



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

**Franklin County
IMX-035-6(140)172--02-35**

**Effective Date
February 18, 2025**

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230292.01 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 the following:
- Top of subgrade (pre and post cement treatment) in areas under PCC shoulder and pavement,
 - Granular subbase, and
 - Other areas for remapping provided by the Engineer.
- 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 area noted above after meeting the project's compaction specification requirements.

230292.02 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.
- D. **Setup and Training.**
 - 1. 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 prior to roller(s) leaving the project site. Coordinate the schedule and location for installation of the kit at least 2 weeks prior to the install date. Partial kit removal is required prior to moving instrumented roller(s) from one project site to another project site. Coordinate partial kit removal at least 7 days prior to moving the roller.
 - 2. Required classroom and on-site, project-specific training will be provided by the Engineer. Coordinate 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). The Engineer will provide a location for the on-site training. Training shall be a maximum of 4 hours in duration. Coordinate the schedule and location for training at least 2 weeks in advance.
 - 3. Operator training shall include the following:
 - a. Background information for the specific modulus inspector kit to be installed.
 - b. Setup and checks for the modulus inspector kit and RTK-GNSS equipment operation.
 - c. Operation of the mapping system on the roller, i.e., start/stop of data recording, and on-board display options.
 - d. Operation of computer screen and understanding of real-time results to achieve modulus target values.

230292.03 CONSTRUCTION.

- A. Perform modulus verification roller mapping on areas noted in Description section.
- B. Smooth the surface prior to mapping. Perform mapping 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. 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.
- C. Each completed map shall be a minimum length of 300 feet and the entire width of the compaction work area, unless approved otherwise by the Engineer.
- D. Modulus verification roller mapping of post-cement treated subgrade shall be performed 24 to 72 hours after treatment.

- E. Modulus verification roller mapping performed on the granular subbase shall be completed prior to final trimming.
- F. Coordinate with Engineer additional field testing (such as automated plate load testing) to be performed by the Engineer.

230292.04 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.

- 1. Measurement for the locations noted, for each lift mapped in the mapping report:
 - a. Top of soil subgrade (pre and post cement treatment): Based on square yards shown in the plans for PCC shoulder and pavement.
 - b. Granular subbase: Based on square yards shown in the plans for granular subbase.
 - c. Other areas for additional mapping: Based on square yards measured by the Engineer.
- 2. Areas not successfully mapped will be deducted. Additional areas mapped by the Contractor while maneuvering or turning the roller will not be measured for payment.

230292.05 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).