Standards Committee
Meeting Agenda
Wednesday, July 6, 2022, at 9:00am
Meeting Location: 1334 Smith Street, Charleston, WV in Lower-Level Conference
Also meeting virtually via Google Meet. E-mail distribution includes instruction.

Call to Order

Roll Call of Attendees

Approval of Minutes of 5-4-2022 Meeting

Unfinished Business – Standards discussed at last Committee meeting

TITLE	Champion
3rd time to Committee. Discussed in March and May. Six proposed drawings and revisions to WVDOH Standard Details Book – Volume 3. These drawings are for bearings and would be new 1800 section. The following sheets are included: a) *Sheet # 1800B1 - Plain Elastomeric Bearing Details* b) *Sheet # 1800B2 - Laminated Elastomeric Bearing Details* c) *Sheet # 1800BR1 – Steel Beam Non-Guided Bearing Restraints* d) *Sheet # 1800BR2 – Steel Beam Guided Bearing Restraints* e) *Sheet # 1800BR3 – Steel Beam Fixed Bearing Restraints* f) *Sheet # 1800BR4 – Concrete Beam Non-Guided Bearing Restraints* No update to the Standard Details. Approval is expected in July	B. Neeley
2nd time to Committee. Discussed in May. *Design Directive (DD)-644 Asphalt Pavement.* The DD is redline copy, showing the propose changes to past working copy. It removes some of the proposed Marshall Mix Design requirements and clarifies selection criteria. No update to the DD. Approval is expected in July	V. Allision

New Business

TITLE	Champion
None	

Next Meeting Date: Wednesday, September 7, 2022.
Deadline for submissions: August 8, 2022.

Adjournment

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Standards Committee
Meeting Minutes
May 4, 2022

Call to Order: The meeting was called to called to order by Acting Chair Steve Boggs shortly after 9:00 AM.

Attendees: See Attendee List for a list of attendees.

Minutes: Minutes of the 3-4-2022 Meeting were approved without objection.

Unfinished Business: Items which were discussed at prior meeting are listed below:

I. Various Design Directive (DD) updates based upon AASHTO Green Book 7th edition's moving towards performance based practical design and the definitions of project categories were briefly explained, no discussion.

Four new DD's:

1. *DD-600 Geometric Design Project Categories.*
2. *DD-601 New Construction Project Category.*
3. *DD-602 Reconstruction Project Category.*
4. *DD-603 Construction Projects on Existing Roads.*

Updates to following existing DD's:

1. *Existing DD-601 Geometric Design Criteria for Rural Highways.* The DD will be removed
2. *Existing DD-602 Interchange Ramps Width.* The DD will be removed.
3. *Existing DD-603 Spiral and Superelevation.* The DD will be removed.
4. *Existing DD-604 Non-Freeway NHS RRR Policy.* The DD will be removed.
5. *Existing DD-605 Controlling Criteria and Design Exception Policy.* Updated DD.
6. *Existing DD-606 Non-NHS Policy.* The DD will be removed.
7. *Existing DD-608 Median and outside slopes, Overlay projects.* The DD will be removed.
8. *Existing DD-609 Interstate RRR Standards and Guidance.* The DD will be removed.
9. *Existing DD-610 Geometric Design Criteria for Urban Highways.* The DD will be removed.
10. *Existing DD-624 Ramp Terminals.* Updated DD.
11. *Existing DD-817 Minor Preventive Maintenance.* The DD will be removed.

All fifteen Design Directive changes were approved at the meeting. Vote 4-0.

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II. *Structure Directives*. The existing Bridge Design Manual has been updated and revised title to Structure Directives. There was a brief explanation, no discussion. The Structure Directives were approved at the meeting. Vote 4-0.

III. Six proposed drawings and revisions to WVDOH Standard Details Book – Volume 3. These drawings are for bearings and would be new 1800 section. Barrett Neeley introduced and discussed these during the meeting.

1. *Sheet # 1800B1 - Plain Elastomeric Bearing Details*
2. *Sheet # 1800B2 - Laminated Elastomeric Bearing Details*
3. *Sheet # 1800BR1 – Steel Beam Non-Guided Bearing Restraints*
4. *Sheet # 1800BR2 – Steel Beam Guided Bearing Restraints*
5. *Sheet # 1800BR3 – Steel Beam Fixed Bearing Restraints*
6. *Sheet # 1800BR4 – Concrete Beam Non-Guided Bearing Restraints*

Hope to approve at the next meeting.

New Business: Items discussed for the first time at committee meeting are listed below:

IV. *DD-644 Asphalt Pavements.* The revision updates asphalt pavement mix deign requirments and selection criteria. Vince Allision introduced and explained proposed DD during the meeting.

Next Meeting: The next meeting is on Wednesday July 6, 2022. Deadline for submissions June 10, 2022.

Adjournment: The meeting was adjourned.

DRAFT

Manuals Committee
Meeting Minutes
May 4, 2022

Call to Order: The meeting was called to called to order by Acting Chair Steve Boggs shortly after conclusion of Standards Committee meeting.

Attendees: See Attendee List for a list of attendees.

Unfinished Business: Items which were discussed at prior meeting are listed below:

I. **2022 Construction Manual.** Update of the 2002 Construction Manual. The revision updates reporting requirements, adds/deletes sections, and updates inspection/construction methods.

Two comments were submitted on the manual:

a. John Crane, WVAPA. Question on reference to Turnpike in subsection 103.4.1-Insurance Requirements
b. Roadsafe Traffic. Question on proprietary name & MASH language in subsection 664.1.2-Material Considerations

(Discussion Ensued)

The 2022 Construction Manual was approved at the meeting, as noted. Vote 4-0.

Next Meeting: The next meeting is on Wednesday July 6, 2022. Deadline for submissions June 10, 2022.

Adjournment: The meeting was adjourned.

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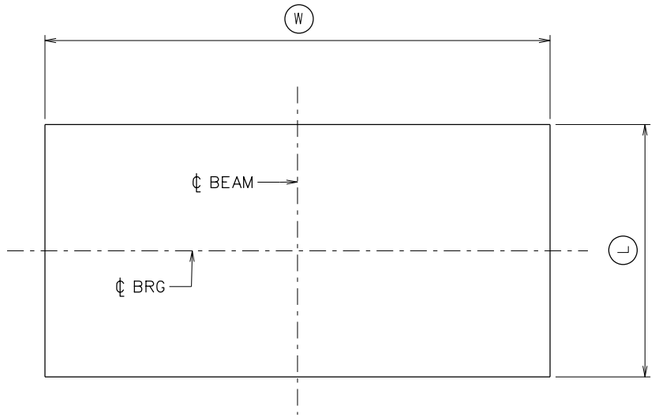
May Standards Committee and Manuals Committee Meeting
Wednesday, May 4, 2022
Attendee List

1.	Ahmed, Monji	HDR, Inc.
2.	Allison, Vincent.	WVDOH – MCS&T Division
3.	Anders, Tony	Triton
4.	Bodnar, David	WVDOH – Engineering Division
5.	Boggs, Steve	WVDOH – Technical Support Division
6.	Brayack, Daniel *	WVDOH – MCS&T Division
7.	Brennan, Patrick	WVDOH – Performance Management
8.	Brown, Phillip	WVDOH – MCS&T Division
9.	Conley-Rinehart, Laura	WVDOH – Technical Support Division
10.	Crane, John	WV Asphalt Pavement Association
11.	Danberry, Sasha	WVDOH – Contract Administration Division
12.	Elkins, Jerry	HNTB
13.	Farley, Paul	WVDOH – MCS&T Division
14.	Foster, Jason	WVDOH – Deputy State Highway Engineer - Development
15.	Hevener, Wes	AMT Engineering
16.	Hoover, Kimberly	WVDOH – Operations Division
17.	Johnson, Ross	Mountain State Insurance
18.	McGlumphy, Kevin	Associated Asphalt
19.	Neeley, Joseph B	WVDOH – District One
20.	Scites, RJ *	WVDOH – Engineering
21.	Smith, Shawn *	WVDOH – Contract Administration Division
22.	Smith, Yuvonne	FHWA
23.	Thaxton, Andrew	WVDOH – MCS&T
24.	Varney, Billy	TRC Companies
25.	Whitmore, Ted *	WVDOH – Traffic Engineering Division
26.	Zyzka, Mara	WVDOH – Technical Support Division

* Voting Delegate

TOTAL ATTENDEES: 26



BEARING PLAN

TYPICAL SECTION

NOTES:

1. BRIDGE SEATS ON WHICH BEARING PADS WILL BE MOUNTED SHALL BE FINISHED TO A TRULY LEVEL PLANE AT THE EXACT REQUIRED ELEVATION. IF FULL CONTACT IS NOT ACHIEVED, FIELD ADJUSTMENTS OR MODIFICATIONS SHALL BE MADE BY THE CONTRACTOR TO ENSURE FULL CONTACT SUBJECT TO THE APPROVAL OF THE ENGINEER.

2. WELDING WHILE THE BEARING PAD IS IN CONTACT WITH METAL IS DISCOURAGED.

3. PLAIN ELASTOMERIC BEARING SHALL BE DUROMETER 50 OR 60 CORRESPONDING TO A SHEAR MODULUS OF 113 OR 165 PSI RESPECTIVELY.

4. DUROMETER 50 BEARINGS ARE RECOMMENDED FOR BRIDGES WITH MODERATE LONGITUDINAL SLOPE, SKEW OR CURVATURE.

5. PLAIN BEARINGS SHALL ONLY BE USED FOR TEMPORARY SUPPORT AT INTEGRAL ABUTMENTS OR PIERS. PLAIN BEARINGS ARE FORBIDDEN AS THE PERMANENT METHOD FOR ACCOMMODATING THERMAL MOVEMENTS.

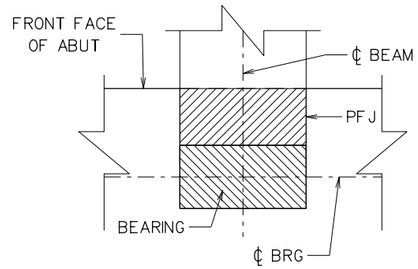
6. PRIOR TO SHIPMENT, BEARINGS SHALL BE WRAPPED WITH A WATERPROOFING COVERING. THE BEARINGS SHALL NOT BE UNWRAPPED UNTIL BEARINGS ARE READY TO BE SET INTO THEIR FINAL POSITION.

7. THE CONTRACTOR SHALL FINISH ALL CLOSURE POURS AT INTEGRAL SUBSTRUCTURE UNITS PRIOR TO WINTER SHUTDOWN AFTER THE BEAMS AND BEARINGS HAVE BEEN INSTALLED.

8. THE CONTRACTOR SHALL VERIFY THE POSITIONING OF BEAMS AND CONDITION OF THE TEMPORARY BEARING AFTER EXTREME LOW OR HIGH TEMPERATURE EVENTS. REPLACE DAMAGED BEARINGS AT THE DISCRETION OF THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR RESETTING BEAMS AND BEARING REPLACEMENT IF NEEDED.

9. THE CONTRACTOR SHALL TAKE SPECIAL PRECAUTIONS TO AVOID SPILLS OF GREASE, DIRT AND OTHER FOREIGN MATERIAL ON BEARINGS DURING INSTALLATION. ALL FOREIGN MATERIAL SHALL BE REMOVED BY AN APPROVED METHOD BEFORE FINAL INSTALLATION. A DEGREASING AGENT APPROVED BY THE ENGINEER SHALL BE REQUIRED FOR ALL SPILLS.

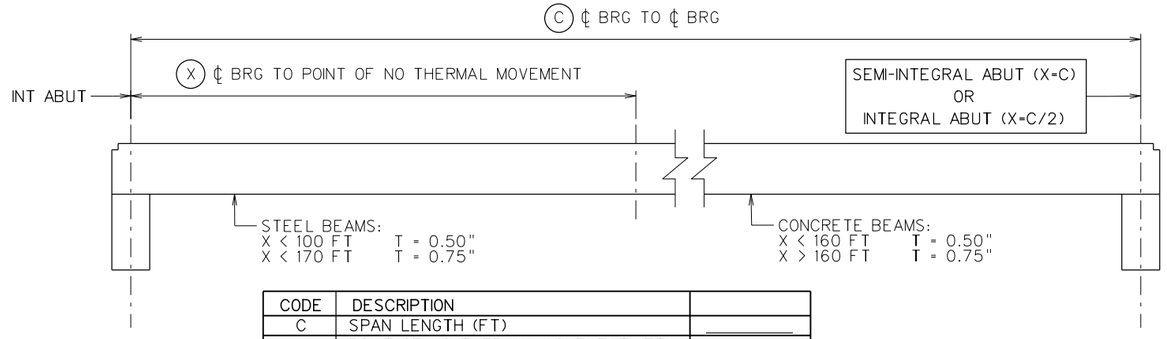
10. A PREFORMED JOINT (PFJ) SHALL BE USED IN FRONT OF THE TEMPORARY BEARINGS AS NEEDED TO FILL ALL VOIDS. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO AVOID ENCASING WATER WITHIN THE ABUTMENT.



BEARING LAYOUT

PLAIN BEARING PAD CONTROL DIMENSIONS

CODE	DESCRIPTION	EQUATION	ABUT 1	ABUT 2
	NO. OF PADS			
	DUROMETER			
L	PAD LENGTH (IN)			
W	PAD WIDTH (IN)			
T	THICKNESS (IN)			
A	PAD PLAN AREA (SQ. IN.)	WxL		
P	PAD PLAN PERIMETER (IN)	2W + 2L		
S	SHAPE FACTOR	$\frac{A}{PxT}$		
	DUROMETER 50 ALLOWABLE COMPRESSIVE STRESS (PSI)	$13.7S^2 < 800$		
	DUROMETER 60 ALLOWABLE COMPRESSIVE STRESS (PSI)	$18.7S^2 < 800$		
	ACTUAL COMPRESSIVE STRESS (PSI)			



CODE	DESCRIPTION	
C	SPAN LENGTH (FT)	
*X	POINT OF NO THERMAL MOVEMENT (FT)	

*THE POINT OF NO THERMAL MOVEMENT SHALL BE COMPUTED USING BEST ENGINEERING PRACTICE FOR MULTI SPAN BRIDGES.

BRIDGE ELEVATION SCHEMATIC

NOT TO SCALE

NO.	REVISION	DATE	BY

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGNED	DATE	CHECKED	DATE
DRAWN	DATE	REVIEWED	DATE

STANDARD BRIDGE PLANS
PLAIN ELASTOMERIC BEARING DETAILS
SHEET NUMBER 1800B1

PRINT DATE
5-FEB-2022 13:59

5-FEB-2022 13:59

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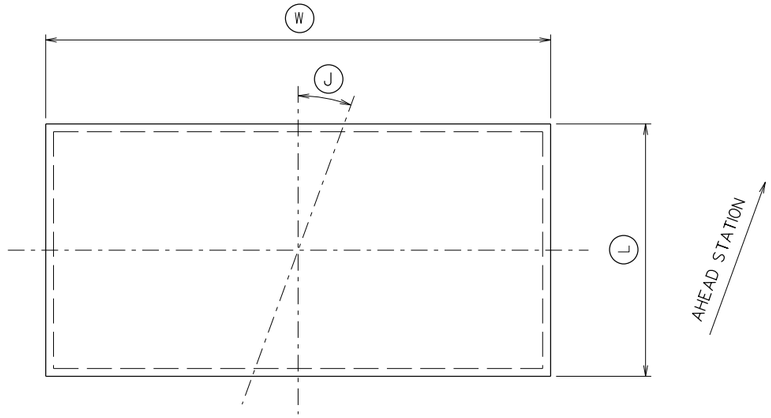
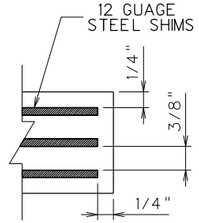
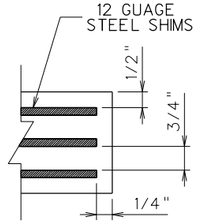


BEARING PLAN



DETAIL A
(TYPE A SHOWN)

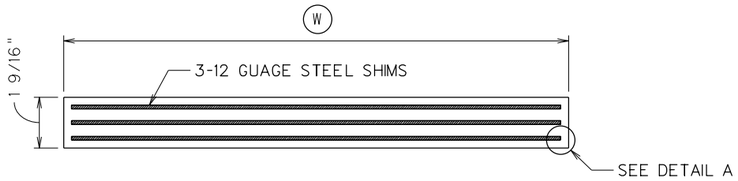


DETAIL B
(TYPE A SHOWN)

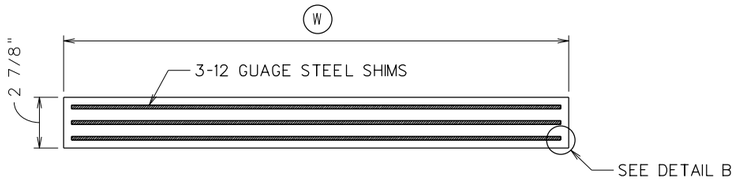
LAMINATED BEARING PAD CONTROL DIMENSIONS

CODE	DESCRIPTION	ABUT 1	PIER 1	PIER 2	ABUT 2
	PAD TYPE				
	NO. OF PADS				
J	SKEW				
L	PAD LENGTH				
W	PAD WIDTH				
DESIGN REACTION (K)					
DESIGN ROTATION (RAD)					
DESIGN MOVEMENT (IN)					

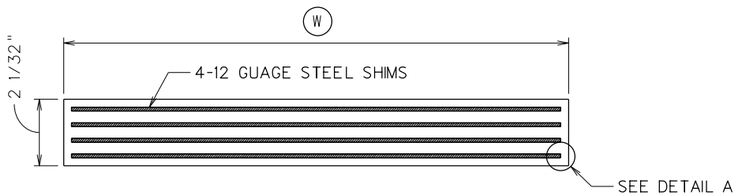
DESIGNS SHALL BE BY AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, METHOD B



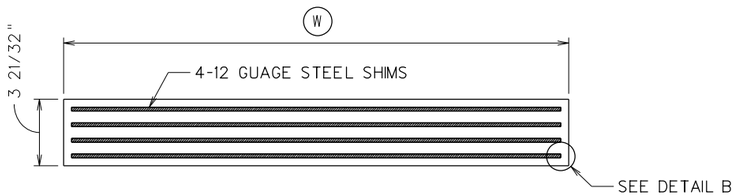
TYPICAL SECTION - TYPE A1



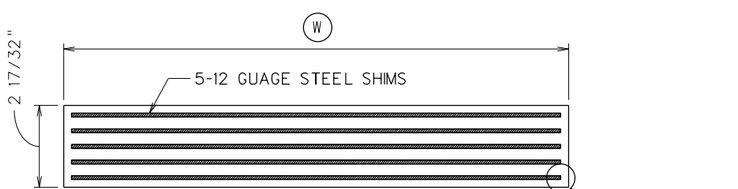
TYPICAL SECTION - TYPE A2



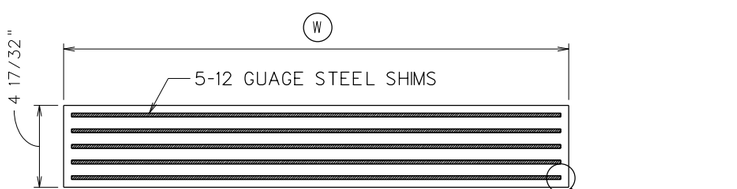
TYPICAL SECTION - TYPE B1



TYPICAL SECTION - TYPE B2



TYPICAL SECTION - TYPE C1



TYPICAL SECTION - TYPE C2

NOTES:

1. ALL LAMINATED BEARING PAD SHALL BE OF 60 DUROMETER (HARDNESS) ELASTOMER. STEEL LAMINATE SHALL CONFORM TO ASTM A1011, GRADE 36 OR BETTER.

2. LAMINATED BEARINGS SHALL BE SUBJECT TO TESTING REQUIREMENTS IN ACCORDANCE WITH AASHTO LRFD CONSTRUCTION SPECIFICATIONS.

3. PRIOR TO SHIPMENT, LAMINATED BEARING ASSEMBLIES SHALL BE FULLY ASSEMBLED, BLOCKED AND SECURED INTO POSITION, AND WRAPPED WITH A WATERPROOFING COVERING. THE BEARING ASSEMBLY SHALL NOT BE UNWRAPPED UNTIL THE BEARING COMPONENTS ARE READY TO BE SET INTO THEIR FINAL POSITION.

4. BRIDGE SEATS ON WHICH BEARING PADS WILL BE MOUNTED SHALL BE FINISHED TO A TRULY LEVEL PLANE AT THE EXACT REQUIRED ELEVATION. IF FULL CONTACT IS NOT ACHIEVED AFTER THE DECK IS IN PLACE, FIELD ADJUSTMENTS OR MODIFICATIONS SHALL BE MADE BY THE CONTRACTOR TO ENSURE FULL CONTACT SUBJECT TO THE APPROVAL OF THE ENGINEER.

5. EPOXY GRIT COATING SHALL BE APPLIED TO ALL STEEL SURFACES CONTACTING THE BEARING PAD AND EXTEND ½" IN ALL DIRECTIONS BEYOND THE PAD'S LIMITS. THE EPOXY GRIT SHALL BE INSTALLED IN ACCORDANCE WITH THE EPOXY MANUFACTURER'S INSTRUCTIONS. ALLOW THE EPOXY TO FULLY CURE FOR THE MINIMUM TIME RECOMMENDED BY THE MANUFACTURER THEN REMOVE ANY LOOSE GRIT BEFORE BEARING INSTALLATION. EPOXY GRIT SHALL MEET THE REQUIREMENTS OF SSPC AB1 ABRASIVE SPECIFICATIONS #1 - MINERAL & SLAG ABRASIVES, TYPE 2 OR BETTER.

6. WELDING WHILE THE LAMINATED BEARING PAD IS IN CONTACT WITH METAL IS DISCOURAGED. WHEN WELDING IS REQUIRED, TEMPERATURE INDICATING WAX PENS OR OTHER SUITABLE MEAN SHALL BE USED TO ENSURE THE PAD NOT BE EXPOSED TO TEMPERATURES GREATER THAN 250° F. ANY DAMAGE TO THE PAD DUE TO WELDING WILL BE CAUSE FOR REJECTION.

7. ALL BEARINGS SHALL BE MARKED PRIOR TO SHIPPING. THE MARKS SHALL INCLUDE THE BEARING LOCATION AND A DIRECTION ARROW THAT POINTS UP-STATION. ALL MARKS SHALL BE PERMANENT AND SHALL BE VISIBLE AFTER THE BEARING IS INSTALLED.

8. ALL DESIGN PARAMETERS REQUIRED WITHIN THE LAMINATED BEARING PAD CONTROL DIMENSIONS TABLE SHALL BE UNFACTORED (SERVICE LIMIT STATE) AND INCLUDE IMPACT.

9. A STATIC COEFFICIENT OF FRICTION OF 0.20 SHALL BE USED IN THE DESIGN TO VERIFY LAMINATED BEARINGS ARE NOT SUBJECT TO SLIP UNDER SERVICE AND STRENGTH LIMIT STATES. ADDITIONAL CONSIDERATION MAY BE WARRANTED FOR STEEP GRADES.

DRAFT

PRINT DATE
5-FEB-2022 14:02

5-FEB-2022 14:02

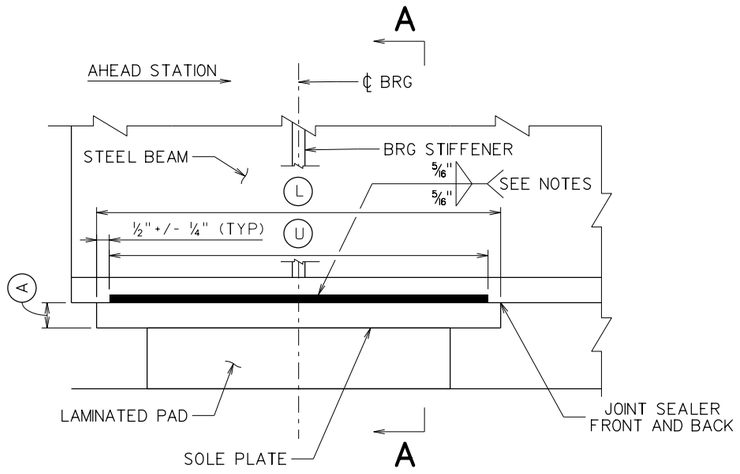
NOT TO SCALE

NO.	REVISION	DATE	BY

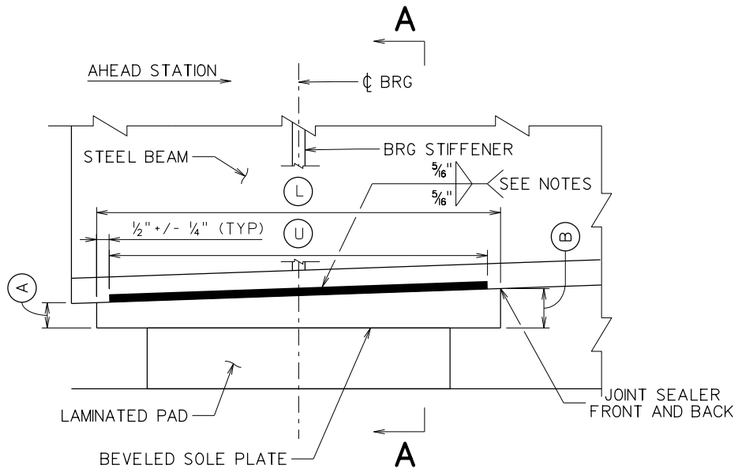
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGNED	DATE	CHECKED	DATE
DRAWN	DATE	REVIEWED	DATE

STANDARD BRIDGE PLANS
LAMINATED ELASTOMERIC BEARING DETAILS
SHEET NUMBER 1800B2



NON-GUIDED SIDE ELEVATION
(SLOPES < 0.50% ALONG BEAM)



NON-GUIDED SIDE ELEVATION
(SLOPES > 0.50% ALONG BEAM)

NOTES:

1. UNLESS OTHERWISE NOTED, SOLE PLATES SHALL BE MADE OF THE SAME STEEL AS THE ABUTTING BOTTOM FLANGE. WHERE DIFFERING MATERIALS ARE SPECIFIED WELDABILITY OF THE MATERIALS SHALL BE VERIFIED IN ACCORDANCE WITH AWS D1.5 - BRIDGE WELDING CODE.

2. SOLE PLATES SHALL HAVE A MINIMUM THICKNESS OF ¾" AND MINIMUM BEVEL, IF APPLICABLE, OF 0.01 RADIANS.

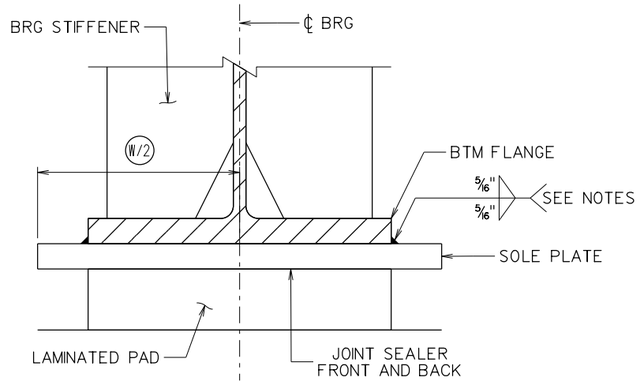
3. EPOXY GRIT COATING SHALL BE APPLIED TO ALL STEEL SURFACES CONTACTING THE BEARING PAD AND EXTEND ½" IN ALL DIRECTIONS BEYOND THE PAD'S LIMITS. THE EPOXY GRIT SHALL BE INSTALLED IN ACCORDANCE WITH THE EPOXY MANUFACTURER'S INSTRUCTIONS. ALLOW THE EPOXY TO FULLY CURE FOR THE MINIMUM TIME RECOMMENDED BY THE MANUFACTURER THEN REMOVE ANY LOOSE GRIT BEFORE BEARING INSTALLATION. EPOXY GRIT SHALL MEET THE REQUIREMENTS OF SSPC AB1 ABRASIVE SPECIFICATIONS #1 - MINERAL & SLAG ABRASIVES, TYPE 2 OR BETTER.

4. SHOP WELDING OF SOLE PLATES IS PREFERRED. WHERE FIELD WELDING IS NECESSARY, ALL COATINGS SHALL BE REMOVED BY GRINDING IN THE VICINITY OF THE WELD TO A BRIGHT METAL SURFACE ATLEAST 1 INCH IN ALL DIRECTIONS OF THE AREA TO BE WELDED. THE WELD AND DAMAGED AREA OF PAINTED SURFACE SHALL BE CLEANED AND REPAIRED AS SPECIFIED BY THE ENGINEER.

5. WELDING WHILE THE LAMINATED BEARING PAD IS IN CONTACT WITH METAL IS DISCOURAGED. IF REQUIRED, TEMPERATURE INDICATING WAX PENS OR OTHER SUITABLE MEAN SHALL BE USED TO ENSURE THE PAD IS NOT EXPOSED TO TEMPERATURES GREATER THAN 250° F. ANY DAMAGE TO THE PAD DUE TO WELDING WILL BE CAUSE FOR REJECTION.

6. THE ENGINEER SHALL VERIFY WELDS ARE CAPABLE OF WITHSTANDING ALL SUBJECT FORCE EFFECTS.

7. THE DETAILS AND NOTES HEREIN ARE NOT APPLICABLE FOR VULCANIZED BEARINGS. REFER TO AASHT-NSBA STEEL BRIDGE COLLABORATION G9.1 FOR MORE INFORMATION.



SECTION A-A

BEARING RESTRAINTS CONTROL DIMENSIONS

CODE	DESCRIPTION	ABUT 1	PIER 1	PIER 2	ABUT 2
A	PLATE THICKNESS (IN)				
B	PLATE THICKNESS (IN)				
L	PLATE LENGTH (IN)				
W	PLATE WIDTH (IN)				
U	WELD LENGTH (IN)				

NOT TO SCALE

NO.	REVISION	DATE	BY

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGNED	DATE	CHECKED	DATE
DRAWN	DATE	REVIEWED	DATE

STANDARD BRIDGE PLANS
STEEL BEAM NON-GUIDED BEARING RESTRAINTS
SHEET NUMBER 1800BR1

PRINT DATE
5-FEB-2022 15:30

5-FEB-2022 15:30

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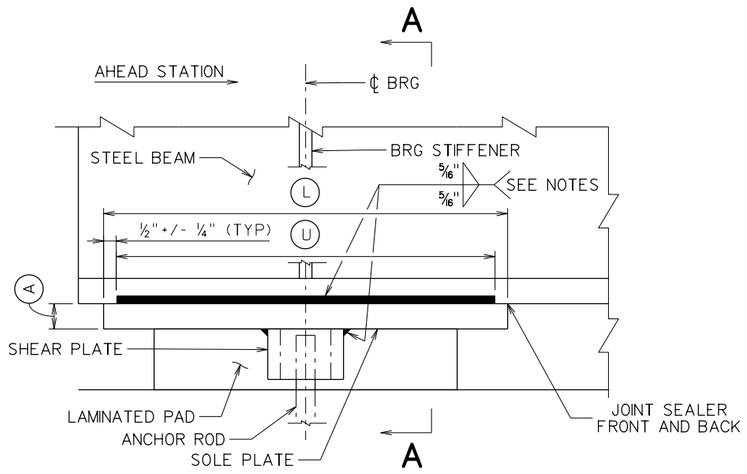
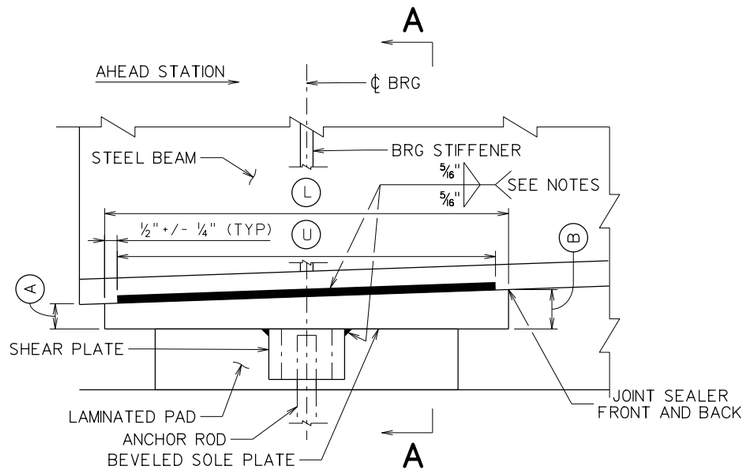
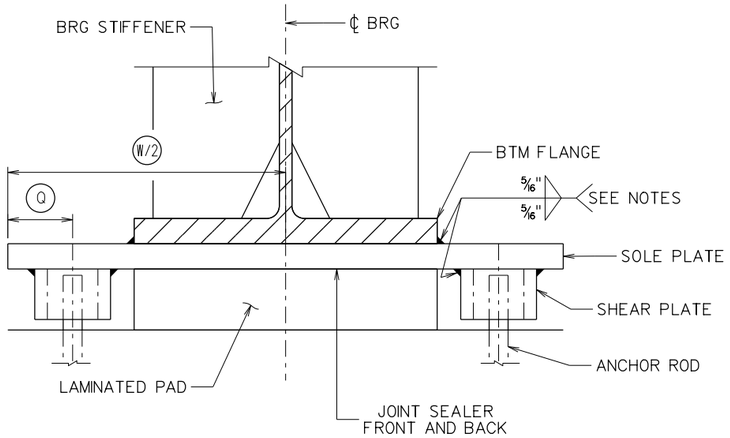


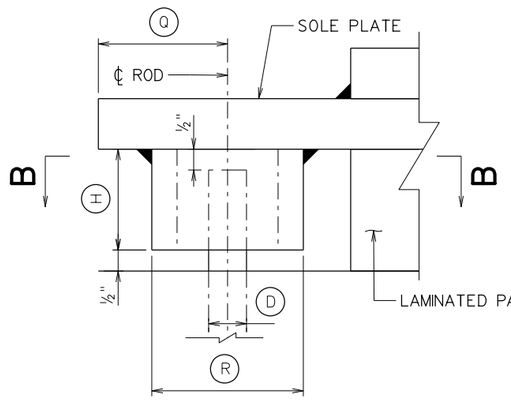
GUIDED SIDE ELEVATION
(SLOPES < 0.50% ALONG BEAM)



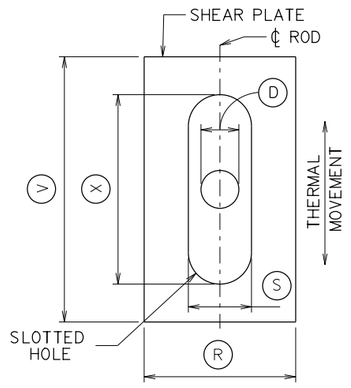
GUIDED SIDE ELEVATION
(SLOPES > 0.50% ALONG BEAM)



SECTION A-A



SHEAR KEY DETAIL



SECTION B-B

BEARING RESTRAINTS CONTROL DIMENSIONS

CODE	DESCRIPTION	ABUT 1	PIER 1	PIER 2	ABUT 2
A	PLATE THICKNESS (IN)				
B	PLATE THICKNESS (IN)				
L	PLATE LENGTH (IN)				
W	PLATE WIDTH (IN)				
U	WELD LENGTH (IN)				
D	ANCHOR ROD DIAMETER (IN)				
Q	SHEAR PLATE OFFSET (IN)				
H	SHEAR PLATE HEIGHT (IN)				
R	SHEAR PLATE WIDTH (IN)				
S	SLOTTED HOLE WIDTH (IN)				
V	SHEAR PLATE LENGTH (IN)				
X	SLOTTED HOLE LENGTH (IN)				
FACTORED LATERAL LOAD (KIP)					

NOTES:

1. UNLESS OTHERWISE NOTED, SOLE PLATES SHALL BE MADE OF THE SAME STEEL AS THE ABUTTING BOTTOM FLANGE. WHERE DIFFERING MATERIALS ARE SPECIFIED WELDABILITY OF THE MATERIALS SHALL BE VERIFIED IN ACCORDANCE WITH AWS D1.5 - BRIDGE WELDING CODE.

2. SOLE PLATES SHALL HAVE A MINIMUM THICKNESS OF ¾" AND MINIMUM BEVEL, IF APPLICABLE, OF 0.01 RADIANS.

3. EPOXY GRIT COATING SHALL BE APPLIED TO ALL STEEL SURFACES CONTACTING THE BEARING PAD AND EXTEND ½" IN ALL DIRECTIONS BEYOND THE PAD'S LIMITS. THE EPOXY GRIT SHALL BE INSTALLED IN ACCORDANCE WITH THE EPOXY MANUFACTURER'S INSTRUCTIONS. ALLOW THE EPOXY TO FULLY CURE FOR THE MINIMUM TIME RECOMMENDED BY THE MANUFACTURER THEN REMOVE ANY LOOSE GRIT BEFORE BEARING INSTALLATION. EPOXY GRIT SHALL MEET THE REQUIREMENTS OF SSPC AB1 ABRASIVE SPECIFICATIONS #1 - MINERAL & SLAG ABRASIVES, TYPE 2 OR BETTER.

4. SHOP WELDING OF SOLE PLATES IS PREFERRED. WHERE FIELD WELDING IS NECESSARY, ALL COATINGS SHALL BE REMOVED BY GRINDING IN THE VICINITY OF THE WELD TO A BRIGHT METAL SURFACE ATLEAST 1 INCH IN ALL DIRECTIONS OF THE AREA TO BE WELDED. THE WELD AND DAMAGED AREA OF PAINTED SURFACE SHALL BE CLEANED AND REPAIRED AS SPECIFIED BY THE ENGINEER.

5. WELDING WHILE THE LAMINATED BEARING PAD IS IN CONTACT WITH METAL IS DISCOURAGED. IF REQUIRED, TEMPERATURE INDICATING WAX PENS OR OTHER SUITABLE MEAN SHALL BE USED TO ENSURE THE PAD IS NOT EXPOSED TO TEMPERATURES GREATER THAN 250° F. ANY DAMAGE TO THE PAD DUE TO WELDING WILL BE CAUSE FOR REJECTION.

6. THE ENGINEER SHALL VERIFY WELDS ARE CAPABLE OF WITHSTANDING ALL SUBJECT FORCE EFFECTS.

7. THE DETAILS AND NOTES HEREIN ARE NOT APPLICABLE FOR VULCANIZED BEARINGS. REFER TO AASHT-NSBA STEEL BRIDGE COLLABORATION G9.1 FOR MORE INFORMATION.

8. UNLESS OTHERWISE NOTED, SHEAR PLATES SHALL BE MADE OF THE SAME STEEL AS THE ABUTTING SOLE PLATE. WHERE DIFFERING MATERIALS ARE SPECIFIED WELDABILITY OF THE MATERIALS SHALL BE VERIFIED IN ACCORDANCE WITH AWS D1.5 - BRIDGE WELDING CODE.

9. SHEAR PLATES SHALL BE WELDED TO THE SOLE PLATE ALL AROUND. THE ENGINEER SHALL VERIFY WELDS ARE CAPABLE OF WITHSTANDING ALL SUBJECT FORCE EFFECTS.

10. THE WIDTH OF THE SLOTTED HOLE SHALL BE AS RECOMMENDED FOR ANCHOR RODS IN AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) UNLESS OTHERWISE NOTED. OVERSIZING HOLE WIDTH SHOULD BE AVOIDED.

11. THE LENGTH OF THE SLOTTED HOLE SHALL BE NO LESS THAN THE COMPUTED THERMAL MOVEMENT AT THE BEARING.

12. ANCHOR RODS SHALL COMPLY WITH AASHTO M111, GRADE 55 AND BE FULL LENGTH HOT DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M232. THE ENGINEER SHALL SIZE ANCHOR RODS FOR ALL FORCE EFFECTS. ANCHOR ROD FLEXURE SHALL BE CONSIDERED.

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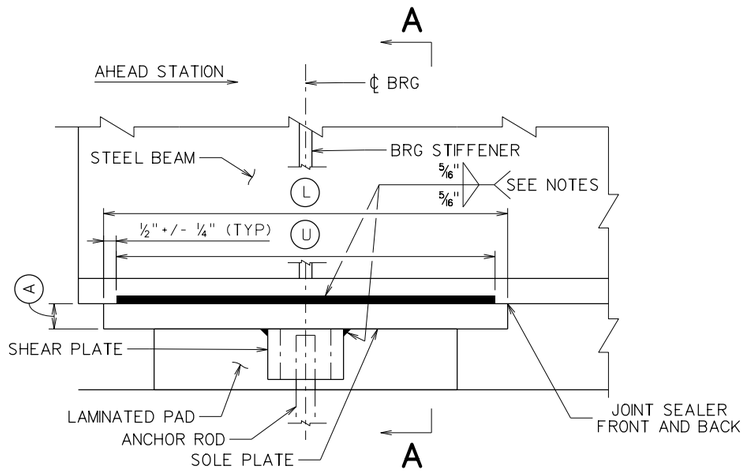
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

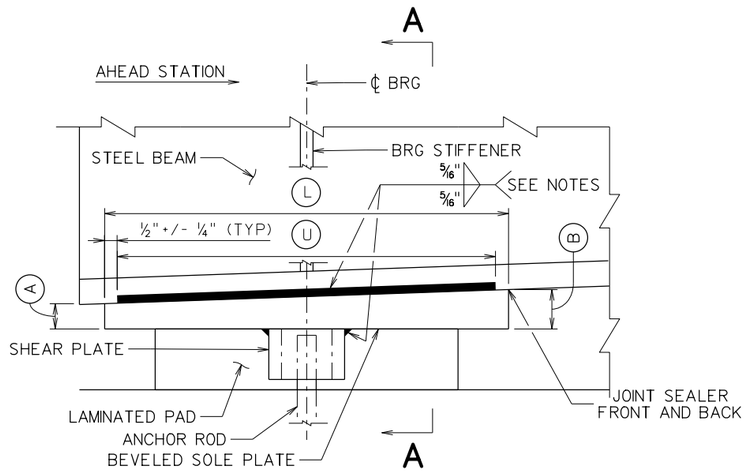
DESIGNED	DATE	CHECKED	DATE
DRAWN	DATE	REVIEWED	DATE

STANDARD BRIDGE PLANS
STEEL BEAM GUIDED BEARING RESTRAINTS
SHEET NUMBER 1800BR2

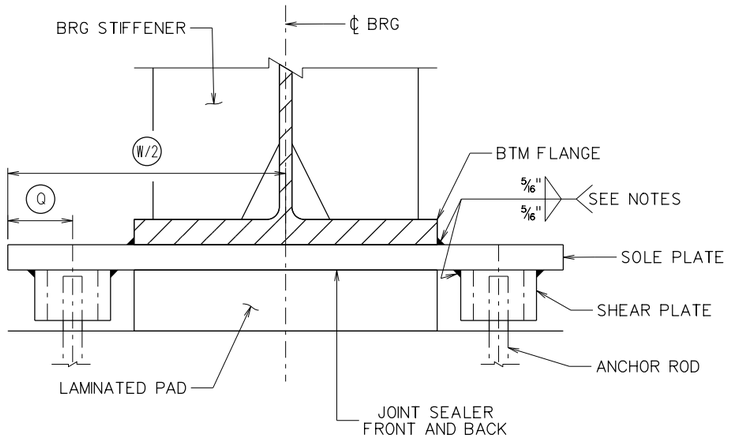
7-FEB-2022 07:40



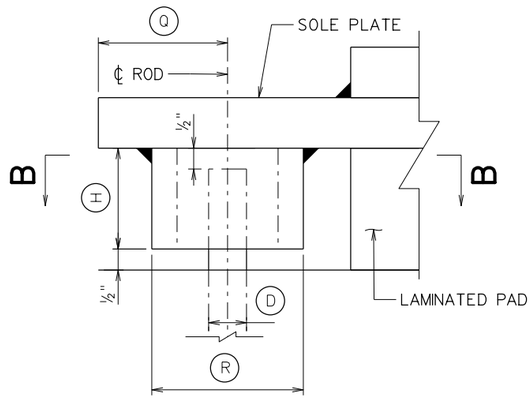
FIXED SIDE ELEVATION
(SLOPES < 0.50% ALONG BEAM)



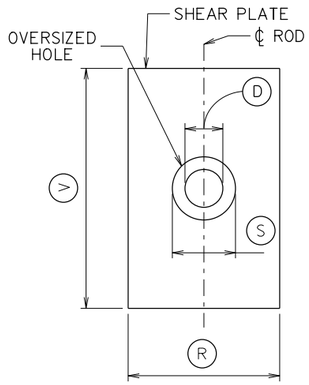
FIXED SIDE ELEVATION
(SLOPES > 0.50% ALONG BEAM)



SECTION A-A



SHEAR KEY DETAIL



SECTION B-B

BEARING RESTRAINTS CONTROL DIMENSIONS

CODE	DESCRIPTION	ABUT 1	PIER 1	PIER 2	ABUT 2
A	PLATE THICKNESS (IN)				
B	PLATE THICKNESS (IN)				
L	PLATE LENGTH (IN)				
W	PLATE WIDTH (IN)				
U	WELD LENGTH (IN)				
D	ANCHOR ROD DIAMETER (IN)				
Q	SHEAR PLATE OFFSET (IN)				
H	SHEAR PLATE HEIGHT (IN)				
R	SHEAR PLATE WIDTH (IN)				
S	SHEAR PLATE HOLE DIA (IN)				
V	SHEAR PLATE LENGTH (IN)				
FACTORED LONGITUDINAL LOAD (KIP)					
FACTORED LATERAL LOAD (KIP)					

NOTES:

1. UNLESS OTHERWISE NOTED, SOLE PLATES SHALL BE MADE OF THE SAME STEEL AS THE ABUTTING BOTTOM FLANGE. WHERE DIFFERING MATERIALS ARE SPECIFIED WELDABILITY OF THE MATERIALS SHALL BE VERIFIED IN ACCORDANCE WITH AWS D1.5 - BRIDGE WELDING CODE.

2. SOLE PLATES SHALL HAVE A MINIMUM THICKNESS OF ¾" AND MINIMUM BEVEL, IF APPLICABLE, OF 0.01 RADIANS.

3. EPOXY GRIT COATING SHALL BE APPLIED TO ALL STEEL SURFACES CONTACTING THE BEARING PAD AND EXTEND ½" IN ALL DIRECTIONS BEYOND THE PAD'S LIMITS. THE EPOXY GRIT SHALL BE INSTALLED IN ACCORDANCE WITH THE EPOXY MANUFACTURER'S INSTRUCTIONS. ALLOW THE EPOXY TO FULLY CURE FOR THE MINIMUM TIME RECOMMENDED BY THE MANUFACTURER THEN REMOVE ANY LOOSE GRIT BEFORE BEARING INSTALLATION. EPOXY GRIT SHALL MEET THE REQUIREMENTS OF SSPC AB1 ABRASIVE SPECIFICATIONS #1 - MINERAL & SLAG ABRASIVES, TYPE 2 OR BETTER.

4. SHOP WELDING OF SOLE PLATES IS PREFERRED. WHERE FIELD WELDING IS NECESSARY, ALL COATINGS SHALL BE REMOVED BY GRINDING IN THE VICINITY OF THE WELD TO A BRIGHT METAL SURFACE ATLEAST 1 INCH IN ALL DIRECTIONS OF THE AREA TO BE WELDED. THE WELD AND DAMAGED AREA OF PAINTED SURFACE SHALL BE CLEANED AND REPAIRED AS SPECIFIED BY THE ENGINEER.

5. WELDING WHILE THE LAMINATED BEARING PAD IS IN CONTACT WITH METAL IS DISCOURAGED. IF REQUIRED, TEMPERATURE INDICATING WAX PENS OR OTHER SUITABLE MEAN SHALL BE USED TO ENSURE THE PAD IS NOT EXPOSED TO TEMPERATURES GREATER THAN 250° F. ANY DAMAGE TO THE PAD DUE TO WELDING WILL BE CAUSE FOR REJECTION.

6. THE ENGINEER SHALL VERIFY WELDS ARE CAPABLE OF WITHSTANDING ALL SUBJECT FORCE EFFECTS.

7. THE DETAILS AND NOTES HEREIN ARE NOT APPLICABLE FOR VULCANIZED BEARINGS. REFER TO AASHT-NSBA STEEL BRIDGE COLLABORATION G9.1 FOR MORE INFORMATION.

8. UNLESS OTHERWISE NOTED, SHEAR PLATES SHALL BE MADE OF THE SAME STEEL AS THE ABUTTING SOLE PLATE. WHERE DIFFERING MATERIALS ARE SPECIFIED WELDABILITY OF THE MATERIALS SHALL BE VERIFIED IN ACCORDANCE WITH AWS D1.5 - BRIDGE WELDING CODE.

9. SHEAR PLATES SHALL BE WELDED TO THE SOLE PLATE ALL AROUND. THE ENGINEER SHALL VERIFY WELDS ARE CAPABLE OF WITHSTANDING ALL SUBJECT FORCE EFFECTS.

10. THE DIAMETER OF HOLES IN SHEAR PLATE SHALL BE AS RECOMMENDED FOR ANCHOR RODS IN AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) UNLESS OTHERWISE NOTED.

11. ANCHOR RODS SHALL COMPLY WITH AASHTO M111, GRADE 55 AND BE FULL LENGTH HOT DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M232. THE ENGINEER SHALL SIZE ANCHOR RODS FOR ALL FORCE EFFECTS. ANCHOR ROD FLEXURE SHALL BE CONSIDERED.

12. THE BEARING RESTRAINTS SHALL BE DESIGNED FOR MAXIMUM FACTORED LONGITUDINAL AND LATERAL LOADS CONCURRENTLY UNLESS OTHERWISE NOTED.

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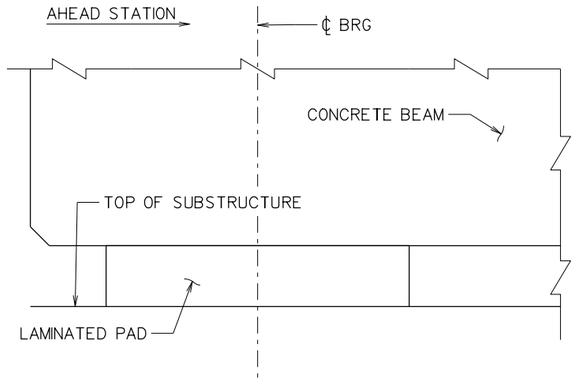
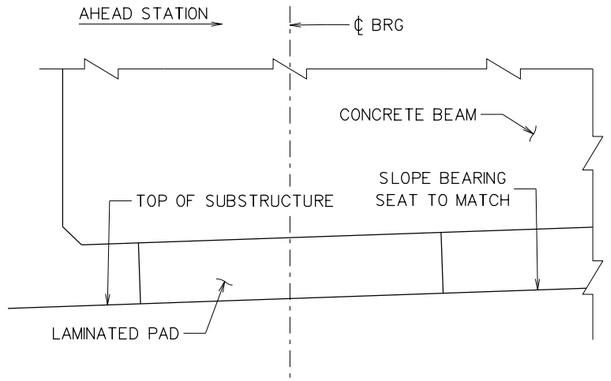
DRAWN	DATE	REVIEWED	DATE

STANDARD BRIDGE PLANS
STEEL BEAM
FIXED BEARING RESTRAINTS
SHEET NUMBER 1800BR3

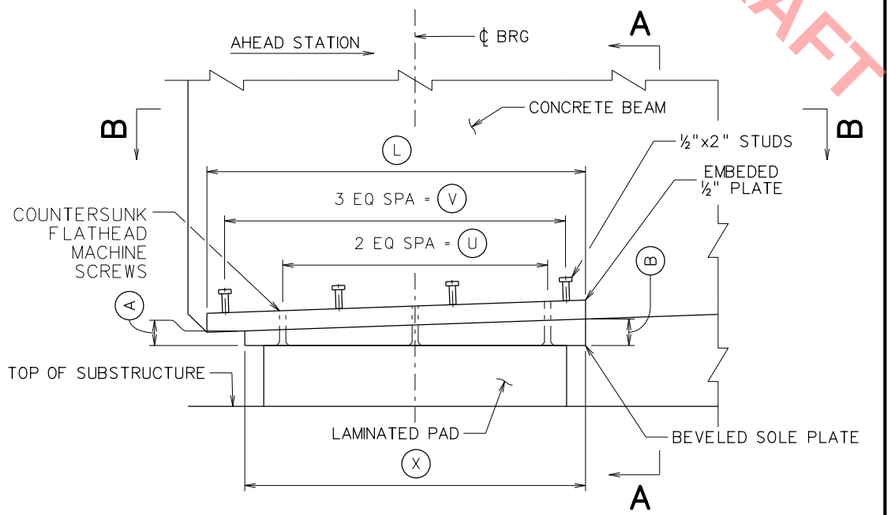
7-FEB-2022 07:39



NON-GUIDED SIDE ELEVATION
(SLOPES < 0.50% ALONG BEAM)



NON-GUIDED SIDE ELEVATION
(SLOPES > 0.50% AND < 2.00% ALONG BEAM)



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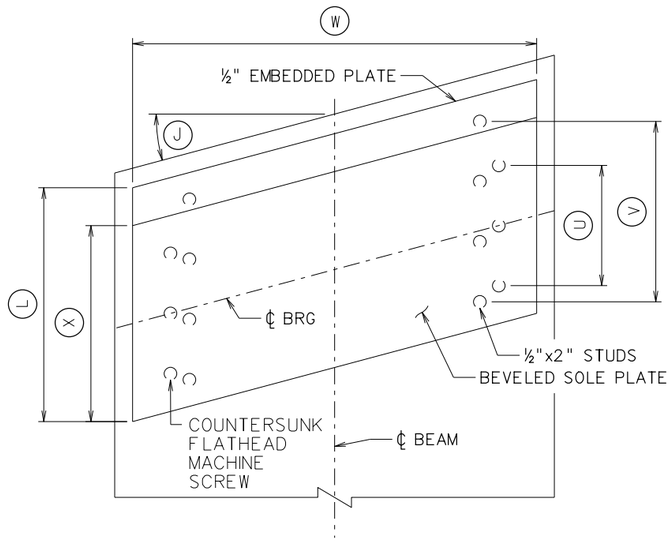
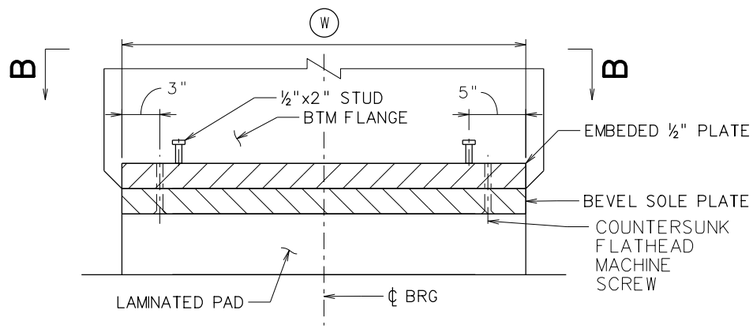
(SLOPES > 2.00% ALONG BEAM)



SECTION B-B
(SKEW < 30°)



SECTION A-A

BEARING RESTRAINTS CONTROL DIMENSIONS					
CODE	DESCRIPTION	ABUT 1	PIER 1	PIER 2	ABUT 2
A	PLATE THICKNESS (IN)				
B	PLATE THICKNESS (IN)				
J	SKEW (DEG)				
L	BEVEL PLATE LENGTH (IN)				
W	WIDTH OF PLATES (IN)				
U	END TO END OF BOLTS (IN)				
V	END TO END OF STUDS (IN)				
X	EMBEDDED PLATE LENGTH (IN)				

NOTES:

1. SPECIAL ATTENTION SHOULD BE GIVEN TO DRAINAGE WHEN SLOPPING BEARING SEATS TOWARDS A BACKWALL OR OTHER OBSTRUCTION. SLOPPING OF BEARING SEATS AT ABUTMENTS IS FORBIDDEN BELOW DECK JOINTS.

2. UNLESS OTHERWISE NOTED, BEARING PLATE AND SOLE PLATES SHALL CONFORM TO AASHTO M270 GRADE 50. AFTER FABRICATION AND BEFORE DRILLING COUNTERSUNK HOLES, THE PLATES SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

3. BEVELED SOLE PLATES SHALL HAVE A MINIMUM BEVEL OF 0.01 RADIANS.

4. TAP PLATES AFTER GALVANIZATION FOR INSTALLATION OF ½" DIAMETER ASTM F3125, GRADE A325S COUNTERSUNK BOLTS. DRILL BOTH PLATES AS AN ASSEMBLED UNIT. THREAD THE EMBEDDED PLATE ONLY. COVER TAPPED HOLES IN EMBEDDED PLATE AS NEEDED TO AVOID INFILTRATION OF CONCRETE DURING BEAM FABRICATION.

5. THE POSITION OF SHEAR STUDS MAY BE MODIFIED AS NEEDED WITH THE ENGINEER'S APPROVAL.

6. ALL PLATES SHALL BE THOROUGHLY CLEANED OF ALL FOREIGN MATERIAL IMMEDIATELY PRIOR TO INSTALLATION IN ACCORDANCE WITH STANDARD SPECIFICATIONS. TIGHTEN COUNTERSUNK BOLTS SNUG TIGHT.

7. EPOXY GRIT COATING SHALL BE APPLIED TO ALL STEEL SURFACES CONTACTING THE BEARING PAD AND EXTEND TO THE EDGES OF THE STEEL PLATES. THE EPOXY GRIT SHALL BE INSTALLED IN ACCORDANCE WITH THE EPOXY MANUFACTURER'S INSTRUCTIONS. ALLOW THE EPOXY TO FULLY CURE FOR THE MINIMUM TIME RECOMMENDED BY THE MANUFACTURER THEN REMOVE ANY LOOSE GRIT BEFORE BEARING INSTALLATION. EPOXY GRIT SHALL MEET THE REQUIREMENTS OF SSPC AB1 ABRASIVE SPECIFICATIONS #1 - MINERAL & SLAG ABRASIVES, TYPE 2 OR BETTER.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

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DRAWN	DATE	REVIEWED	DATE

STANDARD BRIDGE PLANS
CONCRETE BEAM NON-GUIDED BEARING RESTRAINTS
SHEET NUMBER 1800BR4

7-FEB-2022 10:24

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGN DIRECTIVE 644
ASPHALT PAVEMENT

April 20, 2022
Supersedes February 23, 2017

This Design Directive (DD) provides guidance on selecting asphalt pavement mix design methods and types of asphalt pavement. It also provides descriptions of situations that require polymer-modified asphalts, and methods for calculating quantities and types of materials that are to be used.

TYPES OF ASPHALT MIX DESIGNS

MARSHALL ASPHALT MIX DESIGN - Bruce Marshall developed the "Marshall" method of asphalt mix design in the late 1930's for the Mississippi Highway Department. This method has been used by the WVDOT ~~in the past and was the standard mix design method for many years~~since the 1970's. ~~Only use asphalt mixtures utilizing the Marshall mix design methodology in the following applications:~~

~~Purchase Orders (POs), both pickup and laydown, and~~
~~Non-NHS county routes with less than 3000 ADT.~~

~~Note that while Marshall mixtures are exclusive to these applications, Superpave may also be used if the designer chooses to do so. Superpave shall be used in all other scenarios. Projects shall use only one mix design methodology.~~

SUPERPAVE ASPHALT MIX DESIGN - "Superpave" stands for Superior Performing Asphalt Pavements. It represents an improved system for specifying the components of asphalt concrete, asphalt mixture design and analysis, and asphalt pavement performance prediction. The Strategic Highway Research Program (SHRP) developed the Superpave asphalt pavement mix design method in the early 1990's.

ASPHALT PAVEMENT MIX DESIGN TYPE SELECTION

Superpave asphalt ~~pavemen~~mixture types are~~t is~~ to be used for the following type projects:

1. New construction of multilane divided highways where the mainline pavement is asphalt pavement.
2. Overlay or 3R type projects on existing multilane divided highways where the asphalt pavement overlay is 3 inches or more.
3. Overlay type projects on existing National Highway System (NHS) highways where the asphalt pavement overlay is 3 inches or more.
4. Projects on other highways where approved by the Deputy State Highway Engineer for Development or Operations.

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Marshall asphalt ~~pavement~~ mixture types ~~will~~ are permitted ~~be used~~ on all other projects.

SPECIFICATION SELECTION CRITERIA

There are three specifications available when identifying the asphalt requirement for projects. Specifications Sections 401, 402 and 410 shall be used based on project criteria.

- Section~~s~~ 401 ~~and~~ is the standard asphalt pavement specification, covering most roadways.
- Section 402 is utilized for roadways needing polish resistant aggregates to promote skid resistance.~~are the Specifications that have been used historically for project plan development.~~
- Section 410, "Percent Within Limits", is a specification for use when there is a need for performance related results. This Specification uses mathematical models to quantify relationships between quality characteristics and product performance. These characteristics include mat density, asphalt content, bond strength and others, with samples taken directly from the roadway. Acceptance according to Section 410(PWL) shall be limited to the top two layers of the pavement, scratch and P&L do not count as a pavement layers. Other materials below the top two layers shall be accepted in accordance with section 401.

Section 410 (PWL) of the Specification shall be used on the following project types:

1. New Construction where the mainline is asphalt pavement.
2. Overlay projects on existing multilane divided highways.
3. Overlay projects on any National Highway System (NHS) routes, as found on the Divisions website using the latest version of the "Annual Roadway Inventory Statistics"
4. Projects on other highways where approved by the Deputy State Highway Engineer for Development or Operations.

Additionally, a project must meet the following specific requirements for the use of Section 410:

1. Projects exceeds 5,000 tons in ~~any asphalt layer~~either of the top two asphalt layers (scratch and P&L do not count as ~~a~~ layers)
2. The overall width of asphalt equals or exceeds 20 feet in width
3. Project paving is continuous for a minimum of 1500 feet
4. Posted speeds equal to or greater than 35 mph

The Specifications in Section 401 and 402 ~~of the Specification~~ shall be used for all other projects.

DETERMINATION OF EQUIVALENT SINGLE AXLE LOAD (ESAL)

The "ESAL Calculator" program shall be used to calculate the 20-year projected design ESALs for all projects unless one of the following applies.

1. The "ESAL Calculator" program produces a value exceeding 10,000,000.
2. When a traffic study has been performed. (i.e. When traffic movements or traffic counts are provided by the Traffic Modeling and Analysis Unit of the Planning Division.)

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3. On roadway realignment projects that exceed 1000 feet of relocated roadway.
4. When there is an expected development in the area that may change or alter the nature or character of the expected traffic. (i.e. Shopping centers, schools, etc.)
5. The project is on the CRTS (Coal and Resource Transportation System).

The ESAL Calculator program can be obtained from the West Virginia Department of Transportation's Engineering Publications and Manuals website at http://www.transportation.wv.gov/highways/engineering/Pages/Manuals.aspx, then under the "Paving" heading choose "ESAL Calculator".

When the ESAL Calculator program cannot be used to calculate the ESALs, then the ESALs or the percentage of traffic in each of the 13 classes shall be obtained from the Traffic Monitoring Unit of the Performance Management Group. The Traffic Monitoring Unit can be emailed at TMATrafficMonitoring@wv.gov. The designer is cautioned that the development of appropriate data to establish accurate ESAL estimates should be requested prior to the Design Study Office Review (if there is one) or prior to the Preliminary Field Review (if there was not a design study.)

SURFACE PREPARATIONS

Milling is used to remove surface distresses, create a better bond for an overlay, restore cross slope, and maintain vertical geometric properties, such as bridge clearance, guardrail height, and grade with gutter area. Milling shall be the preferred method of correcting deviations to the road surface prior to resurfacing.

When milling is specified by the contract, the thickness of milling specified by the Designer shall be at least ¼" into the layer just below the layer(s) being removed. The intent is to mill off entire layers, and not leave any partial layers.

Milling of Asphalt Pavement Surfaces, Section 415 of the Specifications, contains three types of milling: Standard Milling, Fine Milling, and Micromilling. These are differentiated primarily by the carbide tooth spacing, typically 15, 8, and 5 mm respectively, resulting in finer textured surfaces. These milling types specify the final surface texture prior to any overlay. The following describes the conditions in which the designer should use each type of milling:

> **Standard Milling -** Used as the default milling of asphalt pavement. It is intended to be used when the Division plans to remove existing asphalt pavement to correct deviations less than 1 inch, without a high level of profile and slope control.
>
> **Fine Milling -** Used when the Division intends to overlay the milled surface with a 2 inch or less asphalt course. It shall also be used when the contract contains pay items from Section 410 of the Specifications, *Asphalt Base and Wearing Courses, Percent Within Limits (PWL)*. It is intended be used when control of the profile and slope of the milled surface is important. Fine milling shall only be used if there is a minimum of 5,000 SY of fine milling.
>
> **Micro Milling -** Used for smoothness correction, skid correction, bump and/or grade corrections on existing or newly paved surfaces. This milling is typically less than an inch.

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It is not intended to be used when additional asphalt will be placed on the milled surface.

If fine milling is needed and multiple milling passes are necessary, standard milling shall be used to cut down to one inch above the final prepared surface. The designer shall document in the plans the estimated thickness of each type of milling.

ASPHALT MATERIAL (TACK COAT)

Asphalt Material (Tack Coat) (Section 408) shall be specified for placement on all existing pavement prior to placing asphalt pavement. If the designer can anticipate phased construction where part of the base or intermediate course will be open to traffic prior to final lift placement additional Asphalt Material should be included.

SCRATCH

Scratch Course is normally used in rehabilitation or resurfacing projects that do not contain a milling item. Scratch should be used to correct rutting and other deviations up to about one inch when the milling operation will cause an unnecessary disruption to the traveling public. If milling is performed on the project, Scratch Course shall not be used.

Scratch Course can be placed over the entire project or to the limits established by the designer. If the Scratch Course is not to be placed over the full width of the project, it shall be specified full lane width increments. Although Scratch Course can be placed over the entire project, it is not a constant thickness layer. The term "Scratch Course" comes from the method of placement of this item. The paving equipment is set to drag on or “scratch” the high areas of the existing pavement, only depositing material in the low areas; thereby creating a smooth surface on which to place the next layer of asphalt pavement.

Scratch course may be specified as a 9.5 mm or a 4.75 mm mix.

Scratch Course shall be shown on the plan typical sections as a line without a thickness or application rate. Scratch Course is not included in the structural design of the pavement.

Scratch Course shall not be used on new construction.

PATCH AND LEVEL

Patching and Leveling is to be placed at various locations throughout the project to remove irregularities in the existing pavement, such as dips, or to raise the outside edge of the existing pavement to provide a uniform template prior to placing a base or wearing course. Patching and Leveling shall not be specified as a continuous layer or course to be placed over the full width and length of the project.

Patching and Leveling shall be used only in resurfacing or rehabilitation projects, not in the construction of new pavements. It shall be specified when the deviations in the existing pavement are 1 inch or greater in depth.

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Patching and Leveling shall be shown on the plan typical sections as a layer with thickness specified as "variable - 2" maximum lift thickness. No application rate shall be shown. Patching and Leveling thickness is not included in the structural design of the pavement.

PERFORMANCE GRADED (PG) BINDER TYPE SELECTION

Binder Selection will be based on the design ESAL estimate for all projects.

Binder	ESALs
PG64S-22	<20 million
PG64H-22	20 million – 30 million
PG64E-22 (Polymer Modified Binder)	See below

While rare, for colder areas of the state, a lower binder grade of PG 58S-28 may be appropriate. If unsure, the designer can contact the Asphalt Group of Materials Control, Soils, and Testing Division at DOHasphalt@wv.gov.

When using anything other than PG64S-22, the binder grade shall be provided on both the general notes sheet and the typical section sheet(s) showing the pavement details.

PG 64S-22 binder may be used in asphalt placed below the top two lifts in any pavement section. Scratch course and patching and leveling are not identified as lifts.

POLYMER MODIFIED ASPHALTS (PMA) OR NON STANDARD GRADE
The binder PG 64E-22, which is a polymer-modified binder, is required to be used in the following cases:

1. For the surface lift on roadways facilitating access to industrial parks, warehouses, production facilities, etc.
2. High Performance Thin Overlay (HPTO) asphalt pavement in accordance with Special Provision 496. Since PG 64E-22 is required by the Special Provision a plan note is not required.

A binder grade associated with a higher ESAL count may be used at the discretion of the responsible engineer on projects where the pavement exhibits severe rutting or shoving problems due to heavy traffic conditions, such as:

1. Intersections with very heavy truck traffic
2. Truck climbing lanes and ramps

PMAs have shown great success as being a long-term solution to severe rutting problems. Due to the additional cost of a PMA, it shouldn't be used on any project without first repairing base failures and removing excessively rutted pavement. PMA shall generally be used only in the skid surface mix (preferably a 12.5 mm mix) but may also be used in the underlying courses depending on the severity of the traffic conditions. Always use the preferred thickness from the Superpave asphalt pavement recommended lift thickness tables as a minimum thickness when using PMA.

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Any mix design to be used as a scratch course shall not be specified to use PMA.

PMA Pavement quantities shall be used in increments of 400 tons due to minimum requirements necessary for ordering of material.

PG 64S-22 binder should be used in asphalt placed below the top two lifts in any pavement section. Scratch course and patching and leveling are not identified as lifts.

PAVEMENT STRUCTURE

BOTTOM COURSES
When developing the overall pavement thickness, it is recommended the designer use 25 mm mix as the bottom lifts. When a 25mm mix is to be used on a section 410(PWL) project, acceptance of the 25mm layer(s) shall be in accordance with section 401.

Where Marshall is permitted, a Marshall Type 2 Base Course shall be specified ~~in lieu~~instead of a Type 1 Base when the total base course thickness is less than or equal to 3.25 inches.

INTERMEDIATE COURSES
On new construction or multi-lift projects a Superpave 19mm or Marshall Type 2 base mixture shall be utilized below the surface course to promote smoothness in the final pavement.

SURFACE COURSES
The wearing course is a single ~~lift~~ constant thickness layer to be placed over the entire pavement surface. The wearing course is the riding surface on which traffic travels. A Superpave 4.75 mm, 9.5mm, or 12.5mm or Marshall Type 1 or Type 3 Wearing mixture is the mix type to be used as the surface course. PMA can also be used if traffic warrants. A Marshall Type 4 Wearing is intended for use in heavy truck traffic situations, note that a wearing 4 is a visually coarse mixture.

~~A skid mix~~Section 402 shall be used ~~as~~ for the surface course on projects with a current ADT of 3000 or more vehicles per day. ~~On projects meeting this ADT criteria, the wearing course shall be a skid resistant mix in accordance with Section 402 of the Specifications.~~ Only Superpave 9.5mm and 12.5mm mixtures and Marshall Type 1 and Type 4 wearing mixtures shall be specified as a skid resistant mix.

A 4.75 mm mix shall only be used for pavement preservation applications or as a surface course over an intermediate course in multi-lift applications. High performance thin overlays may be used for pavement preservation on roads with ADT of ~~greater than~~ 3000 ~~VPD~~or more vehicles per day.

SUPERPAVE MIX TYPE RECOMMENDATIONS

The following table provides a list of Mix Type recommendations for the designer to use when preparing pavement lift thicknesses for the typical section. Pavement designs provide an overall thickness of asphalt pavement and the designer is generally left to make the decision on bottom, intermediate, and surface course thickness. The designer should use recommendations found in

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the Pavement Structure section, as well as minimum and maximum thicknesses from the table.

Recommended Lift Thickness for Superpave Asphalt Pavement			
Mix Type (mm)	**Minimum (inches)**	**Maximum (inches)**	**Preferred** Note 1 **(inches)**
4.75	5/8	1.0	5/8
9.5	1.5	2.0	1.5
12.5	1.5	2.5	2.0
19	2.25	3.5	2.5
25	3.0	4.0	3.5

Note 1: Minimum Thickness with Polymer Modified Binders

MARSHALL MIX TYPE RECOMMENDATIONS

A. Marshall Bottom and Intermediate Courses (Base Courses): It is recommended that in multi-lift pavements when Type 1 Base Course is used, an intermediate course (the top lift of base course) be a Type 2 to improve the smoothness of the finished pavement. This would eliminate the use of a Scratch Course prior to placing the surface course.

~~a. Type 1 Base Course shall be specified when the total base course thickness for new construction is greater than 3.25 inches. On resurfacing projects, Type 1 Base Course shall not be specified where temporary traffic control requirements prohibit an edge drop-off of 3 inches.~~

~~b. Type 2 Base Course shall be specified when the total base course thickness is less than or equal to 3.25 inches.~~

Recommended Lift Thickness (inches) for Marshall Base Courses			
Mix Type	**Minimum**	**Maximum**	**Preferred**
2	2.0	3.0	2.0
1	3.25	5.0	4.0

B. Marshall Wearing Courses: The wearing course is a single lift constant thickness course to be placed over the entire pavement surface. ~~The wearing course is the riding surface on which traffic travels. Type 4 Wearing Course is intended for use in heavy truck traffic situations.~~

Recommended Lift Thickness (inches) for Marshall Wearing Courses			
Mix Type	**Minimum**	**Maximum**	**Preferred**
3	0.5	0.75	5/8
1	1.0*	1.5*****	1.0*
4	2.0	2.0	2.0

* 1½ inch thickness on resurfacing projects where the Wearing Course is the only asphalt pavement material being placed exclusive of Patching & Leveling and Scratch Courses.

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PLAN REQUIREMENT

Projects will show the 20-year projected design ESALs on both the general notes sheet and the typical section sheet(s) showing the pavement details. This includes new construction, reconstruction, AND resurfacing projects (including ALL bridge replacement projects regardless of the length of pavement placed). The design ESALs shall be shown for the mainline and all other affected roadways where more than 500 feet of pavement is being placed.

The aggregate used in asphalt mixtures can be either primarily stone and gravel, or slag. The aggregate used is up to the contractor, and typically depends on what the contractor has readily available that also meets mix requirements. Mixes with the two aggregate types have different densities; as such, estimated weight quantities will be different for mixes with each aggregate type. Alternates for these two shall be listed in the plans, and the contractor will bid appropriately.

The following is an example of how to list alternate asphalt pavement items in plans:

BB1 401001-042 SUPERPAVE HMA BASE CRSE, SG, TY 25, TN (Pavement Repair)
BB2 401001-043 SUPERPAVE HMA BASE CRSE, S, TY 25, TN (Pavement Repair)

PLAN REQUIREMENTS WHEN USING MARSHALL MIX DESIGN

In addition to the requirements listed above, projects using Marshall asphalt pavement, including District-designed projects, will designate the use of “Medium Marshall Mix Design” or “Heavy Marshall Mix Design” as well as the design ESALs on both the general notes sheet and the typical section sheet(s) showing the pavement details. The designer should note that the terms “Medium” and “Heavy” refer to Equivalent Single Axle Loads (ESALs), and not to the quality of the asphalt pavement. After determining the ESALs, the mix design type shall be determined from the following criteria.

Medium Marshall Mix Design - This design is intended for use on local service roads or rural resurfacing projects with a 20-year projected design ESALs of less than 3,000,000.

Heavy Marshall Mix Design - This design is intended for use on new construction projects and on projects with a 20-year projected design ESALs of equal to or greater than 3,000,000.

QUANTITY ESTIMATING

ASPHALT PAVEMENT - The quantity for asphalt pavement shall be estimated at 1.98 ton/cy for stone and gravel mixes, 1.89 ton/cy for slag mixes and 2.10 ton/cy for steel slag mixes**.**

PATCHING AND LEVELING - The quantity for Patching and Leveling Course shall be estimated by multiplying the nominal depth of the irregularity to be repaired plus ¾ inch by the irregularity’s surface area. Then the conversion rates of 1.98 ton/cy for stone and gravel mixes, 1.89 ton/cy for

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slag mixes and 2.10 ton/cy for steel slag mixes will be utilized.

SCRATCH COURSE - The quantity for Scratch Course shall be estimated at a thickness of one-half inch (0.028 ton/sy) for the entire area to be covered with Scratch Course. If the Specification allows, Scratch Course may alternatively be estimated by the square yard. Scratch Course shall not be used if there is Milling on the project, or if there are more than two lifts of asphalt being placed.

ASPHALT MATERIAL (TACK COAT) - The quantity for Asphalt Material (Tack Coat) shall be estimated using the undiluted rates as indicated in Table 408.11 in the Specifications. No application rate will be shown on the typical sections.

SMOOTHNESS – If a project meets the requirements of Section 720.6 of the Specifications, smoothness testing shall be requested by the designer through the Request Form available at MCS&T's Tool Box at https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx. If the test results are available, the results shall be included the PS&E submittal. If not available, then the request for testing shall be included in the PS&E submittal. If the results arrive before letting, then the results shall be included in an amendment. If too late for an amendment, then the results shall be provided to the District Construction Engineer.

SPECIAL SITUATIONS

GENERAL

The Specifications have been written to account for the majority of the situations that would occur during construction. However, there are always special situations that require the designers' attention.

Specification requirements shall only be altered after careful consideration and when, in the opinion of the designer, there is no practical way for the work to be performed in accordance with the Specifications and a project specific special provision shall be developed as outlined in DD-105.

COMPACTION

The specification density requirement in the of the Specifications shall not be modified when asphalt pavement is placed at normal paving widths. It is possible that asphalt pavement will be placed in certain areas of the project where densities of this magnitude cannot be obtained. These areas usually have an irregular shape, which will not allow the proper use of compaction equipment. Listed below is a situation where the density specification may be modified by plan note and the plan note to be used.

Situation	Plan Note
Concrete pavement repair Note3	Compaction testing shall be in accordance with the Lot-by-Lot method and the rollerpass method shall not be used for acceptance testing for compaction. The engineer may reduce the target density requirement if the contractor has made every reasonable effort at obtaining the required density.

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Note3: If the proper density is not obtained during placement, traffic will continue to compact the asphalt pavement in the pavement repair area, causing additional settlement. This will be very noticeable because the surrounding overlay will be placed on the existing concrete pavement, which is rigid and will not settle.

When overlaying Portland Cement Concrete Pavement (PCCP) the concrete is sometimes in need of repair. Whether this is an initial overlay or a subsequent overlay, the designer shall examine the extent of the needed PCCP repairs and evaluate whether to repair with Patch and Level, to perform proper concrete pavement repairs, or to remove the PCCP through rubblization or another process prior to the asphalt overlay. The use of Patch and Level is restricted to those projects with a few shallow repairs when the cost of mobilization for concrete repairs is high. PCCP removal should be considered only when the existing pavement is extremely distressed. In addition to compaction, consideration shall be given to smoothness, temporary traffic control, and long term impacts to the traveling public.