



Intelligent Compaction: Great Success or Colossal Failure?

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Goals

Annual
Manager Evaluation - Completed
Matthew Chandler

Job Title: CIVIL ENGINEERING MANAGER 1
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Manager: Heather Hall
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Employee Data

Empl ID: 00125026
Department: 4930390020
Location: 019

Field Operations OI: (A6392)
Davidson County
Business Unit: 40100

The document status is Completed

Long Format

Goals | Work Outcomes | Competencies | Overall Performance

Section 1 - Strategic & Operational Goals

- Expand | Collapse
- Goal 1: Implement Intelligent Compaction
- Goal 2: Restore and Reconstruct Marshall Mix Paving

Why?

Encourage Adoption of beneficial paving technology

- Promote more uniformly compacted roadways
- Improved efficiency of construction

Improve Quality Control on the roadway

- Give roller operators a better tool
- What gets measured, gets done

TDOT's Intended Use

- Research only?
- Real time inspection?



How?

Call the experts...



How?



IICTG 2017 Conference
Sept. 26-28, 2017
Minneapolis, MN USA

Register at www.IICTG.org

The First International Intelligent Construction Technologies Group (IICTG) Conference

TDOT Special Provision 407 IC

Breakdown and Intermediate Roller Equipped With:

- GPS with Differential Corrections
 - Network RTK
 - Commercially Available
 - TDOT's Network
 - Base Station
- Non-contact Temperature Sensor
- Integrated On-Board Documentation System with Display

TDOT Special Provision 407 IC

GPS Components

On-Board Display

Infrared Temperature

Documentation Accelerometer System

Courtesy: Sakai America

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TDOT Special Provision 407 IC

Records:

- Number of Passes at each location
- Surface Temperature at each pass
- Record and store each day's data

Deliverable:

- End of Project, Export Veta file
- Follow naming convention (e.g. CNZ999-I0040-IC.VETAPROJ)
- Provide data on request

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TDOT Special Provision 407 IC

- System Breaks/Quits Working?
 - Fix it.
 - Production may finish for the day without IC
 - But System will be operational prior to resuming work.
- GNSS Coverage lacking?
 - Use base station instead
 - Contractor responsible to check coverage prior to start work

Engineering Flowchart

DOES IT MOVE?

Should it? No Yes

No Problem No Problem

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- How to Bid?
 - Dedicated Item Number to include all associated costs
 - 407-07.01 Intelligent Compaction Equipment
 - In the future... Incidental to the cost of Asphalt Mix

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Where?

Original Plan

OGFC projects on Night Jobs

- TDOT Spec: 2 passes min
- No density req'd

Problem:

- Low Stake trial
- Not enough work for contractors to buy equipm't
- How do we know if it worked?

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Where?

Phase One Implementation Plan

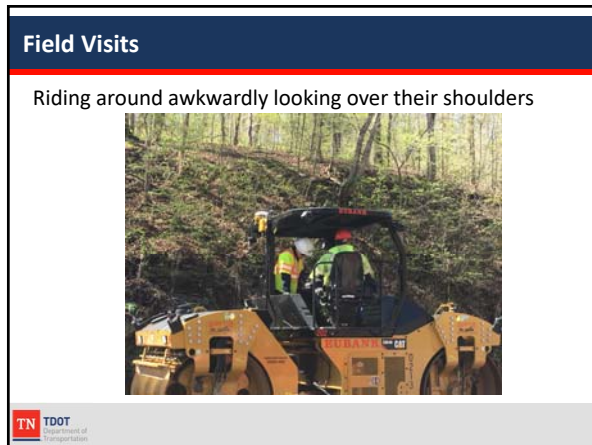
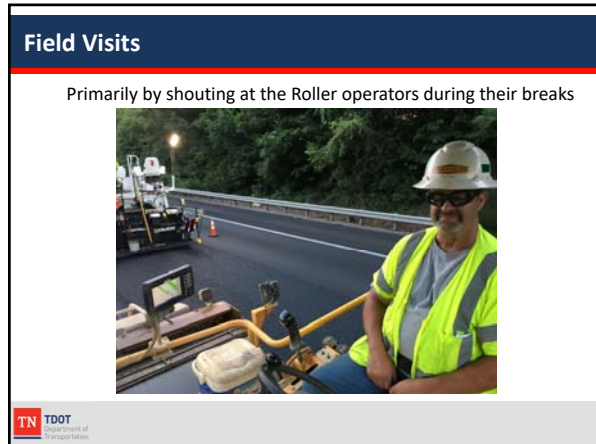
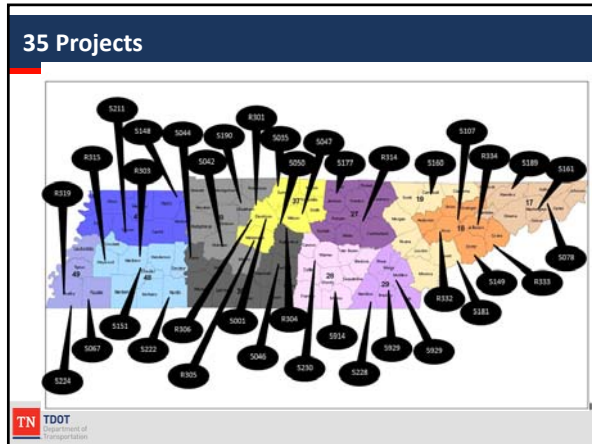
Interstate Projects

- All Jobs 2018 & 2019

Thin Lifts/Dense graded

- 2 per district in 18 & 19
- Potentially additional projects in 2019
- Ideally one job of each TL and dense

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Roller Operator Interview Summary

Roller Operators:

- Most saw a benefit for night paving
- However, most didn't (admit to) actively utilize the system

IC? You mean Internal Combustion? No need!

A photograph of a worker on a roller machine with a speech bubble that says "IC? You mean Internal Combustion? No need!".

Management Survey

- 2/3: better coverage/density
- 1/3: used for real/near time QA
- "Made operator more conscious"
- Some saw benefit in using the thermal sensor
- Less than 20% saw no benefit
- Some had issues with "distracted rolling"

An illustration of a person sitting at a desk with a computer monitor, representing a management survey participant.

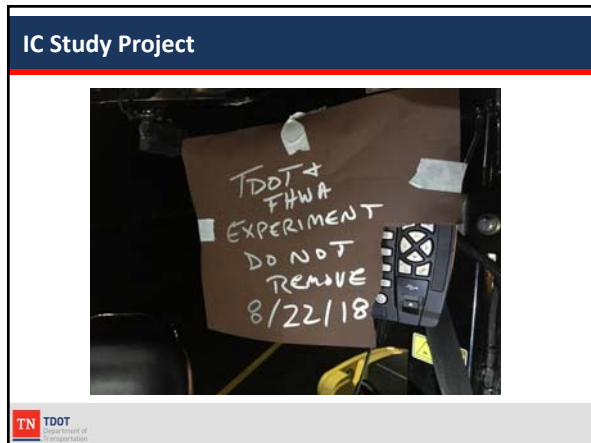
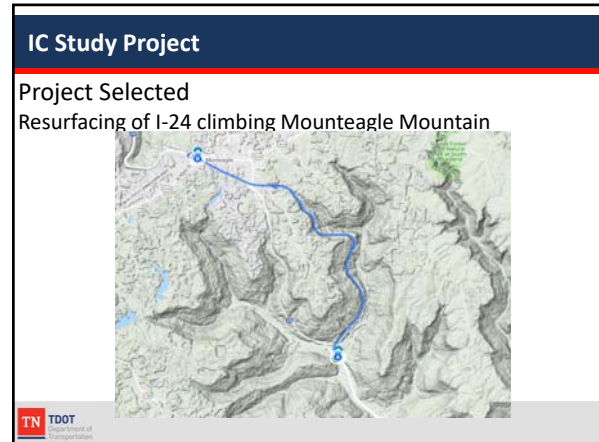
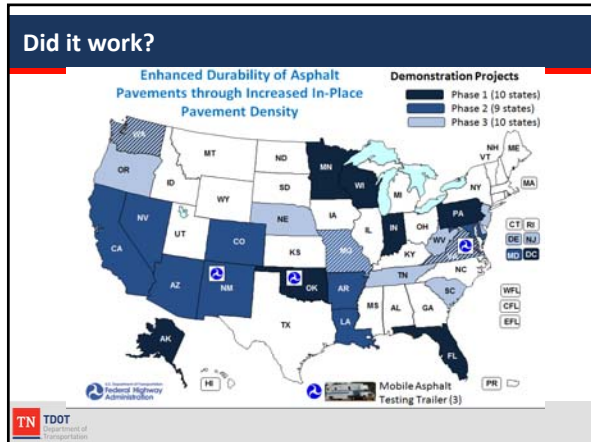
Did it work?

I think you get me 9% more, CHANDLER!

A photograph of a man's face next to a data table. A callout bubble says "I think you get me 9% more, CHANDLER!". The table shows data for "Corrected Density" and "Density".

Test #	Day	Test 1	Test 2	Test 3	Test 4	Avg	Corrected Density	Density
1	1	152.0	152.0	152.0	152.0	152.0	152.0	152.0
2	2	152.0	152.0	152.0	152.0	152.0	152.0	152.0
3	3	152.0	152.0	152.0	152.0	152.0	152.0	152.0
4	4	152.0	152.0	152.0	152.0	152.0	152.0	152.0
5	5	152.0	152.0	152.0	152.0	152.0	152.0	152.0
6	6	152.0	152.0	152.0	152.0	152.0	152.0	152.0
7	7	152.0	152.0	152.0	152.0	152.0	152.0	152.0
8	8	152.0	152.0	152.0	152.0	152.0	152.0	152.0
9	9	152.0	152.0	152.0	152.0	152.0	152.0	152.0
10	10	152.0	152.0	152.0	152.0	152.0	152.0	152.0
11	11	152.0	152.0	152.0	152.0	152.0	152.0	152.0
12	12	152.0	152.0	152.0	152.0	152.0	152.0	152.0
13	13	152.0	152.0	152.0	152.0	152.0	152.0	152.0
14	14	152.0	152.0	152.0	152.0	152.0	152.0	152.0
15	15	152.0	152.0	152.0	152.0	152.0	152.0	152.0
16	16	152.0	152.0	152.0	152.0	152.0	152.0	152.0
17	17	152.0	152.0	152.0	152.0	152.0	152.0	152.0
18	18	152.0	152.0	152.0	152.0	152.0	152.0	152.0
19	19	152.0	152.0	152.0	152.0	152.0	152.0	152.0
20	20	152.0	152.0	152.0	152.0	152.0	152.0	152.0
21	21	152.0	152.0	152.0	152.0	152.0	152.0	152.0
22	22	152.0	152.0	152.0	152.0	152.0	152.0	152.0
23	23	152.0	152.0	152.0	152.0	152.0	152.0	152.0
24	24	152.0	152.0	152.0	152.0	152.0	152.0	152.0
25	25	152.0	152.0	152.0	152.0	152.0	152.0	152.0
26	26	152.0	152.0	152.0	152.0	152.0	152.0	152.0
27	27	152.0	152.0	152.0	152.0	152.0	152.0	152.0
28	28	152.0	152.0	152.0	152.0	152.0	152.0	152.0
29	29	152.0	152.0	152.0	152.0	152.0	152.0	152.0
30	30	152.0	152.0	152.0	152.0	152.0	152.0	152.0
31	31	152.0	152.0	152.0	152.0	152.0	152.0	152.0
32	32	152.0	152.0	152.0	152.0	152.0	152.0	152.0
33	33	152.0	152.0	152.0	152.0	152.0	152.0	152.0
34	34	152.0	152.0	152.0	152.0	152.0	152.0	152.0
35	35	152.0	152.0	152.0	152.0	152.0	152.0	152.0

100.9%



Did it work?

	AVG %Gmm	Standard Deviation
With Intelligent Compaction	93.8	1.53
Without Intelligent Compaction	93.0	1.94

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- ### In Practice
- Technology
- Base Station Control most common
 - Typically placed by a subcontract surveyor
 - Often needed repeaters as well
 - Most expensive option
 - But option with most contractor control.
-
- Logos: TDOT Department of Transportation

- ### In Practice
- Technology
- Those that used TDOT GNSS network reported few problems
 - Survey Office did accidentally cancel one subscription mid project. (oops)
 - A couple projects with spotty cell service
- Satellite Coverage
- Some loss of coverage but mainly in steep valleys and momentarily under bridges.
- Logos: TDOT Department of Transportation

Torture Test

It worked!

The Secret Backway into the Smokies that Only the Locals Know

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Cost?

Costs:

No of Bidders	Average of Bid Price
1	\$ 81,857.16
2	\$ 83,509.83
3	\$ 50,083.33
5	\$ 55,512.89
Average	\$ 74,719.40

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Look at the Pretty Colors

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Data driven?

We've generated a lot of data.
Is anyone using it?

Probably not...yet?

- It looks pretty, but VETA is not so easy to use
- Need really specific formatting specs
- Consider getting some help

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Thanks

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DEPARTMENT OF TRANSPORTATION

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