Transport Research Laboratory
Creating the future of transport

PUBLISHED PROJECT REPORT PPR790

Scottish Inspection Panel Report 2015

M J McHale

Prepared for: Transport Scotland, Trunk Roads and Bus Operations Directorate (M McLaughlin)

Project Ref: TS/TRBO/SER/2012/12/02

Quality approved:

M McHale (Project Manager)

I Carswell (Technical Referee)

Disclaimer

This report has been produced by the Transport Research Laboratory under a contract with Transport Scotland. Any views expressed in this report are not necessarily those of Transport Scotland.

The information contained herein is the property of TRL Limited and does not necessarily reflect the views or policies of the customer for whom this report was prepared. Whilst every effort has been made to ensure that the matter presented in this report is relevant, accurate and up-to-date, TRL Limited cannot accept any liability for any error or omission, or reliance on part or all of the content in another context.

Contents amendment record

This report has been amended and issued as follows:

Version	**Date**	**Description**	**Editor**	**Technical Referee**
1.0	20/10/15	Draft Report – first review	M. McHale	I. Carswell

Contents

Executive summary

The Transport Scotland Pavement Forum (TSPF) was set up in 2007 to improve communication across the road industry and to share and implement best practice quickly. As part of this remit, the TSPF introduced an annual monitoring procedure in 2008 to assess the performance of asphalt surface courses laid on the trunk road network.

The annual survey is undertaken by the Scottish Inspection Panel (SIP), which comprises a cross-industry membership with individuals representing Transport Scotland, the Performance Audit Group (PAG plus), the Mineral Products Association (MPA) Scotland and TRL. The visual condition of the surface course, or surface treatment, is assessed by the SIP team to record its condition at the time of inspection. The results are gauged against previous surveys of materials of a similar age. The survey team also record any features that are likely to influence the long-term performance of the surface course and to establish initial causes and typical modes of failure.

Transport Scotland's pavement management system, IRIS, was used to provide information on materials laid during the 2013/14 surfacing season. In total, 47 two-year-old schemes were selected for inspection, representing around 37% of the road schemes completed in 2013/14. Schemes were chosen to represent a range of sites in terms of climate, terrain, geographical location, traffic loading and surfacing type. The surface courses comprised Thin Stone Mastic Asphalt (TSMA), Thin Asphaltic concrete (TAC) and TS2010.

The 2015 SIP survey assessed 85% of the two-year-old surfacing sites to be defect free and performing very well. A comparison with the SIP 2008-2014 surveys showed the surface courses examined in 2015 received the highest ever percentage of *Excellent* and *Good* markings. Only three sites (6% of total) were recorded to exhibit aggregate loss which is historically the most common defect. This noteworthy reduction in aggregate loss is very encouraging, particularly in terms of optimizing long-term durability. Only one of the 2015 sites was noted to exhibit some type of joint defect, this compares to four sites in 2014 and seven sites in 2013. Ninety-three percent (13 out of 14 sites) surfaced with TS2010 were assessed as either *Excellent* or *Good* by all the panel members. An examination of data based on site stress showed that there is a trend towards specifying smaller stone aggregate sizes on highly stressed sites and in general the mixtures containing smaller stone sizes are performing well. Poor maintenance and defective drainage was witnessed at two sites.

Based on the observations and results of the 2015 SIP survey, several recommendations are made, including reviewing maintenance strategies, investigating preservation treatments and continuing visual inspections to ensure positive changes are being implemented and maintained. Future visual inspections are also proposed to provide information for asset management purposes, life-cycle planning and demonstrating value for money.

1 Introduction

The Transport Scotland Pavement Forum (TSPF) was created in 2007 to improve communication across the road industry and to share and implement best practice quickly. One early concern that was brought to the attention of the TSPF was the poor performance of new surface courses laid on the trunk road network. The Scottish Inspection Panel (SIP) was therefore established by the forum in 2008 with a remit to provide an annual indicator of the performance of surface courses and to recommend improvements if appropriate. The SIP team comprises a group of widely experienced asphalt experts who represent a cross-section of the asphalt industry (Figure 1.1). Team members are selected to represent Transport Scotland, the Performance Audit Group (PAG plus), the Mineral Products Association (MPA) Scotland and TRL. The SIP team utilise an established visual assessment procedure to score the condition of surface courses and record any features that appear to affect the service life of the material.

Figure 1.1 Scottish Inspection Panel

1.1 Visual assessment

Each year the SIP team assess the visual condition of a random selection of surface courses, or surface treatments. The results are gauged against previous surveys of materials of a similar age. The survey team also record any features that are likely to influence the long-term performance of the surface course and to establish initial causes and typical modes of failure. In addition to assessing the early life performance, the SIP team also assess older sites to estimate the typical service life of a surface course. The latter is typically carried out every two to three years and is required for asset management purposes, life-cycle planning and demonstrating value for money.

This report describes the results of the 2015 survey. It documents the current performance of asphalt surface courses recently laid on the trunk road network and compares the results with previous surveys to identify any trends. The report also includes recommendations to improve the performance of surfacing on the trunk road network.

2 Site inspections

2.1 Site selection

2.1.1 Two-year-old sites

Transport Scotland's pavement management system, IRIS, was used to provide information on materials laid during the 2013/14 surfacing season. Forty-seven schemes were selected for inspection, representing around 37% of the 128 road schemes completed in the 2013/14 surfacing season. Schemes were chosen to represent a range of sites in terms of climate, terrain, geographical location, traffic loading and surfacing type. The surface courses assessed in 2015 comprised Thin Stone Mastic Asphalt (TSMA), Thin Asphaltic concrete (TAC) and TS2010.

All the surfacing schemes selected for inspection had been in service for around two years. The actual age of each site varied between 17 and 29 months. This is due to the surfacing season typically running from April to March, the full extent of the financial year.

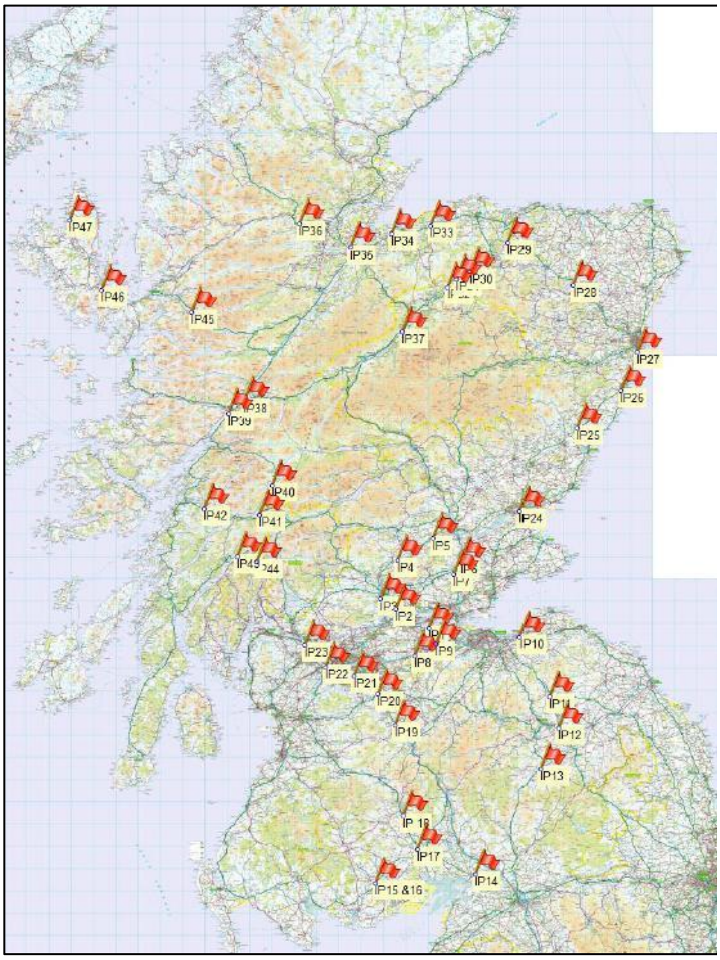

Figure 2.1 Location of sites

Key: two-year-old sites

The nominal period of two years is selected as it provides a good indicator of the likely future performance of a surfacing. If the surfacing is free of defects at this period, experience has shown that it is likely to provide a good service life.

2.2 Inspected sites

For the purposes of retaining supplier anonymity, all sites inspected have been allocated specific acronyms throughout the report, e.g. IP1, IP2, etc. In certain instances the site assessed is subdivided into separate parts and this is denoted by a subscript, e.g. IP3a. This is typically done when the site contains areas that are subject to different levels of traffic stress, e.g. sites that contain a tight bend or busy junction; and where performance between lanes (dual carriageways and motorways) is observed to be significantly different.

The sites inspected, including age at inspection, surfacing type, and traffic stress level, are shown in Table 2.1.

Table 2.1 Inspected sites

Site No.	Age (yrs.)	Type	Stress Level	Site No.	Age (yrs.)	Type	Stress Level
IP1	1.6	TAC	L	IP26	2.0	TAC	M
IP2a	1.8	TAC	L	IP27a	2.2	TS2010	M-H
IP2b	1.8	TS2010	L	IP27b	2.2	TS2010	M-H
IP3	2.0	TS2010	L	IP28	2.0	TSMA	M
IP4	1.6	TAC	L-M	IP29	1.9	TS22010	L
IP5	2.0	TAC	M-H	IP30	1.6	TAC	M
IP6	1.5	TS2010	L-M	IP31	1.5	TSMA	L
IP7	1.7	TAC	L-M	IP32	1.8	TSMA	L
IP8	1.4	TS2010	M-H	IP33	2.0	TSMA	L
IP9	2.2	TS2010	M-H	IP34	1.9	TSMA	M
IP10	2.4	TAC	M	IP35	1.8	TSMA	M-H
IP12	2.3	TSMA	M	IP36	1.5	TSMA	M
IP13	1.9	TAC	L	IP37	2.2	TSMA	L-M
IP14	1.9	TS2010	L	IP38	1.9	TSMA	L
IP15	1.8	TS2010	M	IP39	2.2	TSMA	L
IP16	1.8	TS2010	L	IP40a	2.1	TSMA	L-M
IP17	1.9	TAC	L	IP40b	2.1	TSMA	L-M
IP18	1.8	TAC	M	IP41	1.7	TSMA	L
IP19	2.0	TS2010	M	IP42	1.5	TSMA	L
IP20	1.9	TS2010	H	IP43	1.5	TSMA	L-M
IP21	1.8	TS2010	M-H	IP44	2.2	TSMA	M-H
IP22	2.0	TS2010	M-H	IP45	2.3	TSMA	M
IP24	1.5	TAC	H	IP46	2.0	TSMA	L
IP25a	1.7	TAC	M	IP47	2.0	TSMA	L

KEY:

TSMA - Thin stone mastic asphalt with unmodified bitumen with added fibres

TAC - Thin asphaltic concrete with polymer-modified bitumen

TS2010 (TSIA No 35, 2010) - comprises stone mastic asphalt with a minimum content of polymer-modified bitumen and added fibres (*7.1% for 6mm; 6.7% for 10mm, and 6.3% for 14mm).*

Stress Level: L – Low stress site; M – Medium stress site; and H – High stress site.

2.3 Inspection method

The sites were assessed visually and ranked in accordance with the TRL Inspection Panel Methodology (McHale *et al*, 2011). Full details of the method of inspection, including the meaning of each mark and defect suffix, are described in Appendix A. The assessment attributes a mark from a 7 point scale (Table A2), and where appropriate, defect suffixes are also apportioned to each site (Table A1). The method has been adapted to suit the requirements of the SIP survey and to obtain best value from the data.

3 Visual condition

3.1 Results

The visual assessment results for the 2015 inspection are summarised in Table 3.1. In most instances the panel mark represents the average of seven individual assessments.

Table 3.1 Mean visual assessment results, 2015

Site No.	Type	Stress Level	Agg. size	Panel Mark	Site No.	Type	Stress Level	Agg. size	Panel Mark
IP1	TAC	L	0/14	G	IP26	TAC	M	0/10	E/G
IP2	TAC	L	0/14	M -	IP27a	TS2010	M-H	0/6	E/G
IP2a	TAC7	L	0/14	G	IP27b	TS2010	M-H	0/10	G
IP3	TS2010	L	0/10	E	IP28	TSMA	M	0/10	E/G
IP4	TAC	L-M	0/10	M/A -v	IP29	TS22010	L	0/10	E/G
IP5	TAC	M-H	0/10	E	IP30	TAC	M	0/10	G
IP6	TS2010	L-M	0/10	E	IP31	TSMA	L	0/10	G
IP7	TAC	L-M	0/6	E/G	IP32	TSMA	L	0/10	G jo
IP8	TS2010	M-H	0/10	E	IP33	TSMA	L	0/10	E
IP9	TS2010	M-H	0/10	G	IP34	TSMA	M	0/10	E/G
IP10	TAC	M	0/10	M +v	IP35	TSMA	M-H	0/14	E
IP12	TSMA	M	0/10	E	IP36	TSMA	M	0/14	G
IP13	TAC	L	0/10	G/M -	IP37	TSMA	L-M	0/14	E/G
IP14	TS2010	L	0/10	E/G	IP38	TSMA	L	0/14	E/G
IP15	TS2010	M	0/10	E	IP39	TSMA	L	0/10	E/G
IP16	TS2010	L	0/10	E/G	IP40a	TSMA	L-M	0/14	E/G
IP17	TAC	L	0/10	E	IP40a	TSMA	L-M	0/14	E/G
IP18	TAC	M	0/10	G	IP41	TSMA	L	0/14	G
IP19	TS2010	M	0/10	E	IP42	TSMA	L	0/14	G/M v
IP20	TS2010	H	0/10	E/G	IP43	TSMA	L-M	0/10	G
IP21	TS2010	M-H	0/10	E	IP44	TSMA	M-H	0/14	G/M*
IP22	TS2010	M-H	0/10	G/M +	IP45	TSMA	M	0/14	E/G
IP24	TAC	H	0/6	E/G	IP46	TSMA	L	0/14	E/G
IP25a	TAC	M	0/10	E/G	IP47	TSMA	L	0/14	E/G

Colour coded results: Green = E–G; Amber = G/M, M, M/A; and Red = A or less.

**No consistent fault marked therefore no suffix mark was given.*

3.2 Assessment of early-life performance

The mean visual condition marks for the 2015 survey have been plotted in Figure 3.1 for the three surfacing types inspected. The line drawn on Figure 3.1 represents an idealised linear deterioration with time for the surfacing based on the Highways Agency research (Nicholls *et al*, 2010), i.e. typical service lives for TSMA and TAC.

3.2.1 Two years in service

A suggested standard to provide a reasonable design life is the condition that a surfacing should be assessed as '*Good*' or better after two years in service. If this criterion is met, around a 13 year service life is anticipated based on research (Nicholls *et al*, 2010). This estimate can vary depending on factors such as nominal aggregate size, traffic intensity and stress levels.

A summary of the average panel marks for the 2015 survey is shown graphically in Figure 3.1. The SIP 2015 sites that were considered to be performing well have been circled in Figure 3.1. All of these sites (85%) were assessed by the panel as being E or G. Fifteen percent of the sites were given assessment scores of *Good/Moderate*, *Moderate* and *Moderate/Acceptable*.

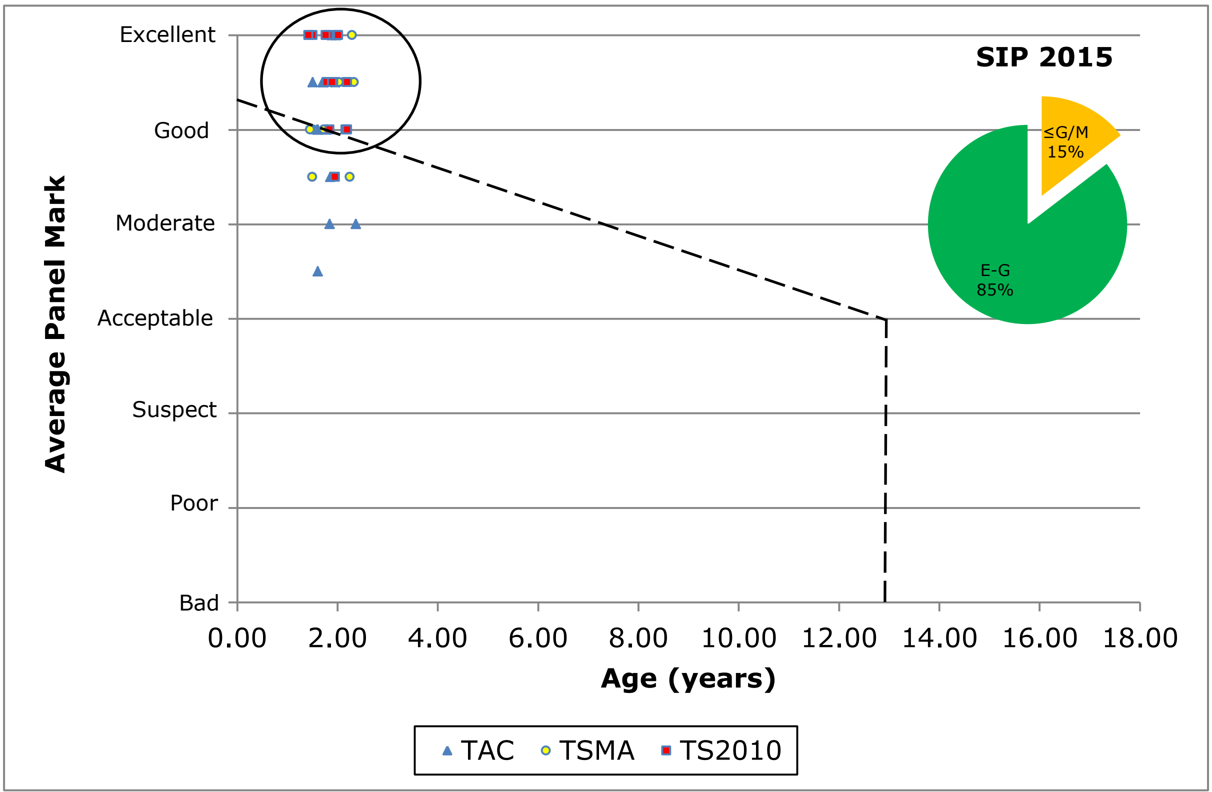

Figure 3.1 Average visual condition markings

3.3 Comparison with previous surveys

A comparison of the breakdown of average survey markings for all SIP surveys undertaken to date is shown in Figure 3.2. The surface courses examined in 2015 (laid in the 2013/14 surfacing season) received the highest percentage of E and G markings since the surveys started in 2008.

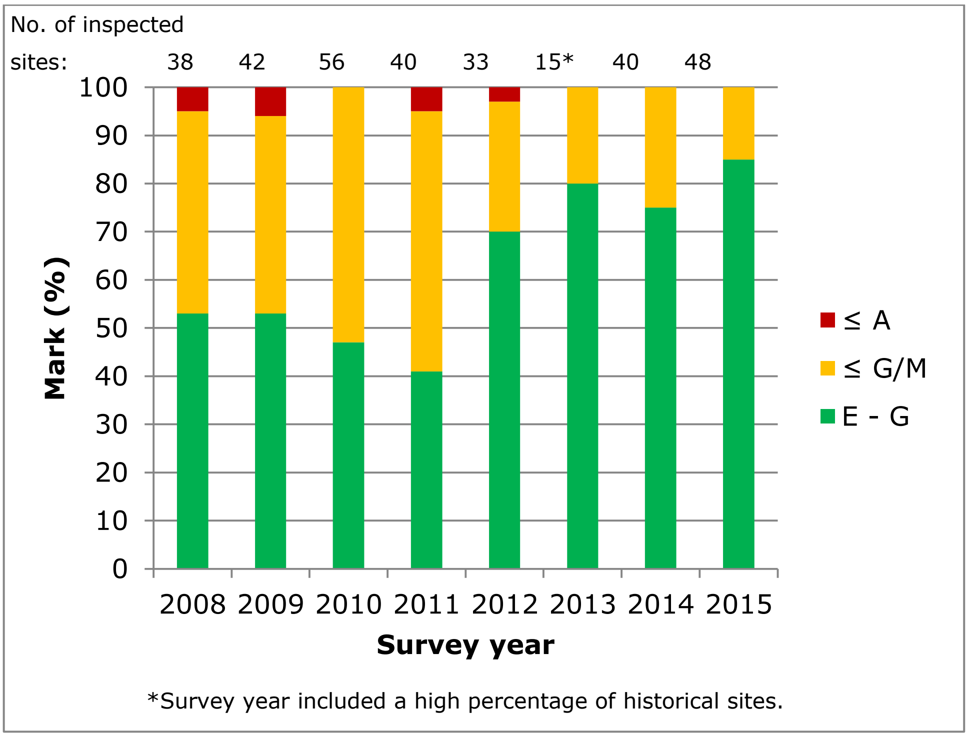

Figure 3.2 Comparison of average markings for SIP2008-SIP2015.

3.3.1 Recorded defects

The proportion of sites exhibiting defects over the last eight SIP surveys is presented in Figure 3.3. Compared to previous surveys, the 2015 survey recorded the lowest number of visual defects. Eighty-five percent of the 2015 sites were assessed as being defect free.

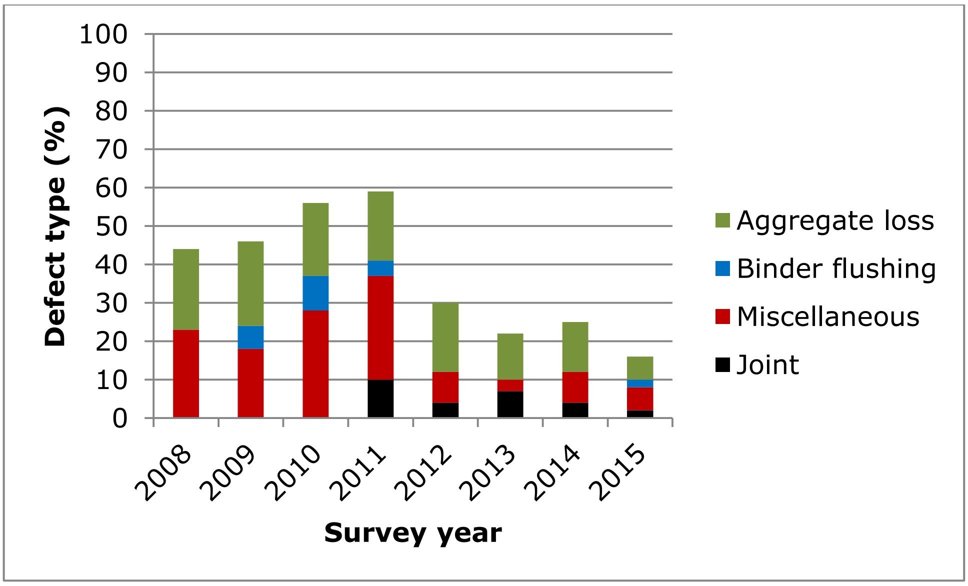

Figure 3.3 Comparison of recorded defects for SIP surveys

Historically, aggregate loss (coded green) has been the most common defect recorded by the SIP team and efforts to reduce its occurrence have previously been unsuccessful. It can be seen from Figure 3.3 that the percentage of aggregate loss remained reasonably constant between the years 2008-2014. However, in 2015 only three sites (6% of total) were recorded to exhibit this defect (Figure 3.4). This noteworthy reduction in aggregate loss is very encouraging, particularly in terms of optimizing long-term durability. Possible reasons for this improvement are discussed in Chapter 4.

Figure 3.4 Aggregate loss at IP4

Miscellaneous defects (coded red) were seen to be at a similar level to 2014. These defects are related to features such as material variability and variability with traffic intensity.

Joint defects (coded black) have only been recorded as a separate defect since 2011. They are used to denote the presence of an open or a deteriorated joint. Previously they were typically noted or included under aggregate loss if the joint was fretted or appeared 'open'. Only one of the 2015 sites was noted to exhibit some type of joint defect.

Binder flushing (coded blue) occurred on only one site.

4 Discussion

The results and data, along with observations made by the 2015 SIP survey team, are discussed below.

4.1 Introduction of TS2010

The TS2010 surface course specification (TSIA No. 35, 2010) was introduced at the end of 2010. As part of controlling the introduction to this new specification, asphalt suppliers have been asked to undertake Transport Scotland's three-stage TAIT approval process. Successful completion of this process permits asphalt manufacturers to supply the material on the trunk road network. As a result, 15 of the sites visited in 2015 comprised material designed and manufactured to the TS2010 specification. This represented 31% of the SIP 2015 survey sites.

4.1.1 Performance and influence of TS2010

Figure 4.1 shows that 13 of the 14 sites surfaced with TS2010 were assessed as either E or G by all the panel members. One site (representing 7% of the TS2010 sample) was assessed as G/M+. The site was marked at a lower level owing to the presence of some binder flushing which should not occur. However, the flushing was not thought to be of major concern owing to the presence of grit which is required as part of the TS2010 specification. Flushing can potentially reduce the skid resistance of a surface course.

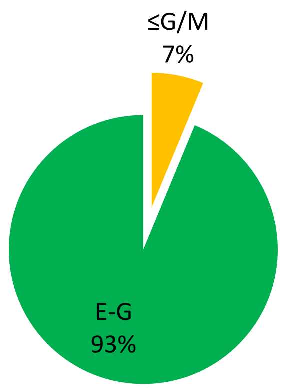

Figure 4.1 TS2010 average markings

It is clear that the high marks assigned to the TS2010 have contributed to the best overall marks being reported to date. The introduction of the TS010 material appears to have made a major impact on reducing the amount of sites that exhibit aggregate loss. The TS2010 is a dense material which presents a close-knit surface appearance (Figure 4.2). However, it cannot in itself explain the significant reduction seen in aggregate loss across other non-TS2010 sites. It is likely that the road industry have acknowledged the need to close up the appearance of surface courses in general following the introduction of TS2010 and this is reflected in this year's results.

Figure 4.2 TS2010 at IP3 (mark E)

4.2 Performance on highly stressed sites

A recommendation based on the findings of a previous SIP survey (McHale, 2013) was that the site stress level of surfacing scheme needs to be reviewed in order to select the most appropriate material in terms of stone size. It had been observed that the rate of deterioration is strongly influenced by the level of stress applied to a surface course, e.g. turning and cornering manoeuvres, and heavy braking. Mixtures containing smaller nominal stone aggregate stone sizes were seen to perform better than larger stone sizes. In an attempt to document the performance of materials laid on highly stressed sites an estimation of the site stress level was included in the SIP survey process.

4.2.1 Site stress level

The assessment of site stress level by the SIP team is made on the section of surfacing being assessed. High traffic flows in isolation do not necessarily attract a high stress allocation (H). Emphasis is put on factors that relate to the geometry of the site, such as horizontal and vertical alignment, and the presence of junctions. These features are considered to generate the highest braking, turning and cornering stresses. Typical examples of site stress levels are as follows:

- Straight, flat section – Low (L)
- Bends and/or gradients – Medium (M)
- Bends and/or gradients with high traffic volumes – Medium to High (M-H)
- Junctions, roundabouts – High (H)

Figure 4.3 shows the performance of different mixtures, based on nominal aggregate size, on sites that were assessed to be Medium-High (M-H) or High (H) in 2015 and 2014. The figure clearly shows that there is a trend towards specifying smaller stone aggregate sizes on highly stressed sites and in general the smaller stone sizes are performing well (Figure 4.4).

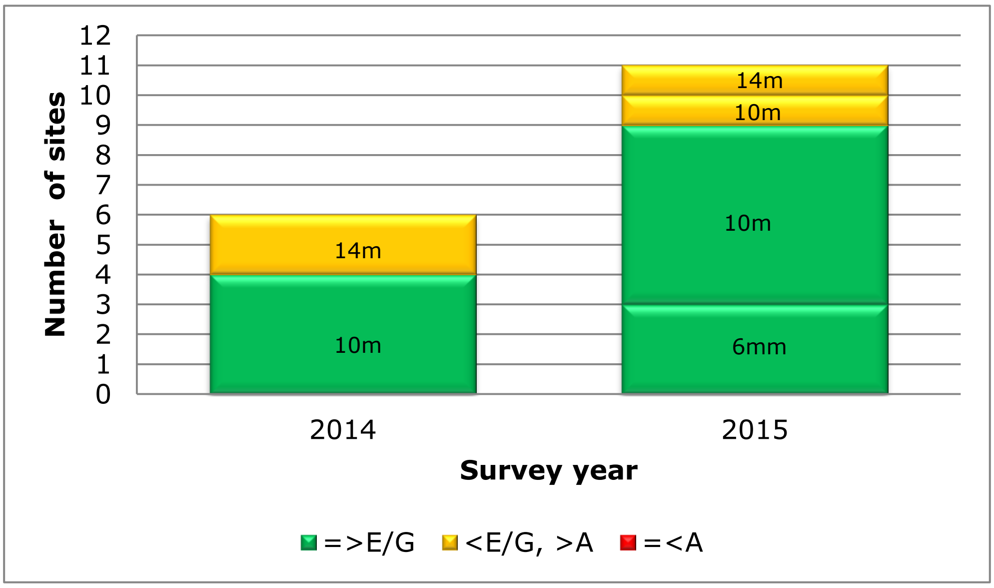

Figure 4.3 Performance of different mixtures on highly stressed sites

Figure 4.4 Site IP 5 (TAC, 0/ 10 mm) on stress level M-H (mark E)

4.3 Performance and aggregate size

Previous analyses of defects associated with 0/14 mm mixtures revealed that they commonly exhibit aggregate loss. Figure 4.5 shows the distribution of nominal aggregate mixture size in combination with average panel mark. The seven sites (15%) that exhibited some defect are shown in amber. A breakdown of these sites reveals that three contained 0/14 mm mixtures and four 0/10 mm mixtures. It is encouraging to note that only one of the 0/14 mm sites was marked down for aggregate loss in the 2015 survey. Overall, 77 % of the 0/14 mm sites (10 sites) were defect free which is an improvement on previous years. This is likely to be a function of suppliers closing up the surface appearance and designers restricting the use of 0/14 mm mixtures to low and medium stress sites.

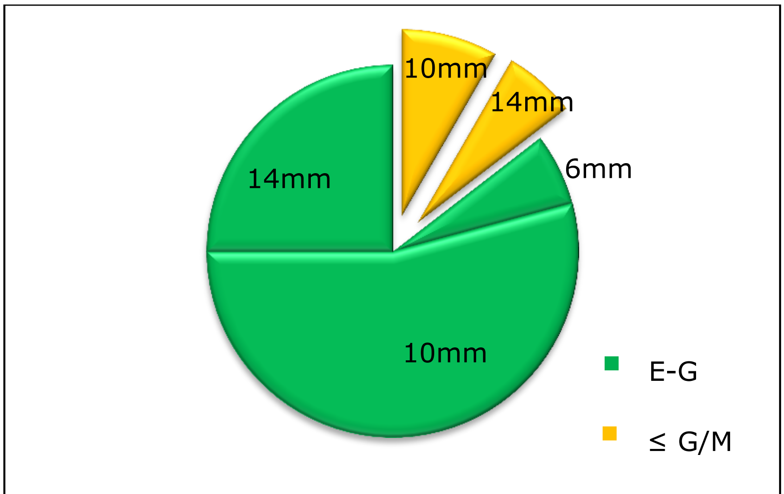

Figure 4.5 Distribution of aggregate size for all 2015 SIP sites

In addition, it was noted during the SP15 survey that the TSMA and TAC materials had a much 'tighter' (denser) appearance which gives greater confidence in their potential to provide longer term serviceability.

4.4 Workmanship

Efforts to promote the importance of forming high quality joints appears to be paying dividends in that only one of the 2015 SIP sites was marked down as having poor joint construction. This compares to four sites in 2014 sites and seven sites in 2013 recording some type of joint defect. The latest result is very encouraging as it will improve the long-term performance of the surface course and protect the underlying pavement construction from the ingress of water.

4.5 Drainage

In general drainage on sites located on the busier parts of the road network appeared to be well maintained. However, two incidences of defective drainage were noted on the more rural parts of the network. The installation - of what appeared to be part of a new drainage improvement - on Site IP29 was not working (Figure 4.6). On Site IP30 a gully was observed to be totally choked and overgrown with vegetation (Figure 4.7). It should be stressed that the service life of the surface course and underlying pavement layers will be reduced if drainage is not properly maintained.

Figure 4.6 Defective drainage (IP29)

Figure 4.7 Choked gully (IP30)

4.6 Miscellaneous

4.6.1 *Part repair*

Only discontinuous sections (patches) of the slow lane at IP25 had been repaired (Figure 4.8). It is likely that the basis for this decision was based on funding constraints. However, the remaining surfacing was observed to be in a very poor condition and two potholes had resulted. It is possible that the poorly deteriorated and clearly permeable

Figure 4.8 Part repair (IP25)

material could prematurely damage the new inlay. This should be borne in mind when adopting this strategy for repairs.

4.6.2 Surface dressing after treatment

Figure 4.9 Treated surface dressing

The SIP team inspected a spray on road preservation treatment (Figure 4.9) that is designed to prolong the life span of surfaced dressed roads by further securing the chippings to improve chip retention. Limited information was available but it is understood that a specially formulated polymer modified bitumen emulsion is applied to the new dressing by using the conventional spray tankers. The SIP team assessed the current condition of the treatment as *Good. S*urface dressing sites assessed previously by the panel on the trunk road network have not been successful. It is possible that a technique such as this may provide benefits such minimising the risk of early failure due to stripping.

5 Findings

As part of the 2015 SIP survey, 47 two-year-old schemes were selected for inspection. This represented around 37% of the road schemes completed on the Scottish trunk road network in the 2013/14 surfacing season. Schemes were chosen to represent a range of surfacing in terms of climate, terrain, traffic and surfacing type. The main findings of the survey were as follows:

- The panel assessed 85% of the two-year-old surfacing sites to be defect free and performing very well.
- A comparison with the SIP 2008-2014 surveys showed the surface courses examined in 2015 received the highest ever percentage of *Excellent* and *Good* markings.
- Only three sites (6% of total) were recorded to exhibit aggregate loss which is historically the most common defect. This noteworthy reduction in aggregate loss is very encouraging, particularly in terms of optimizing long-term durability.
- Only one of the 2015 sites was noted to exhibit some type of joint defect, this compares to four sites in 2014 and seven sites in 2013.
- Ninety-three percent (13 out of 14 sites) surfaced with TS2010 were assessed as either *Excellent* or *Good* by all the panel members.
- An examination of data based on site stress showed that there is a trend towards specifying smaller stone aggregate sizes on highly stressed sites and in general the mixtures containing smaller stone sizes are performing well.
- Poor maintenance and defective drainage was witnessed at two sites.

6 Recommendations

Based on the observations and results of the 2015 SIP survey, the following recommendations are made:

- The results of the 2015 survey should be disseminated widely to encourage the good practices being observed and share the positive impact of recent initiatives such as the introduction of TS2010.
- The timely maintenance and monitoring of drainage systems should be promoted to ensure road user safety and prolong and enhance pavement durability.
- Care should be exercised in adopting strategies to save money based on partial repairs.
- Preservation treatments that minimise the risk of early failure of surface dressing should be investigated further.
- The results from the 2015 SIP survey have demonstrated that improvements to surface courses are being made, such as improving durability through the reduction of aggregate loss and achieving better joint construction. With the increased use of TS2010 it is anticipated that further improvements can be made. As such, future visual inspections should be continued to ensure positive changes continue to be implemented.
- It is proposed that older sites be included in the 2016 SIP survey to provide information for asset management purposes, life-cycle planning and demonstrating value for money.

Acknowledgements

The work described in this report was carried out in the Design & Maintenance Group of the Transport Research Laboratory. The author is grateful to Ian Carswell who carried out the technical review and auditing of this report. The assistance of the Scottish Inspection Panel is much appreciated, of which the members of the 2015 survey were the author together with:

Martin McLaughlin	Transport Scotland
Alan Ferguson	Transport Scotland
Angus Bowman	PAGplus (CH2M HILL)
Harry Cant	MPA Scotland
Scott Buchannan	MPA Scotland
Dougie Millar	Consultant materials & QA advisor
Ian Carswell	TRL (Convener)

References

McHale, M J, I Carswell and P Roe (2011). New surface course specification for Scotland. *TRL Report 670.* Wokingham: TRL Ltd.

McHale, M J (2013). Scottish Inspection Panel Report 2013. Published Project Report, PPR687. Wokingham: TRL Ltd.

Nicholls, J C, I Carswell, C Thomas and B Sexton (2010). Durability of thin asphalt surfacing systems. Part 4: Final report after nine years' monitoring**.** *TRL Report TRL674.* Wokingham: TRL Ltd.

TSIA No 35 (2010). Introduction of TS2010 Surface Course Specification and Guidance Notes. Transport Scotland: Standards and Traffic and Economics Branch.

Appendix A Inspection panel methodology

A.1 Selection of Sites

A1.1 The sites shall be selected using the IRIS database and in consultation with Transport Scotland to obtain a selection of sites laid across the whole Transport Scotland trunk road network that are coming up to their warranty period. In addition, further sites may be added at the discretion of Transport Scotland. Prior to the day of any visits, or during the visit if the site has not been visited before, the Convenor or Panel representative shall carry out a dynamic risk assessment for the sites to be visited and be responsible for making arrangements for the provision of any road closures and other precautions necessary to ensure that the inspections can be carried out in a safe and orderly manner. The route of the visit, methodology and risk assessment shall be sent electronically to all panel members in advance of the visits.

A.2 Inspection Panel

A2.1 The Inspection Panel shall consist of members agreed with Transport Scotland and, if appropriate, a local representative from either the Agent Authority and/or a representative from the client or Contracting/supplier side appropriate for the sites(s) to be inspected. The agreed members shall include a representative from TRL, who will act as Convenor. All members shall act in a personal capacity.

A2.2 Members of Panel shall provide details of H&S training they have undergone related to working on or near a highway. Where necessary the Panel Members shall undertake an induction with the Regional Authority responsible for maintaining the highway on behalf of Transport Scotland. Panel members will need to hold a Transport Scotland Motorway Pass. Transport Scotland or their representative shall assess whether there are any deficiencies in the training that will inhibit the Member from being allowed on any or all of the sites and advise accordingly. In addition to the information provided in this document a separate H&S and Environmental Risk assessment is provided for all members of the Inspection team. All members are to confirm that both of these documents have been understood and that they are content with the Risks Assessments prior to commencing inspections.

A2.3 Transport Scotland or their representative, after fixing the date for an inspection, shall inform other members as soon as possible before the inspection. A copy of this method of inspecting road trial sites shall be sent to any potential panel members who have not taken part before so that they can familiarise themselves with it.

A2.4 No Panel Member shall take part in the inspection of a site if they have had an alcoholic drink that day.

A.3 Initial Project Briefing

A3.1 Once the Inspection Panel has assembled, members shall be given an Inspection Panel Member's Report Forms. The itinerary of inspections and layout of each site will be provided in a separate document in advance to each of the panel members. The Convenor shall have an Inspection Panel Convenor's Report Form in addition to his/her Inspection Panel Member's Report Form.

A3.2 If appropriate, the Convenor shall brief members on particular aims of the trial and any implications on the emphasis of that inspection. In particular, the Convenor shall supply a list of any project specific suffixes to be used and their interpretation.

A3.3 The Panel shall agree on the weather conditions prevailing, and record it on their report forms. It is important to note both the weather (e.g. Sunny, Overcast, Raining) and surface condition (e.g. Wet, Drying, Dry) of the site.

A3.4 The panel shall agree on the 'stress' level for each site and categorised as Low (L), Medium (M) or High (H). As an example, H will be commensurate with very heavy traffic flows, long uphill sections (with a high level of HGV traffic) and Junctions with high levels of turning traffic.

A.4 Safety Signing of Vehicles

A4.1 The panel does not generally use closures for the inspections as these are of less than 15 minutes duration. However, if there is a closure in place on the site, not more than two vehicles shall be permitted to park in any closure, with personnel changing vehicles prior to entry when necessary. The preference is for as many people as practicable to be in each vehicle to minimise the number of vehicles in any closure. Inspection vehicles will be marked and equipped in accordance with Traffic Signs Manual, Chapter 8, Part 2: Operations, Section 05. When inspecting any site without a closure the site shall be inspected into the direction of oncoming traffic. Moving onto to the live carriageway shall not be permitted unless a spotter has been arranged whilst the member is in the live carriageway. Note: it is not permitted to go onto any live carriageway on motorways and high speed dual carriageways, or when a lane closure has been provided.

A4.2 Where an inspection is to be undertaken from a hard shoulder of a motorway, without a closure, only two vehicles will be permitted and they shall park with wheels facing the verge and no more than 100m apart. The inspection shall take place from the hard shoulder between the two vehicles. The panel shall inspect the site from the forward vehicle towards the rear vehicle (i.e. facing the traffic).

Motorway site inspections should take place when the traffic flows are at reduced levels. These surveys should therefore be planned to take place outside of peak traffic hours. Should the traffic flows be considered very high at the time of arrival on site, the inspection should be deferred.

A4.3 Where parking availability is not known prior to arrival on site a suitable location off carriageway shall be sought so that access/egress from vehicles is safe and the vehicles do not inhibit the safety of other motorists or pedestrians.

A4.4 When sites have been visited previously, the previous risk assessment may be used but should be reassessed in case circumstances have changed. When visiting sites for the first time, the general risk assessment can be used, but any specific points noted and kept for future reference. Any amendment to specific risk assessments shall be recorded.

A4.5 All panel members shall confirm their agreement and register their understanding of the risk assessment and H&S requirements.

A.5 Personal Protection Equipment

A5.1 All Panel Members shall wear a high visibility long-sleeved vest or coat to BS EN 471, Table 1: Class 3 or better, that is done up during all inspections.

A5.2 In a closure, all Panel Members shall also wear safety footwear and, if the site is live with work being undertaken at high level or if otherwise required by those providing the traffic management, a helmet.

A5.3 Any Panel Member not properly attired shall be asked to leave the site until the situation is rectified to the satisfaction of the Convenor.

A.6 Inspection

A6.1 The Panel shall walk each section in turn, studying the condition as closely as practicable. Members shall stop and look back at intervals along each section so as to view the surfacing with the light in a different direction.

A6.2 As far as practicable, Panel Members shall stay together as a group when inspecting and not get extended which could be distracting to road users. The Panel shall walk, in order of preference if available:

a) within any closure provided;
b) on a footpath alongside the section of the road being inspected;
c) with a lay-by alongside the section of the road being inspected;
d) on the verge alongside the section of the road being inspected; or
e) along the road being inspected.

Panel Members shall walk towards the oncoming traffic wherever practicable.

A6.3 Localised areas that have been subject to untypical mechanical or chemical actions (e.g. damage caused by a vehicle running on its wheel-rim or by a diesel spillage) shall also be ignored. If variations are on a larger scale, such as between wagon loads when laid, the section shall be assessed in sub-sections. TRL shall try to establish the reasons for any large differences by checking the laying records and the compositional analysis at the appropriate time.

A6.4 Members shall record on their Inspection Panel Member's Report Form a mark for each section soon after inspecting it. Whilst members can discuss points of interest noted along the section, they shall not reveal how they intend to mark that section until all members have recorded their individual mark. Marks will general be collected by the convenor after each site has been inspected. Where the inspections are from the hard shoulder of the motorway the marks will be collected after moving off site to minimise the time on the hard shoulder.

A.7 Marking

A7.1 Each section shall be assessed on the basis of its current serviceability irrespective of the elapsed time since it was laid. In considering the serviceability of the surfacing, the aspects in Table 1 for the specific type of surfacing shall be considered, together with any project related aspects given in the initial briefing. If any of the aspects are evident to a significant degree on the section, the relevant suffix from Table A1 shall be applied to the basic marking. Suffix v shall not be applied to a section marked as t, nor + to one marked –.

A7.2 Joints are a particular issue with respect to initiation of fretting and subsequent failure of the surfacing so additional suffices have been added to record the presence of open joints and joints where fretting and ravelling have occurred. Note: an open joint (jo) refers to joints that are clearly susceptible to the ingress of water and have been inadequately sealed at the time of construction.

A7.3 Once any appropriate fault suffixes have been assigned, the basic mark shall be allocated from the 7-point scale in Table 2. Intermediate markings between scales shall not be given. When considering the markings, any sections that warrant a suffix cannot have a basic mark of G or better (one exception is G jo where the mat itself is considered to be in a good condition but the joint considered open (see above).

TABLE A1 - Revised Fault Suffixes

Suffix	Description	Material type	Notes
v	variable	all	Random variations from point to point within the section only, not "traffic laning" or of obvious variations from load to load.
t	variability with traffic intensity	all	Marked transverse differences caused by variations in traffic intensity between lanes.
+	fatting up	macadam, surface dressing	
–	loss of chippings	hot rolled asphalt	
	loss of aggregate	porous asphalt, macadam, thin surfacing, slurry surfacing	
	loose chippings	surface dressing	
	wearing causing substrate to “grin” through	high-friction surfacing	
j_o / j_f	Joint issue	j_o = *open joint** / j_f = fretting at joint	
f	fretting of mortar	hot rolled asphalt	
g	growth of vegetation	porous asphalt	
p	ponding	porous asphalt	
d	de-lamination from substrate	porous asphalt, thin surfacing, surface dressing, high-friction surfacing, slurry surfacing	
s	stripping	all except high-friction surfacing	
c	cracking	hot rolled asphalt, macadam, thin surfacing, high-friction surfacing	

**Applies to a poorly constructed joint, susceptible to the ingress of water and potential for early life failure*

A.8 Overall Assessment

8.1 When each member has reported his individual result, the Convenor shall convert them using the transformation:

E = 6; *G* = 5; *M* = 4; *A* = 3; *S* = 2; *P* = 1; and *B* = 0.

TABLE A2 - Basic 7-Point Scale

<table>
<tr><th colspan="2">Mark</th><th colspan="2">Description</th></tr>
<tr><td>E</td><td>(excellent)</td><td>no discernible fault</td><td rowspan="4">Termed satisfactory</td></tr>
<tr><td>G</td><td>(good)</td><td>no significant fault</td></tr>
<tr><td>M</td><td>(moderate)</td><td>some faults but insufficient for serious problem</td></tr>
<tr><td>A</td><td>(acceptable)</td><td>several faults but would usually be just acceptable</td></tr>
<tr><td>S</td><td>(suspect)</td><td>seriously faulted but still serviceable in the short term</td><td rowspan="3">Termed unsatisfactory</td></tr>
<tr><td>P</td><td>(poor)</td><td>requires remedial treatment</td></tr>
<tr><td>B</td><td>(bad)</td><td>requires immediate remedial treatment</td></tr>
</table>

8.2 The mean of the individual results shall be calculated to one decimal place and converted back into the Panel marking, rounding off as follows:

.8 to .2 Basic marking with symbol/s; and

.3 to .7 Intermediate marking with symbol/s.

8.3 Suffixes shall be applied to the Panel marking when at least a third of the Panel members, rounded up, give it on their individual markings provided:

- the basic Panel marking is not *G* or better, as then no suffixes can be applied (with the exception of j_o); and
- both *v* and *t*, or both + and –, are given, when only one of each pair can be applied to the basic Panel marking. The choice shall be based on the number of times the different suffixes occur on individual markings (in the case of a tie, the Convenor shall decide).

8.4 If the Panel consists of less than 6 members at an inspection, this fact shall be noted when reporting the results.

A.9 Confidentiality

Whilst the Panel marking can be reported, the individual marks allocated by members of the Panel shall be treated in confidence. This limitation is to allow members to make judgements as to the condition of the trial sections without consideration.