

## FWD Testing – Guidance for Local Agencies



### **INTRODUCTION**

Falling Weight Deflectometer (FWD) testing is growing among local agencies (cities and counties) in Minnesota. The need for this testing has grown as these agencies become more aware of the need to understand the strength of their pavement structures to better manage their overall roadway systems. Currently local agencies are hiring consulting firms to provide this service of performing FWD testing of their pavements. This guidance is intended to assist local agencies in specifying FWD testing services and strive for uniformity and consistency in the data obtained among agencies across the state.

### **BACKGROUND**

An FWD device is designed to simulate deflection of a pavement surface caused by a fast-moving truck. The FWD generates a load pulse by dropping a weight that transmits this to the pavement through a 300 millimeter diameter circular steel load plate. The load plate must seat firmly on the pavement surface to obtain reliable results. A poor pavement surface that is rutted, highly cracked and distressed will not provide good data. Stiffness of the pavement structure is estimated by using various computational methods. Knowing the temperature of the materials in the pavement structure is critical. The stiffness calculated must be corrected for the temperature at the time of testing.

To learn more about and better understand FWD testing, go to the MnDOT website at:

[www.dot.state.mn.us/materials/pvmt/design/fwd.html](http://www.dot.state.mn.us/materials/pvmt/design/fwd.html)

or review the Federal Highway Administration publication “Long-Term Pavement Performance (LTPP) Program Manual for Falling Weight Deflectometer Measurements” (December 2006) which can be found at:

<http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltp/06132/06132.pdf>

### **GUIDANCE**

This guidance is intended to assist you in obtaining consistent and reliable FWD testing data when hiring a consultant to perform this testing for you. When hiring a consultant to perform FWD testing for your agency, it is important to provide accurate information concerning your pavement structure so they can provide good test results and analysis back to you. Also, it assists you in requesting reports, products and data that will allow you to analyze the test results yourself.

It is important from the view point of State Aid that all FWD test data be consistent and of high quality. Data should be analyzed using the MnDOT TONN2010 program. The latest version of the TONN2010 program is located on the [MnDOT Pavement Design Software](#) web page. This will allow for the state-wide comparison of

FWD data on the County State Aid Highway (CSAH) system. You may also refer to Section 200 – FWD in Chapter 2 – Investigation of the MnDOT Pavement Design Manual for Further information on FWD testing. The following items should be understood, provided and/or requested to assure FWD test data is uniform and consistent between agencies across the state:

- Best or recommended time of year to perform FWD testing is in the summer and early fall (June thru October) when the pavement section is unaffected by thaw-weakening or frozen soils.
- Research as-built plans of the road segment to be tested to determine the material layer thicknesses within the pavement structure.
- For more accurate test data and reliable FWD results or if as-built plans are not available, core the pavement and obtain actual pavement structure material layer thicknesses at several locations.
- Document and specifically define your roadway segments to be tested. This can be done by either defining roadway intersections, stationing or coordinates (latitude and longitude). Current FWD data gathering equipment software has input for latitude and longitude.
- Specify testing frequency (single lane one direction, two lanes both directions, distance between test locations).
  - Preferred testing frequency is MnDOT standard of every 500 ft. in outer wheel path in both directions.
  - Minimum testing frequency is every 1,000 ft. in outer wheel path in most heavily traveled lane (one direction).
- Specify the test results are to be reported according to the roadway segmentation requested.
- Each roadway segment tested shall be reported as its own “Session”.
- Data should be analyzed using the latest version of the MnDOT TONN2010 program. This is for uniformity and consistency of data between agencies across the state. This can be accessed on the [MnDOT Pavement Design Software](#) web page.
- Request a paper report of the test results and analysis. However, this is typically provided.
- Request an electronic copy of the MS Access electronic database file containing all test data collected.
- Additional data your consultant will require you provide to perform the analysis:
  - Most current AADT (obtained from traffic maps, State Aid or TDA).
  - Provide estimated ESAL’s for projected pavement life. You can use the [State Aid ESAL calculator](#) to calculate this.
  - Define either as an Urban or Rural roadway.
  - Number of lanes (total in each direction).
  - Subgrade soil type defined as: P-plastic (clay), SP-semi-plastic (lean clay/silt), NP-non-plastic (sand/gravel).
- Organize your FWD projects and information gathering through the use of an Excel data worksheet form to assure consistent, complete and accurate data is provided to the consultant.