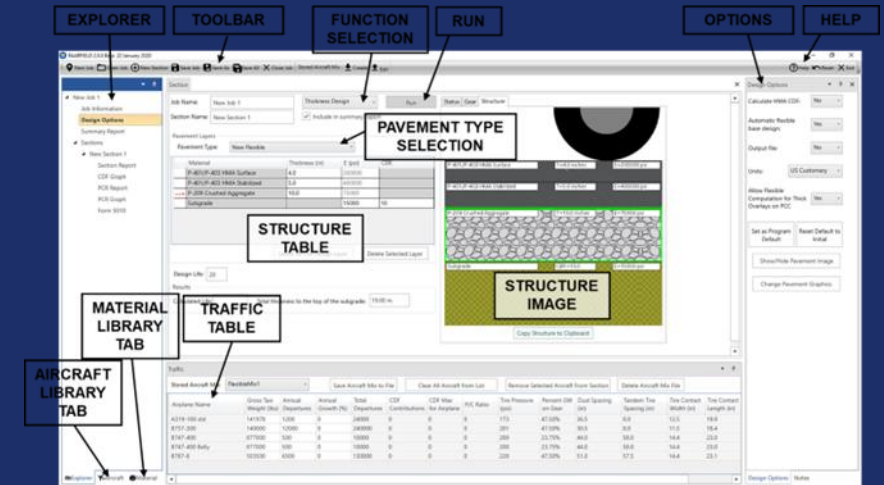


WORKSHOP – Airport Pavement Design and Evaluation



Federal Aviation
Administration

FAARFIELD 2.1: Flexible Pavement Design & PCR Exercise

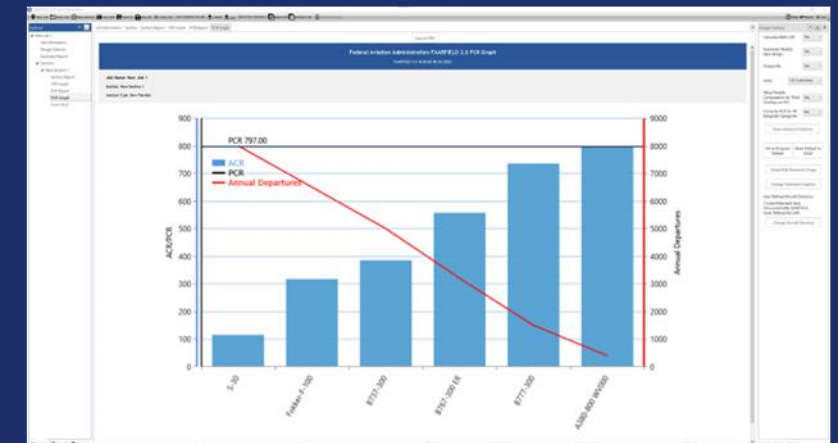


Presented to: ASCE T&DI 2026 International Airfield & Highway
Pavements Conference

Detroit, MI, USA

By: Navneet Garg, Ph.D., F.ASCE
FAA Airport Technology R&D

Date: June 28, 2026



Flexible Pavement Design Example

A flexible pavement is being designed for a new runway at a commercial airport in Detroit. Based on the information obtained from the Airport Master Plan, the new runway is expected to handle the traffic mix presented in Table 1. Eight soil borings were performed for this project, the results of which are presented in Table 2.

Table 1. Aircraft traffic mix for flexible pavement design example.

Aircraft	Departure Weight, lbs	Arrival Weight, lbs	Annual Departures
Single-Wheel	30,000	22,500	8,000
Fokker F100	98,000	75,000	6,500
Boeing 737-300	138,500	115,000	5,000
Boeing 767-300 (ER)	350,000	290,000	3,200
Airbus 380-800 WV000	1,200,000	1,020,000	400
Boeing 777-300	580,000	524,000	1,500

Table 2. Soil boring results for flexible pavement design example.

Boring No.	UCSC Soil Type	Moisture Content, %	Opt. Moisture Content, %	Dry Unit Weight, lb/ft ³	Water Table Depth, ft	CBR, %
B-1	SC	12.2	10.4	129.0	10	10.6
B-2	SC	14.4	12.2	124.6	10	7.2
B-3	SC	16.5	9.6	132.4	8.5	8.4
B-4	CL	15.8	13.5	120.2	6.5	6.3
B-5	CL	17.0	14.5	122.5	8	4.8
B-6	CL	16.2	13.8	120.7	5.5	5.9
B-7	CL	16.8	12.6	124.0	4.5	4.2
B-8	CL	14.2	12.8	128.2	6	6.4
Average:						
Std. Dev.:						

Flexible Pavement Design Example

1. What do the soil boring results tell us about the in situ soil properties? What subgrade support value do you recommend for design?
2. What type and thickness of base/subbase materials do you recommend? Are positive drainage features required?
3. Should the pavement be designed for aircraft arrival or departure weights? What is the required flexible pavement thickness for the runway? What is the most demanding aircraft?
4. Perform a sensitivity analysis on the following variables:
 - Average annual departures of most demanding aircraft (+/- 10 percent of departures).
 - Departure weight of the most demanding aircraft (+/- 10 percent of weight).
 - Subgrade modulus (+/- 10 percent of modulus).



Flexible Pavement Design Example

1. What do the soil boring results tell us about the in-situ soil properties? What subgrade support value do you recommend for design?
2. What type and thickness of base/subbase materials do you recommend? Are positive drainage features required?
3. Should the pavement be designed for aircraft arrival or departure weights? What is the required flexible pavement thickness for the runway? What is the most demanding aircraft?

Table 2. Soil boring results for flexible pavement design example.

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B-1	SC	12.2	10.4	129.0	10	10.6
B-2	SC	14.4	12.2	124.6	10	7.2
B-3	SC	16.5	9.6	132.4	8.5	8.4
B-4	CL	15.8	13.5	120.2	6.5	6.3
B-5	CL	17.0	14.5	122.5	8	4.8
B-6	CL	16.2	13.8	120.7	5.5	5.9
B-7	CL	16.8	12.6	124.0	4.5	4.2
B-8	CL	14.2	12.8	128.2	6	6.4
Average:		15.4	12.4	125.2	7.4	6.7
Std. Dev.:		1.7	1.7	4.3	2.1	2.0

FAARFIELD 2.0

The screenshot shows the FAARFIELD 2.0 software interface with the following components labeled:

- EXPLORER**: Points to the left sidebar containing a tree view of the project structure.
- TOOLBAR**: Points to the top menu bar with options like New Job, Open Job, New Section, Save Job, Save As, Save All, Close Job, Stored Aircraft Mix, Create, and Edit.
- FUNCTION SELECTION**: Points to the 'Run' button in the top toolbar.
- PAVEMENT TYPE SELECTION**: Points to the 'Pavement Type' dropdown menu in the 'Pavement Layers' section.
- STRUCTURE TABLE**: Points to the table listing pavement materials and their properties.
- STRUCTURE IMAGE**: Points to the visual representation of the pavement structure layers.
- TRAFFIC TABLE**: Points to the table listing aircraft data and traffic parameters.
- MATERIAL LIBRARY TAB**: Points to the 'Material' tab in the bottom left.
- AIRCRAFT LIBRARY TAB**: Points to the 'Aircraft' tab in the bottom left.
- OPTIONS**: Points to the 'Design Options' panel on the right side.
- HELP**: Points to the 'Help' button in the top right corner.

STRUCTURE TABLE Data:

Material	Thickness (in)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200000	
P-401/P-403 HMA Stabilized	5.0	400000	
P-209 Crushed Aggregate	10.0	75000	
Subgrade		15000	10

TRAFFIC TABLE Data:

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Dual Spacing (in)	Tandem Tire Spacing (in)	Tire Contact Width (in)	Tire Contact Length (in)
A319-100 std	141978	1200	0	24000	0	0	0	173	47.50%	36.5	0.0	12.5	19.9
B737-300	140000	12000	0	240000	0	0	0	201	47.50%	30.5	0.0	11.5	18.4
B747-400	877000	500	0	10000	0	0	0	200	23.75%	44.0	58.0	14.4	23.0
B747-400 Belly	877000	500	0	10000	0	0	0	200	23.75%	44.0	58.0	14.4	23.0
B787-8	503500	6500	0	130000	0	0	0	228	47.50%	51.0	57.5	14.4	23.1

Starting Screen – No Job Files Created

FAARFIELD 2.0.18 (Build 05/26/2022)

Menu: New Job, Open Job, New Section, Save Job, Save As, Save All, Close Job, User Defined Aircraft, Create, Edit, Batch Run Selection, Select All, DeSelect All, PAVEAIR Access, Help, Reset, Exit

Explorer:

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
- Sections
 - New Section 1
 - Section Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Form 5010

Section Tab:

Section

Job Name: New Job 1 Thickness Design Run Status Gear Structure

Section Name: New Section 1 ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type:

Material	Thickness (in.)	E (psi)
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Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 0.0 in.

Copy Structure to Clipboard

Traffic Tab:

Stored Aircraft Mix Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
---------------	-------------------------	-------------------	-------------------	------------------	-------------------	----------------------	-----------	---------------------	--------------------	--------------------------	---------------------------	---------------------------

Explorer: Explorer Aircraft Material

Creating/Naming a Job File

Click on "New Job"

Enter Job Name

Enter Section Name

The screenshot displays the FAARFIELD 2.0.18 software interface. The 'Explorer' pane on the left shows a tree structure with 'New Job 1' selected under 'Job Information'. The 'Section' pane in the center shows the 'New Section 1' workflow. The 'Job Name' field is set to 'New Job 1' and the 'Section Name' field is set to 'New Section 1'. The 'Pavement Layers' section is empty, and the 'Design Life (Years)' is set to 20. The 'Results' section shows 'Calculated Life (Years)' and 'Total thickness to the top of the subgrade' fields. The 'Traffic' section at the bottom shows a table for 'Stored Aircraft Mix' with columns for various aircraft parameters.

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
---------------	-------------------------	-------------------	-------------------	------------------	-------------------	----------------------	-----------	---------------------	--------------------	--------------------------	---------------------------	---------------------------

Selecting Structure

Select "Thickness Design"

Select Pavement Type as "New Flexible"

Default pavement structure Details in table

Default pavement Design Life

Default pavement structure for "New Flexible"

FAARFIELD 2.0.18 (Build 05/26/2022)

Job Name: New Job 1 Thickness Design Run

Section Name: New Section 1 Include in Summary Report Add To Batch

Pavement Layers

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
P-209 Crushed Aggregate	10.0	75,000	
Subgrade		15,000	10

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 19.0 in.

Traffic

Stored Aircraft Mix Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
---------------	-------------------------	-------------------	-------------------	------------------	-------------------	----------------------	-----------	---------------------	--------------------	--------------------------	---------------------------	---------------------------

Design Options

Click “Design Options”

Select Option for “HMA CDF”

“Automatic Flexible Base Design”

“Output File”

“Units”

The screenshot displays the FAARFIELD 2.0.18 software interface. The main workspace is divided into several sections. On the left, the 'Explorer' pane shows a tree view of the project structure, including 'New Job 1', 'Job Information', 'Design Options', 'Summary Report', and 'Sections'. The 'Design Options' tab is selected. The main workspace shows the 'Section' tab, which includes fields for 'Job Name' (New Job 1), 'Section Name' (New Section 1), and 'Pavement Type' (New Flexible). Below these, a table lists the pavement layers:

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
P-209 Crushed Aggregate	10.0	75,000	
Subgrade		15,000	10

Below the table, there are buttons for 'Select As The Design Layer' and 'Delete Selected Layer'. The 'Design Life (Years)' is set to 20. The 'Results' section shows 'Calculated Life (Years)' and 'Total thickness to the top of the subgrade: 19.0 in.'.

The 'Design Options' dialog box is open on the right, showing various settings. The 'Design Options' tab is active, and the 'Notes' tab is also visible. The settings include:

- Calculate HMA CDF: Yes
- Automatic flexible base design: Yes
- Output file: Yes
- Units: US Customary
- Allow Flexible Computation for Thick Overlays on PCC: Yes
- Compute ACR for All Subgrade Categories: No
- Show Advanced Options: Button
- Set as Program Default: Button
- Reset Default to Initial: Button
- Show/Hide Pavement Image: Button
- Change Pavement Graphics: Button
- User Defined Aircraft Directory: C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft\
- Change Aircraft Directory: Button

The 'Traffic' section at the bottom of the main workspace contains a table for 'Stored Aircraft Mix' and buttons for 'Save Aircraft Mix to File', 'Clear All Aircraft from List', 'Remove Selected Aircraft from Section', and 'Delete Aircraft Mix File'.

Materials Library – Layer Types

Click “Materials” tab to open materials library

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All DeSelect All PAVEAIR Access Help Reset Exit

Material Section

General
User Defined
Subgrade

Aggregate
P-154 Uncrushed Aggregate
P-208 Crushed Aggregate
P-209 Crushed Aggregate
P-211 Lime Rock
P-219 Recycled Concrete Aggregate

P-401/P-403 HMA
P-401/P-403 HMA Surface
P-401/P-403 HMA Overlay

P-501 PCC
P-501 PCC Surface
P-501 PCC Overlay (unbonded)
P-501 PCC Overlay on Flexible

Stabilized
P-301 Soil Cement Base
P-304 Cement Treated Base
P-306 Lean Concrete
P-401/P-403 HMA Stabilized
Variable (flexible)
Variable (rigid)

Section

Job Name: New Job 1 Thickness Design Run Status Gear Structure

Section Name: New Section 1 Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
P-209 Crushed Aggregate	10.0	75,000	
Subgrade		15,000	10

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 19.0 in.

Traffic

Stored Aircraft Mix Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
---------------	-------------------------	-------------------	-------------------	------------------	-------------------	----------------------	-----------	---------------------	--------------------	--------------------------	---------------------------	---------------------------

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory: C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft\ Change Aircraft Directory

Design Options Notes

FAARFIELD 2.1: Flexible Pavement Design & PCR Exercise

June 28, 2026



Click "Aircraft" tab to open aircraft library

Creating Aircraft Traffic Mix

FAARFIELD 2.0.18 (Build 05/26/2022)

Job Name: New Job 1 | Thickness Design | Run | Status | Gear | Structure

Section Name: New Section 1 | Include in Summary Report | Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
--> P-209 Crushed Aggregate	10.0	75,000	
Subgrade		15,000	10

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): | Total thickness to the top of the subgrade: 19.0 in.

Airplane: B777-300

Y= 258 | X= -158

Copy Gear to Clipboard

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default | Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory: C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft

Change Aircraft Directory

Design Options | Notes

Traffic

Stored Aircraft Mix: Flexible Example 1 | Save Aircraft Mix to File | Clear All Aircraft from List | Remove Selected Aircraft from Section | Delete Aircraft Mix File

Airplane Name	Gross-Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	0	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	0	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	0	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0	0	0	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0	0	0	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0	0	0	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0	0	0	188	0.95	13.9	22.3	243.8

Select Aircraft from
“FAARFIELD Aircraft Library”

“Save Aircraft Mix to File”
Give file name, stored in
MyFAARFIELD/TrafficLibrary
directory

“Gear Geometry”

Highlight an aircraft to
display gear geometry

Subgrade CBR

FAARFIELD 2.0.18 (Build 05/26/2022)

Section

Job Name: New Job 1 Thickness Design Run Status Gear Structure

Section Name: New Section 1 Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
P-209 Crushed Aggregate	10.0	75,000	
Subgrade		7,050	4.7

Years: 20 design life for pavement section is 20 years (1 to 50 allowed).

life (Years): Total thickness to the top of the subgrade: 19.0 in.

Copy Structure to Clipboard

Layer Property

Materials Menu

General

☐ User Defined

☒ Subgrade

P-401/P-403 HMA

☐ P-401/P-403 HMA Surface

☐ P-401/P-403 HMA Overlay

P-501 PCC

☐ P-501 PCC Surface

☐ P-501 PCC Overlay (Unbonded)

☐ P-501 PCC Overlay on Flexible

Aggregate

☐ P-154 Uncrushed Aggregate

☐ P-208 Crushed Aggregate

☐ P-209 Crushed Aggregate

☐ P-211 Lime Rock

☐ P-219 Recycled Concrete Aggregate

Stabilized

☐ P-301 Soil Cement Base

☐ P-304 Cement Treated Base

☐ P-306 Lean Concrete

☐ P-401/P-403 HMA Stabilized

☐ Variable (flexible)

☐ Variable (rigid)

Update Thickness (in.): 12.0

Update Modulus (psi): 15,000

Update Concrete Flexural Strength R (psi):

Update CBR: 4.7

Update Subgrade Reaction (pci): 172.4

Buttons: Add Layer Below, Add Layer Above, OK, Delete Layer, Cancel

Traffic

Stored Aircraft Mix: Flexible Example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	0	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	0	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	0	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0	0	0	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0	0	0	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0	0	0	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0	0	0	188	0.95	13.9	22.3	243.8

Design Options Notes

- Enter Subgrade CBR
- Modulus is computed as $1500 \times \text{CBR (psi)}$
- Enter data directly in the table, or click on a layer to bring up the layer property dialog box.

Performing Pavement Thickness Design

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All Deselect All PAVEAIR Access Help Reset Exit

Aircraft

FAARFIELD Aircraft Group

- Generic
- Airbus
- Boeing
- McDonnell Douglas
- Other Large Jet
- Regional/Commuter
- General Aviation
- Military
- Non-Airplane Vehicles
- External Library

FAARFIELD Aircraft Library

- SWL-2
- SWL-5
- SWL-10
- SWL-50
- S-3
- S-5
- S-10
- S-12.5
- S-15
- S-20
- S-25
- S-30
- S-30 HTP
- S-35 HTP
- S-40 HTP
- S-45
- S-50
- S-60

Section

Job Name: New Job 1 Thickness Design Run Status Gear Structure

Section Name: New Section 1 Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
P-209 Crushed Aggregate	10.0	75,000	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 19.0 in.

Traffic

Stored Aircraft Mix Flexible Example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	0	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	0	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	0	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0	0	0	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0	0	0	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0	0	0	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0	0	0	188	0.95	13.9	22.3	243.8

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory: C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft\ Change Aircraft Directory

Design Options Notes

Click "Run" to start pavement thickness design

Completed Pavement Thickness Design

P-209 Thickness was designed

P/C Ratio for each aircraft

CDF max. for aircraft

CDF contribution of each aircraft

FAARFIELD 2.0.18 (Build 05/26/2022)

File Edit View Options Help

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All Deselect All PAVEAIR Access

Explorer

- Workshop1
 - Job Information
 - Design Options
 - Summary Report
 - Sections
 - Flexible Example 1
 - Section Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Form 5010

Section

Job Name: Workshop1 Thickness Design Run Status Gear Structure

Section Name: Flexible Example 1 Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
--> P-209 Crushed Aggregate	26.8	63,195	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 35.8 in.

Traffic

Stored Aircraft Mix: Flexible Example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	1.77	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	1.33	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	1.26	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0.01	0.02	1.14	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0.35	0.39	1.15	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0.02	0.76	1.25	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0.62	0.62	1.19	188	0.95	13.9	22.3	243.8

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

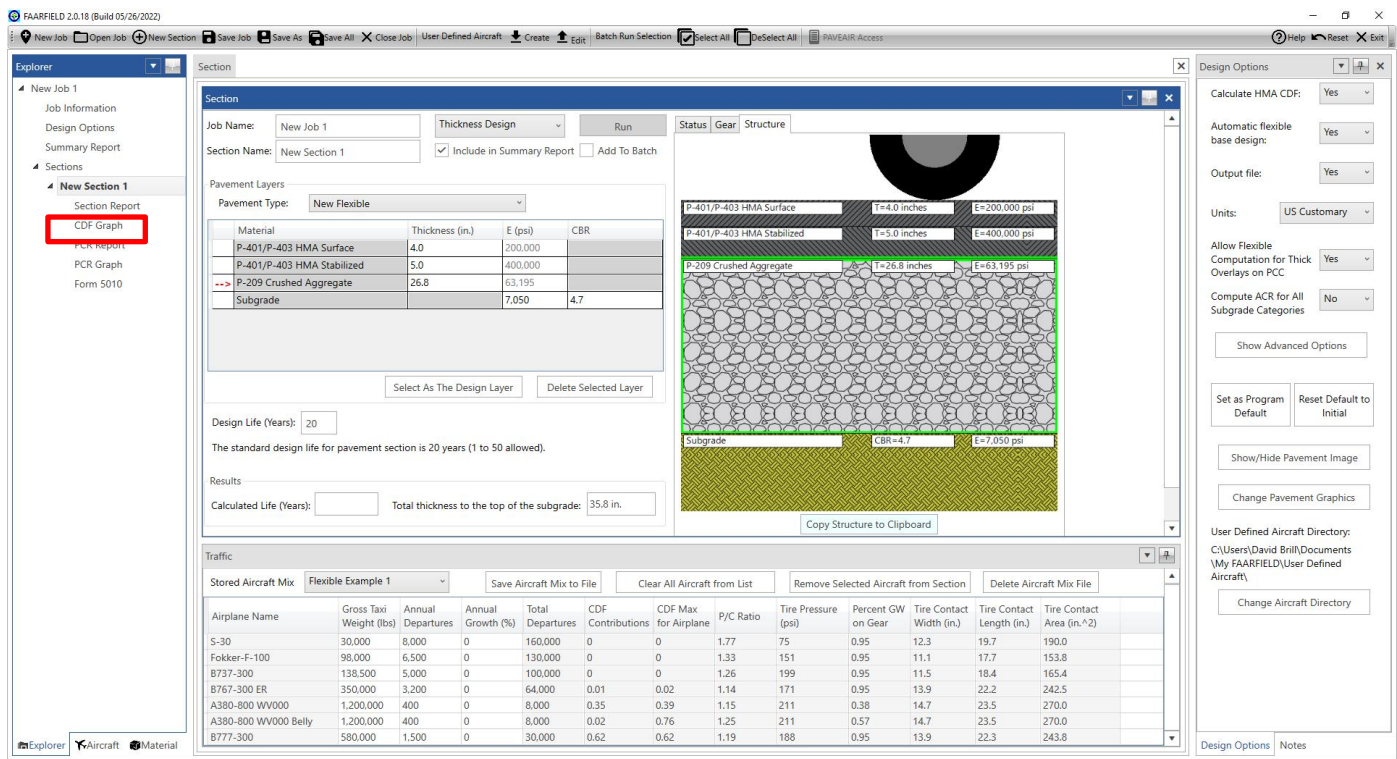
Show/Hide Pavement Image

Change Pavement Graphics

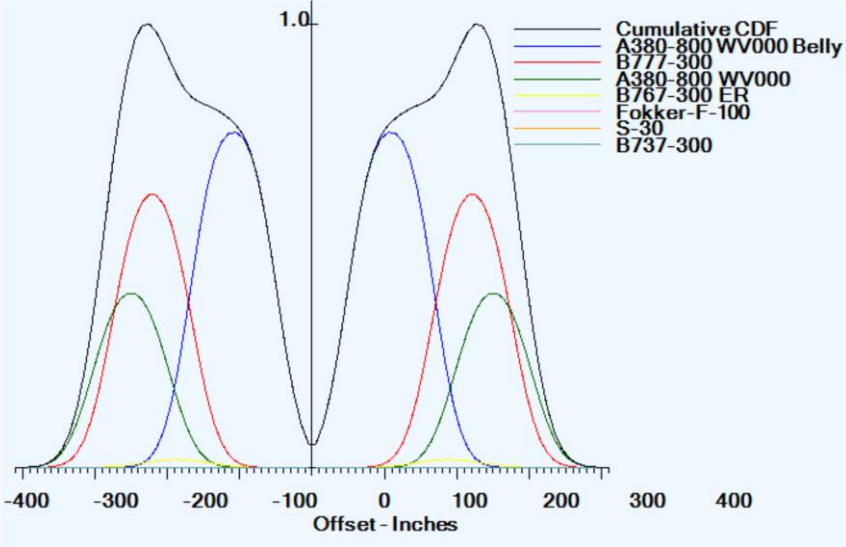
User Defined Aircraft Directory: C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft\ Change Aircraft Directory

Design Options Notes

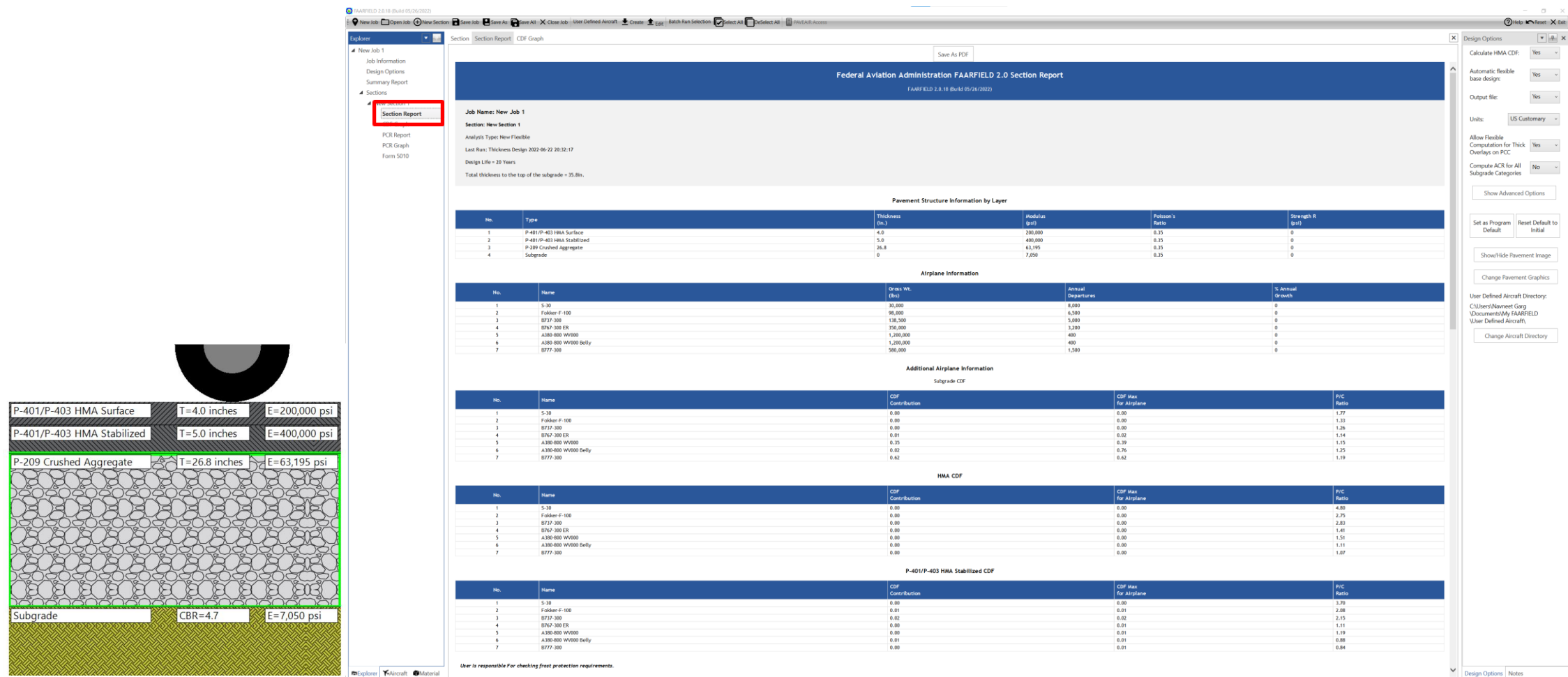
CDF Chart



Job Name: New Job 1
Section: New Section 1
Analysis Type: New Flexible
Analysis Run Time: 2022-06-22 20:32:17
Last Run: Thickness Design
Design Life = 20.0 Years
Total thickness to the top of the subgrade = 35.8in.



Section Report



Life/Compaction

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All Deselect All PAVEAIR Access Help Reset Exit

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
- Sections
 - New Section 1
 - Section Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Form 5010

Section

Job Name: New Job 1 Life/Compaction Run Status Gear Structure

Section Name: New Section 1 ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
P-209 Crushed Aggregate	26.8	63,195	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 35.8 in.

Copy Structure to Clipboard

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory: C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft

Change Aircraft Directory

Design Options Notes

Traffic

Stored Aircraft Mix Flexible Example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	1.77	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	1.33	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	1.26	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0.01	0.02	1.14	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0.35	0.39	1.15	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0.02	0.76	1.25	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0.62	0.62	1.19	188	0.95	13.9	22.3	243.8

Explorer Aircraft Material

Select "Life/Compaction"

Click "Run" to start Life and Compaction requirements

Life/Compaction

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All DeSelect All PAVEAIR Access Help Reset Exit

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
- Sections
 - New Section 1
 - Section Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Form 5010

Section

Job Name: New Job 1 Life/Compaction Run

Section Name: New Section 1 ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
--> P-209 Crushed Aggregate	26.8	63,195	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): 20.0 Total thickness to the top of the subgrade: 35.8 in.

Status Gear Structure

New Flexible Analysis Completed
Run Time: 4 seconds
Sub CDF = 1.00; Life = 20.0 yrs;
HMA CDF = 0.03

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory:
C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft

Change Aircraft Directory

Traffic

Stored Aircraft Mix Flexible Example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	1.77	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	1.33	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	1.26	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0.01	0.02	1.14	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0.35	0.39	1.15	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0.02	0.76	1.25	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0.62	0.62	1.19	188	0.95	13.9	22.3	243.8

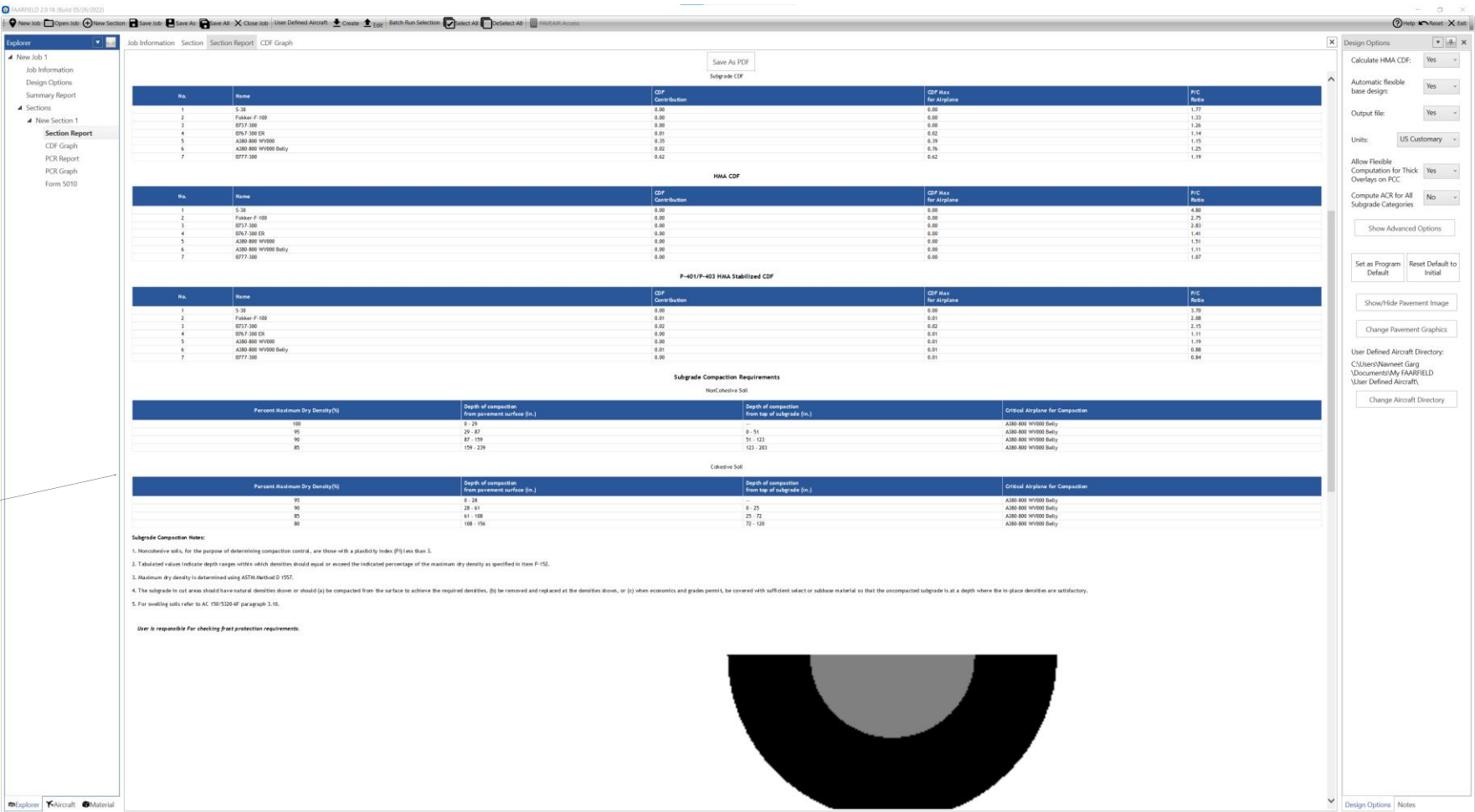
Explorer Aircraft Material

Design Options Notes

Pavement Life results

Compaction Requirements

Compaction requirements are available in Section Report



PCR

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All DeSelect All PAVEAIR Access Help Reset Exit

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
- Sections
 - New Section 1
 - Section Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Form 5010

Section

Job Name: New Job 1 PCR Run

Section Name: New Section 1 ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
--> P-209 Crushed Aggregate	26.8	63,195	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20 P/TC Ratio: 1

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): 20.0 Total thickness to the top of the subgrade: 35.8 in.

Status Gear Structure

New Flexible Analysis Completed
Run Time: 4 seconds
Sub CDF = 1.00; Life = 20.0 yrs;
HMA CDF = 0.03

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory:
C:\Users\David Brill\Documents
(My FAARFIELD)\User Defined Aircraft

Change Aircraft Directory

Traffic

Stored Aircraft Mix flexible example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
S-30	30,000	8,000	0	160,000	0	0	1.77	75	0.95	12.3	19.7	190.0
Fokker-F-100	98,000	6,500	0	130,000	0	0	1.33	151	0.95	11.1	17.7	153.8
B737-300	138,500	5,000	0	100,000	0	0	1.26	199	0.95	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0.01	0.02	1.14	171	0.95	13.9	22.2	242.5
A380-800 WV000	1,200,000	400	0	8,000	0.35	0.39	1.15	211	0.38	14.7	23.5	270.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0.02	0.76	1.25	211	0.57	14.7	23.5	270.0
B777-300	580,000	1,500	0	30,000	0.62	0.62	1.19	188	0.95	13.9	22.3	243.8

Design Options Notes

Select "PCR"

Click "Run" to PCR Computations

PCR

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All DeSelect All PAVEAIR Access Help Reset Exit

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
- Sections
 - New Section 1
 - Section Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Form 5010

Section

Job Name: New Job 1 PCR Run

Section Name: New Section 1 ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	4.0	200,000	
P-401/P-403 HMA Stabilized	5.0	400,000	
--> P-209 Crushed Aggregate	26.8	63,195	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20 P/TC Ratio: 1

The standard design life for pavement section is 20 years (1 to 50 allowed).

Results

Calculated Life (Years): Total thickness to the top of the subgrade: 35.8 in.

Status Gear Structure

PCR Calculation Completed
Run Time: 9 seconds
PCR = 797/F/D/X/T

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory:
C:\Users\David Brill\Documents\My FAARFIELD\User Defined Aircraft

Change Aircraft Directory

Traffic

Stored Aircraft Mix flexible example 1 Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Section Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)	(D)
S-30	30,000	8,000	0	160,000	0	0	1.15	75	0.95	14.4	23.1	261.8	16.8
Fokker-F-100	98,000	6,500	0	130,000	0	0	1.25	151	0.956	14.4	23.1	261.5	25.3
B737-300	138,500	5,000	0	100,000	0	0	1.26	199	0.908	11.2	17.9	156.5	27.6
B767-300 ER	350,000	3,200	0	64,000	0	0	1.14	171	0.924	13.0	20.8	212.8	32.0
A380-800 WV000	1,200,000	400	0	8,000	0.36	0.41	1.15	211	0.38	14.4	23.1	261.8	37.0
A380-800 WV000 Belly	1,200,000	400	0	8,000	0.02	0.76	1.25	211	0.57	14.4	23.1	261.5	0.0
B777-300	580,000	1,500	0	30,000	0.62	0.62	1.21	188	0.948	13.0	20.8	213.2	35.6

Results of "PCR" computations

FAARFIELD 2.1: Flexible Pavement Design & PCR Exercise

June 28, 2026

FAARFIELD 2.0.18 (Build 05/26/2022)

New Job Open Job New Section Save Job Save As Close Job User Defined Aircraft Create Batch Run Selection Select All Defect All HSEAR Access

Explorer
New Job 1
Job Information
Design Options
Summary Report
Sections
New Section 1
Section Report
PCR Report
Form 5010

Job Information Section Section Report CDF Graph PCR Report

Save As PDF

Federal Aviation Administration FAARFIELD 2.0 PCR Report

FAARFIELD 2.0.18 (Build 05/26/2022)

Job Name: New Job 1
Section: New Section 1
This file name = PCR Results for New Flexible 2022-06-22 20:45:49
Evaluation pavement type is flexible and design program is FAARFIELD.
Section name: New Section 1 in job file: New Job 1.JOB.xml
Units = US Customary
Analysis Type: New Flexible
Subgrade Modulus =7,050psi (Subgrade Category is D)
Evaluation Pavement Thickness = 35.8 in.
Pass to Traffic Cycle (PtoTC) Ratio = 1.00
Maximum number of wheels per gear = 6
CDF = 1.000
At least one aircraft has 4 or more wheels per gear.

Design Options
Calculate HMA CDF: Yes
Automatic flexible base design: Yes
Output file: Yes
Units: US Customary
Allow Flexible Computation for Thick Overlays on PCC: Yes
Compute ACR for All Subgrade Categories: No
Show Advanced Options
Set as Program Default Reset Default to Initial
Show/Hide Pavement Image
Change Pavement Graphics
User Defined Aircraft Directory:
C:\Users\Naveet Garg\Documents\My FAARFIELD\User Defined Aircraft
Change Aircraft Directory

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight (lbs)	Percent Gross Weight	Tire Pressure (psi)	Annual Departure	20 Years Coverage
1	S-30	30,000	95.00	75	8,000	43,206
2	Fokker-F-100	98,000	95.60	151	6,500	62,234
3	B737-300	138,500	90.80	199	5,000	45,823
4	B767-300 ER	350,000	92.40	171	3,200	55,525
5	A380-800 WV000	1,200,000	38.00	211	400	6,656
6	A380-800 WV000 Belly	1,200,000	57.00	211	400	9,026
7	B777-300	580,000	94.80	188	1,500	34,344

Results Table 2. PCR Value

No.	Aircraft Name	Critical aircraft Total equiv. departures	Max allowable Gross Weight of critical aircraft (lbs)	ACR Thick at max. MGW (in.)	PCR/F/D
1	A380-800 WV000	527	1,200,000	37.0	797.0

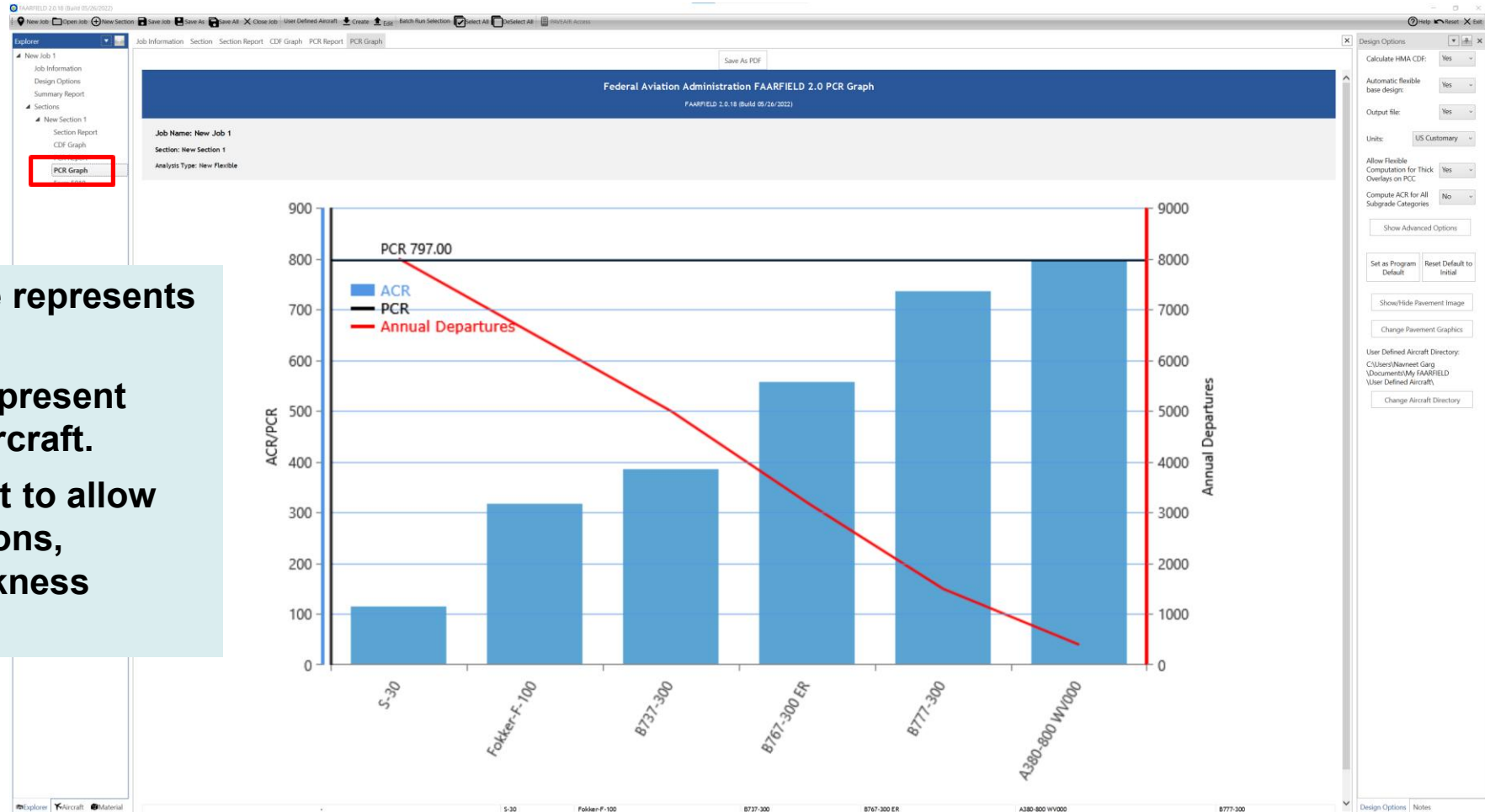
Results Table 3. New Flexible ACR at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight (lbs)	Percent Gross Weight on Main Gear	Tire Pressure (psi)	ACR Thick (in.) (D)	ACR/F/D
1	S-30	30,000	95.00	75	16.8	114
2	Fokker-F-100	98,000	95.60	151	25.3	316.2
3	B737-300	138,500	90.80	199	27.6	384.9
4	B767-300 ER	350,000	92.40	171	32.0	556.8
5	A380-800 WV000	1,200,000	95	211	37.0	797
6	B777-300	580,000	94.80	188	35.6	734.6

Design Options Notes

PCR Graph

- Black horizontal line represents PCR.
- Blue vertical bars represent ACR of individual aircraft.
- PCR is just sufficient to allow unrestricted operations, consistent with thickness design.



FAA Form 5010

FAARFIELD 2.0.18 (Build 05/06/2022)

File Edit View Help

Job Information Section Section Report CDF Graph PCR Report PCR Graph Form 5010

Save As PDF

Federal Aviation Administration FAARFIELD 2.0 Form 5010

FAARFIELD 2.0.18 (Build 05/26/2022)

RUNWAY DATA

Job Name: New Job 1

Section: New Section 1

Gross Weight (In THSDS)

35 S	120
36 D	250
37 2D	333
38 2D/2D2	837
39 PCR	797/F/D/X/T

Gross Weight (In THSDS)

35 S	120
36 D	250
37 2D	333
38 2D/2D2	837
39 PCR	797/F/D/X/T

Design Options

Calculate HMA CDF: Yes

Automatic flexible base design: Yes

Output file: Yes

Units: US Customary

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: No

Show Advanced Options

Set as Program Default: Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

User Defined Aircraft Directory: C:\Users\Name\Gang\Documents\My FAARFIELD User Defined Aircraft

Change Aircraft Directory

Design Options Notes



Acknowledgments:

Staff at FAA Airport Technology R&D Branch

*FAA Airport Engineering Division:
Harold Muniz-Ruiz, Jeff Crislip*

Support Contractors ARA, Dynatest, GDIT

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<http://www.airporttech.tc.faa.gov>