HeadLight STIC Project Update

Tablet-based Construction Quality Management

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VTRC
Quality Management

Ensures that an organization, product or service is consistent. It has four main components: quality planning, quality control, quality assurance and quality improvement.

Quality management is focused not only on product and service quality, but also on the means to achieve it.
Current Quality Program
Largely Paper Based
A Look at a “Day in the Life”

Field documentation
Calls and voicemails
Media handling
Tracking progress with paper

Driving to and from office

All to recopy into a “system”
Existing Contractor/VDOT Paper Workflow(s)

Inspector (VDOT)

- Approve via Signature
- Submit to Office
- Scan and post to network

Can take over a week

Contractor

- Write test data into notepad
- Fill out forms
- Submit to Inspector
Existing Process Challenges Observed

- Inspector not always on immediate site (have to be in multiple places)
- Significant delay between report completion and review/approval
- Difficult to collaborate
- Still laborious form and report completion process
- Multiple source records
- Lack of consistency between districts and stakeholders
- Lack of transparency between agency and contractor
We Need a New Way of Viewing Projects

PROJECTS

CAPABILITIES

MANAGEMENT

Contractors

Owners

Consultants

Inspectors

Executives

Construction Managers

Management

Inspector

Report

Field Tech

Project
Leverage the HeadLight Project Intelligence platform to facilitate paperless collection, communication, and usage of Quality Management (Density) information for VDOT and Contractors during project construction.

- Discovery and Business Process Analysis
- Configuration of Density Forms within HeadLight
- Provide HeadLight devices/access to both VDOT and Contractors
- Provide Deployment Training
- Ongoing Use and Support
- Research Summary Report + Case Study
Technical Working Group

Identified early on the need to have a partnership between the agency and the contractors to be successful.

Formed a TWG to advise on process and technical details. Members include technical leads from VAA + VDOT.

Some early learnings:
- Existing processes aren’t always consistent in existing workflow
- Helped identify these and come to agreement for technology
- Fantastic support and guidance on use cases
Objective: A more efficient workflow

Contractor

- Record Density Data and Observations (notes, media, equipment, etc.)
- Create TL-59A/B
- Submit to Inspector

Inspector (VDOT)

- Real-time access to field data
- Search and Filter for data anytime
- Approve

Immediate, Same day
Capture Data Once and Use Multiple Times

[Diagram showing data flow from 'HeadLight' toTL60, TL59A, TL59B]

- Analytics
- Search
- Reporting
Field Testing with Superior Paving

Initial Deployment in October
Increased accessibility via multi-form factor input

Data can be directly collected on:
- Mobile
- Tablet
- Desktop

Dynamic form sizing

Offline capabilities
More efficient field data entry

Reduced entry needed
Prepopulated Header Data

Tap vs. Type
Pick Lists

Dynamic Validation
Ensure proper data entered
Reduce errors via dynamic calculations

- Calculate Bonus in real time
- Automatically Round
- Use proper significant digits
- Immediate Feedback
- Identify issues early
Combined with HeadLight Fieldbook
### Automated Reporting

**Roller Pattern/Sawn Plugs & Control Strip Target Density**

<table>
<thead>
<tr>
<th>Route</th>
<th>Control Strip No.</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>8/1/17</td>
</tr>
</tbody>
</table>

**Location**

- **Formation:** South of I-64
- **Lane:** Left
- **Lot No.:** 1
- **Width of Application:** 11 ft
- **Lot Length:** 360 ft
- **Mix Producer:** Superior
- **Plant Location:** Powell Lane

**Nuclear Calibration Check**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (g/cm³)</td>
<td>2.481</td>
<td>2.486</td>
<td>2.484</td>
<td>2.481</td>
<td>2.486</td>
<td>2.489</td>
</tr>
<tr>
<td>Average Density</td>
<td>2.486</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Quality Control Testing Result by Nuclear Gauge**

<table>
<thead>
<tr>
<th>Sub Lot</th>
<th>Distance to B (ft)</th>
<th>Nuclear Density (g/cm³)</th>
<th>Sub Lot Average (g/cm³)</th>
<th>Joint Density (ft³/g)</th>
<th>Joint Density (ft³/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-A</td>
<td>157-0</td>
<td>146.4</td>
<td>146.4</td>
<td>146.4</td>
<td>146.4</td>
</tr>
<tr>
<td>1-B</td>
<td>147.1</td>
<td>147.1</td>
<td>147.1</td>
<td>147.1</td>
<td>147.1</td>
</tr>
<tr>
<td>2-A</td>
<td>132.8</td>
<td>148.1</td>
<td>148.1</td>
<td>148.1</td>
<td>148.1</td>
</tr>
<tr>
<td>2-B</td>
<td>149.3</td>
<td>149.3</td>
<td>149.3</td>
<td>149.3</td>
<td>149.3</td>
</tr>
<tr>
<td>3-A</td>
<td>144.6</td>
<td>144.6</td>
<td>144.6</td>
<td>144.6</td>
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</tr>
</tbody>
</table>

**Note:** Values may vary.
Accountability with audit trail
Early Findings + Results

- Field Techs have loved the efficient data entry
- Increasing utility of inspectors to be in more than one place in one time
- Increasing velocity of information and approvals
- Initial increase in consistency of documentation
- Some existing process variance identified
- Data format leads to additional opportunities

“This makes data capture a breeze, and the ability to see what is happening in real time is going to be huge with our collaboration with VDOT”
- James Terrell Superior Paving
Enable Spatial Data Analysis
An Integrated e-Construction Workflow(s)

Capture QC Data: TL-59A/B, TL-60, etc., notes, media, other etc.

Create TL-series Forms

Submit TL-series Forms

Capture Observations: notes, media, equipment, personnel, quantities, etc.

Create Daily Activity Report

Submit Daily Activities

Doc and Plan Review: plan review, markup, etc.

Review and Approve Forms

Data + PDF

Site Manager Mgmt

Real-time access to field data

Search and Filter for data anytime

Dashboard of activities and progress
NEXT STEPS

● Ongoing pilot into next paving season
  ○ Additional projects and contractors
  ○ Exploring increased utilization on additional forms
  ○ Exploring increased utilization with FieldBook

● Research report

● Exploring coordinating with construction e-Construction efforts
Thank you!

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