

Inspection of Crossings in Glasgow Central

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Executive Summary

*On the 3rd of June 2012 **Issue 4** of the Network Rail Standard NR/L2/TRK/1054 – “Inspection, maintenance and repair procedures for cast, welded and fabricated crossings in the track” was released, with a compliance date of 23rd September the same year. This paper summarises the fundamental changes this issue of the standard brings to crossing inspection, maintenance and repair with specific reference to experience within Glasgow Central Track Maintenance Engineer Section. A large scale crossing renewal project currently underway in Glasgow Central, driven by the condition of the crossings, is briefly described. In conclusion, a short critique of the standard itself is given from the author’s point of view.*

This paper is written by Tom Smith who is the Assistant Track Maintenance Engineer for Glasgow Central section and as part of this role has managed the introduction and delivery of the new TRK/1054 standard within that section.

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1 – Introduction

NR/L2/TRK/1054 **Issue 4** governs the inspection regime for all cast and built up crossings within Network Rail infrastructure and specifies the timescales and repair methods for any defects which may be discovered. The standard is designed to identify defects at an early stage for safety reasons and so that economic repairs can be completed prolonging the lifespan of the crossing.

Issue 2 of the equivalent standard came into force in 2003 under the reference RT/CE/S/054. **Issue 3** was released in December 2011 but superseded by **Issue 4** shortly afterwards, with the newest issue having a compliance date of 23rd September 2012.

2 – Fundamental changes and implications

As with any standard change there are a large number of changes between old and new, with the two major implications considered by the author to be:

1. Introduction of the requirement to inspect all types of crossing for wear and batter using a straight edge
2. Imposition of timescales for repair/removal for all defect types

Issue 2 mandated visual inspection for defects within cast manganese crossings, because ultrasonic testing can not be carried out on this material. **Issue 4** adds a visual inspection for wear and batter for all crossing types, aiming to identify wear early when weld repair is economical and the lifespan of the crossing can be extended. Therefore all built-up, normal quality crossings had to be added into the 1054 inspection regime. Because most of these crossings have been in the track for considerable periods of time without this inspection regime, it is inevitable that a high proportion of them will now be worn well beyond the actionable stage and a high volume of repairs will result.

In **Issue 2**, actions on discovery of a defect involved combinations of increased monitoring, watchmen and emergency speed restrictions. No timescale for repair was specified although the minimum action code table had a footnote stating that all defects should be weld repaired as soon as possible. In practice this often led to defects being left in the track under increased monitoring. This could seem the most cost effective option and not be considered dangerous as manganese steel has a low rate of propagation - cracks have been known to remain in crossings for years without visible propagation. **Issue 4** introduces removal timescales in addition to increased monitoring regimes and therefore provides for a more effective system to ensure that defects are removed in good time. For selected defects there is no increased monitoring required and only a timescale for repair is imposed.

3 – Application of Issue 4 within TME Glasgow Central area

The Glasgow Central section covers the south of Glasgow, including the approaches to Glasgow Central station where the highest concentration of mainline S&C in Scotland can be found. The 54 inspection plan for the section, compliant with **Issue 4**, includes 332 crossings of which 102 are “built up”. The inspections are completed by a dedicated “Special Inspections” team of two and managed by the Assistant TME.

Issue 4 has been immediately problematic in both the volume of repair work generated and the repair timescales mandated – some of which are exceptionally difficult to meet. For example, if a 25mm deep crack is discovered in the change of section of a crossing **Issue 4** mandates daily inspection and removal within 7 days. This defect cannot be repaired in the track and the time taken to measure, order, receive delivery of, plan and install a new crossing is clearly longer than this. While a stock of strategic spares can be maintained it is impractical, particularly in areas of complex geometry, to cover all crossings.

A total of four national Temporary Non-Compliances (TNCs) were issued soon after the standard went live as implementation issues surfaced. These were ultimately combined into a single derogation applying to the Scotland area. This derogation generally increases the timescales permitted for repair while maintaining the original increased inspection frequency.

Until the Phase 2B/C reorganisation of Network Rail Maintenance in April 2011, a dedicated team of maintenance welders worked on the approaches to Glasgow Central. After the re-org, the approach reverted to an overall pool of welders covering defects and maintenance work as required across the Glasgow Delivery Unit, an area from Mallaig in the north to East Kilbride in the south. The approach to maintaining crossings has migrated from proactive towards reactive - now a time bound defect is often required or else welding resource may be used in other areas.

By the summer of 2013 Glasgow Central section had a total of 35 increased inspections, including 7 daily inspections. This represented a significant cost to the business in additional shifts required to carry out the monitoring and administrative time spent to record them.

4 – Programme of new crossing installations

In 2012 the poor condition of crossings in Central approaches and Rutherglen Corridor was recognised and due to the criticality of these areas for train services a major funding package was approved. A total of 86 crossings will be replaced with a target completion date of 31st March 2014 – 28 of these will be delivered by the TME maintenance teams with the remainder by the Works Delivery organisation.

Crossings have been chosen for replacement based largely on reports from the 54 inspection regime. Where significant defects have been found which require excessive welding resource, TNCs have in many cases been granted on the basis that the cost of weld repair is disproportionate to the risk of leaving the defect in the track until

replacement. This ensures that our limited welding resource is used to attend to crossings which will remain in the track, extending their life span and making significant savings in future replacement costs. To date a total of 8 such TNCs have been authorised.

As an example, Network Rail average unit costs for 2013/14 year to date show that the cost of replacing a crossing is **£16552**, with the average MMA weld repair shift at **£548**. In simple terms, once a crossing requires more than 30 shifts to repair it becomes uneconomical to repair, but it is necessary to consider that any crossing that requiring even half this number of shifts is likely to be in very poor condition and require significant ongoing attention. Some crossings in Glasgow Central have been assessed as requiring 20+ welding shifts to fully repair.

Meanwhile, the cost of an S&C inspection is put at **£32** ignoring the administrative costs of recording it so the total cost of each inspection is around **£50**. Clearly this expense will mount up over time and in occasional cases the cost of continuing enhanced monitoring until the crossing is replaced may approach or exceed the value of a timely repair.

In the case of Glasgow Central many crossings are due to be replaced anyway – in this case generally 10 shifts is taken as the cut off for whether a repair is carried out or a TNC put in place, so long as the risk can be controlled and subject to exceptional individual circumstances

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5 – Summary: plusses and minuses of the new issue

The standard has been difficult to implement and things will continue in that vein for some time to come. The biggest impact on resource in TME Central has been weld repairs but in other more geographically extensive sections then the volume of lipping defects, which has not been actioned as part of a 54 inspection before, has caused problems.

The last issue of the standard unintentionally allowed for defects to remain in the track for an indefinite amount of time, ignored built up crossings and did not impose actions on wear and batter or lipping. The current issue imposes quite onerous timescales on all of the above with the result that workload has rocketed. In Glasgow Central, if it wasn't for the extensive crossing replacements, the workload generated by the new standard would be completely undeliverable with our current resource.

Furthermore, **Issue 4** loses credibility by imposing actions such as a 7 day timescale for un-repairable defects. The average crossing must be inspected once per year, so a defect could be present for tens of weeks before detection – it would not appear to represent an unacceptable risk to allow an achievable timescale for replacement as long as enhanced monitoring is carried out.

It is important to recognise that the standard is supposed to represent where the railway should be in terms of a proactive approach, detecting problems at the earliest opportunity or carrying out maintenance work which prevents any problems in the

first place. This is almost certain to extend asset life, improve safety and ultimately save money.

In summary, the standard has the right idea in moving the approach to maintaining crossings to a proactive, early intervention one. The condition of some of the crossings now being replaced in Glasgow Central demonstrates that we need to improve. However, the standard is perhaps a case of too much too soon. A stepped approach, using two or three successive issues of the standard to impose gradually more onerous actions would have been better, with further consideration of whether the timescales imposed are achievable and whether they really are proportionate to the risk involved.