



ACCELERATED LOADING RCC OVER SOIL CEMENT

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LTRC Project 12-7P



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Outline

- **Background**
- **Construction of RCC Test Sections**
- **Preliminary Results**
 - **This is the GOOD stuff!!!**



Why is LADOTD interested in RCC?

- **RCC pavements provide the following advantages:**
 - Fast construction
 - High load carrying capacity for heavy loads
 - Early strength gain
 - Low maintenance and durable
 - Light surface reduces lighting requirements
 - Economical
- **A thin RCC pavement** may provide a cost-effective solution for Louisiana low-volume roads having heavy truck traffic, e.g.,
 - Shale gas exploration, logging and agricultural activities

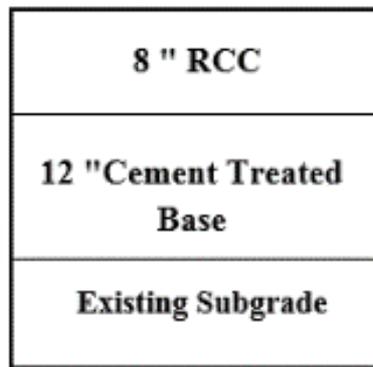
Why interested in RCC?



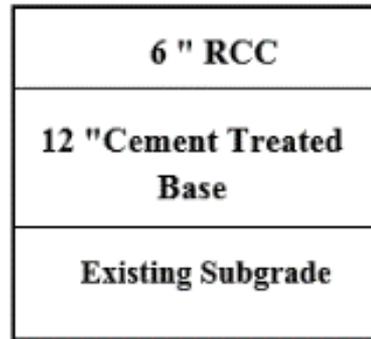
Objectives of the Study

- (1) to determine the structural performance with failure mechanism and load carrying capacity of **thin RCC** surfaced pavements
- (2) to determine the applicability of using a **thin RCC** surfaced pavement structure (with cement treated or stabilized base) as a design option for low- and high-volume pavement design in Louisiana

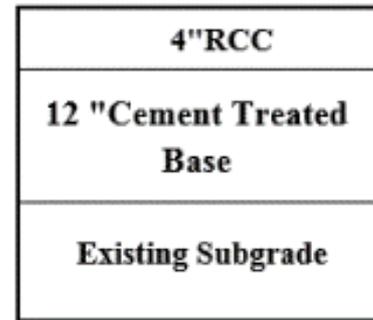




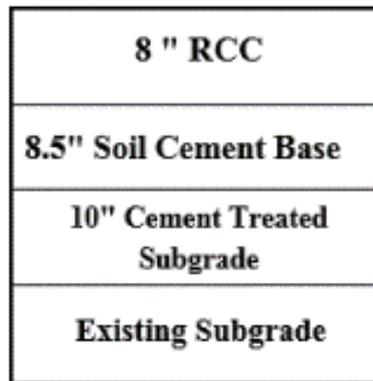
Section 1



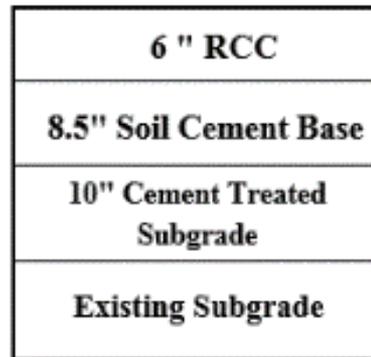
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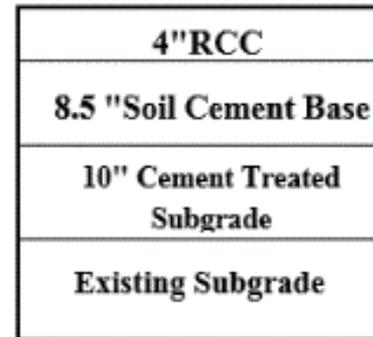
Section 3



Section 4



Section 5



Section 6

- Six full-scale, RCC-surfaced pavement test sections were constructed at the LTRC's ALF facility
 - Each section: 71.7-ft long and 13-ft wide

RCC Test Lanes Construction

- The construction of RCC test lanes was a joint effort between LTRC and its concrete industry partners:
 - CAAL was instrumental in arranging industry support through donations of manpower and materials for this project;
 - Gilcrest Contractors provided the manpower and equipment to construct the subgrade and base courses;
 - Rollcon in Houston, TX paved the test lanes; and
 - Cemex of Arizona setup and operated pugmill



Pictures



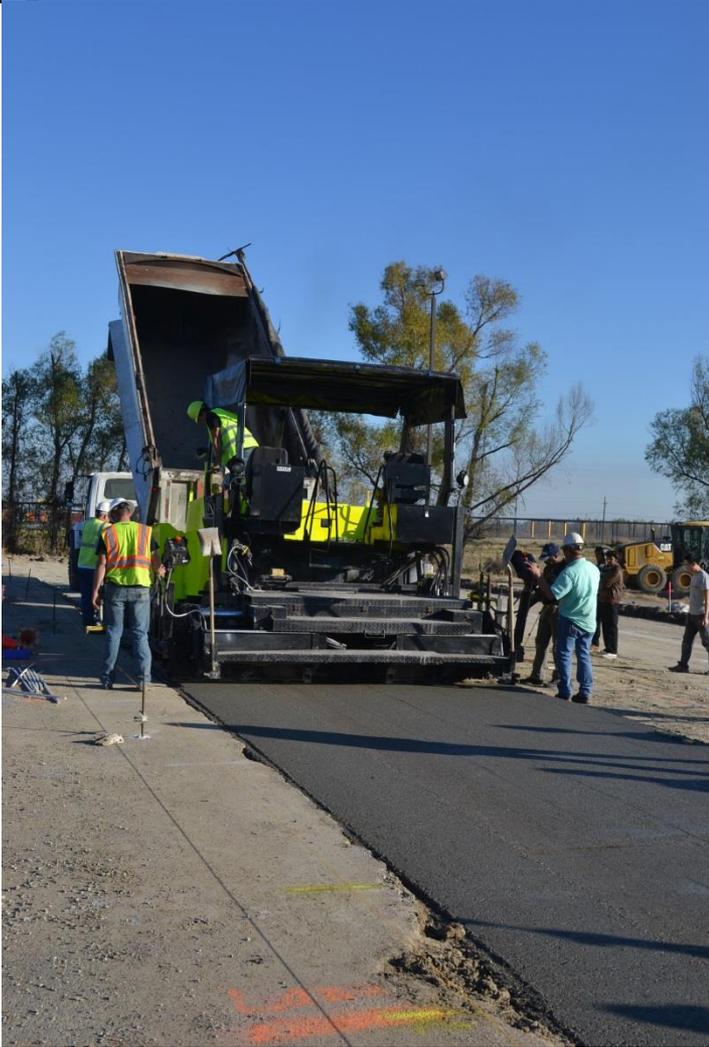
Pictures



Rapidmix 400C horizontal twin shaft pugmill

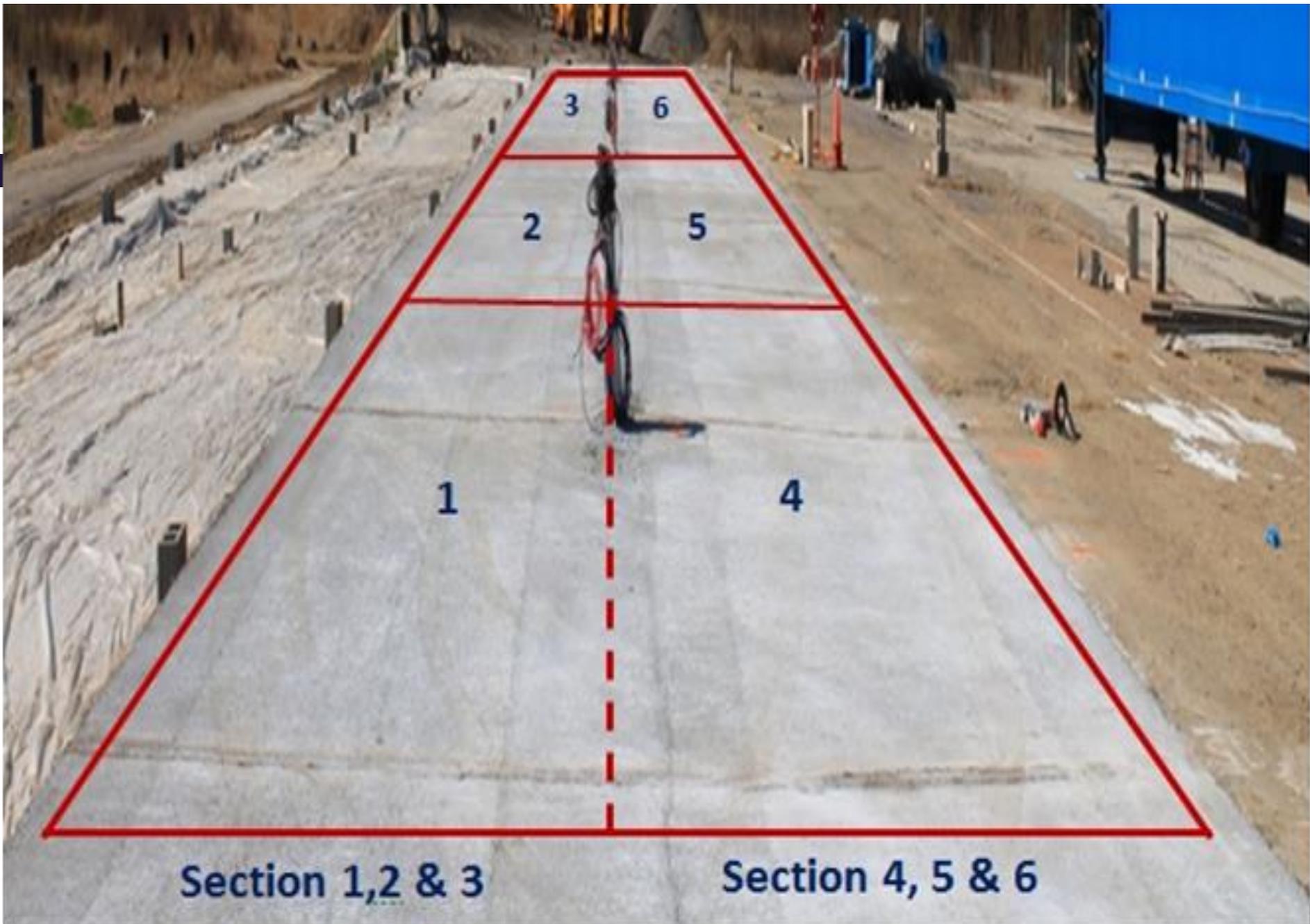


Pictures



Pictures





Section 1,2 & 3

Section 4,5 & 6

Constructed RCC Test Sections



Lane 1

Lane 2

8 " RCC
12 "Cement Treated Base
Existing Subgrade

Section 1

6 " RCC
12 "Cement Treated Base
Existing Subgrade

Section 2

4"RCC
12 "Cement Treated Base
Existing Subgrade

Section 3

8 " RCC
8.5" Soil Cement Base
10" Cement Treated Subgrade
Existing Subgrade

Section 4

6 " RCC
8.5" Soil Cement Base
10" Cement Treated Subgrade
Existing Subgrade

Section 5

4"RCC
8.5 "Soil Cement Base
10" Cement Treated Subgrade
Existing Subgrade

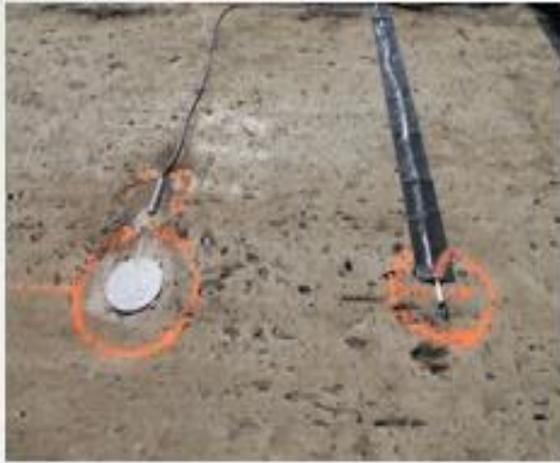
Section 6



Monitoring and Accelerated Loading of RCC Pavement Sections



Instrumentation Installation



Pressure Cell & Asphalt Strain gage



Asphalt Strain gage & Concrete Strain Gage



Protecting the Cables



Levelling Pressure Cell



Installation of Moisture gage



Installation of Thermo-probe

13'
13'

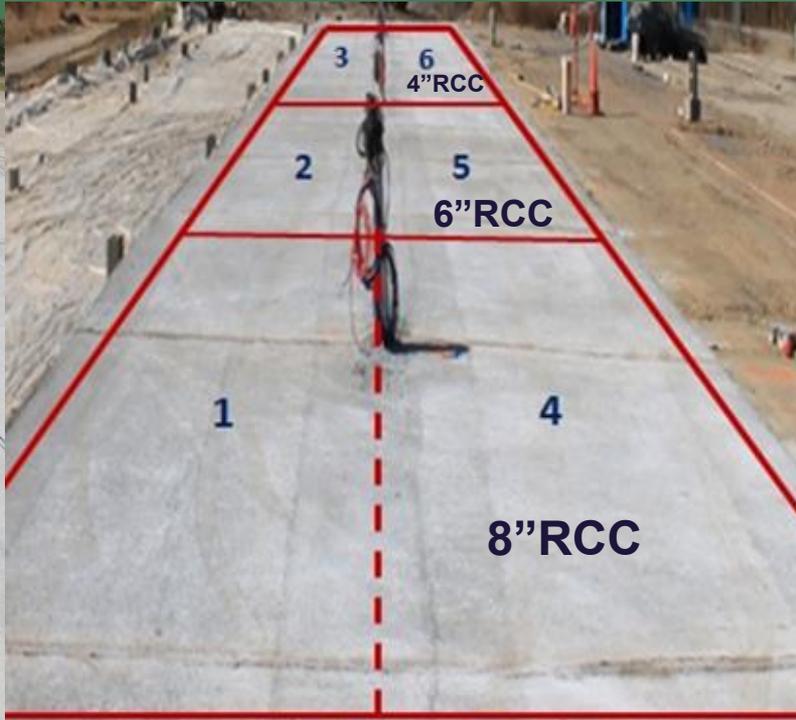
Accelerated Pavement Testing - ATLaS30



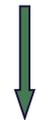
Dual-tire load, 130psi
Load: up to 30 kips
Speed: 4~6 mph
Bi-directional loading
Effective length: 42-ft
About 10,000 passes/day



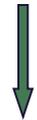
Accelerated Loading Testing



- Started on **Section 4**



- then **Section 5**



- then **Section 6**

- Roughly 78,000 reps.
for each load level

9,000 lb



16,000 lb



20,000 lb



22,000 lb

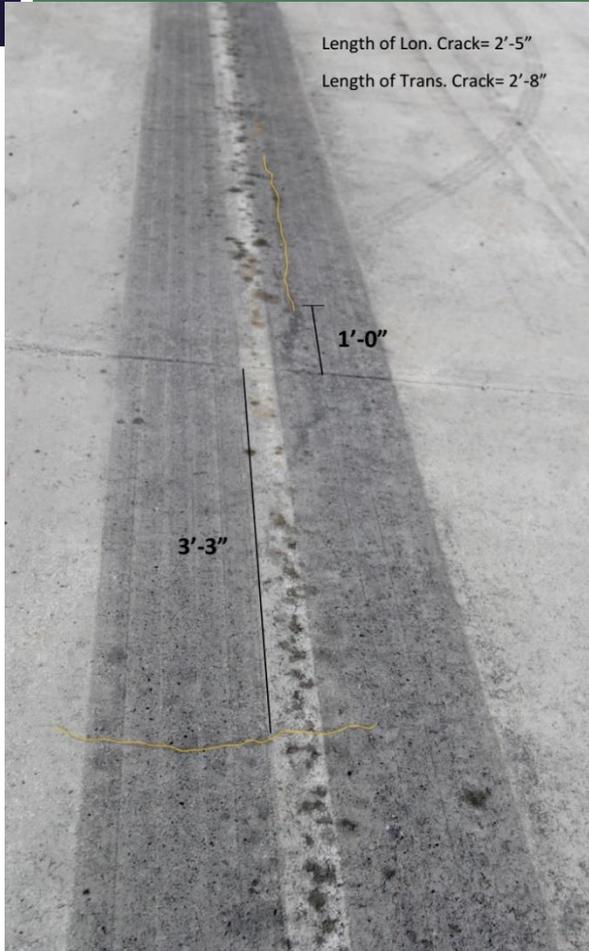


25,000 lb



8" RCC Section

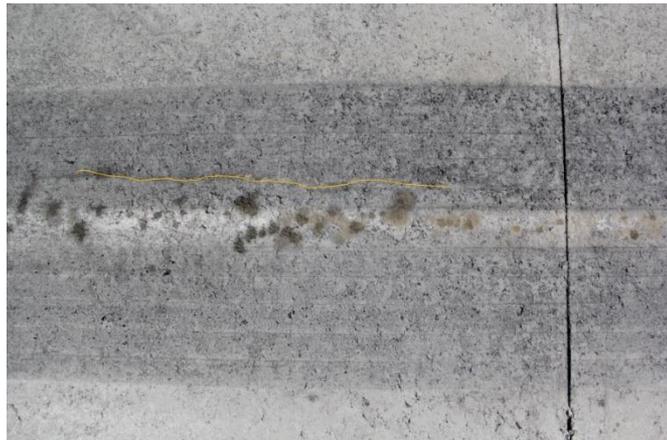
- After total 390,000 reps. of various loads of 9-, 16, 20, 22-, 25-kip



Overall



Transverse Crack



Longitudinal Crack



4" RCC Section



- After 78,000 reps. for each load level of 9-, 16, 20, 22-, 25-kip, respectively, and over 468, 000 additional reps of 16-kip



Summary of Current Loading Results

- To date, each of three sections tested has received more than 390,000 heavy load repetitions, which equivalent to 10.9 million ESALs.
 - No severe cracking, or significant changes in measured roughness, or faulting, therefore, no section has reached to a failure mode.
- According to 1993 design guide, a 4"-, 6"- or 8"-PCC pavement would have a design pavement life of *0.7, 1.9 or 6.6 million ESALs*, respectively.
 - Obviously, all RCC sections have passed above design lives;
 - Continue loading in order to determine the failure modes/mechanism for those thin RCC test sections.
 - Test results will be used to come up a pavement design procedure for thin RCC pavement design in Louisiana.

Potential RCC Implementation

- The preliminary ATLaS30 loading results generally indicate that
 - a thin-RCC over soil cement pavement structure seems to have superior load carrying performance
 - Recommendation to select and build several field RCC test sections on those Louisiana highways where the pavements are often encountered by heavy truck loading
 - To validate the APT performance and provide implementation guidelines

THANK YOU!

