NW-ACPA/WSDOT Meeting Minutes
Thursday May 30, 2019 9:00 AM – noon
ACME Job Trailer, North Bend

Present	Name	Company	Present	Name	Company	Present	Name	Company
X	Berg, Gary	Salinas	X	Kane, Ed	WSDOT		Salinas, John II	Salinas
X	Brasch, Tom	WSDOT	X	Pipinich, Bob	GMCC		Seghetti, Robert	Acme
X	Clark, Steve	Acme	X	Powell, Jim	NWACPA		Uhlmeyer, Jeff	WSDOT
X	Dyer, Bob	WSDOT		Rivera, Angel	FHWA	X	Watts, Troy	WSDOT
	Deffenbacher, Jon	WSDOT	X	Russell, Mark	WSDOT		Webster, Garrett	WSDOT

OLD BUSINESS:

13-03 Smoothness requirements for PCCP rehabilitation –

October 11, 2018 – Mark Russell - The special provisions are complete but have not made it into the amendments. Attachment #1 is the current draft, which has been deemed acceptable to Industry and WSDOT. Bob Dyer will get these into the January 2019 Amendments to the Standard Specs.

May 30, 2019 – Bob Dyer – The spec 5-01.3(10) made it into the January 2019 amendments to the Standard Specs. (attach 13-03). Item Closed.

14-03 Alternate material for the installation of dowel bars and tiebars in existing PCCP

4/21/2014 – Jim Allen of ACME Paving brought samples of and discussed using AMBEX Cementitious Anchoring Capsule for tie bars and dowels. This is a dry pre-mixed cement grout that is contained in a water permeable wrapping. Once the grout capsule is saturated in water it becomes a fast setting grout. The system was reported as being used in Minnesota, New York and Idaho. It was suggested that we contact Mark Gaines, The Bridge Construction Engineer to see if the structural side of the house had any experience with the system. Mark's comments were " I am not familiar with Ambex AAC and don't believe we have ever used a product like this for bridge or structure applications. Based on the data sheet, it seems like a good product with documented pull-out capacities. While you aren't looking for pull-out capacity, a high pull-out capacity provides some indication that the hole has been completely filled with a high-quality material. A couple things that could be concerns. I would imagine that dowel bars see considerable cyclic loading as heavy vehicles pass over the joints. I'd have some concern that this product would not hold up as well as an epoxy to repeated cyclic loading over a number of years. Cementitious products are likely more brittle and less pliable than epoxy-based product. The other thing you may want to look at is whether this product is suitable for horizontal anchoring like you would have with dowel bars. The data sheet doesn't identify if this is appropriate for only downward vertical anchors or if it works for horizontal anchors. Epoxy product data sheets are usually very specific with respect to what applications that are suitable for. I have not heard anything about 9-20 products bonding better to dry surfaces. However, I very quickly took a look at three of the products covered by QPL 9-20.2 (SikaQuick 2500, Tamms Express Repair and Quikrete FastSet DOT Mix). All three of these products require saturated surface dry conditions before placement. I assume the other products do as well, but I didn't check. From my experience, we would always rely on following the manufacturer's recommendations for proprietary products like these. Deviating from these recommendations could product a product that doesn't achieve the properties identified in the data sheets. If there is research on this, could you have NW-ACPA forward it on to us/me?" Action Item: Jeff Uhlmeyer to check with other states and then possibly look for a job to try them on.

10/20/2014 – No discussion at today's meeting. Robert Seghetti agreed to follow up at next meeting.

4/6/2015 – No discussion.

10/21/2015 – Steve Clark will follow up.

May 12, 2016 – Steve Clark explained that the problem needing to be fixed is that industry is looking for a more economical means s to anchor tie bars than by using epoxy - for projects with small quantities of tie bars. This issue relates to tie bars only, and not to dowels. Industry is seeking approval to use grout to anchor the tie bars, as an option to the epoxy that is currently required. Messrs. Uhlmeyer and Russell indicated that

they would be OK with grout in this application as long as the annular space is completely filled. Bob Dyer agreed to draft a spec and send it out for review as soon as possible this spring.

November 9, 2016 – Further clarification from industry is that a project with "small quantities" of tie bars is a project with less than 500 SY of PCCP. WSDOT pavement management said the property that's needed for grout when used with tie bars is pull-out strength. Bob Dyer agreed to draft a spec for grout for tie bars along those lines. Dave Jones will consider getting epoxies for dowel bars on the QPL. Jim Powell will draft a spec regarding epoxy for dowel bars that works more smoothly and timely for contractors but also meets WSDOT needs.

April 10, 2017 – Bob Dyer provided a draft spec (Attach #1, 14-03). Industry will submit pullout data on grout. Bob Dyer will ask Kurt Williams if small quantities of epoxy can be accepted by certification. Industry requested today that WSDOT consider the spec changes being contemplated for anchoring drilled dowel bars to also be considered for use on drilled tie bars.

March 29, 2018 – Industry wants an epoxy that can be on the QPL and accepted by manufacturer's cert. Dave Jones reported that WSDOT's reluctance to accept epoxy by manufacturer's cert is because so many of the samples we test at the HQ lab fail to meet specs. There are one or two epoxies that consistently pass WSDOT tests, and they are accepted by manufacturer's cert. Industry requested that epoxies be accepted by lot, because it seems irrational that epoxies from the same lot will pass tests for one contract then fail tests for another contract. Industry also questioned if we really need more than 5,000 psi? It was agreed that this issue will taken on by a separate task group for resolution, and Jim Powell will organize its meetings.

October 11, 2018 – Status of changes to Standard Specs – Mark Russell -– A draft revision to the Standard Specification (Attach #2) which allows for Type II non-shrink grout (as an alternative to epoxy) has been deemed acceptable to Industry and WSDOT. Bob Dyer will get this spec into the January 2019 Amendments to the Standard Specs. See item XXXX for new discussion on epoxies.

May 30, 2019 – Bob Dyer – This spec made it into the January 2019 amendments to the Standard Specs. The following is what went in. Item Closed.

"After drilling, secure dowel bars and tie bars into the existing pavement with either an epoxy bonding agent Type I or IV as specified in Section 9-26.1, or a grout Type 2 for non-shrink applications as specified in Section 9-20.3."

16-01 Smoothness requirements when paving next to existing pavement.

May 12, 2016 – Industry is concerned that it is impossible to match a pre-existing joint (or newly-paved HMA joint) and simultaneously meet specs for PCCP pavement smoothness, and this is becoming a more common WSDOT expectation with projects that have stages and traffic switches.

November 9, 2016 – Jim Powell agreed to provide a draft of a proposed spec at the next meeting.

April 10, 2017 – This item needs to be discussed with WSDOT Project Development so it can be addressed in the contracts during advertisement as a contract requirement and therefore priced by a level playing field. Some ideas for addressing this would be to put a requirement in the contract (1) profile grind the existing edge before placing PCCP, for the case when existing is either HMA or PCCP. (2) Place new PCCP with a 2'+- gap between the edge of new PCCP and existing, then fill the 2' gap with a transition of HMA or PCCP that matches the edge on both sides. (3) Place the new PCCP to best-fit machine match the existing, but hand-finish the outer 2' or so of the fresh concrete to precisely match the existing. Bob Dyer and Mark Russel will develop some possible spec changes for discussion at the next meeting. Industry provided excerpts from three other states showing some ways other states are dealing with surface smoothness of new PCCP place adjacent to PCCP placed on a previous contract (Attach #2a, #2b, and #2c).

March 29, 2018 – Continued discussion – This issue has so many variables and complexities, it was agreed that this issue will taken on by a separate task group for resolution, and Jim Powell will organize its meetings.

October 11, 2018 – After group discussion, it was agreed by industry and WSDOT that a GSP with requirements for profile grinding 4 feet of the adjacent lane, along with a pay item, should be standard practice in all contracts. Doing so would be understood to mean that the smoothness of all of the new PCCP would be

required to meet the full smoothness requirements for new pavement. WSDOT will implement. Dyer has the ball.

May 30, 2019 - Bob Dyer – Draft spec is attached. (attach 16-01). Agreed to change to 3 foot minimum grind. Dyer will try to get into 2010 spec book. Will require instructions to designers on when to include the bid item.

16-02 Thickness measurement.

May 12, 2016 – ACPA's concern is that measuring cores cannot be done as accurately as needed, given the large area each core represents. Industry's preference would be to use a precision survey, done before and after paving, to form the basis for calculating pavement depth. It was acknowledged that we will still need to take cores for density measurement. Bob Dyer agreed to research other owner's methods for measuring PCCP pavement depth.

November 9, 2016 – Dave Jones reported on his visit to the FHWA Mobile PCCP testing lab, which showcased a nondestructive thickness measuring device (see photo below). It was agreed that industry would provide a draft of a proposed spec to determine PCCP thickness which addresses all of industry's concerns.

April 10, 2017 – Update from Industry. A draft spec was provided proposing an alternative way of measuring thickness by precision surveying (Attach #3a) and using magnetic imaging tomography (MIT) (Attach #3b).

March 29, 2018 – (Attach #2) is a copy of the spec for measuring PCCP thickness using magnetic imaging ~~tomology~~ tomography. Since the last meeting, industry has reviewed it and commented. The attached draft has been revised to address industry comments. Dyer will send out an editable MS Word version with the minutes so committee members can make comments. Send Comments to Mark Russell.

October 11, 2018 – Status of Spec – Mark Russell - A new version of the magnetic imaging tomography (MIT T2 Scan) has been drafted. Bob Dyer sent out an editable Word version with the March 29, 2018 meeting minutes so committee members can make comments and send to Mark Russell. Jim Powel will send the specification to industry. No comments have been received. (Attachment #3 is the current draft)

May 30, 2019 – Bob Dyer – This spec made it into the January 2019 amendments to the Standard Specs. Attached is what went in (attach 16-02). Item Closed.

16-08 Use of IRI for smoothness acceptance on new PCCP

October 11, 2018 Mark Russell - The special provisions are complete but have not made it into the amendments. (Attachment #4 and #5) These have been deemed acceptable to Industry and WSDOT. Bob Dyer will get these into the January 2019 Amendments to the Standard Specs.

May 30, 2019 – Bob Dyer – This spec made it into the January 2019 amendments to the Standard Specs. Attached is what went in (attach 16-08). Item Closed.

16-10 – Spall repair –

October 11, 2018 – Attachment #5.5 – Mark Russell - The new specification is currently available as a special provision. It has been deemed acceptable to Industry and WSDOT. It needs to be moved into the Standard Specs. Bob Dyer will get this spec into the January 2019 Amendments to the Standard Spec.

May 30, 2019 – Mark Russell – Turned into a GSP for the time being. (Attach #16-10) Comments on the attached spec were as follows: Need to talk to HQ Materials Lab about the gradation spec. Need to specify acceptance criteria. Need to add that using a large hole saw (for cutting circles) is acceptable for small spalls and better than cutting rectangles around small spalls.

18-03 Steel Price Escalation Clause for Dowel Bars and Tie Bars

October 11, 2018 – Jim Powell provided (Attachment #6) to demonstrate the problem. Bob Dyer will send Jim a copy of WSDOT's current steel price escalation GSP, along with the implementing instructions, for discussion of modifying for use on dowel bars.

May 30, 2019 – Bob Dyer – WSDOT's current GSP is attached for discussion. (attach 18-03). Industry will evaluate and get back to WSDOT.

18-06 Hollow Tube Dowel Bars

October 11, 2018 – Mark Russell

May 30, 2019 – WSDOT has approved several manufacturers. Mark Russel to check if they are all on the QPL. Item Closed.

18-07 Joint Sawcut Depth: T/3 versus T/4

October 11, 22018- Jeff Uhlmeyer (Attachment #7 and #8) After discussion, Industry and WSDOT agreed that the spec should allow D/4 minimum to D/3 maximum sawcut depth. Bob Dyer will try to have implemented in the Standard Plans by January 2019.

May 30, 2019 – Bob Dyer – This change to the Standard Plans is not yet effective. (attach 18-07). Is the draft being circulated for final comment. All agreed it looks good.

18-08 – Lowering the required strength of epoxies used for dowel bars and tie bars

October 11, 2018 – Some discussion led by John Salinas. Uhlmeyer and Russel will look into and report back at next meeting.

May 30, 2019 – WSDOT seemed to think that a minimum of 6000 psi would be acceptable. Mark Russel to check with Kurt Williams to see if that value makes sense.

NEW BUSINESS

18-09 Survey Control for Official Measurement of PCCP depth for Payment

May 30, 2019 – The MIT scan is now the standard basis for measuring PCCP depth for acceptance, so this issue seems to be resolved. Item closed.

18-10 Use of 1-1/4 inch dowel bars for thinner PCCP

May 30, 2019 – WSDOT prefers to leave the standard spec as it is (1.5 inch solid bars, or 1.625 inch tubes), but will write a special provision to allow smaller diameter bars when we know the existing pavement is thinner than current standards. Item closed.

19-01 Changes to Specs for Relief Cuts

May 30, 2019 Jeff Uhlmeyer – (Attach 19-01) Twisted Uhlmeyer and Russell's arms to consider developing a Standard Plan instead of describing it all in text.

19-03 MIT thickness testing calibration and challenge procedures

May 30, 2019 Mark Russell – Kurt Williams is working on a calibration procedure – Jim Powell will propose something for Kurt to review. Cores could be used as a challenge to the MIT scan measured depths, but nothing decided – Jim Powell will prepare a draft proposal for WSDOT to consider.

19-04 Challenge testing for concrete strength.

May 30, 2019 Bob Pipinich suggested we develop a process for challenging low cylinder breaks on new PCCP. Could consider adapting the ACI 318 tolerance/core procedure, or consider what WSDOT uses for low break cylinders on structural concrete. Dyer and Power will develop a draft proposal.

Next Meeting: November 14, 2019.

5-01.3(10) Pavement Smoothness

Pavement surface smoothness for cement concrete pavement grinding on this project will include International Roughness Index (IRI) testing. Ride quality will be evaluated using the Mean Roughness Index (MRI) calculated by averaging the IRI data for the left and right wheel path within the section.

Smoothness Testing Equipment and Operator Certification

Use an inertial profiler and operator that meet the requirements of Section 5-05.3(3)E.

Surface Smoothness

Operate the inertial profiler in accordance with AASHTO R 57. Collect two longitudinal traces, one in each wheel path. Collect the control profile at locations designated in Table 2 prior to any pavement rehabilitation Work on the areas to be tested. Collect an acceptance profile at locations designated in Table 2 after completion of all cement concrete pavement grinding on the project. Profiles shall be collected in a continuous pass including areas excluded from pay adjustments. Provide notice to the Engineer a minimum of seven calendar days prior to testing.

Table 2 Locations Requiring MRI Testing

Travel lanes where cement concrete grinding is shown in the plans	Control profile
Additional locations designated by the Engineer	Control profile
Travel lanes with completed cement concrete pavement grinding	Acceptance profile
Bridges, approach panels and 0.02 miles before and after bridges and approach panels and other excluded areas within lanes requiring testing	Control and acceptance profile
Ramps, Shoulders and Tapers	Do not test

Within 30 calendar days after the Contractor's testing, the Engineer may perform verification testing. If the verification testing shows a difference in MRI greater than the 10 percent, the following resolution process will be followed:

1. The profiles, equipment and procedures will be evaluated to determine the cause of the difference.
2. If the cause of the discrepancy cannot be resolved the pavement shall be retested with both profilers at a mutually agreed time. The two profilers will test the section within 30 minutes of each other. If the retest shows a difference in MRI equal or greater than the percentages shown in Table 2 of AASHTO R 54 the Engineer's test results will be used for pavement smoothness acceptance.

The Contractor shall evaluate profiles for acceptance or corrective action using the current version of ProVAL and provide the results including the profile data in unfiltered electronic Engineering Research Division (ERD) file format to the Engineer within 3 calendar days of completing each days profile testing. If the profile data files are created using an export option in the manufacturer's software where filter settings can be specified, use the filter settings that were used to create data files for certification.

Analyze the entire profile. Exclude areas listed in Table 3.

Table 3 Areas Excluded from MRI Acceptance Requirements

Location	Exclude
Beginning and end of grinding	Pavement within 0.02 mile
Bridges and approach slabs	The bridge and approach slab and 0.02 mile from the ends of the bridge or approach slab
Defects in the existing roadway identified by the Contractor that adversely affect the MRI such as dips, depressions and wheel path longitudinal joints.[1]	0.01-mile section containing the defect and the 0.01-mile section following the section with the defect.

[1] The presence of defects is subject to verification by the Engineer

Report the MRI results in inches per mile for each 0.01-mile section and each 0.10-mile section. Do not truncate 0.10-mile sections for areas excluded from MRI acceptance requirements. MRI requirements will not apply to 0.10-mile sections with more than three 0.01 mile-sections excluded. MRI requirements for the individual 0.01-mile sections shall still apply. The Engineer will verify the analysis.

The MRI for each 0.10 mile of ground lane will comply with the following:

Control Profile per 0.10 Mile	Maximum MRI of Acceptance Proifle per 0.10 Mile
≤130 inches/mile	78 inches/mile
>130 inches/mile	0.6 x Control Profile MRI

The MRI for each 0.01 mile of the completed cement concrete grinding shall not exceed 160 inches/mile.

All Work is subject to parallel and transverse 10-foot straightedge requirements, corrective work and disincentive adjustments.

Surface smoothness of travel lanes including areas subject to MRI testing shall not vary more than ⅛ inch from the lower edge of a 10-foot straightedge placed on the surface parallel to the centerline.

The smoothness perpendicular to the centerline will be measured with a 10-foot straightedge within the lanes. There shall be not vertical elevation difference of more than a ¼ inch between lanes.

Pavement that does not meet these requirements will be subject to corrective Work. All corrective Work shall be completed at no additional expense, including traffic control, to the Contracting Agency. Pavement shall be repaired by one or more of the following methods:

1. Diamond grinding.

2. By other method accepted by the Engineer.

Repair areas shall be re-profiled to ensure they no longer require corrective Work. With concurrence of the Engineer, a 10-foot straight edge may be used in place of the inertial profiler.

If correction of the roadway as listed above either will not or does not produce satisfactory results as to smoothness or serviceability the Engineer may accept the completed pavement and a credit will be calculated in accordance with Section 5-01.5. Under these circumstances, the decision whether to accept the completed pavement or to require corrective work as described above shall be vested entirely in the Engineer.

~~Perform the Work described in Section 5-05.3(12), and the following:~~

"Retrofit Dowel Bars", per each.

The unit Contract price per each shall be full payment for all costs to complete the Work as specified, including furnishing and installing parting compound, dowel bar expansion caps, caulking filler, foam core insert material, cement patch where pavement is removed for dowel bar retrofit and for all incidentals required to complete the Work as specified.

"Partial Depth Spall Repair", by force account as provided in Section 1-09.6.

To provide a common Proposal for all Bidders, the Contracting Agency has entered an amount in the Proposal to become a part of the total Bid by the Contractor.

"Sealing Existing Concrete Random Crack", per linear foot.

The unit Contract price per linear foot for "Sealing Existing Concrete Random Crack" shall be full payment for all costs to complete the Work as specified, including removing incompressible material, preparing and sealing existing random cracks where existing random cracks are cleaned and for all incidentals required to complete the Work as specified.

"Grinding Smoothness Compliance Adjustment", by calculation.

Grinding Smoothness Compliance Adjustments will be based on the requirements in Section 5-01.3(10) and the following calculations:

A smoothness compliance adjustment will be calculated in the sum of minus $100 for each and every section of single traffic lane 0.01 mile in length and $1,000 for each and every section of single traffic lane 0.10 mile in length that does not meet the requirements in Section 5-01.3(10) after corrective Work.

"Sealing Existing Longitudinal and Transverse Joint", per linear foot.

The unit Contract price per linear foot for "Sealing Existing Longitudinal and Transverse Joint", shall be full payment for all costs to complete the Work as specified, including removing incompressible material, preparing and sealing existing transverse and longitudinal joints where existing transverse and longitudinal joints are cleaned and for all incidentals required to complete the Work as specified.

"Cement Concrete Pavement Grinding", per square yard.

The unit Contract price per square yard for "Cement Concrete Pavement Grinding", when multiplied by the number of units measured, shall be full payment for all costs to complete the Work as specified. The costs of any additional pavement grinding and profiling required to complete the Work as specified is also included in this payment.

"Replace Uncompactable Material", by force account as provided in Section 1-09.6.

Payment for "Replace Uncompactable Material" will be by force account as provided in Section 1-09.6 and will be full payment for all work required to replace uncompactable material and provide base for the Concrete panel. This will include, but not be limited to, excavating the subgrade, placement of a soil stabilization construction geotextile, and backfilling with crushed surfacing base course, as well as the work detailed in items 1 through 5 noted in Section 5-01.3(4). For the purpose of providing a common Proposal for Bidders, the Contracting Agency has entered an amount in the Proposal to become a part of the total Bid by the Contractor.

All costs associated with the containment, collection and disposal of concrete slurry and grinding residue shall be included in the applicable concrete grinding or cutting items of Work.

5-05.3(9) Joint Matching Pre-existing Pavement Joints

Prior to paving new PCCP in a driving lane or portion of a driving lane, which is longitudinally adjacent to pre-existing pavement which is to remain at completion of the project, use a four foot wide diamond grinder to grind the adjacent four feet of the pre-existing pavement edge in a manner that provides for the following. These requirements apply without regard to whether the pre-existing pavement is Portland cement or bituminous, and without regard to whether the new or existing pavement is in a lane, gore, or shoulder.

1. Leave no vertical edge in the pre-existing pavement deeper than 1/8 inch
2. The elevation of the new PCCP at the longitudinal joint with the pre-existing pavement shall match the elevation of the ground edge, +/- 1/8 inch.
3. The full width of the new PCCP shall meet the surface smoothness requirements of Section 5-05.3(12).

5-04.4 Measurement

By the linear foot measured along the longitudinal joint.

5-5 Payment

Under the new bid item "PCCP Joint Matching", per linear foot, except at locations where the contract requires PCCP pavement grinding in accordance with Section 5-01.3(10), in which case no payment will be made under the bid item "PCCP Joint Matching"

Draft Standard Spec

Patches that abut the lane/shoulder joint require placement of a formed edge, along the slab edge, even with the surface.

The patching material shall be mixed, placed, consolidated, finished, and cured according to manufacturer's recommendations. Slab/patch interfaces that will not receive pavement grinding shall be sealed (painted) with a 1:1 cement-water grout along the patch perimeter.

The Contractor shall reseal all joints in accordance with Section 5-05.3(8)B.

Opening to traffic shall meet the requirements of Section 5-05.3(17).

Low areas which grinding cannot feasibly remedy, shall be sandblasted, filled with epoxy bonded mortar, and textured by grinding. The epoxy bonding agent shall meet the requirements of Section 9-26.1(1)B for Type II epoxy.

5-05.4 Measurement

Cement concrete pavement will be measured by the cubic yard for the completed pavement. The volume will be determined from measurements taken as listed below.

1. The width measurement will be the width of the pavement shown on the typical cross-section in the Plans, additional widening where called for, or as otherwise specified in writing by the Engineer.
2. The length will be measured along the center of each Roadway or ramp.
3. The depth ~~will~~ shall be determined ~~from the reference cores~~ in accordance with Section 5-05.5(1). The depth utilized to calculate the volume shall not exceed the Plan depth plus 0.04 feet.

The volume of ~~the pavement section represented by the reference core~~ cement concrete pavement in each thickness lot shall equal the measured length × width × ~~reference core depth~~ thickness measurement.

Corrosion resistant dowel bar will be measured per each for the actual number of bars used in the completed Work.

Tie bar with drill hole will be measured per each for the actual number of bars used in the completed Work. Tie bars with drill holes in cement concrete pavement placed under the Contract will not be measured.

The ride smoothness compliance adjustment calculation is the volume of pavement, in cubic yards, represented by the profilograph.

The calculation for ~~portland~~ cement concrete compliance adjustment is the volume of concrete represented by the CPF and the Thickness deficiency adjustment.

5-05.5 Payment

Payment will be made for each of the following Bid items that are included in the Proposal:

"Cement Conc. Pavement", per cubic yard.

The unit Contract price per cubic yard for "Cement Conc. Pavement" shall be full compensation for all costs incurred to carry out the requirements of Section 5-05, except for those costs included in other items, which are included in this Subsection and are included in the Proposal. All costs associated with performing the magnetic pulse induction

Price Adjustment Schedule	
MRI for each 528 ft. section	Pay Adjustment Schedule
in. / mi.	$ / 0.10 mi.
118	-3440
119	-3520
120	-3600
121	-3680
122	-3760
123	-3840
124	-3920
≥125	-4000

~~Payment for "Ride Smoothness Compliance Adjustment" will be calculated by multiplying the unit Contract price for cement concrete pavement, times the volume for adjustment, times the percent of adjustment determined from the schedule below.~~

~~1. Adjustment will be based on the initial profile index before corrective Work.~~

~~2. "Ride Smoothness Compliance Adjustment" will be calculated for each 0.1-mile section represented by profilogram using the following schedule:~~

~~Ride Smoothness Profile Index (Inches per mile)~~	~~Compliance Adjustment (percent adjustment)~~
~~1.0 or less~~	~~+4~~
~~over 1.0 to 2.0~~	~~+3~~
~~over 2.0 to 3.0~~	~~+2~~
~~over 3.0 to 4.0~~	~~+1~~
~~over 4.0 to 7.0~~	~~0~~
~~over 7.0~~	~~-2*~~

~~*Also requires correction to 7 inches per mile.~~

"~~Portland~~ Cement Concrete Compliance Adjustment", by calculation.
Payment for "~~Portland~~ Cement Concrete Compliance Adjustment" will be calculated by multiplying the unit Contract price for the cement concrete pavement, times the volume for adjustment, times the percent of adjustment determined from the calculated CPF and the Deficiency Adjustment listed in Section 5-05.5(1)A.

5-05.5(1) Pavement Thickness

Cement concrete pavement shall be constructed in accordance with the thickness requirements in the Plans and Specifications. Tolerances allowed for Subgrade construction and other provisions, which may affect thickness, shall not be construed to modify such thickness requirements.

Thickness measurements in each lane shall comply with the following:

Thickness Testing of Cement Concrete Pavement	
Thickness Lot Size	15 panels maximum
Thickness test location determined by	Engineer will select testing locations in accordance with WSDOT TM 716 method B.
Sample method	AASHTO T 359
Sample preparation performed by	Contractor provides, places, and secures disks in the presence of the Engineer[1]
Measurement method	AASHTO T 359
Thickness measurement performed by	Contractor, in the presence of the Engineer[2]
[1]Reflectors shall be located at within 0.5 feet of the center of the panel. The Contractor shall supply a sufficient number of 300 mm-diameter round reflectors meeting the requirements of AASHTO T 359 to accomplish the required testing. [2]The Contractor shall provide all equipment and materials needed to perform the testing.	

Thickness measurements shall be rounded to the nearest 0.01 foot.

Each thickness test location where the pavement thickness is deficient by more than 0.04 foot, shall be subject to price reduction or corrective action as shown in Table 2.

Table 2 Thickness Deficiency

0.04' < Thickness Deficiency ≤ 0.06'	10
0.06' < Thickness deficiency ≤ 0.08'	25
Thickness deficiency > 0.08'	Remove and replace the panels or the panels may be accepted with no payment at the discretion of the Engineer.

The price reduction shall be computed by multiplying the percent price reduction in Table 2 by the unit Contract price by the volume of pavement represented by the thickness test lot.

Additional cores may be taken by the Contractor to determine the limits of an area that has a thickness deficiency greater than 0.04 feet. Cores shall be taken at the approximate center of the panel. Only the panels within the limits of the deficiency area as determined by the cores will be subject to a price reduction or corrective action. The cores shall be taken in the presence of the Engineer and delivered to the Engineer for measurement. All costs for the additional cores including filling the core holes with patching material meeting the requirements of Section 9-20 will be the responsibility of the Contractor.

~~A primary unit of pavement is defined as the area of pavement placed in each day's paving operations or a complete intersection. Within such primary unit of pavement, there may be an area or areas, which are deficient in thickness by more than 0.05 foot. This deficient area or areas will be defined as a secondary unit or units. If secondary units are found to exist, the primary unit area will be reduced by the secondary unit area included therein. At a time determined by the Engineer, thickness measurements will be made in each primary unit of pavement at the minimum rate of one measurement for each 500 cubic yards of pavement, or fraction thereof. The exact~~

a. discharge is completed within 45 minutes after the introduction of mixing water to the cement and aggregates, or

b. discharge is completed within 60 minutes after the introduction of mixing water to the cement and aggregates, provided the concrete mix temperature is 70°F or below during placement, or

c. discharge is completed within 60 minutes after the introduction of mixing water to the cement and aggregates, provided the mix contains an approved set retarder at the manufacturer's minimum dosage rate.

5-05.3(3)C Finishing Equipment

The standard method of constructing concrete pavement on State Highways shall be with approved slip-form paving equipment designed to spread, consolidate, screed, and float-finish the freshly placed concrete in one complete pass of the machine so a dense and homogeneous pavement is achieved with a minimum of hand finishing. On other roads and on WSDOT projects requiring less than 1,000 square yards of cement concrete pavement or requiring individual placement areas of less than 1,000 square yards, irregular areas, intersections, and at locations inaccessible to slip-form paving equipment, cement concrete pavement may be placed with approved placement and finishing equipment utilizing stationary side forms. Hand screeding and float finishing of cement concrete pavement may only be utilized on small irregular areas as allowed by the Engineer.

5-05.3(3)D Joint Sawing Equipment

The Contractor shall provide approved power driven concrete saws for sawing joints, adequate in number of units and power to complete the sawing at the required rate. The Contractor shall provide at least one standby saw in good working order. An ample supply of saw blades shall be maintained at the site of the Work at all times during sawing operations. The Contractor shall provide adequate artificial lighting facilities for night sawing. All of this equipment shall be on the job both before and continuously during concrete placement. Sawing equipment shall be available immediately and continuously upon call by the Engineer on a 24-hour basis, including Saturdays, Sundays, and holidays.

5-05.3(3)E Smoothness Testing Equipment

~~The Contractor shall provide a California-type computerized profilograph, complete with recorder, for determining the profile index of the pavement according to WSDOT T 807. The profilograph shall be on the project, calibrated, in good working condition, and ready for operation before construction of any concrete pavement begins. The operator shall be competent and experienced in operation of the equipment.~~

Inertial profilers shall meet all requirements of AASHTO M 328 and be certified in accordance with AASHTO R 56 within the preceding 12 months.

The inertial profiler operator shall be certified as required by AASHTO R 56 within three years preceding profile measurement.

Equipment or operator certification by other states or a profiler certification facility will be accepted provided the certification meets the requirements of AASHTO R 56. Documentation verifying certification by another state shall be submitted to the Engineer a minimum of 14 calendar days prior to profile measurement. Equipment certification documentation shall include the information required by part 8.5 and 8.6 of AASHTO R 56. Operator documentation

shall include a statement from the certifying state that indicates the operator is certified to operate the inertial profiler to be used on the project. The decision whether another state's certification meets the requirements of AASHTO R 56 shall be vested entirely in the Engineer.

5-05.3(4) Measuring and Batching Materials

The batch plant site, layout, equipment, and provisions for transporting material shall ensure a continuous supply of material to the Work.

1. **Measuring Materials**

   a. **Aggregates** – The fine aggregate and each size of coarse aggregate shall be measured by weighing, the weight for the particular aggregates used being proportional to their respective bulk specific gravities. The weighing of each size of material shall be a separate and distinct operation.

   Corrections shall be made for variations in weight of materials due to the moisture content.

   The equipment for weighing aggregates shall conform to the requirements of Section 1-09.2.

   b. **Cement** – Cement shall be weighed on scales meeting the requirements of Section 1-09.2. Adequate provision shall be made to prevent loss of cement between the batch box and the mixer.

   c. **Water** – Water may be measured either by volume or by weight. The accuracy of measuring the water shall be within a range of error of not over 1 percent.

2. **Batching Materials** – On all projects requiring more than 2,500 cubic yards of ~~portland cement~~ concrete for paving, the batching plant shall be equipped to proportion aggregates and cement by weight by means of automatic and interlocked proportioning devices of approved type.

5-05.3(4)A Acceptance of Portland Cement or Blended Hydraulic Cement Concrete Pavement

Acceptance of portland cement or blended hydraulic cement concrete pavement shall be as provided under statistical or nonstatistical acceptance. Determination of statistical or nonstatistical shall be based on Proposal quantities and shall consider the total of all Bid items involving of a specific class.

Statistical acceptance will apply only to Contracts advertised, Awarded and administered by WSDOT, unless specifically provided otherwise in the Special Provisions. Contracting agencies other than WSDOT must specifically invoke statistical acceptance in their Special Provisions if it is desired.

Statistical Acceptance, (1) applies only to WSDOT projects, (2) is administered under the provisions of Section 5-05.5, and (3) will be used for a class of mix when the Proposal quantities for that class of mix is 1,500 cubic yards or greater.

Nonstatistical Acceptance will be used (1) for a class of mix when the Proposal quantities for that class of mix is less than 1,500 cubic yards and (2) all contracts advertised, Awarded and administered by agencies other than WSDOT.

The point of acceptance will be per WAQTC TM 2 or at the point of discharge when a pump is used.

At the beginning and end of paving each day, the Contractor shall, with an approved stamp, indent the concrete surface near the right hand edge of the panel to indicate the date, month, and year of placement.

At approximate 500-foot intervals where designated by the Engineer the Contractor shall, with an approved stamp, indent the concrete surface near the right hand edge of the pavement with the stationing of the Roadway.

5-05.3(12) Surface Smoothness

Pavement surface smoothness for this project will include International Roughness Index (IRI) testing. The Contractor shall perform IRI testing on each through lane, climbing lane, and passing lane, greater than 0.25 mile in length and these lanes will be subject to incentive/disincentive adjustments. Ride quality will be evaluated using the Mean Roughness Index (MRI) calculated by averaging the IRI data for the left and right wheel path within the section.

Ramps, shoulders and tapers will not be included in MRI testing for pavement smoothness and will not be subject to incentive adjustments. All Work is subject to parallel and transverse 10-foot straightedge requirements, corrective work and disincentive adjustments.

Operate the inertial profiler in accordance with AASHTO R 57. Collect two longitudinal traces, one in each wheel path. Collect profile data after completion of all concrete paving on the project in a continuous pass including areas excluded from pay adjustments. Provide notice to the Engineer a minimum of seven calendar days prior to testing.

Within 30 calendar days after the Contractor's testing, the Engineer may perform verification testing. If the verification testing shows a difference in MRI greater than the percentages shown in Table 2 of AASHTO R 54 the following resolution process will be followed:

1. The profiles, equipment and procedures will be evaluated to determine the cause of the difference.
2. If the cause of the discrepancy cannot be resolved the pavement shall be retested with both profilers at a mutually agreed time. The two profilers will test the section within 30 minutes of each other. If the retest shows a difference in MRI equal or greater than the percentages shown in Table 2 of AASHTO R 54 the Engineer's test results will be used to establish pay adjustments.

Surface smoothness of travel lanes not subject to MRI testing will be measured with a 10-foot straightedge no later than 5:00 p.m. of the day following the placing of the concrete. The completed surface of the wearing course shall not vary more than 1/8 inch from the lower edge of a 10-foot straightedge placed on the surface parallel to the centerline.

Smoothness perpendicular to the centerline will be measured with a 10-foot straightedge across all lanes with the same cross slope, including shoulders when composed of cement concrete pavement. The overlapping 10-foot straightedge measurement shall be discontinued at a point 6 inches from the most extreme outside edge of the finished cement concrete pavement. The completed surface of the wearing course shall not vary more than ¼ inch from the lower edge of a 10-foot straightedge placed on the surface perpendicular to the centerline. Any deviations in excess of the above tolerances shall be corrected.

The Contractor shall evaluate profiles for acceptance, incentive payments, disincentive payments, or corrective action using the current version of ProVAL and provide the results including the profile data in unfiltered electronic Engineering Research Division (ERD) file format to the Engineer within 2 calendar days of completing testing each section of pavement. If the profile

data files are created using an export option in the manufacturer's software where filter settings can be specified, use the filter settings that were used to create data files for certification. Analyze the entire profile. Exclude any areas specifically identified in the Contract. Exclude from the analysis the first 100 feet after the start of the paving operations and last 100 feet prior to the end of the paving operation, the first 100 feet on either side of bridge Structures and bridge approach slab. Report the MRI results in inches per mile for each 52.8 foot section and horizontal distance measurements in project stationing to the nearest foot. Include pay adjustments in the results. The Engineer will verify the analysis.

Corrective work for pavement smoothness may be taken by the Contractor prior to MRI testing. After completion of the MRI testing the Contractor shall measure the smoothness of each 52.8-foot section with an MRI greater than 125 inches per mile with a 10-foot straightedge within 14 calendar days or as allowed by the Engineer. The Contractor shall identify all locations that require corrective work and provide the straight edge measurements at each location that exceeds the allowable limit to the Engineer. If all measurements in a 52.8-foot section comply with smoothness requirements, the Contractor shall provide the maximum measurement to the Engineer and a statement that corrective work is not required. Unless allowed by the Engineer, corrective work shall be taken by the Contractor for pavement identified by the Contractor or Engineer that does not meet the following requirements:

1. The completed surface shall be of uniform texture, smooth, uniform as to crown and grade, and free from defects of all kinds.
2. The completed surface shall not vary more than ⅛ inch from the lower edge of a 10-foot straightedge placed on the surface parallel to the centerline.
3. The completed surface shall vary not more than ¼ inch in 10 feet from the rate of transverse slope shown in the Plans.

All corrective work shall be completed at no additional expense, including traffic control, to the Contracting Agency. Corrective work shall not begin until the concrete has reached its design strength unless allowed by the Engineer. Pavement shall be repaired by one or more of the following methods:

1. Diamond grinding; repairs shall not reduce pavement thickness by more than ¼ inch less than the thickness shown in the Plans. When required by the Engineer, the Contractor shall verify the thickness of the concrete pavement by coring. Thickness reduction due to corrective work will not be included in thickness measurements for calculating the Thickness Deficiency in Section 5-05.5(1)A.
2. Removal and replacement of the cement concrete pavement.
3. By other method allowed by the Engineer.

For repairs following MRI testing the repaired area shall be checked by the Contractor with a 10-foot straightedge to ensure it no longer requires corrective work. With concurrence of the Engineer an inertial profiler may be used in place of the 10-foot straight edge.

If correction of the roadway as listed above either will not or does not produce satisfactory results as to smoothness or serviceability the Engineer may accept the completed pavement and a credit will be calculated in accordance with Section 5-05.5. The credit will be in addition to the price adjustment for MRI. Under these circumstances, the decision whether to accept the completed pavement or to require corrective work as described above shall be vested entirely in the Engineer.

thickness testing shall be included in the unit Contract price per cubic yard for "Cement Conc. Pavement".

"Corrosion Resistant Dowel Bar", per each.

The unit Contract price per each for "Corrosion Resistant Dowel Bar" shall be full payment for furnishing, and installing corrosion resistant dowel bars and any costs for drilling holes, placing dowel bars with baskets, furnishing and installing parting compound and all other costs associated with completing the installation of corrosion resistant dowel bars.

"Tie Bar with Drill Hole", per each.

The unit Contract price per each, "Tie Bar with Drill Hole" shall be full payment for furnishing, and installing tie bars and any costs for drilling holes, and all other costs associated with installation of tie bars. All costs for tie bars with drill holes in cement concrete pavement placed under the Contract shall be included in the unit Contract price per cubic yard for "Cement Conc. Pavement".

"Ride Smoothness Compliance Adjustment", by calculation.

Smoothness Compliance Adjustments will be based on the requirements in Section 5-05.3(12) and the following calculations:

1. Final MRI acceptance and incentive/disincentive payments for pavement smoothness will be calculated as the average of the ten 52.8-foot sections in each 528 feet in accordance with the price adjustment schedule.

a. For sections of a lane that are a minimum of 52.8 feet and less than 528 feet, the price adjustment will be calculated using the average of the 52.8 foot MRI values and the price adjustment prorated for the length of the section.

b. MRI values per 52.8-feet that were measured prior to corrective work will be included in the 528 foot price adjustment for sections with corrective work.

2. In addition to the price adjustment for MRI a smoothness compliance adjustment will be calculated in the sum of minus $1000.00 for each and every section of single traffic lane 52.8 feet in length in that does not meet the 10-foot straight edge requirements in Section 5-05.3(12) after corrective Work.

Price Adjustment Schedule	
MRI for each 528 ft. section	Pay Adjustment Schedule
in. / mi.	$ / 0.10 mi.
< 30	2400
30	2400
31	2320
32	2240
33	2160
34	2080
35	2000
36	1920
37	1840
38	1760
39	1680

Price Adjustment Schedule	
MRI for each 528 ft. section	Pay Adjustment Schedule
in. / mi.	$ / 0.10 mi.
40	1600
41	1520
42	1440
43	1360
44	1280
45	1200
46	1120
47	1040
48	960
49	880
50	800
51	720
52	640
53	560
54	480
55	400
56	320
57	240
58	160
59	80
60	0
61	0
62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0
73	0
74	0
75	0
76	-80
77	-160
78	-240

Price Adjustment Schedule	
MRI for each 528 ft. section	Pay Adjustment Schedule
in. / mi.	$ / 0.10 mi.
79	-320
80	-400
81	-480
82	-560
83	-640
84	-720
85	-800
86	-880
87	-960
88	-1040
89	-1120
90	-1200
91	-1280
92	-1360
93	-1440
94	-1520
95	-1600
96	-1680
97	-1760
98	-1840
99	-1920
100	-2000
101	-2080
102	-2160
103	-2240
104	-2320
105	-2400
106	-2480
107	-2560
108	-2640
109	-2720
110	-2800
111	-2880
112	-2960
113	-3040
114	-3120
115	-3200
116	-3280
117	-3360

Price Adjustment Schedule	
MRI for each 528 ft. section	Pay Adjustment Schedule
in. / mi.	$ / 0.10 mi.
118	-3440
119	-3520
120	-3600
121	-3680
122	-3760
123	-3840
124	-3920
≥125	-4000

~~Payment for "Ride Smoothness Compliance Adjustment" will be calculated by multiplying the unit Contract price for cement concrete pavement, times the volume for adjustment, times the percent of adjustment determined from the schedule below.~~

~~1. Adjustment will be based on the initial profile index before corrective Work.~~

~~2. "Ride Smoothness Compliance Adjustment" will be calculated for each 0.1-mile section represented by profilogram using the following schedule:~~

~~Ride Smoothness Profile Index (Inches per mile)~~	~~Compliance Adjustment (percent adjustment)~~
~~1.0 or less~~	~~+4~~
~~over 1.0 to 2.0~~	~~+3~~
~~over 2.0 to 3.0~~	~~+2~~
~~over 3.0 to 4.0~~	~~+1~~
~~over 4.0 to 7.0~~	~~0~~
~~over 7.0~~	~~-2*~~

~~*Also requires correction to 7 inches per mile.~~

"~~Portland~~ Cement Concrete Compliance Adjustment", by calculation.
Payment for "~~Portland~~ Cement Concrete Compliance Adjustment" will be calculated by multiplying the unit Contract price for the cement concrete pavement, times the volume for adjustment, times the percent of adjustment determined from the calculated CPF and the Deficiency Adjustment listed in Section 5-05.5(1)A.

5-05.5(1) Pavement Thickness

Cement concrete pavement shall be constructed in accordance with the thickness requirements in the Plans and Specifications. Tolerances allowed for Subgrade construction and other provisions, which may affect thickness, shall not be construed to modify such thickness requirements.

(January 7, 2019)

Partial Depth Spall Repair – Epoxy Concrete

Epoxy Resin Binder

Epoxy resin binder shall meet the requirements of ASTM C881 Type III Grade 1 or 2, Class A, B, or C.

Aggregate

The aggregate shall be thoroughly washed and kiln dried.

The aggregate for epoxy concrete shall conform to Section 9-03.1 and the following requirements for grading except that ASR mitigation will not apply to aggregate for epoxy concrete:

Sieve Size	Percent Passing	
	Gradation 1	Gradation 2
½"		100
⅜"	100	83-100
#4	62-85	65-82
#8	45-67	45-65
#16	29-50	27-48
#30	16-36	12-30
#50	5-20	6-17
#100	0-7	0-7
#200	0-3	0-3
All percentages are by weight.		

The combined aggregate shall have a maximum of 45 percent crushed particles.

The surface of the aggregate shall be dry and the moisture content of the combined aggregate shall not exceed 1.0 percent when tested in accordance with AASHTO T 255. The aggregate temperature shall be between 40°F and 100°F at the time of mixing.

Sand for Abrasive Finish

The sand for abrasive finish shall be commercial quality blast sand having at least 95 percent passing the No. 8 sieve and at least 95 percent retained on the No. 20 sieve when tested in accordance with AASHTO T 27. The moisture content of the sand shall not exceed 1.0 percent.

Partial Depth Spall Repair – Polyester Concrete

The components of the polyester concrete including the polyester resin binder, aggregate, and high molecular weight methacrylate resin surface primer shall be provided through a single system provider.

Polyester Resin Binder

Polyester resin binder shall be an unsaturated isophthalic polyester-styrene co-polymer.

Prior to adding the initiator, the resin shall conform to the following requirements:

Viscosity:	75 to 200 cps (20 rpm at 77°F, RVT No. 1 spindle)	ASTM D2196
Specific Gravity:	1.05 to 1.10 at 77°F	ASTM D1475
Styrene Content:	40% to 50% by weight of polyester styrene resin	ASTM D2369

The hardened resin shall conform to the following requirements:

Elongation:	35% minimum, type I specimen, thickness 0.25" ± 0.03", Rate – 0.45 in./min.	ASTM D638
Tensile Strength:	2,500 psi minimum, type I specimen thickness 0.25" ± 0.03", Rate – 0.45 in./min.	ASTM D 638
Conditioning:	18 hours/77°F/50% + 5 hours/158°F	ASTM D618
Silane Coupler:	1.0% minimum (by weight of polyester-styrene resin)	

The silane coupler shall be an organosilane ester, gammamethacryloxypropyltrimethoxysilane. The promoter/hardeners shall be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators. MEKP and CHP initiators shall be used as recommended by the manufacturer.

Polyester resin binder will be accepted based on submittal to the Engineer of a Manufacturer's Certificate of Compliance.

High Molecular Weight Methacrylate (HMWM) Resin

HMWM resin shall be wax-free, low odor and consist of a resin, initiator and promotor conforming to the following requirements:

Viscosity	<25 cps (Brookfield RVT with UL adaptor, 50 rpm at 77°F)	ASTM D2196
Flash Point:	180°F minimum	ASTM D3278
Tack-Free Time:	400 minutes maximum	California Test 551
SSD Bond Strength	700 PSI minimum at 24 hours and 70 ± 1°F	California Test 551
Specific Gravity	0.90 minimum at 77°F	ASTM D1475
Volatile Content	30 percent, maximum.	ASTM D2369
Vapor Pressure	0.04 inches Hg, maximum at 77°F	ASTM D323

The promoter/initiator system for the methacrylate resin shall consist of a metal drier and peroxide.

If supplied separately from the resin, the drier shall not be mixed directly with the peroxide. The containers shall not be stored in a manner that allows leakage or spilling to contact the containers or materials of the other.

HMWM resin will be accepted based on submittal to the Engineer of a Manufacturer's Certificate of Compliance.

Aggregate

The aggregate shall be thoroughly washed and kiln dried.

The aggregate for polyester concrete shall meet the requirements of Section 9-03.1 except that ASR mitigation will not apply to aggregate for polyester concrete. Polyester concrete aggregate shall conform to the following requirements for gradation:

Sieve Size	Percent Passing	
	Gradation 1	Gradation 2
½"		100
⅜"	100	83-100
#4	62-85	65-82
#8	45-67	45-65
#16	29-50	27-48
#30	16-36	12-30
#50	5-20	6-17
#100	0-7	0-7
#200	0-3	0-3
All percentages are by weight.		

The combined aggregate shall have a maximum of 45 percent crushed particles.

The surface of the aggregate shall be dry and the absorption shall not exceed 1.0. The moisture content of the combined aggregate shall not exceed one-half of the aggregate absorption when tested in accordance with AASHTO T255. The aggregate temperature shall be between 40°F and 100°F at the time of mixing.

Sand for Abrasive Finish

The sand for abrasive finish shall be commercial quality blast sand having at least 95 percent passing the No. 8 sieve and at least 95 percent retained on the No. 20 sieve when tested in accordance with AASHTO T 27. The moisture content of the sand shall not exceed 0.5 percent.

(June 11, 2019)

Partial Depth Spall Repair

This work consists of repairing partial depth spalls using either epoxy concrete or polyester concrete.

Partial Depth Spall Repair – Epoxy Concrete

Manufacturer's Technical Representative

The Contractor shall have the services of a qualified epoxy resin binder manufacturer's technical representative physically present at the job site during the first shift of epoxy concrete placement. The manufacturer's technical representative shall assist the Contractor in training the Contractor's personnel and providing technical assistance in preparing the concrete surface, applying primer, and mixing, placing, and curing the epoxy concrete. If the epoxy concrete Work is unsatisfactory, or additional training or technical assistance is needed the Contractor shall have the services of the manufacturer's at the job site for additional time as deemed necessary by the Engineer.

Mix Design

Epoxy concrete shall be composed of epoxy resin binder and aggregate. The Contractor shall prepare and submit a Type 1 Working Drawing consisting of the epoxy concrete mix proportions and mixing procedure. The epoxy resin binder in the epoxy concrete shall be between 11 to 13 percent by weight of the dry aggregate. The mix design shall include the proportion of epoxy resin binder as a percentage of the dry weight of aggregate, the approximate set time and the time for opening to traffic for the temperature ranges expected during epoxy concrete placement.

Delivery and Storage of Materials

All materials shall be delivered in their original containers bearing the manufacturer's label, specifying date of manufacturing, batch number, trade name brand, and quantity. Each shipment shall be accompanied by a Safety Data Sheet (SDS) for each component of the resin binder.

The material shall be stored in accordance with the manufacturer's recommendations.

Surface Preparation

Removal of the existing pavement shall not damage any pavement to be left in place. Any existing pavement that is to remain that has been damaged shall be repaired at no additional expense to the Contracting Agency. If jackhammers are used for removing pavement, they shall not weigh more than 30 pounds, and chipping hammers shall not weigh more than 15 pounds. All power driven hand tools used for the removal of pavement shall be operated at angles less than 45 degrees as measured from the surface of the pavement to the tool. The patch limits shall extend beyond the spalled area a minimum of 3 inches. Repair areas shall be kept square or rectangular. Repair areas that are within 12 inches of another repair area shall be combined.

A vertical cut shall be made to a minimum depth of 2 inches around the perimeter to be patched as marked by the Engineer. The Contractor shall remove material within the perimeter of the saw cut to a depth of 2 inches, or to sound concrete as determined by the Engineer.

The concrete surfaces shall be prepared by removing all material which may act as a bond breaker between the surface and the epoxy concrete. The surfaces to receive the epoxy concrete shall be abrasive blasted and all loose material removed. All abrasive blasting residue shall be removed.

Spall repair shall not be done in areas where dowel bars are encountered.

When a partial depth repair is placed directly against an adjacent longitudinal joint, a bond-breaking material such as polyethylene film, roofing paper, or other material as accepted by the Engineer shall be placed between the existing concrete and the area to be patched.

Working transverse joints or cracks adjacent to or within the repair area require placement of a compressible insert. The new joint or crack shall be formed to the same width as the existing joint or crack. The compressible joint material shall be placed into the existing joint 1 inch below the depth of repair. The compressible insert shall extend at least 3 inches beyond each end of the patch boundaries.

Patches that abut the Lane/Shoulder joint require placement of a formed edge, along the slab edge, even with the surface.

If the concrete surfaces become contaminated, the contaminated areas shall be re-cleaned.

Precautions shall be taken to ensure that no dust or debris leaves the roadway and that all traffic is protected from rebound and dust. Appropriate shielding shall be provided as required at no additional cost to the Contracting Agency. The Contractor shall reseal all joints in accordance with Section 5-05.3(8)B.

Application of Prime Coat

Application of the prime coat and the epoxy concrete shall not begin if rain is forecast within 12-hours of completion of the Work. The area receiving the prime coat shall be dry and had no rain within the past 12 hours. Immediately prior to applying the prime coat, loose material shall be removed using oil and moisture free compressed air. The concrete surface shall be between 40°F and 100°F when applying the prime coat.

Immediately before placing epoxy concrete, the prepared concrete surface shall be given a prime coat consisting of one coat of the epoxy resin binder.

The prime coat shall be worked into the concrete in a manner to assure complete coverage of the area receiving epoxy concrete.

If the primed surface becomes contaminated, the contaminated area shall be cleaned and re-primed.

The prime coat shall not be allowed to run into drainage structures, joints or working cracks.

Mixing Components

The components of the epoxy resin binder shall be thoroughly blended just prior to mixing with the aggregate. The epoxy concrete shall be thoroughly mixed prior to placing.

The Contractor shall prevent any cleaning chemicals from reaching the epoxy concrete mix during the mixing operations.

Epoxy Concrete Placement

Under no circumstances shall any epoxy resin or epoxy concrete be allowed to run into drainage structures, joints or working cracks.

The epoxy concrete shall be placed on the liquid prime coat and consolidated in accordance with the manufacturer's recommendations.

Finished Epoxy Concrete Surface

All repair areas shall be struck off level with the adjacent concrete. Forms shall be coated with suitable bond release agent to permit ready release of forms.

Sand for abrasive finish shall be broadcast onto surface to uniformly cover any smooth or glossy areas immediately after finishing and before resin gelling occurs. The completed surface shall be free of any smooth or glossy areas. After the epoxy concrete has cured any smooth or glossy areas shall be repaired by the Contractor in the manner recommended by the System Provider and approved by the Engineer at no additional cost. The surface texture of epoxy concrete shall be uniform and impervious to moisture.

Curing

The epoxy concrete shall be cured in accordance with the manufacturer's recommendations. The Contractor shall measure the compressive strength of the cured epoxy concrete with a rebound hammer in accordance with ASTM C 805. Traffic and equipment shall not be permitted on the epoxy concrete until it achieves a compressive strength of 2,500 psi based on the rebound hammer manufactures correlation of rebound number to compressive strength for the rebound hammer used.

Partial Depth Spall Repair – Polyester Concrete

Manufacturer's Technical Representative

The Contractor shall have the services of a qualified polyester concrete manufacturer's technical representative physically present at the job site during the first shift of polyester concrete placement. The manufacturer's

technical representative shall assist the Contractor in training the Contractor's personnel and providing technical assistance in preparing the concrete surface, applying primer, and mixing, placing, and curing the polyester concrete. If the polyester concrete Work is unsatisfactory, or additional training or technical assistance is needed the Contractor shall have the services of the manufacturer's at the job site for additional time as deemed necessary by the Engineer to correct the deficiency.

Mix Design

Polyester concrete shall be composed of a polyester resin binder and aggregate. The Contractor shall prepare and submit a Type 1 Working Drawing consisting of the polyester concrete mix proportions and mixing procedure. The polyester resin binder in the polyester concrete shall be between 11 to 13 percent by weight of the dry aggregate. The mix design shall include the proportion of polyester resin binder as a percentage of the dry weight of aggregate, the approximate set time and time for opening to traffic for the temperature ranges expected during polyester concrete placement.

Delivery and Storage of Materials

All materials shall be delivered in their original containers bearing the manufacturer's label, specifying date of manufacturing, batch number, trade name brand, and quantity. Each shipment shall be accompanied by a Safety Data Sheet (SDS) for each component of the resin binder.

The material shall be stored in accordance with the manufacturer's recommendations.

Surface Preparation

Removal of the existing pavement shall not damage any pavement to be left in place. Any existing pavement that is to remain that has been damaged shall be repaired at no additional expense to the Contracting Agency. If jackhammers are used for removing pavement, they shall not weigh more than 30 pounds, and chipping hammers shall not weigh more than 15 pounds. All power driven hand tools used for the removal of pavement shall be operated at angles less than 45 degrees as measured from the surface of the pavement to the tool. The patch limits shall extend beyond the spalled area a minimum of 3 inches. Repair areas shall be kept square or rectangular. Repair areas that are within 12 inches of another repair area shall be combined.

A vertical cut shall be made to a minimum depth of 2 inches around the perimeter to be patched as marked by the Engineer. The Contractor shall remove material within the perimeter of the saw cut to a depth of 2 inches, or to sound concrete as determined by the Project Engineer.

The concrete surfaces shall be prepared by removing all material which may act as a bond breaker between the surface and the polyester concrete. The surfaces to receive the polyester concrete shall be abrasive

blasted and all loose material removed. All abrasive blasting residue shall be removed.

Spall repair shall not be done in areas where dowel bars are encountered.

When a partial depth repair is placed directly against an adjacent longitudinal joint, a bond-breaking material such as polyethylene film, roofing paper, or other material as accepted by the Engineer shall be placed between the existing concrete and the area to be patched.

Working transverse joints or cracks adjacent to or within the repair area require placement of a compressible insert. The new joint or crack shall be formed to the same width as the existing joint or crack. The compressible joint material shall be placed into the existing joint 1 inch below the depth of repair. The compressible insert shall extend at least 3 inches beyond each end of the patch boundaries.

Patches that abut the Lane/Shoulder joint require placement of a formed edge, along the slab edge, even with the surface.

If the concrete surfaces become contaminated, the contaminated areas shall be re-cleaned by abrasive blasting at the Contractor's expense.

Precautions shall be taken to ensure that no dust or debris leaves the roadway and that all traffic is protected from rebound and dust. Appropriate shielding shall be provided as required at no additional cost to the Contracting Agency. The Contractor shall reseal all joints in accordance with Section 5-05.3(8)B.

Application of Prime Coat

Application of the prime coat and the polyester concrete shall not begin if rain is forecast within 12-hours of completion of the Work. The area receiving the prime coat shall be dry and had no rain within the past 12 hours. Immediately prior to applying the prime coat, loose material shall be removed.

The concrete surface shall be between 40°F and 100°F when applying the prime coat.

The Contractor shall apply a prime coat consisting of one coat of promoted/initiated wax-free HMWM resin to the prepared concrete and steel surfaces immediately before placing the polyester concrete.

The prime coat shall be worked into the concrete in a manner to assure complete coverage of the area receiving polyester concrete.

If the primed surface becomes contaminated, the contaminated area shall be cleaned and re-primed.

The prime coat shall not be allowed to run into drainage structures, joints or working cracks.

Mixing Components

The components of the polyester resin binder shall be thoroughly blended just prior to mixing with the aggregate. The polyester concrete shall be thoroughly mixed prior to placing.

The Contractor shall prevent any cleaning chemicals from reaching the polyester concrete mix during the mixing operations.

Polyester Concrete Placement

Under no circumstances shall any polyester resin or polyester concrete be allowed to run into drainage structures, joints or working cracks.

Place polyester concrete within two hours of placing the HMWM prime coat.

Polyester concrete shall be placed within 15 minutes following initiation. Polyester concrete that is not placed within this time shall be discarded.

The surface temperature of the area receiving the polyester concrete shall be the same as specified above for the HMWM prime coat.

The polyester concrete shall be consolidated in accordance with the manufacturer's recommendations.

Finished Polyester Concrete Surface

All repair areas shall be struck off level with the adjacent concrete. Forms shall be coated with suitable bond release agent to permit ready release of forms.

Sand for abrasive finish shall be broadcast onto surface to uniformly cover any smooth or glossy areas immediately after finishing and before resin gelling occurs. The completed surface shall be free of any smooth or glossy areas. After the polyester concrete has cured, any smooth or glossy areas shall be repaired by the Contractor in the manner recommended by the System Provider and approved by the Engineer at no additional cost. The surface texture of polyester concrete shall be uniform and impervious to moisture.

Curing

The polyester concrete shall be cured in accordance with the manufacturer's recommendations. The Contractor shall measure the compressive strength of the cured polyester concrete with a rebound hammer in accordance with ASTM C 805. Traffic and equipment shall not be permitted on the polyester concrete until it achieves a compressive strength of 2,500 psi based on the rebound hammer manufactures correlation of rebound number to compressive strength for the rebound hammer used.

1-09.3.OPT2.FR1 Steel Cost Adjustments

(August 6, 2018)

Use in all projects that use quantities of steel in excess of 50,000 pounds, including non-proprietary walls, pedestrian bridges and vehicular bridges.

Fill-in #1 is the initial cost basis of steel and should use a value of $0.40/lb. Any deviation from the default value of $0.40/lb requires approval of the HQ Construction Office.

Fill-in #2 is a list of the bid items that are eligible for steel cost adjustment. This can include bid items that are entirely composed of steel (e.g., Steel Reinforcing Bar for Bridge) and can also include lump sum items that use significant quantities of steel (e.g., Superstructure, Lump Sum). Contact the HQ Strategic Analysis and Estimating Unit for assistance preparing the Engineer’s Estimate for the bid item "Steel Cost Adjustment."

(2 fill-ins)

(August 6, 2018)

Steel Cost Adjustment

The Contractor may elect to participate in the steel cost adjustments for work permanently incorporated into this Contract. Steel cost adjustment is not a guarantee of full compensation for changes to the cost of steel items; not eligible for all items with steel; and any adjustment provided by this provision will not obligate the Contracting Agency for any costs beyond the amount adjusted by this provision.

This Special Provision provides the option to opt-in to steel cost adjustments for eligible Bid items. The Contractor is provided one opportunity to opt-in and there are no future opt-out provisions. The steel cost adjustment requirements of this Special Provision apply for the duration of the Contract.

General

The Contractor may select Bid items from the list below to be included in the steel cost adjustment. The Contractor is not obligated to select any Bid items or to participate in the steel cost adjustment program. The steel cost adjustment will apply only to the Bid items selected by the Contractor.

Prior to Contract execution the Contractor shall submit the Steel Cost Adjustment Opt-In Bid Item List, WSDOT Form 410-031, to the WSDOT Contract Ad and Award Office. The form is to be received at the WSDOT Bid Room, located at the Transportation Building, 310 Maple Park Avenue SE, Room 2D20, Olympia, WA 98501-2361 or may be submitted by facsimile to the following FAX number, (360) 705-6966. The Steel Cost Adjustment Opt-In Bid Item List shall be signed by an authorized representative of the Contractor. Should the Contractor fail to return this document as required no Bid items will be eligible for steel cost adjustment.

Steel Index Values

The Contracting Agency will use the Bureau of Labor Statistics (BLS) producer price index (PPI) series Id: WPUSISTEEL1 index value for steel cost adjustments.

The Base Steel Materials Index Value (BV) will be the most recent value published on the BLS website on the day of bid opening. This value will be fixed on the day of bid opening even if the BLS lists this as a preliminary value. The Monthly Steel Materials Index Value (MV) will be the final index value published on the BLS website for any month during the Contract.

Measurement

The Contracting Agency has determined the initial cost basis (ICB) of steel to be *** $$1$$ ***. This cost basis is reflected in the steel cost adjustment calculations below, is non-negotiable and will be taken as a fixed value for the duration of the Contract.

For each month that steel material is incorporated into the permanent Work of the Contract or paid for as Materials on Hand and the MV is more than 110 percent or less than 90 percent of the BV the Contractor shall provide the Engineer with the following for each eligible Bid item by the end of the following month:

1. The weight of steel material for the month, and

2. Documentation of the weight and shipment to the Contractor of the steel material by bills of lading, invoices, or purchase orders.

Should the Contractor not provide the required documentation as specified the following shall apply:

1. Steel material that has an MV that is more than 110 percent of the BV will not be eligible for a steel cost adjustment.

2. The steel cost adjustment for a Bid item with an MV that is less than 90 percent of the BV will be calculated using a weight of steel determined by the Engineer.

Steel materials will not be eligible for cost adjustments until all requirements of the Contract have been met. Steel added to a Contract as part of a Value Engineering Change Proposal will not be eligible for steel cost adjustment. Steel cost adjustments made in accordance with this Special Provision will not be reflected on payments made to the Contractor until after the index value required for the calculation becomes final. Preliminary index values may be used to establish the BV, but will not be used to establish the MV in calculations.

For each Bid Item selected by the Contractor on the Steel Cost Adjustment Opt-In Bid Item List form a cost adjustment evaluation will be made. A cost adjustment will only be made if the MV for the month the Work associated with the Bid Item is performed differs by more than ten-percent from the BV.

The steel cost adjustment will be determined as follows:

1. If the MV is within ten-percent of the BV, there will be no adjustment.

2. If the MV is more than 110-percent of the BV, then

$$CA = (((MV - BV) \div BV) - 0.10) \times (ICB \times WS)$$

3. If the MV is less than 90-percent of the BV, then

$$CA = (((MV - BV) \div BV) + 0.10) \times (ICB \times WS)$$

Where:

CA = Cost Adjustment, dollars
MV = Monthly Steel Materials Index Value from BLS for the month determined above
BV = Base Steel Materials Index Value taken as the most recent value published on the BLS website on the day of bid opening.
ICB = Initial Cost Basis of steel per pound
WS = Weight of steel (in pounds) eligible for cost adjustment

The following Bid Items are eligible for the steel cost adjustment program for this Project:

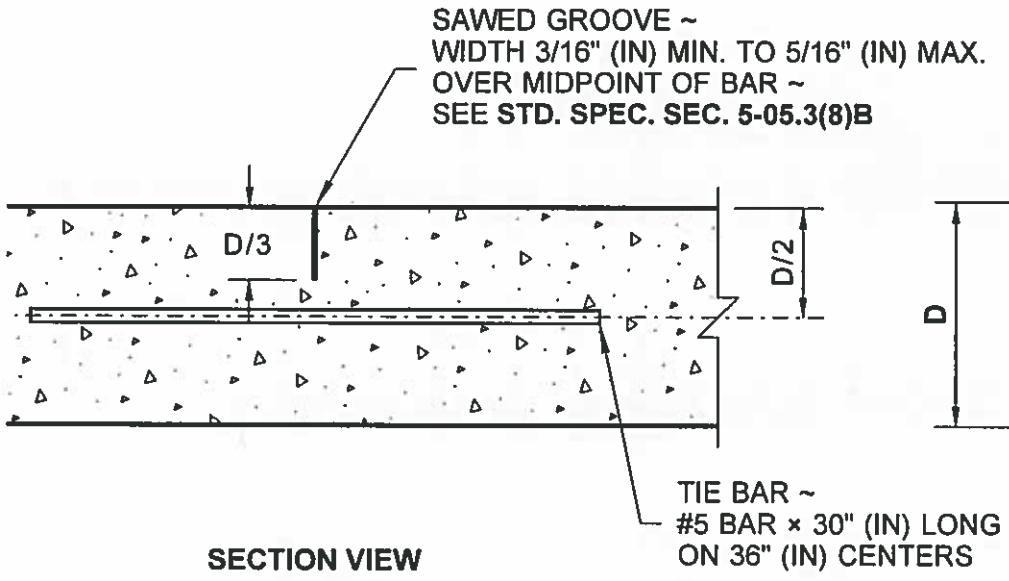
*** $$2$$ ***

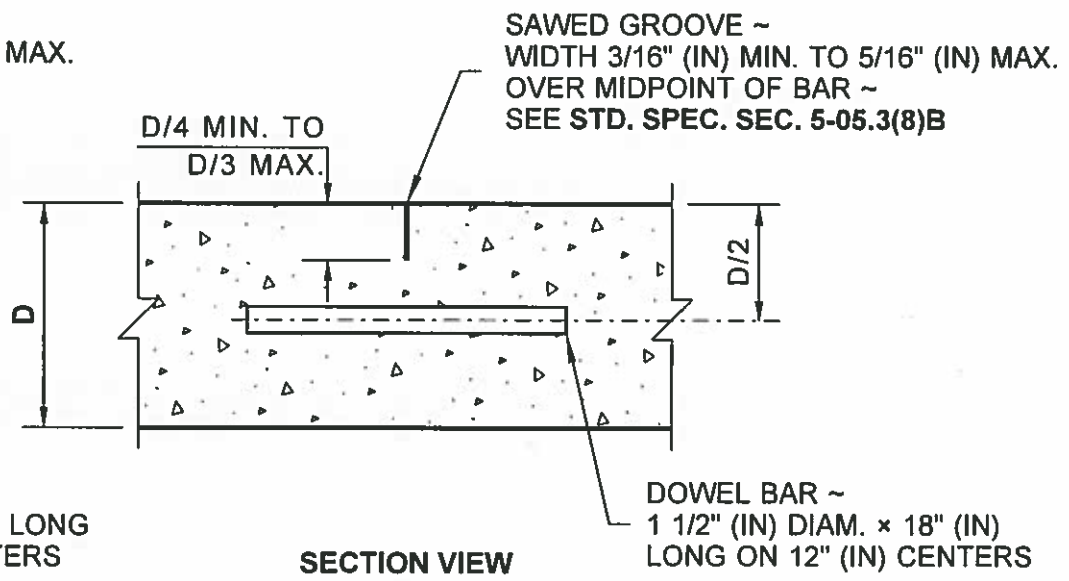
Payment

Payment will be made for the following bid item when included in the bid proposal:

"Steel Cost Adjustment", by calculation.

To provide a common proposal for all bidders, the Contracting Agency has entered an amount in the proposal to become a part of the Contractor's total bid.





IGITUDINAL CONTRACTION JOINT

TRANSVERSE CONTRACTION JOINT

draft 10-21

5-01.3(4)A General

Curing, cold weather Work, concrete pavement construction in adjacent lanes, and protection of pavement shall meet the requirements of Section 5-05.3(13) through Section 5-05.3(15). The Contractor, at no cost to the Contracting Agency, shall repair any damage to existing pavement caused by the Contractor's operations.

5-01.3(4)8 Sawing and Dimensional Requirements

Concrete slabs to be replaced as shown in the Plans or staked by the Engineer shall be at least 6.0 feet long and full width of an existing pavement panel. The portion of the panel to remain in place shall have a minimum dimension of 6 feet in length and full panel width; otherwise the entire panel shall be removed and replaced. There shall be no new joints closer than 3.0 feet to an existing transverse joint or crack.

Prior to removing concrete slabs, the Contractor shall Ssubmit a Type 2 Working Drawing detailing the method of panel removal, placement of relief cuts, and overcut locations. A vertical full depth saw cut is required along all longitudinal joints and at transverse locations. ~~And, unless the Engineer approves allows otherwise, a~~An additional vertical full depth relief saw cut located 12 to 18 inches from and parallel to the initial longitudinal and transverse saw cut locations is ~~also~~ required if impact methods are used to break up the panel during removal. Removal of existing cement concrete pavement shall not cause damage to adjacent slabs that are to remain in place. The Contractor, at no cost to the Contracting Agency, shall repair any damage caused by the Contractor's operation. Overcuts are allowed only where shown on the Type 2 Working Drawing. Overcuts ~~necessary to remove the panel~~ shall be repaired ~~by filling with Type I or Type IV epoxy resin as specified in Section 9-26 or~~ by sealing in accordance with Section 5-05.3(8). In areas that will be ground, slab replacements shall be performed prior to pavement grinding.

Side forms shall meet the requirements of Section 5-05.3(7)6 whenever a sawed full depth vertical face cannot be maintained.

When new concrete pavement is to be placed against existing cement concrete pavement, tie bars and dowel bars shall be drilled and grouted into the existing pavement with either Type I or IV epoxy resin as specified in Section 9-26.