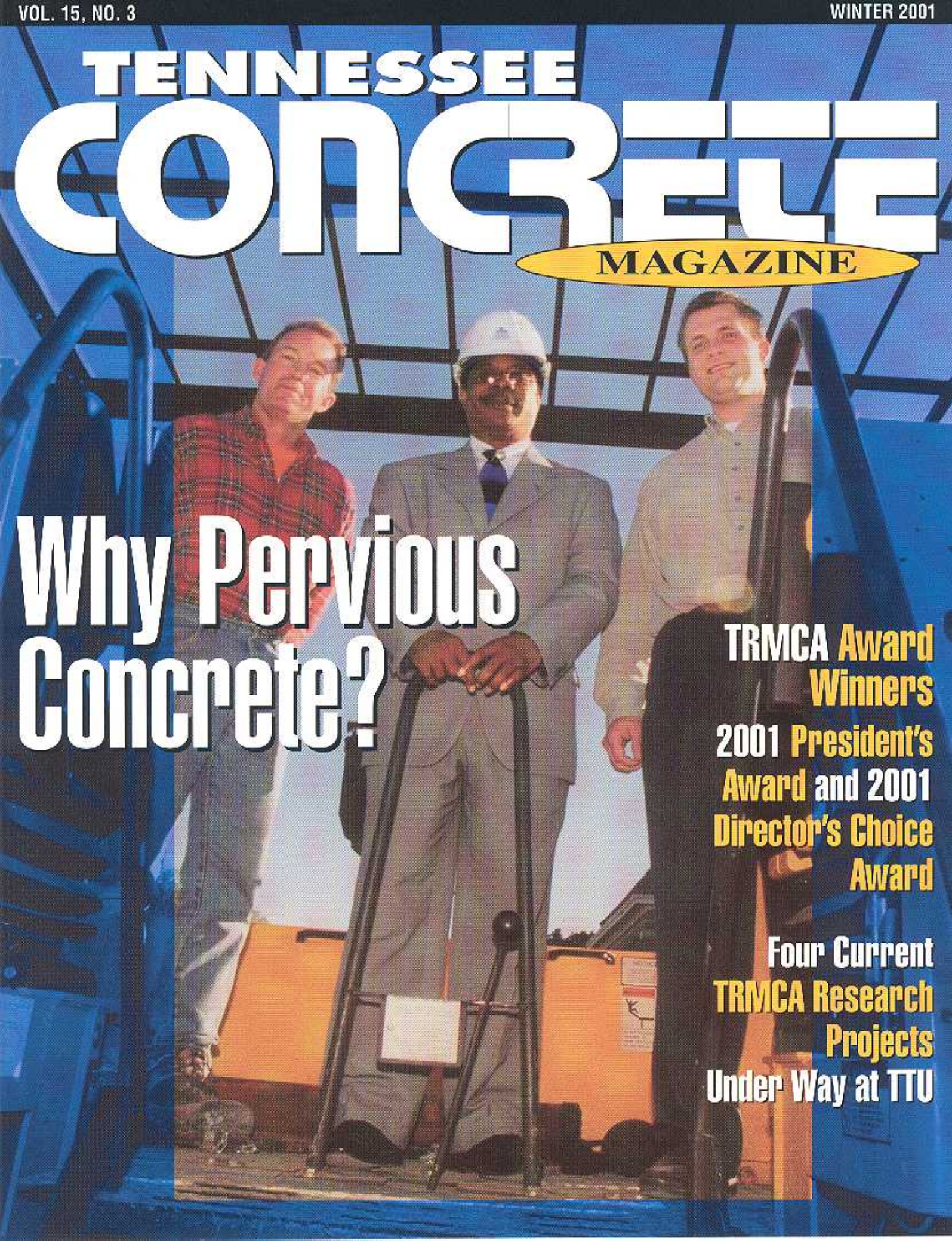
VOL. 15, NO. 3 WINTER 2001

TENNESSEE CONCRETE MAGAZINE



Why Pervious Concrete?

TRMCA Award Winners

2001 President's Award and 2001 Director's Choice Award

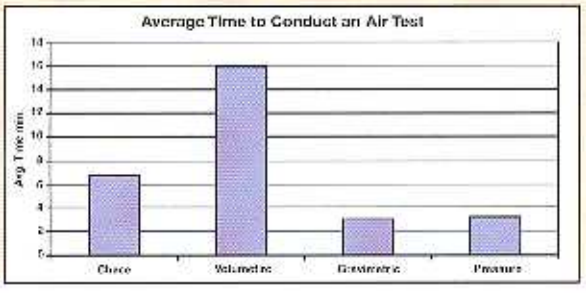
Four Current TRMCA Research Projects Under Way at TTU

Four Current TRMCA Research

The Tennessee Ready Mixed Concrete Association, along with government and industry partners, is sponsoring several concrete-related research projects at Tennessee Technological University. Although the projects address a wide variety of materials, the focus of TRMCA research efforts is always the same: Improvement of concrete products and testing procedures. The following are short summaries of the projects. Additional information can be obtained by contacting TRMCA at (615) 360-7393 or visiting www.trmca.org.

Comparison of AASHTO Plastic PCC Air Determination Techniques (with the Tennessee Department of Transportation) 1/01 –1/02

- Primary graduate research assistant – Keith Honeycutt
- The research team has conducted duplicate air tests on thirty-two three-cubic-yard field batches of TDOT Class A PCC using all four currently available AASHTO plastic PCC air determination techniques (Pressure, Volumetric, Gravimetric, and Chace Indicator).
- Methods are being compared statistically, logistically, and economically.
- The objective of this study is to recommend the most suitable currently available AASHTO method for determining plastic PCC air content.
- Information on the relationship between compressive strengths determined with 4 x 8 cylinders and compressive strengths determined using standard 6 x 12 cylinders was also obtained.



Long Term Excavatability of Flowable Fill Containing Coal Combustion Byproducts (with the Combustion Byproducts Recycling Consortium, TRMCA and the Kentucky Ready Mixed Concrete Association) 2/01 – 8/03

- Primary graduate research assistant – Jamey Dotson
- The goal of project is to increase end user confidence in the performance (excavatability in particular) of excavatable flowable fill (EFF).
- Twenty-three different EFF mixtures were placed in trenches (3 x 3 x 16 feet) simulating utility cuts. After approximately two years, an attempt will be made to determine the excavatability of the each EFF mixture with a backhoe. The qualitative excavatability will be correlated with compressive strength development of the EFF over the two-year period.
- All EFF mixtures were tested for flow, unit weight, gravimetric air content, and suitability for load application as per ASTM procedures.
- The product of the study will be a CD-ROM containing project results and model specifications for EFF mixtures.
- "This material was prepared with the support of the US Department of Energy, Federal Energy Technology Center through it's Cooperative Agreement No. DE-FC26-998FT40028 with West Virginia University Research Corporation. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of WVU or DOE."

Projects Under Way at TTU

Development of a New Test Method for Determining Pervious PCC Air Void Content (with InstroTek Inc.) 12/00 – 1/02

Portland Cement Pervious Pavements (PCPP) typically contains 15-20% voids. The voids are due to the absence of fine aggregate in the concrete mixture used to construct the pavement. The voids in PCPP allow infiltration of rainwater into the pavement structure. The rainwater may be stored in the pavement structure, routed to drainage or storage facilities, or allowed to percolate into the underlying soil.

Void content is more critical to PCPP performance than compressive strength. Specifying compressive strength of PCPP as the only acceptance criteria may be detrimental to PCPP performance. Voids may be reduced to increase compressive strength, defeating the purpose of PCPP. It may be prudent for specifying agencies to specify either air voids only or a combination of air voids and compressive strength. In either case, an accurate, repeatable test method to determine PCPP air voids will be needed.

Air voids will be calculated using the following equation:

Percent Air Voids = 100(1 – Gmb/Gmm)

Where: Gmb = bulk specific gravity of the pervious PCC
Gmm = theoretical maximum specific gravity of the pervious PCC

The Gmb and Gmm of the pervious PCC cores will be measured using the InstroTek CoreLok system.

Project summary:

- Primary graduate assistants – Mark Cates, Jamey Dotson, Keith Honeycutt
- Approximately 30 to 40 pervious PCC core samples
- After air void determination is completed, all core samples will be saw cut smooth, capped and tested for compressive strength

Preliminary Study of the Effect of Pervious PCC on Percolation Water pH (8 - 9/01)

Primary graduate research assistant – Jamey Dotson

The preliminary investigation was conducted to determine:

- The amount and rate of pH increase of water exposed to four typical pervious PCC cores
- The amount and rate of pH increase of water exposed to a typical #57 limestone and a typical limestone base material (crusher run) for comparison purposes

Conclusion: Water detained in pervious PCC took much longer (4x to 15x) to reach a potentially harmful pH than water detained in #57 limestone or limestone base rock .

This research summary was compiled by L. K. Crouch, Professor of Civil Engineering, who served as principal investigator on the projects. The author wishes to acknowledge the following contributors to the research:

Richard Maxwell, TTU Civil Engineering Technician

Tim Dunn, TTU CEP Laboratory Assistant

Heather J. Sauter, Assistant Professor MTSU CIM Program

Audrey Copeland, Ph.D. Candidate in Civil Engineering, Vanderbilt University

Ted Dyer, MS Candidate in Civil Engineering, University of Tennessee - Knoxville

Jesse Davis, Missy Jaynes, and Sayward Touton TTU Undergraduate Research Assistants

Dr. Daniel Badoe, Dr. Sharon Huo, Dr. Vincent Neary, Dr. Lenly Weathers, Assistant Professors of Civil Engineering, TTU

Sandy Garrison, Helen Knott, Etter Staggs, Tony Greenway, and Dr. Sastry Munukutla of the TTU Center for Electric Power

The many concrete industry personnel who donated materials and provided technical expertise (it would take several pages to list all these names, the concrete industry has been very good to TTU Civil Engineering)

The Tennessee Department of Transportation (especially Division of Materials and Tests personnel)

Ali Regimand, President of InstroTek Inc.