Intelligent Compaction: Olmsted County’s Experience and Lessons Learned, including HMA IC

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Olmsted County’s Experience

- Project Details
- IC Specification – QC/QA
- Project Overview / Experience
- Lessons Learned
- What’s Next in Minnesota
Project Details

SAP 55-602-17

- Grading
  - Intelligent Compaction
  - Light Weight Deflectometer
- Aggregate Base
- Storm Sewer
- Concrete Surfacing
- Bituminous Paving
Typical Section

- 0.8 miles
- 12" Select Granular Borrow
- 6" Aggregate Base
- 8" Non-Reinforced Concrete Pavement
- 4 Lanes, 8¢ Shoulder, 12¢ Lane
Quality Control (QC) Requirements

- Roller Demonstration
- Pre-Approval
- Continuous IC-MV record
  - (intelligent compaction measurement values)
    - Base Map
    - Proofing Layers
- Moisture Control
- Weekly QC Report
  - Electronic and printed IC-MV maps
  - Corrective Actions
  - Moisture Content Test Results
# Proofing Layers

## Granular Materials (Meeting Spec. 3149)

<table>
<thead>
<tr>
<th>Embankment Materials Height</th>
<th>Proof Layer Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \leq 2 \text{ feet} )</td>
<td>top of embankment height</td>
</tr>
<tr>
<td>( &gt; 2 \text{ feet} &amp; \leq 4 \text{ feet} )</td>
<td>mid point &amp; top of embankment height</td>
</tr>
<tr>
<td>( &gt; 4 \text{ feet} )</td>
<td>successive 2 foot layers</td>
</tr>
</tbody>
</table>

## Non-Granular Materials

<table>
<thead>
<tr>
<th>Embankment Materials Height</th>
<th>Proof Layer Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \geq 1 \text{ feet} )</td>
<td>@ 1 foot layers</td>
</tr>
</tbody>
</table>
Quality Assurance (QA) Requirements

- Observation of final proof layer IC-MV
- Review and approve Contractor’s Weekly QC Report
- Stiffness Measurement
  - Light Weight Deflectometer (LWD)
  - Pilot Testing – Not Required

Light Weight Deflectometer (Model: Zorn ZFG2000)
Roller Operations

- Caterpillar – Pad Foot
- Roller Operator
  - Hoffman Constr. – TH10
    - Detroit Lakes
- More than 1 Roller
- New Job Roles
Aggregate Base

Changed from Class 5 to Class 7
Limited Project Timeline

- **Schedule**
  - Restricted – School Schedule

- **Activities**
  - Utilities
  - Storm Sewer
  - Subgrade Work
Local Traffic

- Maintain local traffic.
- Able to accommodate during PCC construction.
Rain Events

- 3 to 4 (1 hour) heavy rain events.
- Erosion Control
- Moisture Control
Number of Rollers Needed

- 2 rollers on job at all time.
- Contractor knew what was needed.
Proofing Run (7/30/08)
Overall Summary

- Increased Moisture Control
- Increased Compaction Uniformity
- No reminders of roller(s) needed on job.
- Increased Communications® Increased Team Effort
- Initial Skepticism® Value of Technology
IC Lessons Learned: What Worked

- **Real-Time Results** (IC and LWD)
- **Increased**
  - Compaction Uniformity
  - Inspector Safety
  - Grade Control
  - Speed Control
  - Record Keeping
  - Planning
IC Lessons Learned: What Worked

- Operators learn how to make better decisions
  - Pass/Fail Proof Rolling
  - Moisture Control
  - Soft areas identified and corrected earlier
Lessons Learned: Problems Encountered

- **Data Management**
  - Massive Data Set
  - Utilization
  - Organization
  - Generates large amounts of printout maps

- **Roller Operator Requirements**
  - Computer Literate
  - Educated Operators
    - Bored and Loose Interest

- **Too much technology coming too fast!**
Lessons Learned: Problems Encountered

- **Proof Layer Preparation**
  - Fine Grading (removal of scraper ruts, bumps, etc.)
  - Bumps Create Failing IC-MV

IC-MV Map Courtesy of Mathiowetz Construction
Lessons Learned: Problems Encountered

- IC Roller is “mapper” not a “packer”
- Proofing Preparation
  - Limits ‘Workable’ Areas
  - Cuts off Haul Roads
Intelligent Compaction Projects

- 2004
  - District 3, MnROAD

- 2005
  - District 1, US 53, Duluth
  - District 7, US 14, Janesville
  - District 8, US 12, Atwater

- 2006
  - District 2, TH 64, Bemidji
  - District 3, MnROAD
  - Metro District, I-494 Valley Creek Road, Saint Paul

- 2007
  - District 3, US 10, Staples
  - District 4, US 10, Detroit Lakes
  - District 7, TH 60, Worthington
  - Metro District, TH 36, Saint Paul

- 2008
  - Olmsted County, CSAH 2
  - Kandiyohi County, CSAH 4
  - District 3, MnROAD
  - District 7, TH 60, Worthington
Potential IC Projects

n 2009
  u Select Stimulus Package Projects
    - TH 169 and I-494
    - TH 610
    - CSAH 22, Olmsted County

n 2010
  u CSAH 10, Olmsted County
  u Paynesville Bypass
  u Central Corridor
What’s Next in Minnesota?

- Specification Refinement
  - Field Experience
  - Research Findings
  - User Group Meetings
  - Quality Control Focus
  - Create IC Specification Task Force
THANK YOU!

Pure Excitement over Intelligent Compaction and Light Weight Deflectometers