

Roller Compacted Concrete Experiences in Arkansas

The Hattieville Project

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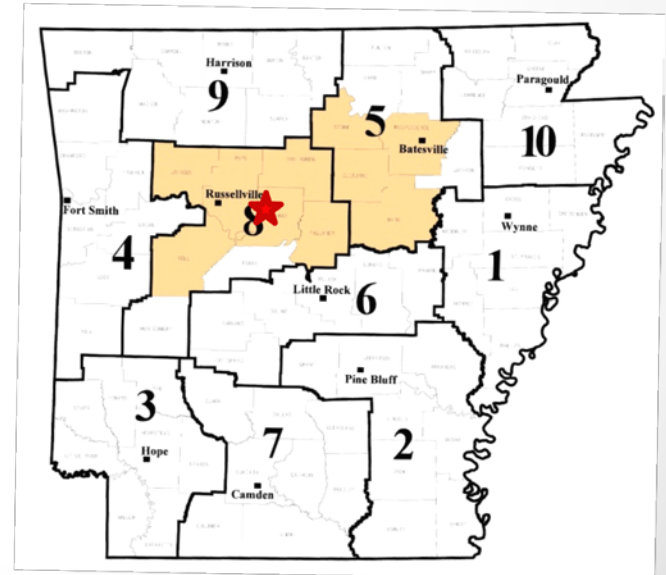


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RCC Construction Project

- Fayetteville Shale Play Area
- Cement-Treated Reconstructed Base (CTRB)
 - Full-Depth Reclamation
- Roller-Compacted Concrete (RCC)
 - Section 1 – 7" over CTRB
 - Section 2 – 8" overlay









Section 1

- Slow progress
- Marginal densities
- Low strengths



Changes for Section 2

- New plant
- New paver
- No fly ash in mix
- Higher water content
 - Because of changes in cementitious materials



Compressive Strengths

Location	1 day (psi)	3 day (psi)	7 day (psi)	14 day (psi)	28 day (psi)	28 day (psi)	90 day (psi)	Density (pcf)	Density (pcf)
S1 – WB	1418	2982	3395	3505	3661	2813	4545	148.8	144.8
S1 – EB	457	1837	2553	2897	3328	2175	4139	150.6	138.6
S2 – WB	2077	3873	4279	4726	4943	3337	5284	148.2	143.0
S2 – EB	4102	5307	6504	6016	6289	3938	6993	151.3	142.5
S1 – Reconst.	2096	4340	4837	5174	5722	4531	6212	149.8	141.1

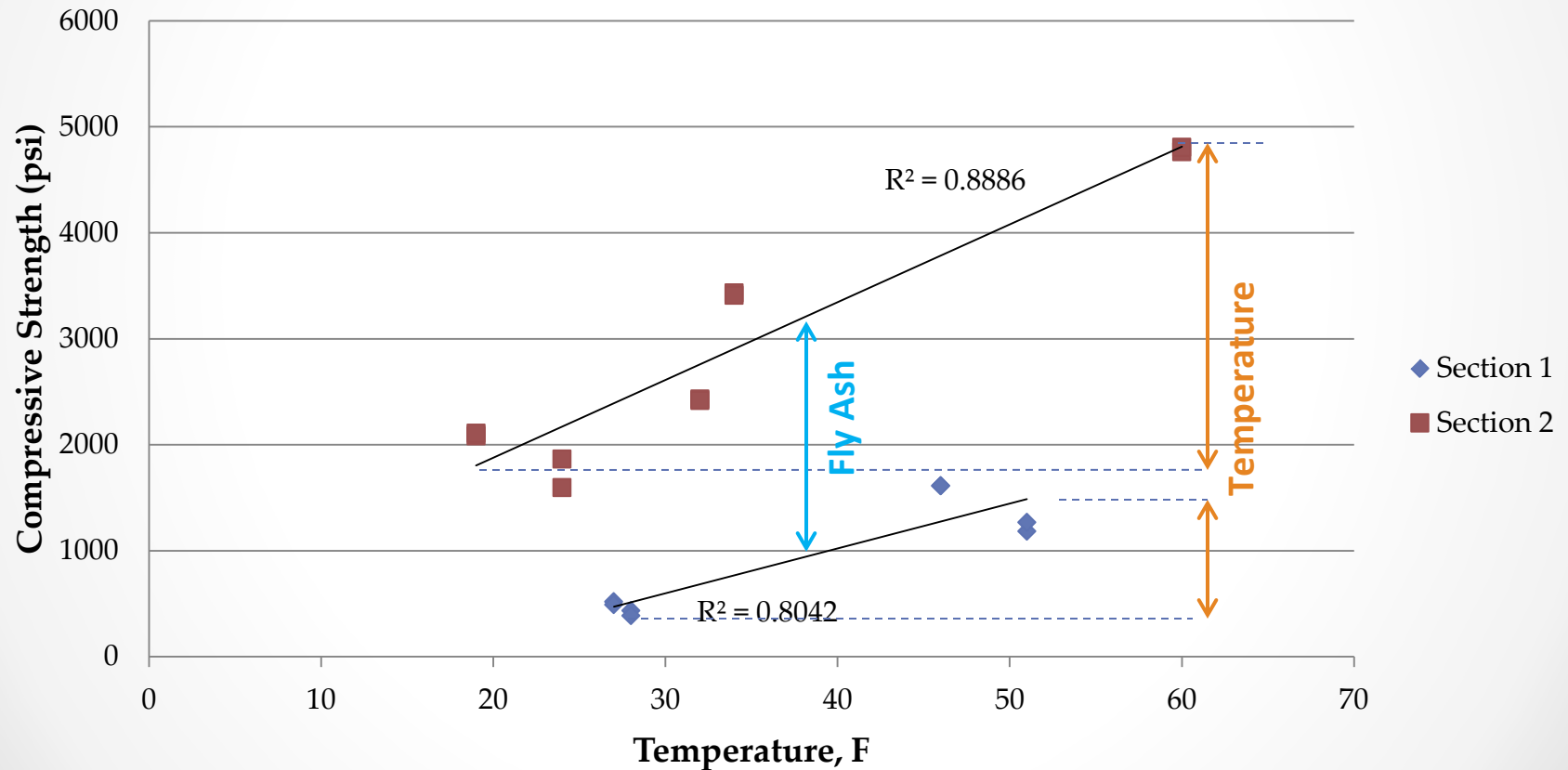
***Cylinders**

****Cores**

Nighttime temperatures generally ranged from 25 to 45 F

Temperature and Fly Ash?

Temperature vs. Strength
Cylinders, 24 hr



Smoothness and Skid Resistance

- Smoothness
 - Before Diamond Grinding
 - 250 in/mi
 - After Diamond Grinding
 - 69.5 in/mi – 76.0 in/mi
 - Almost 3 years
- Skid Resistance
 - Skid Number ~58





DO
NOT
PASS



Cracking



1 crack
1st yr
reconst.
section

2 Years Later



Centerline Deterioration



After 1
year,
15%
Affected
Length

Transverse Joint Spalling



<5%
defective
1st year







Cost

- \$2,010,550 total project cost
- \$484,444/l-m RCC (not counting transitions)
- Compare to ????
- 2" HMA overlay - \$88,000/l-m
 - RCC is 5x more expensive?
- 8" HMA overlay - \$415,017/l-m
 - 20-year design life
- Non-freeway reconstruction with minor widening
 - \$1,500,000/l-m

RCC saves over \$1 million / lane-mile

Lessons Learned

- Practice, practice, practice
- Great application – remember intent!
- Watch out for low temperatures
 - Increase minimum placement temperature to 50F?
- Fly ash in mix not recommended
 - Unless strength gain is compatible with temperature
- Plant must be capable of providing continuous production - speed and coordination critical
- Construction joints are difficult
- Thin overlay vs. diamond grinding?

After Two Years. . .



After Almost 3 Years



Recommendations

- Use RCC for:
 - Low to medium traffic volume roadways
 - Rural highways and city streets
 - As a base for medium to high traffic roadways
- Do not use RCC for:
 - Freeways and other high traffic volume highways
 - Urban areas and arterials
 - Unless detour options are available
- Allow RCC paving April – September
 - Do not pave at $< 50^{\circ}\text{F}$
 - Do not pave if nighttime low is expected to be $< 40^{\circ}\text{F}$

Thank You!



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