F　鋪面厚度設計個人電腦程式之簡介

F.1　AASHTO 厚度設計法(1993 年版)
- (PAVEMENT ANALYSIS SOFTWARE, PAS)

F.2　PCA 厚度設計法(1990 年版) - (PCAPAV)

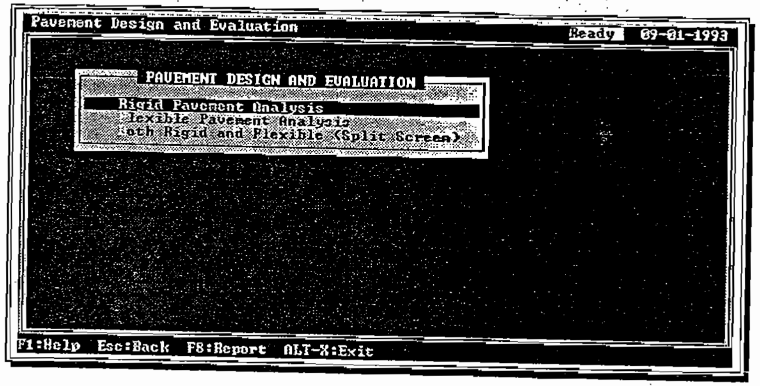
(資料來源：

1. American Concrete Pavement Association, “Pavement Analysis Software” (PAS), Arlington Heights, Illinois, U.S.A., 1993.
2. Portland Cement Association, “PCAPAV -Thickness Design of Highway and Street Pavements,” Skokie, Illinois, U.S.A., 1990.

F.1 AASHTO 厚度設計法(1993 年版) - (PAVEMENT ANALYSIS SOFTWARE, PAS)

PAVEMENT DESIGN AND EVALUATION

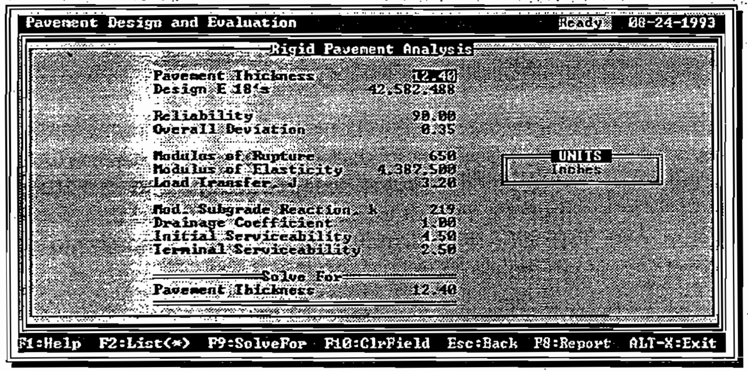
You can design new pavements or analyze old pavements with PAS's pavement design and evaluation module. Depending on your problem, you can work with both rigid and flexible pavements either separately or in a side-by-side format.



RIGID PAVEMENT DESIGN AND EVALUATION

The 'Rigid Pavement Analysis' section uses the methodology of Part II of the 1993 Guide. However, correlation equation from compressive strengths, modulus of rupture, and concrete modulus of elasticity from the American Concrete Institute are also included on the 'HELP' screens to aid the user in determining appropriate values. Similarly, 'HELP' screens and correlation equation between modulus of subgrade reaction (k), soil resilient modulus (M_r), California bearing ratio (CBR), and resistance value (R) from the Army Corps of Engineers and NCHRP Project 128 are also included.

Note: The correlation equation for CBR and R-value on the 'HELP' screens are for estimating the soil resilient modulus and should not to be used to relate each other.



Inputs for the 'Rigid Pavement Analysis' screen are pavement thickness, design E-18s, reliability, overall standard deviation, modulus of rupture, modulus of elasticity, load transfer (J), modulus of subgrade reaction (k), drainage coefficient, and initial and terminal serviceability. By using the 'F9 SolveFor' function key, you can solve for any of these variables, except modulus of elasticity, terminal serviceability, and overall deviation.

Although the AASHO Road test included concrete pavements from 2.5 to 12.5 inches, we recommend that the minimum new pavement thickness for streets be 5.0 inches and for parking lots 4.0 inches. Therefore, PAS uses 4.0 and 20.0 inches, respectively, as the minimum and maximum allowable inputs for thickness. Of course, overlays can be less than 4.0 inches.

The input variable for design E-18's does not include boundary values. The design E-18's are either the allowable or predicted traffic expressed in E-18s. For more information, see 'Traffic Conversion' in the user's guide, 'Traffic' in the 'Simplified Guide,' or Section 2.1.2 of Part II of the 1993 AASHTO Guide.

As discussed in the 'Simplified Guide,' reliability is essentially a factor of safety for a given design. reliability input ranges from 50 to 100 percent. The 'HELP' screen for reliability provides recommendations for an appropriate value depending on roadway functional classification:

FUNCTIONAL CLASSIFICATION	RECOMMENDED LEVEL OF RELIABILITY Urban	Rural
Interstate/Freeways	85 – 99.9	80 – 99.9
Principal Arterials	80 – 99	75 – 95
Collectors	80 – 95	75 – 95
Local	50 – 80	50 – 80

The overall deviation, or standard deviation, is a coefficient that describes how well the AASHO Road Test data fit the AASHTO design equations. It also is an input in the design equation and this program. AASHTO recommends using a value between 0.30 and 0.40 for rigid pavements. Typically, 0.35 is an adequate value for most rigid pavement design problems.

The modulus of rupture is the average 28-day third-point flexural strength of the concrete. AASHTO recommends you increase the minimum specified flexural strength (S_c) by a 'z' factor multiplied by the standard deviation (SD) of the flexural strength to determine the design flexural strength (S'_c).

$$S'_c(\text{design}) = S_c + z(SD)$$

The 'z' factor is a function of the percentage of tests allowed below the minimum specified value. For more information on this, see the 'Simplified Guide,' or section 2.3.4 of Part II of the 1993 Guide.

Modulus of elasticity describes the stress-strain properties of a material. Since this value can be difficult to determine for concrete, it is usually correlated to the compressive or flexural strength by the use of ACI equations. By using the 'HELP' screen, PAS will calculate the modulus of elasticity based on the flexural strength. The value PAS calculates on the help screen will be transferred to the main input screen.

The load transfer coefficient, or J-factor describes the slab interaction across a joint. A lower J-factor indicates better load transfer across the joint. Edge support and load transfer devices also increase slab

E 18's Millions	Doweled & Mesh Reinforced Edge Support No	Yes	Aggregate Interlock Edge Support No	Yes	Continuously Reinforced Edge Support No	Yes	Pavement Class
Up to 0.3	3.2	2.7	3.2	2.8			Local Streets & Roads
0.3 to 1	3.2	2.7	3.4	3.0			
1 to 3	3.2	2.2	3.6	3.1			
3 to 10	3.2	2.7	3.8	3.2	2.9	2.5	Arterials and Highways
10 to 30	3.2	2.7	4.1	3.4	3.0	2.6	
over 30	3.2	2.7	4.3	3.6	3.1	2.6	

Load Transfer, J: 3.20

interaction and decrease the J-factor. The J-factor 'HELP' screen displays J-factor recommendations depending on the pavement type and edge support. We have adopted these recommendations which were originated by the Portland Cement Association. They fall within the guideline values that AASHTO recommends.

The modulus of subgrade reaction, or k-value describes the support strength for rigid pavements. Typical values range from about 50 psi/in for soft, marshy soils to about 500 psi/in for cement-treated and lean concrete bases. The modulus of subgrade reaction 'HELP' screen provides a correlation between the resilient modulus of the subgrade and base course to the k-value for different subbase materials.

Pavement Design and Evaluation Ready 08-24-1993

RIGID SUBGRADE ANALYSIS

Material Type	Resilient Modulus (psi)	Loss of Support
Cement Treated Granular Base	1,000,000 – 2,000,000	0 – 1
Cement Aggregate Mixture	500,000 – 1,000,000	0 – 1
Asphalt Treated Base	350,000 – 1,000,000	0 – 1
Bituminous Stabilized Mixture	40,000 – 300,000	0 – 1
Lime Stabilized Base	20,000 – 70,000	1 – 3
Unbounded Granular Materials	15,000 – 45,000	1 – 3
Fine Graded or Natural Subgrade	3,000 – 40,000	2 – 3

1) Resilient Modulus of the Subgrade = 4,518
2) Resilient Modulus of the Base = 25,000 <Hit Enter for None>
3) Base Thickness (4 to 12 inches) = 4.0
4) Depth to Rigid Foundation = ∞ <Hit Enter if > 10'>
5) Loss of Support (0, 1, 2, or 3)(*) = 0
>> MODULUS OF SUBGRADE REACTION, k = 219 psi/in

F9:SolveFor to Calculate k value

UNITS psi

F1:Help F2:List(*) F9:SolveFor F10:ClrField Esc:Back F8:Report ALT-X:Exit

The drainage coefficient (C_d) is available to quantify the drainage capabilities of the pavement structure. Pavement structures with poor drainage have a low C_d while good draining pavement structures have higher C_d values. The 'HELP' screen which is found within the subgrade 'HELP' screen, recommends the following values:

Quality of Drainage	Percent of Time Pavement Structure is Exposed to Moisture Levels Approaching Saturation: Less than 1%	1 – 5 %	5 – 25 %	Greater than 25%
Excellent	1.25 – 1.20	1.20 – 1.15	1.15 – 1.10	1.10
Good	1.20 – 1.15	1.15 – 1.10	1.10 – 1.00	1.00
Fair	1.15 – 1.10	1.10 – 1.00	1.00 – 0.90	0.90
Poor	1.10 – 1.00	1.00 – 0.90	0.90 – 0.80	0.80
Very Poor	1.00 – 0.90	0.90 – 0.80	0.80 – 0.70	0.70

Note: The drainage coefficient (C_d) values are based on the poor soil conditions found at the AASHO Road Test. Therefore, we do not *recommend assigning C_d values less than 1.0, except in extremely poor soil locations.*

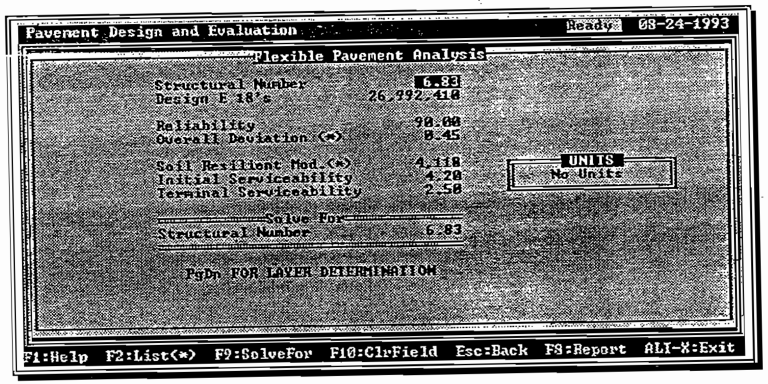
The 'Rigid Pavement Analysis' screen provides an input for initial and terminal serviceability. The serviceability scale ranges from 0 to 5 with a '5' being a perfect pavement and a '0' being a pavement that is impassable. The initial serviceability (p_i) was 4.5 for rigid pavement and 4.2 for flexible pavements at the road test. These are good starting values for a design problem if no other information is available. The terminal serviceability (p_t) is the serviceability at which a pavement is considered to require major rehabilitation. The 'HELP' screen for terminal serviceability (p_t) provides the following recommendations for selecting the terminal serviceability depending on roadway functional classification:

Typical Minimum Terminal Serviceability (pt) values for various road and street classifications.

pt	Street or Highway Classification
2.50	Interstate and Major Highways or Arterials
2.25	Prime Secondary Routes, Industrial & Commercial Streets
2.00	Secondary Routes, Residential Streets & Parking Lots

FLEXIBLE PAVEMENT DESIGN AND EVALUATION

The 'Flexible Pavement Analysis' section is based on Part II of the 1993 Guide. Correlation equations between the soil resilient modulus (M_r), and the California bearing ratio (CBR), and resistance value (R) developed by the Army Corps of Engineers and NCHRP Project 128 are found on the 'HELP' screens. The relationships for CBR and R-value are for estimating the soil resilient modulus and cannot be used to relate CBR and R-values.



Inputs for the 'Flexible Pavement Analysis' screen are structural number (SN), design E-18s, reliability, overall standard deviation, soil resilient modulus, and initial and terminal serviceability. Like the 'Rigid Pavement Analysis' screen, you can use the 'F9 SolveFor' function key on any input variable to determine its result based on the other input values.

The structural number (SN) of a flexible pavement system indicates the required total pavement section. The first input field on the 'Flexible Pavement Analysis' screen is for the SN. In most ordinary flexible pavement design problems, the user will solve for this value.

The input variable for design E-18's does not include boundary values. The design E-18's are either the allowable or predicted traffic expressed in E-18s. For more information, see 'Traffic Conversion' in the user's guide, 'Traffic' in the 'Simplified Guide,' or Section 2.1.2 of Part II of the 1993 AASHTO Guide.

Reliability in flexible pavement design is similar to reliability for rigid pavement design. The 'HELP' screen for reliability provides the same recommendations based on roadway functional classification.

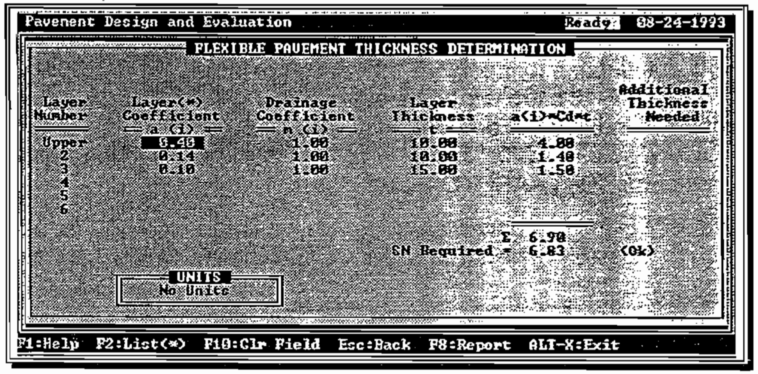
The overall deviation, or standard deviation, is a coefficient that describes how well the AASHO Road Test data fits the AASHTO design equations. It also is an input in the design equation and this program. AASHTO recommends using a value between 0.40 and 0.50 for flexible pavements. Typically, 0.45 is an adequate value for most flexible pavement design problems.

The soil resilient modulus describes the subgrade strength for flexible pavements. Typical values range from about 1000 psi for soft, marshy soils to about 40,000 psi for stable coarse grained soils. The 'HELP' screen for soil resilient modulus includes correlation equations between for soil resilient modulus and the CBR and R-value.

The 'Flexible Pavement Analysis' input screen provides an input for both initial and terminal serviceability. Remember, the serviceability scale ranges from 0 to 5 with a '5' being a perfect pavement and a '0' being a pavement that is impassable. The initial serviceability (p_i) was 4.2 for flexible pavements at the road test. This is a good starting value for a flexible pavement design problem if no other information is available. The terminal serviceability (p_t) is the serviceability at which a pavement is considered to require major rehabilitation. The 'HELP' screen for terminal serviceability (p_t) provides the same recommendations for selecting the terminal serviceability as are shown for rigid pavements.

Flexible Layer Determination

An additional step is necessary to complete a flexible pavement design. This is because the AASHTO flexible design equation only provides a structural number to characterize the pavement thickness. After determining the SN, it is necessary to determine layer thicknesses which when combined will provide the required structural number. This is accomplished by pressing the 'PgDn' key to access the 'Layer Determination' screen:



The flexible pavement 'Layer Determination' screen provides a simple spreadsheet format for trying different combinations of layers and materials. In a flexible pavement design, a coefficient is assigned to each flexible pavement layer that converts the actual layer thickness to a layer structural number. The coefficients are indicative of the relative strengths of the materials. The sum of all the layer structural numbers must equal or exceed the required structural number (SN) from the AASHTO equation.

The SN is converted to layer thickness by using the following formula:

$$SN = a_1t_1 + a_2t_2m_2 + a_3t_3m_3 + ...$$

where

a_1, a_2, a_3 = layer coefficients representative of the surface, base, subbase, etc. These are based on the ability of a material to function as a structural component of the pavement. Typical values for several materials can be found in the 'HELP' screen. For more information, see section 2.3.5 of the 1993 Guide.

t_1, t_2, t_3 = actual thickness of the surface, base, subbase, etc. in inches.

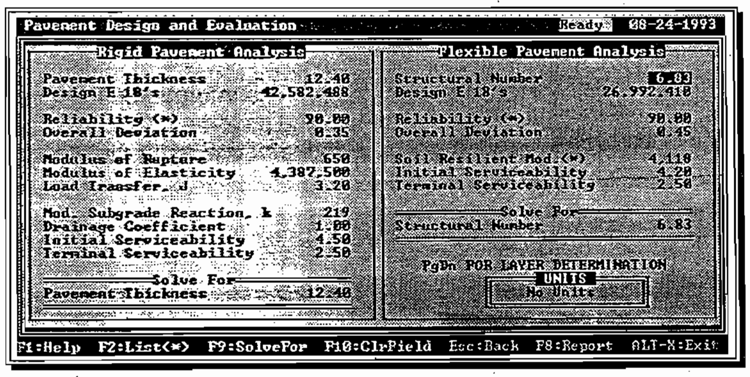
m_2, m_3 = drainage coefficients for the base, subbase, etc. Values for the drainage coefficient can be found in the 'HELP' screen. For more information, see section 2.4.2 of the 1993 Guide.

The pavement thickness is found by iterating layer thickness until the sum of the $a_i*t_i*m_i$ of each layer is equal or greater than the required SN.

The Additional Thickness Needed column on the right-hand side of the 'Layer Determination' screen provides a check to ease layer thickness design. The column displays how much additional thickness is needed to meet the total SN for the layer/material on which the cursor rests. You may use the value PAS displays to adjust your layer thicknesses and optimize your design.

BOTH RIGID AND FLEXIBLE PAVEMENT DESIGN AND EVALUATION

This split screen performs the same functions as both the Rigid Pavement Analysis' and 'Flexible Pavement Analysis' screens. However, it allows you to perform both designs in a side-by-side format, so that you can easily make direct comparisons between the two pavement types. All inputs, variables and 'HELP' screens are identical. You are still required to press the 'PgDn' key for the flexible pavement 'Layer Determination' screen.



***NOTE:** When using the split screen for design and evaluation, you must press 'F9 SolveFor' twice: once to solve for the rigid unknown and once for the flexible unknown.*

F.2 PCA 厚度設計法(1990 年版) - (PCAPAV)

Running PCAPAV

Boot your system. Insert the PCAPAV disk into drive A:, and type:

PCAPAV

(Note: Starting PCAPAV from a fixed-disk system is done by setting the default drive to C:. At the C> prompt, type PCAPAV.)

PCAPAV is loaded into memory and screen page 1 looks like:

```
 14:05:23                     PCAPAV(TM) 1.10                           Page  1
 02-06-86     Proprietary Software of PORTLAND CEMENT ASSOCIATION
                              Pavement Design
                        ppppp       ccccc       aaaaa
                        p    p     c     c     a     a
                        p    p     c                 a
                        p    p     c            aaaaa
                        ppppp      c     c     a     a
                        p          c     c     a     a
                        p           ccccc       aaaaa
                 (C) Copyright Portland Cement Association 1985
                             All Rights Reserved
     This program is to be used as a design aid by experienced qualified
     ENGINEERS.   This program is not intended for use as a final design
     or a substitute for  sound  engineering  judgement.   The purchaser
     assumes all responsibilty for the use of this program in connection
     with any project.

   Input File:  PAVEMENT.EX1                Output File:  PAVEMENT.EX1
   Project ID.  example 1
   Engineer:    Everyman, USA
   Solution Options:  Normal

  Esc-QUIT F8-Print Data F9-Save F10-compute   move cursor   PgDn-Next Page
```

Fig. 1 shows the input format that will appear on the screen. The input items (menu items) are listed in the order that input data is entered.

```
 14:07:47                     PCAPAV(TM) 1.10                            Page  2
 02-06-86      Proprietary Software of PORTLAND CEMENT ASSOCIATION
                          Pavement  Design  Data
Modulus of Subg/Subb K   150.0 PCI         Axle Load Cat.   1.Light
Modulus of Rupture  MR   600.0 PSI                          2.Medium
                                                            3.Heavy
A D T T  290.00                                             4.Very Heavy
                                                            5.Input Axles
Design Life  20 Years

Load Transfer
  At Joint           1.Dowel
                     2.Agg. Interlock

  At Shoulder        1.Conc. Shoulder
                     2.No Conc. Shoulder

 Load Safety Factor       1.  1.0
                          2.  1.1
                          3.  1.2

 Estimated Pavement Thickness 7.0  IN

  Esc-QUIT F8-Print Data F9-Save F10-compute   move cursor   PgDn-Next Page
```

Fig. 1 - Input Format

Identification Screen

Input File

Data already stored in the file may be recalled onto the input screen for running a design problem. The data at this point may be altered if desired before executing the problem without changing the data on file. The disk is issued with six design examples which may be recalled or deleted as the user desires.

Output File

Input data may be stored in the file under the name typed into the output file by the user. The input data is stored in the file by typing the [F9] SAVE key after the data has been entered onto the input screen.

Solution Options

The user may choose the normal mode or single thickness mode of operation by typing any character or using the space bar to select a design solution for either an optimum thickness or a desired trial thickness.

Average Daily Truck Traffic

The average daily truck traffic (ADTT) in both directions is selected as any number between 0.01 and 200,000. This includes only trucks with six tires or more and does not include panel and pickup trucks and other four-tire vehicles. For facilities of four lanes or more, the ADTT is adjusted by the use of Fig. 2.

Axle-Load Categories

Several axle-load data sets are stored in the computer program. These are shown in Table 1 (reproduced from Table 15 of Reference 1). The specific category is selected by the user when typing any character or using the space bar to select the desired axle-load category. In the case of Categories 1 through 4, no additional input is required on this menu item.

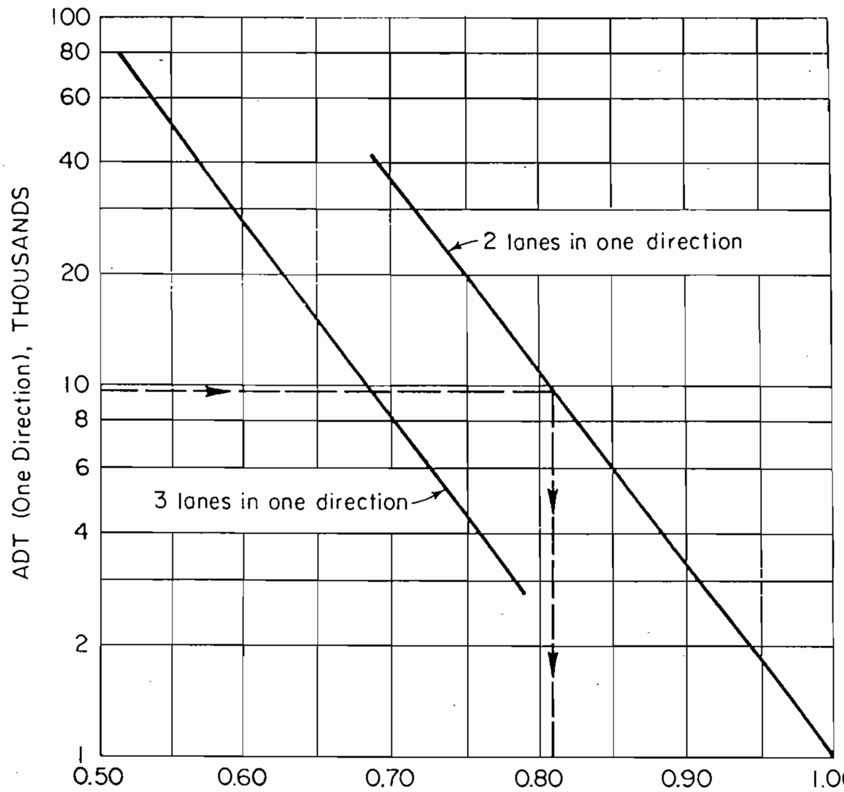


Fig. 2 - Proportion of Trucks in Right Lane of a Multilane Divided Highway

Axle-Load, kips	Axles per 1000 Trucks (excluding all two-axle, four-tire trucks)			
	Category 1	Category 2	Category 3	Category 4
Single Axles				
4	1693.31			
6	732.28			
8	483.10	233.60		
10	204.96	142.70		
12	124.00	116.76	182.02	
14	56.11	47.76	47.73	
16	38.02	23.88	31.82	57.07
18	15.81	16.61	25.15	68.27
20	4.23	6.63	16.33	41.82
22	0.96	2.60	7.85	9.69
24		1.60	5.21	4.16
26		0.07	1.78	3.52
28			0.85	1.78
30			0.45	0.63
32				0.54
34				0.19
Tandem Axles				
4	31.90			
8	85.59	47.01		
12	139.30	91.15		
16	75.02	59.25	99.34	
20	57.10	45.00	85.94	
24	39.18	30.74	72.54	71.16
28	68.48	44.43	121.22	95.79
32	69.59	54.76	103.63	109.54
36	4.19	38.79	56.25	78.19
40		7.76	21.31	20.31
44		1.16	8.01	3.52
48			2.91	3.03
52			1.19	1.79
56				1.07
60				0.57

Table 1 - Four Axle-Load Categories Stored in Program

If the user elects to input his own axle-load data, he selects Category 5 under Axle-Load Category. In this case, additional input data is required (refer to Fig. 3 for a description of the appropriate input). The user can input any value (integer only) to a maximum of 998 kips for the maximum single-axle load or 996 kips for the maximum tandem-axle load. For both single- and tandem-axle loads, the user inputs 10 values of the expected number of load repetitions expressed as axles per 1000 trucks starting with the maximum load, decremented by 2 kips for single axles and 4 kips for tandem axles. The number of load repetitions must be a number between 0.01 and 9999.99. The user may move the cursor up or down while in this category by using the cursor left [←] or cursor right [→] keys, respectively. (See, for example, Column 3 of Table 5 in Reference 1.)

```
14:17:03                      PCAPAV(TM) 1.10                              Page 2
02-06-86     Proprietary Software of PORTLAND CEMENT ASSOCIATION
                              Pavement  Design  Data
Modulus of Subg/Subb K  150.0 PCI        Axle Load Cat.   1.Light
Modulus of Rupture  MR  600.0 PSI                         2.Medium
                                                          3.Heavy
A D T T    0.25                                           4.Very Heavy
                                                          5.Input Axles
Design Life  20 Years                      Maximum Single axle load   22  KIPS
                                           Maximum Tandem axle load   36  KIPS
Load Transfer                                   A X L E   L O A D S
  At Joint        1.Dowel                  SAL    Axles    TAL    Axles
                  2.Agg. Interlock         KIPS   /1000    KIPS   /1000
                                            22      0.96    36      4.19
  At Shoulder     1.Conc. Shoulder          20      4.23    32     69.59
                  2.No Conc. Shoulder       18     15.81    28     68.48
                                            16     38.02    24     39.18
 Load Safety Factor   1. 1.0                14     56.11    20     57.10
                      2. 1.1                12    124.00    16     75.02
                      3. 1.2                10    204.96    12    139.30
                                             8    483.10     8     85.59
 Estimated Pavement Thickness 5.6  IN        6    732.28     4     31.90
                                             4   1693.31     0      0.00
 Esc-QUIT F8-Print Data F9-Save F10-compute   move cursor  PgDn-Next Page
```

Fig. 3 - Example of Input Using Axle-Load Category 5 & User Data

Note: For the maximum axle loads, the program will not accept values less than 22 kips for single axles and 36 kips for tandem axles. If the user's values are not this high for "Axles per 1000 trucks," he can assign values of zero to the highest loads that are not wanted.

Load-Safety Factors

In the design manual[1], appropriate load-safety factors of 1.0, 1.1, 1.2, and 1.2, respectively, have been incorporated into design tables for axle-load categories 1, 2, 3, and 4. However, in the computer program, these values are not automatically assigned to axle-load categories. It is generally intended that the program user should input the appropriate value specified above depending on the axle-load category selected. Once the load safety factor item is selected for input, the user can choose the desired factor by typing any character or using the space bar to move the cursor down.

Load Transfer—At Joint and Shoulder

When the load transfer item has been selected, the user may select the type of load transfer provided at the joint. By typing any character or using the space bar, the cursor is moved down and the selection is made between a doweled joint or aggregate interlock (undoweled) joint. When the load transfer is selected, the carriage return key is pressed, giving the user the next choice of either a concrete shoulder (curb and gutter) or no concrete shoulder. This selection is made by moving the cursor down by typing any character or using the space bar. The carriage return key is then pressed to enter the shoulder type selected.

14:19:29 PCAPAV(TM) 1.10 Page 1
02-06-86 Proprietary Software of PORTLAND CEMENT ASSOCIATION

Project: example 3
Engineer: Everyman, USA
Input Data: Axle Load Category 2.Medium
Subgrade / Subbase K 150.0 PCI
Modulus of Rupture MR 600.0 PSI
Avg. Daily Truck Traffic (2 way) ADTT 2100.00
Design Life 20 years
Doweled Joints
No Concrete Shoulders
Load Safety Factor 1.1
Estimated Pavement Thickness 6.0 IN
Design Thickness =8.0 Inches

		Load Repetitions		---Fatigue Analysis-----			----Erosion Analysis---		
SAL	*LSF	Axle/ 1000	Expected Reps	Stress Ratio	Allowable Reps	Fatigue Consump	Power	Allowable Reps	Erosion
26	28.6	0.07	537.	0.656	6577.	8.16	39.411	1300473.	0.04
24	26.4	1.60	12264.	0.608	24661.	49.73	33.581	2103953.	0.58
22	24.2	2.60	19929.	0.560	93087.	21.41	28.217	3523011.	0.55
20	22.0	6.63	50819.	0.512	438472.	11.59	23.320	6814367.	0.75
18	19.8	16.61	127316.	0.464	9082815.	1.40	18.889	14696439.	0.87
16	17.6	23.88	183040.	0.415	**********	0.00	14.925	40629368.	0.45
14	15.4	47.76	366080.	0.366	**********	0.00	11.427	211779898.	0.17
12	13.2	116.76	894965.	0.317	**********	0.00	8.395	**********	0.00
10	11.0	142.70	1093796.	0.267	**********	0.00	5.830	**********	0.00
8	8.8	233.60	1790544.	0.217	**********	0.00	3.731	**********	0.00

TAL	*LSF	Axle/ 1000	Expected Reps	Stress Ratio	Allowable Reps	Fatigue Consump	Power	Allowable Reps	Erosion
44	48.4	1.16	8891.	0.492	1163597.	0.76	39.369	1304593.	0.68
40	44.0	7.76	59480.	0.450	**********	0.00	32.536	2317990.	2.57
36	39.6	38.79	297325.	0.407	**********	0.00	26.354	4519721.	6.58
32	35.2	54.76	419735.	0.365	**********	0.00	20.823	10179958.	4.12
28	30.8	44.43	340556.	0.322	**********	0.00	15.943	29826993.	1.14
24	26.4	30.74	235622.	0.278	**********	0.00	11.713	173686912.	0.14
20	22.0	45.00	344925.	0.234	**********	0.00	8.134	**********	0.00
16	17.6	59.25	454151.	0.190	**********	0.00	5.206	**********	0.00
12	13.2	91.15	698665.	0.145	**********	0.00	2.928	**********	0.00
8	8.8	47.01	360332.	0.099	**********	0.00	1.301	**********	0.00

Total Fatigue Used = 93.05 Erosion Damage = 18.64

7.5 Inch Thickness Inadequate, Fatigue Used= 477.20 Erosion Damage = 33.46

Fig. 5 - Example of Output

Most of the output is self-explanatory. Additional information concerning specific output items is explained below:

MR The input 28-day concrete flexural strength (modulus of rupture). The computer program automatically decreases this by a 15% coefficient of variation.

SAL Single-Axle Loads in kips.

TAL Tandem-Axle Loads in kips (a Tandem-Axle Load is the total load on two axles).

LSF Load-Safety Factor. It is multiplied by the axle loads. (See page 10 of Reference 1.)

Axle/1000 Axles per thousand trucks inputted for each axle load.

Expected Reps - the computed number of these axles in the design period (Axle/1000 x ADTT/2 x 365 days x Age) in one direction only.

Stress Ratio (Fatigue Analysis) - The stress due to load divided by concrete strength.

Allowable Reps - the allowable number of axle-load repetitions based on the fatigue criteria.

Fatigue Consump - the fatigue consumption (expected repetitions divided by allowable repetitions).

Power (Erosion Analysis) - The rate of work (magnitude and speed of deflection) applied to a slab corner by the axle load.

Allowable Reps - the allowable number of axle-load repetitions based on the erosion criteria.

Erosion - erosion damage (expected repetitions divided by allowable repetitions).