ACPA's StreetPave:

ACPA'S MARKETING CLAIM OF "EQUIVALENT" ASPHALT AND CONCRETE DESIGN SECTIONS WITHIN THEIR NEW THICKNESS DESIGN SOFTWARE PROGRAM IS FALSE. *STREETPAVE* INAPPROPRIATELY REDUCES THE SINGLE SUBGRADE MODULUS VALUE THAT IS INPUT BY THE USER PRIOR TO RUNNING THE ASPHALT DESIGN CALCULATION. NO SIMILAR REDUCTION IS PERFORMED WITH THE CONCRETE DESIGN.

TO FURTHER UNDERSTAND HOW THIS MANIPULATION OF THE AI THICKNESS DESIGN METHOD WITHIN *STREETPAVE* TAKES PLACE, GO TO WWW.ASPHALTINSTITUTE.ORG AND DOWNLOAD A COMPREHENSIVE PAPER TITLED "DEBUNKING *STREETPAVE*."

User Beware

By Mark Buncher, PhD, PE; Mark Blow, PE; and Dwight Walker, PE

Why would you use a concrete thickness program to design an asphalt pavement?

The Asphalt Institute and many other well-established asphalt pavement industry associations have invested significant amounts of capital, time and effort in bringing the transportation industry credible, high value engineering tools, technology and information regarding asphalt pavement. Design professionals should use these sources exclusively for their asphalt pavement design needs.

Likewise, the concrete pavement industry promotes their product by developing tools for using concrete in pavement applications. One such tool, a thickness design program called *StreetPave* that is sold by the American Concrete Pavement Association (ACPA), goes beyond the scope of designing concrete pavement and attempts to replicate the Asphalt Institute's thickness design methods. A critical flaw in this replication of the Institute's method needs to be exposed.

The ACPA website describes *StreetPave* as follows:

> "StreetPave is the latest in thickness design technology for streets and local road pavements. This software utilizes new engineering analyses to produce optimized concrete pavement thicknesses for city, municipal, county, and state roadways. It includes an asphalt cross-section design process (based on the Asphalt Institute method) to create an equivalent asphalt design for the load carrying capacity requirement. A "Life Cycle Cost Analysis" module allows you to perform a detailed cost/benefit analysis and make informed decisions on your pavement design project. With one pavement design tool, you can design equivalent concrete and asphalt sections and evaluate the best possible solution(s) for your pavement needs."

The problem with this description is that the claim of *equivalent* asphalt and concrete sections is false. *StreetPave* takes the single subgrade strength value input by the user (only one value is allowed) and inappropriately reduces it prior to running the asphalt thickness design calculation. No similar reduction is performed with the concrete design. Thus, the asphalt section is based on a subgrade strength that is significantly less than the user input value and is different from the subgrade strength used in the concrete design. The result is an asphalt section that is thicker than necessary, and more costly than the *equivalent* concrete section.

Resilient Modulus Input

The Asphalt Institute methods allow the pavement designer to use one of two practices to determine a single Design Subgrade Modulus (M_R) value that is used in conjunction with the thickness design curves. One practice evaluates a group of individual subgrade modulus tests, and based on the test method's variability and a desired level of reliability, determines an appropriate Design Subgrade M_R value. This procedure is based on normal statistical variation and is clearly described in our MS-1 manual, SW-1 software and Research Report 82-2. The second practice simply allows the pavement designer to assess all known subgrade condition information and then apply conservative engineering judgment to assign a single Design Subgrade M_R value to be used with the design curves.

ACPA's *StreetPave*, however, queries the user for a single Subgrade M_R value, presumed by the user to be the design value, and then in a "black box" manner further reduces it with a statistical calculation using default variability and reliability values. This forced reduction is unseen and does not occur as a separate, noticeable step, but only as a hidden part of calculating the asphalt pavement thickness. If the user does not access a secondary help screen, he will not be aware that the single M_R design value was reduced. *StreetPave* covertly applies an additional and inappropriate factor of safety unbeknownst to the user, which results in excessive asphalt thickness.

SW-1 versus StreetPave Comparison

Perhaps the best way to illustrate the problem with *StreetPave* is to apply it to one of ACPA's own examples. In a recent ACPA marketing brochure, *StreetPave* is used to design *equivalent* concrete and asphalt pavement sections for a residential street. Figure 1 shows how the Institute's actual design procedure (using our SW-1 software) compares

to *StreetPave's* incorrect replication of the Institute's method.

One can see the differences are not trivial, with 37 percent additional asphalt thickness. For readers interested in more detail, an in-depth paper concerning this subject has been posted on the Asphalt Institute's website at www.asphaltinstitute.org.

Life Cycle Cost Analysis Module

StreetPave also has a life cycle cost analysis (LCCA) module that takes the so-called *equivalent* concrete and asphalt design sections and provides "a detailed cost/benefit analysis" on the two sections. The ACPA promotional literature provides a snapshot of the results for a lightly traveled residential street as shown in Figure 2 below.

FIGURE 1

	Input M_R	HMA Thickness
AI's SW-1	3,000 psi	4.6 in.
ACPA's StreetPave	3000 psi reduced to 1,818.5 psi	6.3 in.
% Difference	39	37

The LCCA chart infers that a 6.5 inch thick asphalt residential street will need major rehabilitation after 11 and again 9 years later. If the numbers shown in this LCCA chart are accurate, a 6.5 inch thick asphalt street constructed in 1985 should be nearly a foot thick by now. Common sense and experience with pavement performance for many similar lightly traveled residential streets makes such a thick pavement highly unlikely and over-designed.

To design an asphalt pavement, we strongly suggest you use one of the many well-respected and credible asphalt thickness design procedures that are available in our industry. We do not recommend using ACPA's *StreetPave* for asphalt pavement design or LCCA. User beware!

Buncher, Blow and Walker are engineers with the Asphalt Institute.

FIGURE 2: ACPA'S STREETPAVE LIFE CYCLE COST ANALYSIS MODULE

Residential (ADTT 3 trucks/day, 11,500 ESALs, 2-lane with curbs) initial costs