OBJECTIVES

- Review the state-of-the-art in pervious concrete testing practices including:
  - Aggregate Testing and Sample Casting
  - Fresh Concrete Testing
  - Structural Performance Testing
  - Durability Performances Testing
- Identify and recommend test methods for work with a focus on
  Canadian application of pervious concrete

INTRODUCTION

- Investigating sustainable pavement alternatives has made pervious concrete an attractive solution for low-volume infrastructure.
- Pervious concrete can act as both a pavement surface and stormwater management for a given site.
- Pervious concrete is a new technology limited information on cold-climate performance.
- Lack of dedicated standards or a consensus approach is a clear barrier to implementation of pervious concrete.

AGGREGATE TESTS AND CASTING

Aggregate Tests

- Main tests include:
  - Aggregate size analysis (ASTM C1313)
  - Specific gravity (ASTM C127)
  - Bulk density (ASTM C29)
- Abrasion Resistance
  - Testing using a micro-devil device
  - Values of 0% are considered acceptable

Casting Samples

- Analysis has shown that cast samples, using standard compaction techniques, do not consistently replicate field compaction

STRUCTURAL TESTS

Compressive Strength

- Testing usually follows CSA A23.2-9C or ASTM C39 methodologies.
- In Canada, CSA A23.2-3C describes sample preparation involving rolling of the sample; known to not be effective for pervious concrete.
- A new suggested methodology involves using the proctor hammer to compact specimens.

Density and Void Content

- Performed following ASTM C1688, a dedicated standard for pervious concrete.
- Previously followed CSA A23.4-C and A23.3-6C for void content and density respectively
- New standard compacts the sample with a proctor hammer, which results in more realistic measured values

FRESH CONCRETE TESTS

Slump

- Performed following CSA A23.2-SC
- Typically shows '0' slump
- Likely due to the structural differences between pervious and conventional concrete

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PERMEABILITY

- Follows ASTM C1701, for pervious concrete pavements.
- Prior to this standard, other methods included:
  - Gibson permeameter
  - Falling head permeability

DURABILITY TESTS

Freeze Thaw Resistance

- Testing usually follows ASTM C666 methodology, with adaptation.
- Testing halted by the samples to be artificially frozen and thawed while saturated.
- The porous nature of the material makes the value of this questionable.

Scaling Resistance

- The most current standard followed is ASTM C744, which has rendered the American Society of Testing and Materials (ASTM) standard obsolete.
- This is not possible with a porous sample.
- Dedicated test methods for this are desperately needed in order to validate pervious concrete for the Canadian climate.

- The most current standard followed is ASTM C74, which has rendered the American Society of Testing and Materials (ASTM) standard obsolete.
- This is not possible with a porous sample.
- Dedicated test methods for this are desperately needed in order to validate pervious concrete for the Canadian climate.

CONCLUSIONS

- Clear benefits for establishing dedicated test methods for pervious concrete materials have been demonstrated. These methods are able to drive the consensus for research and allow practitioners to obtain reliable results for implementing the material
- Changes must be made to the compaction procedures for these tests as traditional rolling is not sufficient; the proctor hammer has demonstrated more reliable results
- Vast improvement and consensus is required for durability testing, particularly on freeze thaw and scaling resistance
- This is of particular importance to Canadian practitioners

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