

WELCOME TO THE



WEBINAR SERIES

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- The webinar will start at 12 noon Central/1:00 PM Eastern



FY 2021 Webinar #3 BcT Enhancements

February 23, 2021

FY 2021 Webinar #3, BcT Enhancements

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
- ▶ Yanbin Zhang, 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 #3, BcT Enhancements

- ▶ Phones are being muted.
- ▶ 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 #3 BcT Enhancements

Poll 1: Questions 1, 2, and 3



1. How many individuals are viewing this webinar at your location?

- 1
- 2
- 3 to 5
- More than 5

2. What is your affiliation?

- State Government
- Federal Government
- Contractor/Association
- Consultant
- Academia



3. What type of deflection equipment is typically used by you or your organization?
- Dynatest Version
 - Kuab
 - JILS
 - Another device is used
 - Do not use deflection basin tests for rehabilitation design.

Prerequisites for this Webinar

Prior experience with:

- ▶ FWD deflection basin testing.
- ▶ Backcalculation of elastic layer modulus values.
- ▶ Using a backcalculation software tool, preferably the BcT.

Learning Outcomes

1. Apply layer thickness data in the segmentation process using the BcT.
2. Determine the pavement structure simulation used in backcalculation.
3. Evaluate the results from the BcT backcalculation process for use in rehabilitation design.

FY 2021 – Webinar 3: BcT Enhancements

Outline of today's webinar:

1. Introduction; Overview of BcT Enhancements
2. Demonstration of BcT Enhancements
3. Summary and Closing Comments
4. Question and Answer Session



BcT Enhancements

1. Added *.mdb format for deflection data.
2. Added layer thickness input file.
3. Added sensor spacing file button.
4. Added chart to display layer thicknesses, along with layer definition table.
5. Layer thickness automatically populated in structure simulation, if thickness file available.
6. Stiff or rigid layer button added to structure definition.
7. Depth to rigid layer display chart added.
8. Temperature correction feature added.
9. Export to BcT data file added.

BcT software and documentation can be downloaded from AASHTOWare web site
<http://www.me-design.com>



The screenshot shows the AASHTOWare Pavement ME Design website. The top navigation bar includes links for Home, Downloads, Documents, Tools, Information, Report Bugs, Licensing, and Webinars. A blue arrow points to the 'Downloads' menu, which is open and shows 'Software' and 'Climatic Data' options. The main banner features the text 'AASHTO For state-of-the-art pavement design' and 'ME Design 2.6 Released'. Below the banner, there are two news items: '***AASHTOWare Backcalculation Tools v1.0.6 is now available. [12/4/2020]***' and '***AASHTOWare Pavement ME Design v2.6 is now available. [6/26/2020]***'. A 'Subscribe' button is located to the right of the second news item. At the bottom, there is a text block describing the software and a sign-up form with an 'Enter your email' input field and a 'Subscribe' button.

AASHTOWare Pavement ME Design

AASHTO
For state-of-the-art pavement design

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Software
Climatic Data

ME Design 2.6 Released

AASHTOWare Pavement ME Design

AASHTOWare Backcalculation Tools v1.0.6 is now available. [12/4/2020]

AASHTOWare Pavement ME Design v2.6 is now available. [6/26/2020]

AASHTOWare Pavement ME Design is the next generation of AASHTOWare® pavement design software, which builds upon the mechanistic-empirical pavement design guide, and expands and improves the features in the accompanying prototype computational software. ME Design supports AASHTO's Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice. ME Design is a production-ready software tool to support the day-to-day pavement design functions of public and private pavement engineers.

Subscribe

Sign up here to receive the latest ME Design product updates.

Enter your email

BcT

How do we get the BcT?

1. Included in AASHTOWare
PMED License

2. Standalone single user
purchase

Annual license fee: \$1,250

[Link to AASHTOWare Purchasing](#)

BcT Software

Home Downloads Documents Tools Information Report Bugs Licensing Webinars

AASHTOWare Pavement ME Design Version 1.2 Build 1.2.01 (Date: 11/16/2012)

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Recent Files ▾

Explorer

Database/Screen Log
[X] Open ME Design without database connection
Login
Password

About ME Design
AASHTOWare Pavement ME Design
Copyright AASHTOWare 2012
License status: **Unlicensed** [Activate/Reinstall License](#)
Version 1.2 Build 1.2.01 Date: 11/16/2012

Tools to Optimize Pavement Designs

FlexibleNew FlexibleRehab

Software Download

AASHTOWare Backcalculation Tools v1.0.6 is now available. [12/4/2020]

AASHTOWare Pavement ME Design v2.6 is now available. [6/26/2020]

Log In

User Name:

Password:

Remember me next time.

Login

AASHTOWare Pavement ME Design license purchase is available at the [AASHTOWare website](#) (US and Canada Only). For International orders please visit the [international licensing page](#).





AASHTOWare Pavement ME Design Version 1.2 Build 1.2.01 (Date: 11/16/2012)

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Tools to Optimize Pavement Designs

SOFTWARE INSTALLATION AND LICENSING

▶ Software and Hardware Requirements

▶ Software Download

▶ Software Licensing and Activation

▶ Database Resource Documents

▶ Example ME Design Projects

▶ **Backcalculation Tools**

To install AASHTOWare Backcalculation Tools on your computer, extract the files included in the AASHTOWareBackcalculationToolsInstaller.zip file to a temporary directory. Run the [AASHTOWare - Backcalculation Tools Installer.exe \[v1.0.6\]](#) file from the temporary directory and select install. An installation walkthrough and step-by-step instructions for license activation can be found [here](#). Please note that v1.0.6 requires Microsoft .Net Framework 4.8.

Overview and Features of BcT

ME Design Backcalculation Tools

Input FWD Data
 Segmentation Sensors
 Final Segmentation
 Structure Definition
 Backcalculation
 Physical Features
 Export to MEDesign

Guided Process:
 Select the input deflection data file for analysis.

1. Select the FWD data file type from the drop down list.
2. Click the Browse button to select the input FWD file. This opens a file browser window. Select the input FWD file and click OK, or double-click the filename to load data.
3. The Re-Parse button reloads data from the selected file and reverts all changes made by the user.
4. General information and plate radius values can be edited. Sensor spacing can be changed by double-

Test Point	Station Distance Feet	Lane	Test Type	Air Temp. F
1	0	NA	NA	77.288
2	50.6	NA	NA	77.81
3	0	NA	NA	77.018
4	52.3	NA	NA	76.982
5	101.2	NA	NA	77.09

Plate Radius: 5.9 Unit: Inch

Sensor Direction	Sensor 1	Sensor 2
Sensor Spacing X	0	8
Sensor Spacing Y	0	0

Drop Number	Target Load Level lbf	Load lbf	DEF 1 mils	DEF 2 mils	DEF 3 mils	DEF 4 mils	DEF 5 mils	DEF 6 mils	DEF 7 mils	DEF 8 mils	DEF 9 mils	Basin Characterization
10	9000	9159	4.05	2.93	2.48	2.02	1.65	1.24	1.08	0.85	0.74	Type 2
11	12000	12316	5.48	3.96	3.37	2.72	2.24	1.67	1.36	1.14	0.96	Typical
12	16000	16638	7.87	5.80	4.93	3.95	3.28	2.53	2.04	1.68	1.38	Typical

Save and Proceed

1. Input FWD Data
2. Segmentation Sensors
3. Final Segmentation
4. Structure Definition
5. Backcalculation
6. Physical Features
7. Export to ME Design

FY 2021 – Webinar 3: BcT Enhancements

Outline of today's webinar:

1. Introduction; Overview of BcT Enhancements
2. Demonstration of BcT Enhancements
3. Summary and Closing Comments
4. Question and Answer Session



Demonstration of BcT Enhancements

1. Input FWD Data
2. Segmentation Sensors
3. Final Segmentation
4. Structure Definition
5. Backcalculation
6. Physical Features
7. Export to ME Design



1. Import FWD Data File

Input FWD Data

FWD data file type

- MDB (*.mdb)
- JILS (*.DAT)
- KUAB (*.FWD)
- Dynatest V.20 (*.FWD)
- Dynatest F20_SI (*.F20)
- Dynatest V.25 (*.F25)
- MDB (*.mdb)
- BcT Project (*.bctproj)

File Name: Section_1
Manufacturer: Dynatest
FWD Model:
FWD Serial Num:
Location:
Operator: Administrator

Plate Radius: 5.9
Sensor Spacing: Ser

Drop Number	Target Load (lbf)
10	9000
11	12000
12	16000

Guided Process:
Select the input deflection data file for analysis.

1. Select the FWD data file type from the drop down list.
2. Click the Browse button to select the input FWD file. This opens a file browser window. Select the input FWD file and click OK, or double-click the filename to load data.
3. The Re-Parse button reloads data from the selected file and reverts all changes made by the user.
4. General information and plate radius values can be edited. Sensor spacing can be changed by double-clicking the sensor spacing value.

▶ FWD file format converters:

1. KUAB – .FWD
2. JILS – .DAT
3. Dynatest – V20 (*.FWD)
4. Dynatest - F20 (*.F20)
5. Dynatest – V25 (*.F25)
6. Dynatest - *.mdb

1. Import FWD Data File

ME Design Backcalculation Tools

Input FWD Data
 Segmentation Sensors
 Final Segmentation
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FWD data file type: MDB (*.mdb)
 FWD data file location: C:\Users\hvonquintus\Documents\7_Projects\AASHT
 Thickness data file location: C:\Users\hvonquintus\Documents\7_Projects\AASHT

File Name: Section_1
 Manufacturer: Dynatest
 FWD Model:
 FWD Serial Num:
 Location:
 Operator: Administrator

Test Point | Station Distance Feet | Lane | Test Type | Air Temp. | Surface Temp. | Pavement Temp. | Longitude | Latitude | Elevation

1	0	NA							
2	50.6	NA							
3	0	NA							
4	52.3	NA							
5	101.2	NA							

Plate Radius: 5.9 Un
 Sensor Spacing:

Sensor Direction	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Sensor 7	Sensor 8	Sensor 9
Sensor Spacing X	0	8	12	18	24	36	48	60	72
Sensor Spacing Y	0	0	0	0	0	0	0	0	0

Drop Number | Target Load Level lbf | Load lbf | DEF 1 mils | DEF 2 mils | DEF 3 mils | DEF 4 mils | DEF 5 mils | DEF 6 mils | DEF 7 mils | DEF 8 mils | DEF 9 mils | Basin Characterization

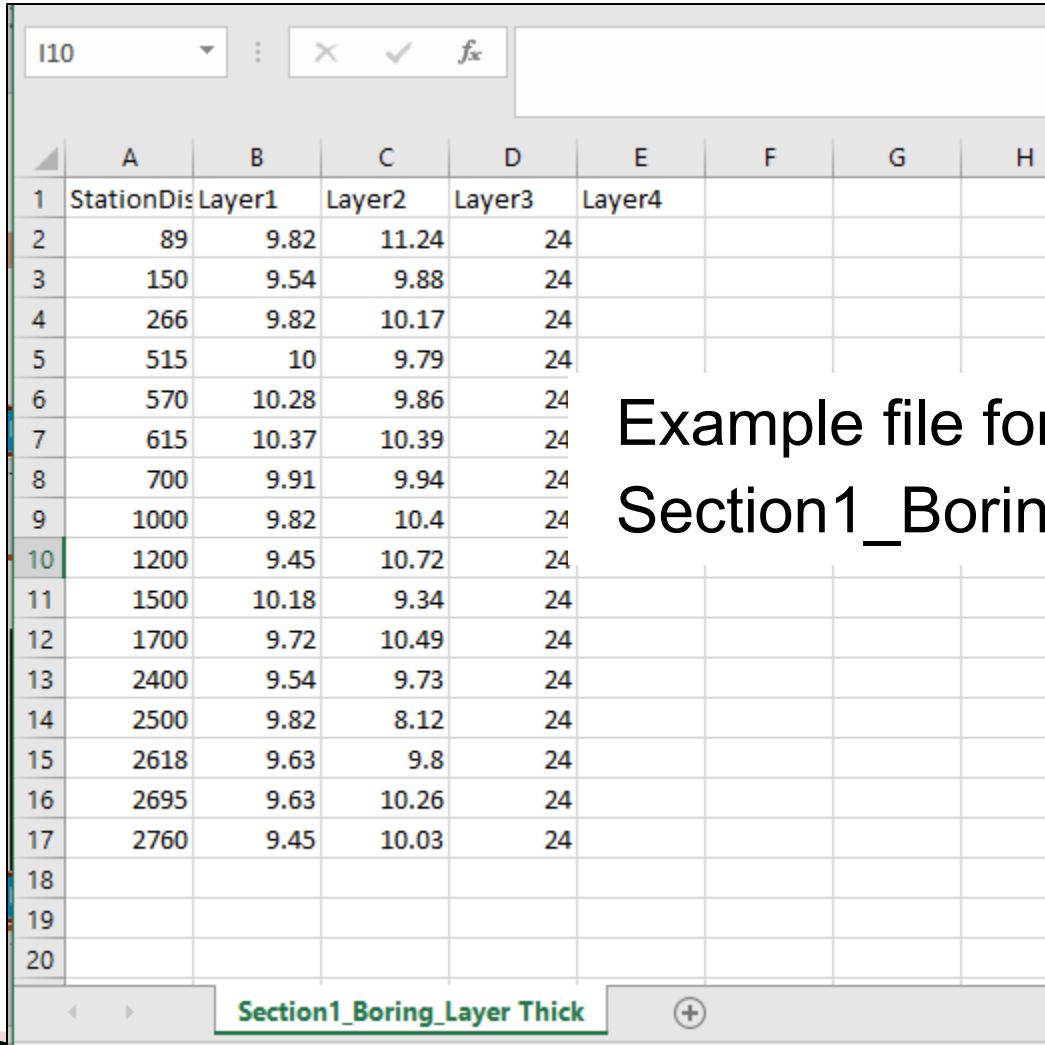
10	9000	9159	4.05	2.93	2.48	2.02	1.65	1.24	1.08	0.85	0.74	Type 2
11	12000	12316	5.48	3.96	3.37	2.72	2.24	1.67	1.36	1.14	0.96	Typical

Save and Proceed

Guided Process:
 Select the input deflection data file for analysis.
 1. Select the FWD data file type from the drop down list.
 2. Click the Browse button to select the input FWD file. This opens a file browser window. Select the input FWD file and click OK, or double-click the filename to load data.
 3. The Re-Parse button reloads data from the selected file and reverts all changes made by the user.
 4. General information and plate radius values can be edited. Sensor spacing can be changed by double-

FWD Data File
Thickness Data File

1. Import FWD Data File



The image shows a spreadsheet window with a title bar containing 'I10'. The spreadsheet has columns labeled A through H and rows numbered 1 through 20. The data is organized as follows:

	A	B	C	D	E	F	G	H
1	StationDis	Layer1	Layer2	Layer3	Layer4			
2	89	9.82	11.24	24				
3	150	9.54	9.88	24				
4	266	9.82	10.17	24				
5	515	10	9.79	24				
6	570	10.28	9.86	24				
7	615	10.37	10.39	24				
8	700	9.91	9.94	24				
9	1000	9.82	10.4	24				
10	1200	9.45	10.72	24				
11	1500	10.18	9.34	24				
12	1700	9.72	10.49	24				
13	2400	9.54	9.73	24				
14	2500	9.82	8.12	24				
15	2618	9.63	9.8	24				
16	2695	9.63	10.26	24				
17	2760	9.45	10.03	24				
18								
19								
20								

The spreadsheet title bar shows 'Section1_Boring_Layer Thick' and a '+' icon. The spreadsheet is displayed in a window with a standard toolbar at the top.

Example file format:
Section1_BoringLayerThick.csv

1. Import FWD Data File

ME Design Backcalculation Tools About | Manual

○ **Input FWD Data**

- Segmentation Sensors
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Guided Process:
 Select the input deflection data file for analysis.

1. Select the FWD data file type from the drop down list.
2. Click the Browse button to select the input FWD file. This opens a file browser window. Select the input FWD file and click OK, or double-click the filename to load data.
3. The Re-Parse button reloads data from the selected file and reverts all changes made by the user.
4. General information and plate radius values can be edited. Sensor spacing can be changed by double-

FWD data file type: MDB (*.mdb)

FWD data file location: C:\Users\hvonquintus\Documents\7_Projects\AASHT Browse Re-Parse

Thickness data file location: C:\Users\hvonquintus\Documents\7_Projects\AASHT

File Name: Section_1 FWD Serial Num:

Manufacturer: Location:

FWD Model: Operator: Administrator

▶ Sensor spacing file ◀

Test Point	Station Distance Feet	Lane	Test Type	Air Temp. F	Surface Temp. F	Pavement Temp. F	Longitude Decimal Degree	Latitude Decimal Degree	Elevation
1	0	NA	NA	77.288	84.398	NA	-97.8850111743438	29.6590246936105	
2	50.6	NA	NA	77.81	84.65	NA	-97.8849577079989	29.6591440529997	
3	0	NA	NA	77.018	84.092	NA	-97.8850180149991	29.6590152240001	
4	52.3	NA	NA	76.982	84.758	NA	-97.8849602740006	29.6591488430002	
5	101.2	NA	NA	77.09				29.6592741160001	

Plate Radius: 5.9 Unit: Inch

Load Sensor Spacings
Save Sensor Spacings

Sensor Direction	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Sensor 7	Sensor 8	Sensor 9
Sensor Spacing X	0	8	12	18	24	36	48	60	72
Sensor Spacing Y	0	0	0	0	0	0	0	0	0

Drop Number	Target Load Level lbf	Load lbf	DEF 1 mils	DEF 2 mils	DEF 3 mils	DEF 4 mils	DEF 5 mils	DEF 6 mils	DEF 7 mils	DEF 8 mils	DEF 9 mils	Basin Characterization
14	9000	9025	4.96	2.91	2.43	2.13	1.81	1.16	1.06	0.83	0.68	Type 2
15	12000	12178	6.70	3.89	3.29	2.82	2.37	1.61	1.43	1.10	0.81	Type 2
16	16000	16000	8.75	5.11	4.29	3.68	3.11	2.26	2.03	1.55	1.22	Type 2

Save and Proceed



Demonstration of BcT Enhancements

1. Input FWD Data
2. Segmentation Sensors
3. Final Segmentation
4. Structure Definition
5. Backcalculation
6. Physical Features
7. Export to ME Design



2. Segmentation Sensors

ME Design Backcalculation Tools

Filter for charts Drop (Load Level) 4 (1600) Test Types NA Basin Characterization Types Typical Lane NA

Input FWD Data
Segmentation Sensors

Final Segmentation
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Guided Process:
Select up to three sensors for segmentation. The charts show peak deflections for the selected sensor and drop height along the length of the project.

1. Drop number filter – Toggle drop numbers to show peak deflections on chart.
2. Test types filter – Toggle test types to filter data for backcalculation. Select analysis methods such as load transfer efficiency or void detection from the Test Types options.
3. Basin characterization types filter – Select which basins to display (Typical,

Sensor 0 Deflection (mil) 15 10 5 0 0 500 1000 1500 2000 2500

Sensor 18 Deflection (mil) 10 5 0 0 500 1000 1500 2000 2500

Sensor 72 Deflection (mil) 4 2 0 0 500 1000 1500 2000 2500

Layers thicknesses

Layers Layer Layer 1 Layer 2 Layer 3

Thickness (inc) 30 20 10 0 0 500 1000 1500 2000 2500

Station Distance (ft)

Save and Proceed

Demonstration of BcT Enhancements

1. Input FWD Data
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3. Final Segmentation

ME Design Backcalculation Tools

Input FWD Data
Segmentation Sensors
Final Segmentation
Structure Definition
Backcalculation
Physical Features
Export to MEdesign

Filter for charts: Drops, Test Types, Basin Characterization Types, Lane

Sensor: 0

Deflection (mils)

Thickness (inch)

Station Distance (ft)

Layers: Subgrade (Coarse Gra), Subgrade (Fine Grain)

Segmentation Mode

- Preliminary
- Statistical

Chart Action:

- Mouse left click to add a segment line
- Mouse left click hold and drag a segment line to update the boundary
- Mouse right click a segment line to remove

Guided Process:

Create segments for backcalculation – statistical segmentation results are provided on charts for guidance. Segmentation results are applied to all sensors identically, i.e. updating segments for one sensor changes the segments for other sensors. Filters cannot be updated on the final segmentation screen.

Click on the chart between two stations to insert a vertical segment marker. This will add a segment with start and end station numbers to the table on the right side of the screen. User may add as many segments as

Save and Proceed

3. Final Segmentation

ME Design Backcalculation Tools

Input FWD Data
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Filter for charts Drops Test Types Basin Characterization Types Lane

Sensor 0

Deflection (mils)

Station Distance

Layers

Thickness (inch)

Station Distance (ft)

Segmentation Mode
 Preliminary
 Statistical

Chart Action:
- Mouse left click to add a segment line
- Mouse left click hold and drag a segment line to update the boundary
- Mouse right click a segment line to remove

Data Grid Action:
UNDO REDO

Num	From	To	DELETE
		2760	

Layer 1 AC (AC)
Layer 2 Treated Base (Lime Tr)
Layer 3 Subgrade (Coarse Gra)
Layer 4 Subgrade (Fine Grain)

Layer Structure Definition

Save and Proceed

Guided Process:
Create segments for backcalculation – statistical segmentation results are provided on charts for guidance. Segmentation results are applied to all sensors identically, i.e. updating segments for one sensor changes the segments for other sensors. Filters cannot be updated on the final segmentation screen.
Click on the chart between two stations to insert a vertical segment marker. This will add a segment with start and end station numbers to the table on the right side of the screen. User may add as many segments as

Demonstration of BcT Enhancements

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4. Structure Definition

ME Design Backcalculation Tools About | Manual

- Input FWD Data
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- Backcalculation
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Please click on a segment or drag on segments to view or apply layer definition changes. Progress

Number of Layers: Has Stiff Layer

Layer	Layer Type	Thickness (in)	Poisson's Ratio	Minimum Modulus (ksi)	Maximum Modulus (ksi)	Mean (Seed) Modulus (ksi)	Fixed
Layer 1	AC (AC)	9.794365671641	0.35	400	6000	1000	<input type="checkbox"/>
Layer 2	Treated Base (Lime Treated)	10.45188899253	0.35	15	1000	50	<input type="checkbox"/>
Layer 3	Subgrade (Coarse Grained)	24	0.45	10	80	25	<input type="checkbox"/>
Layer 4	Subgrade (Fine Grained)	0	0.45	5	50	15	<input type="checkbox"/>

Guided Process:
 Define the pavement layer structure for all segments.

- Click on an individual segment, click and drag over multiple segments or hold down Control ('Ctrl') button and click on multiple segments to set the target pavement length.
- Select the number of pavement layers (maximum no. of layers is 5).
- For each layer, select layer type and set thickness, Poisson's ratio, seed modulus and backcalculated modulus limits for each layer.

Clicking the Apply button assigns the

Thickesses automatically populated.

4. Structure Definition

ME Design Backcalculation Tools

Input FWD Data
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Please click on a segment or drag on segments to view or apply layer definition changes.

Progress

Deflection (mils)

Station Distance (ft)

Number of Layers: 5

Has Stiff Layer

Layer	Layer Type	Thickness (in)	Poisson's Ratio	Minimum Modulus (ksi)	M _e Modulus (ksi)	M _b Modulus (ksi)	
Layer 1	AC (AC)	9.79532075471E	0.35	400	6000	1000	<input type="checkbox"/>
Layer 2	Treated Base (Lime Treated)	9.513603773584	0.35	15	1000	50	<input type="checkbox"/>
Layer 3	Subgrade (Coarse Grained)	24	0.45	10	80	25	<input type="checkbox"/>
Layer 4	Subgrade (Fine Grained)	100	0.45	5	50	15	<input type="checkbox"/>
Layer 5	Bedrock	0	0.2	0	0	500	<input checked="" type="checkbox"/>

Apply

Save and Proceed

Rigid or stiff layer added.

Guided Process:
Define the pavement layer structure for all segments.
1. Click on an individual segment, click and drag over multiple segments or hold down Control ('Ctrl') button and click on multiple segments to set the target pavement length.
2. Select the number of pavement layers (maximum no. of layers is 5).
3. For each layer, select layer type and set thickness, Poisson's ratio, seed modulus and backcalculated modulus limits for each layer.
Clicking the Apply button assigns the

Demonstration of BcT Enhancements

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5. Backcalculation

ME Design Backcalculation Tools

Input FWD Data
Segmentation Sensors
Final Segmentation
Structure Definition
Backcalculation
Physical Features
Export to MEdesign

Modulus and RMSE | Layer Compensation | Depth to Bedrock

Sensor Selection

Sensor (x,y)	Selected
(0, 0)	<input checked="" type="checkbox"/>
(8, 0)	<input checked="" type="checkbox"/>
(12, 0)	<input checked="" type="checkbox"/>
(18, 0)	<input checked="" type="checkbox"/>
(24, 0)	<input checked="" type="checkbox"/>
(36, 0)	<input checked="" type="checkbox"/>

Standard Temperature: 77

Temp. Correction (Adjusted Modulus): N

Backcalculate

Drop

Drop	Selected
1 (9000)	<input checked="" type="checkbox"/>
2 (9000)	<input checked="" type="checkbox"/>
3 (12000)	<input checked="" type="checkbox"/>
4 (16000)	<input checked="" type="checkbox"/>

Save and Proceed

Guided Process:
Performs backcalculation for all segments using the EVERCALC® program.

1. Deselect trailing sensors from the list of sensors.
2. Click 'Backcalculate' button to run the backcalculation process.
3. After successful completion of backcalculation process, view results for any segment by selecting the segment from the 'Segment' drop-down list.
4. Logarithmic Chart button toggles the Y-axis on the layer modulus chart between arithmetic and logarithmic

Temperature Correction Feature Added.

If pavement temperatures are not included in deflection file, do not use adjustment.

5. Backcalculation

ME Design Backcalculation Tools About | Manual

- Input FWD Data
- Segmentation Sensors
- Final Segmentation
- Structure Definition
- Backcalculation**
- Physical Features
- Export to MEdesign

Guided Process:

Performs backcalculation for all segments using the EVERCALC® program.

1. Deselect trailing sensors from the list of sensors.
2. Click 'Backcalculate' button to run the backcalculation process.
3. After successful completion of backcalculation process, view results for any segment by selecting the segment from the 'Segment' drop-down list.
4. Logarithmic Chart button toggles the Y-axis on the layer modulus chart between arithmetic and logarithmic

Modulus and RMSE

Sensor Selection

Sensor (x,y)	Selected
(0, 0)	<input checked="" type="checkbox"/>
(8, 0)	<input checked="" type="checkbox"/>
(12, 0)	<input checked="" type="checkbox"/>
(18, 0)	<input checked="" type="checkbox"/>
(24, 0)	<input checked="" type="checkbox"/>
(36, 0)	<input checked="" type="checkbox"/>

Standard Temperature: 77

Temp. Correction (Adjusted Modulus):

Backcalculate

Drop	Selected
1 (9000)	<input checked="" type="checkbox"/>
2 (9000)	<input checked="" type="checkbox"/>
3 (12000)	<input checked="" type="checkbox"/>
4 (16000)	<input checked="" type="checkbox"/>

Layer Compensation

Segment Selection: 0 - 2201.2 Logarithmic Scale: Layer Selection:

- AC (AC)
- Treated Base (Lime Treated)
- Subgrade (Coarse Grained)
- Subgrade (Fine Grained)

Depth to Bedrock

Drop (%): 100 **Update**

Save and Proceed



5. Backcalculation

ME Design Backcalculation Tools About | Manual

- ✓ Input FWD Data
- ✓ Segmentation Sensors
- ✓ Final Segmentation
- ✓ Structure Definition
- Backcalculation**
- Physical Features
- Export to MEdesign

Guided Process:
Performs backcalculation for all segments using the EVERCALC® program.

1. Deselect trailing sensors from the list of sensors.
2. Click 'Backcalculate' button to run the backcalculation process.
3. After successful completion of backcalculation process, view results for any segment by selecting the segment from the 'Segment' drop-down list.
4. Logarithmic Chart button toggles the Y-axis on the layer modulus chart between arithmetic and logarithmic

Modulus and RMSE | Layer Compensation | **Depth to Bedrock**

Segment Selection: 20.75 - 2640.7

Depth to Bedrock

Station Distance (ft)

Save and Proceed



Demonstration of BcT Enhancements

1. Input FWD Data
2. Segmentation Sensors
3. Final Segmentation
4. Structure Definition
5. Backcalculation
6. Physical Features
7. Export to ME Design



6. Physical Features Backcalculation

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Guided Process:
Displays results of load transfer efficiency (LTE) calculations and load-deflection intercept for loss of support analysis. LTE is calculated as the ratio of unloaded sensor deflection (D sub u) to loaded sensor deflection (D sub l).

1. Select the sensor corresponding to the unloaded deflection – Sensor Numerator, Du.
2. Select the sensor corresponding to the loaded deflection – Sensor Denominator, Dl.
3. Toggle drops to be included/excluded from calculation of average

Test Type: [Dropdown]
Sensor Numerator: 12, 0 [Dropdown]
Sensor Denominator: 0, 0 [Dropdown]
Drop: [Dropdown]
 1
 2
 3
 4

LTE

Station Distance (ft)

Station Distance (ft)

Save and Proceed

Demonstration of BcT Enhancements

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7. Export to ME Design

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Segment	Status
0 - 2201.2	<input checked="" type="checkbox"/>
20.75 - 2640.7	<input checked="" type="checkbox"/>

Layer	Layer Name	MEDesign Layer Selection	Average Modulus	Standard Deviation	COV (%)	Thickness	Poisson
1	AC (AC)	Default asphalt concrete (existing)	669.8	173.1	25.8%	9.79436567164186	0.35
2	Treated Base (Lime Treated)	Lime fly ash	142.2	58	40.8%	10.4518889925373	0.35
3	Subgrade (Coarse Grained)	A-1-a	58.6	16.4	27.9%	24	0.45
4	Subgrade (Fine Grained)	A-6	28.7	8.9	31.1%	0	0.45

Analysis Type: AC over AC
 Average LTE (%): NaN
 Temperature: 0
 Frequency (Hz): 30

Exporting the files

Guide

Displays results at project file

1. Click on display a
2. For each 'ME Design' down the corresponding layer type to export to ME Design. Pavement ME provided several options for defining material types.
3. Summary results may not be edited by the user.
4. Select 'Analysis Type', which is the



7. Export to ME Design

7_Projects > AASHTO > AASHTO_BcT Items > test files[2] > Section_1

Name	Date modified	Type	Size
EverCalc Export	2/22/2021 10:38 AM	File folder	
EVERCALC.STD	2/22/2021 7:06 PM	STD File	1 KB
Section_1_S1.DEF	2/22/2021 7:06 PM	DEF File	4 KB
Section_1_S1.FIL	2/22/2021 7:06 PM	FILE FILE	1 KB
Section_1_S1.GEN			
Section_1_S1.LOG			
Section_1_S1.OUT			
Section_1_S1.SUM			
Section_1_S2.DEF			
Section_1_S2.FIL			
Section_1_S2.GEN			
Section_1_S2.LOG	2/22/2021 7:06 PM	Text Document	106 KB
Section_1_S2.OUT	2/22/2021 7:06 PM	OUT File	242 KB
Section_1_S2.SUM	2/22/2021 7:06 PM	SUM File	22 KB
Section_1_universal.csv	2/22/2021 6:41 PM	Microsoft Excel C...	35 KB
SensorSpacings.csv	2/22/2021 1:31 PM	Microsoft Excel C...	1 KB

Exporting the files:

- ▶ Evercalc Export
- ▶ Evercalc files summary
- ▶ Section1_universal.csv

7. Export to ME Design

Backcalculation by Evercalc 5.0 - Summary Output

	A	B	C	D	E	F	G	H	I	J
1	Backcalculation by Evercalc 5.0 - Summary Output									
2	Route:									
3	Plate Radi	No of Layers: 4								
4	No of Sen	Stiff Layer: No								
5	Offsets (ir	P-Ratio: .350 .350 .450 .450								
6	Station	Load (lbf)	E1(ksi)	E2(ksi)	E3(ksi)	E4(ksi)	DepthToS	RMS Error		
7	0	9156	297.8	125.4	100	48.2	43.82	1.85		
8	0	9148	290.5	125.3	100	48.3	43.82	2.01		
9	0	12300	290.5	125.3	97.7	48.3	43.82	1.6		
10	0	15413	290.5	125.3	97.7	48.3	43.82	1.51		
11	0	9172	290.7	135	100	48.8	43.82	1.79		
12	0	9159	296.3	138	100	47.4	43.82	2.4		
13	0	12316	310	119.1	100	48.6	43.82	1.23		
14	0	16170	310	119.1	97.7	48.6	43.82	1.73		
15	50.6	9152	447.6	74.2	100	51.5	43.82	3.94		
16	50.6	9140	405.4	126.4	84.8	47.4	43.82	3.35		
17	50.6	12221	429	102.7	83.4	49.4	43.82	1.06		
18	50.6	15416	429	102.7	83.4	49.4	43.82	1.82		
19	52.3	9029	160.4	235.1	73.1	49.2	43.82	4.91		
20	52.3	9025	163.3	210.4	74.5	50.2	43.82	4.98		

Section_1_S1_evercalc

Exporting the files:
Section1_S1_evercalc.csv



FY 2021 – Webinar 3: BcT Enhancements

Outline of today's webinar:

1. Introduction; Overview of BcT Enhancements
2. Demonstration of BcT Enhancements
3. Summary and Closing Comments
4. Question and Answer Session



Summary and Closing Thoughts

- ▶ The enhanced BcT version was based on suggestions from the users.
- ▶ Additional suggestions should be submitted to the Task Force for future enhancements and improvements.

FY 2021 Webinar #3 BcT Enhancements

Poll 2: Questions 4, 5, and 6



4. Have you used the BcT program?

- Yes
- No

5. Which of the following backcalculation programs do you typically use for rehabilitation design?

- BcT
- MODULUS
- MODCOMP
- EVERCALC
- ELMOD
- Another Program
- Have not used a backcalculation program



6. Do you or your organization use ground penetrating radar to determine pavement layer thickness?

- No
- Yes

FY 2021 – Webinar 3: BcT Enhancements

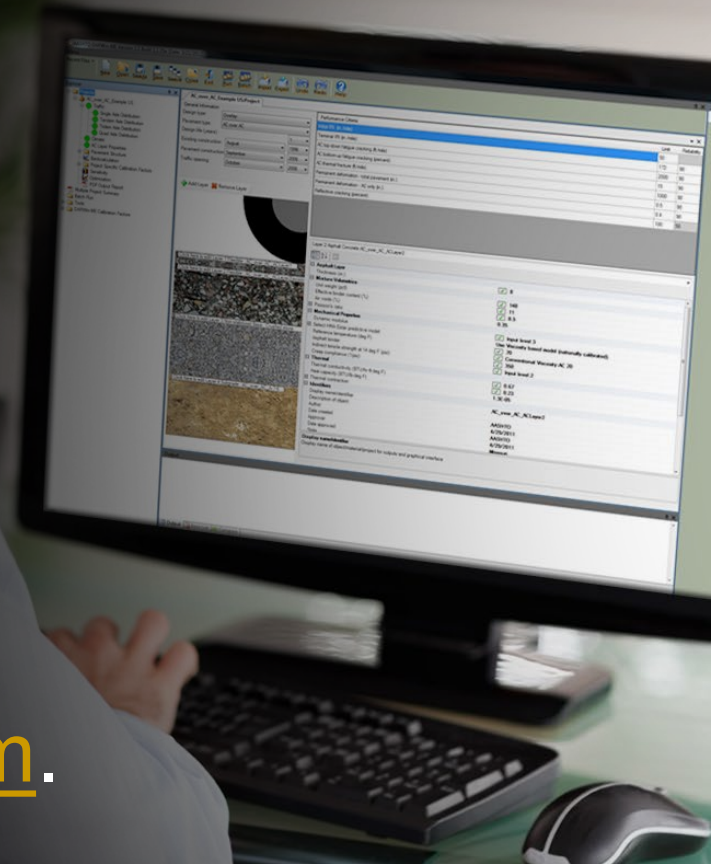
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QUESTION AND ANSWER SESSION



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



FY 2021 – Webinar Series

Remember:

- ▶ Webinar #4: Asphalt overlay design for pavements with multiple overlays and deflection data.
- ▶ May/June 2021.



How do we get the BcT?

1. Included in AASHTOWare
PMED License

2. Standalone single user
purchase

Annual license fee: \$1,250

[Link to AASHTOWare Purchasing](#)

Thank you for Attending the Webinar!

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PREFERRED

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