Engineering Brief # 48

Subject: INFORMATION: ENGINEERING BRIEF NO. 48
INTERLOCKING CONCRETE PAVERS

From: Acting Manager, Engineering and Specifications Division, AAS-200
To: All Regions and Academy

Attn: Manager, Airports
Division & AAC-960

We have received several questions recently about the AAS position on the use of pavers on airports. We feel it is appropriate to issue an engineering brief at this time to ensure that FAA is providing consistent information to airports and their consultants.

Engineering Brief No. 48, INTERLOCKING CONCRETE PAVERS, provides information and policy guidance on the use of interlocking concrete pavers on federally funded airport pavement projects.

We would appreciate your comments at your convenience.

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ENGINEERING BRIEF NO. 48

INTERLOCKING CONCRETE PAVERS

Background
Interlocking pavers provide a pavement surface similar in appearance to a brick pavement. Applications in other countries include sidewalks, roads, streets, airports, and loading docks. Most applications in the U.S. are on sidewalks, driveways, and streets and used mainly for aesthetic reasons. Pavers are made in a variety of sizes and shapes. Pavers for airport applications are typically about 4 inches wide, 8 inches long, 2-1/2 inches thick. They are placed on a thin + 1 inch thick layer of bedding sand which, in turn, is supported on a very firm and stable foundation. Pavers require rigid restraint around their perimeter with some type of curbing.

Airport Applications
The United Kingdom has some 160,000 square meters of pavers in

place on airports. Pavers have also been used on airports in Australia, Israel and Scandinavia. Use of interlocking pavers on airports was pioneered at Luton Airport in Great Britain in 1982. Pavers were initially tried as hardstands in apron areas. Successful performance as hardstands led to a trial application in a runway turnaround area. Continued success with paver surfaces led to their use on 9 more hardstands and a second runway turnaround area.

We are aware of two paver surface failures on airports. One failure occurred at Luton Airport. Jet blast from a 737-300 blew out a section of pavers. No injuries or damage were reported. This failure was attributed to the geometry of the paver, which was different from that successfully used previously at Luton. The failed area was replaced with the previously used paver shapes. No further problems were encountered. The second failure of pavers was at London's Heathrow Airport where a paver surface was removed after it developed unacceptable depressions.

Airport Applications in the U.S.
Use of pavers on U.S. airports has been vigorously promoted for some 2-3 years. In 1990 three short connecting taxiways and portions of two other connecting taxiways were constructed with paver surfaces at the Dallas-Fort Worth Airport. Construction was performed at night to minimize interference with day operations. DFW elected to use pavers to permit longer work periods for each night's construction. This project was not A.I.P. funded. The Southwest Region and AAS were opposed to the use of pavers for this application. The reason for lack of FAA support in this instance was that AAS and ASW both felt that it was inappropriate to start our learning curve at an airport like DFW. Both offices felt the first U.S. trial should have been on a less heavily trafficked airport. To date it appears that the DFW installation is performing satisfactorily.

Advantages
Pavers are purported to offer several advantages over conventional asphalt and concrete surfaces. Among these are:
Factory made - thereby offering uniform size and strength.

Repair or relocation of utilities is faster and less disruptive.

Can be trafficked immediately - no curing time.

Construction less susceptible to inclement weather.

AAS Concerns
While AAS recognizes pavers may offer advantages in certain instances, there are also concerns which prompts this office to adopt a conservative approach to the use of pavers on airports. Our primary concerns are as follows:

Surface Stability Should the pavers be dislodged by jet blast or prop wash, the effects could be disastrous for personnel in the vicinity and/or nearby aircraft. In addition we are concerned about the bedding sand which could blown about by

wind and jet blast. Manufacturers have recently developed materials and techniques to seal the surface and thus hold bedding sand in place. The effectiveness and longevity of the sealer are unknown at this time.

Spillage Fuel or other liquids spilled on a paver surface could seep into the bedding sand and result in a pollution problem. AAS is also concerned about the potential for spills to collect in and saturate the bedding sand over a long period of time, possibly resulting in a fire hazard.

Cost In order to achieve the precision required for a high stability surface, it appears that hand placement of the pavers should be used. Intuitively it would seem that the labor costs involved would make it difficult for this type of surface to compete with asphalt or concrete surfaces except in peculiar situations. Mechanized placement is being developed, however, joint width is critical and this is difficult to control with mechanized placement.

During the summer of 1991 Mr. Mudd, AAS-1, attended a meeting in Great Britain and had the opportunity to talk with his counterpart in Great Britain. Great Britain is doing about the same thing we advocate, i.e., using pavers in limited applications until their performance can be assessed. Two other considerations were brought up that we had not addressed. One being slipperiness of the paver surface. Friction readings on pavers of about 0.45 are not uncommon after some useage. Use of pavers on road and highway projects in Great Britian is limited due to concern for slipperiness. A second consideration is lack of information on the effects of water freezing in the sand bedding layer immediately below the paver surface.

Present AAS Policy
AAS has adopted a conservative policy on the use of pavers at airports. Each installation will require AAS approval and will be evaluated based on the following considerations. Our present policy to disallow use on runways, taxiways or other pavement areas likely to trafficked by aircraft operating at high speeds and by jet aircraft employing high levels of thrust. In addition, pavements trafficked by jet aircraft with "low-slung" jet engines (737, 757, 767, etc.) will be less likely to receive approval. Other considerations include the need to employ pavers as opposed to standard surfaces, i.e., concrete or asphalt. Desire to achieve an aesthetically pleasing surface is not sufficient justification.

John L. Rice
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