

# Analyzing the Effect of Ground Glass Pozzolan as a Supplementary Low-Carbon Cementitious Material



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## Introduction

This research is developing concrete mix designs that meet modern high performance durability standards while supplementing cement for more environmentally friendly concrete (EFC) materials. This project is analyzing the usage of a ground glass pozzolan as a potential supplementary cementitious material with minimal carbon footprint.



Figure 1. Concrete cylinders right after the demolding process.

## Objectives

The overall deliverable is a concrete mix that meets strength and durability requirements for modern high-performance concrete. This project is analyzing how the usage of a ground glass pozzolan as a supplementary cementitious material affects the strength, durability and chloride penetration capacity of the concrete.

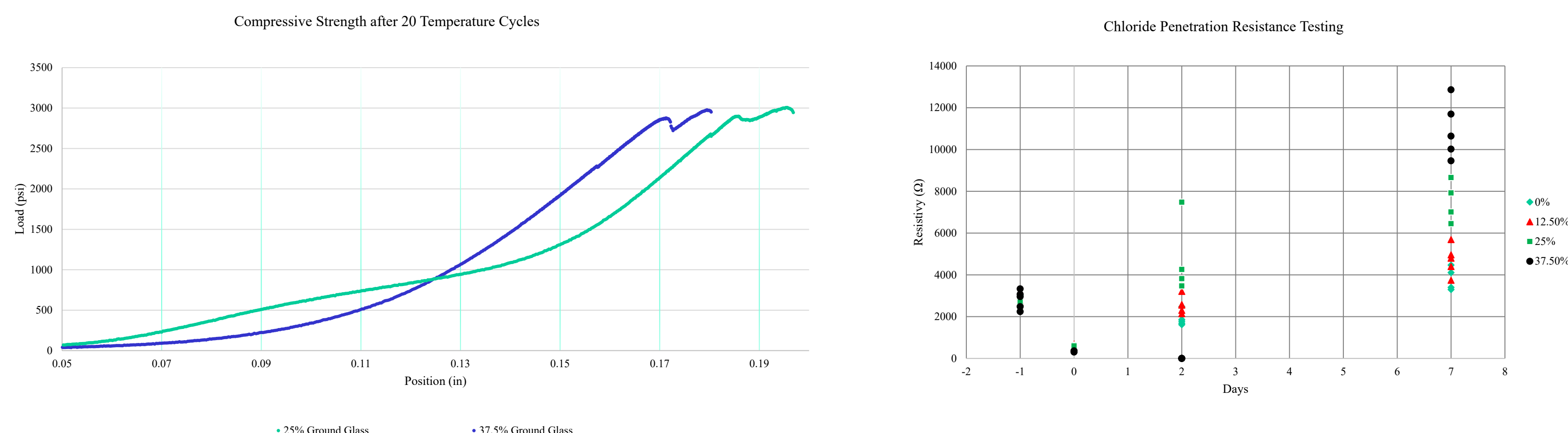


Figure 2. a. Results from compressive strength testing of specimens containing 12.5% and 25% ground glass pozzolan after 20 freeze-thaw cycles. b. Electrical resistance measure of chloride penetration for specimens containing 0%, 12.5%, 25% and 37.5% ground glass pozzolan.

## Methodology or Action Taken

Concrete specimens will be placed in a freeze-thaw chamber while intermittently being tested for compressive strength. Figure 3. shows a concrete cylinder specimen following load testing. Concrete specimens will be soaked in a sodium chloride solution and then measured for resistivity in order to analyze the chloride penetration capacity.



Figure 3. Concrete specimen being tested for compressive strength (Left), Concrete specimens undergoing chloride soaking (Right)

## Conclusion and Future Directions

The overall deliverable is designing a concrete mix that meets the standards for modern high-performing concrete while supplementing Portland cement with a more environmentally friendly material, such as ground glass pozzolan. Moving forward, further testing of these mix designs will occur, as well as potentially analyzing the efficacy of locally sourced material.

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## References

VTrans (2020) "Section 501 – Performance-Based Structural Concrete – Draft" Vermont Agency of Transportation