Rigid Pavement Design

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RIGID PAVEMENT DESIGN

AC 150/5320-6E, Airport Pavement Design and Evaluation

Rigid Pavement Design
Typical Rigid Pavement

Portland Cement Concrete (PCC) *

Subbase Course **

Subgrade

* FAARFIELD only designs the PCC layer

** Stabilization required when airplanes exceeding 100,000 lbs are in the traffic mix
## FAA Specifications

<table>
<thead>
<tr>
<th>Surface</th>
<th>Subbase</th>
<th>Subgrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-501</td>
<td>P-154</td>
<td>P-152</td>
</tr>
<tr>
<td>P-208</td>
<td>P-155*</td>
<td>P-157*</td>
</tr>
<tr>
<td>P-209</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-211</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-301</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-304*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-306*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-401*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-403*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubblized PCC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Chemically Stabilized Materials
FAA Rigid Pavement Design

• NEW procedure
• 3-D finite element method (3D-FEM) used for direct calculation of stress at the edge of a concrete slab
• Predictor of pavement life
  – Maximum stress at pavement edge
  – Assumed failure position – bottom at slab edge
Critical Load Condition
Assumptions

Maximum stress at pavement edge
25% load transfer to adjacent slab

LOAD

Maximum Stress
Bottom of Slab

Subgrade Support
Top-Down Cracking

- Top-down cracking due to edge or corner loading not included in design
  - Maximum stress due to corner or edge loading condition
  - Risk increases with large multi-wheel gear configurations
  - These conditions may need to be addressed in future procedures

![Diagram of slab with arrows indicating maximum stress at the top](image)
Observed Cracking at NAPTF
Observed Cracking – Airbus PEP Test

- Pavement test by AIRBUS
- Corner cracking and longitudinal panel cracking
Possible Critical Load Locations Considering Slab Curling

Critical for Bottom-Up Crack

Critical for Top-Down Crack
Pavement Structural Design Life

- Default “design life” is 20 years
- Indicates pavement performance in terms of allowable load repetitions before SCI = 80
- Determined based on annual departures multiplied by 20 years (design life)
- Only evaluates fatigue of the PCC surface
- Other distresses/conditions are not considered
Rigid Pavement Failure Model

\[
\frac{DF}{F_c} = \left[ \frac{F'_sbd}{\left(1 - \frac{SCI}{100}\right)(d-b) + F'_sb} \right] \times \log C + \left[ \frac{\left(1 - \frac{SCI}{100}\right)(ad-bc) + F'_sb}{\left(1 - \frac{SCI}{100}\right)(d-b) + F'_sb} \right]
\]

where:
- \(a = 0.5878\), \(b = 0.2523\), \(c = 0.7409\), \(d = 0.2465\),
- \(C\) = coverages
- SCI = Structural Condition Index
- \(F'_s\) = is a compensation factor that accounts for a high-stiffness (stabilized) base.
- \(F_c\) = calibration factor = 1.13

**Note:** Equation is linear in log \((C)\) for any value of \(F'_s\)
This is a departure from LEDFAA rigid failure model.
Rigid Pavement Failure Model

• a, b, c and d are coefficients obtained by least squares regression of the design factor (DF) against the log of coverages to failure

• Based on full-scale tests
  – U.S. Army Engineer Waterways Experiment Station (WES)
  – NAPTF (FAA test facility)
Rigid Pavement Failure Model

• The constant $F'_s$ is the compensation factor for high-quality bases
• Modifies the slope of the falling leg of the SCI vs. log (C) line
• In full-scale tests, rigid pavements constructed with stabilized bases exhibited longer life post-first crack than those without such bases
• Default value is 1 (based on 8-inch P-209)
• Stabilized bases have values < 1
Rigid Pavement Failure Model

• Initial cracking occurs at the same time for aggregate and stabilized subbase
• Stabilized section performs better (longer life) after initial cracking
Rigid Pavement Failure Model

CONCRETE STRUCTURAL MODEL
FAARFIELD

Log Coverages (n)

Structural Condition Index (SCI)

- STBS
- AGBS

Design & Evaluation WORKSHOP
Rigid Pavement Failure Model

- $F_c'$ is the calibration (scaling) factor
- Not derived from analysis of full-scale data
- Based on comparison of the uncalibrated failure model with corresponding designs based on the design chart method in AC 150/5320-6D (known performance models)
- Value of 1.13 is used in FAARFIELD
Traffic Mix #4 - MEMPHIS RWY 18R

PCC Design Thickness, in.

- R805FAA / COMFAA 2.0
- LEDFAA 1.3
- FAARFIELD 1.003 (Fc=1.13)

E = 7.5 ksi  E = 15 ksi  E = 25 ksi  E = 7.5 ksi  E = 15 ksi  E = 25 ksi  E = 7.5 ksi  E = 15 ksi  E = 25 ksi

MEM RWY 18R-36L - All traffic  MEM RWY 18R-36L - no B777

R = 500 psi  R = 650 psi
Mix 3 - IAD RWY 1L (B727 design aircraft)

FAARFIELD vs. Westergaard
FAARFIELD vs. Westergaard

Westergaard Procedure

- 18.25” PCC
- 8” Stabilized Base

FAARFIELD Procedure

- 17.38” PCC (17.61 with P-401 base)
- 8” P-306 Base

SUBGRADE $k = 160$
FAARFIELD vs. Westergaard

Westergaard Procedure

- 18.25 " PCC
- 8" Stabilized Base
- SUBGRADE  k = 160

FAARFIELD Procedure

- 16.52 " PCC
- SUBGRADE  k = 323

DON’T USE EFFECTIVE K-VALUE IN FAARFIELD
Required Input Variables

• Subgrade support conditions
  – k-value or modulus (E)

• Material properties of each layer
  – Modulus for all layers (flexural strength for PCC)
  – Thickness for all layers except PCC surface
  – Poisson’s Ratio – fixed in FAARFIELD (0.15)

• Traffic
  – Frequency of load application
  – Airplane characteristics

• Design life
Subgrade Characteristics

- Subgrade assumed to have infinite thickness
- FAARFIELD accepts Resilient Modulus ($E_{SG}$) or k-value (only necessary to enter one value)
  - Converts k-value to modulus

$$E_{SG} = 26k^{1.284}$$

$E_{SG}$ = Resilient modulus of subgrade, psi
$k$ = Foundation modulus of the subgrade, psi/in

AASHTO T 222, Nonrepetitive Static Plate Load Test of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements
Subgrade Characteristics

k-value can be estimated from CBR

\[ k = \left[ \frac{1500 \times CBR}{26} \right]^{0.7788} \]

\( k = \) Foundation modulus of the subgrade, psi/in

FAARFIELD Allowable Range

\( k = 17.2 \) to 361.1 psi/in
Subbase Layer Characteristics

- Minimum material requirements
  - P-154, P-208, P-209, P-211, P-301, P-304, P-306, P-401, P-403, and rubblized PCC
- Up to three base/subbase layers allowed in FAARFIELD (minimum of one required)
Subbase Layer Characteristics

- 4-inch minimum thickness
- Stabilization required with airplanes exceeding 100,000 lbs
- Aggregate materials - modulus depends on thickness
  - Modulus calculated by FAARFIELD based on thickness
PCC Layer Characteristics

• Minimum material requirements
  – P-501

• Flexural strength as design variable
  – FAARFIELD will allow 500 to 800 psi
  – FAA recommends 600 to 700 psi for design
  – ASTM C 78, Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
    – Modulus fixed at 4,000,000 psi

• 6-inch minimum thickness requirement

• Thickness rounded to the nearest 0.5 inch
Design Flexural Strength

- Design strength can be 5% greater than P-501 28-day strength
- For P-501 flexural strength of 650 psi, design for flexural strength of 680 psi
- For existing PCC layer:

\[ M_r = 43.5 \times \frac{E_{pcc}}{10^6} - 488.5 \]

where,

- \( E_{pcc} \) = back-calculated PCC modulus, psi
- \( M_r \) = PCC modulus of rupture (flexural strength), psi
Design Flexural Strength
Factors to Consider

• Capability of industry in a particular area to produce desired strength
• Flexural strength vs. cement content data from prior projects at the airport
• Need to avoid high cement contents, which can affect concrete durability
• Whether early opening requirements necessitate using a lower strength than 28 days
• ASR concerns
Traffic Input

- Airplane characteristics
  - 198 airplane models currently available in FAARFIELD
  - Wheel load – determined automatically based on gross weight
  - Wheel locations – Internal to FAARFIELD aircraft library
  - Tire pressure – Internal to FAARFIELD aircraft library

- Frequency of load application
  - Entered as annual departures
    - Arrival traffic ignored
    - User determines percent of total airport volume
FAARFIELD Gear Alignment on Slab Edge

- FAARFIELD places the gear perpendicular or parallel to the edge of a slab
- FAARFIELD makes this determination
- 3-D Finite Element Model
Key Advantages of 3-D Model

• Correctly models rigid pavement features - slab edges and joints
• Provides the complete stress and displacement fields for the analyzed domain
• Handles complex load configurations easily
• No inherent limitation on number of structural layers or material types
• Not limited to linear elastic analysis
Disadvantages of 3D-FEM

- May require long computation times
- Pre-processing and post-processing requirements
- Solutions are mesh-dependent
  - In theory, the solution can always be improved by refining the 3D mesh
  - Improvement comes at the expense of time
3D-FEM Solution

Stress $\sigma_{xx}$

Deflection

Stress $\sigma_{yy}$
What is 3D Finite Element?

• 3D Finite Element is:
  – A method of structural analysis
  – Applicable to a wide range of physical structures, boundary and loading conditions

• 3D Finite Element is not:
  – A design method or procedure
  – An exact mathematical solution
  – Always preferable to other analysis models
In finite element analysis, it is important to distinguish:

- The physical structure
- The idealized model
- The discretized (approximate) model
Discretized Model of Rigid Airport Pavement

SLAB

SUBBASE

SUBGRADE

(Infinite Elements)
Discretized Model of Rigid Airport Pavement
Types of 3D Elements

Linear (8-Node) Brick

Quadratic (20-Node) Brick

Nonconforming (Incompatible Modes)

Axial (1-D)

Focal Point

Infinite Element

Equal to 6-8 layers of ordinary 8-node element
8-Node Incompatible Solid Element

Horizontal Mesh Size
- 6” X 6” mesh size selected for FAARFIELD
  - 96-99% accuracy
  - 3 – 6 times faster solution than 4X4 (multiple wheel gear analysis)
  - 20 – 55 times faster solution the 2X2 (multiple wheel gear analysis)

Vertical Mesh Size
- Single element selected for FAARFIELD (slab thickness)
  - Produced similar results when compared to 6 element (3”) mesh
Effect of Mesh Size on Run Time

Using Windows XP, Pentium-4, 512MB
Discretized Model – Slab Size (30 x 30 feet)

Stress Comparison for Different Pavement Structures and Slab Sizes Under B727 Load

Pavement Structure:
- 14 in. PCC Slab;
- 6 in. Stabilized Subbase;
- 6 in. Granular Subbase;
- Subgrade Strength:
  - Very Low (E = 4,500 psi);
  - Low (E = 7,500 psi);
  - Medium (E = 15,000 psi);
  - High (E = 25,000 psi);
Load: Boeing B727-200

SLAB Size for model
To provide a more realistic model of the edge-loaded slab response, all pavement layers below the slab are extended some distance “d”

d = 24 inches
Discretized Model – Subbase Extension Deflection along the Slab Edge

Low Strength subgrade

High Strength subgrade
Discretized Model – Subbase Extension Stress at the Slab Bottom

Low Strength subgrade

High Strength subgrade
Discretized Model – Subbase Extension

- The width “d” of the extended step foundation used in FAARFIELD is 24 inches
- The stress difference using 24 inches or longer is negligible

<table>
<thead>
<tr>
<th>Responses</th>
<th>Step width, d</th>
<th>Diff. in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d = 24 inches</td>
<td>d = 108 inches</td>
</tr>
<tr>
<td>Critical Stress at the Bottom, $l_S = 58.3$ inches (psi)</td>
<td>736.2</td>
<td>741.8</td>
</tr>
<tr>
<td>Critical Stress at the Bottom, $l_S = 23.6$ inches (psi)</td>
<td>415.6</td>
<td>417.0</td>
</tr>
<tr>
<td>Maximum Deflection, $l_S = 58.3$ inches (inches)</td>
<td>94.8</td>
<td>91.8</td>
</tr>
<tr>
<td>Maximum Deflection, $l_S = 23.6$ inches (inches)</td>
<td>15.6</td>
<td>15.3</td>
</tr>
</tbody>
</table>
Handling Mixed Aircraft Traffic in FAARFIELD

- FAARFIELD groups airplanes into 4 categories:
  - Single wheel, dual wheel (e.g., B-737)
  - Dual tandem (e.g., B-767, B-747)
  - Triple dual tandem (e.g., B-777)
  - Complex gear configuration (C-5, C-17A)

- All airplanes in a category are analyzed with one call to calculation subroutine (NIKE3D), using the same mesh

- Results in significant savings in computation time
3D FEM Mesh Optimization

Single/Dual: S or D

Dual-Tandem: 2D

Triple Dual Tandem: 3D
Improvement in Solution Time

- Approximate time for B-777 stress solution:
  - July 2000: 4 - 5 hours
  - July 2001: 30 minutes (single slab with infinite element foundation)
  - May 2002: 2 - 3 minutes (implement new incompatible modes elements)
  - Current version implemented in FAARFIELD: 10 seconds or less
FAARFIELD Rigid Pavement Design

Accompanies Draft AC 150/5320-6E

AIRPORT PAVEMENT Design & Evaluation WORKSHOP
Click on “New Job”
Creating / Naming a Job File

Enter Job Title

Click OK
Copy Basic Section / Pavement Type from Samples

Click on “Samples”
Copy Basic Section / Pavement Type from Samples

Default Basic Pavement Sections

Click on “Copy Section”
## 7 Basic Starting Structures in FAAFIELD

<table>
<thead>
<tr>
<th>Section Name</th>
<th>Pavement Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAggregate</td>
<td>New flexible on Aggregate base</td>
</tr>
<tr>
<td>AConFlex</td>
<td>Asphalt overlay on Flexible pavement</td>
</tr>
<tr>
<td>AConRigid</td>
<td>Asphalt overlay on Rigid pavement</td>
</tr>
<tr>
<td>NewFlexible</td>
<td>New Flexible on stabilized base</td>
</tr>
<tr>
<td>NewRigid</td>
<td>New Rigid on stabilized base</td>
</tr>
<tr>
<td>PCConFlex</td>
<td>PCC overlay on flexible</td>
</tr>
<tr>
<td>PCConRigid</td>
<td>Unbonded PCC on rigid</td>
</tr>
</tbody>
</table>

Be sure to select the pavement type that most correctly represents your pavement needs.
Copy a Typical Section

Click on desired pavement section

Then click on the project where the section will be saved
Create a New Job Title

Enter Section Title

Click OK
Create a New Job Title

Click “End Copy”
Select the job and then select the section you want to analyze.

Click on “Structure” To open the file.
Working with a Pavement Section

The selected sample pavement will appear.

‘R’ represents PCC flexural strength.

The structure may be modified if desired.
Modifying a Pavement Section

Click on the box around the layer material you want to modify.
Modifying a Pavement Section

Select the layer type you want to include in your pavement section

No modification required for this example

Click OK
Limitations for Pavement Layers

- The layer types in FAARFIELD are limited.
- Placement of layers may also be limited.
- The “Undefined” and “Variable” stabilized layers allow some customization of layers.
Limitations for Pavement Layers

- The “Overlay Partially Bonded” option is not available.
- This feature can be activated in the “options” window but is no longer a valid FAA design standard.
Undefined and Variable Pavement Layers

• “Undefined” layer
  – 1,000 to 4,000,000 psi
• “Variable” (rigid) stabilized layer
  – 250,000 to 700,000
• “Variable” (flexible) stabilized layer
  – 150,000 to 400,000 psi
• “P-401 Asphalt” stabilized layer
  – Fixed modulus of 400,000 psi
Modifying a Pavement Section

Click on a property to modify any of the layer properties.

Confirm the subgrade k-value for this example.
Modifying a Pavement Section

Enter the new value for the material property
** some materials will have limits on property values

use 141.4 for this example

Click OK
Modifying a Pavement Section

Note: PCC strength range 500 – 800 psi

Enter the desired flexural strength

Click “OK”
If you try to change the modulus value for an aggregate layer, the program notifies you that these layers are set automatically.
Modifying a Pavement Section

New values appear in the structure window

Click End Modify
Enter Traffic Mix

Click on “Aircraft” to enter traffic mix.
Enter Traffic Mix

You may want to clear any existing aircraft.
Enter Traffic Mix

Click on the aircraft group desired.

Then select the desired aircraft and click “Add”

Repeat for complete traffic mixture
## Traffic Mix for Example

<table>
<thead>
<tr>
<th>Aircraft Name</th>
<th>Gross Taxi Weight, lb</th>
<th>Annual Departures</th>
<th>Annual Growth, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv. B727-200 Option</td>
<td>210,000</td>
<td>1200</td>
<td>0.0</td>
</tr>
<tr>
<td>B747-400</td>
<td>877,000</td>
<td>800</td>
<td>0.0</td>
</tr>
<tr>
<td>B777-200 ER</td>
<td>657,000</td>
<td>1200</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Enter Traffic Mix

The user can modify:
- Gross Weight
- Annual Departures
- % Annual Growth

Other necessary airplane information is stored internally and cannot be modified.
Certain aircraft may appear in the list twice. This is to address the presence of wing gears and belly gears.

FAARFIELD treats these as two aircraft, although the weight and departures are interlocked.
Adjusting Aircraft Gross Weight

Click on the aircraft gross weight to change the weight.
Adjusting Aircraft Gross Weight

Enter the new weight and click OK.
Aircraft Gross Weight Limitations

- There are limitations on changes to aircraft gross weights.
- A range is provided for each aircraft, which represents reasonable weights for the aircraft.

The default value of gross load for this aircraft is 657,000 lbs.
Enter a new value in the range: 394,200 to 821,250 lbs.
Click on “Annual Departures” to change departures for an aircraft.
Adjusting Aircraft Annual Departures

Enter the annual departures of the aircraft

Click OK

Current program limit on annual departures: 0 to 100,000
Annual Departures in FAARFIELD

- Annual departures has the same meaning as the previous design procedure
- Arrivals are ignored
- For design purposes, FAARFIELD uses the total annual departures, adjusted for growth, multiplied by the total design period in years
  - 1200 annual departures X 20 years = 24,000 departures
Click on the annual growth value to bring up the pop-up box.

Enter the percent annual growth and click OK.
Adjusting Aircraft % Annual Growth

Allowable range of percent annual growth is +/- 10%

You can create the same effect by modifying the annual departures such that the total annual departures results in the desired total
### Viewing Aircraft Information

#### FAAFIELD - Create or Modify Aircraft for Section NewRigid in Job PROJECT

<table>
<thead>
<tr>
<th>Aircraft Name (3)</th>
<th>Gross Taxi Weight (lbs)</th>
<th>Annual Departures</th>
<th>% Annual Growth</th>
<th>Total Depart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv. B727-20...</td>
<td>210,000</td>
<td>1,200</td>
<td>0.00</td>
<td>24.0</td>
</tr>
<tr>
<td>B747-400</td>
<td>877,000</td>
<td>800</td>
<td>0.00</td>
<td>16.0</td>
</tr>
<tr>
<td>B777-200 ER</td>
<td>657,000</td>
<td>1,200</td>
<td>0.00</td>
<td>24.0</td>
</tr>
</tbody>
</table>

Scroll over to reveal additional columns of information.
Aircraft Information Available in FAARFIELD

User can modify

Calculated values

Airplane information stored in FAARFIELD

<table>
<thead>
<tr>
<th>Aircraft Name (3)</th>
<th>Gross Taxi Weight (lbs)</th>
<th>Annual Departures</th>
<th>% Annual Growth</th>
</tr>
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<tbody>
<tr>
<td>Adv. B727-20...</td>
<td>210,000</td>
<td>1,200</td>
<td>0.00</td>
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<tr>
<td>B747-400</td>
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<td>0.00</td>
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<tr>
<td>B777-200 ER</td>
<td>657,000</td>
<td>1,200</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Departures</th>
<th>CDF Contribution</th>
<th>CDF Max for Aircraft</th>
<th>P/C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>24,000</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>16,000</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>24,000</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tire Press. (psi)</th>
<th>Percent GW on Gear</th>
<th>Dual Spacing (in)</th>
<th>Tandem Spacing (in)</th>
<th>Tire Contact Width (in)</th>
<th>Tire Contact Length (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>173</td>
<td>47.5</td>
<td>34.00</td>
<td>0.00</td>
<td>15.15</td>
<td>24.23</td>
</tr>
<tr>
<td>200</td>
<td>95.0</td>
<td>44.00</td>
<td>58.00</td>
<td>14.39</td>
<td>23.03</td>
</tr>
<tr>
<td>205</td>
<td>47.5</td>
<td>55.00</td>
<td>57.00</td>
<td>14.21</td>
<td>22.73</td>
</tr>
</tbody>
</table>
Viewing Aircraft Information

CDF columns and P/C ratio will be zero when aircraft are first entered.

Save the list when finished entering airplanes then click the back button.
Performing the Pavement Design

The layer with the small arrow is the layer that will be adjusted to provide the structural design.

The location of the arrow is determined by the type of pavement structure.
## Layer Adjusted During Design

<table>
<thead>
<tr>
<th>Pavement Type</th>
<th>Layer Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAggregate</td>
<td>P-154 Subbase</td>
</tr>
<tr>
<td>AConFlex</td>
<td>P-401 AC Overlay</td>
</tr>
<tr>
<td>AConRigid</td>
<td>P-401 AC Overlay</td>
</tr>
<tr>
<td>NewFlexible</td>
<td>P-209 Subbase</td>
</tr>
<tr>
<td>NewRigid</td>
<td>PCC Surface</td>
</tr>
<tr>
<td>PCConFlex</td>
<td>PCC Overlay on Flexible</td>
</tr>
<tr>
<td>PCConRigid</td>
<td>PCC Overlay Unbonded</td>
</tr>
</tbody>
</table>
Click on the “Des. Life” to change number of years for the design period.

When the pop-up box appears, enter the desired number of years.

NOTE: the standard FAA design is for 20 years.
Performing the Pavement Design

You are now ready to design the structure.

Simply click on "Design Structure"

The program will keep you informed about the status of the design.
Performing the Pavement Design

Be Patient !!!

Helpful hints to pass the time:
• Take a coffee break
• Check you email
• Return phone calls
• Study the Advisory Circular
• Enjoy your weekend....
The program will adjust the design layer until a CDF of 1.0 is achieved.
Reviewing Aircraft Data After Completing the Design

CDF and P/C ratio information is now available.

This information allows you to see what aircraft have the largest impact on the pavement structure.
Saving and Reviewing the Pavement Design Data

When finished with the design, click the “Back” button and select whether you want to save the data.
To view a summary of the design, click the “Notes” button.
Reviewing Design Information

You can view the summary data or copy it to other electronic media.

Data can also be exported in XML to allow automated entry into FAA Form 5100.
Reviewing Design Information

FAARFIELD - Airport Pavement Design (V 1.102, 10/12/07)

Section NewRigid in Job PROJECT.
Working directory is C:\Program Files\FAARFIELD\.

The structure is New Rigid.
Design Life = 20 years.
A design for this section was completed on 01/25/08 at 10:02:40.

Pavement Structure Information by Layer, Top First

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Thickness in</th>
<th>Modulus psi</th>
<th>Poisson's Ratio</th>
<th>Strength R psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCC Surface</td>
<td>16.15</td>
<td>4,000,000</td>
<td>0.15</td>
<td>700</td>
</tr>
<tr>
<td>2</td>
<td>P-306 Econcrete</td>
<td>6.00</td>
<td>700,000</td>
<td>0.20</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>P-209 Cr Ag</td>
<td>6.00</td>
<td>35,432</td>
<td>0.35</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Subgrade</td>
<td>0.00</td>
<td>15,002</td>
<td>0.40</td>
<td>0</td>
</tr>
</tbody>
</table>

Total thickness to the top of the subgrade = 28.15 in

Aircraft Information

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Gross Wt. Lbs</th>
<th>Annual Departures</th>
<th>% Annual Growth</th>
<th>CDF Contribution</th>
<th>CDF Max for Aircraft</th>
<th>P/C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adv. E727-200 Option</td>
<td>210,000</td>
<td>1,200</td>
<td>0.00</td>
<td>0.84</td>
<td>0.84</td>
<td>2.97</td>
</tr>
<tr>
<td>2</td>
<td>B747-400</td>
<td>877,000</td>
<td>800</td>
<td>0.00</td>
<td>0.16</td>
<td>0.27</td>
<td>3.46</td>
</tr>
<tr>
<td>3</td>
<td>B777-200 ER</td>
<td>657,000</td>
<td>1,200</td>
<td>0.00</td>
<td>0.01</td>
<td>0.28</td>
<td>4.04</td>
</tr>
</tbody>
</table>
Interactive User’s Manual / Help File

For assistance with the program, click the Help key
Interactive User’s Manual / Help File

Search by Contents/chapters, Index, or word search

FAARFIELD is a computer program for airport pavement thickness design. It implements both layered elastic based and three-dimensional finite element-based design procedures developed by the Federal Aviation Administration (FAA) for new and overlay design of flexible and rigid pavements. The thickness design procedures implemented in the program are the FAA airport pavement thickness design standards referenced in Advisory Circular (AC) 150/5320-6E.

The core of the program is a structural response module consisting of two programs, LEAF and NIKE3D (version 3.3.2.FAA.1.0). LEAF is a layered elastic computational program implemented, in this case, as a Microsoft Windows™ dynamic link...
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