

**VADOT Special Provision
Contractor Support of Research Project**

**HOT MIX ASPHALT (HMA)
(Type IV)**

**Intelligent Compaction Pooled Fund
“Accelerated Implementation of Intelligent Compaction Technology for
Embankment Subgrade Soils, Aggregate Base and Asphalt Pavement Materials”**

Description: This Special Provision is to describe additional work (roller transportation/security, materials, equipment, and operators) by the Contractor to support this research project, which will be conducted prior to and during placement and compaction of Hot Mix Asphalt materials. The purpose of the research study is to demonstrate Intelligent Compaction (IC) technology, to evaluate the benefits and effectiveness of IC technology for compaction and for mapping the supporting material prior to HMA placement, to evaluate the benefits of IC technology for compaction of HMA compared to conventional compaction equipment/practices, to accelerate the development of IC specifications and to identify/prioritize needed improvements and research in IC equipment. The IC test results will not be used for approval or rejection of the project materials testing but will only be used to support the research study.

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

I. Time Frame

The IC research team will be conducting experiments for approximately five to six consecutive working days. The working days do not include days when work cannot occur due to weather conditions. The planned dates of the research will be established during the IC research project pre-construction meeting at least two weeks in advance of the work. For planning purposes, the IC research team has targeted the IC field demonstration 45-60 days after the notice to proceed is given.

II. Equipment

The IC research team will provide the IC roller(s) and Global Positioning System (GPS) equipment at no cost to the project. Depending on the availability of the rollers, at least two different manufactures will be available for the project. At the beginning of the

project, the IC roller will be delivered by the manufacturer to a location designated by the Contractor. The IC roller(s) will be equipped with the following equipment, software and capabilities:

1. A drum mounted measurement system capable of producing a “Roller Measurement Value” (RMV) that is an indication of the stiffness of the materials being rolled and compacted
2. Thermal gauges for surface temperature measurement
3. GPS technology that will provide color-coded mapping of roller passes, mat temperature and RMV

The Contractor will be responsible for onsite transportation of the rollers to the designated construction site(s) and to the VADOT Open House which will be within relatively close proximity to the project as discussed during the pre-construction meeting. If necessary, the roller will be transported by the Contractor to a secure area during non-working hours. To support the IC research operations a GPS System plus testing personnel and construction equipment is also needed. Additionally, it is estimated that up to 300 gallons of diesel fuel is needed. It is anticipated that 20 -6 in. cores will be needed to be taken by the Contractor for the IC research. The location(s) of the cores will be established by the IC research team.

Testing of the cores will be responsibility of the Agency. Falling Weight Deflectometer (FWD) testing is also to be conducted in the mapping areas. The FWD and operator will be provided by the Agency at no cost to the project. The Agency may also request additional nuclear and/or non-nuclear density testing alternatives for correlation on the project. The Agency is responsible for providing the density testing equipment and operators as applicable.

III. Operators

Operators provided by the Contractor will consist of qualified and skilled individuals that are familiar with the operation of the equipment for compaction equipment for HMA. Generally, the IC roller will be used to replace one or two of the conventional rollers (typically the breakdown roller) during the rolling operation. It is not anticipated that more than two operators will not be required. The operator(s) will need to be available for training by the IC roller manufacturer for at least one to two hours at the beginning of the research study.

IV. Additional Time for Compaction and Testing

The IC research will consist of monitoring the compaction process (with and without the IC rollers) and performing testing during and after the compaction process is completed. Generally, the research on the compaction process itself will be performed during typical compaction operations that will keep pace with normal production

schedules. The IC research team may requested the operator(s) to supplement their normal rolling patterns, speed up or slow down for specific supplemental in-place testing. The Contractor is requested to accommodate this additional time by adjusting the production/ placement/ compaction process, increasing the number of hours of production and by providing traffic control as necessary.

V. Additional Density Testing by Contractor Personnel

Density testing with both a nuclear density gauge and with cores will be performed at a higher frequency than during a normal paving project. All test results collected as part of the IC operations will not be considered as part of the project acceptance program. Standard contract specifications apply to the acceptance of the materials.

VI. Evaluation (Mapping) of Underlying Material Support Characteristics

As part of the research effort, the support characteristics of the underlying materials will be evaluated. Prior to the placement of the HMA materials, the existing pavement that will be directly below the initial HMA layer will be “mapped” using an IC roller. The mapping will consist of measuring the stiffness the underlying materials in order to establish the existing stiffness of the materials and to identify areas of non-uniformity. The Contractor may utilize the information to determine if supplemental work is necessary to meet the contract requirements.

Where research is being conducted on a new construction project, mapping will be conducted on the in-place materials (soils and/or aggregate) base materials. Where research is being conducted on a project where an HMA 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.

Where research is being conducted on a project where an HMA overlay is being placed over an existing Portland Cement Concrete pavement that has been rubblized or cracked and sealed, etc., mapping will be conducted on the finished surface. Mapping needs to be conducted prior to placement of prime or tack coat applications.

1. 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 2000-3000 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 will be approximately eight hours.
2. Mapping of the in-place, existing asphalt pavement: After any milling and/or patching is performed in the research area, the existing asphalt

- pavement will be “mapped” with the tandem drum IC roller. The mapping area is estimated to be 3000-4000 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 will be approximately four to eight hours.
3. Mapping of in-place rubblized or cracked and seated Portland Cement Concrete Pavement: After the shaping and compaction of the materials the PCC surface will be “mapped” with the tandem drum IC roller. The mapping area is estimated to be 3000-4000 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 will be approximately four to eight hours.

VII. Roller Correlation Test Strip

The Contractor is requested to establish a “control strip” at the beginning of the project using the IC roller to compare the RMV with achieved density after each pass of the roller. Where applicable, the Agency standard procedure for density control strip procedures will be performed. The purpose of the control strip is to establish the roller pattern (number of passes) needed to obtain specification density, to evaluate the relationship (if any) between RMV and density and to establish a target RMV that can be used by the operator as an “on-the-fly” indication of the compaction achieved.

VIII. Communication with Research Team

At least once a day, the IC research Team will meet with the Contractor's project manager to plan and coordinate the research work. At the time of the meeting, the IC research team will provide clear instruction on the anticipated testing operations. The Contractor is requested to keep the 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 IC research team will accommodate the Contractor requests to facilitate the progress of the project. The IC research team will also provide the Contractor the results of testing as requested.

IX. IC Research Team Office

Normally the Intelligent Compaction evaluations and support by the IC research team will be collected and processed in the field. The IC team requests the use of a portion the project trailer office to consolidate the data and to coordinate the next day's operations if needed. This time can be also used to facilitate the demonstrations to the Contractor if requested.

The Contractor is responsible for providing electrical connections, drinking water, and sanitary facilities during the IC field demonstrations at the project trailer. Sufficient

parking for the IC research team vehicles and an additional area for five additional vehicles should be sufficient.

X. Global Positioning System

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, roller-integrated measurement values (RMV), and other measurements such as surface temperatures.

The use the Universal Transverse Mercator (UTM) Coordinates is the preferred coordinate system for the research project. The UTM zone for Virginia site will be either 17N or 18N depending on the location of the project. A RTK GPS base station that acquires northing, easting, and elevation data and broadcasts differential correction data to the rollers and hand-held rovers will be utilized. The GPS base station utilized will have a tolerance of less than 40 mm in both horizontal and vertical directions.

XI. Method of Measurement *(The DOT needs to decide if their will be additional payment or not for the IC work and revised this and the next section accordingly.)*

This work will be not be measured as the payment will be lump sum for providing assistance for and performance of the research project.

XII. Basis of Payment

Payment will be full compensation for roller transportation and security as well as materials, fuel, equipment, and operators, any delay during testing program, site preparation, use of GPS system or any other services required for progress of the Intelligent Compaction research program at the contract lump sum price for IC Compaction Research.

Pay Item	Unit
IC Compaction Research.....	LS