SP-150728
(New)

SPECIAL PROVISIONS
FOR
MODULUS VERIFICATION USING ROLLER MAPPING OF PAVEMENT FOUNDATION LAYERS

Black Hawk County
NHSX-020-6(72)--34-07

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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.

150728.01 DESCRIPTION.

A. This work consists of in situ verification of modulus for the pavement foundation layers through use of an instrumented roller. Modulus verification using roller mapping shall be performed on all lifts within the limits of the special backfill and granular subbase for the mainline and within the limits of the modified subbase for the ramps/loops, including the top of natural subgrade (i.e. the bottom of the Class 13 excavation area).

B. Modulus verification roller mapping will be accomplished using the Contractor's vibratory smooth drum roller(s) outfitted with an instrumentation kit provided by the Engineer. Modulus verification roller mapping will be completed at the surface representing the top of each compaction lift after meeting the project's compaction specification requirements.

C. Map results will be used by the Engineer to identify low modulus areas for placement of Subgrade Stabilization Material per Section 2113 of the Standard Specifications to stabilize the special backfill, modified subbase, and/or granular subbase.

150728.02 EQUIPMENT.

A. The roller(s) shall meet the following minimum requirements:

1. Machine Type: Self-propelled smooth drum vibratory roller with secure enclosed cab (e.g., Caterpillar CS56B or equivalents).

2. Weight: Operating weight of at least 24,000 pounds.

3. Drum Width: 84 inches.

4. Vibration Settings: Nominal amplitude range of 0.03 inches (low vibration) to 0.08 inches

(high vibration) and nominal frequency range of 30 Hz.

B. Roller(s) shall be available for the duration of the pavement foundation layer construction. The Contractor shall determine the number of roller(s) needed for their operations.

C. The modulus verification roller mapping instrumentation kit to be installed by the Engineer on the roller(s) and provided by the Engineer will involve:

1. Mounting a temporary computer screen in the roller cab to display to the roller operator a color-coded modulus map.

2. Mounting a temporary computer box in the cab to transmit data automatically.

3. Mounting temporary RTK-GNSS antennas secured to the top of the roller cab for recording position.

4. Mounting a set of sensors temporarily to the roller to measure modulus.

150728.03 CONSTRUCTION.

Modulus verification roller mapping shall be performed on the surface of each compacted lift of the special backfill and granular subbase for the mainline and each compacted lift of the modified subbase for the ramps/loops. Mapping shall also be performed on the top of the natural subgrade (i.e. bottom of the Class 13 excavation area) prior to placing special backfill for the mainline or modified subbase for the ramps/loops. Mapping shall be performed in such a way that it covers the full extent of the compaction work area. Overlapping between adjacent roller lanes shall be approximately 10% at a minimum. Contractor shall keep roller speed and vibration settings (frequency and amplitude) constant during roller operations and within range of the requirements provided during site-specific operator training. Modulus verification roller mapping results will be reported for forward driving direction only unless the roller is calibrated by the Engineer for mapping in reverse direction. Modulus verification roller mapping performed on the granular subbase shall be limited to two vibratory roller passes, unless directed by the Engineer, and completed prior to final trimming.

150728.04 SETUP AND TRAINING.

A. The Contractor shall make the roller(s) available for one day (8 hours) to the Engineer for installation of the modulus instrumentation kit provided by the Engineer and one day to remove the kit. The schedule and location for installation of the kit shall be coordinated at least 2 weeks prior to the install date.

B. On-site roller operator training will be provided by the Engineer. The Contractor shall coordinate operator training prior to initiating modulus roller mapping, and then as needed during the remaining operations. Contractor's personnel available for training shall include the Project Manager and roller operator(s). Iowa DOT personnel shall include the Engineer and field inspector(s). The Engineer will provide a location for the on-site training. Training shall be a maximum of 4 hours in duration. The schedule and location for training shall be coordinated at least 2 weeks in advance.

C. Operator training shall include the following:

1. Background information for the specific modulus inspector kit to be installed.

2. Setup and checks for the modulus inspector kit and RTK-GNSS equipment operation.

3. Operation of the mapping system on the roller, i.e., start/stop of data recording, and on-board display options.

4. Operation of computer screen and understanding of real-time results to achieve modulus target values.

150728.05 MEASUREMENTS, OUTPUT, AND REPORTING

A. The modulus verification roller mapping results will be calibrated using independent in situ testing provided by the Engineer. The map reports will include a compaction report showing the color-coded modulus roller mapping results from each work area and will be available electronically, using a smart phone, tablet, or computer, to the Contractor and Engineer personnel. The complete record of results, containing all map reports, will be available to the Contractor through a free web application.

B. The results of the modulus maps will be used by the Engineer to identify low modulus areas for placement of Subgrade Stabilization Material per Section 2113 of the Standard Specifications. The modulus map report results will be available to the Contractor in near real-time using a project specific web link. The location for Subgrade Stabilization Material placement as determined by the Engineer will be based on the mapping record and will be provided to the Contractor.

150728.06 METHOD OF MEASUREMENT.

Measurement for the quantities of the items associated with modulus verification roller mapping operations will be as follows:

A. Roller Equipment for Modulus Verification Roller Mapping
Lump sum.

B. Modulus Verification Roller Mapping Operations.
Measurement of the mapping area will be based on the total area as shown in the plans for the granular subbase and special backfill for the mainline and the modified subbase for the ramps/loops, for each lift mapped in the mapping report, including the top of natural subgrade (i.e. bottom of Class 13 Excavation). Areas not successfully mapped will be deducted. If additional passes for a lift are requested by the Engineer, additional payment will be based on the area for the subbase material shown in the plans.

150728.07 BASIS OF PAYMENT.

Payment will be the contract unit price for the items associated with modulus verification roller mapping operations as follows:

A. Roller Equipment for Modulus Verification Roller Mapping

1. Payment for roller equipment will be lump sum contract price.

2. Payment is full compensation for:
- **a.** Providing the roller(s) for the duration of the pavement foundation layers work period.
- **b.** Furnishing trained operators.
- **c.** Making each roller available for hardware kit installation and hardware removal.
- **d.** Making each roller and operator available for training.

B. Modulus Verification Roller Mapping Operations.

1. Per square yard.

2. Payment is full compensation for all work associated with modulus verification roller mapping using the equipped roller(s).