

**Maryland SHA Special Provision
Contractor Support of
Hot Mix Asphalt Intelligent Compaction Demonstration Project**

Description: This special provision is to describe additional work by the Contractor to support this demonstration project, which will be conducted prior to and during placement and compaction of asphalt materials. The additional work includes: onsite roller transportation/security, materials, equipment, and operators. The purpose of the project is to demonstrate Intelligent Compaction (IC) technology, to evaluate the benefits and effectiveness of IC technology for improving compaction processes and for mapping the supporting material prior to asphalt placement. Also, this project would evaluate correlation of the IC and related data to in-place asphalt densities. The IC data that will be recorded will not be used for approval or rejection of the project materials testing but will only be used to support the demonstration activities.

IC for asphalt materials is defined as the gathering of data from self-propelled tandem drum vibratory system involved with the measurement and recording of roller position, date/time, speed, vibration frequency, vibration amplitude, pass count, travel direction, surface temperature and compaction measurement value. Real Time Kinematic (RTK) based Global Positioning System (GPS) is to be used for determining the position of the rollers and mapping of IC measurements.

I. Time Frame

The FHWA will provide limited support for Maryland State Highway Administration (DOT) through the IC research team to conduct a field demonstration of IC technology for approximately three to four consecutive working days. The demo project will be performed on asphalt pavement materials between **May-July, 2014 (to be updated)**. The working days do not include days when work cannot occur due to weather conditions. The planned dates of the demonstration will be established at least six weeks in advance of the work to facilitate planning and scheduling equipment, personnel and the IC research team.

II. Equipment

The FHWA IC research team will provide two IC rollers and necessary GPS equipment at no cost to the Contractor. This includes freight charges to transport the IC and GPS equipment to the project location. At the beginning of the project, the IC roller will be delivered by the manufacturer to a secure location designated by the Contractor.

The GPS equipment will consist of GPS radio and receiver mounted on the IC roller, a GPS base station (either stand-alone or virtual) and a hand-held GPS rover. The GPS shall be Real Time Kinematic (RTK). The rover will be compatible with the RTK GPS equipment being used on the rollers by referencing to the same GPS correction signal

from a ground-based base station or a virtual reference system. The IC roller will be equipped with the following equipment, software and capabilities:

1. A drum mounted measurement system capable of producing a Intelligent Compaction Measurement Value (IC-MV) that is an indication of the stiffness of the materials being rolled and compacted;
2. Thermal gauges for surface temperature measurement;
3. RTK/VRS GPS technology; and
4. Real-time onboard computer display that provides color-coded maps of roller passes, mat temperatures and IC-MV.
5. The recorded IC data shall be Veda-compatible.

The Contractor will be responsible for onsite transportation of the roller from the original drop-off location to the designated construction site(s). If necessary, the roller will be transported by the Contractor to a secure area during non-working hours. Additionally, it is estimated that the Contractor will supply up to 300 gallons of diesel fuel and water as necessary.

The Contractor will be responsible for conducting a test strip with the IC rollers to determine the optimum number of roller passes to achieve the contract requirements. Nuclear density gauge and/or other on-situ testing will be performed for evaluating the correlation between these point test results and IC-MV. Either the Contractor or the agency will provide the testing equipment and a qualified operator to assist the FHWA IC research team. Additional DOT research testing may be conducted at the time and will be included in the project report. (Testing to be determined by the DOT).

After the compaction operations are complete on a base or intermediate layer, 60 cores will be taken at locations marked by the FHWA IC research team. Either the Contractor or the DOT will provide the coring equipment and qualified operators. Either the Contractor or the DOT will conduct the laboratory density testing of cores in accordance with standard DOT procedures. Past experiences has shown the coring will take approximately 4 hours to complete the operations depending upon on the number of core rigs provided. (DOT to select a coring plan)

GPS measurements for the coring locations will be performed using a hand-held GPS rover. The FHWA IC research team and GPS vendors will provide the GPS rover and a qualified operator.

The Contractor may also be requested to provide any needed traffic control to accommodate the above testing.

III. Technical Support

A technical representative of the IC roller and GPS manufacturer(s) will be present on the project during the IC demonstration and at least one day prior to the IC demonstration. The representative will assist the DOT and contractor personnel in setting up the operation prior to paving, taking down the GPS equipment at the end of each day, collecting and storing data on a daily basis and troubleshooting any problems that occur during the IC demonstration.

One-half day training for the use of the Veda IC data management software can also be offered by the IC research team at no charge to the DOT or the Contractor. Training requirements include an enclosed facility with power, internet access, projection screen and a projector relatively close to the project area. All participants (DOT, Contractors, Consultants, and Academia) will need their own computers. (DOT to choose Veda Training option)

IV. Planning Meeting

At least two month prior to the beginning of the IC demonstration, there needs to be a planning conference call between the DOT, Contractor and the IC research team representatives. The purpose of the meeting will be to discuss in detail various tasks of the IC demonstration, including assignments of responsibility for each task. Minutes and action items of the planning meeting will be prepared by the FHWA IC research team and distributed to all parties.

V. Operators

The Contractor will provide two operators familiar with the general operation of rolling equipment used during asphalt operations. The operator will need to be available for training by the IC roller manufacturers for at least two hours at the beginning of the field operations on the IC roller.

Generally, the IC roller will be used to replace the conventional rollers (breakdown and intermediate roller) during the rolling operation. During the course of the demo, each of the rollers will be operated in each position.

VI. Additional Time for Compaction and Testing

The IC demonstration will consist of monitoring the compaction process and performing in situ testing during and after the compaction process is completed. Generally, the research on the compaction process itself will be performed during typical compaction operations and will keep pace with normal production schedules. The IC demo is only for the gathering of the IC and related testing data. Standard contract specifications will apply to the density acceptance of the pavement materials.

VII. Evaluation or Mapping of Underlying Material Support Characteristics

As part of the demonstration effort, the support characteristics of the underlying materials may be evaluated, if possible. Prior to the placement of the asphalt materials, the existing pavement that will be directly below the initial asphalt layer is suggested to be “mapped” using an IC roller. The mapping will consist of measuring the stiffness the underlying in order to establish the baseline stiffness of the materials and to identify areas of weak support.

Where the demonstration is being conducted on a new construction project, mapping will be conducted on the in-place materials (soils and/or aggregate) base materials. Where the demonstration is being conducted on a project where an asphalt overlay is being placed over an existing asphalt pavement, mapping will be conducted on the existing asphalt pavement or on the pavement after milling operations are completed. Mapping needs to be conducted prior to placement of the tack coat.

Mapping of in-place subgrade soils/aggregate base material: After placement, shaping and compaction of the subgrade soils, aggregate base materials, the aggregate base layer will be “mapped” with the tandem drum IC roller. The mapping area is estimated to be 1500 feet in length and will be identified by the IC research team in cooperation with the Contractor. The estimated time for mapping of the areas to be evaluated during the research is approximately one hour.

VIII. Communication with Agency and Research Team

At least once a day, the IC research team members will meet with the Contractor's project manager and the DOT to plan and coordinate the demonstration work. At the time of the meeting, the DOT and IC research team will provide clear instruction on the anticipated testing operations. The Contractor is requested to keep the DOT and IC research team aware of project changes that may effect the IC operations. The Contractor field staff is encouraged to visit with the IC research team to discuss the IC operations. The DOT and the Contractor will all get the results/report of IC demonstration.

IX. Global Positioning System Requirement

Intelligent Compaction rollers are dependant on availability of a Global Positioning System (GPS) to track roller positions during operations in order to display color-coded maps of roller pass counts, IC-MV, and other measurements such as surface temperatures.

All GPS data shall include longitude, latitude, and timestamps. The use the Universal Transverse Mercator (UTM) Coordinates is the preferred coordinate system for the convenience of GPS validation. The UTM zone for Maryland is 18N. Daily GPS validation is required to compare GPS records on IC rollers and that from a GPS rover according to the standard procedure described in the FHWA generic IC specifications.

The tolerance for the GPS differences shall be less than 6 inch (150 mm) in both horizontal x and y directions.

X. Open House

As part of the IC demonstration project, the DOT may elect to sponsor, plan and conduct a one-half day open house. The purpose of the open house would be to conduct a short discussion of the technology and to allow the participants the opportunity to see and hear about the IC roller operations. The IC research team will be available to support the open house at no cost to DOT. Typical attendees include DOT, Contractors, Consultants, and Academia from the area. Open House requirements include an enclosed facility with power, screen and a projector and an open space for the IC rollers relatively close to the project area. The IC research team will prepare an event flyer for distribution by the DOT. (DOT to choose Open House option)

XI. Method of Measurement (DOT to modify as appropriate)

This work will not be measured as the item will be paid as a lump sum for providing assistance for of the IC demonstration project.

XII. Basis of Payment (DOT to modify as appropriate)

Payment will be full compensation for the use and delivery of the IC roller, the use and delivery of the GPS system and any other services required for the IC demonstration program at the contract lump sum price for IC Demonstration.

Pay Item	Unit
IC Demonstration.....	LS

All costs related to the use of the Contractors QC personnel and testing equipment, local transportation, materials, fuel, equipment operators, security, and other miscellaneous expenses are not included in the IC demonstration project.

All direct costs associated with the IC Veda Training and/or the Open House is not included in the IC demonstration project.