

## Accessible Zebra Crossing Research Phase 2 Report

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## Accessible Zebra Crossing Research Phase 2 Report

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## Executive Summary

### Introduction

In 2021, Jacobs, with partners The Scottish Collaboration for Public Health Research and Policy (SCPHRP), University of Edinburgh (UoE), was appointed by Transport Scotland to undertake a second phase of research into Zebra crossings. This phase of research (Phase 2) has had a particular focus on the needs of people with disabilities and their attitudes to, and experience of, Zebra crossings.

The study has been funded by Transport Scotland through the Scottish Roads Research Board (SRRB) programme. The Department for Transport (DfT) has also provided input, given the relevance to ongoing work across the UK to improve transport accessibility for all user groups.

Phase 2 research follows Phase 1, undertaken during 2020/21. Details of Phase 1 are reported in a separate report titled 'Fully Accessible Zebra Crossings, SRRB Research Framework, Jacobs, Oct 2021'.

This second phase, undertaken during 2021/22, built upon the findings from Phase 1, engaging directly with individuals aged over 65 and individuals with disabilities, whose views were under-represented in the Phase 1 online questionnaire.

The findings from Phase 1 literature review and online survey highlighted key issues experienced by disabled people when using crossings, including:

- Vehicles failing to stop to let the individual cross;
- Difficult for users to judge if and when a vehicle is going to stop;
- Difficult for road users to see pedestrians waiting to cross;
- Unobservant or impatient motorists;
- Location of crossing makes it difficult for pedestrians/road users to see each other; and
- Lack of maintenance of signage, road markings and lighting indicating a Zebra crossing.

Phase 2 of the research sought to explore these issues in more detail. Phase 2 research was undertaken in two stages; through a series of online focus groups (Stage 1), and a site survey in a real-world environment (Stage 2).

### Research aims and objectives

Research to date has considered the use of Zebra crossings by all users, and in particular, the needs of most at risk road users.

### Overarching research aims

The overarching aim of the research is to meet the requirements of the Equality Act 2010, Public Sector Equity Duty (PSED), to explore if and how reasonable adjustments could be made to Zebra crossings to ensure they meet the needs of individuals with protected characteristics. In doing so, it is hoped that the research can realise the following additional aims:

- Identify areas for improvement in perceived safety for people with a disability;
- Influence current and future practice in the deployment of Zebra crossings across on all road types; and
- Promote good practice in the deployment of Zebra crossings.

As the research is ongoing, and there is potential for future phases of research, these aims remain valid.

## Phase 2 aims and objectives

The aims of Phase 2 were to:

- Close the knowledge gap from Phase 1 on the needs of users most at risk (specifically disabled users), and their attitude to and experiences at Zebra crossings; and
- Identify those at-risk groups for whom Zebra crossings are beneficial, and for which at risk groups they are not suitable, to understand what, on balance, is reasonable for all.

To achieve the above, the following objectives were defined;

- Validate the findings of the Phase 1 online questionnaire and literature review, or otherwise;
- Seek the views and experiences of disabled people with whom the online survey may not have engaged; and
- Identify potential improvements to the design of Zebra crossings or their surroundings for further investigation, primarily regarding increasing perceptions of safety for most at risk users.

## Summary of research findings

### Participants' views and experiences

Participants were asked how often they use Zebra crossings, and about the environment surrounding these crossings. If participants stated they do not use Zebra crossings, they were asked why. Participants were then asked about issues they have witnessed or experienced; feelings and behaviours whilst approaching and using Zebra crossings; and if they think there are positive aspects of these types of crossings.

**Table 1 – Summary of participants' views and experiences of Zebra crossings**

Theme	Summary of findings
Frequency and use	<ul style="list-style-type: none"> <li>▪ Ranged from daily to never</li> <li>▪ Use depends on whether a crossing is located near to where they live/travel plus the factors outlined below</li> </ul>
Overall experiences	<ul style="list-style-type: none"> <li>▪ Most feel cautious on the approach to Zebra crossings and said it is hard to know when to cross</li> <li>▪ Blind people feel especially vulnerable</li> <li>▪ No auditory confirmation that it is safe, and wind or noise from roadworks can make crossing especially difficult</li> <li>▪ Feel the need to move quickly across</li> </ul>
Impact of location, surroundings, and infrastructure	<ul style="list-style-type: none"> <li>▪ Feel more unsafe when Zebra crossings are located near corners, roundabouts or where there are high traffic volumes</li> <li>▪ Bus stops and trees can restrict visibility</li> <li>▪ Black and white stripes in the crossing areas are better than coloured</li> <li>▪ Height of Belisha beacons too high for some</li> </ul>
Impacts of other road users	<ul style="list-style-type: none"> <li>▪ Hard to hear cycles, electric cars etc. approaching</li> <li>▪ Perception that cyclists are less likely to stop</li> <li>▪ Perceived lack of understanding by road users of the Highway Code</li> <li>▪ Less pedestrian traffic compared with controlled crossings</li> <li>▪ Perception that the UK has less of a pedestrian friendly culture compared to other countries</li> </ul>

## Suggested improvements

Table 2 summarises participants' suggested improvements, accumulated from focus group findings and the site survey. Across all focus groups, maintenance and more effective lighting were the most frequently suggested improvements, followed by road safety education and a clearer indication to the driver that a Zebra crossing is ahead.

**Table 2 – Participants' suggested improvements**

Theme	Summary of suggested improvements
Location and maintenance	<ul style="list-style-type: none"> <li>▪ Assessment of location of Zebra crossing and surroundings before, during, and after Zebra crossing construction</li> <li>▪ Ongoing maintenance of road markings and lighting</li> </ul>
Technical changes – lighting, signals and signage	<ul style="list-style-type: none"> <li>▪ Improved lighting at and near crossings</li> <li>▪ Visual and audible signals (e.g. flashing lights, rumble strips) for road users</li> <li>▪ Improved signage for road users</li> <li>▪ Lowering of height of Belisha beacon</li> </ul>
Technical changes – Zebra crossing surface/construction	<ul style="list-style-type: none"> <li>▪ Raised tables</li> <li>▪ Narrow carriageway/footway buildouts</li> <li>▪ Attention to dropped kerb requirements</li> <li>▪ Attention to kerb upstand heights</li> <li>▪ Tactile paving to be extended all the way to the building line</li> <li>▪ CCTV cameras</li> </ul>
Education and training	<ul style="list-style-type: none"> <li>▪ Adverts and road safety education campaigns</li> <li>▪ Raise awareness of Highway Code</li> <li>▪ Ongoing road user training</li> <li>▪ Disability awareness training</li> </ul>
Legislation/enforcement	<ul style="list-style-type: none"> <li>▪ Parking enforcement</li> <li>▪ Speed limit reduction</li> <li>▪ Highway Code enforcement</li> </ul>

## Conclusions

Phase 2 of the research study, undertaken in 2021, sought to build upon the findings of Phase 1, undertaken in 2020; this found that whilst attitudes of users and practitioners towards Zebra crossings were largely favourable, it was recognised that people with disabilities are more likely to feel uncomfortable using Zebra crossings due to a range of issues.

A wide range of potential improvements, including physical design adaptations as well as stricter compliance measures and increased training were suggested during Phase 1 to improve the safety of Zebra crossings, to make them more appropriate to the needs of all users.

The views and experiences of most at risk road users captured during Phase 2 have validated these findings and have deepened understanding of the issues faced by older people and people with disabilities, and of potential improvements that could be considered.

Of the participants who took part in the study, most feel cautious on approach to Zebra crossings and said it is hard to know when to cross. Participants who are blind/visually impaired feel especially vulnerable. Participants



feel more unsafe when using Zebra crossings that are located near corners or roundabouts, or where there are high traffic volumes or wider roads. All user groups considered that there is a lack of understanding by road users of the Highway Code, perceiving the UK to have less of a pedestrian friendly culture compared to other countries.

The site survey demonstrated the variance of user experiences depending on participants' own abilities. The area surrounding a Zebra crossing, the location of the crossing, as well as the design of the Zebra crossing itself all contributed to participants' perceptions and experiences. The raised table with flush kerbs was found to be accessible and comfortable for those with mobility issues, however this posed issues for blind participants who found it challenging to safely locate the crossing.

Participants provided a range of suggested improvements to improve experiences of using Zebra crossings. These suggestions were grouped into:

- Location and maintenance;
- Technical changes;
- Education and training; and
- Legislation/enforcement.

It is worth highlighting that, whilst participants would prefer to use a signal-controlled crossing over a Zebra crossing, almost all considered that there is a role for Zebra crossings, and they are better than an uncontrolled crossing.

### Recommended next steps

The findings of Phase 2 have supplemented and supported Phase 1, with a broad range of potential improvements suggested. It is Jacobs' recommendation that further work is undertaken to explore in more detail the feasibility of potential improvements, moving nearer towards the overarching research aims described in Section 2.

The next steps to achieving this could include:

1. Engagement with Zebra crossing trials/ innovations delivery teams across the UK, to obtain an understanding of lessons learned, successes and failures. This would be limited to trials/ innovations which have been conducted within the last five years (2017-2022) and trials/ innovations which align with suggested accessibility improvements identified during previous phases;
2. Focus groups and interviews with Roads Authorities and industry representatives to explore the feasibility and deliverability of suggested improvements identified in previous research phases;
3. A trial of one or more suggested infrastructure improvements as identified during Phase 2. This would be informed by findings from discussions with Roads Authorities and industry experts. Investigations could include the identification of a Local Authority willing to trial intervention(s) on their road network; and
4. Trial of a local education/awareness-raising campaign targeting driver/rider behaviour in relation to Zebra crossings. The trial could consist of pre-intervention market research with road users to inform messaging, engagement with a specific local community, including young people and people with cognitive impairments (groups underrepresented in previous phases of research), a trial behaviour change campaign (delivered in partnership with the Local Authority), pre- and post- evaluation with road users and members of the community, including road users at greater risk.

## Introduction

In 2021, Jacobs, with partners The Scottish Collaboration for Public Health Research and Policy (SCPHRP), University of Edinburgh (UoE), was appointed by Transport Scotland to undertake a second phase of research into Zebra crossings. This phase of research (Phase 2) has had a particular focus on the needs of people with disabilities and their attitudes to, and experience of, Zebra crossings.

The study has been funded by Transport Scotland through the Scottish Roads Research Board (SRRB) programme. The Department for Transport (DfT) has also provided input into the study, given the relevance to ongoing work across the UK to improve transport accessibility for all user groups.

## Context

Zebra crossings are a form of crossing facility which can be installed instead of an uncontrolled or informal crossing, or signal-controlled crossing.

Each type of crossing facility has advantages and disadvantages and decisions on what type of crossing is most appropriate should be made according to the circumstances of the site and road users' needs. The Traffic Signs Manual (TSM) 2016, Chapter 6 advises that a site assessment should be conducted to make an informed decision about whether a crossing is needed, and if so, what type of crossing it should be.

Zebra crossings are often perceived to not provide any additional benefit to some disabled user groups. There are no indicators to blind and partially sighted people that any approaching vehicle or cycle has stopped. Also, blind and partially sighted people may be reliant on sound when deciding if it is safe to cross. With the continuing growth in cycling, and increasing use of hybrid and electric vehicles, this reliance on sound is becoming more problematic.

Other people with disabilities encounter difficulties using Zebra crossings, including but not limited to wheelchair users (given the different eye height), and people with learning disabilities. Therefore, a Zebra crossing may offer no improvement over an uncontrolled crossing for some individuals. They will, however, still provide advantages to other groups of users considered to be most at risk, such as older people.

Under the Equality Act 2010, the Public Sector Equality Duty (PSED) requires public bodies to have due regard to the need to eliminate discrimination, advance equality of opportunity and foster good relations between different people when carrying out their activities. This includes the duty to make reasonable adjustments if disabled people are put at a disadvantage.

This research has focussed on standard Zebra crossings within a street environment. TSM 2016 includes additional forms of crossing which use the Zebra crossing layout for pedestrians, namely parallel crossings (this consists of black and white stripes for pedestrians, as at a Zebra crossing, with a parallel route for cyclists) and 'mini' Zebras (a Zebra crossing for pedestrians across a cycleway, in which the Belisha beacons may be omitted). Although these different crossing types were not considered specifically within the research, recommendations for improvements may be relevant to features common to all types of Zebra crossings.

Other ongoing Zebra crossing research studies have been noted, including Greater Manchester Combined Authority's trial of side road Zebra crossings and Portsmouth City Council's trial of a light-up Zebra crossing, triggered by pedestrian movement.

Research has taken cognisance of the Highway Code 2022 update to Rule 19, clarifying that drivers and riders should give way to pedestrians waiting to cross a Zebra crossing, and must give way to pedestrians on a Zebra crossing.

It is expected that this research could inform guidance and action plans including:

- Cycling by Design; and
- Roads for All: Good Practice Guide for Roads.

In addition to informing guidance that is relevant in a Scottish context, there may be opportunities for this research to inform broader guidance, for example, future updates to the DfT's Inclusive Mobility guidance (published in 2021), and other relevant guidance in other parts of the UK.

### Research undertaken to date

This Phase 2 research follows Phase 1, undertaken during 2020/21, which focussed primarily on information gathering through three work stages:

1. A literature review of best practice being adopted in Scotland, the UK and other countries, with respect to Zebra crossings;
2. A publicly available online questionnaire investigating attitudes towards Zebra crossings amongst members of the public; and
3. A questionnaire issued to officers of Roads Authorities investigating their policies on the retention of Zebra crossings, their views on the appropriateness of Zebra crossings and any potential improvements they consider may improve their safety.

Details of Phase 1 are reported in a separate report titled 'Fully Accessible Zebra Crossings, SRRB Research Framework, Jacobs, Oct 2021'.

This second phase, undertaken during 2021/22, has built upon the findings from Phase 1, engaging directly with individuals aged over 65 and individuals with disabilities, whose views were under-represented in the Phase 1 online questionnaire. The number of responses amongst certain groups was relatively low, particularly amongst deaf people or people with hearing loss. Feedback on the questionnaire highlighted that it was biased against people who use British Sign Language (BSL) as their first language, which would result in some people finding it difficult to engage with the questionnaire. Furthermore, there are inherent issues with using an online questionnaire as they rely primarily on online access and a certain level of technology awareness and ability, which would influence some individuals' ability to participate.

The findings from the literature review and online survey in Phase 1 highlighted key issues experienced by disabled people when using crossings, including:

- Vehicles failing to stop to let the individual cross;
- Difficult for users to judge if and when a vehicle is going to stop;
- Difficult for road users to see pedestrians waiting to cross;
- Unobservant or impatient motorists;
- Location of crossing makes it difficult for pedestrians/road users to see each other; and
- Lack of maintenance of signage, road markings and lighting indicating a Zebra crossing.

Phase 2 of the research has sought to explore these issues in more detail. It has been undertaken in two key stages; through a series of online focus groups (Stage 1), and a site survey in a real-world environment (Stage 2).

### Structure of report

This report details the research activities and findings from Phase 2, with Jacobs' and the UoE's recommendations for future work in this area. Following this introduction, this report is structured as follows:

- Research aims and objectives;
- Research Methodology;
- Findings from Stage 1 focus groups;
- Findings from Stage 2 site survey;
- Conclusions and recommendations for future work; and
- Appendices containing materials used in the promotion and delivery of the research.

## Research aims and objectives

The research to date has considered the use of Zebra crossings by all users, and in particular, the needs of most at risk road users. In this section, we set out the overarching aims of the Zebra crossing research, and the specific objectives of Phase 2.

### Overarching research aims

The overarching aim of the research is to meet the requirements of the PSED, to explore if and how reasonable adjustments could be made to Zebra crossings to ensure they meet the needs of individuals with protected characteristics. Doing so, it is hoped that the research can realise the following additional aims:

- Identify areas for improvement in perceived safety for people with a disability;
- Influence current and future practice in the deployment of Zebra crossings across on all road types; and
- Promote good practice in the deployment of Zebra crossings.

As the research is ongoing, and there is potential for future phases of research, these aims remain valid.

### Phase 2 aims and objectives

The overarching aims of Phase 2 were to:

- Close the knowledge gap from Phase 1 on the needs of users most at risk (specifically disabled users), and their attitude to and experiences at Zebra crossings; and
- Identify those at-risk groups for whom Zebra crossings are beneficial, and for which at risk groups they are not suitable, to understand what, on balance, is reasonable for all.

To achieve the above, the following objectives were defined; for the Phase 2 research to:

- Validate the findings of the Phase 1 online questionnaire and literature review, or otherwise;
- Seek the views and experiences of disabled people with whom the online survey may not have engaged; and
- Identify potential improvements to the design of Zebra crossings or their surroundings for further investigation, primarily regarding increasing perceptions of safety for most at risk users.

Section 3 details the study methodology that was developed to achieve the Phase 2 aims and objectives.

## Research methodology

Phase 2 engaged directly with people aged 65 and over, and people with disabilities, to better understand their views and experiences of, and ideas for potential improvements to, Zebra crossings and their surroundings.

Phase 2 was undertaken in two stages:

1. A series of focus groups, themed according to users' type of disability, and by age; and
2. A site survey at an existing Zebra crossing, to triangulate (and therefore establish the validity and reliability) the findings of the Phase 1 online survey and Phase 2 focus groups.

Details on Phase 2 methodology are set out below. When designing and delivering the research activities, the research team benefited hugely from the experience, advice and guidance of a range of organisations and individuals representing older people and disabled people, for which we are grateful for.

## Guiding principles

The Jacobs/UoE research team adopted a series of guiding principles to deliver an effective Phase 2 study:

- Research is carried out with people and not on people;
- Participants' privacy will be protected at all times;
- Recruitment of participants must be a positive experience for them;
- Communication with participants is in a means most appropriate for them, seeking consent from participants directly, rather than through a carer or representative;
- Be guided by best practice and advice from representative organisations;
- Participants are not obliged to take part and feel able to remove themselves from the process at any point; and
- Study findings will be shared with participants.

## Ethical considerations

Ethical approval for Phase 2 was granted in December 2021 by UoE Moray House School of Education and Sport Ethics Committee.

The Ethics Committee were provided with details of the research project, including the aims and objectives, a summary of the research methods and techniques, an indication of the type, number, selection criteria and recruitment of participants and site details, including data collection methods. In addition, a Covid-19 Face to Face research risk assessment was completed.

Being that the research study engaged with people at greater risk, measures were put in place to reduce risks from the outset. It was recognised that asking individuals to cross the street using a Zebra crossing may be stressful for some individuals. It was emphasised throughout the study that participants were free to leave the study at any time if they feel uncomfortable. The Zebra crossing selected for the site survey was identified based on its suitability and risk assessed prior to being used in the study. Researchers had an ethical responsibility to protect participants from any harm arising from the research. In this case, we chaperoned the individual crossing the road to reduce the risk from unanticipated behaviour of other road users. Covid-19 government guidance was adhered to throughout the study. The Research Team and participants were encouraged to take lateral flow tests prior to the Site surveys.

We ensured that we used appropriate and accessible formats (audio, visual, written), language (English, British Sign Language, Easy Read format) and terminology when communicating with participants and their carers/representatives. This ensured participants felt comfortable and respected, as well as appropriately informed about the study and their (optional) role in it. We also consulted with representative groups and the participants themselves to ensure we were taking all the necessary measures to protect and/or inform participants. Representative groups also assisted with recruitment.

Specific measures considered for each of the participant groups are detailed in the table below.

**Table 3 – Specific measures considered for each participant group**

Target Group	Stage 1 Focus Group Considerations	Additional Stage 2 Site Survey Considerations
All groups	<ul style="list-style-type: none"> <li>Focus groups were held on Zoom via UoE Zoom account. Representative organisations advised that this was the most accessible platform for participants</li> <li>Participants were asked in advance if they had any support needs</li> </ul>	<ul style="list-style-type: none"> <li>There was a safe space to wait, away from the carriageway and out of the way of other pedestrians using the pavement</li> <li>Post-crossing surveys were conducted inside the gates of Grange Cemetery (located next to the Zebra crossing site) where a bench was available for participants to sit whilst being interviewed. An indoor space was available in case of bad weather</li> <li>Transportation by taxi was available for all participants to help enable ease of travel to and from site. Taxis were booked via Jacobs account</li> <li>Participants were requested to contact the research team to let them know they got home safely</li> </ul>
Individuals who are deaf; BSL users; have a hearing impairment	<ul style="list-style-type: none"> <li>A researcher fluent in BSL, accompanied by BSL interpreters, helped facilitate the online focus group</li> <li>Live captioning was provided via Zoom’s auto captioning function</li> <li>All study information was available in Easy Read format</li> <li>A BSL promotional video was produced</li> <li>A researcher fluent in BSL was available to communicate with participants throughout</li> </ul>	<ul style="list-style-type: none"> <li>A researcher fluent in BSL, accompanied by a BSL interpreter helped facilitate the site survey for participants who were BSL users (welcoming participants, providing participants with pre-crossing information, conducting the post-crossing interview)</li> <li>Post-crossing participant interviews were video recorded. The researcher fluent in BSL transcribed the video interviews</li> </ul>
Individuals who are blind; have a visual impairment	<ul style="list-style-type: none"> <li>All study information was available in audio format and communication (including pre, during and post-data collection) was done verbally</li> <li>Participants could dial into the Zoom meeting via telephone as well as join online via a device</li> </ul>	<ul style="list-style-type: none"> <li>Support persons and guide communicators were invited cross with participants if that replicated their usual way of navigating a street environment</li> </ul>
Individuals who have a physical disability that affects their day-to-day movement		<ul style="list-style-type: none"> <li>Participants were asked in advance what assistance (if any) they required</li> </ul>
Individuals with a cognitive impairment	<ul style="list-style-type: none"> <li>A representative from The Scottish Commission for People with Learning Disabilities (SCLD) acted as the key contact between the participants and the research team. The same SCLD representative also attended the online</li> </ul>	<ul style="list-style-type: none"> <li>This group did not participate in the site survey</li> </ul>

Target Group	Stage 1 Focus Group Considerations	Additional Stage 2 Site Survey Considerations
	focus group supporting both participants and the research team <ul style="list-style-type: none"> <li>▪ Maximum number for this group was capped at 6</li> <li>▪ Topic guide was tailored following advice and guidance from SCLD. Timings of the focus group were adjusted so that there were more breaks</li> </ul>	
Individuals aged 65 and over	<ul style="list-style-type: none"> <li>▪ The primary researcher has extensive experience working with older people. She ensured that the study was conducted in an accessible and safe manner for this group</li> </ul>	

## Recruitment of participants

Individuals from most at-risk road user groups were invited to participate in the research. The recruitment process was undertaken in early 2022.

### Target groups

We engaged with five main target groups of participants for the research:

- Individuals who are deaf; a user of British Sign Language (BSL); have a hearing impairment;
- Individuals who are blind; have a visual impairment;
- Individuals with a physical disability that affects their day-to-day movement;
- Individuals with a cognitive impairment (specifically a learning disability)<sup>1</sup>; and
- Individuals aged 65 and over.

### Recruitment criteria

Within the target groups described above, we sought to recruit individuals:

- With 'lived' experiences, rather than representing an organisation or lobby group;
- With experience of using Zebra crossings, as well as not;
- From anywhere in Scotland;
- Aged 18 and over; and
- A mix of age, gender, ethnicity, and socio-economic status.

### Recruitment materials

Recommendations from representative organisations and best practice guidance informed the design of recruitment materials. The content and format was tailored to meet the communication preferences of the different target groups and included:

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<sup>1</sup> Note that cognitive impairment covers a range of conditions such as dementia, Alzheimer's and Parkinson's, learning difficulties. Challenges with participant recruitment within the time available meant that we engaged with a subset of this group, individuals with learning disabilities, and recognise this as a limitation of the study. Note also that these participants did not take part in the Stage 2 site surveys to mitigate the personal risks to them.

- Static images (accompanied by alternative text) and suggested content for use on social media and/or newsletters;
- British Sign Language (BSL) information video with accompanying transcript<sup>2</sup>;
- Information sheet, available in Easy Read and audio format;
- Participant questionnaire, available to be completed online or over the phone;
- Consent form, available in Easy Read format with the option of being completed online or over the phone.

Relevant materials are contained in Appendix A.

**Zebra Crossing Research Study**

**Do you have a sensory or physical disability?**  
Join an online focus group and share your views and experiences of zebra crossings

- People aged 18 and over
- People living anywhere in Scotland
- People who use zebra crossings and those who choose not to
- £20 shopping voucher for taking part
- British Sign Language Interpretation and Live Captioning available

Contact Jenny Muir Tel: 0131 659 1547  
Email: [zebracrossingresearch@jacobs.com](mailto:zebracrossingresearch@jacobs.com)

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Figure 1 – Example of recruitment materials shared via social media

### Recruitment channels

Representative organisations played a key role in promoting the opportunity to participate via their networks. They were provided with tailored promotional packs where materials were provided in a format which was most suitable for their target audience. Organisations were requested to share the invitation to participate amongst their networks. Organisations shared information via social media, member bulletins and in some cases directly to individuals who they felt would be interested.

In addition the invitation to participate was shared via;

- Local Authority officers;
- Roads for All Forum;
- Access Panels;
- Active Travel Delivery Partners;
- UoE and personal social media accounts;
- Jacobs colleagues/networks; and
- Research team's personal contacts.

<sup>2</sup> [Zebra Crossing Project Promotional Video in BSL - Transport Scotland, Jacobs and University of Edinburgh - Media Hopper Create](#)



## Delivery of stage 1 focus groups

A series of online focus groups were undertaken between March and June 2022; facilitated by one Jacobs and one UoE team member. A member of the UoE team providing facilitation in BSL, accompanied by two translators for the focus group for deaf and hearing impaired participants.

Focus groups lasted for two hours and were hosted via Zoom; each were audio/video recorded and transcribed anonymously by a third-party company specialising in transcription. Each of the five focus group sessions had between three and nine individuals participating. Each participant was provided with a £20 shopping voucher to thank them for their time.

Participants were required to read/listen to information on the research study before completing a consent form in advance of participating in the focus group. An Easy Read version of the information sheet is found in Appendix B. The participant consent form is found in Appendix C.

Each session was facilitated as a semi-structured discussion, moderated by the facilitators asking specific questions to prompt and guide conversation, but allowing the session to proceed organically, with the discussion flowing from the observations and dynamics of other individuals in the group. Participants were provided with an overview of the research and a definition of what Zebra crossings are. Participants were asked to describe how often they used crossings (or if they did not) and their views and experiences of using them (or why they did not use them). Facilitators then provided a summary of Phase 1 research findings, inviting participants to share their thoughts on the findings. Finally, participants were asked to identify what could be done to improve their experience of Zebra crossings. The focus group topic guide is included in Appendix D.

**Table 4 – Stage 1 focus group participants**

Focus group	Number of participants
Individuals who are Deaf; a user of British Sign Language (BSL); have a hearing impairment	8
Individuals who are blind; with visual impairments	10
Individuals with a physical disability that affects their day-to-day movement	3
Individuals with a learning disability	2
Individuals aged 65 and over	5

In addition, one-to-one interviews were conducted with two individuals (one person who is registered blind and one person who has a hearing impairment and learning disability), in addition one individual submitted feedback via email. In total, 31 individuals participated in Stage 1.

## Delivery of stage 2 site survey

The Stage 2 site survey was designed to validate the findings arising from both Phase 1 of the research, and the focus groups described above. It sought to identify issues in a real-world environment; to witness first-hand the experience of participants, and to hear their views on potential improvements following their experience.

Participants of the Stage 1 focus groups were asked at the time of initial consent if they would be willing to participate in a site survey at a Zebra crossing in Edinburgh. The invitation to participate was extended to individuals who expressed an interest in Stage 1 but were unable to participate, and to individuals who are Deafblind, who were underrepresented during Stage 1. To mitigate participation risks, individuals with learning disabilities were not invited to participate in Stage 2.

The site selected for the survey was a Zebra crossing on Beaufort Road, Edinburgh. The crossing is approximately 9.8m wide, with breadth of 2.8m. Details are shown in the schematic below<sup>3</sup>.

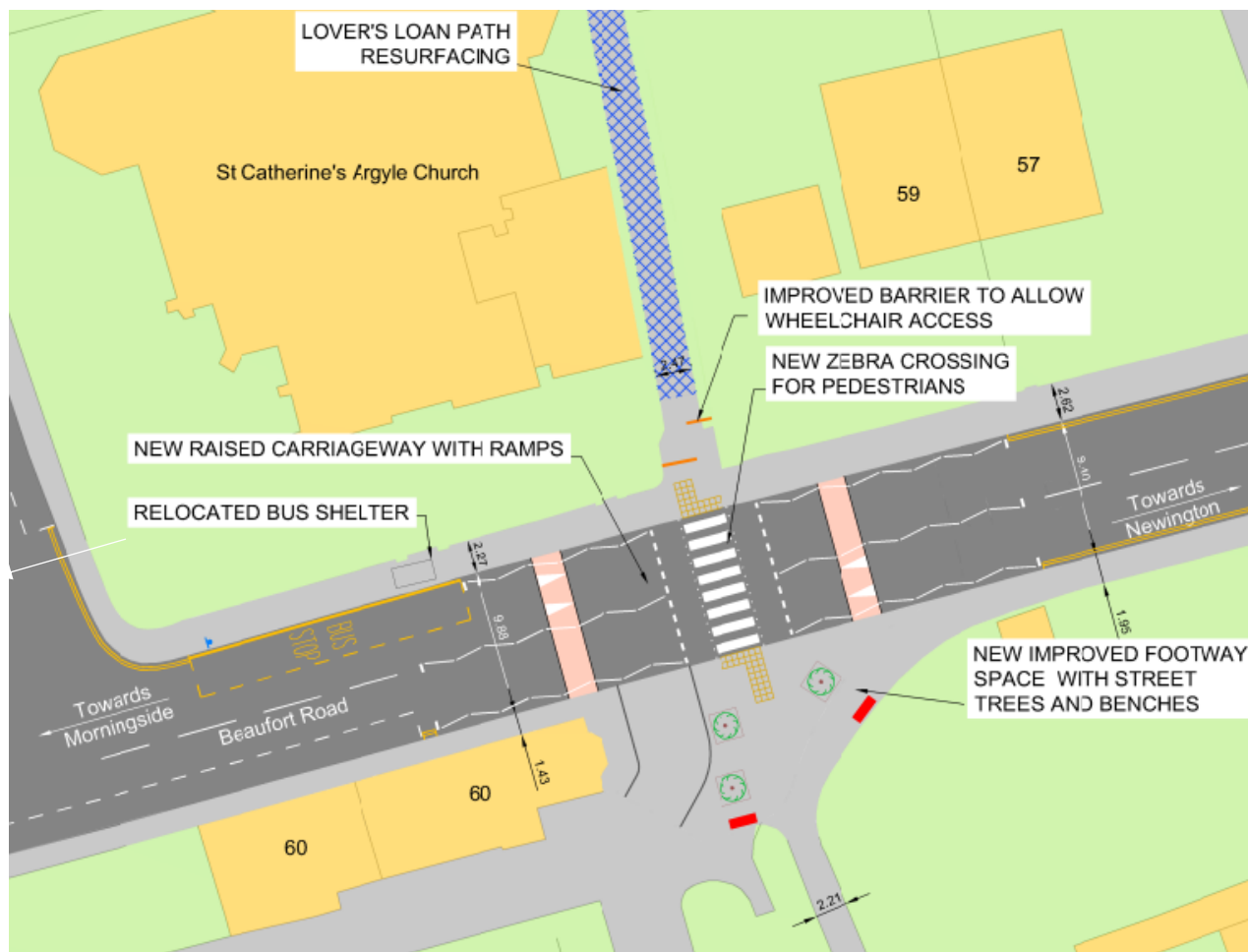


Figure 2 – Schematic of Beaufort Road Zebra crossing which was used for the site survey

The Zebra crossing used for the site survey was chosen based on its condition and location. To reduce the risk to participants, the chosen crossing was one that was centrally located in Edinburgh, recently installed, located on a road with good sight lines, fully functioning and well maintained.

The survey took place on Tuesday, 28<sup>th</sup> June 2022. A risk assessment was completed in advance, with a dynamic risk assessment carried out throughout the duration of the site survey. On the day of the site surveys a member of the research team checked the Zebra crossing was in full working order prior to the surveys commencing. Participants and their support persons were required to provide consent in advance. Prior to crossing participants were briefed by researchers, provided with a high visibility jacket and an audio recording device (aside from BSL users).

<sup>3</sup> Source: Cycling and walking improvements on Grange Road – Final Design, Design Drawings, The City of Edinburgh Council, 2018, [Cycling and walking improvements on Grange Road - Final Design - City of Edinburgh Council - Citizen Space](#)



**Figure 3 – Two street views of the Beaufort Road Zebra crossing used for the site surveys. Photograph taken by UoE**

Participants' experiences and attitudes towards Zebra crossings, as well as issues and potential improvements in the use and design of Zebra crossings, were collected in two ways:

1. Participant audio recordings captured on the approach to, and during crossing; and
2. Post-crossing interview with open-ended and closed questions covering pre-, during, and post-crossing experiences and suggested improvements to Zebra crossings. Interviews were audio recorded. BSL user interviews were video recorded.

Participants were asked to cross the crossing twice and audio record themselves on the approach to and on the crossing (aside from BSL users who were unable to do so). They were encouraged to share their thoughts, feelings and experiences out loud as they crossed so this could be captured in the recording. However, participants needed to prioritise crossing safely, and their crossing experience was captured immediately after crossing. As such, these recordings were not the focus of the site survey, but rather added additional context to the participant's post-crossing interviews. Of the ten participants who crossed, eight were recorded while crossing. Two of these recordings were audible; both from blind/visually impaired participants (Participants 7 and 11, respectively). The other six recordings were inaudible or had no commentary as the participant was focused on crossing (n=4), or the participant was a BSL user (n=2).

A member of the research team captured background observations of weather conditions (e.g., overcast, wet, raining), footpath conditions (e.g., dry, wet, damp), noise (e.g., quiet, moderate, loud), traffic volumes (e.g., quiet, moderate, busy), road user and footway user behaviour. This was noted at the time of each participant approaching and then crossing the Zebra crossing. These observations are detailed on Table 8 (pg. 26). As with the during-crossing recordings, these observations were intended to add context to the participant interviews, but were not the focus of the site survey.

Another member of the research team chaperoned participants whilst they crossed. Following the crossing exercise a researcher asked individuals questions about their experience. Each survey lasted no longer than 30 minutes per individual. Participants requiring BSL were briefed and interviewed by a BSL user from the research team with support from a translator.

Findings also include the research team's background observations of the surrounding street environment and the behaviour of participants prior and during crossing. An environmental observations guide can be found in Appendix I.

A more detailed Safe System of Work and post crossing interview guide is contained within Appendix E and J consecutively.

Nine out of the ten participants had never used the Zebra crossing before. One participant (Participant 1) used the crossing approximately once per month.

Two registered individuals could not attend on the day and were recorded as ‘did not participate’.

**Table 5 – Stage 2 site survey participants**

Participant number	User group	Approximate time of crossing	Additional notes
1	Deaf/hearing impaired	9am	
2	65+	10am	
3	65+	10.30am	
4	Blind/visually impaired	11am	
5	Physical disability	11.30am	Wheelchair user
6	Blind/visually impaired	12 noon	
7	Deaf – BSL user	2pm	
8	Deafblind	2.30pm	Participant crossed with their Guide Communicator
9	Deafblind	3pm	Participant crossed with their Guide Dog
10	Deaf – BSL user	3.30pm	

## Data analysis

Focus group data was transcribed completely and verbatim by a transcription agency. Transcripts were analysed using a thematic analysis approach, where themes were identified by the researchers based on a predetermined coding framework. The coding framework was designed based on the focus group topic guide. Transcripts were coded deductively based on the coding framework and organised into themes which have been summarised in the results section below. A computer software package (Nvivo 11 for Windows) was used to code the transcripts and manage the thematic structure.

As mentioned above, there were three sources of site survey data; 1) background observations (n=10), 2) recordings of participants whilst crossing (n=2), and 3) recordings of participant post-crossing surveys (n=10). Background observations were noted down by a member of staff at Jacobs, and are summarised in Table 8. For the recordings of participants crossing, detailed notes were taken based on the participants’ commentary. For the post-crossing survey recordings, detailed notes were taken and summarised in a table, with one column allocated to each survey question. Both sets of recorded data were then summarised in paragraphs (see results section below).

## Research limitations

There are a number of limitations of the research that are worth noting.

### Focus group limitations

Phase 2 of the research did not engage with young people (individuals aged under 18 years) and did not engage with a representative group of individuals with cognitive impairments (only two individuals with learning disabilities took part; individuals with other cognitive impairments such as dementia, Alzheimer’s and Parkinson’s were not represented). This was primarily due to budget and time limitations within this phase of research; it is recommended that these user groups are engaged in further research.

There are inherent issues with engaging with individuals online, as this relies primarily on access to online facilities and a certain level of technology awareness. Some individuals may have been less able to participate in the focus groups as a consequence.

The focus group and site survey considered 'traditional' Zebra crossings (those in a street environment, crossing traffic lanes). Zebra crossings which cross cycle lanes were not considered in detail.

During the focus groups, participants were asked what reasonable adjustments could be made to Zebra crossings to make them more accessible for individuals with disabilities. Participants found it difficult to specify what they considered to be a reasonable adjustment (as this was felt to be too subjective), and this discussion prompted participants to return to improvements previously suggested during the focus group sessions.

### **Site survey limitations**

As with many in-person research activities, sample-size was a limitation. More individuals could have been recruited to gather more data and perspectives. However, the site surveys were both time and resource intensive, and this number is considered appropriate for qualitative studies such as this one.

To reduce the risk to participants, the site surveys took place during daytime, out with peak times (the first participant arrived at 09.00 and the last participant completed their survey at 16.15). The survey was conducted in relatively benign weather conditions. Participants were required to wear a high visibility jacket and be chaperoned by a researcher whilst they crossed. Given these constraints, it is possible that the crossing was easier to use, and riders and participants acted differently (perhaps in a safer manner) around the crossing during the time of the survey. For example, the requirement to wear a high visibility jacket deterred one blind participant from taking part as they did not feel the survey would be a true representation of their experiences of using Zebra crossings. Most participants felt they were more visible to vehicles and other road users, mainly because they were provided with these jackets.

The Zebra crossing used for the site survey was chosen based on its condition and location. Most participants who expressed an interest in taking part lived in Edinburgh or were able to travel easily to the site. To reduce the risk to participants, the chosen crossing was one that was recently installed, located on a road with good sight lines, was fully functioning and well maintained. Poor maintenance of Zebra crossings, and visibility of pedestrians and road users, were raised as issues by participants during the research. It is recognised that the Zebra crossing selected for the survey, as an example of good practice, did not exhibit these issues. Choosing a Zebra crossing with these and other issues could have yielded more data on the accessibility of Zebra crossings. However, it would have been at the expense of participant safety. Furthermore, detailed experiences and perceptions of Zebra crossing use were discussed in the focus groups which yielded data on these issues.

## Findings from stage 1 focus groups

This section presents the findings from the focus groups, providing representative views and quotes from all participant groups.

Findings are grouped into 2 main themes:

1. Views and experiences of participants; and
2. Suggested improvements (education, maintenance, technical changes, legislation/enforcement, reasonable adjustments and faith in solutions).

### Participants' views and experiences

Participants were asked how often they use Zebra crossings, and about the environment surrounding these crossings. If participants stated they do not use Zebra crossings, they were asked why. Participants were then asked about issues they have witnessed or experienced; feelings and behaviours whilst approaching and using Zebra crossings; and if they think there are positive aspects of these types of crossings.

**Table 6 – Summary of participants' views and experiences of Zebra crossings**

Theme	Summary of findings
Frequency and use	<ul style="list-style-type: none"> <li>▪ Ranged from daily to never</li> <li>▪ Use depends on whether a crossing is located near to where they live/travel plus the factors outlined below</li> </ul>
Overall experiences	<ul style="list-style-type: none"> <li>▪ Most feel cautious on the approach to Zebra crossings and said it is hard to know when to cross</li> <li>▪ Blind people feel especially vulnerable</li> <li>▪ No auditory confirmation that it is safe, and wind or noise from roadworks can make crossing especially difficult</li> <li>▪ Feel the need to move quickly across</li> </ul>
Impact of location, surroundings, and infrastructure	<ul style="list-style-type: none"> <li>▪ Feel more unsafe when Zebra crossings are located near corners, roundabouts or where there are high traffic volumes</li> <li>▪ Bus stops and trees can restrict visibility</li> <li>▪ Black and white stripes in the crossing areas are better than coloured</li> <li>▪ Height of Belisha beacons too high for some</li> </ul>
Impacts of other road users	<ul style="list-style-type: none"> <li>▪ Hard to hear cycles, electric cars etc. approaching</li> <li>▪ Perception that cyclists are less likely to stop</li> <li>▪ Perceived lack of understanding by road users of the Highway Code</li> <li>▪ Less pedestrian traffic compared with controlled crossings</li> <li>▪ Perception that the UK has less of a pedestrian friendly culture compared to other countries</li> </ul>

### Frequency and use

The frequency of participants using Zebra crossings ranged from daily to never. This mainly depended on the number of Zebra crossings participants encountered in their local area. Those living in or near Edinburgh perceive the city as having many Zebra crossings and are more likely to be regular users, compared to Glasgow, for

instance. Participants also found Zebra crossings most often near schools and in urban areas rather than more rural ones. Participants who live or are often in these types of areas tend to use Zebra crossings more frequently. Frequency and use also varies dependent on the nature of each individual's disability. One blind participant stated he would never use a Zebra due to safety concerns.

### Overall experiences

Both positive and negative experiences of using Zebra crossings were reported by participants. Their experiences were shaped by their disability; the positioning of the crossings; the features of the crossings; their experiences with other types of crossings (controlled and uncontrolled); and the attitudes and behaviours of those around them (pedestrians and road users).

Nearly all participants stated they approach Zebra crossings with caution, some noted feeling anxious or unsafe when approaching and using them. Most participants said it is difficult to know when it is safe to cross. Several participants also feel there is a general lack of consideration from pedestrians, road users and local authorities for the health and wellbeing of disabled people and this extended to accessible crossings.

*I get anxious and I am not sure when it is safe to cross. I'm wary, will the cars stop or not? I'm never sure when it is the right time to walk over.* (Interview 2, deafblind participant)

*It's the not knowing whether it's your turn or the traffic's turn or the traffic doesn't know what you're going to do. [...] It's the indecision of Zebras that make it a nightmare.* (Participant M6, blind and visual impairment focus group)

Of the groups interviewed, participants from the blind and visually impaired focus group were the most likely to note they feel unsafe and/or strongly dislike using Zebra crossings. Two of these participants described the issue of crossing as 'life or death'. One participant from this focus group mentioned the isolation of disabled individuals afraid of negotiating traffic, who then have lower tendency to leave their homes.

A few visually impaired participants noted they rely on hearing to cross, and it is stressful to do so without an auditory confirmation that it is safe, and noise from wind or roadworks can make crossing especially difficult.

A visually impaired participant found it difficult to distinguish between Zebra crossings and other controlled crossings, as the tactile paving can be the same for both. One blind participant stated guide dogs are trained to stop at a kerb and wait for the traffic to stop before moving onto the crossing. Two participants from the blind or visual impairment focus group emphasised the continued need for signalised crossings as well as having more Zebra crossings.

*We have to play Russian roulette, stick our foot on the roadway and hope there is not a cyclist – silent cyclist – an electric car, one of these awful e-scooters or anything else. But we cannot be sure that traffic has stopped, especially cyclists.* (Interview 1, visually impaired participant)

Many of the participants across the different focus groups feel the need to cross quickly to avoid being hit by cyclists or cars impatient to keep going; an issue they felt is not the case at signal-controlled crossings. Those with physical impairments, some wheelchair users, and those 65+ stated it takes them more time for them to cross, and some of these participants mentioned a feeling of guilt around making drivers wait. Additionally, parents or caregivers highlighted they feel particularly nervous crossing with children.

### Impact of location, surroundings and infrastructure

In terms of specific problems with Zebra crossings, participants noted that lighting should be stronger, and the crossings must be better maintained. Many participants found Belisha beacons to often be too dim (or even not functioning at all), especially for night-time or low visibility weather conditions. This makes them feel that crossing is dangerous.

Many participants also noted poor maintenance of the crossings, most notably the white painted stripes on the road fading with time and not being replaced, so the crossings are not effective in showing drivers they should stop and are less visible to pedestrians.

One participant in the blind and visually impaired group found tactile paving, if not maintained, goes flat over time and is no longer able to indicate where to cross. Additionally, it was noted by a couple of participants in the 65+ focus group that in some cases the footway or central reservation is not wide enough for wheelchairs and buggies to wait safely.

Participants who are partially blind and visually impaired prefer black and white crossings, which provide good contrast. It was considered that colourful crossings, which participants were aware of through national media, would decrease feelings of safety and in some cases be a barrier to using them.

*Any other colour scheme, I wouldn't see it...there's not enough contrast with green and black of whatever other colour schemes they're playing with. So the black and white is really important. If you're going to have Zebra crossings, they have to be the colour of a Zebra, not any other colour.* (Participant M1, blind and visual impairment focus group)

*I like the fact that...for my eyesight, I can see the black and white. The tactile paving, I can feel that, and know there's a Zebra crossing coming up, so I like that.* (Participant F2, blind and visual impairment focus group)

Participants across all focus groups felt negatively about Zebra crossing positioned after a corner. They found drivers to come around corners too fast and often did not have time to stop before reaching the crossing. Crossings located near corners where it is not possible to see what is beyond it when approaching, were perceived as reducing driver visibility of pedestrians and making it more difficult to cross. Many participants reported that in areas with heavy vehicle traffic, especially near roundabouts, Zebra crossings are considered less appropriate and useful for them.

*When they're in residential areas, I think people maybe feel safer using them because they're slightly quieter, but in busier areas, I don't know that they're entirely appropriate just as they are.* (Participant M2, deaf and hearing impairment focus group)

*I think they're useful on roads which have a low volume of traffic and low speed of traffic, but they're not much good anywhere else.* (Participant M1, 65+ focus group)

For those with physical disabilities, the lower height of a wheelchair can make it harder to see cars coming, as noted by one participant in this focus group. For those aged 65+, the height of the Belisha beacon was said by one participant to sometimes be too high off the ground, as older people tend to be less tall and may have more difficulty looking up and seeing them.

Those who had experienced Zebra crossings with a raised table and/or where the carriageway had been narrowed to slow driver speed, cited positive experiences using them. Participants also perceived the costs of installation and maintenance of Zebra crossings as cheaper compared with other controlled crossings. Though most would prefer signal-controlled crossings, almost every participant determined that a Zebra crossing is better than no crossing at all.

*If it's a financial issue that they can't or won't put up a controlled crossing then yes, the Zebra crossing is ideal because it does give people, especially elderly people, the opportunity of safely getting across the road.* (Participant F3, 65+ focus group)

### Impact of other road users

Many participants noted that electric cars, hybrid cars with start-stop technology, e-scooters, or bicycles are difficult or impossible to hear, and it is hard to know when they are approaching. Participants reported that drivers did not always stop, even when they see a pedestrian waiting to cross, and that motorists and cyclists may proceed when a pedestrian is crossing, if they see an opening. Some participants in a few of the focus groups felt



that cyclists hardly ever stopped at crossings and found this to be a greater issue at Zebra crossings compared to other controlled crossings. Participants considered there to be a lack of consideration, and some have experienced hateful words from drivers when trying to cross.

*I think there's something about the perception [...] that the right of way on Zebra crossings is flexible. And it's about right of way for the part of road you're on, not waiting 'til somebody has actually crossed the entire crossing.* (Participant M3, blind and visual impairment focus group)

Many participants across the focus groups and interviews perceived a lack of respect for rules and the Highway Code amongst some road users. They suggested that, without having studied the Highway Code, a driver may not know the rules of a Zebra crossing. For example, they may not know it is mandatory, not advised, to stop as soon as a pedestrian steps foot in the road. The new changes in the Code prioritise pedestrians, yet participants discussing the Code had not noticed a shift in driver and rider behaviour around this.

One participant from the deaf and hearing impairment focus group highlighted the need for cyclists as well as drivers to be well-versed in the Highway Code. Another participant from this focus group felt that the Highway Code is unclear in places and is not accessible enough. For example, participants from the learning disability focus group pointed out that, although the Highway Code states drivers must stop once a pedestrian has set foot on the road, pedestrians (particularly those with a visual impairment) cannot always be sure if a car is going to stop. As such, they may not initiate crossing and cars may not feel the need to stop.

*I wonder about cyclists as well sometimes, and their understanding and knowledge, because I'm not sure they follow the Highway Code always either. [...] I quite often I see cars stopping and the cyclist just keeps going past them...* (Participant 6, deaf and hearing impairment focus group)

Several participants agreed that Zebra crossings helped cope with pedestrian volumes as footways are often less crowded for those waiting to cross at Zebra crossings, compared with busier signal-controlled crossings.

Some suggested that the U.K. has less of a pedestrian-led culture than countries like Canada, the U.S. or Germany where motorists are perceived to respond more systematically and regularly to pedestrians.

## Suggested improvements

Participants were presented with an overview of the activities and findings of the Phase 1 research, and asked for their reflections on this information. Following this a comprehensive discussion with participants sought to gather their views on potential improvements to Zebra crossings, including technical changes, education, and legislation.

Participants were referred to the PSED and explicitly asked what reasonable adjustments they felt could be made to remove any substantial disadvantage that disabled people face in using Zebra crossings, in comparison to people who are not disabled. Participants who avoid using Zebra crossings were asked what the alternative should be and how far they would be willing to go to avoid a Zebra crossing. Finally, participants were asked what they felt were the priority issues with Zebra crossings as well as their most important solutions to these problems.

Table 5 summarises participants' suggested improvements, with further detail provided below. Across all focus groups, maintenance and more effective lighting were the most frequently suggested solutions, followed by road safety education and a clearer indication to the driver that a Zebra crossing is ahead.

**Table 7 – Participants' suggested improvements**

Theme	Summary of suggested improvements
Location and maintenance	<ul style="list-style-type: none"> <li>▪ Assessment of location of Zebra crossing and surroundings before, during, and after Zebra crossing construction</li> <li>▪ Ongoing maintenance of road markings and lighting</li> </ul>

Theme	Summary of suggested improvements
Technical changes – lighting, signals and signage	<ul style="list-style-type: none"> <li>▪ Improved lighting at and near crossings</li> <li>▪ Visual and audible signals (e.g. flashing lights, rumble strips) for road users</li> <li>▪ Improved signage for road users</li> <li>▪ Lowering of height of Belisha beacon</li> </ul>
Technical changes – Zebra crossing surface/construction	<ul style="list-style-type: none"> <li>▪ Raised tables</li> <li>▪ Narrow carriageway/footway buildouts</li> <li>▪ Attention to dropped kerb requirements</li> <li>▪ CCTV cameras</li> </ul>
Education and training	<ul style="list-style-type: none"> <li>▪ Adverts and road safety education campaigns</li> <li>▪ Raise awareness of Highway Code</li> <li>▪ Ongoing road user training</li> <li>▪ Disability awareness training</li> </ul>
Legislation/enforcement	<ul style="list-style-type: none"> <li>▪ Parking enforcement</li> <li>▪ Speed limit reduction</li> <li>▪ Highway Code enforcement</li> </ul>

## Location and maintenance

Participants across all focus groups stressed the importance of Zebra crossing locations being assessed relative to their surroundings. They suggested this takes place before, during, and after construction. For example, checking trees or bus stops aren't obstructing sightlines; not too close to corners or junctions. They noted that it is important to consider the visibility of the crossing for road users and pedestrians.

It was suggested that consideration must also be given to the gradient of footway, some participants expressed difficulties accessing crossings where the gradient was considered too steep.

*Perhaps we need to revisit where some of them are sited.* (Participant M1, physical impairment focus group)

Most participants across all focus groups and interviews felt that maintenance of Zebra crossings was most important (e.g. ensuring the black and white markings are clear and that lighting is working correctly). Participants felt that Zebra crossings are not always maintained to a safe and accessible standard. Some participants from the physical impairment focus group suggested that maintenance planning be set out when a Zebra crossing is constructed, and that Local Authorities should prioritise road maintenance. They also suggested regular maintenance checks and action to ensure high quality provision is maintained.

## Technical changes

Technical changes suggested by participants included improved lighting and alerts, signage for drivers and riders, and road surfaces.

### Lighting, signals and signage

Several participants who are blind or have a visual impairment stated the need for better lighting at and near Zebra crossings. There was a preference for flood lights and spotlights. One visually impaired participant mentioned their experience of using a Zebra crossing with a sensor which caused the crossing to light up at night when she stepped on it. She noted that this made a notable difference to her perceived visibility, and hence

safety, and suggested that this be implemented at other Zebra crossings to aid pedestrian movements particularly when it is dark.

Many participants across all focus groups noted a desire for a better indication for drivers leading up to Zebra crossings so they are aware that there is a Zebra crossing ahead of them. Examples included a flashing light (triggered by a pedestrian pressing a button) and tactile indicators on the road (such as a rumble strip or speed hump).

*Make it [the Zebra crossing] more apparent. If they're driving along and they're maybe not paying attention, maybe there's...something we can put on the road markings maybe 50 metres before or...something to just bring their attention that they're approaching one.* (Participant M4, blind and visually impaired focus group)

*Make it [the Zebra crossing] more visible for drivers, whether it's extra lights or whether it's raised bits on the road, [...] even a sign some distance away showing a driver that they're coming up to a Zebra crossing.* (Participant F3, 65+ focus group)

Consistent with the apprehension around whether road users would stop, some suggested that there was a need for better signage before the Zebra crossing so that road users were prewarned and prepared to stop if necessary:

*So I think signage is important, and we certainly need something to get the driver's attention, so whether it's a speed bump or whether it's signage or whether it's a red light, I think we certainly need at least one of those things.* (Participant M2, deaf and hearing impairment focus group)

*We've usually got roadworks ahead or roundabout ahead or traffic lights ahead, but I don't think there's a sign to say that there is a Zebra crossing coming up.* (Participant F1, learning disability focus group)

A few participants also suggested that lowering the height of the Belisha beacon would make it easier for older people to see.

### Surface/construction

Several participants across the focus groups suggested that Zebra crossings should have raised tables, which they perceived would serve several functions. For example, pedestrian prioritisation would be reinforced:

*So as cars are going over it, they're immediately realising that it's a speed hump and they're having to slow down, so there's already the language of a driver slowing down, [...] that does make me more comfortable using that one crossing.* (Participant M1, deaf and hearing impaired focus group)

*Raised pedestrian crossings are much improved over the standard Zebra crossing for a wheelchair user.* (Email response, physically impaired participant)

A few participants stated that narrowing the carriageway and/or installing footway buildouts would make Zebra crossings more accessible. It was felt that built out kerb-lines would enhance sight lines make pedestrians' intent to cross clearer to road users. Participants suggested that more efforts be made to ensure that refuge areas (at the central reservation and on either side) meet the minimum requirements for wheelchair and buggy access.

*I think a very big issue on a lot of them [Zebra crossings] is if there's a fair number of pedestrians just going up and down the footway and there's no widening of the footway, you [road users] can't pick out somebody who's intending to cross, but if the road is narrowed and the footway widened, there's what you would call a queuing point where you're visible, still on the footway but not in the regular traffic flow.* (Participant M2, 65+ focus group)

*If you have the raised table and a narrowing of the road so there's only room for one lane of traffic in each direction so you can't have cars trying to overtake. It's the one of the things that a fairly wide road with no central reservation you can get a car overtaking one that is stopping and they can't see somebody who's stepped onto the crossing.* (Participant M1, 65+ focus group)

One of the physically impaired participants (wheelchair user) found that Zebra crossings are more likely to have dropped kerbs compared to other crossings. They noted that attempting to use Zebra crossings with dropped kerbs have caused them to fall out of their wheelchair on several occasions, as the kerb height was too high. As a result of these experiences, they suggested that the 0 to 6 mm rule of kerb design be more strictly enforced (if there is not a raised table).

Participants from the 65+ and the blind and visual impairment focus groups suggested installing CCTV cameras at Zebra crossings to act as a deterrent for drivers who may not act appropriately at crossings. They also suggested installing audible signals which indicated when it is safe to cross (though no specific solutions were mentioned).

*For blind people, you should have something that will make a noise, like a beeping noise so they can hear when it is safe to cross over. But there is no noise at the Zebra crossing for blind people.* (Interview 2, deafblind participant)

Two participants in the learning disability focus group suggested more crossing patrol roles (equivalent of school crossing patrol officers) would be helpful.

### Education and training

Most participants across all focus groups felt that there needed to be an increased awareness of how to use Zebra crossings, and that there is a requirement for improved road safety education.

*Even for adults, particularly with learning difficulties, who are maybe just getting their independence, there isn't really anything to say, oh, this is how you cross a Zebra crossing [...], this is how to watch out for cars.* (Participant F1, learning disabilities focus group)

Several participants across all focus groups suggested that adverts and road safety education campaigns accessible through television, social media and video-sharing websites (e.g. YouTube) should be used to inform and remind all road users about the Highway Code, and how to use Zebra crossings. Many of these participants drew from their childhood memories of seeing such adverts on television. Road user education was deemed important, including promoting the hierarchy of road users (emphasising that pedestrians, those most at risk, are at the top of the hierarchy). Participants felt that adverts and campaigns should be more regular as people tend to forget the rules over time and may not be aware of changes to the Highway Code.

Several participants across all focus groups suggested that the Highway Code be more clearly written and accessible to the public, especially considering the recent changes. They felt that hard copies should be accessible to the public and that it should be easier to access online and for free<sup>4</sup>.

A few participants from the physical impairment focus group also suggested that road users take part in ongoing testing and training to maintain their right to use the road, including disability awareness training.

*If we go and teach in schools and teach the kids about disability awareness, my goodness the parents learn so quickly. So I think we have to start...start to teach the kids about the hierarchy of road users and what their responsibilities are, in simple terms, about what it is.* (Participant M1, physical impairment focus group)

*...once you've passed your driving test, many people [...] potentially do it at 17. Then they're entitled to drive until they're 75 without any review whatsoever. And over those 60 years, laws change, capability of cars change, the business of neighbourhoods change, and there's no need to retest people, re-educate people, re-inform them about how that works. So I actually think the whole aspect of education and the permission to continue driving is a really important issue that people need to undergo. [...] most other*

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<sup>4</sup> At the time of the focus groups the Highway Code was available for free online. Being that the purpose of the research was to gain an understanding of participants perceptions and experiences, the online availability of the Highway Code was not discussed during the focus group.

*professional aspects of life you have to continue professional development training as part of your ongoing entitlement to participate.* (Participant M1, blind and visually impaired focus group)

## **Legislation/enforcement**

Participants across all focus groups suggested various solutions related to legislation and enforcement of the Highway Code. One participant from the 65+ focus group suggested that the no parking rule within the Zebra zig-zag area be enforced more strictly as parking within this area obstructs visibility. Speed limit reduction (20 miles an hour maximum) was specifically mentioned across all focus groups. Another participant from the blind and visual impairment focus group emphasised that to be effective, legislation must be accompanied by enforcement. Legislation around ensuring the locations of crossings are sensible was suggested by participants in the deaf and hearing impairment and physical impairment focus groups.

## **Reasonable adjustments**

Participants were asked what reasonable adjustments could be made to Zebra crossings to make them more accessible for individuals with disabilities.

This was a challenging question for participants to answer effectively, as it was felt the term 'reasonable adjustments' is too subjective; that one person's view of what is reasonable is different to someone else's, and most felt that Zebra crossings need to be equally safe and accessible to people of all ability groups. The discussion prompted participants to return to previously suggested improvements. One participant from the physical impairment focus group suggested that Equality Impact Assessments should be completed on all Zebra crossings to determine accessibility.

## **Other comments**

Several participants felt that if Zebra crossings were more widespread and/or more widely used, drivers would behave more appropriately around them; they would be more 'normal' in the street environment, and pedestrians would be safer.

Participants across the focus groups and interviews felt that it was difficult to get Local Authorities to respond to some of the issues they described. Those participants who had been in contact with their Local Authority in the past regarding Zebra crossings or other road issues, were often told that there is no funding available for road maintenance and upkeep.

*Councils don't have enough money to spend either to maintain the roads in a reasonable condition or even to maintain the footways in a reasonable condition, never mind make any improvements.*  
(Participant M2, physical impairment focus group)

## Findings from stage 2 site survey

This section presents the observations and findings from the site survey conducted at a Zebra crossing in Edinburgh, providing representative views and quotes from all participant groups.

Findings are grouped into three key themes:

1. Background observations;
2. Crossing experiences; and
3. Suggested improvements.



Figure 4 – Participant crossing during the site survey. Photograph taken by Jacobs

### Background observations

The environment surrounding the Zebra crossing appeared to be relatively quiet during most of the session, although traffic volumes increased towards the end of the survey, notably fewer cars were observed stopping for participants during the busier periods. There were periods of moderate noise, mainly from nearby traffic and grass cutting. The weather fluctuated during the day, from dry to damp, while generally remaining overcast. No extreme<sup>5</sup> weather conditions were observed.

Most participants were noted to be apprehensive as they approached the Zebra crossing. Once they arrived at the crossing, participants were noted to check multiple times for cars coming from both directions. Participants allowed for sufficient time to ensure cars were stopping or had stopped, before they began crossing. Blind/visually impaired participants were observed to use tactile sensing with canes. However, some blind participants found it difficult to locate the tactile paving, meaning it was difficult for them to locate the crossing.

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<sup>5</sup> Extreme weather being a weather event which is significantly different from the average or usual perceived weather pattern for that time of year.

It was noted that several drivers revved their engines while waiting for the participants to cross. Other drivers were observed to patiently wait until the participant had crossed. Most participants did not acknowledge the waiting vehicle as they crossed the road.

Table 8 outlines the conditions (weather, footpath, background noise, traffic levels) at the time of each participant crossing.

**Table 8 – Observations during individual participant sessions**

Participant No.	Weather Conditions	Footpath Conditions	Background Noise Levels	Traffic Levels
1	Overcast, Wet	Wet	Moderate	Busy
2	Overcast	Damp	Loud	Quiet
3	Overcast	Damp	Loud	Quiet
4	Overcast	Dry	Moderate	Quiet
5	Overcast	Dry	Moderate	Quiet
6	Overcast	Dry	Moderate	Quiet
7	Overcast, raining-lightly	Damp	Quiet	Moderate
8	Overcast	Dry	Quiet	Busy
9	Overcast, raining-lightly	Damp	Quiet	Busy
10	Overcast	Dry	Moderate	Busy

## Crossing experiences

Participants reported a range of emotions while waiting to cross the Zebra crossing; from relaxed to anxious and hesitant. Participants who crossed when there was less traffic and were accustomed to using Zebra crossings felt more relaxed or neutral when waiting to cross. Participants felt less relaxed as they approached the crossing if they were unsure if road traffic was going to stop. They also felt anxious judging when the right time to step off the footway was (especially participants who are blind/visually impaired) and felt pressure to cross quickly if they could sense cars waiting. Several participants noted they did not know when it was safe to cross and did not feel safe when attempting to do so.

*I felt I was just taking my life in my hands [when attempting to cross].* (Participant 8, deafblind participant)

Participants felt similar emotions while actively crossing; from relaxed to anxious and hesitant. Participants felt relaxed or neutral as they crossed when there was little traffic, when they were able to confidently assess when it was safe to cross, and if they were accustomed to using Zebra crossings. Participants who were less confident about when it was safe to cross, and unsure if vehicles and cyclists would stop while they were on the crossing, were more anxious during crossing. As mentioned above, some participants also felt pressure to cross fast because cars were waiting:

*I'm conscious that the drivers want me to walk quickly on the Zebra crossing. I feel they wanted me to hurry up so they can continue with their journey. I felt hesitant and was thinking, should I run?*  
(Participant 10, deaf/hearing impaired participant)

Post-crossing, some participants described feeling neutral because they were well accustomed to using Zebra crossings. However, several described a sense of relief that they made it across, and cars no longer had to wait for them.

## Feelings of personal visibility

Participants felt they were visible to vehicles and other road users, mainly because they were provided with a high visibility jacket by the research team prior to crossing. A few participants noted that the road was clear and straight which made them feel more visible from a distance. Participant 10 (deaf/hearing impaired participant) noted that some cars did not stop and was therefore unsure how visible they (the participant) were.

## Influence of the weather

Around half of the participants said that the weather influenced how they felt about using Zebra crossings. Participant 5 (wheelchair user) noted that wheelchairs and rain are not compatible, and therefore make it quite difficult to cross the road during rainy weather. A few other participants also commented that rain influences their feelings towards using Zebra crossings (for example, the footway being slippery and more difficult to walk across when wet). Several participants who are blind/visually impaired noted that it was difficult to see, and thus confidently cross, when it was too light, too dark or raining outside.

## Condition of crossing and surrounding area

Blind/visually impaired participants felt that the Zebra crossing had been added as an afterthought (did not fit with the area) and found approaching it difficult due to the expanse of footway space on one side of the crossing (which included trees fenced off with guardrail and acted as obstacles for cane users), lack of building line to guide them and that the crossing was located on a raised table meaning the kerb was flush with the carriageway (this issue is detailed below under locating the crossing).

Despite the negative comments (mainly from blind/visually impaired participants), most participants felt that the condition of the crossing (which was new) was very good. They felt that the white stripes on the road were clear, the Belisha beacon was bright and easy to see, and:

*...[the] tactile [paving] is very distinct from the footway and easy to tell where it began and ended"* (Participant 6, blind/visually impaired participant)

## Width of the carriageway

Half of the participants said that the width of the carriageway influenced their feelings and ability to use the crossing. They noted that a wider crossing (as this one was) felt less safe because there is further to walk, and likely more traffic (for example if there are multiple lanes). Additionally, as it takes longer to cross a wider carriageway, anxiety over the impatience of road users is heightened.

*With wider roads, I would need to be more observant to make sure all cars are stopping. With a shorter distance to cross, I will only need to worry about one or two cars.* Participant 7 (deaf/hearing impaired participant)





Figure 5 – Beaufort Road Zebra crossing (used in the study). Image taken by UoE

## Locating the crossing

Participants' perceptions of the ease of locating the crossing ranged from very easy to very difficult. Participants who are blind/visually impaired (n=4) found it difficult to locate due to it being on a raised table, which made it hard to differentiate the kerb from the footway and identify the tactile markings. Participants 7 and 11 both noted in their audio recording that the kerb was not lowered (the crossing had a raised table) which presented an issue for distinguishing where the footway ended, and the road (crossing) began.

While observing the participants, the researcher noted that Participant 2 (who is over 65) was hesitant when approaching the crossing. Participants 5 and 7 (who are blind/visually impaired) had difficulty finding the tactile paving at the crossing, and a member of the research team had to actively intervene to prevent them from straying onto the road whilst trying to find the kerb line, and guide them to the tactile paving to locate the crossing.

*The absence of a kerb I find so difficult.* (Participant 7 deaf/hearing impaired participant)

Furthermore, the tactile paving line did not extend to the building line which Participant 6 (who is blind/visually impaired) found confusing. Conversely, the remaining participants (n=6), who are not visually impaired or blind, found that the raised table made the crossing easier to locate because it stood out on the road. Participants also found the crossing easy to locate as it was well-maintained (as mentioned above, the white lines on the road were clear and the Belisha beacons were bright and could be seen from afar).

## Determining when it was safe to cross

Participants determined it was safe to cross if and when they were confident in confirming that the approaching vehicles and cyclists (if any) had stopped moving. This task was easier for some participants (such as those 65 and over) and more difficult for others who were less able to rely on both sight and hearing (such as those who are blind/visually impaired and/or deaf/hearing impaired).

Participants who are blind/visually impaired found it difficult to hear when traffic had stopped, especially if there were cyclists or quiet cars on the road. Participants who are deaf/hearing impaired could not always see when

cars or bicycles were approaching. This was particularly difficult for deafblind participants who found both challenging (n=2).

Participant 9 had a guide dog; its trained response is to stop at the kerb to alert its owner that they should cross. The flush kerb line with the carriageway caused the dog to be confused, resulting in them not acting as trained at the crossing place. In this instance, as the participant felt it was safe, he overrode the dog's reluctance to cross and proceeded to move across the crossing.

### Traffic volume, speed and noise

Participants noted that cyclists and quiet vehicles were often difficult to hear regardless of weather. One participant who is deafblind and wears hearing aids reflected on their general experiences, noting that when it is noisy (either due to traffic, the weather or other factors) they are sometimes unable to differentiate noises and establish how far away traffic is. This makes it difficult for them to determine when to cross. Participants 7 and 11 (both blind/visually impaired participants) mentioned on their audio recordings that there was a lot of noise coming from the street traffic.

A few participants crossed when it was quiet and stated that noise was not an issue. One participant noted that the quietness made it easier for them to cross.

When asked about the impact of traffic volume and speed, answers were mixed. A few participants noted that if they determined the traffic volume and speed was high, they took extra care in crossing and deciding when to do so. One participant felt pressure to cross quickly as he felt traffic volume was high.

*I wonder if I am the cause of the wait.* Participant 8 (deafblind participant)

Some participants found it difficult to determine traffic speed and if cars were slowing down at the crossing. This often led to hesitancy and anxiety when crossing. A few participants said that even though they were able to determine traffic speed, they did not feel confident that cars would stop at the crossing which also increased anxiety.

*If cars travel at a high speed, I don't feel confident that they will stop. If they travel at a speed that is not too fast, I'll feel more reassured. I watch the speed of the cars before making a decision.* (Participant 7, deaf/hearing impaired participant)

*I thought I would be confident to cross this Zebra crossing but was surprised to see cars passing at a speed without stopping for me. So, it made me wary of the cars on this road. I thought the hi-vis jacket would help me to be more noticeable to the drivers but obviously not.* (Participant 10, deaf/hearing impaired participant)

### Driver and cyclist behaviour

Most participants noted that driver and cyclist behaviour was generally good at the time of crossing, and this made it easier for them to cross. They felt that drivers and cyclists were slowing down near the crossing and stopping for them to cross, which made them feel safer when crossing.

There were some isolated incidents where some participants noted that this is not always the case. Some road users were perceived to be reluctant to stop, and were impatient when stopped, especially cyclists. As noted previously, there were reports of some drivers revving their engine whilst waiting for the participant to cross. Some drivers towards the end of the day were observed failing to stop for participants.

### Ability to see and hear vehicles and cyclists

Most participants noted difficulty in hearing cyclists and electric vehicles. One participant noted that hearing aids are unable to pick up the high pitch of a bicycle bell which renders them useless to hearing aid users. The

crossing was on a straight and wide road, which made it easy to see oncoming traffic as compared to crossings on narrow or winding roads.

## Ease of moving across and transitioning from kerb to road

Most participants felt it was easy to move across the crossing, aside from Participant 4 (blind/visually impaired participant) who echoed the difficulty in knowing if vehicles and cyclists would stop for them to cross. As participant 6 (blind/visually impaired participant) was crossing, he recorded into his audio device that the crossing felt safe, and he was able to feel the tactile paving on both sides well and cross easily. Most participants felt the transition from road to kerb was comfortable. The raised height of the crossing made the transition smoother, however as noted by a few blind/visually impaired participants, this also made it difficult to know when the crossing began and ended as the crossing was on a raised table.

## Suggested improvements

At the end of the interview, participants were asked if they had any suggestions for improvement to the crossing or more generally in the surrounding environment. A few blind/visually impaired participants continued to emphasise the difficulties in being able to distinguish the footway from the crossing when using raised tables. They argued that kerb should drop down more at the crossing.

They also suggested that the tactile paving extend all the way to the building line so they can orient themselves when they reach the footway. In contrast, a few participants (who were not blind/visually impaired) noted that raised tables made for a smoother transition from the kerb to the road (particularly for people with physical disabilities) and suggests to road users that the footway has priority instead of the road.

Aside from changing the Zebra crossing to a signal-controlled crossing, several participants suggested that additional tactile or audio features be added to the crossing (and other Zebra crossings) to help pedestrians know when it is safe to cross (for example a noise or moving object to indicate cars have stopped).

## Case studies

The following case studies illustrate the experiences of road users at greater risk when approaching, crossing and moving away from the crossing.

### Margot

Margot (pseudonym) is over 65. Although she has good vision and hearing, she is often hesitant to use Zebra crossings because she is uncertain if drivers and riders will stop for her. It was her first time using this Zebra crossing and she found it relatively easy to locate.

Margot sensed that drivers and riders could see her well, and felt at ease as she approached the crossing. However, she soon began to feel nervous as she set foot onto the crossing, unsure if the approaching vehicles and cyclists would stop as she crossed. She found it particularly difficult to estimate the speed at which vehicles were going at in order to guess if they were able to stop safely.

As Margot approached the crossing, she noted that the surrounding area was quite noisy from grass-cutting, construction and traffic in the area. Although she has good hearing, she found this distracting when attempting to cross.

Margot was pleased to see that drivers and riders stopped and patiently waited for her to cross. When she reached the end of the crossing she felt a sense of relief.

"I am glad I am on the other side now!" Margot said to herself as she finished crossing.

**James**

James (pseudonym) is Deafblind and uses a guide dog. It was his first time using this Zebra crossing. As he approached the crossing, he found it difficult to find the kerb since the crossing is raised to a similar level (on a raised table). James's guide dog was also confused, as he is trained to stop and cross at kerbs. He had to override the dog's reluctance to cross and felt anxious while crossing. James said of his crossing experience: "I felt I was just taking my life in my hands".

James felt that drivers could see him well and could tell the cars had stopped to let him and his dog cross. However, he felt that they were impatiently waiting for him to cross. This made him feel pressured to cross faster, although he knew he had to go at his own pace. In the past car drivers have sounded their horns at James, signalling for him to cross more quickly, which he felt put more pressure on him to speed up.

James's hearing aids are not able to pick up all types of noise which made it difficult to hear traffic, especially as it was quite noisy when he crossed. The wind can also interfere with his hearing aids, which makes it even more difficult to hear traffic. It was overcast on the day, which made it more difficult than usual for James to make out cars and the footway. Although it did not occur this time, drivers sometimes wave at James to encourage him to cross. As he is visually impaired, he is normally unable to recognise this signal which leads to confusion for both parties.

The footway and/or crossing was dry when James crossed. Sometimes however footways and crossings can be wet and slippery, and on these occasions, James must be extra careful when crossing. James often wonders if his guide dog will lose concentration, causing an accident.

## Conclusions

Phase 2 of the research study, undertaken in 2021, sought to build upon the findings of Phase 1, undertaken in 2020; this found that whilst attitudes of users and practitioners towards Zebra crossings were largely favourable, it was recognised that people with disabilities are more likely to feel uncomfortable using Zebra crossings due to a range of issues.

A wide range of potential improvements, including physical design adaptations as well as stricter compliance measures and increased training were suggested during Phase 1 to improve the safety of Zebra crossings, to make them more appropriate to the needs of all users.

The views and experiences of most at risk road users captured during Phase 2 have validated these findings, and have deepened understanding of the issues faced by older people and people with disabilities, and of potential improvements that could be considered.

Of the participants who took part in the study, most feel cautious on approach to Zebra crossings and said it is hard to know when to cross. Participants who are blind/visually impaired feel especially vulnerable. Participants feel more unsafe when using Zebra crossings that are located near corners or roundabouts, or where there are high traffic volumes or wider roads. All user groups considered that there is a lack of understanding by road users of the Highway Code, perceiving the UK to have less of a pedestrian friendly culture compared to other countries.

The site survey demonstrated the variance of user experiences depending on participants' own abilities. The area surrounding a Zebra crossing, the location of the crossing, as well as the design of the Zebra crossing itself all contributed to participants' perceptions and experiences. The raised table with flush kerbs was found to be accessible and comfortable for those with mobility issues, however this posed issues for blind participants who found it challenging to safely locate the crossing.

Participants provided a range of suggested improvements to improve experiences of using Zebra crossings. These suggestions were grouped into:

- Location and maintenance;
- Technical changes;
- Education and training; and
- Legislation/enforcement.

It is worth highlighting that, whilst participants would prefer to use a signal-controlled crossing over a Zebra crossing, almost all considered that there is a role for Zebra crossings, and they are better than an uncontrolled crossing.

## Recommended next steps

The findings of Phase 2 have supplemented and supported Phase 1, with a broad range of potential improvements suggested. It is Jacobs' recommendation that further work is undertaken to explore in more detail the feasibility of potential improvements, moving nearer towards the overarching research aims described in Section 2.

The next steps to achieving this could include:

1. Engagement with Zebra crossing trials/ innovations delivery teams across the UK, to obtain an understanding of lessons learned, successes and failures. This would be limited to trials/ innovations which have been conducted within the last five years (2017-2022) and trials/ innovations which align with suggested accessibility improvements identified during previous phases;
2. Focus groups and interviews with Roads Authorities and industry representatives to explore the feasibility and deliverability of suggested improvements identified in previous research phases;

3. A trial of one or more suggested infrastructure improvements as identified during Phase 2. This would be informed by findings from discussions with Roads Authorities and industry experts. Investigations could include the identification of a Local Authority willing to trial intervention(s) on their road network; and
4. Trial of a local education/awareness-raising campaign targeting driver/rider behaviour in relation to Zebra crossings. The trial could consist of pre-intervention market research with road users to inform messaging, engagement with a specific local community, including young people and people with cognitive impairments (groups underrepresented in previous phases of research), a trial behaviour change campaign (delivered in partnership with the Local Authority), pre- and post- evaluation with road users and members of the community, including road users at greater risk.

## Appendix A. Recruitment materials

### Twitter

Do you have a sensory or physical disability, or are you aged 65 & over? Join an online focus group & share your views & experiences of Zebra crossings. Focus groups will be held in March via Zoom. For more info contact Jenny Muir 0131 659 1547 or [Zebrecrossingresearch@jacobs.com](mailto:Zebrecrossingresearch@jacobs.com)



**Zebra Crossing Research Study**

**Do you have a sensory or physical disability, or aged 65 and over? Join an online focus group**

- People living anywhere in Scotland
- People who use zebra crossings and those who choose not to
- £20 shopping voucher for taking part
- British Sign Language Interpretation and Live Captioning available
- People aged 18 and over

Contact Jenny Muir Tel: 0131 659 1547  
Email: [zebracrossingresearch@jacobs.com](mailto:zebracrossingresearch@jacobs.com)

SCOTTISH ROAD SRRB RESEARCH BOARD Jacobs THE UNIVERSITY OF EDINBURGH

The image is a circular graphic for a research study. On the left, there is a black background with white text. The text includes the title 'Zebra Crossing Research Study', a call to action, a list of criteria for participants, contact information, and logos for the Scottish Road Research Board (SRRB), Jacobs, and The University of Edinburgh. On the right, a circular photograph shows a zebra crossing on a road. A woman is walking across the crossing. There are trees and buildings in the background. A signpost is visible on the left side of the road.

Alt text/image description (to enable screen readers to interpret the attached image):

*Image containing more information and a photograph. Heading reads 'Zebra Crossing Research Study'. Photograph showing a Zebra crossing with white stripes painted onto the road in the crossing area and flashing amber lights at the side of the road on black and white striped poles. Pavement kerbs are dropped where the pavement meets the road. A lady is walking along the pavement.*

*Information reads; Do you have a sensory or physical disability, or are you aged 65 and over? Join an online focus group. Seeking people; living anywhere in Scotland, £20 shopping voucher for taking part, British Sign Language interpretation & Live captioning available, aged 18 & over. Contact Jenny Muir, telephone 0131 659 1547 or email [Zebrecrossingresearch@jacobs.com](mailto:Zebrecrossingresearch@jacobs.com). Transport Scotland, Scottish Roads Research Board, Jacobs, University of Edinburgh logos featured along the bottom.*

### Facebook

Do you have a sensory or physical disability, or are you aged 65 and over?

Join an online focus group and share your views and experiences of Zebra crossings and help identify potential improvements. Invitation is open to people who use Zebra crossings, as well as those who choose not to use them.

### When:

- Individuals aged 65 and over, 10-12 noon, Monday 7th March, via Zoom
- Individuals who are deaf or have a hearing impairment, 6-8pm Wednesday 9th March, via Zoom (BSL interpretation & live transcript will be available)
- Individuals with a physical disability, 2-4pm, Wednesday 16th March, via Zoom
- Individuals who are blind or have a visual impairment, 6-8pm, Wednesday 16th March, via Zoom

People living anywhere in Scotland – People who use Zebra crossings as well as those who choose not to – Participation incentive of £20 shopping voucher available – People aged 18 and over

British Sign Language interpretation and live captioning available.

For more information, or to register your interest in taking part, contact Jenny Muir; Tel: 0131 659 1547 or [zebracrossingresearch@jacobs.com](mailto:zebracrossingresearch@jacobs.com)

A circular graphic with a black background on the left containing text and a photograph of a zebra crossing on the right. The text includes the title 'Zebra Crossing Research Study', a call to action, a list of criteria, contact information, and logos for the Scottish Road Research Board, Jacobs, and The University of Edinburgh. The photograph shows a zebra crossing with a sign for 'Town Centre' and 'Sandbank' in the background.

**Zebra Crossing Research Study**

**Do you have a sensory or physical disability, or aged 65 and over? Join an online focus group**

- People living anywhere in Scotland
- People who use zebra crossings and those who choose not to
- £20 shopping voucher for taking part
- British Sign Language Interpretation and Live Captioning available
- People aged 18 and over

Contact Jenny Muir Tel: 0131 659 1547  
Email: [zebracrossingresearch@jacobs.com](mailto:zebracrossingresearch@jacobs.com)

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### LinkedIn

@Transport Scotland, supported by @Jacobs and @University of Edinburgh, is undertaking research into how people with disabilities and older people in Scotland view and experience Zebra crossings.

Individuals who have a sensory or physical disability, as well as individuals aged 65 and over, are invited to join an online focus group to share their views and experiences with the research team.

The research team are seeking views of people who use Zebra crossings as well as those who choose not to. Findings will help identify potential changes which could improve how people with disabilities and older people use Zebra crossings.

### When:

- Individuals aged 65 and over, 10-12 noon, Monday 7th March, via Zoom
- Individuals who are deaf or have a hearing impairment, 6-8pm Wednesday 9th March, via Zoom (BSL interpretation & live transcript will be available)



- Individuals with a physical disability, 2-4pm, Wednesday 16th March, via Zoom
- Individuals who are blind or have a visual impairment, 6-8pm, Wednesday 16th March, via Zoom

*People living anywhere in Scotland – People who use Zebra crossings as well as those who choose not to – Participation incentive of £20 shopping voucher available – People aged 18 and over*

British Sign Language interpretation and live captioning available

For more information, or to register your interest in taking part, contact Jenny Muir; Tel: 0131 659 1547 or [Zebrecrossingresearch@jacobs.com](mailto:Zebrecrossingresearch@jacobs.com)

A circular graphic containing text and a photograph of a zebra crossing. The text on the left side of the circle reads: "Zebra Crossing Research Study", "Do you have a sensory or physical disability, or aged 65 and over? Join an online focus group", a bulleted list of criteria, and contact information for Jenny Muir. The photograph on the right shows a zebra crossing with white stripes on a road, a signpost, and buildings in the background.

**Zebra Crossing Research Study**

**Do you have a sensory or physical disability, or aged 65 and over? Join an online focus group**

- People living anywhere in Scotland
- People who use zebra crossings and those who choose not to
- £20 shopping voucher for taking part
- British Sign Language Interpretation and Live Captioning available
- People aged 18 and over

Contact Jenny Muir Tel: 0131 659 1547  
Email: [zebracrossingresearch@jacobs.com](mailto:zebracrossingresearch@jacobs.com)

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Alt text for image attachment:

*Image containing a photograph of a Zebra crossing, showing white stripes painted onto the road and amber flashing lights at the side of the road. Text repeats content of written post. Transport Scotland, Scottish Roads Research Board, Jacobs and University of Edinburgh logos displayed.*

## Newsletter

### Focus Group Invitation, March 2022, Zebra Crossing Research, Jacobs and University of Edinburgh

Jacobs and the University of Edinburgh are conducting research into Zebra crossings on behalf of Transport Scotland and the Scottish Roads Research Board.

Zebra crossings help pedestrians cross from one side of the road to the other. They have white stripes painted onto the road in the crossing area, with flashing amber lights (known as belisha beacons) at both sides of the road on black and white striped poles. Pavement kerbs are dropped at both ends of the crossing, usually with tiles with raised bumps (known as tactile paving) where the pavement meets the road.

Zebra crossings give priority to pedestrians, where drivers and riders are required to stop and give way. The research team would very much like to understand your views and experiences of Zebra crossings, from which they hope to identify improvements to the design of Zebra crossings and/or their surroundings.

The research team are inviting people from the most at-risk groups to take part in an online focus group;

When:

- Individuals aged 65 and over, 10-12 noon, Monday 7th March, via Zoom
- Individuals who are deaf or have a hearing impairment, 6-8pm Wednesday 9th March, via Zoom (BSL interpretation & live transcript will be available)
- Individuals with a physical disability, 2-4pm, Wednesday 16th March, via Zoom
- Individuals who are blind or have a visual impairment, 6-8pm, Wednesday 16th March, via Zoom

To register your interest in taking part, or for more information, please contact Jenny Muir, Senior Transport Planner at Jacobs, [Zebracrossingresearch@jacobs.com](mailto:Zebracrossingresearch@jacobs.com) Tel: 0131 659 1547

## Appendix B. Easy Read focus group information sheet

### Invitation to Participate in a Research Study - Stage 1

#### British Sign Language version:

[https://media.ed.ac.uk/media/Zebra+Crossing+Project+Promotional+Video+in+BSL+-+Transport+Scotland%2C+Jacobs+and+University+of+Edinburgh/1\\_vqmoohqx](https://media.ed.ac.uk/media/Zebra+Crossing+Project+Promotional+Video+in+BSL+-+Transport+Scotland%2C+Jacobs+and+University+of+Edinburgh/1_vqmoohqx)

#### Introduction

You are invited to take part in first part of this research study. Before you take part, it is important that you understand the aim of the study and what you will be doing. Please read the information before you make any decisions.

#### Who are we?



Jacobs



THE UNIVERSITY  
of EDINBURGH

Jacobs and University of Edinburgh are working together as a team to investigate Zebra crossings for Transport Scotland and Scottish Road Research Board.

#### Why are we doing this Zebra crossing research?

Transport Scotland wants to improve the Zebra crossings for disabled people and older people. They want your feedback. Are you happy with the Zebra crossings? Do you think Zebra crossings need change?

#### What is a Zebra crossing?



Zebra crossings help people to walk across the road safely.

They have white stripes painted onto the road in the crossing area.



Zebra crossings have two black and white poles with flashing orange lights on top. These orange lights are called belisha beacons.

You will see the kerb on the pavement is lower. There are usually tiles with raised bumps. They are called tactile paving.



Zebra crossings don't have a button to press like traffic lights.

There are no red traffic lights to tell drivers to stop.

### **Why have I been invited?**

You have been invited because we are interested in your feedback on Zebra crossings. We are looking for people with disabilities and older people living in Scotland to take part in this research. We also invite carers and support people.

### **Do I have to take part?**

You don't have to take part. It is up to you. It is voluntary.

### **What if I change my mind about taking part?**

You can change your mind anytime. You can let us know anytime if you don't want to take part. We will not ask why you don't want to carry on. If you don't want us to keep your feedback, please let us know.

### **What will happen if I say yes?**

### **Consent**

It is important that you are happy to take part in this research project. You need to tick and sign an online consent form. We must have your consent form before the focus group meeting. If you can't use the online consent form, you can give consent by email or telephone. You will be provided with details on how to consent after confirming you would like to take part (explained below).

### **Focus Group**

You need to let us know quickly if you want to take part because there is a limited number for focus group meeting. Only 8 people can come to the meeting.

When you give your consent, you can go to the meeting. We will give you a zoom link to join the online meeting.

At the online focus group, you will be with 5 to 7 other people and the research team. We will ask questions to find out what you think of Zebra crossings. We will also ask for your thoughts on how to improve the Zebra crossing. If you have never been on a Zebra crossing before, we are interested to find out why.

The focus group will be on Zoom, and we will record the meeting to help us take notes. You do not have to have your camera on. We think it will take around 2 hours.

### **Will the focus group meeting be accessible?**

The following support will be available to you if you choose to take part in the study:

- Deaf and hard of hearing people – a deaf BSL researcher will be at the focus group with BSL/English interpreters. There will be captioning for people who do not use BSL.
- For those who are blind or have a visual impairment, all information on the study (information sheets, consent forms) will be explained verbally by the researcher. Participants can speak to the researcher who will write notes.
- You can join the focus group session by telephone or online video link, you can choose which option is better for you.
- If you are a carer or support person: we will ask you to give consent and share the views of the person you are supporting.
- Please let us know if you need any other support.

### **What are the benefits of taking part?**

We hope that you will find the focus group to be interesting and useful. Your feedback will help us to think about how make Zebra crossings more accessible for older people and people with disabilities.

### **Are there any risks to taking part in the study?**

No.

### **Will my information be confidential?**

**Yes.** All information collected about you will be kept strictly confidential. We will not use your name when we write reports. We will keep all the information from you on a computer with password at the University of Edinburgh. We will keep your consent form in a different place so nobody knows who took part in this project.

For more information about how the University use your data please go to:

<https://www.ed.ac.uk/records-management/privacy-notice-research/>

**What will happen to the results of the research study?**

- A report will be written, and the results will be given to Transport Scotland, the Scottish Roads Research Board and the Department for Transport. It will also be published online.
- We may write about the results and explain to other people working in universities.
- We can give you a summary report after the project. If you want a copy please let us know.

**What will happen to the data collected from me after the study?**

Information collected from you, will be stored in a secure computer folder with password. We may use the information for more research. Your name will not be mentioned.

**Who is organising and funding the research?**



**Jacobs**



THE UNIVERSITY  
of EDINBURGH

Transport Scotland gave money to Jacobs Engineering Group with the University of Edinburgh to do the research.

**Does the study have ethical approval?**

This study has been approved by the School of Health in Social Science Research Ethics Committee.

**For more information about the study, or to consent via email or telephone, please contact the researcher below:**

Jenny Muir

Email: [Zebracrossingresearch@jacobs.com](mailto:Zebracrossingresearch@jacobs.com)

Telephone: 0131 659 1547 or 1800101316591547 or via contactscotlandBSL <https://contactscotland-bsl.org>

**If you have any complaints:**

Please contact Professor Matthias Schwannauer, Head of School, School of Health in Social Science, [headofschool.health@ed.ac.uk](mailto:headofschool.health@ed.ac.uk), +44 (0)131 651 3954.

For additional information regarding complaints please visit the following link:

<https://www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf>

**Thank you for taking the time to read this information.**

**If you would like to take part, please contact Jenny Muir (contact details above), and let her know how you would like to consent (online form, over the phone or via email) and you will be provided with information on how to do so.**

## Appendix C. Focus group participant consent form

Please give consent by adding your initials to each box, and providing your name and date at the end of the form.

	<b>Please add your initials below</b>
I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information and ask questions and am satisfied with the answers I received.	
I confirm that I have had the opportunity to let the researchers know if I have additional support needs and I have been, or will be, provided with the support I require to participate in the study.	
I understand that participation is voluntary and that I am free to withdraw at any time without giving any reason.	
I understand that my information will be anonymised and no information that identifies me will be made publicly available. Electronic data will be anonymised and stored on secure University of Edinburgh servers and can only be accessed by the researchers.	
I understand that the study will involve me taking part in a focus group with researchers and other participants.	
I understand that the focus group will be audio/video-recorded (and I do not need to have our camera on) and transcribed anonymously by a third party. I understand that the information collected about me will be stored in a confidential and anonymous electronic database, which may be used to support other research in future and may be shared anonymously with other researchers.	
I consent to receive more information for the second part of the project. I understand that I do not have to take part in the second part of the project.	
I understand and agree that the data collected will be analysed and a report will be written (and available publicly online), and results will be presented to Transport Scotland, the Scottish Roads Research Board and the Department for Transport and may also be published in an academic journal and presented at academic conferences.	

I agree to take part in this study.

Full Name:

Signature (can be e-signature):

Date dd/mm/yyyy:

## Appendix D. Focus group topic guide

### PART 1 – 65 mins

#### Welcome (10 mins)

[Introduce Jacobs/University of Edinburgh facilitators/moderators/interpreters].

[Most participants will be asked to complete a consent form before joining the session. If consent has not been obtained from everyone in the group, use this opportunity for people to verbally consent to participating].

Thank you for taking part in this focus group. We are running research for Transport Scotland on Zebra crossings.

You have been asked to take part as your views are important. We hope to understand more about your thoughts and experiences of using Zebra crossings. We also want to hear from those of you who don't use them, and the reasons for this. This will help us understand if there is anything that could be made better to help how disabled people and older people use Zebra crossings.

We will start by introducing ourselves. Then we will talk about what a Zebra crossing is. After that we will ask you some questions to understand your views and experiences of Zebra crossings. At the end we will ask if you have any suggestions for action/improvement. Our discussion will take no more than two hours. We will stop for a break at about [time].

Our discussion will be recorded [also mention live captioning in Word for deaf/hearing impairment group]. [Check that everyone is comfortable with using Zoom functions]. The recording will be stored securely until it is ready to be written out, then it will be deleted. The notes will contain no information that would allow you or comments made by you to be identified.

#### Ground rules [can be provided in advance in information sheet and then do brief overview]

- Only one person speaks at a time. There may be a temptation to jump in when someone is talking but please wait until they have finished
- There are no right or wrong answers, and you do not have to agree with others who are talking
- Please don't discuss the comments of other group members outside the focus group
- If there are any questions or discussions that you do not wish to answer or participate in, you do not have to do so
- When you do have something to say, please do so. We want to hear the views of all of you
- Does anyone have any questions? [Check everyone understands why they're here]

#### Warm up (5 mins)

- First, I'd like everyone to introduce themselves. Can you tell us your name and where you live?

#### Definition of Zebra crossings (10 mins)

[Explain what type of crossing a Zebra crossing is, and what it is not. Graphics to illustrate [for Blind group, need to provide explanation]].

A Zebra crossing helps pedestrians cross from one side of the road to the other. They have white stripes painted onto the road in the crossing area, with flashing amber lights (known as belisha beacons) at both sides of the road on black and white striped poles. The kerb on the pavement is lower at both sides of the crossing, usually with tiles with raised bumps (known as tactile paving) where the pavement meets the road



[Explain Highway Code in terms of pedestrian priority waiting at and crossing the Zebra crossing]. Zebra crossings give priority to pedestrians. Drivers and riders must stop and give way when you are on the crossing and should give way when you are waiting to cross.

- Does everyone understand what we mean by a Zebra crossing?
- What is your understanding of how Zebra crossings should work?

### Frequency of use of Zebra crossings (10 mins)

- Has everyone here used a Zebra crossing before? [Ask everyone to confirm yes or no, make note to refer back to individuals based on their answers]
- [For those saying yes], when was the last time you used a Zebra crossing? [Give options for this past week, past month, longer ago, etc.]
- [For those saying yes], how often do you typically use Zebra crossings? [Give options for daily, weekly, less often, etc]
- [For those saying yes], what is the street environment like? [Probe for urban, suburban, on a bus/cycle route, etc]
- [State that we'll come onto discussion of views and experiences next]

### Views and experiences of Zebra crossings (30 mins)

- [Refer back to previous section to summarise who does and who doesn't use Zebra crossings]
- [To give those who don't use Zebra crossings an opportunity to speak (as won't have done in previous section)] If you don't use Zebra crossings, why is this? Probe for reasons:
  - Is it due to practical reasons (no crossing available, has been upgraded, changing route of journey means no longer use)
  - An issue with the crossing/surrounding environment?
  - How far would you go out of your way to avoid a Zebra crossing and use an alternative facility?
- What are the main problems that you have seen or experienced when using Zebra crossings? [Refer back to Highway Code - probe for how experiences differ in practice from legislation?]
- From your experience, what are the positive things about a Zebra crossing?
- Can you recall how you feel/how you react when you approach and then use the crossing?
- [Probe for whether others share similar or different experiences of using Zebra crossings?]
- [Probe for whether the group thinks these similarities/differences are due to age or nature of disability, or other factors?]
- [Probe for whether the group thinks experiences are similar regardless of the type of environment that the crossing is located]

### Comfort break: 5 mins

## **PART 2 – 50 mins**

### **Discussion of Phase 1 research (15 mins)**

- [Provide description of Phase 1 research and summary of findings [Slide with key points, description for Blind group]]
- What do you think about the findings? [Probe for the extent to which people concur or disagree with the findings],
- Does anything surprise you about the findings?
- [Draw out any issues presented in the Phase 1 findings that haven't been discussed already in previous section]

### **Potential solutions (20 mins)**

- What could be done to improve experiences of Zebra crossings? [Prompt for ideas across a range of topics, e.g.:]
  - Technical: changes to the crossing itself, changes to the approaches to it, changes to wider environment, maintenance issues, signage, lighting, etc
  - Education: driver and wider education and awareness raising, campaigns and initiatives, information
  - Legislation: further changes to Highway Code
  - Refer back to any other topic areas which have been mentioned earlier in the session
- [Prompt for which suggestions are specific to individuals' disabilities and which are more general considerations]
- Under the Equality Act 2010, public bodies have to make reasonable adjustments to make sure that disabled people are not put at a disadvantage. For those that said that they would avoid a Zebra crossing and use an alternative crossing, what should this facility be and how far away? What other improvements would be needed?
- [Facilitator to summarise responses by those who use Zebra crossings, and those who do not, relaying findings back to the group to check participants agree. Further probe if suggested solutions would encourage those who don't currently use Zebra crossings, to do so in future.

### **Concluding questions (10 mins)**

- Of all the things we've discussed today, what do you think are the most important issues we should know?
- If you could choose one, what would be the most important solution that could be introduced to improve experiences?
- Does anyone have any final questions or any final points to make?

### **Wrap up and next steps (5 mins)**

- Your opinions today have been very valuable. I would like to remind you that your comments will be written up but will be anonymous and the information you have provided will be stored securely. A summary report will be sent to those of you who indicated they would like a copy

- [Describe site surveys as next stage of research, thank everyone who has already expressed an interest in taking part. Locations will be determined by where people live and proximity to Zebra crossing. Travel expenses will be paid. [Exception of cognitive impairment group, who will not be taking part in site surveys]]
- Thank you for participating. Love 2 Shop vouchers will be sent out within the next 7 days.

## Appendix E. Site survey safe system of work

### 1. Project Details:

<b>Location/Project</b>	<b>Zebra Crossing Research Project</b>		
<b>Task</b>	<b>Stage 2: On-site Survey: The Grange, Edinburgh</b>		
<b>Project #</b>	<b>B2359904</b>	<b>Date</b>	<b>28/06/22</b>

### 2. Scope of Work

This document details the safe method of delivering on-site surveys with individuals with disabilities, and individuals aged over 65, at a Zebra crossing at Grange Road, Edinburgh.

Participants will be asked to cross at the Zebra crossing in one direction and then cross for a second time in the other direction. They will be accompanied across the crossing by a Jacobs/University of Edinburgh (UoE) team member. Participant’s support persons are also welcome to cross if desired. There will be two additional Jacobs team members on site, who will be making background observations and be present from a health and safety perspective.

Participants are required to consent to taking part in the survey and will be invited to wear an audio recorder. If comfortable participants will describe how they feel and what they observe as they approach and cross the crossing. After crossing for a second time, participants will be asked some questions about their experiences, at an appropriate location nearby. The surveys are being delivered by Jacobs and University of Edinburgh.

There will be four team members on site throughout the day (three from Jacobs, one from UoE). In addition, another UoE staff member will be present for one survey slot to undertake a participant interview in British Sign Language. Two members of the team will travel to the site on foot from Jacobs’ Edinburgh Office. Two members of the team will travel by foot to the site from home. All travel details will be detailed and approved in the TSPA.

### 3. Resources

<b>Labor</b>	<b>Supervisor: Colm Smyth/Jenny Muir (Jacobs)</b>	<b>Operatives: Micky Anokye, Michael Merritt (Jacobs), Sofia Alvarado (University of Edinburgh)</b>
<b>Materials</b>	<b>Participant Register (inc. contact details and travel plan), Consent form, Topic Guide, Environmental Observations Sheet</b>	
<b>Plant/tools/equipment</b>	<b>First aid kit, sanitising wipes/spray/hand gel, hi-vis vests, clip boards, sunscreen, large umbrella, masks, audio recording devices, mobile phones, power bank</b>	
<b>Programme/time</b>	<b>8hrs (8.30am – 4.30pm)</b>	

### 4. Access Arrangements

The survey will be completed using public footways and a Zebra crossing, and not require traffic management. The site will be accessed using public roads, footways and recognised pedestrian crossings. If there are any access

issues identified which cannot be resolved on site, then the site team will return to the office and the survey will be cancelled.

The first survey will begin after the main morning peak (first participant slot commences at 09.00), and before main evening peak (last participant slot finishes at 4.15pm). Participants who live in walking distance from the location are invited to attend early in the day, with those travelling from further away arriving late morning through to mid-afternoon.

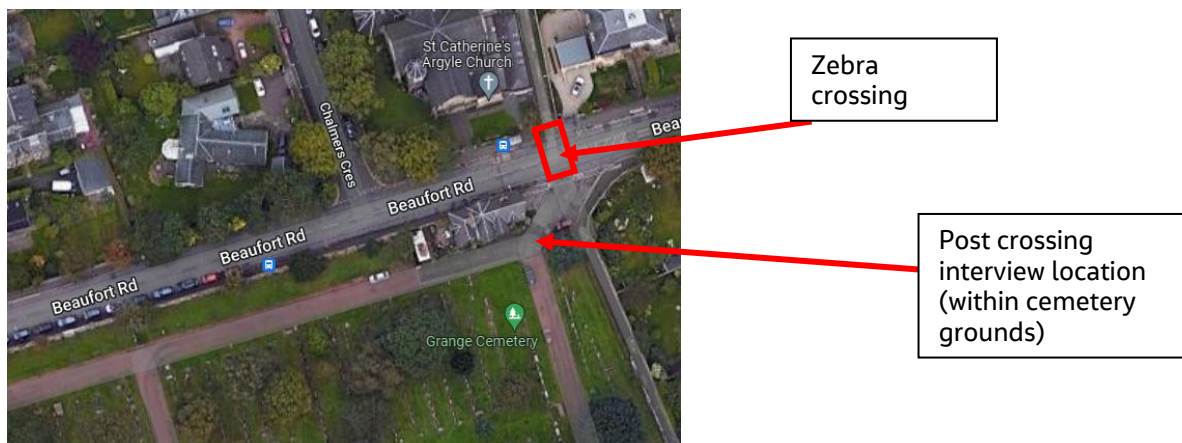
The meeting point will be at the entrance to Grange Cemetery on Grange Road. The survey will then take place at the Zebra crossing next to the cemetery.

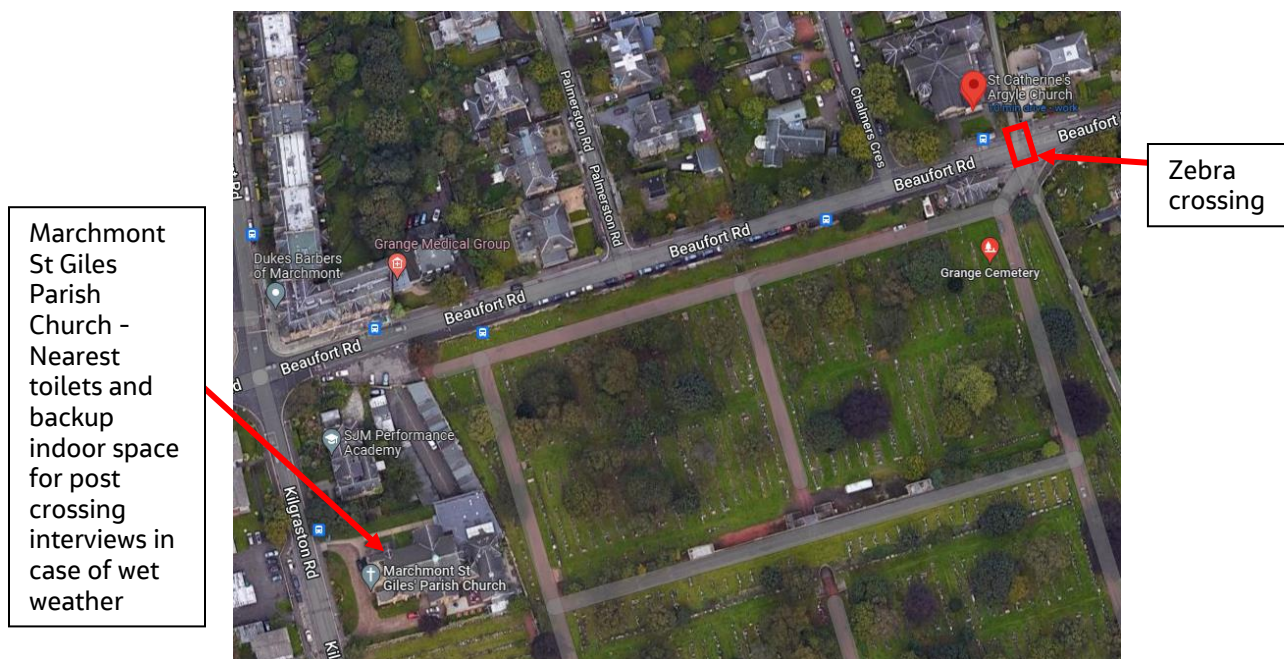
No roadworks are scheduled on Grange Road for the dates on, or, either side of the survey. No burials are scheduled at Grange Cemetery for the date of the survey.

## 5. Working Area Boundaries



The survey will take place at the Zebra crossing on Grange Road/Beaufort Road, Edinburgh.





## 6. Methodology

1	In advance of the survey date, allocate participants with a 45-minute time slot spread. Slots spread out between 9am and 4.15pm. Ask participants to arrive 5 minutes early. Obtain the following details in advance; consent, contact details, support needs, emergency contact details and participant travel plan.	JM
2	Issue participant information sheet in advance, detailing date, location, supervisor contact details and outline of survey expectations.	JM
	<b>Hold Point – SAFETY – check Jacobs delivery team training certificates (Field Health, Safety &amp; Environment (HSE), Working In On or Around Road Infrastructure)</b>	JM
3	Hold delivery team meeting in advance of survey. Discuss Safe System of Work, 'step back' approach, risk assessment, roles and responsibilities. Instruct team to dress for weather conditions, apply sunscreen if forecast to be sunny and wear comfortable footwear.	JM
4	Check the weather forecast 24hrs before the survey (AM 27 <sup>th</sup> June). Cancel the survey if any weather warnings are issued or any adverse weather (wind, rain) is forecast for Edinburgh on the date of survey.	JM
5	Pack PPE on 27 <sup>th</sup> June, ready to take to site the following morning.	JM
	<b>Hold Point – SAFETY – Delivery team to ensure mobile phones are fully charged in preparation for day on site.</b>	All
6	JM to check weather forecast AM 28 <sup>th</sup> June and review throughout the day. JM to collect PPE from Jacobs office and walk to survey site at The Grange.	JM
7	Delivery team (JM, MA, MM, SA, CS) to meet on site at 8.30am, hi-vis vests to be put on. CS to conduct a visual site assessment for any hazards and update risk assessment if applicable. If for	All

	any reason site is deemed unsafe for survey, survey to be cancelled. Team briefing to make sure everyone is clear on their role and familiar with site. JM, MA, MM, SA walk to Marchmont St Giles church via cemetery to assess and familiarise with route.	
	<p><b>Hold Point – SAFETY –</b></p> <p><b>Hand sanitiser will be available. Each team member will have an individual bottle. Sanitising surface spray and sanitising wipes will be available to clean audio equipment which will be shared between participants.</b></p> <p><b>Use StepBack approach at the start of, and during the day.</b></p>	All
8	Use pedestrian area at the entrance to Grange Cemetery on Grange Road, meaning participants are out of the way of pedestrians and not blocking the pavement.	All
9	<p>MA to be based at the meeting point, greeting participants as they arrive, providing them with a hi-vis vest, explaining the process, answering any questions, completing consent forms (if outstanding, for both participants and support persons) and if required booking taxis for participants' departure. Participants will be asked if they are comfortable wearing an audio recording device, if yes MA will assist the participant in fitting the device and checking participants are comfortable speaking into it. If wearing an audio device, MA to record participants ID number.</p> <p>Participant register will be available, including contact details and emergency contact details.</p>	MA
	<b>Hold Point – SAFETY – Masks available if MA needs to assist participants with fitting audio devices to their person. If fitting devices to an individual, must make sure the individual is happy for this to be done and this is done in view of another delivery team member or support person.</b>	MA
10	Participants to be chaperoned to kerb edge and across the crossing by JM. JM will introduce herself and explain her role. JM agree suitable que for participant to notify JM when ready to cross and JM to reply confirm. JM will accompany the participant at a suitable distance (close enough to intervene if needed, and close enough to hear/see agreed verbal/visual que).	JM
	<b>Hold Point – SAFETY – If participants arrive with a support person, support persons are also invited to cross with participants. Support persons will receive the same briefing and PPE as participants, however they will not be fitted with an audio device.</b>	
11	Participants will be asked to navigate to the side of the road, assess when it is safe to cross and cross at the Zebra crossing when they feel safe to do so. Participant to give JM a que when moving off to cross. JM will also make her own assessment, if deemed safe to cross, JM will accompany participants at a suitable distance (able to intervene if needed). This process will be repeated for the return crossing.	JM
12	Participants who opted to carry an audio recording device will be asked to describe how they feel and verbalise any observations before and during both crossings.	
13	<p>MM will observe the crossing from the pavement by Lover's Loan, noting down environmental observations.</p> <p>See Environmental Observations Questionnaire.</p>	MM

14	Once the crossing has been completed twice SA will meet participants and lead them back to the pedestrianised area within the gates of The Grange Cemetery. Marchmont St Giles Parish Church to be used as a backup space in the case of bad weather (access via graveyard, 5 minute walk). SA will conduct a post-crossing interview, asking participants about their experience, findings will be recorded on Qualtric Survey and audio device.  BSL users and individuals with Guide Communicators will require their interpreters to ask questions (question set will be sent to interpreters in advance) and SA to transcribe responses.	SA
15	SA will collect participant's hi-vis jacket and audio device (if applicable).	SA
	<b>Hold Point – SAFETY – Sanitising surface spray and sanitising wipes will be available at the meeting point and will be used to clean audio equipment which will be shared between participants.</b>	MA
16	MA to assist participants in onwards travel plans, making sure they get a taxi etc.	MA
17	Each participant slot is expected to take 45 minutes. There will be a 15 minute overlap between participants. i.e. first participant arrives at 9am, the next participant arrives at 9.30am. This allows for a rotation of participants whilst not doubling up on activities. i.e. only one participant will be crossing at one time.	All
	<b>Hold Point – SAFETY – When delivery team members are not required to be in position for their specified role, they will congregate in the area within the cemetery gates so that they are off the pavement and away from the carriageway.</b>	All
18	Lunch break between 12.45 – 1.30pm	All

## 7. Emergency Provisions and Procedures

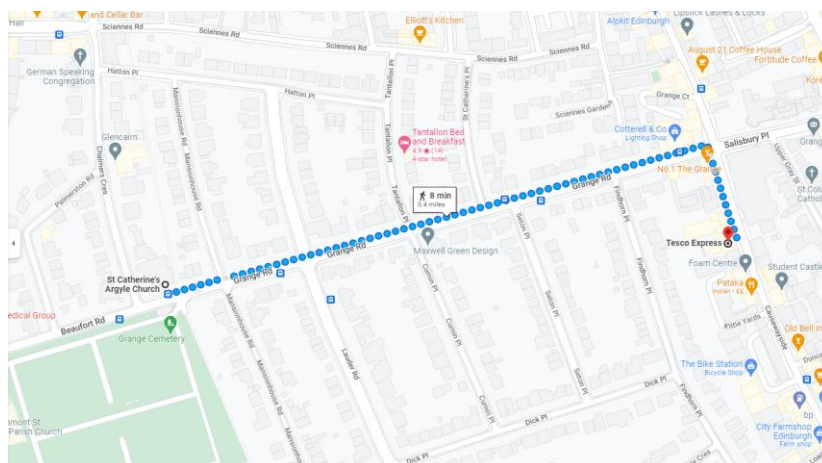
All delivery team members to carry a mobile phone. In a life threatening emergency, call 999 giving St Catherine's Argyle Church, The Grange as location. What 3 words location: Garden.Flap.Charge

In the event that a call has to be made to the police or emergency services, the caller should state:

- Location
- Name, sex and age of casualty
- Nature of injuries or incident
- Number of people in the party
- Mobile phone number
- Nature of disability/medical condition/support need

Nearest defibrillator 8 minute walk (16 mins there and back), located at Tesco Express, Causewayside.





Nearest Minor Injuries Clinic – Western General Hospital (20 minute drive). Call taxi to transport individuals.

Nearest A&E – Royal Infirmary Edinburgh – (12 minute drive). Call ambulance or taxi to transport individuals.

First Aid kit available on site for cuts and grazes. Includes bandages, dressings, plasters, eye wash, gloves, ice pack and saline wipes. Individuals would apply treatment themselves.

In case of an emergency, survey would be stopped immediately, JM to make site safe and call 999 for help. If injured person is mobile, seek to safely move them to area in front of St Catherine’s Argyle Church. MM/MA to call Colm Smyth to report any incidents.

## 8. Contact numbers

Emergency ambulance, police, fire and rescue dial 999  
 Non-emergency police number is 101

Jenny Muir: xx (all participants have been issued with JM mobile number)  
 Colm Smyth: xx  
 Emergency Contact: 999  
 Central Taxis: 0131 229 2468 (Jacobs account: JAC160, Jacobs UK Ltd)

## 9. Declaration

### PERSONS IN ATTENDANCE DURING THE WORK

I, the undersigned, have read, discussed and fully understand the above Safe System of Work and Risk Assessment for Stage 2 – Zebra Crossing On-site Survey, and will adhere to all its method of working and conditions set down

PRINT NAME	COMPANY	SIGNATURE	DATE
Colm Smyth	Jacobs		27/06/22
Jenny Muir	Jacobs		27/06/22

## Accessible Zebra Crossing Research Phase 2 Report

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Michael Merritt	Jacobs		27/06/22
Micky Anokye	Jacobs		27/06/2022
Ana Sofia Alvarado V.M.	University of Edinburgh		27/06/2022

Once approved, the Safe System of Work shall not be deviated from or amended without agreement of the Project Manager or Construction Manager. Following any amendment, the document will be reissued as a revised copy.

	<b>Prepared by</b>	<b>Reviewed by</b>	<b>Approved by</b>
<b>Name</b>	Jenny Muir	Caley McDowall	Colm Smyth
<b>Signature</b>			
<b>Date</b>	16/06/2022	24/06/22	27/06/22

## Appendix F. Easy read site survey information sheet

**Date:** Tuesday 28<sup>th</sup> June 2022

**Location:** St Catherine's Argyle Church, 61-63 Grange Rd, Edinburgh EH9 1TY

**Time:** Please arrive 5 minutes before your allocated time slot

**Contact details:** Jenny Muir, Jacobs, 07980 862760

**What to bring:** Please dress appropriately for the weather, make sure you are protected from the sun and wear comfortable clothing/footwear. We expect the full session to take place outdoors. In the event of wet or windy weather we may use a nearby indoor space for the follow-up interview with the researcher.

**Travel costs:** Please keep all receipts. If travelling by taxi, please book by using Jacobs company account (details below).

**Lothian buses:** Services 5 and 24 stop outside St Catherine's Argyle Church on The Grange Road

**Taxi account:** Central Taxis

Tel: 0131 229 4466

Code to book: JAC160

Company Reference (phone operative will ask for this): Jacobs UK Limited

Central Taxis will invoice Jacobs directly.

### Introduction

You have been invited to take part in Stage 2 of this research study. Before you take part, it is important that you understand the aim of the study and what you will be doing. Please read the information before you make any decisions.

### Why are we doing this Zebra crossing research?

Transport Scotland wants to improve the Zebra crossings for disabled people and older people. They want your feedback. We would like to understand how Zebra crossings operate in a live environment through observing you cross one of them.

### What is a Zebra crossing?



Zebra crossings help people to walk across the road safely.

They have white stripes painted onto the road in the crossing area.



Zebra crossings have two black and white poles with flashing orange lights on top. These orange lights are called belisha beacons.

You will see the kerb on the pavement is lower. There are usually tiles with raised bumps. They are called tactile paving.



Zebra crossings don't have a button to press like traffic lights.

There are no red traffic lights to tell drivers to stop.

**Why have I been invited?**

You have been invited because we are interested in your feedback on Zebra crossings.

**Do I have to take part?**

You do not have to take part. It is up to you. It is voluntary.

**What if I change my mind about taking part?**

You can change your mind anytime. You can let us know anytime if you do not want to take part. We will not ask why you do not want to carry on. If you do not want us to keep your feedback, please let us know.

**What will taking part in Stage 2 of the study involve?**

We will ask you to cross at the Zebra crossing in one direction and then cross for a second time in the other direction.

A member of the research team will cross with you at a distance. Your own support person is also welcomed to cross with you. Another member of the research team will be watching from a distance.

After crossing for a second time, you will be asked some questions about your experience, this will take place at an appropriate location nearby.

### **What do I have to do?**

#### **Consent**

It is important that you are happy to take part in this research project. You need to tick and sign an online consent form. We must have your consent form before the site survey. If you cannot use the online consent form, you can give consent by email or telephone.

#### **How will my support needs be considered if I take part in the study?**

The following measures will be available to you if you choose to take part in the study:

- For BSL users, an English/BSL interpreter will be available on site.
- For those who are blind or have a visual impairment, all information on the study (information sheets, consent forms) will be provided in an audio format and communication (including instruction) pre, during and post-data collection will be done verbally. Furthermore, a researcher will be on hand should you require any assistance using the Zebra crossing.
- You will also be asked if you have additional support requirements not already listed above and we will endeavor to provide this.
- COVID-19 Government guidance will be adhered to throughout.

#### **What are the benefits of taking part?**

We hope that you will find the site survey to be interesting and useful. Your feedback will help us to think about how make Zebra crossings more accessible for older people and people with disabilities.

#### **Are there any risks to taking part in the study?**

Yes.

#### **Risks of participation (COVID-19)**

We have taken specific steps to minimise the risk of exposure to COVID-19 during the study by adhering to the most up to date Scottish Government guidance. These measures include good hand hygiene and surface cleaning. You will only interact with researchers who in the last 24 hours have had a recent negative lateral flow test, have not experienced COVID-19-related symptoms, and are not required to self-isolate due to close contact with a COVID-19 positive individual. We will also kindly ask you, and all other participants to do a lateral flow test 24 hours or less before participating. If you have any issues accessing free lateral flow tests, please contact the researcher (contact details below) and they will be happy to assist you.

However, even with these control measures, there remains some additional risk of exposure to COVID-19 from participating in this study, but we do not assess that this risk is higher than engaging in other day-to-day activities.

#### **Understanding your risk from exposure to COVID-19**

It is not possible to eliminate all risk of exposure to COVID-19, and so it is important for you to understand and consider your own personal risk in the unlikely event of exposure.

You may be more likely to be at high-risk from infection if you have previously been advised to shield from the virus, if you have certain health conditions (including heart disease, lung disease, kidney disease, diabetes, or

neurological disease), or if you are taking immunosuppressant medication or steroids. The risks of serious consequences from COVID-19 are also known to increase on average with age. To understand more about potential risk factors, please visit this NHS webpage.

### **Making an informed choice**

It is important that you make an informed choice whether to take part in this research, considering your potential risk from the virus, and the measures in place to reduce the risk of exposure. It is important that you feel that you have all the information required regarding these risks, and can consider those risks alongside your personal circumstances (e.g. health, caring responsibilities).

### **What if I am unwell prior to the research interaction?**

If you feel unwell, experience COVID-19 related symptoms, have a positive lateral flow or PCR test, then please contact the researcher (Jenny Muir [jenny.muir@jacobs.com](mailto:jenny.muir@jacobs.com), 0131 659 1547 or 07980 862760 or 1800101316591547 or via contactscotlandBSL <https://contactscotland-bsl.org>

### **What if I become unwell after the research interaction?**

If you experience COVID-19 related symptoms, and/or have a positive COVID-19 test following the research interaction, please follow the Scottish Government guidance (or local equivalent).

### **Will my information be confidential?**

**Yes.** All information collected about you will be kept strictly confidential. We will not use your name when we write reports. We will keep all the information from you on a computer with password at the University of Edinburgh. We will keep your consent form in a different place, so nobody knows who took part in this project.

For more information about how the University use your data please go to:

<https://www.ed.ac.uk/records-management/privacy-notice-research/>

If you decide to take part, we will require that you complete a consent form before taking part in the research session.

### **What will happen to the results of the research study?**

- A report will be written, and the results will be given to Transport Scotland, the Scottish Roads Research Board, and the Department for Transport. It will also be published online.
- We may write about the results and explain to other people working in universities.
- We can give you a summary report after the project. If you would like a copy, please let us know.

### **What will happen to the data collected from me after the study?**

Information collected from you, will be stored in a secure computer folder with password. We may use the information for more research. Your name will not be mentioned.

### **Who is organising and funding the research?**



Transport Scotland gave money to Jacobs Engineering Group with the University of Edinburgh to do the research.

**Does the study have ethical approval?**

This study has been approved by the School of Health in Social Science Research Ethics Committee.

**For more information about the study, please contact the researcher below:**

Jenny Muir

Zebrecrossingresearch@jacobs.com

0131 659 1547 or 1800101316591547 or via contactscotlandBSL <https://contactscotland-bsl.org>

**In case of any complaints about the research:**

Please contact Professor Professor Matthias Schwannauer, Head of School, School of Health in Social Science, headofschool.health@ed.ac.uk, +44 (0)131 651 3954.

For additional information regarding complaints please visit the following link:

<https://www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf>

**Thank you for taking the time to read this information.**

**Please consent by clicking on the 'Consent Form' link in the email which this Information Sheet was attached to.**

## Appendix G. Site survey consent form

Please give consent by adding your initials to each box, and providing your name and date at the end of the form.

	Please add your initials below
I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information and ask questions and am satisfied with the answers I received.	
I confirm that I have had the opportunity to let the researchers know if I have additional support needs and I have been, or will be, provided with the support I require to participate in the study.	
I understand that participation is voluntary and that I am free to withdraw at any time without giving any reason.	
I understand that my information will be anonymised and no information that identifies me will be made publicly available. Electronic data will be anonymised and stored on secure University of Edinburgh servers and can only be accessed by the researchers.	
I understand that the study will involve me being observed whilst using a Zebra crossing and discussing my experiences of crossing with researchers.	
I understand that the information collected about me will be stored in a confidential and anonymous electronic database, which may be used to support other research in future and may be shared anonymously with other researchers.	
I understand and agree that the data collected will be analysed and a report will be written (and available publicly online), and results will be presented to Transport Scotland, the Scottish Roads Research Board and the Department for Transport and may also be published in an academic journal and presented at academic conferences.	
I consent to future contact regarding possible participation in further research arising directly from this study. I understand that this will not commit me to taking part in further research.	
I am aware that participating in this study at the current time may carry risks in relation to potential exposure to COVID-19, and I understand the steps that have been taken in relation to minimising the risks of exposure and transmission.	
I have not experienced any COVID-19 related symptoms or been in contact with a known COVID-19 positive individual in the 14 days prior to this research interaction.	

I agree to take part in this study.

Full Name:

Signature (can be e-signature):

Date dd/mm/yyyy:



## Appendix H. Site survey participant briefing

[provided verbally or via BSL on the day of the site survey]

### Pre-crossing – explanation of survey purpose and process

- Reminder of why we are undertaking survey – as a follow-up to Stage 1 focus groups to understand how individuals experience Zebra crossings in a real-world environment;
- Reminder of survey process:
  - Survey will follow a two-stage approach, whereby you will be asked to cross in one direction and then cross for a second time in the other direction;
  - You will be accompanied across the crossing by Jenny Muir; support persons are also welcome to cross with you too if desired. Michael Merritt will be making background observations and be present from a health and safety perspective;
  - You are invited to wear an audio recording device. If you feel comfortable, you can describe out loud your thoughts and actions on the approach to crossing for the first time (but this will not be a discussion with the chaperone);
  - After crossing for the second time, you will be asked some questions about your experience;
  - The survey and discussion should take no longer than 30 minutes, weather permitting this will take place outdoors, otherwise we will make use of the café space at Marchmont St Giles, Butterflies Café (5-minute walk)
  - The discussion before and after the crossing will be recorded on voice recorder and the recording will be stored securely until it is ready to be written out, then it will be deleted. The notes will contain no information that would allow you or comments made by you to be identified;
  - Bottles of water and snacks are available, teas and coffees are available from Butterflies Café. A shopping voucher will be posted out next week.

### Advice for participants

- Please act as you normally would when making the crossing – you do not need to do anything differently;
- There are no right or wrong answers;
- If there are any questions that you do not wish to answer, you do not have to do so;
- If at any time, you have any concerns, tell the researcher and survey will be stopped immediately;
- Do you have any questions? [Check participant understands why they're here and that they are happy to proceed]; and
- Post-survey, check that participant is comfortable with return travel arrangements, and action as needed.

**Taxi account:** Central Taxis

Tel: 0131 229 4466

Code to book: JAC160

Company Reference: Jacobs UK Limited

## Appendix I. Environmental observations guide

### Environmental Observations #1 – Beginning of the Day

Time:

Date:

Geometric considerations –visibility and sightlines:

Condition of signs and lines relating to the crossing:

### Environmental Observations #2 – Per-participant

Q1 Participant ID

Q2 Audio recording?

- Yes (1)
- No (2)

Q3 Time of day (00:00)

Q4 Body language pre-crossing: if they seem hesitant, how often do they turn their head to look for approaching vehicles before crossing, how long do they wait to cross once vehicle has stopped, do they acknowledge vehicle, how they approach the crossing.

Q5 Body language during crossing: if they seem hesitant or rushed, how often do they turn their head to look for vehicles whilst crossing, do they acknowledge vehicles.

Q6 Body language post-crossing: if there is anything noticeable in their behaviour once they have finished crossing.

Q7 Weather conditions (can select multiple)

- Sunny
- Overcast
- Raining- light
- Raining- heavy
- Wet
- Dry
- Other notes (if applicable)

Q8 Carriageway and footway surface conditions

- Dry
- Wet
- Other (please specify)

Q9 Traffic volume (motorists)

- Quiet
- Moderate
- Busy

Q10 Traffic volume (cyclists)

- Quiet
- Moderate
- Busy

Q11 Pedestrian volume

- Quiet
- Moderate

- Busy

Q12 Background noise- volume

- Loud
- Moderate
- Quiet

Q13 Background noise- source

- Traffic
- Wind/rain
- Roadworks
- People (please specify)

- Other (please specify)

Q14 Behaviour of other road users; how motorists, cyclists, other pedestrians approach the crossing (qualitative assessment)

END

## Appendix J. Site survey post crossing interview guide

Q1 Participant ID

Q2 Audio recording?

- Yes - Crossing & Interview
- Yes - Interview only
- No

Q3 Did you cross with a support person?

- Yes
- No

Q4 Have you used this crossing before



### Pre-crossing experiences

Q5 How did you feel when waiting to cross? Please select all that apply.

- Anxious
- Worried
- Hesitant
- Neutral
- Relaxed
- Other (please specify)

Q6 Why do you think you felt this way?



Q7 How easy was it to locate the crossing and find the kerb?

- Very easy
- Easy
- Somewhat easy
- Slightly difficult
- Very difficult

Q8 Why was this?



Q9 When you were waiting to cross, how well did you feel drivers/riders could see you?

- Very well
- Well
- Somewhat well
- Not very well
- I didn't feel they could see me at all

Q10 Why do you think this was?



Q11 How did you determine it was safe to cross?



Q12 Was there anything that made this difficult?



Q13 How easy was it to hear vehicles and cycles approaching?

- Very easy
- Easy
- Somewhat easy
- Slightly difficult
- Very difficult
- N/A

Q14 Why was this?



Q15 How did the traffic volume and speeds feel and did this have an effect?



Q16 (Excl. deaf participants) What was the noise from the road and surrounding area like and did it have an effect?



Q17 How did drivers/cyclists/other pedestrians behave when you were waiting to cross?

- Did this differ from your usual experiences?
- Did this affect how you felt today?



Q18 What did the general surrounding street environment feel like?



Q19 What is your view of the condition of the crossing and the area round it (carriageway/footway surface, maintenance, lighting, signage, etc)?

- Very good
- Good
- Okay
- Not good
- Bad

Q20 Did the weather influence how you were feeling?

- Yes, a lot
- Yes, a little
- No

Q21 Why was this?



## During-crossing experiences

Q22 How did you feel when crossing? Please select all that apply.

- Anxious
- Worried
- Hesitant
- Rushed
- Relaxed
- Other (please specify)

Q23 Why do you think you felt this way?



Q24 Did the width of the carriageway have an effect?

- Yes, a lot
- Yes, a little
- No

Q25 Why was this?



Q26 How easy or otherwise was it to hear vehicles and cycles approaching when you were crossing?

- Very easy
- Easy
- Somewhat easy
- Slightly difficult
- Very difficult
- N/A

Q27 Why was this?



Q28 How easy or otherwise was it to see vehicles and cycles approaching when you were crossing?

- Very easy
- Easy
- Somewhat easy



- Slightly difficult
- Very difficult
- N/A

Q29 Why was this?



Q30 How easy was it to move across the crossing?

- Very easy
- Easy
- Somewhat easy
- Slightly difficult
- Very difficult

Q31 Why was this?



Q32 Was the transition from kerb to road comfortable?

- Very comfortable
- Comfortable
- Somewhat comfortable
- Slightly uncomfortable
- Very uncomfortable

Q33 Why was this?



Q34 How did traffic volume and traffic speeds make you feel while you were crossing and did this have an effect?



Q34 How did drivers/cyclists/other pedestrians behave when you were crossing?

- Did this differ to usual experiences?
- Did this affect how you felt today?



### **Post-crossing experiences**

Q35 How did you feel immediately once you had completed crossing? How is this different from usual experiences?



Q36 Do you have any suggestions for improvement to this crossing or more generally in the surrounding environment?



**Thank you**

**END OF SURVEY**