Overview

For pedestrians with a disability, using a level crossing can be a challenge. Level crossings present pedestrians with a variety of visual and audible messages, and require users to cross a surface that may pose physical challenges due to its structure, gradient and exposure to the track. Pedestrians with sensory, physical or cognitive impairments may be less able to cross safely because of these factors. Level crossings account for 8.2% of the overall rail network risk (Safety Risk Model v6.1) and pedestrians are involved in approximately three-quarters of all incidents at level crossings, placing them at greater risk than road vehicle users (Risk Profile Bulletin v6.1, June 2009).

This research was carried out on behalf of the Road-Rail Interface Safety Group (RRISG), and in conjunction with the Disabled Transport Advisory Committee (Rail) (DPTAC Rail) to help inform the upgrade and/or renewal of public road level crossings in terms of the accessibility issues facing disabled pedestrians. It has identified, reviewed and ranked current facilities which disabled pedestrians may find difficult to use at level crossings on public roads in Great Britain (GB) in order to present solutions that aim to improve accessibility for all users.

Aims

The aim of the research was to investigate what specific facilities for pedestrians with disabilities should be included in the next generation of level crossing designs in order to improve accessibility and reduce risk. Specifically, the objectives were to:

- Identify, review and rank the existing facilities that pedestrians with disabilities find difficult to use at level crossings.
- Explore and evaluate ways of improving level crossing facilities for disabled pedestrians in future designs for crossing replacements.
- Develop practicable and accessible solutions, indicating which potential solutions are most appropriate for further evaluation and which are not, based on the level of accessibility and practicability they offer. A ‘practicable’
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solution for the rail industry is one that is feasible on both a practical and economic level.

The scope was confined to public road level crossings in GB only. The research was concerned with facilities on the immediate approach to the level crossing, as well as the crossing itself.

Method

The method comprised:

- The development of an initial list of access problems and solutions. Drawing on a preliminary list provided by disabled representatives from DPTAC and JCBMP (Joint Committee on Mobility of Blind and Partially Sighted People) and a workshop including representatives from the rail industry, 16 site visits were made. These covered a range of public road level crossings and were used to identify and expand the set of problems facing pedestrians with disabilities in order to identify possible solutions.
- Defining the level crossing task process and conducting task analyses. This helped to define the performance shaping factors, error mechanisms and worst-case outcomes for each problem. This facilitated the development of specific solutions.
- Pedestrians with disabilities and their representatives took part in discussion groups to share their experiences of level crossings. Participants identified the problems they faced (which were added to the list) and were encouraged to suggest how level crossings could be changed to mitigate these problems. Experts from the highway and railway industries took part in separate discussion groups to provide further information about the problems that affect pedestrians with disabilities and the possible solutions. Particular emphasis was given to engineering solutions, drawing on the expertise of the participants.
- Scoring and ranking potential solutions. A system was developed to score and rank the accessibility and practicability of the potential solutions using multi-criteria decision analysis (MCDA). Solution scores were confirmed at a workshop attended by experts from the rail industry.
- Finally, delivering an industry-approved set of solutions. Solutions were grouped and ranked based on the level of accessibility and practicability they provided. The most promising solutions were grouped to create an 'ideal' accessible level crossing.
Findings

The research identified seventy seven potential solutions to improve accessibility at level crossings, of these:

- Thirty were engineering solutions that helped to improve crossing identification, navigation, physical access and/or decision-making.
- Twenty-two were discounted because they did not improve level crossing accessibility substantially.
- Ten were already addressed by existing guidance or regulations.
- Eight were deemed impracticable by industry experts.
- Seven were marked as recommendations for railway design and maintenance, or for non-rail authorities.

Within the 30 viable engineering solutions, a combination of 12 solutions (referred to here by the number used in the main report) was selected to address the key deficits in accessibility that are a priority for the rail industry.

- S01 Improved audible warnings using dynamic volume adjustment to ensure continuous audibility above background noise.
- S16 LED wig-wags should be provided whenever there is scope to upgrade from incandescent bulbs to improve signal visibility for all users.
- S20 Wider use of the flashing red man pedestrian signal to help all pedestrians identify the crossing and assist specific groups with knowing when it is not safe to cross.
- S28 Corduroy tactile paving surfaces before transverse footway lines on all approaches to all level crossings (where provided with footways) to help people with sight loss to identify level crossings.
- S29a Tactile longitudinal white guidelines over the level crossing footway to assist pedestrians with sight loss to navigate a safe path over the crossing.
- S47 Marked surface to warn pedestrians where it is not safe to stand due to the risk of being struck by a lowering barrier.
- S53 Non-reflective materials for the crossing surface to prevent reflected glare from the crossing which can disorient and temporarily 'blind' pedestrians with sight loss, as well as others.
- S57 Improved consistency for transverse footway lines by ensuring that they are used at all crossings with a footway and are applied in a consistent form (ie a solid white line).
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- S60 Level, consistent and rubberised crossing surfaces for pedestrians that are distinctly different from the surfaces used for approaching footways.
- S61 Level and consistent surfaces for approaching footways (where provided) that are distinctly different from the crossing surface itself to help pedestrians with sight loss detect level crossings reliably.
- S66 Consistent, colour-contrasting fencing for barrier lifting mechanisms and level crossing areas.
- S67 Colour contrast for wig-wag posts.

These 12 most promising solutions are mapped on the level crossing diagram below to illustrate the features of a more accessible level crossing. It is not intended to suggest that all of the measures would be used at any one crossing and the diagram is purely illustrative and is not to scale.

The research confirmed that level crossings achieve a moderate level of accessibility in their current state. Evidence collected from focus groups with disabled pedestrians and industry experts, and from site visits to level crossings did not identify particular problems that would prevent large proportions of the disabled population from accessing level crossings.

This assumption is supported by a very low number of reported incidents involving pedestrians with disabilities at level crossings. However, incidents may be under-reported, particularly as some disabilities are 'hidden'. The lack of incidents could also be due to limited use of level crossings by the disabled population because they are considered 'inaccessible', even though this research found little evidence to support this.

Nevertheless several access problems exist at level crossings, falling into three specific categories:

- Identification of the crossing
- Decision-making
- Navigation and physical access

The 12 most promising solutions described above address the majority of access issues. In addition, the ORR Railway Safety Principles and Guidance (RSPG2E) already provides a wealth of guidance on accessible features that, if applied consistently across the network and maintained to the required standard, would bring a marked improvement in accessibility for pedestrians with disabilities.
Accessibility is continuously evolving, as the mobility and independence of people with disabilities changes, and as the technology and support available improves, access provisions should be re-assessed to ensure they meet future demands. It is therefore recommended that this report and the detailed solution descriptions contained within are reviewed regularly to ensure that accessibility at level crossings for people with disabilities is continuously updated.

**Deliverables**

The deliverables from this research are a final report and its appendices.

**Next Steps**

As was the intention with this research, the recommendations proposed are generic and have been developed in order to support the duty holder in understanding the various wider issues and solutions to level crossing accessibility issues in consultation with six different disabilities groups across GB.

Whilst local authorities would be the main body for the duty holder to consult when planning level crossing renewals or upgrades, the duty holder has also been asked to consider how, as far as reasonably practicable, it can consult with local disabled groups so that the solutions put forward for each upgrade/renewal provide the best level of accessibility for all users. In light of the findings, Network Rail as the duty holder has considered the recommendations and has undertaken to take all of the findings into account when crossings are renewed / upgraded. It has also proposed that some of the findings should go into the Level Crossing Risk Management Toolkit (which RSSB owns) when it is next updated so that additional measures at a specific crossing can be considered should it become apparent that a large number of people with accessibility problems are using it.

The main benefits from the implementation of this research will not be realised immediately but as each crossing is renewed or upgraded. On a localised basis, crossing by crossing, a combination of some or all of the 12 recommended solutions will improve accessibility not only for people with one or more disabilities, but for pedestrian users generally.

The report will be available as a PDF via the RSSB website. For other, more accessible, formats please contact the RSSB enquiry desk at enquirydesk@rssb.co.uk, noting that making data in some of the tables accessible may be technically difficult to achieve.
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