

## AUSTROADS SPECIFICATION AG:AM/S002

# SPECIFICATION FOR PAVEMENT DEFLECTION MEASUREMENT WITH A FALLING WEIGHT DEFLECTOMETER (FWD)

## COMMENTARY

### 1 SCOPE

The following key principles were established during the development of this specification and its associated test methods:

- the specification and test methods must be relevant to the national, state and local government networks, and to personnel managing those networks
- standardisation of practice is desirable
- equipment validation exercises do not need to be tied to specific jurisdictions, and inter-jurisdictional acceptance of equipment validation is desirable
- specification requirements that cannot readily be measured or assessed should be avoided.

Additionally, there were two, often conflicting, imperatives that had to be balanced when preparing the specification and associated test methods:

- a specification could not be a vague guideline, but must provide clear statements of requirements
- for a specification to obtain wide acceptance, it must be flexible enough to cater for the range of different requirements that occur between jurisdictions.

In the preparation of the specification and test methods, considerable effort was made to balance these issues. For example, in order to ensure wide applicability, no attempt was made to specify requirements for the locations of testing because of the wide range of location referencing systems, testing spacings, number of lanes tested, etc. operating throughout Australasia.

In the majority of cases, it is anticipated that the specification, and in turn the test methods, will be framed within broader contract documentation specific to a given application. Such overarching contract documentation provides an opportunity for the Client to specify additional requirements, or make specific exclusions, from the Austroads specification.

Whilst the specification could be amended on a contract-by-contract basis to reflect the requirements for the specific project, this is not recommended as it would dilute the standardised nature of the Austroads specification. It is preferred that the contract documentation requires adherence to the Austroads specification, but separately lists additional amendments, requirements or exclusions.

Table A presents the intended roles of the specifications, test methods and broader contract documentation within a condition data collection contract.

Table A: Document roles within a condition data collection contract

Document type	Description
Test method	instructions for carrying-out a specific activity
Specifications	<ul style="list-style-type: none"> <li>• statements about which activities to undertake and when to undertake them</li> <li>• list of roads to be surveyed</li> <li>• details of the client's referencing system (i.e. the system to be used to report the data)</li> <li>• details of the data format for the presentation of the final data</li> </ul>
Additional contract documentation	<ul style="list-style-type: none"> <li>• legal terms of contract</li> <li>• quality plan and procedures</li> <li>• provision for risk (including types of insurances)</li> <li>• definitions of responsibilities (e.g. traffic control)</li> <li>• additional requirements</li> <li>• specific exclusions from Austroads specification</li> </ul>

When considering additional requirements or exclusions to the specifications and test methods it is important to remember that, during their development, these documents have been closely examined by asset managers, tender documentation writers and equipment users. Accordingly, the specification and test methods should be considered as both technically sound and practical to use. Care should be taken when adding requirements to the specification to ensure that there is a need to do so, and that the additions are achievable and relevant.

Additional guidance and background information can be found in the *Austrroads Guide to Asset Management – Part 5D: Strength* (Austrroads 2007).

## 1.1 Scope of specification

It is important to note that the specification and associated test methods have been prepared for the testing of pavements at the network level. Care should be taken when applying the specification or test methods at the project level.

If the Client has additional occupational health and safety requirements, e.g. specific traffic control requirements, then these should be specified in additional contract documentation.

## 1.2 Scope of works

The specification contains the following three annexes which must be populated by the Client before use:

- Annex 1: the list of roads to be surveyed
- Annex 2: details of the location referencing system to be used when reporting the data
- Annex 3: details of the data format to be used when reporting the final data

Each of these annexes currently contains guidance to the Client as to how each annex should be populated. It is intended that these guidance notes be replaced (including any examples) with the contract specific detailed information required.

## 2 ROLES

No comment.

## 3 REFERENCED DOCUMENTS

Only those documents referenced by the specification are included in this list. Individual related test methods may refer to additional documentation.

## 4 EQUIPMENT

### 4.1 Minimum equipment specification

The detailed list of test equipment requirements is contained in the data collection test method (AG:AM/T006).

### 4.2 Calibration

The independent assessment of pavement deflections required for equipment validation is problematic in nature. Close control of the calibration of the primary sensors on an FWD is easier to achieve, and provides increased confidence in the test results.

#### 4.2.1 Calibration scheme

During the annual reference calibration the primary sensors of the FWD (the load cell, deflection sensors and temperature sensors) are calibrated against appropriate reference sensors.

The three-monthly relative calibrations only consider deflection sensors. The procedure involves comparing the readings of all deflection sensors against each other, and does not use a reference sensor.

### 4.3 Equipment validation

#### 4.3.1 Validation of distance measurement

Test Method AG:AM/T005 is not specific to the FWD device, and can be used for many different road condition monitoring equipment types.

#### 4.3.2 Repeatability of deflection measurement

The COST 336 U2 procedure involves the comparison of multiple deflection readings taken in rapid succession at a single location.

Due to the highly variable nature of bituminous and granular pavement deflections, the comparison of deflection results taken at different times is difficult and the use of such comparisons as a contractual check of FWD measurement performance is not recommended.

The COST 336 U3 procedure can be used to compare deflection readings taken at the same location over a period of time. The procedure notes that 'deflection results will not be constant over the year due to temperature and seasonal changes. For that reason the test provides only indicative data'. Australian pavements are considered likely to be more sensitive to temperature and seasonal changes than the European pavements considered by the COST 336 work. For this

reason a long term repeatability test such as COST 336 U3 has not been included in the specification.

## 5 SURVEY

### 5.1 Survey roads

No comment.

### 5.2 Location referencing

No comment.

### 5.3 Survey procedure

No comment.

### 5.4 Commencement of survey

#### 5.4.1 *Test parameters*

The survey test method AG:AM/T006 does not specify the locations at which FWD tests are to be conducted. Neither the longitudinal spacing between tests, nor the transverse location across the lane are specified. These locations must be defined by the Client.

#### 5.4.2 *Validation*

No comment.

#### 5.4.3 *Initial process quality assessment*

It is intended that this assessment act as a 'sanity check' on the complete survey system (equipment-through-to-reporting) to ensure that the expected results are being obtained.

### 5.5 Ongoing repeatability

No comment.

## 6 REPORTING

There is a difference between the *recording* of data and the *reporting* of data. The survey test method, AG:AM/T006, lists parameters that must be *recorded* during an FWD survey. It is possible that the Client's *reporting* data format will not require some of these parameters, and it is similarly possible that the *reporting* format may require additional or derived parameters (such as GPS location data or estimated pavement structural numbers).

## ANNEX 1 – LIST OF ROADS TO BE SURVEYED

### Guidance

The Client must replace these guidance notes with a detailed list of the roads to be surveyed. Alternatively, the Client may replace the guidance notes with a reference to the list of roads contained elsewhere in additional contract documentation.

## ANNEX 2 – LOCATION REFERENCING SYSTEM

### Guidance

The Client must replace these guidance notes with a detailed explanation of the location referencing system to be used to report the collected data. Alternatively, the Client may replace the guidance notes with a reference to a description of the location referencing system contained elsewhere in additional contract documentation.

## ANNEX 1 – DATA FORMAT

### Guidance

The Client must replace these guidance notes and example with a detailed description of the data format required for the final presentation of the data. Alternatively, the Client may replace the guidance notes with a reference to a description of the data format contained elsewhere in additional contract documentation.

## REFERENCES

Austrroads 2007, Guide to asset management – Part 5D: strength. Publication AG:AM05D/07, Austrroads, Sydney (in preparation).

## AMENDMENT RECORD

Amendment No.	Sections amended	Action <sup>1</sup>	Date
1 (Initial release)	All (Michael Moffatt, ARRB)	New	26 March 2007
<sup>1</sup> Key: Format                    change in format Substitution            old section removed and replaced with new section New                        insertion of new section Removed                old section removed			

This commentary is relevant to the 26 March 2007 release of Austrroads Specification AG:AM/S002.