



# Ternary Mix Design Benefits

Todd Hanson, Iowa DOT

## INTRODUCTION

Over 11 million square yards (9.2 million square meters) of concrete paving has been placed in Iowa utilizing the following ternary blends:

Type IS with 20% Class C fly ash replacement

- 8.5 million yd<sup>2</sup> (7.1 million m<sup>2</sup>)

Type IP with 20% Class C fly ash replacement

- 2.7 million yd<sup>2</sup> (2.2 million m<sup>2</sup>)

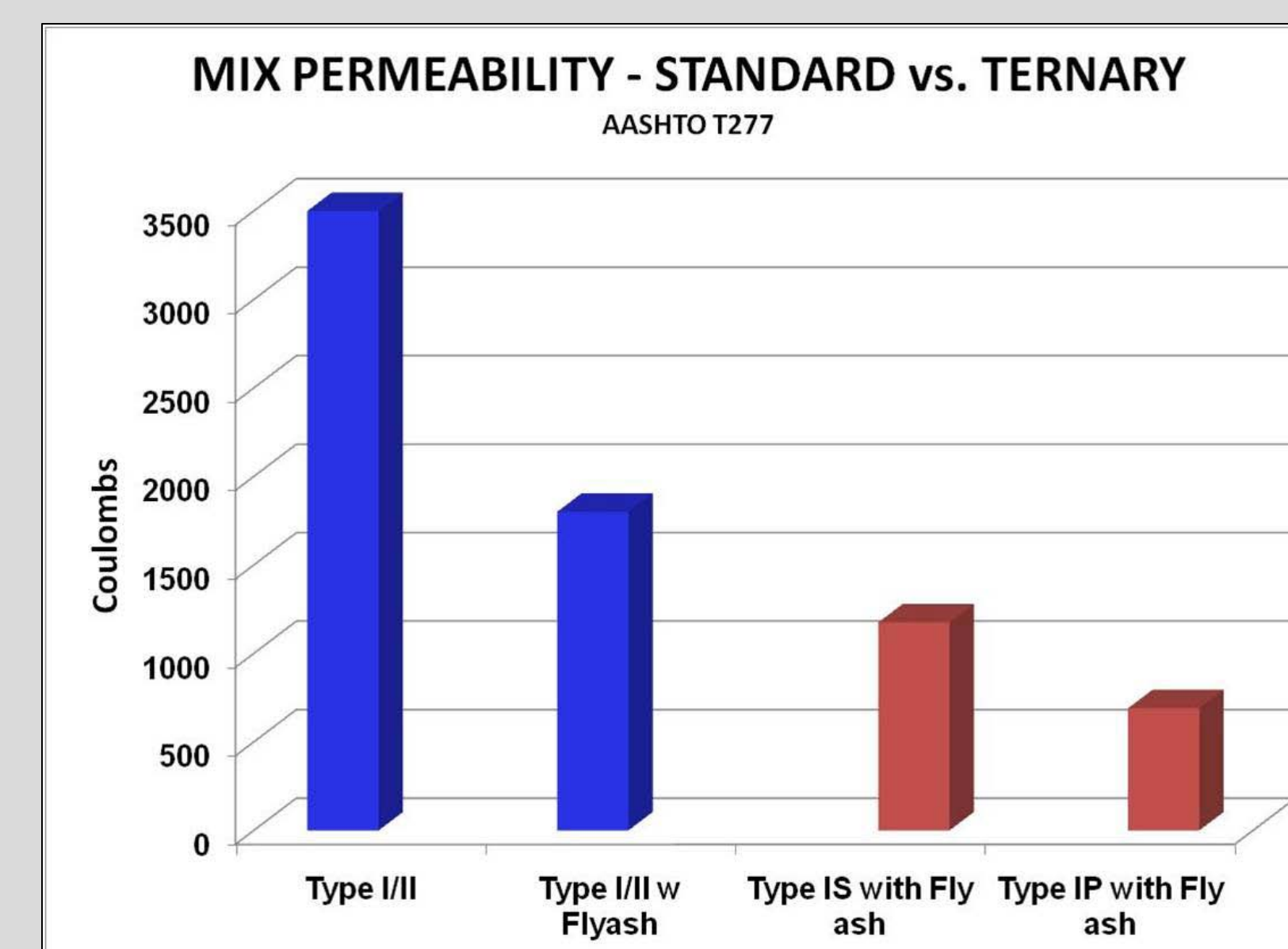
Benefits include :

- Reduced permeability & Increased strengths
- Increased resistance to alkali silica reactivity
- Improved workability
- Economical – lower cost of slag and fly ash
- Reduced environmental impact – 40-50% replacement



## PERMEABILITY

Since most durability related failures are related to fluid transport through concrete, reducing permeability through the use of ternary mixes increases the potential for long-term concrete durability.



## WORKABILITY

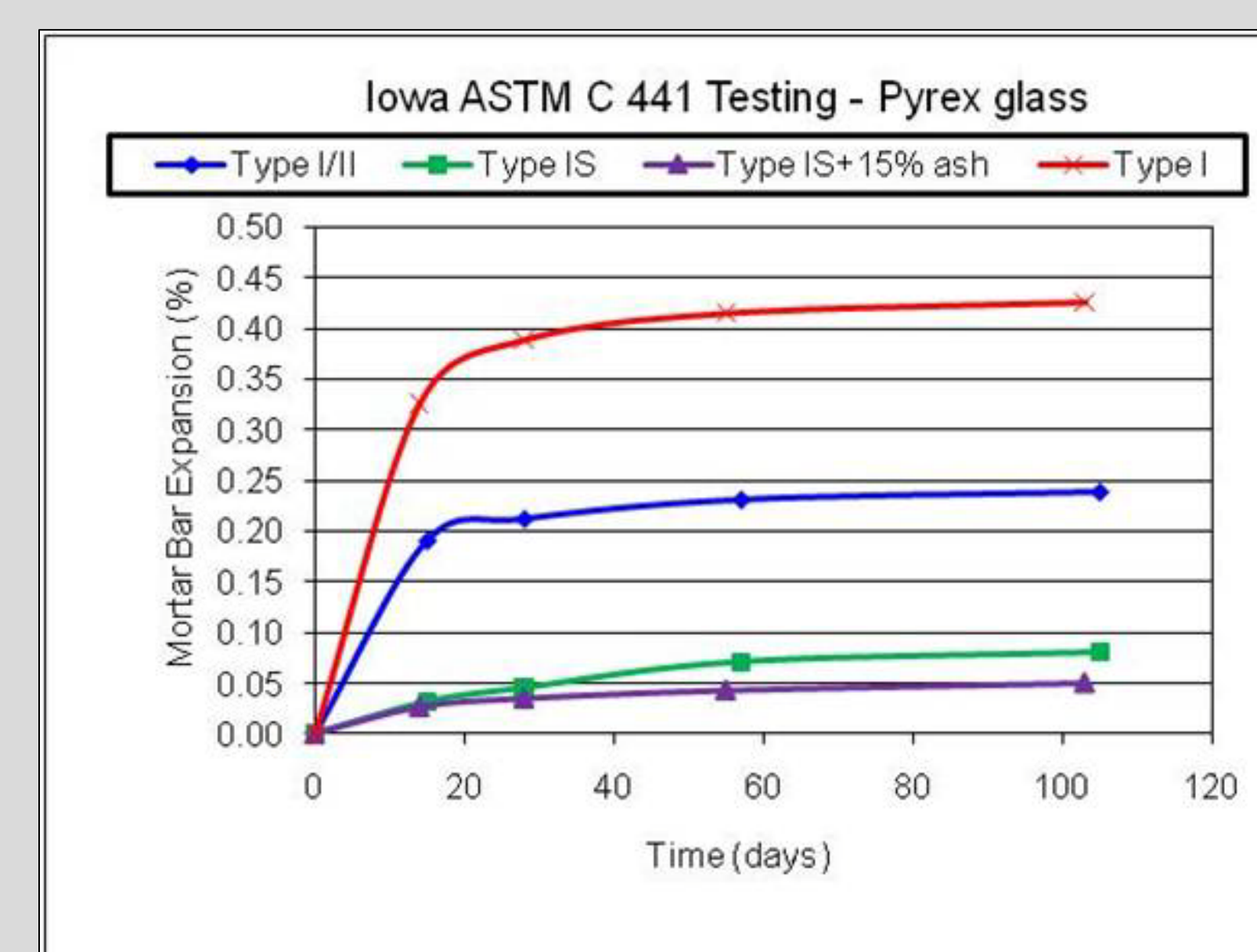
Ternary mixes provide excellent workability and finishing characteristics, especially in hot weather.



Type IS with 20% Class C fly ash replacement

## ASR RESISTANCE

Ternary mixes provide increase resistance to potential alkali silica reactivity.



Type IP with 20% Class C fly ash replacement