



**CENTER FOR TRANSPORTATION INFRASTRUCTURE SYSTEMS
THE UNIVERSITY OF TEXAS AT EL PASO**

Project Summary Report 0-4380-S

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Project 0-4380: Feasibility Study for Continuous Deflection Testing for Texas Pavements at Near Highway Speeds

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Continuous Deflection Testing of Texas Pavements

To assess the structural condition and bearing capacity of existing or newly constructed pavement systems, the most commonly used nondestructive testing device is the Falling Weight Deflectometer. The Falling Weight Deflectometer is a stop-and-go (discrete testing) operation, which increases testing time and operational cost and creates an unsafe working environment due to traffic interruptions.

To measure deflection profiles at or near highway speeds, various national and international research

efforts have taken place in the last decade. However, the status, reliability, operational speed and cost, and limitations of the developed systems are unknown. The objectives of this research project were to summarize the state-of-the-art of continuous deflection measurement systems and identify a suitable device that meets TxDOT criteria.

What We Did

We reviewed the published information and contacted identified producers of the continuous deflection testing devices.

Based on the information gathered, the following devices were identified: Rolling Dynamic Deflectometer, (RDD) Rolling Wheel Deflectometer (RWD), Airfield Rolling Weight Deflectometer (ARWD), Road Deflection Tester (RDT), and High Speed Deflectograph (HSD). Although there are other devices like the French or British Deflectograph, they are not suitable for performing evaluations at traffic speeds.

What We Found

A picture of each device is included in the Figure (next page) and



information about each device is summarized in the Table (next page). The device evaluation revealed that the RDD is a good tool; however, it is not suitable for performing evaluations at highway speeds. Although the ARWD device is suitable for airfields, the device needs to be modified for highways before it can

be implemented. The RWD device has been successfully demonstrated in various parts of the country including Texas; however, the measured deflections are dependent on the speed and estimates significantly higher deflections than other devices. In addition, the device provides only one

deflection measurement, which is not sufficient to identify the structural condition of pavements. Similar issues have been identified with the RDT device. The only device that provides more than one deflection measurement is the HSD, manufactured by Greenwood Engineering. The device has been successfully evaluated



by Laboratoire Central des Ponts et Chaussées and Transportation Research Laboratory of the United Kingdom. The device is currently being evaluated by highway agencies of the United Kingdom and the Denmark, and results from the evaluation can provide an indication whether the device

meets TxDOT requirements. The device uses a deflection velocity transducer and its limitations need to be identified as well. The device has been recently renamed as Traffic Speed Deflectometer (TSD)

The Researchers

Recommend

Based on the information gathered, there is only one device, the HSD, which has been commercially produced and can be purchased from Greenwood Engineering for approximately 2.4 million dollars.

Summary of Dynamic Deflection Measurement Devices

Device	Texas Rolling Dynamic Deflectometer (RDD)	Airfield Rolling Weight Deflectometer (ARWD)	Rolling Wheel Deflectometer (RWD)	Rolling Deflection Tester (RDT)	High Speed Deflectograph (HSD)
Manufacturer	UT Austin	Dynatest Consulting and Quest Integrated	Applied Research Associates	Swedish National Road Administration and VTI	Greenwood Engineering.
Estimated Cost	N/A	N/A	N/A	N/A	\$ 2,400,000
Operational Speed	1 mph	20 mph	45 to 65 mph	60 mph	50 mph
Distance between readings	2 to 3 ft	9 ft	0.5 in	0.001 s	0.80 in. (20 mm)
Applied Load	10 kips static + 5 kips dynamic	9 kips	18 kips fixed	8 to 14 kips (40 to 70 kN)	11 kips (49 kN)
Deflection Sensor Accuracy	0.05 mils	N/A	± 2.75 mils (± 0.070 mm)	±10 mils (± 0.256 mm)	±4 mils/s (± 0.1 mm/s)
System Accuracy	N/A	1 mil at 6 mph	N/A	N/A	0.2 mils (5 µm)
Other Features	GPS Equipped	N/A	GPS Equipped	N/A	GPS Equipped
Number of Operators	2	N/A	2	2	2
Calibration Process	Yes	N/A	Yes	Yes	Yes
Comments	Too slow for network level.	No Release Date Available.	No Release Date Available.	No Release Date Available.	Sold two devices so far.



For More Details

The research is documented in the following report:

- 0-4380-1: “Continuous Deflection Testing of Highways at Traffic Speeds”

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