SP- 150043
(New)

SPECIAL PROVISIONS
FOR
BRIDGE DECK OVERLAY SHRINKAGE RESEARCH PROJECT

Hamilton County
BRFN-020-4(51)--39-40

Effective Date
January 20, 2016

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150043.01 DESCRIPTION.

A. The objective of this research is to investigate the effects of shrinkage reducing admixture (SRA) and cementitious content reduction on the shrinkage behavior of Iowa bridge deck overlays. In this investigation, four types of concrete mixes will be used in the following bridge deck overlays: mixes Class O and Class O-modified on Design 116 and mixes Class HPC-O-C20-S25 and Class HPC-O-C20-S25-modified on Design 216. To assess the implications of using these different overlays, strains (along the transverse and longitudinal directions), moisture content, and temperature of the bridge deck overlays will be monitored from the time of casting up to one year. The results are expected to provide an insight on to the performance of the modified concrete mixes, in comparison with the original Iowa concrete mixes, under field conditions.

B. Through the Institute of Transportation (InTrans), a research team at the Department of Civil, Construction and Environmental Engineering (CCEE), Iowa State University, is under contract with the Iowa DOT for the modification and field testing of the bridge overlay concrete mixes. Coordination among the research team, various offices of the Iowa DOT, and Contractor are critical during the installation of various sensors for shrinkage monitoring. Assistances in gaining access to the bridge (on and under the bridge) as well as to the bridge components (decks and girders) prior to and during each stage, for completing deck surveys, sensor installation and data collection are required.

C. The monitoring system will include, but may not be limited to, the following components:

- Six to eight strain gages per mixture type (see attached drawing for their locations).
- Two moistures sensors per mixture type.
- Two to four data loggers per bridge.

D. The following mixes will be utilized:

Table 150043.01-1: Concrete Mix Proportions for Bridge Overlays

Mix	Modification
for Design 116	
Class O	
Class O - modified	Shrinkage Reducing Admixture
for Design 216	
HPC-O-C20-S25	
HPC-O-C20-S25-modified	Abs. Vol. Cement = 0.117

150043.02 MATERIALS.
The research team will be responsible for providing the SRA and for providing and installing all of the monitoring system components for this project. It is expected that the Contractor will provide onsite equipment for the research team members to access to the locations to install the designed sensors on the bridge decks and girders (see Appendix A) and to collect the data from the sensors. (Note: To install sensors on girders, under bridge accesses are needed.) It is also expected that the Contractor give a minimum 96 hour notice to the research team (Kejin Wang, (515) 294-2152) prior to the removal of the existing concrete overlay.

150043.03 CONSTRUCTION.
The Contractor shall contact the research team with 48 hours advanced notice of each stage of construction as shown in Appendix A – accommodation needed. The Contractor shall grant the research team the access duration shown in Appendix A – Accommodation Needed in order to install the sensors and equipment, conduct surveys and collect data. The Contractor shall also need to supply a lift and traffic control for the Research Team to install sensors under the bridge deck and girders.

A. Deck Survey.
Following notification by the contractor of the intent to remove the existing overlay, the research team will conduct a survey of the existing overlay prior to removal and another survey of the deck after the removal of the existing overlay.

B. Sample Collection.

1. During construction, the research team will collect concrete samples to test concrete slump, unit weight, temperature and air content, prepare fifteen 4 inch by 8 inch cylinders, and three 3 inch by 3 inch by 11 inch prisms per mix.

2. The research team will also observe and document the overlay construction process and requests that the Contractor provide actual concrete batch weights.

C. Data Collection.

1. The research team will be responsible for and will work with the members at the Bridge Engineering Center, ISU, on the sensor installation for the project.

2. Once installed, the contractor shall pay attention and avoid any damage to the sensors and related accessories so as to maintain the integrity of the monitoring system after the installation. The Contractor will be responsible for repairing any sensors damaged after installation. Please see Appendix A for the summary of the shrinkage monitoring details.

3. After construction of the new overlays, the research team will inspect the overlays and collect data from the sensors at 1 and 7 days after construction.

D. Access to Site.
The Contractor shall provide the research team parking access for two vehicles within the project site.

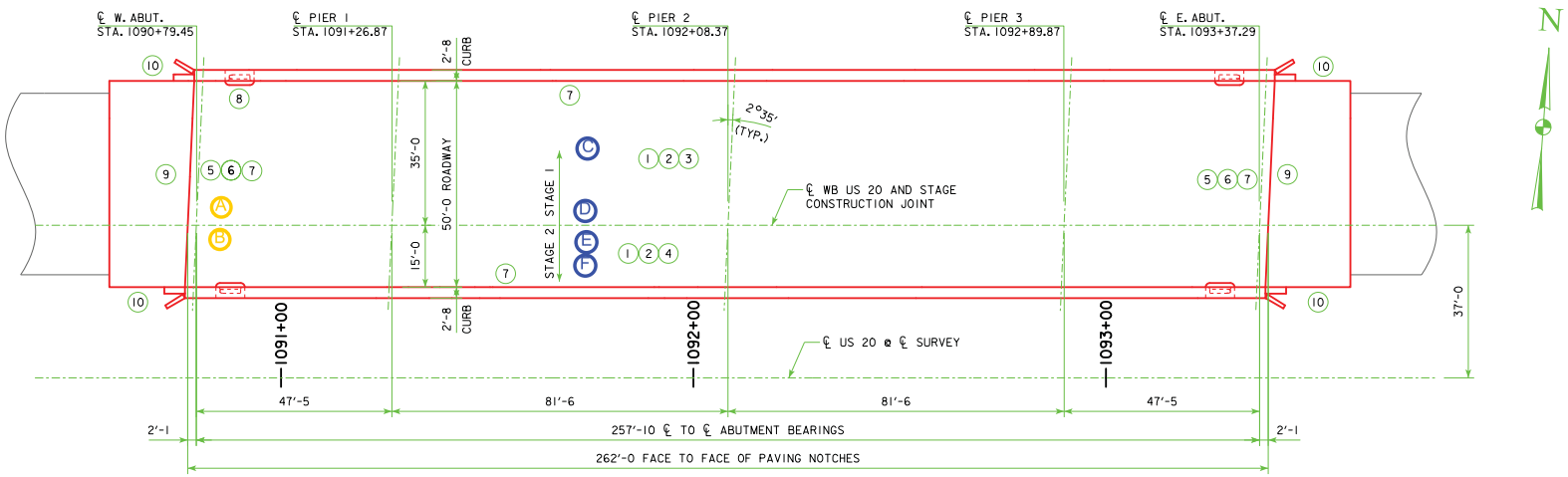
150043.04 METHOD OF MEASUREMENT.
Bridge Deck Overlay Shrinkage Research Project will not be measured for payment.

150043.05 BASIS OF PAYMENT.
Bridge Deck Overlay Shrinkage Research Project will be paid for at the lump sum contract price. Payment is full compensation for providing research team access to structure prior to and during each stage for completing deck surveys, instrument installation and taking initial measurements and any additional measurements required during construction.

Appendix A: SHRINKAGE MONITORING DETAILS

Item	Activity	Sensor Type	Location	Accommodation Needed	Timing
A	Existing overlay survey		Bridge deck	Access to site 72 hour in advance	Prior to removal of existing overlay
Class O mix					
B	Deck survey after existing overlay removal		Bridge deck	On-site access 96 hours before casting of overlay; under bridge access equipment (lift); traffic control for under bridge – south bound of I-35.	Prior to new overlay casting
C	Installation of monitoring system	Strain gauges - 4	Between Pier I and 2		
		Strain gauges - 2	Between W abutment and Pier I		
		Strain gauge - 1	Between Pier I and 2, at the girder		
		Strain gauge - 1	Between Pier I and 2, under the deck		
		Moisture sensor - 2	Between Pier I and 2		
D	Installation of data loggers cabinets		W. Abutment		
E	Fresh concrete sample collection and testing		TBD	On-site access	During construction
F	Overlay monitoring and data collection		W. Abutment and deck	On-site access	1, 7 days after construction
Class O-modified mix					
G	Deck survey after existing overlay removal			On-site access 96 hours before casting of overlay; under bridge access equipment (lift); traffic control for under bridge – south bound of I-35.	Prior to new overlay casting
H	Installation of monitoring system	Strain gauges - 4	Between Pier I and 2		
		Strain gauges - 2	Between W abutment and Pier I		
		Moisture sensor - 2	Between Pier I and 2		
I	Fresh concrete sample collection and testing		TBD	On-site access	During construction
J	Overlay monitoring and data collection		W. Abutment and deck	On-site access	1, 7 days after construction

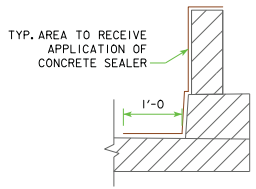
Item	Activity	Sensor Type	Location	Accommodation Needed	Timing
HPC-O-C20-S25 mix					
K	Deck survey after existing overlay removal			On-site access 96 hours before casting of overlay; under bridge access equipment (lift); traffic control for under bridge – south bound of I-35.	Prior to new overlay casting
L	Installation of monitoring system	Strain gauges - 4	Between Pier I and 2		
		Strain gauges - 2	Between W abutment and Pier I		
		Strain gauge - 1	Between Pier I and 2, at the girder		
		Strain gauge - 1	Between Pier I and 2, under the deck		
		Moisture sensor - 2	Between Pier I and 2		
M	Installation of data loggers cabinets				
N	Fresh concrete sample collection and testing		TBD	On-site access	During construction
O	Overlay monitoring and data collection		W. Abutment and deck	On-site access	1, 7 days after construction
HPC-O-C20-S25-modified mix					
P	Deck survey after existing overlay removal			On-site access 96 hours before casting of overlay; under bridge access equipment (lift); traffic control for under bridge – south bound of I-35.	Prior to new overlay casting
Q	Installation of monitoring system – HPC-O-modified mix	Strain gauges - 4	Between Pier I and 2		
		Strain gauges - 2	Between W abutment and Pier I		
		Moisture sensor - 2	Between Pier I and 2		
R	Fresh concrete sample collection and testing		TBD	On-site access	During construction
S	Overlay monitoring and data collection		W. Abutment and deck	On-site access	1, 7 days after construction



SITUATION PLAN

TEST GAUGE LEGEND

- (A) 2 STRAIN WITHIN THE OVERLAY (STAGE 1)
- (B) 2 STRAIN WITHIN THE OVERLAY (STAGE 2)
- (C) 2 STRAIN AND 1 MOISTURE WITHIN THE OVERLAY (STAGE 1)
  1 STRAIN UNDER THE DECK (STAGE 1)
  1 STRAIN AT THE GIRDER (STAGE 1)
- (D) 2 STRAIN AND 1 MOISTURE WITHIN THE OVERLAY (STAGE 1)
- (E) 2 STRAIN AND 1 MOISTURE WITHIN THE OVERLAY (STAGE 2)
- (F) 2 STRAIN AND 1 MOISTURE WITHIN THE OVERLAY (STAGE 2)



DETAIL OF CONCRETE SEALER AREA

TRAFFIC ESTIMATE

2013 AADT 4300 V.P.D.
TRUCKS 21 %

REPAIRS SHALL CONSIST OF:

1. REMOVAL OF EXISTING DECK OVERLAY
2. BRIDGE DECK REPAIR, CLASS A
3. CLASS O PCC BRIDGE DECK OVERLAY (STAGE 1)
4. CLASS O PCC - MODIFIED BRIDGE DECK OVERLAY (STAGE 2)
5. REMOVING AND RECONSTRUCTING THE BACKWALLS AND PORTIONS OF THE DECK, DIAPHRAGM, CURBS, AND BARRIER RAILS AT BOTH ABUTMENTS
6. REMOVING EXISTING STEEL EXTRUSION JOINTS AND INSTALLING NEW STEEL EXTRUSION WITH NEOPRENE GLAND AT BOTH ABUTMENTS
7. PERFORM CONCRETE REPAIRS ON THE BRIDGE SEATS AND CURBS
8. REMOVE AND RECONSTRUCT THE DECK DRAIN AT THE NORTHWEST CORNER
9. REMOVE AND REPLACE PORTION OF APPROACH PAVEMENT AT EACH BRIDGE END
10. REPLACING THE EXISTING GUARDRAIL AND CONSTRUCTION PAVED SHOULDER ADJACENT TO GUARDRAIL

LOCATION:

ON WB U.S. 20 OVER I-35
T-88N, R-23W
SECTION 7
ROSE GROVE TOWNSHIP
HAMILTON COUNTY
MAINT. NO. 4053.0L020
FHWA NO. 26650
LATITUDE 42.448781
LONGITUDE -93.569061

DESIGN FOR REPAIRS TO A 2°35' (L.A.)

257'-10 X 50' PPCB BRIDGE (WBL)

47'-5 END SPANS 2 - 81'-6 INTERIOR SPAN

SITUATION PLAN

STA. 1092+08.37 (℄ WB US20) NOVEMBER, 2015

HAMILTON COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 2 OF 13 FILE NO. 31064 DESIGN NO. 116

whks engineers + planners + land surveyors

DESIGN TEAM : JDK / RRE / DJA	HAMILTON COUNTY	PROJECT NUMBER BRFN-020-4(51)--39-40	SHEET NUMBER 3

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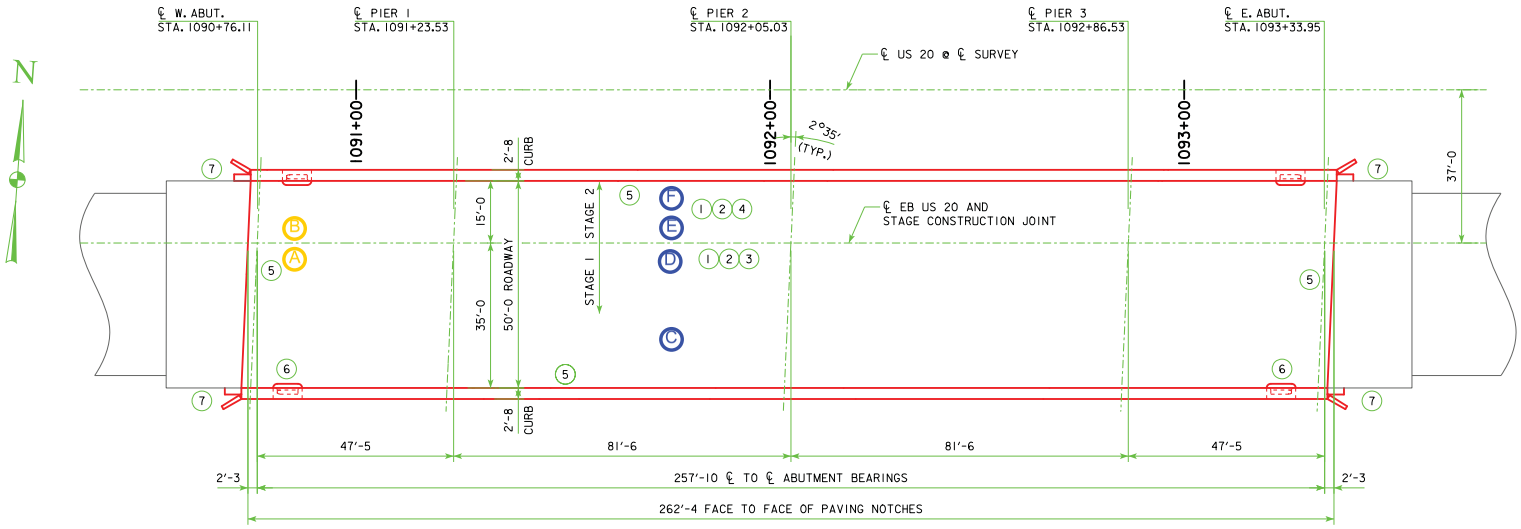

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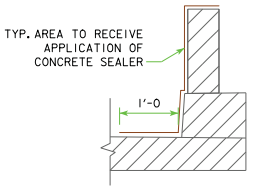

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REPAIRS SHALL CONSIST OF:

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HAMILTON COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 2 OF 6 FILE NO. 31064 DESIGN NO. 216

whks engineers + planners + land surveyors

DESIGN TEAM : JDK / RRE / DJA | HAMILTON COUNTY | PROJECT NUMBER BRFN-020-4(51)--39-40 | SHEET NUMBER 16

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