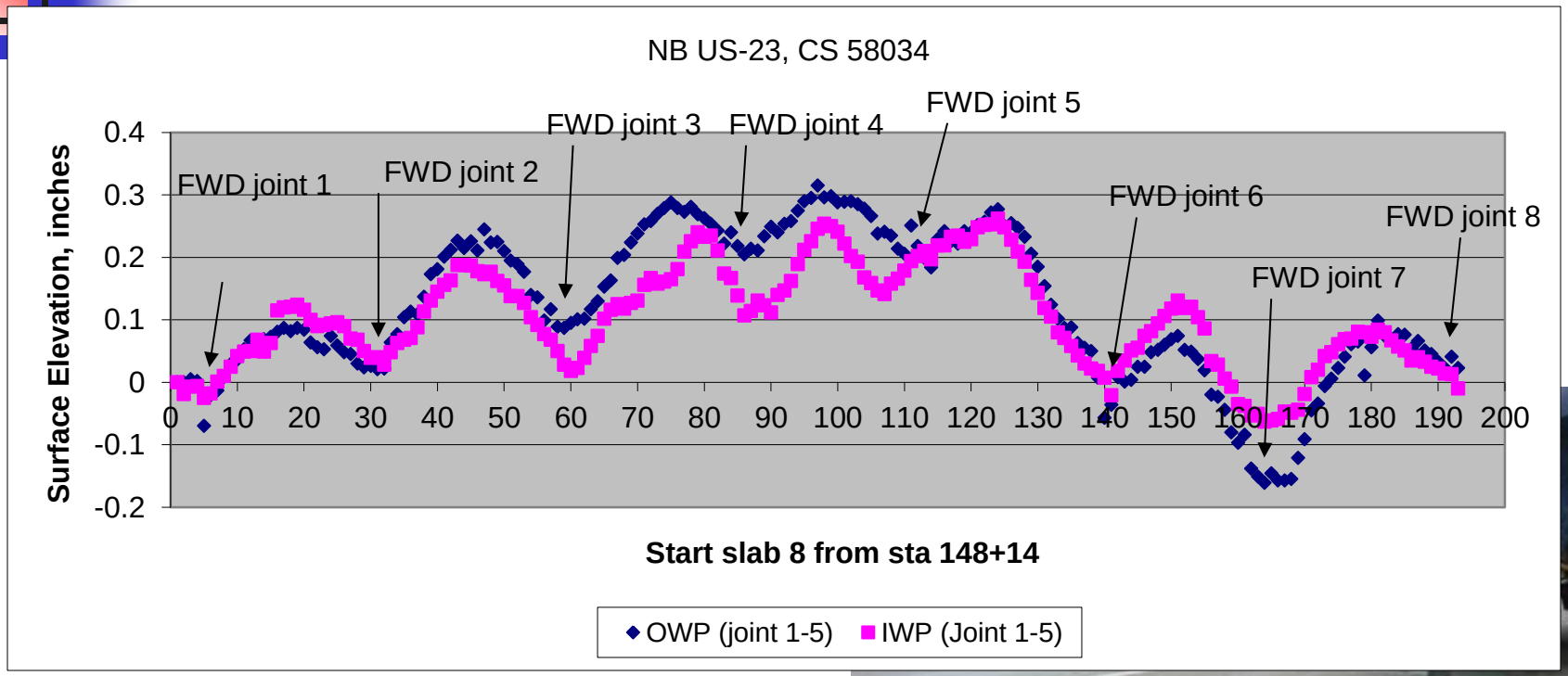
Preventive Maintenance of Rigid Pavements using High Density Polyurethane Foam for Slab Jacking and Stabilization

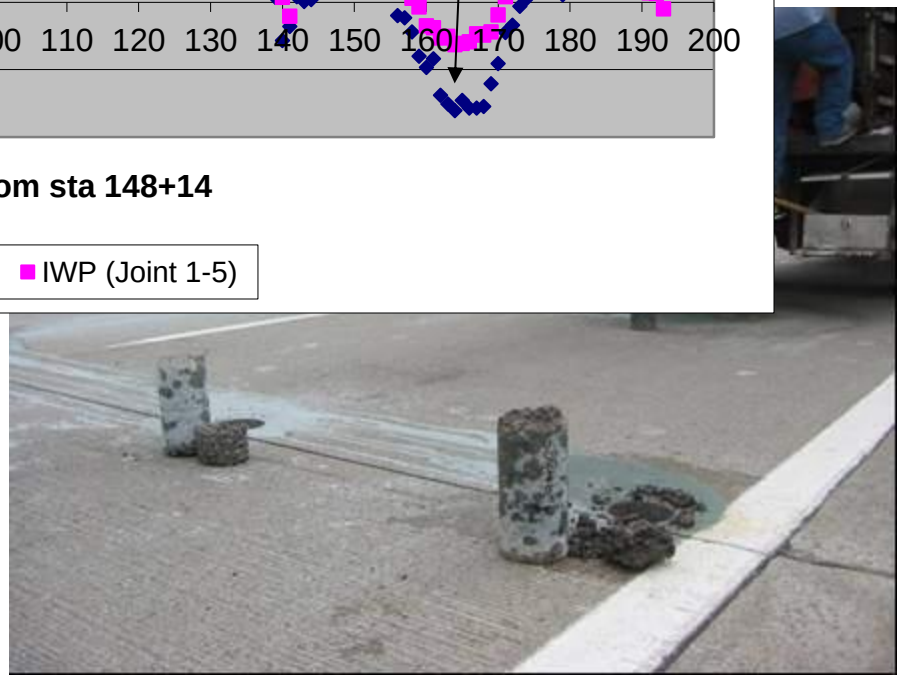
Michigan Department of Transportation
Emerging Technology

Pavement investigation tools that were used for project selection

- Falling Weight Deflectometer (FWD) testing
- Pavement profiling
- Coring at select locations determined by non- destructive testing results

NB US-23 Test Section
Surface Profile showing joint Settlement





WB I-94, CS 82021, Belleville, 27 Ft JRCP; 11 inch Concrete; 4 inches CTB

Mid-panel top down cracking starts after a level of joint settlement occurs

Polyurethane Stabilization as a Preventive Maintenance Strategy

- Experimental polyurethane joint stabilization was done by MDOT at a few joints in 2007
- More experimental stabilization techniques were completed in 2009 to refine the process
- FWD tests were run prior to joint stabilization and shortly after work was completed
- Lower deflections and higher load transfer effectiveness was recorded along the outside edge of pavement after the joint stabilization

FWD testing will be done annually to monitor changes in deflections for US-23 NB Asphalt Stabilized OGDC Polyurethane Joint Treatment

FWD results before and after stabilization

Station Reference	Impact #	Load lbf	Test Point	Test Type	Prefoam D0 Deflection (mils)	Postfoam D0 Deflection (mils)	Percent Change
202	2	7000	TJT	BJT	8.53	3.77	-56%
202	3	9000	TJT	BJT	10.46	4.85	-54%
202	4	12000	TJT	BJT	13.26	6.71	-49%
202	5	9000	TJT	BJT	10.59	4.89	-54%
203	2	7000	TJT	AJT	8.99	3.78	-58%
203	3	9000	TJT	AJT	11.02	4.88	-56%
203	4	12000	TJT	AJT	13.71	6.8	-50%
203	5	9000	TJT	AJT	11.22	4.95	-56%
229	2	7000	TJT	BJT	9.73	3.39	-65%
229	3	9000	TJT	BJT	12.05	4.48	-63%
229	4	12000	TJT	BJT	15.3	6.14	-60%
229	5	9000	TJT	BJT	12.49	4.49	-64%
230	2	7000	TJT	AJT	9.78	3.91	-60%
230	3	9000	TJT	AJT	11.95	5.06	-58%
230	4	12000	TJT	AJT	15	7.06	-53%
230	5	9000	TJT	AJT	12.31	5.12	-58%
244	2	7000	MID	NA	3.69	10.06	173%
244	3	9000	MID	NA	4.99	13.19	164%
244	4	12000	MID	NA	6.71	17.51	161%
244	5	9000	MID	NA	5.03	13.42	167%
256	2	7000	TJT	BJT	6.06	3.81	-37%

Conclusions

- FWD and pavement profiling are important tools for predicting pavement distress and planning rigid pavement preventive maintenance

- Polyurethane joint stabilization shows promise as a preventive maintenance strategy for delaying top-down cracking in jointed concrete pavement

Emerging Technology Projects

- One project has been awarded and will be completed in the spring on I-94 near Jackson, MI.

- Another project is in the design phase for construction next year on US-23 near Flint, MI.

Slab jacking on M-6 near Grand Rapids