US 58 Concrete Overlay Construction 2012

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Discussion

- Project Selection
- Pavement Condition
- Pavement Evaluation
- Design/Construction Considerations/Constraints

Project Selection

Presented four locations to CP Tech Center

- **US 58 WB Bowers Hill (City of Chesapeake)**
- **SR 35 in Southampton County**
- **US 58 WB Southampton County**
- **US 522 Warren County**

Project Selection

Project Name	Project Description	Length (miles)	AADT (2009)	No. of Lanes
US 58 WB Chesapeake	Divided suburban highway, open ditch section with minor cut/fill sections	1.6	42,000 (7% Trucks)	3
SR 35 Southampton Co	Two-lane rural route	4.0	2,300 (25% Trucks)	2
US 522 Warren Co	Divided rural highway, open ditch section with minor cut/fill sections	0.5	22,000 (14% Trucks)	2
US 58 WB Southampton Co	Divided rural highway, open ditch section with minor cut/fill sections	5.3	8,300 (14% Trucks	2

Pavement Condition

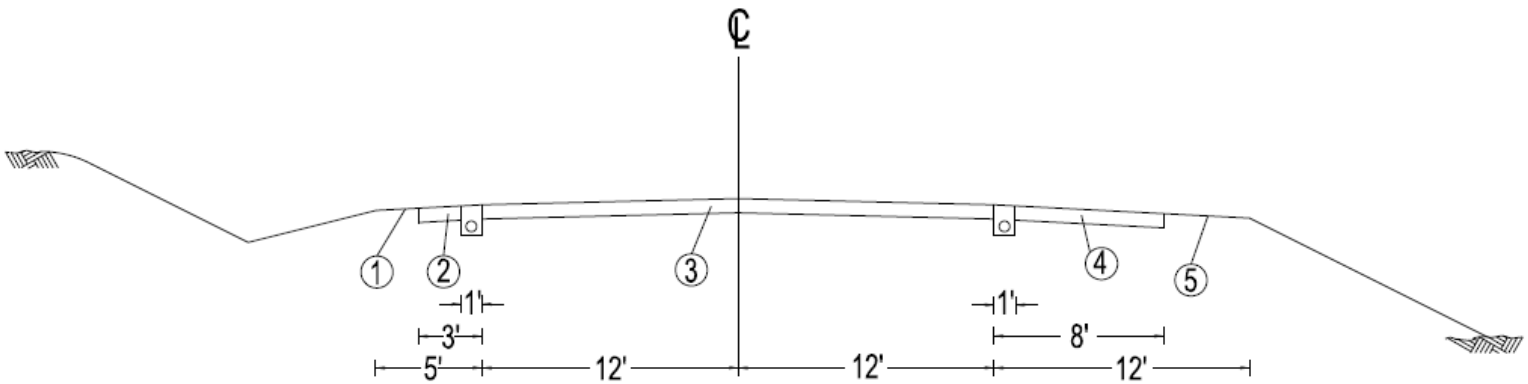
US 58 Southampton

Jointed Concrete Pavement WB 0.48 miles long

Year	SDR	IRI, inches per mile
2009	54	156
2010	34	162
2011	42	173

Pavement Condition

Existing Typical Section (Jointed Reinforced Pavement)
US 58 WestBound, Southampton County



From: MP 16.13 To: MP 15.82
Project Length: 0.31

1. Sod Shoulder
2. 8" Existing Asphalt Inside Shoulder
3. Existing 8" JRCP 2-12 Lanes
4. 8" Existing Asphalt Outside Shoulder
5. Sod Shoulder

Not to Scale

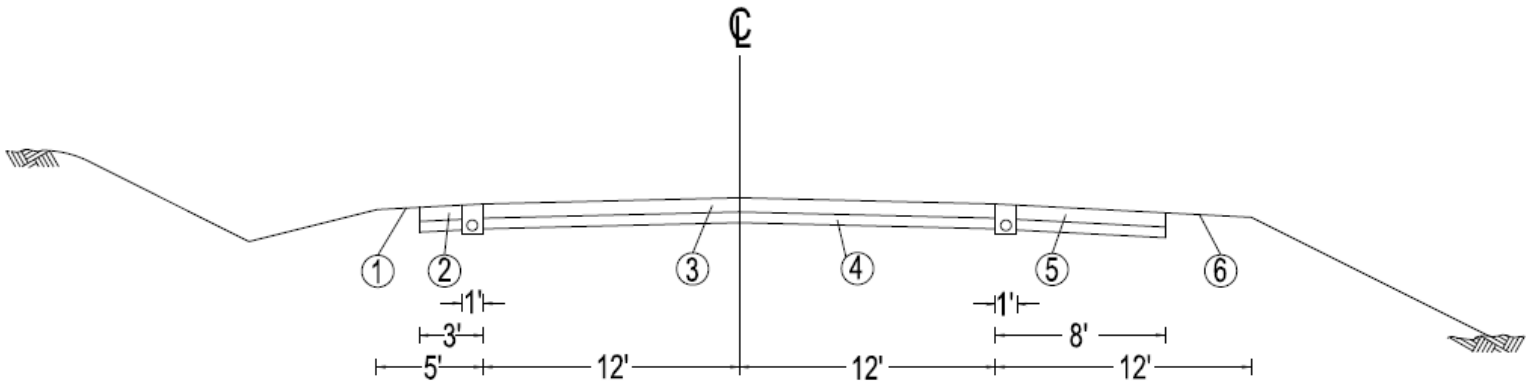
Pavement Condition

US 58 Southampton
Continuously Reinforced Concrete Pavement WB
4.77 miles long

Year	CDR	CPR	IRI, inches per mile
2009	75	66	129
2010	55	92	133
2011	52	49	132

Pavement Condition

Existing Typical Section (CRCP)
US 58 WestBound, Southampton County



From: MP 20.89 To: MP 16.13
Project Length 4.76

1. Sod Shoulder
2. 8" Existing Asphalt Inside Shoulder
3. Existing 8" CRCP 2-12 Lanes
4. Existing 6" - CTA
5. 8" Existing Asphalt Outside Shoulder
6. Sod Shoulder

Not to Scale

Pavement Condition

Continuously Reinforced Concrete Pavement WB

4.77 miles long

Year	Asphalt Patching	PCC Patch 2	PCC Patch 3	Punchouts & Spalled Y
2009	1,078 (0.4%)	8,301 (2.7%)	0	1,718 (0.6%)
2010	962 (0.3%)	6,207 (2.1%)	7,594 (2.5%)	80 (<0.1%)
2011	1,126 (0.4%)	5,824 (1.9%)	13,266 (4.4%)	4,135 (1.4%)

All distresses in sf

% based on area of single lane rated

Pavement Evaluation

Pavement Evaluation

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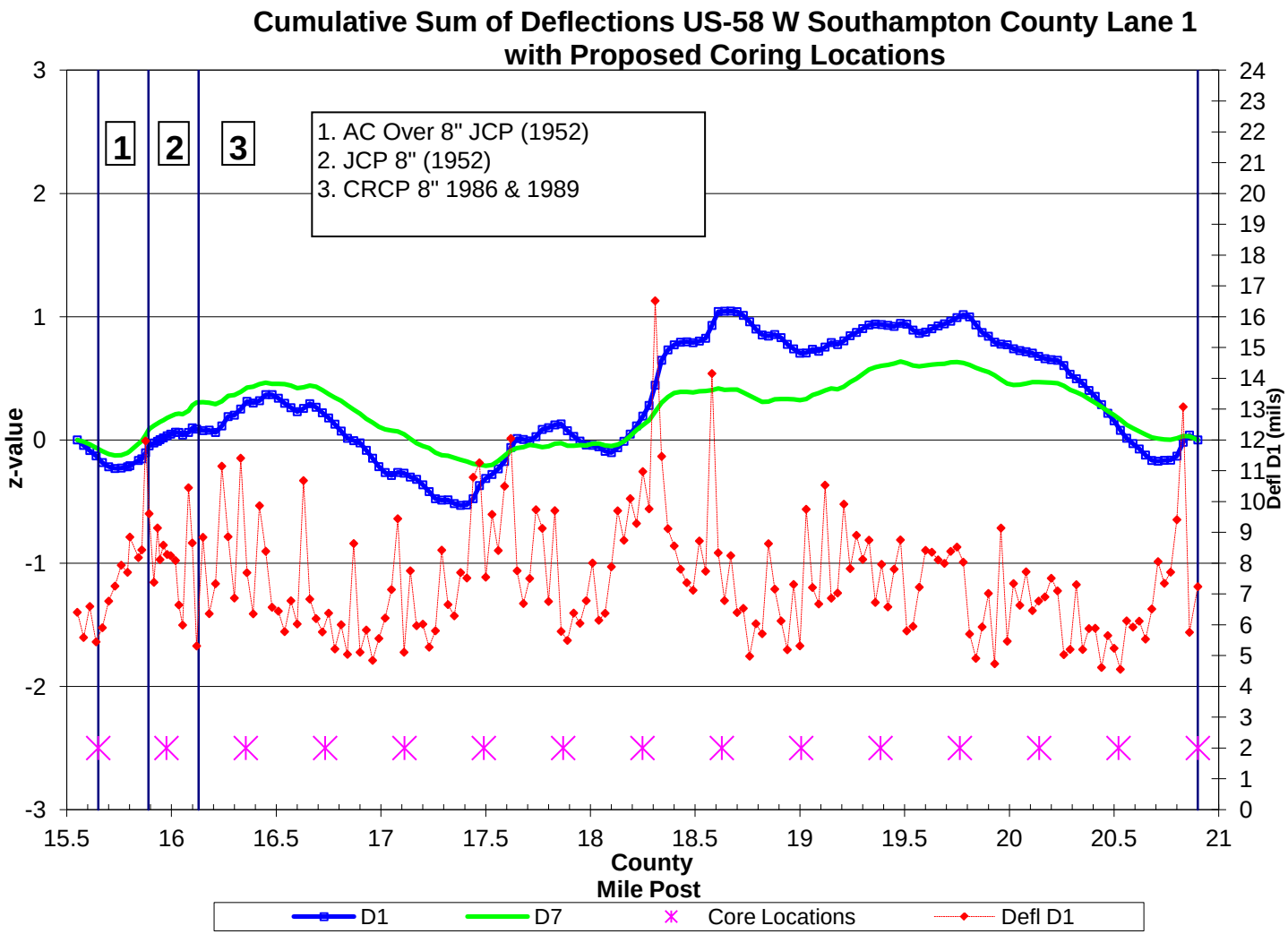
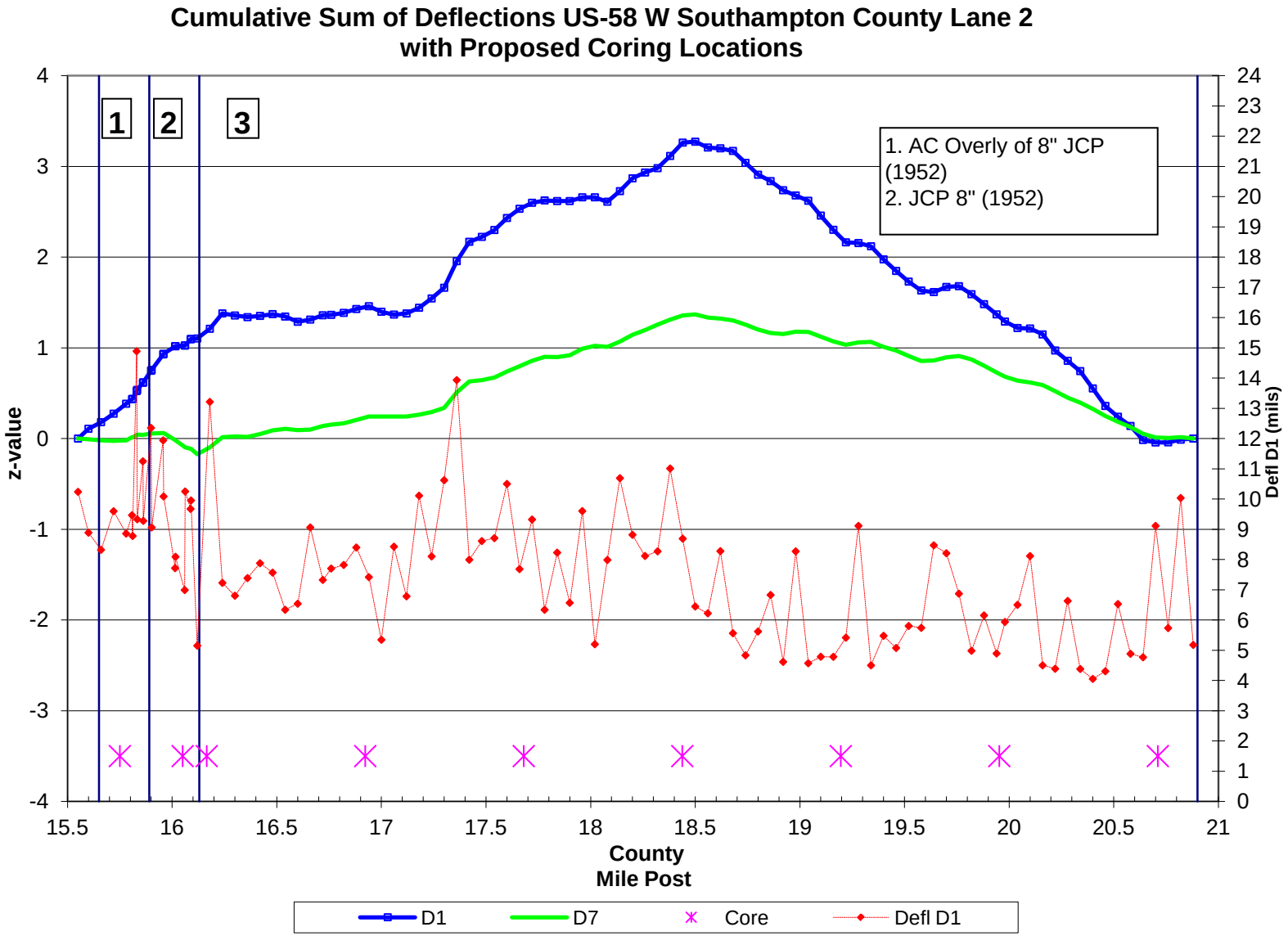
Pavement Evaluation

- Condition & Patching Surveys
- FWD Testing

Pavement Evaluation



Pavement Evaluation



Pavement Evaluation

- Condition Surveys
- FWD Testing
- Cores and Compressive Strength Testing

			Pavement Layer Thicknesses				
Core No	MP	Pavement Type	PCC	AC	CTA	GAB	SC
1.1	20.9	CRCP	7.5		6.25		
1.2	20.5	CRCP	8.5		7.25		
1.2S	20.5	AC Shoulder		8.25	7		
1.3	20.1	CRCP	8.25		6		
1.4P	19.7	CRCP Patch	8		6		
1.4	19.7	CRCP	8		5		
1.5	19.4	CRCP	8.5		7.5		
1.5S	19.4	AC Shoulder		5.25	7.5		
1.6	19	CRCP	7.75		7		
1.7	18.6	CRCP	8		5		
1.8	18.2	CRCP	7.75		6		
1.8P	18.2	CRCP Patch	8.5				
1.9	17.8	CRCP	8			6	8
1.9S	17.8	AC Shoulder		8			
1.10	17.5	CRCP	7.25		9.5		
1.11	17.1	CRCP	8.5		6		
1.11S	17.1	AC Shoulder		6.5	5		
1.12	16.7	CRCP	8.5		8		
1.13	16.3	CRCP	9.5		6		
1.14	15.9	JRCP Mesh	9.5				
1.15	15.7	Composite AC/JRCP	9.5	9.5			
1.15S	15.7	AC Shoulder		13			
2.1	20.7	CRCP	9.25		6.75		
2.1S	20.7	AC Turnlane		9.25			
2.2	19.9	CRCP	8.5		5		
2.2S	19.9	AC Shoulder		7.5	4.5		
2.3	19.2	CRCP	8		6.75		
2.4	18.4	CRCP	8.25			6	
2.4S	18.4	AC Shoulder		8.25		4	
2.5	17.7	CRCP	8		12		5
2.6	16.9	CRCP	7.75		6		
2.6S	16.9	AC Shoulder		7.75	4		
2.7	16.1	JRCP Mesh	8.5				
2.8	16	JRCP Mesh	8.5				
2.8S	16	AC Turn Lane		7.75	4.5		
2.9	15.7	Composite AC/JRCP	19	10.5			
2.9S	15.7	AC Shoulder		18			

Pavement Evaluation

Compressive Strengths

	Compressive Strength, psi	
Core No	Concrete	Stabilized Base
1.12	7,590	-
1.14	7,580	-
1.2	-	1,260
1.5	8,250	1,960
1.5S	-	890
1.6	-	964
1.9	7,310	-
2.1	-	1,820
2.6	8,330	3,310
Average	7,812	1,701

Pavement Evaluation

- Condition Surveys
- FWD Testing
- Cores and Compressive Strength Testing
- Soil Borings

Hole No.	MP	Sample Jar Depth	SPT Blow Count	N-Value	USCS (Visual -Manual)	Moisture Content (%)
1.1	20.9	0-2	3-5-6-5	11	CL	20.3%
		0-2	3-5-6-5	11	CL	17.4%
		2-4	4-5-8-8	13	CH	20.3%
		4-6	5-8-9-10	17	CH	25.4%
1.4	19.7	0-2	3-4-6-9	10	CL	19.2%
		0-2	3-4-6-9	10	SP	18.9%
		2-4	5-5-5-6	10	SC	17.9%
		4-6	3-3-3-5	6	SP-SC	19.6%
1.7	18.6	0-2	2-3-4-4	7	SP-SC	17.7%
		0-2	2-3-4-4	7	CH	27.0%
		2-4	4-4-4-4	8	CH	25.3%
		4-6	3-3-3-4	6	CH	25.2%
1.10	17.5	0-2	3-4-5-7	9	CH	23.0%
		2-4	7-5-7-6	12	SC	21.7%
		4-6	4-3-4-4	7	SC	25.3%
1.13	16.3	0-2	8-9-10-10	19	SP	
		0-2	8-9-10-10	19	SP	8.8%
		2-4	8-5-4-4	9	SP	13.8%
		4-6	3-3-4-5	7	SC	20.1%
1.15	15.7	0-2	8-8-8-11	16	SP-SM	
		2-4	11-22-18-13	40	SW-SM	
		2-4	11-22-18-13	40	SP	10.4%
		4-6	8-3-4-4	7	SP	22.2%
		4-6	8-3-4-4	7	SP	16.3%

Design/Construction Considerations

Existing Elevations

Maintenance of Traffic

Right of Way (ROW)

Environmental

Drainage

Existing Road/Shoulder Widths

Pavement Evaluation

Based on Pavement Evaluation and constraints, divided project into 3 sections:

- **4-inch bonded overlay (2.58 miles long)**
- **7-inch unbonded overlay (2.21 miles long)**
- **11-inch plain jointed concrete (0.30 miles long)**

Design/Construction Considerations

4-inch Bonded Overlay

- Takes advantage of slightly better condition of segment
- Successful application on other high truck volume roadways
- Resulting change in grade comparable with application of asphalt overlays
- Not a good option if pavement is in very poor condition

Design/Construction Considerations

7-inch Unbonded Overlay

- Reduced amount of pre-overlay repairs required
- Can be effectively used on pavements in poor to very poor condition
- Successful applications in other states
- Resulting change in grade comparable to break and seat with asphalt overlay
- Used 9.5mm PFC as bond breaker

Design/Construction Considerations

11-inch Plain Jointed Concrete

- Maintains current grade at intersection with adjoining businesses
- Facilitated tie-in to existing asphalt surfaced pavement

Design/Construction Considerations

For designs used 1993 AASHTO Pavement Design Guide with design inputs from VDOT's Materials Manual of Instructions (MOI), Chapter IV – Pavement Design and Evaluation.

Questions