Interstate and Primary PCC Pavement Overlays Review

Final Report

for

MLR-23-01

December 2023

Construction & Materials Bureau

IOWA DOT

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Construction & Materials Bureau
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December 2023

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<tr><td colspan="4">16. Abstract
Iowa has a long history of PCC pavement overlays. Several research projects were placed over the years, which led to a variety of different designs and features. The objective of this study was to perform a review of concrete overlays performance on the interstate and primary system and determine any best practices or lessons learned.</td></tr>
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Introduction

Iowa has a long history of PCC pavement overlays. As early as 1932, there were various PCC resurfacing projects, as it was called at the time, over brick and PCC pavement. Most of these designs included welded wire fabric on top of the existing pavement. Unfortunately, there are not any records indicating the performance of any of the projects.

Several research projects were placed over the years. The first whitetopping project was placed on the Storm Lake airport in 1971. This overlay is still in service with several areas of patched panels. In 1973, a research project[1] in Greene County kicked off the modern era of bonded and unbonded overlays. In 1994, thin bonded overlay research project with 65 test sections was placed on IA 21 in Iowa county. In 2002, an overlay and widening research project with over 100 test sections was placed on IA 13 in Delaware county.

Objectives

A recent 2017 study[2] by the National Concrete Pavement Technology Center at Iowa State University mainly concentrated on PCC overlays on the secondary system. Using pavement management data, the research concluded that 89% of all overlays in Iowa are good to excellent. Another 2014 study[3] was conducted by the National Concrete Pavement Technology Center on performance of overlays in the United States. The objective of this study was to perform a review of concrete overlays performance on the interstate and primary system and determine any best practices or lessons learned. A map and project information can be found in Appendix A. Construction history and project reviews can be found in Appendix B.

Concrete Overlay History

Iowa has a long history of PCC pavement overlays. As early as 1932, there were various PCC resurfacing projects, as it was called at the time, over brick and PCC pavement. Most of these designs included welded wire fabric on top of the existing pavement. Unfortunately, there are not any records indicating the performance of any of the projects. In 1949, a 6-inch PCC resurfacing project on US 30 in Benton County was one of the early projects to utilize widening with the overlay. Designs on these early PCC resurfacing projects may be found in Appendix C.

Figure 1 – Benton County US 30 Bonded Overlay 1949

Concrete Overlay Designs

The Iowa DOT classifies concrete overlays in the following categories:

- Whitetopping – PCC over HMA Pavement
- Unbonded – PCC over Composite Pavement
- Bonded – PCC over PCC Pavement.

There have been multiple design features incorporated and changed over the years. A variety of joint spacing and thicknesses have also been utilized.

Review of Iowa County IA 21 Research Project

In 1994, Dr. James Cable developed a research project[4] on IA 21 in Iowa County. This whitetopping research project included 65 different test sections with thicknesses of 2, 4, 6, and 8 inch and joint spacing of 2, 4, 6, 12, and 15 feet. Also, three different types of base preparations were used on the project, including patching and scarifying, patching only, and cold in place recycling. A few sections were placed with monofilament or fibrillated polypropylene microfibers. The test section layout may be found in Appendix D.

A two-year review in 1996 showed some distress in the 2-inch sections. Eventually, some of the 2-inch sections were patched and later overlaid with HMA in 2002, 2006, and 2009. However, a 2023 review showed that most of the 4-inch test sections and all of the 6-inch test sections were in good condition, regardless of joint spacing. Approximately, four miles of the 4-, 6-, and 8-inch PCC overlay sections are performing well, after 29 years of service.

Figure 2 – 6-inch Overlay 12 x 12 ft. Joint Spacing

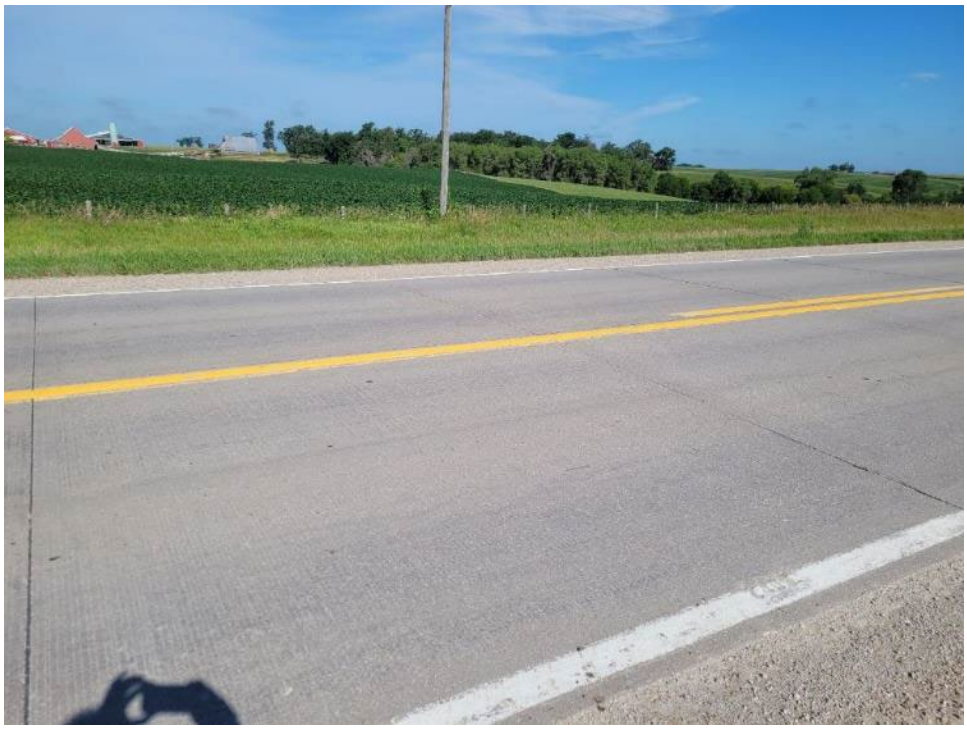

Figure 3 – 8-inch overlay 12 x 15 ft. Joint Spacing

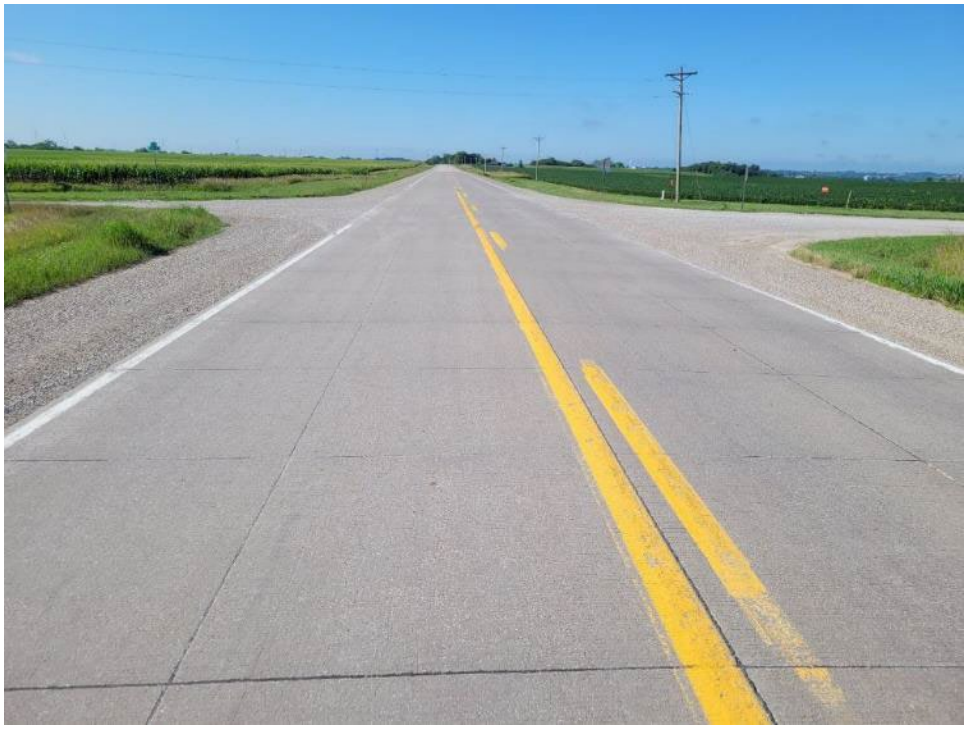

Figure 4 – 6-inch overlay 6 x 6 ft. Joint Spacing

Figure 5 – 4-inch overlay 4 x 4 ft. Joint Spacing

Figure 6 – 4-inch overlay 2 x 2 ft. Joint Spacing

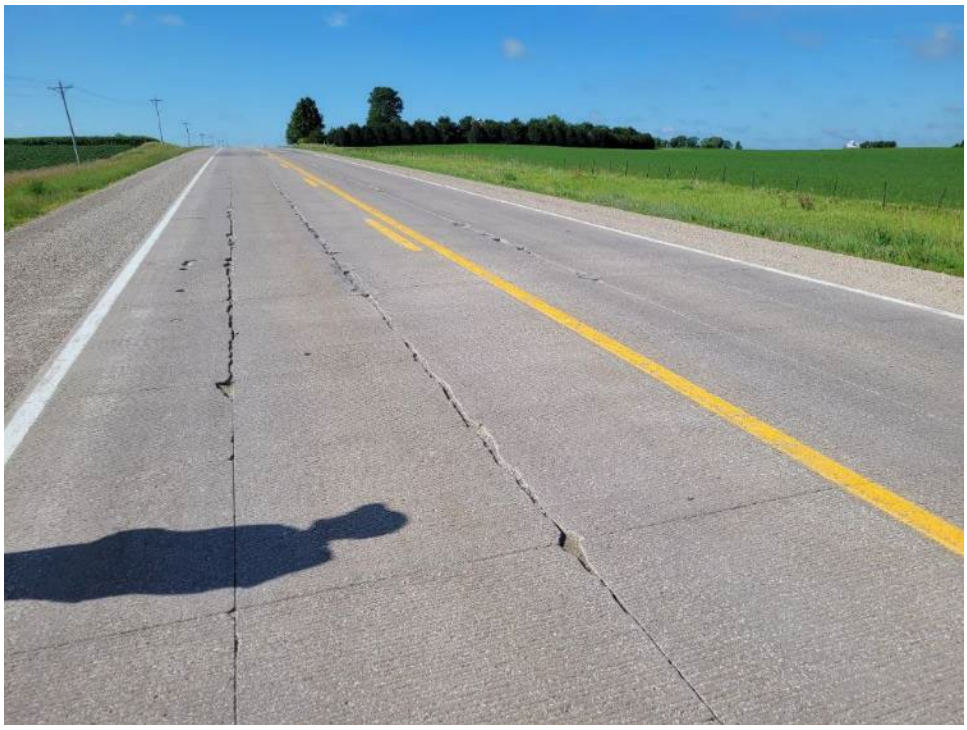

Figure 7 – 4-inch Overlay 4 x 4 ft. Joint Spacing exhibiting some joint deterioration.

A possible reason why the test sections still are performing very well may be because the overlay was placed the same width as the existing pavement, without widening or tied shoulders. Another factor may be for the test sections, 4 inches or thicker test, all joints were sealed.

Review of Delaware IA 13 Overlay Research Project

In 2002, Dr. Cable developed another research project[5] on IA 13 in Delaware County. This project was a widening and unbonded overlay of a composite pavement. The old widening units were removed and a 6 foot by 8-inch-thick widening was added to each side. There were 191 test sections of 3.5-inch and 4.5-inch overlay, varying panel size, macro fibers, microfibers, tied shoulders, and untied shoulders.

The longitudinal joint former was used to form the joint between the widening units and overlay. There were issues with cracking within a short time period, due to lack of a formed joint. This coupled with the widening unit heaving caused issues on this overlay. In areas, the widening units are inversely sloped toward the outside wheel path making it difficult to remove snow.

Figure 8 – Delaware IA 13 Unbonded Overlay Construction

Figure 9 – Delaware IA 13 Widening Unit Heaving

Review of Sac IA 175 Unbonded Overlay Experimental Project

Another experimental overlay was placed on IA 175 in Sac County in 2007. This project was a 4.5 inch unbonded overlay with 2 feet by 8-inch-thick widening on each side. The existing pavement had 2-foot HMA widening on each side in the 1980s. Engineering fabric was used over the HMA widening units and no visible cracking was observed in the pavement prior to the PCC overlay. No reinforcing steel was used to tie the widening units to the overlay.

Cracking occurred in the outside wheel paths in less than two years. It was assumed that the old HMA widening unit was heaving causing the cracking. However, it was later discovered that the outside widening unit was heaving that cause the cracking. This problem led to the use of the 60-inch reinforcing steel bar across the old widening and tied to the new widening.

The district sealed all the cracking and there has not been a lot of patching required. Even with all the cracking, the overlay still rides fairly well at the time of this report.

Figure 10 – Sac IA 175 UBOL Left Shoulder Crossslope 1.66%

Figure 11 – Sac IA 175 UBOL Left Shoulder Crossslope 1.13%

Figure 12 – Sac IA 175 UBOL Left Shoulder Crossslope 1.13%

Review of Whitetopping Overlays

Review of the Iowa County IA 21 whitetopping overlay showed how well some of the test sections are performing after 29 years.

Another whitetopping project that has been in service for more than 40 years is the Adair County I-80 westbound overlay, in 1979. The design was to mill 8 inches of HMA and replace with 10 inches of PCC. Overall, the overlay is in good condition with a few patched areas. The pavement was diamond ground in 2020.

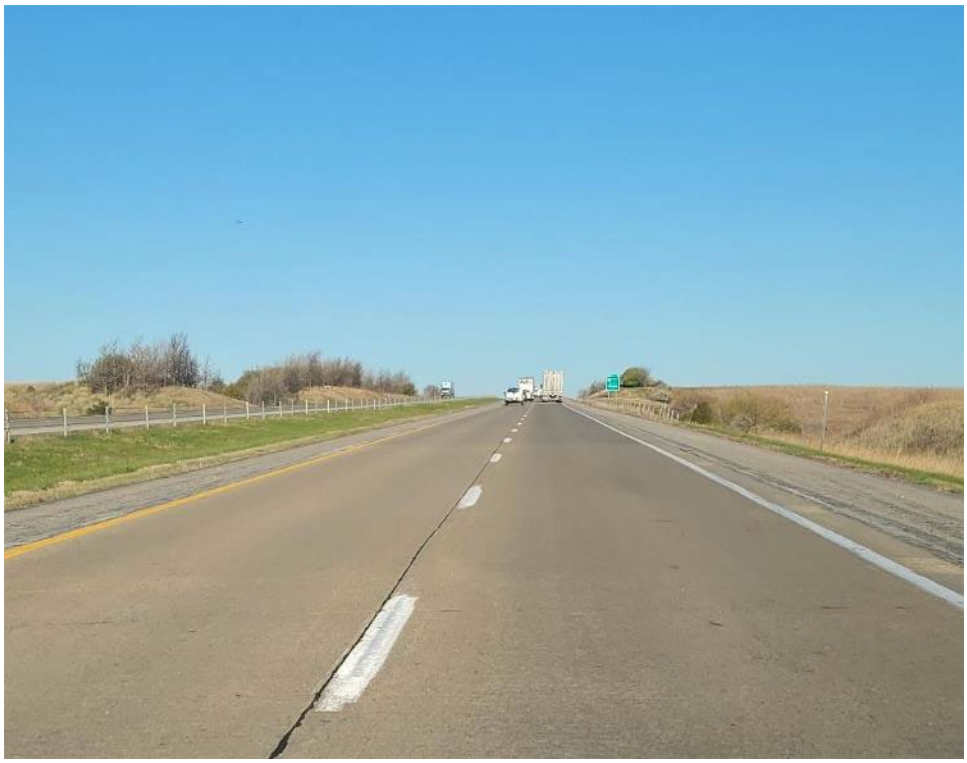

Figure 13 – Adair I-80 WB Whitetopping Overlay Paved 1979 (Picture 2023)

Review of other whitetopping overlays include Montgomery US 71 and Cass US 71 projects. Built in 2006 and 2007, respectively, both 8-inch overlays are in very good condition. The Montgomery County whitetopping has HMA shoulders and the Cass County whitetopping has tied PCC shoulders.

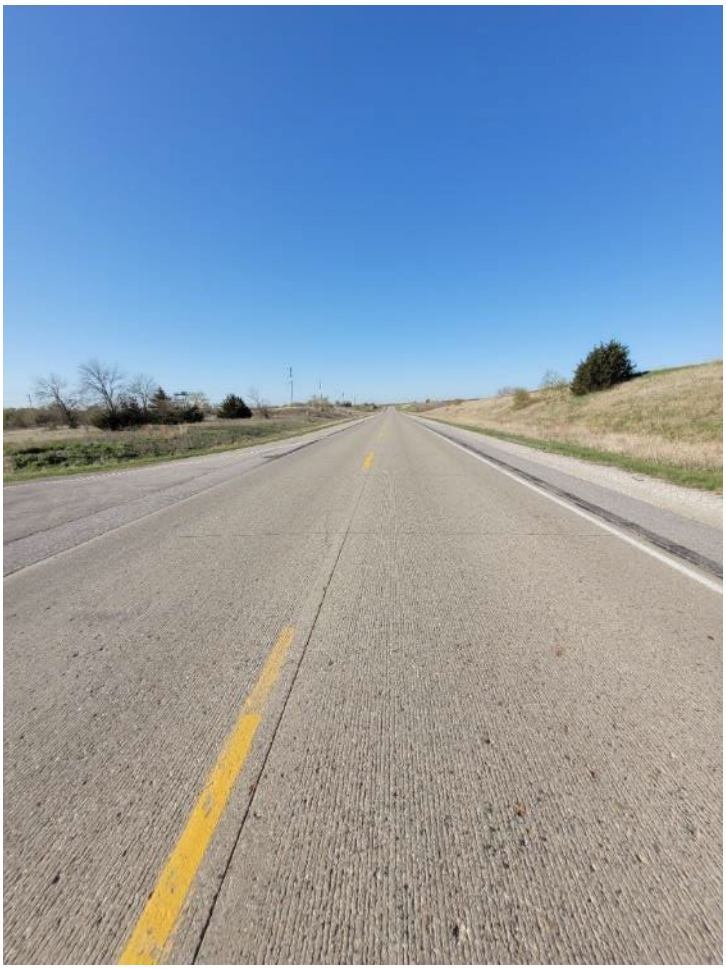

Figure 14 – Montgomery County US 71 Built 2006 (Picture 2023)

Figure 15 – Cass US 71 Built 2007 (Picture 2023)

One project to note that includes both whitetopping and unbonded overlay sections is on US 71 in the Clay/Dickinson counties. It is interesting to note that the whitetopping areas of the overlay are performing well, while areas of the unbonded overlay are experiencing longitudinal cracking and panel movement. The sections of whitetopping overlay used a 36-inch tie bar, while the sections of unbonded overlay have a 6-foot #5 reinforcing tie steel.

Figure 16 – Clay/Dickinson US 71 Whitetopping Overlay Built 2012 (Picture 2023)

Figure 17 – Clay/Dickinson US 71 Unbonded Overlay Built 2012 (Picture 2023)

Figure 18 – Clay US 71 Whitetopping Built 2015

Figure 19 – Clay US 71 Whitetopping Built 2016

Review of Unbonded Overlays

Many of the unbonded overlays have been placed over old 1920s and 1930s pavements that were built 18 to 20 foot wide and were widened and resurfaced in the 1950s. After the early cracking found on the Sac IA 175 overlay, it was decided to staple a 60-inch reinforcing bar across the old widening unit into the new widening/shoulder. With the exception of the US 71 Clay unbonded overlays placed in 2015 and 2016, nearly all of the unbonded overlays exhibit some type of longitudinal cracking and/or panel movement in the interior slabs.

Many of the unbonded overlays placed between 2002 and 2014 were thin at 5 inches or less. Also, between 2004 and 2014, all joints were left after sawing without any joint filler material. This likely caused issues with joint infilling, which led to problems with panels moving.

Figure 20 – Osceola IA 9 panel movement

Figure 21 – Grundy IA 14 Longitudinal Cracking and Shattered Panels

A thicker overlay did not seem to prevent the cracking with the longer reinforcing tie steel. On the Dallas US 169 unbonded overlay, this 7 inch unbonded overlay with 12 x 12-foot panels and tied shoulders with a 60-inch reinforcing bar exhibits quite a bit of longitudinal cracking. Most of the cracks have been sealed and there is very little patching. The cracking does not seem to affect the ride of the pavement, currently. The as constructed shoulder cross slope was 2 percent. Checking shoulder cross slope near the areas with longitudinal cracking indicated shoulder cross slope anywhere from 0.9% to 1.48%. Thus, the shoulders appear to heave, causing cracking off the end of the 60-inch reinforcing steel.

Figure 22 – Dallas US 169 UBOL Longitudinal Cracking

Figure 23 – Dallas US 169 UBOL Shoulder Cross Slope 1.40%

However, on the Clay US 71 overlays placed in 2015 and 2016, which include both whitetopping and unbonded overlays, both overlay types are in very good condition. As noted earlier, the unbonded overlay placed on Clay/Dickinson US 71 had a few areas of longitudinal cracking. The main difference between the 2012 overlay and the newer overlays was the joint spacing. The 2012 unbonded overlay has 6 x 6-foot panels, with a 6-foot #5 reinforcing steel over the old widening into the tied 4 x 6-foot shoulder. While the 2015 and 2016 overlays have 8 x 9-foot panels with a 6-foot #5 reinforcing steel across the old widening into the 8 x 7-foot shoulder. This design places the sawed joint directly over the old 18-foot original pavement edge.

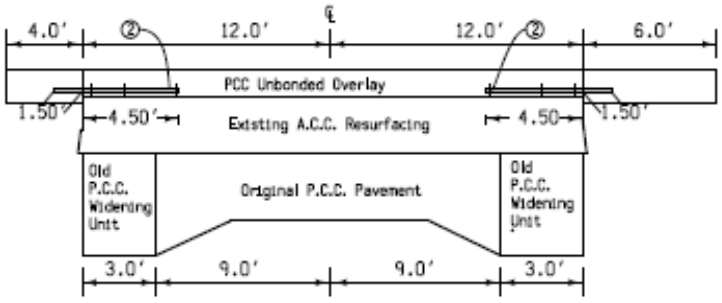

Figure 24 – Clay/Dickinson US 71 2012 UBOL typical

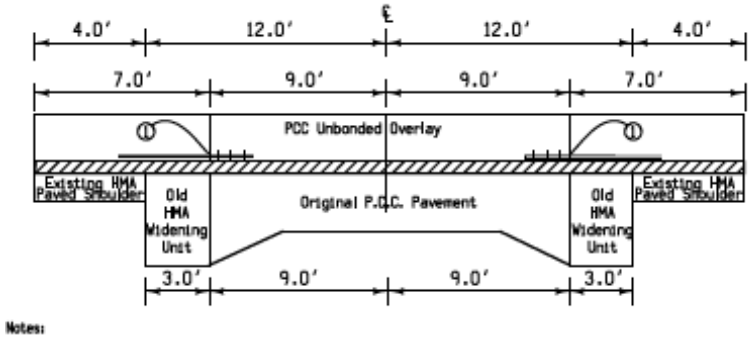

Figure 25 – Clay US 71 2015-16 UBOL typical

Figure 26 – Clay US 71 2015 UBOL

Figure 27 – Clay US 71 2016 UBOL

The 9 inch unbonded overlays in Fremont and Mills counties placed in 2009 are both performing very good. There are no patches or longitudinal cracking noted during a review in 2023. Interesting to note, the driving lane was widened to 14 foot, or 2 foot over the existing shoulder. No cracking was noted, however, HMA shoulders were used, so there was no tie steel used between the shoulder and the overlay.

Figure 28 – Fremont County I-29 NB Unbonded Overlay (2023)

Figure 29 – Mills County I-29 NB Unbonded Overlay (2023)

Review of Bonded Overlays

Many of the early bonded overlays were placed on existing pavements in poor condition. Thus, any issues in the underlying pavement reflected through the overlay in short time. Also, many of the early bonded overlay projects were fast track projects[6], utilizing Type III cements and insulating blankets for rapid strength gain. However, the very high temperatures and rapid hydration of the Portland cement resulted in non-durable paste, leading to durability issues.

A bonding grout was required for bonded PCC overlays until the April 2003 specification revision. Issues with bonding grout drying out can cause debonding of the overlay. It was found that when the existing PCC surface is in surface saturated dry condition, bonding with the PCC overlay is more than adequate.

Another issue affecting performance of bonded PCC overlays is the alignment of sawed joints in overlay with those in the existing pavement. All joints must be aligned directly over the existing joints to prevent random cracking. All joints need to be sawn full depth of the overlay and transverse joints need to be sawed as wide as the existing joints.

Currently, there is only one bonded concrete overlay projects remaining on the interstate and primary system. Placed in 1994, the Franklin County IA 3 bonded overlay project is the last remaining bonded overlay on the primary system. This bonded overlay was also a fast-track project, however, it was placed in cooler conditions in the fall and likely the concrete temperatures were not as elevated. Thus, the pavement exhibited better performance than the fast-track overlays placed in the summer.

Figure 30 – Poweshiek I-80 Bonded Overlay 1984 with Grout on Existing Pavement

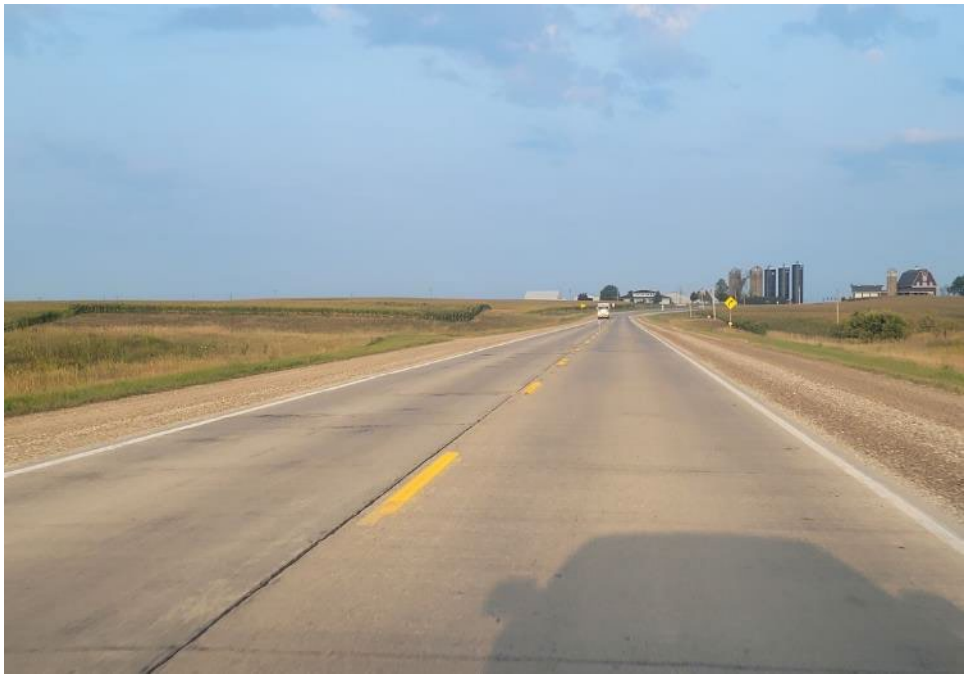

Figure 31- Franklin Co. IA 3 Bonded Overlay

The existing concrete pavement should be in fairly good condition prior to placement of a bonded PCC overlay. Otherwise, any defects in the existing pavement will be mirrored through the overlay, in a very short time period.

Existing Pavement Prior to Overlay Design

For whitetopping and unbonded overlays, the condition of the HMA creates a critical component impacting the performance of the PCC overlay. The existing HMA layer may be oxidized with large number of thermal cracks. If the thermal cracks are unable to be removed by milling or filling, these thermal cracks can lock in the overlay, causing cracking in the PCC overlay.

On several projects, after milling was completed and haul trucks drove on the surface, the existing HMA layer deteriorated in areas. On the Woodbury I-29 unbonded overlay project, the HMA layer de-bonded from the PCC surface below during milling operations. HMA resurfacing was added as extra work to alleviate some of these issues. A non-woven geotextile interlayer has also been used to fix short areas of deterioration.

Figure 32 – HMA deterioration on US 71 Cass Whitetopping Project

The condition of existing PCC pavement, prior to a bonded PCC overlay, was discussed in the Review of Bonded Overlays section.

Design Features of Overlays

During this review, several design features were noted that have impact on the performance of the overlay. One of the best features noted was using full depth pavement at the beginning (BOP) or end (EOP) of the project and transition between overlay types. Using full depth pavement at the BOP or EOP is especially important if the transition pavement it HMA. Using full depth pavement prevents the panels from migrating due to traffic.

Figure 33 – Clay/Dickinson US 71 NB panels migrating in driving lane at BOP against HMA pavement.

Using full depth pavement transition between overlay types also improves performance of the overlay. This is especially needed if there is a difference in joint spacing. For instance, an unbonded overlay with 6 x 6-foot panels butted to a whitetopping overlay with other joint spacing, such as 12 x12 foot or 9 x 8 foot. The full depth panel prevents misaligned joints from extending into adjacent panels.

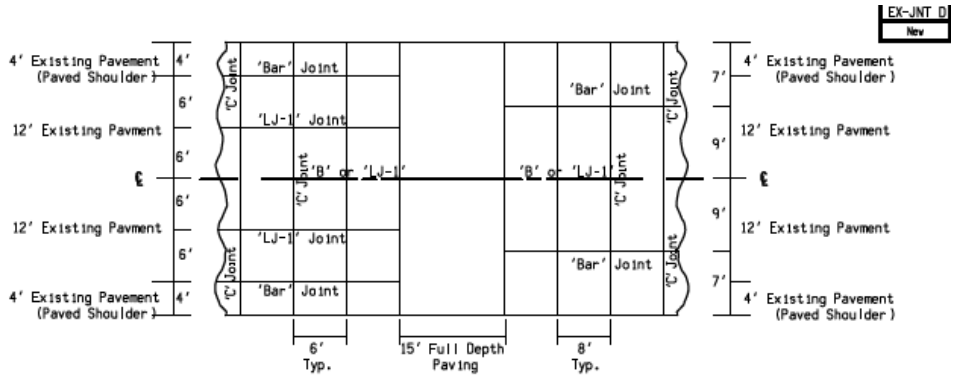

Figure 34 – Full depth transition between overlay types typical

Figure 35 – Full depth transition panel US 71 Clay County

A typical design feature of unbonded overlays where the existing pavement had been widened and widened again with the overlay that has caused performance issues is the use of 60-inch reinforcing steel stapled to the existing pavement over the widening unit, extending into the new widening. This seems to cause issues on nearly all of these unbonded overlays where it has been used.

On many of the projects that exhibit longitudinal cracking in the wheel path, it has been observed that the shoulder has heaved and is not at the cross slope as placed. Many times, the shoulder is approximately 1 percent lower cross slope that from that as placed. Apparently, this tends to raise the outside panel resulting in a crack developing off the end of the tie steel in the wheel path.

Prior to 2011, a #4 reinforcing steel bar 60 inches long was placed over the existing widening and into the new widening unit. From 2011 to 2014 a #5 bar was used and a #4 from 2015 and later. It was noted that the #5 bar may be too rigid and standards were changed back to the #4 bar. Although, it does not appear that changing to a smaller diameter bar has helped eliminate longitudinal cracking. Most all are stapled to the existing pavement and panels throughout the middle are moving with direction of traffic.

Figure 36 – Typical tie steel on unbonded overlay with existing widening.

Figure 37 – Closeup of steel, stapled to existing pavement.

Figure 38 – Shoulder slope 3.3%, Paved 4%

Figure 39 – Typical cracking off end of steel in wheel path.

Observations indicate that the outside panels and shoulder appear to be locked in place with the steel stapled to the existing pavement. On several projects, the center panels are moving with traffic. On two lane pavements, there are areas where the panels are moving at each other and

becomes an area where the panels buckle. Note in Figure 38 that the panels have moved approximately 1 inch from the left and approximately 1 ½ inches from the right, resulting in the between joint to buckle.

Figure 40 – Interior panels moving towards each other and blowup.

Future Overlay Design Details

Several alternate designs have been placed in the last few years that likely will address the issues found with the 60-inch reinforcing steel. One method used on the Marshall County IA 14 project was a 36-inch reinforcing steel was stapled across the existing widening unit. The overlay was placed full width and the shoulders were not tied.

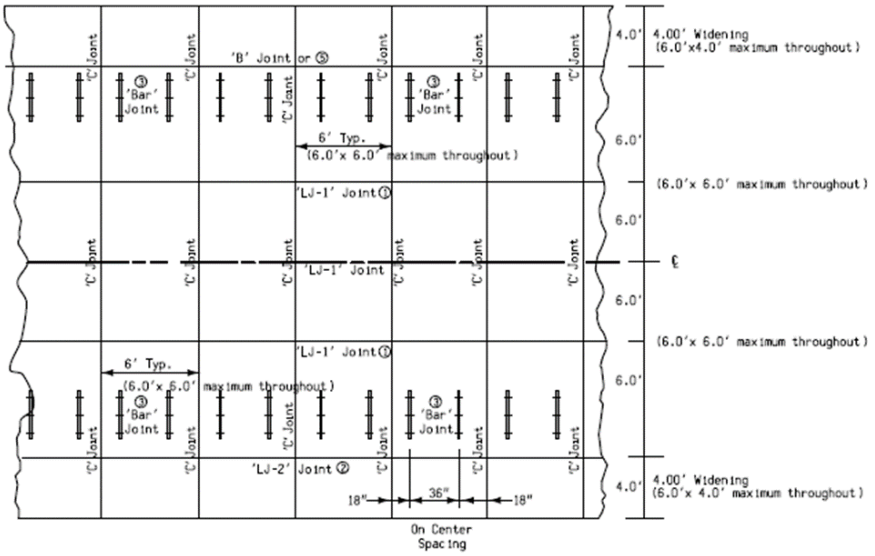

Figure 41 – Marshall County IA 14 Overlay Typical

Figure 42 – Marshall County IA 14 Overlay

The use of macro fibers has been tried successfully on a few county projects in Worth and Buchanan counties. Based on the success of those projects, test sections utilizing macro fibers and various joint spacing were placed on the Woodbury IA 31 whitetopping overlay in 2020.

Begin Sta.	End Sta.	Length feet	PCC SY	PCC CY	Fiber lbs	Transverse Sawcut Spacing FT	Longitudinal Sawcut Spacing FT
43+76	50+00	624	2079.8	359.7	1438.7	6	6
142+00	152+00	1000	3333.0	576.4	2305.6	15	12
152+00	162+00	1000	3333.0	576.4	2305.6	12	12
162+00	172+00	1000	3333.0	576.4	2305.6	9	12
172+00	182+00	1000	3333.0	576.4	2305.6	9	6
182+00	192+00	1000	3333.0	576.4	2305.6	6	6
423+00	441+00	1800	5999.4	1037.5	4150.1	6	6

Figure 43 – Woodbury IA 31 Overlay 2020 Macro Fiber Test Sections

In 2022, the adjacent Cherokee IA 31 whitetopping project was placed with 4 lbs. macro fibers per cubic yard. The shoulders were tied with a #4 x 36” reinforcing steel bar at 30-inch center to center. The joint spacing utilized 12 x 12-foot panels.

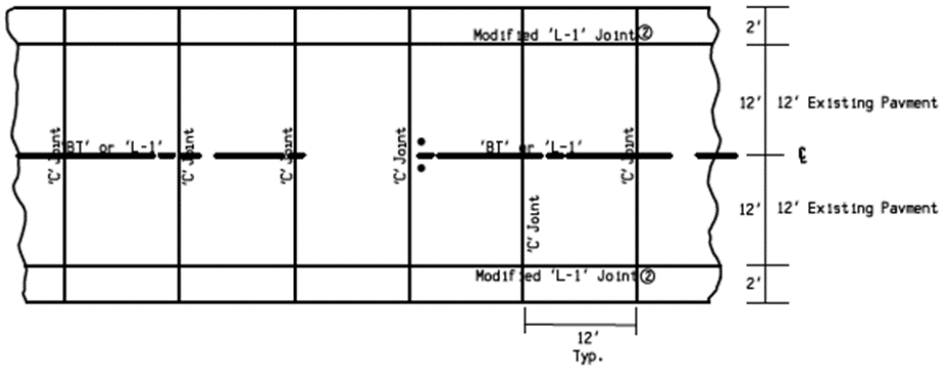

Figure 44 – Cherokee IA 31 Whitetopping with Macro Fibers

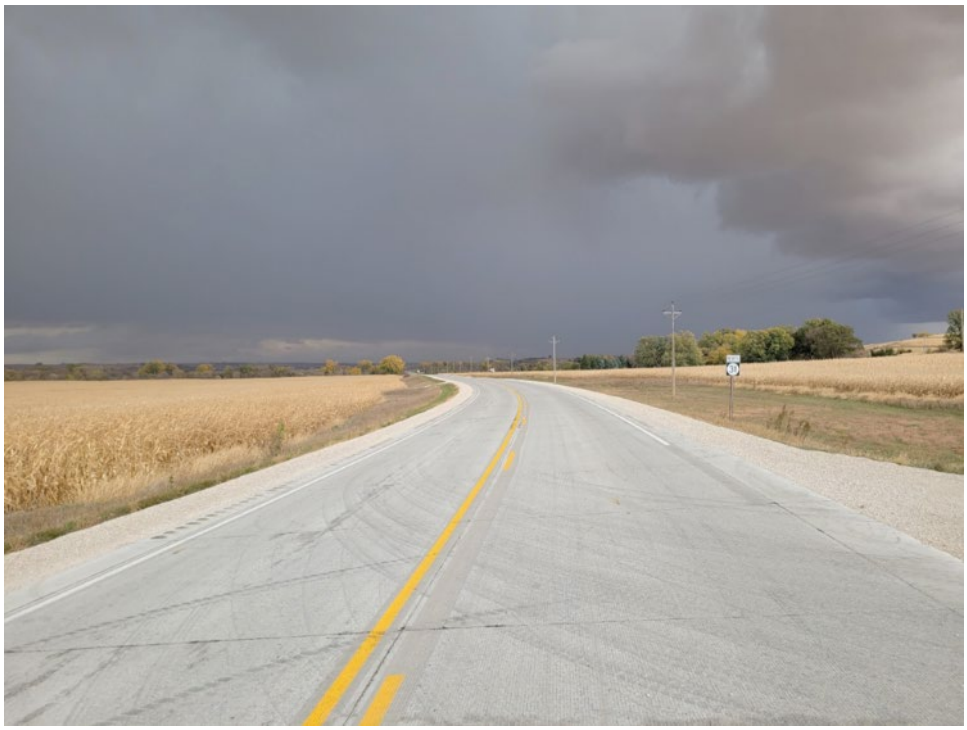

Figure 45 – Cherokee IA 31 Whitetopping with Macro Fibers

In 2022, an unbonded overlay on US 63 in Tama and Blackhawk counties was placed with 5 lbs. of macro fiber per cubic yard. No reinforcing steel was used in the project. The existing pavement was rubblized in 1998, prior to an HMA overlay. The joint spacing utilized 6 x 6-foot panels.

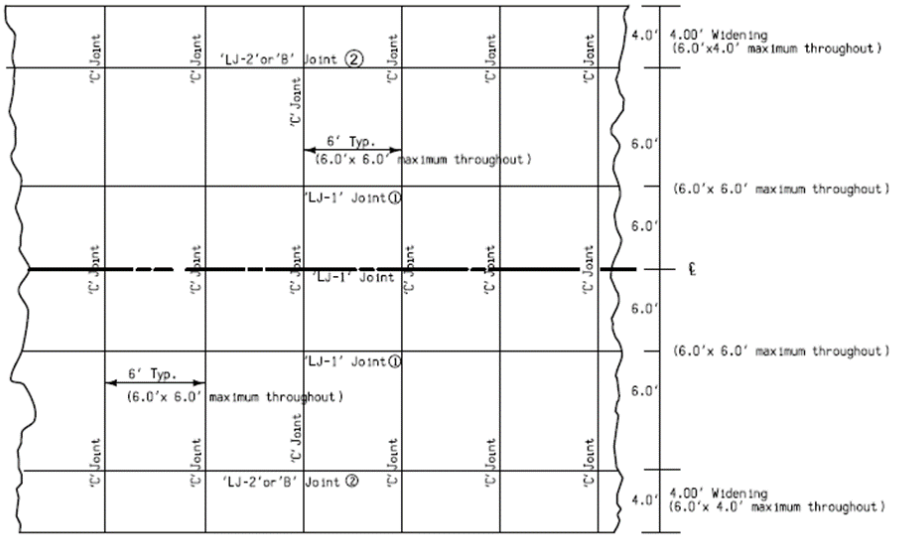

Figure 46 – Cherokee IA 31 Overlay Typical

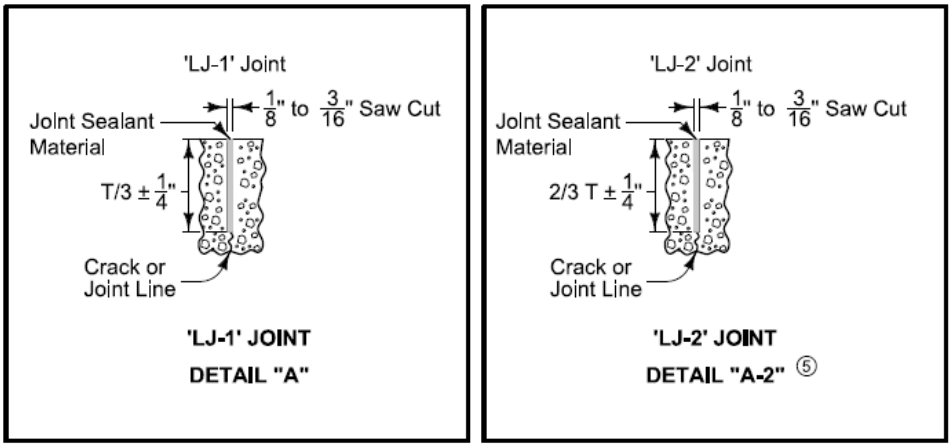

Figure 47 – LJ-1 and LJ-2 Joint Typical

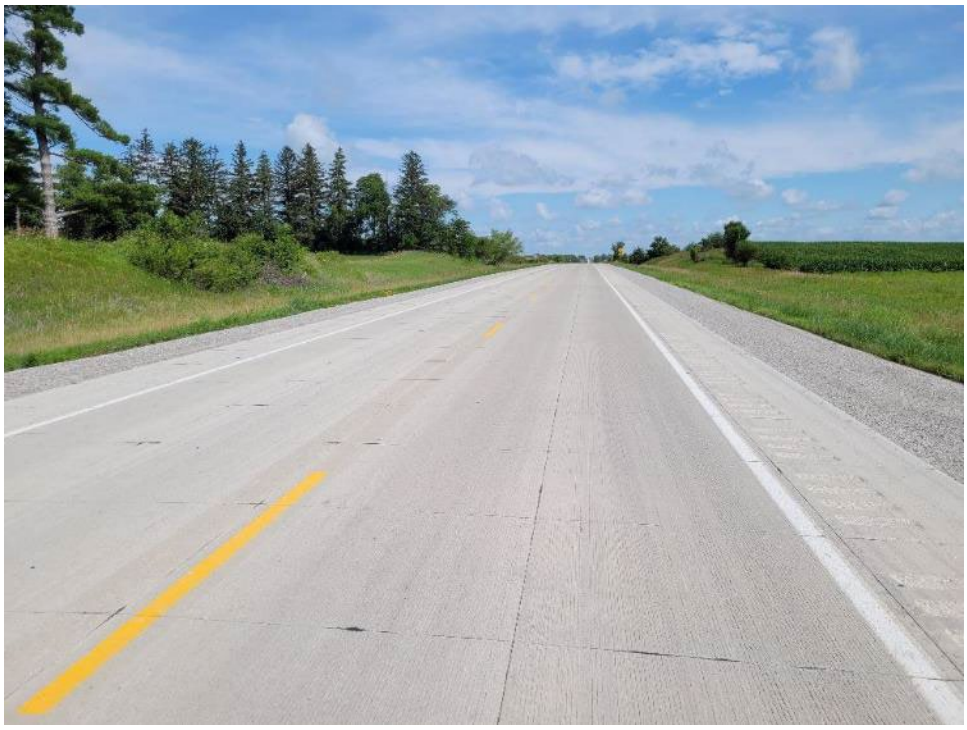

Figure 48 – Tama/Blackhawk US 63 Overlay with 5 lbs. macro fiber per cubic yard.

In 2023, the Plymouth IA 3 whitetopping project utilized 4 lbs. of macro fiber per cubic yard. Similar to the Cherokee IA 31 whitetopping, the modified L-1 joint was used to tie the shoulders. Joint spacing was increased to 12 x 12-foot panels.

Utilizing fibers should be the future design for overlays. The fibers allow wider joint spacing, keep any cracking tight, reduce panel movement, and may eliminate the need for reinforcing to tie shoulders or bridge old widening units. These projects should be monitored regularly for performance and incorporated into current overlay designs.

Overlay Construction

During construction of overlays, the superelevated curves are typically corrected to the proper cross slope. When this is done with the overlay, the concrete can become much thicker than the design thickness on the outside of the curve. On the Woodbury I29 northbound overlay in 2008, the thickness on the outside of the curve reached up to 15 inches in some locations. The design was a 9 inch unbonded overlay, requiring the longitudinal joints to be sawed at T/3, or 3 inches. Sawing at 3 inches was not adequate on the thickened outside edge of the pavement, which should have been 5 inches based on the concrete placed.

This led to longitudinal cracking right away. Cracking also occurred in the inside lane from due to the widened slab over the shoulder and differential settlement. Approximately 3763 feet of cracking in the left lane and 9242 feet of cracking in the right lane was cross stitched.

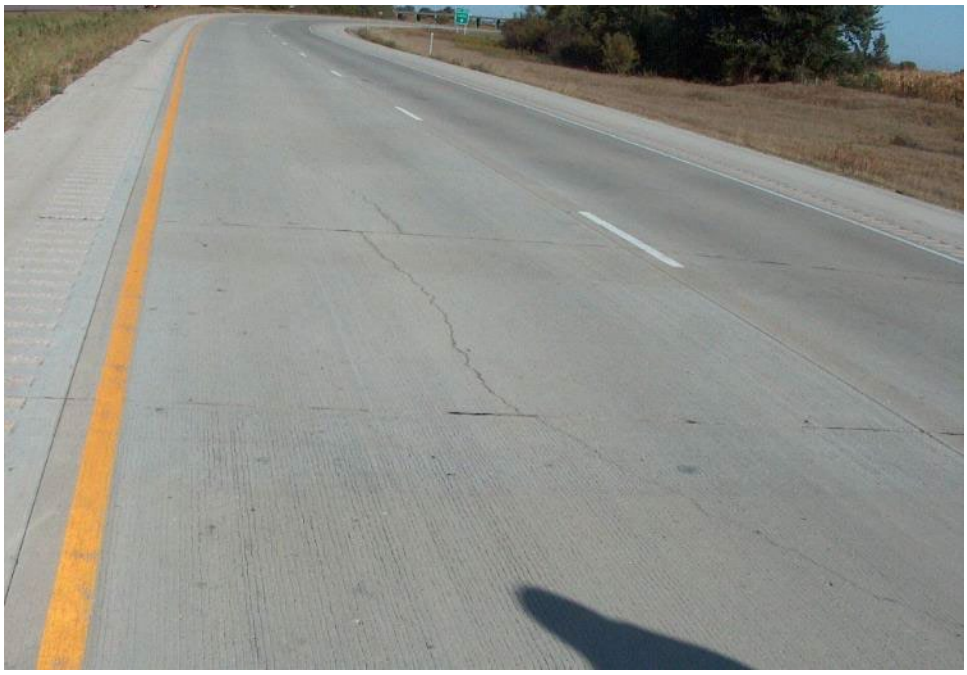

Figure 49 – Woodbury I-29 NB Longitudinal Cracking – passing lanes.

Two similar projects were let the next construction season on I-29 in Fremont and Mill counties. Fortunately, the same contractor placed those overlays and developed a spreadsheet with pavement depths in order to assure the longitudinal joints were sawed at T/3.

Patching Overlays

Patching of PCC overlays falls into to two categories, patching the overlay and full depth patching. When there are just a shattered panel or two, the overlay itself may be patched. However, many times the reason for the shattered panel is because the overlay is typically less than design thickness at that location. If may be possible to remove some of the HMA, if thick enough, to achieve a thicker patch replacement. If the HMA is thin or has deteriorated, a full depth patch may be required.

Figure 50 – Shattered panel. Typically overlay is thin in these areas.

If panels are moving, a full depth patch to the bottom of the existing pavement is recommended to prevent further movement. Many times, the old existing pavement may have longitudinal steel making it difficult to saw through the old pavement at the depth below. On the Clay/Dickinson US 71 project, the patch was pinned to the existing pavement below. These overlays should continue to be monitored to see if the panel movement has reduced significantly.

Full depth patches were placed approximately every 500 to 1000 feet on the Osceola IA 9 project in 2023 to prevent movement. West of US 59 the pavement seemed to exhibit more movement that east of US 59. A saw and seal project were also let on the Osceola IA 9 project. This project should be monitored for performance after the patching and sealing project.

Figure 51 – Full depth PCC patch in overlay

Figure 52 – Patch, existing original pavement left in place and pins.

Regardless of the type of patching, it is imperative to not add room on the ends to the patch. This allows more movement of the panels, leading to further patching issues. Patches should be placed tight to the next panel.

Figure 53 – Panel placed with1 inch gap. Do NOT leave space.

Observations and Conclusions

Based on review of overlays on the interstate and primary system, the following observations were noted:

- Nearly all whitetopping overlays are in good condition, with minimal cracking and very little panel movement.
- There is substantially less cracking when the overlay is placed the same width as the existing pavement.
- Longitudinal joints sawed less than T/3 based on concrete placed causes cracking.
- The 60-inch reinforcing steel over existing widening and tie shoulders has caused longitudinal cracking on nearly all overlays where it was used.
- There are less issues with cracking when the smaller 36-inch reinforcing steel is used.
- Condition of the HMA interlayer may impact project progress if issues are found during milling.
- Unfilled joints cause issues with incompressible material and may be the cause of buckling with panel movement.
- Leaving room for movement with patches promotes further panel movement.

Recommendations

Based on observations during review of concrete overlays on the interstate and primary system, the following recommendations are discussed below:

- Place overlay same width as existing pavement.
- Use 6-inch minimum thickness.
- Use maximum size reinforcing steel of #4 x 36-inch length.
- Use macro fibers at 4 lbs./cy. Fibers help reduce cracking and panel movement.

- When fibers used, joint spacing may increase to 12 x 12 ft on 6-inch for whitetopping overlays and 9 x 8 ft with 7 x 8 ft. shoulders on 6-inch unbonded overlays with existing widening (18-foot original pavement).
- Fill all joints to prevent infilling.
- Saw longitudinal joints T/3 – based on thickness placed.
- Use full depth transition sections to existing pavement and overlay type change.
- Use full depth patches at locations with panel buckling to prevent further movement.

Since there have been some more recent changes with rehabilitation and designs with fibers, it is recommended to monitor the following projects to see how these changes impact long term performance.

- Osceola IA 9 overlay with full depth patches and joint filling.
- Tama/Blackhawk US 63 overlay with fibers and no reinforcing steel.
- Marshall IA 14 overlay, reinforcing stapled over old widening unit and untied shoulders.
- Plymouth IA 3 overlay with fibers and shoulders tied.

The National Concrete Pavement Technology Center has developed several guides for developing an overlay design[7] and specification requirements[8]. Use of these guides as well as recommendations found during this study should be implemented to improve overlay performance.

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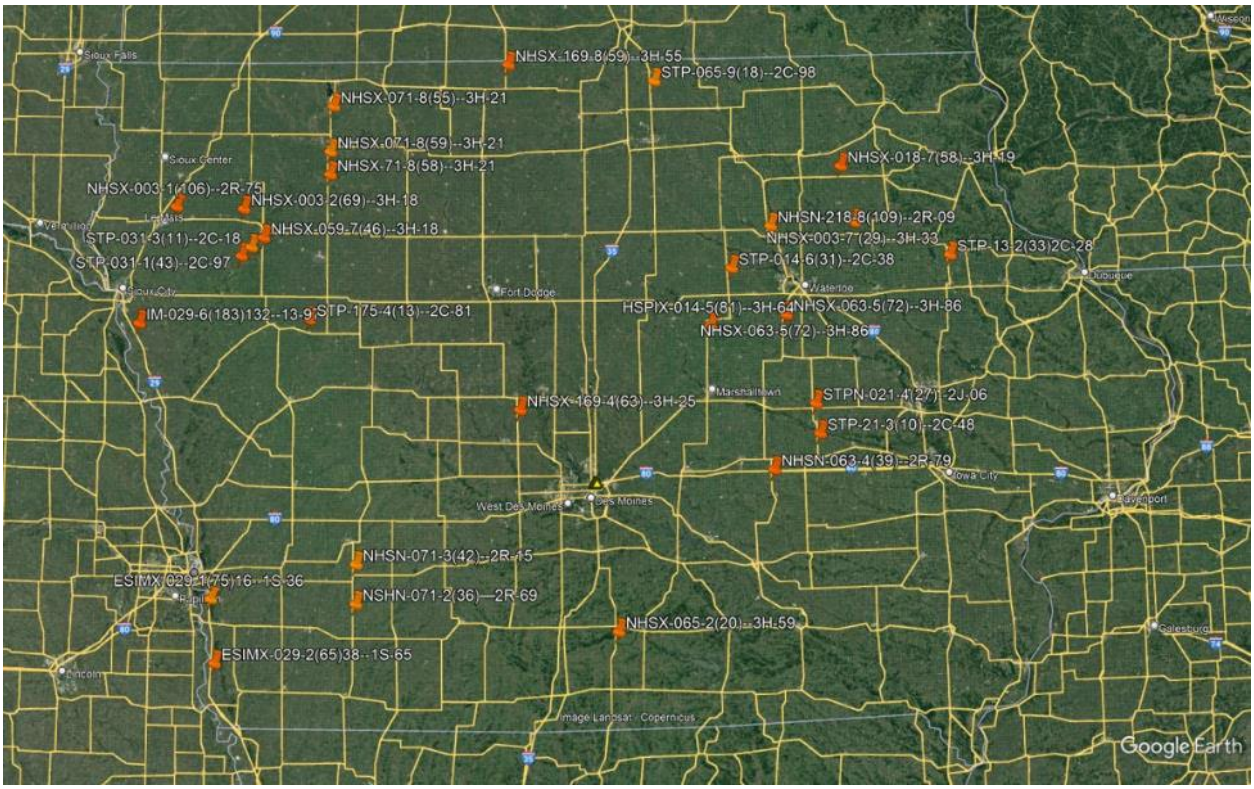
Appendix A – Iowa Primary Overlays Project Information

Google Map of Interstate and Primary PCC Overlays



Interstate & Primary Overlay Project History Table

Iowa DOT Interstate & Primary PCC Overlays

Existing Pavement	Overlay Type	District	County	PROJECT NO.	Route	DESCRIPTION	LENGTH (Miles)	S.Y.	ORIG CONST.	OVERLAY CONST.	ORIG. THICK/ WIDTH	OVERLAY THICKNESS (in)	JOINT SPACING (ft)	PROJECT NOTES	CONTRACTOR
HMA	WT	4	Adair	I-IR-80-2(82086--14-01	I-80	I-80 WBL MP 93.86 to MP 97.25	5.000			1979		10	20	10";24'	QCC
PCC	BOL	4	Pottawattamie	I-EAC/R-80-1(126)	I-80	I-80 EBL Avoca to Shelby	4.492	63,246	1966	1979		3	20	3; replaced no later than 1990 (new PCC)	KCC
HMA	WT	4	Adair	IM-80-2(89)86--14-01	I-80	I-80 EBL (rt. Lane only) MP 85.75 to MP 88.86	8.100			1981		10	20	10"x12.5"; overlaid with 4" HMA in 2009	QCC
PCC	BOL	1	Poweshiek	IR-80-5(106)	I-80	I-80 fr 1 mi. E of IA 146 E approx. 9 mi. to 125	9.084	127,900	1964	1984	10" PCC	4	20	4; overlaid with 4" HMA in 2007	MAN
PCC	BOL	3	Buena Vista	FR-71-7(32)	U.S. 71	U.S. 71 - Jct. IA 3 to Jct. IA 10	6.800	95,773	1949	1986		4	20	4" Bonded Fast Track RESEARCH Project	CPC
PCC	BOL	4	Pottawattamie	IR-80-1(167)	I-80	I-80 [WB] Shelby Intrchg. M16 E to Avoca Intrchg. U.S.59	4.134	53,600	1966	1988		6	20	6; replaced no later than 2005 (new PCC)	IFJ
PCC	BOL	6	Scott	IR-280-9(97)	I-280	I-280 SBL fr S.ff IA22, N to US 6	7.250	137,390	1972	1989		5	20	5.0 Cl.C; replaced sometime after 2011 (new PCC)	CVC
PCC	BOL	6	Scott	IR-280-8(98)	I-280	I-280 [NBL] fr I-80 SE to Mississippi river bridge	1.000	19,212	1973	1990		5	20	5.0 Cl.F; replaced 2011?	VCC
PCC	BOL	6	Scott	IR-280-8(98)	I-280	I-280 [NBL] fr I-80 SE to Mississippi river bridge	7.230	142,863	1973	1990		5	20	5.0 Cl.C; replaced 2011?	VCC
PCC	BOL	1	Hamilton	IR-35-5(54)133--12-40	I-35	I-35 N of Intrchg. with Co. rd D41 N to Intrchg. IA	4.022	65,259	1967	1991		5	20	5.0 Cl.C; replaced 2003? (New PCC)	FCC
PCC	BOL	1	Hamilton	IR-35-5(56)133--12-40	I-35	I-35 fr 2 mi. N of IA 175 Interchg., N approx. 1 mi. N of Co. rd D41 Intrchg.	6.052	111,189	1967	1992	8" PCC	5	20	5.0 Cl.C. SB lane replaced sometime after 2011 (New PCC)	IFJ
PCC	BOL	2	Franklin	NHS-3-5(50)--19-35	IA 3	From .3 mi. W. of JCT 541, E. 1.8 mi. & 2 locs. At I-35 Intrchg.	2.900	40,260	1970	1994	9" PCC	3	20		CVC
HMA	WT	6	Iowa	STP-21-3(10)--2C-48	IA 21	IA 21 fr Jct. of US 6 N to Jct. of IA 212	7.000		1961	1994	3" HMA 1964 0.5" HMA 7" CTB 1961	2, 4, 6	Various	Var. x24'; DOT RESEARCH Project Thin sections resurfaced	MAN
Comp	UBOL	6	Delaware	STP-13-2(33)2C-28	IA 13	IA 13 fr NCL of Manchester N to IA 3	9.545		1937	2002	3" HMA 1982 2" HMA 1964 10-7-10 -18' 1931	3.5 to 4.5	4 to 6?	3.5-4.5"x 28' RESEARCH Project	FCC
HMA	WT	4	Montgomery	NSHN-071-2(36)--2R-69	U.S. 71	U.S. 71 from US34 North to Cass Co. line	12.574	177,035	1972	2006	2" HMA 1981 9" HMA 24' 1972	8	14	8" 24' 3" milled	MAN
Comp	UBOL	3	Sac	STP-175-4(13)--2C-81	IA 175	IA175 from Ida Co. line E to W. Jct US 71	8.577	122,246	1939	2006	4" HMA 24' 1986 10-7.5-10 -20' 1939	4.5	7	4.5" 28' 1986 HMA widening w eng. Fabric over joint	CVC
HMA	WT	4	Cass	NHSN-071-3(42)--2R-15	U.S. 71	U.S. 71 from Montgomery Co line N. to Co. Rd G 43	10.560		1972	2007	2" HMA 1981 9" HMA 24' 1972	8	14	8" x 32' (12' with 4' tied lanes) 3" Milled	FLY
Comp	UBOL	3	Woodbury	IM-029-6(183)132--13-97	I-29	I-29 from Monona Co. Line N to Sergeant Bluff Interchange (NBL)	14.144	236,138	1959	2008	3" HMA 1989 10"-24' PCC 1959	9.5	15	2" Milled 9" 26', FD inside Shldr. paved integral. 7" Out Shldr. 14' driving lane over 12' existing & Shlder.	CVC
HMA	WT	2	Bremer	NHSN-218-8(109)--2R-09	U.S. 218	U.S. 218 Along Waverly Bly-Pass (MP 198.57 to 206.16)	7.750	279,940	1998	2009	11.5" 24' HMA	8.5	14	8.5" x 32' (12' with 4' tied lanes)	MAN
Comp	UBOL	4	Fremont	ESIMX-029-1(75)16--15-36	I-29	I-29, from 1.5 mile N. of Co. Rd. J-26 N. 1.5 mile N. of Co. Rd. J-24 (PCC overlay NBL/HMA resurface SBL)	4.240	66,170	1972	2009	8"-24' CRC/4"CTB	9	15	1" HMA Interlayer 9" x 26' (6' tied FD PCC Shoulders 10 R HMA outside). CD Joints	GOD
Comp	UBOL	4	Mills	ESIMX-029-2(65)38--15-65	I-29	I-29 from 3 miles N. of N. Jct US34 N. to Pottawattamie Co. line (NBL)	5.700	102,473	1971	2009	5" HMA 8" CRC-24' /4" ATB	9	15	HMA Milled Off, 1" New HMA 9" x 26' (6' tied FD PCC Shoulders + 10ft HMA outside). CD Joints	CVC
Comp	UBOL	3	Osceola	STP-009-2(21)-2C-72	IA 9	IA 9 from E. of relocated IA 60 E. to W. of Jct Co. Rd L-58	8.700	136,497	1931	2009	1.5" HMA 1983 3" HMA 1961 3" PCC Widen 1956 10-7-10 -18' 1931	5.5	5	5.5"x28' (4.5x4.5x5' long joints) #4 bars 6' @30" CTR 9.5" x 2' Widening	FLYNN

Interstate & Primary Overlay Project History Table (continued)

Iowa DOT Interstate & Primary PCC Overlays

		3	Clay	NHSX-071-8(59)--3H-21	U.S. 71	US 71: From Co. Rd. B53 N to 15th St in Spencer	7.740	138,911	1931	2015	1" ASC 1976 3" HMA 1962 10-7-10-18' 1931	6	8	6" x 32' (9 x8' panels mainline & 7x8' panels shoulders) UBOL #4 bars 36" @ 60" UBOL 2" Milling	CVC
Comp HMA	UBOL & WT	3	Clay	NHSX-71-8(58)--3H-21	US 71	US 71: Buena Vista Co. Line N. to Co. Rd. B53	6.95	123895	1931	2016	3" HMA 9.5" TBB 1993	6	6	6" x 32' (6 x 6' ML and 4 x 6' Shlder) WT #4 bars 36" @ 30" CTR WT 2" Milling	CVC
		3	Clay	NHSX-71-8(58)--3H-21	US 71	US 71: Buena Vista Co. Line N. to Co. Rd. B53	6.95	123895	1931	2016	1" ASC 1976 3" HMA 1962 10-7-10-18' 1931	6	6	6" x 32' (9 x8' panels mainline & 7x8' panels shoulders) UBOL #4 bars 36" @ 60" UBOL 2" Milling	CVC
Comp	UBOL	6	Benton	STPN-021-4(27)--2J-06	IA 21	IA 21; From E66 N. to just S. US 30	3.46	62080	1979	2016	2" HMA Interlayer 2016 8" PCC	5.5	6	6" x 32' (6 x 6' ML and 4 x 6' Shlder) #4 bars 36" @ 30" CTR 2" HMA Bondbreaker	MAN
Comp	UBOL	4 1	Dallas Boone	NHSX-169-4(63)--3H-25	US 169	US 169 From IA 141 N to US 30	13.02	239362	1940	2018	3" BAC 1987 PCT 1940	7	12	7" x 32' (12 x 12' ML and 4 x 12' Shlder) #4 bars 36" @ 60" CTR Geotextile Interlayer	MAN
Comp	UBOL	1	Marshall Grundy	HSPIX-014-5(81)--3H-64	IA 14	IA 14 From Co. Rd. E18 N. to W. JCT IA 175	11.28	155401	1932	2019	3.5" HMA 1991 1" 1979 1.5" 1959 PCT 1932	6	6	6" x 32' (6 x 6' ML and 4 x 6' Shlder) 1" milling Shoulder/Widening not tied	CVC
HMA	WT	3	Woodbury	STP-031-1(43)--2C-97	IA 31	IA 31 From E. JCT US 20 N. to Co. Rd. C66	8.2	137007	1955	2020	4.5" HMA 1997 BSC 1986 2.5" BAC 1967 3" AAC, 6"BTB, 6"SAS 1955	6	6	6" x 32' (6 x 6' ML and 4 x 6' Shlder) #4 x 36" @ 30"c-c 3" Milling Fiber Test Sections	CVC
HMA	WT	3	Cherokee	STP-031-3(11)--2C-18	IA 31	Washta to US 59	10.17	162607		2022	4.5" HMA 1997 BSC 1986 2.5" BAC 1967 3" AAC, 6"BTB, 6"SAS 1955	6	12	Fibers 4 lb/cy 3"Milling Euclid Tuf Strand SF Fibers #4 x 36" @ 30"c-c	CVC
HMA	WT	3	Plymouth	NHSX-003-1(106)--2R-75	IA 3	Lemars to Remsen	8.72	181506		2022	2" HMA 2009 11" HMA 1995	6	6	6" x 32' (6 x 6' ML and 4 x 6' Shlder) #4 x 36" @ 30"c-c 2" Milling 12 x 12 test section	Croell
Comp	UBOL	1	Tama	NHSX-063-5(72)--3H-86	US 63	From Traer to 0.5 mi S of IA 58	13.14	25286		2022	4" HMA 1998 9" PCC 1973	5	6	5" x 32' (6 x 6' ML and 4 x 6' Shlder) 3" Milling Fibers 5 lb/cy - Forta Ferro	Croell
HMA	WT	3	Plymouth	NHSX-003-1(104)--2R-75	IA 3	Remsen to Cherokee Co Line	5.36	75050		2023	2" HMA 2009 11" HMA 1995	6	12	6" x 36' (12 x12' ML & 6 x12' Shldr 2" Milling #4 x 36" @ 30"c-c Fibers 4 lb/cy Forta Ferro	Croell

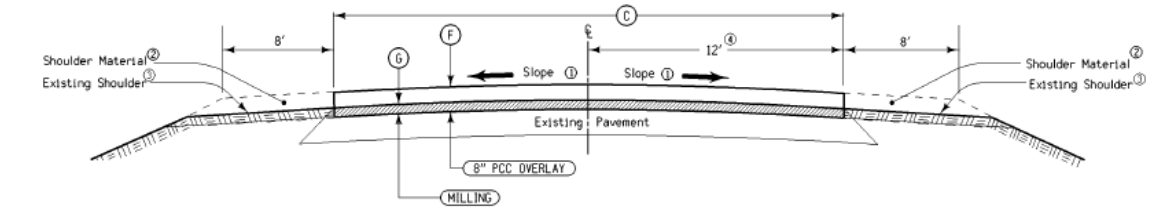
Interstate & Primary Overlay Project History Table (continued)

Iowa DOT Interstate & Primary PCC Overlays

Comp	UBOL	2	Worth	STP-065-9(18)--2C-98	U.S. 65	U.S. 65 from IA 9 in Manly N. to Co. Rd 105	10,960	182,078	1928-9	2009	2" HMA 1978 3" HMA 1961 1928-9 10-7-10 - 18'	5	5	5" x 32' [5" x24' & 4' x 8" Widening] #4 bars 6' @ 30" CTR 4.5x4.5x7ft long JCT 0.5" Milled - Paved half width at time	FLYNN
Comp	UBOL	2	Chickasaw	NHSX-018-7(58)--3H-19	U.S. 18	U.S. 18 from ECL of Fredericksburg E. to West Union	19,000	350,267	1938	2011	3" HMA 1984 3' HMA widen 1978 3" HMA 1966 10-7-10 20' 1938	4	5	4" x 32' [4" x24' & 4' x 8" widening] #5 bars 6' @ 30" CTR 0.5" Milled 2%	MAN
Comp	WT NB	3	Clay	NHSX-071-8(55)--3H-21	U.S. 71	U.S. 71 from US 18 North to SCL of Milford -NBL	9,000	362,471	1954	2012	3" HMA 1992 3" HMA 1984 2" HMA 1969 8" PCC 1954	6	6	6" x 24' (6 outside, 4' inside 8" PCC Shoulders) Shoulders tied with #5 x 6' @30" CTR 1 1/2 to 2 1/2" Milling	MAN
HMA	UBOL SB	3	Clay	NHSX-071-8(55)--3H-21	U.S. 71	U.S. 71 from US 18 North to SCL of Milford -SBL			1992	2012	11" HMA 1992	6	6	6" x 24' (6 outside, 4' inside 8" PCC Shoulders) Shoulders tied with #5 x 6' @30" CTR 1 1/2 to 2 1/2" Milling	MAN
Comp	UBOL	1	Grundy	STP-014-6(31)--2C-38	IA 14	IA 14 From .5 mile South of US 20 North to IA 57	6,910	119,469	1954	2013	2" HMA 1994 VL 8" PCC 1954	4.5	5.5	4.5" x 30' with safety edge #5 bars 3' @ 30" CTR 5.5 x 5.5 x 4' long jts 1" HMA 4'x4.5" widening	CFI
Comp	UBOL	2	Fayette	NHSX-003-7 (29)--3H-33	IA 3	IA 3 from West County Line to North City Limits of Oelwein	10,410	154,787	1930	2013	1.5" HMA 1984 3" HMA 1964 10-7-10 18' 1930	5	5	5" x 32' [5" x 24' & 4'x 9.5" widening] #5 bars 6' @ 30" CTR 4.5 x 5 @ 18' & 7' x 5' outside 1 1/2" Milling	Croell
Comp	UBOL	5	Lucas	NHSX-065-2(20)--3H-59	U.S. 65	U.S. 65, From Wayne Co. Line N. to US 34	8,750	154,994	1954	2013	10-8.5-10 22' 1954	5	5.5 x 5	5" x 32' [5" x 22' & 5' x 9" widening] #5 bars 36" @ 30" CTR 5.5 x 5.5 x 5' long jts 1" HMA	MAN
Comp	UBOL	2	Kossuth	NHSX-169-8(59)--3H-55	U.S. 169	U.S. 169, E. Jct. IA 9 N to Minnesota State Line	7,882	144,302	1940	2014	3" HMA 1984 & HMA Widen 3" HMA 1978 10-7.5-10 20' 1940	5	5	5" x 32' [5" x 24' & 4' x 8" widening] #5 bars 5' @ 30" CTR 5 x 5 x 6' long jts Scarification to 2% cross slope	Croell
Comp	UBOL	1	Poweshiek	NHSN-063-4(39)--2R-79	U.S. 63	US 63 from NCL Montezuma North to Just south of I-80	7,315	132,579	1987	2014	3" HMA 1988 10-7-10 20' 1936	5	5	5" x 32' [5" x 20' & 6' x 9.5" widening] #5 bars 36" @ 30" CTR 5 x 5 x 6' long jts Closed during paving	Croell
Comp	UBOL	3	Cherokee	NHSX-059-7(46)--3H-18	U.S. 59	US 59 from IDA Co. Line N. to IA 3	14,520	309,384	1991	2014	4.5" HMA 1991 3" HMA 1974 10-7.5-10 20' 1937	6	6	6" x 44' [6 x6' panels mainline & 5x5 panels shoulders) 6x6x5x5 long jts #4 bars 6' @ 30" CTR	CVC
Comp HMA	UBOL & WT	3	Cherokee	NHSX-003-2(69)--3H-18	IA 3	Iowa 3: Plymouth Co to ECL of Cleghorn	7,730	145,951	1937	2015	10-7-10 20' 1937	6	6	6" x 32' [5 x 6' ML and 6 x 6' Shlder] 5 x 5 x 6' long jts #4 bars 5' @30" CTR 1 1/2" HMA over PCC section	KNIFE
Comp	UBOL	1	Polk	STPN-069-4(100)--2J-77	U.S. 69	US 69: From Just N of 118th Ave N. to Just S. of IA 210	4,980	124,630	1921	2015	0.5" HMA 1962 1.5" HMA 1956 3" HMA 1949 8" PCC 1921 18'	5	5	5" x 36' [5" x 20' & 8' x 9.5" widening] #5 bars 36" @ 30" CTR 5 x 5 x 6' long jts Milled AC surface-Closed during paving	FUN
Comp HMA	UBOL & WT	3	Clay	NHSX-071-8(59)--3H-21	U.S. 71	US 71: From Co. Rd. B53 N to 15th St in Spencer	7,740	138,911	1931	2015	3" HMA 9.5" TBB 1993	6	6	6" x 32' [6 x 6' ML and 4 x 6' Shlder] WT #4 bars 36" @ 30" CTR WT 2" Milling	CVC

Appendix B - Primary Overlays Project Construction History and Review

Year	2006	**Overlay Type**	Whitetopping
County	Montgomery	**Design**	8” – 24 ft. CD 14 ft. HMA Shoulders
Route	US 71	**Milling**	3” milling
Project	NSHN-071-2(36)—2R-69	**Interlayer**	Existing HMA
Location	U.S. 71 from US34 North to Cass Co. line	**Tie Bars**	n/a



DESIGN RATES	
ITEM	RATE
Milling	145 lbs./sq. ft.

TABLE OF DESIGN QUANTITIES Per Station

LOCATION			(F)	(G)	(C)	MILLING	CLASS 13 EXCAVATION	8" PCC OVERLAY
ROAD IDENTIFICATION	STATION TO STATION		Inches	Inches	Feet	Tons	CY/Side ③	SY
US 71	10+00.00	27+50.00	8	6	24	87.0	9.9	266.67
US 71	27+50.00	620+00.00	8	3	24	43.5	2.5	266.67
US 71 ④	620+00.00	643+00.00	8	3	34	61.63	2.5	377.77
US 71	643+00.00	683+77.00	8	3	24	43.5	2.5	266.67

TYF

Notes:

① Finished slope shall match existing pavement except that the maximum allowable slope is 3.0 %, minimum allowable slope is 2.0 %. Section may be modified as directed by the Engineer through areas of special shaping.

② Shoulder material as specified elsewhere in these plans. See Typical 7153M for more details.

③ Top 4" of existing shoulder material will be removed from BOP to Sta 27+50. Top 1" of existing shoulder material will be removed from Sta. 27+50 to EOP. Shoulder will be reconstructed as per Typical 7153M. Per side per station.

④ 10' climbing lane on right. Includes 400' tapers at each end.

Construction

Some issues with HMA failing during construction. Several areas patched with new HMA.

Review 2023

Overall, in good condition. A few areas with cracking just off centerline (~4 to 5 locations). Some issues with centerline rumble strips went through transverse joints and were patched.

Year	2007	**Overlay Type**	UBOL
County	Sac	**Design**	4.5” x 28 ft. (7 x 7 ft. panels)
Route	IA 175	**Milling**	½” at CL – 2% cross slope
Project	STP-175-4(13)--2C-81	**Interlayer**	Existing HMA
Location	Ida Co. line E to W. Jct US 71	**Tie Bars**	None

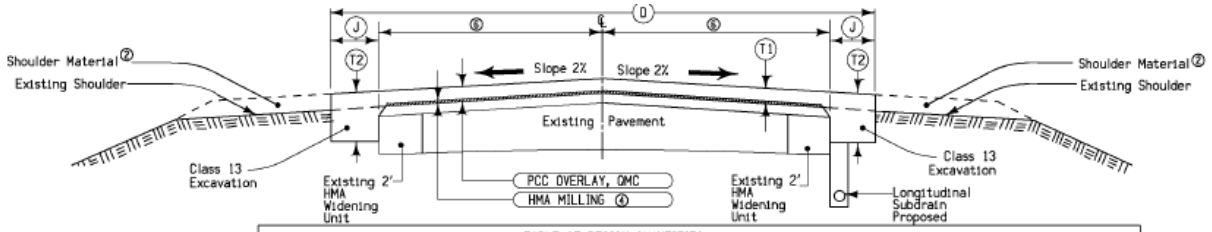


TABLE OF DESIGN QUANTITIES — Per Station

LOCATION			Ⓓ Feet	Ⓙ Feet	Ⓣ1 Inches	Ⓣ2 Inches	PCC OVERLAY, QMC (PLACE) Sq. Yds.	PCC OVERLAY, QMC (FURNISH) Cu. Yds. ③	MILLING Sq. Yds. ④	CLASS 13 Cu. Yds. ⑤
ROAD IDENTIFICATION	STATION TO STATION									
IA 175 (Div. 1)	2373+57	2533+80.1	28	2	4.5	8.0	311.1	46.91	266.67	4.32
IA 175 (Div. 2)	2533+80.1	2568+00	28	2	4.5	8.0	311.1	46.91	266.67	4.32
IA 175 (Div. 2)	2568+00	2575+51.7	28	1	4.5	8.0	311.1	45.06	288.89	2.16
IA 175 (Div. 2)	86+20.0	100+60.7	28	1	4.5	8.0	311.1	45.06	288.89	2.16
IA 175 (Div. 1)	100+60.7	332+93.6	28	2	4.5	8.0	311.1	46.91	266.67	4.32
IA 39 (Div. 2)	3+52.9	7+26.1	28	2	4.5	8.0	311.1	46.91	266.67	4.32

Notes:

2610
MODIFIED

① Refer to tabulation listing of superelevated curves and Standard Road Plans for additional requirements through superelevated curves.

② Shoulder material as specified elsewhere in these plans; refer to typical 7135 on 8.01 for "Type 'B' Granular Surfaced Shoulders."

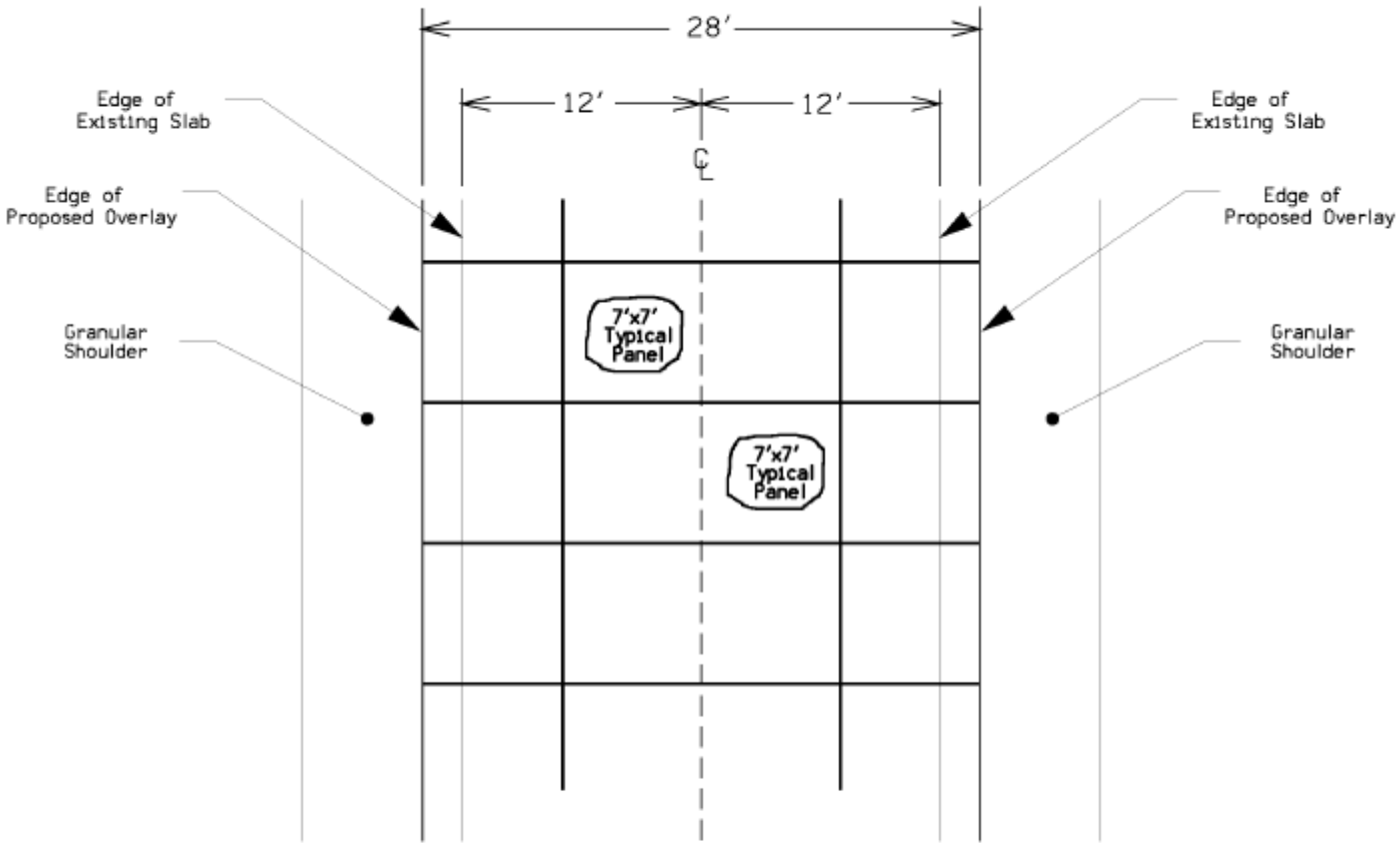
③ Quantity includes PCC widening units to be placed with PCC overlay and based on 5 inch thickness for irregularities.

④ Mill the existing HMA pavement ½" deep at centerline, and to a 2% cross slope except in areas of superelevation and as shown on Typical MW-1.

⑤ Includes both sides.

⑥ Existing pavement width is 24' except in Div. 2 (corporate limits of Odebolt) where it is 26'.

IA 175 / IA 39



JOINTS

——— Sawn (saw-cut width = ⅛", saw-cut depth = 1½")

– – – – Permissable Construction, Unsawn

2008 Cracking

Quite a bit of longitudinal cracking showed up the next year after construction. It was noted that the outside shoulders appeared to be heaving based on the cross slope.

Driving lane panel cross slope 2.09%

Shoulder panel cross slope 1.31%

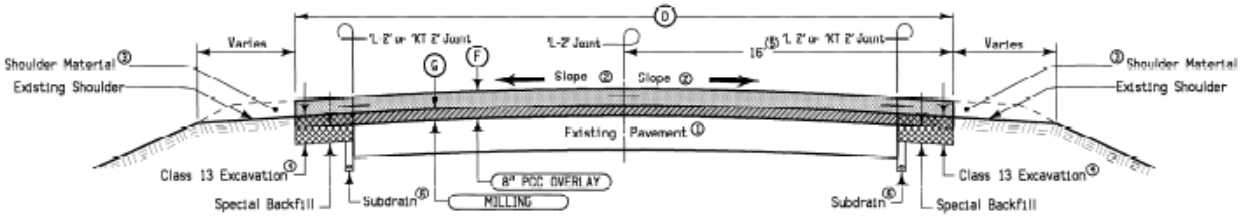
2017 Patching Project

Many of the areas needing patching were not at design thickness of 4.5 inches. Note in the picture that the overlay is 3 inches where patching.

2021 Review

After most of the cracking occurred, the district filled the longitudinal cracks with hot pour sealant. Even with all the cracking that occurred early, the pavement continues to ride fairly will. There are likely areas that need to be patched.

Year	2007	**Overlay Type**	Whitetopping
County	Cass	**Design**	8” x 32 ft. (12 x 14 ft. CD)
Route	US 71	**Milling**	3” Milled
Project	NHSN-071-3(42)--2R-15	**Interlayer**	Existing HMA
Location	Montgomery Co. line N. to Co. Rd G-43	**Tie Bars**	L-2 #5



DESIGN RATES	
ITEM	RATE
Milling	145 lbs./cu. ft.
Special Backfill	140 lbs./cu. ft.

TABLE OF DESIGN QUANTITIES Per Station

ROAD IDENTIFICATION	STATION TO STATION		(F) Inches	(G) Inches	(D) Feet	MILLING SY	CLASS 13 EXCAVATION (4) CY	SPECIAL BACKFILL Tons	8" PCC OVERLAY SY	8" PCC OVERLAY LF
US 71	683+77.00	(7) 894+84.68	8	3	32	266.7	22.2	28	355.56	79.01
US 71	(7) 100+00.00	434+90.00	8	3	32	266.7	22.2	28	355.56	79.01
US 71	564+21.00	582+91.00	8	6	32	266.7	22.2	14	355.56	79.01

Modified

Notes:

(1) Existing pavement width is 24 ft.

(2) Finished slope shall match existing pavement except that the maximum allowable slope is 3.0% minimum allowable slope is 2.0%. Section may be modified as directed by the Engineer through areas of special shaping.

(3) Shoulder material as specified elsewhere in these plans; refer to Typical 7110M.

(4) 9" depth 4' wide. 6" to be replaced with Special Backfill for subdrain work prior to PCC overlay. (Both sides)

(5) Includes 4' PCC paved shoulder. Refer to Typical 2205M for climbing lane details.

(6) Refer to Typical PCC-4 for details. See Tab 104-9 for locations.

(7) Equation Sta. 894+84.68 Back = Sta. 100+00.00 Ahead

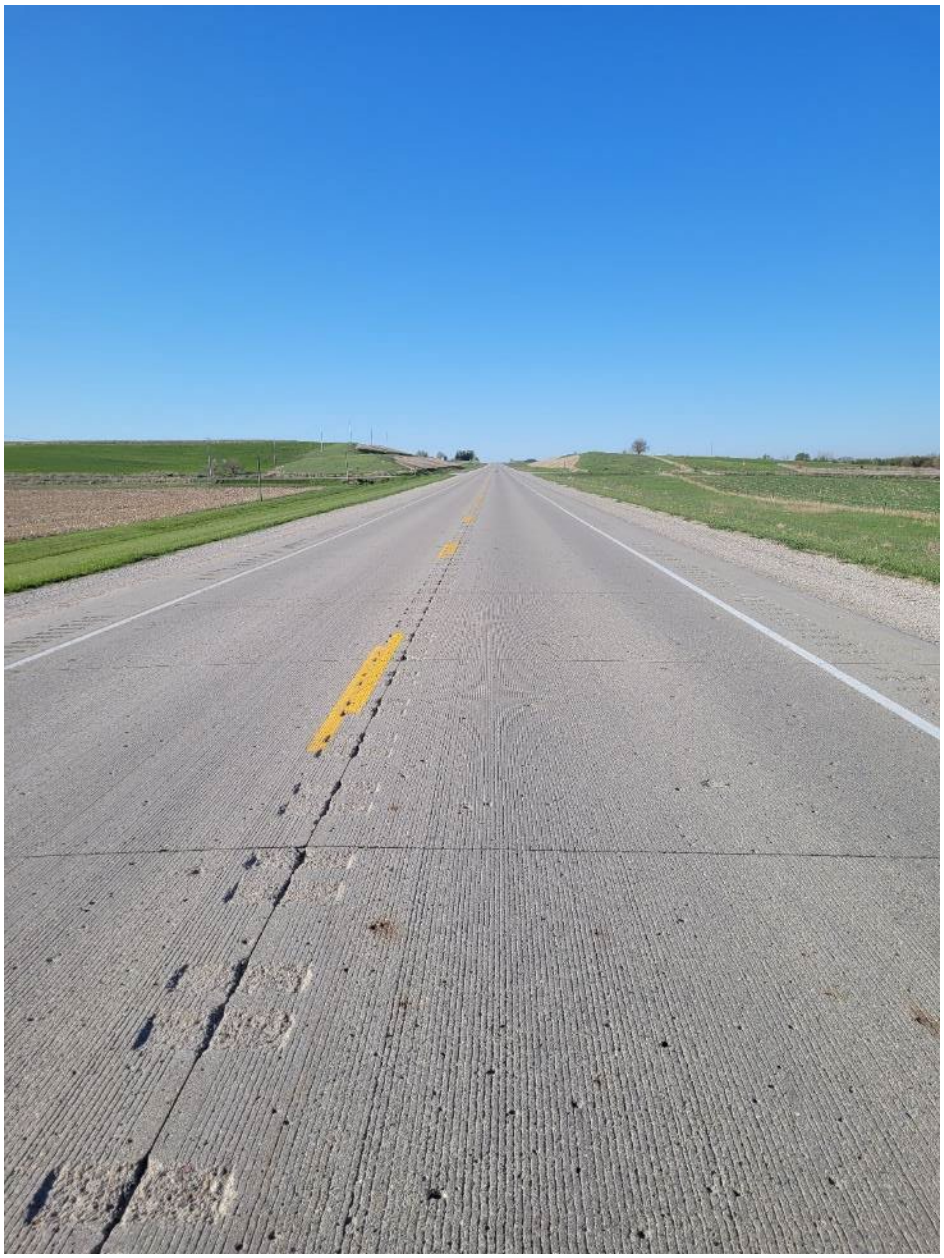
(11) Refer to Detail Sheet 1103 for details.

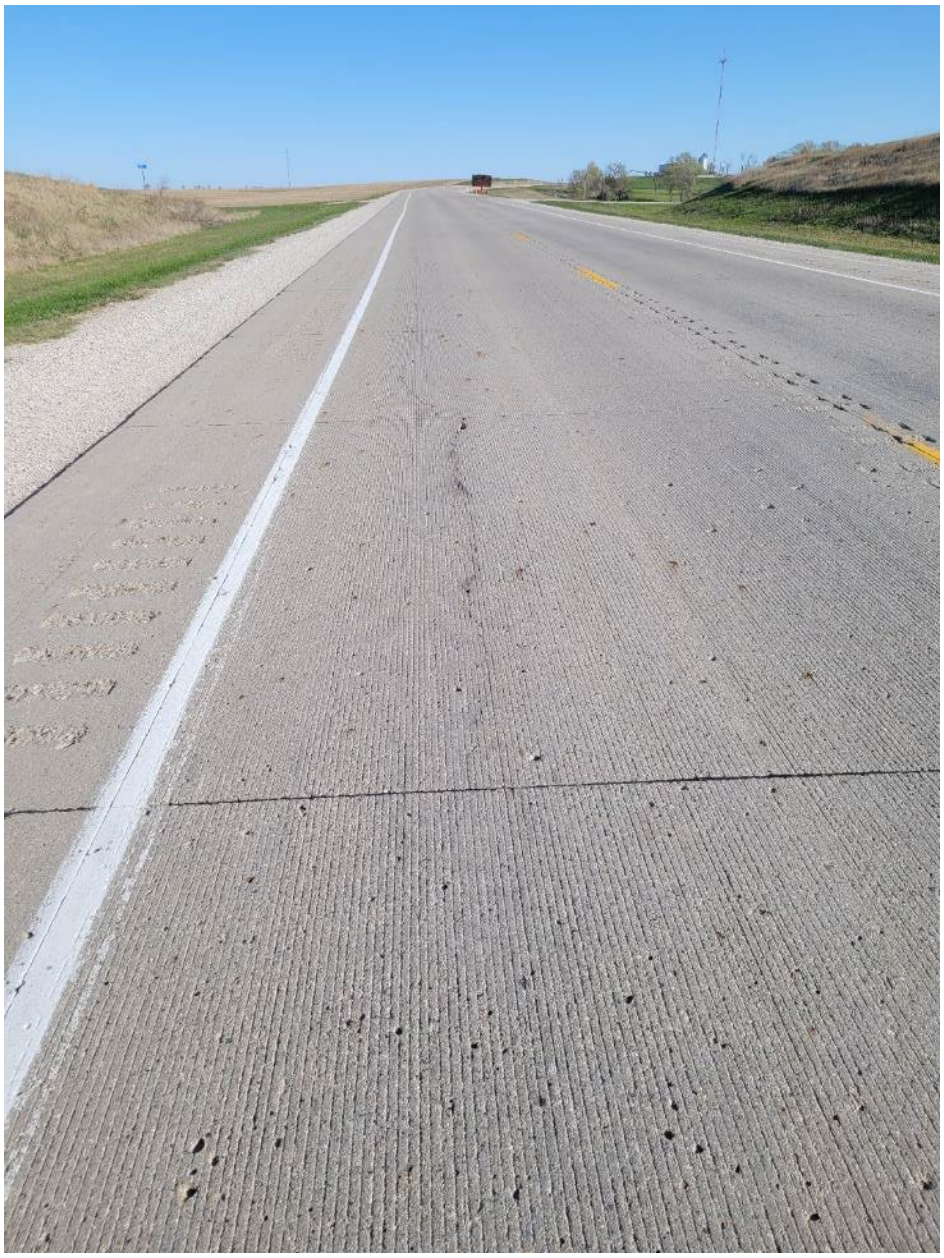
Construction

There were areas where the HMA was in poor condition and new HMA was placed. A shortage of haul trucks caused the paving machine to move slowly waiting for concrete. There are several areas where the grout box material was dropped into the pavement. These areas have major popouts from the light particles in the gravel source.

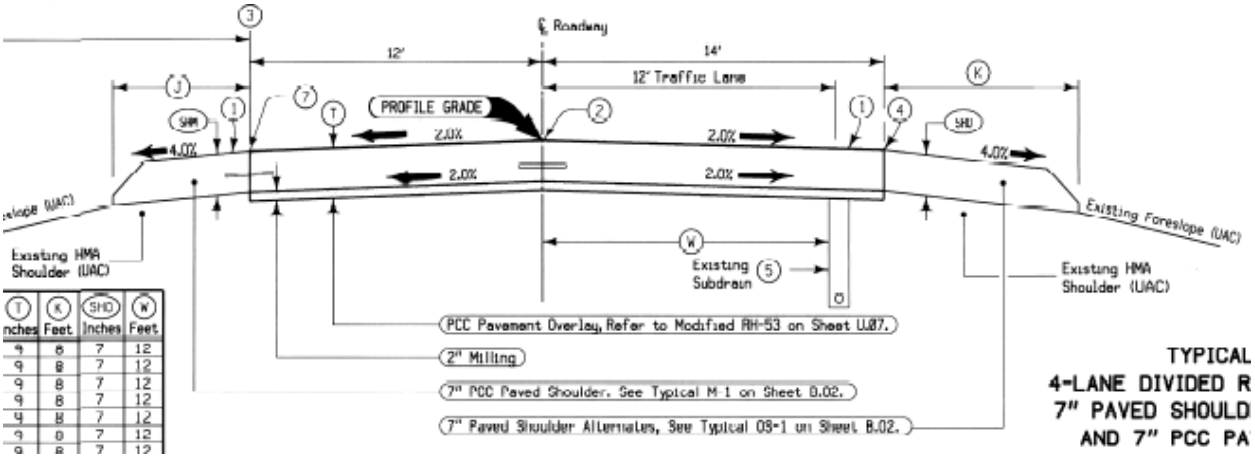
2023 Review

Overall, in good condition. There are approximately 3 to 4 areas with cracking at quarter point. There are also areas where milled rumble strips went through transverse joints and blew out edge.





Year	2008	**Overlay Type**	UBOL
County	Woodbury	**Design**	9” x 26’ FD Inside Shoulder integral. 7” Outside Shoulder.
Route	I-29 NB	**Milling**	2” Milling
Project	IM-029-6(183)132--13-97	**Interlayer**	Existing HMA
Location	Monona Co. Line N to Sgt. Bluff	**Tie Bars**	#5



T Inches	K Feet	SHO Inches	W Feet
9	8	7	12
9	8	7	12
9	8	7	12
9	8	7	12
9	8	7	12
9	8	7	12
9	8	7	12

NBML

1. Shoulder rumble strip required. Refer to Sheets U.08 and U.10 for details.
2. "L-2" joint required. See Standard Road Plan RH-51.
3. The median shoulder may be placed with the 26-ft. wide I-29 NB mainline pavement.
4. For the PCC alternate, use "L-1", "KT-1", or "BT-1" joint. See Standard Road Plan RH-51.
5. UAC and protect existing subdrains.
6. Profile grade for this project is located on the centerline of the NB lanes.
7. Use "L-2", "K-2", or "BT-2" joints. See Standard Road Plan RH-51.

Construction

During milling of the HMA, there were a few areas where the HMA peeled off the existing concrete.

Section 2 Cross stitching 9242 feet right, 3763 feet left.

Year	2009	**Overlay Type**	UBOL
County	Osceola	**Design**	5.5"x28' (4.5x4.5x5' long joints)
Route	IA 9	**Milling**	None
Project	STP-009-2(21)—2C-72	**Interlayer**	Existing HMA Surface
Location	IA 60 E. to L-58	**Tie Bars**	#4 bars 6' @30" CTR

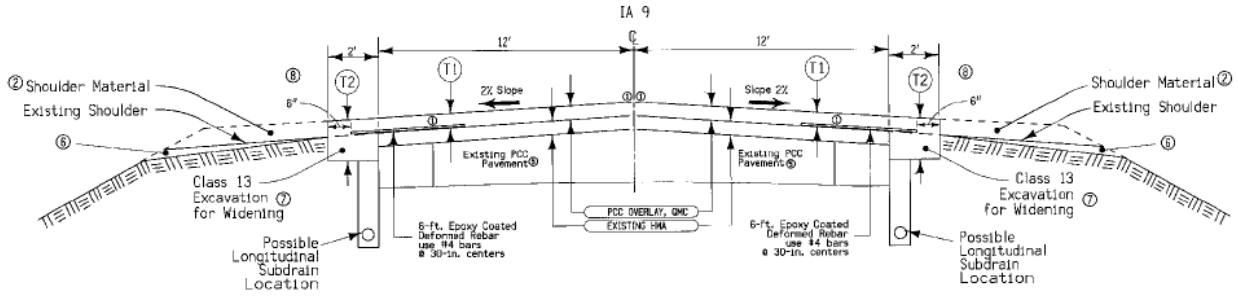


TABLE OF DESIGN QUANTITIES Per Station

LOCATION			D	J	T1	T2	PCC OVERLAY, QMC (PLACE)	PCC OVERLAY, QMC (FURNISH) ③	CLASS 13 ④
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Inches	Inches	Sq. Yds.	Cu. Yds.	Cu. Yds.
IA 9	188+95	360+31.4	28	2	5.5	9.5	311.11	56.79	4.94
IA 9	760+99.47	839+98.21	28	2	5.5	9.5	311.11	56.79	4.94
IA 9	848+89.11	935+58.5	28	2	5.5	9.5	311.11	56.79	4.94
IA 9	943+71.5	1043+25	28	2	5.5	9.5	311.11	56.79	4.94

TYPICA
UNBONI

Notes:

① Longitudinal joints shall be located at centerline, 4.5-ft Lt. and Rt. of centerline and 9.0-ft. Lt. and Rt. of centerline. A modified "L-1" (ML-1) joint shall be located at 9.0-ft. Lt. and Rt. of centerline with a 6-ft. long reinforcing bar. Transverse joints shall be located at 5.0-ft. spacings.

Each 6-ft. rebar shall be attached to the existing HMA surface in at least 3 locations. Connectors shall be no less than 12-in. apart and no more than 15-in. apart. See Sheet LL01 for a plan view of the required joint layout.

② Shoulder material as specified elsewhere in these plans; refer to typical 7135 on Sheet B.1 for "Type 'B' Granular Surfaced Shoulders."

③ Quantity is estimated using a 8-in. thickness over the existing 24-ft. wide pavement and a 10-in. thickness for the integral 2-ft. widening units.

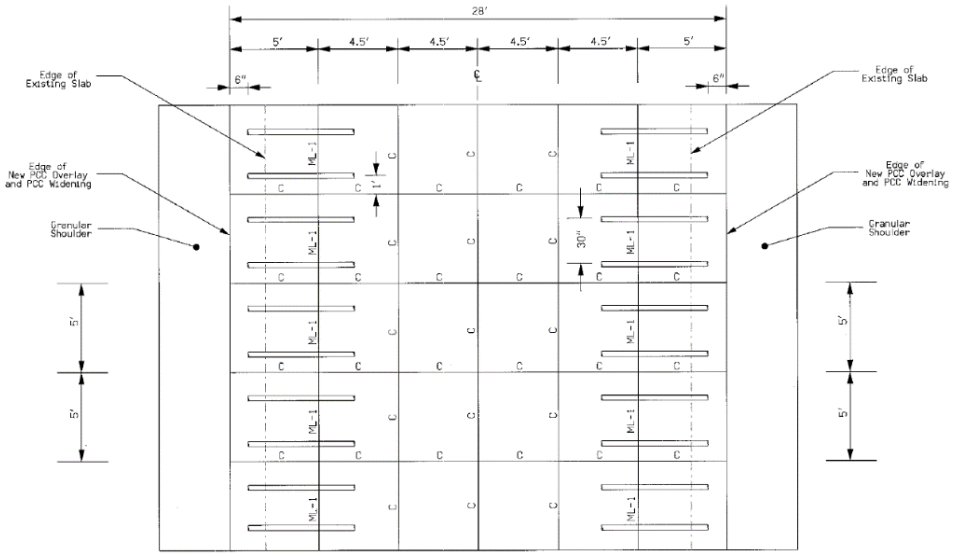
④ Includes both sides.

⑤ Existing total pavement width is 24'.

⑥ Earth Shoulder Construction: Place and compact Class 13 Excavation in this area to build up the shoulder and eliminate the secondary ditch along the edge of the existing shoulder. Slope shall be adjusted as directed by the Engineer.

⑦ Any existing HMA edgerut or fillet material within 2-ft. of the edge of the existing pavement shall be considered Class 13 Excavation except at paved county road intersections.

⑧ Existing HMA fillet material that is located 2-ft. or more from the edge of existing pavement will be tabulated as Additional Class 13 Excavation at Entrances and Gravel Road Intersections. See Tab ADDC. 13 on Sheet C.8.


28'
5'
4.5'
4.5'
4.5'
4.5'
5'
6"
6"
℄
Edge of Existing Slab
Edge of Existing Slab
Edge of New PCC Overlay and PCC Widening
Edge of New PCC Overlay and PCC Widening
Granular Shoulder
Granular Shoulder
1"
30"
5'
5'
5'
5'
MIL-1
C

Construction

Some issues with late sawing causing cracking off end of saw joints.

2021 Review

Panels moving, especially west of US 59. Maintenance placed patches with foam on either said to accommodate slab movement. We noted that now the slabs will move even more. District will let a patching project to ad full depth patches in areas to prevent slab migration.

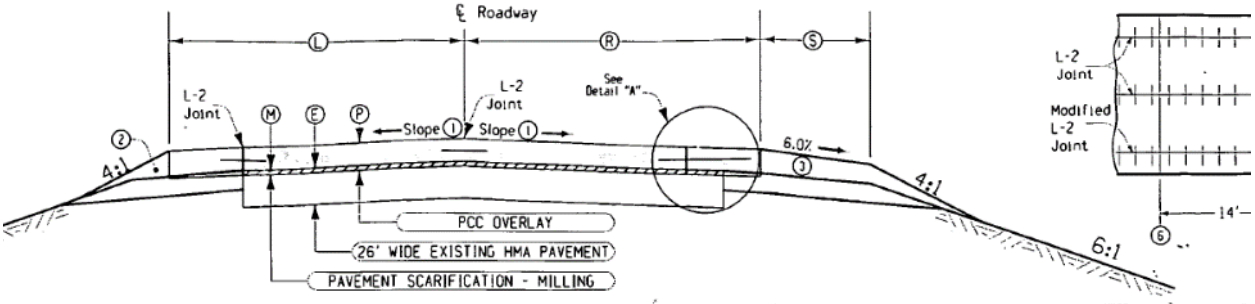
Longitudinal cracking

PCC overlay in better condition east of US 59.

2023

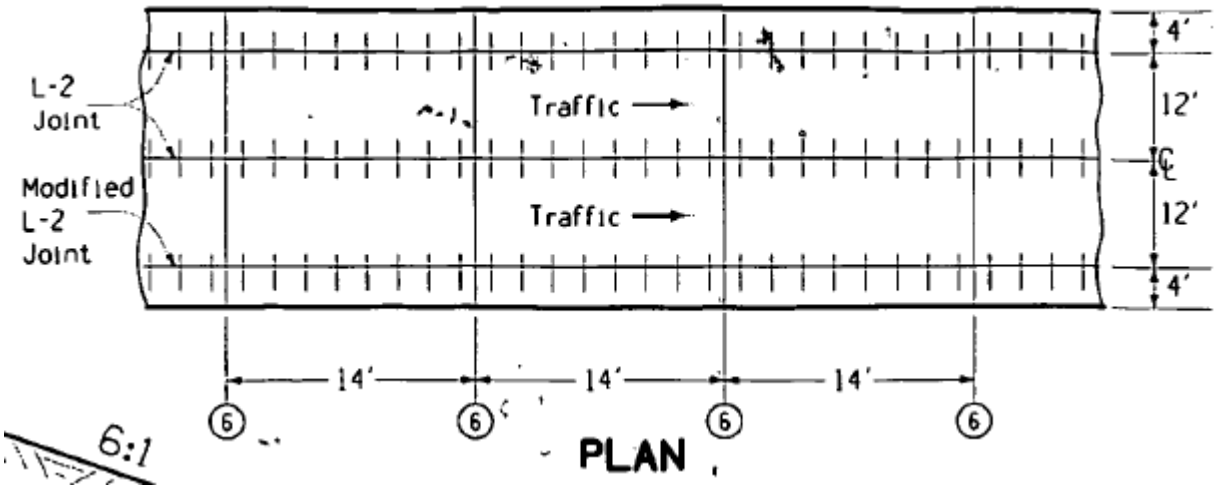
Project let in 2023 included 4293.3 SY of 10-foot x 28-foot x 17-inch full depth patching and 8.9 miles of joint sealing for the entire project. Full depth patches were selected try to stop panel movement.

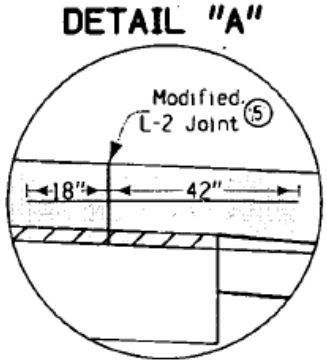
Year	2009	**Overlay Type**	WT
County	Bremer	**Design**	8.5" x 32' (12' with 4' Shoulder.
Route	US 218	**Milling**	Scarify Existing
Project	NHSN-218-8(109)--2R-09	**Interlayer**	Existing HMA
Location	Waverly Bypass	**Tie Bars**	Modified L-2 5’ bar



Design Quantities ④ — * Not a Bid Item

Location			Ⓟ	Ⓔ	Ⓜ	Ⓛ	Ⓡ	Ⓢ	PCC Pavement	*Pavement Scarification	Pavement Scarification
Road Identification	Station To Station		Inches	Inches	Inches	Feet	Feet	Feet	Sq. Yds.	Sq. Yds.	Tons
Northbound Lanes											
U.S. 218	319+44.00	328+25.00	8.5	11.5	1.5	16	16	6	3132	2838	223
U.S. 218	336+75.00	496+66.38	8.5	11.5	1.5	16	16	6	56,858	46,197	3638
U.S. 218	506+25.00	514+52.97	8.5	11.5	1.5	16	16	6	2944	2392	188
U.S. 218	523+36.66	550+63.78	8.5	11.5	1.5	16	16	6	9696	7878	227
U.S. 218	559+64.78	658+85.00	8.5	11.5	1.5	16	16	6	35,236	28,629	2255
U.S. 218	666+85.00	713+85.00	8.5	11.5	1.5	16	16	6	16,711	13,578	1069
Southbound Lanes											
U.S. 218	311+26.00	496+66.38	8.5	11.5	1.5	16	16	6	65,921	55,854	4399
U.S. 218	506+25.00	514+83.43	8.5	11.5	1.5	16	16	6	3052	2480	195
U.S. 218	523+67.12	550+63.78	8.5	11.5	1.5	16	16	6	9588	7790	613
U.S. 218	559+64.78	658+85.00	8.5	11.5	1.5	16	16	6	35,236	28,629	2255
U.S. 218	666+85.00	713+85.00	8.5	11.5	1.5	16	16	6	16,711	13,578	1069
		TOTALS							255,085	209,843	16,131




DETAIL "A"
Modified
L-2 Joint
5
18"
42"

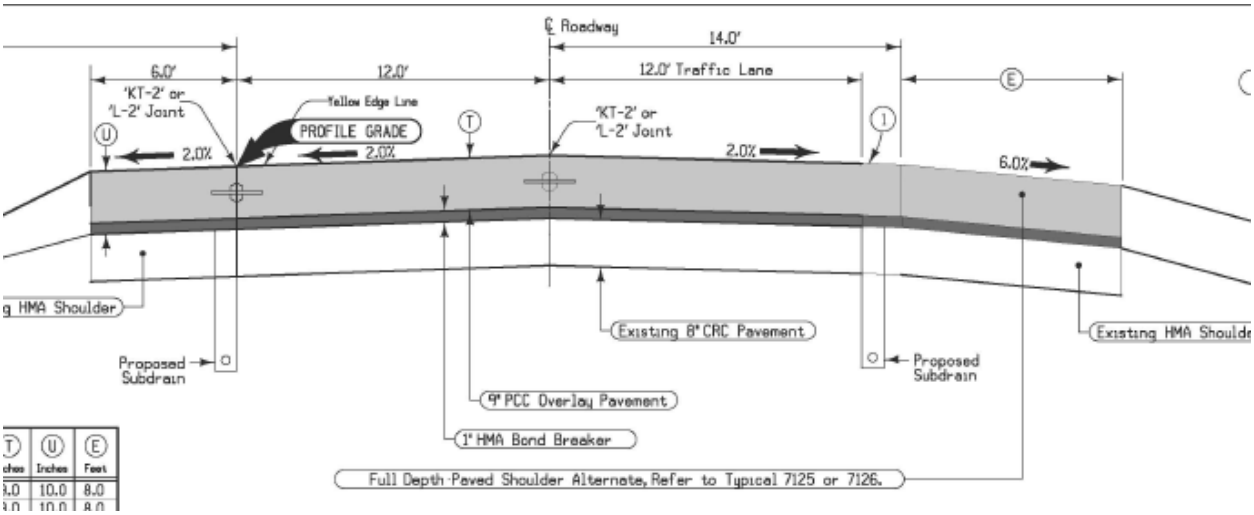
Construction


GOMACO

2023 Review

Overall, in good condition. An area on the north end of the southbound lanes exhibits some issues at the joints. There are a few random areas of longitudinal cracking in the driving lane.

Year	2009	**Overlay Type**	UBOL
County	Fremont	**Design**	9" x 26' (8' & 6' HMA Shoulders) CD
Route	I-29 NB	**Milling**	n/a
Project	ESIMX-029-1(75)16--1S-36	**Interlayer**	1" HMA New
Location	1.5 mile N. of Co. Rd. J-26 N. 1.5 mile N. of Co. Rd. J-24	**Tie Bars**	L-2



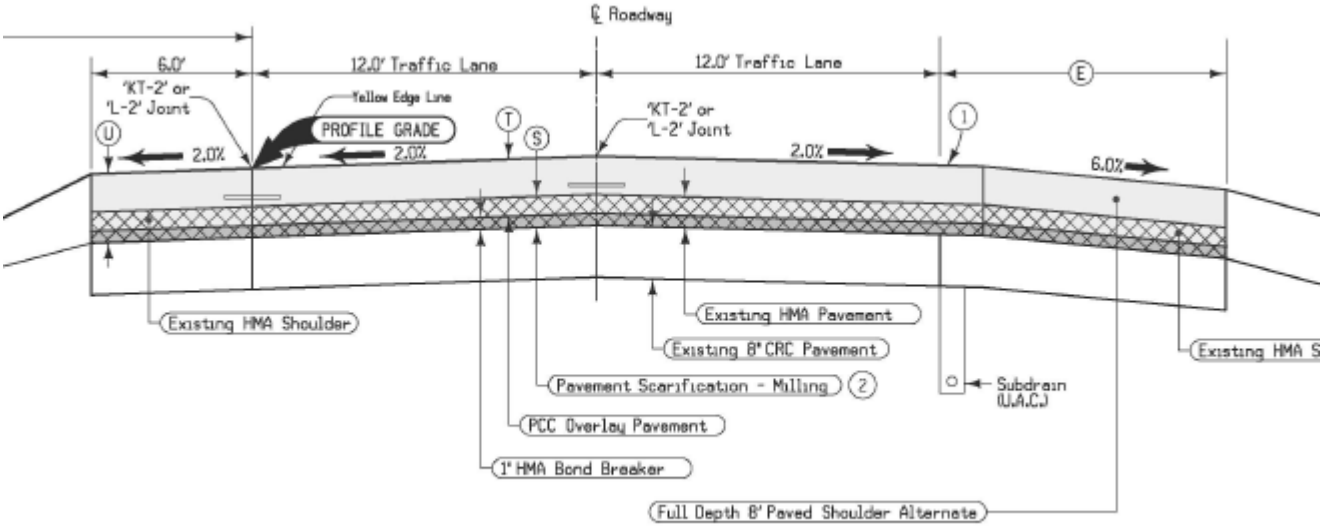
LOCATION NORTHBOUND LANES			MW	M		T	U	E
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet		Inches	Inches	Feet
I-29 NBL	886+00	1016+00	64	UAC		9.0	10.0	8.0
I-29 NBL	1020+00	1043+50	64	UAC		9.0	10.0	8.0
I-29 NBL	1047+30	1120+00	64	UAC		9.0	10.0	8.0

NOTE: Station equation: Sta. 975+23.92 BacK = Sta. 985+48.40 Ahead.

2023 Review

Pavement in very good condition. No issues with cracking.

Year	2009	**Overlay Type**	UBOL
County	Mills	**Design**	9" x 26' (8' & 6' HMA Shoulders) CD
Route	I-29	**Milling**	4-5" Existing HMA removed
Project	ESIMX-029-2(65)38--1S-65	**Interlayer**	1" New HMA
Location	3 miles N. of N. Jct US34 N. to Pottawattamie Co. line	**Tie Bars**	L-2



LOCATION NORTHBOUND LANES			MW	M	S	T	U	E
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Inches	Inches	Inches	Feet
Mills Co.	EQN: STA. 865+69.20 = STA. 860+71.80							
I-29 NBL	701+31.00	862+65.16	50	UAC	5.0	9.0	10.0	10.0
	863+58.63	944+44.40	50	UAC	5.0	9.0	10.0	10.0
Pott. Co.	EQN: STA. 944+44.40 = STA. 00+00.00							
I-29 NBL	00+00.00	60+24.60	50	UAC	4.0	9.0	10.0	10.0

2023 Review

Pavement in very good condition. No issues with cracking.

Year	2009	**Overlay Type**	UBOL
County	Worth	**Design**	5.5"x28' (4.5x4.5x5' long joints)
Route	US 65	**Milling**	0.5” Milling – Paved Half Width
Project	STP-065-9(18)--2C-98	**Interlayer**	Existing HMA
Location	IA 9 N. to Co. Rd 105	**Tie Bars**	#4 bars 6' @ 30" CTR

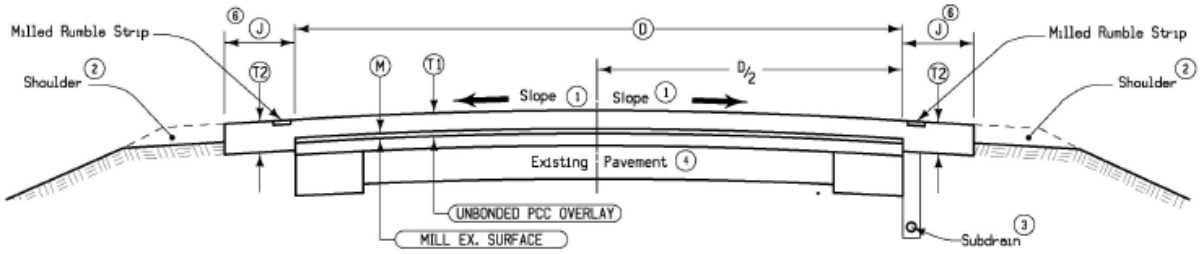


TABLE OF DESIGN QUANTITIES Per Location (5)

LOCATION			(M)	(T1)	(D)	(T2)	(J)	PCC OVERLAY QMC (Furnish)	PCC OVERLAY QMC (Place)	REMARKS
ROAD IDENTIFICATION	STATION TO STATION		Inches	Inches	Feet	Inches	Feet	Cu. Yds.	Sq. Yds.	
US 65	2329+00.05	2331+25.05	0.5	5.0	24	8.0	4	129.2	800.0	225' to BOP
US 65	2331+25.05	2434+22.00	0.5	5.0	24	8.0	4	4405.1	28137.9	BOP to 1st Bridge Approach
US 65	2436+14.00	2447+03.05	0.5	5.0	24	8.0	4	626.0	3872.2	End 2nd Bridge Approach to 1st Reconstruction
US 65	2462+79.00	2575+61.00	0.5	5.0	24	8.0	4	6460.7	40113.8	End 1st Reconstruction to Town Section
US 65	2575+61.00	2629+28.00	2.0	5.0	24	8.0	4	2482.0	19,082.7	Town Section
US 65	2629+28.00	2667+38.00	0.5	5.0	24	8.0	4	2120.5	13,546.7	Town Section to 3rd Bridge Approach
US 65	2669+28.00	2767+06.00	0.5	5.0	24	8.0	4	5427.7	34,766.2	4th Bridge Approach to 5th Bridge Approach
US 65	2786+82.99	2908+06.00	0.5	5.0	24	8.0	4	6625.8	43,104.0	End 2nd Reconstruction to 225' from EOP
US 65	2908+06.00	2910+31.00	0.5	5.0	24	8.0	4	129.2	800.0	225' to EOP
370th St.	Total Area = 2054.5							50.7	228.3	Quantity subtracted to get TOTAL
390th St.	Total Area = 2051.6							50.7	228.0	Quantity subtracted to get TOTAL
430th St.	Total Area = 2054.5							50.7	228.3	Quantity subtracted to get TOTAL
TOTAL:								29,569.0	183,448.9	

Modified

Notes:

(1) Finished slope shall match existing pavement except that the maximum allowable slope is 3.0% minimum allowable slope is 2.0%. Section may be modified as directed by the Engineer through areas of special shaping.

Refer to tabulation listing of superelevated curves and Standard Road Plans for additional requirements through superelevated curves.

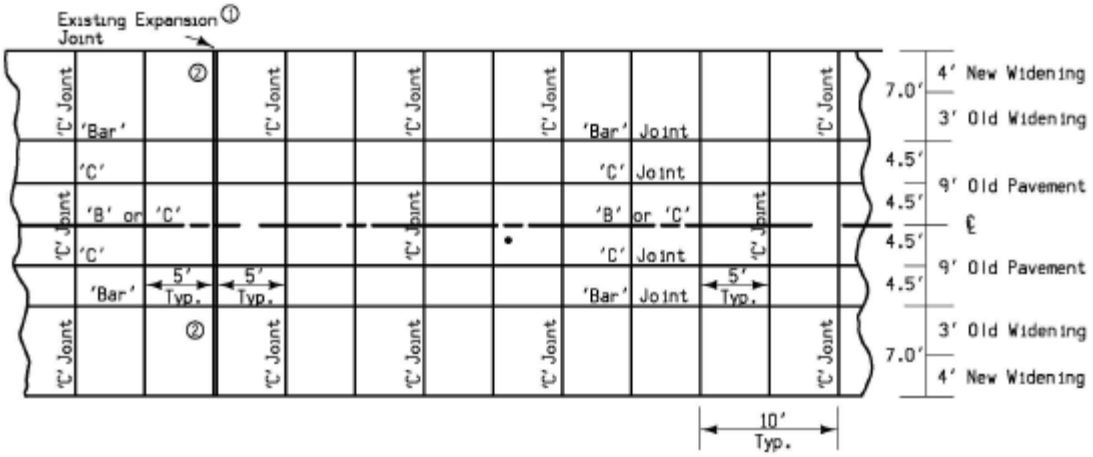
(2) Refer to other drawings for details of shoulder design and construction.

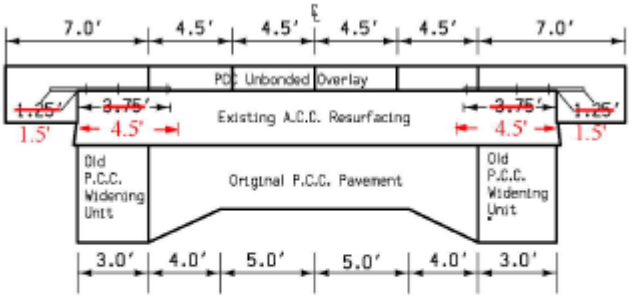
(3) Refer to Standard Road Plan RF-19C. Subdrain on one side only.

(4) PCC Pavement with PCC Widening Units and HMA Resurfacing

(5) Quantities include partially paved shoulders based on T2 of 8.5 inches for irregularities.

(6) See Typicals TL-1, TL-2 and 'J' Sheets for locations where (J) is omitted for turn lanes.





Notes:

① Extend existing expansion joints in kind in new pavement.

② Place CF joint in overlay.

Construction

Overlay was placed half width at a time.

2013 Review

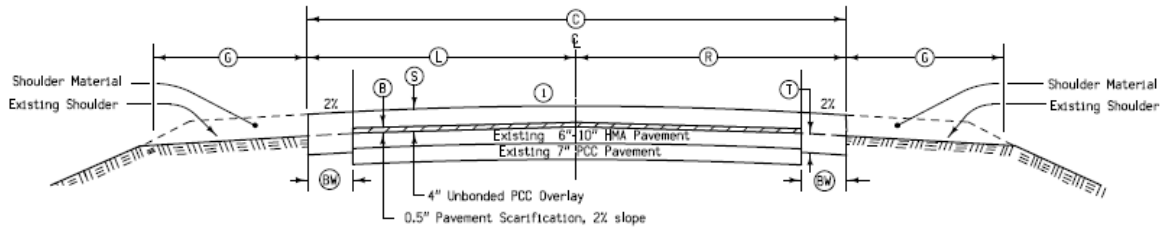
Areas of cracking and broken panels.

2021 Review

Areas of blowups due to panel movement.

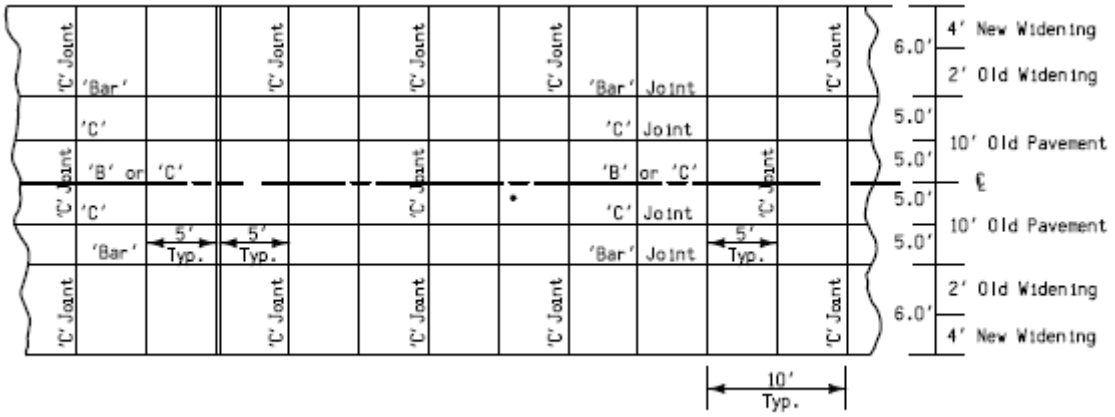
2023 - Patching project let in 2023 with 2536.4 SY of 10-inch full depth patching and 293 patches by count.

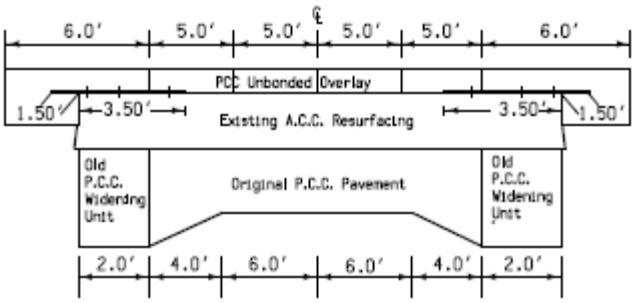
Year	2011	**Overlay Type**	UBOL
County	Chickasaw-Fayette	**Design**	4" x 32' (4" x24' & 4' x 8" widening) - Paved half width
Route	US 18	**Milling**	0.5" Milled 2%
Project	NHSX-018-7(58)--3H-19	**Interlayer**	Existing HMA
Location	ECL of Fredericksburg E. to West Union	**Tie Bars**	#5 bars 6' @ 30" CTR



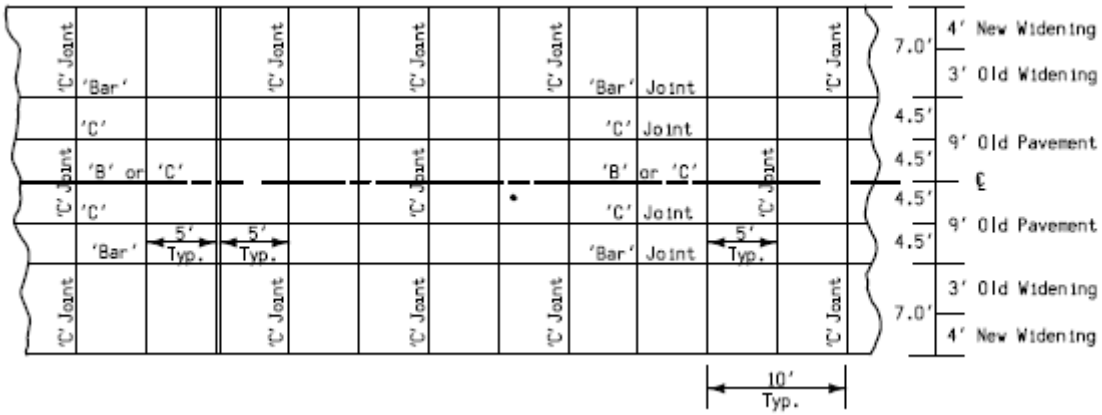
Location			(S)	(B)	(3) (C)	(L)	(R)	Overlay Quantities (2) Per Station (2) Class 13	PCC Overlay	(T)	(BW)	(G)	(5) Granular Shoulder	Remarks
Road Identification	Station To Station		Inches	Inches	Feet	Feet	Feet	Cu. Yds.	Cu. Yds.	Inches	Feet	Feet	Tons	
US 18	346+55.4	416+37	4	0.5	32	16	16	12.35	49.38	4	4	6	33.97	
US 18	420+08	784+66.0*	4	0.5	32	16	16	12.35	49.38	4	4	6	33.97	
US 18	83+74	99+92.9	4	0.5	32	16	16	12.35	49.38	4	4	6	33.97	
US 18	99+92.9	100+42.9	Vart	0.5	32	16	16	12.35	54.32	4	4	6	35.87	
US 18	100+42.9	108+68.8	5	0.5	32	16	16	12.35	59.26	4	4	6	37.77	***
US 18	108+68.8	109+18.8	Vart	0.5	32	16	16	12.35	54.32	4	4	6	35.87	
US 18	109+18.8	340+33	4	0.5	32	16	16	12.35	49.38	4	4	6	33.97	
US 18	346+82	701+87.27	4	0.0	32	16	16	12.35	49.38	4	4	6	33.97	

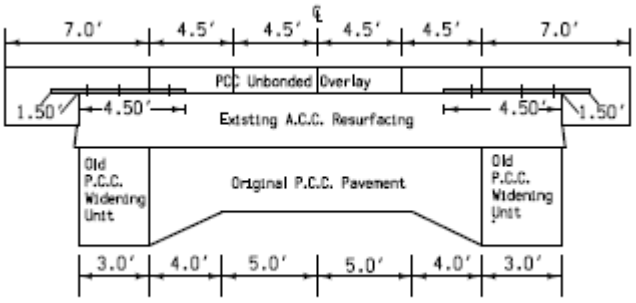
Sta. 346 to W-14




℄
6.0'
5.0'
5.0'
5.0'
5.0'
6.0'
PCC Unbonded Overlay
1.50'
3.50'
Existing A.C.C. Resurfacing
3.50'
1.50'
Old P.C.C. Widening Unit
Original P.C.C. Pavement
Old P.C.C. Widening Unit
2.0'
4.0'
6.0'
6.0'
4.0'
2.0'

W-14 to EOP


'C' Joint
'Bar'
'C'
'B' or 'C'
'C'
'Bar'
5' Typ.
'C' Joint
'Bar' Joint
'C' Joint
10' Typ.
7.0'
4' New Widening
3' Old Widening
4.5'
9' Old Pavement
4.5'
℄
4.5'
9' Old Pavement
4.5'
3' Old Widening
7.0'
4' New Widening


℄
7.0'
4.5'
4.5'
4.5'
4.5'
7.0'
PCC Unbonded Overlay
1.50'
4.50'
Existing A.C.C. Resurfacing
4.50'
1.50'
Old P.C.C. Widening Unit
Original P.C.C. Pavement
Old P.C.C. Widening Unit
3.0'
4.0'
5.0'
5.0'
4.0'
3.0'

Construction

Placed half width other lane open to traffic. Used a modified drop off.

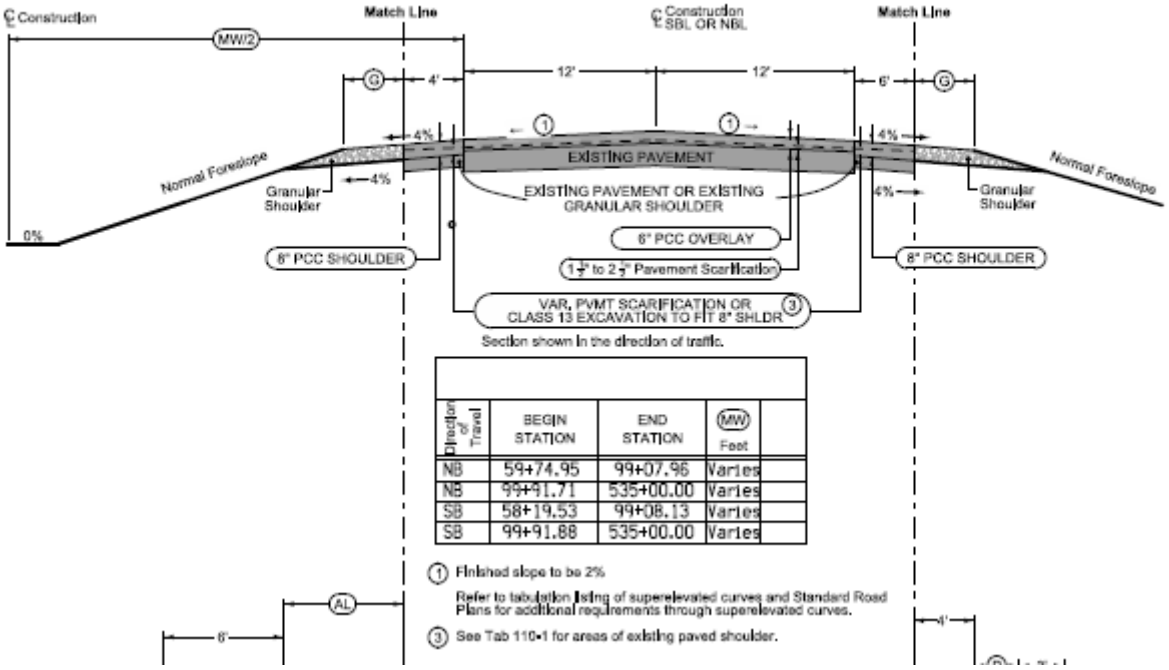
2017 Cracking

2021 Review

2023

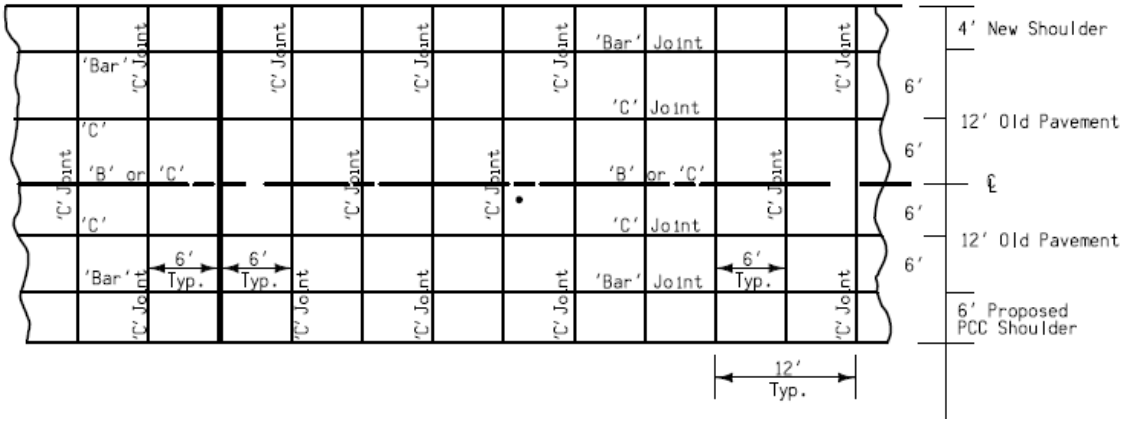
A patching project was let in 2023 with 10,221.09 SY of full depth patching by area and 1680 SY of full depth patches by count. The vast majority of patches were only the 4.5-inch overlay, with a few areas of 10 inch and 17-inch full depth.

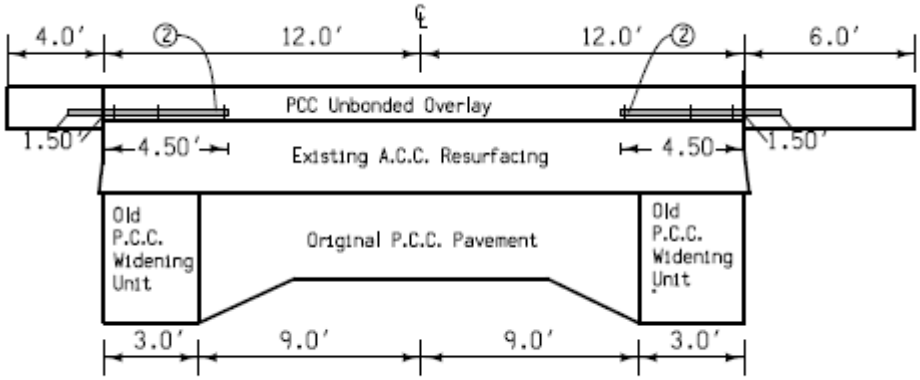
Year	2012	**Overlay Type**	WT & UBOL
County	Clay	**Design**	6" x 24' (6' outside, 4' inside 8" PCC Shoulders)
Route	US 71 SB	**Milling**	1 1/2 to 2 1/2" Milling
Project	NHSX-071-8(55)--3H-21	**Interlayer**	Existing HMA
Location	US 18 N to SCL of Milford	**Tie Bars**	#5 x 6' @30" CTR - UBOL #5 x 3' @30" CTR - WT



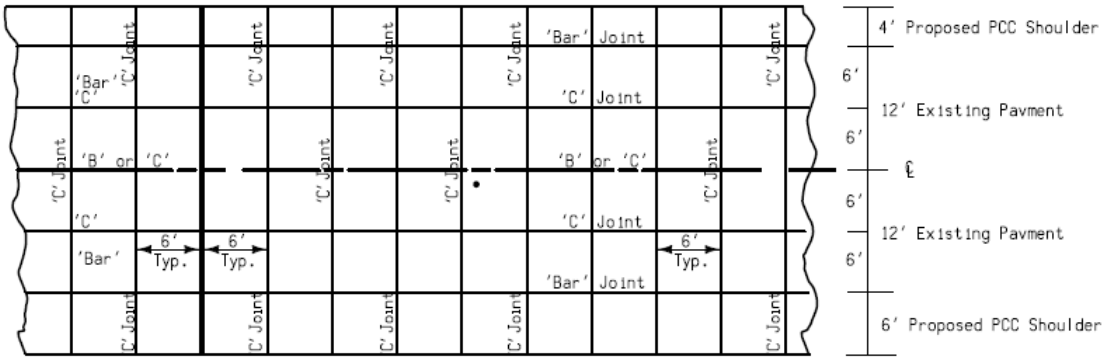
Milepost	Direction	Existing Pavement Type
207.92-212.88	NB	Composite
212.88-217.37	NB	HMA
207.92-212.88	SB	HMA
212.88-214.55	SB	Composite
214.55-215.33	SB	HMA
215.33-216.08	SB	Composite
216.08-217.37	SB	HMA

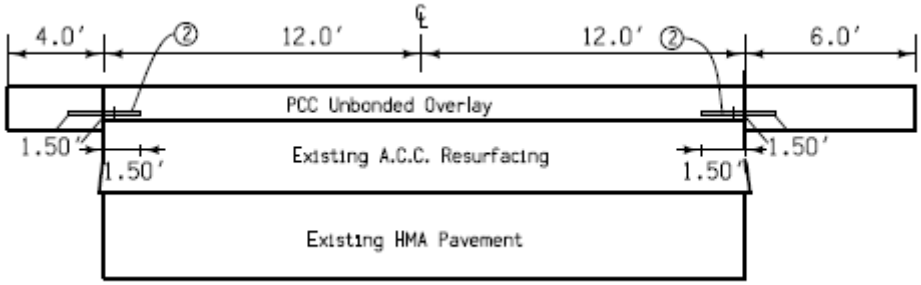
Over existing composite pavement





Over existing HMA pavement




4.0'
②
12.0'
℄
12.0'
②
6.0'
PCC Unbonded Overlay
1.50'
1.50'
Existing A.C.C. Resurfacing
1.50'
1.50'
Existing HMA Pavement

Construction

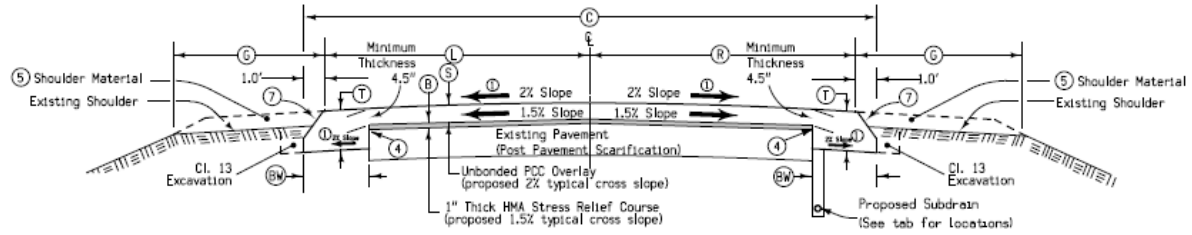
2021 Review

UBOL sections - Longitudinal cracking off end of reinforcing in the outside wheel path. Shoulder heaving. Whitetopping overlay sections in very good condition.

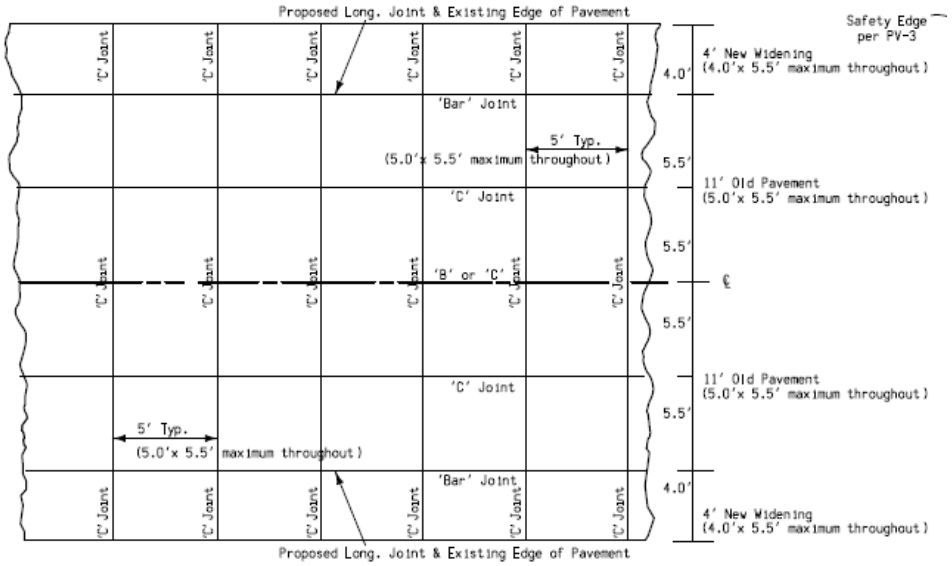
Shoulder cross slope 3.3%, Design 4%.

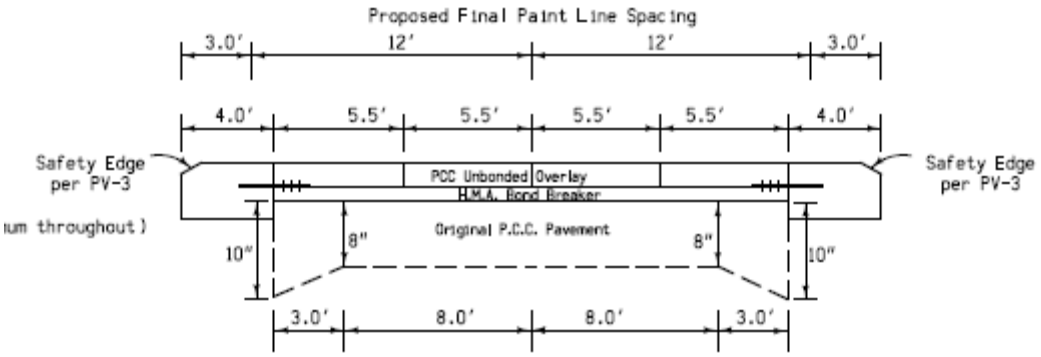
Whitetopping section

Year	2013	**Overlay Type**	UBOL
County	Grundy	**Design**	4.5" x 30' with safety edge; 5.5’ x 5.5- x 4' long joints
Route	IA 14	**Milling**	1" HMA
Project	STP-014-6(31)--2C-38	**Interlayer**	Existing & New HMA
Location	From 0.5 miles S of US 20 N to IA 57	**Tie Bars**	#5 bars 3' @ 30" CTR



Location			Overlay Quantities (Per Location)												
			(B)	(S)	(C) (3)	(L)	(R)	(2) Class 13	(8) Tack Coat	Stress Relief	PCC Overlay	PCC Overlay	(T)	(BW)	(G)	Remarks
Road	Station To Station		Inches	Inches	Feet	Feet	Feet	Cu. Yds.	Gal.	Sq. Yds.	Cu. Yds.	Sq. Yds.	Inches	Feet	Feet	
IA 14	382+75	384+00														See Typical HMA1 on sheet B.2
IA 14	384+00	386+30	1	4.5	48	Vart.	Vart.	24	51	1,022	178.0	1,226.7	9.5	4	5	
IA 14	386+30	392+00	1	4.5	48-32	Vart.	Vart.	60	101	2,027	377.8	2,533.3	9.5	4	5	
IA 14	392+00	450+00	1	4.5	30	14	14	609	709	14,178	3,038.8	19,333.3	9.5	4	5	
IA 14	450+00	500+00	1	4.5	30	14	14	525	611	12,222	2,619.7	16,666.7	9.5	4	5	
IA 14	500+00	578+50	1	4.5	30	14	14	802	988	19,762	4,137.6	26,548.9	9.5	4	5	(6)
IA 14	578+50	588+50	1	4.5	30	14	14	11	12	244	52.4	333.3	9.5	4	5	
IA 14	588+50	638+00	1	4.5	30	14	14	501	630	12,591	2,614.6	16,827.1	9.5	4	5	(6)
IA 14	638+00	639+00	1	4.5	30	14	14	11	12	244	52.4	333.3	9.5	4	5	
IA 14	639+00	666+50	1	4.5	30	14	14	289	336	6,722	1,440.8	9,166.7	9.5	4	5	
IA 14	666+50	696+00	1	4.5	30	14	14	310	361	7,211	1,545.6	9,833.3	9.5	4	5	
IA 14	696+00	746+00	1	4.5	30	14	14	525	611	12,222	2,619.7	16,666.7	9.5	4	5	
								3,667	4,422	88,446	18,677.4	119,469.3				
IA 14	746+00	747+50														See Typical HMA1 on sheet B.2





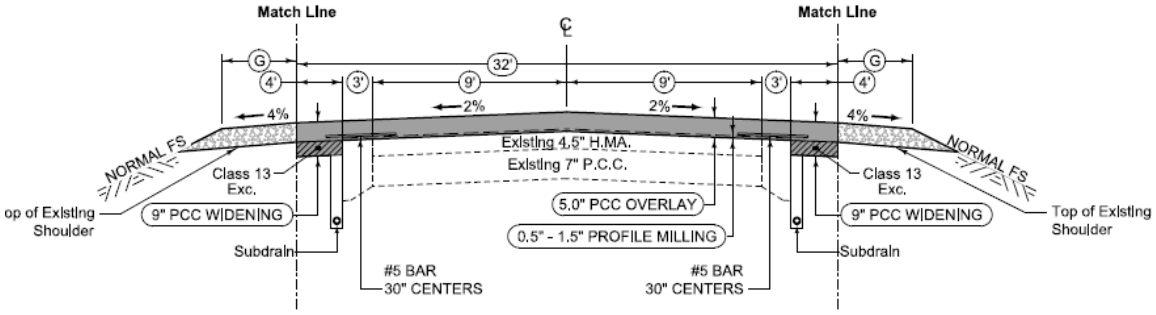
Construction

Tie steel was glued down with epoxy.

2021 Review

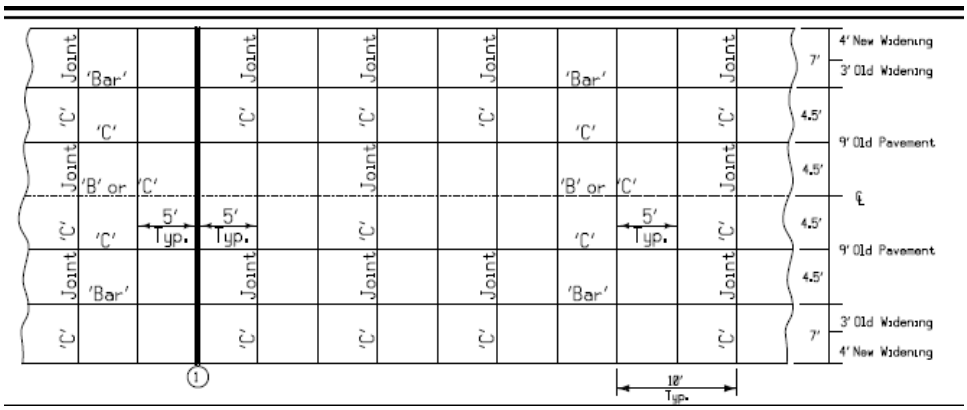
A few broken panels in wheel paths. Some of these areas have been patched.

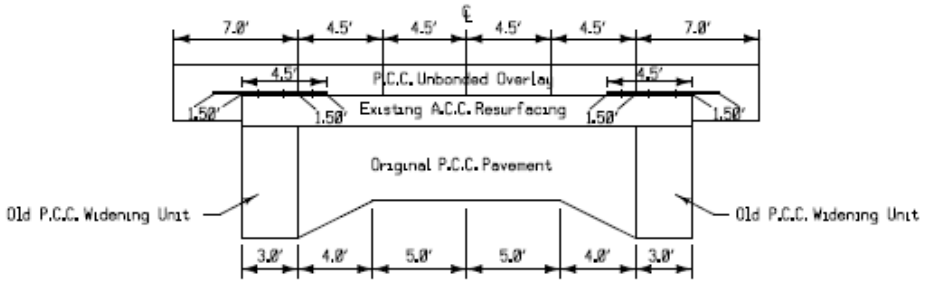
Year	2013	**Overlay Type**	UBOL
County	Fayette	**Design**	5" x 32' (4.5 x 5’ panels 24' wide & 4' x 9.5" widening)
Route	IA 3	**Milling**	1 1/2" Milling
Project	NHSX-003-7 (29)--3H-33	**Interlayer**	Existing HMA
Location	County Line to NCL of Oelwein	**Tie Bars**	#5 bars 6' @ 30" CTR



3R_Overlay_ MODIFIED	
STATION TO STATION	
677+22.20	785+50.50
791+45.50	1002+44.54
1007+77.46	1124+00.00

Longitudinal joint: See B.6 for Jointing Details
Transverse joint: See B.6 for Jointing Details





Construction

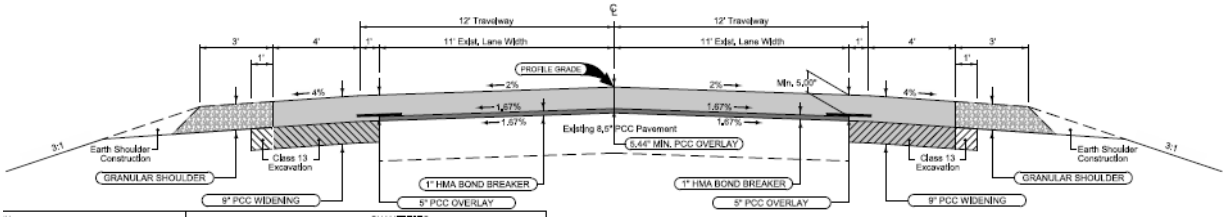
During milling operations, the mill removed HMA on the outside edge of the pavement in areas. Fabric interlayer was used to cover the exposed PCC pavement.

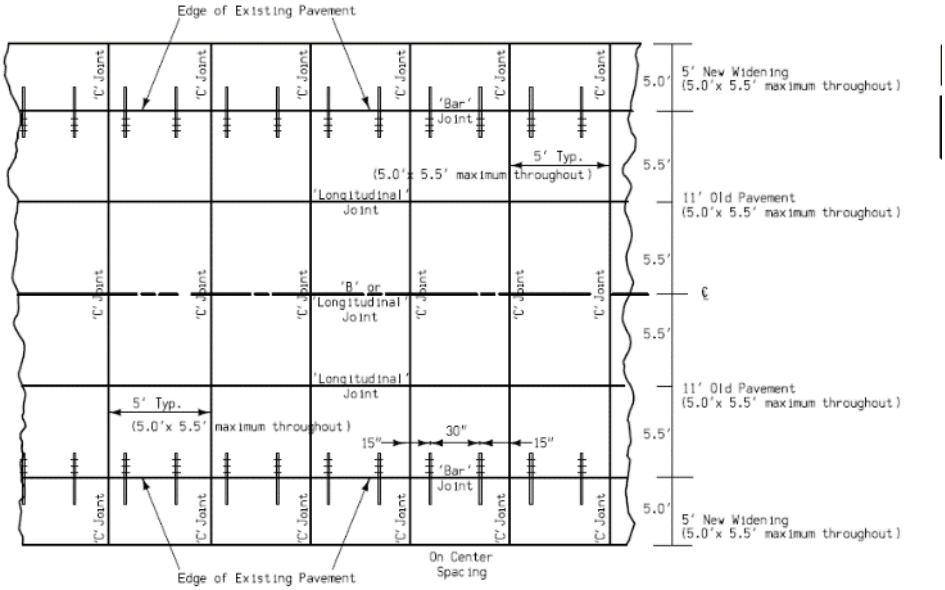
2017 – Cracking at 4 ft from edge. Location of old edge of widened pavement.

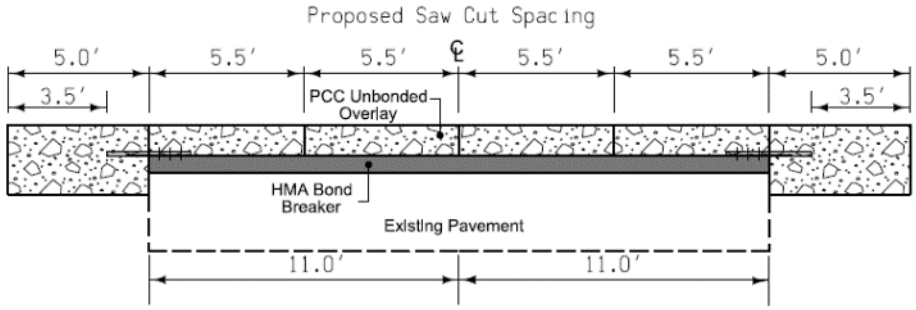
2021 Review

Cracking along paint line. Some patching.

Year	2013	**Overlay Type**	UBOL
County	Lucas	**Design**	5" x 32' (5" x 22' & 5' x 9" widening)
Route	US 65	**Milling**	1954 8.5" PC8
Project	NHSX-065-2(20)--3H-59	**Interlayer**	1" HMA Bond Breaker
Location	Wayne Co. Line N. to US 34	**Tie Bars**	#5 bars 36" @ 30" CTR







Construction

2023 Review

Several areas with patches. Patches were full lane width, with no midpanel longitudinal joint. Several areas with outside wheel path cracking. Shoulder cross slope was 1.0 to 1.5%. Fairly long areas in good condition as well.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1.00


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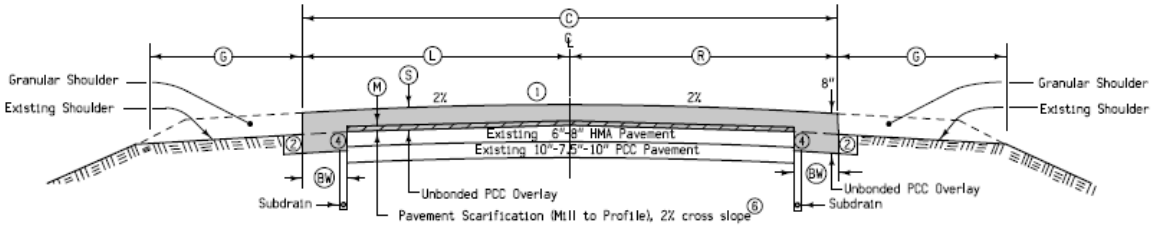
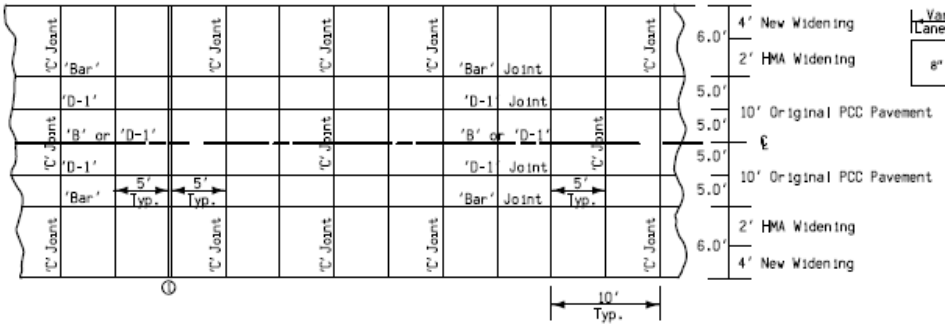
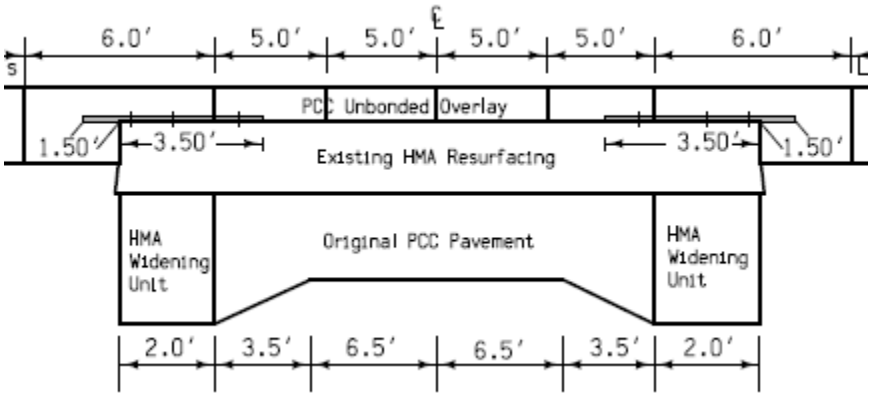
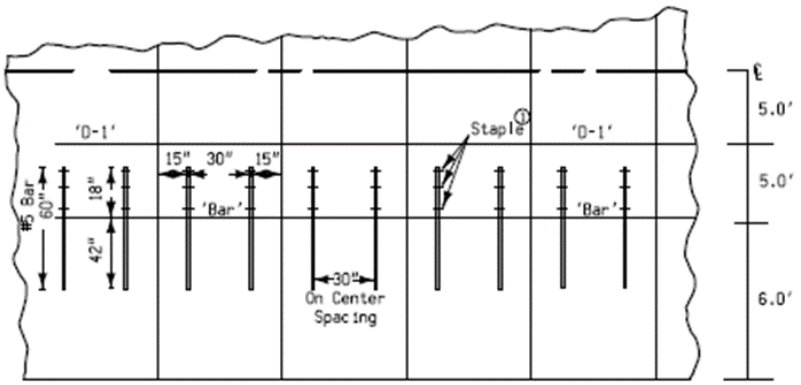
Year	2014	**Overlay Type**	UBOL
County	Kossuth	**Design**	5" x 32' (5" x 24' & 4' x 8" widening)
Route	US 169	**Milling**	Profile to 2% cross slope, 1”
Project	NHSX-169-8(59)--3H-55	**Interlayer**	Existing HMA
Location	IA 9 N to Minnesota State Line	**Tie Bars**	#5 bars 5' @ 30" CTR



Location			Ⓢ	Ⓜ ⑥	Ⓒ ③	Ⓛ	Ⓡ	Overlay Quantities Per Station				Ⓑⓦ	Ⓖ ⑤	Remarks
Road Identification	Station To Station							Class 13, ② Excavation	Unbonded PCC Overlay	Unbonded PCC Furnished	Scarification Overlay			
			Inches	Inches	Feet	Feet	Feet	Cu. Yds.	Sq. Yds.	Cu. Yds.	Sq. Yds.	Feet	Feet	
US 169	4+00.0	344+65.0	5	VAR.	32	16	16	9.3	355.6	56.8	266.7	4	2	
US 169	349+90.0	410+94.6	5	VAR.	32	16	16	9.3	355.6	56.8	266.7	4	2	
US 169	410+94.6	411+74.6	5	VAR.	32	16	16	9.3	355.6	56.8	266.7	4	2	SUPERELEVATION TRANSITION
US 169	411+74.6	415+05.0	5	VAR.	32	16	16	9.3	355.6	56.8	266.7	4	2	SUPERELEVATED



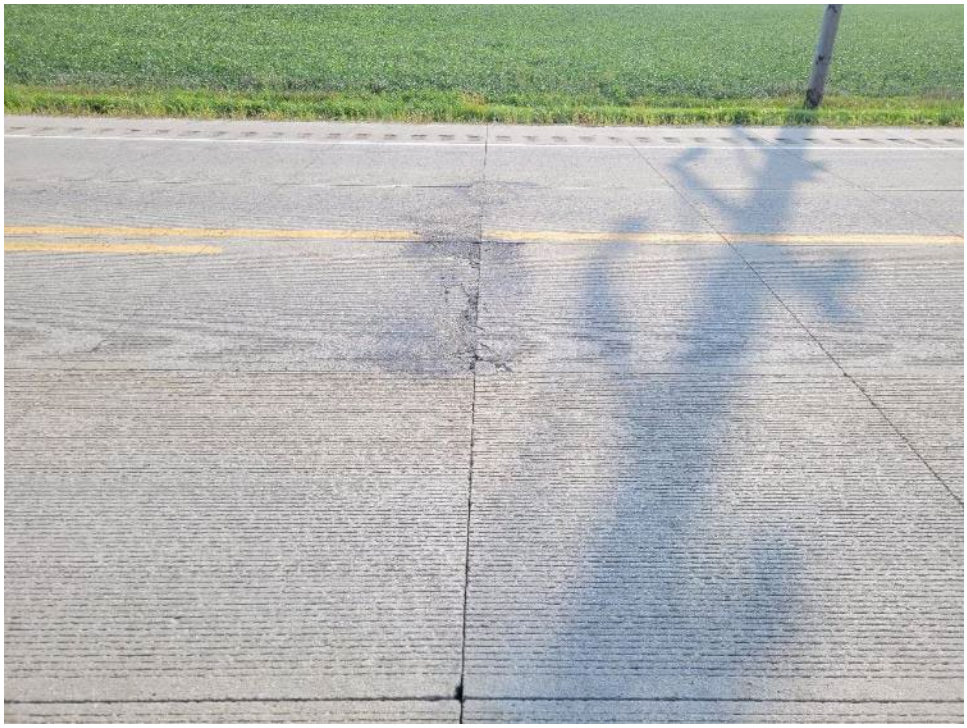




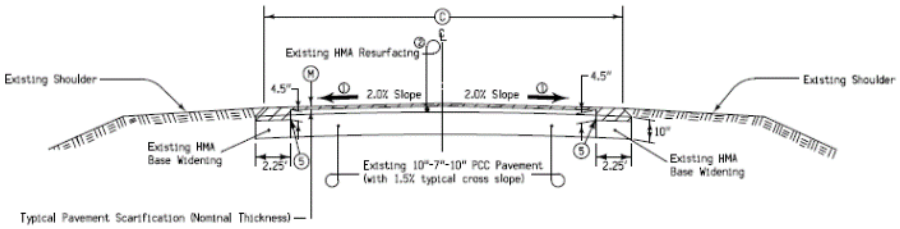
Construction

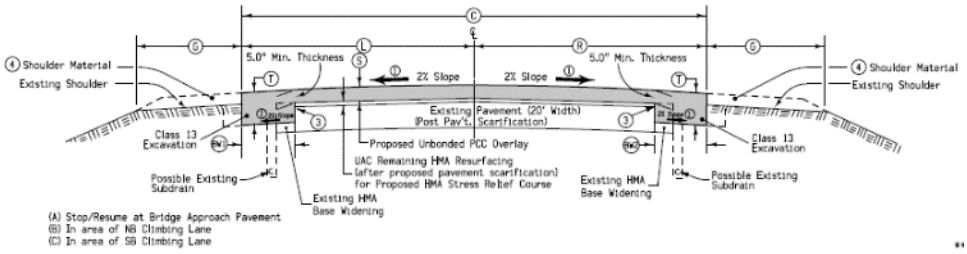
2023 Review

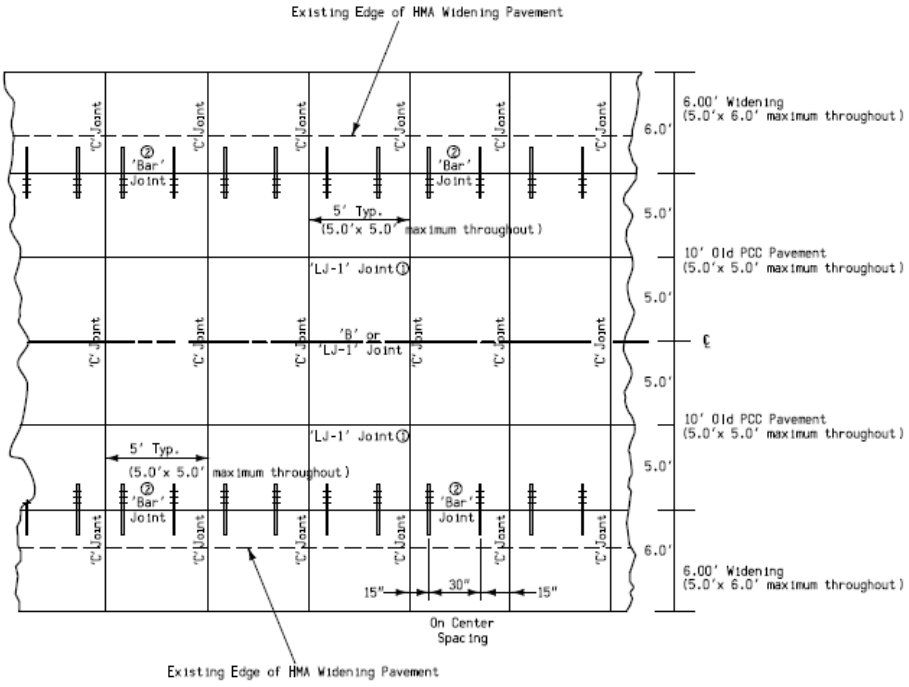
Areas of broken panels with Durapatch.

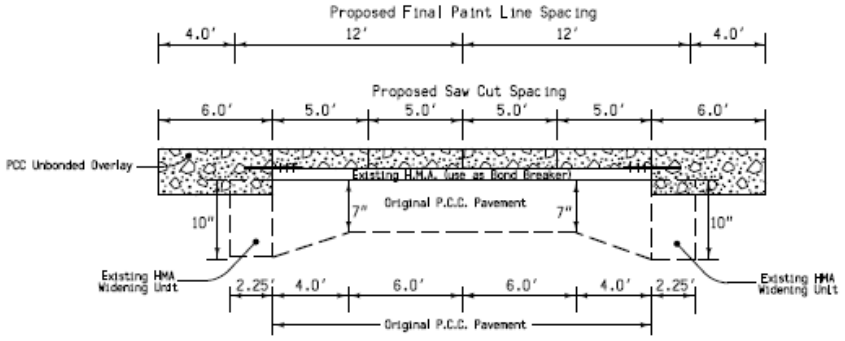


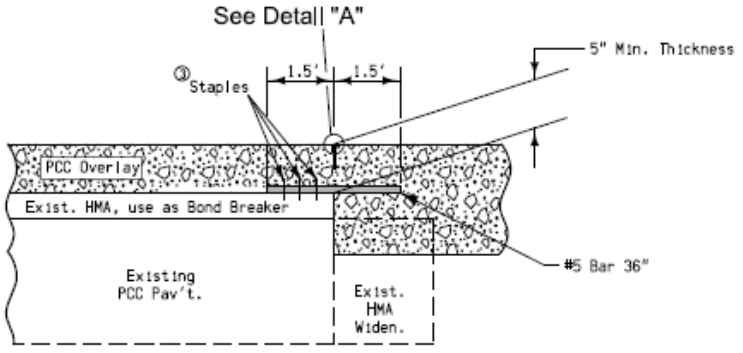
Year	2014	**Overlay Type**	UBOL
County	Poweshiek	**Design**	5" x 32' (5" x 20' & 6' x 9.5" widening) 5 x 5 x 6' long joints
Route	US 63	**Milling**	0.5 to 1.5”
Project	NHSN-063-4(39)--2R-79	**Interlayer**	Existing HMA
Location	Montezuma N to Just south of I-80	**Tie Bars**	#5 bars 36" @ 30" CTR











'BAR' JOINT

DETAIL "B"

Construction 2014

HMA was thin in some areas. 1482 tons of HMA added for stress relief layer. Issues with center line rumble strip blowing out joints.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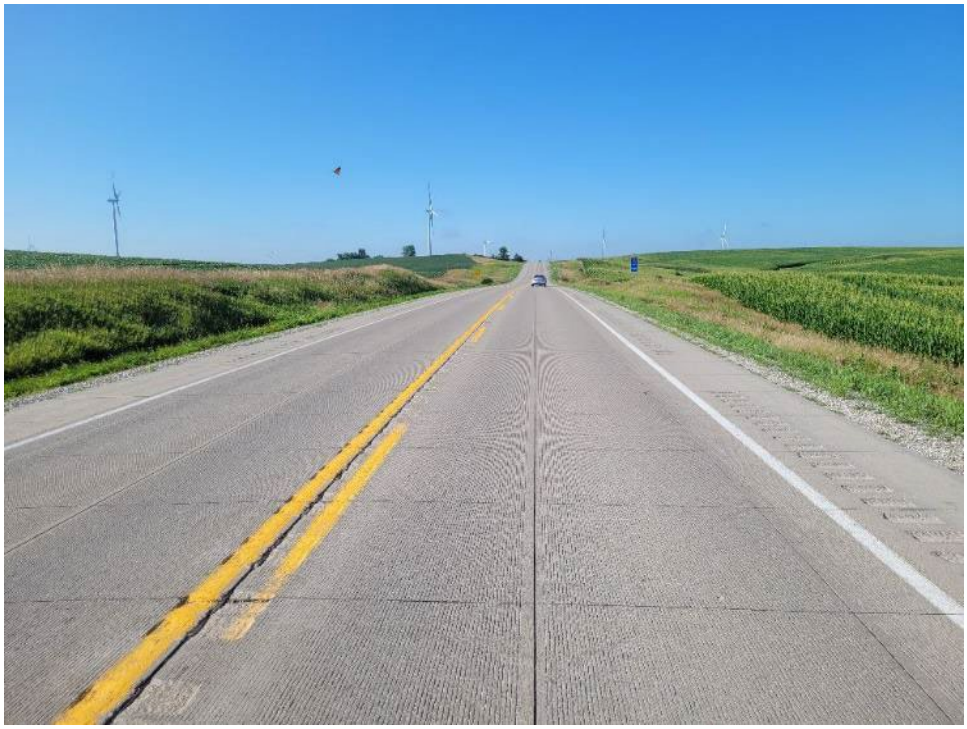
2023 Review

Lots of areas with longitudinal cracking. Some areas with broken panels.



Year	2014	**Overlay Type**	UBOL
County	Cherokee	**Design**	6” 12x12 & 6x6 Panels – 10 ft. shoulders. 44 ft. Total
Route	IA 3	**Milling**	2” Milling
Project	NHSX-059-7(46)--3H-18	**Interlayer**	Existing HMA
Location	IDA Co. Line N. to IA 3	**Tie Bars**	#4 bars 6' @ 30" CTR

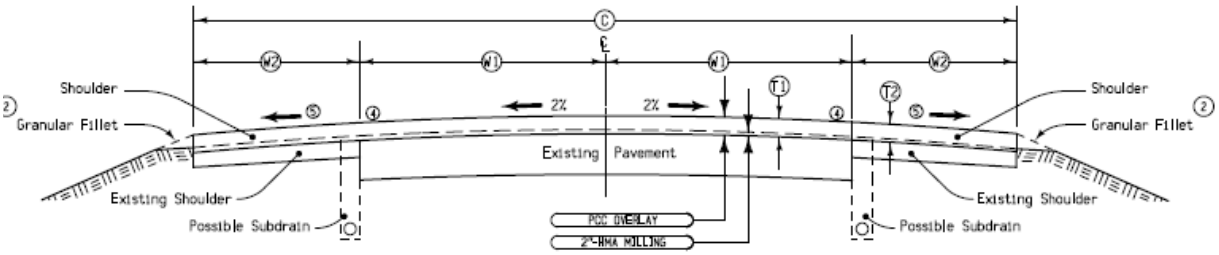


TABLE OF DESIGN QUANTITIES — Per Station

LOCATION			SIDE	W1	W2	T1	T2	PCC OVERLAY, QMC (PLACE)	PCC OVERLAY, QMC (FURNISH) ①	MILLING	REMARKS
ROAD IDENTIFICATION	STATION TO STATION			Feet	Feet	Inches	Inches	Sq. Yds.	Cu. Yds.	Tons	
US 59	810+00	810+63.40	Rt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	Ida County Line
US 59	0+00	266+00.63	Rt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	
US 59	266+00.63	269+72.45	Rt	12.0	—	6.0	--	133.33	22.22	26.58	C63
US 59	270+00.60	270+88.24	Rt	12.0	—	6.0	--	133.33	22.22	26.58	C63
US 59	270+88.24	566+37.80	Rt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	RR Guardrail
US 59	566+37.80	566+98.83	Rt	12.0	—	6.0	--	133.33	22.22	26.58	RR Guardrail
US 59	571+15.17	571+27.34	Rt	12.0	—	6.0	--	133.33	22.22	26.58	RR Guardrail
US 59	571+27.34	581+89.61	Rt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	RR Guardrail
US 59	581+89.61	586+51.50	Rt	12.0	—	6.0	--	133.33	22.22	26.58	Washborn St. (S)
US 59	586+51.50	595+35.61	Rt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	
US 59	595+35.61	597+11.61	Rt	12.0	—	6.0	--	133.33	22.22	26.58	Washborn St. (N)
US 59	597+11.61	635+82.20	Rt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	Spring Rd HMA Ent.
US 59	635+82.20	639+47.20	Rt	12.0	—	6.0	--	133.33	22.22	26.58	Linden St.
US 59	259+24	267+53	Rt-C	0-24.0	—	6.0	--	107.12	17.85	34.95	US 59 & IA 31 Inter.
US 59	267+53	269+72.45	Rt-C	24.0	—	6.0	--	266.58	44.43	86.97	US 59 & IA 31 Inter.
US 59	270+00.60	270+88	Lt-C	24.0	—	6.0	--	267.73	44.62	87.35	US 59 & IA 31 Inter.
US 59	270+88	281+37	Lt-C	24.0-0	—	6.0	--	133.27	22.21	43.48	US 59 & IA 31 Inter.
US 59	810+00	810+63.40	Lt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	Ida County Line
US 59	0+00	52+00	Lt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	
US 59	52+00	56+47	Lt	12.0	—	6.0	--	133.33	22.22	26.58	C66
US 59	56+47	268+85.88	Lt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	
US 59	268+85.88	269+72.45	Lt	12.0	—	6.0	--	133.33	22.22	26.58	IA 31
US 59	270+00.60	277+61.73	Lt	12.0	—	6.0	--	133.33	22.22	26.58	IA 31
US 59	277+61.73	426+36.49	Lt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	
US 59	426+36.49	430+92.66	Lt	12.0	—	6.0	--	133.33	22.22	26.58	C44
US 59	430+92.66	566+86.66	Lt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	RR Guardrail
US 59	566+86.66	566+98.83	Lt	12.0	—	6.0	--	133.33	22.22	26.58	RR Guardrail
US 59	571+15.17	571+75.57	Lt	12.0	—	6.0	--	133.33	22.22	26.58	RR Guardrail
US 59	571+75.57	632+87.20	Lt	12.0	10.0	6.0	6.0	244.44	40.74	26.58	RR Guardrail
US 59	632+87.20	639+47.20	Lt	12.0	—	6.0	--	133.33	22.22	26.58	Linden Street

Notes:

(18) Sta. 810+00 to Sta. 426+36.49
Longitudinal joints shall be located at centerline, 6.0-ft Lt. and Rt. of centerline, 12.0-ft. Lt. and Rt. of centerline, and 17.0-ft Lt. and Rt. of centerline.A modified "L-1" (ML-1) joint shall be located at 12.0-ft. Lt. and Rt. of centerline with a 6-ft. long reinforcing bar. Transverse joints shall be located at 6.0-ft. spacings. See "EX-JNT A" on Sheet B.4.

(19) Sta. 426+36.49 to Sta. 639+47.20
Longitudinal joints shall be located at centerline, 12-ft Lt. and Rt. of centerline, A modified "L-1" (ML-1) joint shall be located at 12.0-ft. Lt. and Rt. of centerline with a 6-ft. long reinforcing bar. Transverse joints shall be located at 10.0-ft. spacings. See "EX-JNT B" on Sheet B.4.

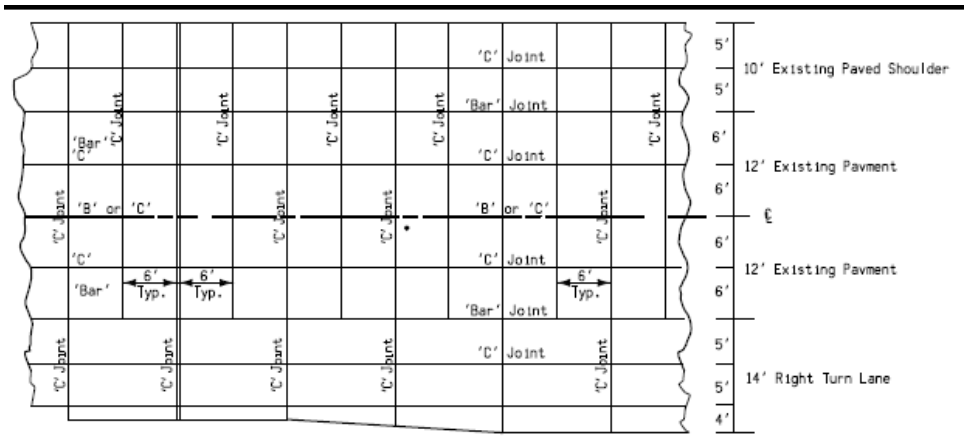
(2) Shoulder material as specified elsewhere in these plans; refer to typical 7145 on Sheet B.3.

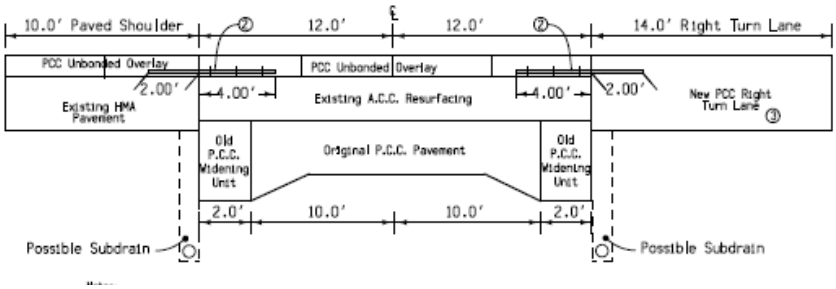
(3) Quantity is estimated using a 6-in. thickness over the existing 24-ft. wide pavement and a 10-in. thickness for the integral 2-ft. widening units.

(4) Refer to "EX-JNT" on B.4 for rebar placement.

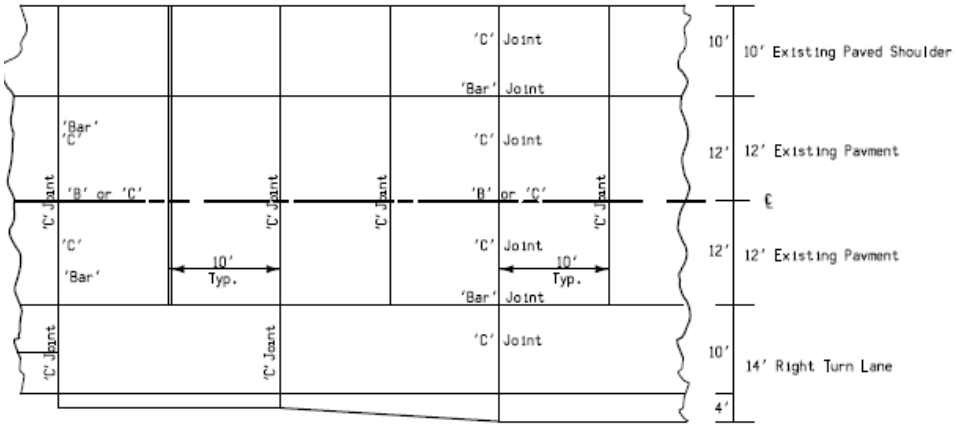
(5) Slope shall be 3% on "Turn Lanes" and 4% on shoulders.

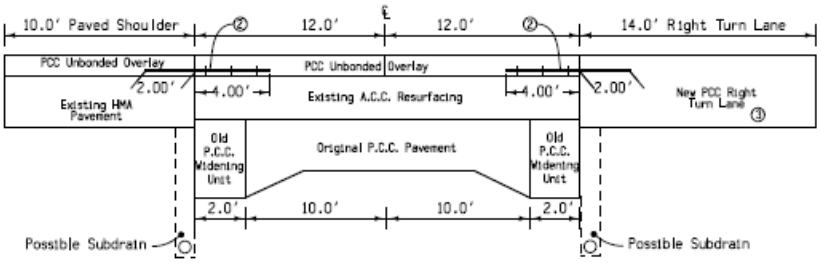
Sta. 810+00 to 426+36





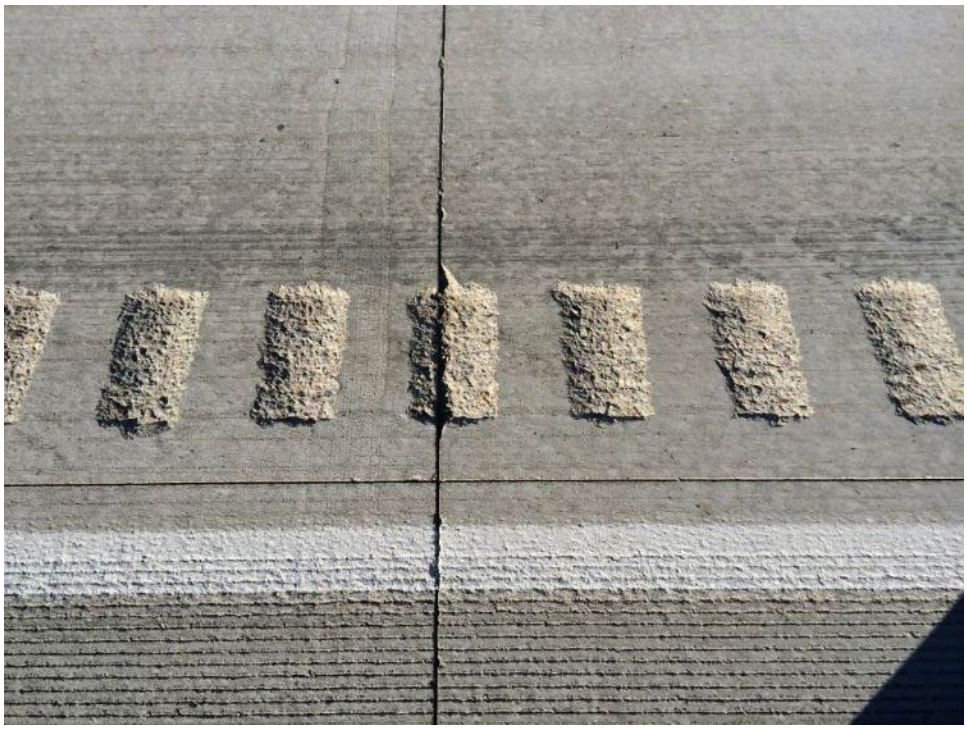
Sta. 426+36 to 639+47





Construction

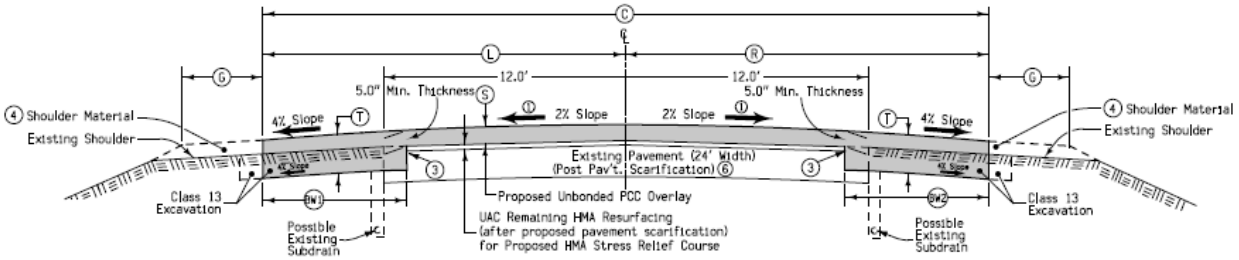
Placed half width.

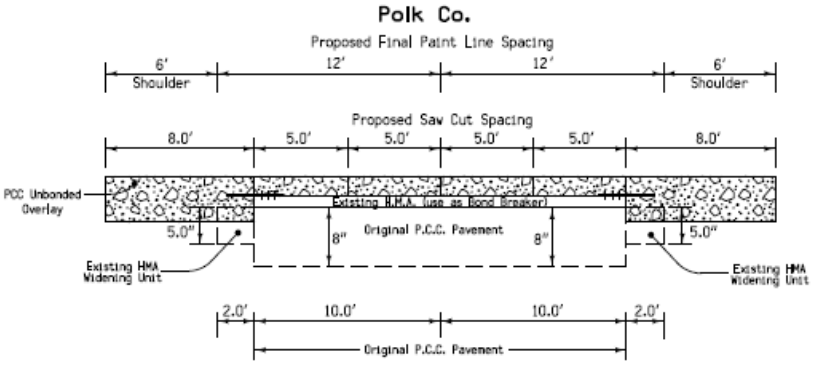


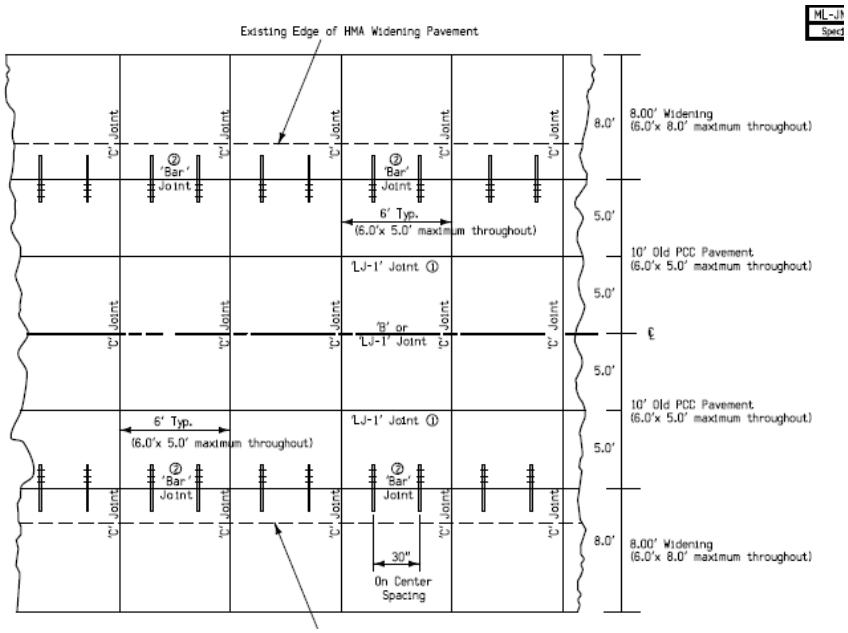
Review 2021

Areas of cracking at quarter point. Some broken panels.

Year	2015	**Overlay Type**	UBOL
County	Polk	**Design**	5" x 36' (5" x 20' & 8' x 9.5" widening) 5 x 5 x 6' long joints
Route	US 69	**Milling**	0.5" to 2" milling
Project	STPN-069-4(100)--2J-77	**Interlayer**	Existing HMA
Location	118th Ave N. to Just S. of IA 210	**Tie Bars**	#5 bars 36" @ 30" CTR



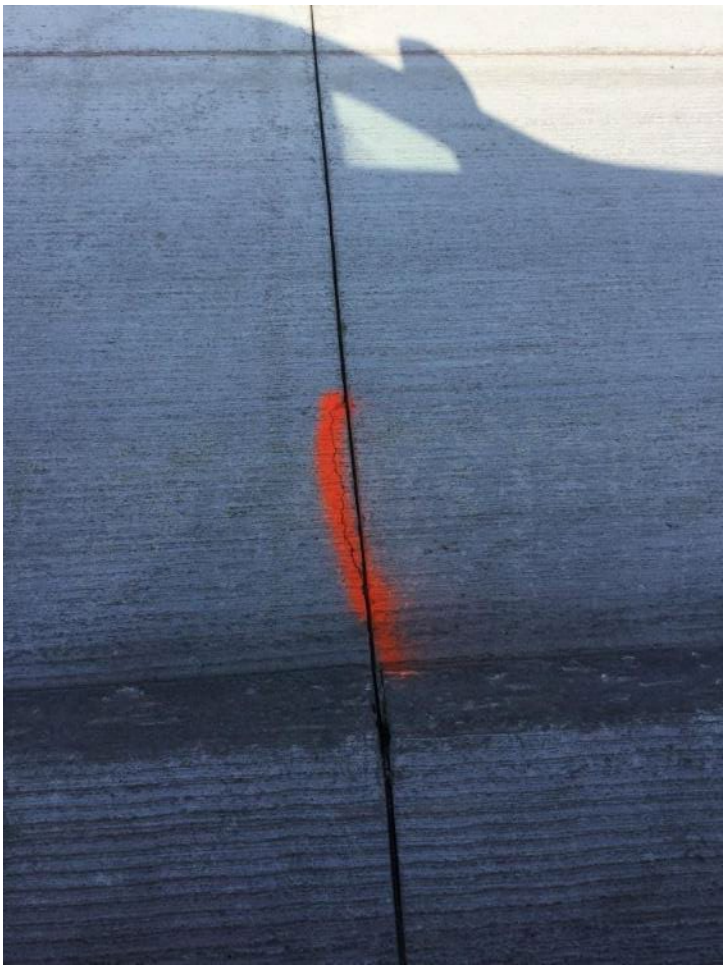




Construction

Placed half width. Some random cracking off sawed joints.


GSZ
S850



Review 2021

Longitudinal cracking in wheel path.

Shoulder cross slope 3.5%, Design 4%

Year	2015	**Overlay Type**	UBOL & WT
County	Clay	**Design**	6" x 32' (9 x8' panels ML & 7x8' panels shoulders) UBOL 6" x 32' (6 x 6' ML and 4 x 6' Shoulder) WT
Route	US 71	**Milling**	2" Milling
Project	NHSX-071-8(59)--3H-21	**Interlayer**	Existing HMA
Location	B53 N to 15th St in Spencer	**Tie Bars**	L-1 #4 @30" 6' – UBOL L-1 #4 @30" 3' WT

Typical Cross Section – UBOL

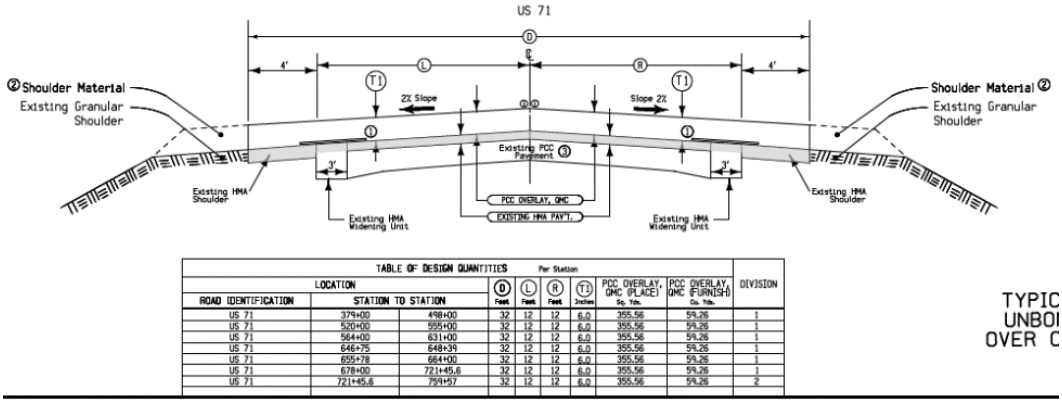


TABLE OF DESIGN QUANTITIES Per Station

LOCATION			(D)	(L)	(R)	(T)	PCC OVERLAY, QMC (PLACE)	PCC OVERLAY, QMC (FURNISH)	DIVISION
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Feet	Inches	Sq. Yds.	Cu. Yds.	
US 71	379+00	498+00	32	12	12	6.0	355.56	591.26	1
US 71	520+00	555+00	32	12	12	6.0	355.56	591.26	1
US 71	564+00	631+00	32	12	12	6.0	355.56	591.26	1
US 71	646+75	648+39	32	12	12	6.0	355.56	591.26	1
US 71	655+78	664+00	32	12	12	6.0	355.56	591.26	1
US 71	678+00	721+45.6	32	12	12	6.0	355.56	591.26	1
US 71	721+45.6	759+57	32	12	12	6.0	355.56	591.26	2

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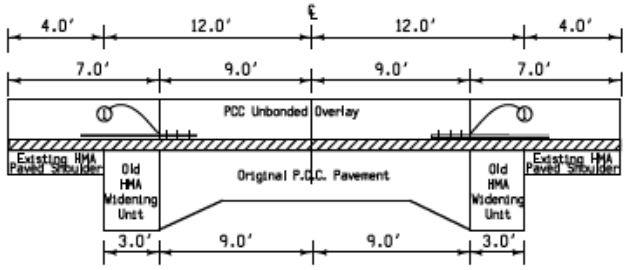
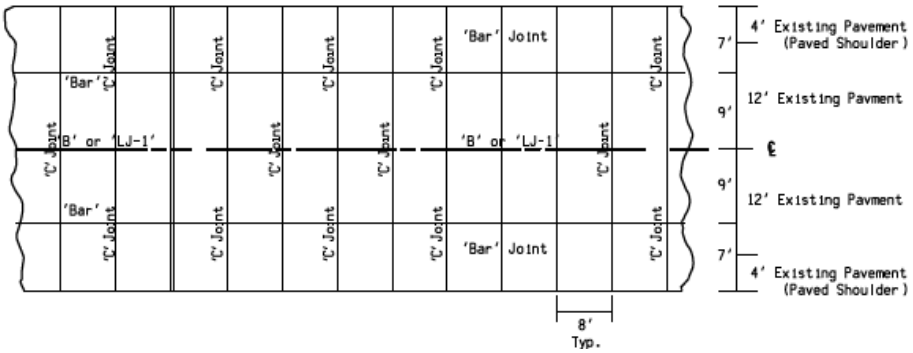


Notes:

Modified "L-1" (ML-1) joint #4 Bars at 30" on center spacing with a 6-ft long reinforced bar centered over widening unit (10.5' Lt. and Rt. of centerline). Maintain minimum 6-in clearance from transverse joints. Minimum 3 staples per Tiebar. Stapling process subject to Engineer approval prior to Paving operation. Approval is based on no tiebar movement during Paving operation. Mechanical insertion of tie bar is allowed.

TY
AI



Typical Cross Section WT

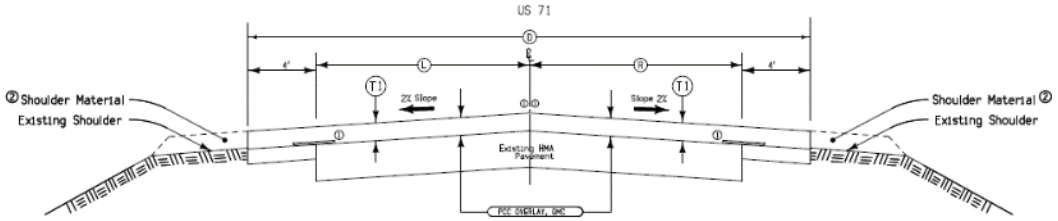
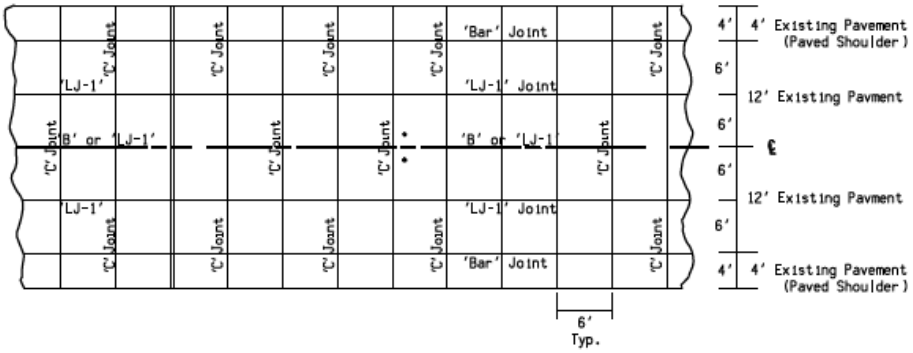
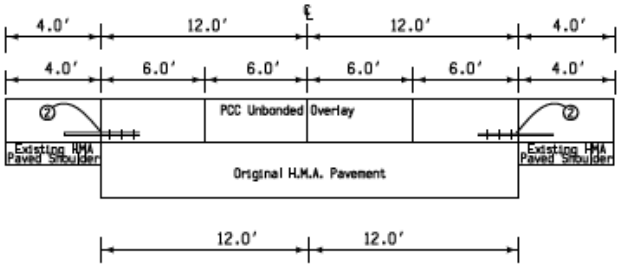


TABLE OF DESIGN QUANTITIES Per Station

LOCATION			Ⓓ	Ⓛ	Ⓡ	Ⓣ	PCC OVERLAY, QMC (PLACE)	PCC OVERLAY, QMC (FURNISH)
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Feet	Inches	Sq. Yds.	Cu. Yds.
US 71	371+48	376+00	32	12	12	6.0	355.56	59.26
US 71	498+00	520+00	32	12	12	6.0	355.56	59.26
US 71	555+00	564+00	32	12	12	6.0	355.56	59.26
US 71	631+00	648+75	32	12	12	6.0	355.56	59.26
US 71	664+00	678+00	32	12	12	6.0	355.56	59.26

TYPIC





Notes:

1. Extend existing expansion joints in kind in new pavement.
2. Modified "L-1" (ML-1) joint #4 Bars at 30" on center spacing with a 3-ft long reinforced bar centered over joint. Maintain minimum 6-in clearance from transverse joints. Minimum 3 staples per Tiebar. Stapling process subject to Engineer approval prior to Paving operation. Approval is based on no tiebar movement during Paving operation.

Longitudinal joints shall be located at centerline, 6.0-ft Lt. and Rt. of centerline and 12.0-ft. Lt. and Rt. of centerline. A modified "L-1" (ML-1) joint shall be located at 12.0-ft. Lt. and Rt. of centerline with a 3-ft. long reinforcing bar. Transverse joints shall be located at 6.0-ft. spacings.

Mechanical insertion of tie bar is allowed.

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PC

Milepost	Existing Pavement Type
188.13-190.29	Composite
190.29-192.21	HMA
192.21-193.80	Composite
193.80-195.06	HMA

Construction

2023 Review

Overall, both the UBOL and WT are in very good condition.

UBOL Overlay section

Whitetopping Overlay section

Year	2016	**Overlay Type**	UBOL & WT
County	Clay	**Design**	6" x 32' (9 x8' panels ML & 7x8' panels shoulders) UBOL 6" x 32' (6 x 6' ML and 4 x 6' Shoulder) WT
Route	US 71	**Milling**	2" Milling
Project	NHSX-071-8(58)--3H-21	**Interlayer**	Existing HMA
Location	Buena Vista Co. Line N. to Co. Rd. B53	**Tie Bars**	L-1 #4 @30" 6' – UBOL L-1 #4 @30" 3' WT

Typical Cross Section - UBOL

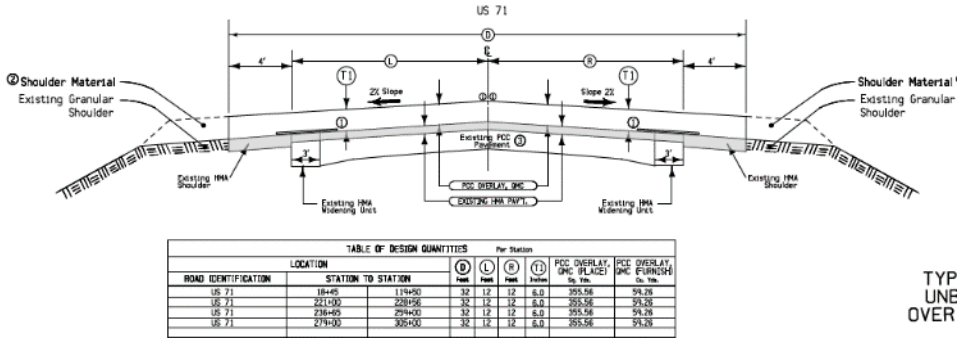

TABLE OF DESIGN QUANTITIES Per Station

ROAD IDENTIFICATION	LOCATION STATION TO STATION		(D) Feet	(L) Feet	(R) Feet	(T) Inches	PCC OVERLAY, QMC (PLACE) Sq. Yds.	PCC OVERLAY, QMC (FURNISH) Cu. Yds.
US 71	18+45	119+50	32	12	12	6.0	355.56	59.26
US 71	221+00	228+56	32	12	12	6.0	355.56	59.26
US 71	236+65	259+00	32	12	12	6.0	355.56	59.26
US 71	279+00	305+00	32	12	12	6.0	355.56	59.26

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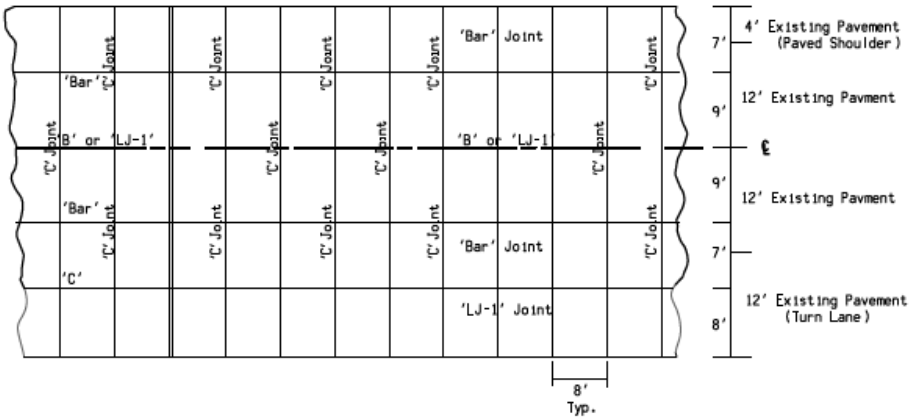

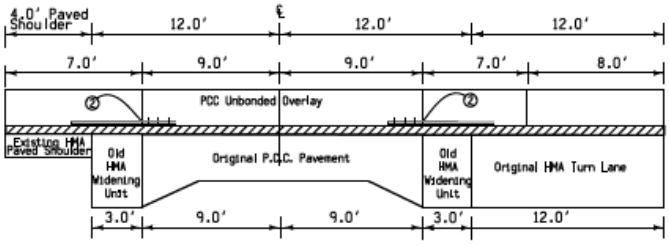

Notes:

) Extend existing expansion joints in kind in new pavement.

) Modified "L-1" (ML-1) joint H4 Bars at 30" on center spacing with a 6-ft long reinforced bar centered over widening unit (10.5' LL and Rt. of centerline). Maintain minimum 6-in clearance from transverse joints. Minimum 3 staples per Tiebar. Stapling process subject to Engineer approval prior to Paving operation. Approval is based on no tiebar movement during Paving operation. Mechanical insertion of tie bar is allowed.

) See ML-2 on Sheet B.2.

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Typical Cross Section – WT

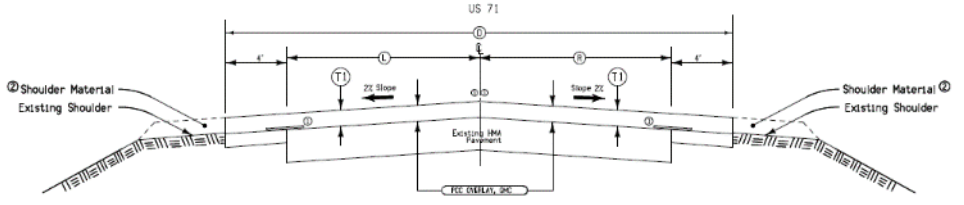
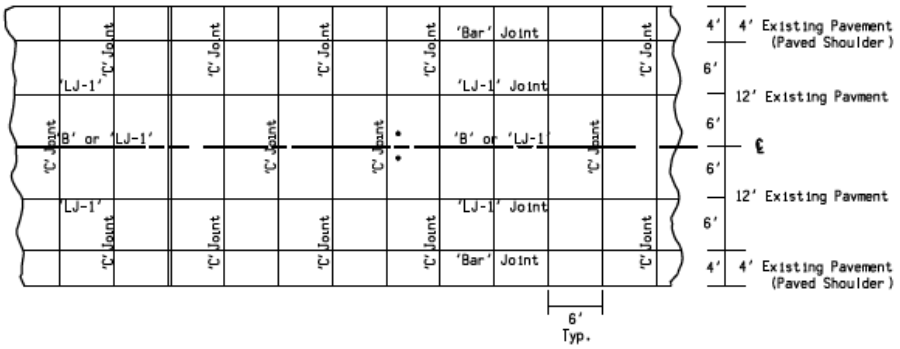
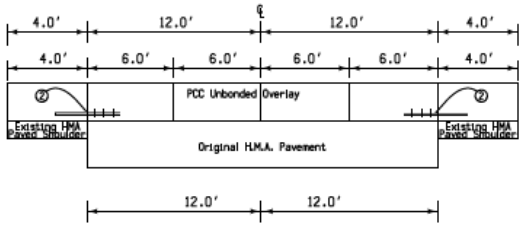


TABLE OF DESIGN QUANTITIES (Per Station)								
LOCATION			Ⓓ	Ⓛ	Ⓡ	T1	PCC OVERLAY, SMC (FLARE)	PCC OVERLAY, SMC (TURNING)
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Feet	Inches	Sq. Yds.	Sq. Yds.
US 71	114+50	221+00	32	12	12	6.0	355.56	59.26
US 71	259+30	275+50	32	12	12	6.0	355.56	59.26
US 71	385+00	398+66	32	12	12	6.0	355.56	59.26





Notes:

① Extend existing expansion joints in kind in new pavement.

② Modified "L-1" (ML-1) joint #4 Bars at 30" on center spacing with a 3-ft long reinforced bar centered over joint. Maintain minimum 6-in clearance from transverse joints. Minimum 3 staples per Tiebar. Stapling process subject to Engineer approval prior to Paving operation. Approval is based on no tiebar movement during Paving operation.

Longitudinal joints shall be located at centerline, 6.0-ft Lt. and Rt. of centerline and 12.0-ft Lt. and Rt. of centerline. A modified "L-1" (ML-1) joint shall be located at 12.0-ft Lt. and Rt. of centerline with a 3-ft. long reinforcing bar. Transverse joints shall be located at 6.0-ft. spacings.

Mechanical insertion of tie bar is allowed.

TYPICAL CF
AND JOINT
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OVER EX

Construction

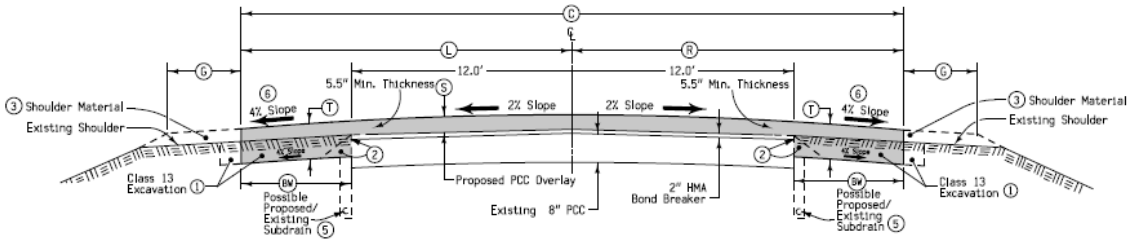
Review 2023

Overall, both the UBOL and WT are in very good condition.

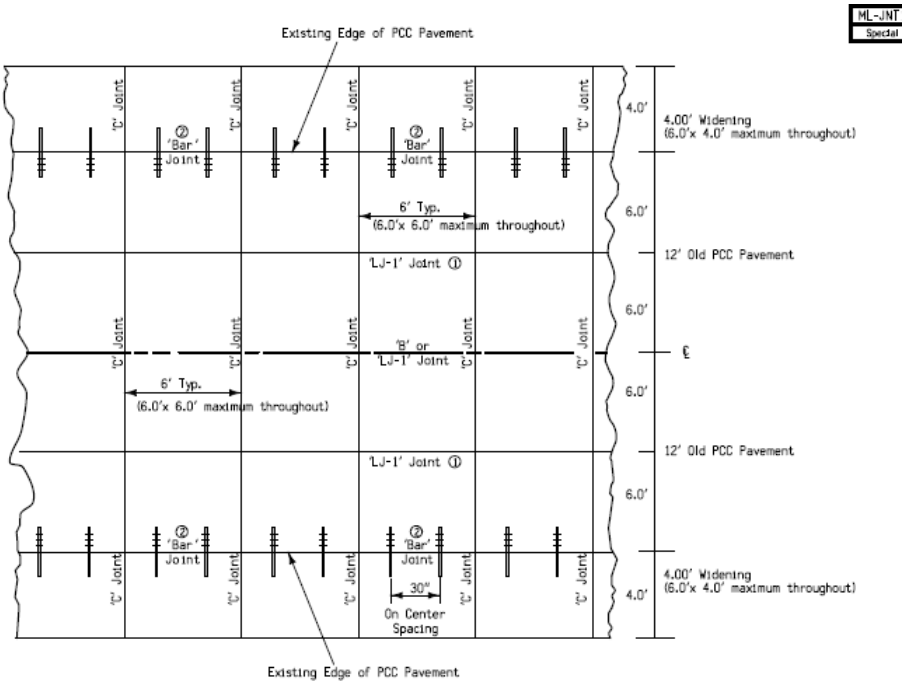
Whitetopping overlay section

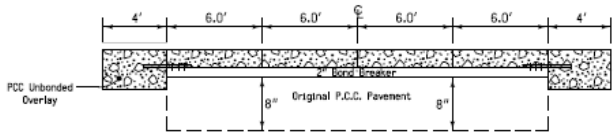
Unbonded overlay section

Year	2016	**Overlay Type**	UBOL
County	Benton	**Design**	5.5" x 32' (6 x 6' ML and 4 x 6' Shoulder)
Route	IA 21	**Milling**	n/a
Project	STPN-021-4(27)--2J-06	**Interlayer**	New HMA
Location	From E66 N. to just S. US 30	**Tie Bars**	#4x36" @30" C-C



Location			S	C (4)	L	R	Overlay Quantities (Per Location)			T	BW	G	Remarks
Road	Station To Station						1 Class 13	PCC Overlay	PCC Overlay				
			Inches	Feet	Feet	Feet	Cu. Yds.	Cu. Yds.	Sq. Yds.	Inches	Feet	Feet	
IA 21	72+85	247+25	5.5	32.0	16.0	16.0	1347	10,563	62,080	8	4.0	6.0	approx. MP 57.82 to MP 61.18
													17,460' @ 2x8.167sf/27= 10,563 CY PCC
													17,460' @ 2x1.042sf /27= 1348 CY Cl 13





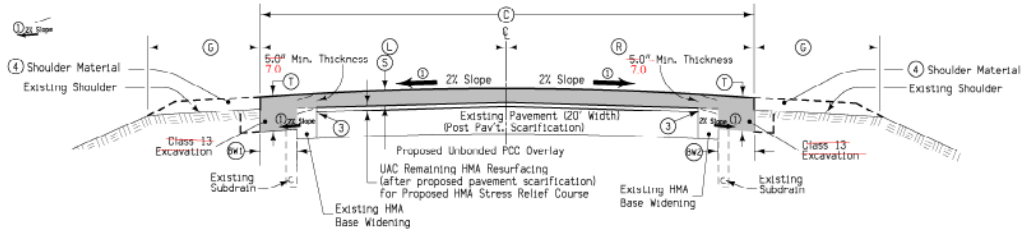
Construction


GOMACO

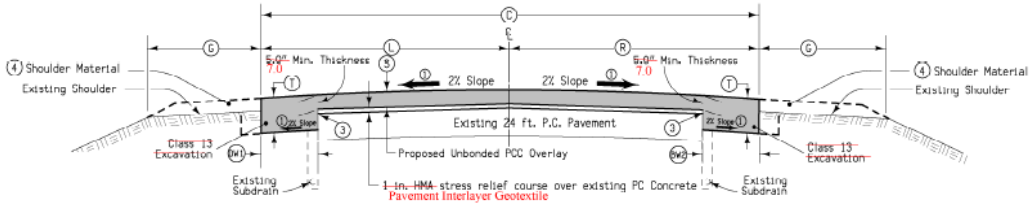
Review 2023

Overall, the overlay is in very good condition.

Year	2018	**Overlay Type**	UBOL
County	Dallas/Boone	**Design**	7" x 32' (12 x 12' ML and 4 x 12' Shoulder)
Route	US 169	**Milling**	n/a
Project	NHSX-169-4(63)--3H-25	**Interlayer**	Fabric Interlayer
Location	IA 141 N to US 30	**Tie Bars**	



Location			(S)	(C) ②	(L)	(R)	(T)	(BW1)	(BW2)	(G)
Road	Station to Station		Inches	Feet	Feet	Feet	Inches	Feet	Feet	Feet
US 169	26+12.6	62+94	~~7~~5.0	32.0	16.0	16.0	9.5	4.0	4.0	Vari.
US 169	91+01	710+00	~~7~~5.0	32.0	16.0	16.0	9.5	4.0	4.0	Vari.



Location			(S)	(C) ②	(L)	(R)	(T)	(BW1)	(BW2)	(G)
Road	Station To Station		Inches	Feet	Feet	Feet	Inches	Feet	Feet	Feet
US 169	73+61	91+01	~~7~~5.0	32.0	16.0	16.0	9.5	4.0	4.0	Vari.

Review 2021

Lots of longitudinal cracking.

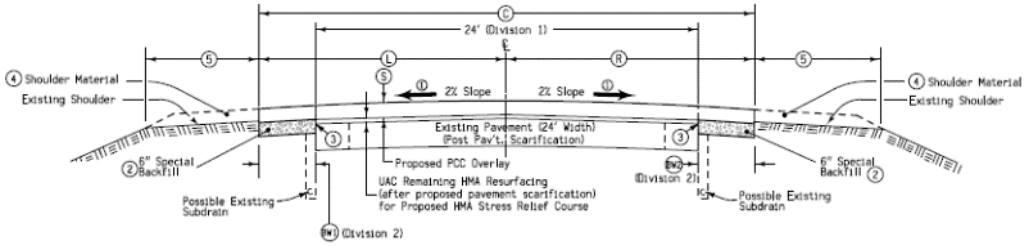

JOHNSON

Shoulder cross slope 1.2%, Design 2%.

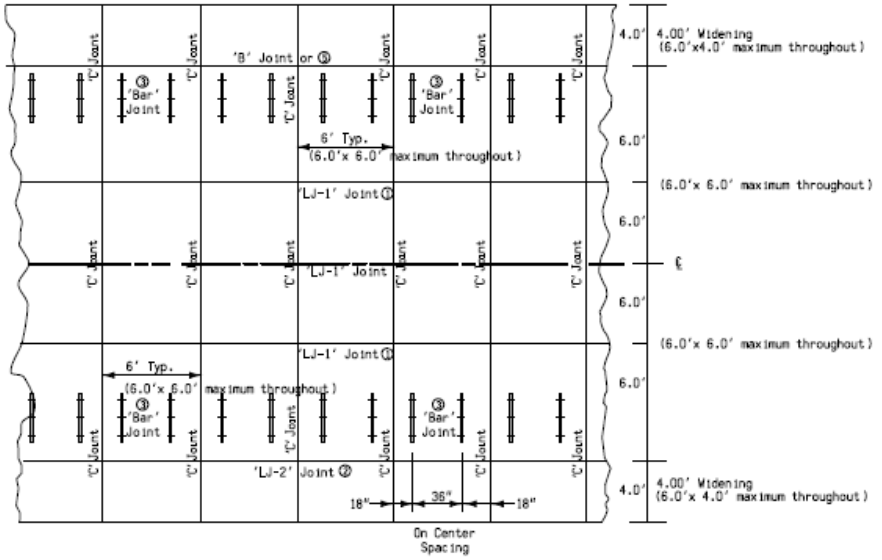
2023

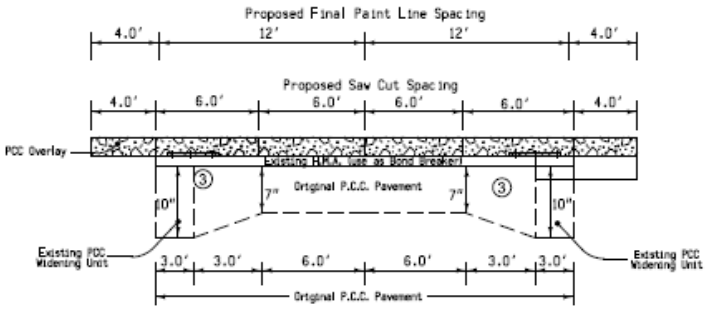
Lots of longitudinal cracking. Most have been sealed.

Year	2019	**Overlay Type**	UBOL
County	Marshall/Tama	**Design**	6" x 32' (6 x 6' ML and 4 x 6' Shoulder)
Route	IA 14	**Milling**	1" Milling
Project	HSPIX-014-5(81)--3H-64	**Interlayer**	Existing HMA
Location	Co. Rd. E18 N. to W. JCT IA 175	**Tie Bars**	Shoulder not tied



Location									Division 1 Overlay Quantities Per Location		Division 2 Overlay Quantities Per Location				Remarks
Road	Station To Station								PCC Overlay	PCC Overlay		PCC Overlay	PCC Overlay	Special Backfill	
			Inches	Feet	Feet	Feet	Feet	Feet	Cu. Yds.	Sq. Yds.	Class 13 Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	
IA 14	371+50.00	442+76.63	6	32	16	16	4	4	3165	19012	1745	1056	6337	1745	
	3+33.60	46+71.50	6	32	16	16	4	4	1955	11728	1077	652	4029	1077	
	46+71.50	48+51.50	6	32	16	18	4	4	1458	802	29	18	157	29	Rt. Turn Lane Taper
	48+51.50	52+00.00	6	32	16	24			215	1292	119	52	215	119	Includes Rt. Turn Lane
	52+00.00	95+59.00	6	32	16	16	4	4	1875	11252	1033	645	3851	1033	
	102+57.40	520+00.00	6	32	16	16	4	4	18552	111315	10219	6184	37105	10219	





Construction

Review 2021

In very good condition. Shoulders do appear to be heaving, but no cracking due to no tie steel.

Sta 33+00 Mainline 1.9%

Sta 33+00

Station 412+00

2023

Still performing very well.

Year	2020	**Overlay Type**	WT
County	Woodbury	**Design**	6" x 32' (6 x 6' ML and 2 x 6' Shoulder)
Route	IA 31	**Milling**	3” Milling
Project	STP-031-1(43)--2C-97	**Interlayer**	Existing HMA
Location	E. JCT US 20 N. to Co. Rd. C66	**Tie Bars**	Fiber Test Sections

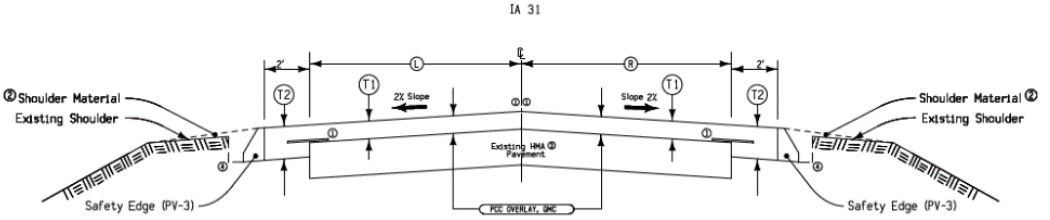


TABLE OF DESIGN QUANTITIES Per Station

LOCATION			L	R	T1	T2	PCC OVERLAY, QMC (PLACE)	PCC OVERLAY, QMC (FURNISH)
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Inches	Inches	Sq. Yds.	Cu. Yds.
IA 31	43+76	277+54	12	12	6	8	333.3	57.64
IA 31	278+53	315+45.5	12	12	6	8	333.3	57.64
IA 31	318+68.5	458+50	12	12	6	8	333.3	57.64

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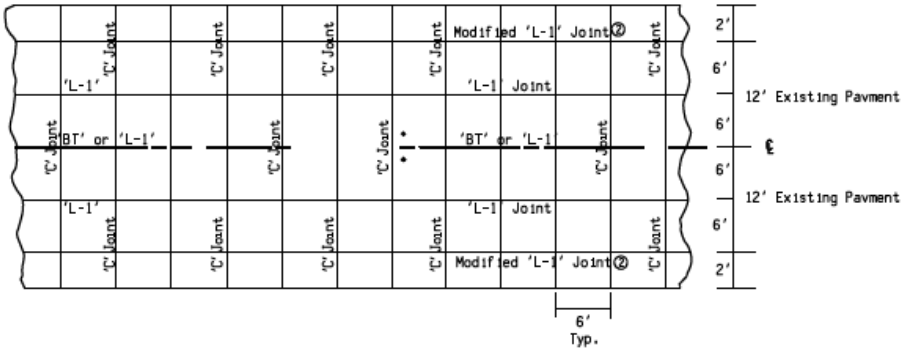
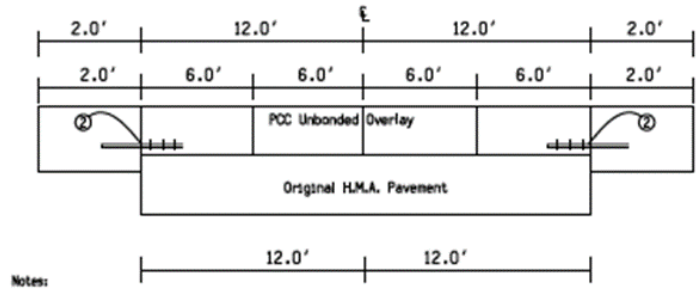
FULL D





Notes:

L-1 joint shall use detail D-1 as shown on PV-101. No tie bars to be used except as stated in note (2).

An "L-1" joint shall be located at 12.0-ft. Lt. and Rt. of centerline with a 3-ft. long reinforcing bar.

Reinforced bars shall be #4 Bars at 30" on center spacing with a 3-ft long reinforcing bar centered over joint. Maintain minimum 6-in clearance from transverse joints. Minimum 3 staples per Tiebar. Stapling process subject to Engineer approval prior to Paving operation. Approval is based on no tiebar movement during Paving operation.

Mechanical insertion of tie bar is allowed.

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PC

Macro Fiber Test Sections

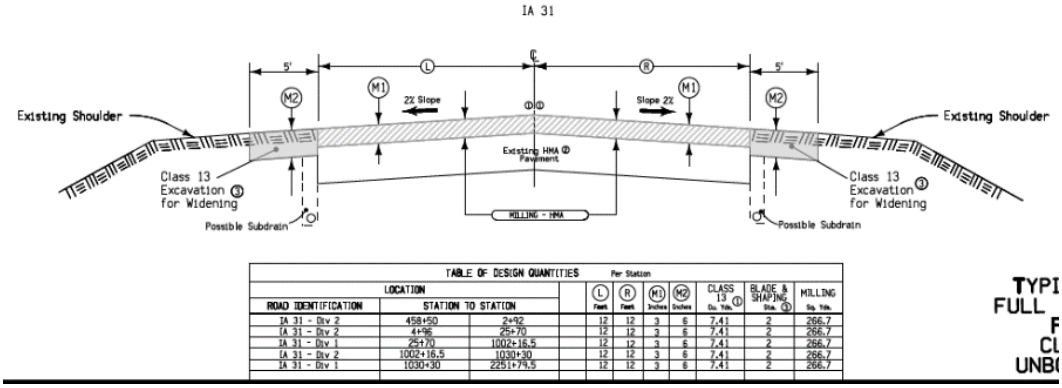
Begin Sta.	End Sta.	Length feet	PCC SY	PCC CY	Fiber lbs	Transverse Sawcut Spacing FT	Longitudinal Sawcut Spacing FT	Remarks
43+76	50+00	624	2079.8	359.7	1438.7	6	6	Use Detail EX-JNT A on sheet B.2
142+00	152+00	1000	3333.0	576.4	2305.6	15	12	Use Detail EX-JNT B on sheet U.1
152+00	162+00	1000	3333.0	576.4	2305.6	12	12	Use Detail EX-JNT B on sheet U.1
162+00	172+00	1000	3333.0	576.4	2305.6	9	12	Use Detail EX-JNT B on sheet U.1
172+00	182+00	1000	3333.0	576.4	2305.6	9	6	Use Detail EX-JNT B on sheet U.1
182+00	192+00	1000	3333.0	576.4	2305.6	6	6	Use Detail EX-JNT B on sheet U.1
423+00	441+00	1800	5999.4	1037.5	4150.1	6	6	Use Detail EX-JNT A on sheet B.2

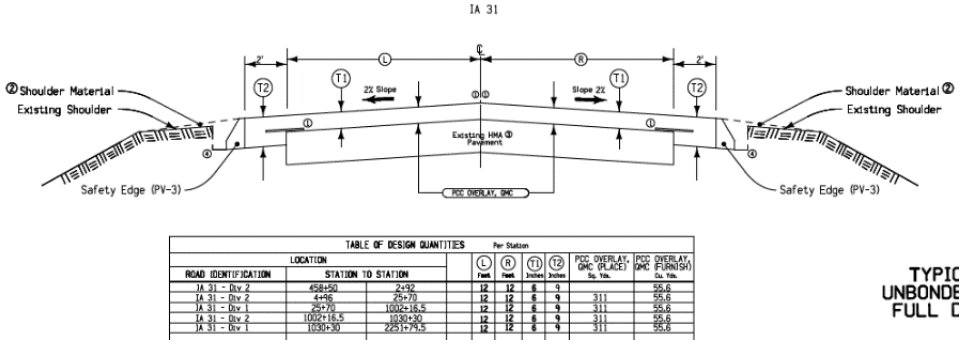
Construction

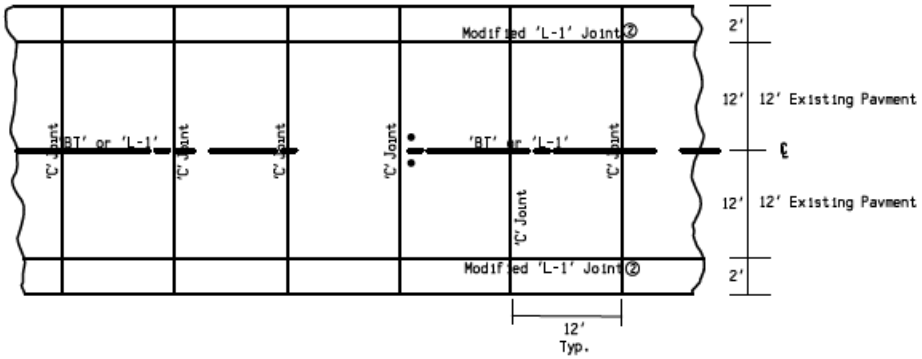
Review 2021

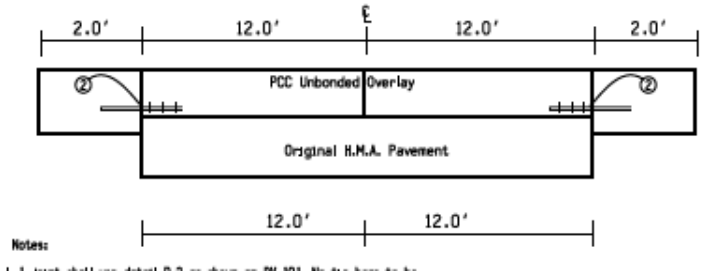
Overall, the overlay is in very good condition.

Year	2022	**Overlay Type**	UBOL
County	Cherokee	**Design**	6" x 28' (12' x12' ML and 2 x 12' Shoulder), Fibers – 4 lb/cy
Route	IA 31	**Milling**	3" Milling
Project	STP-031-3(11)--2C-18	**Interlayer**	Existing HMA
Location	Washta to US 59	**Tie Bars**	L-1, 3 ft @ 30" centers









2022 Review

Overall, the overlay is in very good condition. A few areas with random cracking off sawed joints. Issues with center line rumble strip depth and crossing joint.

Year	2022	**Overlay Type**	WT
County	Plymouth	**Design**	6" x 36' (6 x 6' ML and 6 x 6' Shoulder) 12x12 Test Section
Route	IA 3	**Milling**	2” Milling
Project	NHSX-003-1(106)--2R-75	**Interlayer**	Existing HMA
Location	Lemars to Remsen	**Tie Bars**	L-1, 3 ft @ 30” centers

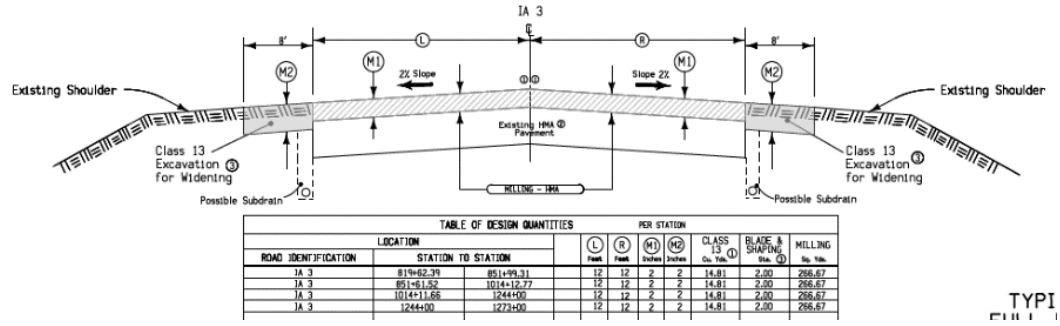


TABLE OF DESIGN QUANTITIES — PER STATION

LOCATION			L Feet	R Feet	M1 Inches	M2 Inches	CLASS 13 Cu. Yds.	BLADE & SHAPING Sta.	MILLING Sq. Yds.
ROAD IDENTIFICATION	STATION TO STATION								
IA 3	819+62.39	851+99.31	12	12	2	2	14.81	2.00	266.67
IA 3	851+61.52	1014+12.77	12	12	2	2	14.81	2.00	266.67
IA 3	1014+11.66	1244+00	12	12	2	2	14.81	2.00	266.67
IA 3	1244+00	1273+00	12	12	2	2	14.81	2.00	266.67

TYPI

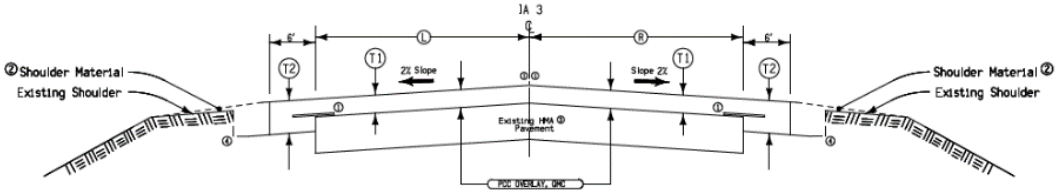
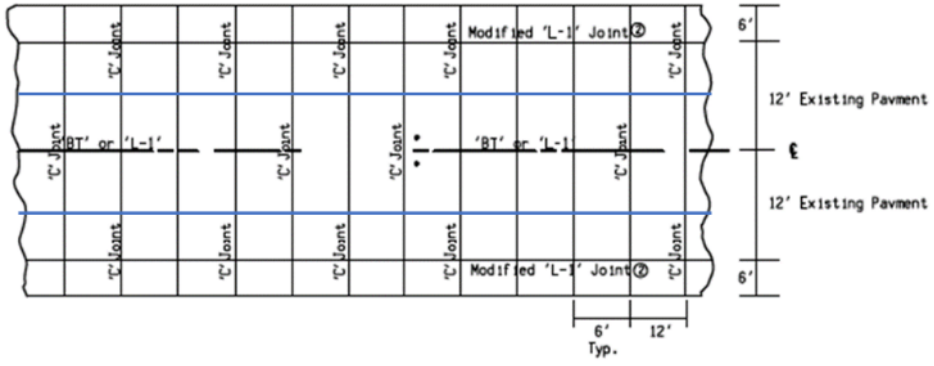
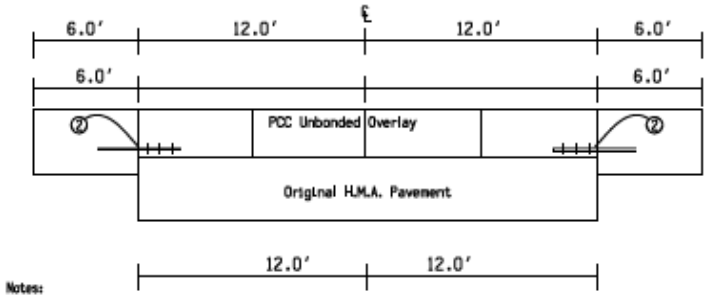


TABLE OF DESIGN QUANTITIES — Per Station

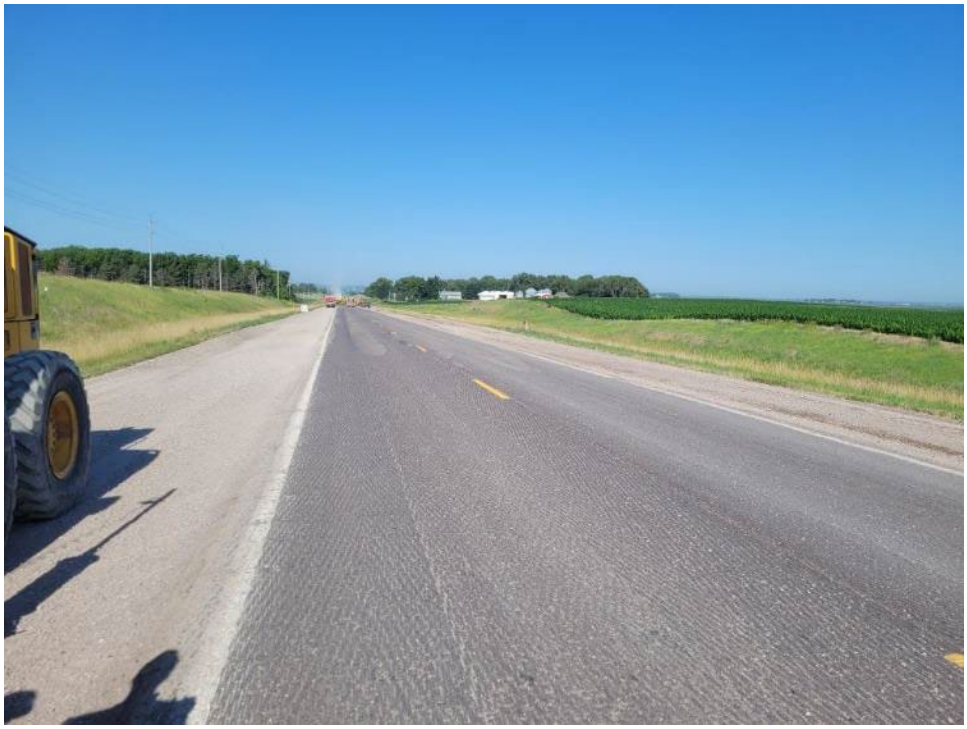
LOCATION			L Feet	R Feet	T1 Inches	T2 Inches	PCC OVERLAY, QMC (PLACE) Sq. Yds.	PCC OVERLAY, QMC (FURNISH) Cu. Yds.
ROAD IDENTIFICATION	STATION TO STATION							
IA 3	819+62.39	851+99.31	12	12	6	9	400	77.78
IA 3	851+61.52	1014+12.77	12	12	6	9	400	77.78
IA 3	1014+11.66	1244+00	12	12	6	9	400	77.78
IA 3	1244+00	1273+00	12	12	6	9	400	77.78





Construction

Overlay was placed full width to be able to place shoulders as soon as 325 psi maturity was reached. Goal was to pave ~1 mile per day and fully open each section within 2 days after paving. The test section of 12 x 12 foot panels is located between Otter Ave. and Oyens Ave. (~Sta 1028+00 to 1038+00).

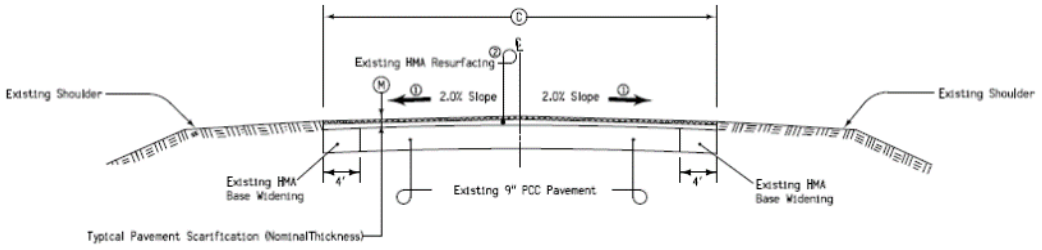



GP4
IOWA DOT

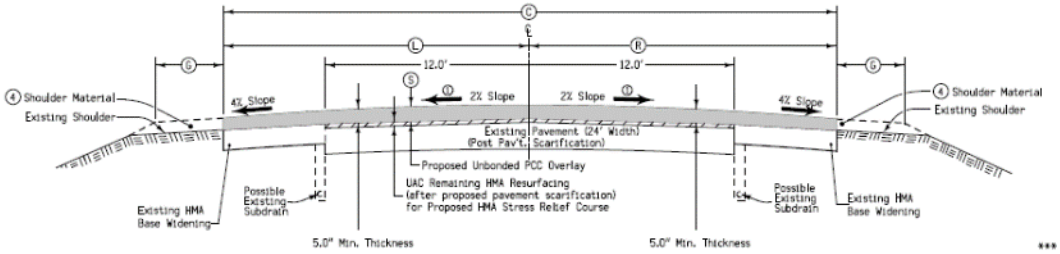
2022 Review

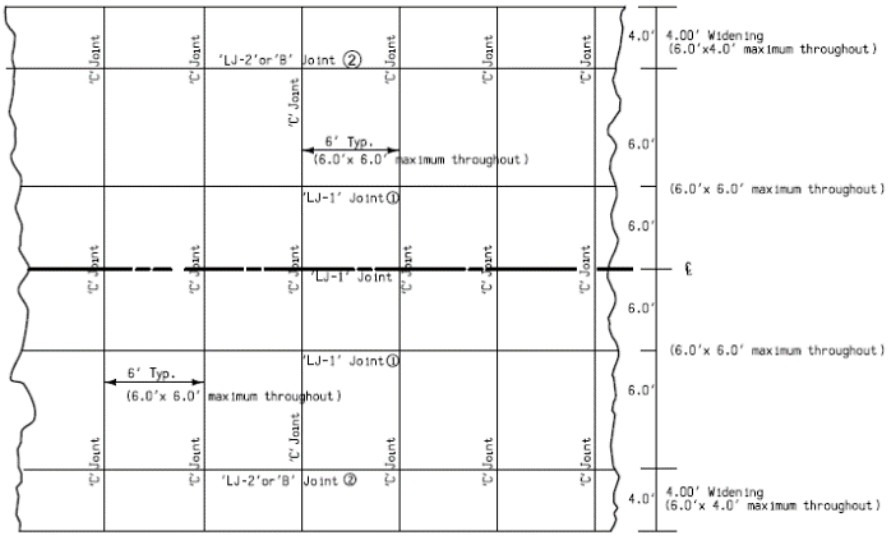
Overall, the overlay is in very good condition.

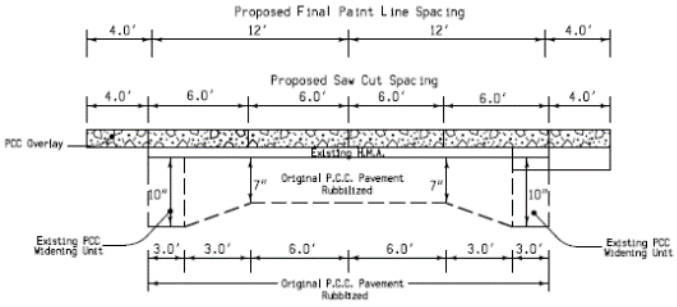
Year	2022	**Overlay Type**	UBOL
County	Tama/Blackhawk	**Design**	5" x 32' (6 x 6' ML and 4 x 6' Shoulder)
Route	US 63	**Milling**	1” Milling
Project	NHSX-063-5(72)--3H-86	**Interlayer**	Existing HMA
Location	Traer to 0.5 mi S of IA 58	**Tie Bars**	Fibers 5 lb/cy – No Tie Steel



Location			Ⓘ Ⓜ	Ⓒ	Remarks
Road Identification	Station To Station		Inches	Feet	
US 63	131+25.40	493+88.60	1	32.0	EQUATION 493+88.60(BK) = 0+00(AH)
US 63	0+00	332+36	1	32.0	EQUATION 493+88.60(BK) = 0+00(AH)







Construction


GOMACO

2023 Review

Overall, the overlay is in very good condition.

Year	2023	**Overlay Type**	WT
County	Plymouth	**Design**	6" x 36' (12 x 12' ML and 6' x 12' Shoulder)
Route	IA 3	**Milling**	3" Milling
Project	NHSN-003-1(104)--3H-75	**Interlayer**	Existing HMA
Location	Remsen to Co. Line	**Tie Bars**	Fibers 4 lb/cy #4 x 36" at 30" C-C

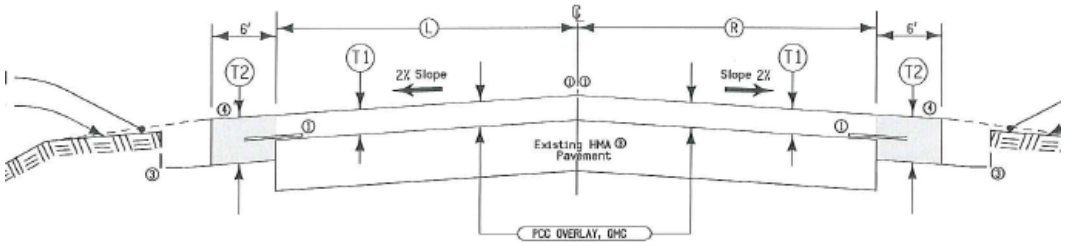
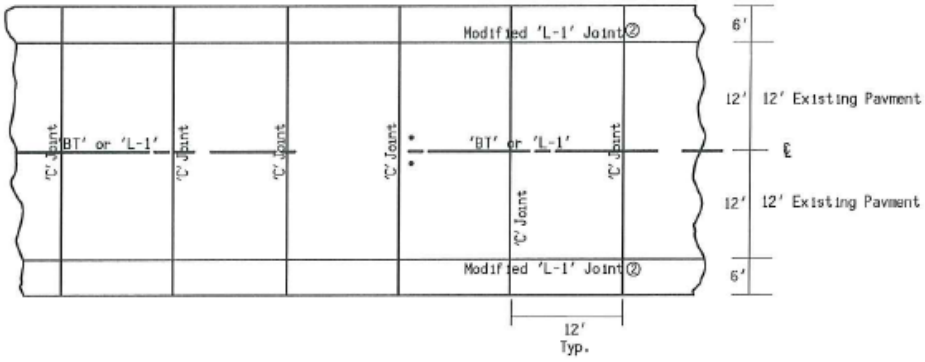
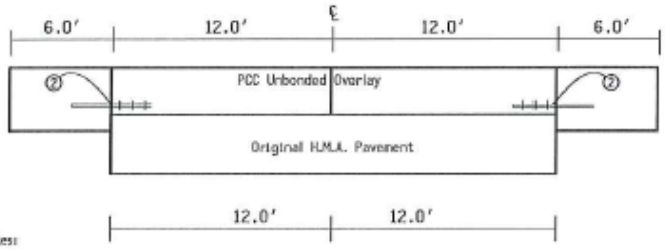


TABLE OF DESIGN QUANTITIES Per Station

LOCATION			(L)	(R)	(T1)	(T2)	PCC OVERLAY, QMC (PLACE)	PCC OVERLAY, QMC (FURNISH)
ROAD IDENTIFICATION	STATION TO STATION		Feet	Feet	Inches	Inches	Sq. Yds.	Cu. Yds.
IA 3 DIV. 1	1315+30	1332+78	12	12	6	9	266.67	44.44
IA 3 DIV. 2	1332+78	1596+74	12	12	6	9	266.67	44.44





Notes:

① L-1 joint shall use detail D-3 as shown on PV-101. No tie bars to be used except as stated in note ②.

② An "L-1" joint shall be located at 12.0-ft. Lt. and Rt. of centerline with a 3-ft. long reinforcing bar.

Reinforced bars shall be #4 Bars at 30" on center spacing with a 3-ft long reinforcing bar centered over joint. Maintain minimum 6-in clearance from transverse joints. Minimum 3 staples per Tiebar. Stapling process subject to Engineer approval prior to Paving operation. Approval is based on no tiebar movement during Paving operation.

Mechanical insertion of tie bar is allowed.

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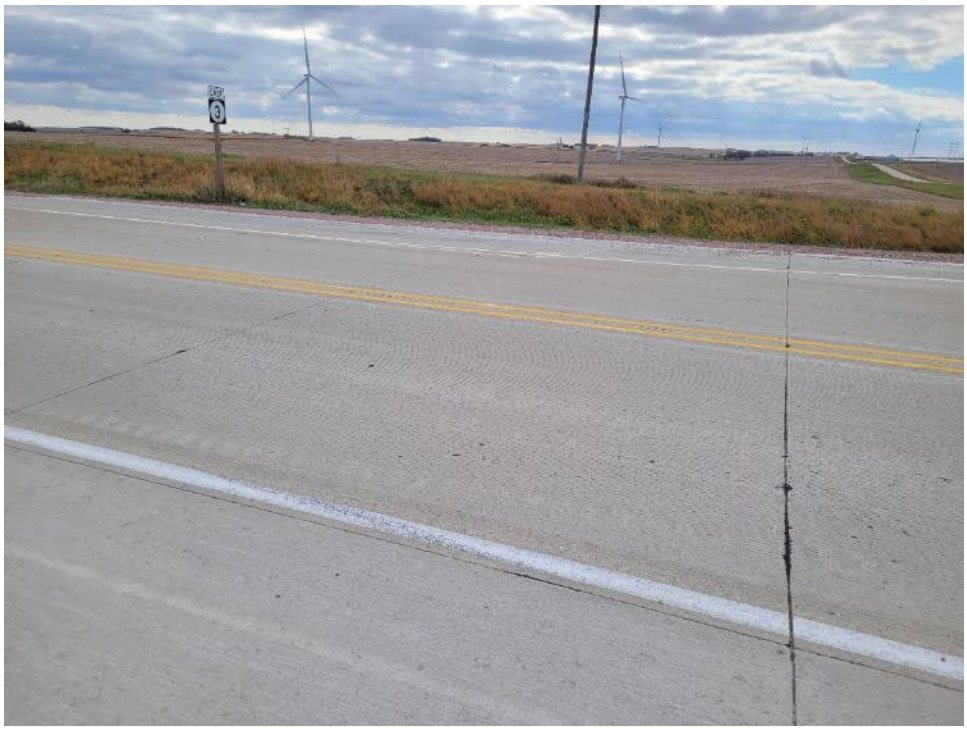


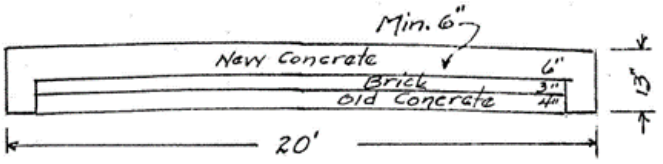
Appendix C – Old Pavement Resurfacing Designs

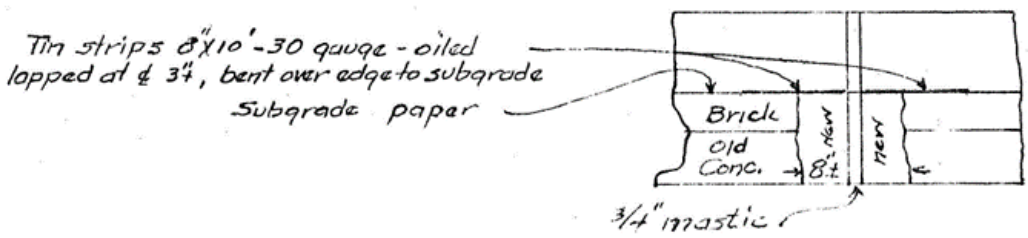
Design No. R-1
First used in letting of 5-10-32

R-1

Dubuque FA 148 D 8.365

Similiar to Design No R 2 except
for the details below

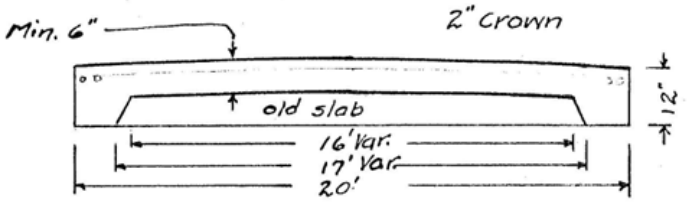


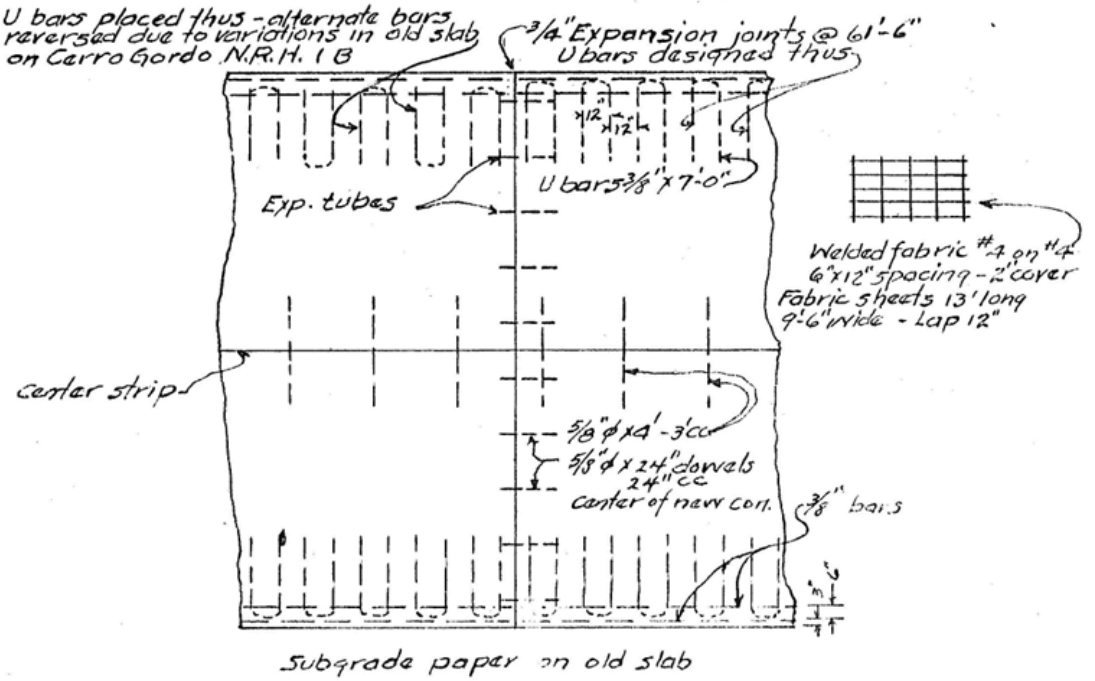


Design No. R-2
First used in letting of 9-12-33

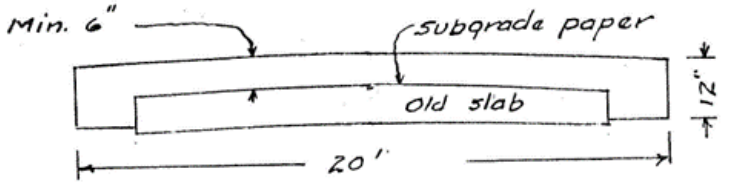
R-2

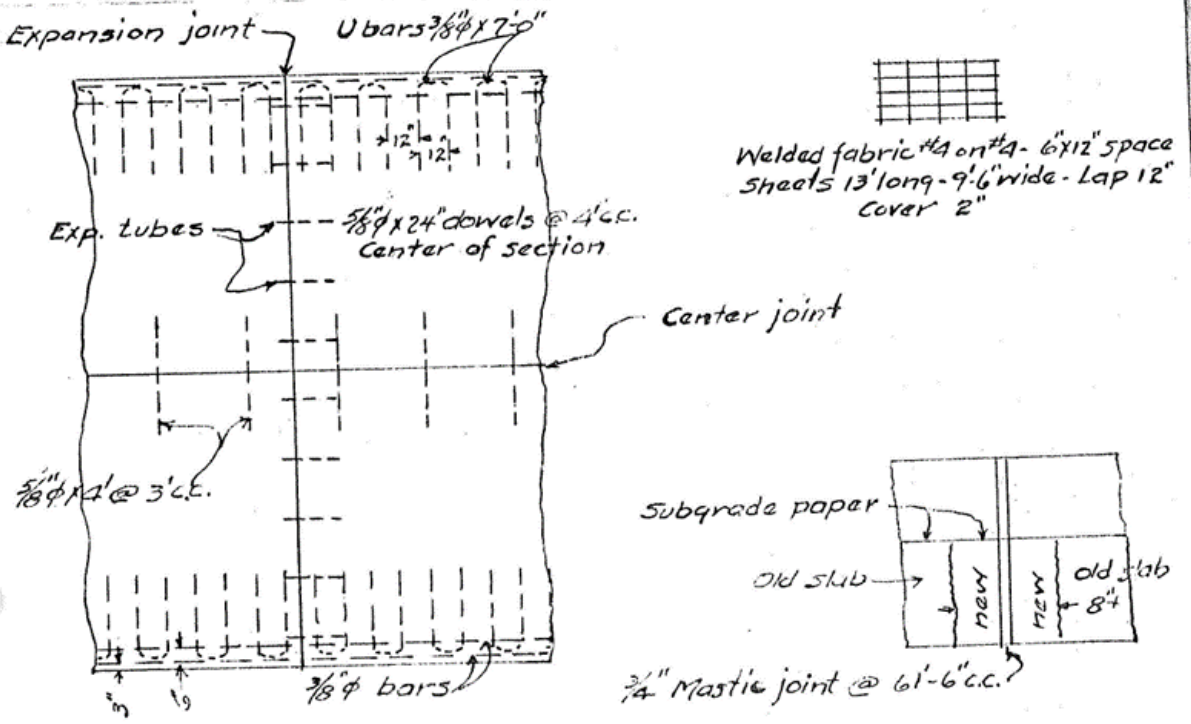
Carro Gordo	NRH 1B	1.059
Winnebago	NRM 139	0.294
Woodbury	P 45	1.8015





R-3

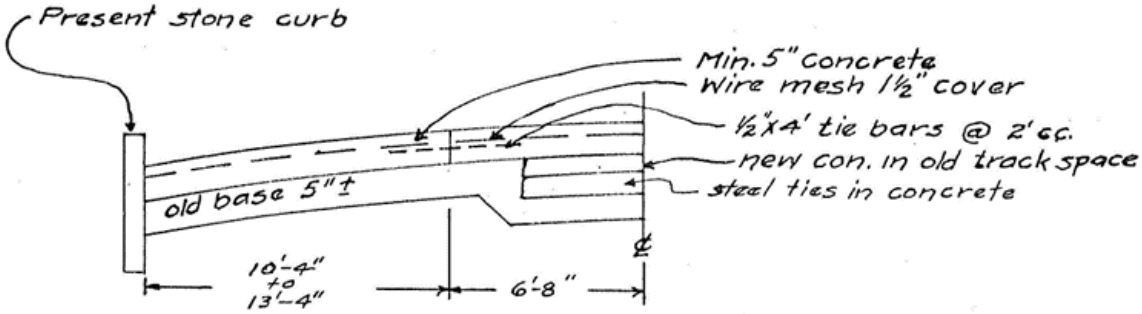

Min. 6"
subgrade paper
old slab
12"
20'

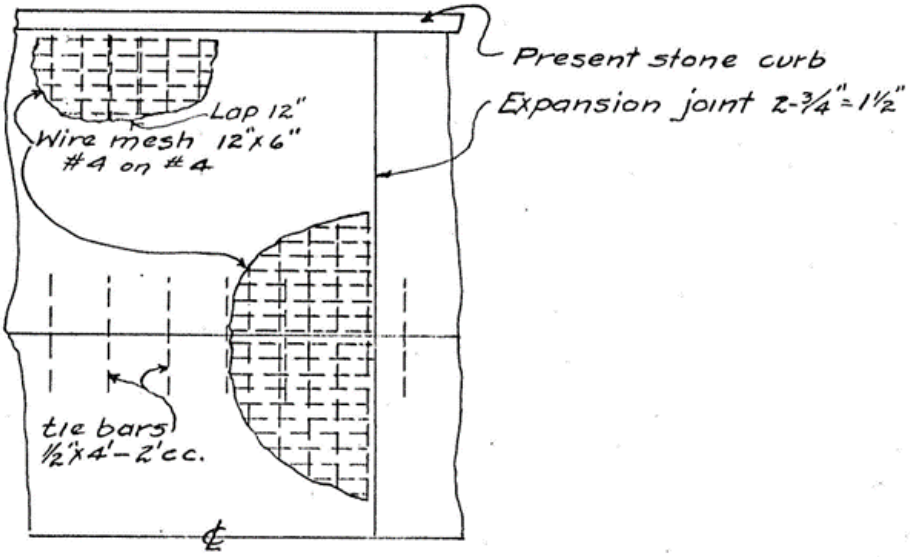

Expansion joint
U bars 3/8" x 2'-0"
12"
12"
Exp. tubes
5/8" x 24" dowels @ 4' c.c.
Center of section
Center joint
5/8" x 4' @ 3' c.c.
3/8" ø bars
Welded fabric #4 on #4 - 6" x 12" space
sheets 13' long - 9'-6" wide - Lap 12"
Cover 2"
Subgrade paper
Old slab
new
new
old slab
8"
3/4" Mastic joint @ 61'-6" c.c.

Design No. R-4
First used in letting of 1-29-35

R-4

Dubuque NRM 17 DEF 1.995

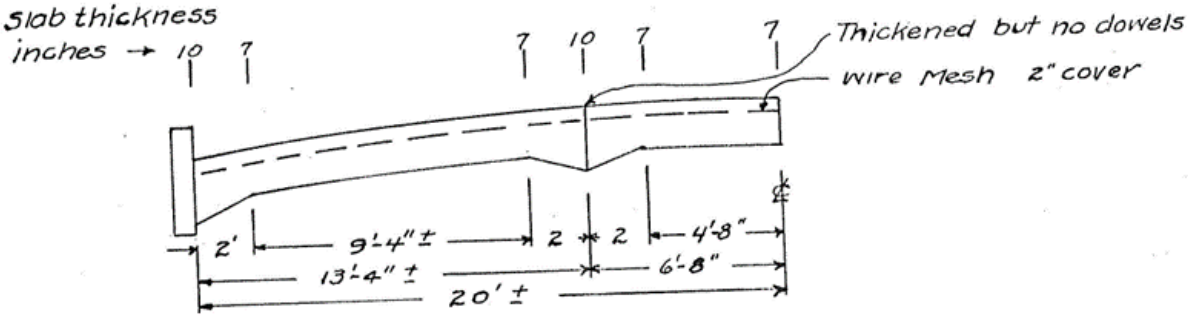


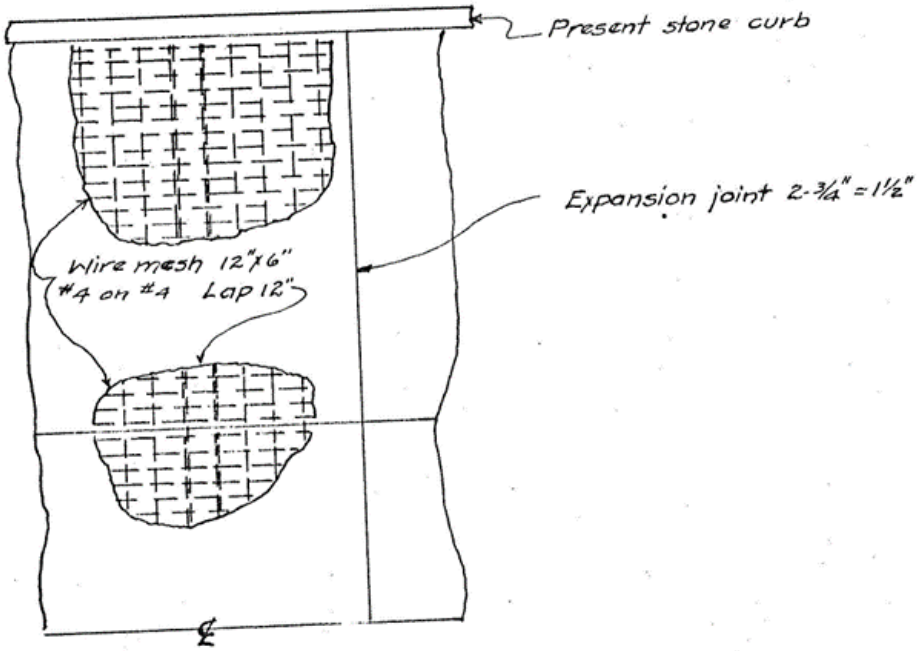


R-5

Design No. R-5
First used in letting of 1-29-35

Dubuque NRM 17 DEF 1.995

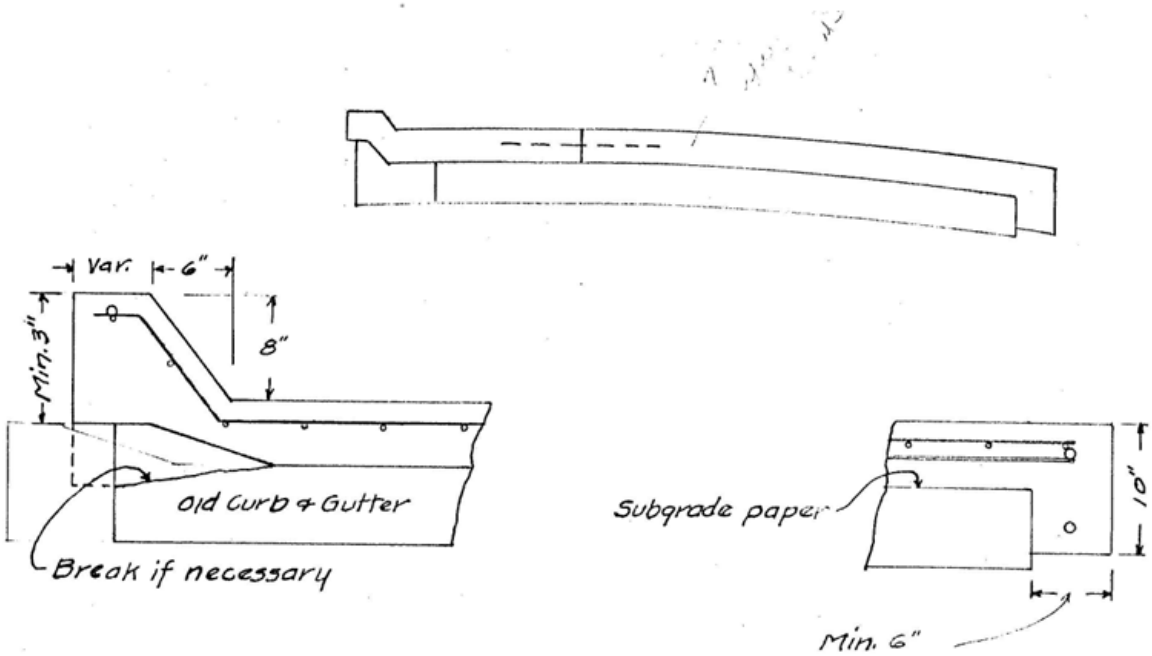


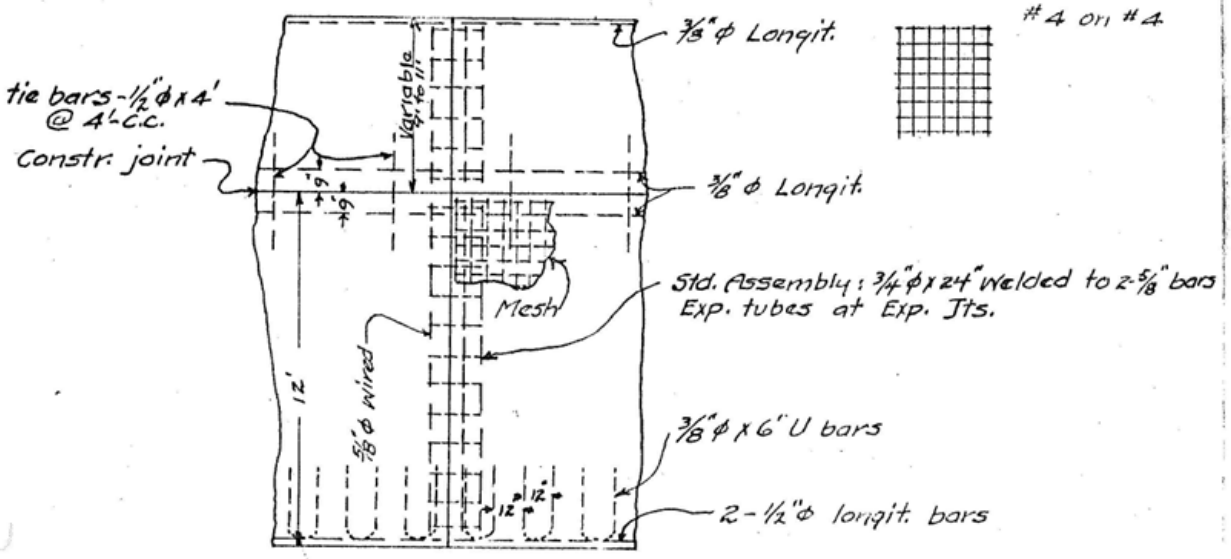


Design No R-6
First used in letting of 6-29-36

R-6

Des Moines WPMH 572 B 0.933

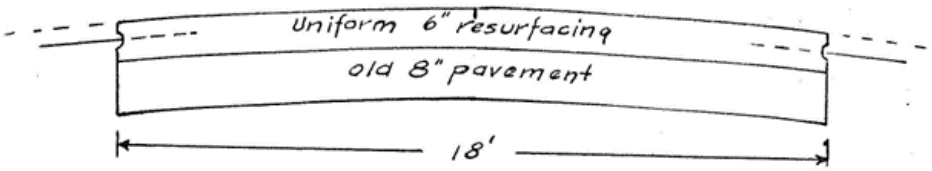


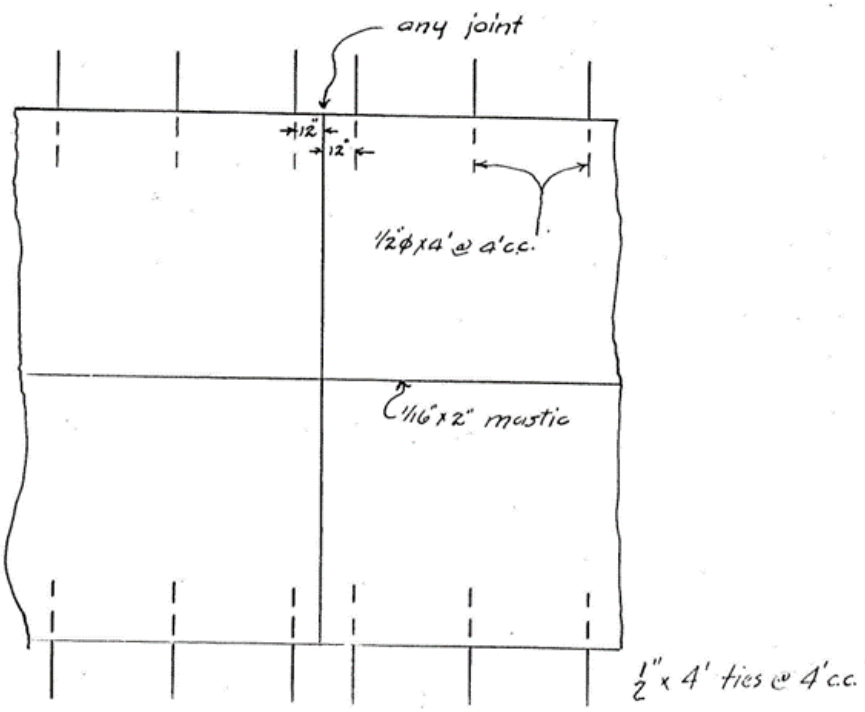


Design No. R-7
First used in letting of 4-21-42

R-7

Des Moines DAVI-2 2.045

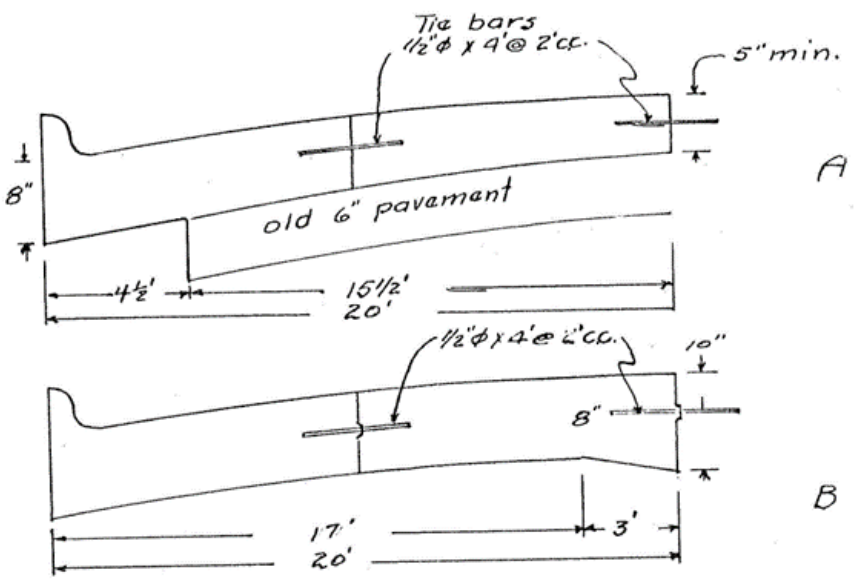


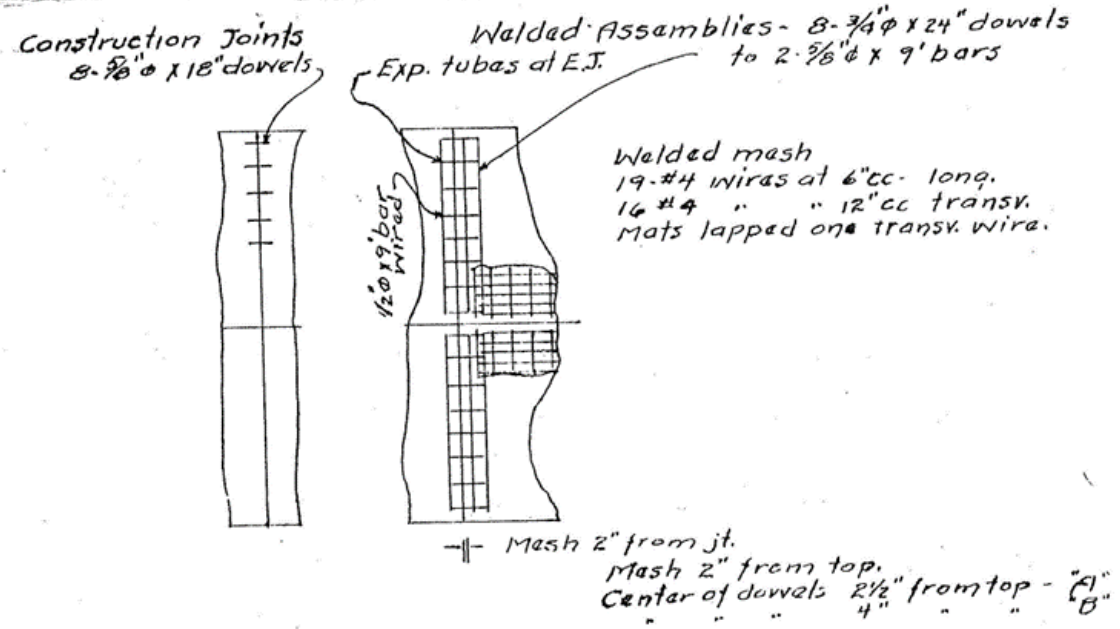


Design No. R - 8
First used in letting of

Plymouth U-38 (6)

R-8



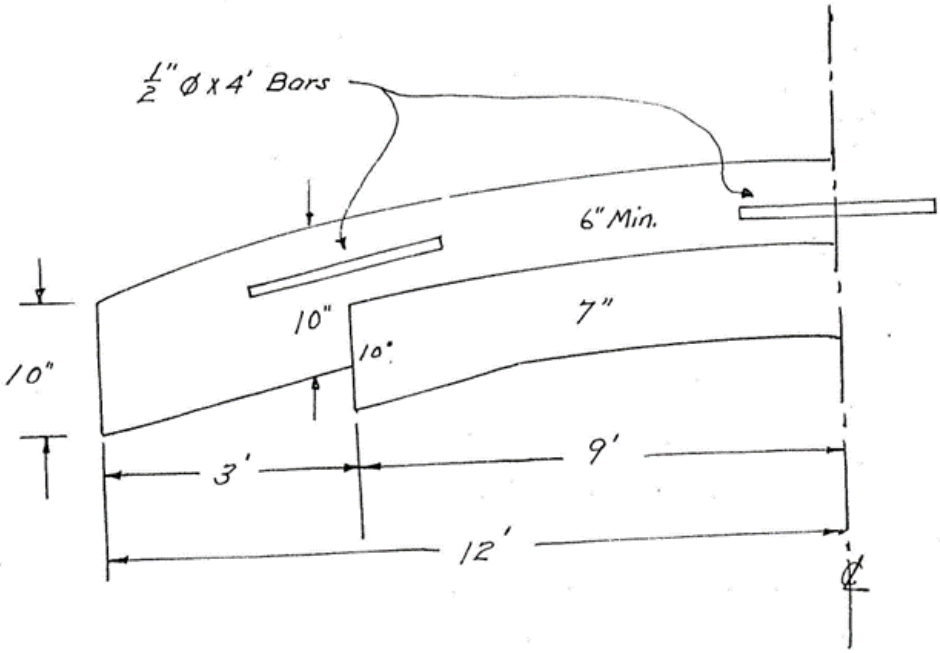


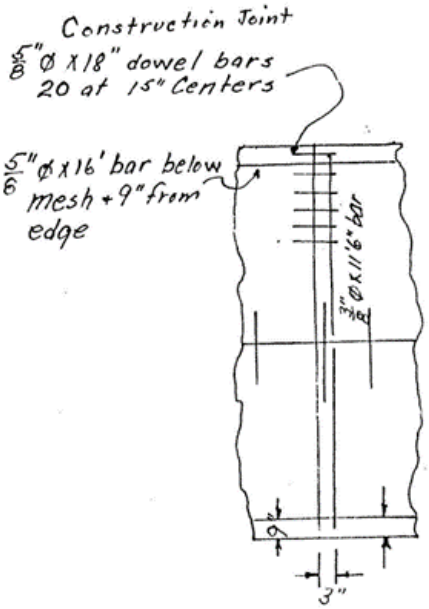
Design No. R-9

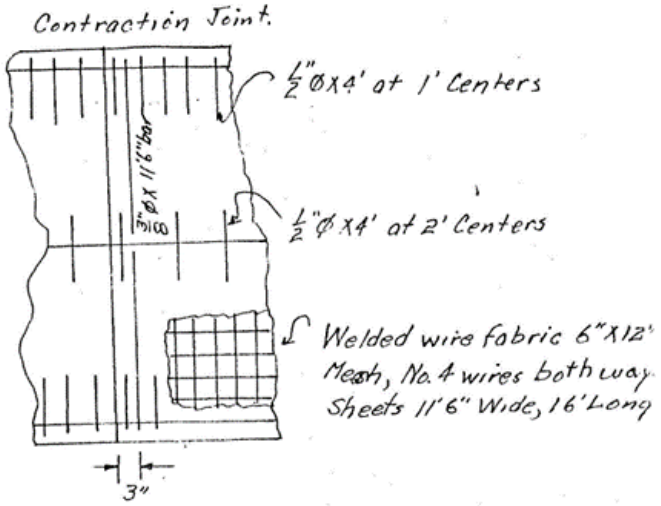
First Used in Letting of 7-19-49

Benton	F 233(2)
Benton	F 278(2)

R 9





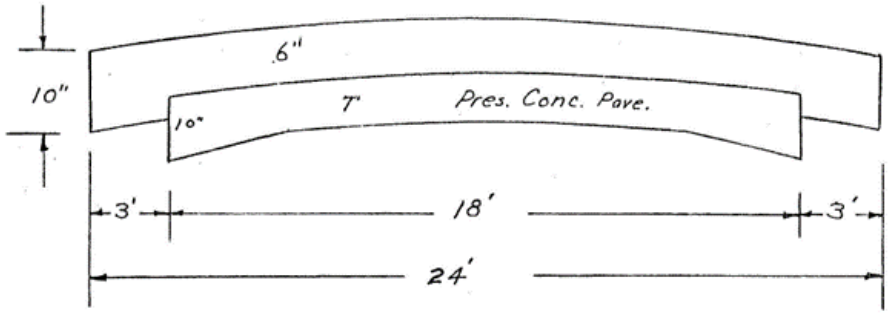


Design No. R-10

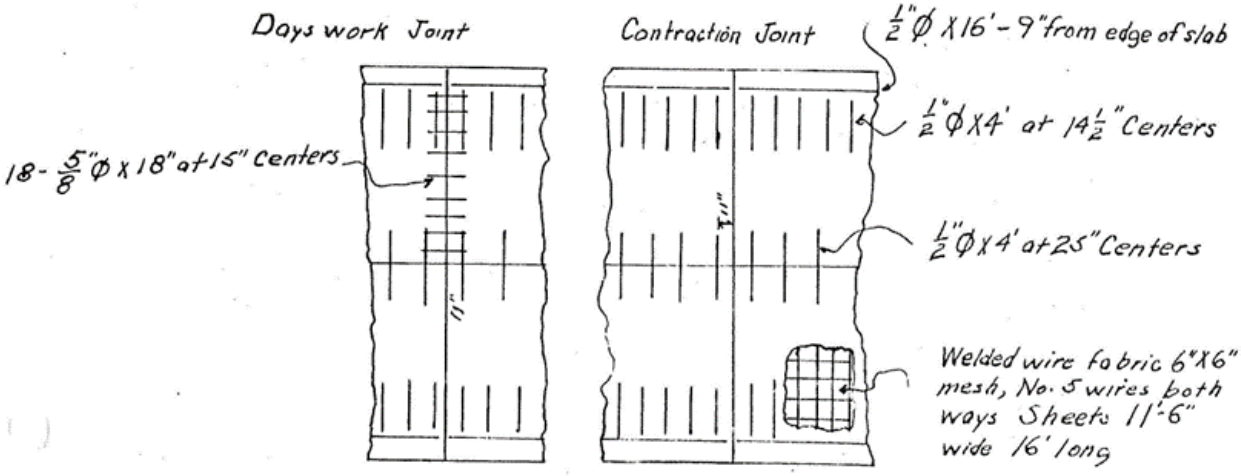
First Used in Letting of8-1-50

Linn F-96(11) 4.312 Miles 1950

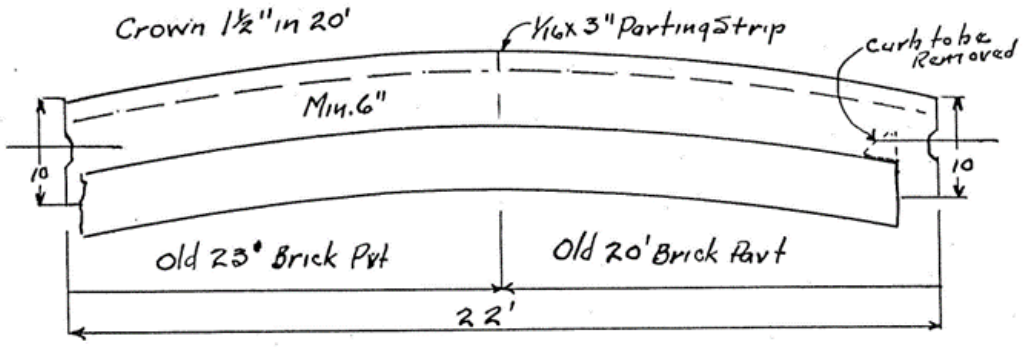
R 10

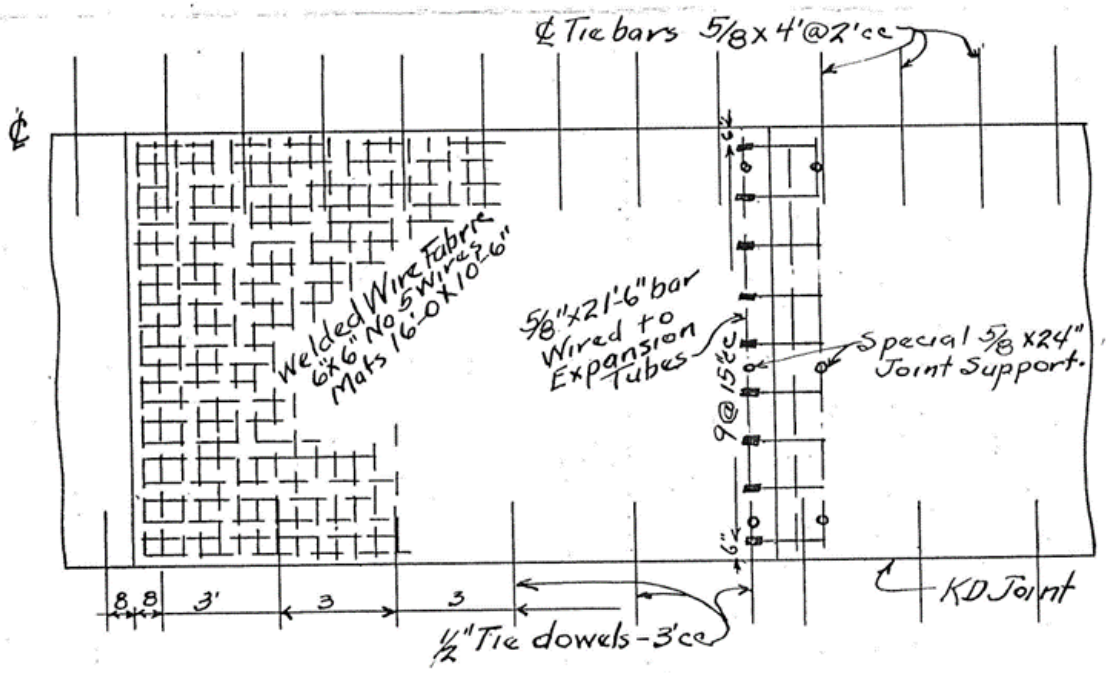


Contraction Joints at 16'-4" intervals



R-11


Crown 1½" in 20'
Y16 x 3" Parting Strip
Curb to be Removed
Min. 6"
10
10
Old 23' Brick Pvt
Old 20' Brick Pavt
22'

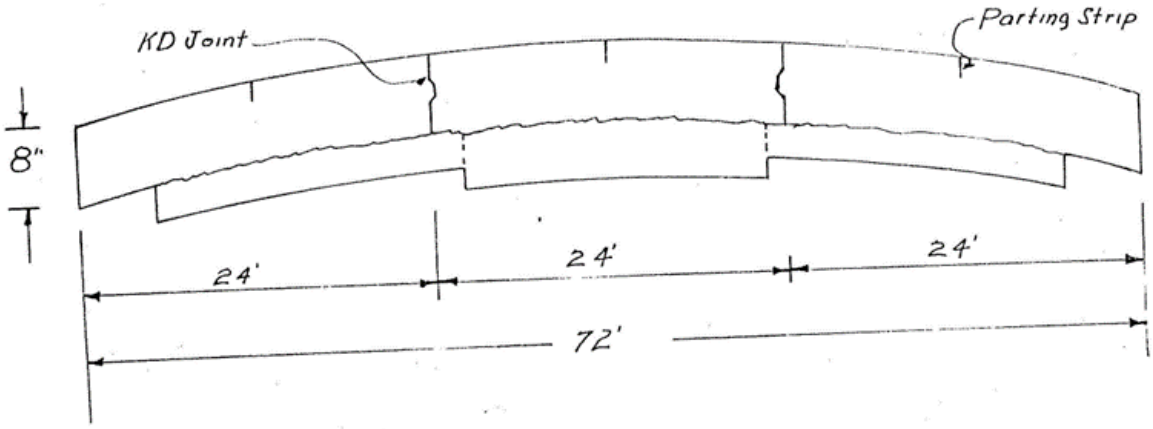

℄ Tie bars 5/8 x 4' @ 2' cc
℄
Welded Wire Fabric 6x6" No 5 Wires Mats 16-0 x 10-6"
5/8" x 21'-6" bar Wired to Expansion Tubes
Special 5/8 x 24" Joint Support.
9 @ 15" cc
6"
KD Joint
8
8
3'
3
3
½" Tie dowels - 3' cc

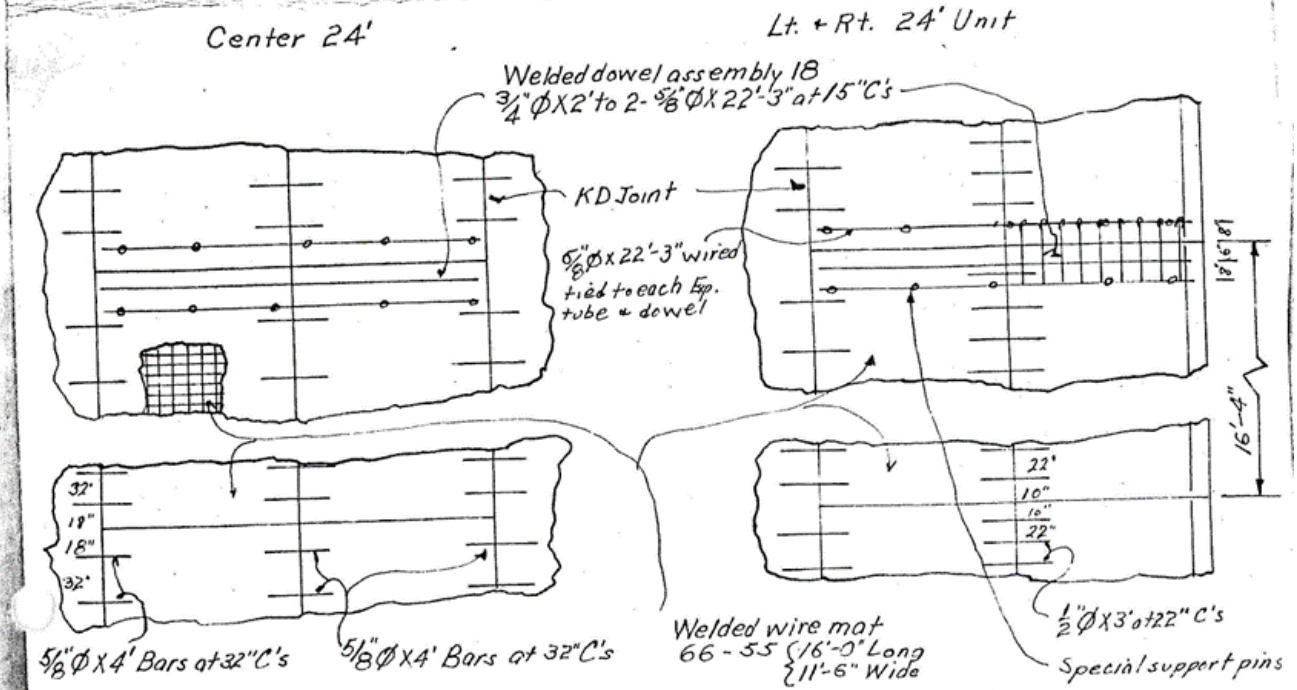
Design No. R-12

First Used in Letting of 6-6-50

Linn U-22(5)

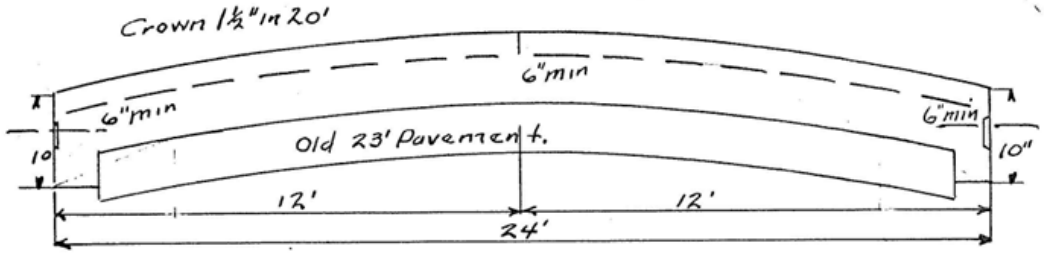
R-12

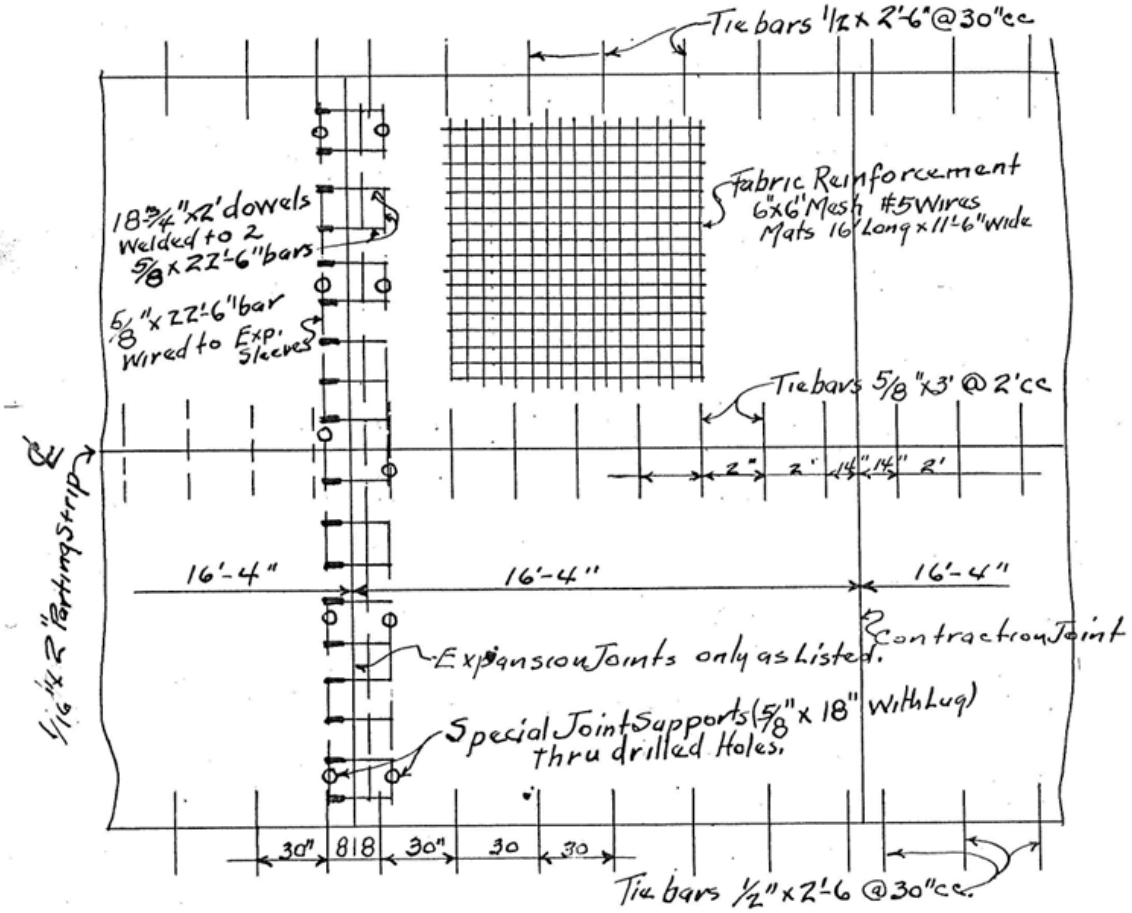




Design R 13 Width 24 Ft Min 6" Edge 10"
First used in letting of 7-6-50
Page U 651(4) 0.989 Miles 1950

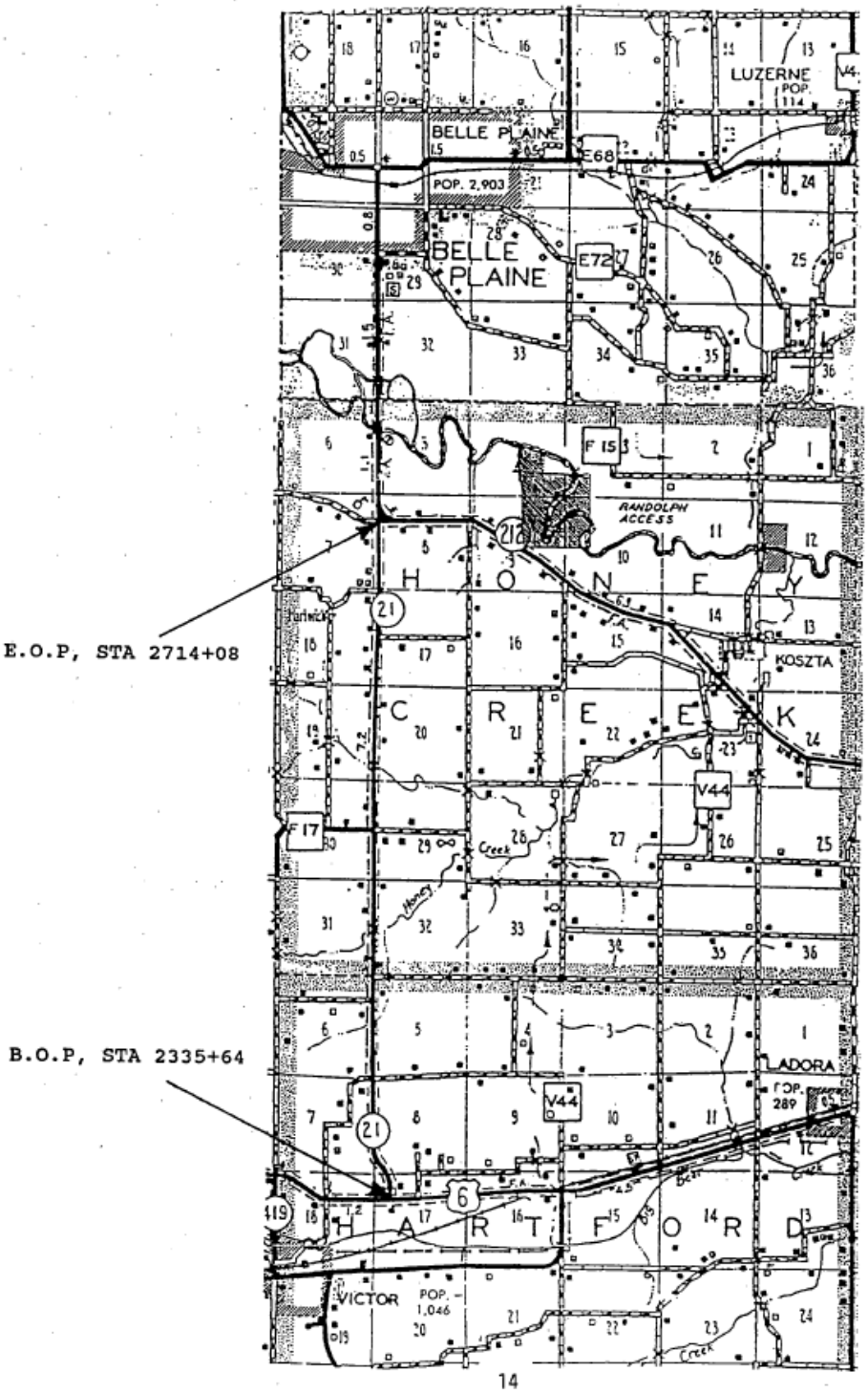
R-13



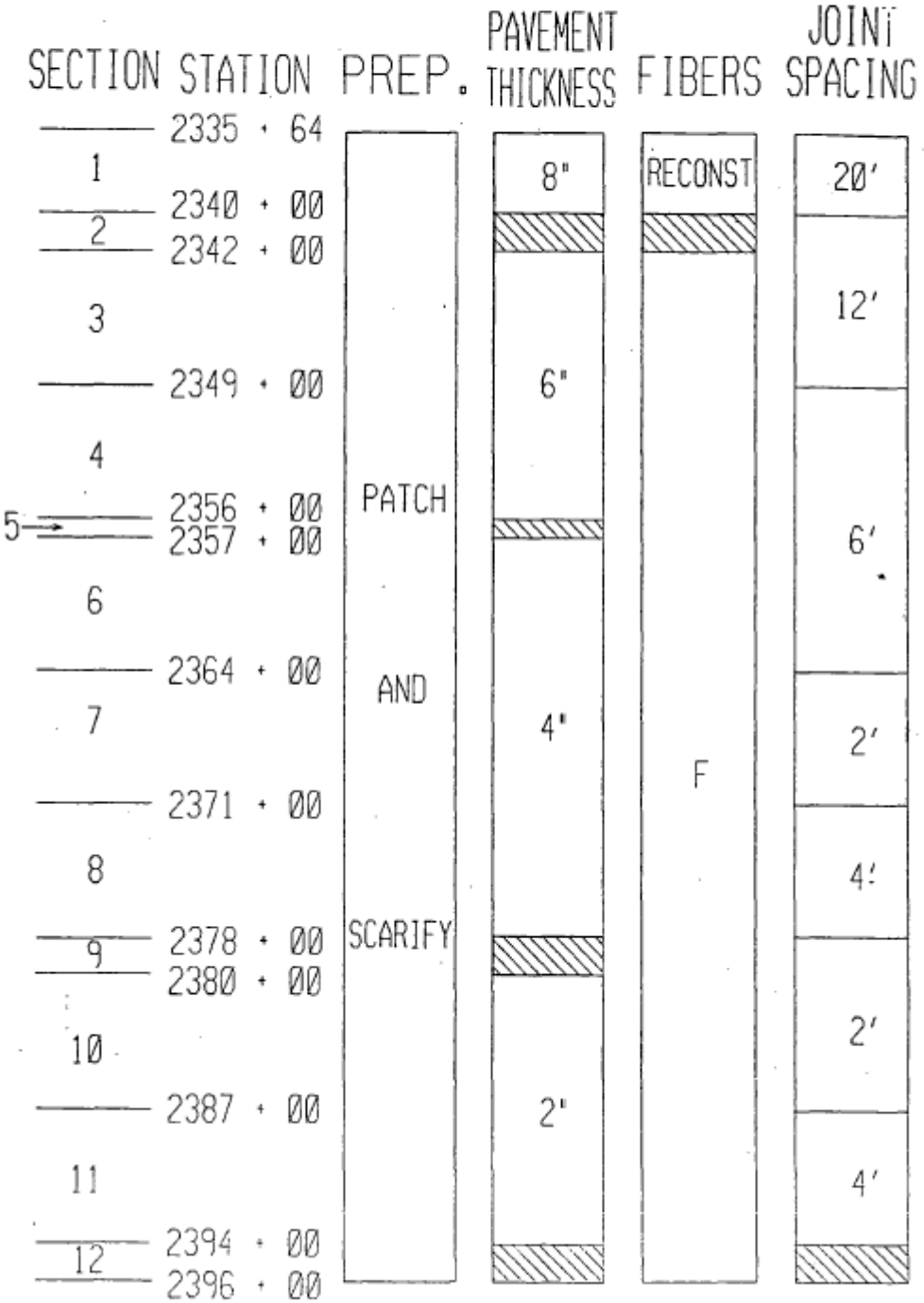


Appendix D – Iowa County IA 21 Whitetopping Overlay Test Sections

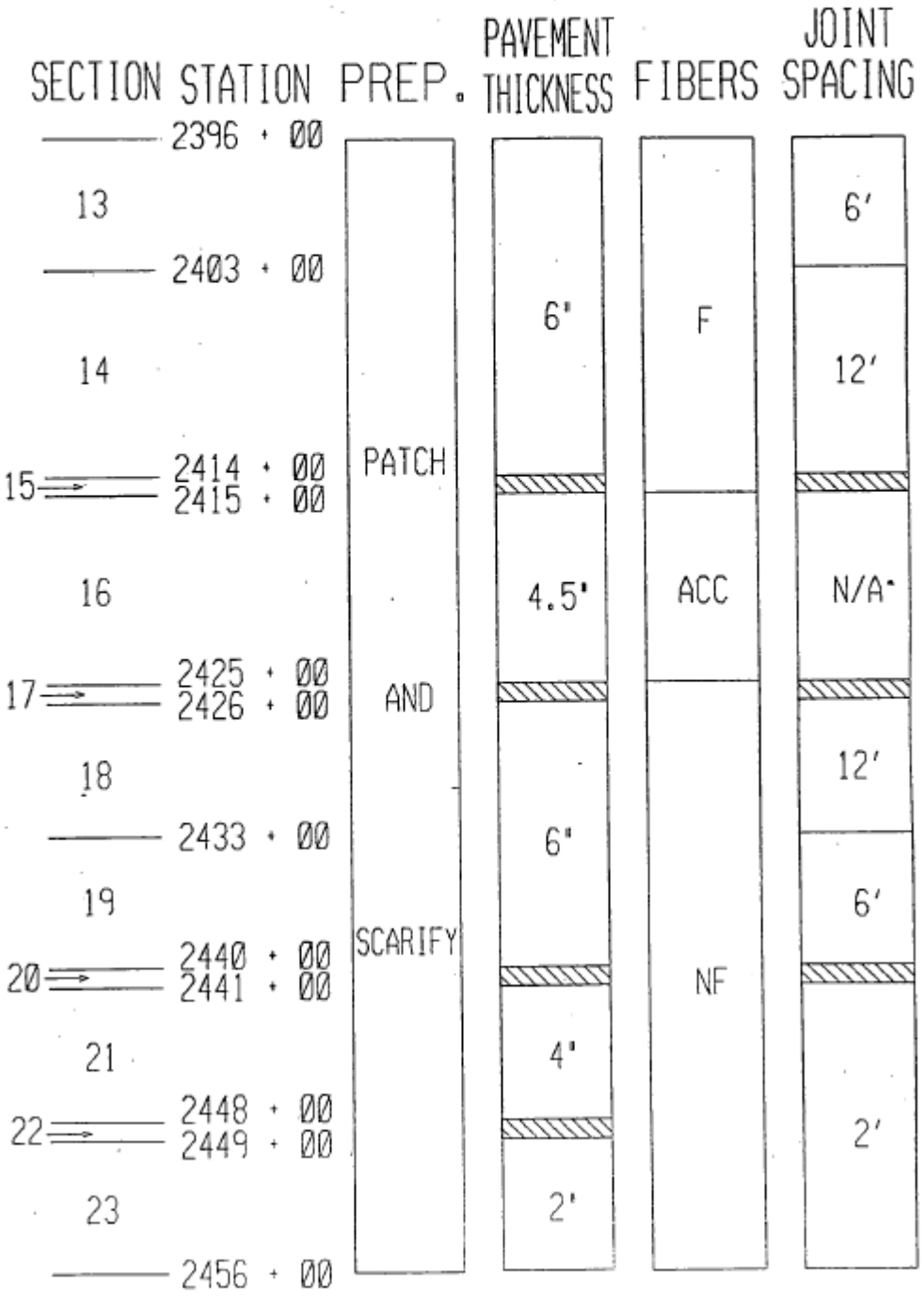
Whitetopping Research Location
Iowa County IA 21
STP-21-3(10)—2C-48



WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT



WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT



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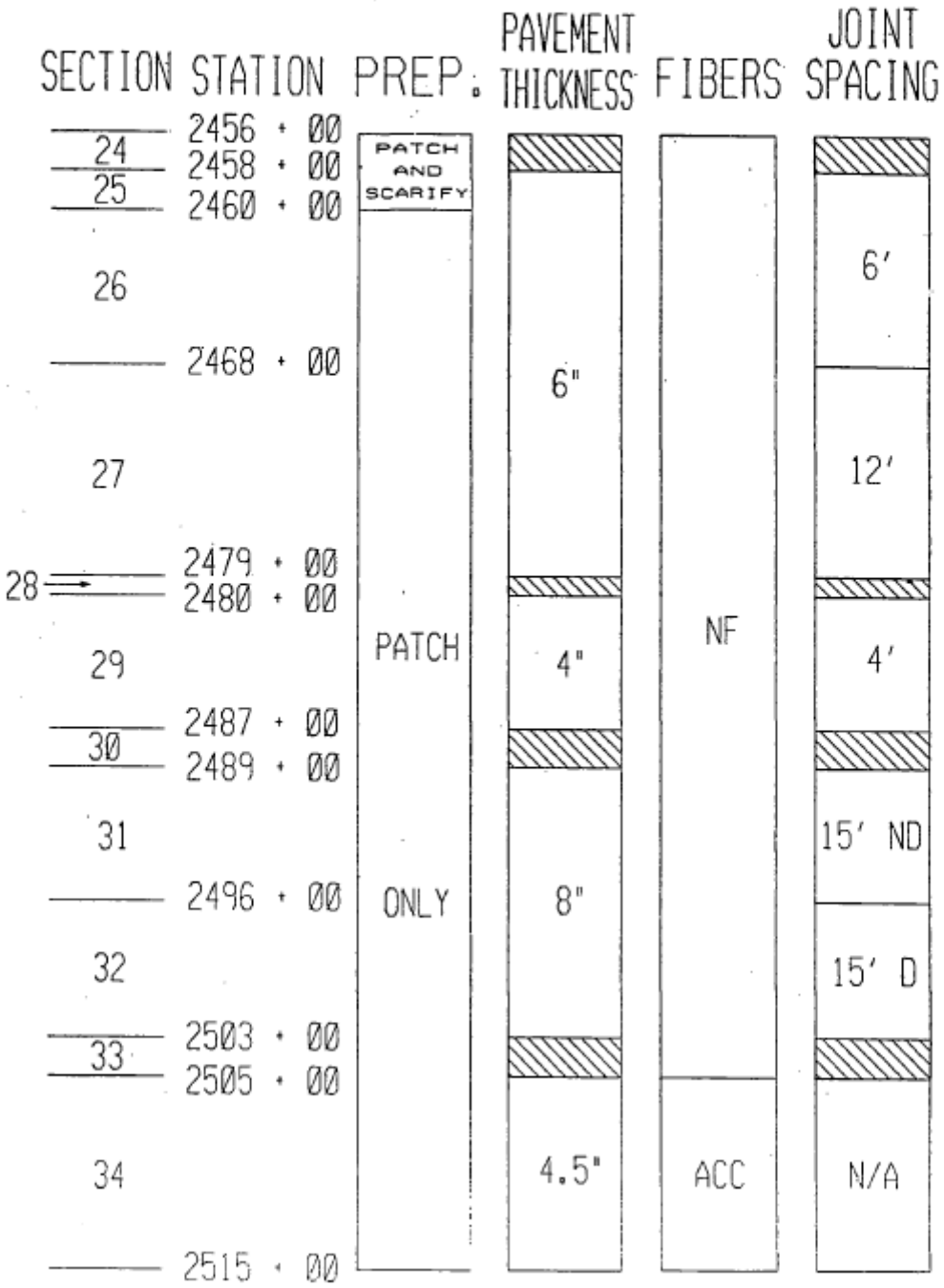
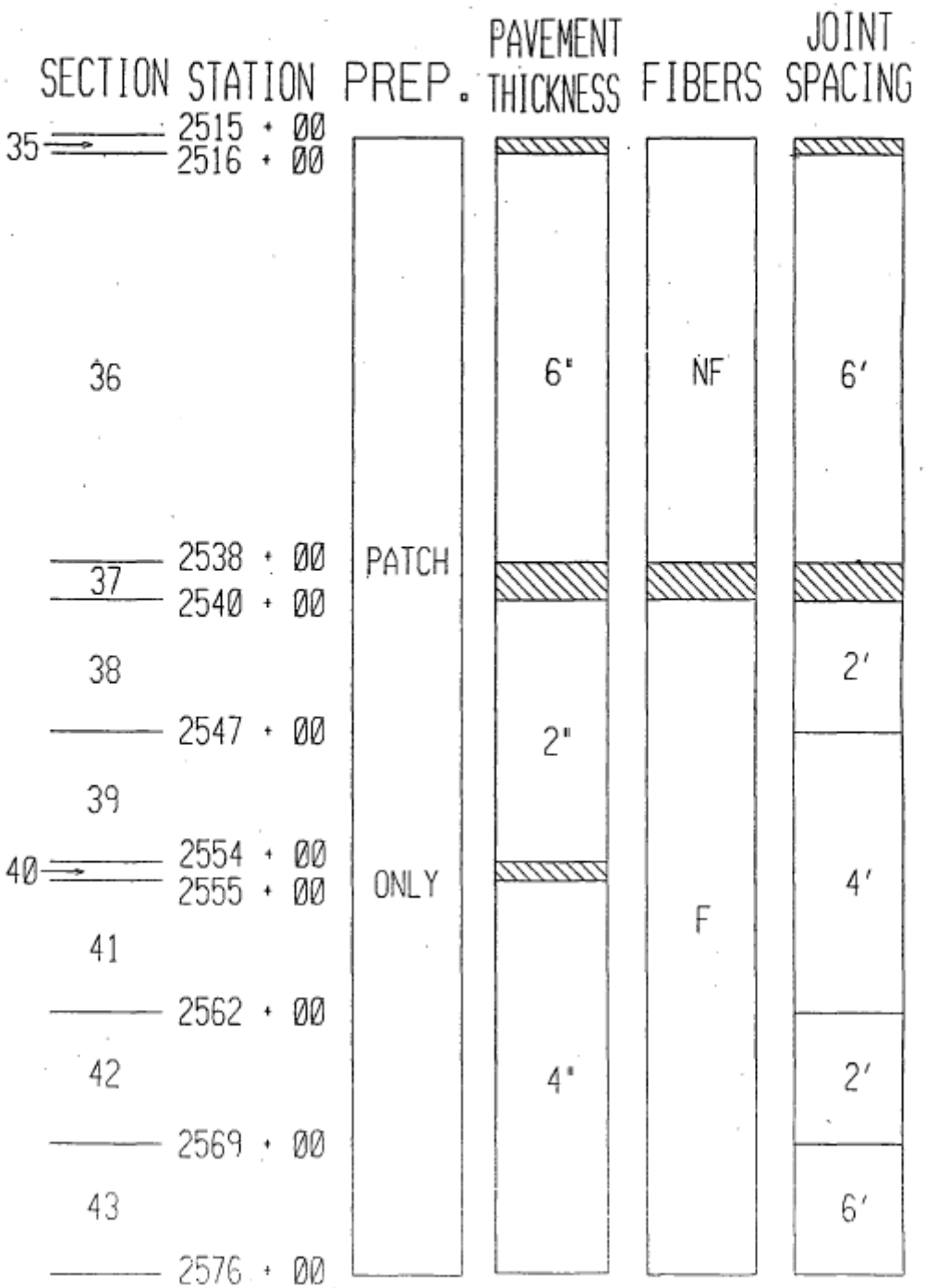
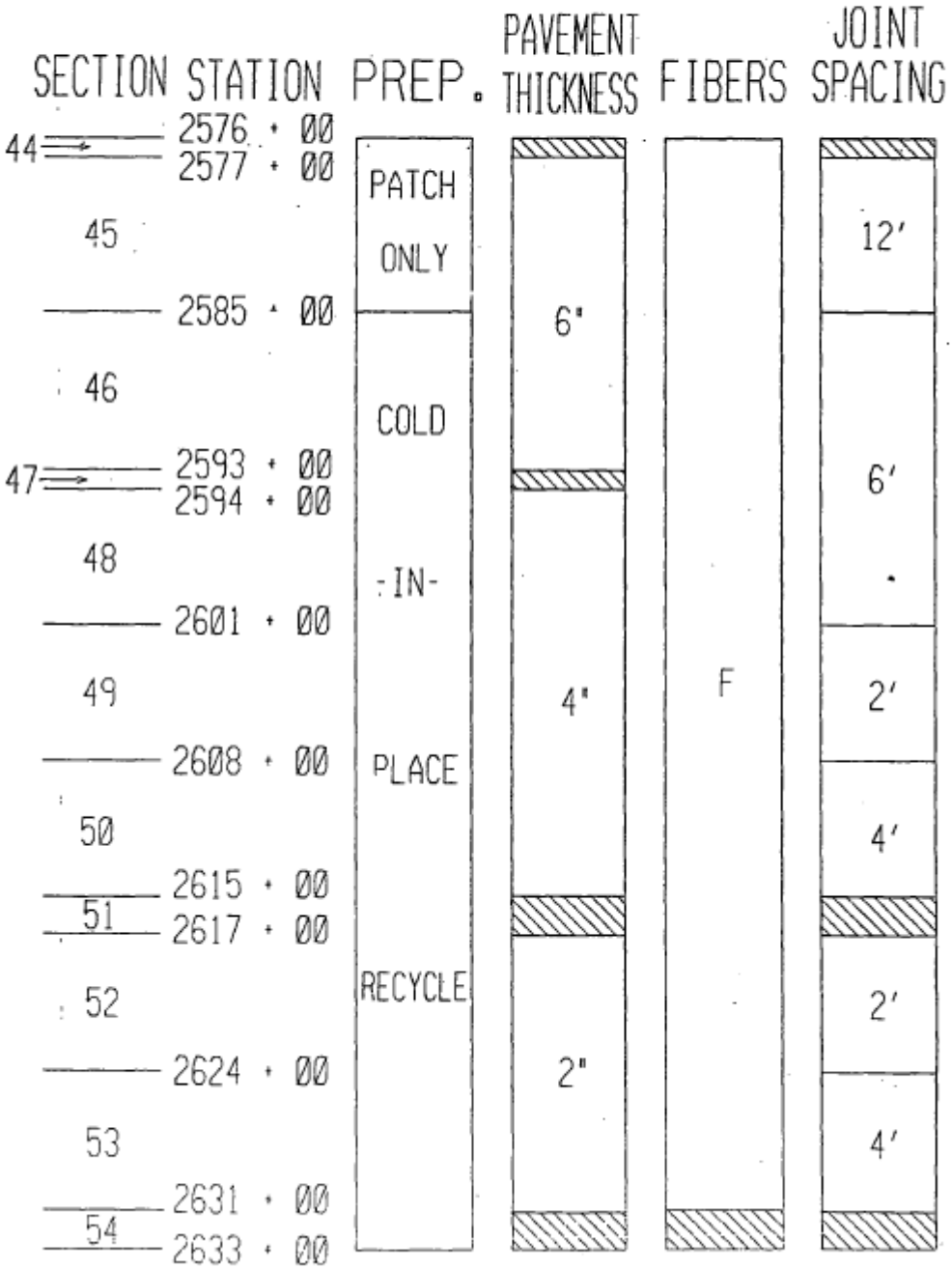
WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT



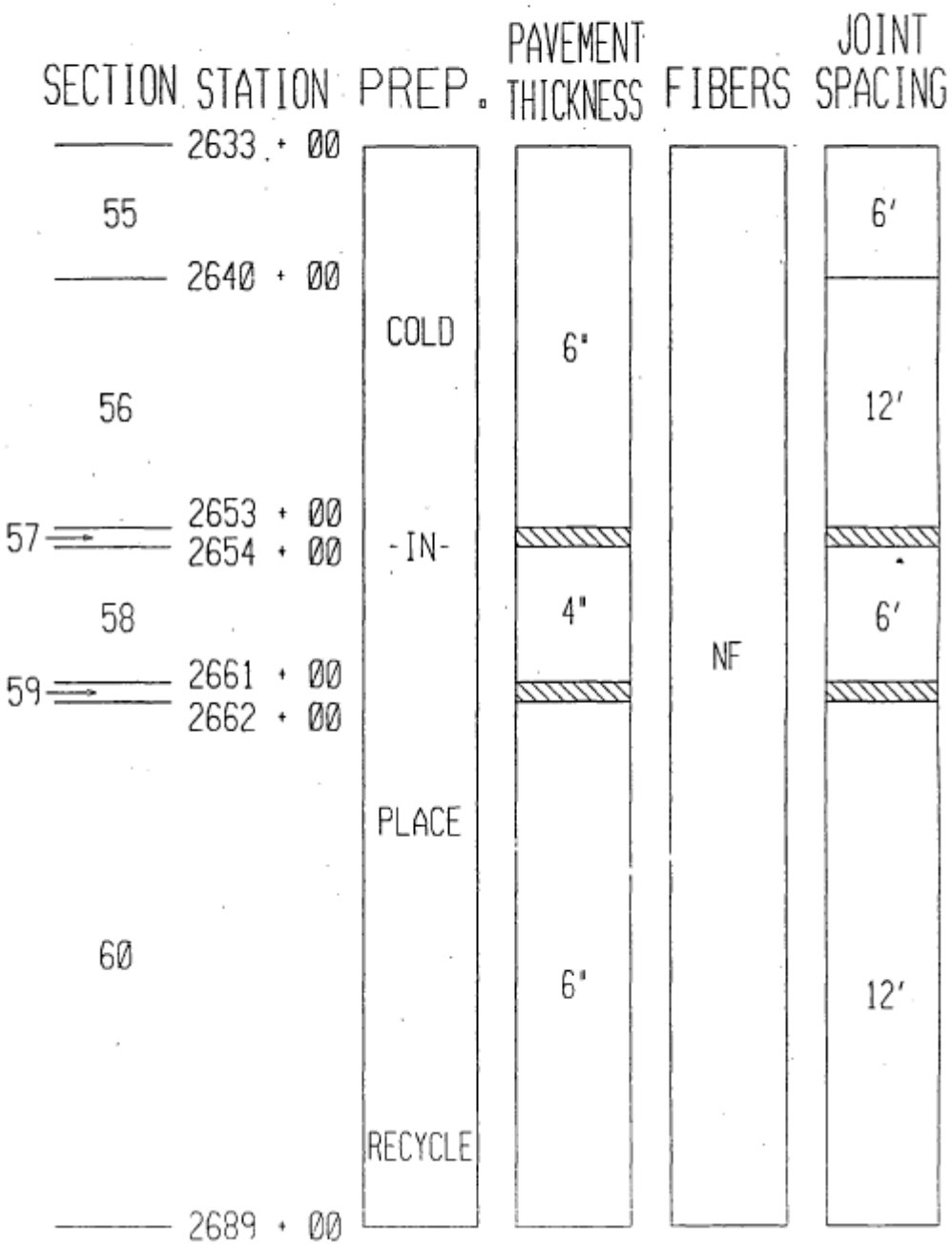
WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT



WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT



WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT



WHITETOPPING RESEARCH
STP-21-3(10)--2C-48
IOWA COUNTY
TEST SECTION LAYOUT