



Sight Line for Street Works Pilot Report

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Summary

The Sight Line system for street works is a combination of physical changes to pedestrian signs and barriers and a digital information system which makes sites easier to navigate for people with sight loss.

Funded by Transport for London's Future Streets Incubator Fund, a full embodiment of the system was produced and deployed by street works operatives at a series of sites in North London over eight weeks. Regular inspections were made of the sites to determine if the system was being deployed correctly. Interviews were conducted with the operatives using the system, and people with sight loss and people who work with them.

Site inspections revealed that both the physical and digital elements of the system were consistently deployed correctly throughout the trial. Testimony from the street works operatives and their manager suggested that doing this had not imposed a considerable additional burden on them in terms of time or effort. The people with sight loss and those who work with them concurred with the participants in previous research in finding the additional information provided by both the physical and digital systems useful.

These results show that day-to-day deployment of the system is practical, of benefit to people with sight loss, and of minimal dis-benefit to streetworks operatives. This suggests wider deployment of the system would offer increased independence for people with sight loss without imposing a significant additional burden on street works operatives.



2 Background

Between 2009 and 2010, as part of a CABE sponsored, RCA Helen Hamlyn Centre for Design (HHCD) research project eight people with sight loss were shadowed on walking journeys they would regularly make independently. [A report was published](#) articulating the diverse navigational strategies and sometimes contradictory needs of the group. Despite this diversity the attribute that was most common across the group, relative to sighted people, was an increased dependence on mental maps and hence a reliance on predictability in the environment.

The most common source of unpredictability in the street environment is street works. They frequently appear unexpectedly and can make navigational cues (like building line features or street furniture) inaccessible, causing disorientation.

“On Monday, when I walked out there were roadworks right there, I didn’t know what to do so I just went home again”

Long Cane user, Bermondsey

“I would say Roadworks, that’s the biggest problem on the street right now, roadworks”

Residual Sight user, Canning Town

A second [HHCD research project](#) sponsored by the Royal London Society for Blind People in 2011 and 2012 sought to understand in detail how street works affect people with sight loss and propose changes to the signing and guarding system to make them easier to negotiate.

As part of this project seven people with sight loss were shadowed negotiating a series of real-world street works sites. Street works operatives were also shadowed and interviewed. In response to insights from this research a series of modifications to signing and guarding were prototyped and iterated in response to user testing and feedback.

The resulting physical design features were tested, in comparison to the existing standard signing and guarding system, on two simulated street works sites on Vauxhall Bridge Road. 13 people with sight loss negotiated both sites, rated their comfort levels on each one and stated their preferences. [11 of them preferred the modified set-up with the remaining two stating no preference.](#)

As well as the physical design features a digital information system was also designed and prototyped but not tested.

When the system design and test results were presented to stakeholders on both the regulatory and operational sides of the street works industry a concern was consistently raised. As the system provides additional information, which is in some cases safety critical, if this information is frequently wrong it would be more dangerous than not providing the information.

The Future Streets Incubator Fund allocated £19,630 to fund the realisation of the digital information system and pilot of both this and the physical parts of the system in day to day use by actual street works personnel on live sites.

3 Objective

The pilot had two main goals. The first was to investigate if both the physical and digital aspects of the Sight Line System are a realistic proposition for day-to-day deployment by actual street works staff.

In order to be viewed as a success in this respect the system would need to be deployed to a quality and consistency to provide the intended useful additional information function without negatively impacting the workflow of the staff.

The second goal is to gather additional evidence of the system's usefulness or otherwise to pedestrians with vision impairment.

4 Methodology

4.1 Manufacture and development

A set of 100 roadworks barriers and 10 pedestrian directional signs were manufactured to the Sight Line specification. This involved production of the signs from scratch, with profiles CNC cut from 3.5mm yellow Acrylic capped ABS and bonded together with Acetone to build up the sign forms. The signs were fitted with iBeacon compatible battery operated Bluetooth beacons from EM Electronics whose major and minor IDs were coded into QR codes attached to the sign fronts.



Sign assembly



Complete signs

100 High Impact Polystyrene strips were produced containing both tactile dots and a high contrast yellow and black sawtooth pattern. These were attached to 100 otherwise standard Oxford Plastics Avalon Barriers.

A server side application was developed which was deployed with a database to Amazon Web Services. Read and write API were provisioned.

An android app was developed which presented a simple user interface to street works operatives and collected information from them about site configuration. This app used the write API to save a record of the site, including the GPS position of the start and end, to the database.

An iOS app was developed that scanned for system iBeacons and when one was detected used the read API to retrieve the relevant site details. These were presented to the user as an audio description and as large size, high contrast text.

4.2 Deployment

Signs and barriers were delivered to street works contractor CVU and their staff were trained on the correct deployment based on the following rules:

Barriers should be deployed with the tactile dots and yellow and black sawtooth pattern on the side pedestrians would be expected to be.

Signs should be present at the start and end of the site with arrows pointing in the direction pedestrians would be expected to walk.

The signs should be attached to the barriers with the tactile arrows at the same height as the tactile dots on the barriers.

The signs at the start and end of the site should be logged to the digital system using the android app, with the digital record an accurate description of the actual site configuration.

After a soft-start full deployment of the system by CVU staff began at the start of June 2016 on Fairbridge Road in Islington. The road was being fully re-paved by CVU so the street works sites on it were continually moving, requiring frequent re-deployment of the system.

4.3 Evaluation

Once deployment had begun weekly inspections of the sites were conducted. Both their physical set-up and digital description were evaluated to see if they conformed to the deployment rules.

Additionally the sites were visited by people with sight loss and people that work with them. The sites were visited by one of Islington council's rehab workers and arrangements were made for a visit with the whole rehab team but they cancelled this and then ceased to engage. The sites were also visited a long cane user on whose phone the iOS app was installed.

Finally interviews were conducted with the on-site site street works supervisor and his manager.



5 Results

Site inspection results and photos are presented in the table below.

Date & Time	Digital description matches site configuration?	Barriers are correct way around?	Pedestrian signs are positioned correctly?	Images
2/6/16 12:15	Yes	Almost all	Yes	
10/6/16 10:38	Yes	Yes	Yes	
15/6/16 21:47	Yes	Yes	Yes	
26/6/16 22:17	Yes	Yes	Yes	
14/7/16 00:19	Yes	Yes	Yes	
26/7/16 13:36	Yes	Yes	Yes	
31/7/16 23:33	Yes	Yes	Yes	

Both of the CVU staff interviewed felt that the entire system, both physical and digital parts had been easy and simple to use.

“Everything seems to be going well with it. The barriers are easy to set up. There’s clear definition between which side you need to be on, or which side the barriers need to be fitted on and the app is easy enough to use”

Luke O’Bryan, Borough Manager, CVU

“It’s virtually the same as setting up a normal Chapter 8 system, there is no extra work involved in setting the system up, it’s quite easy to set up. The only thing you have to remember is that you are setting it up for blind people. You are more aware that you are setting it up for a special user”

“I haven’t found it difficult to use. The app is very user friendly, it’s simple use, the instructions on it are very, very simple to follow.”

Vincent Buckley, Supervisor for the Islington Borough Contract, CVU

They both felt that if the system were deployed more widely it would not impose an unreasonable burden on the operatives using it and that they would be able to deploy it correctly.

“I think with the correct amount of training it could work” Luke O’Bryan

The Islington borough rehab worker felt the system would be of benefit to her service users. She was particularly positive about the digital aspect of the system and felt that additional haptic information would make it even more useful to people who are deaf-blind.

The long cane user was able to quickly learn the operation of both the iOS app and the physical coding of the signs and barriers and found both helpful.

“It’s all reassurance and as a blind person, that’s what I want, that I’m not actually going to walk off the edge of a cliff.. I liked it. I can pick it up very quickly and use it”

Dick Groves, Long Cane User

He suggested that it would be useful if the app announced the end of the site as well as the start.



6 Conclusion

The high degree of compliance illustrated by site inspections indicates that the system is indeed deployable day-to-day by actual street works personnel in a way that should give users a confidence they are receiving correct information.

The operatives testimony suggests that both the digital and physical elements are easy and intuitive to understand and use, reducing the probability of incorrect deployment. Additionally, the presence of features that are expressly for disabled people may encourage them to be more mindful of those people when setting up the site.

The experience of the people who have been working on it day to day suggests that deploying the system more widely would not impose a significant additional burden on their colleagues in terms of time or effort.

The digital system performed as intended end-to-end - from the operatives app through the server-side elements to the iBeacons and the end user app.

The people with sight loss and those who work with them who have been consulted so far concurred with the participants in previous research in finding the additional information provided by both the physical and digital systems useful.

These findings, when combined with those of previous research and testing suggest that the benefits of the system to people with sight loss is considerable and the costs to street works operatives in terms of additional time and effort are low. These findings would support wider deployment of the system.

7 Acknowledgements

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Most importantly there would have been no pilot whatsoever without the kind assistance of Luke O'Bryan, Vincent Buckley and their staff on site on Fairbridge Road. They picked up the system with enthusiasm and good humour and deployed it (and continue to do so) with great diligence.

Finally there would be no Sight Line System whatsoever without the incredibly generous assistance of all of the people with sight loss who have contributed to its research, design and evolution over the last seven years. From being shadowed on strange journeys to testing out even stranger prototypes they have put up with a huge amount and contributed their experiences, criticisms and ideas with incredible energy.