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PORTLAND CEMENT CONCRETE
PAVEMENT TECHNOLOGY

IOWA STATE UNIVERSITY

Mobile Concrete Research Lab

Bringing advanced laboratory capabilities to the field

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Iowa State University:

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Dept. of Civil, Construction &

Environmental Engineering

Vice Provost for Research &

Advanced Studies

LAB PERSONNEL

Tom Cackler, PCC Center Director

Jim Grove, PCC Research Engineer

Bob Steffes, PCC Research Engineer

Heath Gieselman, PCC Technician

Jeremy McIntyre, PCC Technician

Bryan Zimmerman, PCC Technician

CONTACT

Jim Grove: 515-294-5988 (office), 515-

450-3399 (cell), jimgrove@iastate.edu

Bob Steffes: 515-294-7323 (office),

515-450-7362 (cell),

steffesr@iastate.edu

PCC CENTER IOWA STATE UNIVERSITY

2901 South Loop Drive, Suite 3100

Ames, IA 50010-8634

515-294-8103

www.pcccenter.iastate.edu

One-of-a-Kind Testing Facility on Wheels

A new, state-of-the-art mobile lab has recently been launched from the PCC Center at Iowa State University to bring high-tech concrete materials and concrete pavement testing capabilities to the field. The Mobile Concrete Research Lab has been custom built and fully outfitted with equipment capable of performing a comprehensive suite of tests.

Lab Fills Gap in Research Capabilities

Tom Cackler, PCC Center director, spoke at the mobile lab's grand opening about why the lab is needed: "For years I've heard a lot about how laboratory results don't match those in the field. This lab brings sophisticated testing equipment right to the construction site."

The mobile lab's advanced research capabilities are expected to lead to many benefits for the Federal Highway Administration (FHWA), state DOTs, and ultimately the traveling public. The results of the lab's research will help transportation agencies better understand concrete material properties and interactions and improve quality-control testing during construction. The ultimate goal is to meet the public's demand for road construction crews to "get in, get out, and stay out."

The lab will also lead to critical advancements and improved practices for the concrete paving industry. "This is a door-opener to the future," explained Jerry Voigt, senior vice president and COO of the American Concrete Pavement Association (ACPA).

Lab's First Project

The lab's first job is testing shadow construction projects for the FHWA pooled fund study Material and Construction Optimization for the Prevention of Premature Pavement Distress in Portland Cement Concrete Pavements (MCO project). To date, 15 states have joined Iowa in this effort.

A major goal of the research is to examine and refine a suite of tests used to more accurately evaluate concrete pavement properties. In conjunction with the MCO project, a manual of practical tests to evaluate concrete properties is being developed; the reference manual will provide an integrated approach to concrete pavement materials and construction.

Made Possible by Partnerships

Funding for the quarter-million-dollar mobile lab was made possible through a unique partnership between the ACPA, regional paving associations, and Iowa State University.



Lab Trailer Details

- 44'-length, all-aluminum, insulated trailer
- 36'x8'6" lab area (including 6' rear work room)
- 7'6" height
- Gooseneck: 20-kw diesel generator on air suspension (sound proof); 50-gal fuel tank; 50-gal water tank
- 20,000-lb total trailer weight (including equipment)
- Two 10,000-lb axels (6,000 lb on gooseneck)
- Rear 8'x8' pull-out canopy
- Outside (front) 110-V electric connection
- Outside (rear) water & 110-V electric connection
- 110-V, 220-V, 12-V DC electric systems
- 3 air conditioners
- 2 heaters
- 4 hydraulic leveling jacks
- Hot & cold water
- Stainless steel counter top
- Rubberized floor coating
- Lista tool cabinet
- Multiple tie-down brackets
- Conference/work area with 2'x4' portable table (seats six)
- 8' desk work area
- 3'x6' dry erase board/magnetic board
- Refrigerator & microwave oven
- Cell phone antenna
- Projector screen & space for TV

Tow Vehicle Details

- International 4300 low-profile truck (year 2005)
- Automatic transmission
- DT 466-in³, 245-hp diesel engine
- Rear air-bag suspension system
- Extended cab (5 passengers total)
- 10' steel flatbed with gooseneck ball hitch (used as 6'x8' field work platform)
- 4 side toolboxes
- 3,000-watt portable generator
- 60-gal water tank with electric pump (nurse tank for mobile lab water tank; field & test equipment wash water)
- 60-gal fuel tank with electric pump (nurse tank for mobile lab generator fuel tank)
- Safety beacon



Air void analyzer

Tests/Test Equipment

- Air void analyzer (AVA) with isolation base and sample collector to measure concrete air void system
- Cordless hammer-drill
- Full-time weather station
- 2 iQdram calorimeters to determine heat signature of mortar & concrete
- 60"x24"x21" curing tank
- Vicat consistency apparatus
- Core drill
- Sieve shakers to determine coarse & fine aggregate gradations (stored in custom-built cabinets)
- 50-kg scale & 0.1-g balance
- 250,000-lb-capacity concrete compression tester to measure compressive & flexural strength development
- Third-point beam tester
- Hobart paste/mortar mixer
- Mortar penetrometer to test mortar set time (ASTM C403)
- Flow table (ASTM C1437 modified)
- Kestrel handheld weather station
- Infrared noncontact temperature measuring device
- Handheld global positioning system (GPS)
- Concrete maturity loggers (Command Center & IntelliRock Systems)
- Slump cone
- 2 pressure meters for air content & unit weight
- Coffee cup test (heat generation)
- Foam index test (air entrainment)
- Modulus of elasticity test
- Splitting tensile test
- 14 beam molds (6"x6"x20") for flexural strength test
- Cylinder molds for compressive strength test
- Microwave oven to determine water-to-cement ratios
- Cell phones & wireless internet access
- 2 laptop computers
- 18" Lapro concrete saw
- Large screen projector
- Digital camera
- Digital thermometer
- Air compressor