

Intelligent Compaction Specifications
Nevada Department of Transportation

The specifications covers the requirements for additions to the standard specifications for section **401.03.11 Rolling** for the purpose of tracking and documenting rolling patterns of rollers and temperature on plantmix bituminous pavements. Compaction equipment and procedures shall meet all requirements listed in the Standard Specifications sections **402.03.06 Compaction** and **403.03.08 Compaction**.

This work shall consist of compaction of asphalt mixtures utilizing Intelligent Compaction (IC) rollers within the limits of the work as described in the plantmix sections of the plans and the special provisions. All lifts of paving shall use IC roller technology. This technology shall only be required on the breakdown rollers and intermediate rollers if mat temperature allows.

Submit documentation of the manufacture, model and type of roller that will be used in IC operations.

Global Positioning System (GPS) Requirements

Breakdown and intermediate rollers shall be equipped with GPS radio and receiver units to monitor the equipment locations and track the number of roller passes. GPS receivers shall utilize the Universal Transverse Mercator (UTM) or Nevada State Plane coordinate system and have a survey tolerance of not greater than 3.0 in (76.2 mm) in both the horizontal (x and y) directions. Once declared, the coordinate system utilized shall be the same for all rollers for the entire project.

GPS data shall be in the following format:

- Time: Military, local time zone, hhmmss.ss
- GPS: latitude/longitude, degrees/minutes ddmm.mmmmmmm or decimal degrees dd.ddddddd
- Grid: feet, 0.01 feet

GPS Base Station: a single ground-based system that consists of a GPS receiver, GPS antenna, radio and radio antenna to provide L1/L2 differential GPS correct signals to other GPS receivers within a range limited by radio, typically 2 miles in radius without repeaters.

A technical representative from the IC and GPS equipment supplier shall be present for training and technical support at start of full shift/day of paving operations for the first 5 paving days (after test sections are complete) and until all IC equipment and technology is operating correctly and then as needed for the remaining time period (breakdowns in IC equipment, technical problems, etc.). This cost will be included in the lump sum bid item for Intelligent Compaction Equipment.

Prior to the start of production, the Contractor and representatives of the GPS and IC roller manufacturer shall conduct the following to check the proper setup of the GPS, IC rollers and the rover using the same datum:

1. On a location nearby or within the project limits, the GPS base station (if required by the GPS) shall be established and the IC roller and the GPS rover tied into the same base station.

2. Verification that the roller and rover are working properly and that there is a connection with the base station.
3. Roller and rover coordinates shall be checked for proper verification prior to beginning operations.

GPS check testing shall be conducted daily during production operations to ensure consistency and accuracy of GPS measurements for all GPS devices prior to the paving and compaction operations.

Intelligent Compaction Measured Values (IC-MV)

Breakdown rollers shall be of the vibratory type and shall be equipped with accelerometers to measure the interaction between rollers and compacted plantmix in order to evaluate the applied compaction effort. The output from the roller is designated as the Intelligent Compaction Measurement Value (IC-MV) which represents the stiffness of the materials based on the vibration of the roller drums and the resulting response from the underlying materials. This is for informational purposes only and not mandatory, compaction will still be measured by Nevada T335.

Temperature Measurement

Breakdown and intermediate rollers shall be equipped with non-contact temperature sensors for measuring pavement surface temperatures.

On Site Training

The Contractor shall coordinate for on-site training for Contractors and Agency personnel related to operation of the IC Technology. Contractor's personnel shall include the paving superintendent, QC Technician(s) and roller operators. Agency's personnel shall include at a minimum paving inspectors, compaction testers and survey crew chief. Training shall cover the following minimum topics:

1. Background information for the specific IC system to be used
2. Setup and checks for IC system, GPS receiver, base station and hand held rovers
3. Operation of the IC system on the roller; i.e., setup data collection, start/stop of data recording, and on-board display options
4. Transferring raw IC data from the rollers via USB connections
5. Operation of vendor's software to open and view raw IC data files and exporting all passes and proofing data files in Veda-compatible format
6. Operation of Veda software to import the above exported all-passes and proofing data files, inspection of IC maps, input point test data, perform statistics analysis and produce reports for project requirements

IC Construction Operations Criteria

A minimum coverage of 90% of the individual construction area shall meet or exceed the optimal number of roller passes for a 1000 ton area. Corrective action shall be taken by the Contractor for areas not meeting these requirements for coverage or uniformity.

Integrated On-Board Documentation System

An on-board documentation system that is capable of displaying real-time color-coded maps of IC measurement values including the stiffness response values, location of the roller, number of roller passes, pavement surface temperatures, roller speeds, vibration frequencies and amplitudes of roller drums. The display unit shall be capable of transferring the data by means of a USB port. Data files shall be compatible with IC data analysis software Veda Version 2.0 or later, available at www.intelligentcompaction.com. Following each work day or shift, operators shall make daily data files available to the NDOT project Resident Engineer for review.

Basis of Payment

All costs of equipment and related additional expenses shall be bid under the following lump sum item:

Pay Item	Pay Unit
Intelligent Compaction Equipment.....	Lump Sum