WELCOME TO THE

AASHTOWare Pavement

ME Design

WEBINAR SERIES

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- The webinar will start at 10 noon Central/11:00 AM Eastern

AASHTOWare Pavement™ ME Design

AASHTO

FY 2021 Webinar #4
Rehabilitation Design for Fractured JPCP and an Asphalt Overlay

June 1, 2021

FY 2021 Webinar #4,
Rehabilitation Design; Multiple Asphalt Overlays

Moderator:

- Clark Morrison, North Carolina Department of Transportation; Chair
- Hari Nair, Virginia Department of Transportation; Co-chair

Presenters:

- Harold Von Quintus, ARA
- Wouter Brink, ARA

Presentation will be available for viewing on the ME-Design Resource website:
http://www.me-design.com

Pavement ME Task Force Members

1. Clark Morrison, PE, North Carolina DOT, Chair
2. Ryan Fragapane, AASHTO Project Manager
3. Hari Nair, PE, Virginia DOT, Vice-Chair
4. Felix Doucet, Eng., Quebec MOT
5. David Holmgren, PE, Utah DOT
6. Patrick Bierl, PE, Ohio DOT
7. Dulce Feldman, PE, California DOT
8. Kumar Dave, PE, Indiana DOT
9. Susanne Chan, Ontario MOT, TAC Liaison
10. Tom Yu, PE, FHWA Liaison

FY 2021 Webinar #4, Rehabilitation Design; Multiple Asphalt Overlays

- Phones are being muted.
- Webinar is being recorded.
- Please post your questions in the Q&A box. This can be accessed by clicking on the Webex Q&A button.
- The presenters will answer all questions at the end of the webinar/demonstration as time permits.
- Questions not answered, because of time, will be responded to separately.

FY 2021 Webinar #4, Rehabilitation Design; Multiple Asphalt Overlays

Webinars for FY 2021:

1. *Calibration Assistance Tool: Getting ready for local calibration.*
2. *Calibration Assistance Tool: Completing a local calibration.*
3. *Backcalculation Tool: BcT Enhancements.*
4. **Rehabilitation design for a Fractured JPCP and an asphalt overlay.**

FY 2021 Webinar #4: Rehabilitation Design; Multiple Asphalt Overlays

Poll 1: Questions 1, 2, and 3

Prerequisites for this Webinar

Prior experience with:

- Using Pavement ME Design.
- Pavement evaluations for rehabilitation design.
  - Distress surveys.
  - Deflection tests
  - Subsurface investigations.
- Backcalculation of elastic layer modulus values using the BcT.

How to get the BcT?

1. Included in AASHTOWare PMED License

2. Standalone single user purchase
   Annual license fee: $1,250

Link to AASHTOWare Purchasing

Common Questions

1. How to design an asphalt overlay for a pavement that already has been overlaid?
2. How to design an asphalt overlay for a fractured PCC pavement?

Webinar was selected to help answer both questions in day-to-day practice.

Intent of webinar: not to go through the software itself, but to determine inputs/make decisions in using results from the BcT and PMED for a rehabilitation design of a fractured PCC pavement with an asphalt surface.

Learning Outcomes

1. Applying results from the BcT program.
2. Evaluating results from backcalculation for use in rehabilitation design.
3. Simulating fractured JPCP with an asphalt surface.
4. Select appropriate rehabilitation input level.
5. Determine load transfer efficiency.
6. Reflection cracks calibration coefficients for interlayers.

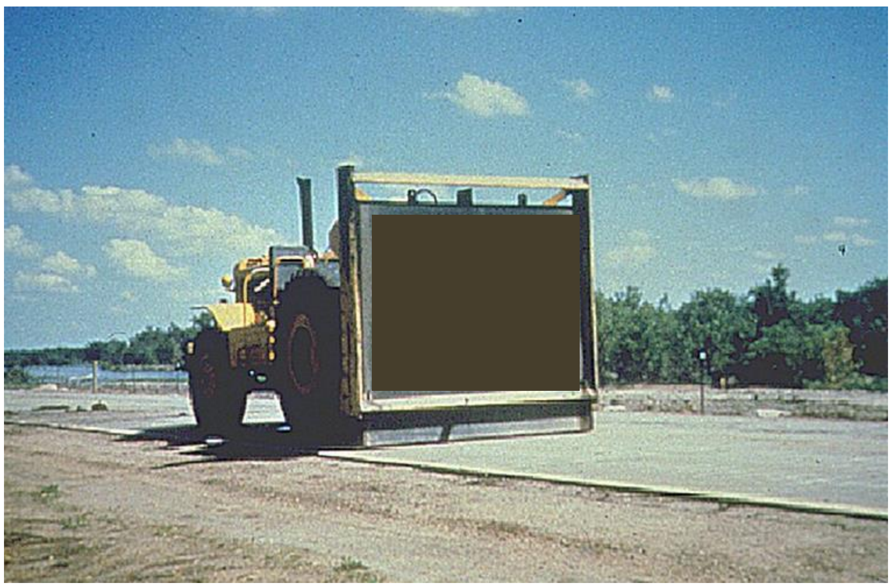
FY 2021 – Webinar 4:
Rehabilitation Design; Multiple Asphalt Overlays

Outline of today's webinar:

1. Description of Existing Pavement
2. Applying Results from the BcT
3. Rehabilitation Analysis Type for Pavements with an Existing Asphalt Overlay
4. Inputs for Rehabilitation Design
5. Rehabilitation Design
6. Question and Answer Session

Description of Existing Pavement

- JPCP was fractured and overlaid in 2001.
- Current asphalt overlay exhibits cracking and moderate deterioration around cracks.



Description of Existing Pavement

- FWD deflection tests to backalculate elastic layer moduli.
- A few cores and borings completed for preliminary rehabilitation design.
- GPR for layer thickness determination.
- Distress condition surveys to determine surface condition.

Description of Existing Pavement

Details of the existing pavement for rehabilitation design.

Layer	Event		Thickness, in.
	Activity	Date	
Asphalt Overlay	Overlay	July 2001	7.5 to 9.5
JPCP	Fractured Slabs	June 2001	9 to 10
	Initial Construction	Sept 1976	
Aggregate Base	Initial Construction	Sept 1976	4 to 8
Embankment, Soil	Compacted soil over existing soil	Sept. 1976	60 to 600
Rigid/Stiff Layer			

Description of Existing Pavement

Details of the existing asphalt wearing surface over the fractured JPCP for rehabilitation design.

Layer	Event		Thickness, in.
	Activity	Date	
Asphalt Wearing Surface	Overlay; 9.5 mm, PG64-28	July 2001	2.0
Asphalt Intermediate Layer	Overlay; 12.5 mm, PG64-22	July 2001	4.0
Asphalt Leveling layer	Overlay; 12.5 mm, PG64-22	July 2001	2.0

Description of Existing Pavement

Surface condition of the asphalt overlay and condition of the asphalt layers.

Distress, Average	Amount and Severity
Rut Depth, in.	0.20
Transverse Cracks, ft./mi.	450, moderate
Fatigue Cracks, percent	<5, minor

FY 2021 – Webinar 4:
Rehabilitation Design; Multiple Asphalt Overlays

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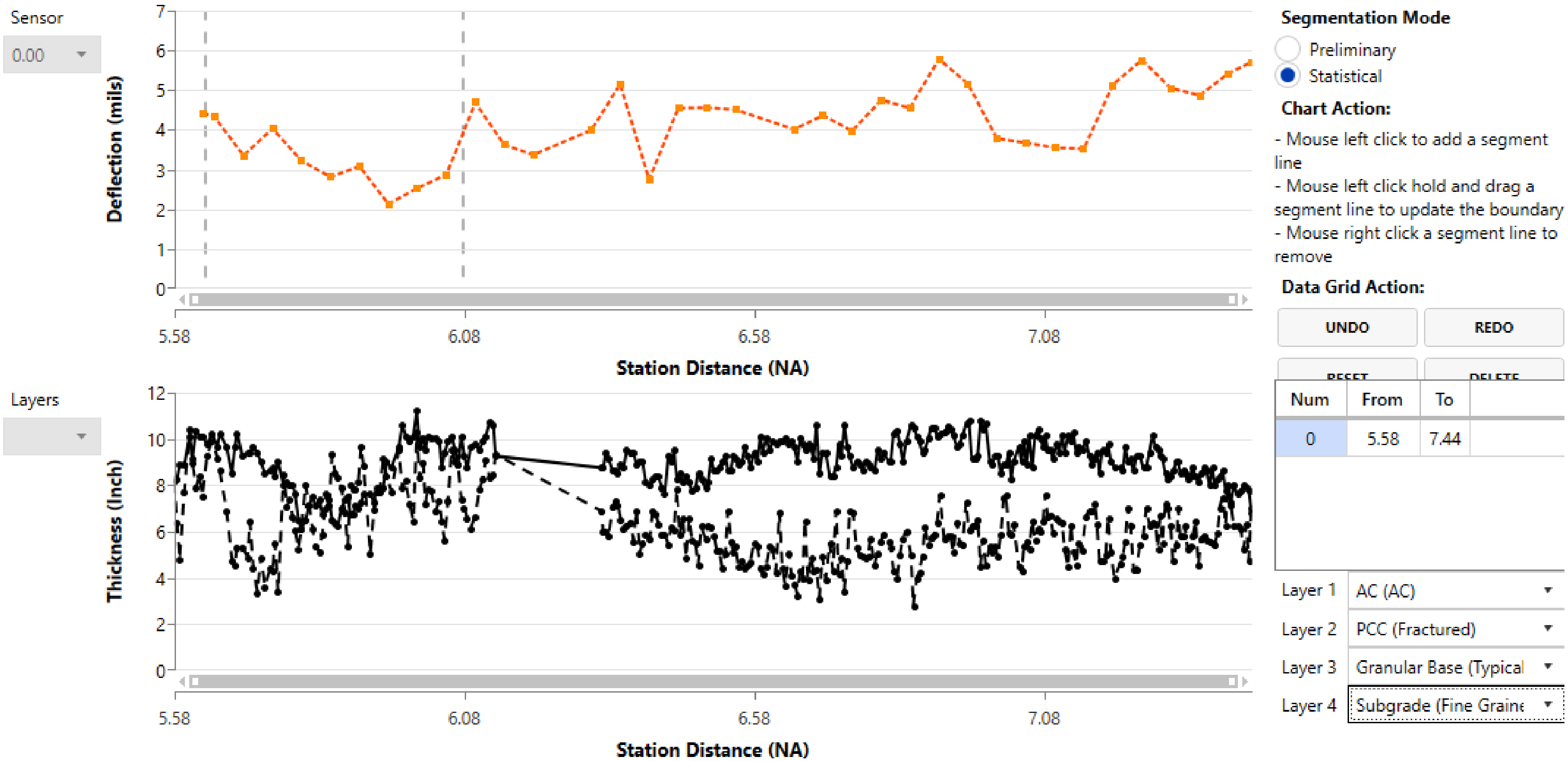
Applying BcT for Rehabilitation Design

As a reminder, focus is on :

- How to use/interpret results from the BcT for rehabilitation design;
- Not on how to use the BcT.

Applying BcT for Rehabilitation Design

Overview of FWD and GPR tests.



Applying BcT for Rehabilitation Design

Backcalculation process limited to 5 total layers.
Some questions to be asked:

1. Is the 8-inch aggregate base below 16+ inches of asphalt and PCC an insensitive layer?
2. Should a rigid layer be included?
3. Is it necessary to subdivide the PCC layer into two layers with the crack and seat fracture method?
4. Should the existing asphalt layer be subdivided into multiple or just one layer?

Applying BcT for Rehabilitation Design

Should elastic modulus of the 5 to 9 inch aggregate base layer be backcalculated or a fixed layer?

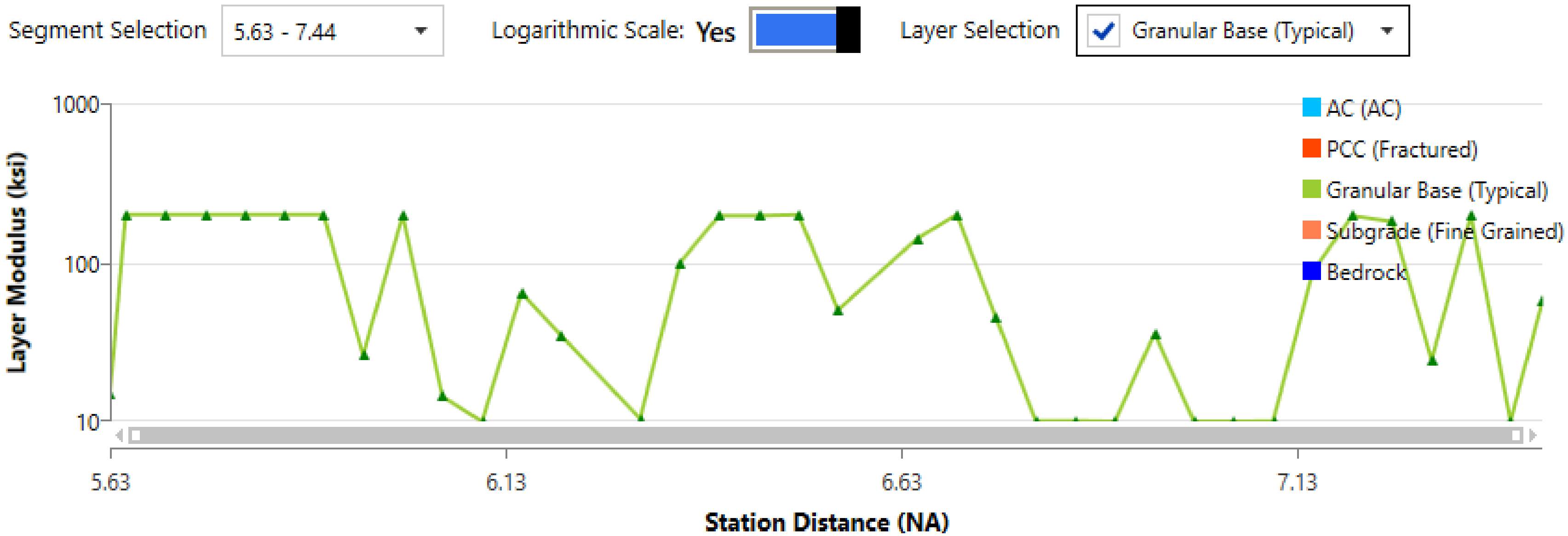
Rule of thumb:

- Fix the elastic modulus of subsurface layers that are less than half the thickness of the upper layers.

Applying BcT for Rehabilitation Design

Aggregate Base Layer: Fix or backcalculate the elastic modulus?

Backcalculated elastic modulus of aggregate base:



Applying BcT for Rehabilitation Design

Aggregate Base Layer: Fix or backcalculate the elastic modulus?

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)
1	AC (AC)	Default asphalt concrete (existing)	2328.9	1013.8	43.5%
2	PCC (Fractured)	Fractured JPCP	775.7	570.7	73.6%
3	Granular Base (Typical)	Crushed stone	98.7	83.6	84.7%
4	Subgrade (Fine Grained)	A-4	41.8	16.6	39.8%
5	Bedrock	Highly fractured and weathered	500	0	0.0%

- Aggregate base has a high COV and goes from minimum to maximum boundary value.

Applying BcT for Rehabilitation Design

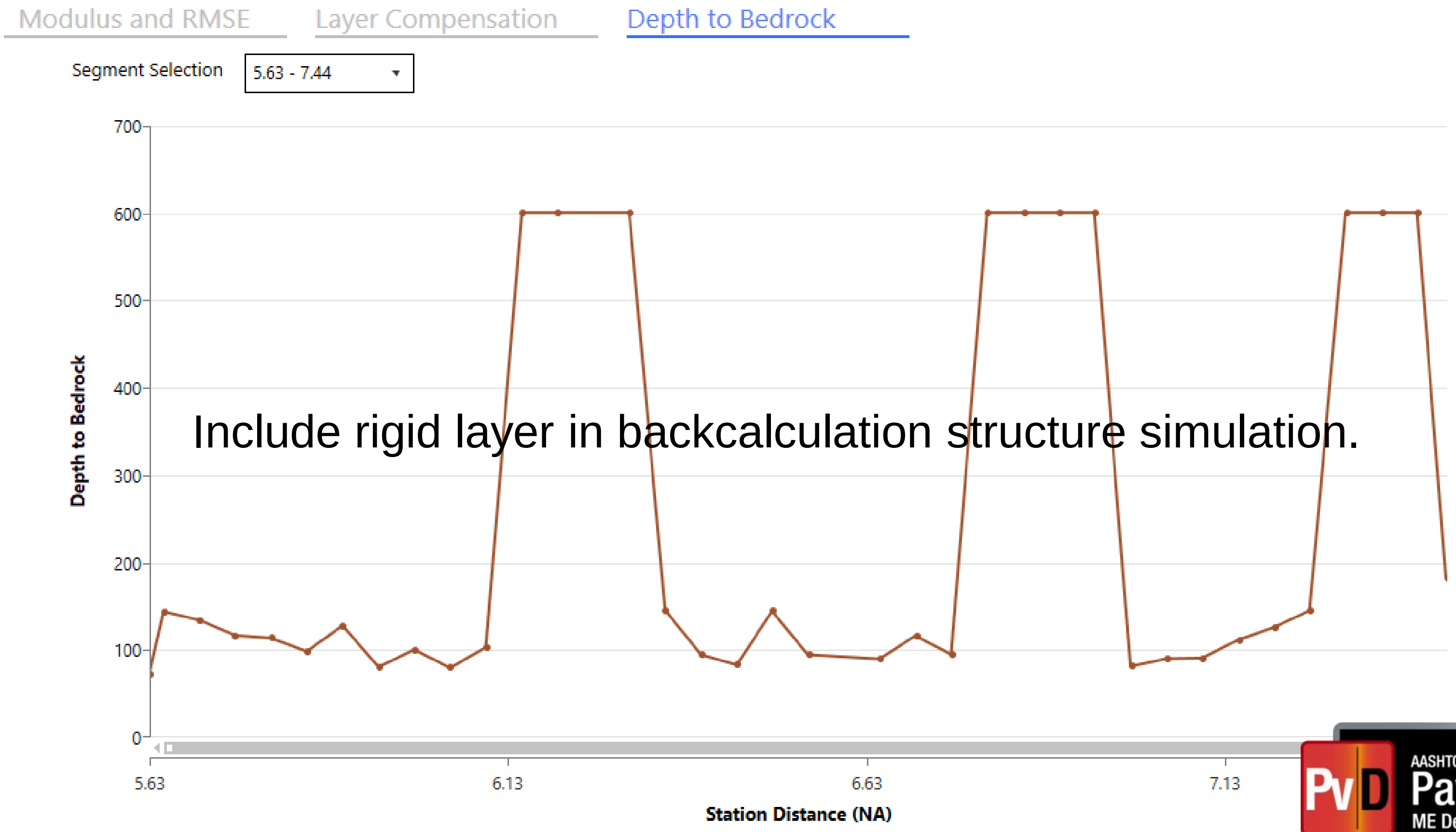
Aggregate Base Layer: Fix or backcalculate the elastic modulus?

Fixed Base Elastic Modulus, ksi	Asphalt Layer, ksi	Fractured PCC, ksi	Subgrade Soil, ksi
30	2,234	886	42.3
50	2,301	814	40.5
60	2,329	788	40.1
80	2,380	745	39.5
100	2,422	705	39.1

- Aggregate base has a high COV and little impact on the other elastic layer moduli backcalculated.
- In summary, fix the aggregate base modulus at the typical modulus value.

Applying BcT for Rehabilitation Design

Is a rigid layer present along the design segment?
Use the BcT to calculate the depth to a rigid layer.



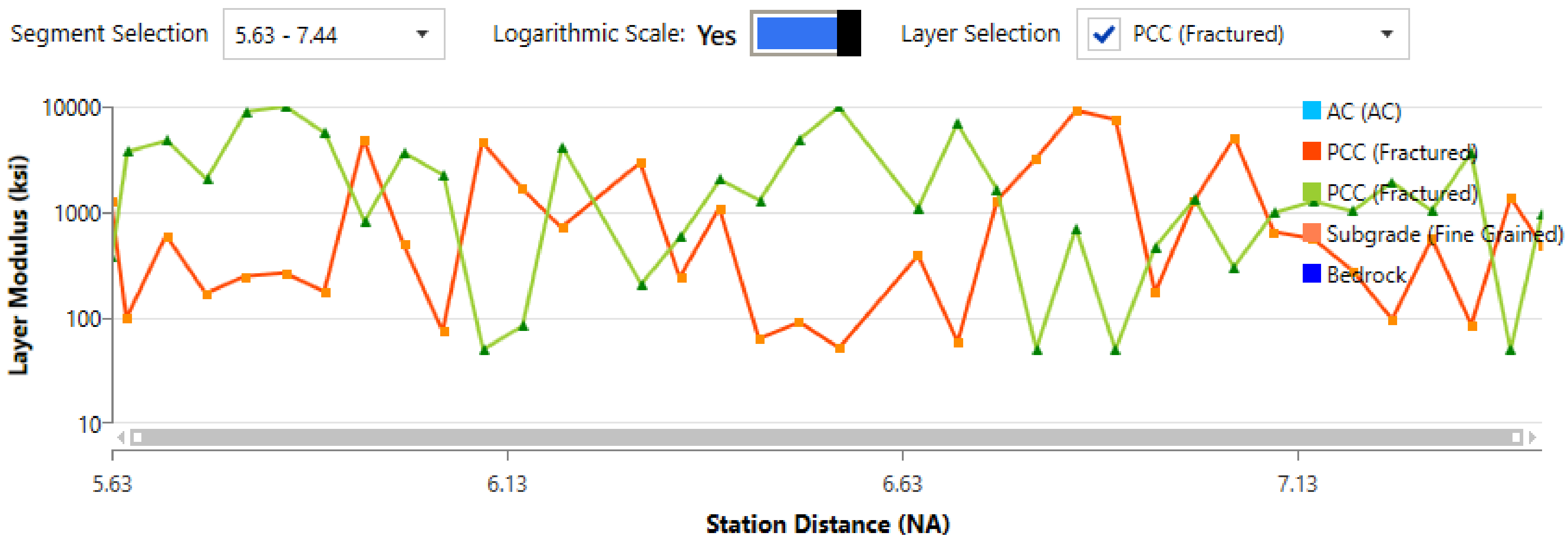
Applying BcT for Rehabilitation Design

Should the fractured PCC slab be simulated as one or two layers?

- Crack and seat:
  - JPCP; simulate as 1 layer.
  - JRCP; simulate as 1 or 2 layers
- Rubblization:
  - JPCP; simulate as 1 or 2 layers.
  - JRCP; simulate as 2 layers.

Applying BcT for Rehabilitation Design

Should the fractured PCC slab be simulated as one or two layers?



Applying BcT for Rehabilitation Design

Should the fractured PCC slab be simulated as one or two layers?

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)
1	AC (AC)	Default asphalt concrete (existing)	2419.6	1158.6	47.9%
2	PCC (Fractured)	Fractured JPCP	1418.6	2125.6	149.8%
3	PCC (Fractured)	Fractured JPCP	2463.8	2754	111.8%
4	Subgrade (Fine Grained)	A-4	37.9	15	39.6%
5	Bedrock	Highly fractured and weathered	500	0	0.0%

- No consistent and significant difference between the two PCC layers.
- In summary, simulate the fractured PCC as one layer.

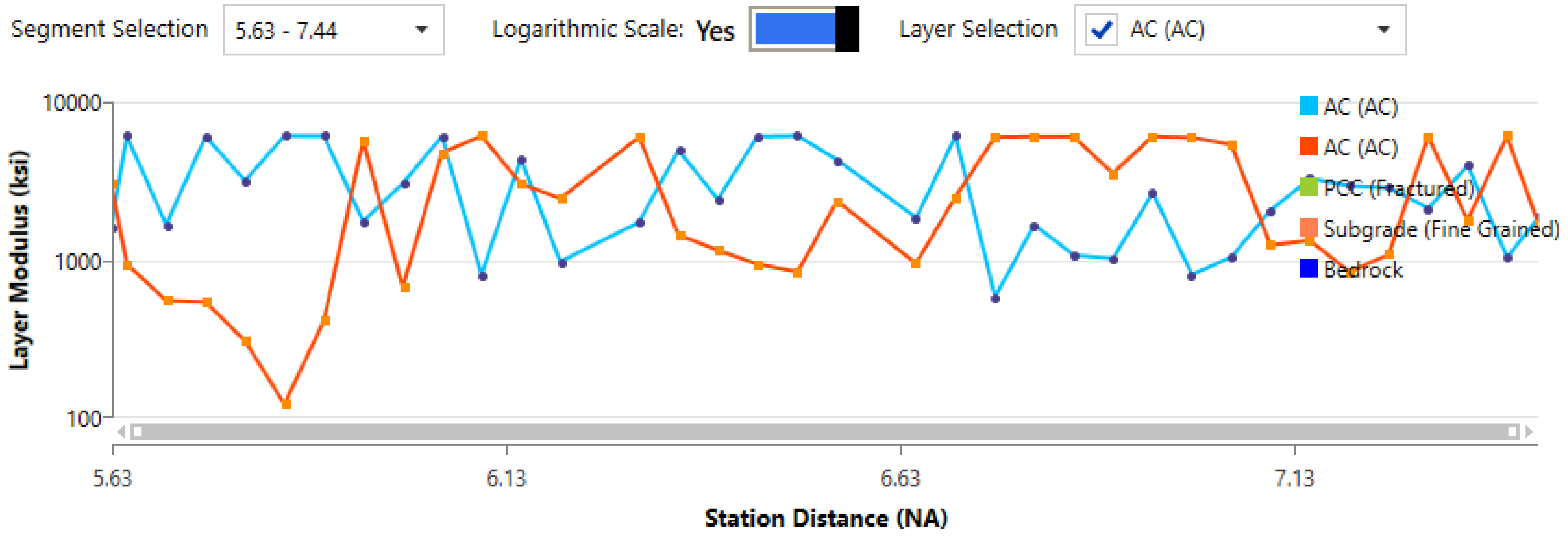
Applying BcT for Rehabilitation Design

Should the existing asphalt overlay be simulated as one or two layers?

- No observed or designated moisture damage or mix deterioration through core.
  - Simulate as one layer.
- Moisture damage or mix deterioration observed through core:
  - Simulate as 2 layers.

Applying BcT for Rehabilitation Design

Should the existing asphalt overlay be simulated as one layer or divided into two layers?



Applying BcT for Rehabilitation Design

Should the existing asphalt overlay be simulated as one layer or divided into two layers?

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)
1	AC (AC)	Default asphalt concrete (existing)	3013.9	1888.6	62.7%
2	AC (AC)	Default asphalt concrete (existing)	2845.7	2202	77.4%
3	PCC (Fractured)	Fractured JPCP	1170.6	1576.8	134.7%
4	Subgrade (Fine Grained)	A-4	34.2	14.6	42.5%
5	Bedrock	Highly fractured and weathered	500	0	0.0%

- No consistent and significant difference between the two asphalt layers; cores do not show a difference between the asphalt layers.
- In summary, simulate the asphalt overlay as one layer.

Applying BcT for Rehabilitation Design

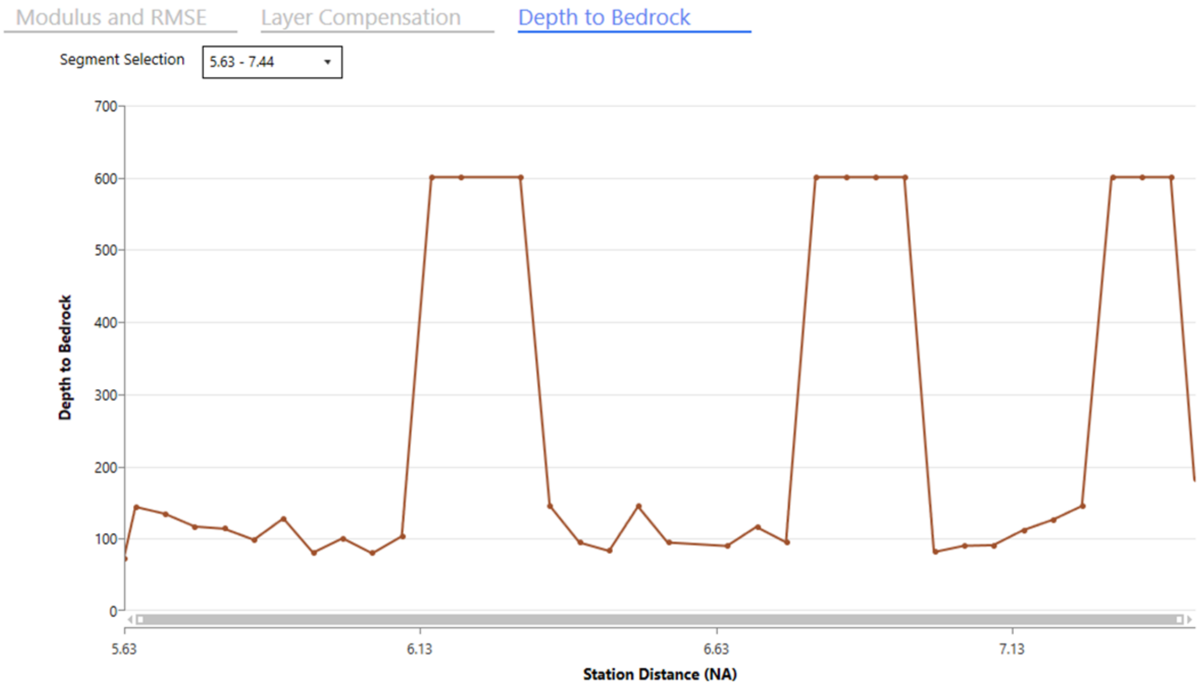
In summary:

1. Is the 8-inch aggregate base below 16+ inches of asphalt and PCC an insensitive layer? **YES.**
2. Should a rigid layer be included? **YES, for some sections**.
3. Is it necessary to subdivide the PCC layer into two layers with the crack and seat fracture method? **NO.**
4. Should the existing asphalt layer be subdivided into multiple or just one layer? **NO.**

Backcalculating Elastic Layer Modulus

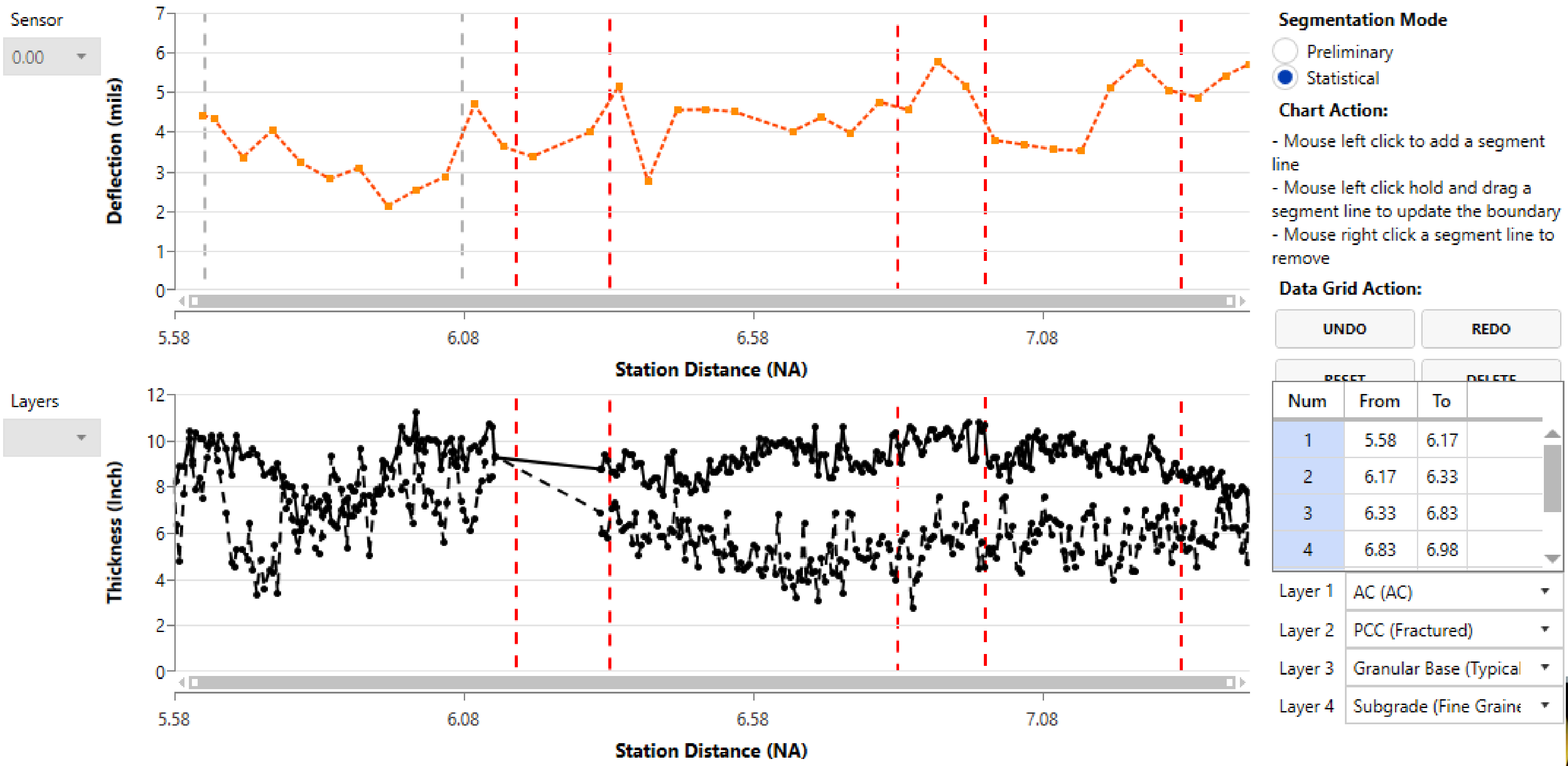
Segments for rehabilitation design:

- Use depth to rigid layer as the initial identification of design segments.



Backcalculating Elastic Layer Modulus

Design segments of the existing asphalt overlay of the fractured JPCP for rehabilitation design.



Backcalculating Elastic Layer Modulus

Details of the existing asphalt wearing surface over the fractured JPCP for rehabilitation design.

Segment #1

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)	Thickness
1	AC (AC)	Default asphalt concrete (existing)	2300	1293.6	56.2%	8.73565217391305
2	PCC (Fractured)	Fractured JPCP	1016.7	667.3	65.6%	10.3660869565217
3	Granular Base (Typical)	Crushed stone	50	0	0.0%	7.18260869565217
4	Subgrade (Fine Grained)	A-4	52	21.7	41.7%	121.1
5	Bedrock	Highly fractured and weathered	500	0	0.0%	0

Segment #4

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)	Thickness
1	AC (AC)	Default asphalt concrete (existing)	2370.7	919.4	38.8%	10.0157142857
2	PCC (Fractured)	Fractured JPCP	616.1	351.9	57.1%	10.2632142857
3	Granular Base (Typical)	Crushed stone	50	0	0.0%	5.57285714285
4	Subgrade (Fine Grained)	A-4	34.1	2.3	6.8%	574.2
5	Bedrock	Highly fractured and weathered	500	0	0.0%	0

Backcalculating Elastic Layer Modulus

Backcalculated elastic layer modulus (ksi) and Thick.

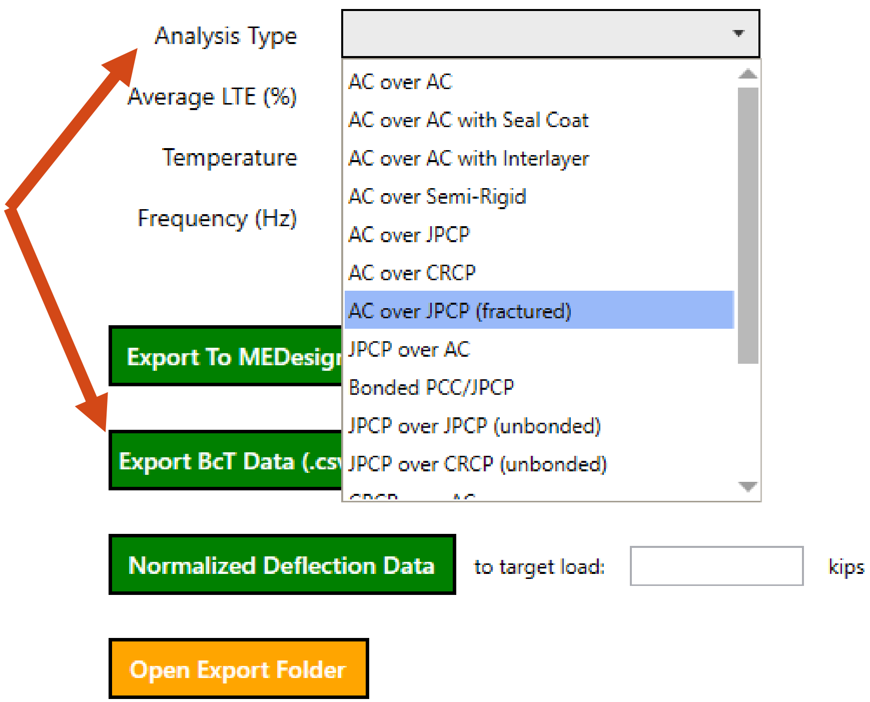
Layer	Segments; Elastic Modulus, ksi					
	1	2	3	4	5	6
Asphalt	2,300	2,019	2,610	2,371	2,006	2,262
PCC; Fractured	1,017	1,430	643	616	717	489
Aggregate Base	50	50	50	50	50	50
Soil	52	58	31	34	31	38

Layer	Segments; Layer Thickness, inches					
	1	2	3	4	5	6
Asphalt	8.7	9.0	9.0	10.0	9.3	8.1
PCC; Fractured	10.4	10.7	10.5	10.3	10.1	10.6
Aggregate Base	7.2	6.1	5.3	5.6	5.8	6.0
Soil	121	574	138	574	153	496

Exporting Elastic Layer Modulus

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)	Thickness
2	PCC (Fractured)	Fractured JPCP	621.2	353.9	57.0%	10.25535714285
3	Granular Base (Typical)	Crushed stone	50	0	0.0%	5.505
4	Subgrade (Fine Grained)	A-4	34.1	2.3	6.8%	574.2
5	Bedrock	Highly fractured and weathered	500	0	0.0%	0

- Export the BcT results for each analysis segment to the PMED software.



Exporting Elastic Layer Modulus

Export the BcT results for each analysis segment to the PMED software.

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)	Thickness
1	AC (AC)	Default asphalt concrete (existing)	2370.7	919.4	38.8%	10.01571428571
2	PCC (Fractured)	Fractured JPCP	616.1	351.9	57.1%	10.26321428571
3	Granular Base (Typical)	Crushed stone	50	0	0.0%	5.572857142857
4	Subgrade (Fine Grained)	A-4	34.1	2.3	6.8%	574.2
5	Bedrock	Highly fractured and weathered	500	0	0.0%	0

Analysis Type

Error

Incompatible ME Design analysis type selected.
Existing pavement layer type in structure definition does not match the analysis type.

OK

PMED file must be set up manually.

FY 2021 – Webinar 4: Rehabilitation Design; Multiple Asphalt Overlays

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Rehabilitation Analysis/Input Level

Rehabilitation input level; which one should be used?

In accordance with the Manual of Practice, Chapters 9 and 12.

Rehabilitation Design Strategy Input Level					
AC over AC	AC over Semi-Rigid	AC over JPCP, Intact	AC over CRCP, Intact	AC over JPCP/JRCP Fractured (C&S)	AC over PCC, Rubblized
Level 1 – NDT Level 2 – Distresses Level 3 – Rating		Rehab input level is not an option.			Simulate as new Asphalt Pavement

The more information the better. Use of rehabilitation input levels 1 and 2 should result in comparable designs. If not, investigate further.

FY 2021 – Webinar 4:
Rehabilitation Design; Multiple Asphalt Overlays

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Inputs for Rehabilitation Design

As a reminder, focus is on:

- How to determine inputs for rehabilitation design for a fractured JPCP already overlaid.
- Not on how to use the Pavement ME Design software.

Inputs for Rehabilitation Design

Setting up the pavement structure and overlay.

Some questions to be asked:

1. What c-factor should be used to determine the resilient modulus of the unbound layers?
2. What is the overlay construction date?
3. What asphalt overlay properties should be used to simulate the existing asphalt overlay?

Layer for Segment 4	Modulus, ksi	Thickness, in.
Asphalt Overlay	2,371	10.0
PCC; Fractured	616	10.3
Aggregate Base	50	5.6
Soil	34	574

Inputs for Rehabilitation Design: C-Factor

Use c-factors to determine the elastic modulus of the unbound layers in accordance with Manual of Practice; Table 10-8

Layer Type	Location	C-Value or M_r/E_{FWD} Ratio
Aggregate Base/Subbase	Between a Stabilized & AC Layer	1.43
	Below a PCC Layer	1.32
	Below an AC Layer	0.62
Subgrade-Embankment	Below a Stabilized Subgrade/Embankment	0.75
	Below an AC or PCC Layer	**0.52**
	Below an Unbound Aggregate Base	**0.35**

Inputs for Rehabilitation Design: C-Factor

Layer	Thickness, in.	BcT Elastic Modulus, ksi	C–Factor	PMED Resilient Modulus, ksi
Asphalt Overlay	10.0	2,371	NA	Master Curve
Fractured PCC	10.3	616	NA	616
Aggr. Base	5.6	50	NA	Lab/Default Value
Soil	574	34	0.35	11.9

Layer Type	Location	C-Value or M_r/E_{FWD} Ratio
Aggregate Base/Subbase	Below a PCC Layer	1.32
	Below an AC Layer	0.62
Subgrade-Embankment	**Below an AC or PCC Layer**	**0.52**
	Below an Unbound Aggregate Base	**0.35**

Inputs for Rehabilitation Design: C-Factor

- Aggregate Base; 25 ksi:
  - An insensitive layer
  - Use DCP when base is insensitive, if available.
  - Use the default or laboratory derived resilient modulus, 30 ksi.
- Fine-Grained Soil; 11.9 ksi:
  - Use value below aggregate base, unless aggregate base is contaminated/saturated.

Layer Type	Location	C-Value or M_r/E_{FWD} Ratio
Aggregate Base/Subbase	Below a PCC Layer	1.32
	Below an AC Layer	0.62
Subgrade-Embankment	Below an AC or PCC Layer	0.52
	Below an Unbound Aggregate Base	**0.35**

Inputs for Rehabilitation Design

Subgrade Fine-Grained Soil

Layer 5 Subgrade : A-4

Unbound		
Coefficient of lateral earth pressure (k0)	✓	0.5
Layer thickness (in)	✓	Semi-infinite
Poisson's ratio	✓	0.4
Modulus		
Resilient modulus (psi)	✓	11900
Sieve		
Gradation & other engineering properties	✓	A-4

Inputs for Rehabilitation Design

Subgrade Fine-Grained Soil:

Layer 5 Subgrade : A-4

Unbound		
Coefficient of lateral earth pressure (k0)	✓	0.5
Layer thickness (in)	✓	Semi-infinite
Poisson's ratio	✓	0.4
Modulus		
Resilient modulus (psi)	✓	11900
Sieve		
Gradation & other engineering properties	✓	A-4

Average water content of subgrade soil during FWD testing for sections 3 to 6:

13.5 percent

Sieve Size	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	60.6
#100	
#80	73.9
#60	
#50	
#40	82.7
#30	
#20	
#16	
#10	89.9
#8	
#4	93
3/8-in.	95.6
1/2-in.	96.7
3/4-in.	98
1-in.	98.7
1 1/2-in.	99.4
2-in.	99.6
2 1/2-in.	
3-in.	
3 1/2-in.	99.8

	Liquid Limit	21
	Plasticity Index	5
☐	Is layer compacted?	
☑	Maximum dry unit weight (pcf)	118.4
☐	Saturated hydraulic conductivity (ft/hr)	8.308e-06
☐	Specific gravity of solids	2.7
☑	Water Content (%)	13.5
☐	User-defined Soil Water Characteristic Curve (SWCC)	

af	68.8376536119812
bf	0.998285126875545
cf	0.475715611755117
hr	500

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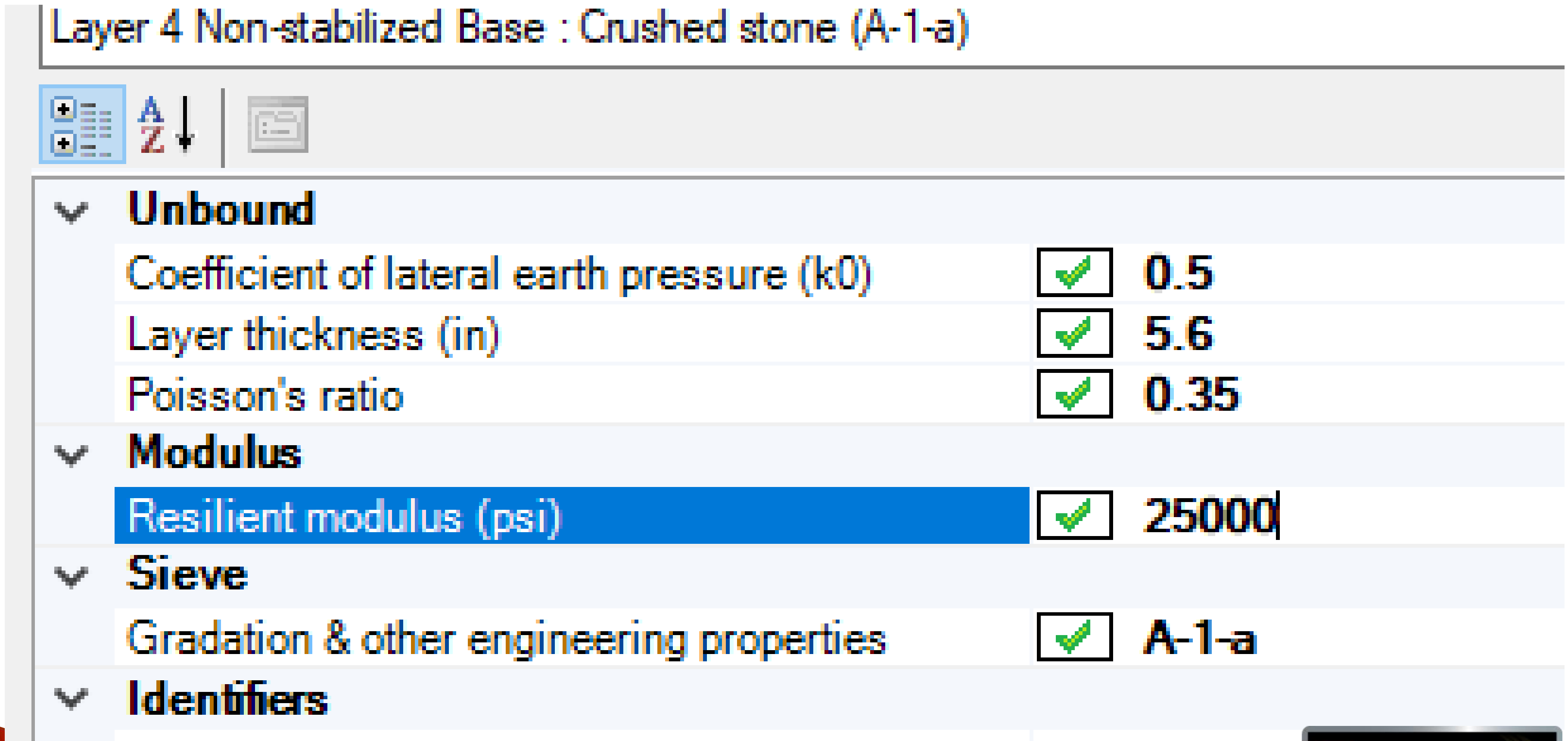
Inputs for Rehabilitation Design

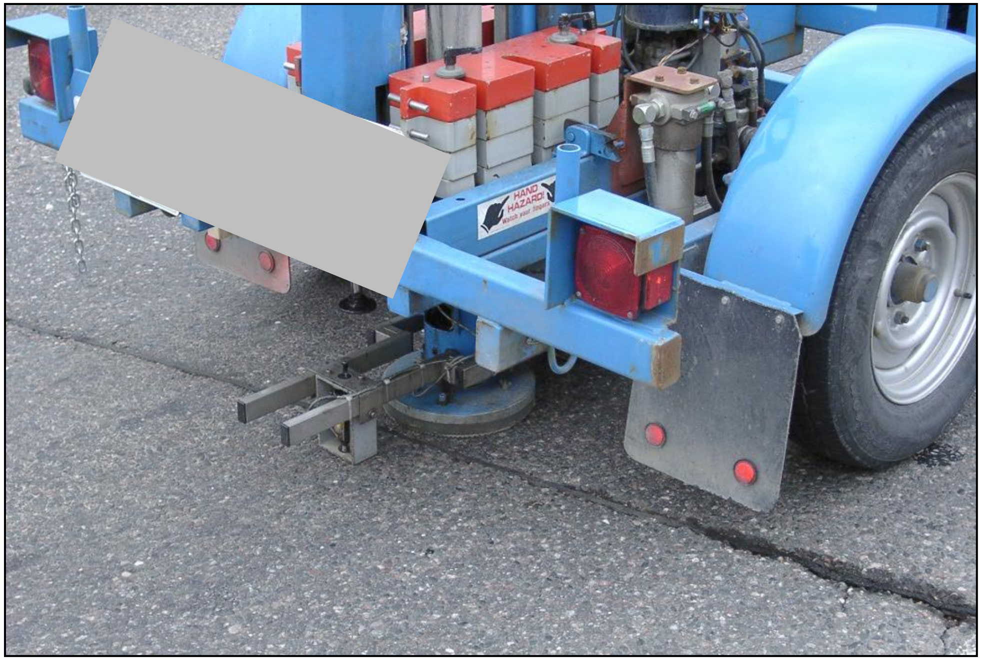
Aggregate base layer.



Inputs for Rehabilitation Design

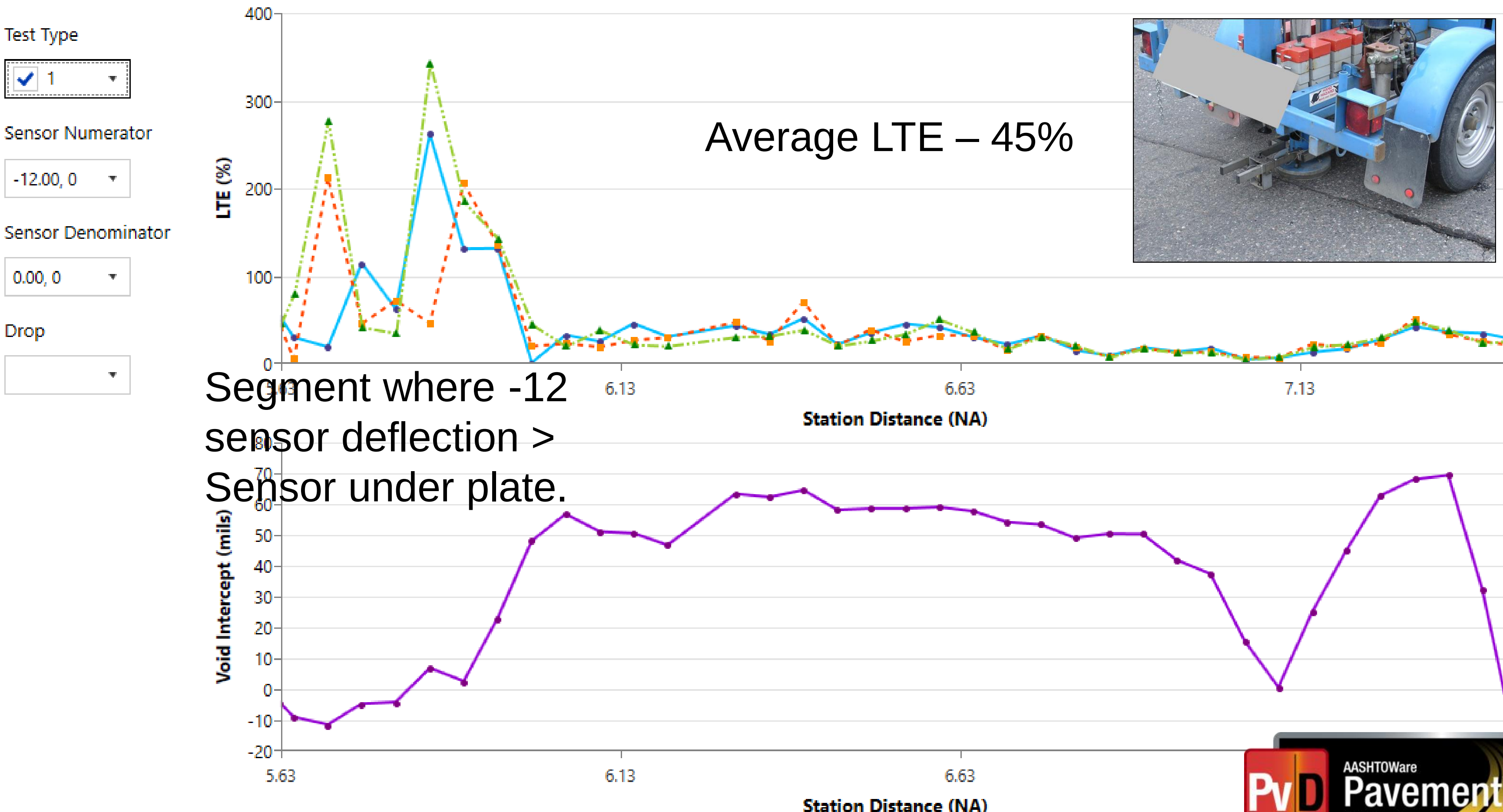
Fractured JPCP: LTE and Elastic Modulus; Table 9-13 in Manual of Practice:

- Measured value.
- Default tied to crack severity.



Inputs for Rehabilitation Design

Fractured JPCP: LTE based on deflections, input level 1.



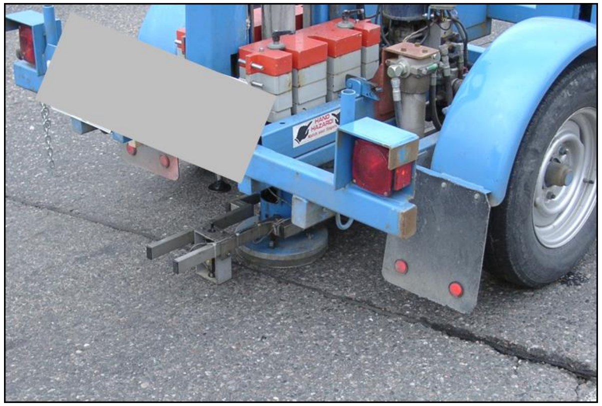
Average LTE – 45%

Segment where -12 sensor deflection > Sensor under plate.

Inputs for Rehabilitation Design

Fractured JPCP: LTE based on crack severity, input level 2.

Type of Crack	Condition of Crack/Joint	LTE Values for different Crack Severity Levels		
		Low	Moderate	Severe
Intact JPCP: transverse joint	Dowelled joints	LTE = 90; if not measured		
	Non-dowelled joints	LTE = 75; if not measured		
Fractured JPCP; transverse crack	Crack and Seat	NA	50	NA
	Rubblized, JPCP	NA	NA	NA



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Inputs for Rehabilitation Design

Fractured JPCP: LTE and Elastic Modulus.

Layer 3 Sandwich/Fractured : Fractured JPCP

Fractured	
Crack spacing in fractured slab (ft)	3
Fractured slab LTE (%)	50
General	
Poisson's ratio	0.2
Layer thickness (in)	10.3
Unit weight (pcf)	150
Strength	
Elastic/resilient modulus (psi)	616000
Thermal	
Heat capacity (BTU/lb-deg F)	0.28
Thermal conductivity (BTU/hr-ft-deg F)	1.25

Inputs for Rehabilitation Design

Asphalt Overlay Properties used in rehabilitation design:

1. First asphalt overlay; existing:
   - Aged asphalt.
   - Upper and lower asphalt layers, if cores and deflection testing suggest different responses.
2. Second asphalt overlay; top-down cracking:
   - Wearing surface
   - Lower asphalt overlay layer

Inputs for Rehabilitation Design

Existing asphalt overlay:

- Backcalculated E-Values: 2,200 to 2,500 ksi
- Lab Derived E*-Values: 2,400 t0 2,800 ksi

Thus, no structural deterioration or mixture disintegration defined by FWD deflection basins and backcalculated E-values.

Inputs for Rehabilitation Design

Layer 2 Flexible : Default asphalt concrete

Existing asphalt overlay.

Asphalt Layer	
Thickness (in)	7
Mixture Volumetrics	
Air voids (%)	7
Effective binder content (%)	10.5
Aggregate gradation	Aggregate Parameter: 0.329
Poisson's ratio	(calculated)
Unit weight (pcf)	147
Mechanical Properties	
Asphalt binder	SuperPave:64-28
Dynamic modulus	Input level:3
Select HMA Estar predictive model	Use Viscosity based model (nationally calibrated).
Reference temperature (deg F)	70
Thermal	
Heat capacity (BTU/lb-deg F)	0.23
Thermal conductivity (BTU/hr-ft-deg F)	0.67
Thermal contraction	1.234E-05 (calculated)

Inputs for Rehabilitation Design

Layer 1 Flexible : Default asphalt concrete

Second asphalt overlay.

Asphalt Layer	
Thickness (in)	3
Mixture Volumetrics	
Air voids (%)	7
Effective binder content (%)	11.6
Percent asphalt content by weight of mix (%)	5.6
Aggregate gradation	Aggregate Parameter: 0.289
Poisson's ratio	(calculated)
Unit weight (pcf)	145
Mechanical Properties	
Asphalt binder	SuperPave:70-28
Creep compliance (1/psi)	Input level:3
Dynamic modulus	Input level:3
Select HMA Estar predictive model	Use Viscosity based model (nationally calibrated
Reference temperature (deg F)	70
Indirect tensile strength at 14 deg F (psi)	Input level:3
Thermal	
Heat capacity (BTU/lb-deg F)	0.23
Thermal conductivity (BTU/hr-ft-deg F)	0.67
Thermal contraction	1.301E-05 (calculated)

Inputs for Rehabilitation Design

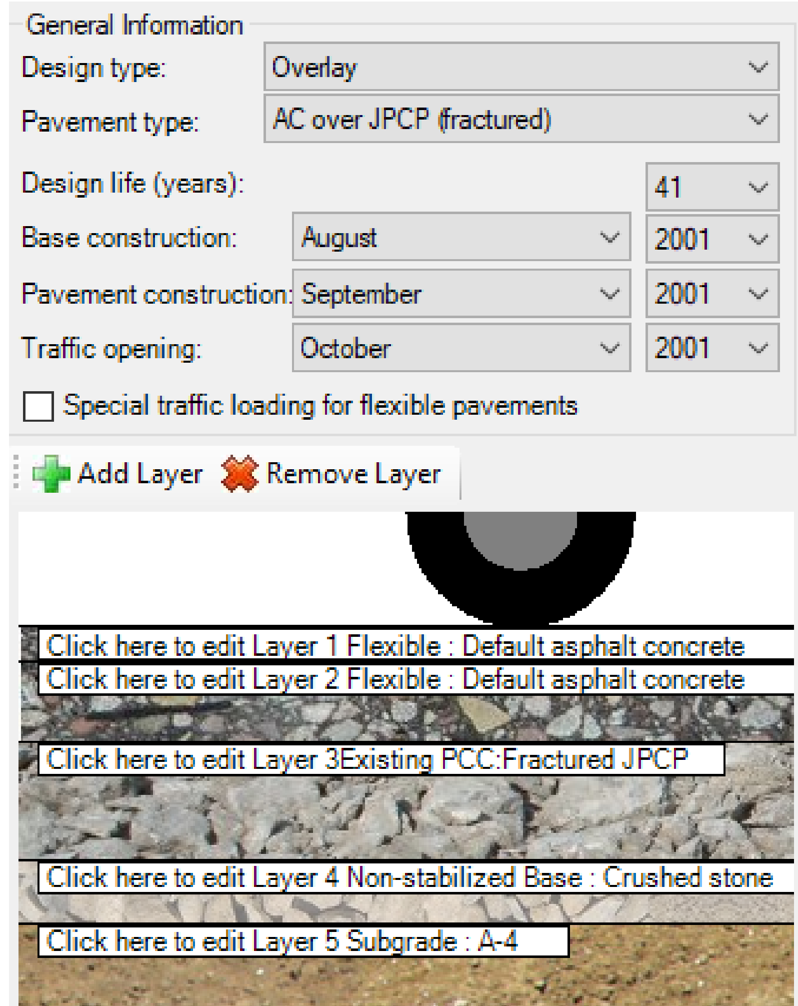
Preliminary rehabilitation design.

Layer	Event		Thickness, in.
	Activity	Date	
Asphalt Overlay	Overlay	Aug. 2022	3.0
Asphalt Overlay	Milling Depth	Aug. 2022	3.0
Asphalt Overlay	Overlay	July 2001	7.5 to 9.5
JPCP	Fractured Slabs	June 2001	9 to 10
	Initial Construction	Sept 1976	
Aggregate Base	Initial Construction	Sept 1976	4 to 8
Embankment, Soil	Compacted soil over existing soil	Sept. 1976	60 to 600
Rigid/Stiff Layer			

Inputs for Rehabilitation Design

Rule of thumb for date of overlay:

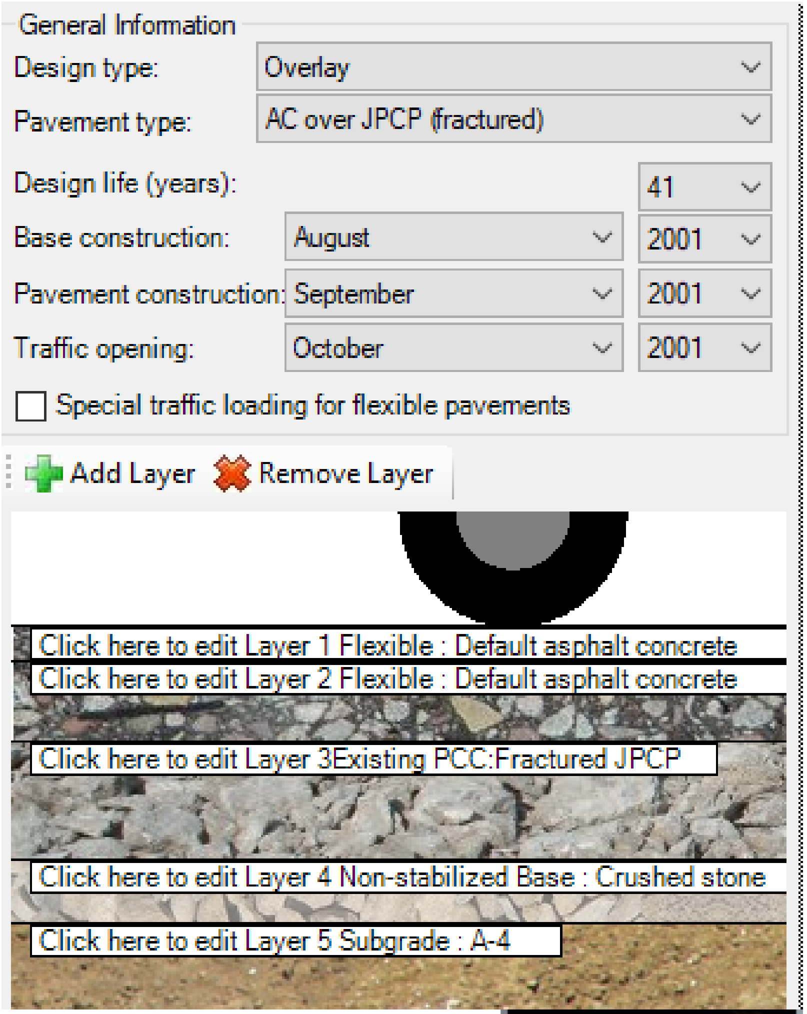
- Thickness of overlay remaining greater than thickness of new overlay – set overlay date of first overlay with maintenance strategy.
- Thickness of overlay remaining less than thickness of new overlay – set overlay date of second overlay.



Inputs for Rehabilitation Design

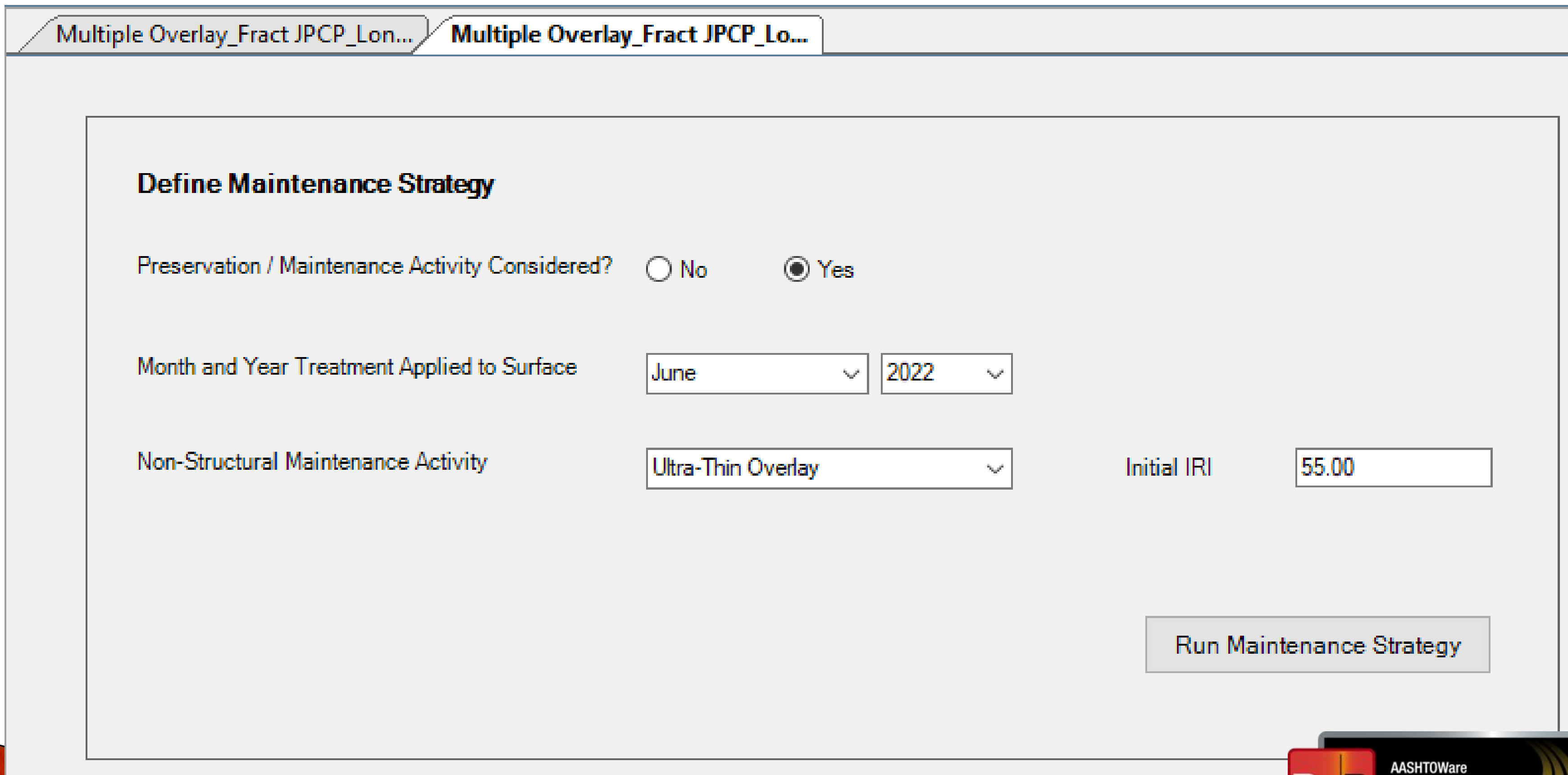
Date of Overlay/Pavement Construction; the first or second overlay?

- First overlay: 2001 with a 41 year design life; and resurfacing at year 2022.
- Second overlay: 2022 with a 20 year design life.



Inputs for Rehabilitation Design

Resetting non-structural distress values for the overlay placed in 2022.



Inputs for Rehabilitation Design

Threshold Values.

Performance Criteria	Limit	Reliability	Report Visibility
Initial IRI (in/mile)	*55*		✓
Terminal IRI (in/mile)	150	90	✓
AC top-down fatigue cracking (% lane area)	15	90	✓
AC bottom-up fatigue cracking (% lane area)	10	90	✓
AC thermal cracking (ft/mile)	1500	50	✓
Permanent deformation - AC only (in)	0.5	90	✓
AC total transverse cracking: thermal + reflective ...	1500	90	✓

FY 2021 – Webinar 4:
Rehabilitation Design; Multiple Asphalt Overlays

1. Description of Existing Pavement
2. Applying Results from the BcT
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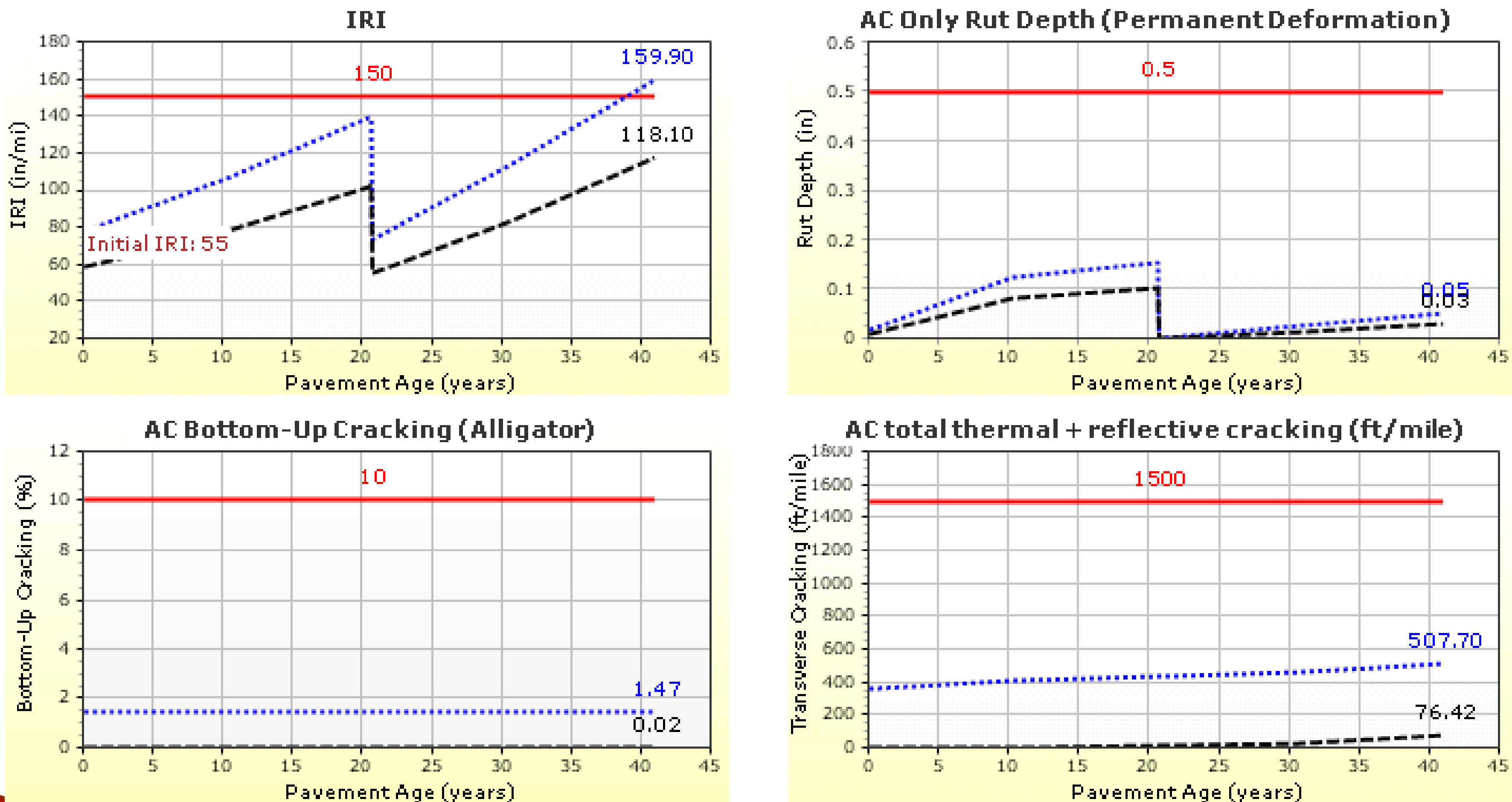
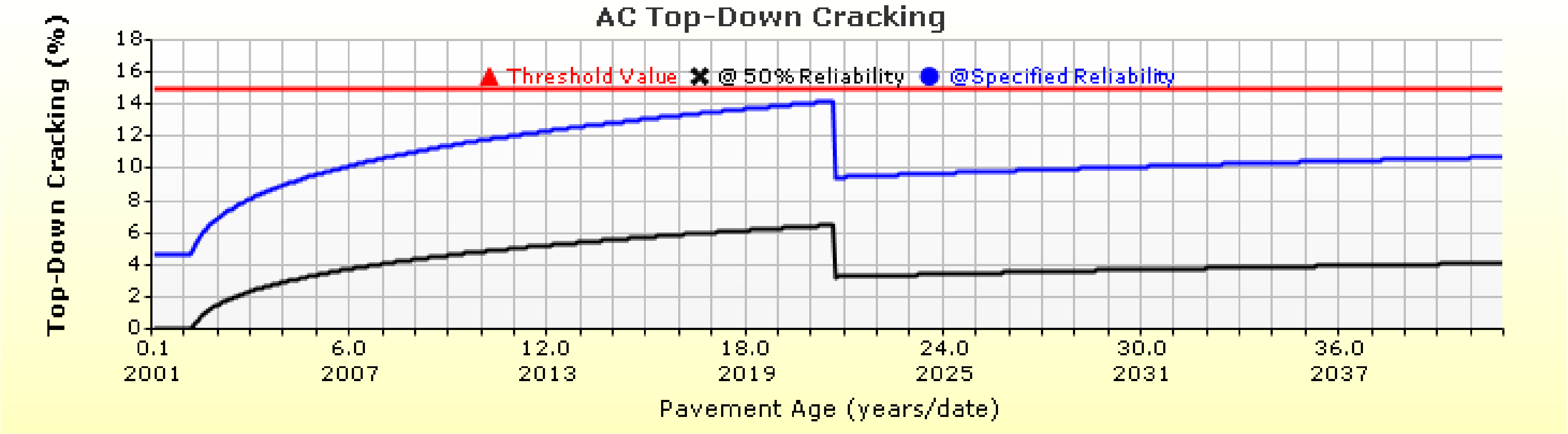
5. Rehabilitation Design
6. Question and Answer Session

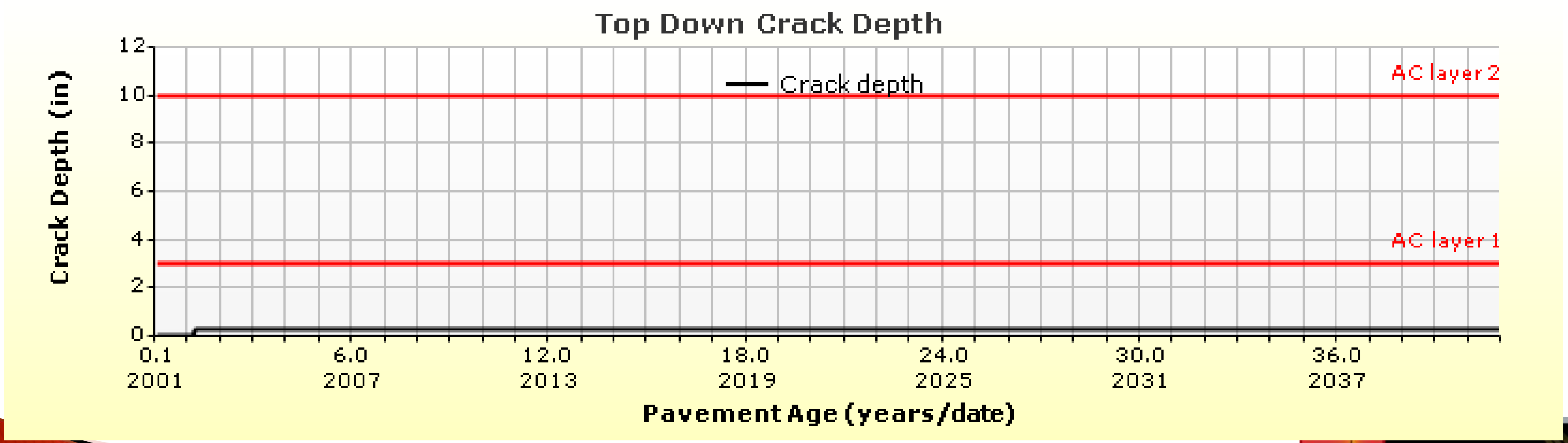
Rehabilitation Design

Distress Charts



Rehabilitation Design

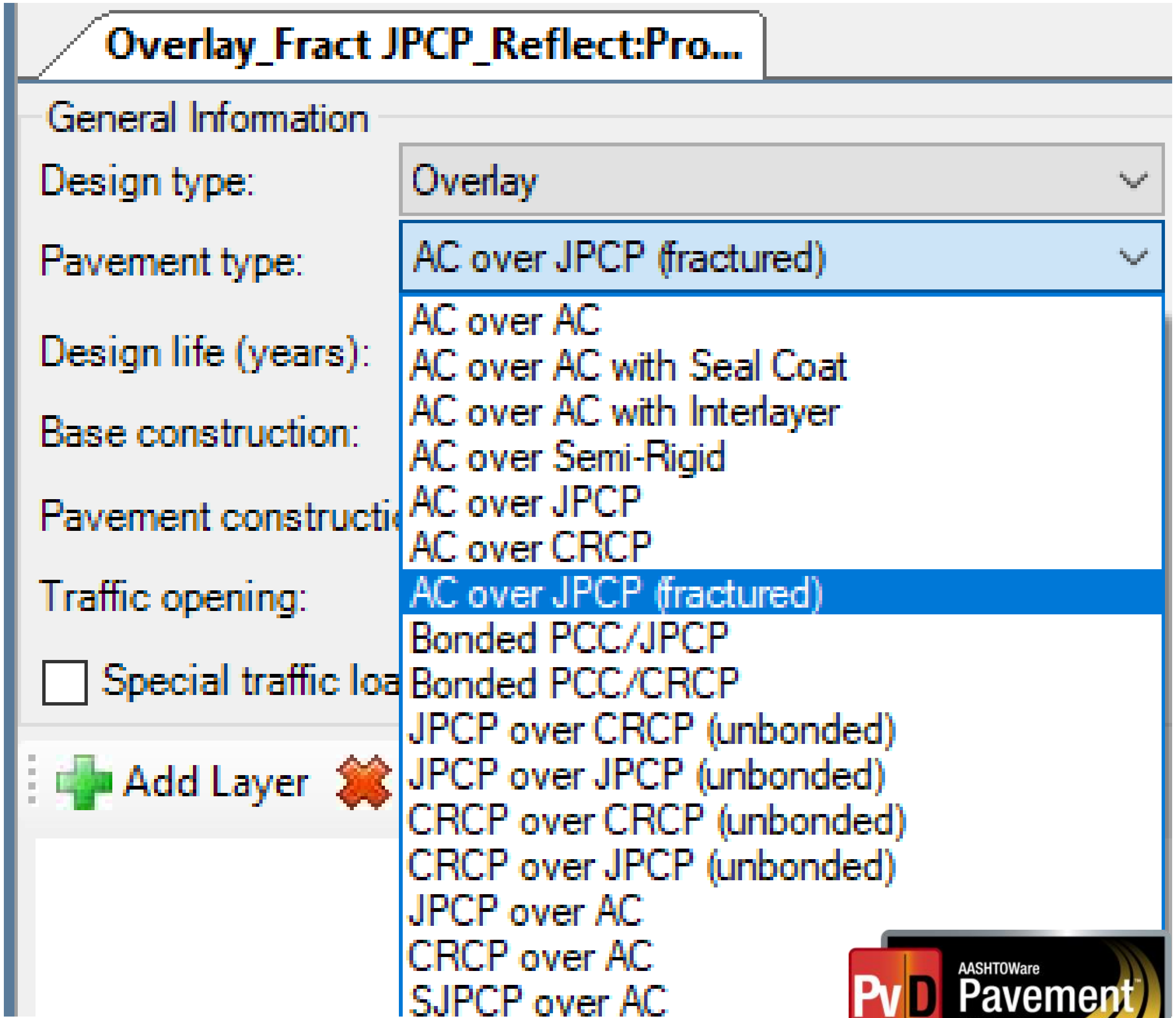




Rehabilitation Design

Strategies to mitigate reflective cracking:

- Interlayers
- Seal Coats
- Proprietary materials.



Rehabilitation Design

Strategies to mitigate reflective cracking:

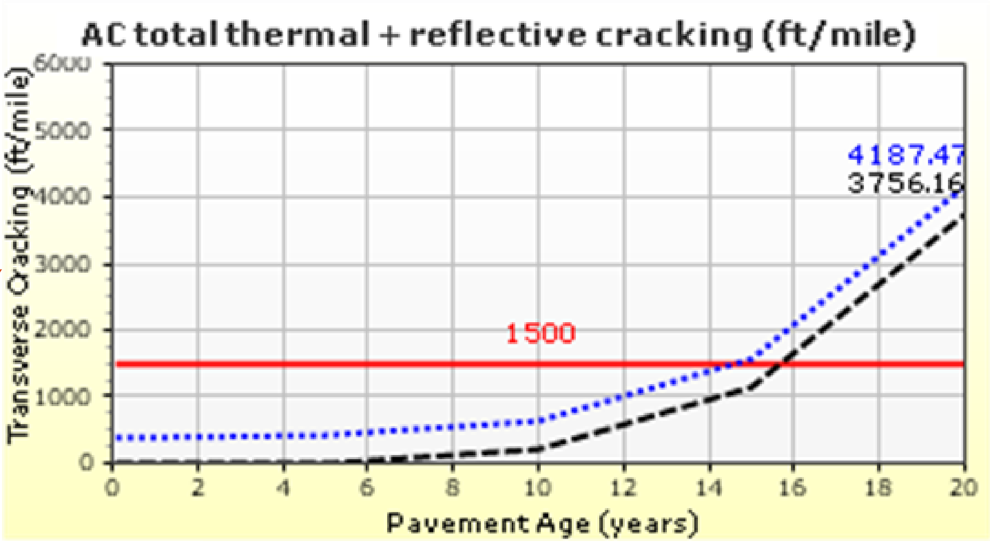
- Calibration of reflection cracking transfer function using LTPP sections resulted in minimal difference in using different interlayers/seal coats.

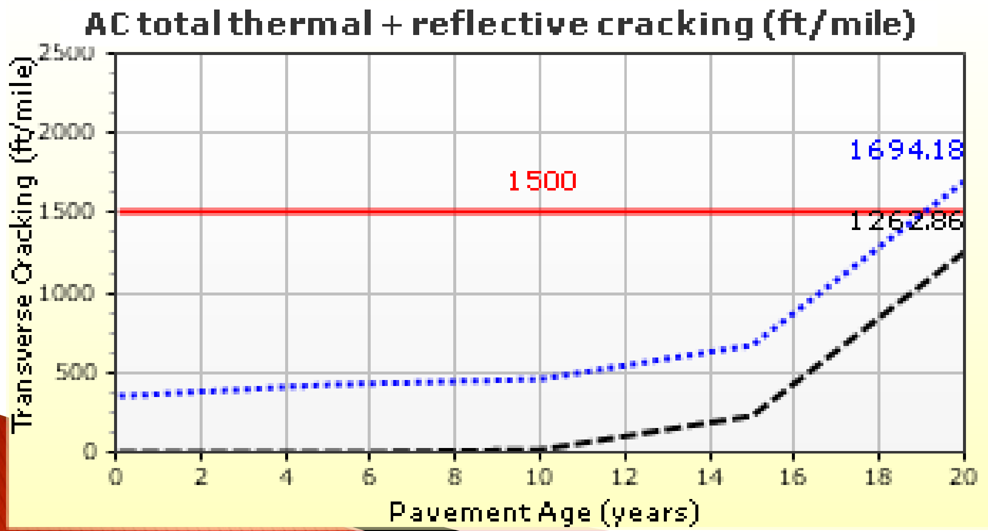
Reflective Transverse Cracking CRCP/Fractured		
Reflective Transverse Cracking CRCP/Fractured C1	✔	1.0375
Reflective Transverse Cracking CRCP/Fractured C2	✔	1.8929
Reflective Transverse Cracking CRCP/Fractured C3	✔	0.1
Reflective Transverse Cracking CRCP/Fractured C4	✔	262.1
Reflective Transverse Cracking CRCP/Fractured C5	✔	-9.6645
Reflective Transverse Cracking CRCP/Fractured K1	✔	0.012
Reflective Transverse Cracking CRCP/Fractured K2	✔	0.0002
Reflective Transverse Cracking CRCP/Fractured K3	✔	0.1
Reflective Transverse Cracking CRCP/Fractured Stanc		52.54 * Pow(TRANSVE

Rehabilitation Design

Mitigating reflective cracking – coefficients to change based on different rehabilitation strategies.

C1 = 1.0375
C2 = 1.8929
C4 = 262.1
C5 = -9.6645





C1 = 0.35
C2 = 1.75
C4 = 262.1
C5 = -10.25

In Summary

1. Applied results from the BcT program for rehabilitation design.
2. Evaluated E-results to make decisions for use in rehabilitation design.
3. Simulated fractured JPCP with an asphalt surface.
4. Rehabilitation input level assignment.
5. Determined load transfer efficiency.
6. Overviewed updates for calibration coefficients regarding interlayers for use in mitigating reflection cracks.

FY 2021 Webinar #4 Rehabilitation Design; Multiple Asphalt Overlays

Poll 2: Questions 4, 5, 6, and 7

FY 2021 – Webinar 4:
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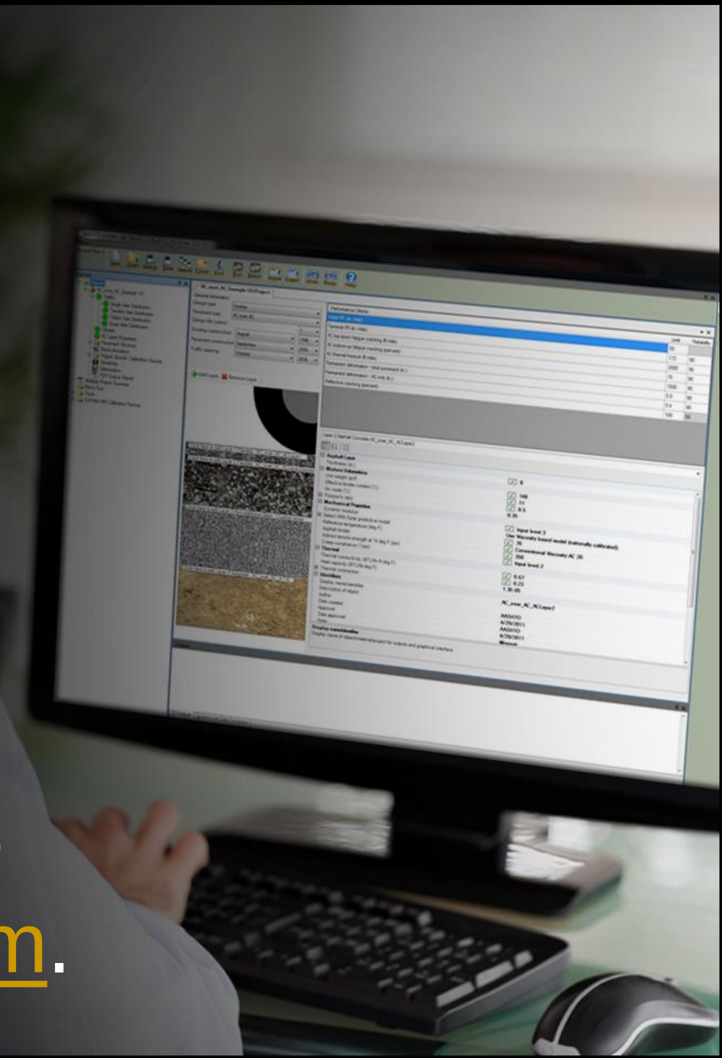
QUESTION AND ANSWER SESSION



We welcome comments & suggestions for future webinars; Send an email to pavementmedesign@ara.com.

FY 2022 – Webinar Series

1. AASHTOWare will be hosting 4 webinars next FY.
2. Users are encouraged to submit a topic they would like discussed as part of these webinars.
3. Submit suggested topics to AASHTOWare or the Help Desk – the task force will consider all submitted.

Thank you for Attending the Webinar!

AASHTOWare Pavement ME-Design Contacts:

- Ryan Fragapane, AASHTO
  rfragapane@aashto.org
  Phone: (202) 624-3632
- Clark Morrison, NCDOT
  cmorrison@ncdot.gov

ME Design Resource Website
http://www.me-design.com

Pavement ME Design Users Group Contact:

- Jennifer Albert, FHWA
  Jennifer.Albert@dot.gov

Help Desk, Customer Support:

PREFERRED

- Pavement ME Design Help Desk
  pavementmedesign@ara.com
- Phone: (217) 356-4500

Other ARA Staff:

- Chad Becker
  cbecker@ara.com
- Wouter Brink,
  wbrink@ara.com
- Harold Von Quintus, P.E.
  hvonquintus@ara.com

Phone: (217) 356-4500