Air Content in Louisiana
"Several Points for Future Discussion"

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Overview

- Background
- Air Types
- Why Use
- Mix Designs
- Discussion Points
- Other States Specifications
- Future Direction
- Questions

Background

- Air in concrete is a standard practice
  - Helps protect the paste from freezing and thawing damage
  - Increases yield
  - Increased workability
  - Decreased segregation and bleeding
  - Decreases strength
- Air is 'cheap'

Background

- Older pavements did not have air entrainment in them
- Use of tallow and other grinding aids provided paste protection
- Some of these pavements are still in use today
  - Some are over 100 years old in the worst case scenario environments

Air Types

- Vinsol resins
- Non-vinsol resins
  - aka synthetic air entraining agents
  - Detergents, salts of sulfonated lignin, fatty acids, etc.
- Air entraining cement
  - i.e. the air entrainer is ground with the clinker during manufacture

Why Use?

- Increase yield
- Increase workability
- Decrease or eliminate segregation or bleeding
- Increased resistance to freezing and thawing

Mixture Designs

- Air constitutes 4-8% volume in air entrained concrete
- Air constitutes 0-3% volume in non-air entrained concrete

- **In order for freeze thaw damage to occur, the pavement temperature must be below 17°F for 5 hours AND be above 90% saturation**

Discussion Points

- Three questions:
  1. Do our pavements reach the critical temperature?
  2. Do our bridge decks reach the critical temperature?
  3. If they do reach that temperature, are they sufficiently saturated to cause damage?

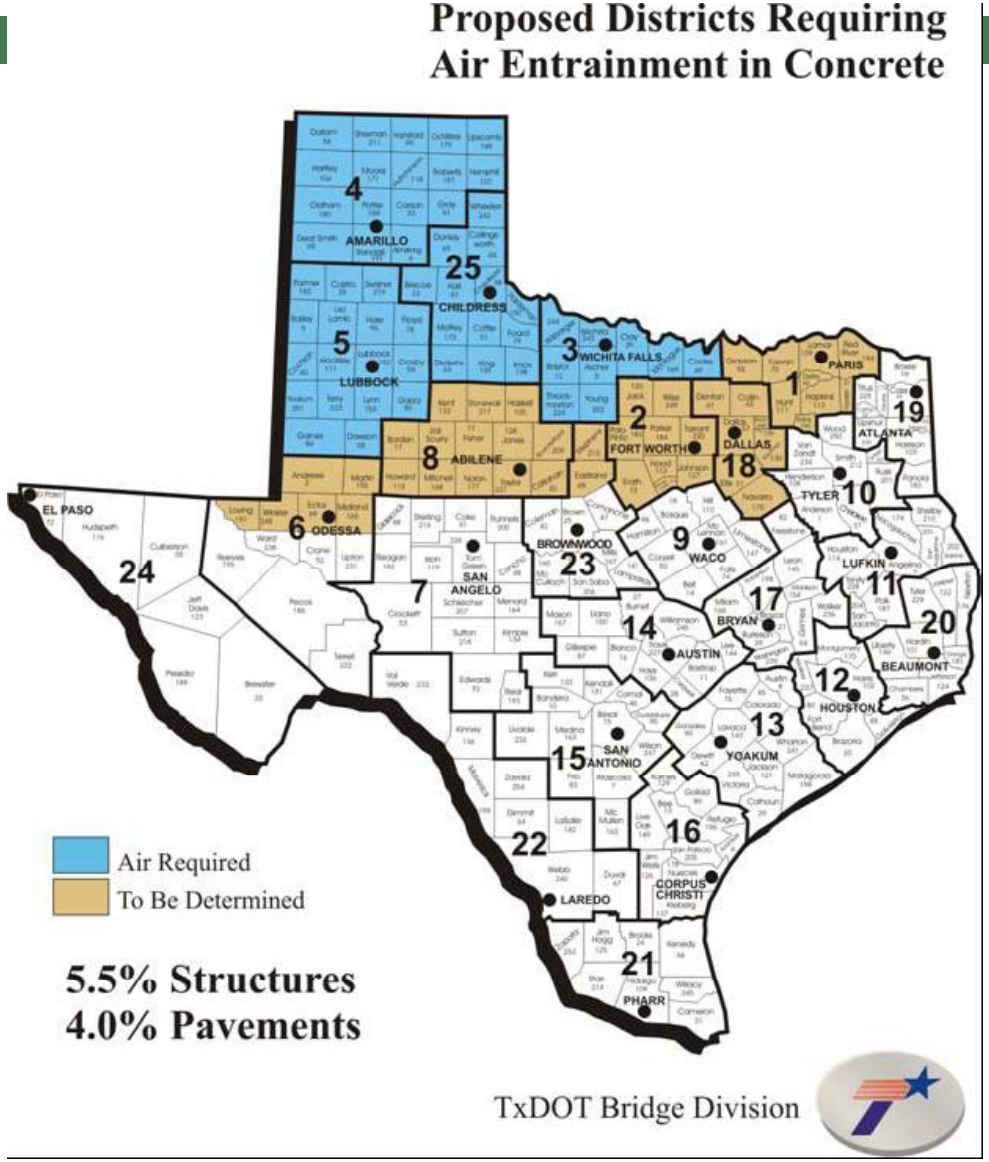
Other States Specifications

- Texas
- Florida

Texas Specifications

- Recent major overhaul
  - Air is required unless noted on plans
  - Can waive according to map on next slide

Texas Specifications



Texas Specifications

- Overhauled the specifications for two major reasons
  1. Concrete is not cold enough for the required length of time with sufficient moisture present
  2. Compatibility issues with the ever increasing complexity of concrete
- Contractors can still add air for workability, but testing will not be required

Florida Specifications

- Air entrainment of concrete is not required
- Acceptable air content range is 1 to 6% if air entraining agent is added

Where Do We Go From Here?

- Combination of FL and TX specifications?
- Adapt Texas specifications to our state?
- Adapt Florida specifications to our state?

Pros and Cons

- Pros
  - Decreased cement contents to achieve similar strengths
  - Decreased chance for incompatibilities
  - Reduced cost of doing business
  - Capitalism determines the amount of air for any particular project
- Cons
  - Potential for increased bleeding and segregation
  - Backlash from admixture companies
  - Decreased yield
  - Decreased workability

Food for Thought

City	Year	Record Low	Average Low
Baton Rouge	1989	9	40
Lake Charles	1989	11	41
New Orleans	1889	7	43
Shreveport	1930	-2	36

Future Direction

- LTRC is looking into this topic very closely
- Also looking at current specifications with the construction and materials divisions of DOTD
- More widely accepted that one would think

Questions