INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room N925 CM
Indianapolis, Indiana 46204

PHONE: (317) 232-5502
FAX: (317) 232-5551

Eric Holcomb, Governor
Joe McGuinness, Commissioner

AGENDA

July 19, 2017 Standards Committee Meeting

MEMORANDUM

July 05, 2017

TO: Standards Committee

FROM: Scott Trammell, Secretary

RE: Agenda for the July 19, 2017 Standards Committee Meeting

A Standards Committee meeting is scheduled for 09:00 a.m. on July 19, 2017 in the N625 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 18, 2017 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. 1	(2018 SS)	Mr. Pankow	pg 4
109.05		Payment for Extra Work	
Item No. 2	(2018 SS)	Mr. Pankow	pg 8
711.48		Shop Cleaning and Storage of Weathering Steel	
Item No. 3	(2018 SS)	Mr. Beeson	pg 12
401.04		Design Mix Formula	
401.05		Volumetric Mix Design	
401.06		Recycled Materials	
401.09		Acceptance of Mixtures	
401.12		Process Control	
401.13		Weather Limitations	
401.14		Spreading and Finishing	
401.16		Density	
401.19		Pay Factors	
401.20		Appeals	
401.22		Basis of Payment	
Item No. 4	(2018 SS)	Mr. Beeson	pg 24
402.07		Mix Criteria	
402.11		Preparation of Surfaces to be Overlaid	
402.13		Spreading and Finishing	
402.16		Low Temperature Compaction Requirements	
Item No. 5	(2018 SS)	Mr. Beeson	pg 29
904.02		Fine Aggregates	
904.03		Coarse Aggregates	
Item No. 6	(2018 SS)	Mr. Beeson	pg 33
909.02(d)		Waterborne Finish Paint	
910.05		Castings	
Item No. 7	(2018 SS)	Mr. Orton	pg 38
SECTION 601		Guardrail	
911.02		Treated Lumber	
926.03		Alternate Material Guardrail ~~Blocks~~*Blockouts*	

cc: Committee Members
FHWA
ICI

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: In coordination with FHWA, there is an identified need for the Department to provide better cost verification documentation for new item change order requests from Contractors.

PROPOSED SOLUTION: New methodology is being proposed to help achieve a standardized and improved process for cost analysis and cost verification for the new item change orders.

APPLICABLE STANDARD SPECIFICATIONS: 109.05

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: N/A

APPLICABLE SECTION OF GIFE: 2.19

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Ad hoc committee members from Industry, INDOT Construction Management, and INDOT District Construction.

IMPACT ANALYSIS (attach report):

Submitted By: Gregory Pankow

Title: State Construction Engineer

Organization: Construction Management

Phone Number: 317-232-5502

Date: May 22, 2017

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? 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? No
- For construction workers? No

Will this proposal improve quality for:

- Construction procedures/processes? Yes
- Asset preservation? No
- 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? Yes
- 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:

REVISION TO STANDARD SPECIFICATIONS

SECTION 109 - MEASUREMENT AND PAYMENT
109.05 PAYMENT FOR EXTRA WORK

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 109, BEGIN LINE 650, DELETE AND INSERT AS FOLLOWS:

109.05 Payment for Extra Work

A Change Order Request form, available on the Department's website, shall be submitted for review for all extra work prior to the Engineer drafting a change order. The form shall describe any unique circumstances and shall include unit prices or lump sum prices utilizing standard Department pay items.

Extra work performed in accordance with 104.03 will be paid for by one of the following methods:

(a) Agreed Price

Extra work will be paid for at ~~the~~ agreed upon unit prices or lump sum prices as documented on approved change orders. ~~The Contractor shall, when directed, furnish a cost breakdown to substantiate a unit price or lump sum price.~~*The Department will perform a cost analysis of the Contractor's unit price or lump sum price indicated on the Change Order Request form.*

Based on the results of the cost analysis, the Engineer may direct the Change Order Request form to be amended to incorporate additional information, including:

1. *A detailed explanation of unique circumstances of the extra work.*
2. *The effect of the circumstances on the requested price.*
3. *A breakdown of the estimated costs for the categories of labor, equipment, and materials in sufficient detail to enable the Engineer to determine the basis and amount of the requested price.*

COMMENTS AND ACTION

109.05 PAYMENT FOR EXTRA WORK

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: 109 pg 113. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: NONE GIFE Sections cross-references: 2.19	_____ 2020 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 _____ SiteManager Update

Mr. Pankow
Date: 07/19/17

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: There have been situations in which the cleaning of weathering steel components has been questioned. The Specifications discuss beams and girders but are silent on component items.

PROPOSED SOLUTION: In order to clarify the intent for the cleaning of weathering steel, 711.48 is being revised to include component items within the steel structural support system.

APPLICABLE STANDARD SPECIFICATIONS: 711.48

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: 407-2.01

APPLICABLE SECTION OF GIFE: 5.24.8.3

APPLICABLE RECURRING SPECIAL PROVISIONS: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Ad hoc

IMPACT ANALYSIS (attach report):

Submitted By: Gregory Pankow

Title: State Construction Engineer

Organization: Construction Management

Phone Number: 317-232-5502

Date:

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? No
- Construction time? No
- Customer satisfaction? No
- Congestion/travel time? No
- Ride quality? No

Will this proposal reduce operational costs or maintenance effort? No

Will this item improve safety:

- For motorists? No
- For construction workers? No

Will this proposal improve quality for:

- Construction procedures/processes? Yes
- 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:

REVISION TO STANDARD SPECIFICATIONS

SECTION 711 - STEEL STRUCTURES
711.48 SHOP CLEANING AND STORAGE OF WEATHERING STEEL

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 711, BEGIN LINE 766, DELETE AND INSERT AS FOLLOWS:

711.48 Shop Cleaning and Storage of Weathering Steel

The fabricator shall protect bare steel sections and sub-assemblies so as not to damage or stain them. The use of paints, crayons, or other materials used for identification purposes shall be avoided on bare steel sections. Storage shall be such to enable free drainage to avoid moisture pockets.

A sound uniform surface for the formation of a protective oxide coating on *all* surfaces shall be prepared as follows.

(a) Hot Rolled Products

~~These products shall include structural shapes, plates, hot-rolled sheets, and hot-rolled strip.~~ The entire length and perimeter of each fascia beam or girder shall be cleaned in accordance with 619.08(c). The entire length and perimeter of each interior beam or girder shall be cleaned in accordance with 619.08(d). *Unless otherwise indicated, all components such as, but not limited to, diaphragms, cross frames, stiffeners, bearing assemblies, and sway bracing that are permanently incorporated into the structure shall be cleaned in accordance with 619.08(d).* Contamination from grease, oil, or shop marking shall be avoided. If such contamination is unavoidable, such surfaces shall be cleaned in accordance with 619.08(b).

(b) Welded Area

All exposed welds on fascia surfaces shall be prepared by means of power grinding *in accordance with 619.08(h)* or blast cleaning in accordance with 619.08(~~d~~*c*) to remove welding flux, slag, scale, or spatter.

COMMENTS AND ACTION

711.48 SHOP CLEANING AND STORAGE OF WEATHERING STEEL

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: 711.48 pg 609. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: 407-2.01 GIFE Sections cross-references: 5.24.8.3	_____ 2020 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 _____ SiteManager Update

Mr. Beeson
Date: 07/19/17

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Further clarification regarding last round of 401 specification edits. A need to establish Gsb for a DMF and track Gsb during production of DMF. Eliminate ignition oven variability and use extraction for binder determination.

PROPOSED SOLUTION: Revise language for clarification. Add language regarding tracking of Gsb during DMF production. Add requirement for a test strip. Specify extraction only.

APPLICABLE STANDARD SPECIFICATIONS: 401

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: 6/20/17

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? 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 3 months.

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 401, BEGIN LINE 42, DELETE AS FOLLOWS:

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.

SECTION 401, BEGIN LINE 79, DELETE AND INSERT AS FOLLOWS:

Dust/Calculated Effective Binder Ratio shall be 0.6 to 1.4. The Dust/Calculated Effective Binder Ratio for 4.75 mm mixtures shall be ~~in accordance with AASHTO M 323~~*1.0 to 2.0*.

SECTION 401, BEGIN LINE 87, DELETE AND INSERT AS FOLLOWS:

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~~*331*, if required, for dense graded ~~mixtures~~ and ~~AASHTO T 331 for~~ open graded mixtures.

SECTION 401, BEGIN LINE 132, DELETE AND INSERT AS FOLLOWS:

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

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

VOIDS FILLED WITH ASPHALT, VFA, CRITERIA @ N_{des}	
ESAL	VFA, %
< 3,000,000	65 – 78
3,000,000 to < 10,000,000	65 – 75
≥ 10,000,000	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 67% to 79%.
4. For OG~~9.5 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, 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. The RAP coarse aggregate shall pass the maximum size sieve for the mixture being produced.

RAP for the ESAL category 3 and 4 surface mixtures shall be *a fine RAP with* 100% passing the 3/8 in. (9.5 mm) sieve and 95 to 100% passing the No. 4 (4.75 mm) sieve. *The Contractor may request the use of coarse RAP in a category 4 surface mixture up to a maximum 20.0% by volume of material retained on the No. 4 (4.75 mm) sieve. The election to use coarse RAP in a category 4 surface mixture will void the allowed use of crushed stone and gravel coarse aggregate materials in accordance with 904.03(d). SMA RAP as defined in 410.06 shall not be used in any HMA mixture.*

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

SECTION 401, BEGIN LINE 180, DELETE AND INSERT AS FOLLOWS:

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	*9.5 mm*	12.5 mm	9.5 mm	4.75 mm
2	25.0*				25.0*			25.0*		
3	25.0*				25.0*			25.0*		
4	25.0*				25.0*			25.0*		

* The contribution of RAS to any HMA mixture shall be ≤ 3.0% by total mass of mixture and ≤ 15.0% binder replacement.

SECTION 401, BEGIN LINE 222, DELETE AND INSERT AS FOLLOWS:

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, Gse, of the mixture will be determined in each sublot and reported from the acceptance sample testing.

The total aggregate bulk specific gravity, Gsb, value will be determined in accordance with ITM 590 from acceptance plate samples for dense graded 9.5 mm, 12.5 mm, 19.0 mm, and 25.0 mm mixtures following every 5,000 t of base and intermediate or every 3,000 t of surface produced for a DMF at a certified HMA plant. The frequency may be reduced at the direction of the Engineer.

If the ITM 590 Gsb value has deviated no more than ± 0.010 from the DMF value, the DMF value will not change.

If the ITM 590 Gsb value has deviated more than ± 0.010 from the DMF value, the Department determined ITM 590 Gsb value will be used. The Department will notify the

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

Contractor in writing of the ITM 590 Gsb value. The ITM 590 Gsb value will replace the Gsb of the DMF on subsequent sublots following the date of notification.

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 sublot. 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 sublot and the BSG of the aggregate blend from the DMF 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 sublot. 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~~*not in accordance with 401.05,* ~~or~~ a volume of effective binder in the mixture below design minimums*, or a volume of effective binder in the mixture greater than 2.0% above 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~~*331,* 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.

SECTION 401, BEGIN LINE 360, DELETE AND INSERT AS FOLLOWS:

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.

A test strip in accordance with ITM 597 shall be required 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 1,000 t of base and intermediate or 600 t of surface. The test strip shall be constructed as part of the first 300 t of DMF production or the Engineer may allow the test strip construction to

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

be located off the paving project if requested by the Contractor. Plate samples shall be obtained from the test strip in accordance with ITM 802 and ITM 580.

A maximum 10-business day production shutdown for the DMF shall accompany the completion of the test strip in order for the Contractor and Engineer to conduct mixture testing.

One test strip is required for each submitted DMF per calendar year.

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 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 315°F whenever PG 64-22 or PG 70-22 binders are used or not more than 325°F whenever PG 76-22 binder is used.

SECTION 401, BEGIN LINE 504, DELETE AND INSERT AS FOLLOWS:

The Contractor shall obtain cores in the presence of the Engineer with a device that shall produce a uniform 6*.00 ± 0.25* in. diameter pavement sample. Coring shall be completed prior to the random location being covered by the next course.

~~Surface courses~~*All core locations will be marked and* shall be cored within two work days of placement. *A* d~~D~~amaged 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.

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

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 sublot for coring. If an entire sublot falls within this area, test results from the previous sublot will be used for acceptance. If the previous sublot is not available, the subsequent sublot 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 sublot, 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, Method A or AASHTO T ~~275~~*331*, 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 sublot will be available when the sublot 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).

SECTION 401, BEGIN LINE 676, DELETE AND INSERT AS FOLLOWS:

If the Lot PWL for any one of the properties is less than 50 ~~or~~, a sublot has an air void content less than 1.0% or greater than 7.0%, *or a sublot has a volume of effective binder greater than 3.0% above design minimums*, 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.

SECTION 401, BEGIN LINE 712, DELETE AND INSERT AS FOLLOWS:

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

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

SPECIFICATION LIMITS		
MIXTURE		
	LSL*	USL**
Air Voids at N_{des}, %	2.60	5.40
Voids In Mineral Aggregate at N_{des}, %	Spec	Spec + 2.~~00~~*50*
DENSITY		
	LSL*	USL**
Roadway Core Density (% Gmm), %	91.00	n/a
* LSL, Lower Specification Limit ** USL, Upper Specification Limit		

SECTION 401, BEGIN LINE 736, DELETE AND INSERT AS FOLLOWS:

If the SCPF for a sublot is less than 0.85 *or the volume of effective binder is greater than 3.0% above design minimums*, 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~~*sublot 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.*

SECTION 401, BEGIN LINE 756, DELETE AND INSERT AS FOLLOWS:

VMA		
Dense Graded	Open Graded	Pay Factor
Deviation from Spec Minimum	Deviation from Spec Minimum	
> + ~~2.5~~ *3.0*		Submitted to the Office of Materials Management*
~~></~~ ≥ + ~~2.0~~ *2.5* and ≤ + ~~2.5~~ *3.0*		~~0.25~~*1.00 minus 0.05 for each 0.1% over +2.5%*
~~></~~ ≥ + ~~1.5~~ *2.0* and ≤ < + ~~2.0~~ *2.5*		~~0.65~~*1.05 minus 0.01 for each 0.1% over +2.0%*
> + 0.5 and ≤ < + ~~1.5~~ *2.0*		1.05

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

≥ 0.0 and ≤ + 0.5	All	~~1.00~~*1.05 minus 0.01 for each 0.1% under +0.5%*
≥ ~~- 0.5~~ - *2.0* and < 0.0		~~0.85~~*1.00 minus 0.05 for each 0.1% under 0.0%*
~~≥ - 1.0 and < - 0.5~~		~~0.65~~
~~≥ - 1.5 and < - 1.0~~		~~0.45~~
~~≥ - 2.0 and < - 1.5~~		~~0.25~~
~~≥ - 2.5 and < - 2.0~~		~~0.00~~
< ~~- 2.5~~ - *2.0*		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.		

SECTION 401, BEGIN LINE 862, DELETE AND INSERT AS FOLLOWS:

(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~~*ITM 571*.

(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~~*331*, if required.

SECTION 401, BEGIN LINE 939, DELETE AND INSERT AS FOLLOWS:

If QC/QA-HMA ~~intermediate~~*19.0 mm* over QC/QA-HMA ~~base~~*25.0 mm* mixtures are specified, QC/QA-HMA ~~intermediate~~*19.0 mm* mixture may be considered as a substitute for the QC/QA-HMA ~~intermediate~~*19.0 mm* and QC/QA-HMA ~~base~~*25.0 mm* 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~~*19.0 mm* mixture. The quantity and amount for QC/QA-HMA ~~intermediate~~*19.0 mm* mixture shall equal the sum of the contract quantities and amounts shown for QC/QA-HMA ~~intermediate~~*19.0 mm* and QC/QA-HMA ~~base~~*25.0 mm* mixtures. The unit price for QC/QA-HMA ~~intermediate~~*19.0 mm* mixture shall be equal to the sum of contract amounts divided by the sum of contract quantities. Payment for the QC/QA-HMA ~~intermediate~~*19.0 mm* mixture will be made at the unit price per ton for QC/QA-HMA ~~intermediate~~*19.0 mm* mixture. No payment will be made for additional work or

REVISION TO STANDARD SPECIFICATIONS

SECTION 401 - QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT
401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

costs which may result due to this change. *The finished thickness of the substituted 19.0 mm mixture course shall be at least two times but not more than six times the maximum particle size as shown on the DMF.*

COMMENTS AND ACTION

401.04 DESIGN MIX FORMULA
401.05 VOLUMETRIC MIX DESIGN
401.06 RECYCLED MATERIALS
401.09 ACCEPTANCE OF MIXTURES
401.12 PROCESS CONTROL
401.13 WEATHER LIMITATIONS
401.14 SPREADING AND FINISHING
401.16 DENSITY
401.19 PAY FACTORS
401.20 APPEALS
401.22 BASIS OF PAYMENT

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: 401 pg 257 thru pg 282. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: NONE GIFE Sections cross-references: NONE	_____ 2020 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 _____ SiteManager Update

Mr. Beeson
Date: 07/19/17

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: In revising the 401 spec, it was determined the 402 spec could similarly be updated to provide clarity and eliminate ignition oven.

PROPOSED SOLUTION: Revise language for clarification, specify extraction only

APPLICABLE STANDARD SPECIFICATIONS: 402

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: 6/20/17

Mr. Beeson
Date: 07/19/17

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
402.07 MIX CRITERIA
402.11 PREPARATION OF SURFACES TO BE OVERLAID
402.13 SPREADING AND FINISHING
402.16 LOW TEMPERATURE COMPACTION REQUIREMENTS

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 402, BEGIN LINE 91, DELETE AS FOLLOWS:

A DMF shall be prepared in accordance with the above table and submitted in a format acceptable to the Engineer one week prior to use. The DMF shall state the ~~calibration factor and test temperature to be used for the determination of~~ binder content ~~using ITM 586 or ITM 571~~.

SECTION 402, BEGIN LINE 149, DELETE AND INSERT AS FOLLOWS:

~~Compacted aggregate bases and r~~*R*ubblized *concrete pavements* ~~bases~~ 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.

SECTION 402, BEGIN LINE 178, DELETE AND INSERT AS FOLLOWS:

The temperature of each mixture at the time of spreading shall ~~not~~ be ~~more~~*less* than 315°F whenever PG 64-22 or PG 70-22 binders are used.

SECTION 402, BEGIN LINE 304, DELETE AND INSERT AS FOLLOWS:

The Contractor shall obtain cores in the presence of the Engineer with a device that shall produce a uniform 6*.00 ± 0.25* in. diameter pavement sample. Coring shall be completed prior to the random location being covered. The final HMA course shall be cored within one work day of placement. Damaged cores 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.

The Engineer will take immediate possession of the cores. If the Engineer's cores are subsequently damaged, additional coring within a specific section 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 shall be expressed as:

$$\text{Density} = 100 \times \text{BSG}/\text{MSG}$$

where:

BSG = average bulk specific gravity
MSG = maximum specific gravity

REVISION TO STANDARD SPECIFICATIONS

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT
402.07 MIX CRITERIA
402.11 PREPARATION OF SURFACES TO BE OVERLAID
402.13 SPREADING AND FINISHING
402.16 LOW TEMPERATURE COMPACTION REQUIREMENTS

The Engineer will determine the bulk specific gravity of the cores in accordance with AASHTO T 166 Method A or AASHTO T ~~275~~*331*, if required. The maximum specific gravity will be mass determined in water in accordance with AASHTO T 209. Density shall not be less than 92.0%.

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

COMMENTS AND ACTION

402.07 MIX CRITERIA
402.11 PREPARATION OF SURFACES TO BE OVERLAID
402.13 SPREADING AND FINISHING
402.16 LOW TEMPERATURE COMPACTION REQUIREMENTS

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: 402 pg 283 thru 292. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: NONE GIFE Sections cross-references: NONE	_____ 2020 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 _____ SiteManager Update

Mr. Beeson
Date: 07/19/17

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Clarification needed regarding limits of fine and coarse aggregates. Allowance needed for steel slag fine aggregates.

PROPOSED SOLUTION: Revise language to add clarity regarding limits and steel slag fine aggregates.

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 x204

Date: 6/20/17

Mr. Beeson
Date: 07/19/17

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? N
- Customer satisfaction? N
- 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? 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? 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 904 - AGGREGATES
904.02 FINE AGGREGATES
904.03 COARSE AGGREGATES

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 904, BEGIN LINE 113, DELETE AND INSERT AS FOLLOWS:

(b) For HMA Mixtures

Fine aggregates for use in HMA shall be natural sand or crushed limestone, dolomite, gravel, sandstone, SF, or ACBF. SF sand may be used ~~only~~ in HMA surface mixtures. *SF sand may only be used in HMA base and HMA intermediate mixtures if SF in accordance with 904.01 is used to produce the SF sand.* The amount of crushed limestone sand shall not exceed 20% *by volume* of the total aggregate used in HMA surface mixtures with ESAL equal to or greater than 3,000,000, except limestone sands manufactured from aggregates on the Department's list of approved Polish Resistant Aggregates will not be limited. If soundness testing cannot be conducted, the aggregate shall come from a Category I source in accordance with ITM 203.

SECTION 904, BEGIN LINE 245, DELETE AND INSERT AS FOLLOWS:

1. HMA Coarse Aggregate

a. ESAL 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. ESAL 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. ESAL 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 *the coarse aggregate* material retained on the No. 4 (4.75 mm) sieve when blended with a high friction aggregate.

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

COMMENTS AND ACTION

904.02 FINE AGGREGATES
904.03 COARSE AGGREGATES

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: 904 pg 884 and pg 890-891. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: NONE GIFE Sections cross-references: NONE	_____ 2020 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 _____ SiteManager Update

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Currently, Standard Specification 909.02(d)3 has two Mixed Paint Properties that are outdated relative to current mixed paint available in the marketplace.

Also, currently Standard Specification 910.05 requires a casting date on the certified inspection report for castings. Industry has informed us this requirement cannot be met on each and every casting sold.

PROPOSED SOLUTION: Revisions to the viscosity and pH ranges in 909.02(d)3 will more accurately reflect what is currently available on the mixed paint marketplace.

Requiring the casting date on the casting inspection report in 910.05 is unfeasible and not being practiced. Adding the class of gray iron and the grade of ductile iron will more accurately identity materials available in the marketplace.

APPLICABLE STANDARD SPECIFICATIONS: 909.02(d)3 and 910.05.

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: Ad hoc committee of Michael Prather, Michael Pelham, Kelly Cummins plus paint and castings industry members.

IMPACT ANALYSIS (attach report): Attached

Submitted By: Michael Pelham, through Michael Prather, through Matthew Beeson

Title: Materials Services Engineer through Technical Manager through State Materials Engineer

Organization: Office of Materials Management

Phone Number: (317) 610-7251 Ext. 203

Date: 6/22/2017

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? No

Customer satisfaction? No

Congestion/travel time? No

Ride quality? No

Will this proposal reduce operational costs or maintenance effort? No

Will this item improve safety:

For motorists? No

For construction workers? No

Will this proposal improve quality for:

Construction procedures/processes? Yes

Asset preservation? No

Design process? No

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: These revisions will update paint specifications that are out of date with current materials available in the marketplace and therefore lower cost.

These revisions to the casting specification will assist in the procurement process and result in more clarification for contractor and field personnel.

REVISION TO STANDARD SPECIFICATIONS

SECTION 909 - PAINT AND LIQUID EPOXY
909.02(d) WATERBORNE FINISH PAINT
SECTION 910 - METAL MATERIALS
910.05 CASTINGS

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 909, BEGIN LINE 166, DELETE AND INSERT AS FOLLOWS:

3. Mixed Paint Properties

The mixed paint shall be in accordance with the requirements as follows:

Viscosity, ASTM D 562, Krebs Units	80 - ~~100~~*110*
Weight/volume, ASTM D 1475, deviation from approval formulation, max.	0.2 lb/gal.
Pigment grind, ASTM D 1210, Hegman, min.	5
Total solids, % by weight, ASTM D 2369, min.	48
Vehicle solids, % by weight of vehicle, min.	37.5
Dry time, ASTM D 1640, 3 mils wet film thickness on a tin coated steel panel @ 25 ± 1°C and 50 ± 5% relative humidity, max.:	
Set-to-touch, h	1
Dry hard, h	24
Contrast ratio, ASTM D 2805, 5 ± 0.5 mils wet film thickness dried 24 h @ 25 ± 2°C on Leneta Form 2A or 2C, min.	0.97
Specular gloss, 60°, 10 mils ± 0.5 mils wet film thickness on a tin coated steel panel, dried 48 h @ 25°C and 50 ± 5% relative humidity, ASTM D 523, max.	30
pH, ASTM E 70	7.0 – ~~9.0~~*9.5*
Volatile organic compounds, ASTM D 3960, max.	1.50 lb/gal.

SECTION 910, BEGIN LINE 367, DELETE AND INSERT AS FOLLOWS:

910.05 Castings

The casting design shall be proof loaded to 40,000 lbs in accordance with AASHTO M 306. Castings shall be in accordance with the plan dimensions and to the following requirements for the designated materials. A certified inspection report shall be submitted by the manufacturer with each shipment of castings, except as otherwise provided herein. Inspection and testing shall be done by the manufacturer. The certified inspection report shall list the ~~casting date,~~ casting number, and the type of material, ~~such as~~ *including the class of* gray iron, and *the grade of* ductile iron. It shall state that inspection and testing has been performed, that all parts shipped meet the pertinent specification requirements, and that all component parts fit. The supporting test results, including proof load data, shall be retained and be available on request for a period of seven years. All castings shall have the manufacturer's identification and the date of manufacture cast on an exposed surface. Acceptance of castings will be based on the certified inspection report, visual inspection, and check measurements.

COMMENTS AND ACTION

909.02(d) WATERBORNE FINISH PAINT
910.05 CASTINGS

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: NONE	_____ 2020 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 _____ SiteManager Update

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: The transition to MGS w-beam as the Department standard for guardrail supports the AASHTO/FHWA Joint Implementation Agreement for installing MASH-compliant safety hardware.

The MGS w-beam guardrail standard drawings were approved as revised during the May 2017 committee meeting (RPD 601-R-658d). Revisions to the *Standard Specifications* were not included. Revisions to *SS* section 601 are necessary to add the MGS w-beam guardrail and to differentiate it, where necessary, from the current strong-post w-beam guardrail.

MGS w-beam guardrail system uses the same components as the current strong-post w-beam guardrail – w-beam rail section, assembly bolts, steel or timber post, timber or composite blockout. However, the MGS w-beam guardrail assembly makes the system distinctly different.

PROPOSED SOLUTION: Revise the *Standard Specifications* sections 601, 911.02, and 926.03 to complement the MGS w-beam standard drawings and the July 1, 2018 (letting) sunset date for guardrail end treatments.

"MGS w-beam guardrail" is used to differentiate the system from "w-beam guardrail" in both the specification and the pay items.

Section 601 revisions:

- Revise "block" to "blockout" to be consistent with MASH terminology.
- Revise "wood" to "timber" to be consistent with MGS system FHWA eligibility letter and standard drawing callouts.
- Add "MGS w-beam guardrail" into the section and distinguish its use (where appropriate) from "w-beam guardrail".
- Add sunset date when the 27 3/4" end treatment cannot longer be substituted for a 31" guardrail end treatment. [Prior to July 1, 2018: NCHRP 350 compliant, 31-in. or 27 ¾-in. plus height transition. After July 1, 2108: MASH compliant, 31-in only.]
- Add requirement for the contractor to provide the manufacturer's FHWA eligibility letter for both end treatments and impact attenuators. Update language to "NCHRP 350 or MASH". The approved materials list will control whether devices have been crash tested under NCHRP 350 or MASH.
- Revise method of measurement and basis of payment, and add MGS pay items.

Section 911.02(d) revisions:

- Revise "block" to "blockout" to be consistent with MASH terminology.
- Add language that restricts the use of a timber post for w-beam guardrail and explicitly allows steel or timber for MGS w-beam guardrail. [The w-beam guardrail did not pass MASH with timber posts. The w-beam guardrail did pass MASH with steel posts but the w-beam rail element tore.]

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

(continued)

Section 926.03 revisions

- Revise “block” to “blockout” to be consistent with MASH terminology.
- Update language to “NCHRP 350 or MASH”.
- Revise certification requirements to providing an FHWA eligibility letter.

IDM sections 49-4.0 thru 49-9.0 are under review and will be provided at a later date.

APPLICABLE STANDARD SPECIFICATIONS: 601, 911.02(f), and 926.03

APPLICABLE STANDARD DRAWINGS: New 601-MGSA series (RPD 601-R-658d)

APPLICABLE DESIGN MANUAL SECTION: 49-4.0, 49-5.0, 49-8.0, 49-9.0 (under review)

APPLICABLE SECTION OF GIFE: Section 21.1. Currently general and may not need updates, but providing a distinction between w-beam and MGS may be beneficial.

APPLICABLE RECURRING SPECIAL PROVISIONS: No

PAY ITEMS AFFECTED: Yes

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Todd Shields and Elizabeth Phillips (interim revisions to the Approved Material List for guardrail end treatments).

IMPACT ANALYSIS (attach report): Yes

Submitted By: Katherine Smutzer (on behalf of Mark Orton)

Title: Standards Engineer

Organization: INDOT/Standards

Phone Number: 317-233-2074

Date: July 3, 2017

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 (materials are all the same for MGS w-beam guardrail) and Yes (the AML will need to be updated for 31" NCHRP Report 350 test level 3)

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? No

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? Yes

AASHTO or other design code? Yes

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: MASH-compliant w-beam guardrail must be used for installations on the NHS for projects letting after December 31, 2017. MASH-compliant end treatments must be used for installations on the NHS for projects letting after July 1, 2017.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

(Note: Proposed changes shown highlighted gray)

The Standard Specifications are revised as follows:

SECTION 601, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 601 – GUARDRAIL

601.01 Description

This work shall consist of the fabrication, assembly, and installation of guardrail, guardrail transitions, and guardrail end treatments, in accordance with these requirements, and as shown on the plans. This work may also consist of the extension of existing guardrail with new guardrail, the removal of existing guardrail, or adjusting the height of existing guardrail.

MATERIALS

601.02 Materials

Materials shall be in accordance with the following:

Alternate Material ~~Blocks~~*Blockouts* 926.03
Guardrail Posts.....910.10
Rail Accessories, Fittings, and Hardware 910.11
Steel Thrie-Beam Rail.....910.09
Steel W-Beam Rail.....910.09
Timber Posts and ~~Blocks~~*Blockouts*.....911.02(f)

All guardrail, post, accessories, fittings, and hardware shall be supplied from a source listed on the Department's list of Certified Guardrail Suppliers in accordance with 910.19. Guardrail end treatments shall be selected from the Department's list of approved Guardrail End Treatments in accordance with 601.07 and impact attenuators shall be selected from the Department's list of Approved Impact Attenuators in accordance with 601.08.

PCC in anchors and in pads or bases for impact attenuators shall be class A and in accordance with 702. Sheet signs and sign posts shall be in accordance with 802.

Barrels used in impact attenuators shall be yellow with black lids. The aggregate used in the barrels shall be uncrushed gravel, class F or higher, in accordance with 904 and the following gradation requirements.

Sieve Size	% Passing
1/2 in. (12.5 mm)	100
No. 50 (300 µm)	0 - 5

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

No. 100 (150 µm) 0 - 2

All other impact attenuators shall have end reflectorization as shown on the plans or attached to the nose of the attenuator in accordance with the attenuator manufacturer's recommendation.

Thrie beam guardrail elements shall be steel and shall be in accordance with the applicable requirements for steel beam guardrail shown in 910.09, 910.10, and 910.11.

~~The~~*W-beam or Midwest Guardrail System (MGS) W-beam guardrail,* components, assembly, post spacing, post lengths, and installation for each location shall be as shown on the plans. Double-facing of the guardrail will be required at the locations shown on the plans. *For W-beam guardrail,* ~~In~~*in* locations where conditions will not allow the use of 7 ft posts, 6 ft posts may be substituted when approved.

The base metal thickness of the steel W-beam rail element for a curved guardrail system shall be 0.105 in. The base metal thickness of the steel W-beam terminal connector shall be 0.138 in. *The controlled released terminal (CRT)* wood breakaway posts shall be S4S timber and shall otherwise be in accordance with 911. The curved rail timber posts shall be in accordance with 911. All structural tubing shall be in accordance with ASTM A 500. The remaining steel components shall be in accordance with 910.

CONSTRUCTION REQUIREMENTS

601.03 General Requirements

Posts shall be installed plumb at the spacing and embedment depth shown on the plans. Posts shall be driven where subsurface conditions enable the use of normal driving equipment. Where subsurface conditions prohibit driving the posts, a 12 in. diameter hole shall be bored to the required embedment depth. The hole shall be backfilled with suitable material in 6 in. maximum lifts, compacted as directed, and then the posts driven.

Posts damaged during installation shall be repaired or replaced as directed with no additional payment.

When new guardrail is being installed to replace existing guardrail and traffic is to be maintained during the work, the installation of the new guardrail shall follow the removal of the existing guardrail as closely as practical. Adequate safety protection shall be provided as directed between the time that the existing guardrail is removed and the time that the installation of the new guardrail is completed.

When new guardrail is being installed where there is no existing guardrail and traffic is to be maintained during the work, the mounting of the ~~blocks~~*blockouts* and the rail elements to the

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

posts shall be completed as soon as practical after the posts are installed. The time between the installation of the posts and the mounting of the ~~blocks~~*blockouts* and rail elements shall not exceed 24 h. Drums shall be placed to mark all installed guardrail posts left bare overnight. The spacing of these devices shall be numerically equal to the worksite speed limit, but not less than 20 ft.

All damaged galvanized surfaces shall be coated in accordance with 910.11(a)4.

W-beam guardrail shall be installed as shown on the plans with the W-beam rail element splice at the post. MGS W-beam guardrail shall be installed as shown on the plans with the W-beam rail element splice at midspan. MGS W-beam guardrail installed with half or quarter post spacing shall be spliced as shown on the plans.

The nested W-beam guardrail element shall consist of two rail elements, one set inside the other. The length of nested guardrail placed over a culvert shall not be spliced.

601.04 Guardrail Erection

~~Blocks~~*Blockouts* and rail elements shall be erected in a manner resulting in a smooth, continuous installation. All bolts shall be of sufficient length to extend beyond the nuts and shall be drawn tight. Rail installed along a radius of 150 ft or less shall be shop curved. Rail elements shall be lapped as shown on the plans.

601.05 Curved W-Beam Guardrail Systems

This work shall consist of the fabrication, assembly, and installation of specified types of curved W-beam guardrail connector system or curved W-beam guardrail terminal system in accordance with the requirements herein and as shown on the plans.

The installation of the terminal end buffer may utilize an alternate single piece having similar dimensional shape to the terminal end buffer as shown on the plans, and which mates with the W-beam guardrail.

Where the W-beam terminal connector is lapped on the outside of the guardrail, a galvanized 1 in. inside diameter, 2 in. outside diameter, 0.134 in. thick, narrow plain washer shall be placed under the splice bolt heads.

Nuts for the anchor cable assembly shall be hand tightened, plus one complete turn at the anchor plate end. All other nuts shall be torqued to 50 ft lb.

The installation of the type 5 anchor shall include tightening the cable with the swaged end to eliminate all slack.

The W-beam rail in the type 5 anchor shall be attached to the steel pipe with 5/8 in. diameter by 1 1/4 in. button head bolt with no washer. Connection to the post will not be required.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

601.06 Guardrail Transitions

Guardrail transitions shall be required to connect guardrail to bridge rail, guardrail to piers, and new W-beam guardrail to existing rub rail type guardrail. The required type of guardrail transition shall be as shown on the plans. ~~The fabrication, assembly, and installation of thrie-beam components and timber posts and blocks for guardrail transitions will be required for the locations shown on the plans.~~

An MGS guardrail transition, with or without curb, shall be required to connect guardrail to bridge rail, guardrail to piers. An MGS height transition shall be required to connect MGS W-beam guardrail to existing W-beam or existing rub rail type guardrail. The required type of guardrail transition shall be as shown on the plans.

The fabrication, assembly, and installation of thrie-beam rail, W-beam rail components, and posts and blockouts for guardrail transitions will be required for the locations shown on the plans.

601.07 Guardrail End Treatments

Guardrail end treatments shall be required to terminate guardrail installations at the locations shown on the plans. The type I guardrail end treatment shall be either as shown on the plans, or shall be selected from the Department's list of approved Guardrail End Treatments. The type II guardrail end treatment shall be as shown on the plans. The type OS or MS guardrail end treatments shall be selected from the Department's list of approved Guardrail End Treatments. The reflectorization of guardrail end treatments, and the grading requirements shall be as shown on the plans.

For contracts letting prior to July 1, 2018 the following applies. When a 31-in. guardrail end treatment is required to terminate MGS W-beam guardrail, a 27 3/4 in. guardrail end treatment with an MGS height transition may be substituted when approved.

Double facing of guardrail end treatment type I will be required when it is used in conjunction with double faced guardrail.

Each unit shall be installed in accordance with the manufacturer's recommendations. A *copy of the manufacturer's FHWA eligibility letter stating that its product complies with the requirements of NCHRP 350 or MASH test level 3 shall be provided.*

Assembly and installation shall be supervised or performed at all times by an installer trained and certified by the unit's manufacturer, and shall be in accordance with the manufacturer's recommendations at the locations shown on the plans. A copy of the installer's certificate shall be provided to the Engineer prior to the start of the work.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

The Contractor shall provide the Department with original copies of all necessary current manufacturer's installation manuals and working drawings in accordance with 105.02.

When installing end treatments to existing rub rail type guardrail, the rub rail, if not spliced at the last existing post, shall be cut and the end repositioned behind the flange of the post. If the rub rail is spliced at the last existing post, the existing splice material shall be removed and the end of the rub rail repositioned behind the flange of the post. In both cases, the rub rail shall be connected to the post as shown on the plans.

Guardrail end treatments shall be installed within 24 h of the completion of the guardrail installation to which they are to be attached. Drums in accordance with 801.09 shall be placed for overnight marking of the bare end of the guardrail when the installation of the guardrail end treatment will not be completed until the day following the completion of the guardrail installation to which it is to be attached.

601.08 Impact Attenuators

Impact attenuators shall be placed or reset to obtain the proper height where shown on the plans. The unit for each new location shall be of the width recommended by the manufacturer and for the test level specified and shall be chosen from those shown on the Department's list of approved Impact Attenuators. Each unit shall be placed in accordance with the manufacturer's recommendations, on a PCC pad. A *copy of the manufacturer's FHWA eligibility letter stating that its product complies with the requirements of NCHRP 350 or MASH test level 3 shall be provided.*

Assembly and installation or resetting shall be supervised or performed at all times by an installer trained and certified by the unit's manufacturer, and shall be in accordance with the manufacturer's recommendations at the locations shown on the plans. A copy of the installer's certificate shall be provided to the Engineer prior to the start of work.

The Contractor shall provide the Department with original copies of all necessary current manufacturer's installation manuals and working drawings in accordance with 105.02.

Transition panels and all other necessary hardware shown in the manufacturer's recommendations to be required for bi-directional traffic protection shall be included in the installation or resetting, if the unit is installed at a location where traffic is passing the unit on both sides in opposite directions.

If a spare parts package is required for the unit being installed, such package shall consist of those parts which are shown on the list provided in the contract documents for the stage and test level required. The spare parts shall correspond to those shown on the list for the unit to be placed. The package shall be delivered to the location directed and will become the property of the Department.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

~~Impact attenuators may be placed on the Department's approved list based on the manufacturer's documentation subject to the Department's acceptance. The manufacturer shall provide a copy of the test report stating that its product fully complies with the requirements of NCHRP 350 crash test level 3, and that its product has been approved by the FHWA. Products will be maintained on the Department's approved list by a manufacturer's certification submitted annually in October and the Department's continued acceptance. This certification shall state that the product has not been changed since the NCHRP 350 crash testing, that the NCHRP 350 test results still apply to this product, and that the FHWA approval is still applicable.~~

601.09 Extension of Existing Guardrail

Extension of existing rub rail type guardrail with new W-beam guardrail shall require adjusting the post heights in the last 25 ft of existing rub rail type guardrail adjacent to the extension as shown on the plans. Guardrail transition type VH shall be used to make this adjustment. The post spacing of the guardrail transition type VH shall equal that of the last 25 ft of existing rub rail type guardrail adjacent to the extension. The rub rail shall be terminated at the last existing post in the transition in accordance with 601.06.

Extension of existing rub rail type or W-beam guardrail with new MGS w-beam guardrail shall require adjusting the splice location and post height in the last 37 ft 6 in. of the existing rub rail type or w-beam guardrail as shown on plans. MGS height transition shall be used to make this adjustment. The rub rail shall be terminated at the last existing post in the transition in accordance with 601.06.

601.10 Removal of Existing Guardrail

Removal of existing guardrail shall be in accordance with the applicable requirements of 202 and these requirements. The locations shall be as shown on the plans. When it is specified that the removed guardrail is to become the property of the Department, the rail elements, posts, and ~~blocks~~*blockouts* shall be removed without being damaged. The removed material shall be stored as directed.

601.11 Adjusting Existing Guardrail Height

The height of the existing guardrail shall be adjusted by the use of moveable ~~blocks~~*blockouts* as shown on the plans. The height shall be measured to the top of the rail element along the face of the rail. Existing fixed ~~blocks~~*blockouts* shall be replaced with moveable ~~blocks~~*blockouts* installed at the proper height. Existing moveable ~~blocks~~*blockouts* shall be disconnected from the posts and re-mounted at the proper height.

601.12 Resetting Guardrail

This work shall consist of the removal of existing guardrail and, and if necessary, storing it, and then re-erecting it where shown on the plans or as directed.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

601.13 Method of Measurement

Guardrail, guardrail with rub rail, shop curved guardrail, adjusting guardrail height, guardrail removal, and resetting guardrail will be measured by the linear foot along the top of the rail element, complete in place. Nested guardrail will be measured per each 100 lft run placed. Modified posts for nested guardrail will be measured per each, complete in place. *MGS structure top-mounted posts will be measured per each, complete in place. Long span MGS W-beam guardrail will be measured per each for the type specified and corresponding run length.* Guardrail transitions, W-beam *and MGS W-beam* guardrail cable terminal anchors, and guardrail end treatments will be measured per each, complete in place. Guardrail buried end treatments type II will be measured per each. Impact attenuators and ~~reseting~~*resetting* impact attenuators will be measured per each for the type and width and test level, complete in place. The curved W-beam guardrail connector system and the curved W-beam guardrail terminal system will be measured per each for the type specified. Grading at guardrail end treatments, the reflectorization of guardrail end treatments, and concrete used in anchoring guardrail end treatments will not be measured for payment.

Impact attenuator spare parts packages will be measured per each for the type and width, test level, and stage for which it is specified.

601.14 Basis of Payment

W-beam *and MGS W-beam* guardrail will be paid for at the contract unit price per linear foot for the specified post spacing. Thrie-beam and thrie-beam double faced guardrail will be paid for at the contract unit price per linear foot for guardrail, thrie-beam and guardrail, thrie-beam, double faced, complete in place. Nested guardrail will be paid for at the contract unit price per each 100 lft run, complete in place for guardrail, W-beam, nested. *Long span MGS guardrail will be paid for at the contract unit price per each type specified and corresponding run length, complete in place for guardrail, MGS, long span.* W-beam *and MGS W-beam* guardrail cable terminal anchor*s* will be paid for at the contract unit price per each, complete in place. Modified posts for nested guardrail will be paid for at the contract unit price per each for modified posts, nested guardrail. *Structure top-mounted posts will be paid for at the contract unit price per each for guardrail, MGS, structure top-mounted posts.*

W-beam guardrail with rub rail will be paid for at the contract unit price per linear foot for guardrail, WR-beam complete in place. Shop curved guardrail, adjusting guardrail height, guardrail removal, and resetting guardrail will be paid for at the contract unit price per linear foot. Guardrail transitions and guardrail end treatments will be paid for at the contract unit price per each for the type specified. Guardrail buried end treatments type II will be paid for at the contract unit price per each, complete in place.

Impact attenuators and ~~reseting~~*resetting* impact attenuators will be paid for at the contract unit price per each for the type and width, and test level specified. The curved W-beam guardrail connector system and curved W-beam guardrail system will be paid for at the contract unit price

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

per each for the type specified, complete in place.

Impact attenuator spare parts packages will be paid for at the contract unit price per each for the type and width, test level, and stage for which it is specified.

Where existing guardrail height is adjusted, such work will be paid for at the contract unit price per linear foot. The cost of removal, all necessary storage, new adjustable post brackets, attachment of rail section, and miscellaneous nuts and bolts as required shall be included in the cost of adjust guardrail height.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Guardrail Connector System, W-Beam, Curved, _____ type	EACH
Guardrail End Treatment, _____ type	EACH
Guardrail Transition, VH, ____ ft ____ in. Spacing	EACH
Guardrail, Adjust Height	LFT
Guardrail, MGS, Height Transition	*EACH*
Guardrail, MGS, Long Span	*EACH*
Guardrail, MGS, Structure Top-Mounted Posts	*EACH*
Guardrail, MGS, Transition, _____ type	*EACH*
Guardrail, MGS W-Beam, ____ ft ____ in. Spacing	*LFT*
Guardrail, MGS W-Beam, Cable Terminal Anchor	*EACH*
Guardrail, MGS W-Beam, Double Faced, _____ ft _____ in. Spacing	*LFT*
Guardrail, MGS W-Beam, Shop Curved, _____ ft _____ in. Spacing	*LFT*
Guardrail, Remove	LFT
Guardrail, Reset	LFT
Guardrail, Terminal System, W-Beam Curved, _____ type	EACH
Guardrail, Thrie-Beam	LFT
Guardrail, Thrie-Beam, Double Faced	LFT
Guardrail, Transition, _____ type	EACH
Guardrail, W-Beam, Shop Curved, _____ ft _____ in. Spacing	LFT
Guardrail, W-Beam, ____ ft ____ in. Spacing	LFT
Guardrail, W-Beam, Cable Terminal Anchor	EACH
Guardrail, W-Beam, Double Faced, _____ ft _____ in. Spacing	LFT
Guardrail, W-Beam, Nested	EACH

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

Guardrail, WR-Beam ..... LFT
Impact Attenuator Spare Parts Package, _____,
type-width
_____, _____.....EACH
test level stage
Impact Attenuator, _____, _____.....EACH
type-width test level
Impact Attenuator, Reset, _____, _____.....EACH
type-width test level
Modified Posts, Nested Guardrail.....EACH

For W-beam guardrail, ~~T~~h*ethe* substitution of 6 ft posts for 7 ft posts where conditions will not allow the use of the longer post will be at the same contract unit price of the longer post.

The substitution of W 6 x 8.5 for W 6 x 9 steel posts, in MGS W-beam guardrail, will be at the same contract unit price for heavier post.

The cost of resetting guardrail shall include the removal, necessary storage, resetting and replacement of damaged or missing parts and new posts as required.

The cost of reflectorization of impact attenuators and guardrail end treatments shall be included in the respective pay items.

The cost of all grading required for the guardrail buried end treatment shall be included in the cost of guardrail end treatment, type II.

The cost of earthwork, grading, and transition panel if required, and PCC pad shall be included in the cost of impact attenuator.

The cost of excavation, concrete footings, reinforcement, and structural steel tubing required for modified posts, nested guardrail, shall be included in the cost of the pay item.

The cost of all materials, including replacing damaged or missing parts, labor, and necessary incidentals required to reset impact attenuators, will be included in the cost of impact attenuator, reset.

Where guardrail transition type TGB is used with bridge railing type TR, the cost of eliminating the thrie-beam terminal connector and driving the posts to the height above ground shown on the plans shall be included in the cost of the guardrail transition.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

The Standard Specifications are revised as follows:

SECTION 911, BEGIN LINE 136, DELETE AND INSERT AS FOLLOWS:

911.02 Treated Lumber

(a) General

Treated lumber shall be lumber which is preservative treated by pressure processes in accordance with the AWPA Standards. AWPA Standards T1 and U1 specifies general requirements for all wood products. Other AWPA Standards applying to specific items are set out in 911.02(b), 911.02(c), 911.02(d), 911.02(e), and 911.02(g). Lumber to be treated shall be in accordance with 911.01, except as modified in 911.02(b), 911.02(c), 911.02(d), and 911.02(e). The lumber may be inspected at the treating plant. Preservatives shall be in accordance with 911.02(h). Wherever ammoniacal or alkaline copper quat azole or wherever copper preservative is utilized, only stainless steel or hot dipped galvanized fasteners and hardware shall be used. Galvanizing for fasteners shall be in accordance with ASTM A 153. Galvanizing for hardware shall be in accordance with ASTM A 653, coating designation G185. Fasteners and hardware in contact with one another shall be of the same base material and coating if applicable, and shall be used consistently throughout the treated wood article or structure.

(b) Bridge Lumber

This shall be southern yellow pine or coast region douglas fir. There shall be no heartwood requirements and the amount of sapwood shall not be limited. Wane will not be allowed on any treated plank for flooring and may be excluded elsewhere when so specified. In other lumber, wane shall not exceed 1/8 of the width of any face and 1/4 of the length of the piece on any one corner. Both the outer and inner bark shall be removed from any area where wane is allowed. Lumber for bridges shall be treated with a preservative in accordance with applicable provisions of AWPA Standards T1 and U1, use category UC4C.

(c) Piling

Wood piling, before treatment, shall be in accordance with 911.01(e) except piles shall be southern yellow pine, red oak, or coast region douglas fir. The outer and inner bark shall be removed before treatment. Unless otherwise specified, piling shall be treated with a preservative in accordance with the applicable requirements of AWPA Standards T1 and U1, use category UC4C.

(d) Guardrail Posts, Braces, and Battens

Wood for these items shall be cut from live, dense southern yellow pine, coast region douglas fir, red oak, or other species if so designated in the proposal or purchase order. Posts shall be rough sawed unless otherwise specified. Dimensions shall be as shown on the plans. There shall be a length tolerance of plus 2 in. for posts. The bottoms shall be sawed square and the tops roofed as shown on the plans. Wane shall not extend more than 2 ft from the bottom end. Knots shall be

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

closely trimmed, but hollow knots extending in close to the center of the post, loose knots, and knot clusters will not be allowed. Posts shall be practically straight and no post with a crook exceeding 1 in. between top and butt will be accepted.

Posts listed above shall be sound posts. No sapwood rot will be allowed. Ring shake will not be allowed and oak posts shall be free from pecks or excessive grub holes. Grub holes in the butt, 1/2 in. or less in diameter, are not considered defects. Posts containing ant holes will not be accepted. Any post which contains any defect which is detrimental to the post will be rejected.

Wood braces and battens shall be of the same general species and specifications as required for the posts and shall be of the dimensions shown on the plans.

~~Wood~~*Timber* guardrail posts, and wood parts in connection with guardrails, shall be treated with a preservative in accordance with the applicable provisions of AWPA Standards T1 and U1.

Timber post may be used within a run of MGS W-beam guardrail as shown on the plans. Timber posts shall not be used within a run of W-beam guardrail.

(e) Sign Posts

Wood sign posts shall be cut from live catalpa; northern white cedar; native red cedar; southern red cedar; black locust; yellow locust; mulberry; red, black, and white oak group; osage orange; dense southern yellow pine; redwood; sassafras; coast region douglas fir, or other species as specified. Posts shall be surfaced four sides.

Dimensions shall be in accordance with the plans. There shall be a length tolerance of 2 in. Both butt and top ends shall be sawed square. All outer and inner bark shall be removed. One way sweep, not exceeding 1 in. between the top and butt, will be acceptable. Short crooks will not be allowed.

The posts shall be sound timber. No splits, shakes, excessive cracks, loose decayed or hollow knots will be allowed. Occasional pin, shot, or grub holes in oak, or bird pecks in other timbers, will not be considered defects. All posts shall be entirely treated with preservatives in accordance with all applicable provisions of AWPA Standards T1 and U1.

(f) Sawed Timber Posts and ~~Blocks~~*Blockouts* for Thrie-Beam and W-Beam Guardrail

The requirements for posts and ~~blocks~~*blockouts* prior to treatment shall be as shown below.

1. Species and Grades

~~Wood~~*Timber* posts shall be of the species listed, and shall be in accordance with the grading requirements specified in Table A. ~~Wood blocks~~*Timber blockouts* shall be of the species listed,

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

and shall be in accordance with the grading requirements specified in Table B. ~~Wood~~*Timber* posts and ~~blocks~~*blockouts* shall have a nominal cross section and dimensions as shown on the plans.

TABLE A

SPECIAL AND GRADING REQUIREMENTS FOR SAWED TIMBER GUARDRAIL POSTS		
SPECIES	POSTS & TIMBERS GRADE	GRADING RULES AGENCIES[a]
HARDWOODS		
Red Oak (Northern Red, Black, Pin, Laurel, Cherry-Bark, Scarlet, Water and Willow Oaks)[b], Hard Maple (Black & Sugar) and Red Maple, White Ash, White-Heartwood Beech, Yellow Birch, Hickory (Mockernut, Pignut, Shagbark, and Shellbark Hickories)	Grade GRP	Department
SOFTWOODS		
Douglas Fir, Douglas Fir-Larch	No. 1 or better	WWPA or WCLIB
Southern Pine	No. 1 or better	SPIB
Jack Pine 8 in. by 8 in.	No. 1 or better	NHPMA

[a] NHPMA (Northern Hardwood and Pine Manufacturers Assoc.); WWPA (Western Wood Products Assoc.); WCLIB (West Coast Lumber Inspection Bureau); and SPIB (Southern Pine Inspection Bureau).
[b] Southern Red Oak will not be allowed.

Posts and ~~blocks~~*blockouts* shall be graded in accordance with grading rules based on principles and methods specified in ASTM D 245. Where there is a conflict between AWPA and ASTM standards, AWPA will prevail. Where there is a conflict between either AWPA or ASTM standards and this specification, this specification will prevail.

All material shall show the approved grading agency stamp indicating mill origin, species, and grade.

TABLE B

SPECIES AND GRADING REQUIREMENTS FOR SAWED TIMBER GUARDRAIL ~~BLOCKS~~*BLOCKOUTS*		
SPECIES	POSTS & TIMBERS GRADE	GRADING RULES AGENCIES[a]
HARDWOODS		
Red Oak (Northern Red, Black, Pin, Laurel, Cherry-Bark, Scarlet, Water and Willow Oaks)[b], Hard Maple (Black & Sugar) and Red		

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

Maple, White Ash, White-Heartwood Beech, Yellow Birch, Hickory (Mockernut, Pignut, Shagbark, and Shellbark Hickories)	Grade GRP	Department
SOFTWOODS		
Douglas Fir, Douglas Fir-Larch	No. 2 or better	WWPA or WCLIB
Southern Pine Species	No. 2 or better	SPIB
Jack Pine, Red Pine, and Eastern White Pine (Northern White Pine)	No. 1 or better	NHPMA

[a] NHPMA (Northern Hardwood and Pine Manufacturers Assoc.); WWPA (Western Wood Products Assoc.); WCLIB (West Coast Lumber Inspection Bureau); and SPIB (Southern Pine Inspection Bureau).
[b] Southern Red Oak will not be allowed.

2. Department Grade GRP

The requirements for posts to be in accordance with the Department's Grade GRP, Guardrail Posts, will be as follows.

a. Splits

Splits in the plane of the bolt hole shall not exceed 3 in. At other locations, splits shall not exceed 6 in.

b. Checks

Single checks shall not be greater than 3 in. deep. Checks opposite each other shall not total more than 3 in. deep, as measured with a probe that is not more than 1/16 in. in thickness or in diameter.

Single checks of 1/4 in. wide, or wider, measured at the widest point, shall not extend more than 1/3 of the length of the post. Single checks, measured at the widest point, shall not exceed 3/8 in. in width.

c. Shakes

Shakes, measured in the least dimension, shall not exceed 2 in.

Splits, checks, and shakes shall not be in combinations which may cause the post to separate into several pieces.

d. Stains

Stained heartwood, not caused by decay, shall not exceed 15% of the piece.

e. Slope of Grain

Slope of the grain shall not exceed 1 in 10.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

f. Wane

Wane shall be less than 1/4 of each face.

g. Knots

Knots shall be sound and tight. The sum of the least dimensions of all knots in a 6 in. length of post, all faces, shall be less than 5 in. Grain distortion caused by knot clusters shall not exceed 2 1/2 in. Knots will be allowed on all faces, but knots shall not exceed 2 1/2 in. in the least dimension.

3. Department Grade GRB

The requirements for ~~blocks~~*blockouts* to be in accordance with the Department's Grade GRB, Guardrail ~~Blocks~~*Blockouts*, will be as follows.

a. Splits

Splits in the plane of the bolt hole shall not exceed 3 in. At other locations, splits shall not exceed 5 in.

b. Checks

Checks shall be in accordance with 911.02(f)2b.

c. Shakes

Shakes, measured in the least dimension, shall not exceed 3 in. Shakes shall not extend beyond 1/2 the standard grading length of the piece.

Splits, checks, and shakes shall not be in combinations which may cause the post to separate into several pieces.

d. Stains

Stained heartwood, not caused by decay, shall not exceed 25% of the piece.

e. Wane

Wane shall be less than 1/3 of each face.

f. Knots

Grain distortion caused by knot clusters shall not exceed 4 in. Knots will be allowed on all faces, but knots shall not exceed 4 in. in the least dimension.

4. General Requirements

Posts and ~~blocks~~*blockouts* shall be in accordance with the following general requirements.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

a. Decay

Posts and ~~blocks~~*blockouts* shall be free from decay before treatment.

b. Unsound Wood

Posts containing unsound wood will be rejected. ~~Blocks~~*blockouts* may contain small spots of unsound wood provided they are well scattered.

c. Crook or Bow

Crook or bow shall not exceed 1 in. per 10 ft length.

d. Dimensional Tolerances

Posts and ~~blocks~~*blockouts* shall be sawed square to within -1/2 in. of the specified cross-sectional dimensions. A tolerance of -2 in. will be allowed on the specific length of the posts. A tolerance of -1/2 in. will be allowed on the specified length of the ~~blocks~~*blockouts*.

5. Pressure Treating Posts and ~~Blocks~~*Blockouts*

Pressure treating posts and ~~blocks~~*blockouts* shall be in accordance with the following requirements and AWPA Standards T1, and U1.

a. Machining

Posts and ~~blocks~~*blockouts* shall be sawed to their final shape and holes bored prior to treatment.

b. Blank

c. Inspection Before Treatment

The treater shall be responsible for ensuring that the material has the required approved grading agency stamp before treatment is commenced. The stamp or marking shall be applied on a wide face at the trimmed end. The stamp shall be applied such that it remains readable after treating. Material that has been air dried or kiln dried shall be inspected for moisture content as specified below, in accordance with AWPA Standard M2. Tests of representative pieces shall be conducted. The minimum number of tests shall be the lesser of 5% or 50 pieces out of a charge.

d. Test for Moisture Content

The test shall be made with an electrical resistance type moisture meter with insulated needles of 1 1/2 in. in length. The readings shall be corrected for species and temperature readings in accordance with the meter instructions. The readings shall be taken on one surface at mid-length with needles driven to their full length. The lot will be considered acceptable when the average moisture content does not exceed 19%. Individual pieces exceeding 23% moisture content will be rejected. Such pieces shall be removed from the lot.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

e. Preservative Treatment

All posts and ~~blocks~~*blockouts* shall be treated with a preservative as specified herein.

f. Material for Preservative Treatments

The preservative used for treating posts and ~~blocks~~*blockouts* shall be in accordance with the appropriate AWPA Standards listed in table C.

TABLE C

MATERIAL	AWPA STANDARDS
Ammoniacal Copper Zinc Arsenate, ACZA	P5 and P22
Chromated Copper Arsenate, CCA	P5 and P23

g. Treatment Methods

Wood for guardrail posts and ~~blocks~~*blockouts* shall be treated to be in accordance with AWPA Standard T1, and the requirements specified herein.

h. Sorting and Spacing

The material in a charge shall consist of the same species or consist of species within one group shown in table D. The material shall have similar moisture content and be of similar form and size. ~~Blocks~~*Blockouts* and posts may be treated in the same charge.

Pieces in the charge shall be separated by horizontal stickers so that preservative and steam, if used, shall contact all horizontal surfaces.

TABLE D

SPECIES GROUPINGS FOR TREATMENT IN SAME CHARGE	
GROUP	SPECIES
A	Southern Pine
B	Douglas Fir
C	Jack Pine*
D	Hardwoods
* Also Red Pine and Eastern White Pine ~~Blocks~~*Blockouts*	

i. Conditioning

Conditioning shall be in accordance with AWPA Standard T1.

j. Blank

k. Inspection During Treatment

The treater shall determine that the preservatives used are in accordance with the requirements herein. The minimum frequency of the preservation analysis shall be each charge for

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

the occasional single charge inspected. The minimum frequency for consecutive treatments from the same working tank shall be the first and at least one of every five additional charges, selected at random. Preservative samples shall be taken as appropriate so as to be representative of the solution in the treating cylinder.

l. Retentions

The minimum retentions in lb/cu ft for the outer 0.6 in. of guardrail posts and ~~blocks~~*blockouts* shall be those listed in table F. Retentions shall be determined by chemical assay with samples taken after treatment in accordance with the inspection after treatment requirements shown below and the AWPA Standards listed in table E.

TABLE E

MINIMUM REQUIREMENTS FOR RETENTION OF PRESERVATIVE			
PRESERVATIVE	RETENTION, lb/cu ft		AWPA STANDARD
	POSTS	~~BLOCKS~~*BLOCKOUTS*	
CCA or ACZA	0.60	0.40	A11

If ~~blocks~~*blockouts* are treated along with posts, retention of the charge shall be determined by assay of borings from posts.

m. Penetration

The penetration requirements for heartwood and sapwood shall be as specified in table F. Samples to determine penetration shall be taken after treatment in accordance with the inspection after treatment requirements shown below.

TABLE F

PENETRATION REQUIREMENTS FOR POSTS AND ~~BLOCKS~~*BLOCKOUTS*		
SPECIES	MINIMUM PENETRATION	
	HEARTWOOD	SAPWOOD
Allowed Species*	0.3 in.	0.6 in. or 90%, whichever is greater
* For Red Oak, 65% of the total annual rings shall be penetrated. If this is not possible, properly conditioned wood may be treated to refusal.		

n. Inspection After Treatment

Following treatment, the charge shall be inspected in accordance with AWPA Standard M2, Part A, section 4. All non-compliant material shall be removed from the remaining acceptable material before shipment.

Sampling and testing for preservative retention and penetration will be done by the Department.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

o. Branding

All post and ~~blocks~~*blockouts* shall be burn branded clearly and permanently on one of the wide faces. The brand shall be within 12 in. of the top of the post. The brand shall show the treater's identification, the plant designation, and the year of treatment. The month may also be included. The brand shall also show the species or group code designation shown in table G, the preservative type, and retention, all in accordance with AWPA Standard M6.

p. Conformance

The treating plant supplying the material shall be responsible for and will be required to supply a certificate indicating the species, grade, preservative type, retention, year, and name of treater. The certificate shall also include all of the other information which is listed in AWPA Standard M2, Part A, section 6.2.

TABLE G

GROUP CODING AS AN ALTERNATE TO SPECIES CODING*	
GROUP	CODE
Hardwoods	MH
Jack Pine	J
Other Softwoods	MS
* Species designated in tables A and B	

q. Records

Copies of treating records, analysis records, and other records which may be necessary to determine accordance with specifications shall be made available to Department personnel or their designated representatives upon their request. Required information shall be that which is listed in Part A, section 6.2 of AWPA Standard M2. These records shall be retained by the treating plant for five years from the date of material shipment.

r. Independent Inspections

The Department may inspect the material or call for a non-Departmental inspection to verify that it is in accordance with all specifications.

6. Field Treatment of Posts and ~~Blocks~~*Blockouts*

Cuts, holes, or injuries to the surface of posts and ~~blocks~~*blockouts* which occur after pressure treatment shall be field-treated by brushing, spraying, dipping, soaking, or coating. The Contractor shall ensure that all injuries, such as abrasions and nail and spike holes, are thoroughly saturated with the field-treating solution. Holes bored in pressure-treated materials shall be poured full of preservative. Horizontal holes may be filled by pouring the preservative into the holes with a bent funnel after temporarily plugging the other end of the hole.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

The solution used for field treatment shall be copper naphthenate in accordance with AWPA Standard P34.

7. Rejection for Degrade After Treatment

Guardrail posts or ~~blocks~~*blockouts* developing the following degrade prior to installation will be rejected regardless of prior approvals.

a. single checks greater than 3 in. deep or checks opposite each other totaling more than 3 in. deep, measured with a probe not more than 1/16 in. thick;

b. single checks 1/4 in. wide or wider measured at the widest point, and extending more than 1/3 of the length of the post or ~~block~~*blockout*;

c. single checks greater than 3/8 in. wide measured at the widest point;

d. splits greater than 3 in. long which are in the plane of the bolt hole;

e. crooks or bows exceeding 1 in. per 10 ft length; and all twists;

f.combinations of checks, splits, or shakes which are otherwise in accordance with the specifications but which may cause the post or ~~block~~*blockout* to separate into several pieces.

(g) Recreational Applications

Lumber that will be used in facilities where human contact will occur, such as handrails, pedestrian facilities including decking and picnic tables, shall be treated with ammoniacal or alkaline copper quat in accordance with AWPA Standards T1, U1 and P5. The treater shall perform inspection and marking in accordance with AASHTO M 133. Material furnished under this specification shall be covered by a type C certification in accordance with 916.

(h) Preservatives

Preservatives shall be in accordance with AASHTO M 133 as modified by EPA regulation.

Waterborne preservatives shall be in accordance with AWPA Standard P5, and shall be Acid Copper Chromate, Alkaline Copper Quat, Ammonical Copper Quat, Copper Azole, Copper Naphthenate or Chromated Copper Arsenate.

REVISION TO STANDARD SPECIFICATIONS

SECTION 601 - GUARDRAIL
SECTION 911 - WOOD MATERIALS
911.02 TREATED LUMBER
SECTION 926 - MISCELLANEOUS MATERIALS
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

The Standard Specifications are revised as follows:

SECTION 926, BEGIN LINE 105, AS FOLLOWS:

926.03 Alternate Material Guardrail ~~Blocks~~*Blockouts*

Non-timber blockouts shall be dimensioned as tested and shall be used with the type of guardrail as tested, in accordance with NCHRP 350 *or MASH*. ~~Blockouts shall be accompanied by a certification from the manufacturer stating the blockouts furnished have the same chemistry, mechanical properties, and geometry as those certified to have passed the NCHRP 350 crash test and have been certified by the FHWA to be acceptable for use on NHS facilities~~ *Blockouts shall be accompanied by a copy of the FHWA eligibility letter stating that the product complies with the requirements of NCHRP 350 or MASH test level 3.*

Alternate material blockouts meeting the criteria may be used interchangeably with timber blockouts as long as the line and grade of the face of the guardrail is true to that shown on the plans.

COMMENTS AND ACTION

SECTION 601 - GUARDRAIL
911.02 TREATED LUMBER
926.03 ALTERNATE MATERIAL GUARDRAIL BLOCKS

DISCUSSION:

Motion: Second: Ayes: Nays: FHWA Approval:	Action: _____ Passed as Submitted _____ Passed as Revised _____ Withdrawn
Standard Specifications Sections referenced and/or affected: 601 pg 400 thru 407; 911 pg 974 thru 983; and 926.03 pg 1102. Recurring Special Provision affected: 601-R-146 REMOVAL OF GUARDRAIL Standard Drawing affected: New 601-MGSA series (RPD 6-1-R-658d) Design Manual Sections affected: 49-4.0, 49-5.0, 49-8.0, 49-9.0 (under review) GIFE Sections cross-references: Section 21.1. Currently general and may not need updates, but providing a distinction between w-beam and MGS may be beneficial	_____ 2020 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 _____ SiteManager Update