



# Iowa Department of Transportation

## SPECIAL PROVISIONS FOR INTELLIGENT COMPACTION-HMA

Boone County  
RTB-RB-34(013)--90-00

Effective Date  
February 6, 2013

**THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS AND APPLICABLE SUPPLEMENTAL SPECIFICATIONS.**

In addition to the requirements of the Supplemental Specifications for Flexible Pavement, the following shall apply:

### **121018.01 DESCRIPTION.**

- A.** This specification describes the Contractor's responsibilities for furnishing Intelligent Compaction (IC) equipped rollers, data acquisition, training, roller verification/repeatability testing, and transmitting data to the Engineer. IC for HMA is defined as the gathering of data from self-propelled vibratory roller systems involved with the measurement and recording of roller position, date/time, speed, vibration frequency, vibration amplitude, surface temperature, pass count, travel direction, and a compaction measurement value (MV). Real Time Kinematic (RTK) based Global Positions System (GPS) with base station corrections shall be used for determining the position of the roller. Results from the IC shall be displayed to the roller operator on a color coded computer screen in real-time during roller operations and the data saved for transfer and viewing by the Engineer.
- B.** Quality acceptance for IC-HMA will be per the Special Provisions for Plant Aging of Flexible Paving Mixture.
- C.** Submit to the Engineer an IC Work Plan at least 2 weeks prior to the Preconstruction Conference. Describe in the work plan the following:
  - 1.** Compaction equipment to be used including:
    - Vendor
    - Roller model,
    - Roller dimensions and weights,
    - Description of IC measurement system,
    - GPS capabilities,
    - Documentation system,

- Temperature measurement system, and
  - Software.
2. Roller data collection methods including sampling rates and intervals and data file types.
  3. Transfer of data to the Engineer including method, timing, and personnel responsible. Data transfer shall occur at minimum once per day or as directed by the Engineer.
  4. Training plan and schedule for roller operators, Engineer's personnel, and Iowa State University's research personnel; including both classroom and field training.
  5. Communication protocol for informing the Iowa State University research team point of contact concerning construction progress and schedule to facilitate research field testing and data collection.

## **121018.02 EQUIPMENT AND MATERIALS.**

### **A. Rollers.**

Comply with Article 2001.05 of the Standard Specifications for self-propelled vibratory rollers. Article 2001.05 applies to all rollers used in the breakdown position. Breakdown roller is defined as the roller(s) making the initial contact with the HMA.

Ensure that IC equipment can measure roller position, date/time, speed, vibration frequency, vibration amplitude, surface temperature, pass count, travel direction, and a compaction measurement value (MV). Provide a computer screen in the roller cab for viewing measured results. Ensure that results are stored for transfer to the Engineer for viewing on a laptop computer. Provide the Engineer and Iowa State University each with a copy of the IC roller vendor software for viewing results. Ensure that results are displayed as color coded spatial maps based on GPS coordinates.

### **B. Data Collection, Export, and Onboard Display.**

Provide and export the following data in a comma, colon, or space delimited ASCII file format:

- Machine Model, Type, and Serial/Machine Number
- Roller Drum Dimensions (Width and Diameter)
- Roller and Drum Weights
- File Name
- Date Stamp
- Time Stamp
- RTK based GPS measurements showing Northing, Easting, and Elevation
- Roller Travel Direction (e.g., forward or reverse)
- Roller Speed
- Vibration Setting (i.e., On or Off)
- Vibration Amplitude
- Vibration Frequency
- Surface Temperature
- Compaction Measurement Value

Ensure that the roller's onboard display will furnish color-coded GPS based mapping showing number of roller passes, surface temperature, vibration frequency, vibration amplitude, and the MV on a computer screen in the roller operators cab. Provide displayed results to the Engineer for review upon request.

### **C. Local GPS Base Station.**

Provide a real time kinematic global positioning system (RTK-GPS) to acquire northing, easting, and elevation data used in mapping of IC measurements. Ensure the system has the capability to

collect data in an established project coordinate system. Furnish a local GPS base station used for broadcasting differential correction data to the rollers with a tolerance less than 0.1 feet in the vertical and horizontal.

An acceptable alternative to the RTK-GPS will be a GPS system with Correction Service Subscription (CSS). CSS is a service that can be subscribed to receive VRS signals in order to achieve higher accuracy GPS positioning normally via cellular wireless data services; i.e., without the need for a ground-based base station. Examples of GPS Correction Service subscriptions are: Trimble VRSTM, Trimble VRS NOWTM, and OmniSTAR.

### **121018.03 CONSTRUCTION.**

#### **A. Equipment Breakdowns.**

In the event of IC roller breakdowns/IC system malfunctions/GPS problems, the Contactor may operate with conventional rolling operations, but IC data shall be collected and provided for a minimum 80% of the project HMA quantity.

#### **B. Data submittal.**

Furnish to the Engineer an electronic file in ASCII file format with information listed under Article SP-121018.02, B. As a minimum the file transfer shall occur immediately following the final compaction operations on each working day. The Engineer may request data any time during compaction operations.

### **121018.04 METHOD OF MEASUREMENT.**

None. Lump sum item.

### **121018.05 BASIS OF PAYMENT.**

- A.** Payment for Intelligent Compaction-HMA will be the lump sum contract price.
- B.** Payment is full compensation for all work associated with providing IC equipped rollers, transmission of electronic data files, two copies of IC roller manufacturer software, training, and preparing and maintaining work space for Iowa State University's IC trailer and associated parking.
- C.** Delays due to GPS satellite reception of signals to operate the IC equipment or IC roller breakdowns will not be considered justification for contract modifications or contract extensions.