

FAARFIELD 2.1 Hands-On Training

Class Exercise 3

FAARFIELD 2.1 for ACR-PCR Calculations

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

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Date: June 28, 2026



**Federal Aviation
Administration**



Flexible Pavement PCR Example

A flexible pavement is being designed for a new runway at a commercial airport. 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, kg	Arrival Weight, kg	Annual Departures
S-30	13,608	10,206	8000
Fokker F-100	44,452	34,019	6500
B737-300	62,822	52,163	5000
B767-300 ER	158,757	131,541	3200
A380-800	544,310	462,664	400
B777-300	263,083	237,682	1500

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

Boring No.	UCSC Soil Type	Moisture Content, %	Optimal MC, %	Dry unit weight, kN/m ³	Water Table Depth, m	CBR, %
B-1	SC	12.2	10.4	20.26	3	10.6
B-2	SC	14.4	12.2	19.57	3	7.2
B-3	SC	16.5	9.6	20.80	2.5	8.4
B-4	CL	15.8	13.5	18.88	2.0	6.3
B-5	CL	17.0	14.5	19.24	2.4	4.8
B-6	CL	16.2	13.8	18.96	1.7	5.9
B-7	CL	16.8	12.6	19.48	1.4	4.2
B-8	CL	14.2	12.8	20.14	1.8	6.4
Average:						
Std. Deviation:						



Completed Pavement Thickness Design

FAARFIELD 2.1.2 (Build 06/03/2026)

New Job Open Job New Structure 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 Structure Structure Report CDF Graph

FAARFIELD Aircraft Group

Generic

Airbus

Boeing

McDonnell Douglas

Other Large Jet

Regional/Commuter

General Aviation

Military

Non-Airplane Vehicles

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

Structure

Job Name: New Job 3 Thickness Design Run Status Gear Structure

Structure Name: New Structure 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	63,213	
Subgrade		7,050	4.7

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.): 35.8

Structure

P-401/P-403 HMA Surface T=4.0 inches E=200,000 psi

P-401/P-403 HMA Stabilized T=5.0 inches E=400,000 psi

P-209 Crushed Aggregate T=26.8 inches E=63,213 psi

Subgrade CBR=4.7 E=7,050 psi

Copy Structure to Clipboard

Traffic

Stored Aircraft Mix: ACR-PCR Workshop 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	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	138,499	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	0.01	1.13	169	0.95	14.0	22.4	245.2
A380-800 WV000	1,199,999	400	0	8,000	0.36	0.4	1.14	211	0.38	14.7	23.5	270.2
A380-800 WV000 Belly	1,199,999	400	0	8,000	0.02	0.77	1.25	211	0.57	14.7	23.5	270.2

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My FAARFIELD Aircraft Directory

Change Aircraft Directory

Design Options Notes User Information



One-Step PCR Procedure

- For PCR following design, the evaluation structure and traffic mix are already entered in FAARFIELD.
- No equivalent thickness calculation needed.
- In PCR mode, FAARFIELD automatically switches to standard CG and tire pressure conditions for ACR evaluation.
- FAARFIELD automatically determines the subgrade category from subgrade data.
- FAARFIELD automatically determines the critical aircraft from the traffic list.



FAARFIELD 2.1.2 (Build 06/03/2026)

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

Aircraft

FAARFIELD Aircraft Group

Generic

Airbus

Boeing

McDonnell Douglas

Other Large Jet

Regional/Commuter

General Aviation

Military

Non-Airplane Vehicles

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

Structure Structure Report CDF Graph

Structure

Job Name: New Job 3 PCR Run

Structure Name: New Structure 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	63,213	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20 P/T/C Ratio: 1

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.): 35.8

Traffic

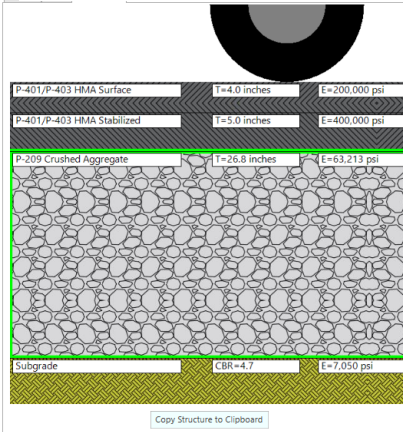
Stored Aircraft Mix: ACR-PCR Workshop Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

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	98,000	6,500	0	130,000	0	0	0	151	0.95	11.1	17.7	153.8
B737-300	138,499	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	169	0.95	14.0	22.4	245.2
A380-800 WV000	1,199,999	400	0	8,000	0	0	0	211	0.3804	14.7	23.5	270.2

Explorer Aircraft Material

Select "PCR" in the function drop-down box.

Click "Run" to execute PCR Computations



Reduced Cross Section: 1:100

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My Documents\FAARFIELD\PCR\Aircraft Directory

Change Aircraft Directory

Design Options Notes User Information



PCR

FAARFIELD 2.1.2 (Build 06/03/2026)

Aircraft: FAARFIELD Aircraft Group

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

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

Structure: Structure Report, CDF Graph

Run: Run, Add To Batch

Status: PCR Calculation of New Structure 1 Completed, Run Time: 11 seconds, PCR = 850/F/D/X/T

PCR displays here: PCR 850/F/D/X/T

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

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.): 35.8

Tire Pressure (kPa) and Percent GW on Gear table:

Tire Pressure (kPa)	Percent GW on Gear
517.11	0.95
1043.63	0.95
1370.99	0.95
1168.60	0.95
1455.74	0.38
1455.74	0.57

Note – FAARFIELD automatically loads the correct tire pressure and %GW on main gear for PCR calculations. These may be different than thickness design values.



PCR Reports and Graphs

FAARFIELD 2.1.2 (Build 06/03/2026)

File Edit View Options 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 DeSelect All PAVEAIR Access

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- New Job 2
 - Job Information
 - Design Options
 - Summary Report

Structure Structure Report CDF Graph

Structure

Job Name: New Job 3 PCR Run

Structure Name: New Structure 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	63,213	
Subgrade		7,050	4.7

Select As The Design Layer Delete Selected Layer

Design Life (Years): 20 P/T/C Ratio: 1

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.): 35.8

Status Gear Structure

PCR Calculation of New Structure 1 Completed
Run Time: 11 seconds
PCR = 850/F/D/X/T

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My Documents\FAARFIELD\Aircraft Directory

Change Aircraft Directory

Design Options Notes User Information

Traffic

Stored Aircraft Mix: ACR-PCR Workshop 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	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	0.956	11.1	17.7	153.8
B737-300	138,499	5,000	0	100,000	0	0	1.26	199	0.908	11.5	18.4	165.4
B767-300 ER	350,000	3,200	0	64,000	0	0	1.13	169	0.924	14.0	22.4	245.2
A380-800 WV000	1,199,999	400	0	8,000	0.36	0.4	1.14	211	0.38	14.7	23.5	270.2



PCR Report

FAARFIELD 2.1.2 (Build 06/03/2026)

New Job Open Job New Structure 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 Structure Structure Report CDF Graph PCR Report

New Job 1
Job Information
Design Options
Summary Report
Structures
New Structure 1
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record

New Job 2
Job Information
Design Options
Summary Report
Structures
Rigid Pavement Example
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record

New Job 3
Job Information
Design Options
Summary Report
Structures
New Structure 1
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record

Save As PDF

Federal Aviation Administration FAARFIELD 2.1 PCR Report

FAARFIELD 2.1.2 (Build 06/03/2026)

Job Name: New Job 3

Structure: New Structure 1

This file name = PCR Results for New Flexible 2026-06-28 07:09:16

Evaluation pavement type is flexible and design program is FAARFIELD.

Structure name: New Structure 1 in Job file: New Job 3.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 = 0.970

At least one aircraft has 4 or more wheels per gear.

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My FAARFIELD User Defined Aircraft

Change Aircraft Directory

Design Options Notes User Information

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	90,325
2	Fokker-F-100	98,000	95.60	151	6,500	97,473



PCR Report

Federal Aviation Administration FAARFIELD 2.1 PCR Report

FAARFIELD 2.1.1 (Build 12/21/2023)

Job Name: PCR Comparisons 2

Structure: Airport B RWY 10R-28L

This file name = PCR Results for New Flexible 2024-02-01 08:54:31

Evaluation pavement type is flexible and design program is FAARFIELD.

Structure name: Airport B RWY 10R-28L in job file: PCR Comparisons 2_JOB.xml

Units = Metric

Analysis Type: New Flexible

Subgrade Modulus = 72.41MPa (Subgrade Category is C)

Evaluation Pavement Thickness = 711 mm

Pave to Traffic Cycle (PtoTC) Ratio = 1.00

Maximum number of wheels per gear = 4

CDF = 0.000

At least one aircraft has 4 or more wheels per gear.

Summary Data

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight	Tire Pressure (MPa)	Annual Departure	20 Years Coverage
1	B767-300(UDA)	143,789	92.20	1,210.88	365	5,689
2	B757-200	116,100	91.20	1,261.74	1,360	20,870
3	B737-900	85,366	93.60	1,515.22	1,360	21,169
4	B737-800	79,242	93.60	1,406.53	4,360	68,176
5	MD-83	73,016	94.80	1,344.48	365	5,404
6	B737-400	68,266	93.80	1,275.53	365	5,498
7	B737-300	63,503	90.80	1,385.85	17,885	266,731
8	B737-500	60,781	92.20	1,337.58	2,920	43,563
9	B717-200 HGW	55,338	94.40	1,130.74	3,531	50,595
10	CRJ900	38,329	95.00	1,110.39	6,570	91,366
11	CRJ700	34,019	95.00	1,005.87	18,615	258,580
12	ERJ-145 ER	21,999	95.00	1,062.49	32,405	404,016
13	S-10	3,969	95.00	301.65	550	4,928
14	S-3	1,043	95.00	284.23	600	4,856
15	D-30	13,608	95.00	586.05	6,525	77,404
16	S-10	4,536	95.00	344.74	15,225	136,426
17	D-50	22,680	95.00	551.58	40,400	537,250

Results Table 1

Results Table 2. PCR Value

No.	Aircraft Name	Critical aircraft Total eqv. departures	Max allowable Gross Weight of critical aircraft (kg)	ACR Thick at max. PGW (mm)	PCR/F/C
1	B737-900	1,360	116,791	807	771.9

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

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight on Main Gear	Tire Pressure (MPa)
1	B767-300(UDA)	143,789	92.2	1,210.88
2	B757-200	116,100	91.2	1,261.74
3	B737-900	85,366	93.6	1,515.22
4	B737-800	79,242	93.6	1,406.53
5	MD-83	73,016	94.8	1,344.48
6	B737-400	68,266	93.8	1,275.53
7	B737-300	63,503	90.8	1,385.85
8	B737-500	60,781	92.2	1,337.58
9	B717-200 HGW	55,338	94.4	1,130.74
10	CRJ900	38,329	95	1,110.39
11	CRJ700	34,019	95	1,005.87
12	ERJ-145 ER	21,999	95	1,062.49
13	S-10	3,969	95	301.65
14	S-3	1,043	95	284.23
15	D-30	13,608	95	586.05
16	S-10	4,536	95	344.74
17	D-50	22,680	95	551.58

Results Table 2

Results Table 3



Federal Aviation
Administration

PCR Report

- PCR report tables are similar to COMFAA results tables, but simpler.
 - Results Table 1 – Input Traffic Data.
 - Results Table 2 displays PCR data for the critical (reference) aircraft only. PCR is defined as the ACR of the critical aircraft at the maximum allowable gross weight (MAGW).
 - Results Table 3 – ACR Data.
- No cut-and-paste. The PCR graph is generated automatically.



PCR Report Tables 1 and 2

FAARFIELD 2.1.2 (Build 06/03/2026)

File Edit View Options 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 DeSelect All PAVEAIR Access

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- New Job 2
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - Rigid Pavement Example
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- New Job 3
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record

Structure Structure Report CDF Graph PCR Report

Save As PDF

Maximum number of wheels per gear = 6

CDF = 0.970

At least one aircraft has 4 or more wheels per gear.

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight (lbs)	Percent Gross Weight	20
1	S-30	30,000	95.00	90,3
2	Fokker-F-100	98,000	95.60	97,473
3	B737-300	138,499	90.80	79,509
4	B767-300 ER	350,000	92.40	56,394
5	A380-800 WV000	1,199,999	38.00	6,987
6	A380-800 WV000 Belly	1,199,999	57.00	6,425
7	B777-300	579,999	94.80	25,308

Results Table 2. Critical Aircraft

No.	Aircraft Name	Critical aircraft Total equiv. departures	Max allowable gross weight of critical aircraft (lbs)	Max truck at max. MGW (k)	PCR/F/D
1	A380-800 WV000	50	1,202,176	37.9	851.3

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	75	16.8	113.9
2	Fokker-F-100	98,000	95.6	151	25.3	314.6
3	B737-300	138,499	90.8	199	27.5	382.9
4	B767-300 ER	350,000	92.4	169	31.7	543.8
5	A380-800 WV000	1,199,999	95	211	37.8	848.1
6	B777-300	579,999	94.8	188	35.5	727.2

Design Options

Calculate HMA CDF: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My PAVEAIR\My Aircraft Directory

Change Aircraft Directory

Design Options Notes User Information

Critical Aircraft

PCR/F/D

851.3

PCR/F/D

851.3

- Actual computed PCR = 851.3.
- Report PCR to nearest whole multiple of 10 (per ADM).
- Report PCR 850/F/D/X/T.



PCR Report

ACR/PCR	Classification Rating
ACR Thickness	ACR Pavement Reference Thickness
MAGW	Aircraft Weight that Converts Total Equiv. Departures to CDF = 1.0
Total Equiv. Departures	Number of Departures for Critical Aircraft that provides same CDF as Aircraft Mix

No.	Aircraft Name	Critical aircraft Total equiv. departures	Max allowable Gross Weight of critical aircraft (lbs)	ACR Thick at max. MGW (in.)	PCR/F/C
1	B747-400	1,752	948,183	30.3	694.9



PCR Report

**Parameters are for ACR-PCR
analysis only →**

**Should not be used during
pavement structural design**

		Departures	Aircraft (lbs)	(in.)	
1	B747-400	1,752	948,183	30.3	694.9



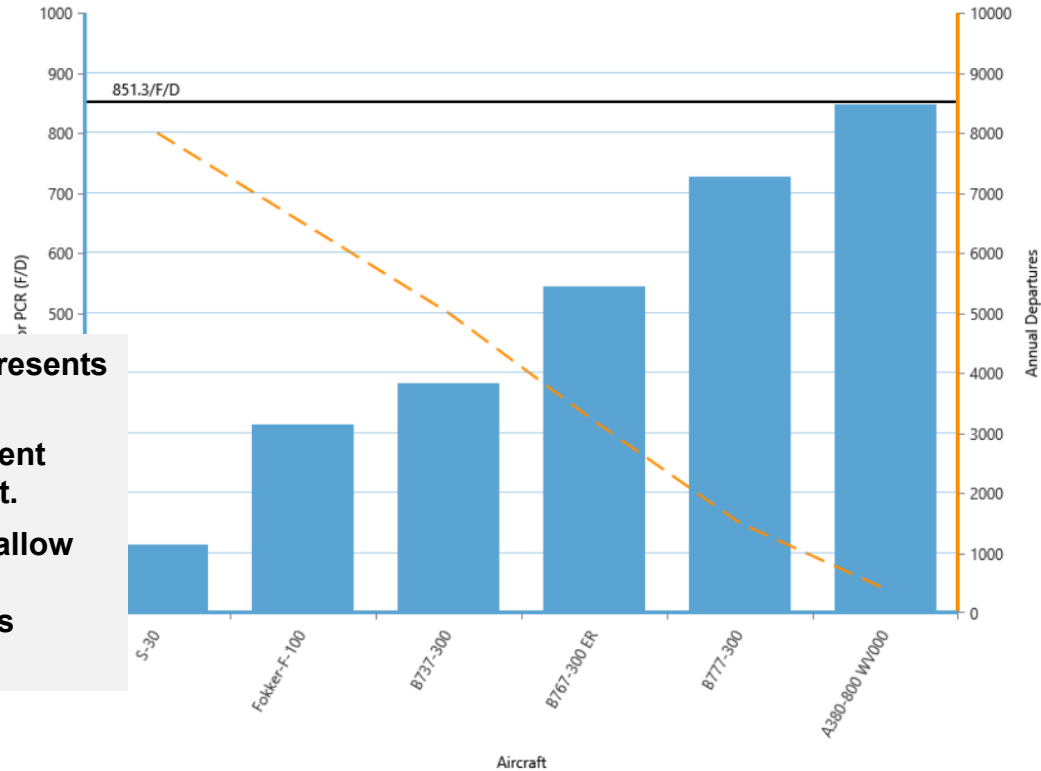
PCR Report Table 3

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	75	16.8	113.9
2	Fokker-F-100	98,000	95.6	151	25.3	314.6
3	B737-300	138,499	90.8	199	27.5	382.9
4	B767-300 ER	350,000	92.4	169	31.7	543.8
5	A380-800 WV000	1,199,999	95	211	37.8	848.1
6	B777-300	579,999	94.8	188	35.5	727.2



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.



Airport Master Record (AMR) Data

FAARFIELD 2.1.2 (Build 06/03/2026)

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

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - Airport Master Record
- New Job 2
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - Rigid Pavement Example
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- New Job 3
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record

Structure Structure Report CDF Graph PCR Report PCR Graph Airport Master Record

Save As PDF

Federal Aviation Administration FAARFIELD 2.1 Airport Master Record

FAARFIELD 2.1.2 (Build 06/03/2026)

RUNWAY DATA

Job Name: New Job 3

Structure: New Structure 1

Gross Weight (In THSDS)

35 S	120
36 D	250

Gross Weight (In THSDS)

35 S	120
36 D	250
37 2D	353
38 2D/2D2	866
39 PCR	850/F/D/X/T

Slab Stress Displayed: No

Output file: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My FAARFIELD User Defined Aircraft

Change Aircraft Directory

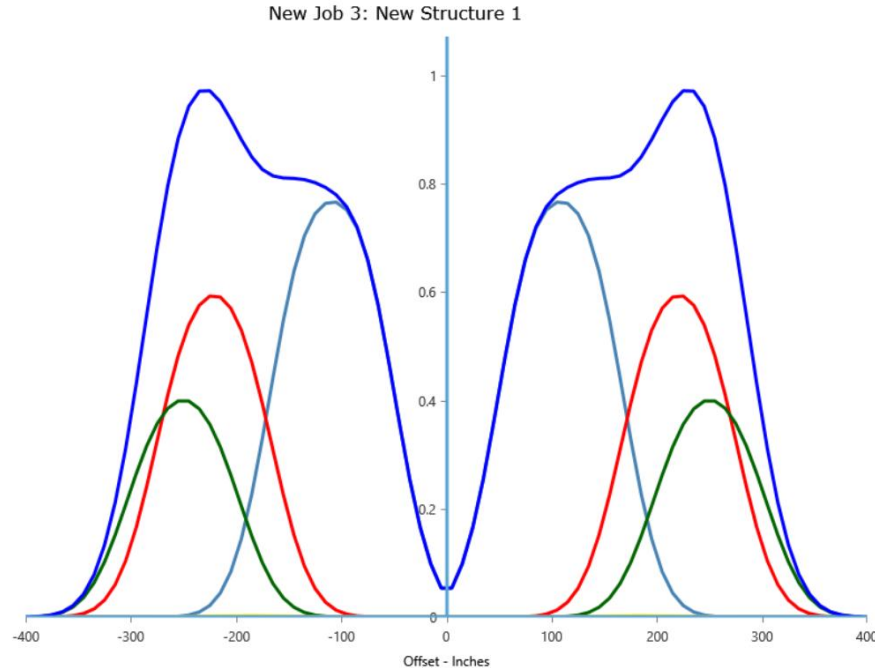
Design Options Notes User Information

U.S. airports use this information to populate the Airport Master Record (AMR)



Federal Aviation
Administration

CDF Graph



- CDF for this example < 1
 - Consistent with no restrictions on using aircraft.
 - Aircraft generally bunched up around same offset.
- Maximum CDF for PCR is usually less than CDF for design.
 - Due to different gear characteristics used for PCR computation
 - For design, we assume 95% of gross weight on the main gear (conservative).
 - PCR assumes maximum ramp mass and actual corresponding aft c.g.



Rigid Pavement PCR Example

A rigid pavement is being designed for a new runway at a commercial airport. 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. The specified 28-day strength (ASTM C78) is 4.6 MPa.

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

Aircraft	Departure Weight, kg	Arrival Weight, kg	Annual Departures
S-30	13,608	10,206	8000
Fokker F-100	44,452	34,019	6500
B737-300	62,822	52,163	5000
B767-300 ER	158,757	131,541	3200
A380-800	544,310	462,664	400
B777-300	263,083	237,682	1500

Same as flexible example!

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

Boring No.	UCSC Soil Type	Moisture Content, %	Optimal MC, %	Dry unit weight, kN/m ³	Water Table Depth, m	CBR, %
B-1	SC	12.2	10.4	20.26	3	10.6
B-2	SC	14.4	12.2	19.57	3	7.2
B-3	SC	16.5	9.6	20.80	2.5	8.4
B-4	CL	15.8	13.5	18.88	2.0	6.3
B-5	CL	17.0	14.5	19.24	2.4	4.8
B-6	CL	16.2	13.8	18.96	1.7	5.9
B-7	CL	16.8	12.6	19.48	1.4	4.2
B-8	CL	14.2	12.8	20.14	1.8	6.4
Average:						
Std. Deviation:						



Rigid Pavement PCR Example

FAARFIELD 2.1.2 (Build 06/03/2026)

File Edit View Options 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 DeSelect All PAVEAIR Access

Explorer

- New Job 1
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- New Job 2
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - Rigid Pavement Example**
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- New Job 3
 - Job Information
 - Design Options
 - Summary Report
 - Structures
 - New Structure 1
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record

Structure Structure Report CDF Graph PCR Report PCR Graph Airport Master Record

Structure

Job Name: New Job 2 Thickness Design Run Status Gear Structure

Structure Name: Rigid Pavement Example 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	16.0	4,000,000		700
P-306 Lean Concrete	5.0	700,000		
P-209 Crushed Aggregate	8.0	25,027		
Subgrade		7,050	95.8	

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): 20.0 Total thickness to the top of the subgrade (in.): 29.0

Copy Structure to Clipboard

Traffic

Stored Aircraft Mix: ACR-PCR Workshop 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	98,000	6,500	0	130,000	0	0	0	151	0.95	11.1	17.7	153.8
B737-300	138,499	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	169	0.95	14.0	22.4	245.2
A380-800 WV000	1,199,999	400	0	8,000	0	0	0	211	0.3804	14.7	23.5	270.2
A380-800 WV000 Belly	1,199,999	400	0	8,000	0	0	0	211	0.5706	14.7	23.5	270.2

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

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\Daniel I Offenbacher\OneDrive - Federal Aviation Administration\Documents\My Documents\FAARFIELD\Aircraft

Change Aircraft Directory

Design Options Notes User Information



Switch to "PCR" and select "Run"

The screenshot displays the AIRFIELD 2.1.2 software interface. The 'Structure' window is active, showing the design parameters for a rigid pavement structure. The 'Job Name' is 'New Job 2' and the 'Structure Name' is 'Rigid Pavement Example'. The 'Pavement Type' is 'New Rigid'. The 'Material' list includes P-501, P-306, P-209, and Subgrade. The 'Design Life' is 20 years, and the 'P/C Ratio' is 1. The 'Results' section shows 'Calculated Life (Years): 20.0' and 'Total thickness to the top of the subgrade (in.): 29.0'. A large red arrow points to the 'Run' button. A red box highlights the 'PCR' button in the top right corner. A red text overlay reads 'Switch to "PCR" and select "Run"'. The 'Traffic' table at the bottom shows data for various aircraft types.

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	138,499	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	169	0.95	14.0	22.4	245.2
A380-800 WW000	1,199,999	400	0	8,000	0	0	0	211	0.3804	14.7	23.5	270.2

Rigid Pavement PCR Example

FAARFIELD 2.1.2 (Build 06/03/2026)

File Edit View Options Help

Structure Structure Report CDF Graph PCR Report PCR Graph Airport Master Record

Job Name: New Job 2 PCR Run

Structure Name: Rigid Pavement Example 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	16.0	4,000,000		700
P-306 Lean Concrete	5.0	700,000		
P-209 Crushed Aggregate	8.0	25,027		
Subgrade		7,050	95.8	

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

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.): 29.0

Traffic

Stored Aircraft Mix: ACR-PCR Workshop Save Aircraft Mix to File Clear All Aircraft

Airplane Name	Gross Taxi Weight (lbs)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF for All
S-30	30,000	8,000	0	160,000	0	0
Fokker-F-100	98,000	6,500	0	130,000	0	0
B737-300	138,499	5,000	0	100,000	0	0
B767-300 ER	350,000	3,200	0	64,000	0	0
A380-800 WV000	1,199,999	400	0	8,000	0.11	0.11

PCR Calculation of Rigid Pavement Example
Run Time: 276 seconds
PCR = 1100/R/D/W/T

PCR = 1100
Rigid Pavement
Subgrade Class D
Unlimited Tire Pressure
Technical Evaluation

Slab Stress Displayed: No

Output file: No

Units: US Customary

Flexible Pavement for Thick Layers on PCC: Yes

Calculate ACR for All Grade Categories: No

Show Advanced Options

Reset Default to Initial

Show/Hide Pavement Image

Change Pavement Graphics

Defined Aircraft Directory: Daniel I Offenbacher - Federal Aviation Administration (Documents)\My Documents\FAARFIELD\Aircraft

Change Aircraft Directory

Design Options Notes User Information



ICAO-ACR Version 1.5

- FAA developed program.
- Calculates standard ACR numbers for aircraft operating on flexible and rigid airport pavements.
- Core library can be linked directly to other programs to either compute ACR directly or use as part of a technical PCR evaluation.
- **New – Reads the FAARFIELD aircraft library directly.**
- Get technical information on how to link the library to a calling program from the ICAO-ACR download page:

<https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/icao-acr-14>



Rigid Pavement PCR Reminders

- Rigid pavement PCR is sensitive to concrete flexural strength (R).
- Subgrade strength categories have changed from ACN/PCN system.
 - Subgrade category is based on the E -modulus at top of subgrade. (No more estimation of top-of-base k .)
 - Subgrade category may be different from PCN.
- More examples: See FAA Report No. DOT/FAA/TC-23/57 (2023):
PCN–PCR Comparisons for Large- and Medium-Hub Airport Runways



Thank You!



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Manager

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Muniz-Ruiz

daniel.i.offenbacher@faa.gov

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



**Federal Aviation
Administration**



PCR Case – Flexible Pavement



**Federal Aviation
Administration**

FAARFIELD 2.0 PCR Example

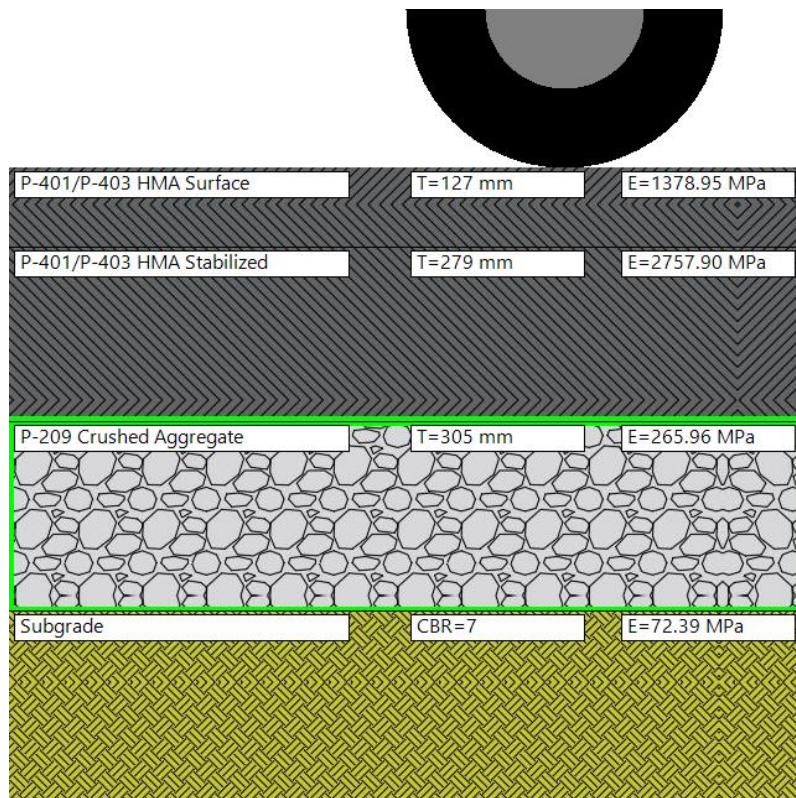
- Airport B
 - Medium-hub airport in the U.S.
 - Runway 10R-28L is a flexible runway constructed in 2013.
- Design Section:
 - 5 in. (127 mm) HMA surface (P-401)
 - 11 in. (279 mm) HMA base (P-401)
 - 12 in. (305 mm) crushed aggregate subbase (P-209)
 - 12 in. (305 mm) cement-stabilized subgrade
 - Existing subgrade soils were of poor quality and potentially contaminated.
 - Cement-stabilized soil layer was added to provide a higher CBR while minimizing disturbance of the existing subgrade.
 - Assumed CBR 7 at the top of the cement-stabilized subgrade.
- Airport reported PCN 77/F/C/W/T using COMFAA 3.0.



Runway Data		Obstruction Data	
Runway Identification	10R/28L	FAR 77 Category	PIR/PIR
Length	10,114	Displaced Threshold	/
Width	150	Controlling Obstruction	/
Surface Type-Condition	ASPH-E	Obstruction Marked/Lighted	/
Surface Treatment	GRVD	Height Above Runway End	/
Gross Weight (In Thousands)		Distance From Runway End	/
Single Wheel (S)	120.0	Centerline Offset & Direction	/
Dual Wheel (D)	250.0	Obstruction Clearance Slope	50/50
2 Dual Wheels in Tandem (2D)	424.0	Close-In Obstruction	N/N
2 Dual Wheels in Tandem/ 2 Dual Wheels in Double Tandem (2D/2D2)			
Pavement Classification Number (PCN)	77 /F/C/W/T		



FAARFIELD 2.1 PCR - Data



Traffic

Stored Aircraft Mix: **Airport B 10R-28L** Save Aircraft Mix to File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures
B767-300(UDA)	143,789	365	0	7,300
B757-200	116,100	1,360	0	27,200
B737-900	85,366	1,360	0	27,200
B737-800	79,242	4,380	0	87,600
MD-83	73,016	365	0	7,300
B737-400	68,266	365	0	7,300
B737-300	63,503	17,885	0	357,700
B737-500	60,781	2,920	0	58,400
B717-200 HGW	55,338	3,531	0	706,200
CRJ900	38,329	6,570	0	131,400
CRJ700	34,019	18,615	0	372,300
ERJ-145 ER	21,999	32,405	0	648,100
S-10	3,969	550	0	11,000
S-3	1,043	600	0	12,000
D-30	13,608	6,525	0	130,500
S-10	4,536	15,225	0	304,500
D-50	22,680	40,400	0	808,000



One-Step PCR Procedure

- For PCR following design, the evaluation structure and traffic mix are already entered in FAARFIELD.
- No equivalent thickness calculation needed.
- In PCR mode, FAARFIELD automatically switches to standard CG and tire pressure conditions for ACR evaluation.
- FAARFIELD automatically determines the subgrade category from subgrade data.
- FAARFIELD automatically determines the critical aircraft from the traffic list.



FAARFIELD 2.1 PCR Example

One-Step Procedure

Structure

Job Name: PCR Comparisons 2 PCR Run Status Gear Structure

Structure Name: Airport B RWY 10R-28L ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (mm)	E (MPa)	CBR
P-401/P-403 HMA Surface	127	1,378.95	
P-401/P-403 HMA Stabilized	279	2,757.90	
P-209 Crushed Aggregate	305	265.96	
Subgrade		72.41	

Select As The Design Layer Delete Selected Layer

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

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 (mm): 711

Copy Structure to Clipboard

Traffic

Stored Aircraft Mix: Airport B 10R-28L Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (m ²)
B767-300(UDA)	143,789	365	0	7,300	0	0	0	1210.88	0	332	531	138.286
B757-200	116,100	1,360	0	27,200	0	0	0	1261.74	0.95	292	467	107.174
B737-900	85,366	1,360	0	27,200	0	0	0	1515.22	0.95	323	517	131.218
B737-800	79,242	4,380	0	87,600	0	0	0	1406.53	0.95	323	517	131.218
MD-83	73,016	365	0	7,300	0	0	0	1344.48	0.95	317	508	126.509
B737-400	68,266	365	0	7,300	0	0	0	1275.43	0.95	315	508	124.651

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

Units: Metric

Allow Flexible Computation for Thick Overlays on PCC: No

Compute ACR for All Subgrade Categories: Yes

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 Briff\Documents\My FAARFIELD\User Defined Aircraft

Change Aircraft Directory



FAARFIELD 2.1 PCR Example

PCR = 770/F/C/X/T

The screenshot displays the FAARFIELD 2.1.1 software interface. The main window shows a 'Structure' tab with a table of design layers. A red box highlights the 'Status' tab, which displays the PCR calculation results: 'PCR Calculation of Airport B RWY 10R-28L Completed', 'Run Time: 51 seconds', and 'PCR = 770/F/C/X/T'. Another red box highlights the 'Status' tab in the top right corner, which also displays the same PCR calculation results. A third red box highlights a table of aircraft data, showing 'Tire Pressure (kPa)' and 'Percent GW on Gear' for various aircraft models. A note box states: 'Note - FAARFIELD automatically loads the correct tire pressure and %GW on main gear for PCR calculations. These may be different than thickness design values.' A red arrow points from the note box to the aircraft data table.

PCR displays here:
PCR 770/F/C/X/T

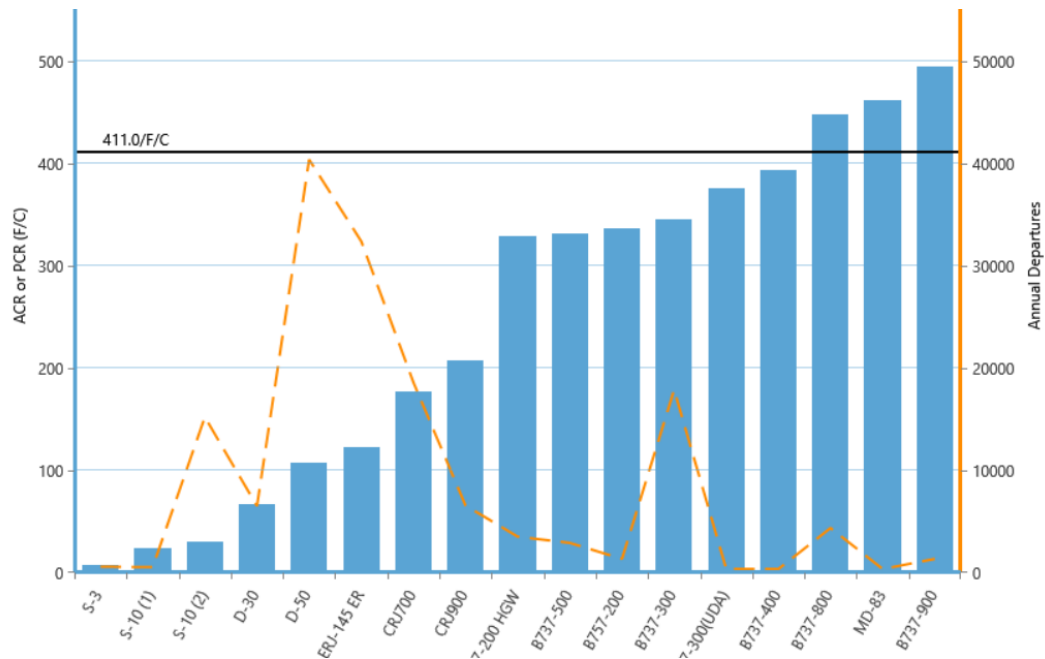
Note -
FAARFIELD automatically loads the correct tire pressure and %GW on main gear for PCR calculations. These may be different than thickness design values.

Status Gear Structure
PCR Calculation of Airport B RWY 10R-28L Completed
Run Time: 51 seconds
PCR = 770/F/C/X/T

Structure	Run	Status	Gear	Structure
P-401/P-403 HMA Surface	127	1.378.95		
P-401/P-403 HMA Stabilized	279	2.757.90		
P-209 Crushed Aggregate	305	266.01		
Subgrade		72.41	7	

Tire Pressure (kPa)	Percent GW on Gear
1210.88	0.922
1261.74	0.912
1515.22	0.936
1406.53	0.936
1344.48	0.948
1275.53	0.938





Understanding PCR Reports and Charts



PCR Reports and Graphs

FAARFIELD 2.1.1 (Build 12/21/2023)

Job Name: PCR Comparisons 2 | PCR | Run

Structure Name: Airport B RWY 10R-28L | Include in Summary Report | Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (mm)	E (MPa)	CBR
P-401/P-403 HMA Surface	127	1,376.95	
P-401/P-403 HMA Stabilized	279	2,757.90	
P-209 Crushed Aggregate	305	266.01	
Subgrade		72.41	7

Select As The Design Layer | Delete Selected Layer

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

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 (mm): 711

Traffic

Stored Aircraft Mix: Airport B 10R-28L | Save Aircraft Mix to File | Clear All Aircraft from List | Remove Selected Aircraft from Structure | Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (mm ²)
B767-300(UDA)	143,789	365	0	7,300	0	0	1.28	1210.88	0.922	332	531	138,286
B757-200	116,100	1,360	0	27,200	0	0	1.3	1261.74	0.912	292	467	107,174
B737-900	85,366	1,360	0	27,200	0	0	1.28	1515.22	0.936	323	517	131,218
B737-800	79,242	4,380	0	87,600	0	0	1.28	1406.53	0.936	323	517	131,218
MD-83	73,016	365	0	7,300	0	0	1.35	1344.48	0.948	317	508	126,509
B737-400	68,266	365	0	7,300	0	0	1.33	1275.53	0.938	315	504	124,651

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

Units: Metric

Allow Flexible Computation for Thick Overlays on PCC: No

Compute ACR for All Subgrade Categories: Yes

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 Brilh\Documents\My FAARFIELD\User Defined Aircraft

Change Aircraft Directory



PCR Report

Federal Aviation Administration FAARFIELD 2.1 PCR Report

FAARFIELD 2.1.1 (Build 12/21/2023)

Job Name: PCR Comparisons 2

Structure: Airport B RWY 10R-28L

This file name = PCR Results for New Flexible 2024-02-01 08:54:31

Evaluation pavement type is flexible and design program is FAARFIELD.

Structure name: Airport B RWY 10R-28L in job file: PCR Comparisons 2_JOB.xml

Units = Metric

Analysis Type: New Flexible

Subgrade Modulus =72.41MPa (Subgrade Category is C)

Evaluation Pavement Thickness = 711 mm

Pav to Traffic Cycle (PtoTC) Ratio = 1.00

Maximum number of wheels per gear = 4

CDF = 0.000

At least one aircraft has 4 or more wheels per gear.

Summary

Data

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight	Tire Pressure (MPa)	Annual Departure	20 Years Coverage
1	B767-300(UDA)	143,789	92.20	1,210.88	365	5,689
2	B757-200	116,100	91.20	1,261.74	1,360	20,870
3	B737-900	85,366	93.60	1,515.22	1,360	21,169
4	B737-800	79,242	93.60	1,406.53	4,360	68,176
5	MD-83	73,016	94.80	1,344.48	365	5,404
6	B737-400	68,266	93.80	1,275.53	365	5,498
7	B737-300	63,503	90.80	1,385.85	17,885	266,731
8	B737-500	60,781	92.20	1,337.58	2,920	43,563
9	B717-200 HGW	55,338	94.40	1,130.74	3,531	50,595
10	CRJ900	38,329	95.00	1,110.39	6,570	91,366
11	CRJ700	34,019	95.00	1,005.87	18,615	258,580
12	ERJ-145 ER	21,999	95.00	1,062.49	32,405	404,016
13	S-10	3,969	95.00	301.65	550	4,928
14	S-3	1,043	95.00	284.23	600	4,856
15	D-30	13,608	95.00	586.05	6,525	77,404
16	S-10	4,536	95.00	344.74	15,225	136,426
17	D-50	22,680	95.00	551.58	40,400	537,250

Results Table 1

Results Table 2. PCR Value

No.	Aircraft Name	Critical aircraft Total eqv. departures	Max allowable Gross Weight of critical aircraft (kg)	ACR Thick at max. PGW (mm)	PCR/F/C
1	B737-900	1,360	116,791	807	771.9

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

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight on Main Gear	Tire Pressure (MPa)
1	B767-300(UDA)	143,789	92.2	1,210.88
2	B757-200	116,100	91.2	1,261.74
3	B737-900	85,366	93.6	1,515.22
4	B737-800	79,242	93.6	1,406.53
5	MD-83	73,016	94.8	1,344.48
6	B737-400	68,266	93.8	1,275.53
7	B737-300	63,503	90.8	1,385.85
8	B737-500	60,781	92.2	1,337.58
9	B717-200 HGW	55,338	94.4	1,130.74
10	CRJ900	38,329	95	1,110.39
11	CRJ700	34,019	95	1,005.87
12	ERJ-145 ER	21,999	95	1,062.49
13	S-10	3,969	95	301.65
14	S-3	1,043	95	284.23
15	D-30	13,608	95	586.05
16	S-10	4,536	95	344.74
17	D-50	22,680	95	551.58

Results Table 2

Results Table 3



PCR Report

- PCR report tables are similar to COMFAA results tables, but simpler.
 - Results Table 1 – Input Traffic Data.
 - Results Table 2 displays PCR data for the critical (reference) aircraft only. PCR is defined as the ACR of the critical aircraft at the maximum allowable gross weight (MAGW).
 - Results Table 3 – ACR Data.
- No cut-and-paste. The PCR graph is generated automatically.



PCR Terminology

- Critical aircraft: Aircraft taken to represent the whole traffic mix in the PCR computation. *It is not necessarily the aircraft with the highest ACR.*
- Critical aircraft total equivalent departures = number of departures of the critical aircraft at the operating weight that results in the same CDF as the whole traffic mixture.
- Maximum allowable gross weight (MAGW) = gross weight of critical aircraft that results in $CDF = 1$ for the evaluation structure (at total equivalent departures).
- PCR = ACR of critical aircraft computed at MAGW.



Results Tables 1 and 2

FAARFIELD 2.1.1 (Build 12/21/2023)

File Edit View Window 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 DeSelect All PAVEAIR Access Help Reset Exit

Explorer Structure PCR Report

PCR Graph
Airport Master Record
Airport B RWY 10L-28R (No)
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record
Airport B RWY 10L-28R Extension
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record
Airport B RWY 10R-28L
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record
Airport C RWY 01-19
Structure Report
CDF Graph
PCR Report
PCR Graph
Airport Master Record
Airport F RWY 9-27
Structure Report

Save As PDF

Results Table 1. Input Traffic Data

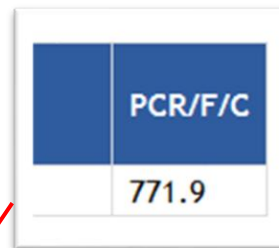
No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight	Tire Pressure (MPa)	Annual Departure	20 Years Coverage
1	B767-300(UDA)	143,789	92.20	1,210.88	365	5,689
2	B757-200	116,100	91.20	1,261.74	1,360	20,870
3	B737-900	85,366	93.60	1,515.22	1,360	21,169
4	B737-800	79,242	93.60	1,406.53	4,380	68,176
5	MD-83	73,016	94.80	1,344.48	365	5,404
6	B737-400	68,266	93.80	1,275.53	365	5,498
7	B737-300	63,503	90.80	1,385.85	17,885	266,731
8	B737-500	60,781	92.20	1,337.58	2,920	43,563
9	B717-200 HGW	55,338	94.40	1,130.74	3,531	50,595
10	CRJ900	38,329	95.00	1,110.39	6,570	91,366
11	CRJ700	34,019	95.00	1,005.87	18,615	258,580
12	ERJ-145 ER	21,999	95.00	1,062.49	32,405	404,016
13	S-10	3,969	95.00	301.65	550	4,928
14	S-3	1,043	95.00	264.23	600	4,856
15	D-30	13,608	95.00	586.05	6,525	77,404
16	S-10	4,536	95.00	344.74	15,225	136,426
17	D-50	22,680	95.00	551.58	40,400	537,250

Results Table 2. PCR Value

No.	Aircraft Name	Critical aircraft Total equiv. departures	Max allowable Gross Weight of critical aircraft (kg)	ACR Thick at max. IGW (mm)	IGW	PCR/F/C
1	B737-900	1,360	118,791	807		771.9

Critical Aircraft

- Actual computed PCR = 771.9.
- Report PCR to nearest whole multiple of 10 (per ADM).
- Report PCR 770/F/C/X/T.



Results Table 3

FAARFIELD 2.1.1 (Build 12/21/2023)

New Job Open Job New Structure 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

- PCR Graph
- Airport Master Record
- Airport B RWY 10L-28R (No)
- Structure Report
- CDF Graph
- PCR Report
- PCR Graph
- Airport Master Record
- Airport B RWY 10L-28R Exten
- Structure Report
- CDF Graph
- PCR Report
- PCR Graph
- Airport Master Record
- Airport B RWY 10R-28L
- Structure Report
- CDF Graph
- PCR Report**
- PCR Graph
- Airport Master Record

Structure PCR Report

Save As PDF

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

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight on Main Gear	Tire Pressure (MPa)
1	B767-300(UDA)	143,789	92.2	1,210.88
2	B757-200	116,100	91.2	1,261.74
3	B737-900	85,366	93.6	1,515.22
4	B737-800	79,242	93.6	1,406.53
5	MD-83	73,016	94.8	1,344.48
6	B737-400	68,266	93.8	1,275.53
7	B737-300	63,503	90.8	1,385.85
8	B737-500	60,781	92.2	1,337.58
9	B717-200 HGW	55,338	94.4	1,130.74
10	CRJ900	38,329	95	1,110.39
11	CRJ700	34,019	95	1,005.87
12	ERJ-145 ER	21,999	95	1,062.49
13	S-10	3,969	95	301.65
14	S-3	1,043	95	264.23
15	D-30	13,608	95	586.05
16	S-10	4,536	95	344.74
17	D-50	22,680	95	551.58

Explorer Aircraft Material

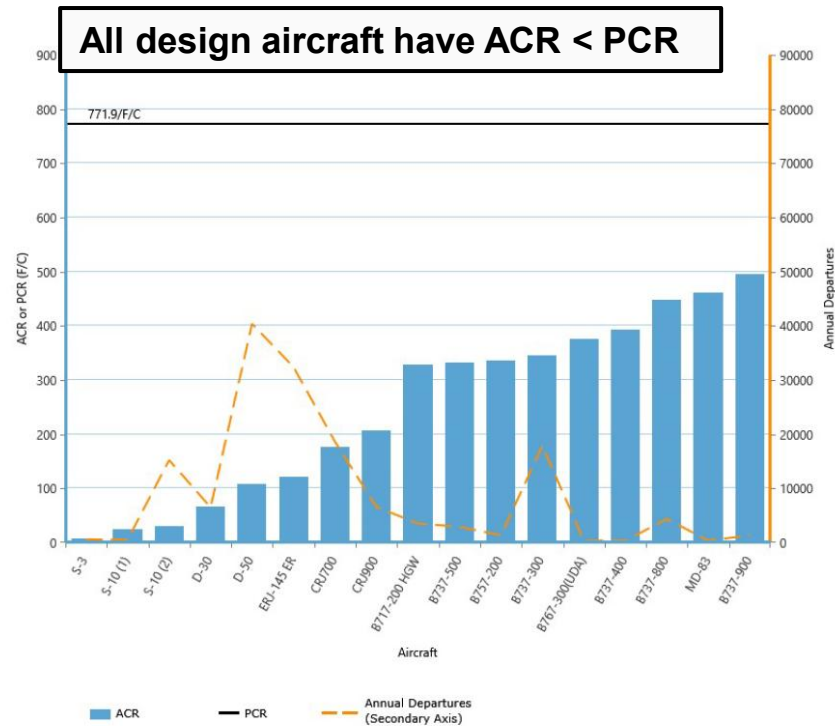
Notes User Information Design Options



PCR Graph for Example

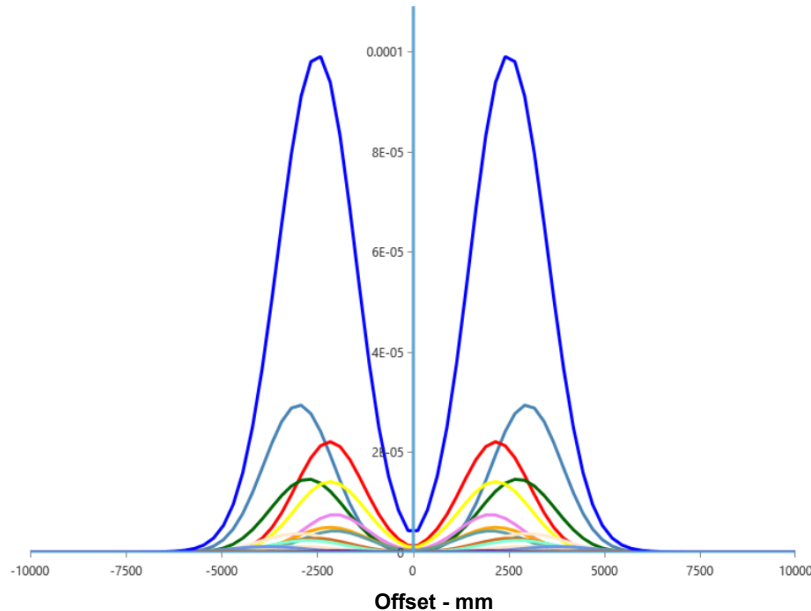
Critical aircraft: B737-900

No.	Aircraft Name	Aircraft ACR	Calculated PCR	Annual Departure
1	B737-900	495.4	771.9	1,360
2	MD-83	461.6	-	365
3	B737-800	447.9	-	4,380
4	B737-400	393.4	-	365
5	B767-300(UDA)	376	-	365
6	B737-300	345.6	-	17,885
7	B757-200	336.5	-	1,360
8	B737-500	331.6	-	2,920
9	B717-200 HGW	328.5	-	3,531
10	CRJ900	207.7	-	6,570
11	CRJ700	177.5	-	18,615
12	ERJ-145 ER	122.2	-	32,405
13	D-50	108	-	40,400
14	D-30	66.9	-	6,525
15	S-10	30.3	-	15,225
16	S-10	24.2	-	550
17	S-3	7.9	-	600



**Federal Aviation
Administration**

CDF Graph



- CDF for this example $\ll 1$
 - Significant excess strength.
 - Consistent with no restrictions on using aircraft.
 - Aircraft generally bunched up around same offset.
- Maximum CDF for PCR is usually less than CDF for design.
 - Due to different gear characteristics used for PCR computation
 - For design, we assume 95% of gross weight on the main gear (conservative).
 - PCR assumes maximum ramp mass and actual corresponding aft c.g.



Airport Master Record (AMR) Data

Use the information on this page to populate fields 35-39 in Airport Master Record (U.S. only).

The screenshot displays the FAARFIELD 2.1.1 software interface. The title bar indicates the version is 2.1.1 (Build 12/21/2023). The menu bar includes options like New Job, Open Job, New Structure, Save Job, Save As, Save All, Close Job, User Defined Aircraft, Create, Edit, Batch Run Selection, Select All, DeSelect All, and PAVEAIR Access. The Explorer pane on the left shows a tree view of the project structure, with 'Airport Master Record' highlighted under 'Airport B RWY 10R-28L'. The main window shows the 'Airport Master Record' tab, which includes a 'Save As PDF' button and a blue header with the text 'Federal Aviation Administration FAARFIELD 2.1 Airport Master Record' and 'FAARFIELD 2.1.1 (Build 12/21/2023)'. Below this, the 'RUNWAY DATA' section shows 'Job Name: PCR Comparisons 2' and 'Structure: Airport B RWY 10R-28L'. The 'Gross Weight (In THSDS)' section contains a table with the following data:

Gross Weight (In THSDS)	
35 S	120
36 D	250
37 2D	415
38 2D/2D2	998
39 PCR	770/F/C/X/T



What if we reduce the base thickness?

FAARFIELD 2.1.1 (Build 12/21/2023)

Structure CDF Graph PCR Report PCR Graph Airport Master Record

Job Name: PCR Comparisons 2 PCR Run Status Gear Structure

Structure Name: Airport B RWY 10R-28L Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (mm)	E (MPa)	CBR
P-401/P-403 HMA Surface	127	1,378.95	
P-401/P-403 HMA Stabilized	150	2,757.90	
P-209 Crushed Aggregate	305	266.01	
Subgrade		72.41	7

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

Units: Metric

Allow Flexible Computation for Thick Overlays on PCC: No

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: Airport B 10R-28L Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (mm²)
B767-300(UDA)	143,789	365	0	7,300	0	0	1.28	1210.88	0.922	332	531	138,286
B757-200	116,100	1,360	0	27,200	0	0	1.3	1261.74	0.912	292	467	107,174
B737-900	85,366	1,360	0	27,200	0	0	1.28	1515.22	0.936	323	517	131,218
B737-800	79,242	4,380	0	87,600	0	0	1.28	1406.53	0.936	323	517	131,218
MD-83	73,016	365	0	7,300	0	0	1.35	1344.48	0.948	317	508	126,509
B737-400	68,266	365	0	7,300	0	0	1.33	1275.53	0.938	315	504	124,651

Traffic mix the same

Reduce base thickness to 150 mm

Design life for pavement structure is 20 years (1 to 50 allowed).

P/TC Ratio: 1

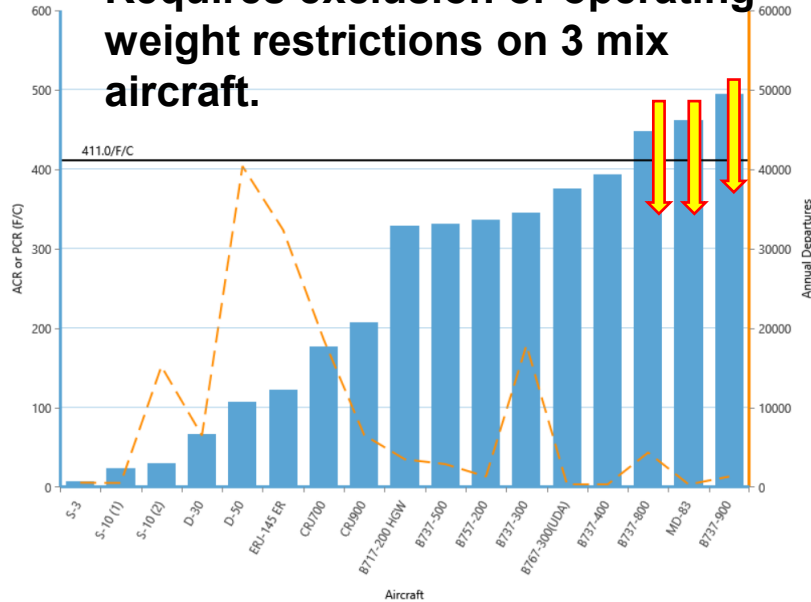
Total thickness to the top of the subgrade (mm): 582

Copy Structure to Clipboard

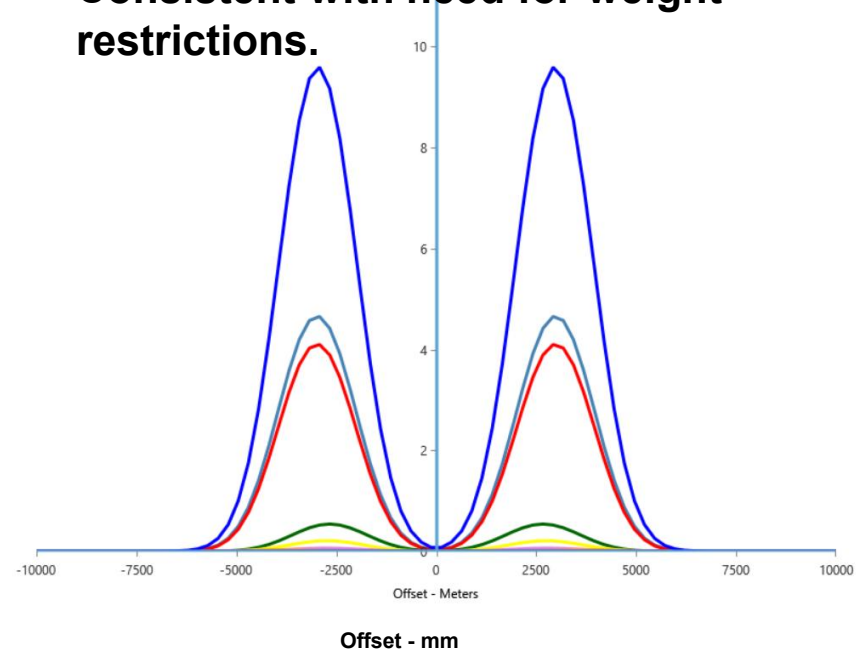


PCR for Reduced Based Thickness

- PCR 410/F/C/X/T
- Requires exclusion or operating weight restrictions on 3 mix aircraft.



- CDF > 1.0
- Consistent with need for weight restrictions.



Use FAARFIELD to Compute ACR

- By default, FAARFIELD computes ACR data for the subgrade strength category of the current pavement.
- Option to return ACR data for all subgrade categories.
- Convenient to compare ACR for various gear configurations.



Use FAARFIELD to Compute ACR

FAARFIELD 2.1.1 (Build 12/21/2023)

Structure CDF Graph PCR Report PCR Graph Airport Master Record

Job Name: PCR Comparisons 2
Structure Name: Airport B RWY 10R-28L
Pavement Type: New Flexible
Material: P-401/P-403 HMA Surface, P-401/P-403 HMA Stabilized, P-209 Crushed Aggregate, Subgrade
Design Life (Years): 20
Calculated Life (Years):
The standard design life for pavement structure is 20 years.

Units: Metric
Allow Flexible Computation for Thick Overlays on PCC: Yes
Compute ACR for All Subgrade Categories: Yes
Show Advanced Options

Design Options
Calculate HMA CDF: No
Reduced Cross Section: No
Automatic flexible base design: Yes
Slab Stress Displayed: No
Output file: No
Units: Metric
Allow Flexible Computation for Thick Overlays on PCC: Yes
Compute ACR for All Subgrade Categories: Yes
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: Airport B 10R-28L
Save Aircraft Mix to File
Clear All Aircraft from List
Remove Selected Aircraft from Structure
Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (mm ²)
B767-300(UDA)	143,789	365	0	7,300	0	0.01	1.45	1210.88	0.922	332	531	138,286
B757-200	116,100	1,360	0	27,200	0.02	0.03	1.36	1261.74	0.912	292	467	107,174
B737-900	85,366	1,360	0	27,200	4.1	4.1	1.34	1515.22	0.936	323	517	131,218
B737-800	79,242	4,380	0	87,600	4.65	4.65	1.34	1406.53	0.936	323	517	131,218
MD-83	73,016	365	0	7,300	0.52	0.54	1.42	1344.48	0.948	317	508	126,509
B737-400	68,266	365	0	7,300	0.06	0.06	1.39	1275.53	0.938	315	504	124,651



Select PCR Mode / Hit Run

FAARFIELD 2.1.1 (Build 12/21/2023)

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

Explorer

- PCR Graph
- Airport Master Record
- Airport B RWY 10L-28R (No)
- Structure Report
- CDF Graph
- PCR Report
- PCR Graph
- Airport Master Record
- Airport B RWY 10L-28R Exten
- Structure Report
- CDF Graph
- PCR Report
- PCR Graph
- Airport Master Record
- Airport B RWY 10R-28L
- Structure Report
- CDF Graph**
- PCR Report
- PCR Graph
- Airport Master Record
- Airport C RWY 01-19
- Structure Report
- CDF Graph
- PCR Report
- PCR Graph
- Airport Master Record
- Airport D RWY 10R-28L
- Structure Report
- CDF Graph
- PCR Report
- PCR Graph
- Airport Master Record

Structure CDF Graph PCR Report PCR Graph Airport Master Record

Structure

Job Name: PCR Comparisons 2 PCR Run Status Gear Structure

Structure Name: Airport B RWY 10R-28L ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (mm)	E (MPa)	CBR
P-401/P-403 HMA Surface	127	1,378.95	
P-401/P-403 HMA Stabilized	150	2,757.90	
P-209 Crushed Aggregate	305	266.01	
Subgrade		72.41	7

Select As The Design Layer Delete Selected Layer

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

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 (mm): 582

Copy Structure to Clipboard

Traffic

Stored Aircraft Mix: Airport B 10R-28L Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (mm ²)
B767-300(UDA)	143,789	365	0	7,300	0	0.01	1.45	1210.88	0.922	332	531	138,286
B757-200	116,100	1,360	0	27,200	0.02	0.03	1.36	1261.74	0.912	292	467	107,174
B737-900	85,366	1,360	0	27,200	4.1	4.1	1.34	1515.22	0.936	323	517	131,218
B737-800	79,242	4,380	0	87,600	4.65	4.65	1.34	1406.53	0.936	323	517	131,218
MD-83	73,016	365	0	7,300	0.52	0.54	1.42	1344.48	0.948	317	508	126,509
B737-400	68,266	365	0	7,300	0.06	0.06	1.39	1275.53	0.938	315	504	124,651

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

Units: Metric

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: Yes

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



PCR Complete

Scroll Traffic Table to the Right

The screenshot displays the PAVE software interface. The main window shows the 'Structure' tab with the 'Job Name' set to 'PCR Comparisons 2' and the 'Structure Name' set to 'Airport B RWY 10R-28L'. The 'Pavement Type' is 'New Flexible'. The 'Run' button is highlighted, and a status message indicates 'PCR Calculation of Airport B RWY 10R-28L Completed Run Time: 52 seconds PCR = 410/F/C/X/T'. The 'Traffic' table is visible at the bottom, showing data for various aircraft types. A red arrow points from the 'Run' button to the 'Traffic' table, indicating the next step in the process.

Structure

Job Name: PCR Comparisons 2 PCR Run

Structure Name: Airport B RWY 10R-28L Include in Summary Report Add To Batch

Pavement Layers

Pavement Type: New Flexible

Material	Thickness (mm)	E (MPa)	CBR
P-401/P-403 HMA Surface	127	1,378.95	
P-401/P-403 HMA Stabilized	150	2,757.90	
P-209 Crushed Aggregate	305	266.01	
Subgrade		72.41	7

Select As The Design Layer Delete Selected Layer

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

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 (mm): 582

Traffic

Stored Aircraft Mix: Airport B 10R-28L Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (mm²)
B767-300(UDA)	143,789	365	0	7,300	0	0.01	1.45	1210.88	0.922	332	531	138,286
B757-200	116,100	1,360	0	27,200	0.02	0.03	1.36	1261.74	0.912	292	467	107,174
B737-900	85,366	1,360	0	27,200	4.1	4.1	1.34	1515.22	0.936	323	517	131,218
B737-800	79,242	4,380	0	87,600	4.65	4.65	1.34	1406.53	0.936	323	517	131,218
MD-83	73,016	365	0	7,300	0.52	0.54	1.42	1344.48	0.948	317	508	126,509

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



Traffic Table

Now displays ACR values for all 4 subgrade categories.

FAARFIELD 2.1.1 (Build 12/21/2023)

Explorer: PCR Graph, Airport Master Record, Airport B RWY 10L-28R (No Growth)

Structure: CDF Graph, PCR Report, PCR Graph, Airport Master Record

Job Name: PCR Comparisons 2 | PCR | Run | Status | Gear | Structure

Traffic

Stored Aircraft Mix: Airport B 10R-28L

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	ACR/F/A	ACR/F/B	ACR/F/C	ACR/F/D
B767-300(UDA)	143,789	365	320.4	342.6	376.0	464.8
B757-200	116,100	1,360	262.3	289.4	336.5	447.6
B737-900	85,366	1,360	417.8	453.9	495.4	562.9
B737-800	79,242	4,380	377.2	410.0	447.9	507.1
MD-83	73,016	365	360.5	409.1	461.6	529.6

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 (mm): 582

Traffic

Stored Aircraft Mix: Airport B 10R-28L

Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)	Tire Contact Area (mm ²)	ACR Thick (mm) (A)	ACR Thick (mm) (B)	ACR Thick (mm) (C)	ACR Thick (mm) (D)	ACR/F/A	ACR/F/B	ACR/F/C	ACR/F/D
1210.88	0.922	332	531	138,286	376	493	592	754	320.4	342.6	376.0	464.8
1261.74	0.912	292	467	107,174	338	450	566	742	262.3	289.4	336.5	447.6
1515.22	0.936	323	517	131,218	439	559	668	815	417.8	453.9	495.4	562.9
1406.53	0.936	323	517	131,218	419	536	638	785	377.2	410.0	447.9	507.1
1344.48	0.948	317	508	126,509	409	536	648	798	360.5	409.1	461.6	529.6

Design Options:

- Calculate HMA CDF: No
- Reduced Cross Section: No
- Automatic flexible base design: Yes
- Slab Stress Displayed: No
- Output file: No
- Units: Metric
- Allow Flexible Computation for Thick Overlays on PCC: Yes
- Compute ACR for All Subgrade Categories: Yes

Set as Program Default | Reset Default to Initial

Show/Hide Pavement Image

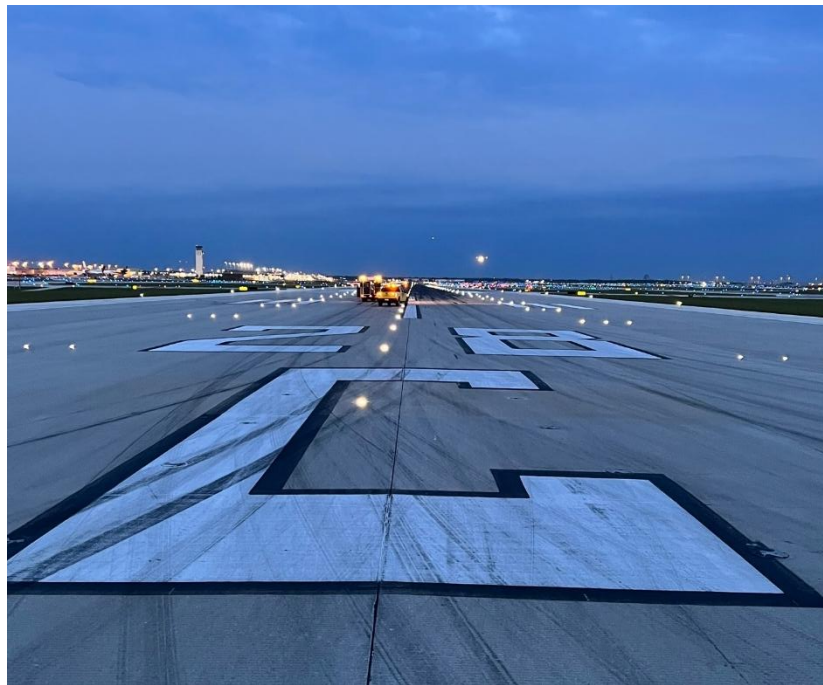
Change Pavement Graphics

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

Change Aircraft Directory



Federal Aviation Administration



Rigid Pavement PCR Example



Federal Aviation
Administration

FAARFIELD 2.1 PCR Example

- Airport E
 - Large-hub airport in the U.S.
 - Runway 10C-28C is a rigid runway constructed in 2013.
- Design Section:
 - 18 in. (457 mm) PCC surface (P-501)
 - 6 in. (152 mm) HMA base (P-403)
 - 6 in. (152 mm) asphalt-treated permeable base (ATPB)
 - 12 in. (305 mm) stabilized subgrade over natural subgrade
- For design purposes, ATPB is assumed equivalent to standard granular base course P-209.
- Subgrade stabilization provides estimated $k = 150$ pci at top of subgrade.
- Airport reported PCN 96/R/C/W/T using COMFAA 3.0 (Old ACN/PCN system).



04L/22R	04R/22L	09C/27C	09L/27R	09R/27L	10C/28C	10L/28R	10R/28L	10X	H1
---------	---------	---------	---------	---------	---------	---------	---------	-----	----

Runway Data

Runway Identification10C/28CFAR 77 CategoryPIR/PIR

Length10,800Displaced Threshold/

Width200Controlling Obstruction/

Surface Type-ConditionCONC-EObstruction Marked/Lighted/

Surface TreatmentCRVDHeight Above Runway End/

Gross Weight (In Thousands)Distance From Runway End/

Single Wheel (S)75.0Centerline Offset & Direction/

Dual Wheel (D)135.0Obstruction Clearance Slope50/50

2 Dual Wheels in Tandem (2D)375.0Close-In ObstructionN/N

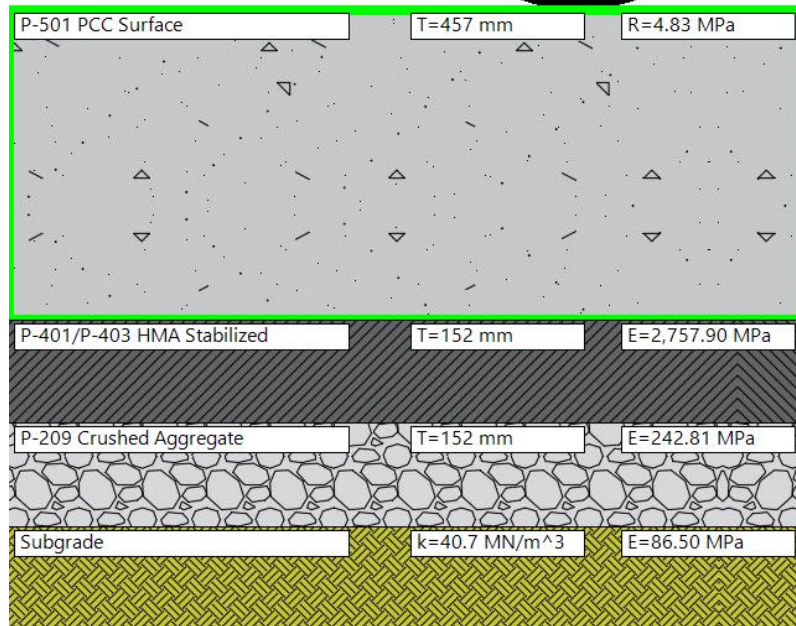
2 Dual Wheels in Tandem/ 2 Dual Wheels in Double Tandem (2D/2D2)902.0

Pavement Classification Number (PCN)96/R/C/W/T



FAARFIELD 2.1 PCR - Data

Airport E - Runway 10C-28C



Stored Aircraft Mix	Airport A		Save Aircraft Mix to File	
Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures
A330-200 WV020	212,735	81	0	1,620
A340-300 std	272,155	840	0	16,800
A340-300 std Belly	272,155	840	0	16,800
A380-800 WV000	405,511	424	0	8,480
A380-800 WV000 Belly	405,511	424	0	8,480
B747-400	395,986	2,722	0	54,440
B747-400 Belly	395,986	2,722	0	54,440
B767-300 ER/Freighter	185,519	3,454	0	69,080
B777-300	327,493	3,372	0	67,440
A300-600 Std Bogie	170,097	1,019	0	20,380
DC/MD-10-10/10F	207,746	71	0	1,420
MD-11	281,681	606	0	12,120
MD-11 Belly	281,681	606	0	12,120
B757-200	113,398	291	0	5,820
A320-200 std	68,039	24,656	0	493,120
B737-800	78,471	26,655	0	533,100
B727-200 Advanced Basic	78,018	1,346	0	26,920
D-50	20,412	28,229	0	564,580
S-30	10,206	3,808	0	76,160



One-Step PCR Procedure

- For PCR following design, the evaluation structure and traffic mix are already entered in FAARFIELD.
- No equivalent thickness calculation needed.
- In PCR mode, FAARFIELD automatically switches to standard CG and tire pressure conditions for ACR evaluation.
- FAARFIELD automatically determines the subgrade category from subgrade data.
- FAARFIELD automatically determines the critical aircraft from the traffic list.



FAARFIELD 2.1 PCR Example

One-Step Procedure

Select "PCR," then click "Run"

Structure

Job Name: PCR Comparisons 2 PCR Run Status Gear Structure

Structure Name: Airport E RWY 10C-28C ☒ Include in Summary Report ☐ Add To Batch

Pavement Layers

Pavement Type: New Rigid

Material	Thickness (mm)	E (MPa)
P-501 PCC Surface	457	27.5
P-401/P-403 HMA Stabilized	152	2.75
P-209 Crushed Aggregate	152	242
Subgrade		86.5

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

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 (mm): 762

Traffic

Stored Aircraft Mix: Airport A Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)
A330-200 WV020	212,735	81	0	1,620	0	0	3.91	1448.33	0.948	374	598
A340-300 std	272,155	840	0	16,800	0	0	1.9	1401.06	0.7935	385	616
A340-300 std Belly	272,155	840	0	16,800	0	0	3.08	1074.60	0.1522	385	616
A380-800 WV000	405,511	424	0	8,480	0	0	4.5	1084.53	0.3805	316	506
A380-800 WV000 Belly	405,511	424	0	8,480	0	0	5	1084.53	0.57	316	506



FAARFIELD 2.1 PCR Example

$$\text{PCR} = 1140/R/C/W/T$$

The screenshot displays the FAARFIELD 2.1.1 software interface. The main window shows the 'Structure' tab with a 'PCR Comparisons 2' job. The 'Structure Name' is 'Airport E RWY 10C-28C'. The 'Pavement Layers' section shows a 'New Rigid' pavement type with the following layers:

Material	Thickness (mm)	E (MPa)	k (MN/m ³)	R (MPa)
P-501 PCC Surface	457	27,579.04		4.93
P-401/P-403 HMA Stabilized	152	2,757.90		
P-209 Crushed Aggregate	152	242.86		
Subgrade		86.50	40.7	

The 'Status' tab is selected, showing the PCR calculation results for 'Airport E RWY 10C-28C Completed'. The 'Run Time' is 331 seconds, and the 'PCR' value is 1140/R/C/W/T.

A callout box points to the 'PCR' value in the 'Status' tab, stating: **PCR displays here: PCR 1140/R/C/W/T**

A note box states: **Note – FAARFIELD automatically loads the correct tire pressure and %GW on main gear for PCR calculations. These may be different than thickness design values.**

A table of aircraft data is shown, with a callout box pointing to the 'Tire Pressure' and 'Percent GW on Gear' columns. The table lists the following data:

Tire Pressure (kPa)	Percent GW on Gear
1448.33	0.948
1401.06	0.794
1074.60	0.152
1084.53	0.38
1084.53	0.57

PCR Reports and Graphs

FAARFIELD 2.1.1 (Build 12/21/2023)

File Edit View Options Help

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

Explorer

- Airport B RWY 10R-28L
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- Airport C RWY 01-19
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
- Airport E RWY 9-37
 - PCR Report
 - PCR Graph
 - Airport Master Record
 - Airport E RWY 10C-28C**
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport Master Record
 - Airport G RWY 16L-34R
 - Structure Report

Structure CDF Graph PCR Report PCR Graph Airport Master Record

Structure

Job Name: PCR Comparisons 2 PCR Run

Status: Gear Structure

Structure Name: Airport E RWY 10C-28C Include in Summary Report Add To Batch

PCR Calculation of Airport E RWY 10C-28C Completed
Run Time: 331 seconds
PCR = 1140/R/C/W/T

Pavement Layers

Pavement Type: New Rigid

Material	Thickness (mm)	E (MPa)	k (MN/m ³)	R (MPa)
P-501 PCC Surface	457	27,579.04		4.83
P-401/P-403 HMA Stabilized	152	2,757.90		
P-209 Crushed Aggregate	152	242.86		
Subgrade		86.50	40.7	

Select As The Design Layer Delete Selected Layer

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

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 (mm): 762

Traffic

Stored Aircraft Mix: Airport E Save Aircraft Mix to File Clear All Aircraft from List Remove Selected Aircraft from Structure Delete Aircraft Mix File

Airplane Name	Gross Taxi Weight (kg)	Annual Departures	Annual Growth (%)	Total Departures	CDF Contributions	CDF Max for Airplane	P/C Ratio	Tire Pressure (kPa)	Percent GW on Gear	Tire Contact Width (mm)	Tire Contact Length (mm)
A330-200 WV020	212,735	81	0	1,620	0	0	1.98	1448.33	0.948	369	590
A340-300 std	272,155	840	0	16,800	0	0	1.88	1401.06	0.794	401	642
A340-300 std Belly	272,155	840	0	16,800	0	0	3.06	1074.60	0.152	222	356
A380-800 WV000	405,511	424	0	8,480	0	0	3.83	1084.53	0.38	372	596
A380-800 WV000 Belly	405,511	424	0	8,480	0	0	4.25	1084.53	0.57	372	596

Design Options

Calculate HMA CDF: No

Reduced Cross Section: No

Automatic flexible base design: Yes

Slab Stress Displayed: No

Output file: No

Units: Metric

Allow Flexible Computation for Thick Overlays on PCC: Yes

Compute ACR for All Subgrade Categories: Yes

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



PCR Report

Summary Data

Results Table 1

Federal Aviation Administration FAARFIELD 2.1 PCR Report	
FAARFIELD 2.1.1 (Build 12/21/2023)	
Job Name: PCR Comparisons 2	
Structure: Airport E RWY 10C-28C	
This file name = PCR Results for New Rigid 2024-02-01 11:08:01	
Evaluation pavement type is rigid and design program is FAARFIELD.	
Structure name: Airport E RWY 10C-28C in job file: PCR Comparisons 2.JOB.xml	
Units = Metric	
Pavement Type = Rigid	
Subgrade Modulus = 86.50MPa (Subgrade Category is C)	
Evaluation Pavement Thickness = 762 mm	
Pavement Traffic Cycle (PtoTC) Ratio = 1.00	
Maximum number of wheels per gear = 6	
CDF = 0.640	

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight	Tire Pressure (MPa)	Annual Departure	20 Years Coverage
1	A330-200 WV020	212,735	94.80	1,448.33	81	818
2	A340-300 std	272,155	79.40	1,401.06	840	8,923
3	A340-300 std Belly	272,155	15.20	1,074.60	840	5,499
4	A380-800 WV000	405,511	38.00	1,084.53	424	2,217
5	A380-800 WV000 Belly	405,511	57.00	1,084.53	424	1,997
6	B747-400	395,986	46.60	1,372.66	2,722	15,562
7	B747-400 Belly	395,986	46.60	1,372.66	2,722	15,530
8	B767-300 ER/Freighter	185,519	92.40	1,365.60	3,454	18,689
9	B777-300	327,493	94.80	1,616.73	3,372	16,303
10	A300-600 Std Bogle	170,097	95.00	1,320.57	1,019	6,037
11	DC MD-10-10/10F	207,746	93.40	1,344.48	71	370
12	MD-11	281,681	77.60	1,393.40	606	3,293
13	MD-11 Belly	281,681	17.00	1,217.53	606	4,027
14	B757-200	113,398	91.20	1,232.17	291	1,456
15	A320-200 std	68,039	93.80	1,269.56	24,656	132,578
16	B737-800	78,471	93.60	1,392.84	26,655	149,876
17	B727-200 Advanced Basic	78,018	96.00	947.69	1,346	9,245
18	D-50	20,412	95.00	496.42	28,229	151,240
19	S-30	10,206	95.00	387.83	3,808	12,031

Results Table 2. PCR Value

No.	Aircraft Name	Critical aircraft Total equiv. departures	Max allowable Gross Weight of critical aircraft (kg)	ACR Thick at max. PGW (mm)	PCR/R/C
1	B777-300	3,398	333,825	511	1138.6

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

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight on Main Gear	Tire Pressure (MPa)	ACR Thick (mm) (C)	ACR/R/C
1	A330-200 WV020	212,735	94.8	1,448.33	399	693.7
2	A340-300 std	272,155	94.60001	1,401.06	417	759.9
3	A380-800 WV000	405,511	95	1,084.53	345	523.2
4	B747-400	395,986	93.2	1,372.66	417	761.7
5	B767-300 ER/Freighter	185,519	92.4	1,365.60	394	682.9
6	B777-300	327,493	94.8	1,616.73	503	1104
7	A300-600 Std Bogle	170,097	95	1,320.57	396	690.1
8	DC MD-10-10/10F	207,746	93.4	1,344.48	404	712.9
9	MD-11	281,681	94.60001	1,393.40	442	852.4
10	B757-200	113,398	91.2	1,232.17	302	405.2
11	A320-200 std	68,039	93.8	1,269.56	315	434.3
12	B737-800	78,471	93.6	1,392.84	348	532.3
13	B727-200 Advanced Basic	78,018	96	947.69	340	508
14	D-50	20,412	95	496.42	150	101.9
15	S-30	10,206	95	387.83	109	55.2

Results Table 2

Results Table 3



Review – PCR Report

- Results Table 1 – Input Traffic Data.
- Results Table 2 displays PCR data for the critical (reference) aircraft only.
 - PCR is defined as the ACR of the critical aircraft at the maximum allowable gross weight (MAGW).
 - Can report PCR to the nearest whole multiple of 10.
- Results Table 3 – ACR Data



Results Tables 1 and 2

FAARFIELD 2.1.1 (Build 12/21/2023)

New Job Open Job New Structure 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 Structure CDF Graph **PCR Report** PCR Graph Airport Master Record

Save As PDF

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight	Tire Pressure (MPa)	Annual Departure	20 Years Coverage
1	A330-200 WV020	212,735	94.80	1,448.33	81	818
2	A340-300 std	272,155	79.40	1,401.06	840	8,923
3	A340-300 std Belly	272,155	15.20	1,074.60	840	5,499
4	A380-800 WV000	405,511	38.00	1,084.53	424	2,217
5	A380-800 WV000 Belly	405,511	57.00	1,084.53	424	1,997
6	B747-400	395,986	46.60	1,372.66	2,722	15,562
7	B747-400 Belly	395,986	46.60	1,372.66	2,722	15,530
8	B767-300 ER/Freighter	185,519	92.40	1,365.60	3,454	18,689
9	B777-300	327,493	94.80	1,616.73	3,372	16,303
10	A300-600 Std Bogie	170,097	95.00	1,320.57	1,019	6,037
11	DC/MD-10-10/10F	207,746	93.40	1,344.48	71	370
12	MD-11	281,681	77.60	1,393.40	606	3,293
13	MD-11 Belly	281,681	17.00	1,217.53	606	4,027
14	B757-200	113,398	91.20	1,232.17	291	1,456
15	A320-200 std	68,039	93.80	1,269.56	24,656	132,578
16	B737-800	78,471	93.60	1,392.84	26,655	149,876
17	B727-200 Advanced Basic	78,018	96.00	947.69	1,346	9,245
18	D-50	20,412	95.00	496.42	28,229	151,240
19	S-30	10,206	95.00	387.83	3,808	12,031

Critical Aircraft

Results Table 2. PCR Value

No.	Aircraft Name	Critical aircraft Total equiv. departures	Max allowable Gross Weight of critical aircraft (kg)	ACR Thick at max. MGW (mm)	PCR/R/C
1	B777-300	3,398	333,825	511	1138.6

Explorer Aircraft Material



Results Table 3

FAARFIELD 2.1.1 (Build 12/21/2023)

New Job Open Job New Structure 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

- Airport Master Record
 - Airport E RWY 10C-28C
 - Structure Report
 - CDF Graph
 - PCR Report**
 - PCR Graph
 - Airport G RWY 16L-34R
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph
 - Airport I RWY 17L-35R
 - Structure Report
 - CDF Graph
 - PCR Report
 - PCR Graph

Structure CDF Graph **PCR Report** PCR Graph Airport Master Record

Save As PDF

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

No.	Aircraft Name	Gross Weight (kg)	Percent Gross Weight on Main Gear	Tire Pressure (MPa)	ACR Thick (mm) (C)	ACR/R/C
1	A330-200 WV020	212,735	94.8	1,448.33	399	693.7
2	A340-300 std	272,155	94.60001	1,401.06	417	759.9
3	A380-800 WV000	405,511	95	1,084.53	345	523.2
4	B747-400	395,986	93.2	1,372.66	417	761.7
5	B767-300 ER/Freighter	185,519	92.4	1,365.60	394	682.9
6	B777-300	327,493	94.8	1,616.73	503	1104
7	A300-600 Std Bogie	170,097	95	1,320.57	396	690.1
8	DC/MD-10-10/10F	207,746	93.4	1,344.48	404	712.9
9	MD-11	281,681	94.60001	1,393.40	442	852.4
10	B757-200	113,398	91.2	1,232.17	302	405.2
11	A320-200 std	68,039	93.8	1,269.56	315	434.3
12	B737-800	78,471	93.6	1,392.84	348	532.3
13	B727-200 Advanced Basic	78,018	96	947.69	340	508
14	D-50	20,412	95	496.42	150	101.9
15	S-30	10,206	95	387.83	109	55.2

Explorer Aircraft Material

Notes User Information Design Options

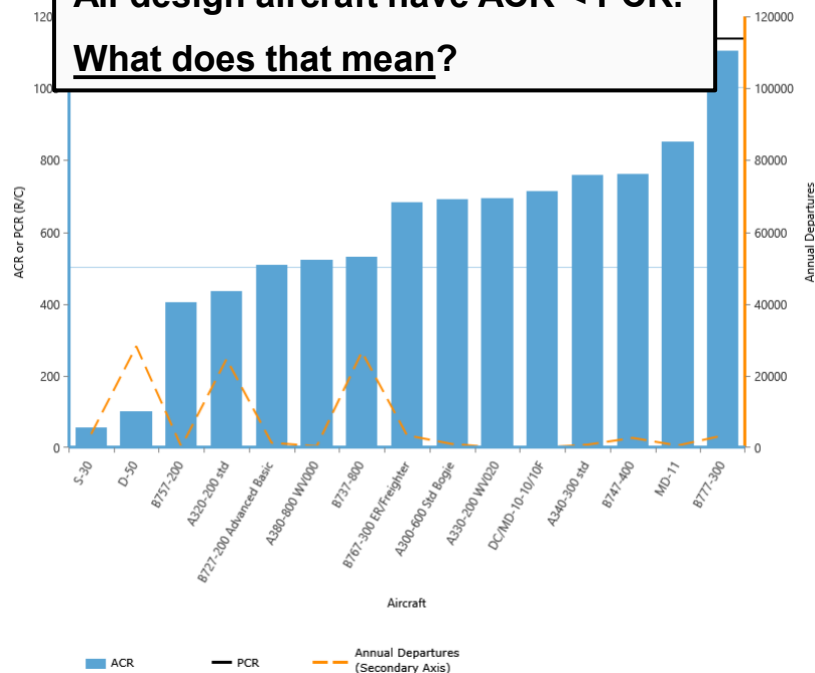


PCR Graph for Example

Critical aircraft: B777-300

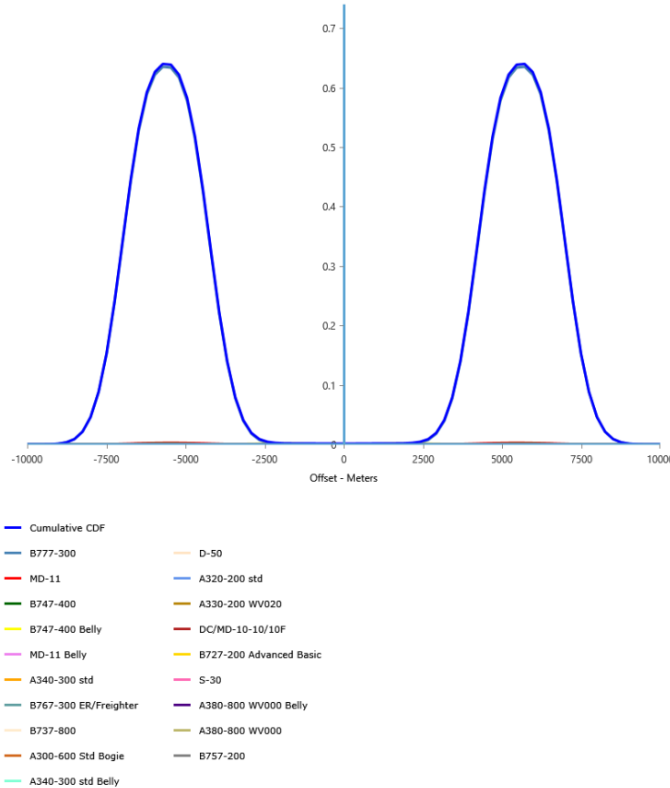
No	Aircraft Name	Aircraft ACR	Calculated PCR	Annual Departure
1	B777-300	1104	1138.6	3,372
2	MD-11	852.4	-	606
3	B747-400	761.7	-	2,722
4	A340-300 std	759.9	-	840
5	DC/MD-10-10/10F	712.9	-	71
6	A330-200 WV020	693.7	-	81
7	A300-600 Std Bogie	690.1	-	1,019
8	B767-300 ER/Freighter	682.9	-	3,454
9	B737-800	532.3	-	26,655
10	A380-800 WV000	523.2	-	424
11	B727-200 Advanced Basic	508	-	1,346
12	A320-200 std	434.3	-	24,656
13	B757-200	405.2	-	291
14	D-50	101.9	-	28,229

**All design aircraft have ACR < PCR.
What does that mean?**



**Federal Aviation
Administration**

CDF Graph



- CDF for this example < 1
 - Excess strength.
 - Consistent with no restrictions on using aircraft.
 - Maximum CDF is dominated by critical aircraft in this case.
- Maximum CDF for PCR is usually less than CDF for design.
 - Due to different gear characteristics used for PCR computation
 - For design, we assume 95% of gross weight on the main gear (conservative).
 - PCR assumes maximum ramp mass and actual corresponding aft c.g.

