



# STRUCTURAL PAVEMENT DESIGN

Using Recycled In-place Pavement Layers  
TxDOT Perspective

# Outline

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2	MODULUS 6.1 Structural Evaluation	8-15
3	FPS 21 Design - General	16-23
4	FPS 21 Design – Recycling Inputs	24-30
5	Issues & Gaps in Knowledge	31-32

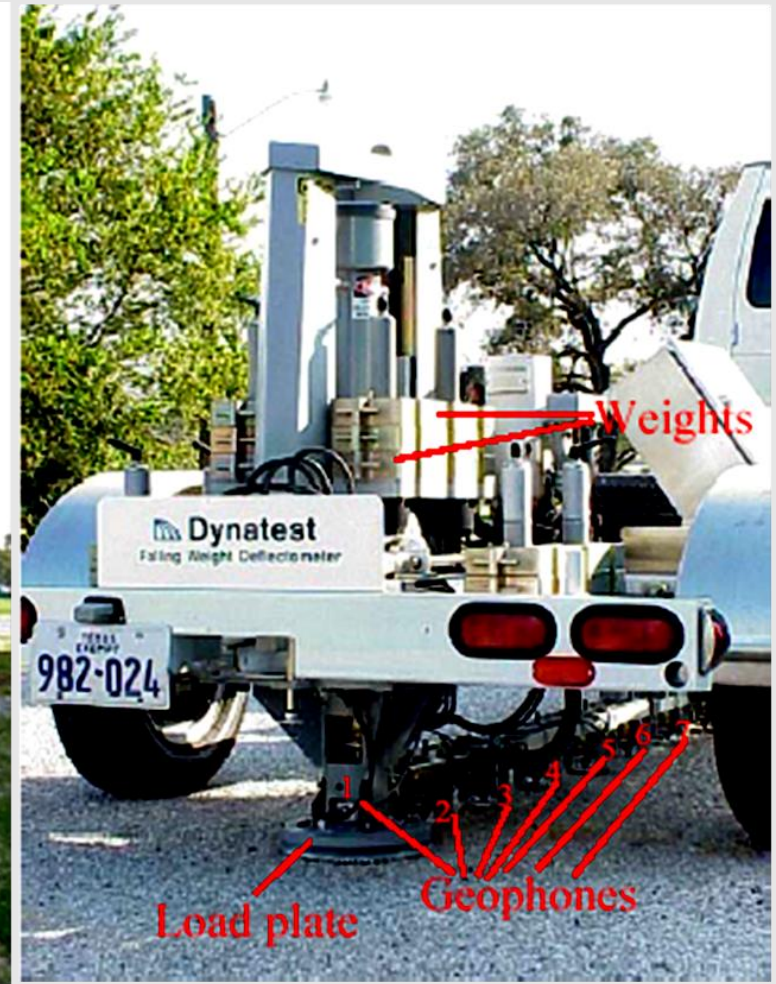
# Basic Design Concepts - 1

- TxDOT uses a rudimentary mechanistic-empirical design procedure where materials are characterized by their modulus and Poisson's ratio at a design temperature of 77F.
  - Current version of design software is FPS 21
  - Traffic Loading in terms of cumulative 18-kip ESALs
  - No environmental inputs
  - Performance equation tied to deterioration in SI, initial deflection index and cumulative traffic loading.

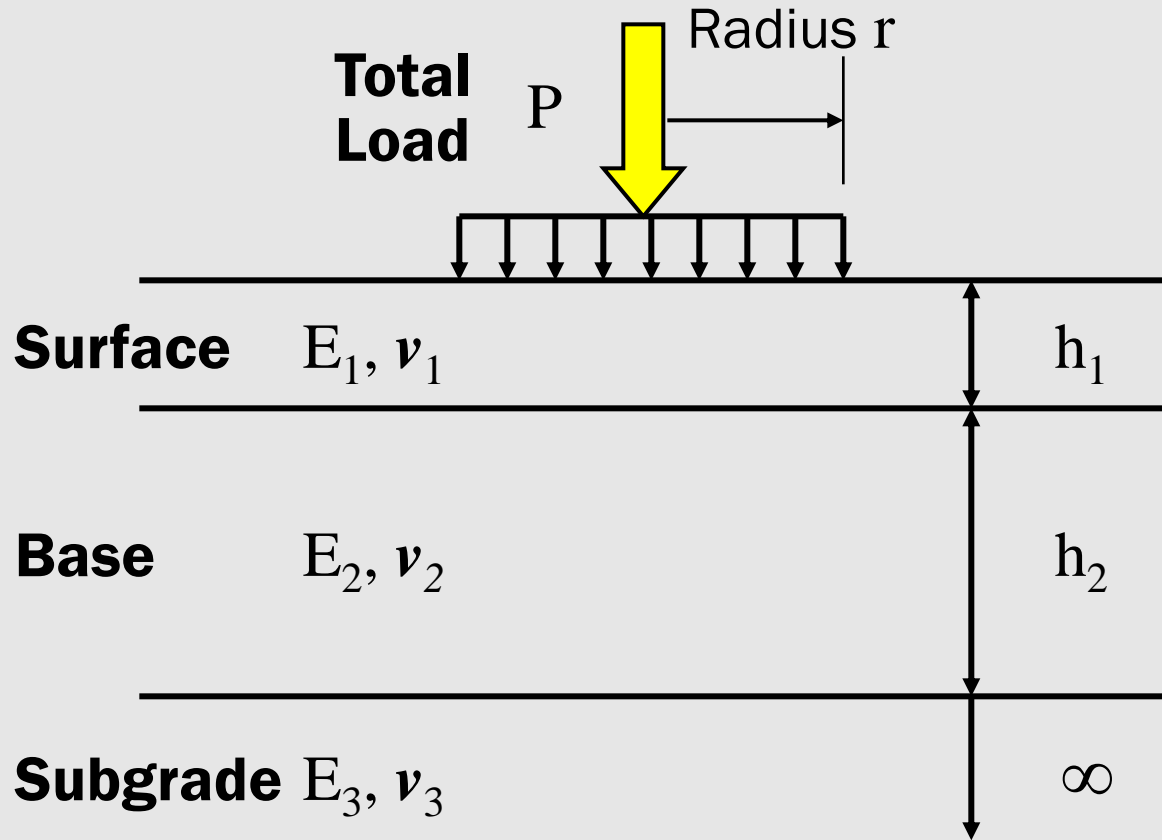
## Basic Design Concepts - 2

- The layer modulus is preferably acquired by back-calculation using measured deflections.
  - 9,000-lb dynamic load is imparted to the pavement surface to simulate truck wheel load (one-half of a standard 18kip axle)
  - MODULUS 6.1 is used to perform back-calculation
  - Average pavement layer thicknesses must be measured/assumed.

# The Falling Weight Deflectometer (FWD)



# Pavement Modeling (Elastic Layer Theory)



# Evaluate Existing Material Properties

- Other Non-destructive tests
  - GPR
  - DCP
- Field Samples:
  - Coring
  - Auguring/Spot Milling
  - Lab Tests (AC content, gradations, stabilization series, mix design)



## MODULUS

Windows 7 or Above

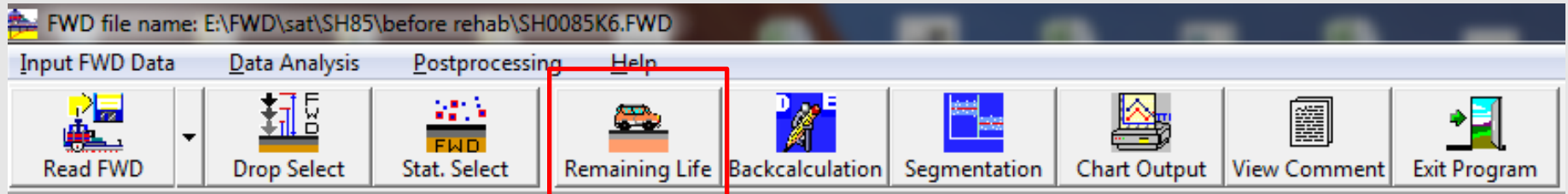
Version 6.1.0

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# MODULUS Remaining Life



**Remaining Life Analysis Screen**

Pavement

District: 15 San Antonio

County: 83 FRIO

Highway: SH 85

Month of FWD Test: 5

FWD Test Temp, Start (F): 90 End (F): 100

FWD Sensor Distance From Load Plate (in): 0.0 12.0 24.0 36.0 48.0 60.0 72.0

Pavement Survey

Number of Lanes: 2

ACP Thickness (in): 3

Average Rut Depth (in): 0.7

Alligator Cracking (%): 20.0

20 Year 18 KIPs (millions): 12

Run Exit

# Remaining Life Utility

- Use non-backcalculated indices to:
  - Make rough estimates of remaining life in terms of fatigue cracking and full-depth rutting
    - Need estimate of current distress
    - 20-year cumulative ESALs
  - Locate problematic layers
- A screening tool to determine level of rehabilitative effort



\*\*\*\*\*  
\* R E L A P S \*  
\*\*\*\*\*

TTI FLEXIBLE PAVEMENT DEFLECTION BASIN ANALYSIS PROGRAM

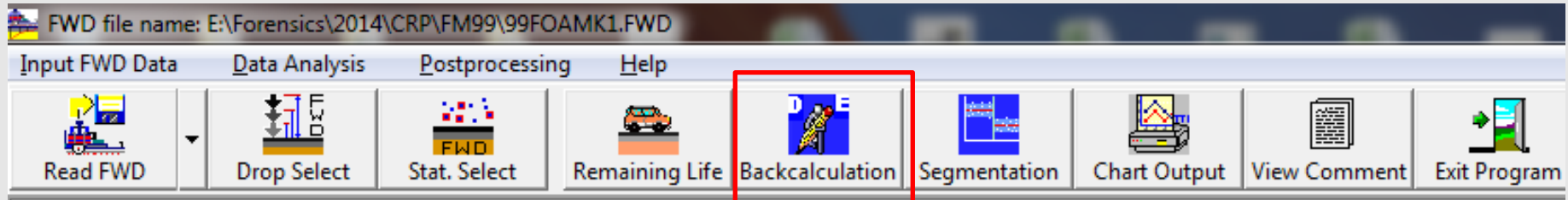
-----  
FWD TESTED FILE NAME : E:\FWD\sat\SH85\before  
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DISTRICT : 15--San Antonio ASPH. THICKNESS : 3.00  
COUNTY : 7--ATASCOSA MONTH TESTED : MAY  
HIGHWAY : SH DESIGN LOAD (lbs): 9000  
TEMPERATURE("F) start: 96.3 knd: 100.0 20 year 18 KIP(m): 12.00  
AVERAGE RUT DEPTH(in): 0.7 LANES : 2  
ALLIGATOR CRACKING : 20.0 % SENSORS: 0 12 24 36 48 60 72  
-----

STATION	** NORMALIZED DEFLECTION (mils) **					ASPH DESIGN		LAYER			REMAINING	
	R1	R2	R3	R4	R7	TEMP DEF	SCI MILS	UPR	LWR	SGR	RUT	CRK
3.101	53.38	24.66	9.01	4.75	1.80	96.3	22.00	VP	VP	PR	0-2	0-2
3.200	55.17	28.53	10.34	5.70	2.04	96.5	19.86	PR	VP	PR	0-2	0-2
3.300	57.84	30.14	12.02	6.31	2.20	96.7	20.56	VP	VP	VP	0-2	0-2
3.400	77.57	36.92	12.75	6.36	2.02	96.9	30.75	VP	VP	PR	0-2	0-2
3.500	28.70	12.71	4.94	2.28	1.03	97.1	12.23	MD	MD	GD	0-2	0-2
3.601	18.25	9.65	4.49	2.48	1.13	97.3	6.31	GD	GD	GD	0-2	2-5
3.701	58.13	28.73	11.88	6.09	2.72	97.5	21.89	VP	VP	VP	0-2	0-2
3.819	65.55	30.81	13.61	7.39	2.69	97.6	26.12	VP	VP	VP	0-2	0-2
3.901	61.31	31.70	13.63	7.80	3.04	97.8	21.70	VP	VP	VP	0-2	0-2
4.000	52.19	26.68	12.31	7.09	2.62	98.0	18.71	PR	VP	VP	0-2	0-2
4.100	41.24	25.34	13.19	7.85	2.86	98.2	10.81	MD	VP	VP	0-2	0-2
4.200	66.25	35.34	14.00	7.01	2.43	98.4	22.26	VP	VP	VP	0-2	0-2
4.300	59.86	30.93	12.83	7.00	2.80	98.6	20.99	VP	VP	VP	0-2	0-2
4.402	42.75	21.89	9.93	5.28	1.96	98.8	15.14	PR	VP	PR	0-2	0-2
4.500	74.47	28.63	9.05	4.60	1.85	99.0	35.04	VP	VP	PR	0-2	0-2
4.600	45.98	20.72	6.16	3.25	1.47	99.2	18.80	PR	VP	MD	0-2	0-2
4.700	23.80	10.44	3.43	1.82	0.85	99.4	9.96	GD	MD	VG	0-2	0-2
4.805	48.71	23.47	9.72	5.36	2.07	99.6	18.42	PR	VP	PR	0-2	0-2
4.900	47.29	23.56	9.28	4.79	1.77	99.8	17.12	PR	VP	MD	0-2	0-2
5.024	34.50	13.55	4.95	2.86	1.06	100.0	15.80	PR	MD	GD	0-2	0-2
MEAN:	50.65	24.72	9.88	5.30	2.02		19.22	PR	VP	PR		
STD DEV:	15.89	7.92	3.42	1.91	0.66		6.78					
COF VAR:	31.36	32.05	34.65	36.05	32.86		35.25					

-----  
\* 0~2:Failed 2~5:Problem 5~10:OK for Now 10+:Good

# MODULUS Backcalculation



**Modulus Input**

Distance to plate: 1: 0.0, 2: 12.0, 3: 24.0, 4: 36.0, 5: 48.0, 6: 60.0, 7: 72.0

Layer:  
 Two  
 Three  
 Four

Semi-Infinite

E4/Stiff Layer Ratio: 100.0

	Thickness (in)	Material	Asphalt Temp.
Surface	6	Asphalt	75.0
Base	12.00	Other Material	
Subbase	8.00	Other Material	
Subgrade	91.18	Other Material	

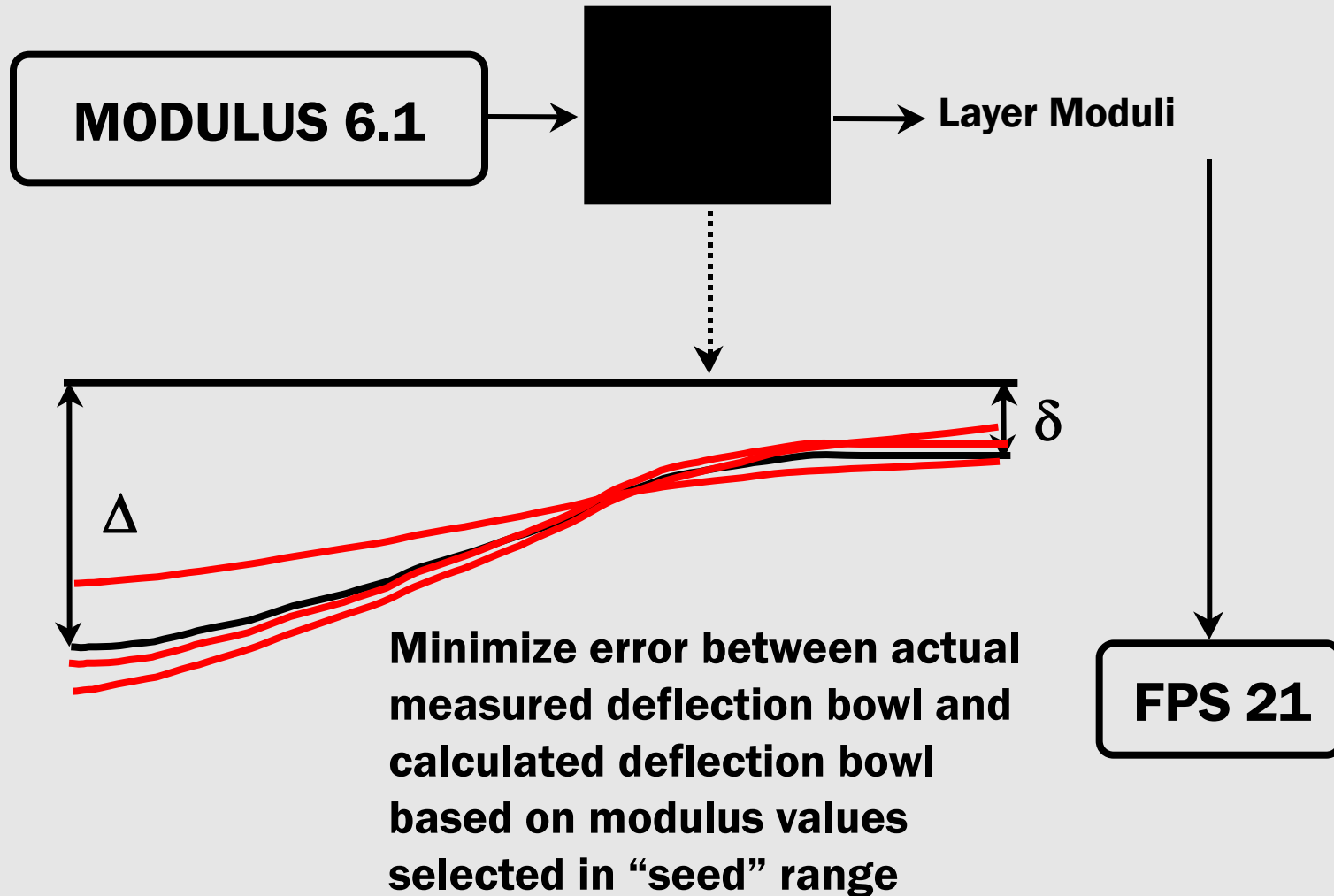
MODULI RANGE (ksi)

	Minimum	Maximum	Poisson's Ratio
Surface	250	1200	0.35
Base	75.0	2000.0	0.25
Subbase	25.0	75.0	0.35
Subgrade	Most Probable Value: 15.0		0.40

Set as default value

Exit Run

# Backcalculation Process





## TTI MODULUS ANALYSIS SYSTEM (SUMMARY REPORT)

(Version 6.1)

District:  
County :  
Highway/Road: 16149 fm0099

	Thickness(in)	MODULI RANGE (psi)		Poisson Ratio Values
		Minimum	Maximum	
Pavement:	6.00	250,000	1,200,000	H1: v = 0.35
Base:	12.00	75,000	2,000,000	H2: v = 0.25
Subbase:	8.00	25,000	75,000	H3: v = 0.35
Subgrade:	91.18 (by DB)		15,000	H4: v = 0.40

Station	Load (lbs)	Measured Deflection (mils):							Calculated Moduli values (ksi):				Absolute ERR/Sens	Dpth to Bedrock
		R1	R2	R3	R4	R5	R6	R7	SURF(E1)	BASE(E2)	SUBB(E3)	SUBG(E4)		
506.000	10,000	24.89	11.27	6.08	4.04	2.94	2.37	2.11	250.0	75.0	25.0	7.6	20.71	192.8 *
600.000	10,625	11.11	8.30	5.91	4.36	3.06	2.42	1.78	744.6	75.0	46.6	8.6	1.72	125.8 *
701.000	10,811	10.00	7.57	5.68	4.34	3.29	2.56	1.96	850.5	97.6	75.0	7.8	0.69	117.2 *
801.000	10,504	8.71	7.16	5.43	4.19	3.30	2.64	2.14	1200.0	139.4	50.0	7.5	1.90	169.5 *
903.000	10,384	10.81	8.15	5.63	4.35	3.46	2.46	2.03	709.3	75.0	75.0	7.6	1.90	95.9 *
1003.000	10,866	9.07	6.83	5.13	3.95	3.12	2.51	2.07	744.3	146.7	75.0	8.4	1.90	205.3 *
1104.000	10,745	9.51	7.49	5.77	4.37	3.31	2.54	2.02	1153.5	110.0	45.4	8.0	0.74	150.3
1206.000	10,734	8.30	6.95	5.50	4.27	3.28	2.50	1.89	1200.0	129.6	71.0	7.6	1.73	109.6 *
1310.000	10,877	6.76	5.94	4.49	3.87	2.98	2.36	1.77	1200.0	362.0	31.4	8.4	2.44	87.7 *
1404.000	10,471	9.28	6.93	5.43	4.07	3.06	2.38	2.20	650.2	167.9	36.3	8.7	1.38	180.5
1504.000	10,570	8.02	6.71	5.28	3.99	3.16	2.37	1.52	1200.0	144.9	64.8	7.9	1.92	79.6 *
1602.000	10,460	11.52	7.43	4.66	3.07	2.15	1.69	1.23	337.7	75.0	42.2	13.1	4.21	124.7 *
1724.000	10,263	12.43	6.91	4.48	2.87	1.95	1.43	1.17	250.0	75.0	35.1	14.8	3.32	109.1 *
1816.000	10,581	5.50	4.86	3.89	3.10	2.42	1.90	1.53	1200.0	508.5	25.0	10.2	2.44	136.5 *
1923.000	10,669	6.03	5.13	3.91	2.95	2.07	1.58	1.15	1200.0	211.9	41.1	13.3	3.91	111.5 *
2014.000	10,526	7.07	4.84	3.72	2.79	1.98	1.46	1.20	436.7	317.6	28.1	14.8	0.90	107.2
2101.000	10,723	8.04	5.58	3.88	2.74	1.98	1.43	1.07	783.8	100.4	75.0	14.3	0.64	101.1 *
2202.000	10,230	11.36	6.08	4.01	2.70	1.87	1.35	0.98	250.0	75.0	75.0	15.0	2.17	99.9 *
2302.000	10,811	6.79	5.03	3.85	2.89	2.17	1.68	1.28	1011.6	185.1	75.0	12.4	1.14	106.3 *
2402.000	10,800	7.41	5.37	4.02	2.91	2.14	1.72	1.25	903.4	145.5	75.0	12.5	2.26	178.5 *
2573.000	10,745	5.45	4.03	3.12	2.40	1.77	1.43	0.99	988.7	313.0	75.0	15.0	1.56	154.8 *
2700.000	10,450	9.23	7.19	5.48	4.16	3.15	2.39	1.85	925.4	136.6	33.5	8.5	0.68	124.8
2801.000	10,329	7.63	5.29	3.73	2.66	1.82	1.30	1.08	654.3	152.2	28.4	16.0	0.79	96.6
2952.000	10,592	8.09	6.30	4.42	3.16	2.29	1.76	1.40	1200.0	99.5	44.2	12.1	2.27	142.9 *
3099.000	9,803	6.59	4.90	3.55	2.54	1.85	1.36	1.06	1195.9	121.2	56.4	14.0	0.86	108.5
3252.000	9,858	6.37	5.00	3.76	2.75	1.94	1.44	0.95	1200.0	182.9	25.0	13.7	1.44	79.5 *
3401.000	9,650	13.82	8.06	4.52	2.73	1.78	1.32	1.03	250.0	75.0	25.0	13.6	9.97	91.4 *
Mean:		9.25	6.49	4.64	3.42	2.53	1.94	1.51	840.4	159.2	50.2	11.2	2.80	117.2
Std. Dev:		3.80	1.52	0.87	0.71	0.61	0.50	0.43	353.1	104.3	20.0	3.0	4.02	29.2
Var Coeff(%) :		41.03	23.45	18.66	20.72	24.28	25.58	28.82	42.0	65.5	39.8	27.3	143.61	24.9

# Backcalculation Limitations

- Layer Thickness at least 3.0-in
- 4-layer maximum limitation
  - Mathematical process: results may not always reflect reality
  - 4-layer solutions are often unreliable (high variability)
- Can not differentiate between similar layers adjacent/bonded together
  - Layer consolidation to determine “composite” modulus

# Pavement Design Using FPS 21

FPS21 Main Menu

## TEXAS FLEXIBLE PAVEMENT DESIGN SYSTEM



# F P S 21

Ver: FPS21, V1.3, Released:12-7-2012



FPS Pavement Design

Stress Analysis Tool

Product Disclaimer

Exit



# FPS 21 Inputs Affecting Thickness Requirements

- Length of Performance Period
  - Typically use staged construction
- Confidence/Reliability Level
- Change in Serviceability Index
- Cumulative Traffic Loading
- Layer Modulus/Allowable Thickness

# FPS 21 Design Parameters That Affect Thickness

## Input Design Data

### Basic Design Criteria

LENGTH OF ANALYSIS PERIOD, (Year)	20
MIN TIME TO FIRST OVERLAY, (Year)	12
MIN TIME BETWEEN OVERLAYS, (Year)	8
DESIGN CONFIDENCE LEVEL 95.0%	C
INITIAL SERVICEABILITY INDEX	4.5
FINAL SERVICEABILITY INDEX	2.5
SERVICEABILITY INDEX AFTER OVERLAY	4.2
DISTRICT TEMPERATURE CONSTANT (°F)	31
INTEREST RATE (%)	7.0

### Program Controls

MAX FUNDS /SQ. YD, INIT CONST	99.0
MAX THICKNESS, INIT CONST	69.0
MAX THICKNESS, ALL OVERLAYS	4.0

### Traffic Data

ADT, BEGINNING (VEH/DAY)	4950
ADT, END 20 YR (VEH/DAY)	7520
18 kip ESAL 20 YR (1 DIR) (millions)	12.200
AVG APP. SPEED TO OV. ZONE (mph)	80.
AVG SPEED, OV. DIRECTION (mph)	80.
AVG SPEED, NON-OV. DIRECTION (mph)	80.
PERCENT ADT/HR CONSTRUCTION (%)	5.0
PERCENT TRUCKS IN ADT (%)	22.5

To Main Menu



# FPS 21 Materials Table and Design Type Selection

Input Design Data (Pavement Structure)

**Construction & Maintenance Data**

MIN OVERLAY THICKNESS, (Inches)

OVERLAY CONST. TIME, HR/DAY

ACP COMP. DENSITY, TONS/CY

ACP PRODUCTION RATE, TONS/HR

WIDTH OF EACH LANE, (Feet)

FIRST YEAR COST, RTN MAINT (\$)

ANN. INC. INCR IN MAINT COST (\$)

**Detour Design for Overlays**

DETOUR MODEL DURING OVERLAYS

TOTAL NUMBER OF LANES( for two direction)

NUM OPEN LANES, OVRLAY DIRECTION

NUM OPEN LANES, NON-OV DIRECTION

DIST. TRAFFIC SLOWED, OV DIR

DIST TRAFFIC SLOWED, NON-OV DIR

To Main Menu

Save to Default

Save Input File

Design Type

LYR	MATERIAL NAME	COST PER CY	MODULUS E (ksi)	POISN RATIO	MIN DEPTH	MAX DEPTH	SALVAGE (%)
1	ACP OVERLAY	115.0	500.0	0.35	0.0	6.0	30.0
2	ASPH CONC PVMT	10.0	500.0	0.35	4	4	30.0
3	BASE	2.0	48.0	0.35	10.0	10.0	75.0
4	SUBGRADE(200)	2.0	12	0.40	200.0		90.0

◀

▶

# FPS 21 Design Types

## Input Design Data (Pavement Structure)

### Construction & Maintenance Data

MIN OVERLAY THICKNESS, (Inches)	1.5
OVERLAY CONST. TIME, HR/DAY	8.0
ACP COMP. DENSITY, TONS/CY	1.98
ACP PRODUCTION RATE, TONS/HR	200.0
WIDTH OF EACH LANE, (Feet)	12.0
FIRST YEAR COST, RTN MAINT (\$)	200.0
ANN. INC. INCR IN MAINT COST (\$)	50.0

### Detour Design for Overlays

DETOUR MODEL DURING OVERLAYS	1
TOTAL NUMBER OF LANES( for two direction)	2
NUM OPEN LANES, OVRLAY DIRECTION	1
NUM OPEN LANES, NON-OV DIRECTION	1
DIST. TRAFFIC SLOWED, OV DIR	0.5
DIST TRAFFIC SLOWED, NON-OV DIR	0.5

To Main Menu

Save to Default

Save Input File

## Select Pavement Design Type

- 1) SURFACE TREATED + FLEX BASE OVER SUBGRADE
- 2) ACP + FLEX BASE OVER SUBGRADE
- 3) ACP + ASPH STAB BASE OVER SUBGRADE
- 4) ACP + ASPH STAB BASE + FLEX BASE OVER SUBGRADE
- 5) ACP + FLEXIBLE BASE + STAB SBGR OVER SUBGRADE
- 6) OVERLAY DESIGN
- 7) USER DEFINED PAVEMENT (less than 7 layers)

Exit Pavement Design Type Selection

**A E=500 ksi v=0.35 ACP OVERLAY**

**B E=500 ksi v=0.35 ASPH CONC PVMT**

**C E=48 ksi v=0.35 BASE**

**D E=16 ksi v=0.40 SUBGRADE(200)**



- Modified Texas Triaxial Check
  - Evaluate subgrade shear failure under single heavy wheel load
  - Design parameters are:
    - ATHWLD
    - Subgrade Texas Triaxial Class
- ME Checks for Full-depth Rutting and Fatigue Cracking
  - Various models, but all are very rudimentary
    - Linear Elastic Layer Theory
    - Not material specific
  - All based on # passes 18-kip axle load

# The Modified Texas Triaxial Check

Texas Triaxial Design Check for Pavement - 1

The Heaviest Wheel Loads Daily (ATHWLD)  ( lb )

Percentage of Tandem Axles  ( % )

Modified Cohesimeter Value ( Cm )  Reference

Input Subgrade Texas Triaxial Class (TTC)

- Option 1: Input TTC based on TEX-117-E
- Option 2: Enter soil PI to estimate TTC
- Option 3: Select TTC based on predominate soil type

Triaxial Thickness Required (inches)

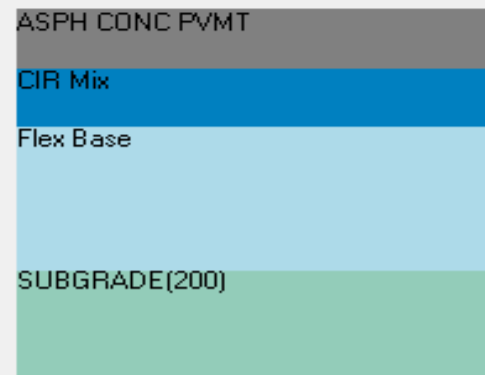
The FPS Design Thickness (inches)

Allowable Reduction (inches)

Modified Triaxial Thickness (inches)

**Design OK !**

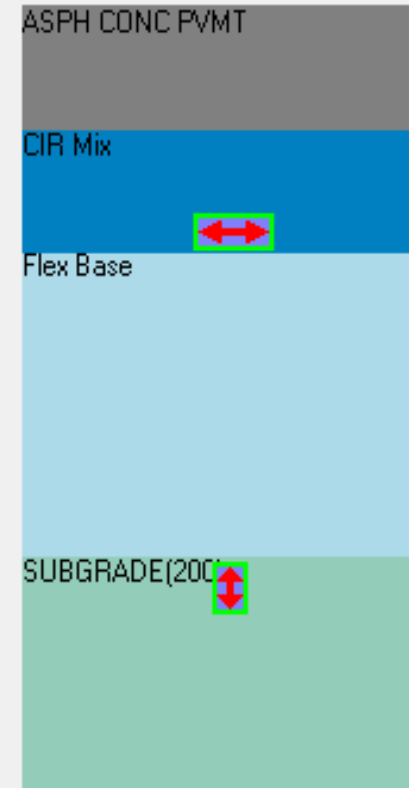
Thick. (in)	Modulus(ksi)	v	Material Name
<input type="text" value="4.00"/>	<input type="text" value="500.0"/>	<input type="text" value="0.35"/>	<input type="text" value="ASPH CONC PVMT"/>
<input type="text" value="4.00"/>	<input type="text" value="160.0"/>	<input type="text" value="0.35"/>	<input type="text" value="CIR Mix"/>
<input type="text" value="10.00"/>	<input type="text" value="45.0"/>	<input type="text" value="0.30"/>	<input type="text" value="Flex Base"/>
<input type="text" value="120.00"/>	<input type="text" value="12.0"/>	<input type="text" value="0.40"/>	<input type="text" value="SUBGRADE(200)"/>



# FPS 21 ME Checks

Mechanistic Design Check for Pavement - 1

Thick. (in)	Modulus(ksi)	v	Material Name	Vary Thickness
4.00	500.0	0.35	ASPH CONC PVMT	<input checked="" type="checkbox"/> 0.50
4.00	160.0	0.35	CIR Mix	
10.00	45.0	0.30	Flex Base	
120.00	12.0	0.40	SUBGRADE(200)	



f1	7.96E-02
f2	3.291
f3	.854
f4	1.37E-09
f5	4.477

Analysis Mode

Design  User Define

$$N_f = f_1 (\epsilon_t)^{-f_2} (E_1)^{-f_3}$$

$$N_d = f_4 (\epsilon_v)^{-f_5}$$

Run

Exit

- The HIR process would typically be considered a “Pavement Preservation” technique –
  - Not a candidate for “structural design process”
  - However, typical design philosophy should still be used to determine whether the structure has adequate remaining life to consider PP viability.
    - Remaining Life Good or Very Good
    - Uniformity/composition of surface material
  - Use “Structural Overlay” design (Type 6) option and assign a design modulus to HIR layer (500 ksi unless better information available)




# FPS Design of Pavements Incorporating CIR

- Design Modulus?
  - Limited experience with product in Texas
  - One job from the early 90's on US 62 (Lubbock District) showed that a temperature corrected (77F) modulus was on the order of 150ksi
  - Uniformity/composition of bituminous material
- Use either a Type 4 Design format:
  - ACP surface/ST
  - CIR layer
  - Flex Base
  - Subgrade
- . . . or Type 7 (User Defined) format.

# FPS 21 User Defined Design Format

User Define Pavement



Layer: 1



**ASPHALT TREATED BASE**  
 Modulus: 400.0 ksi  
 Thickness from: 4.0 to: 10.0 inches

**FLEXIBLE BASE**  
 Modulus: 50.0 ksi  
 Thickness from: 6.0 to: 12.0 inches

**SUBGRADE**  
 Modulus: 16.0 ksi  
 Thickness from: 200.0 to: 200.0 inches

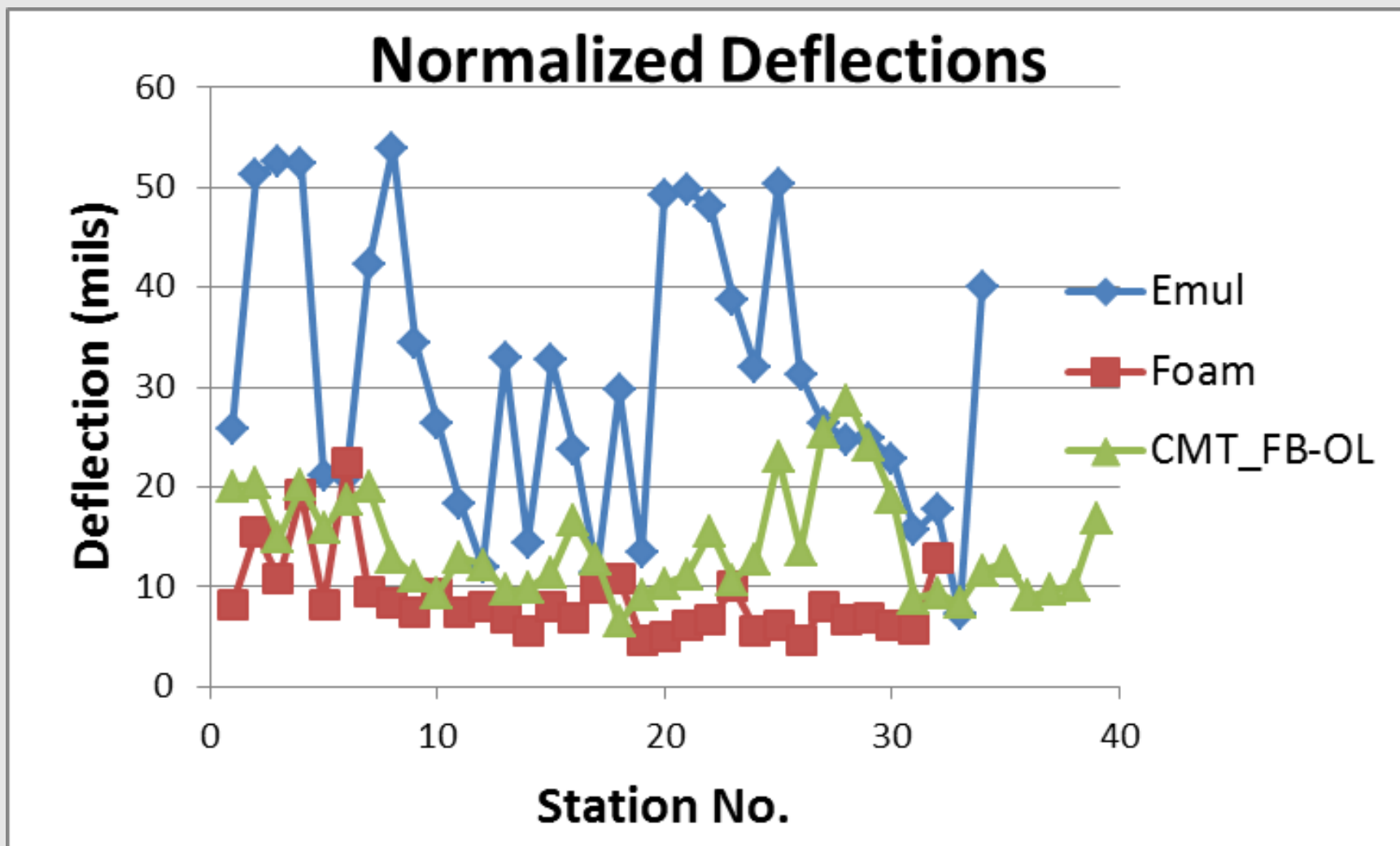
No	Material Type	2004 Specificati	Design Modulus	Poisson' Ratio	Layer Type
1	SURFACE TREATMENT	Item 316, 318	200 ksi	0.35	AC Layer
2	DENSE-GRADED HMA Thin	Item 340, 341	500 ksi	0.35	AC Layer
3	DENSE-GRADED HMA Thick	Item 340, 341	650 ksi	0.35	AC Layer
4	PFC	Item 342	300 ksi	0.30	AC Layer
5	PERFORMANCE MIX 3/4SF	Item 344	650 ~ 950 ksi	0.35	AC Layer
6	PERFORMANCE MIX 1in SF	Item 344	650 ~ 950 ksi	0.35	AC Layer
7	STONE-MATRIX ASPHALT	Item 346	650 ~ 850 ksi	0.35	AC Layer
8	LIMEROCK ASPH PVMT	Item 330	200 ~ 350 ksi	0.35	AC Layer
9	HOT-MIX COLD-LAID ACP	Item 334	300 ~ 400 ksi	0.35	AC Layer
10	RICH BOTTOM LAYER	Item 344	400 ~ 600 ksi	0.35	AC Layer
11	FA or LFA STABILIZED	Item 265	50 ~ 150 ksi	0.35	Base Layer
12	ASPHALT TREATED BASE	Item 292	250 ~ 400 ksi	0.35	Base Layer
13	EMULS ASPH TRT BASE	Item 314	50 ~ 100 ksi	0.35	Base Layer
14	FLEXIBLE BASE	Item 247	40 ~ 70 ksi	0.35	Base Layer
15	LIME STABILIZED BASE	Item 260, 263	60 ~ 75 ksi	0.30 ~ 0.35	Base Layer
16	CEMENT STABILIZED BASE	Item 275, 276	80 ~ 150 ksi	0.20 ~ 0.30	Base Layer
17	FA OR LIME-FLY ASH STAB	Item 265	30 ~ 45 ksi	0.30	SubBase Layer
18	LIME(CEMENT) STAB SUBG	Item 260, 275	30 ~ 45 ksi	0.30	SubBase Layer
19	EMULS ASPH TREAT SUBG	Item 314	30 ~ 45 ksi	0.35	SubBase Layer
20	SUBGRADE		16 ksi	0.40 ~ 0.45	Sub-Grade Layer



# FPS Design of Pavements Incorporating FDR

- Design Modulus?
  - Experience shows highly variable, depending on:
    - Parent material & uniformity
    - Stabilizing Agent
    - Environment
    - Sophistication of Reclaimers
- Use either a Type 3 Design Format
  - ACP surface
  - Reclaimed/Stab. Base
  - Subgrade
- . . . or Type 7 (User Defined), if 4 or more layers involved.

# End Product In-place Variability



# Stabilization Variability



# Reclaimers



High Efficiency Reclaimer – Emulsion or Foam

# Issues and Gaps in Knowledge

- Better assessment of candidate jobs
- Better uniformity of construction
- Urgent need to move to a more mechanistic design procedure.
  - Need better materials characterization
  - Need to incorporate climate effects
  - Need to account for traffic loading in terms of load spectra
- TxDOT not likely to adopt AASHTO Pavement ME
  - 2006/2007 TxDOT Research Study
- TxDOT Research Program evaluating TxME
  - Hope to have limited implementation project approved in FY 15

TxME Explorer

Project1:Structure\*

Projects

- Project1
  - Structure
  - Climate
  - Traffic
  - Reliability

Pavement Type

Surface Treated  
 Conventional or Thin HMA  
 Perpetual

Design/Analysis Life (years): 20 Optional Project Information

Project Location

District: 01 Paris County: 60 DELTA

### AC Layer Material

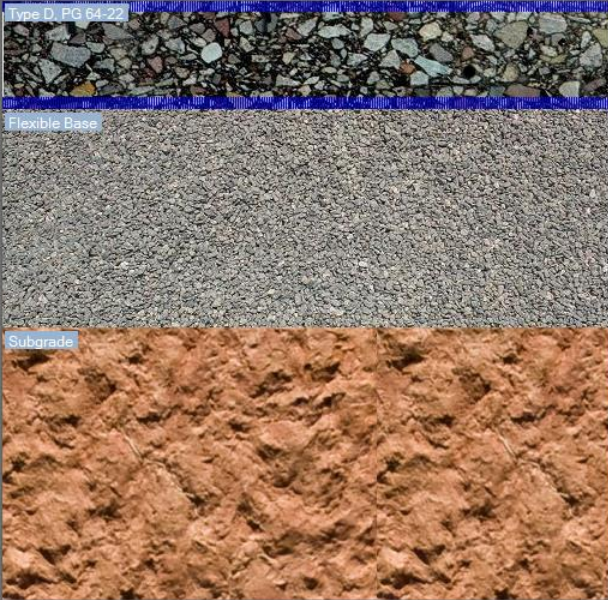
Surface Treatment  Dense-graded  Superpave  
 SMA  CAM

### Base Material

FA or LFA Stabilized Base  Asphalt Treated Base  Emulsion Asphalt Treated Base  
 Flexible Base  Lime Stabilized Base  Cement Stabilized Base

### Subbase/Treated (or Untreated) Subgrade Layer Material

Lime (Cement) Stabilized Subgrade  Emulsion Asphalt Treated Subgrade  Shallow Subgrade



Layer 1: Type D, PG 64-22

Layer Information	
Layer Number	1
Layer Thickness (inches)	4
Material Information	
Binder Type	PG 64-22
Gradation	Type D
RAP %	0
RAS %	0
Material Properties	
Dynamic Modulus	Level 2 input : default value
Fracture Property	@77 F: A=4.2081E-06, n=3.9531
Rutting Property	@104 F: alpha=0.7465, mu=0.8102
Poisson Ratio	0.35
Thermal Coefficient of Expansion (1e-6 in/in/F)	13.5



I DON'T  
GET IT

