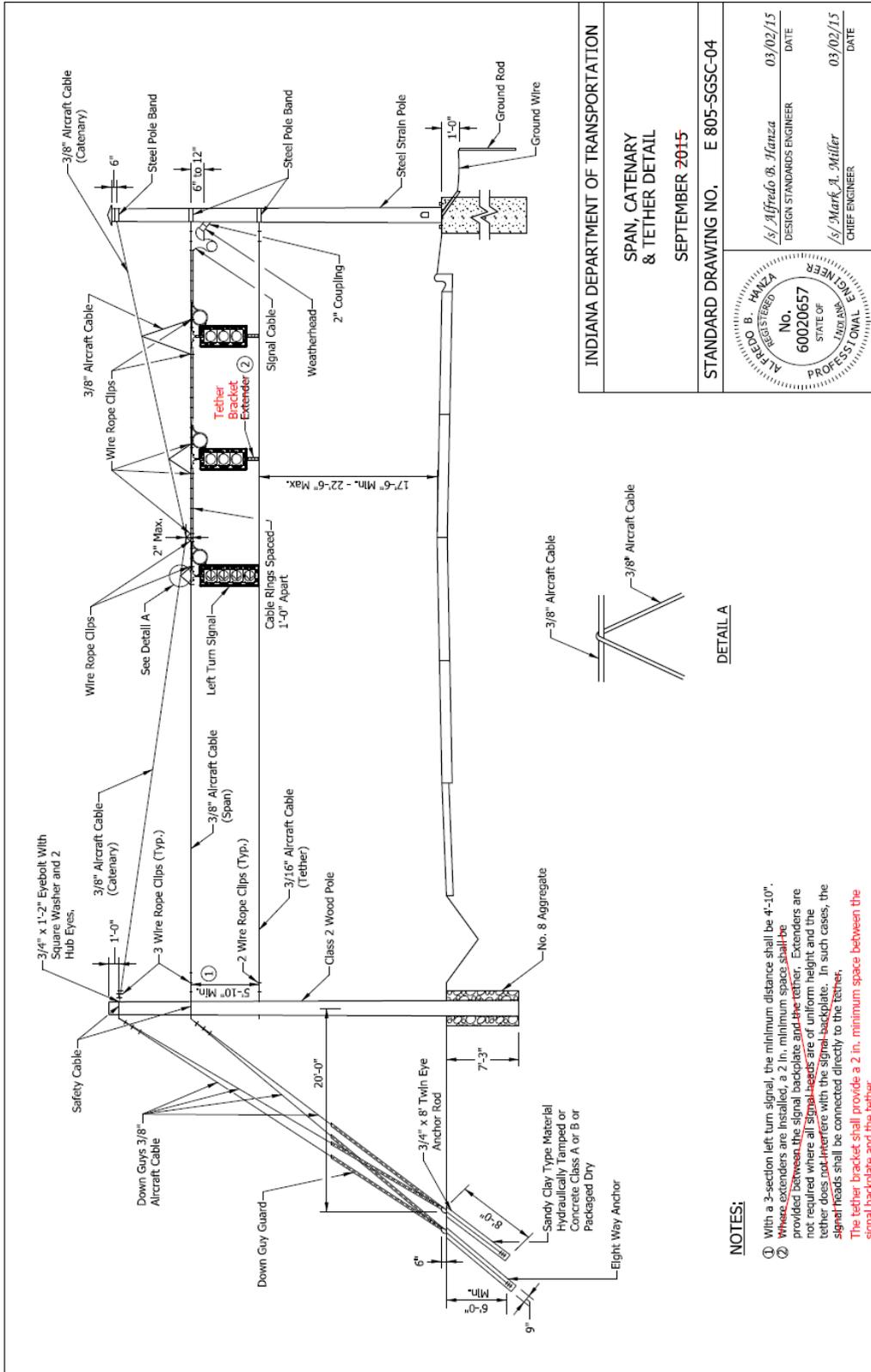
/s/ Mark A. Miller
 CHIEF ENGINEER DATE 03/27/13



SAFETY CABLE AND EYE BOLT DETAIL

* If more than one catenary is attached to pole.

REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS
 805-SGSC-04 SPAN, CATENARY & TETHER DETAILS (WITH MARKUPS)



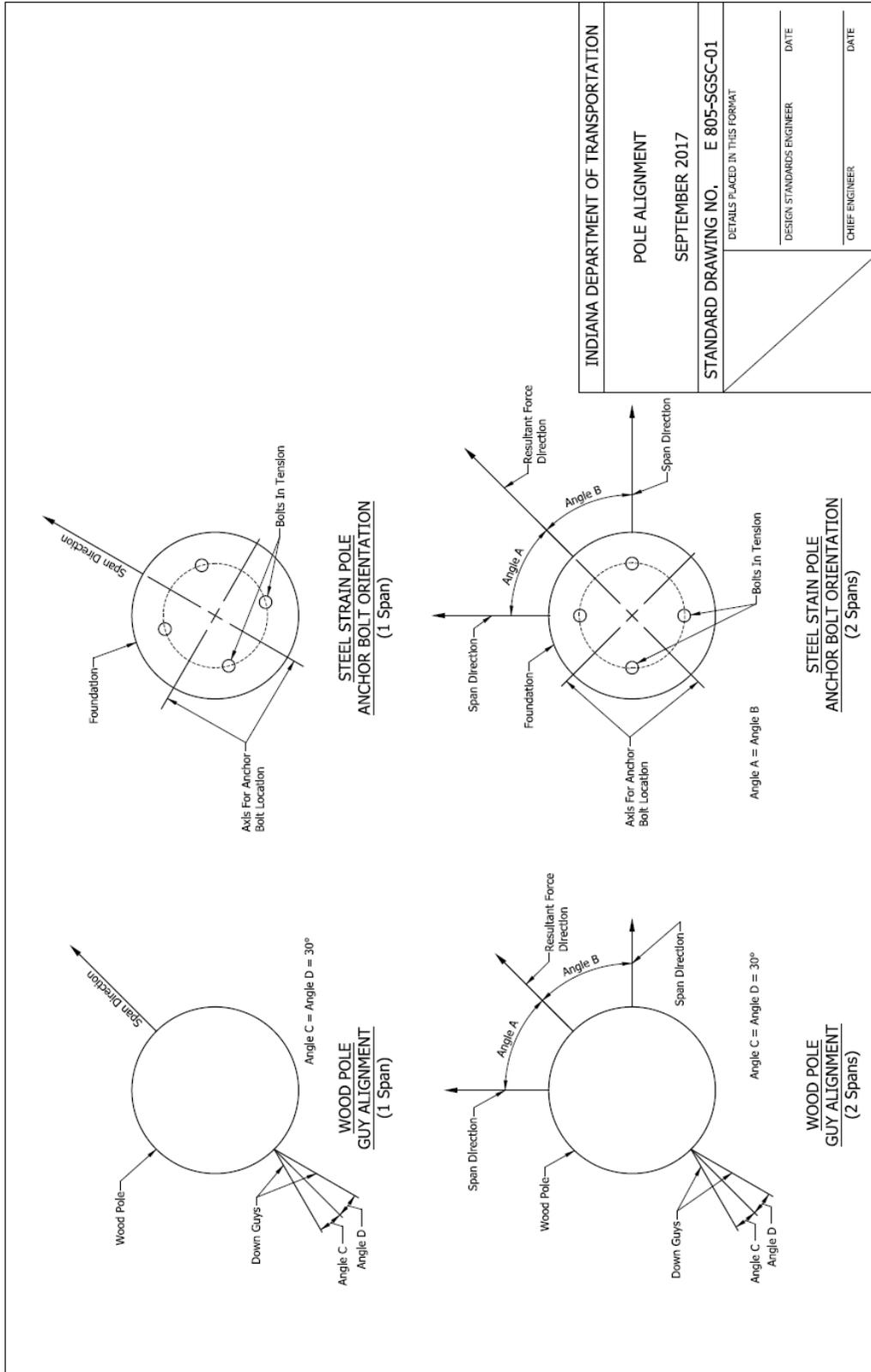
INDIANA DEPARTMENT OF TRANSPORTATION	
SPAN, CATENARY & TETHER DETAIL	
SEPTEMBER 2015	
STANDARD DRAWING NO. E 805-SGSC-04	
DESIGN STANDARDS ENGINEER <i>/s/ Alfredo B. Hanza</i>	DATE 03/02/15
CHIEF ENGINEER <i>/s/ Mark A. Miller</i>	DATE 03/02/15

DETAIL A

- NOTES:**
- With a 3-section left turn signal, the minimum distance shall be 4'-10".
 - Where extenders are installed, a 2 in. minimum space shall be provided between the signal backplate and the tether. Extenders are not required where all signal heads are of uniform height and the tether does not interfere with the signal backplate. In such cases, the signal heads shall be connected directly to the tether.
- The tether bracket shall provide a 2 in. minimum space between the signal backplate and the tether.

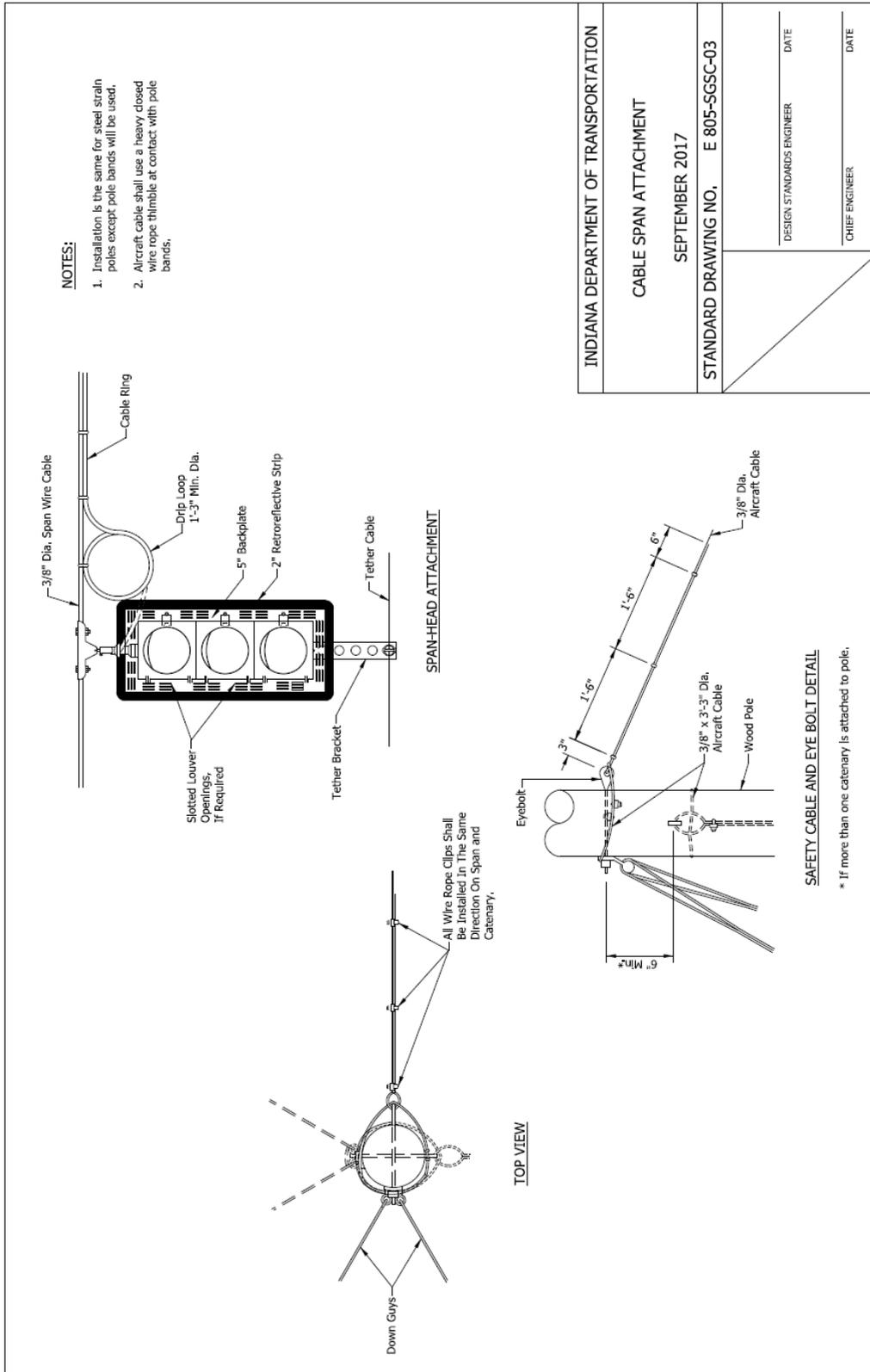
REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

805-SGSC-01 POLE ALIGNMENT (PROPOSED DRAFT)



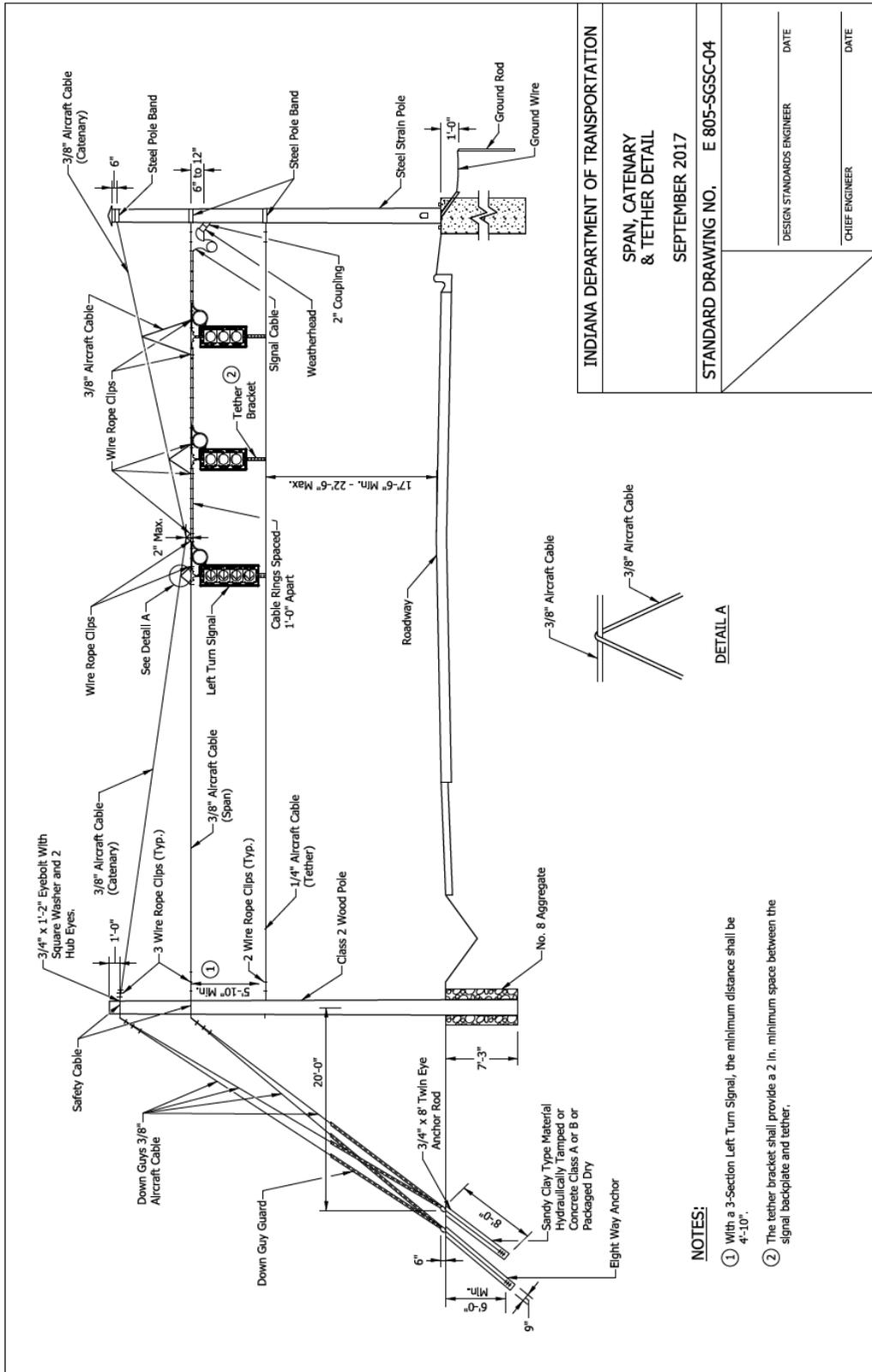
REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

805-SGSC-03 CABLE SPAN ATTACHMENT (PROPOSED DRAFT)



REVISION TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

805-SGSC-04 SPAN, CATENARY & TETHER DETAIL (PROPOSED DRAFT)



COMMENTS AND ACTION

922-T-XXX TETHER BRACKETS

805-SGSC 01 THRU -04

DISCUSSION:

<p>Motion: Second: Ayes: Nays: FHWA Approval:</p>	<p>Action: ____ Passed as Submitted ____ Passed as Revised == __ Withdrawn</p>
<p>Standard Specifications Sections referenced and/or affected: 922.07 pg 1052 and 1053; 922.10 pg 1059. Recurring Special Provision affected: PROPOSED NEW. Standard Drawing affected: 805-SGSC 01 thru -04. Design Manual Sections affected: NONE GIFE Sections cross-references: NONE</p>	<p>____ 2018 Standard Specifications ____ Revise Pay Items List ____ Create RSP (No. ____) Effective ____ Letting RSP Sunset Date: ____ Revise RSP (No. ____) Effective ____ Letting RSP Sunset Date: ____ Standard Drawing Effective ____ Create RPD (No. ____) Effective ____ Letting ____ GIFE Update</p>