



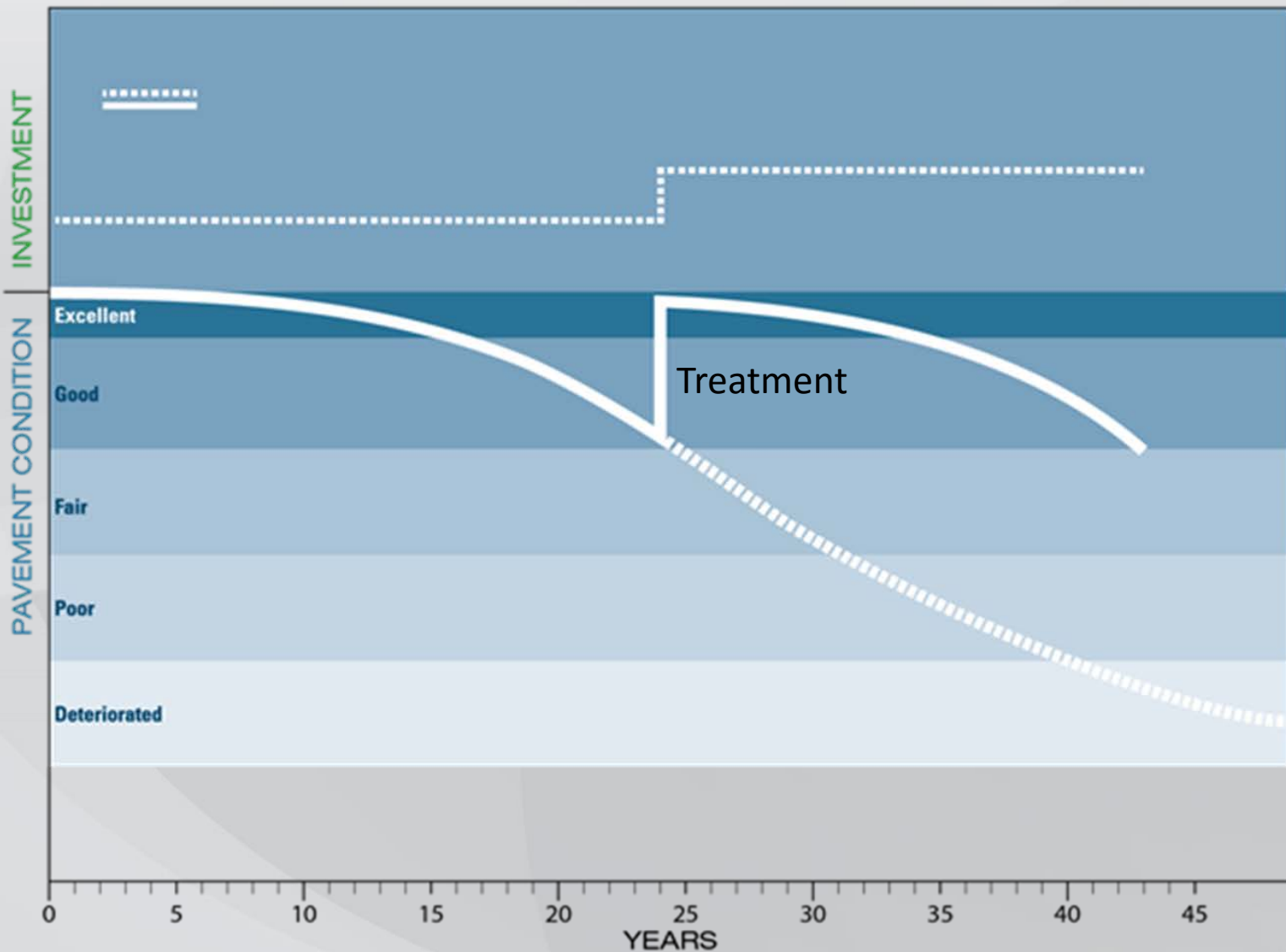
PCC Rehabilitation US 30 in Denison

Shane Tymkowicz

November 28, 2018

Municipal Streets Seminar

Keep Good Roads in Good Shape



OPENING UP THE TOOL BOX

RIGHT TREATMENT AT RIGHT TIME

- FULL DEPTH PATCHING
- PARTIAL DEPTH PATCHING
- DOWEL BAR RETROFIT
- DIAMOND GRINDING
- COMBINE COMPLIMENTARY TREATMENTS
- WINDOW OF OPPORTUNITY

National Concrete Pavement
Technology Center



September 2014

Second Edition

CONCRETE PAVEMENT PRESERVATION GUIDE



U.S. Department of Transportation
Federal Highway Administration

FHWA Publication No. FHWA-HIF-14-014

Full Depth Patching



Partial Depth Patching

- Damage less than $\frac{1}{3}$ Pavement Depth

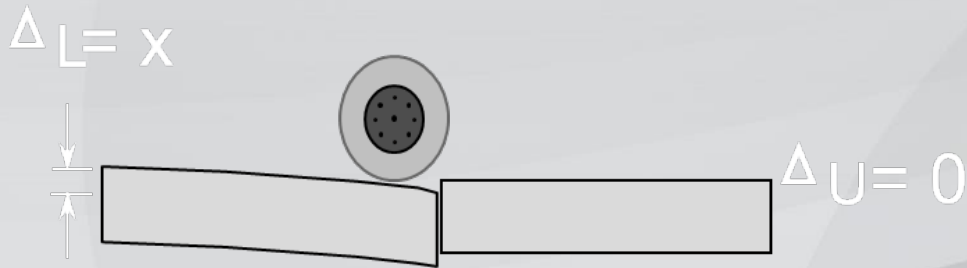


Partial Depth Repair

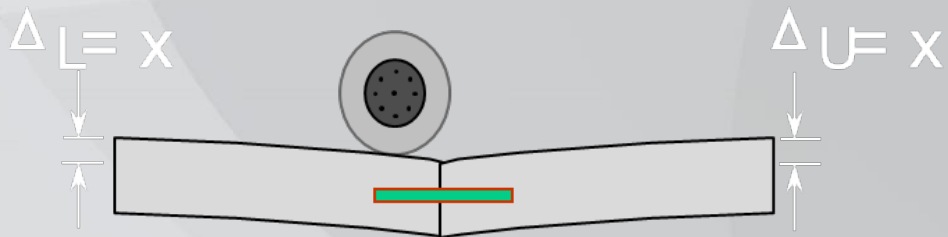


Dowel Bar Retrofit

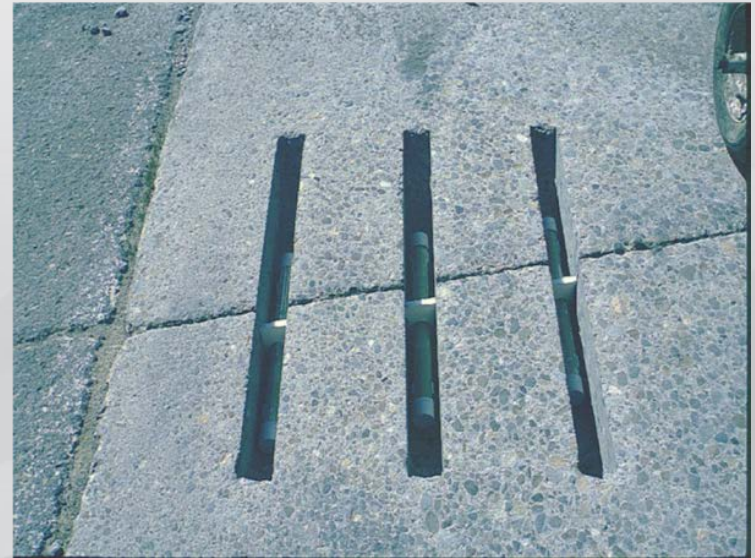
- Load Transfer
- Faulting



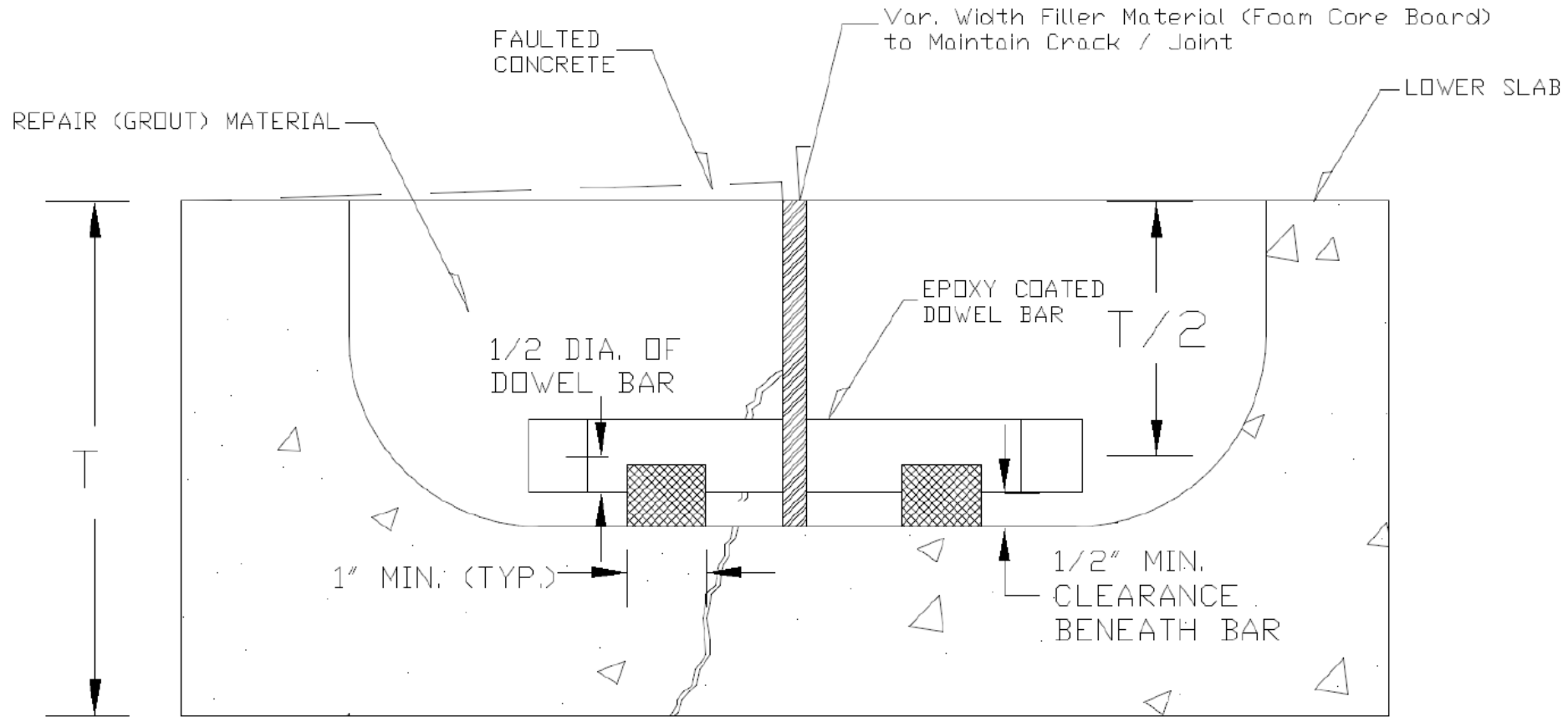
Load Transfer = 0% (Poor)



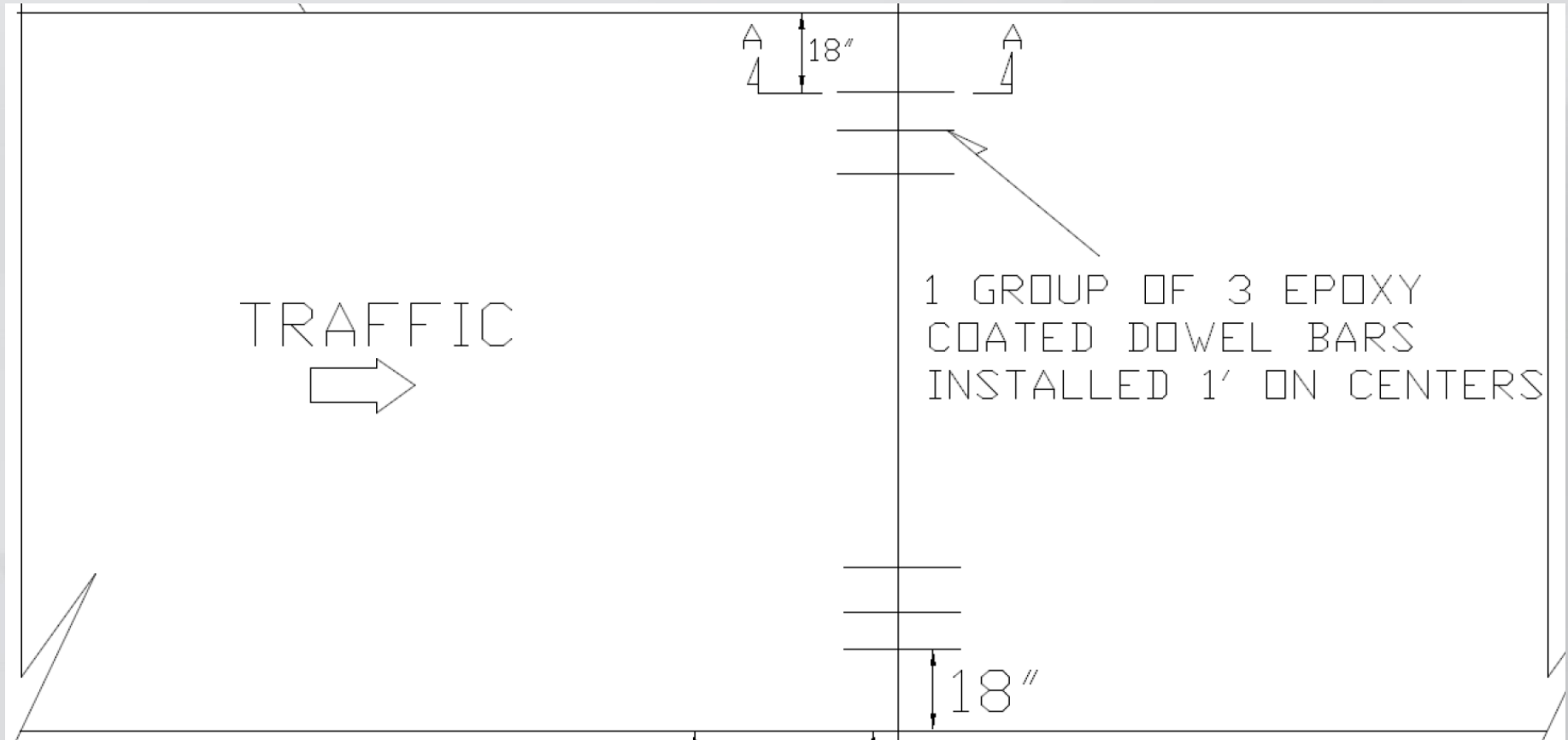
Load Transfer = 100% (Good)



Dowel Bar Typical



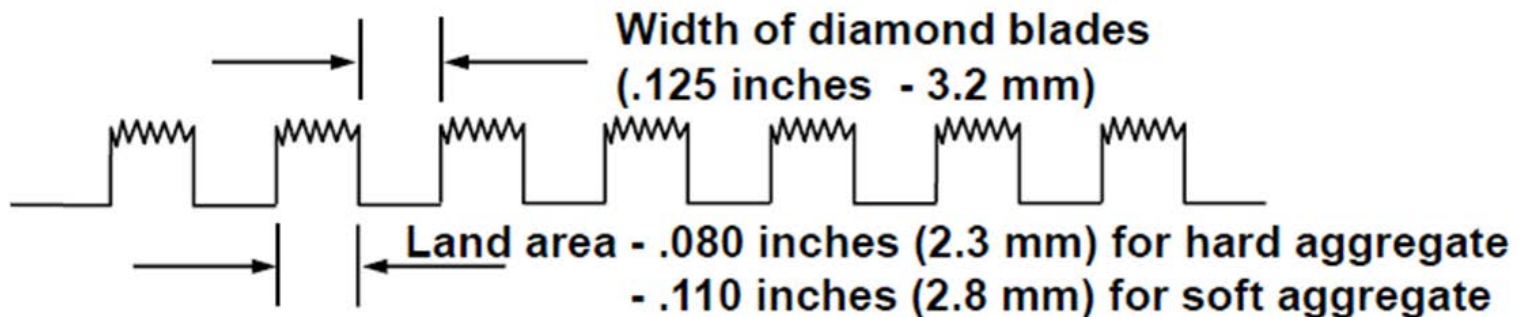
Dowel Bar Retrofit Spacing



Diamond Grinding



Diamond Grinding



US 30 Denison



9500 ADT 12% Trucks
4 Lane Undivided
1.1 Miles in Length
Business Corridor for Denison



A Project Concept

Traffic & Pavement

- Traffic/Capacity
- Pavement Condition & Treatment
- Safety
- Drainage
- Costs
- Asset Management

Life Cycle Analysis

- Right Treatment
- Right Time
- Pavement Spoke
- No Complex Cost Analysis

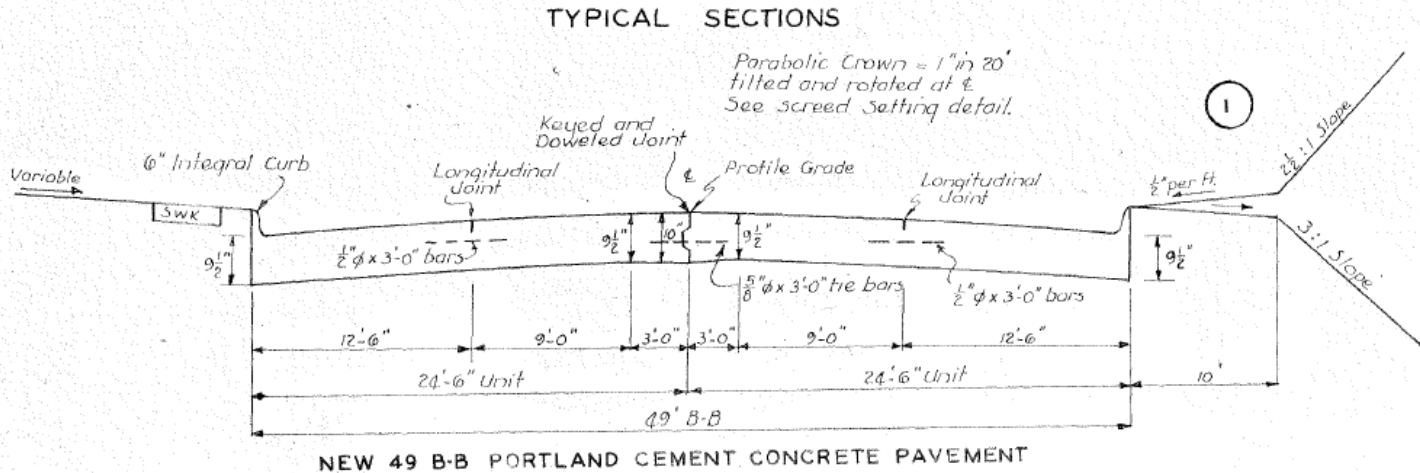
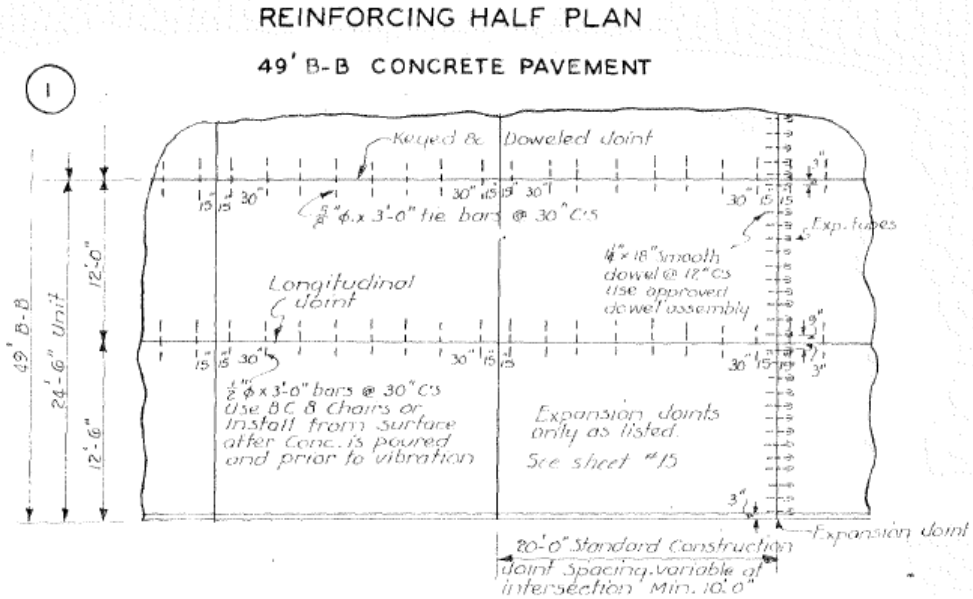
US 30 - Considerations

- Aging 1958 10" PCC Pavement
- Had considered doing something due to roughness for over a decade
- Rough Ride since 1980s
- Low Friction (Safety)
- Drainage
- Access and Staging (Business Corridor)
- Costs (\$\$\$)



Pavement History

- 1958 & 1962
 - No Load Transfer
 - 9.5 & 10 Inch
- Durable Aggregate



Sta. 876+50 to Sta. 879+68.4 variable width pavement - No curb
 Sta. 879+68.4 to Sta. 884+15.6 2-24'-6" Units with 4" Conc. fill-in area (See Sheet No. 4A)
 Sta. 895+19.3 to Sta. 930+06.8 See typical Section above.



Pavement Condition

- Joint Spalling
- Corner Cracks
- Low Friction
- Lots of Good Slab
- Durable Aggregate
- Past Patching



Low Friction/ Polished Aggregate



Pavement Condition



Pavement Condition



IRI Over Time

Year	IRI	Year	IRI
2005	265	2012	277
2006	265	2013	267
2007	256	2014	267
2008	256	2015	273
2009	277	2016	277
2010	277	2017	277
2011	277		

Over 170 IRI is Poor by FHWA Definition



PCI Movement

Year	PCI
2012	33
2013	27
2014	39
2015	39
2016	19
2017	18

PCI – 40% IRI, 40% Cracking & 20% Faulting



Rehabilitation vs Reconstruction

Rehabilitation

- Concept Cost \$1 Million
- Maintain Traffic
- Maintain Access
- Shorter Construction
- Minimal City Costs
- Minimal Utility Impacts
- District Design
- Lots of Pavement Life

Reconstruction

- Estimated at \$5 Million
- Complex Staging
- Business Access a Challenge
- Full Construction Year
- City Costs Higher
- High Utility Impact
- Central or Consultant Design

Rehabilitation vs Reconstruction

Rehabilitation PCC

- Concept Cost \$1 Million
- Maintain Traffic
- Maintain Access
- Shorter Construction
- Minimal City Costs
- Minimal Utility Impacts
- District Design
- Lots of Pavement Life
- *Drainage*
- *Load Transfer*
- *Knowledge/Fear*

Rehabilitation HMA

- Concept Cost \$0.9 Million
- Maintain Traffic
- Maintain Access
- Shorter Construction
- Minimal City Costs
- Minimal Utility Impacts
- District Design
- Lots of Pavement Life

Concept to Reality

- Concept Estimate - \$1.0 Million
 - Added Contingency for Small Project
 - Over Estimated Cost of Grinding Gravel
 - Estimated \$10/sy actual was \$5/sy
 - Over Estimated Cost of Dowel Bar Retrofit
 - Estimated \$50 actual was \$33
- Letting Cost - \$581 Thousand
 - Added Extra Patching
 - \$200 Thousand
 - Grinding & Small Quantity Concerns not Realized
- Final Project Costs - \$800 Thousand (\$2.80/sf)



Patching and Dowel Bar Retrofit



After Grinding



Diamond Grinding Equipment



Pavement After Grinding



Results of Diamond Grinding

- IRI Before – 294.8 inches/mile
 - Note 2017 Data was 277 inches/mile
- IRI After – 116.7 (115 < 45mph)
 - Intersections & Drainage
- PCI Before – 18 (Very Poor)
- PCI After* - 87 (Good)

*Estimated – Next collection cycle 2020



Other Thoughts and Advice

- Invest in Patching
 - Full Depth vs Partial
 - Over Estimate Quantities
- DBR & Partial vs Full Depth
- Once and Done

Partial Depth 3 times the cost
of Full Depth

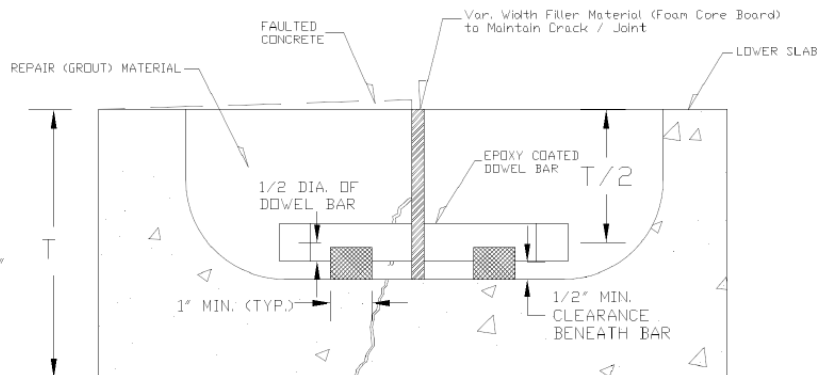
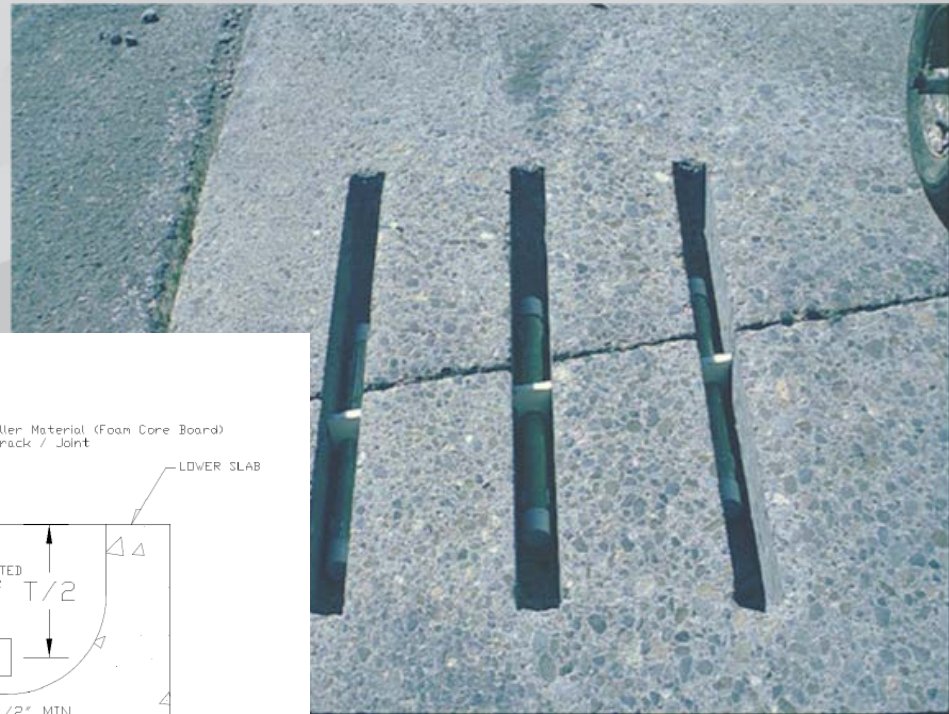


Know Your Pavements – DBR

Pavement Investigation

Need Solid Pavement at Joints

- Patching (Previous Maintenance)
- Coring
- Construction History
- Aggregate Durability



STA 877+70-887+40, T=10'
STA 887+40-935+25, T=9.5'



The Future for District 3

Denison – Measure new IRI & PCI

- Significant Improvement in PCI & IRI
- Monitor Changes over Time
- Include Information in Asset Management

Looking at Additional Locations

- Primghar
- Manning
- Other Urban Area(s)

Asset Management - LCCA



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