

## SUDAS Revision Submittal Form

Status Date: As of 5/18/2023 Topic: MIT thickness  
Manual: Specifications Manual Location: Section 7010, 3.07, D

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### Requested Revision:

### 3.07 QUALITY CONTROL

#### D. Pavement Thickness:

1. At locations determined by the Engineer, cut samples from the pavement by drilling with a core bit that will provide samples with a 4 inch outside diameter. Restore the surface by tamping low slump concrete into the hole, finishing, and texturing. The Engineer will witness the core drilling, identify, and take possession of the cores. The Engineer will determine the core locations, measure the cores, and determine the thickness index according to [Iowa DOT Materials I.M. 346](#) and [347](#), except as modified as follows:
  - a. For regular or irregular shaped areas, use a lot size of 1,000 square yards. Include remnants less than 500 square yards in the last lot and remnants greater than 500 square yards in a separate lot. Take a minimum of three cores per project.
  - b. For any core with a deficiency greater than 0.15 inch, take two additional cores in that pavement lot and use the average of the three cores.
2. If approved by the Engineer, take non-destructive measurements to determine the pavement thickness and the thickness index for each section.
  - a. Use Magnetic Imaging Tomography (MIT) Scan T2 or T3 gauge to perform thickness measurements.
  - b. Use 24 gauge commercial steel as targets that are 11.81 inches in diameter with G90 coating meeting ASTM A 653.
  - c. The Engineer will determine the location of each lot, the random location of each metal target, and the random thickness measuring scheme for each section using an Iowa DOT developed spreadsheet. Immediately prior to paving, the Engineer will place the target or observe the contractor place the target. The program will randomly determine which targets to measure.
    - 1) For regular or irregular areas, the section will be divided longitudinally into 1,000 square yard lots. One target will be located in each lot based on the spreadsheet selection. Beginning with the first station at +00, place a target from the edge of the pavement halfway between dowel baskets, if applicable. If the +00 station falls on a basket, move the target location ahead halfway between the dowel baskets. A minimum of 10 targets will be tested. If a target location falls on a bridge or in an approach section, it will be eliminated.
    - 2) The transverse location of the targets will be randomly determined by the spreadsheet. The random locations will be 4 feet from edge of pavement, left or right. Place targets in the center of the pavement panel to prevent interference by the steel in the joints. For ease of measuring, plates may be placed 18 inches from the edge if there is no tie steel or a work bridge is not available.
  - d. Follow the manufacturer's instructions for operating the thickness gauge. It is important to avoid testing close to any steel including vehicles, equipment, steel toed shoes as well as tie bars, dowel bars and baskets, and manhole covers. When wearing steel toed shoes, always keep both toes at least 2 feet from the gauge during the test. Three repeat readings will be taken. The readings should all be within 0.15 inch of each other.
  - e. Evaluate each section according to Iowa DOT Materials I.M. 346.
  - f. The Engineer will perform quality assurance testing at a minimum of one random test per seven plate locations, using one of the following methods.
    - 1) Probe during paving operations according to Iowa DOT Materials I.M. 396. Plates may be moved to 18 inches from the edge of the pavement to allow easier testing.

- 2) Survey, to a minimum of 0.005 foot, on the plate prior to paving and on top of the pavement directly over the plate after placement to determine an accurate thickness verification.
  - 3) MIT gauge according to Iowa DOT Materials I.M. 346. Use a different gauge than the one used by the contractor on the project.
- g. Include all MIT Scan measurements and quality assurance measurements for calculation of pavement thickness. The final pavement thickness will be determined by one of the following:
- 1) If all the quality assurance measurements are within  $\pm 0.25$  inch of the MIT Scan measurements, the MIT Scan measurements will be considered validated. The Engineer will determine final thickness based on the average MIT Scan measurements.
  - 2) If at any one location, the quality assurance measurements are greater than  $\pm 0.25$  inch difference from the MIT Scan measurements, core at the plate location and 2 feet away from the plate location. If the core at the plate location indicates that it has moved during placement, use the core thickness from the core taken 2 feet away as the pavement thickness. The Engineer will replace the MIT Scan thickness at the location with the core thickness taken 2 feet away along with the average MIT Scan measurements as final pavement thickness.
  - 3) If all of the quality assurance measurements are greater than  $\pm 0.25$  inch difference from the MIT Scan measurements, the Engineer will randomly select a minimum of 10 random locations, at 2 feet from the plate location, for coring by the Contractor. The Engineer will use the average core thickness, tested according to Iowa DOT Materials I.M. 346, to determine final pavement thickness.
- h. If any measurement is deficient from T by 0.5 inch or more, the measurement should be rechecked to confirm the reading and the equipment. If the repeat measurement is also 0.5 inch or more below T, mark the location directly over the target. Drill a 4.0 inch diameter core at that location. If the core length confirms the pavement is deficient by 0.5 inch or more, drill a core 60 feet in each direction longitudinally at the same transverse location from the deficient core. Drilling will be continued at 60 feet intervals until a core is obtained that is not deficient. Interpolate between this core and the adjacent core to determine the limits of the deficient area. These additional cores are to be used to define the deficient area and will not be used in the thickness index calculation. When an obstruction, such as a bridge, intersection, previous work, etc., prevents drilling a core at the required 60 feet interval in either direction longitudinally, continue the balance of the distance on the other side of the obstruction.
23. Coring of pavement or other work for thickness determination may be waived by mutual agreement for sections of the same design thickness less than 2,500 square yards.
  34. Based on the thickness index determined by the Engineer, the pavement payment will be as shown in Tables 7010.05 and 7010.06.
  45. If the thickness index deficiency is greater than 0.51 for pavements thinner than 9 inches or 0.91 for pavements 9 inches or thicker, the Engineer will study the extent and severity of the deficiency of the pavement areas. The Engineer will require one of the following based on a review on the level of deficiency, the amount of the payment penalty, and the estimated reduction in the design life of the deficient pavement:
    - a. Removal and replacement of the deficient areas with pavement complying with the contract documents at no additional cost to the Contracting Authority.
    - b. Completion of an agreement that provides a combination of an extended guarantee period and payment penalty and allows the deficient pavement to be left in place.

**Table 7010.05: Pay Factor for PCC Pavement for Design Thickness less than 9"**

Thickness Index Range	Percent Payment
More than 0 to -0.15	100
-0.16 to -0.25	95
-0.26 to -0.50	85
-0.51 or less	As determined by the Engineer

**Table 7010.06: Pay Factor for PCC Pavement for Design Thickness 9" or Greater**

<b>Thickness Index Range</b>	<b>Percent Payment</b>
More than 0.00 to -0.15	100
-0.16 to -0.20	99
-0.21 to -0.25	98
-0.26 to -0.30	97
-0.31 to -0.35	96
-0.36 to -0.40	95
-0.41 to -0.45	94
-0.46 to -0.50	93
-0.51 to -0.55	92
-0.56 to -0.60	91
-0.61 to -0.65	90
-0.66 to -0.70	89
-0.71 to -0.75	88
-0.76 to -0.80	87
-0.81 to -0.85	86
-0.86 to -0.90	85
-0.91 or less	As determined by the Engineer

**E. Defects or Deficiencies:** Remove and replace or repair pavement containing excessive cracks, fractures, spalls, or other defects at no additional cost to the Contracting Authority. The method of replacement or repair will be determined by the Engineer.

**Reason for Revision:** Adding an option for non-destructive thickness measurements.

**Comments:** Based on Iowa DOT Specifications.

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**District:**     1     2     3     4     5     6    **2/22/2023 Webinar**

**Comments:**    A few cities noted they have successfully used; another questioned if it was premature to add.

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**District:**     1     2     3     4     5     6

**Initial Comments:**    None.

**Final Comments:**    None.

**Action:**         Deferred                       Not Approved             Approved

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**District:**     1     2     3     4     5     6

**Initial Comments:**    None.

**Final Comments:**    None.

**Action:**         Deferred                       Not Approved             Approved

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**District:**     1     2     3     4     5     6

**Initial Comments:**    None.

**Final Comments:**    None.

**Action:**         Deferred                       Not Approved             Approved

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<b>District:</b>	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
<b>Initial Comments:</b>	None.					
<b>Final Comments:</b>	None.					
<b>Action:</b>	<input type="checkbox"/> Deferred		<input type="checkbox"/> Not Approved		<input checked="" type="checkbox"/> Approved	

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<b>District:</b>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input checked="" type="checkbox"/> 6
<b>Initial Comments:</b>	Is MIT Scan proprietary? <i>Note - MIT = magnetic imaging tomography; not proprietary.</i>					
<b>Final Comments:</b>	None.					
<b>Action:</b>	<input type="checkbox"/> Deferred		<input type="checkbox"/> Not Approved		<input checked="" type="checkbox"/> Approved	

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<b>District:</b>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 5	<input type="checkbox"/> 6
<b>Initial Comments:</b>	1/4" is pretty nominal.					
<b>Final Comments:</b>	None.					
<b>Action:</b>	<input type="checkbox"/> Deferred		<input type="checkbox"/> Not Approved		<input checked="" type="checkbox"/> Approved	

**Final District Action Summary:** All 6 districts approved.

**Board of Directors Action:** On the "target location" figure, don't use the 20 foot typical dimension on the figure. Target location should be mid-panel, between the joints. Approved with that change. *Note - removed the target location figure and added "Place targets in the center of the pavement panel to prevent interference by the steel in the joints" to 3.07, D, 2, c, 2).*