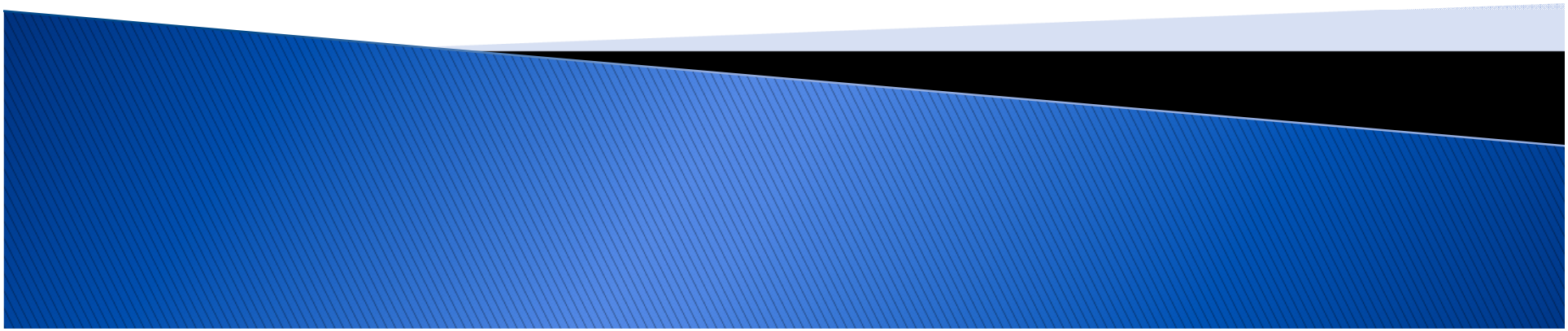
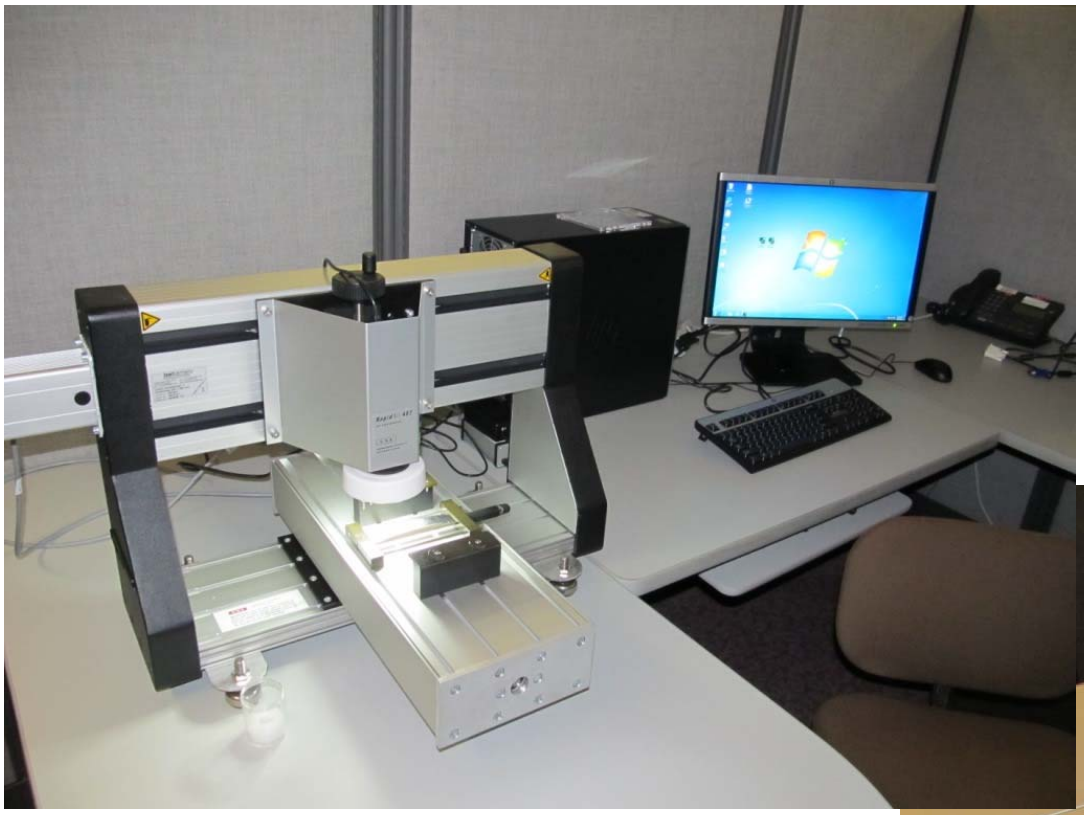
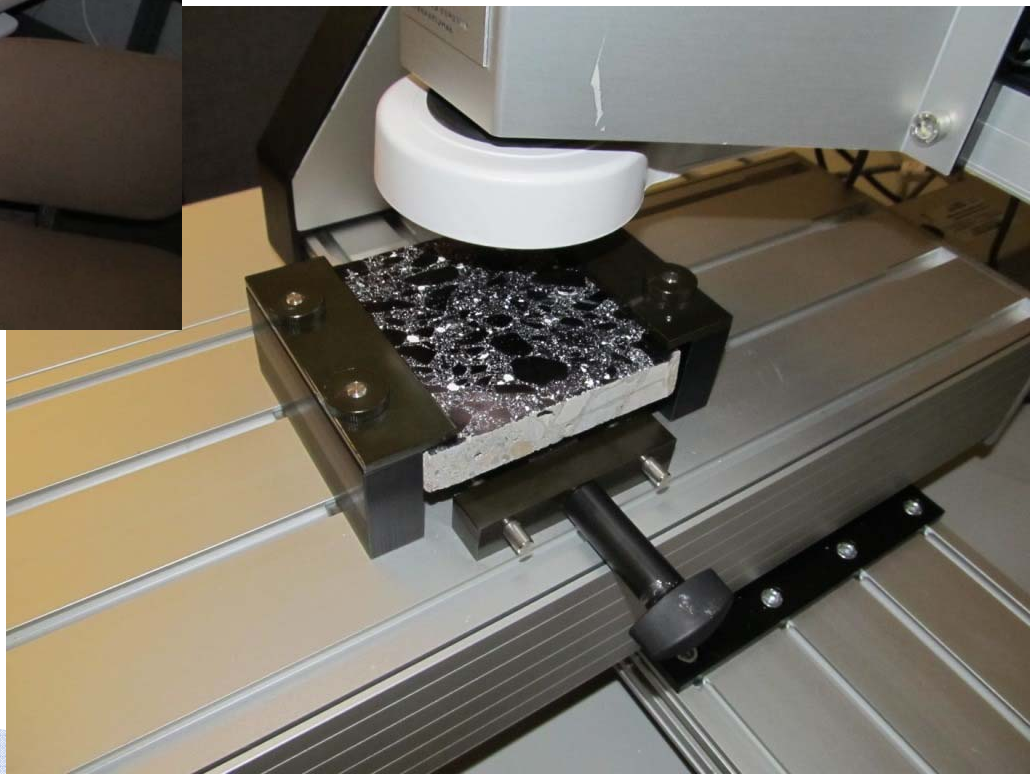
Evaluation of RapidAir457 Air Void Analyzer

Peggi Knight, Iowa DOT



Implementation of RapidAir 457



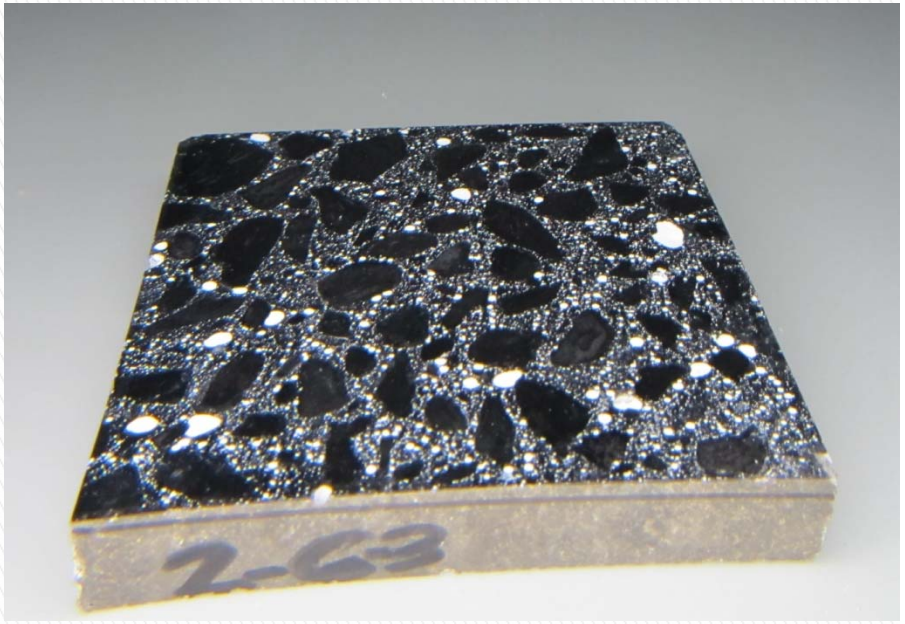


Problem Statement

- Poor air void system has been noted on several pavements exhibiting early deterioration.
- Providing a well entrained air void system is essential to producing concrete with freeze thaw durability.
- ASTM C 457 method of linear traverse is time consuming and susceptible to human error.
- The RapidAir457 air void analyzer would provide quicker results of hardened concrete air void systems.

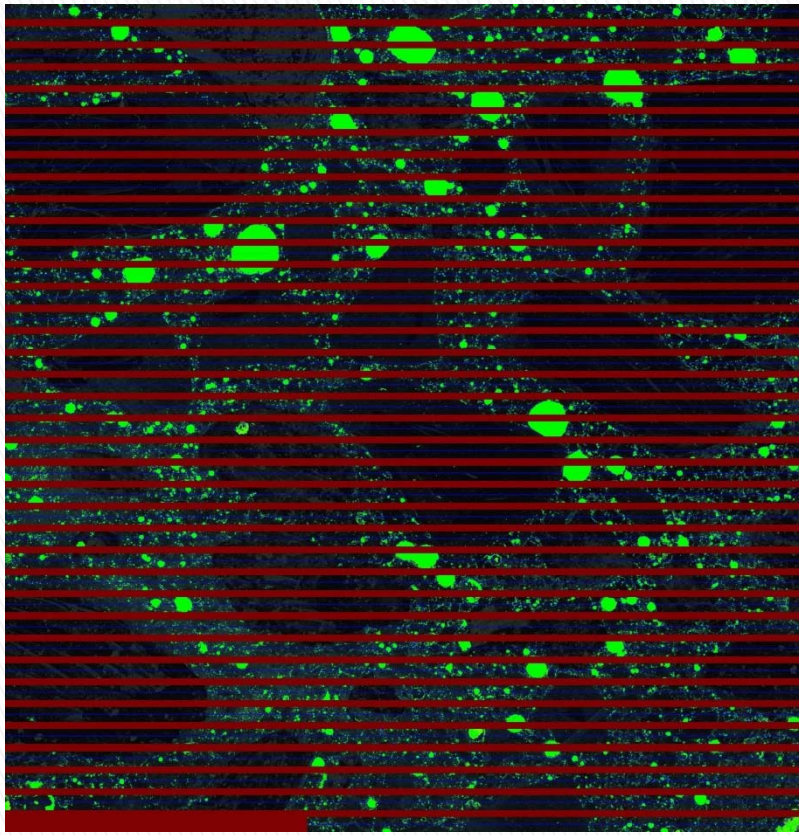
Research Performed

- Laboratory specimens were cast with concrete proportioned with 4, 6, 8, and 10 percent air content.
- Results were compared to an image technique performed at Iowa State University.
- Also, investigated repeatability between samples and operators.



Research Results

- Good correlation between methods with R square greater than 0.90 for air content and spacing factors
- Repeatability of multiple runs on same specimen.
  - Air content std. dev.=0.03
  - Spacing factor std. dev.=0.001
- Variability between operators
  - Air content Std. dev.=0.18-0.40
  - Spacing factor std. dev.=0.003-0.013



Research Recommendations

- RapidAir 457 air void analyzer is an excellent tool used to obtain hardened air void parameters in concrete.
- Results are accurate, repeatable, and far less time consuming than linear traverse and the image analysis techniques.
- From sawing to air void enhancement, the total time for sample preparation was approximately 45 minutes with actual test time of less than 15 minutes.
- The system is user friendly and was able to be used by qualified laboratory technicians with minimal training.

Implementation

- Annual review of hardened air void analysis of project cores to benchmark in place air content trends
- Verification of air content from field project cores when improper testing was performed
- Validation of aggregate correction factor from field cylinders using plastic air content results
- Determine areas of non-complying air content from project cores
- Other concrete research and forensic investigations.

Value of Implementation

- Linear traverse at private lab ~$700 per sample
- Image analysis at local university ~$300 per sample
- RapidAir 457 cost per sample at Iowa DOT lab ~$100 per sample
- Samples can be tested within a day at Iowa DOT lab. Samples sent to other labs can take a week to a month to get results.