Quality!
Important and Measurable

Wisconsin Concrete Paving Association

Moving forward with concrete results
Quality is Important

The service life of a highway is dependent on:

• Quality of the materials
• Quality of the construction
Measuring Quality

• Controlling the quality of materials and methods of construction
  • provides the maximum benefit to the public

• Assuring the quality of materials is a part of the Federal Law
Why Quality Matters & DOT Emphasis on it

1. It impacts the life and maintenance cost of everything we build!
2. Negative trends in non-conforming & non-performance data over the last several years.
3. FHWA has identified this as a top risk for WisDOT and is looking for improvement
   • Good news – we have a start on this!
   • But there is always room for improvement!
Benefits of Improved Quality for Transportation Facilities

- Improved Quality
- Improved Working Atmosphere
- Safe & Long-Lasting Concrete Pavements
- Fewer Quality Disputes
- Reduced Costs for Agency & Competitive Advantage for Contractor
- Improved Public Image

Source: Field Reference Manual for Quality Concrete Pavements
Control of Materials: Standard Spec 106

- FHWA Regulations (23 CFR 637)
- All materials must be approved before incorporated into the work
- Approval based primarily on test results showing the material conforms to specifications
- Testing:
  - Manufacturer performs and certified
  - Performed by the contractor under the quality management program (QMP)
  - Performed by the department
Quality Management Program (QMP)

• Under QMP provisions, department will base approval of materials and acceptance of the work on a combination of the following
  ▪ Contractor Quality Control (QC) testing
  ▪ Department Quality Verification (QV) testing
  ▪ Inspection of the Materials production, storage, handling, and construction processes

• Dispute resolution procedures

• Foundation of the QMP concept is to develop partnership so that the exchange of information is commonplace
QMP Core Elements

- Contractor QC
- Department QV
- Dispute Resolution
- Qualified Laboratories
- Independent Assurance
- Personnel Certification
33 States Using Contractor Test Results in Acceptance Decision

Key:
- Yellow: Use Contractor test results
- Light Green: Use State Tests for Acceptance
• Quality assurance includes:
  • Specifications
  • CMM guidance
  • QC, QV, IA testing
  • Project oversight and inspection
• Communication
  • Open
  • Two-way
  • Transparent
  • Timely
• Documentation
  • Clear
  • Precise
  • Accurate
  • Complete

Quality Assurance Process

The impact of communication between the contractor and the agency on quality cannot be over emphasized

- FHWA Field Reference Manual for Quality Concrete Pavements
WisDOT QMP Concrete Pavements and Structures – Random Numbers

Before Starting a New Lot

• When a mix design and/or placement method changes
• Make sure the final Sublot (Random Sample location) has been satisfied before the end of the current Lot
• If the Lot ended prematurely before the next random number sample location is met, then a NEW Random Sample must be obtained by:
  • Creating a new random location for the smaller subplot
  • Ask project leader to select an engineer directed location
  • DOCUMENT

• Must have all required number of tests for each Lot
• * Concrete Tech Team is currently developing specification language for partial sublots and small quantities
WisDOT DRAFT Partial Sublots

Proposed Specification Language

Lots by Lane-Feet

• Propose adding the following:
  • The contractor may include a sublot with a length less than or equal to 40 percent of the standard length in the previous sublot

Lots by Cubic Yard

• Propose adding the following:
  • The contractor may include a sublot with a volume less than or equal to 40 percent of the volume in the previous sublot
Non-Conformance & Non-Performance of QMP

Concrete Occurrences
• Total of 68 NP and 580 NC
• Regarding Concrete Pavement
  • 50/368 for NP
  • 25/580 for NC
• $4.3M squares in 2019
• Remaining can be attributed to concrete masonry
Value of each test

• HMA – Each QC Verifies $45,000+ of material

• Concrete Paving – Each QC Test Verifies $75,000+ of material

• Concrete Structures - Each QC Test Verifies $20,000+ of material

• Base Aggregate – Each QC Test Verifies $45,000+ of material

EACH TEST HAS SIGNIFICANT VALUE!!
Value of each test

- Is this the air meter you want testing your concrete?
- This test could be worth $20,000+
Quality Control Matters

Type B Meter

Slump Test
Falsified air test results catch up with quality control manager (2018)

- A former concrete quality control manager pleaded guilty to conspiring to commit wire fraud in connection with the U.S. Department of Transportation-funded Dulles Metrorail Project Phase II, an 11.4-mile stretch of the Metropolitan Washington Airports Authority’s (MWAA) 26-mile Silver Line extension.
  - quality control staff he supervised falsified test records knowing that prime contactor would reject concrete measuring air content outside a required 4.5-7.5 percent range.
  - test results showing concrete mixes falling below 4 percent air
  - faces a maximum of five years in prison and $250,000 fine

On Thursday, the company they selected, its owner and five employees were arraigned on charges of doing the very same thing on those two projects and hundreds of others.

In fact, none of the nearly 3,000 test reports that investigators seized from the replacement company, American Standard Testing and Consulting Laboratories, contained legitimate test results, according to one person briefed on the inquiry that led to the charges.

“The volume of fabricated tests is egregious,” the Manhattan district attorney, Cyrus R. Vance Jr., said in announcing the charges. “It was systemic; it was pervasive.”

In addition to Yankee Stadium and the Second Avenue subway, the projects for which test results were allegedly falsified represented a remarkable array of familiar places, both old and new: work on the Lincoln Tunnel, the Jacob K. Javits Convention Center, the Port Authority Bus Terminal, the Metropolitan Transportation Authority’s huge new Fulton Transit Center and East Side Access project, the new air-traffic control tower at La Guardia Airport, a building at Memorial Sloan-Kettering Cancer Center, Weill Medical College, Columbia University and the Intrepid Sea, Air and Space Museum.

The decade-long reputed scheme also included falsifying documents to get city licenses and manipulating government programs to obtain jobs for which they were not entitled, according to the charges.
Boston’s Big Dig: Materials Failure Led to Tunnel Collapse

Collapse of Big Dig Ceiling in Boston Is Tied to Glue

By MATTHEW L. WALD  JULY 11, 2007

Correction Appended


• The supplier in Boston, Powers Fasteners, noted that the fast-set epoxy was not for long-term use, but that information was “in the fine print,” said Mr. Magladry, and no one recognized that the material would weaken. The failure dumped 26 tons of concrete and hardware on the 15-year-old Buick sedan in which Milena Del Valle was riding, and on the surrounding roadway. Her husband, the driver, escaped with minor injuries. The board tested both formulations of epoxy available from Powers and found that the “standard set” type worked fine, but within 80 days, all the samples using the “fast set” formulation had failed.

• Documents released by the board Tuesday show that during the project’s construction, as bolts continued to slip out of the ceiling, various companies involved in the work raised new theories. These included suggestions that nuts had been attached to the bolts with too much force or that ceiling panels were pulling unevenly on the bolts.

• Hundreds of cracked construction nuts have been found within Boston’s Big Dig tunnel system. And, this isn’t the first problem for the highway project that was completed just a few years ago.

• Highway Administrator Tom Tinlin disclosed Wednesday more than 100,000 nuts have been inspected. Nearly 900 damaged nuts were found in the Ted Williams Tunnel and 49 nuts need to be replaced in the Turnpike Connector Tunnel and the Interstate 93 tunnel.
Bad Day?
Aggregate Stockpile & Source Management

Cause:
- Poor aggregate stockpile management
- Poor source management

Solution(s):
- Remove and replace concrete pavement
- Credit taken for the poor quality
- Epoxy repair required
Aggregate Stockpile & Source Management

- What if the loader had dirt on its tires?
Chert & lightweight pieces can also cause problems...

• Some crushing operations can help
• Some layers are just too poor to make durable concrete
Popout issues

Problem – Concrete Surface Voids

Cause:
• Poor aggregate
• Poor aggregate stockpile management

Solution:
• After 5-year warranty period, pavement received an overlay
It’s not just construction materials...

How is Buzz going to get to his rocket???
The moral of the story

- Everyone has a role in producing a quality final product
  - Isn’t that what we all want?
- Communication early and often solves a lot of issues
- It needs to be part of the culture of the firm and employees need to be empowered to address it

IF YOU SEE SOMETHING, SAY SOMETHING.
What Questions Do You Have?