


## Southeast Regional ACPA/PA Concrete Pavement Forum

### Long Life Concrete Pavement

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1

### Long-Life Concrete Pavement Specifications

- Desire of PennDOT to use on I-95 CP-2 Project
- Based mostly on Minnesota & Wisconsin DOT standards and specifications
  - Mark Snyder (ACPA Penn Chapter) and PennDOT consultant produced preliminary specification
  - Neal Fannin (PennDOT) with CPQI Committee have produced final specification,
    - Along with parallel specification development at the Pennsylvania Turnpike Commission.



2

### Long Life Concrete Pavement (LLCP) Pub. 408, Section 530

LLCP is: A combination of:

- materials,*
- mix design,*
- structural design,*
- and construction activities*

- No premature failures or material-related distresses.
- Reduced potential for cracking, spalling, faulting.
- Maintain desirable ride and surface texture characteristics with minimal M&R.
- Assures a service life of 40+ years.




3

### Long-Life Concrete Pavement Mixes

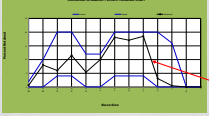
Class of Concrete	Min. Slab	Cement Factor (lb/cy)			Water Content (lb/cy)		Minimum Slab Thickness (ft)	Proposed Slab Thickness (ft)	Proposed Slab Depth (ft)	Min. Slab Temperature (°F)
		Min.	Max.	Max.	Min.	Max.				
LLCP	4.0	117	120	123	5.37	5.62	3	3	3	1,000
Standard Mix 408/2018	4.0	110	115	120	5.50	5.75	3	3	3	1,000
Standard Mix 409/2020	4.0	110	115	120	5.50	5.75	3	3	3	1,000

- Maximum LLCP cement factor barely more than the standard minimum
- Lower cement factor, lower w/c ratio, optimized mix all go together
- Allowable water/cementitious ratio higher for standard mixtures

4

### LLCP Specification

- Air Entrainment**  
The plastic air requirement of 7.0% +/- 1.5%  
(Standard Class AA concrete was 6% ± 1.5%)
- Optimized Aggregate (PTM 529)**  
Combined gradation must be within the prescribed percent retained chart (the "Tarantula Curve")



Makes for a Workable Mix, Avoids Finishability Issues and Segregation/Edge Slump Issues.

5

### LLCP Specification - Mix Requirements:

- Permeability and Shrinkage Limits during mix design phase.**
  - Permeability Limits**
    - Meet a maximum target permeability of 2000 Coulombs after a 56-day curing by AASHTO T277
  - Shrinkage Limits**
    - Maximum shrinkage of 500 microstrain after 28 days by the ASTM C157 air dry method



6

### LLCP Specification – Non-Corrosive Dowel Bars

Dowel Bars are one of the following:

- > Stainless steel
- > Stainless steel clad
- > Zinc clad
- > Galvanized
- > Glass Fiber Polymer coated
  - > Hollow Dowel Bars

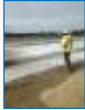





7

### What is in the LLCP Specification?

- **Other Changes/Additions:**
  - ❖ Ternary mixes allowed.
  - ❖ Longitudinal tine texture is the default surface treatment (quieter)
  - ❖ White Poly-Alpha Methyl Styrene (PAMS) is the only spray cure allowed.
 

(shall be used within 6 months of manufacture or before expiration date of product shelf life)
  - ❖ Depth measurements can be by cores or nondestructive testing (MIT method).
  - ❖ Slip Form Paving is standard.

8



### Long Life Concrete Pavement Projects

**Piloted Projects** (all pre-Section 530)

- District 6: Interstate 95 (Section CP2)
- District 9: US-219 (Fay/Golden Triangle)
- District 12: Route 819 small project paved by Golden Triangle (Components)

**Projects with LLCP Components**

- District 9: US-219 (NESL); Long-Life dowels & PAMS cure only (ADAB project awarded as PCC job)
- District 12: I-70/79 (Lane/Swank), All LLCP components except for dowels

9

### Long Life Concrete Pavement Projects

**Section 530 (Completed)**

- District 6: US-422 (H&K/Baseline)

**Section 530 (Under Construction/not open to traffic)**

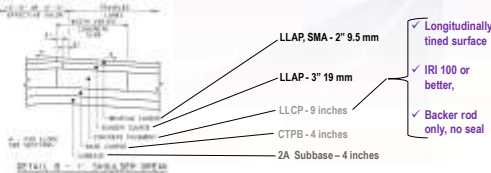

- District 6:
  - I-95, Section (Anderson)
  - I-95, Section (H&K)
- District 5: I-78 (H&K/Baseline)
- District 12: I-70 (Section K10, Golden Triangle)
- District 12: I-70 (Section L10, Trumbull/Golden Triangle)
- District 3: US-15 (New Enterprise), composite pavement
- Turnpike: SR-579/Southern Beltway; five sections from US-22 to I-79




10

### Long Life Concrete Pavement - Composite

- District 3: US-15 (New Enterprise Stone & Lime).

11

### Long Life Concrete Pavement Ride Incentive


- Turnpike: SR 579/Southern Beltway; five sections from US-22 to I-79

**408/2020, Sect 507**

Item	Unit	Quantity	Unit Price	Total Price
LLAP SMA - 2" 9.5 mm	sq yd	1000	1.50	1500
LLAP - 3" 19 mm	sq yd	1000	1.50	1500
LLCP - 9 inches	sq yd	1000	1.50	1500
CTPB - 4 inches	sq yd	1000	1.50	1500
2A Subbase - 4 inches	sq yd	1000	1.50	1500

**PTC, Revised Section 507**

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12

**QUESTIONS/DIALOGUE**  
**LONG-LIFE CONCRETE PAVEMENT**  
**(OUR QUESTIONS)**

What is your opinion on the sustainability of LLCP versus standard pavements?  
Have you applied Performance Engineered Mixture practices on your projects?  
Are you longitudinally tining pavements and/or shoulders. Bridge decks?

**Your Questions/Comments**

13