MSc (Eng.) in Rail Systems Engineering

Department of Mechanical Engineering

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Level Crossings on Rural Railways; Can the railway industry continue to subsidise rural settlements ?

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ERRATA & MINOR CORRECTIONS

As the reader will appreciate, the systems engineering interfaces between brain, keyboard, proof reading, printing and collating are highly complex, prone to human error and the onset of Murphy's Law ten minutes after printing every copy!

The following minor corrections should be noted.

Executive Summary:
Top paragraph, page ii, 5th line down; substitute ....*photographic*..... with .....in *an illustrated* chapter, ...

Contents:
Page viii, insert a blank line between J.1 and Appendix K.

Chapter 1:
The reference to the Controller of Her Majesty's Stationery Office should also mention the reproduction of illustrations in Chapter 6 from Railway Safety Principles & Guidance.

Section 1.2, 4th line; add .....by *the* Director & Chief Executive.....

Section 1.3, Abbreviations; add, *NPV - Net Present Value*

Chapter 4:
Page 4.11, 5th line down, following reference 61; add *(See Figures 10.8 & K.5).*

Chapter 7:
Table 7.F; the last row should include - *At 125 years the bridge may require renewal.*

Chapter 10:
Page 10.10, section 10.2, 6th line; delete the word *second* - The picture is reproduced.....

Appendix D:
Page D28; *Zalinger, D.A., Rogers, B.A.,*..... delete *p* in Rogers.

Executive Summary

Level Crossings are a liability for any railway company; they serve the railway no purpose whatsoever and cause delay to train services, to the public, increase the risk of accidents, mainly due to public ignorance, are expensive to install and maintain. Level crossings are, perhaps, one of the best examples of railway systems engineering requiring inputs from railway signalling, electrical (traction), permanent way and civil engineers, railway operators, from highway engineers, road and rail legislators and the public. Legislation requires the railway to meet the full initial cost of level crossing installation, including the highway works and road signage, and the cost of the regular railway maintenance.

Rural railways, such as those in Lincolnshire, East Anglia and Northern Ireland are generally loss making and require heavy subsidy. They also have large numbers of level crossings, which represent a considerable financial drain on their limited resources. In many cases these rural level crossings allow access to remote habitations and in some cases several points of access within a short distance. The author believes that, given the vast increases in road traffic and the desire to make the user pay, it is time that legislation is changed in the railways' favour. In the case of rural railways, the railway company is effectively subsidising life in rural areas, be it a small village or an isolated farmhouse.

Historically, the costs of bridging the railway have been claimed to be far higher than a level crossing; the author will show that at current price levels, this is no longer the case and that bridges are, in fact, substantially cheaper in overall terms, although it is accepted that there will always be a need for some level crossings as bridging would be out of the question. The cost of installation, maintenance, failure and delays to the road user are all considered, along with some other possible means of reducing the overall costs of those level crossings that will remain.

A literature review has been included and this is supplemented with an annotated bibliography and an appendix of further reading related to level crossings. Extensive

research by questionnaire and subsequent analysis has been undertaken into the public's understanding of the road signs and signals associated with level crossings and is presented to support the view that closure of level crossings is a must. In the course of writing this dissertation a large number of level crossings have been visited and a number of safety issues have been noted and these are presented in a photographic chapter, to highlight the dangers of level crossings.

To show what can be achieved by careful, but possibly harsh, consideration of the surrounding area, a base case study using Northern Ireland Railways' system has been carried out and it will be noted that substantial savings can be made; however, to do so, the railway company would need hard-line support from legislators and other relevant authorities.

The only safe and cost effective level crossing is a closed one!

Conclusions are presented in the final chapter and references are shown throughout each chapter. Appendices include details of level crossings visited and studied; a typical level crossing order and maintenance schedules; questionnaire results for the non-level crossings questions, photographic evidence of dangerous practices, an annotated bibliography and suggestions for further reading.