MINUTES
OF
IOWA DOT SPECIFICATION COMMITTEE MEETING

August 10, 2023

Members Present:	Darwin Bishop	District 3 – DCE
	Mark Dunn	Contracts & Specifications Bureau
	Daniel Harness	Design Bureau
	Eric Johnsen, Chair	Contracts & Specifications Bureau
	Wes Musgrove	Construction & Materials Bureau
	Scott Nixon	District 1 - DCE
	Mike Nop	Bridges & Structures Bureau
	Christy VanBuskirk	Local Systems Bureau
	Bob Welper	District 2 - DME
Members Not Present:	Charlie Purcell	Project Delivery Division
	Willy Sorenson	Traffic & Safety Bureau
Advisory Members Present:	Andy Case	Dallas County
	Ben Daleske	Fayette County
	Jeff Devries	Construction & Materials Bureau
	Tyler Wilson	FHWA
	Brian Worrel	Construction & Materials Bureau

The Specification Committee met on Thursday, August 10, 2023, at 9:00 a.m. Eric Johnsen, Specifications Engineer, opened the meeting. The items were discussed in accordance with the agenda dated May 3, 2023.

The minutes are as follows:

1. Article 2301.05, A, 3, Portland Cement Concrete Pavement.

The Construction and Materials Bureau requested to clarify thickness determination calculation.

2. Article 2316.02, Pavement Smoothness.

The Construction and Materials Bureau requested to remove roundabouts from smoothness testing requirements.

3. Article 2317.04, E, 2, a, Primary and Interstate Pavement Smoothness.

The Construction and Materials Bureau requested to add sand sealing back to Section 2317, which had been accidentally omitted with the recent changes.

4. Article 2317.05, Primary and Interstate Pavement Smoothness.

The Construction and Materials Bureau requested to eliminate confusion over order of operations when calculating flexible pavement I/D adjustment amounts.

5. Article 2528.03, J, Flaggers.

The Construction and Materials Bureau requested to transition from the current flagger training resources (manual and video) to a consolidated resource in website format.

6. Article 4145.02, B, Concrete Culvert Pipe.

The Construction and Materials Bureau requested to clarify that other methods than paint can be used to mark culvert pipe.

7. DS-15XXX, Geospatial Mapping of Sub-Surface and Underground Utilities.

The Construction and Materials Bureau requested approval of Developmental Specifications For Geospatial Mapping of Sub-Surface and Underground Utilities.

8. DS-15XXX, Portable Pop-Up Network for Inspection Use.

The Construction and Materials Bureau requested approval of Developmental Specifications for Portable Pop-Up Network for Inspection Use.

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove	**Office:** Construction and Materials	**Item 1**
Submittal Date: 6/12/2023	**Proposed Effective Date:** April 2024	
Article No.: 2301.05, A, 3 **Title:** Portland Cement Concrete Pavement	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 4/16/2024

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Bridges and Structures Bureau asked if we could clean up the "X" in the equation so that it was clearer and did not appear to be shifted up.

Specification Section Recommended Text:

2301.05, A, 3.

Replace the first equation in the Article:

Use the following formula to determine the thickness index for a section of pavement greater than 3500 square yards:

Where: $TI = (\overline{X} - S) - T$

TI = thickness index for the section.
$\overline{X}$ = mean core length for the section.
T = design thickness. Include subbase adjustment from IM 346.
S = core length standard deviation (of the sample) for the section.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use ~~**Strikeout**~~ and **Highlight**.)

3. Use the following formula to determine the thickness index for a section of pavement greater than 3500 square yards:

Where: $TI = (\overline{X} - S) - T$

TI = thickness index for the section.
$\overline{X}$ = mean core length for the section.
T = design thickness. Include subbase adjustment from IM 346.
S = core length standard deviation (of the sample) for the section.

Reason for Revision: DS originally included a table for adjustment of design thickness. Subbase adjustment was included in IM 346 rewrite, but the reference to the adjustment was not included in the specifications.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X

Bid Item Obsoletion Required (X one)	**Yes**	**No** X
Comments:		
County or City Comments:		
Industry Comments:		

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove	**Office:** Construction and Materials	**Item 2**
Submittal Date: 6/27/2023	**Proposed Effective Date:** April 2024	
Article No.: 2316.02 **Title:** Pavement Smoothness	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 4/16/2024

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The District 2 Office asked if 1/8 inch in 10 feet should be the correct definition of a bump because other excluded sections in Section 2316 use ½ inch in 25 feet. The 1/8 inch in 10 feet was taken from Sections 2301 and 2303 for the definition of a bump when paving. The Construction and Materials Bureau will review if 1/8 inch in 10 feet should continue to be used in all of these sections or if it should be 0.2 or 3/8 to be closer in equivalency to ½ inch in 25 feet.

Specification Section Recommended Text:

2316.02, A, 7, Exclusions.

Add to the beginning of the Article:

Roundabouts will be excluded from smoothness testing. The surface of a roundabout shall not deviate from a straight line by more than 1/8 inch in 10 feet when measured longitudinally with a 10 foot straightedge.

2316.02, D, 1.

Add to the end of the Article:

j. Roundabouts.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use ~~**Strikeout**~~ and **Highlight**.)

2316.02.A.7. Exclusions:

Roundabouts will be excluded from smoothness testing. The surface of a roundabout shall not deviate from a straight line by more than 1/8 inch in 10 feet when measured longitudinally with a 10-foot straightedge. **Paved shoulders will be excluded from smoothness testing unless used as a temporary driving surface. When used as a temporary driving surface, evaluate paved shoulders for bumps and dips only. Evaluate and correct as provided in** Article 2316.03, C**.**

2316.02.D. Profile Index.

1. Calculate a profile index for each segment from the profilogram, according to Materials I.M. 341, except for:

- **a.** Side road connections less than 600 feet in length.
- **b.** Single lift pavement overlays 2 inches or less in thickness unless the existing surface has been corrected by milling or scarification.
- **c.** Storage lanes and turn lanes.
- **d.** Pavement less than 8.5 feet in width.

e. The 16 feet at the ends of the section when the Contractor is not responsible for the adjoining surface.
f. Runout tapers on HMA overlays at existing pavement, bridges, or bridge approach sections when the thickness is less than the design thickness.
g. Detour Pavement.
h. Crossovers.
i. Sections less than 50 feet long.
j. Roundabouts.

Reason for Revision: Testing and evaluation of roundabouts is very problematic. The geometry makes it difficult to utilize a high-speed profiler. Designed cross slopes can create the appearance of bumps or dips in the traces. Removing testing and evaluation from roundabouts eliminates this issue. The 2301 and 2303 have similar language allowing the 10-foot bump cart to be utilized. The 2303 states that if neither 2316 nor 2317 applies to the project the bump cart could be utilized. The engineer should have some tool to ensure a smooth surface is provided as per specification.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X
Comments:		
County or City Comments:		
Industry Comments:		

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove/Jeff De Vries	**Office:** Construction and Materials	**Item 3**
Submittal Date: 6/22/2023	**Proposed Effective Date:** April 2024	
Article No.: 2317.04, E, 2, a **Title:** Primary and Interstate Pavement Smoothness	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 4/16/2024

Specification Committee Approved Text:

2317.04, E, 2, a.

Replace the Article:

On HMA pavement, make corrections by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area. If the surface is corrected by diamond grinding, perform the same work and use the same equipment as specified for PCC pavement~~.~~, except cover the ground surface with a seal coat according to Section 2307, with the following modifications:

1) The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard. Hand methods may be used for spraying.

2) Apply a cover aggregate consisting of sand (slightly damp, but with no free moisture as determined by visual inspection) at a rate of 10 pounds per square yard. Hand methods may be used for spreading. Embed cover aggregate with at least one complete pneumatic roller coverage.

3) This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. Do not place when road surface temperatures are below 60ºF, unless approved by the Engineer.

4) Labor, equipment, and materials used for this seal coat are incidental to other items and will not be paid for separately.

Comments: There was some confusion on the language in the second sentence of Article 2317.04, E, 2, a, 3.

Specification Section Recommended Text:

2317.04, E, 2, a.

Replace the Article:

On HMA pavement, make corrections by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area. If the surface is corrected by diamond grinding, perform the same work and use the same equipment as specified for PCC pavement~~.~~, except cover the ground surface with a seal coat according to Section 2307, with the following modifications:

1) The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard. Hand methods may be used for spraying.

2) Apply a cover aggregate consisting of sand (slightly damp, but with no free moisture as determined by visual inspection) at a rate of 10 pounds per square yard. Hand methods may be used for spreading. Embed cover aggregate with at least one complete pneumatic roller coverage.

3) This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. The Engineer may approve this construction when road surface temperatures are below 60ºF.

4) Labor, equipment, and materials used for this seal coat are incidental to other items and will not be paid for separately.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

2. HMA Pavement.

a. On HMA pavement, make corrections by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area. If the surface is corrected by diamond grinding, perform the same work and use the same equipment as specified for PCC pavement~~.~~, except cover the ground surface with a seal coat according to Section 2307, with the following modifications:

1) The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard. Hand methods may be used for spraying.

2) Apply a cover aggregate consisting of sand (slightly damp, but with no free moisture as determined by visual inspection) at a rate of 10 pounds per square yard. Hand methods may be used for spreading. Embed cover aggregate with at least one complete pneumatic roller coverage.

3) This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. The Engineer may approve this construction when road surface temperatures are below 60ºF.

4) Labor, equipment, and materials used for this seal coat are incidental to other items and will not be paid for separately.

b. If the surface is corrected by overlay, replacement, or inlay, begin and end the surface correction with a transverse saw cut normal to the pavement lane lines or edge lines within any one area. The profile of the surface must be smooth with no bumps or dips at the beginning or end of correction.

c. Overlay correction must be for the entire pavement width. Pavement cross slope must be maintained through the corrected areas.

Reason for Revision: With the recent change to 2317 the sand sealing operation was accidentally omitted. Submitted changes to the 2317 will align the specification with the department's desired best practices.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X

Comments:

County or City Comments:

Industry Comments:

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove	**Office:** Construction and Materials	**Item 4**
Submittal Date: 6/22/2023	**Proposed Effective Date:** April 2024	
Article No.: 2317.05 **Title:** Primary and Interstate Pavement Smoothness	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 4/16/2024

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2317.05, Basis of Payment.

Replace Table 2317.05-3:

Table 2317.05-3: Schedule for Adjustment Payment for PCC Pavements for Primary and Interstate Projects

MRI (inches per mile)	Dollars per 0.1 mile segment per lane	
	Design Thickness	
	Full Depth (>6")	Overlay (<=6")
Less than 47.5	1,500.00	1,250.00
47.5 to 57.5	8,625.00-(150*MRI)	5,226.596-(133.2623*MRI)
57.5 to 75	Unit Price	Unit Price
75 to 90	7,500.00-(100*MRI) (or grind[1])	6,250.00-(83.333*MRI) (or grind[1])
Greater than 90	Grind[1]	Grind[1]
1. Correct these areas below 75.0 inches per mile		

Replace Table 2317.05-4:

Table 2317.05-4: Schedule for Adjustment Payment for PCC Pavements for Non-Primary Projects

MRI (Inches per mile)	Dollars per 0.1 mile segment per lane
Less than 60.0	300.00
60.0 to70.0	2,100.00-(30*MRI)
70.0 to 80.0	0.00
80.0 to 95.0	1,600.00-(20*MRI) or grind[1]
Greater than 95.0	Grind[1]
1. Correct these areas to below 80.0 inches per mile	

Replace Table 2317.05-5:

Table 2317.05-5: Schedule for Adjustment Payment for HMA Pavements for Primary and Interstate Projects

MRI (inches per mile)	Dollars per 0.1 mile segment per lane	
	Design Thickness	
	Full Depth (>4")	Overlay (≤4")
Less than 29.84	1,500.00	1,250.00

29.84 to 39.22	6,271.915-(159.915*MRI)	5,226.596-(133.2623*MRI)
39.22 to 75	Unit Price	Unit Price
75 to 90	7,500.00-(100*MRI) or grind[1]	6,250.00-(83.333*MRI) or grind[1]
Greater than 90	Grind[1]	Grind[1]
1. Correct these areas below 75.0 inches per mile		

Replace Table 2317.05-6:

Table 2317.05-6: Schedule for Adjustment Payment for HMA Pavements for Non-Primary Projects

MRI (Inches per mile)	Dollars per 0.1 mile segment per lane
Less than 35.0	300.00
35.0 to 45.0	1,350.00-(30*MRI)
45.0 to 80.0	0.00
80.0 to 95.0	1,600.00-(20*MRI) or grind[1]
Greater than 95.0	Grind[1]
1. Correct these areas to below 80.0 inches per mile	

Comments:

Member's Requested Change: (Do not use **'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight**.)

Table 2317.05-3: Schedule for Adjustment Payment for PCC Pavements for Primary and Interstate Projects

MRI (inches per mile)	Dollars per 0.1 mile segment per lane	
	Design Thickness	
	Full Depth (>6")	Overlay (<=6")
Less than 47.5	1,500.00	1,250.00
47.5 to 57.5	8,625.00-(150*MRI)	5,226.596-(133.2623*MRI)
57.5 to 75	Unit Price	Unit Price
75 to 90	7,500.00-(100*MRI) (or grind[1])	6,250.00-(83.333*MRI) (or grind[1])
Greater than 90	Grind[1]	Grind[1]
1. Correct these areas below 75.0 inches per mile		

Table 2317.05-4: Schedule for Adjustment Payment for PCC Pavements for Non-Primary Projects

MRI (Inches per mile)	Dollars per 0.1 mile segment per lane
Less than 60.0	300.00
60.0 to70.0	2,100.00-(30*MRI)
70.0 to 80.0	0.00
80.0 to 95.0	1,600.00-(20*MRI) or grind[1]
Greater than 95.0	Grind[1]
1. Correct these areas to below 80.0 inches per mile	

D. HMA Pavement.

The payment for MRI for HMA pavement will be adjusted as shown in Table 2317.05-5 and Table 2317.05-6.

Table 2317.05-5: Schedule for Adjustment Payment for HMA Pavements for Primary and Interstate Projects

MRI (inches per mile)	Dollars per 0.1 mile segment per lane	
	Design Thickness	
	Full Depth (>4")	Overlay (≤4")
Less than 29.84	1,500.00	1,250.00
29.84 to 39.22	6,271.915-(159.915*MRI)	5,226.596-(133.2623*MRI)
39.22 to 75	Unit Price	Unit Price
75 to 90	7,500.00-(100*MRI) or grind[1]	6,250.00-(83.333*MRI) or grind[1]

Greater than 90	Grind[1]	Grind[1]
1. Correct these areas below 75.0 inches per mile		

Table 2317.05-6: Schedule for Adjustment Payment for HMA Pavements for Non-Primary Projects

MRI (Inches per mile)	Dollars per 0.1 mile segment per lane
Less than 35.0	300.00
35.0 to 45.0	1,350.00-(30*MRI)
45.0 to 80.0	0.00
80.0 to 95.0	1,600.00-(20*MRI) or grind[1]
Greater than 95.0	Grind[1]
1. Correct these areas to below 80.0 inches per mile	

Reason for Revision: Desire to eliminate confusion over order of operations.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X
Comments:		
County or City Comments:		
Industry Comments:		

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove / Brian Worrel	**Office:** Construction and Materials	**Item 5**
Submittal Date: 7/11/2023	**Proposed Effective Date:** April 18, 2024	
Article No.: 2528.03, J **Title:** Flaggers	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 4/16/2024

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: Construction and Materials Bureau asked other bureaus to review their documents for any links to or references to the Iowa DOT Flagger's Handbook to get revised.

Specification Section Recommended Text:

2528.03, J, Flaggers.

Replace the Article:

1. Prior to flagging operations, ensure the flaggers are trained in safe flagging operations that comply with ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials, Part 6 of the MUTCD, and the Standard Specifications. Ensure training of flaggers includes the following:
   - **a.** ~~Issuing and reviewing Iowa DOT Flagger's Handbook~~ Reviewing the current Iowa DOT Flagger Training Materials,
   - ~~**b.** Presentation of the current Iowa Professional Flagging Video,~~
   - ~~**c**~~ **b.** Issuing flagger training cards including the information below.
     - **1)** Employee name,
     - **2)** Date of training,
     - **3)** Name of Instructor, and
     - **4)** Expiration date of December 31 of the year following the training date.
2. Maintain a list of the flaggers trained and the date of the training.
3. Training is not required for short time, emergency, or relief assignment of employees to flagging operations. Payment will not be made in accordance with Article 2528.05, I.
4. Ensure flagger operations, equipment, and apparel comply with the current ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials.
5. When nighttime flagging is required, provide auxiliary lighting to illuminate the flagging stations according to the MUTCD, Part 6 and current ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials. Set up this lighting in such a manner to minimize glare to motorists. The cost of furnishing nighttime flagging station lighting is included in the lump sum price bid for Traffic Control.
6. Ensure flaggers always carry their flagger training card and show it upon request.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use ~~**Strikeout**~~ and **Highlight**.)

J. Flaggers.

1. Prior to flagging operations, ensure the flaggers are trained in safe flagging operations that comply with ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials, Part 6 of the MUTCD, and the Standard Specifications. Ensure training of flaggers includes the following:

a. ~~Issuing and reviewing~~ Reviewing the current ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials,

~~**b.** Presentation of the current Iowa Professional Flagging Video,~~

b. Issuing flagger training cards including the information below.

1) Employee name,
2) Date of training,
3) Name of Instructor, and
4) Expiration date of December 31 of the year following the training date.

2. Maintain a list of the flaggers trained and the date of the training.

3. Training is not required for short time, emergency, or relief assignment of employees to flagging operations. Payment will not be made in accordance with Article 2528.05, I.

4. Ensure flagger operations, equipment, and apparel comply with the current ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials.

5. When nighttime flagging is required, provide auxiliary lighting to illuminate the flagging stations according to the MUTCD, Part 6 and current ~~Iowa DOT Flagger's Handbook~~ Iowa DOT Flagger Training Materials. Set up this lighting in such a manner to minimize glare to motorists. The cost of furnishing nighttime flagging station lighting is included in the lump sum price bid for Traffic Control.

6. Ensure flaggers always carry their flagger training card and show it upon request.

Reason for Revision: Transition from two current flagger training resources (printed handbook and video) to one consolidated resource in website format. Complete text will still be printable/downloadable and complete video still viewable/downloadable outside of the modular content/organization of the new website.

All references to the Flagger Training Handbook will need to be updated to Flagger Training Materials with an updated link to https://iowadot.gov/flaggertraining/

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X
Comments:		
County or City Comments:		
Industry Comments: Revisions were discussed with AGC, and all of their concerns were addressed.		

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove	**Office:** Construction & Materials	**Item 6**
Submittal Date: 6/19/2023	**Proposed Effective Date:** April 2024	
Article No.: 4145.02, B **Title:** Concrete Culvert Pipe	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 4/16/2024

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:
4145.02, B.

Replace the third sentence:

Renew all markings ~~made using paint~~ before the original markings become unreadable.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use **Strikeout** and **Highlight**.)

4145.02.B

B. Ensure the class, design, date of manufacture, and trademark are plainly marked or stenciled on the inside of the pipe near the tongues no later than 24 hours after fabrication. If a manufacturer operates two or more plants, ensure the markings they use include a separate distinctive designation for each plant. Renew all markings ~~made using paint~~ before the original markings become unreadable. When the strength of pipe is related to its orientation because of design or reinforcement, permanently mark each piece, at least once inside and once outside on opposite walls, to indicate the top.

Reason for Revision: The fabricators can use other methods in addition to paint.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X

Comments:

County or City Comments:

Industry Comments:

Form 510130 (08-15)

IOWA DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove / Matt Miller	**Office:** Construction & Materials	**Item 7**
Submittal Date: 7/19/2023	**Proposed Effective Date:** ASAP	
Article No.: **Title:**	**Other:** Developmental Specifications For Geospatial Mapping Of Sub-Surface And Underground Utilities	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 8/10/2023	**Effective Date:** 11/21/2023

Specification Committee Approved Text: See attached Developmental Specifications for Geospatial Mapping of Sub-surface and Underground Utilities

Comments: Matt Miller will be the controller of this DS.
The appendix has been included.
The new bid item will be in the Construction Survey (Section 2526) series of bid items.

Specification Section Recommended Text: See attached draft Developmental Specifications for Geospatial Mapping of Sub-surface and Underground Utilities

Comments:

Member's Requested Change: (Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)
New DS

Reason for Revision: New Developmental Specification to add item for mapping underground locations of conduit to designated projects where underground utilities placed for the Department, like Highway Lighting. This item will ensure asbuilt information is best captured to populate operations asset databases on ESRI for future location needs and design work.

New Bid Item Required (X one)	**Yes X**	**No**
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X

Comments:

County or City Comments:

Industry Comments:

DS-23045
(New)

DEVELOPMENTAL SPECIFICATIONS
FOR
GEOSPATIAL MAPPING OF SUB-SURFACE AND UNDERGROUND UTILITIES

Effective Date
November 21, 2023

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

23045.01 DESCRIPTION.
The purpose of this specification is to capture as-constructed or as-built geospatial information for subsurface underground utilities including highway lighting and agency communication lines. Asset information shall be recorded and submitted as directed in this specification. It is the intent of the Contracting Authority to capture three dimensional (3D) as-built data within Contracting Authority right-of-way in accordance with the most current version of ASCE 75. As such, ASCE 75 shall serve as a guiding reference for this specification. The DOT has condensed its specific language into this specification for brevity. Clarifications or questions may be answered within Standard ASCE/UESI/CI 75-22. All tables are from *Standard Guideline for Recording and Exchanging Utility Infrastructure Data*, ASCE/UESI/CI 75-22, with permission from ASCE.

23045.02 MATERIALS.
GPS Equipment to record geospatial location to 0.1 foot and utilize project Geoid and Iowa Regional Coordinate system or transform to those coordinates. See https://iowadot.gov/iarcs/Home for coordinate system.

23045.03 CONSTRUCTION.

A. General.
During the building process or when there is exposure of subsurface utility infrastructure, measurements for both horizontal and vertical coordinates should be taken at every unique feature. This includes locations of horizontal and vertical shifts, deflection points, and at regular intervals across each unique feature to ensure the desired precision of position is achieved. The precision of the position shall be documented on a 0 to 5 scale.

B. Data Collection.
The roles pertaining to data compilation and verification include, but are not limited to, the subsequent points:

1. Document the location and Positional Precision of utility features as per the directives of Table 1-1.

2. Log utility characteristic data in alignment with Table 1-2.

3. Keep a record of the details related to the respective data gathering event.

4. Validate the data, meaning verify all data adheres to the set standard guidelines. The task of data verification can be allocated to the subcontractor in charge of the construction or installation of the utility feature, or the prime contractor overseeing the data gathering.

5. Quickly alert the utility proprietor about inconsistencies between pre-construction data and the actual installed utility locations that don't meet the Positional Accuracy criteria that are specified.

C. Trenchless Construction.

1. In situations where a linear feature's installation partially or entirely requires trenchless technology, the collection and documentation of utility location data should proceed as such:
   a. Apply survey methods to pinpoint the locations where the segment enters and exits the borehole, along with all necessary test pit verification points the boring intersects.
   b. Utilize indirect techniques, such as bore logs containing recorded inertial navigation data for the boring tip, or 3D electromagnetic sonde observations documented on the surface, between the borehole's entrance and exit. These data need to be obtained and recorded in 3D to attain Positional Accuracy as outlined by Table 23045.03-1. Given these data are acquired indirectly, Positional Accuracy Levels are undetermined.

2. If geophysical means yield poor results, there shall be sufficient metadata to clearly document that depictions are based neither on direct nor indirect measurements, but solely on judgment. For any portion of a trenchless feature not directly measured, the Positional Accuracy shall be reported as Indeterminate (Accuracy Level 0, see Table 23045.03-2).

D. Relative Location Positioning.

All relative spatial positions should be converted to absolute positions representing the X-Y-Z Centroid of the utility feature for mapping and data exchange purposes in line with ASCE 75-22.

E. Utilization of Positional Accuracy.

The Positional Accuracy of points gauged in the field should be evaluated separately from the Positional Accuracy of derived features. The Positional Accuracy Level of a measured point is frequently superior to that of a line segment between points.

F. Data Gathering Intervals.

During construction or when underground utility infrastructure is later exposed, the horizontal and vertical coordinate observations should be obtained at each unique feature, at horizontal turns, vertical turns, and deflection points, and along each unique feature with adequate interval frequency to reach the needed Positional Accuracy Level (Table 23045.03-1). The data structure of all deliverables should adhere to standardized field names, domain values, and depicted geometries, shown in Table 23045.03-2 through Table 23045.03-4, or allow direct mapping to the same fields per the Utility Data Schema excel file.

Table 23045.03-1. Levels of Positional Accuracy.

Accuracy Level	Accuracy (Customary Units)	Accuracy (SI Units)
Level 1	0.1 foot	25 millimeters
Level 2	0.2 feet	50 millimeters
Level 3	0.3 feet	100 millimeters
Level 4	1 foot	300 millimeters
Level 5	3 feet	1,000 millimeters
Level 0	Undefined	Undefined

Table 23045.03-2. Feature Types.

Attribute	Description	Example Domain Options
ID	Alphanumeric identifier of the feature	N-1
Owner	Entity owning the feature	IDOT, Any company
Operator	Entity or entities operating the feature	City of Ankeny
Utility Type	Type of service the feature provides	Communication, Electric, Non-potable water, etc.
Utility Subtype	Finer level of service type	Alarm, Alternating current (AC), Cable television, etc.
Feature Type	Category based on feature function and configuration	Segment, Device, Access point, etc.
Component	Subtype of a utility feature	Air eliminator, Amplifier, Anchor, etc.
Conveyance Function	Primary service purpose of the feature	Distribution, Gathering, Service, etc.
Intended Permanence	Intended longevity of the feature	Permanent, Temporary
Underground Status	Whether the feature is partially or completely underground	Aboveground, Underground, Submerged, Mixed
Operational Status	Operational status of the feature	Proposed, In service, Out of service, Abandoned, etc.
Horizontal/Vertical Spatial Reference	Coordinate system and datum for spatial reference	EPSG:7064 NAD83(2011) / IaRCS zone 8
Accuracy	Horizontal and vertical positional accuracies	measured in Feet or Millimeters
Feature Dimensions	Details about the size, position, and orientation of the feature	Dimensions, Azimuth, X-Y-Z coordinates
Linked File	File with additional information about the feature	
Date Data Collected	Date when the feature was surveyed	DD/MM/YYYY
Data Sensitivity Level	Sensitivity level of the recorded data	Unrestricted, Restricted, SSI
Certification	Whether the data has been certified, and by whom	TRUE, FALSE, Certification summary
Material	Main material of the feature	ABS, Aluminum, Asbestos cement, etc.
Protective Measures	Whether the feature has protection, encasement, or interstitial fill	TRUE, FALSE
Conveyance Method	How matter is conveyed through the feature	Gravity, Pressurized, High pressure, etc.
Cross Section Configuration	Cross-sectional shape of the feature	Arch, Box, Cable, etc.
Dimensions	Inside and outside dimensions of the feature	Heights, widths, lengths

Table 23045.03-3. Types of Geometry.

Type of Feature	Geometry Type (Minimum Required)	Geometry Type (Optional)
Segment	Line String	3D Object
Device	Point	Polygon or 3D Object
Access Point	Point	Polygon
Support Structure	Point	Polygon or 3D Object
Containing Structure	Polygon	3D Object
Secured Utility Zone	Polygon	-
Encasement	Line String	3D Object
Marker	Point	-
Tracer	Line String	

Table 23045.03-4. Feature Attributes.

Feature attribute	Segment	Device	Access point	Support structure	Containing structure	Secured utility area	Encasement	Marker	Tracer
ID	M	M	M	M	M	M	M	M	M
Owner	M	M	M	M	M	M	M	M	M
Operator	O	O	O	O	O	O	O	O	O
Utility type	M	M	M	M	M	M	M	M	M
Utility subtype	O	O	O	O	O	O	O	O	O
Feature type	M	M	M	M	M	M	M	M	M
Component	M	M	M	M	M	—	M	O	O
Delivery classification	M	M	—	M	M	—	M	O	O
Intended permanence	O	O	O	O	O	O	O	O	O
Underground status	O	O	O	O	O	O	O	O	O
Operational status	M	M	M	M	M	M	M	M	M
Horizontal spatial reference	M	M	M	M	M	M	M	M	M
Vertical spatial reference	M	M	M	M	M	M	M	M	M
Horizontal accuracy	M	M	M	M	M	M	M	M	M
Vertical accuracy	M	M	M	M	M	M	M	M	M
Accuracy units	C	C	C	C	C	C	C	C	C
X-*Y*-*Z* centroid	M	M	M	M	M	M	M	M	M
Azimuth	—	C	C	C	C	C	—	—	—
X-*Y*-*Z* observed	O	O	O	O	O	O	O	O	O
X-*Y* relative position	C	C	C	C	C	C	C	C	C
Z relative position	C	C	C	C	C	C	C	C	C
X-*Y*-*Z* junction point	O	O	O	O	O	O	O	O	O
Quality level	O	O	O	O	O	O	O	O	O
Linked file	O	O	O	O	O	O	O	O	O
Date data collected	O	O	O	O	O	O	O	O	O
Data sensitivity level	O	O	O	O	O	O	O	O	O

Is certified	O	O	O	O	O	O	O	O	O
Certification summary	O	O	O	O	O	O	O	O	O
Material	O	—	—	O	—	—	O	—	O
Is cathodic protected	O	—	—	O	—	—	O	—	O
Is encased	O	—	—	—	—	—	—	—	O
Is filled	O	—	—	—	O	—	O	—	—
Interstitial fill material	O	—	—	—	O	—	O	—	—
Conveyance method	O	O	—	—	—	—	—	—	—
Cross section configuration	O	—	—	—	—	—	—	—	—
Number of conduits	O	—	—	—	—	—	—	—	—
Inside height	O	—	—	—	O	—	O	—	—
Inside width	O	—	—	—	O	—	O	—	—
Inside length		—	—	—	O	—	—	—	—
Outside height	O	O	—	O	O	—	O	—	—
Outside width	O	O	O	O	O	O	O	—	—
Outside length		O	O	O	O	O	—	—	—
Wall thickness	O	—	—	—	O	—	O	—	—
Measurement units	C	C	C	C	C	C	C	—	—
Note: M = minimum requirement; O = optional; C = conditional (becomes a minimum requirement if the geometry type used is a 3D object or if observed data are available); and — = does not apply.									

G. Data Validation And Responsibilities

This function comprise of, but are not restricted to, the following elements:

1. Validate the accuracy of the collected data as conforming to this standard guideline. The party in charge of the utility feature installation or the party overseeing the data collection shall designate the qualified individual who validates the data's accuracy.

2. Validate that the data included in a deliverable meets Positional Accuracy requirements.

3. Validate that the data included in a deliverable incorporates the necessary data elements as outlined in Table 23045.03-1. The validated data may also include optional data elements agreed upon among stakeholders, including the party responsible for constructing the utility infrastructure, the party responsible for the data collection, the Contracting Authority, and the utility owner. Competency requirements to fulfill these responsibilities effectively include, but are not limited to, the following:

- **a.** Basic understanding of equipment and methods employed in surveying and locating.
- **b.** Knowledge of coordinate systems, projections, and project datum.
- **c.** Comprehension of data attribution as recommended by this standard guideline and/or required by the Contracting Authority.
- **d.** Familiarity with systems and software necessary to produce deliverables required by the Contracting Authority.
- **e.** Awareness of the requirements and goals of standard ASCE/UESI/CI 75-22 guideline and ASCE 38; and
- **f.** Certification as a Professional Engineer, authorized land surveyor, or under the supervision of either.

H. Deliverables.

1. The data structure of all deliverables shall adhere to standardized field names, domain values, and depicted geometries, as shown in the Utility Layers Schema or enable direct

mapping to the same. Geospatial shapefile (.SHP) with all corresponding files including the .PRJ file with coordinate information assigned, submitted to DOT-utilitydata@iowadot.us. A geodatabase template file may also be requested from DOT-utilitydata@iowadot.us.

2. ESRI Shapefiles or geodatabase are preferred, but alternative filetypes that are acceptable are: 2D and 3D Computer-Aided Design (CAD) files or design (DGN) refer to Chapter 40B-1 of the design manual Feature Codes – Full Descriptions (iowadot.gov), Comma-Separated Value (CSV) files, Building Information Modeling (BIM) files, Extensible Markup Language (XML) files, JavaScript Object Notation (JSON) files, Geographic Information System (GIS) files, Graphic Markup Language (GML) Files, Relational Database Records, Spreadsheet files, and Web Feature Services (WFS).

23045.04 METHOD OF MEASUREMENT.

Geospatial Mapping of Sub-Surface and Underground Utilities will be measured per linear foot of completed mapping shapefile of all underground utilities, including measuring the perimeter of polygons.

23045.05 BASIS OF PAYMENT.

A. Linear Feet

B. Payment is full compensation for geospatial shapefile (.SHP) with all corresponding files including the .PRJ file with coordinate information assigned, submitted to DOT-utilitydata@iowadot.us. The Engineer shall verify this has been submitted, free of errors, prior to payment.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Wes Musgrove / Matt Miller	**Office:** Construction & Materials	**Item 8**
Submittal Date: 7/27/2023	**Proposed Effective Date:** ASAP	
Article No.: **Title:**	**Other:** Developmental Specifications for Portable Pop-Up Network for Inspection Use	

Specification Committee Action: This item was deferred to a future meeting for more discussion on implementation.

Deferred: X	**Not Approved:**	**Approved Date:**	**Effective Date:**

Specification Committee Approved Text:

Comments: In addition to the comments below, the District 1 Office asked who will maintain possession of the device during construction.

Specification Section Recommended Text: See attached draft Developmental Specifications for Portable Pop-Up Network for Inspection Use.

Comments: I think we will need some further specifications for the DS.

1. When must the unit be ready on the project?
2. What to do if a unit goes down? How long do they have to fix or replace it?
3. Are cellular costs the Contractor's or Department's responsibility?
4. Is the Contractor allowed to use this network for their use also?

Member's Requested Change: (Do not use '<u>Track Changes</u>', or '<u>Mark-Up</u>'. Use ~~Strikeout~~ and Highlight.)

New DS

Reason for Revision: New Developmental Specification to add item to projects with limited cellular service. This item will ensure digital collection of project data like e-tickets by producing a 300' Wi-Fi with an amplified dual sim cellular connection for the duration of the specific project.

New Bid Item Required (X one)	**Yes X**	**No**
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X
Comments:		
County or City Comments:		
Industry Comments:		

DRAFT DS-23XXX
(New)

DEVELOPMENTAL SPECIFICATIONS
FOR
PORTABLE POP-UP NETWORK FOR INSPECTION USE

Effective Date
November 21, 2023

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

23XXX.01 DESCRIPTION.

This Developmental Specification defines the minimum requirements for portable suitcase pop-up network cases to be used in highway construction sites, equipped with dual SIM 5G mobile connectivity. The network cases shall provide reliable, high-speed wireless connectivity to support construction site inspections through digital means and safety of field staff in support of digital construction technologies.

23XXX.02 MATERIALS.

A. Pop up network case shall include the following minimum requirements:
- Rugged case (w/CAT6 port, 12.6V input, power button).
- DC power cord, wall charger, ethernet, & antenna cables (all pre-wired).
- Secure connectivity for network access.
- Mobile dual SIM provider 5G LTE connection with two Wi-Fi radios (5 GHz and 2.4 GHz).
- 1 Gbps download speed; 150 Mbps upload speed where available.
- 300 feet of expected Wi-Fi broadcast range.
- Ability to configure, manage, troubleshoot remotely with cloud management software.
- Multiple simultaneous connections.
- Advanced threat protection and cloud-managed security controls.
- Integrated antennas and external CAT6 port with POE.

B. Device shall meet or exceed the following specifications:
- **Safety Certifications:** UL/CUL, CB Scheme, EN60950-1, EN 62368
- **Material Certifications:** WEEE, RoHS, RoHS-2, California Prop 65
- **Case Specifications:** Weatherproofing IP64
- **Antenna Type:** Multi-MIMO
- **Leads**: Two Cellular, two Wi-Fi, and one GPS
- **Cellular Type:** 4G | CBRS | LTE (617-960MHz / 1710-6000MHz)
- **Bands:** B2 B4 B5 B12 B14 B17 B25 B26 B29 B30 B41 B66 B71 n5 n25 n41 n66 n71 B2 B4 B5 B12 B14 B17 B29 B30 B48 B66 n5 B2 B4 B5 B12 B14 B17 B29 B30 B66
- **5G NR Bands:** n77 n78 n79 n77 n78 n79 n77 n78 n79
- **Wi-Fi Frequency Range:** 2.4GHz to 7GHz (Concurrent)

- **Isolation 4G 5G Elements**: >10dB
- **Isolation Wi-Fi Elements**: >12db
- **Correlation Co-Efficient 4G/5G Elements:** <0.2
- **Correlation Co-Efficient Wi-Fi Elements:** <0.2
- **Nominal Impedance:** 50Ω
- **Frequency Range:** 1562MHz to 1612MHz
- **LNA Gain**: 29dB ± 2dB
- **VSWR:** <2.0:1
- **Out of Band Rejection:** >45dB (@ > +/- 100MHz f)
- **Typical Noise Figure:** <-2dB
- **Notch Filter Rejection:** @787MHz 24dB
- **Operating Voltage:** 3 to 5V DC
- **Typical Current:** 15mA
- **Antenna Housing:** High Impact UV Stable ABS Polymer
- **Connector Type:** SMA
- **Operating Temp:** -40°F to +176°F
- **Battery Specifications:**
  - FAA compliant Battery Pack (up to 10 hours life)
  - Battery Type Lithium-Ion
  - Output 12V
  - Capacity 10,000 mAh
  - Short-Circuit Protection
  - Over-Current Protection
  - Overcharging Protection
  - Discharge Protection

15095.03 CONSTRUCTION.

15095.04 METHOD OF MEASUREMENT.

The Engineer will count the pop-up network devices, furnished to inspection staff, according to this specification, as required by the contract documents.

15095.05 BASIS OF PAYMENT.

A. Payment for each network case will be the contract unit price.

B. Payment is full compensation for furnishing, delivery, and maintaining service to the pop-up network for the duration of the contract.