2.0
Introduction

2.0 Introduction - Level Crossings

The title of this dissertation, *Level Crossings on Rural Railways: Can the railway industry continue to subsidise rural settlements ?* may be controversial; However, level crossings serve no useful purpose to the railway or offer any means of improving the railways' operational ability to provide a public service. In reality, level crossings are a liability for any railway company:

- ❑ they are expensive to install and maintain
- ❑ they introduce uncontrolled risks onto the railway system in the form of the public
- ❑ introduce risks to the public, largely through their own ignorance of the dangers to themselves
- ❑ cause delay to railway users, impeding the timetabled operation of the railway, particularly where level crossings are manually controlled
- ❑ cause delay to road users and pedestrians
- ❑ are difficult to close permanently
- ❑ each public level crossing requires a Level Crossing Order
- ❑ they are regularly placed in the 'too difficult' box

The economic survival of many rural railways is finely balanced. Many such railways rely heavily on public subsidy to enable them to continue to run services that are considered socially necessary. The revenue costs far outweigh the income from customers using the services. Typical 1998 subsidy levels for train operators running rural services are shown in Table 2.1[3]. Revenue costs are high because such railways have the following characteristics;

- ❑ for historical reasons, they are built to heavy rail standards, with the consequent maintenance this entails
- ❑ the services are generally slow and un-attractive to the passenger
- ❑ such railways suffer first in renewal and maintenance cutbacks

[3] Rail Business Intelligence, 18.02.99, Reed Business Publishing.

- some rural areas have numerous level crossings, bringing with them in some places, unnecessarily low line speeds at ABCL, AOCL and Open crossings and the subsequent loss of headway that results. In some cases level crossings form the major infrastructure component of the line concerned, e.g. Sleaford to Skegness, Antrim to Londonderry etc.

Table 2.A

Subsidy levels 1998/9

Subsidy per passenger mile

Train Operator	Subsidy (pence per passenger mile)
Island Line (Isle of Wight)	63.2
Cardiff	33
North Western	35.5
Northern Spirit	23.7
Central Trains	22.7
Scotrail	21.2
Wales & West	13.4

Level crossings were installed to maintain access to a property that was split in half with

Figure 2.1 Westbrook Lane UWG MSL LC near Collingham Lincs. Can such antiquities survive in the commercial railway ? Can an AHB be justified under any circumstances at such a location?

the original construction of the railway. Generally, the railway company had purchased their land from such landowners and undoubtedly, in the 1840s it was more economical

to put in a level crossing and pay for the staff to operate it than it was to build bridges. The situation was probably exacerbated by the low lying and flatter nature of areas of the country in which some of these rural railways exist. The current infrastructure costs of such rural railways could be reduced significantly if level crossings were abolished wherever possible, although the author accepts that there will always be some level crossings.

2.1 The Need for Change

In the 1840s, the politicians of the day legislated that railways in the UK were to be fenced throughout and subsequently insisted that level crossings required gates that fully closed off the road from the railway and vice versa[4]. They also decreed that the railway should meet the cost of level crossings. In the 1840s however, road traffic consisted of

Figure 2.2

Milford open LC, on the Lydd branch, Kent, one of 12 such crossings on this line, each with a 15kmph speed limit and a requirement for the train to stop if necessary.

Not railway friendly!

[4] Highway (Railway Crossings) Act, 1839; Regulation of Railways Act, 1840; Better Regulation of Railways Act, 1842.

nothing more than a few horses and carts. Other countries did not follow Britain's lead and in many cases did not fence their railways.

Little has changed since the 1840s; the railway is still required to pay[5] for the level crossing installation and maintenance, whilst changes in legislation in the late 1950s allowed automation[6], and substitution of gates with barriers, half barriers and open crossings. Many wooden gated crossings remain, all the same, however, due to difficulties and cost in substituting modern equipment and issues surrounding the road layouts. Road traffic however, has increased beyond all expectations the politicians could have dreamed off in the 1840s.

The current political view in the UK is that the 'user pays', although in the case of level crossings, generally speaking, the user does not pay and therefore is effectively being subsidised by the railway company, particularly so in rural areas where the majority of level crossings still exist. Whilst the rights of access should not be extinguished lightly, the expansion of the roads network has largely, overcome the need for such access, with many alternatives being possible today that were not there when the railway was originally constructed. Perhaps, closure of a level crossing should be judged on the basis of the 'user' presenting a properly argued case for retention, with the onus being on the user to prove the continuing need for the level crossing, and if successful, meeting the full, whole life, costs.

Prior to the 1968 Transport Act, the railway infrastructure owner was required to meet the cost of construction, maintenance and improvement of all overbridges, associated approaches and highways crossing the railway. This Act[7] recognised that such costs were an unreasonable burden on the railway infrastructure owner and transferred the responsibility for such costs to the highway authorities, at public expense. This leads to the current practice of bridge costs being met by the 'user' of the bridge span. Thus an

---

5 Level Crossings Act 1983; Level Crossing Regulations 1997; A guide to the Level Crossing Regulations 1997, Appendix 2, page 8, paragraph 2(a), HSE, 1997, ISBN 0 7176 1261 9.

6 Section 40, British Transport Commission Act of 1954 authorised the use of barriers; Section 124, The Transport Act of 1968, gave the Secretary of State the power to require BR to provide barriers at "other than public carriage roads"; Level Crossings Act 1983;

7 Section 116, Transport Act 1968, page 134, Part VIII, Chapter 73, Statutes in Force, HMSO, ISBN 0 11 804653 5.

Figure 2.3

Banbury Lane MCBcctv LC near Northampton, WCML - a crossing that will need closing if Virgin wish to run 225kmph trains.

overbridge supporting the highway is maintained by the highway authority and, an underbridge carrying the railway over a road, is maintained by the railway infrastructure owner. This is a equitable method of ensuring the 'user pays' and could, justifiably, be used as a precedent to transfer level crossing costs to the user.

Those legislators who prepared the Act, must have recognised that level crossings were a drain on railway resources, as Section 117 gave powers to highway authorities to contribute to the cost of level crossings. It did not, however, enforce contributions, and thus the highway authority can refuse to contribute. Section 39 of the 1845 Railway Act[8] says that all crossings by roads should be by overbridges or underbridges, whilst Section 40 of the same Act allows level crossings. Repealing Section 40 of this Act[9] and, perhaps, strengthening Section 39 of the same Act to force level crossing closure or bridge construction, rather than level crossing modernisation may be the way forward, particularly if Section 117 of the 1968 Act was amended to have a similar meaning to Section 116.

---

8 Railway Clauses Consolidation Act, 1845.

9 And any other relevant or associated legislation.

Figure 2.4
Banbury Lane MCBcctv LC near Northampton, WCML;
a difficult case given the hump back canal bridge within a few metres, and the large house to the right of the photograph, and overhead electrification.

Many rural railways in the UK are strewn with level crossings, in some cases two or three crossings within a few hundred metres or so of each other[10]. As early as 1929, the Royal Commission on Transport[11] recognised railways' claims that level crossings were a serious problem and suggested a programme to eliminate crossings and replace them by bridges and tunnels. Automation came in the early 1960s but has never been completed, largely because some crossings are deemed to be in the 'too difficult' to deal with category.

This leaves a situation on the UK mainland of a combination of gated crossings that are un-maintainable, and barriered, controlled or automatic crossings many of which date from the modernisation that took place in the 1960s. Automation was seen as the way forward then as reliable staff to operate level crossings were difficult to recruit and the salaries paid to such staff had risen dramatically after the Second world war.

---

10 Typical example; Maud Foster, Willoughby Road and Pilleys Lane level crossings, near Boston, Lincolnshire.

11 Royal Commission on Transport 1929; Paragraph quoted from paragraph 232, page 70, Report of the Public Inquiry into the Accident at Hixon Level Crossing on January 6th, 1968, Her Majesty's Stationary Office, Cmnd. 3706. ISBN 10 137060 1.

Many of these are due for replacement at substantial cost to the railway. The Hixon[12] and Lockington[13] accidents caused major impact to UK level crossing practice as far as automation was concerned and has undoubtedly caused delay to the modernisation process.

Currently, a typical automatic half barrier level crossing is costing Railtrack something

Figure 2.5

Lambeg, Northern Ireland Railways looking south; a typical, modern re-inforced concrete bridge, representing a typical bridge proposed by the author.

in the region of £0.55m at today's prices[14], excluding their project management costs, with a design life of around 25 years and constant maintenance. Bridges have always been declared as too expensive. However, they have a design life of 125 years or so, and these days are almost maintenance free. No British evidence has been found by the

---

12 Report of the Public Inquiry into the Accident at Hixon Level Crossing on January 6th, 1968, Her Majesty's Stationary Office, Cmnd. 3706. ISBN 10 137060 1.

13 Railway Accident: Report on the Collision and subsequent Derailment that occurred on 26.7.86 at Lockington Level Crossing, HMSO, 1987, ISBN 0 11 550812 4.

14 Statement made on typical, average AHB costs during discussion between author and Roger Dickinson, Railtrack Signal Engineer, East Anglia Zone, regarding level crossing costs during author's estimating work on West Anglia Route Modernisation Feasibility Study.

Figure 2.6

Uttoxeter West MCBcctv; The best type of level crossing possible, permanently closed!

(photograph taken from the new replacement bridge).

author of any studies comparing level crossings against bridges on a level playing field, although the authors of one American Research paper have looked at such a situation and come out in favour of a detailed analysis of each situation, but suggest that grade crossings are, in the main, cheaper[15].

Why should our railways be forced to continue to pay for such level crossings, given that the level crossings only benefit the road user? Perhaps it is time that the legislation was changed in favour of the railway. One of the biggest obstacles is the question of 'right of way', which, to extinguish, requires negotiations with the landowner and subsequently legal sale of the land to the railway company before the level crossing can be abolished. In many cases the railway effectively has a wayleave to cross the land owned by others. If the landowner does not wish to sell, the railway is powerless to act, effectively holding the railway to ransom.

---

15 Evaluating Grade Separated Rail and Highway Crossing Alternatives, R.C. Taggart, P. Lauria, Ernst & Whinney, G. Groat, C. Rees, A. Brick-Turin, De Leuw Cather & Company, National Co-operative Highway Research Program Report No 288, Transportation Research Board, Washington, USA, 1987.

Our friends in the road building industry do not suffer the same problems; they compulsory purchase such plots of land without any qualms as to the owner's historical rights of way.

2.2 The Dissertation

The aim of this dissertation is to compare the typical generic costs of an AHB level crossing (Chapter 6) versus a bridge (Chapter 7) meeting similar road profiles over the design life of a bridge, e.g. 125 years, and to consider other options, including different level crossing control systems, level crossing closure and construction of minimal diversionary roads in some cases. Using Northern Ireland Railways as a base case (Chapter 9), the author's arguments will be applied to their level crossings to see what changes could be made, although it should be noted that costs in Northern Ireland are generally lower than those in mainland Britain. Other issues are also considered, in particular some of the road safety matters that cause danger (Chapter 10). Evidence has been gathered that shows that the public has a relatively low understanding of the Highway Code in relation to level crossings and the Highway Code in general, and this is discussed in (Chapter 5) in detail, with other detail shown in the appendices.

A literature review has been undertaken (Chapter 4) and is also supplemented by an annotated bibliography and suggestions for further reading (Appendices C and D). Conclusions form the final section of the dissertation (Chapter 11) and references are shown throughout the dissertation in the normal manner, numbered sequentially, including the Appendices.

The best level crossing is a closed one!;

Bridges remove the public risks from level crossings, remove all of the headway constraints from the railway and reduce deaths and major injuries attributed to the railway. In addition maintenance is drastically reduced or, in some areas, no longer required at all:

- ❑ Signalling maintenance for the level crossing is totally eradicated.
- ❑ Permanent way maintenance, e.g. tamping machine operation can be carried out without the need to remove the road decking and road closure required to do so.
- ❑ The PW alignment can be improved to suit the maximum line speed rather than be constrained to the road profile.
- ❑ Overhead electrification wiring can be maintained at the optimum height rather than at clearance height thus improving train current collection and reducing 'hard' spots.
- ❑ Third rail traction no longer needs breaks in the conductor rail, thus improving train current collection and minimising the risk of 'gapping' particularly with locomotives.
- ❑ Conversely, an underbridge would necessitate railway maintenance expenditure although this would be substantially less onerous than level crossing maintenance.
- ❑ If the bridge is built over the railway, the bridge design parameters carrying the road are less onerous than for a bridge that carries a railway and also, the maintenance responsibility and bridge ownership would generally pass to the road infrastructure authorities thus removing all maintenance responsibilities from the railway[16].
- ❑ Highway/railway interfaces at road level would be non-existent; road signage and signals would be dramatically simplified or removed;
- ❑ Utility services within the roadway become simpler to maintain as the roadway is now totally removed from the railway environment.
- ❑ all of which will allow the railway company to direct financial resources to making the railway more viable

Whilst this dissertation is specifically looking at rural railways there is a need for some considerable thought in finding alternatives to level crossings. There appears to be an increasing desire to improve line speeds in the UK for train operators such as Virgin and

[16] Statement made by Alastair Duncan, Railtrack Civil Engineer during a meeting to discuss bridge infrastructure on the Channel Tunnel Rail Link, author participating in meeting, 1997. See also reference 5.

GNER. Any increase in line speeds above 125mph/200kmph *requires closure of all level crossings whether public or private, automatic or manually operated.* This will cause some considerable expenditure on lines such as the East Coast Main Line[17]. It is also likely to lead to some vigorous objections from groups representing footpath and bridleway users who are likely to argue that their rights are more important than the railways[18] and who have substantial political support, and from a few landowners who will not relinquish their rights of access.

[17] Railway Safety Principles and Guidance Part 2, Section A, Guidance on the Infrastructure, HMRI/HSE, 1996, ISBN 0 7176 0949 9.

[18] Anecdotal comment made to author by Stephen Gaskill, HM Principal Inspecting Officer of Railways, HMRI, relating to a discussion he had with a member of the public at Railtex 98 in Manchester, November 1998.