

UK Pavement Management System



Ways of comparing BV96 and BV223

Summary paper

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Document History

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1.02	Revised	RAC	31/10/05	Revised to include the impact of not specifying CL1 & CR1
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Introduction

In 2005/06 the new BVPI 223 for the principal road network was introduced to replace the 2004/05 BVPI 96. Since both these BVPIs are calculated using the same type of data (TTS/SCANNER) it is recognised that authorities may wish to compare the 2005/06 data with the 2004/05 data in order to determine whether their principal road network is improving or deteriorating.

This summary paper offers a number of methods for carrying out such a comparison, and identifies some issues which authorities should be aware of in order to ensure that the comparison is meaningful.

Background

BVPI 96

The requirements for BVPI 96 for 2004/05 are given in full in Technical Note 30¹. However, for convenience the key points are repeated here:

- BVPI 96 was based on TTS data.
- The data was collected from 1 Apr 2004 to 31 Mar 2005 (i.e. 1 year).
- The requirement was to collect data in both directions on the principal road network.
- Only data is CL1 and CR1 is used.
- The data was processed using UKPMS using Merge Method 3 (variable merge) with zero length and percentage tolerances for the merge.
- Rule Set RP5.01 was used.
- The thresholds were
 - Nearside texture depth $\leq 0.6\text{mm}$
 - Nearside rut depth $\geq 11\text{mm}$
 - Offside rut depth $\geq 11\text{mm}$
 - 3m Longitudinal profile variance $\geq 4\text{mm}^2$
 - Whole carriageway cracking intensity $\geq 0.5\%$
- The surveyed length, for surveyed sections, was calculated as the section length multiplied by the nearside multiplier. For single carriageway roads with 2 or more lanes the nearside multiplier is 2, for single one-lane, all dual carriageways and all one-way roads it is 1.
- BVPI 96 is calculated as the length of the network triggering any of the thresholds, divided by the surveyed length (calculated for the network) expressed as a percentage.

¹ 037v0106



BVPI 223

The detailed requirements for BVPI 223 for 2005/06 have been published in Technical Note 36². The key points are:

- BVPI 223 is based on SCANNER and TTS data
- The data is collected from 1 Apr 2004 to 31 Mar 2006 (i.e. 2 years)
- The requirement is to collect data for 50%³ of the principal road network in 2005/06 and add this to the data already collected in both directions in 2004/05, unless no data was collected in 2004/05 in which case the data should be collected in both directions on the principal road network in 2005/06.
- The data should be collected in the nearside lane.
- The data should be processed using the new SCANNER Road Condition Indicator.
- Rule Set RP6.01 and a specified weighting set (the latest version of WS223v01*mm*) should be used.
- The Road Condition Indicator weights all the SCANNER data and a subsection contributes to the BVPI if the combined weight exceeds a threshold. Currently the RCI includes:
 - Nearside texture depth
 - Nearside rut depth
 - Offside rut depth
 - 3m Longitudinal profile variance
 - 10m Longitudinal profile variance
 - Whole carriageway cracking intensity
 - Wheel track cracking intensity
- The surveyed length is taken to be that part of the network where data has actually been recorded.
- BVPI 223 is calculated as the length of the network with a combined weighting exceeding the threshold divided by the surveyed length (i.e. the length where data has been recorded) expressed as a percentage.

Initial Considerations

TTS vs SCANNER data

The only difference⁴ between the type of data collected in a TTS survey compared with a SCANNER survey is that the latter includes some new data for information only. This data is not used in the BVPI calculations, and so for the purposes of comparing BVPI 96 with BVPI 223 TTS and SCANNER data are interchangeable.

² TN36 – BV223 _2005-2006__ Condition of Principal Roads v0105

³ All the network in one direction, or half the network in both directions.

⁴ Disregarding any changes to the accreditation or QA process or to the machines themselves which could affect the accuracy of the data collected.



Surveyed network

Care must be taken when carrying out any comparisons to be clear about the surveyed network and the time period for eligible data. If data is combined from both 2005/06 and 2004/05 then the most recent data for a section/XSP will supersede the older data i.e. the older data will only be used for those sections/XSPs where the 2005/06 data is not available.

Rule set

The changes in the Rule Set from RP5.01 to RP6.01 have no effect on the BVPI calculations. That is, RP6.01 could be used to calculate an unofficial BVPI 96 figure instead of RP5.01.

Contribution of Defects

Three additional defects (10m Longitudinal Profile Variance, Nearside Wheel Track Cracking Intensity and Offside Wheel Track Cracking Intensity) contribute to BVPI 223. These defects were collected in 2004/05 but did not contribute to BVPI 96.

The parts of the network which contribute to BVPI 96 are those where any of the defects individually triggers a threshold value, whereas for BVPI 223 the contribution is based on whether the combined weighted value of the defects exceeds a threshold. So, for example, a part of the network with a nearside rut depth of 12mm would contribute to BVPI 96, but would not necessarily contribute to BVPI 223. Similarly, based on WS223v0101, a subsection with a 10m Longitudinal Profile variance of 56mm² together with 5% nearside wheel track cracking will contribute to BVPI 223, but not to BVPI 96.

Consistency

It is inevitable that there will be differences between the data collected and hence the BVPI figure calculated between one run of a machine and another run of the same (or a different) machine. These differences may be caused by operational factors such as differences in the driving line or by machine variability.

So, even if there is no difference in the condition of the network, the BVPI result calculated will vary within confidence limits. Methods to determine the confidence limits are currently being developed by one of the TTS research projects, and these will in due course allow authorities to establish whether the change in a BVPI figure from one year to the next is significant (i.e. reflecting a real change in the condition of the network) or whether it is merely due to the natural variability inherent in the data collection process.

Even if there is a real change in the condition of the network, this change may in fact reflect the natural annual cycle of network condition (i.e. the timing of the survey with respect to the annual cycle of maintenance) rather than a change in the average network condition taken over the whole year.

Specified lanes

BVPI 96 specifically only includes data in XSPs CL1 and CR1, whereas BVPI 223 includes all data for the survey (although the requirement is that this should be collected in the nearside lane).



Options

There are a number of options for comparing the condition of the network in 2004/05 with 2005/06 and the preferred option will depend on the particular circumstances of the authority, and possibly on the UKPMS system and Survey Contractor used.

Broadly there are two ways of carrying out a comparison:

- Calculate BVPI 96 for both 2004/05 and 2005/06
- Calculate BVPI 223 for both 2004/05 and 2005/06

Each of these two approaches will be considered in more detail.

Using BVPI 96 as a basis for continuity comparison

Since BVPI 96 has already been produced for 2004/05 this approach is based on calculating an unofficial BVPI 96 figure for 2005/06 for comparison purposes.

- If your UKPMS system will allow you to do so then you could repeat the BVPI 96 calculation using the most recent data. You could calculate the result for:
 - Data collected from 1 Apr 2005 to 31 Mar 2006 (1 year). This only gives a comparable result if your survey was carried out on half of the network in both directions. The result will not be comparable with your 2004/05 BVPI 96 figure if you surveyed all the network in one-direction since the formula used for the surveyed length assumes both directions were surveyed.
 - Data collected from 1 Apr 2004 to 31 Mar 2006 (2 years). This will use the most recent (2005/06) data where available for a section/XSP, and the older (2004/05) data elsewhere.

You can use either RP5.01 or RP6.01 for this comparison as the differences between the two rule sets has no impact on the BVPI calculation.

- If required it would be possible for the UKPMS Support Contractor to develop a special weighting set for the Road Condition Indicator which could be used as a proxy for BVPI 96. You could calculate the result using this for:
 - Data collected from 1 Apr 2004 to 31 Mar 2005 (last year's data). You can only do this if your data was collected using the same subsections for all defects. Last year some survey contractors used different subsections for cracking than for the other data. The BVPI 96 proxy is not suitable for such data. Any differences between the proxy result and your official BVPI 96 result are likely to be due to the length surveyed or to the presence of data in XSPs other than CL1 or CR1. For example, if parts of your network are set up as 2-lane single carriageway, but were not in fact surveyed in both directions then the official BVPI 96 result will differ from the proxy. Calculating the proxy for last year's data in this way provides a baseline for comparison with the proxy calculations on the more recent data.
 - Data collected from 1 Apr 2005 to 31 Mar 2006 (1 year). This provides a proxy BVPI 96 figure for the part of your network which was surveyed this year. Since we understand that this year all Survey Contractors will



use the same subsections for all defects (including cracking) it should be possible for all authorities to calculate this figure if they wish.

- Data collected from 1 Apr 2004 to 31 Mar 2006 (2 years). This provides a proxy BVPI 96 figure for your entire network, using the most recent data where available for a section/XSP and the older data elsewhere. This calculation is only possible if the data collected in 2004/05 used the same subsections for all defects (including cracking).

Using BVPI 223 as a basis for continuity comparison

This approach is based on using BVPI 223 to calculate figures for the historical (2004/05) data, to compare with the official BVPI figure for 2005/06. This approach can only be used by those authorities where the data collected in 2004/05 used the same subsections for all defects (including cracking).