Case Study on Friction Management

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Introduction

- Federal Mandate
  - “Every State shall have a program of design, construction and maintenance to improve highway safety.”
- Frictional Management
- Department Responsibility
  - Wet Surface Crash Reduction Program

TxDOT Responsibility

- Skid Data Collection (Macrotexture)
- Aggregate Selection (Microtexture)
- Wet Surface Crash Analysis
- Safety Projects and Cost Effective Treatments

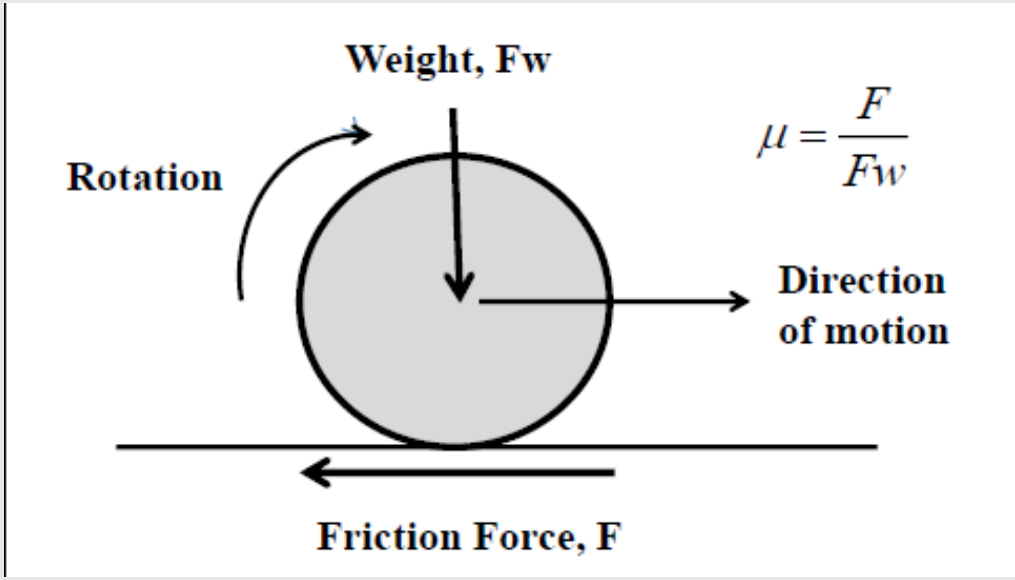
Skid Data Collection (Macrotexture)

- Locked Wheel Skid Truck ASTM E-274

Skid Data Collection

- Smooth Tire (ASTM E-528)
- Speed 50 mph (SN50)
- Sample Size
  - 50 percent of the interstate
  - 25 percent of all other systems
  - Recently completed projects identified by districts

Skid Number



The skid number equals the horizontal tractive force divided by the vertical load, multiplied by 100.

Skid Number

Interpreting Skid Number

Category	Definition
Blue	Mean and Above
Green	-0.5 - 0.0 Std. Dev.
Yellow	-1.0 - -0.5 Std. Dev.
Orange	-1.5 - -1.0 Std. Dev.
Red	Less Than -1.5 Std. Dev.

Aggregate Selection (Microtexture)

Aggregate Selection (Microtexture)

- Rainfall (inches per year)
- Traffic volume (ADT, vehicles per lane, etc.)
- Posted speed
- Geometrics (both number and severity of horizontal and vertical curves, super elevation, etc.)
- Frequency of vehicle stops (driveways, crossroads, etc.)

Aggregate Selection

- Amount of cross traffic
- Amount of truck traffic (percent, number ESALs)
- Surface texture (rough, smooth, etc.)
- Drainage characteristics (cross slope, ponding, rutting, etc.)
- Visibility restrictions (sight distance)
- Crash history

Friction Demand

Demand for Friction	Low (1)	Medium (2)	High (3)	Designer's Rating (1,2, or 3)
Rainfall (in./yr.)	≤20	>20 ≤40	>40	
Traffic (AADT)	≤5,000	>5,000 ≤15,000	>15,000	
Posted Speed (mph)	≤35	>35 ≤60	>60	
Truck (%)	≤8	>8 ≤15	>15	
Vertical Grade (%)	≤2	>2 ≤5	>5	
Horizontal Curve	≤3°	>3° ≤7°	>7°	
Driveways (per mi.)	≤5	>5 ≤10	>10	
Intersecting Roadways (ADT)	≤500	>500 ≤750	>750	
Wet Surface Crashes (%)	≤5	>5 ≤15	>15	
Summary of Total Friction Demand				

Available Friction

Available Friction	Low (1)	Medium (2)	High (3)	Designer's Rating (2, 5, or 8)
Cross Slope	≤2%	>2% ≤3%	>3% ≤4%	
Surface Design Life (yrs.)	>10	>5 ≤10	<5	
Micro-texture of Proposed Surface	Fine Examples: HMAC Type D or HMAC Type F	Medium Examples: Microsurface HMAC Type C, CMHB, Superpave	Coarse Examples: Seal Coat, PFC, NovaChip, SMA	
Aggregate Micro-texture	SAC C	SAC B	SAC A	
Summary of Total Available Friction				

Does the total available friction equal to or exceed frictional demand?

Wet Surface Crash Analysis

- Identification of Wet Surface Crash Sites
  - Wet Surface to Total Crash Ratio
  - Rural Roadway Section - Three (3)
  - Urban Roadway Section - Six (6)
- Wet Surface Crash Site Review

Wet Surface Crash Analysis

- Office Review Process
- Field Review Process
  - Site evaluation
  - Resulting actions and recommendations

Wet Surface Crash Site Review

- Rutting or wheel path channelization
- Build up on shoulder edges
  that causes ponding on the road surface
- Bleeding of pavements

Wet Surface Crash Site Review

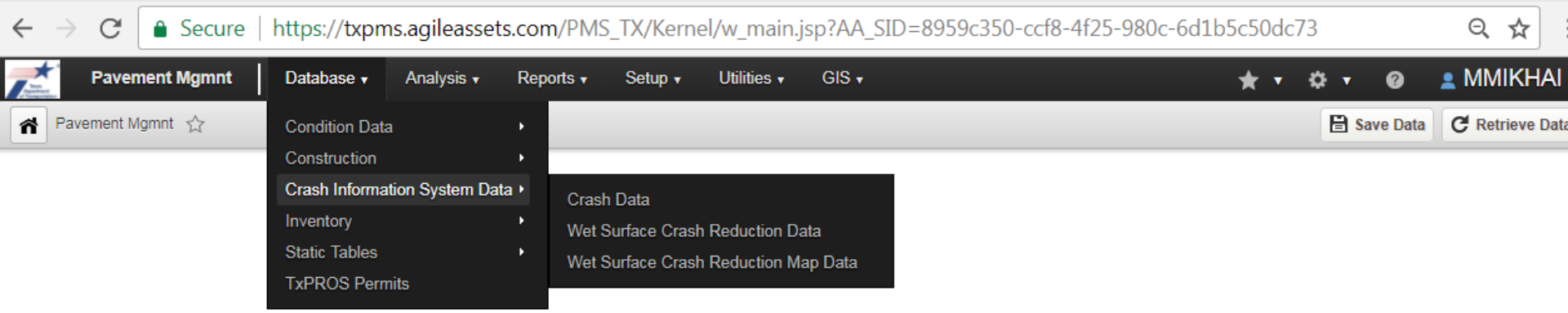
- Drainage issues that result in water on the pavement
- Geometrics (grade & curvature)
- Traffic flow interactions (intersections, ramps, access drives)

Low Friction Treatments

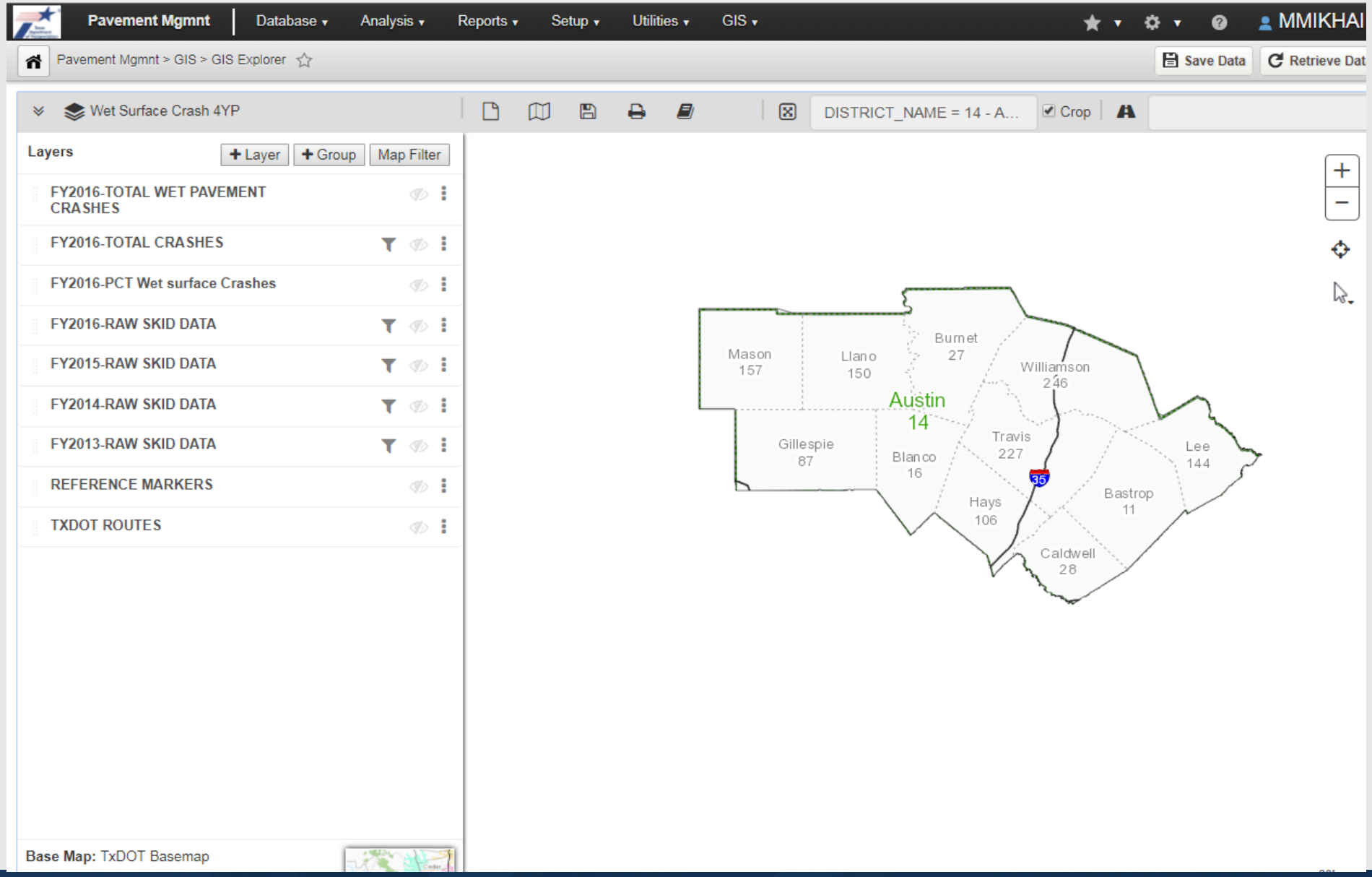
- Re-surface
  - Overlays (PFC, SMA, Ultra Thin Bounded Overlay, TOM mix
  - Chip Seal/Seal Coat
  - Microsurfacing

- Re-texture
  - Grinding & Grooving
  - Skid Abrador

Wet Surface Crash Analysis Data in PA

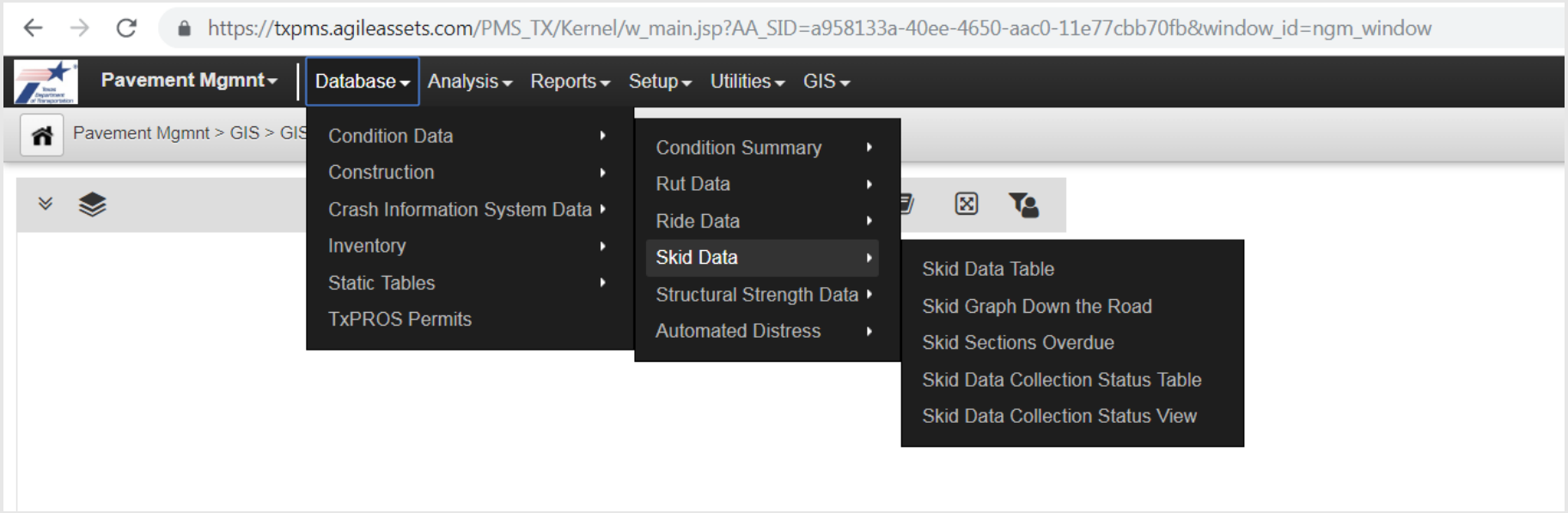


Wet Surface Crash Analysis in PA



PA Skid Data and Report

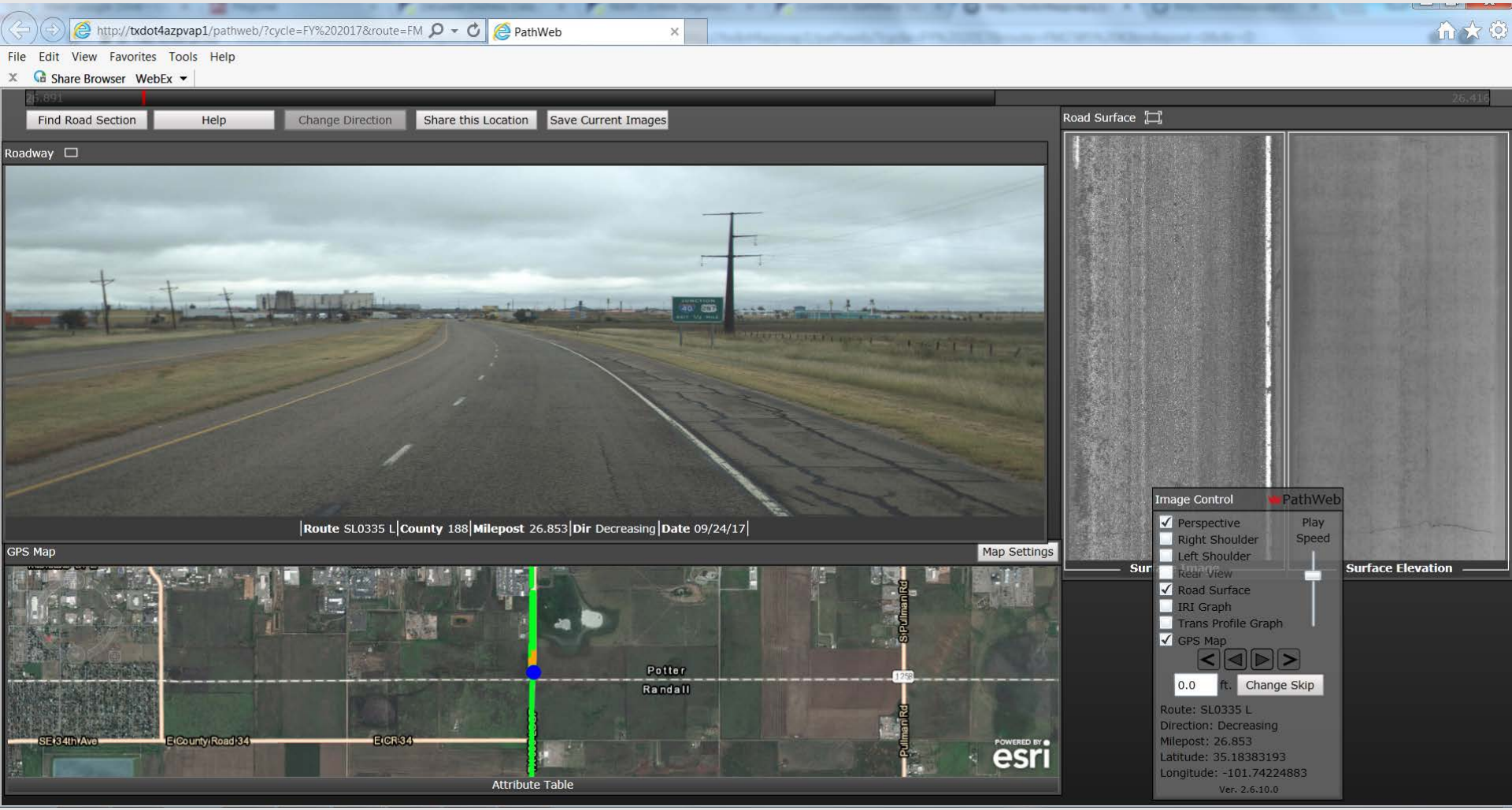
- Skid Data Table



- Critical Value Ratings and Scores Report

MSEC	HIGHWAY	RDBD	REFERENCE MARKERS BEGIN		END		PAVE TYPE	RUT AUTO SHAL	RUT AUTO DEEP	PAT	FAL	BLK	ALG	LNG	TRN	RAV	FLU	ADT (RDBD)	18K (K)	MAINT COST (K)	DATE LAST SURF	PMIS SCORES DIS	RIDE	SSI	SN	CON
03	[redacted]	K1	0228	+00.5	0228	+01.0	5	2	0	0	0	0	0	3	0	0	0	4760	3443	5		100	4.4		23	100
03	[redacted]	L1	0220	+00.0	0220	+00.5	5	19	1	0	0	0	6	1	0	3	3	1951	1552	3		77	3.3		20	77
03	[redacted]	L1	0222	+01.0	0222	+01.5	5	5	4	10	0	0	3	0	0	2	3	2161	1498.5	3		89	3.3		15	89

PathWeb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File Edit View Favorites Tools Help
Share Browser WebEx
Find Road Section
Help
Change Direction
Share this Location
Save Current Images
Roadway
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GPS Map
Map Settings
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Randall
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E County Road 34
E CR 34
S Pullman Rd
Pullman Rd
POWERED BY esri
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Surface Elevation
Image Control
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Perspective
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Left Shoulder
Rear View
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IRI Graph
Trans Profile Graph
GPS Map
Play Speed
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Longitude: -101.74224883
Ver. 2.6.10.0

Skid Data With 4 Year Projects