APPENDIX P

USER’S GUIDE TO THE COMPUTATIONAL MODEL TO
FIELD DATA CALIBRATION PROGRAM
Start the **Reflection Cracking Prediction System for the HMA Overlay Program**. This program included three parts which are **General Information** input, **Pavement Related** input, and **Output**. Pavement related input includes **Traffic**, **Climate**, and **Structure & Material Properties**.
In the **General Information**, five types of overlay are considered in this program. **Design Life** is the maximum days to analyze the reflection cracking. The maximum designing life is 20 years (7300 days) in the calibration. **Construction Information** is the date when the overlay construction was completed and when it was opened to traffic. Both summer (July) and winter (December) should be considered in the calibration.
Traffic Input has two types of traffic input being used in this program which are Annual Average Daily Truck Traffic (AADTT) and Annual Number of Axles (ANA) for each category. Operation Speed is the design speed limit in miles per hour.
![Traffic Load Input](image)

**Vehicle Class** | **Single Axle** | **Tandem Axle** | **Tridem Axle** | **Quad Axle**
---|---|---|---|---
4 | No. 1 | No. 3 | Single Tire | No. 5 | No. 7
5 | No. 2 | No. 4 | | No. 6 | No. 8
6 | | | | | Dual Tires
7 | | | | | No. 1
8 | | | | | No. 2
9 | | | | | No. 3
10 | | | | | No. 4
11 | | | | | No. 5
12 | | | | | No. 6
13 | | | | | No. 7

**Traffic Input Mode**
- **Annual Average Daily Truck Traffic (ADTT):**
  - Category No. 1: 22,000
  - Category No. 2: 3,400
- **Annual Number of Loads:**
  - Category No. 3: 204
  - Category No. 4: 308

**Operation Speed:** 30 mph

**Traffic Analysis Growth:** 100%

[OK] [Cancel]
Climate data included air temperature, wind speed, solar radiation, albedo, emissivity, and absorption data. The user can choose any weather station of 150 stations in this program, or can use the EICM model from MEPDG to generate the *.icm climate data, and load the generated *.icm data in this program.
**Structure & Material Properties** information include pavement thickness, mixture and binder data, and FWD data in this calibration program. There is more required information in the **Edit** for each layer. When the color of the **Edit** button turns from red to green, the input data is completed.
In the AC overlay, most of the FWD modulus, FWD testing temperature, and mixture information were collected from the LTPP data base. The FWD modulus was obtained by backcalculation. The User who is generating a new set of calibration coefficients must provide the FWD and mixture data for the AC overlay on each pavement section. Levels one, two and three input options may be used on the AC mixture properties.
For the input of **Binder Property**, three levels are considered in this program.

**Level one:** Requires all of the parameters to be provided.

**Level two:** Parameters are chosen by giving the Superpave binder performance grading. The remainder of the binder properties are the means of the properties used in the climatic zone.

**Level three:** All the parameters are decided from our database according to the mean of the properties used in the climate zone.
In the input for the **Existing AC** layer, the results of the FWD backcalculated modulus can be more than one input.
Inputs for **Base** and **Subgrade** layers require moduli and Poisson Ratios. Since the modulus varies with the temperature, **Typical Value** or **Monthly Values** are all available.
If all of the required input information is completed, the color of the button of each part should turn from a red color to a green color. Then click the **Analysis**, this program will start to analyze the reflection cracking.
When **Analysis Status** shows **Completed**, the results are ready to be viewed on the right side.
The results are shown in Excel files. The **General Results Summary** Table shows the summary information of this pavement and information of reflection crack by thermal, shearing, and bending.
The numbers of days that are produced by the calibration program as shown in the output screen above, are determined for each of a number of test sections on which field observations of the \( \rho \) and \( \beta \) values have been determined. At least ten such sections are recommended. With this done, the user may then perform a linear regression analysis relating these five numbers of days on each of the sections to the observed values of \( \rho \) and \( \beta \). If the coefficient of determination, \( R^2 \), is high enough then the resulting \( \alpha \) and \( \beta \) calibration coefficients can be inserted into the Design program which is then ready to use for the design of overlays of the same type.