In House Research

NDOR Research Section

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Investigation of Pavement Thickness Reading by MIT-Scan-T2

Nebraska Department of Roads

Research Project:
Investigation of Pavement Thickness Reading by MIT-Scan-T2

Location: In- House

Project Site Location: Fremont Bypass Hwy 275

Starting Date: 06-18-2008

Completion Date: 06-23-2008

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Figure4. NDOR personnel field testing

Introduction:
Nebraska Department of Roads received the MIT-Scan-T2 (Device for Nondestructive Testing of Pavement Thickness) as a loan by The Federal Highway Administration's (FHWA's) Concrete Pavement Technology Program (CPTP). This program enables the State DOT's to evaluate new technologies. The MIT-Scan-T2 measured the thickness of a pavement in a non-destructive manner, using a magnetic tomography technology.
Traditionally, the thickness measurement is performed by taking cores and measuring the height of the core by 9 point reading. This Quality Control/Quality Assurance (QA/QC) measurement is a time consuming/destructive process of in place-concrete.

Figure1. MIT-scan-T2 Complete Device
Taken from by Coltrans DOT's MIT-Scan-T2 Guide

Figure2. MIT-scan-T2 Sensor Unit
Taken from by Coltrans DOT's MIT-Scan-T2 Guide

The instrument can measure thickness to a depth of 18 inches with an accuracy of (1/16 in) of the value measured plus (1mm) with a ±0.5%. It uses reflector disc zinc steel clad material with a thickness of 0.6mm and a diameter of 11.8 in for pavement of thickness range of 7-18 in. Figure 3 shows/demonstrates the recommended locations for the reflectance steel plate within the concrete slab.

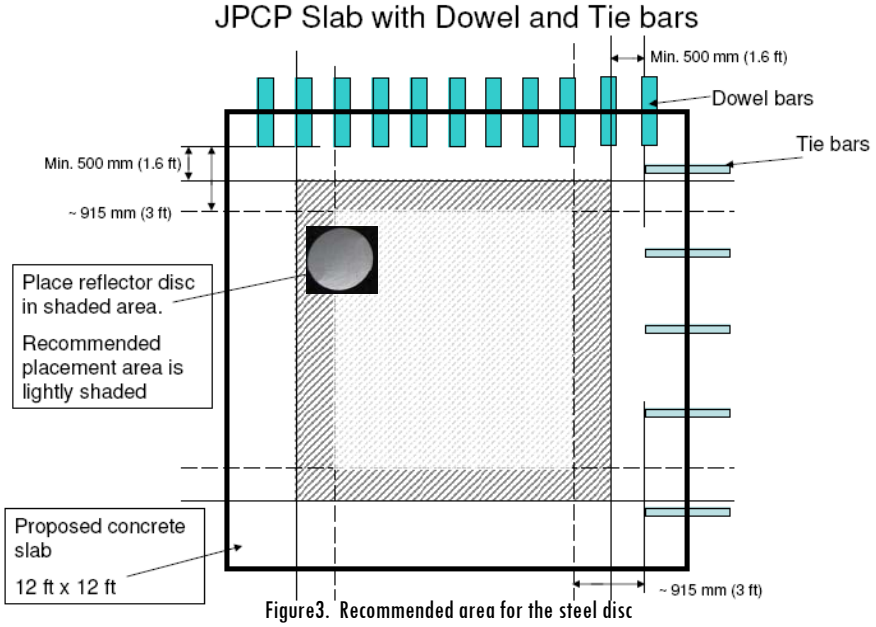

Figure3. Recommended area for the steel disc
Taken from by Coltrans DOT's MIT-Scan-T2 Guide

Purpose of In-House Investigation: The principle objective of this investigation is to find out if NDOR can pursue other methods for measuring thickness. Traditionally, this measurement has been performed by taking cores and measuring the height of the cored PCC. Because coring is a time-consuming and destructive process, only a small number of cores are taken to evaluate thickness of in-place concrete. Because of the small number of cores that can be practically taken to evaluate PCC thickness, the average thicknesses of the cores may not be representative of the pavement thickness. Therefore, the purpose of this project is to evaluate the capabilities of this equipment to correlate readings from core measurements within a $\pm$0.25 in to verify thickness.

Objective of this Investigation:

- The ability to trace the reflector disc in-situ concrete placement.
- The correlation with the MIT-Scan-T2 with the actual core thickness reading.
- The friendliness of functionality, applicability and ease of use.

Conducted in the field: This investigation was part of a paving operation in Fremont, Nebraska at Highway 275, this pavement was designed for (9 in) doweled pavement. Eight steel plates were evaluated by the MIT-Scan-T2. The reflector disk were placed 7 ft from the edge of the slab as shown in Figure 5 and Figure 6.

Figure5. Plate location

Figure6. Plate location

The plate's locations are listed in the following Table along with the MIT-Scan_T2 and 9 point core reading (ASTM C 174) results. NDOR Specifications require the core to be less than 0.25 inches from plan thickness. If the core thickness is greater than 0.25 inches, then there is a payment deduction for the deficient pavement thickness.

Table.1.- Field Information

Plate	Stations	Thickness Reading MIT-Scan-T2 (mm)	Thickness Reading MIT-Scan-T2 (in)	9 Point Core Reading (in)	Difference between MITScan and 9 Point Core Reading (in)
1	49+07	273	10.74	10.49	.26
2	48+22	253	9.96	9.70	.26
3	47+95	277	10.90	10.67	.24
4	47+75	255	10.03	8.64	Flag
5	45+00	220	8.66	8.44	.22
6	44+62	229	9.01	8.75	.27
7	44+00	216	8.50	8.31	.19
8	44+20	233	9.17	9.26	.09

Finding to Date:

This investigation has proven that the equipment is user friendly, lightweight and able to identify the plate locations. Its ease of use and the fact there is no calibration required, saves time with less data to input. However, the MIT-SCAN-T2 requires pre-planning and placing of reflectors over the base coarse prior to paving. The evaluation has shown the MIT-Scan-T2 can be able to correlate with the 9 point core reading with an average of 0.22 inches resulting from 7 data points made in the field. At this time, NDOR requires more data to be collected to draw statistically valid conclusions. Further investigation will be done to evaluate this new technology in the near future.