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# Federal Highway Administration

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## Federal Highway Administration Research and Technology Coordinating, Developing, and Delivering Highway Transportation Innovations

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## Application Notes: FWD Calibration Centers Ensure States Get Quality Data

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### The Challenge

In 1999, \$5.5 billion in Federal highway funds were spent on pavement rehabilitation and resurfacing. To make the best possible decisions about where and when to conduct pavement rehabilitation work, State departments of transportation (DOTs) need extensive data on the structural condition of pavement.

To measure the structural condition of pavement, most pavement engineers rely on falling-weight deflectometer (FWD) technology. FWDs "thump" the pavement and record information about its structure and integrity. But like all sophisticated tools, the FWD must be properly calibrated. If it is not, measurements will be inaccurate. Inaccuracy wastes precious budget dollars.

### The Solution

In the late 1980s, the Long Term Pavement Performance (LTPP) program developed FWD calibration procedures. Adopted by the American Association of State Highway and Transportation Officials (AASHTO) as a provisional standard, these procedures are the only nationally accepted means of ensuring that FWD information is as accurate as it can be.

In the early 1990s, FWD calibration centers were opened in cooperation with State DOTs in Minnesota, Nevada, Pennsylvania, and Texas. The State DOTs manage the centers, and in three of the States, DOT personnel supervise the day-to-day operations and calibrations. The Texas Transportation Institute, through an agreement with the State DOT, operates the FWD calibration center in Texas.

The States provide the space and staffing resources for the calibration centers, while the Federal Highway Administration (FHWA) donates the equipment used in the calibration procedures. For nearly a decade, the four calibration centers have each been operated by highly trained technical staff.

### **Working With the Centers**

In the past several years, use of the calibration centers has been on the rise. In 2000, the four FWD calibration centers were used to calibrate a total of 79 FWDs, including 57 owned by State highway agencies. With the anticipated delivery of the *2002 Guide for the Design of Pavement Structures* and more focus on actual site data, use of the FWD calibration centers is expected to increase in the future.

"Calibration is critical," according to Linda Pierce, Washington State Department of Transportation pavement engineer. "Without a calibration center," she continued, "I would not feel confidence in the FWD data we use."

Indeed, Ken Fults, director of the Materials and Pavements Section of the Construction Division at Texas DOT, explained how important calibration was to one of the Texas districts. "A couple of years ago, one of our districts had a vendor come in and collect FWD data for them," said Fults. "Of course the vendor's FWD equipment had not been properly calibrated. So, several months and several thousand dollars later, it turned out that none of the data collected was usable."

Texas DOT has 15 FWDs, each of which are calibrated on an annual basis. "We think it's of the utmost importance," said Fults, "to have all of our FWDs properly calibrated because we use them so much in our day-to-day operations." And FWD data is key to Texas' roadway rehabilitation and preventive maintenance. "What we say," explained Fults, "is that anytime you are going to add more than an inch-and-a-half or two inches of hot mix to a project, you need a pavement design. When you have a pavement design, you have to have some FWD data. Is FWD data more important than traffic data? Well, it's all relative. But if we know we are going in with good FWD data, then our confidence and our reliability on that design goes up considerably. And if we have as much as 85- to 90-percent confidence that the pavement design we have will last for as long as predicted, then we can move on to other projects and not worry about it."

Arizona's DOT spends approximately \$100 million a year on pavement rehabilitation projects. How important is FWD data to these projects? According to Jim Delton, Arizona DOT pavement management engineer, "For example, let's say there is a road that appears to be fairly cracked. In the absence of FWD data, the natural inclination would be to assume that it is weak. But because FWD testing can be done, it may be discovered that there is still a significant amount of inherent strength in the underlying material. That mainly the surfacing has worn out. So perhaps the road just needs to be resurfaced. Now that project costs less because you don't have to go as deeply into the pavement structure in order to rehabilitate it. That's the benefit that can be gained by using FWD." As for the FWD calibration centers, Delton sees the benefit of the centers as providing assurance.

### **The Benefits**

Using FWD calibration centers helps States to collect accurate data, resulting in:

- Better decisions about when and where to conduct rehabilitation work.
- More cost-effective use of budget dollars targeted for rehabilitation projects.
- Better decisions in designing new pavements and overlays.

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### **For More Information**

For more information regarding the FWD calibration centers, contact Cheryl Richter, (202) 493-3148, [cheryl.richter@fhwa.dot.gov](mailto:cheryl.richter@fhwa.dot.gov). Contacts for each of the four FWD calibration centers are:

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A videotape on FWD procedures was also produced by FHWA through a cooperative agreement with the Minnesota DOT. To obtain a copy, contact Katherine Petros, FHWA, (202) 493-3154, [katherine.petros@fhwa.dot.gov](mailto:katherine.petros@fhwa.dot.gov).

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