



Intelligent Compaction

Intelligent Compaction Equipment for Soils and HMA

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Importance Of Compaction

We've known it for a long time...

"THE IMPORTANCE OF COMPACTION in highway construction has long been recognized. Recent laboratory and field investigation have repeatedly emphasized the value of thorough consolidation in both the base and surfacing courses. Thorough compaction is known to produce the following desirable results:

1. It increases interlocking of the aggregate particles, which is the primary factor in developing a high degree of stability.
2. It retards the entrance of moisture, thus preventing excessive loss of stability under adverse service conditions.
3. It reduces the flow of air and water through bituminous mixtures and is therefore an effective means of lessening damage from weathering and film stripping."

Reference -- "Public Roads, May 1939, authors J.T. Pauls and J.F. Goode"




Why Do We Need Ic?

- Proper in-place density is vital for good performance for
- Conventional compaction equipment and procedures have shortcomings and too often produce poor results
- **Intelligent compaction technology appears to offer "a better way"**




Equipment Types

- Rollers equipped with Intelligent Compaction (IC) technology
- Global Positioning Systems (GPS)
- In Situ testing devices



IC Roller Requirements

- IC Roller Requirements
 - Roller Measurement Value (RMV)
 - GPS-Based documentation system
 - Color-coded display (on-board)
 - Optional: automatic feedback system
 - Tandem drum rollers: surface temperature measurement system



What Type of Rollers?



Vibratory Single Drum
Soil Roller



Vibratory Tandem Drum
Asphalt Roller



Single Drum IC Roller Suppliers

Ammann/Case



Dynapac



Caterpillar



Bomag America



Sakai America



Single Drum Roller Capabilities

Manufacturer	RMV	GPS (RTK)	Auto Feedback
Ammann/Case	K_b (stiffness value)	Y	Y
Bomag	E_{vib} (modulus value)	Y	Y
Caterpillar	CCV (relative value)	Y	N
Dynapac	CMV (relative value)	Y	Y
Sakai	CCV (relative value)	Y	N

Two Different Single Drum Configurations



Ammann/Case Soils IC Rollers with Smooth and Padfoot Drums

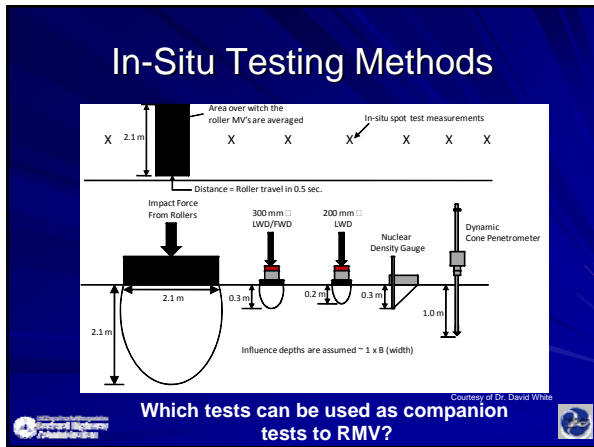


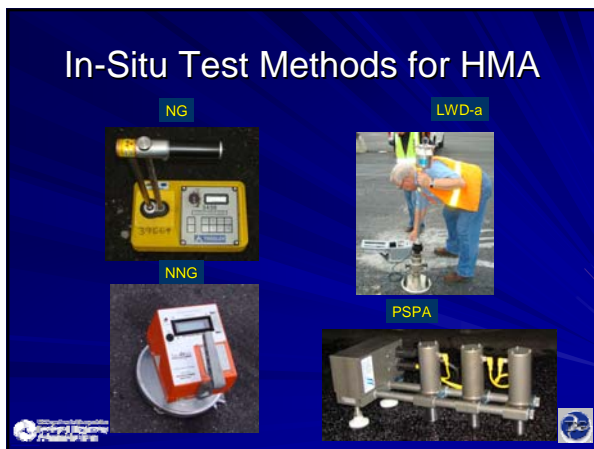


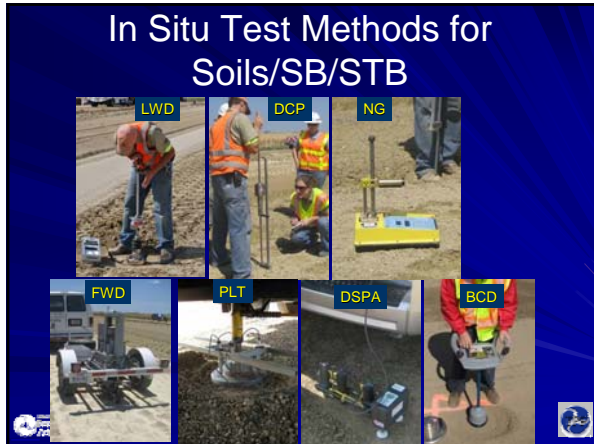
Tandem Drum IC Roller Capabilities

Manufacturer	RMV	GPS (RTK)	Auto Feedback
Bomag	E_{vib} (modulus value)	Y	Y
Caterpillar	NA	Y	N
Sakai	CCV (relative value)	Y	N

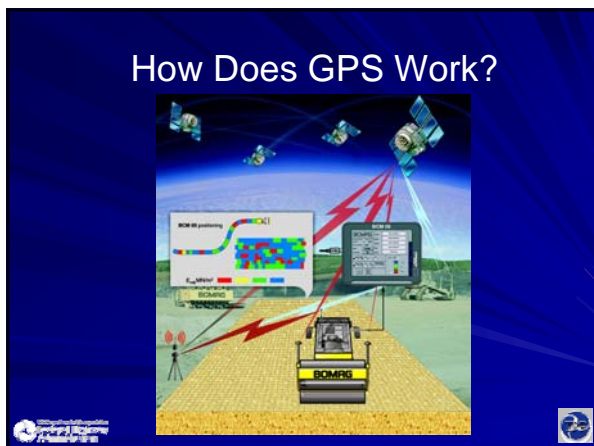












GPS Requirements

- Standardize GPS Equip / Capabilities:
 - RTK-GPS (Real Time Kinematic-GPS) systems on machines.
 - System reports and records values in Northing and Easting and vertical position in meters in UTM coordinates for the project site.
 - If an offset is necessary between GPS antenna and center of drum it has been inputted and validated.
 - **Note: RTK provides "centimeter" accuracy**



Needed Equipment Improvements/Issues

- In Situ Testing Devices
 - Identify and Conduct Research on New Devices
 - Encourage development of Asphalt Test Devices
- GPS
 - Investigate available GPS technologies
 - Simplify GPS setup and use
- Rollers
 - Encourage more suppliers and new technologies
 - Standardize RMV



Intelligent Compaction Equipment **Yesterday**



1924 Buffalo Springfield Steam Roller



