

ICAR

CENTER FOR AGGREGATES RESEARCH

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ICAR'S TECHNICAL ADVISORY COMMITTEE (TAC) IDENTIFIES TOP TEN RESEARCH PRIORITIES

Participants: TAC Members David Jabn, Martin Marietta Aggregates; Chris Rogers, Ontario Ministry of Transportation; & Chuck Marek, Vulcan Materials Company

ICAR's TAC worked industriously for two days in August 2002 to define & articulate the most pressing research needs. They ranked 33 research topics and identified the following as the top ten areas of investigation for possible new ICAR projects.

The TAC includes aggregates experts from industry, government, & academia.

CORRELATING MINUS No. 200 FINE AGGREGATE CHARACTERISTICS TO PERFORMANCE IN CONCRETE

Efforts are underway to modify concrete aggregate specifications in order to permit higher than normal amounts of minus 75 μm , or minus 200, sieve material. The nature of these very fine materials influences concrete rheology, or flow characteristics, as well as ultimate strength and durability. A new test is needed to characterize the performance of material finer than 75 μm better.

ACCEPTABILITY CRITERIA FOR HIGH-FINES CONTENT UNBOUND AGGREGATE PAVEMENT LAYERS

Using more fines in unbound aggregate base (UAB) layers potentially improves layer performance and reduces increasing stockpiles of fines. Research is needed to determine how to use more fines in UAB most effectively: At what increased fine content and with what type fines does it become necessary to mitigate any potential negative effects of these fines using low levels of stabilization?

SELF-CONSOLIDATING CONCRETE (SCC)

Self-consolidating concrete is an emerging technology in the US, though widely used around the world. Its excellent flow characteristics with minimal segregation permit placement without compaction or vibration. It also uses higher amounts of fines, which can have an associated cost savings. The influence of aggregate characteristics, e.g., shape, texture and grading, as well as sensitivities to variations needs to be understood better.

APPLICATION AND SIGNIFICANCE OF THE MICRO DEVAL TEST

There is widespread interest in the Micro Deval apparatus as a potential replacement for soundness and/or abrasion tests. It is perceived to correlate to performance better. There needs to be more research to relate this test to performance directly and to define limits before inappropriate standards are set.

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NEW REPORTS AVAILABLE FROM ICAR RESEARCHERS



ICAR 503 Series: Structural Considerations of Unbound Aggregate Layers for Mechanistic Design

503-1: Evaluation of Potential Aggregate Grading Technologies

503-2: An Evaluation of Automated Devices to Replace and Augment Manual Sieve Analyses in Determining Aggregate Gradation

503-3F: Automation of Aggregate Characterization Using Laser Profiling and Digital Image Analysis

All three reports written by
Carl T. Haas, Alan F. Rauch,
Hyoungkwan Kim, & Craig Browne

ICAR 104-1: Evaluation of Water- Reducing Admixtures in Portland Cement Concrete with High Amounts of Microfine Aggregate by

Scott R. Witthoft, David W.
Fowler, & Kevin Folliard

ICAR 101-2F: Framework for Development of a Classification Procedure for Use of Aggregate Fines in Concrete by

Dan G. Zollinger &
Shondeep Sarkar

THE AGGREGATES INDUSTRY'S TOP TEN RESEARCH NEEDS

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ROLE OF AGGREGATE POINT AND MASS STRENGTH, PARTICLE SHAPE, TEXTURE AND GRADATION ON RESISTANCE TO LOAD IN HMA

Stone Mastic Asphalt is being considered for widespread use as heavy duty HMA because of its demonstrated load carrying capability. SMA is expensive in part because of very restrictive aggregate specification limits. Research is needed on aggregate properties relating to SMA performance, especially the effect of particle shape. Appropriate specification limits need to be established.

EVALUATE MINERAL FILLER FOR HMA/SMA FOR SPECIFICATION DEVELOPMENT

Mineral filler plays a key role in SMA mixes. Aggregate fine materials need to be characterized and evaluated for performance for use as mineral filler.

SIGNIFICANCE OF FRACTURED FACE DEFINITION AND CRUSHED COUNT

Superpave specifies a number of "fractured faces" for coarse aggregate. Many gravel deposits cannot meet these limits because they may either not fit the definition of "fractured" or may not be of sufficient size to permit processing to be crushed so as to achieve the required number of fractured surfaces. Research is needed to determine the influence on asphalt concrete mix performance of crushed faces and to establish accurate limits.

PERFORMANCE DATA VS. AGGREGATE CHARACTERISTICS

There are several models being developed and used in pavement design. These models will use "default" values for aggregate properties if specific data is unavailable. There is a need for a catalogue of physical and mineralogical data of typical aggregate products relating to performance. This will allow for accurate input into the predictive models used in mechanistic designs.

D-CRACKING

Regionally, there is a major problem for aggregates with certain physical properties that when subjected to freeze-thaw conditions lead to a phenomenon known as "D-cracking" in concrete pavements. A rapid test is needed to identify D-cracking susceptible aggregates. Mitigation techniques need to be developed to permit use of locally available aggregate sources.

PERVIOUS CONCRETE

Gap graded concrete mixes that permit percolation of water into substrata retention layers are seen as an environmental aid to reduce runoff from impervious surfaces. Current usage is constrained to light load applications such as parking lots. For wider application and marketing, research is needed into the aggregates' role in requirements for concrete mix strength and durability.

**ICAR's
TECHNICAL
ADVISORY
COMMITTEE
(TAC) MEETING
AUGUST 2002**



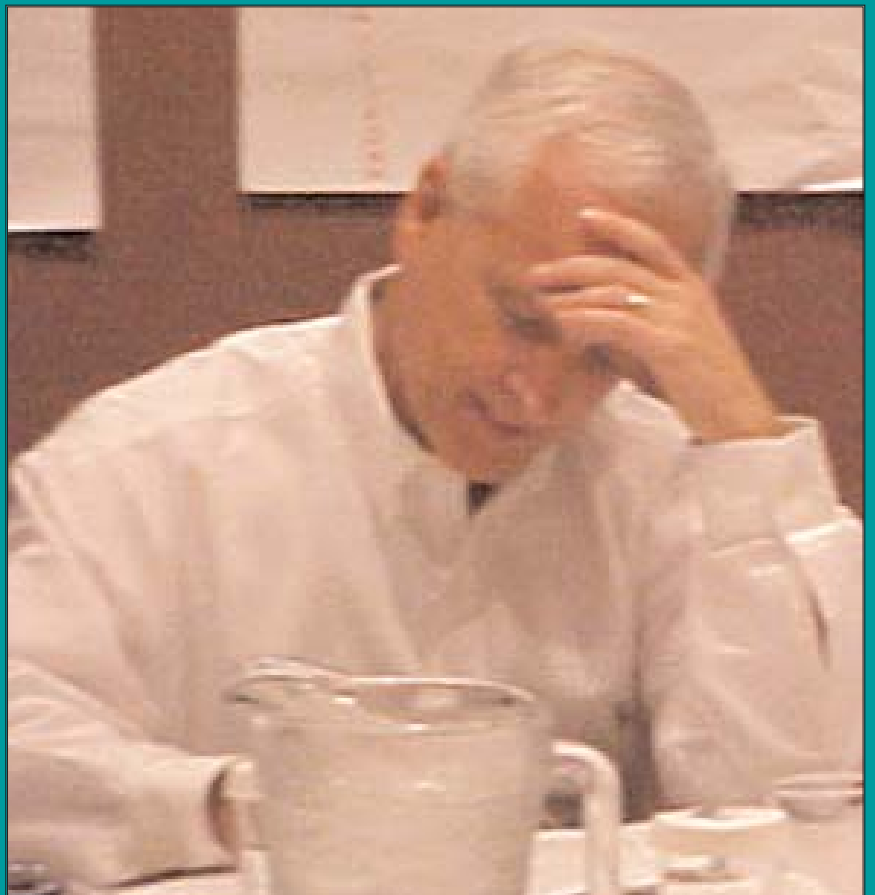
*TAC Chairman Robin Graves, I.,
Vulcan Materials Company
& ICAR's Managing Associate Director
John J. Allen led the two-day meeting.*



*l. to r.: Bill Sheftick, Illinois Department of Transportation; Martin Burbans,
Hanson Aggregates; Mike Taylor, Graniterock; Scott Shuler, Lafarge North
America; & Vernon Marks, Iowa Department of Transportation, ret.*



Charles Pryor, NSSGA



*Professor Dallas Little, ICAR's Associate Director, tallies the votes of the
TAC members, who ranked 33 topics from several different research areas,
including:
portland cement concrete, asphalt concrete, and unbound aggregate bases.*

ICAR'S 11TH ANNUAL SYMPOSIUM

WHO SHOULD ATTEND?

Industry producers, researchers,
sales personnel, & engineers

Construction contractors

DOT employees involved in
research, design, & construction

University researchers &
professors

**AGGREGATES:
ASPHALT CONCRETE,
PORTLAND CEMENT CONCRETE,
BASES & FINES**

HOSTED BY

International Center for
Aggregates Research

The University of Texas/ Texas A& M

Aggregates Foundation for
Technology, Research, & Education

National Stone, Sand, &
Gravel Association

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TENTATIVE PROGRAM

-Meetings of ICAR & AFTRE
Boards

-Sessions with emerging topics
such as performance-based
specifications & warranties

-Special presentations concern-
ing mechanistic design proce-
dures for pavements

- icar model for
unbound pavement
- field data comparison

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www.icar.utexas.edu

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ADDITIONAL PORTLAND CEMENT CONCRETE TOPICS

-Self-consolidating concrete

-Pervious concrete

-Optimizing aggregate content
for portland cement concrete

-Concrete aggregates gradation
specifications

ADDITIONAL ASPHALT CONCRETE TOPICS

-Surface energy predictions &
performance

-Influence of aggregate particle
shape & texture

- High-fines content HMA



l. to r.: Charles F. Potts, APAC, Inc., ICAR Board Member; Charles A. Machemehl, Jr., Georgia Crushed Stone Association, former ICAR Board Co-Chair and Distinguished Researcher, and his brother Randy B. Machemehl, Center for Transportation Research, ICAR Board Member at ICAR's 10th Annual Symposium in Baltimore.

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