

ICAO AERODROME PAVEMENT WORKSHOP

Introduction to FAARFIELD 2.1

Presented to: ICAO Aerodrome Pavement Workshop
Dakar, Senegal

By: Dan Offenbacher P.E. Ph.D.

Date: 24 October 2024



**Federal Aviation
Administration**

FAARFIELD 2.1 (Build 10/09/2023)

File Edit View Structure Run Settings Help

New Job Open Job New Structure Save Job Save As Save All Close Job User Defined Aircraft Create Edit Batch Run Selection Select All Select 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

8757-200 8757-300 8767-200 8767-200 ER 8767-300 8767-300 ER 8767-300 ER/Freighter 8777-200 8777-200 ER 8777-200 LR 8777-300 8777-300 ER 8777F 8777-9 8787-8 8787-9 8787-10

Structure

Structure

Job Name: Example 1 Thickness Design Run Status Gear Structure

Structure Name: Rigid Option 1 Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Rigid

Material	Thickness (in.)	E (psi)	k (pci)	R (psi)
P-501 PCC Surface	14.0	4,000,000		650
P-401/P-403 HMA Stabilized	5.0	400,000		
P-209 Crushed Aggregate	6.0	75,000		
Subgrade		15,000	172.4	

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20

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

Results

Calculated Life (Years): Total thickness to the top of the subgrade (in.): 25.0

Traffic

Stored Aircraft Mix FAA_Example Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure 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	101,000	6,500	0	130,000	0	0	0	156	0.95	11.1	17.7	153.8
B737-300	140,000	5,000	0	100,000	0	0	0	201	0.95	11.5	18.4	165.4
B767-300 ER	413,000	3,200	0	64,000	0	0	0	200	0.95	14.0	22.4	245.2
A380-800 W/V000	1,239,000	400	0	8,000	0	0	0	218	0.38	14.7	23.5	270.0
A380-800 W/V000 Belly	1,239,000	400	0	8,000	0	0	0	218	0.57	14.7	23.5	270.0
B777-300	662,000	1,500	0	30,000	0	0	0	215	0.95	13.9	22.3	243.8

User Information

Current User: PAVEAIR Login

Software Information

Installed Version: 2.1 Available Version: 2.1.0

Aircraft Library Information

Installed Version: 1.1.2 Available Version: 1.1.2

Download Aircraft Library

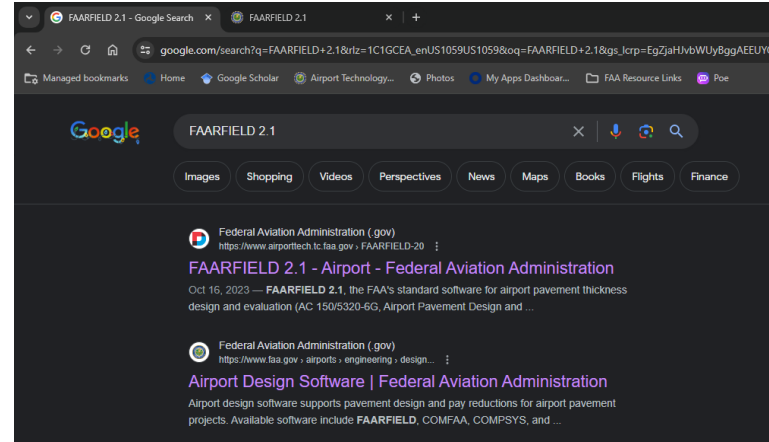
Notes User Information

Download & Install FAARFIELD 2.1 Software

Download FAARFIELD 2.1

- **Link:** <https://airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/faarfield-21>
 - Alternate - Search “FAARFIELD 2.1”

FAARFIELD can only be installed on Windows OS



Download FAARFIELD 2.1

- **Click “Installation Files” to download**
 - Approximately 50 MB
 - Downloaded as compressed ZIP file
- **Source Code is also available at this webpage**

Monday, October 16, 2023

FAARFIELD 2.1

FAARFIELD 2.1 is the standard software accompanying the following FAA Advisory Circulars: AC 150/5320-6G - Airport Pavement Design and Evaluation, AC 150/5335-5D - Standardized Method of Reporting Pavement Strength - PCR

FAARFIELD 2.1, the FAA's standard software for airport pavement thickness design and evaluation (AC 150/5320-6G, Airport Pavement Design and Evaluation) and pavement strength reporting using the ACR/PCR method (AC 150/5335-6D, Standardized Method of Reporting Pavement Strength – PCR), features the following:




- Improved User Interface (UI) functionalities.
- The UI displays Slab Edge Stress and Slab Interior Stress for all aircraft in the Traffic mix, when performing Thickness Design or Life analysis of New Rigid pavement. The UI also shows the Most Demanding Aircraft.
- Performs Reduced Cross Section design for New Flexible and New Rigid.
- Enhanced capabilities to create and save Traffic Mix in the job file.
- Automatically downloads the most up-to-date aircraft library from PAVEAIR when users open the program.
- Improved ACR-PCR analysis.
- Modified information for numerous aircraft in the aircraft library.

Please note that:

- FAARFIELD stands for FAA Rigid and Flexible Iterative Elastic Layered Design. FAARFIELD 2.1 incorporates full 3D finite element responses to aircraft loads for new rigid pavements and rigid overlays. The 3D finite element models used for rigid pavement designs are computationally intensive and may result in long run times, depending on the computer characteristics. Your comments on this program and your suggestions for improvement are appreciated.
- FAARFIELD 2.1 is compatible with Windows™ operating systems. Windows 10 or higher is recommended. Installation instructions are available in the readme file.
- For questions, comments, or further information regarding this program, please contact [Dr. David R. Brill](#), FAA Airport Technology R&D Branch, ANG-E262.

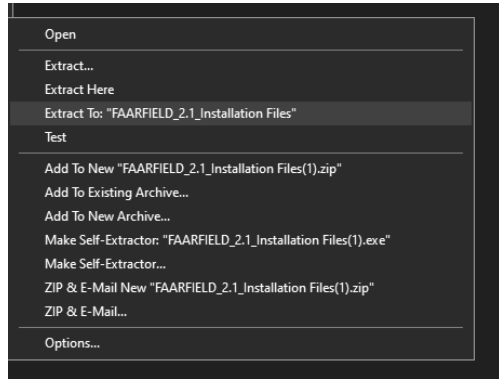
FAARFIELD 2.1 replaces all previous versions of FAARFIELD. To download the previous version FAARFIELD 1.42, use the following link: [FAARFIELD 1.42](#)

Documents to download

-  [FAARFIELD 2.1 readme](#)
-  [FAARFIELD_2_1_Installation Files](#)
-  [FAARFIELD_2_1_SourceCode](#)

Install FAARFIELD 2.1

- Extract the downloaded ZIP file
- Run .MSI file to begin installation

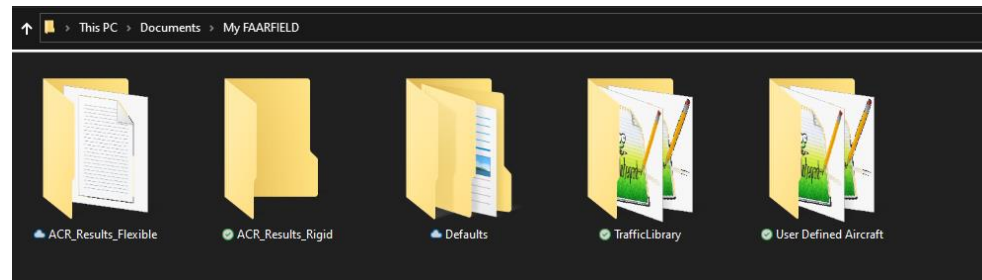
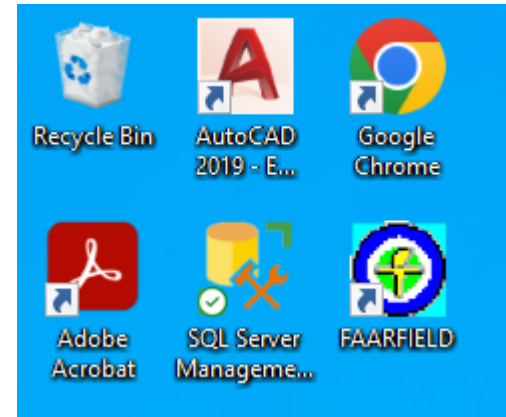


Name	Date modified	Type	Size
FAARFIELD.Installer.msi	10/9/2023 3:09 PM	Windows Installer Packa...	52,092 KB
FAARFIELD.Installer.wixpdb	10/9/2023 3:09 PM	WIXPDB File	594 KB

Install FAARFIELD 2.1

To confirm the installation, look for:

- FAARFIELD application on your desktop
- FAARFIELD in Windows menu
- *My FAARFIELD* folder in your Documents directory



FAARFIELD 2.1 (Build 10/09/2023)

New Job | Open Job | New Structure | Save Job | Save As | Close Job | User Defined Aircraft | Create | Batch Run Selection | Select All | Deselect All | #2/URL/Access

Structure

Structure

Job Name: Example 1 | Thickness Design | Run

Status: Gear | Structure

Structure Name: Rigid Option 1 | Include in Summary Report | Add To Batch

Pavement Layers

Pavement Type: New Rigid

Material	Thickness (in.)	E (psi)	k (pci)	R (psi)
P-501 PCC Surface	14.0	4,000,000		650
P-401/P-403 HMA Stabilized	5.0	400,000		
P-209 Crushed Aggregate	6.0	75,000		
Subgrade		15,000	172.4	

Select As The Design Layer | Delete Selected Layer

Design Life (Years): 20

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

Results

Calculated Life (Years): | Total thickness to the top of the subgrade (in.): 25.0

Traffic

Stored Aircraft Mix: FAA_Example | Save Aircraft Mix to File | Clear All Aircraft from List | Remove Selected Aircraft from Structure | 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	161,000	6,500	0	130,000	0	0	0	156	0.95	11.1	17.7	153.8
B737-300	140,000	5,000	0	100,000	0	0	0	201	0.95	11.5	18.4	165.4
B767-300 ER	413,000	3,200	0	64,000	0	0	0	200	0.95	14.0	22.4	245.2
A380-800 WW000	1,239,000	400	0	8,000	0	0	0	218	0.38	14.7	23.5	270.0
A380-800 WW000 Belly	1,239,000	400	0	8,000	0	0	0	218	0.57	14.7	23.5	270.0
B777-300	662,000	1,500	0	30,000	0	0	0	215	0.95	13.9	22.3	243.8

Notes | User Information

User Information

Current User: PAVEAIR Login

Software Information

Installed Version: 2.1
Available Version: 2.1.0

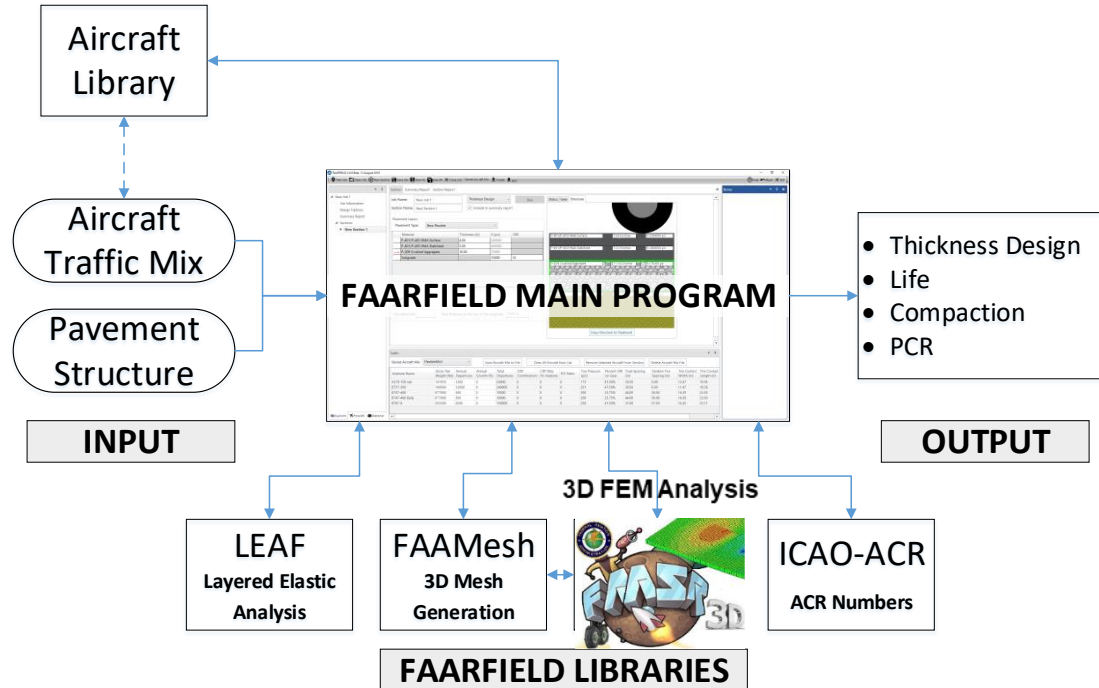
Aircraft Library Information

Installed Version: 1.1.2
Available Version: 1.1.2

Download Aircraft Library

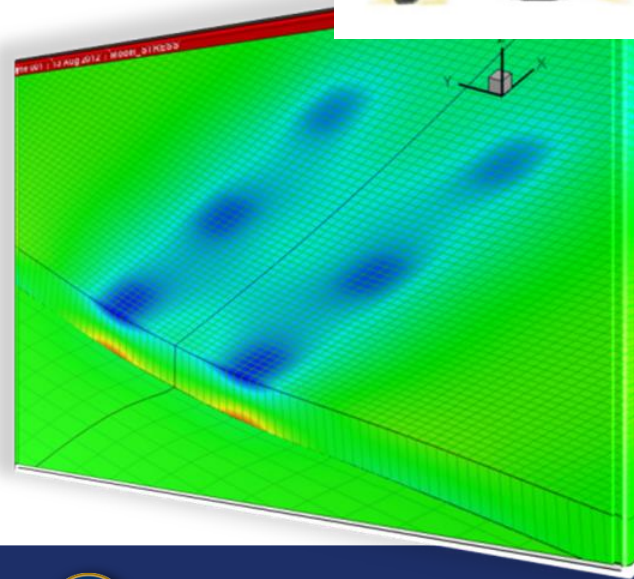
Navigating FAARFIELD 2.1 Software

FAARFIELD 2.1 Organization



FAASR3D – FAA Structural Analysis in 3D

- Visual Basic.NET library.
- Replaces obsolete NIKE3D Fortran program.
- Managed Code - compatible with Microsoft .NET memory management services.
- Improves performance. Old code was subject to memory conflicts and crashing.
- Freely distributable code.
- Continued updates to improve speed & efficiency.



Navigating FAARFIELD 2.1

TOOLBAR

The screenshot shows the FAARFIELD 2.1 software interface. The main window is titled "Section" and displays a cross-section of a pavement structure. The interface is divided into several key areas highlighted by colored boxes:

- EXPLORER (Green Box):** A sidebar on the left containing a tree view of the project structure, including "Airport A", "Design Options", "Summary Report", "Sections", "Section 01", "Section 02", and "Airport B".
- SECTION AREA (Red Box):** The central workspace showing the "Section" details. It includes fields for "Job Name" (Airport A), "Section Name" (Section 01), "Thickness Design", and "Run". Below this is a table for "Pavement Layers" and a visual cross-section of the pavement structure with layers: P-401/P-403 HMA Surface, P-401/P-403 HMA Stabilized, P-209 Crushed Aggregate, and Subgrade. A "Traffic" table is also visible at the bottom.
- OPTIONS (Purple Box):** A sidebar on the right containing "Design Options" such as "Calculate HMA CDF", "Automatic flexible base design", "Output file", "Units", "Allow Flexible Computation for Thick Overlays on PCC", and "Compute ACR for All Subgrade Categories".

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

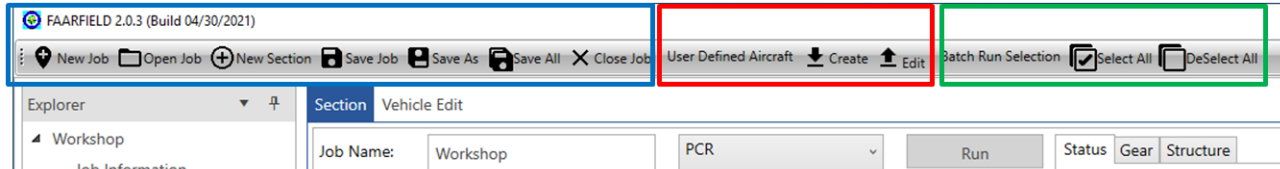
Airplane Name	Gross Taxi Weight (lb)	Annual Departures	Annual Gross Weight	Annual CDF	CDF Max	P/C Ratio	Tire Pressure (psi)	Percent GW on Gear	Dual Tire Spacing (in.)	Tandem Tire Spacing (in.)	Tire Contact Width (in.)	Tire Contact Length (in.)
8737-900	174700	3000	0	0	0	0	75	34.0	0.0	12.7	20.4	
A321-200 opt	207014	2500	0	0	0	0	216	0.475	36.5	0.0	13.6	21.7
EMB-195 STD	107916	4500	0	0	0	0	147	0.475	34.0	0.0	11.8	18.8
CRJ700	72500	3500	0	0	0	0	142	0.95	0.0	0.0	9.9	15.8

FAARFIELD 2.0 – Toolbar

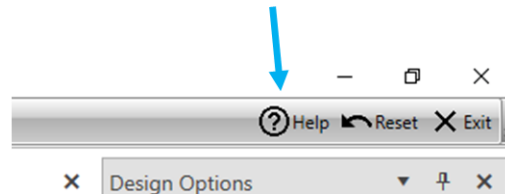
Job & Section Tools

User-Defined
Aircraft Tools

Batch Job
Tools



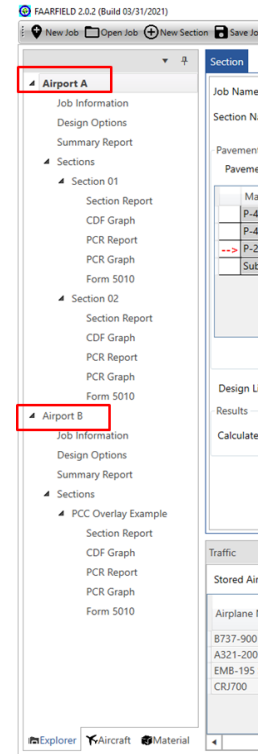
Help File



Federal Aviation
Administration

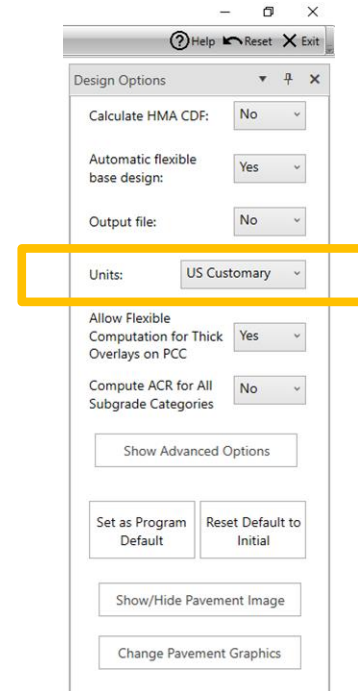
FAARFIELD 2.1 – Explorer Navigation

- FAARFIELD 2.1 supports multiple jobs open at the same time.
- Use the Explorer to navigate between jobs, and display:
 - Sections
 - Section Reports
 - PCR Reports/Graphs
 - 5010 Reports
 - Summary Reports (high-level run information on selected sections in a job)



FAARFIELD 2.1 – Options

- Toggle between U.S. and metric units.
- Set user preferences for graphic display.
- One click restores default options.



FAARFIELD 2.1 – Pavement Section Area

FAARFIELD 2.0.2 (Build 03/31/2021)

Section

Job Name: Airport A Thickness Design Run

Section Name: Section 01 ✓ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (in.)	E (psi)	CBR
P-401/P-403 HMA Surface	5.0	200000	
P-401/P-403 HMA Stabilized	5.0	400000	
--> P-209 Crushed Aggregate	12.7	50889	
Subgrade		15000	10

Design Life (Years): 20

Results

Calculated Life (Years): 22.7 Total thickness to the top of the subgrade: 22.7 in.

Pavement Section Clickable Image

Copy Structure to Clipboard

FAARFIELD 2.1 – Traffic Table (dockable)

Aircraft Selection Tools

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 Tire Spacing (in.)	Tandem Tire Spacing (in.)	Tire Contact Width (in.)	Tire Contact Length (in.)	Tire Contact Area (in.^2)
B737-900	174700	3000	0	60000	0.02	0.04	1.34	204	0.475	34.0	0.0	12.7	20.4	203.4
A321-200 opt	207014	2500	0	50000	0.98	0.98	1.31	212	0.475	36.5	0.0	13.4	21.5	226.0
EMB-195 STD	107916	4500	0	90000	0	0	1.36	147	0.475	34.0	0.0	11.5	18.4	166.4
CRJ700	72500	3500	0	70000	0	0	1.53	142	0.95	0.0	0.0	9.9	15.8	122.1

Selected Aircraft Data

Aircraft Selection

Aircraft library has been completely reorganized and updated for FAARFIELD 2.1!

The screenshot displays the FAARFIELD 2.0.0.h software interface. On the left, the 'Aircraft' panel shows a tree view of aircraft groups, with 'Boeing' highlighted. A callout box labeled 'Aircraft Group' points to this section. Below it, the 'FAARFIELD Aircraft Library' panel lists various aircraft models, with 'B777-300 ER' selected. A callout box labeled 'Library Aircraft' points to this list. The main workspace shows a 'Section' view for 'Airplane B777-200 ER' with a cross-section diagram and a table of material properties:

Material	Thickness (mm)	E (MPa)	CBR
P-401/P-403 HMA Surface	100	1378.95	
P-401/P-403 HMA Stabilized	125	2757.90	
P-209 Crushed Aggregate	250	517.11	
Subgrade		103.42	10

Below the material table is a 'Traffic List' table with columns for Airplane Name, Gross Taxi Weight (kg), Annual Departures, Annual Growth (%), Total Departures, CDF Contributions, CDF Max for Airplane, P/JC Ratio, Tire Pressure (kPa), Percent GW on Gear, Dual Tire Spacing (mm), Tandem Tire Spacing (mm), and Tire Contact Width (mm). A callout box labeled 'Traffic List' points to this table. The bottom right of the interface shows 'Design Options' with various settings like 'Calculate HMA CDF' and 'Automatic flexible base design'.

FAARFIELD 2.0 – Aircraft Library

FAARFIELD Aircraft Group	FAARFIELD Aircraft Group	FAARFIELD Aircraft Group	FAARFIELD Aircraft Group	FAARFIELD Aircraft Group	FAARFIELD Aircraft Group	FAARFIELD Aircraft Group	FAARFIELD Aircraft Group
Generic	Generic	Generic	Generic	Generic	Generic	Generic	Generic
Airbus	Airbus	Airbus	Airbus	Airbus	Airbus	Airbus	Airbus
Boeing	Boeing	Boeing	Boeing	Boeing	Boeing	Boeing	Boeing
McDonnell Douglas	McDonnell Douglas	McDonnell Douglas	McDonnell Douglas	McDonnell Douglas	McDonnell Douglas	McDonnell Douglas	McDonnell Douglas
Other Large Jet	Other Large Jet	Other Large Jet	Other Large Jet	Other Large Jet	Other Large Jet	Other Large Jet	Other Large Jet
Regional/Commuter	Regional/Commuter	Regional/Commuter	Regional/Commuter	Regional/Commuter	Regional/Commuter	Regional/Commuter	Regional/Commuter
General Aviation	General Aviation	General Aviation	General Aviation	General Aviation	General Aviation	General Aviation	General Aviation
Military	Military	Military	Military	Military	Military	Military	Military
Non-Airplane Vehicles	Non-Airplane Vehicles	Non-Airplane Vehicles	Non-Airplane Vehicles	Non-Airplane Vehicles	Non-Airplane Vehicles	Non-Airplane Vehicles	Non-Airplane Vehicles
External Library	External Library	External Library	External Library	External Library	External Library	External Library	External Library
FAARFIELD Aircraft Library	FAARFIELD Aircraft Library	FAARFIELD Aircraft Library	FAARFIELD Aircraft Library	FAARFIELD Aircraft Library	FAARFIELD Aircraft Library	FAARFIELD Aircraft Library	FAARFIELD Aircraft Library
SWL-2	A300-B2	B707-320C	DC3	An-124	BAe 146-300/300QC/300QT	Beechcraft Baron 55	A400M LH
SWL-5	A300-B2K	B717-200 HGW	DC8-63/73	An-225	Beechjet-400/400A	Beechcraft Bonanza F33A	A400M LN1
SWL-10	A300-B4/C4 Std Bogie	B727-100C Alternate	DC9-32	Bombardier CS100	Bombardier CL-604/605	Beechcraft King Air 300	A400M TLL1
SWL-50	A300-B4/C4 LGA Bogie	B727-200 Advanced Basic	DC9-51	COMAC C919	Cessna Citation II/Bravo C550	Beechcraft King Air 350	A400M TLL2
S-3	A300-600 Std Bogie	B727-200 Advanced Option	DC/MD-10-10/10F	COMAC C919 ER	Cessna Citation V	Beechcraft King Air 8100	B-52
S-5	A300-600 LGA Bogie	B737-100	DC/MD-10-30/30F/40	Fokker-F-100	Cessna Citation VI/VII	Beechcraft King Air 8200	C-5
S-10	A310-200	B737-200 Advanced QC	MD-11	Fokker-F-28-1000/2000	Cessna Citation X	Beechcraft King Air C90	C-17A
S-12.5	A310-300	B737-200	MD-83	F-28-3000/4000/6000	CRJ100/200	Cessna 172 Skyhawk	C-123
S-15	A318-100 std	B737-300	MD-90-30 ER	IL-62	CRJ100ER/200ER	Cessna 182 Skylane	C-130
S-20	A318-100 opt	B737-400		IL-76T	CRJ100LR/200LR	Cessna 206 Stationair	C-130-57
S-25	A319-100 std	B737-500		IL-86	CRJ700	Cessna 208B Grand Caravan	C-130-70
S-30	A319-100 opt	B737-600		L-100-20	CRJ900	Cessna 414/414A Chancellor	F-15C
S-30 HTP	A319neo	B737-700		L-1011	CRJ1000	Cessna C210 Centurion	F-16C
S-35 HTP	A320-200 std	B737-800		TU-134A	Dassault Falcon 50/50EX	Cessna C441 Conquest II	F/A-18C
S-40 HTP	A320-200 opt	B737-900		TU-154B	Dassault Falcon 900B/C	Cessna Citation M2 C525	KC-10
S-45	A320-200 WW/000 Boogie	B737-900 ER					P-3C



User-Defined Aircraft Mode

Create, edit and save user-defined aircraft within the program.

The screenshot displays the 'Vehicle Edit' window in the FAARFIELD software. The 'User Defined Aircraft Info' section is active, showing the selected aircraft as 'B767 ER Growth (UDA)'. Key parameters include a Gross Taxi Weight of 413000 lbs, a Percent Gross Weight on Whole Main Gear of 0.95, a PCR Percent Gross Weight on Gear of 0.924, and a Tire Pressure of 200 psi. A 'User Defined Gear' plot shows the gear layout on a coordinate system from -250 to 250 inches. Below the plot are tables for 'Tires' and 'Evaluation Points'. The 'Tires' table lists X and Y coordinates for four tires. The 'Evaluation Points' table lists X and Y coordinates for eight points. The 'Design Options' panel on the right includes settings for HMA CDF, flexible base design, output file, units, and flexible computation. At the bottom, a 'Traffic' section shows a table of 'Stored Aircraft Mix'.

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 Cont. Length (ft)
A320-100	150796	600	0	12000	0	0	0	200	47.50%	36.5	0.0	11.9	19.1
A340-600 std	807333	1000	0	20000	0	0	0	234	35.98%	55.0	78.0	15.7	25.2
A340-600 std Belly	807333	1000	0	20000	0	0	0	222	23.04%	46.3	77.9	12.9	20.7
A380	1238998	300	0	6000	0	0	0	218	19.00%	53.1	66.9	14.7	23.5
A380 Belly	1238998	300	0	6000	0	0	0	218	28.50%	0.0	0.0	14.7	23.5
B737-800	174700	2000	0	40000	0	0	0	204	47.50%	34.0	0.0	12.7	20.4

User-Defined Aircraft Mode

- **FAARFIELD treats UDA just like other library aircraft, except they have (UDA) appended to the aircraft name.**
- **UDA data are stored in files in:
C:\Users\[user]\Documents\My FAARFIELD\User Defined Aircraft**
- **UDA data are also saved to the job file – useful if a job is sent to another user.**

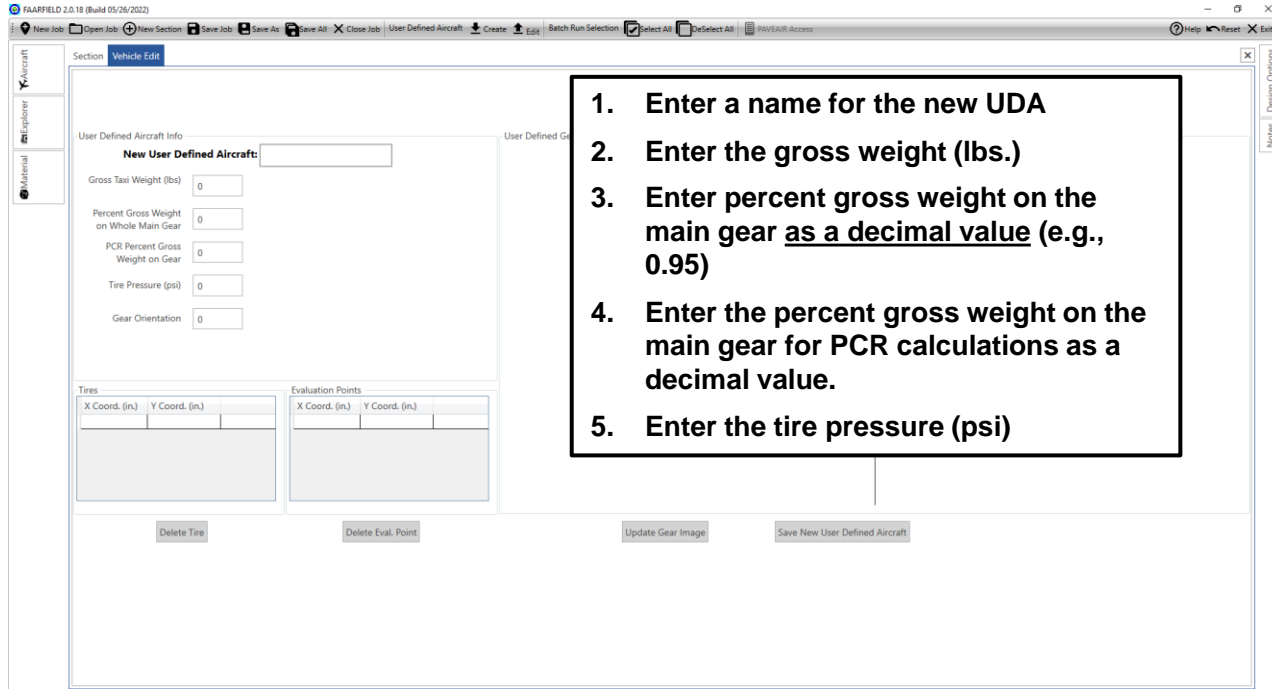
FAARFIELD 2.1 – User Defined Aircraft

The screenshot displays the FAARFIELD 2.0.3 software interface. A red box highlights the 'User Defined Aircraft' toolbar at the top right, which includes 'Create' and 'Edit' buttons. Another red box highlights the 'Thickness Design' dropdown menu in the 'Section' area. A large red box with white text is overlaid on the interface, stating: 'Access the editor using the User Defined Aircraft tools on the toolbar.' The main window shows a 'Section' view for a 'Workshop' job, with a 'Thickness Design' dropdown menu. Below this, there are 'Pavement Layers' and a 'Design Life' field set to 20 years. The 'Results' section shows 'Calculated Life (Years)' and 'Total thickness to the top of the subgrade: 35.8 in.' A cross-section diagram of the pavement structure is visible, showing layers like 'Subgrade', 'CBR=4.7', and 'E=7050 psi'. At the bottom, there is a 'Traffic' section with a 'User Defined Aircraft' dropdown and a table of aircraft data.

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure on Gear (psi)	Percent GW	Dual Tire Spacing (in.)	Tandem Tire Spacing (in.)	Tire Wid
S-30	30000	8000	0	160000	0	0	1.75	75	0.475	0.0	0.0	12.3
Fokker F-100	98000	6500	0	130000	0	0	1.33	151	0.475	23.1	0.0	11.1
B737-300	138500	5000	0	100000	0	0	1.26	199	0.475	30.5	0.0	11.5
B767-300 ER	350000	3200	0	64000	0.01	0.02	1.14	171	0.475	45.0	56.0	13.5
A380-800 WW000	1200000	400	0	8000	0.35	0.4	1.15	211	0.19	53.1	66.9	14.7
B787-9	878000	400	0	8000	0.02	0.76	1.25	211	0.285	0.0	0.0	14.7
B787-9	878000	400	0	8000	0.02	0.76	1.25	211	0.285	0.0	0.0	14.7
B777-300	580000	1500	0	30000	0.62	0.62	1.19	188	0.475	55.0	57.0	13.5



FAARFIELD 2.1 – User Defined Aircraft Mode



1. Enter a name for the new UDA
2. Enter the gross weight (lbs.)
3. Enter percent gross weight on the main gear as a decimal value (e.g., 0.95)
4. Enter the percent gross weight on the main gear for PCR calculations as a decimal value.
5. Enter the tire pressure (psi)



User-Defined Aircraft Mode

Define the tire coordinates.

- X-coordinate is lateral.
- Y-coordinate is longitudinal (in direction of travel)
- Only enter coordinates for one set of wheels (left or right, doesn't matter). They will be reflected on the centerline.

Define the evaluation points. These are used for layered elastic analysis computations.

- Must have at least one evaluation point.
- Typically, under the wheel, at the gear CG, and evenly spaced between.
- Again, only enter coordinates for one set of points (left or right, doesn't matter).

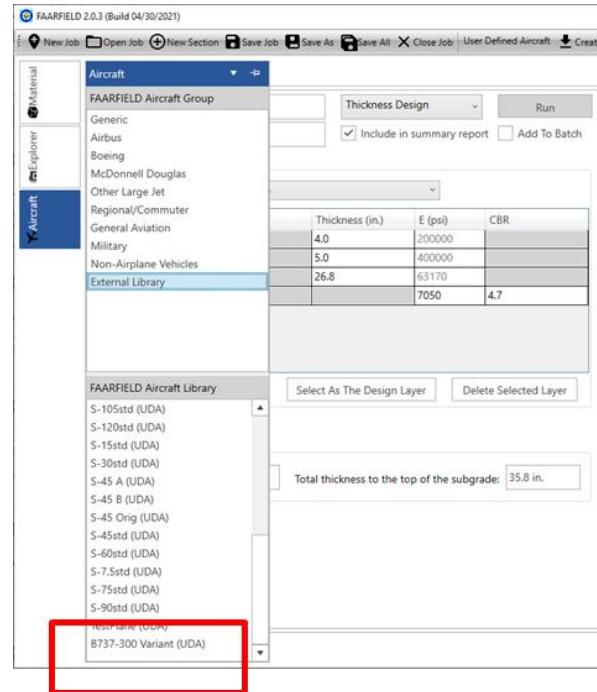
X Coord. (in.)	Y Coord. (in.)
-118.3	0.0
-87.8	0.0

X Coord. (in.)	Y Coord. (in.)
-103.1	0.0
-100.0	0.0
-97.0	0.0
-93.9	0.0
-90.9	0.0
-87.8	0.0

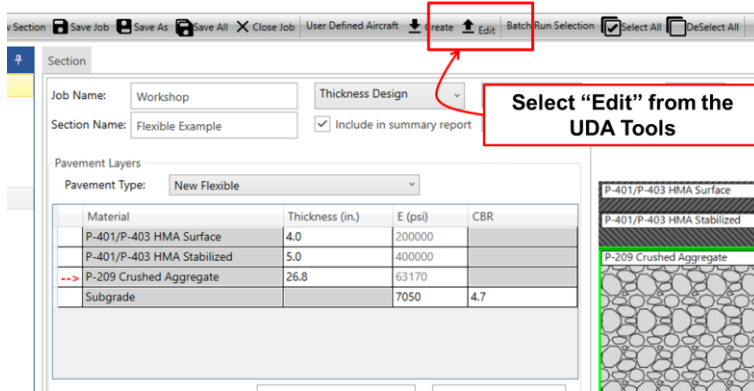
Buttons: Delete Tire, Delete Eval. Point, Update Gear Image, Save New User Defined Aircraft

User-Defined Aircraft Mode

- **New UDA will appear in your External Library group.**
- **Identified by the suffix (UDA)**
- **Can be used in designs the same as internal library aircraft.**
- **Use the editor to define non-airplane vehicles (ARFF vehicles, tugs, etc.) not in the internal library.**



Editing an Existing UDA



Section

Job Name: Workshop Thickness Design

Section Name: Flexible Example Include in summary report

Pavement Layers

Pavement Type: New Flexible

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	26.8	63170	
Subgrade		7050	4.7

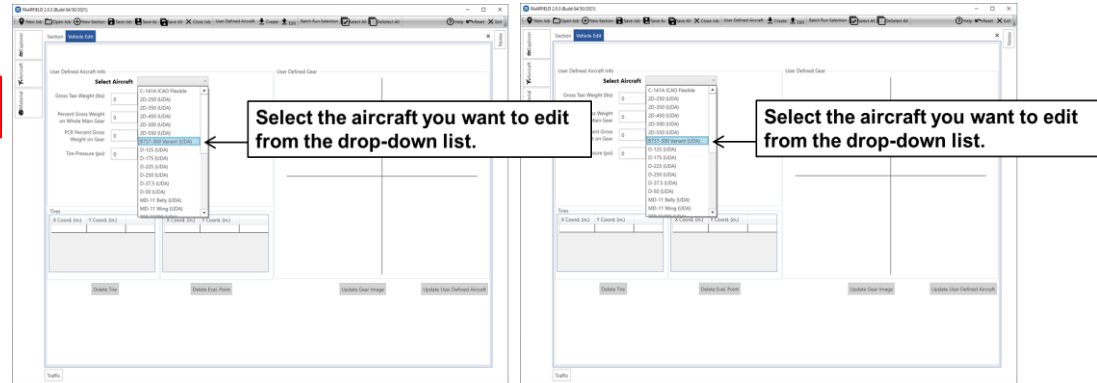
P-401/P-403 HMA Surface

P-401/P-403 HMA Stabilized

P-209 Crushed Aggregate

Select "Edit" from the UDA Tools

1



Select Aircraft

Select Aircraft

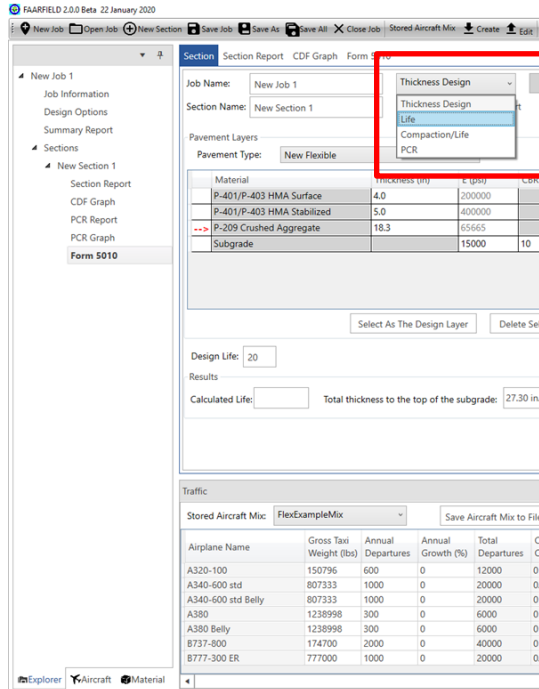
Select the aircraft you want to edit from the drop-down list.

Select the aircraft you want to edit from the drop-down list.

2

3

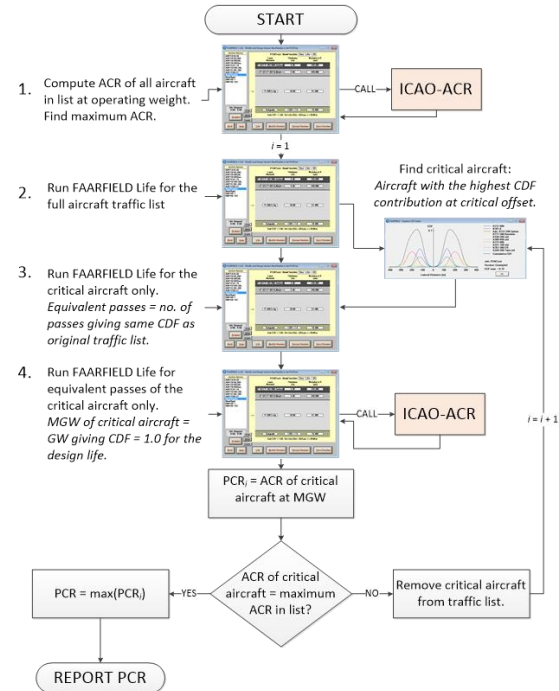
Four Functions in FAARFIELD 2.1



- **THICKNESS DESIGN** – Compute required thickness per AC 150/5320-6.
- **LIFE** – Compute structural life for a given structure and traffic mix.
- **COMPACTION** – Compute subgrade compaction requirements per AC 150/5320-6 for a given structure and traffic mix. (Applies to completed designs.)
- **PCR** – Compute Pavement Classification Rating (PCR) for the structure and traffic mix following AC 150/5335-5D.

FAARFIELD 2.1 Provides PCR

- Directly uses FAARFIELD structure and traffic list.
- Replacement for COMFAA 3.0 & support spreadsheets.
- Method yields uniquely defined PCR – no more looping through all aircraft in the list.
- Implemented in FAARFIELD 2.1
 - Solves problem of computing PCR for mixed traffic (i.e., many narrow bodies and few long range aircraft) without unnecessary operating weight restrictions on the LRs.
 - Seamlessly handles HMA overlays on rigid pavements (topic of afternoon presentation).



FAARFIELD 2.1 Help File

- Completely rewritten for FAARFIELD 2.0.
- This is the first resource you should go to with your questions on FAARFIELD.
- Contains examples.

The screenshot displays the FAARFIELD 2.1 software interface. A red box highlights the 'Help' menu item in the top menu bar, with a yellow arrow pointing to it. The main workspace shows a pavement cross-section diagram with layers: P-401/P-403 HMA Surface (T=4.0 inches, E=200000 psi), P-401/P-403 HMA Stabilized (T=5.0 inches, E=400000 psi), and P-209 Crushed Aggregate. The help window is open, showing a table of contents with 'Help File Organization' selected. The detailed view of 'HELP FILE ORGANIZATION' includes a navigation bar with 'Previous: Introduction to FAARFIELD', 'Current: Help File Organization', and 'Next: Installation of FAARFIELD 2.0'. The main text of the help file reads: '2 HELP FILE ORGANIZATION To access the help file from the software, click Help on the upper left of the toolbar. The help file is also available in PDF format from the FAARFIELD download page of the FAA website. The intent of this help file is to provide sufficient information for operating the program, selecting input data values, and interpreting the output data. This user manual is not intended to provide a complete description of the design procedures and program structure. The manual first describes the installation of FAARFIELD 2.0, then describes each of the program's features in turn.' Below this text is a list of links for various program features: Running the Program, Program Interface, Job and Section Definition and Control, Defining Pavement Structure, Defining Section Traffic Mix, Modes of Operation, Program Output, Design Options, APPENDIX A: Theoretical Approach to Design, APPENDIX B: Cumulative Damage Factor, APPENDIX C: Modulus Assignment Procedure for Aggregate Layers, APPENDIX D: Data Files, and APPENDIX E: Design Examples. At the bottom, it states: 'File names, directory names, menu items, typed commands, computer output, and names of buttons in the interface are shown in fixed-width font. Additional information is provided in the following appendices: Theoretical Approach, Appendix B: Cumulative Damage Factor, Appendix C: Modulus Assignment Procedure for Aggregate Layers, Appendix D: Data Files, Appendix E: Design Examples.'

The screenshot displays the FAARFIELD 2.0.19h software interface. The main window is titled "Section FAWEAR Access". The "Section" panel shows "Job Name: Demo Example 2" and "Thickness Design" selected. The "Pavement Layers" table is as follows:

Material	Thickness (in.)	E (psi)	k (pci)	R (psi)
P-501 PCC Surface	16.6	4,000,000		650
P-401/P-403 HMA Stabilized	5.0	400,000		
P-209 Crushed Aggregate	6.0	15,753		
Subgrade	4.500		67.5	

The cross-section diagram shows a semi-circular pavement structure with layers: P-501 PCC Surface (16.6 inches, E=4,000,000 psi), P-401/P-403 HMA Stabilized (5.0 inches, E=400,000 psi), P-209 Crushed Aggregate (6.0 inches, E=15,753 psi), and Subgrade (4.500 inches, k=67.5 pci). The total thickness is 27.6 inches.

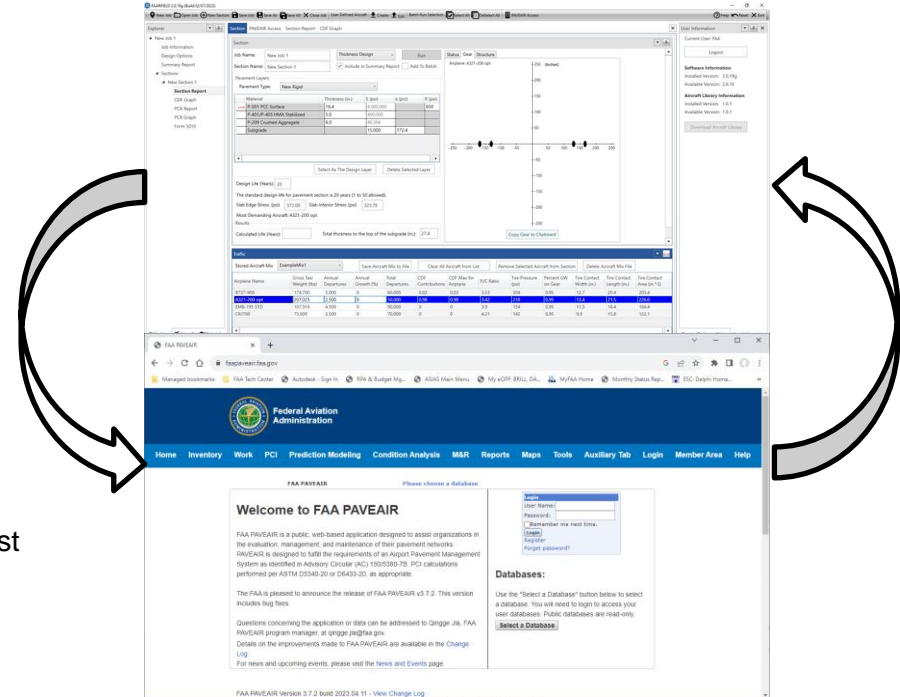
The "Traffic" section shows a table of stored aircraft mix data:

Airplane Name	Gross Taxi Weight (lb)	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)
B737-900	174,700	3,000	0	60,000	0.03	0.05	3.53	204	0.95	12.7	20.4	263.4
A321-200 opt	207,025	2,500	0	50,000	0.97	0.97	3.42	218	0.95	13.4	21.5	226.0
EMB-195 STD	107,916	4,500	0	90,000	0	0	3.9	154	0.95	11.5	18.4	166.4
CRJ700	73,000	3,500	0	70,000	0	0	4.21	142	0.95	9.9	15.8	122.1

New Features in FAARFIELD 2.1

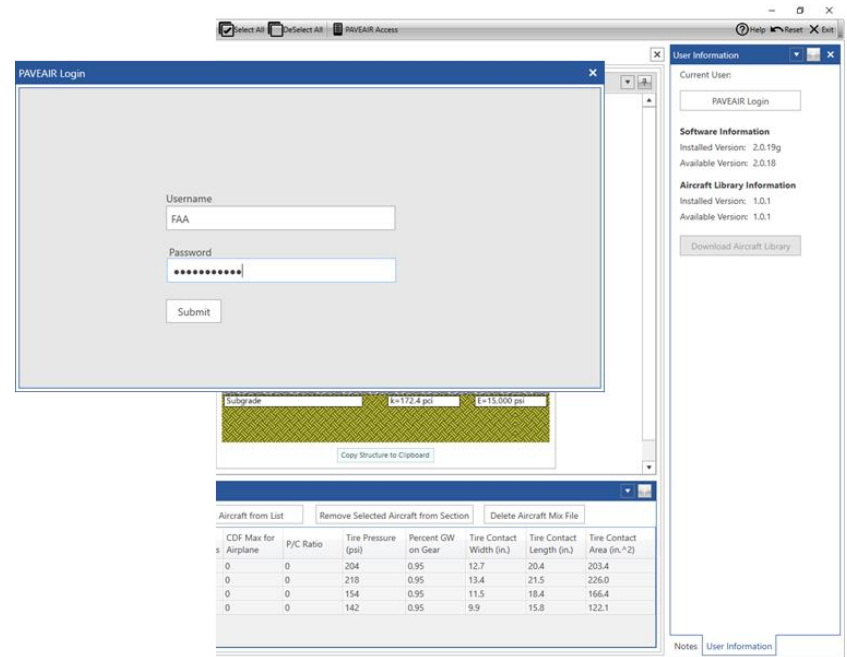
FAARFIELD 2.1 – New Features and Links to FAA PAVEAIR

- **FAA PAVEAIR**
 - FAA’s web-based airport pavement management system (APMS)
 - <https://faapaveair.faa.gov/>
- **Data Integration with FAA PAVEAIR**
 - Log in to PAVEAIR using PAVEAIR user credentials
 - Update to current library version (and eventually to current software version) online
 - Access user-owned PAVEAIR databases
 - Populate Job Information from PAVEAIR data
 - Upload/download/store FAARFIELD job files
- **More New Features**
 - Display critical design stresses for rigid slabs (and most demanding aircraft for A-1 joint design).
 - Option to automatically perform reduced cross section design (1% of traffic).



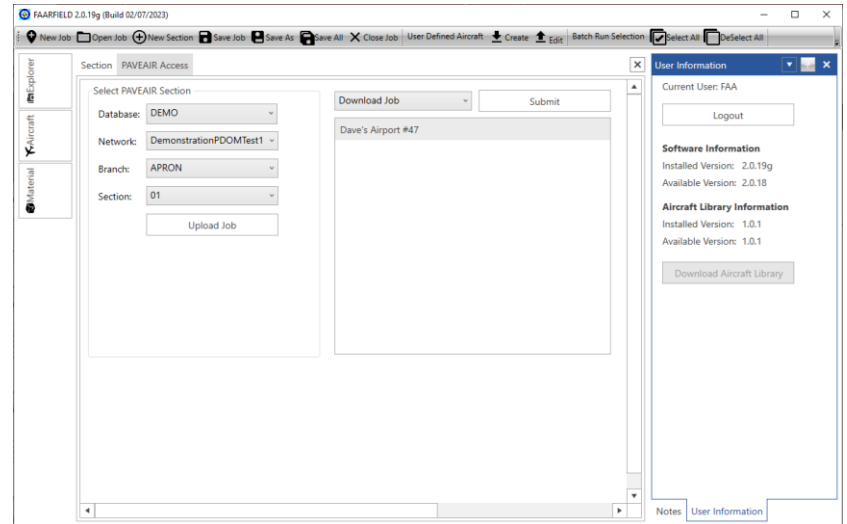
FAARFIELD User Sign-In

- Select “User Information” tab at right
- Sign in using existing PAVEAIR account login and password.
- Panel displays installed and currently available versions of software and aircraft library.
- If your aircraft library is out of date, you have the opportunity to download the latest version.
- In the future, you will be able to update to a newer version of FAARFIELD, run software patches and bug fixes, etc.



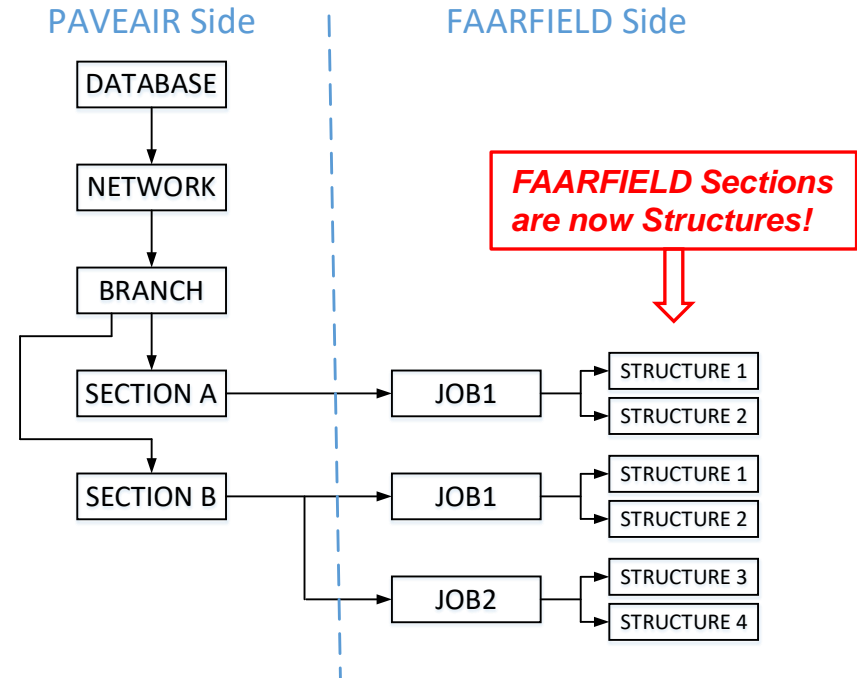
FAARFIELD – PAVEAIR Access Screen

- Once signed in, you have access to all user-owned databases in PAVEAIR.
- Navigate to Network/Branch/Section
- Four possible actions:
 - **Upload Job** – Uploads the current FAARFIELD job to the selected PAVEAIR Network/Branch/Section
 - **Download Job** – Downloads and opens the selected job from the PAVEAIR list in FAARFIELD
 - **Update Job** – Overwrites the selected job
 - **Delete Job** – Deletes the selected job from the PAVEAIR database. (Does not delete from FAARFIELD or the FAARFIELD job file).



Data Organization

- The same FAARFIELD job can be uploaded to multiple locations in a PAVEAIR database.
- Note to users of FAARFIELD 2.0: “Sections” have been renamed to “Structures.” This is to avoid confusion with sections as defined in APMS.
- For the PAVEAIR user, structures can represent:
 - Asphalt vs. concrete options, for use in PAVEAIR LCCA tool
 - Before/after overlay or replacement of section
 - Different possible traffic mixes
 - Etc.



Thank You!

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daniel.i.offenbacher@faa.gov

<https://airporttech.tc.faa.gov>