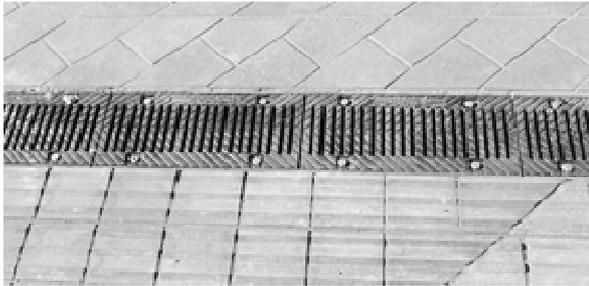


Passionate about Research

Exhibition Road Corduroy Delineator Testing

Report for Royal Borough of Kensington and Chelsea

May 2011



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- Appendix C:** Site Conditions Record
- Appendix D:** Test Questionnaires
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Executive Summary

Study Objectives

MVA Consultancy was commissioned by the Royal Borough of Kensington and Chelsea to undertake testing to determine whether, in an **on-street environment**, the corduroy delineator paving introduced as part of the Exhibition Road single-surface scheme:

- **Can be detected** by blind or partially sighted people when approached from an acute angle; and
- **Is overpassable** by people with mobility impairment.

On-street testing of corduroy paving at 'more acute' angles was one of the recommendations made by University College London on completion of their testing of delineator paving at the PAMELA laboratory in 2010.

PAMELA tested approaching tactile paving at angles of 45 degrees and 90 degrees. This research tested approaching the corduroy delineator paving on Exhibition Road at angles of between 1 degree and 35 degrees, which are angles at which those who are walking close to the delineator along the footway may encounter the delineator.

Test sites

The testing was undertaken over a five-day period on 15th to 16th December 2010, 4th March 2011 and 7th to 8th March 2011.

Different test areas were used for the December 2010 and March 2011 testing periods. As shown in **Figure E1**, the test areas were located on the east side of Exhibition Road between Kensington Gore and Watts Way (south side of Princes Gardens).

The December and March tests were undertaken in Location One and Location Two respectively.

As shown in **Figure E2**, the test sites were approximately 90m long and contained a continuous strip of 800mm wide corduroy paving, which delineates the 'safe area' from the carriageway.

A drainage channel 230mm wide lies between the carriageway and the corduroy delineator. The corduroy delineator is two tone: grey and white. The drainage channel is a different colour (black) to the delineator and is made from a different material (metal).

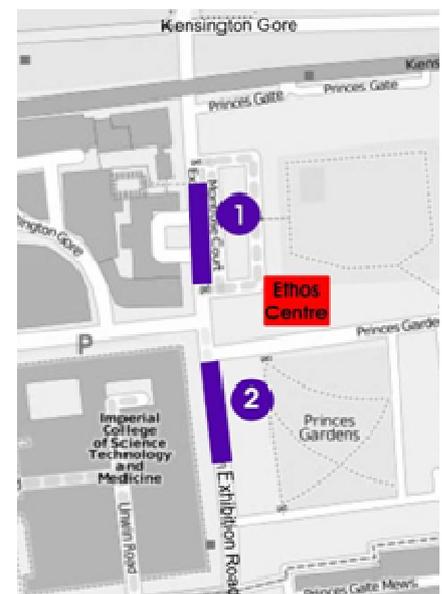


Figure E1: Test location plan

Summary

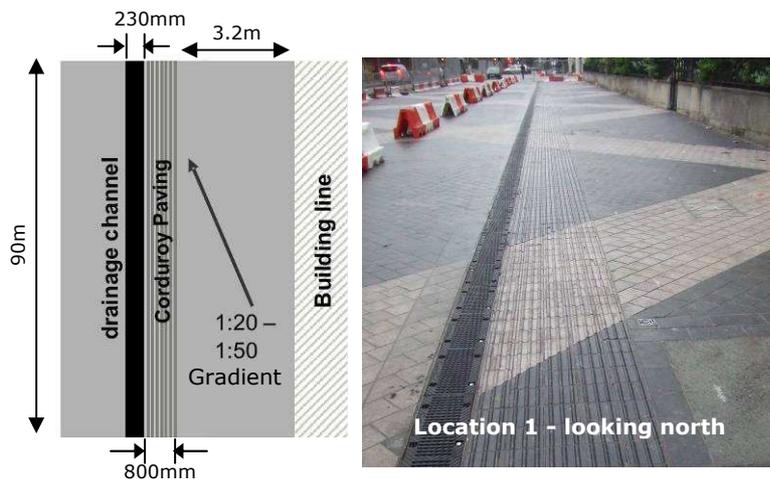


Figure E2: Test site dimensions

Methodology

The test methodology is based on the approach adopted by UCL for the PAMELA testing. The methodology was refined following a test site trial and is defined in 'Schedule 3 - Amended Specification'.

MVA contacted over 220 national, regional and local organisations and individuals to recruit visually and mobility impaired participants. The organisations included: RNIB, Guide Dogs for the Blind, Scope, as well as local hospitals, museums, universities, access groups, charities and societies.

Two groups of participants were recruited to take part in the study:

- **Visually Impaired (VI):** blind or partially sighted people who either:
 - use a long cane (either tapered or with a roller ball end)
 - use a guide dog
 - do not use an aid to help navigate the street environment
- **Mobility Impaired (MI):** who either:
 - use an electric, self-propelled or attendant controlled wheelchair
 - use crutches, sticks or a wheeled walker
 - have no personal mobility impairment but who wear high heels, push a pram or buggy (minimum mass 10kg) or pull trolley style luggage (minimum mass 10kg)

Testing was undertaken during wet and dry conditions and during hours of daylight and darkness. The December tests were completed during more extreme weather conditions. Site conditions were recorded throughout the tests including: weather; lighting; sound; and gradient.

The tests were undertaken in a controlled area where barriers were used to prevent the general public and vehicles from entering the test area.

Summary

The testing comprised three parts:

- **Part One: Pre-Test Questionnaire** - Information was recorded, including: type of footwear; assessment of disabilities and functional capabilities; assessment of anxiety and fatigue levels. For VI participants, a corduroy familiarisation test/assessment was undertaken.
- **Part Two: Testing** - during the tests the following information was recorded:
 - If and where the delineator paving was detected (VI participants);
 - If the delineator paving was overpassable (MI participants);
 - Anxiety/fatigue level; and
 - How the participant detected the delineator paving.
- **Part Three: Post-Test** - included asking participants about how often they go out/visit Exhibition Road and whether they have been involved in single-surface campaigns.

VI participants undertook corduroy tests at the following angles: 1 to 5 degrees; 5 to 15 degrees; 15 to 25 degrees; and 25 to 35 degrees. They also undertook two control tests: blister paving (25 to 35 degrees); and no delineator.

MI participants undertook two tests at 90 degrees: corduroy paving and blister paving.

The Results

A total of **71 VI participants** and **42 MI participants** took part in the testing. The breakdown of different MI and VI groups can be seen in **Figure E3** and **Figure E4** (shown as number and percentage of participants).

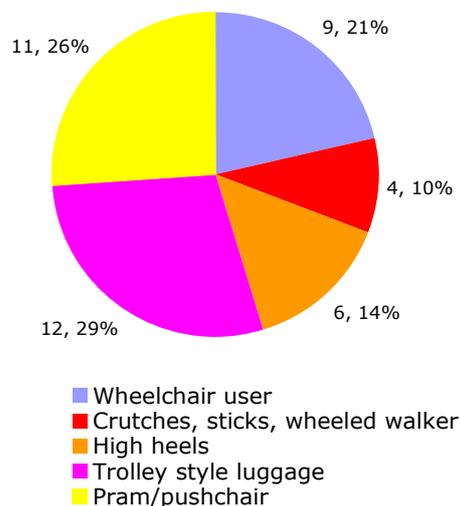


Figure E3 MI Participants

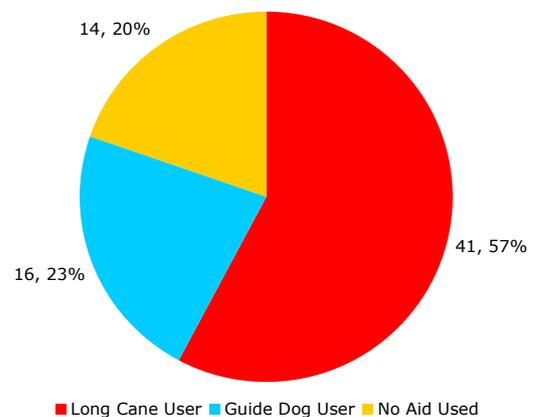


Figure E4 VI Participants

Summary

Pass and Fail Rate

As shown in **Table E1**, only one VI participant (1% of participants) failed to detect the corduroy paving and instead detected the drainage channel (on the 1 to 5 degree angle). In addition, one VI participant failed to detect the blister paving (25 to 35 degree control test) and instead detected the drainage channel.

Table E1 Pass and Fail Rate for Corduroy Delineator Tests

VI Participants		MI Participants	
Pass	99%	Pass	100%
Fail	1%	Fail	0%

Of the VI participants that passed, 18 (25%) participants made false detections prior to detecting the delineator paving. Sixteen of these participants detected the delineator paving after stopping once on the granite paving. Twelve of the false detections were during the 1 to 5 degree test and this is likely to be largely due to the fact that the participants had to walk up to 30 metres before reaching the corduroy delineator paving. Therefore they are more likely to stop due to the detection of tree pits (temporarily concreted over for the tests), drainage covers and other irregularities. The fixed angles of approach meant that tendencies, such as using the building line to help navigate, were suppressed.

All MI participants crossed the corduroy delineator paving.

Ease of Detection/Crossing

Participants were asked to score the ease of detection/ crossing on a scale of 1 to 10 depending on how easy or difficult the blister/ corduroy tactile paving was to detect/cross, where 1 was easy and 10 was difficult.

At 1 degree to 5 degrees angles, 79% of VI participants found the corduroy paving relatively easy to detect. This increased to 89% at between 25 degree and 35 degree angles. While 94% of VI participants found the blister paving relatively easy to detect (at the only angle tested – 25 degrees to 35 degrees). 'Relatively easy' refers to where participants gave a score of between 1 and 5.

88% of MI participants found the corduroy paving relatively easy to cross compared with 95% who thought the blister paving was relatively easy to cross. The twelve percent of MI participants that gave a score for the ease of crossing the corduroy paving of more than 5 was made up of participants who were either pulling trolley style luggage (57%), pushing a pram (29%) or in an electric/self-propelled wheelchair (1 participant = 14%).

It was generally more difficult for VI participants to detect the corduroy paving at the shallow angles (1 to 5 and 5 to 15 degrees). At these angles, the profile of the corduroy is more along the participants' path as opposed to being across the participants' path as with less acute angles.

Length of Delineator Crossed Before Detection

For angles up to 35 degrees, the proportion of VI participants that detected the delineator paving within the 400mm (40cm) of the paving ranged from 65% - 82% across the different angles (72% average).

While it appears that corduroy paving was generally more difficult to detect when approached at the shallower angles, participants detected it earlier (in terms of distance across delineator). The majority of participants, approaching at angles of less than 15 degrees, detected the corduroy paving within the first 200mm (20cm) - Zone A. This is most likely to be a result of there being more corduroy paving to walk across at the more acute angles.

Weather Conditions

There were no discernable differences in the results according to whether it was light/dark or wet/dry.

Conclusions

- These tests aimed to assess whether corduroy delineator paving:
 - Can be detected by blind or partially sighted people when approached from an acute angle; and
 - Is overpassable by people with mobility impairment
- 283 of the 284 tests on corduroy paving (71 VI participants, 4 tests each) were successful giving a 99.6% success rate. This compares well with testing on the blister paving control where 70 out of 71 tests were successful.
- The participant who failed to detect the corduroy paving stopped at the drainage channel. The participant who failed to detect the blister paving also stopped at the drainage channel.
- There was a greater number of false detections at the more acute angles, possibly because participants had further to walk over the granite blocks and therefore were more likely to encounter irregularities such as tree pits (temporarily concreted over for the tests) and service covers.
- At 1 degree to 5 degrees angles, 79% of VI participants found the corduroy paving relatively easy to detect. This increased to 89% at between 25 degree and 35 degree angles. While 94% of VI participants found the blister paving relatively easy to detect (at the only angle tested – 25 degrees to 35 degrees). 'Relatively easy' refers to where participants gave a score of between 1 and 5
- When approached at a more acute angle, the corduroy paving was harder to detect. At more acute angles participants walked closer to the line of the corduroy profile, whereas when crossing at 90 degrees they would walk across the profile.
- Whilst harder to detect at more acute angles, more participants detected the corduroy paving within the first half of the delineator – which is likely to be as a result of the fact that they had further to walk across the delineator at these shallow angles (and therefore spent longer on it).

Summary

- 88% of MI participants found the corduroy paving relatively easy to cross compared with 95% who found the blister paving relatively easy to cross
- No MI participants failed to cross the corduroy paving at 90 degrees (out of 42 tests).

Overall conclusion

Corduroy delineator paving 800mm wide was reliably detected by blind or partially sighted participants in these tests when approached from an acute angle (of between 1 and 35 degrees) and was overpassable by participants with mobility impairments.

1 Introduction

1.1 Study Objectives

1.1.1 MVA Consultancy was commissioned by the Royal Borough of Kensington and Chelsea (hereafter referred to as the Council) to undertake testing to determine whether, in an **on-street environment**, the corduroy delineator paving introduced as part of the Exhibition Road single-surface scheme:

- **Can be detected** by blind or partially sighted people when approached from an acute angle; and
- **Is overpassable** by people with mobility impairment.

1.1.2 The testing was undertaken over a five-day period on 15th to 16th December 2010, 4th March 2011 and 7th to 8th March 2011.

1.1.3 On-street testing of corduroy paving at 'more acute' angles was one of the recommendations made by University College London (UCL) on completion of their testing of delineator paving at the Pedestrian Accessibility and Mobility Environment Laboratory (PAMELA) in 2010. This research¹ was commissioned by Transport for London to test the suitability of certain surfaces as a replacement to the vertical kerb for shared space schemes. The on-site tests were restricted to one issue highlighted by the PAMELA trials – that the corduroy performed less well when approached parallel to the corduroy pattern. The tests were only carried out for blind and partially sighted people and people with mobility impairments

1.1.4 The PAMELA tests aimed to answer the following questions in order to ascertain which potential delineators merited further testing:

- Can a range of delineator surfaces be detected by people who are blind or partially sighted?
- If so, can people who have mobility impairments cross the surface?

1.1.5 This report describes the on-site test methodology (Chapter 2) and provides a summary of the test results (Chapter 3). The conclusions of the delineator testing are provided in Chapter 4.

¹ Childs, C. et al, 2010. Shared Space Delineators: Are They Detectable.

2 Test Methodology

2.1 Introduction

- 2.1.1 The test methodology is based on the approach used by UCL for the PAMELA testing referred to in Chapter 1. The UCL methodology was adapted largely to take account of: the practicalities of testing in an on-street environment; the fact that only one type of delineator paving was being tested and tests undertaken at several angles, whereas the PAMELA tests only tested 45 degree and 90 degree angles.
- 2.1.2 The methodology was refined following a test site trial and is defined in 'Schedule 3 – Amended Specification', which is shown in **Appendix A**.
- 2.1.3 This chapter describes:

- The test sites;
- Recruitment of participants;
- Test programme and test set-up;
- Test records:
 - Part One: Pre-test questionnaire and pre-test
 - Part Two: Corduroy paving and control tests
 - Part Three: Post-test questionnaire

2.2 The Test Sites

- 2.2.1 Different test areas were used for the December 2010 and March 2011 testing periods. As shown in **Figure 2.1**, the test areas were located on the east side of Exhibition Road between Kensington Gore and Watts Way (south side of Princes Gardens).
- 2.2.2 The December and March tests were undertaken in Location One and Location Two respectively.
- 2.2.3 As shown in **Figure 2.2**, the test sites were approximately 90m long and contained a continuous strip of 800mm wide corduroy paving, which delineates the 'safe area' from the carriageway.
- 2.2.4 A drainage channel 230mm wide lies between the carriageway and the corduroy delineator. The corduroy delineator is two tone: grey and white. The drainage channel is a different colour (black) to the delineator and is made from a different material (metal).

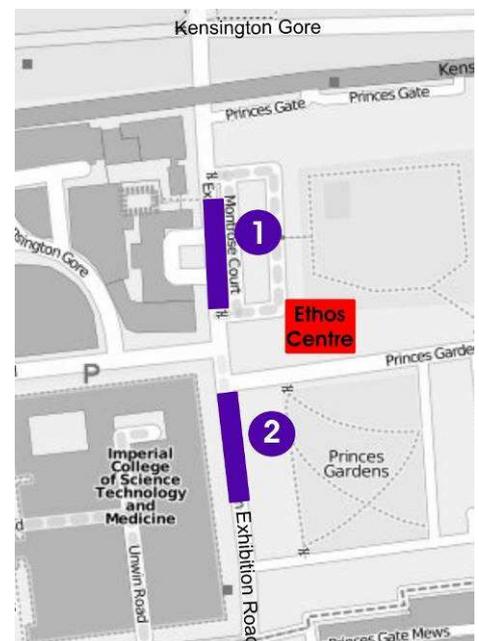


Figure 2.1 Test location plan

2 Test Methodology

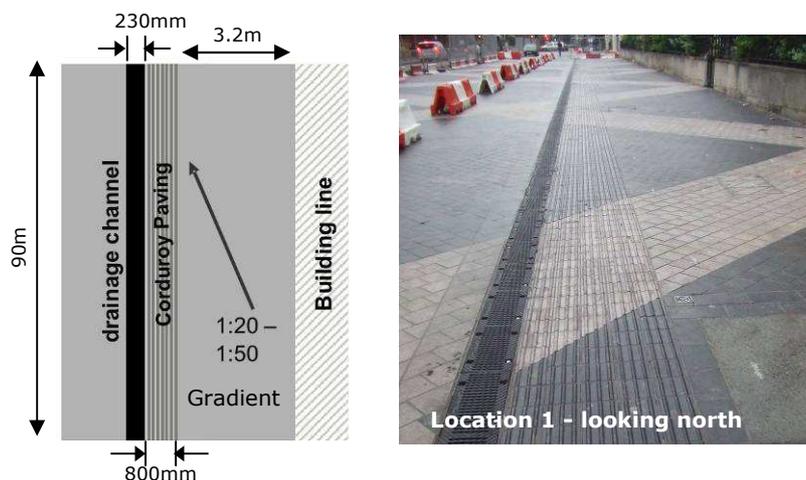


Figure 2.2 Test site dimensions

2.3 Recruitment of Participants

2.3.1 MVA contacted over 220 national, regional and local organisations and individuals to recruit visually and mobility impaired participants. The organisations included: RNIB, Guide Dogs for the Blind, Scope, as well as local hospitals, museums, universities, access groups, charities and societies.

2.3.2 Two groups of participants were recruited to take part in the study:

- **Visually Impaired (VI):** blind or partially sighted people who either:
 - use a long cane (either tapered or with a roller ball end)
 - use a guide dog
 - do not use an aid to help navigate the street environment
- **Mobility Impaired (MI):** who either:
 - use an electric, self-propelled or attendant controlled wheelchair
 - use crutches, sticks or a wheeled walker
 - have no personal mobility impairment but who wear high heels, push a pram or buggy (minimum mass 10kg) or pull trolley style luggage (minimum mass 10kg)

2.3.3 Participants were asked if they had any other disabilities that affected their mobility or vision. There were no VI participants with limited feeling in their feet, which can be a factor in diabetes related sight loss.

2.4 Test Programme and Test Set-up

Test Programme

2.4.1 The order in which the December tests were completed is shown together with their approximate location in **Figure 2.3**. The March tests were completed in the same order but ran from north to south.

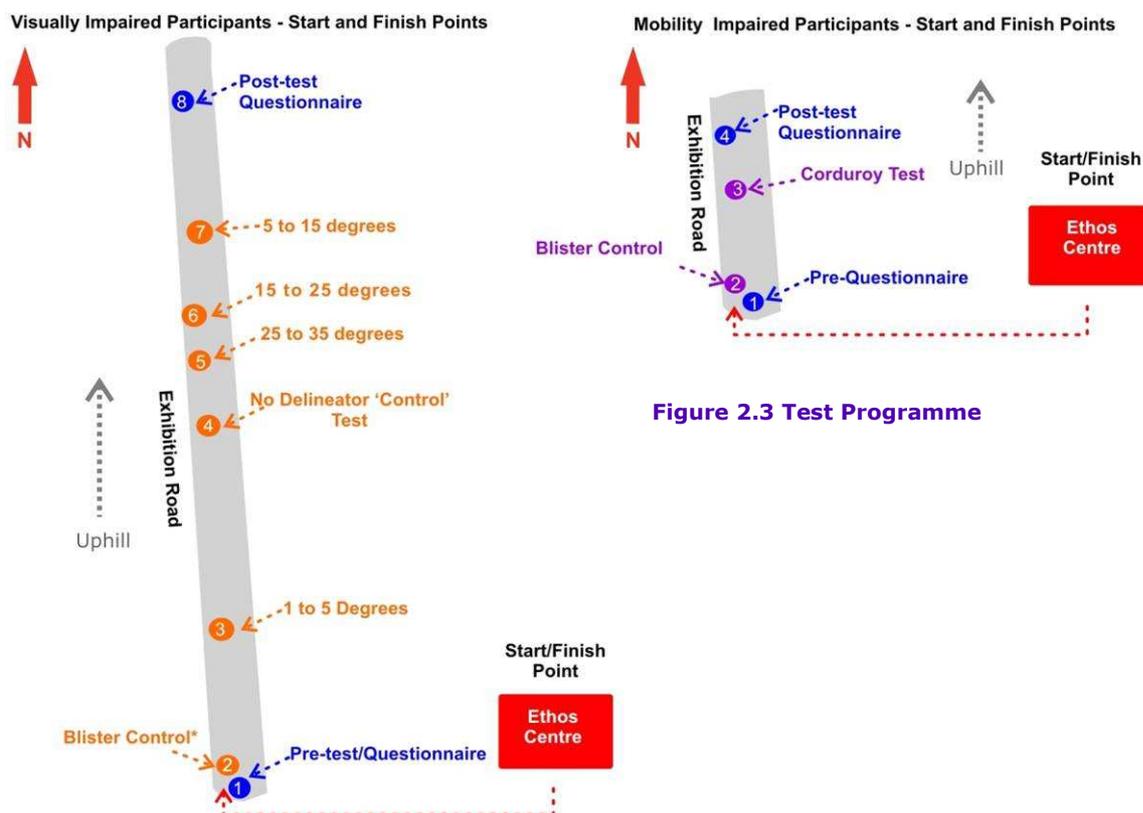


Figure 2.3 Test Programme

2.4.2 As shown in **Table 2.1**, visually impaired participants undertook tests at four different angles to the corduroy paving as well as undertaking two control tests (Blister and No delineator).

2.4.3 Mobility impaired participants undertook a test at 90 degrees to the corduroy and a control test at 90 degrees to blister paving.

Table 2.1 Test Angles

Test	Delineator paving type	Angle to delineator (degrees)	VI test MI test	
			VI test	MI test
Test 1	Corduroy	1 to 5	Y	N
Test 2	Corduroy	5 to 15	Y	N
Test 3	Corduroy	15 to 25	Y	N
Test 4	Corduroy	25 to 35	Y	N
Test 5	Blister	25 to 35	Y	N
Test 6	No delineator	n/a	Y	N
Test 7	Corduroy	90	N	Y
Test 8	Blister	90	N	Y

2.5 Test Set-up

2.5.1 The test angles were marked out using crayon to enable the experimenters to guide participants through the test area as accurately and efficiently as possible. The start points were at different perpendicular distances to the corduroy paving in order to limit the ability for participants to anticipate the delineator paving. **Figure 2.4** shows a schematic diagram and table summarising the angles and lengths walked to and across the delineator before reaching the drainage channel.

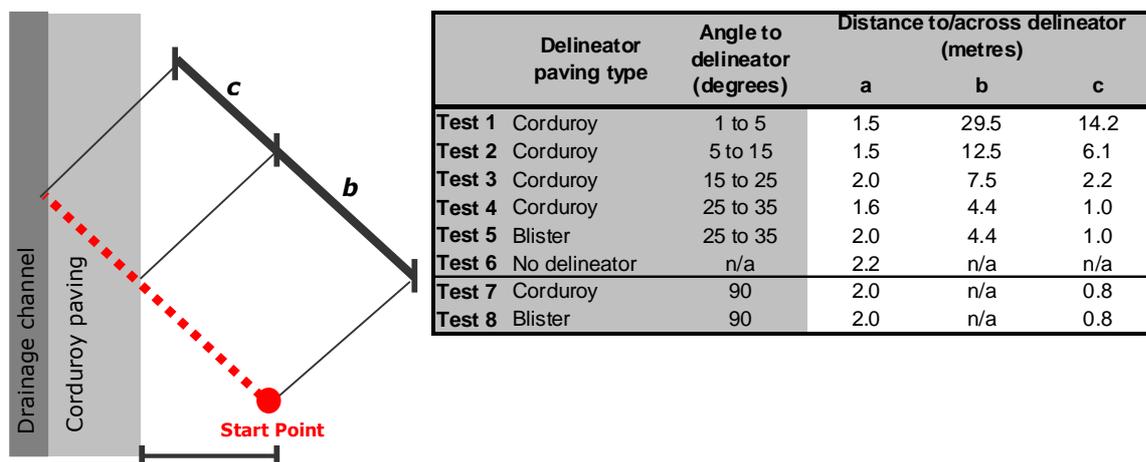


Figure 2.4 Test angle plan and distance table

- 2.5.2 Barriers were used to prevent the general public and vehicles from entering the test area. As the site was cordoned off, some of the real world conditions were not experienced. These include: presence of trees, noise and air movement from traffic; other pedestrians being present and the tendency for VI people to follow the building line.
- 2.5.3 For the testing, a section of 800mm wide blister paving was introduced alongside and in line with the corduroy paving. It should be noted that the tests involved participants walking from granite to corduroy and granite to blister rather than corduroy to blister.
- 2.5.4 A full risk assessment was undertaken prior to test commencement and throughout the testing to ensure the safety of participants and test staff was not compromised.
- 2.5.5 A photographic record of the test angles and test plans are shown in **Appendix B**.

2.6 Test Records

2.6.1 Participants met the MVA testing team at the Ethos Centre on Princes Gardens, as shown in Figure 2.5, where participants were registered and informed about the tests.

2.6.2 A member of MVA's staff (Test Experimenter) then escorted participants to the test area and undertook the testing in the order shown in Figure 2.4. Participants were then escorted back to the Ethos Centre to rest and/or to arrange their onward travel.

2.6.3 Participants were scheduled for testing every 15 minutes between the hours of 09:00 and 18:00. The VI and MI tests took approximately 30 minutes and 10 minutes respectively, however this varied according to factors which included the relative level of mobility of the participant.



Figure 2.5 Ethos Centre Test Preparation

2.6.4 There were three parts to the delineator tests:

- Part One: **Pre-Test Questionnaire** and **Pre-Test**;
- Part Two: **Delineator** and **Control** Tests;
- Part Three: **Post-Test Questionnaire**.

2.6.5 Site conditions were recorded for each test day and included measurements of noise level, temperature and weather conditions. A record of the site conditions can be found in **Appendix C**. Gradients of the test angles were also measured and these varied between 1:20 and 1:50.

Part One: Delineator Pre-Test Questionnaire and Pre-Test

2.6.6 For both VI and MI Participants a **Pre-Test Questionnaire** was completed. The purpose of the Pre-test questionnaire was to:

- Establish the participant's footwear;
- Gauge the participant's disabilities and functional capabilities; and
- Gauge anxiety/fatigue levels.

2.6.7 A copy of the VI and MI Pre-Test Questionnaires can be found in **Appendix D**.

2.6.8 **Table 2.2** summarises the questions/records documented as part of the Pre-Test Questionnaires for these two participant groups.

2 Test Methodology

2.6.9 VI participants were also asked to undertake a **Pre-Test**, which included questions given in Table 2.2. The main purpose of this Pre-Test was to familiarise the VI participants with the corduroy paving. The participants were then asked the following questions:

- If you came across this paving on street, what do you think you would do and why?
- How likely or unlikely would you be to stop if you encountered this surface in the street?
- Have you heard of blister paving before?

Table 2.2 Pre-Test Questions/Records

Visually Impaired Participants	Mobility Impaired Participants
Gender / Age Group	Gender / Age Group
Participant Category: Long Cane User Guide Dog User No Aid Used	Participant Category: Electric/self propelled or attended wheelchair Crutches, sticks or wheeled walker High heels Trolley style luggage Pram/pushchair
Participant footwear	Participant footwear
Tell me what you can see?	Tell me what you can see in your immediate surroundings?
What colours can you see?	Tell me what you can hear?
Tell me what you can hear?	Do you have any other disabilities which may affect your sight or mobility?
Can you see the difference between this part of the road and this part of the road?	Is there anything you have immediately noticed that may have an affect on how you make your journey?
Is there anything you have immediately noticed that may affect your journey?	Please rate your level of anxiety and tiredness (Scale of 0 to 10, where 0 is not anxious/tired and 10 is very anxious/very tired)
Can you read that road sign?	
Could the participant turn to 3 o'clock?	
Do you have any other disabilities which may affect your vision or mobility?	
Please rate your level of anxiety and tiredness (Scale of 0 to 10, where 0 is not anxious/tired and 10 is very anxious/very tired)	

Part Two: Delineator and Control Tests

Visually Impaired Participant Delineator Testing

2.6.10 VI participants undertook **one test** on the corduroy paving at each of the following angles:

- 1 to 5 degrees;
- 5 to 15 degrees;
- 15 to 25 degrees; and
- 25 to 35 degrees.

2 Test Methodology

2.6.11 VI participants also undertook **two control tests**:

- Blister paving (25 to 35 degrees); and
- No delineator paving (measured along a 5m section of the granite blocks).

2.6.12 At the start of each test, the MVA experimenter asked the participant to begin walking at their normal pace towards the experimenter's voice. The experimenter asked the participant to correct their movement if they veered too far to the left or right. The experimenter asked the participant to re-start the test if they veered outside of the marked angles.

2.6.13 The participant was asked to continue walking unless they encountered a change in surface, in which case the participant was asked to stop still and the experimenter asked/recorded the following information:

- How easy or difficult the participant felt it was to detect the change in surface (on a scale of 1-10, where 10 is difficult);
- At what point the change in surface was detected (see Table 3.6);
- How anxious the participant felt when a change in surface was detected (on a scale of 0-10, where 10 is very anxious);
- How fatigued the participant felt when a change in surface was detected (on a scale of 0-10, where 10 is very tired); and
- What the participant detected the change in surface with (e.g. white cane or foot).

2.6.14 The experimenter recorded all 'false detections', which is where the participant stopped before reaching the corduroy or blister paving. The experimenter was also asked to record whether a participant failed to detect the corduroy or blister paving at all and therefore did not stop. If this happened the experimenter was instructed that they should wait until the participant was clear of the delineator before asking them to stop.

2.6.15 After each test the experimenter recorded the test as a 'Pass', 'Pass with false detection' or 'Fail' according to what they witnessed:

- **Pass** – visually impaired participant detected the surface.
- **Pass with false detection** – visually impaired participant detected the surface but also had false detections.
- **Fail** – visually impaired participant failed to detect the surface.

A copy of the VI Delineator Test Sheet can be found in **Appendix D**.



Photographs of Visually Impaired Tests

Mobility Impaired Participant Delineator Testing

2.6.16 Mobility impaired participants were asked to undertake **one test** at a 90 degree angle for each of the following surfaces:

- Corduroy paving; and
- Blister paving (control test).

2.6.17 Participants were positioned to undertake the test at a 90 degree angle but they were not restricted as to what angle they passed over the delineator paving. Any deviation from 90 degrees was recorded.

2.6.18 At the start of the test, the experimenter asked the participant to move towards them and once they had travelled over the delineator paving asked the following questions:

2 Test Methodology

- How easy or difficult the participant felt the surface was to cross (on a scale of 1-10, where 10 is difficult);
- How anxious the participant felt after crossing the delineator paving (on a scale of 0-10, where 10 is very anxious); and
- How fatigued the participant felt after crossing the delineator paving (on a scale of 0-10, where 10 is very tired).

2.6.19 After each test, the experimenter noted a pass or fail according to what they witnessed:

- **Pass** – mobility impaired participant was able to cross the surface.
- **Fail** – mobility impaired participant failed to pass over the surface.

2.6.20 A copy of the MI Delineator Test Sheet can be found in **Appendix D**.



Part Three: Delineator Post-Test Questionnaire.

2.6.21 On completion of the delineator tests, both VI and MI participants were asked the following questions:

- How often the participant goes out;
- Whether they had any prior knowledge of single surface schemes;
- Whether they had been involved in any single surface scheme campaigns;
- Whether they had previously taken part in any research on single surfaces; and
- How often they had visited Exhibition Road in the last year.

2.6.22 A copy of the post-test questionnaire can be found in **Appendix D**.

3 Results

3.1 Introduction

3.1.1 This section reports on the main findings of the delineator testing. **Appendix E** contains a full record of the results tables.

3.2 Number of Participants, Age and Gender

3.2.1 The number of participants tested in each of the VI and MI groups is shown in **Table 3.1**. The split of male and female participants is shown in **Table 3.2** together with a breakdown by age group.

Table 3.1 Number of Participants

Group	Participants tested
Visually impaired:	
A Long Cane User	41
B Guide Dog User	16
C No Aid Used	14
Total	71
Mobility impaired:	
D Wheelchair user	9
E Crutches, sticks, wheeled walker	4
F1 High heels	6
F2 Trolley style luggage	12
F3 Pram/pushchair	11
Total	42
Grand Total	113

Table 3.2 Participants by Gender and Age

		Visually impaired	Mobility impaired
Age Group	15 to 24	0	8
	25 to 44	20	22
	45 to 64	29	9
	65>	22	3
	Total	71	42
Gender	Male	43	12
	Female	28	30
	Total	71	42

3.2.2 From a review of the comments made in the Pre-Tests, of those VI participants in the No Aid group, all had sight loss, described as: no central or peripheral vision; cataracts; inability to see detail/faces and shapes/colours blurred.

3.3 Pass, Fail and Pass with False Detection Results

3.3.1 **VI participants** were asked to walk towards the experimenter's voice, unless they detected a change in surface, in which case they were asked to stop still. If the VI participant detected the delineator paving (without stopping first), this was recorded as a **pass**. A record was made of the position across the delineator where the detection was made (see **Figure 3.1**).

3.3.2 If a participant made false detections, but then went on to detect the delineator paving, this has been recorded as a **pass with false detection** result. The number of false detections was recorded together with what the participant detected. If the VI participant did not stop before or whilst walking across the delineator paving then this was recorded as a **fail**.

3.3.3 **MI participants** were asked to cross the corduroy paving and blister paving at a 90 degree angle only. If the participant crossed the corduroy or blister surfaces, the experimenter marked it as a **pass** and if the MI participant had been unable to cross the surface the experimenter would have marked it as a **fail**.

3 Results

3.3.4 **Table 3.3** shows the number of VI and MI participants for whom a pass or fail result was recorded. As the “pass with false detection” results represent VI participants who detected the delineator, in Table 3.3 these results have been included in the passes.

Table 3.3 Pass and Fail Results

Test	Angle	Pass	%	Fail	%	Total n	%
VI							
1	1 to 5 ⁰	70	99	1	1	71	100
2	5 to 15 ⁰	71	100	0	0	71	100
3	15 to 25 ⁰	71	100	0	0	71	100
4	25 to 35 ⁰	71	100	0	0	71	100
5	Blister 25 to 35 ⁰	70	99	1	1	71	100
6	No delineator	71	100	0	0	71	100
MI							
7	90 ⁰	42	100	0	0	42	100
8	Blister 90 ⁰	42	100	0	0	42	100
Total		508		2		510	

Table 3.3 shows that only one participant failed to detect the corduroy delineator paving and one participant failed to detect the blister paving as part of the control test. For both of the two VI ‘Fails’ the participant detected the black drainage channel.

3.3.5 The two participants who failed did not have any other disabilities which affected their mobility and/or vision, wore flat shoes/trainers and undertook the tests in daylight hours. These two participants also did not stop before reaching the delineator.

3.3.6 All MI participants passed over the delineator paving.

3.3.7 As a comparison, the PAMELA tests recorded a 1-3% ‘fail’ rate across their corduroy and blister tests. However, it is important to note that the PAMELA tests only included angles of 45 and 90 degrees, whereas these tests included angles from 1 degree to 35 degree.

3.3.8 **Table 3.4** summarises the number of participants for whom a Pass with false detection result was recorded (included in the passes in Table 3.3).

Table 3.4 Pass with false detection Results

Test	Angle	Pass with false detection	Total Tests	% Total Tests
VI				
1	1 to 5 ⁰	10	71	14
2	5 to 15 ⁰	4	71	6
3	15 to 25 ⁰	0	71	0
4	25 to 35 ⁰	2	71	3
5	Blister 25 to 35 ⁰	1	71	1
6	No delineator	1	71	1
MI				
7	90 ⁰	0	42	0
8	Blister 90 ⁰	0	42	0
Total		18	510	

3 Results

- 3.3.9 Of those participants that passed, 18 (25%) participants made between one and five false detections prior to detecting the delineator paving. During the tests it was noted that these false detections largely consisted of detecting tree pits (temporary concreted over for the tests) and service covers.
- 3.3.10 Of the 18 participants that made false detections, 16 detected the delineator paving after making one false detection. Ten of the false detections were during the 1 to 5 degree test and this is likely to be due largely to the participant having to walk up to 30 metres (see Figure 2.4) before reaching the corduroy delineator paving. They were therefore more likely to encounter tree pits, service covers and other irregularities.

3.4 Ease of Detection and Ease of Crossing

- 3.4.1 If a VI participant encountered a **change in surface** then they were asked to rate, on a scale of 1 to 10, where 1 was very easy and 10 was very difficult, how easy or difficult it was to detect the change in surface.
- 3.4.2 If a MI participant was able to cross the corduroy or blister surface then they were asked to rate how easy it was to cross on a scale of 1 to 10, where 1 was very easy and 10 was very difficult.
- 3.4.3 It should be noted that the participants 'ease of crossing' did not specifically refer to how comfortable or how physically easy the delineator was to cross.
- 3.4.4 **Table 3.5** shows the results for ease of detection and ease of crossing.

Table 3.5 Ease of Detection / Crossing

Test	Angle	Detection/ease of crossing score (for passes)										Total	% who scored >5
		1	2	3	4	5	6	7	8	9	10		
	VI	Ease of detection (1 easy, 10 difficult)											
1	1 to 5 ⁰	15	11	13	4	12	4	4	3	2	2	70	21
2	5 to 15 ⁰	22	17	8	3	10	6	0	3	0	2	71	15
3	15 to 25 ⁰	23	8	8	8	12	4	3	3	0	2	71	17
4	25 to 35 ⁰	24	10	11	2	16	3	2	1	0	2	71	11
5	Blister 25 to 35 ⁰	35	12	6	5	8	1	2	0	0	1	70	6
6	No delineator	No detections										-	-
	MI	Ease of crossing (1 easy, 10 difficult)											
7	90 ⁰	13	9	9	3	3	3	0	1	1	0	42	12
8	Blister 90 ⁰	20	8	4	5	3	0	1	1	0	0	42	5

- 3.4.5 As shown in Table 3.5, at 1 degree to 5 degrees angles, 79% % of VI participants found the corduroy paving relatively easy to detect. This increased to 89% at between 25 degree and 35 degree angles. While 94% of VI participants found the blister paving relatively easy to detect (at the only angle tested – 25 degrees to 35 degrees). 'Relatively easy' refers to where participants gave a score of between 1 and 5.
- 3.4.6 As shown in Table 3.5, participants found the blister paving easier to detect than the corduroy paving. The corduroy paving was generally more difficult to detect when approached at a shallower angle, where the profile of the corduroy paving runs along the participants' path as opposed to being across the participants' path.

3 Results

- 3.4.7 The type of participant’s footwear was recorded although as shown in Table E13 in Appendix E, this had minimal impact on a participant’s ease of detection.
- 3.4.8 Direct comparisons with the PAMELA tests cannot be made due to the differences in methodology between the Exhibition Road and PAMELA tests as PAMELA tested angles of 45 degrees and 90 degrees whereas in Exhibition Road we tested angles between 1 degree and 35 degrees. We found that on average, 84% of VI participants found the corduroy paving relatively easy to detect (<5), compared with 91% in the PAMELA tests. 94% of VI participants found the blister paving relatively easy to detect (<5), versus 93% for the PAMELA tests.
- 3.4.9 Twelve percent of MI participants gave a score for the ease of crossing the corduroy paving of more than 5 compared with 11% of participants during the PAMELA tests. This 12% was made up of participants who were either pulling trolley style luggage (57%), pushing a pram (29%) or in an electric/self-propelled wheelchair (1 participant = 14%). 95% of participants found the blister paving relatively easy to cross (<5) compared with 92% of participants during the PAMELA tests.

3.5 Length of Delineator Crossed Before Detection

- 3.5.1 If a VI participant detected the corduroy or blister surface then a record was made of the point at which they detected it, as shown in **Table 3.6** and **Figure 3.1**.
- 3.5.2 The length of delineator was measured from the building side: A = 0 to 200mm; B = 200 to 400mm; C = 400 to 600mm and D = 600 to 800mm.

Table 3.6 Length of Delineator Crossed

Test	Angle	Length of delineator crossed				Drainage Channel	Total	%A to B	%A to C
		A	B	C	D				
	VI								
1	1 to 5 ⁰	41	13	8	8	1	71	76	87
2	5 to 15 ⁰	43	15	9	4	0	71	82	94
3	15 to 25 ⁰	35	11	15	10	0	71	65	86
4	25 to 35 ⁰	31	15	16	9	0	71	65	87
	Total Corduroy 1 to 35⁰	150	54	48	31	1	284	72	89
5	Blister 25 to 35 ⁰	31	13	19	7	1	71	62	89

- 3.5.3 As shown in Table 3.6, for angles up to 35 degrees, the proportion of VI participants that detected the delineator paving within the first half (400mm) of the paving ranges from 65% at 15 to 35 degrees to 82% at 5 to 10 degrees. Detection within the first 600mm ranged from 86% at 15 to 25 degrees to 94% at 5 to 10 degrees.
- 3.5.4 In general, it appears that the more acute the angle of approach the earlier the delineator paving was detected (in terms of distance across delineator).
- 3.5.5 While it appears that corduroy paving was generally more difficult to detect when approached at the shallower angles, as shown in Table 3.6 the majority of participants, at angles of less than 15 degrees,

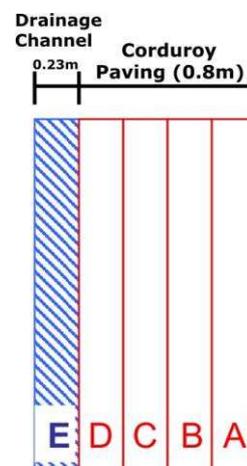


Figure 3.1 Detection Zones

3 Results

detected the corduroy paving within the first 200mm (Zone A). This is most likely to be a result of there being more corduroy paving to walk across at the acute angles.

3.5.6 **Figure 3.2** demonstrates this point, as it shows that at 1-5 degrees a participant would have to walk 14m to reach the edge of the delineator, whereas at 90 degrees they would walk 800mm. Therefore, at 1-5 degrees the participant's first or second step are more likely to be in Zone A when compared to 90 degrees, where the first step is more likely to be in Zone B. It should be noted that the PAMELA tests found the 400mm wide corduroy paving to be ineffective and this informed the decision to use 800mm wide corduroy paving in the Exhibition Road scheme.

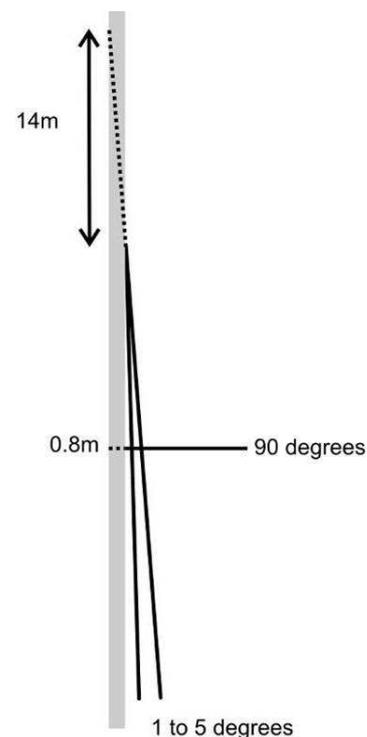


Figure 3.2 Length of delineator crossed at different angles

3.5.7 The tests did not record the walking speed of participants, which will affect how long they spent crossing each zone.

3.5.8 All guide dog users detected the delineator paving with their feet. 59% of cane users detected the delineator paving with their cane and 41% detected it with their feet. 94% of 'No Aid' VI participants detected the delineator paving with their feet, while the remaining 6% detected the delineator paving with their eyes. **Appendix E** contains a table showing this data.

3.6 Likelihood of Stopping

3.6.1 To provide a level of consistency with the PAMELA tests, as part of the pre-tests, VI participants were asked to walk across the corduroy paving and asked how likely it was that they would stop if they encountered this surface in the street. **Table 3.7** summarises the responses to this question.

Table 3.7 Likelihood of Stopping

	Visually impaired			Total	%
	Long Cane User	Guide Dog User	No Aid Used		
Very likely	21	3	3	27	38
Likely	10	4	3	17	24
Neither likely/nor unlikely	1	2	2	5	7
Unlikely	7	4	3	14	20
Very unlikely	2	3	3	8	11
Total	41	16	14	71	100

3.6.2 Table 3.7 shows that 62% of participants were likely or very likely to stop if they encountered the corduroy paving on street. 31% of participants were unlikely or very unlikely to stop if they encountered the corduroy paving on street.

3 Results

3.7 Rate of Anxiety and Tiredness

3.7.1 In common with the PAMELA tests, following each test, VI and MI participants were asked to rate their level of anxiety and fatigue, using a 0 to 10 numerical rating scale, with 0 being not anxious/tired and 10 being very anxious/tired. **Table 3.8** and **Table 3.9** show the results for these questions.

Table 3.8 Level of Anxiety

Test Order	Angle	Level of anxiety (0 = not anxious, 10 = very anxious)										Total	% not anxious	% score >5	
		0	1	2	3	4	5	6	7	8	9				10
VI															
Pre-test		24	11	10	11	7	1	4	1	1	0	1	71	34	10
Blister 25 to 35°		30	9	7	8	6	4	2	0	1	0	4	71	42	10
1 to 5°		30	8	2	10	5	6	1	2	4	0	2	70	43	13
No delineator		32	9	6	7	5	7	1	1	2	0	0	70	46	6
25 to 35°		29	9	10	5	7	5	2	0	2	1	0	70	41	7
15 to 25°		28	9	7	5	8	7	1	0	3	1	1	70	40	9
5 to 15°		31	11	3	8	9	5	0	0	2	1	1	71	44	6
MI															
Pre-test		24	5	4	1	2	3	1	1	0	0	1	42	57	7
Blister 90°		23	9	2	0	3	2	1	1	1	0	0	42	55	7
90°		25	5	4	1	1	3	1	1	1	0	0	42	60	7

3.7.2 A hypothesis is that an increased anxiety may have led to increased difficulty in detection of the delineator paving by VI participants, notably at the shallower angles (1 to 5 and 5 to 15 degrees). It is not apparent from the results in Table 3.8 that participants felt more anxious at more acute angles.

Table 3.9 Level of Tiredness

Test Order	Angle	Level of tiredness (0 = not tired, 10 = very tired)										Total	% not tired	% score >5	
		0	1	2	3	4	5	6	7	8	9				10
VI															
Pre-test		27	6	10	7	8	6	3	2	1	0	1	71	38	10
Blister 25 to 35°		33	5	8	8	7	4	2	1	1	0	2	71	46	8
1 to 5°		30	6	9	8	6	6	1	1	3	0	1	71	42	8
No delineator		38	4	8	8	6	1	2	2	1	0	1	71	54	8
25 to 35°		32	5	10	9	5	5	1	2	1	0	1	71	45	7
15 to 25°		30	6	12	6	5	5	1	3	1	0	2	71	42	10
5 to 15°		32	5	12	7	4	3	3	2	1	0	2	71	45	11
MI															
Pre-test		15	1	3	5	0	5	7	4	1	0	1	42	36	14
Blister 90°		15	2	5	2	1	5	8	3	1	0	0	42	36	29
90°		14	2	4	5	1	5	8	2	1	0	0	42	33	26

3.7.3 Tables 3.8 and Table 3.9 show the order in which the tests were completed. VI and MI participants do not appear to be have become more anxious or tired as the tests progressed.

3.8 Other Disabilities

3.8.1 Participants were asked if they had any other disabilities, which either affected their vision or mobility. Ten per cent of VI participants said that they had other disabilities which included a slight loss of hearing, or that they were unsteady on their feet as a result of injuries or age. Only one participant said that they had diabetes but said that it did not result in a loss of feeling in their feet. This participant passed all of the tests and detected the delineator paving within Zone C (400-600mm).

3 Results

3.8.2 No MI participants suffered from other disabilities that affected their vision or mobility.

3.9 Site Conditions

3.9.1 As the site records in Appendix C show, the most extreme conditions of temperature, precipitation and hours of darkness were experienced during the December tests.

Tests Undertaken During Hours of Darkness

3.9.2 Eight participants (7%) undertook tests during the hours of darkness and all VI participants detected the delineator paving on their first attempt (i.e. no false detections).

3.9.3 Measured across the various tests, 88% to 100% of participants thought the delineator paving was easy (i.e. <5) to detect. Anxiety and tiredness levels remained relatively constant and below 5 throughout the tests.

3.9.4 On average, two-thirds of participants detected the paving within the first 400mm in the dark compared with, on average, 68% of participants who detected the paving within the first 400mm when it was light.

Wet Conditions

3.9.5 17 participants (15%) undertook tests when the ground was wet and all VI participants detected the delineator paving during wet conditions. Only one participant had a false detection (at 1 to 5 degree angle, detecting the delineator after one false detection).

3.9.6 Between 70% and 85% of participants scored less than five for ease of detection of the delineator paving. Anxiety and tiredness levels remained relatively constant and below 5 throughout the tests.

3.9.7 Between 70% and 88% of participants detected the delineator paving within the first 400mm in the wet compared with between 55% and 80% of participants who detected the paving within the first 400mm when it was dry

3.10 Knowledge/involvement in Single Surface Schemes, Campaigns or Research

3.10.1 As shown in **Table 3.10**, on completion of the tests, VI and MI participants were asked whether they have any knowledge or have had any involvement in single surface schemes, campaigns or research.

Table 3.1 Knowledge/Involvement in Schemes/Campaigns/Research

Question:	VI			MI		
	Yes	No	Total	Yes	No	Total
Prior knowledge of single surface schemes?	42	29	71	11	31	42
Involved in any single surface campaigns?	25	46	71	3	39	42
Previously taken part in any research on this topic?	33	38	71	5	37	42

3.10.2 Table 3.10 shows that 33/71 (46%) of VI participants and 5/42 (12%) of MI participants have taken part in previous research, which mainly refers to the PAMELA testing.

4 Conclusions

4.1 Conclusions

- These tests aimed to assess whether corduroy delineator paving:
 - Can be detected by blind or partially sighted people when approached from an acute angle; and
 - Is overpassable by people with mobility impairment
- 283 of the 284 tests on corduroy paving (71 VI participants, 4 tests each) were successful giving a 99.6% success rate. This compares well with testing on the blister paving control where 70 out of 71 tests were successful.
- The participant who failed to detect the corduroy paving stopped at the drainage channel. The participant who failed to detect the blister paving also stopped at the drainage channel.
- There was a greater number of false detections at the more acute angles, possibly because participants had further to walk over the granite blocks and therefore were more likely to encounter irregularities such as tree pits (temporarily concreted over for the tests) and service covers.
- At 1 degree to 5 degrees angles, 79% % of VI participants found the corduroy paving relatively easy to detect. This increased to 89% at between 25 degree and 35 degree angles. While 94% of VI participants found the blister paving relatively easy to detect (at the only angle tested – 25 degrees to 35 degrees). 'Relatively easy' refers to where participants gave a score of between 1 and 5
- When approached at a more acute angle, the corduroy paving was harder to detect. At more acute angles participants walked closer to the line of the corduroy profile, whereas when crossing at 90 degrees they would walk across the profile.
- Whilst harder to detect at more acute angles, more participants detected the corduroy paving within the first half of the delineator – which is likely to be as a result of the fact that they had further to walk across the delineator at these shallow angles (and therefore spent longer on it).
- 88% of MI participants found the corduroy paving relatively easy to cross compared with 95% who found the blister paving relatively easy to cross
- No MI participants failed to cross the corduroy paving at 90 degrees (out of 42 tests).

Overall conclusion

Corduroy delineator paving 800mm wide was reliably detected by blind or partially sighted participants in these tests when approached from an acute angle (of between 1 and 35 degrees) and was overpassable by participants with mobility impairments.

Appendix A – Schedule 3 Amended Specification

In Appendix A 'Undetermined' is used to denote 'Pass with False Detection' (as defined in the main body of the report)

Schedule 3 – Amended Specification

5 November 2010

Background

1. In 2009 Transport for London commissioned University College London (UCL) to test certain surfaces for their suitability as a replacement to the vertical kerb for shared space schemes. The research aimed to answer the following questions:
 - Can this surface be detected by people who are blind or partially sighted?
 - If so, can people who have mobility impairments cross the surface?
2. Two groups of participants were selected:
 - Visually impaired: Blind or partially sighted participants who:
 - used a long cane;
 - had a guide dog; and
 - did not use any aid to help them negotiate the street environment
 - Mobility impaired: Mobility impaired people who:
 - used an electric, self-propelled or attending controlled wheelchair;
 - used crutches, sticks or a wheeled walker; and
 - had no personal mobility impairment but who wore high heels, pushed a pram with a 10kg mass or pulled trolley style luggage with a 10kg mass.
3. The UCL study, published in April 2010 and attached as Appendix 1, was carried out in a laboratory setting. Their report recommended further testing in a street environment.

Objective

4. The aim of this project is to test whether the corduroy warning hazard paving which is being used in the Exhibition Road scheme in Kensington can be detected in an on-street environment by people who are blind or partially sighted including when approached from an acute angle, and is overpassable by people with mobility impairment.

Participant recruitment

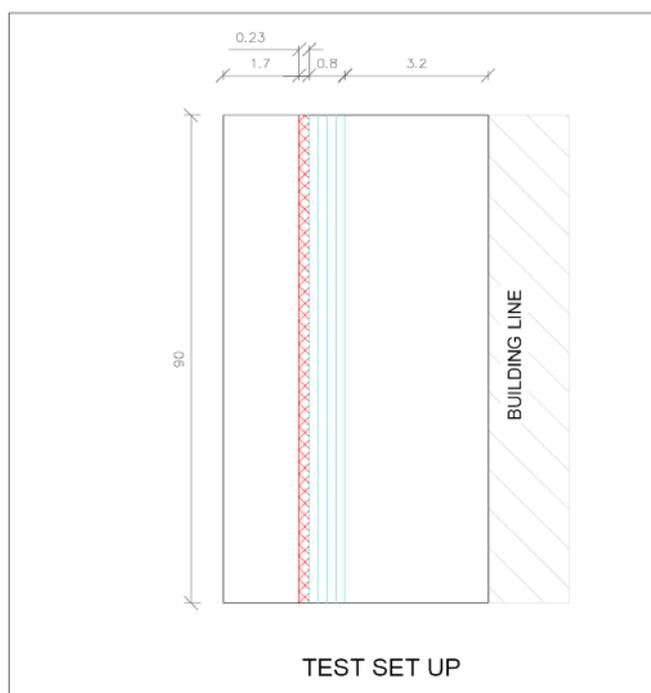
5. Two groups of participants will take part in this research:
 - **Visually impaired:** Blind or partially sighted participants who:
 - used a long cane (both tapered and with a roller ball end);
 - use a guide dog; and
 - do not use any aid to help them negotiate the street environment.

- **Mobility impaired:** Mobility impaired people who:
 - used an electric, self-propelled or attending controlled wheelchair;
 - used crutches, sticks or a wheeled walker; and
 - had no personal mobility impairment but who wore high heels, pushed a pram with a 10kg mass or pulled trolley style luggage with a 10kg mass
6. Participants for the test will be recruited using contacts within disability organisations, local authority access officers/ mobility forums and on-line mobility forums. In addition, some on-street recruitment could be employed for recruiting primarily the non-disabled mobility impaired segment (people wearing high-heels/ pushing prams with a 10kg+ mass/with trolley style luggage with a 10kg+ mass).
 7. Participants will be recruited with the aim of providing representatives who have different:
 - Ages;
 - Gender;
 - type, duration and severity of impairment;
 - mobility aids used.

Test set-up

8. Participants will be asked to move across the test area, which will be 6 metres wide by 90 metres long – the corduroy delineator will be 3.2m away from the building line and will be 0.8m wide (see Figure 1).

Figure 1: Test area

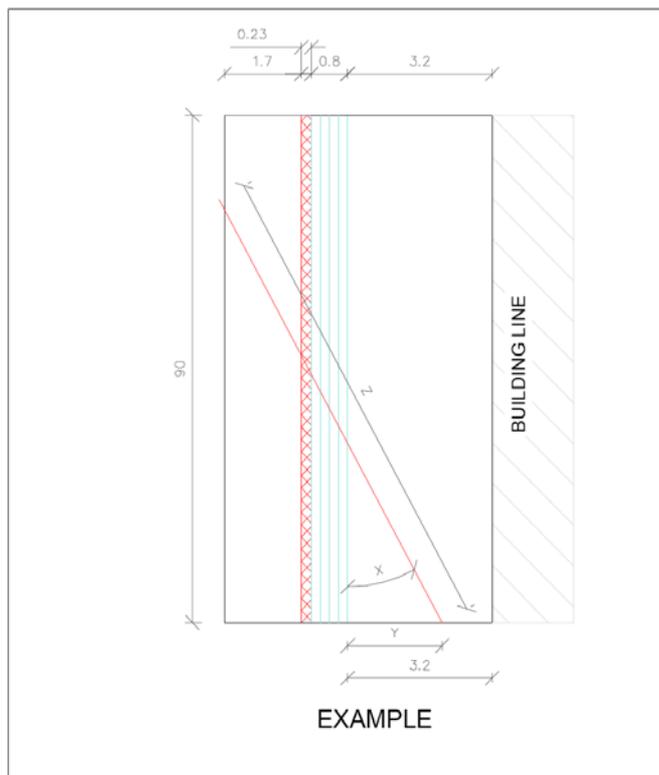


9. The test area will be on-site in Exhibition Road, Kensington, London, SW7 between Kensington Gore and Prince Consort Road on the east side of Exhibition Road. Westminster City Council will provide the test area at no cost to the researcher. Depending on progress of construction in the vicinity of the test area, there may be constraints within the test area which the researcher may have to accommodate.
10. Participants will be asked to walk towards the delineator at different angles (see Table 1 and Figure 2 for examples of how this will work). The starting position (y) and the distance walked (z) is left to the discretion of the researcher subject to the constraints of the area available. Details of the set up for each test, including the distance y and z for each test, should be recorded.

Table 1: Set up angles and starting positions for tests

	Angle to delineator in degrees (x)	Visually Impaired Test	Mobility Impaired Test
Test 1	1 to 5	Yes	No
Test 2	5 to 15	Yes	No
Test 3	15 to 25	Yes <td>No</td>	No
Test 4	25 to 35	Yes	No
Test 5	90	No	Yes

Figure 2: Example of Test



11. The following values for the angle, x , will be tested: 1° to 5° , 5° to 15° , 15° to 25° , 25° to 35° and 90° . Visually impaired and blind participants will be asked to test angles of 1° to 5° , 5° to 15° , 15° to 25° , 25° to 35° . Mobility impaired participants will be asked to approach the delineator at right angles (90°) only.
12. Subject to health and safety considerations, testing will be done, whatever the weather conditions. If half the tests have been completed and it has not yet rained then the remaining tests will be done with the test area wetted using water from the water valve supplied. The aim will be to achieve half the tests in the wet and half the tests in dry conditions and the tests should be randomised with this in mind so that all angles are tested in wet and dry conditions. If it rains on all testing days, then the client accepts that there will be no dry tests.
13. Control tests of no delineator (for the visually impaired participants only) and blister paving (for both visually impaired and mobility impaired participants) should also be carried out. The blister paving control test will be at 25 to 35 degrees so that a comparison can be made with the corduroy paving test at 25 to 35 degrees for visually impaired participants. The blister paving control test will be at 90 degrees for mobility impaired participants.
14. The Client will provide a two metre section of blister paving where the corduroy delineator would normally be placed to act as a control for the test. The blister and corduroy paving will be separated by two metres.
15. Tests should be randomised by:
 - Angle of approach for delineator
 - North-west / south-west initial approach so that for some tests, the test start from north end of test site and for others from the south
 - Blister, delineator or no delineator testing
 - Dry/ wet conditions
 - Time of day (including hours of darkness)
16. A sample of the tests will be recorded using a video camera. Participants will be asked whether they are willing for the video of their test to be shown more widely or whether they wish use to be limited to internal researcher/ client use and only be used in relation to this project.
17. A buffer distance of 1m from the building line should be assumed where possible so that participants are not given a clue as to the distance to the corduroy paving when starting the tests.
18. The researcher will undertake an initial site visit with the Client team and will trial the test methodology prior to beginning the tests in earnest. The trial test will determine which of the following two methodologies is the most appropriate in terms of ease of administration and ability of participants to walk in the most "normal" way as part of the test:
 - Chalk or tape will be placed on the pavement/ road at the appropriate angle and participants will be asked to walk along the line; and
 - Two sets of taut string will be placed three metres away from each other. The participant will located in middle of these strings and will be called by

researcher, located at the appropriate angle, and to asked to move towards their voice.

19. The researcher will be responsible for the costs associated with providing any guidance equipment used.
20. The test set up should not affect a blind or partially sighted persons use of their mobility aid (long cane or guide dog) if they normally use one
21. During testing the researcher will also record the following site conditions:
 - Weather conditions;
 - Lighting levels;
 - Ambient sound levels;
 - Guide line/ surface gradient; and
 - Discontinuities (vertical or horizontal gaps greater than 10mm);and make an assessment as to whether any of these factors had a significant effect on the result of the test.
22. Members of the Review Panel and Access Group will be invited to observe the tests.

Pre-test testing

23. Before starting the test, the participant's footwear will be recorded and participants will be asked the following questions:
 - *[Partially sighted, Mobility Impaired] Tell me what you can see?*
 - *[Partially sighted] Can you read that road sign?*
 - *[Partially sighted] What colours can you see?*
 - *[Partially sighted] Can you see the difference between this part of the road and this part of the road? [The two parts will be white delineator next to white granite and white delineator next to grey granite]*
 - *[Blind, Partially sighted] Can you turn to 3 o'clock?*
 - *[Blind, Partially sighted] Do you have diabetes? And if so, do you suffer from reduced feeling in your feet?*
 - *[Blind, Partially sighted, Mobility Impaired] Tell me what you can hear?*
 - *[Blind, Partially sighted, Mobility Impaired] Is there anything that you have immediately noticed that may have an effect on how you make your journey?*
24. Participants disabilities and functional capabilities will be quantified by a. asking them to rate on a 5-point scale, for example, how clearly they can see a bench on the opposite side of the street; and b. by the interviewer rating their perception of the participants' disabilities on a standard scale, for example '1 Participant could read road sign with ease', '2. Participant could read road sign with some difficulty' and '3. Participant could not read the road

sign'.

25. The researcher will record all visual and mobility impairments of the participants as part of the trial, including whether visually impaired or blind participants had limited feeling underfoot due to a diabetes related eye condition.
26. Participants will be shown, and be asked to walk over, the corduroy paving and the blister paving and be told that this is the paving material they are being asked whether they can detect in the tests. Participants will be asked:
*"If you came across this paving on the street, what do you think you would do and why?
How likely or unlikely would you be to stop if you encountered this in the street?"*
 1. *Very likely*
 2. *Likely*
 3. *Neither/nor*
 4. *Unlikely*
 5. *Very unlikely"*

Delineator Testing

27. The experimenter will ask the visually impaired participants to walk towards the experimenter, for a set distance (or in the case of the 1 to 5 degree test as long as it takes to cross the delineator), at their normal pace, stopping if they detect a change in surface in their path, or are asked to stop by the experimenter. The experimenter will continue to talk to the participant thereby giving them an audible cue to help the participant keep their direction and will also act as a mild distraction so the participant does not concentrate simply on detecting any changes in surface. The researcher will say:
"I'd like you to walk towards my voice – I will let you know if you are veering too far to the left or to the right. You should continue walking until I say stop, unless you encounter a change in surface in which case I would like you to stop still."
28. If the participant veers too much to the left or to the right they will be asked to redo the test but starting closer to the delineator. However in all situations, at least two paces will need to be taken before the participant encounters the delineator.
29. During the tests, if a participant detects a change in surface and then stops, the experimenter will ask:
*"On a scale of 1-10, where 1 is very easy and 10 is very difficult, how easy or difficult was it to detect the change in surface? (Scores of 1-5 mean it was very/fairly easy and scores of 6-10 mean it was fairly/very difficult)
Please continue walking until I tell you to stop or unless you encounter a change in surface in which case I would like you to stop still"*
30. The experimenter will record approximately how much of the delineator

surface had been traversed before being detected.

31. All false detections will be recorded and the above will be repeated each time the participant states that they have detected a change in surface.
32. During the tests, if a participant did not detect the corduroy paving at all and therefore did not stop the experimenter would wait until they were clear of the delineator before asking them to stop. They would then mark down a score of '0' on the rating scale to indicate that the surface had not been detected at all before the participant undertakes the next test. The participant would still be asked the follow up questions so as to not confirm or deny the presence of a tactile surface.
33. The mobility impaired participants will be lined up at 90° to the delineator, but following the UCL laboratory protocol, they will not be restricted as to the angle they pass over the delineator. Any deviation from 90° will be noted.
34. If a mobility impaired participant is unable to cross the surface the experimenter should mark it down as a '0'. If the participant was able to cross the surface, the experimenter will ask the participant to rate how easy the surface was to cross on a scale of 1 to 10 where '1' is very easy to cross and '10' is very difficult to cross. Scores in between 1 and 10 would indicate how much of a struggle it was to cross the surface.
35. Both visually impaired and mobility impaired participants will be asked to rate their anxiety and fatigue, both using a 0 to 10 Numerical Rating Scale. 0 being not anxious/ tired and 10 being very anxious/tired. The Fatigue measure will show if the participant is becoming more tired through the test procedure and consequently requires a rest, or to explain if results are affected. Similarly, the Anxiety measure is used to indicate trends in an individual's results and puts them in context i.e. do people that class themselves as more anxious also have less confidence that a surface is a delineator?
36. After each trial the experimenter will note a pass or fail according to what they have witnessed:
 - Pass – Visually Impaired participant detected the surface; Mobility Impaired participant managed to pass over the surface
 - Undetermined – Visually impaired participant detected the surface but also had other false detections
 - Fail – Visually Impaired participant failed to detect the surface; Mobility Impaired participant failed to pass over the surface
37. After undertaking the test, participants will be asked:
 - *[Blind, Partially sighted, Mobility Impaired] how often do you go out? Daily/ 4-6 days a week/ 1-3 days a week/ less than once a week)?*
 - *[Blind, Partially sighted, Mobility Impaired] do you have prior knowledge of single surface schemes,*
 - *[Blind, Partially sighted, Mobility Impaired] have you been involved in any single surface campaigns*
 - *[Blind, Partially sighted, Mobility Impaired] have you previously taken part*

in any research on the topic and

- *[Blind, Partially sighted, Mobility Impaired] how often have visited Exhibition Road in the last year*

Client Management

38. The client project manager will be Mahmood Siddiqi, Head of Traffic and Transportation at the Royal Borough of Kensington and Chelsea (RBKC).
39. The client will set up a review panel for this project. Members of the review panel will include representatives of organisations representing visually impaired and mobility impaired people, including Guide Dogs. The review panel will receive regular progress reports on the project.

Reporting Procedures and Outputs

40. The client will receive three Progress reports. The test specification will be documented in a Technical Note.
41. The progress reports will also be submitted to the RBKC Access Group, including Guide Dogs, and a presentation will be made to the Access Group on completion of the project.
42. A draft report outlining the results of the study must be submitted by 28 January 2011.
43. The draft report must be submitted to the Review Panel and to the Access Group for comment (allowing 10 days for submission of their written comments).
44. A presentation to Council officers will take place around 15 December 2010.

Ends

Appendix B – Photographic Record of Test Angles

Visibility Impaired Tests



1-5 degrees



5-15 degrees



15-25 degrees



25-35 degrees

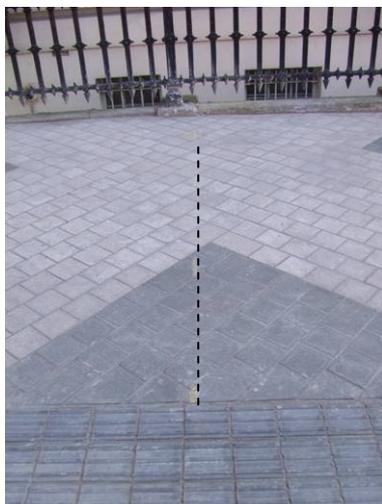


No delineator

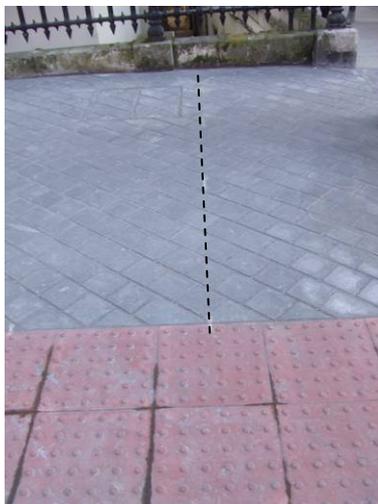


Blister 25-35 degrees

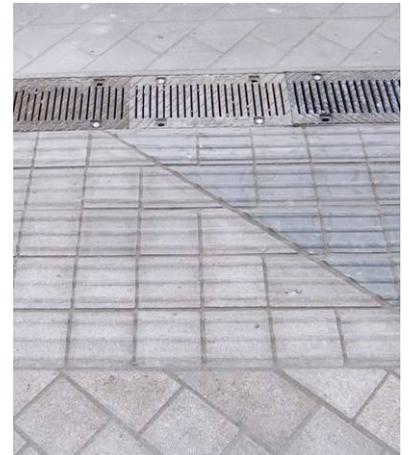
Mobility Impaired Tests



90 degrees

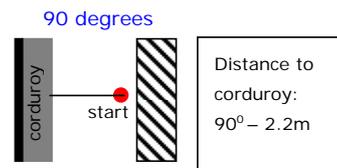
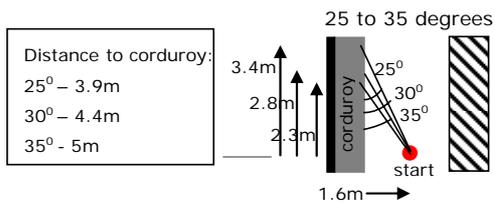
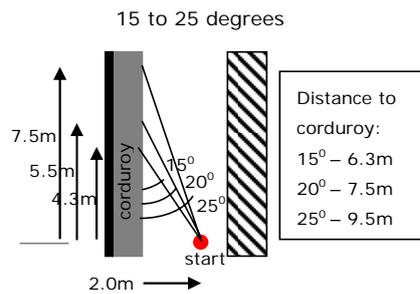
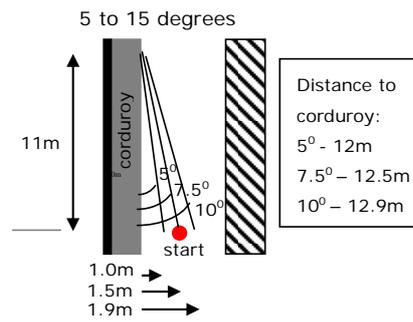
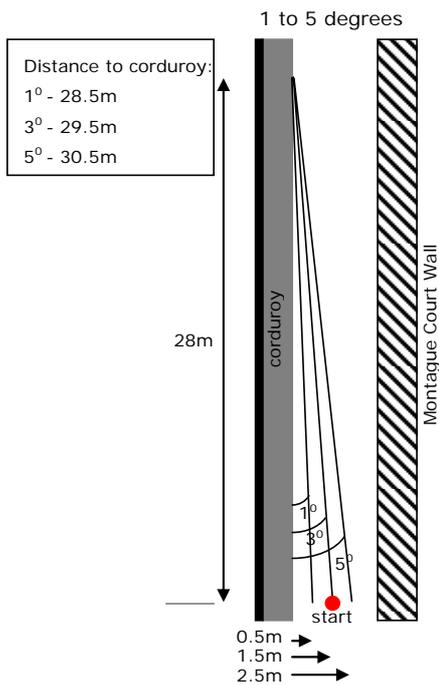


Blister 90 degrees

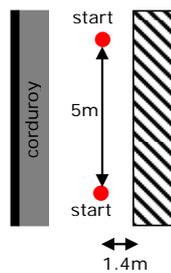


Close up view of corduroy paving

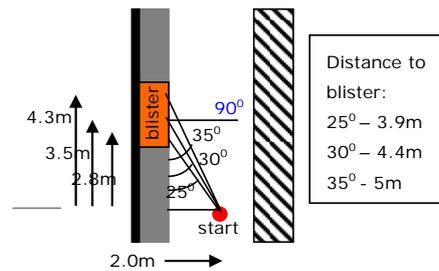
Appendix B: Test angle plans



Control test (no delineator)



Control test – blister paving
 25 to 35 degrees



Note: Blue text denotes tests for Mobility Impaired participants only – all other test for Visually Impaired participants only

Appendix C – Site Conditions

MVA Consultancy - Exhibition Road Corduory Delineator Testing - Site Conditions Record

Date	Weather Conditions	Temperature (OC)	Precipitation Type	Sunshine	Visibility	Wind Direction	Wind Speed	Light Level	Sound Level (dB)
14/12/2010	08:00	1.3	None	No	Good	N	Light	Overcast	55.5
	Noon	4.0	Intermittent drizzle	No	Good	N	Light	Overcast	63.4
	15:00	4.9	Drizzle	No	Good	N	Light	Overcast	63.8
	17:00	4.9	Light Rain	No	Good	N/E	Light	Dark evening	60.2
15/12/2010	08:00	6.3	None	No	Good	N/W	Light	Dark day	65.5
	Noon	6.6	Drizzle	No	Good	N/E	Moderate	Dark day	63.9
	15:00	5.8	Light Rain	No	Good	N	Light	Dark day	63.6
	17:00	2.5	Light Rain	No	Good	N	Light	Dark evening	63.9
04/03/2011	08:00	3.0	None	No	Good	N	Light	Overcast	65.0
	Noon	8.0	None	Yes	Good	N	Light	Sunny day	65.0
	15:00	10.0	None	Yes	Good	N	Light	Sunny day	70.0
	17:00	7.0	None	No	Good	N	Light	Twilight	65.0
07/03/2011	08:00	8.0	None	Yes/shadows	Good	N	Light	Sunny day	70.2
	Noon	10.3	None	Yes	Good	N	Light	Sunny day	63.2
	15:00	11.1	None	Yes	Good	None	None	Sunny day	65.5
	17:00	8.6	None	No	Good	N	Light	Twilight	68.1
08/03/2011	08:00	3.2	None	Yes/shadows	Good	S	Light	Sunny day	67.4
	Noon	13.7	None	Yes	Good	S	Light	Sunny day	62.2
	15:00	12.8	None	No	Good	S	Medium	Overcast	58.8
	17:00	10.7	None	No	Good	S	Light	Twilight	57.3

Appendix D – Test Questionnaires

In Appendix D 'Undetermined' is used to denote 'Pass with False Detection' (as defined in the main body of the report)

Visually Impaired Participants Pre-Test Questionnaire

Date:

Participant Name:

Time:

Gender: Female Male

Experimenter Name:

Age Group: Under 15 45-64
 15-24 65 or over
 25-44

Participant Category: Long Cane User
 Guide Dog User
 No Aid Used

Participant Footwear:

Walking boots/shoes (thick soles) Ballet flats
 Trainers Wedges
 Flat boots/shoes High heels
 Mules Other, please specify below:

Experimenter: I am now going to ask you a few questions about your vision.

Q1. Tell me what you can see?

Q2. What colours can you see?

Q3. Tell me what you can hear?

Q4. Can you see the difference between this part of the road and this part of the road? (Experimenter: please inform the participants of dark grey and light grey setts)

Yes No

Q5. Is there anything that you have immediately noticed that may affect how you make your journey?

Yes No

Q6. Can you read that road sign?

(Experimenter pick out a sign nearby and inform the participant's of it's location)

Yes No

Experimenter: participant disabilities and functional capabilities will be quantified by asking them the following question:

Q7. On a 3-point scale, how clearly can you see the following (sign/landmark) on the opposite side of the street?

Can read with ease
 Can read with some difficulty
 Could not read

Q8. Experimenter: please rate your perception of the participant's disabilities, where:

Participant can read with ease
 Participant can read with some difficulty
 Participant cannot read

Q9. Ask the participant to turn to 3 o'clock and record if they could perform this movement

Yes No

Q10. Do you have any other disabilities which may affect your vision or mobility? (e.g. Diabetes, which may result in reduced feeling in feet)

Anxiety and Tiredness Test

Q11. Please rate your level of anxiety

Q12. Please rate your level of tiredness

'0' being not anxious
 '10' very anxious

'0' being not tired
 '10' being very tired

Corduroy Pre-Test

Experimenter: Please ask the participants to walk towards the test area and position them so that they can walk across the corduroy paving. Ask the participant to walk over the paving towards your voice.

Inform the participants that during the test, this is the type of surfacing that they will be asked to detect during the test as well as one test in which they will walk over blister paving.

Ask the following questions:

Q13. If you came across this paving on the street, what do you think you would do and why?

Q14. How likely or unlikely would you be to stop if you encountered this surface in the street?

- Very likely
- Likely
- Neither likely/nor unlikely
- Unlikely
- Very unlikely

Q15. Have you heard of blister paving before?

Yes No

Experimenters: if the participant has not heard of blister paving before, then explain what blister paving is i.e is usually found at crossings to act as a warning device for visually impaired users.

If the participant is still not aware of blister paving, please take them to the blister paving and ask them to walk over it.

Experimenters: if you have to walk the participants over the blister paving, please complete the blister paving control test last.

Delineator/Control Test Record Sheet - Visually Impaired Participants

Instruction Sheet

Visually Impaired participants will be asked to undertake tests at **1 to 5**, **5 to 15**, **15 to 25** and **25 to 35** degree angles only.

The **Control Test** will involve guiding the participants over some blister paving at a 25 to 35 degree angle and walking in a straight line over paving with no delineator

Take the participant to the start point and before you start each test, inform the participant of what is going to happen as follows:

In a minute, I'd like you to walk towards my voice. I will let you know if you are veering too far to the left or to the right. You should continue walking until I say stop, unless you encounter a change in surface in which case I would like you to stop still. I will then ask you as series of questions.

If the participant veers outside the buffer zone please ask the participant to redo the test.

All false detections must be recorded and the questions over leaf should be repeated each time the participant states they have detected a change in the surface.

If a participant did not detect the corduroy paving at all and therefore did not stop. The experimenter should wait until they are clear of the delineator before asking them to stop. Mark down a score of '0' on the rating scale to indicate that the surface had not been detected at all before the participant undertakes the next test.

Following each test participants will be asked to rate their anxiety and tiredness, both using a 0 to 10 numerical rating scale. '0' being not anxious/tired and '10' being very anxious/tired.

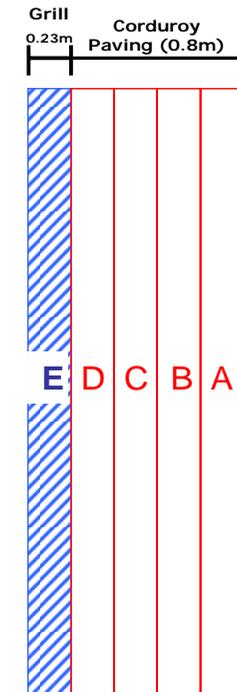
After each trial the experimenter will note a pass, undetermined, fail according to what they have witnessed:

Pass – visually impaired participant detected the surface;

Undetermined – visually impaired participant detected the surface but also had other false detections; and

Fail – visually impaired participant failed to detect the surface.

Length of Delineator Crossed Plan



Delineator/Control Test Record Sheet - Visually Impaired Participants

Date: Participant Name:

Time:

Experimenter Name:

Test Angle (please ring)	1 to 5	5 to 15	15 to 25	25 to 35	Blister	No Delineator
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	Questions	Scores		Record					Please record general observations and participant comments here (for example if a participant detects a change in surface, which is not the corduroy make a note of what they have detected e.g. service cover, surface defect etc)
				R1	R2	R3	R4	R5	
Delineator/Control Test	Ease of Detection								
	On a scale of 1-10 where 1 is very easy and 10 is very difficult, how easy or difficult was it to detect the change in surface?	'0' No detection	'1' very easy	'10' very difficult					
Delineator/Control Test	Length of Delineator Crossed								
	How much of the delineator surface has been traversed before being detected?	Please use the attached plan to determine the approx location. In the case of white cane/guide dog users it is the point at which the cane/dog touches the delineator that Zone (A-E) should be recorded							
Post-Test	Please rate your level of anxiety	'0' being not anxious	'10' very anxious						
	Please rate your level of tiredness	'0' being not tired	'10' being very tired						
								Pass, Undetermined or Fail	

Mobility Impaired Participants Pre-Test Questionnaire

Date:

Participant Name:

Time:

Gender: Female Male

Experimenter Name:

Age Group: Under 15 45-64
 15-24 65 or over
 25-44

- Participant Category:
- Electric/self-propelled or attending controlled wheelchair
 - Crutches, sticks or a wheeled walker
 - High heels
 - Trolley style luggage
 - Pram/pushchair

Participant Footwear: *only record for MIs that can walk*

- Walking boots/shoes (thick soles)
- Ballet flats
- Trainers
- Wedges
- Flat boots/shoes
- High heels
- Mules
- Other, please specify below:

Experimenter: *I am now going to ask you a few questions about your sight.*

Q1. Tell me what you can see in your immediate surroundings?

Q2. Tell me what you can hear?

Q2 Response:

Q3. Do you have any other disabilities which may affect your sight or mobility? (If yes, specify)
(e.g. Diabetes, which may result in reduced feeling in feet)

Yes No

Q3 Response:

Q4. Is there anything that you have immediately noticed that may have an affect on how you make your journey?

Yes No

Anxiety and Tiredness Test

Q5. Please rate your level of anxiety

'0' being not anxious
 '10' very anxious

Q6. Please rate your level of tiredness

'0' being not tired
 '10' being very tired

Delineator/Control Test Record Sheet - Mobility Impaired Participants

Instruction Sheet

Mobility impaired participants will be asked undertake the test at the 90 degree angle only but they will not be restricted as to the angle they pass over the delineator. Any deviation from 90 degrees will be noted.

Before you start the test, inform the participant of what is going to happen as follows:

In a minute, I'd like you to move towards me at a 90 degree angle. Once you have travelled over the corduroy paving I will ask you some questions.

If the mobility impaired participant is unable to cross the surface the experimenter should mark it down as '0'.

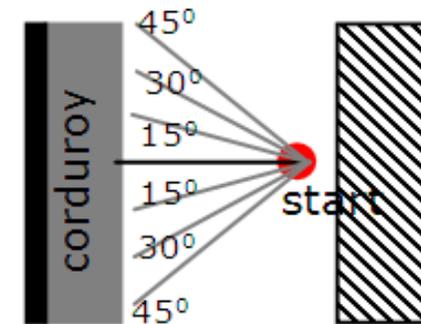
If the participant was able to cross the surface, the experimenter will ask the participant to rate how easy the surface was to cross on a scale of 1 to 10 where '1' is very easy to cross and '10' is very difficult to cross. Scores in between 1 and 10 would indicate how much of a struggle it was to cross the surface.

Following the test participants will be asked to rate their anxiety and fatigue, both using a 0 to 10 numerical rating scale. '0' being not anxious/tired and '10' being very anxious/tired.

After each trial the experimenter will note a pass or fail according to what they have witnessed:

Pass – mobility impaired participant was able to cross the surface.

Fail – mobility impaired participant failed to pass over the surface.



Delineator/Control Test Record - Mobility Impaired Participants

Date:

Time:

Experimenter Name:

Participant Name:

Test Angle <i>(please ring)</i>	90	Blister
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		Questions	Scores		Record	Please record general observations and participant comments here:
Delineator Test	Ease of Crossing					
	If the participant was able to cross the surface ask the participant to rate how easy the surface was to cross	'0' failed to cross				
		'1' is very easy to cross	'10' is very difficult to cross			
Did the participant veer from the 90 degree angle if so how much?	Please indicate approximate degree to which the participant past over the blister paving. Refer to plan on instruction sheet					
Post-Test	Please rate your level of anxiety	'0' being not anxious	'10' very anxious			
	Please rate your level of tiredness	'0' being not tired	'10' being very tired			
				Pass/Fail		

Post-Test Questionnaire

Date:

Time:

Participant Name:

Experimenter Name:

Q1. How often do you go out?

- Daily
- 4-6 days a week
- 1-3 days a week
- Less than once a week

Q2. Do you have prior knowledge of single surface schemes?

- Yes
- No

Q3. Have you been involved in any single surface campaigns?

- Yes, please specify below
- No

Q4. Have you previously taken part in any research on the topic?

- Yes, please specify below
- No

Q5. How often have you visited Exhibition Road in the last year?

- Daily
- Weekly
- Few times a month
- Few times a year
- Never

Appendix E – Results Tables

Pre-Test and Post-Test Records/Questions

Group		Participants tested
Visually impaired:		
A	Long Cane User	41
B	Guide Dog User	16
C	No Aid Used	14
Total		71
Mobility impaired:		
D	Wheelchair user	9
E	Crutches, sticks, wheeled walker	4
F1	High heels	6
F2	Trolley style luggage	12
F3	Pram/pushchair	11
Total		42
Grand Total		113

App E Ta1. Number of participants

Age Group	Visually impaired		Mobility impaired
	15 to 24	0	8
25 to 44	20	22	
45 to 64	29	9	
65>	22	3	
Total	71	42	
Gender	Male	43	12
	Female	28	30
Total	71	42	

App E Ta2. Age and gender

Footwear	Frequency	%
Walking boots/shoes (thick sole)	12	17
Trainers	13	18
Flat boots/shoes	42	59
Mules	2	3
Ballet flats	1	1
High heels	1	1
Total	71	100

App E Ta3. Type of footwear - VI

	Visually impaired			Total	%
	Long Cane User	Guide Dog User	No Aid Used		
Very likely	21	3	3	27	38
Likely	10	4	3	17	24
Neither likely/nor unlikely	1	2	2	5	7
Unlikely	7	4	3	14	20
Very unlikely	2	3	3	8	11
Total	41	16	14	71	100

App E Ta4. Likelihood of Stopping - VI

How often do you go out?		
	Frequency	%
Daily	42	59.2
4 to 6 days a week	21	29.6
1 to 3 days a week	6	8.5
Less than once a week	2	2.8
Total	71	100.0

App E Ta5. How often go out - VI

How often do you go out?		
	Frequency	%
Daily	38	90
4 to 6 days a week	4	10
Total	42	100

App E Ta6. How often go out - MI

How often have you visited Exhibition Road in the last year?		
	Frequency	%
Daily	3	4.2
Weekly	1	1.4
Few times a month	2	2.8
Few times a year	36	50.7
Never	29	40.8
Total	71	100.0

App E Ta7. How often visited Exhibition Road - VI

How often have you visited Exhibition Road in the last year?		
	Frequency	Valid Percent
Daily	10	23.8
Weekly	8	19.0
Few times a month	4	9.5
Few times a year	14	33.3
Never	6	14.3
Total	42	100.0

App E Ta8. How often visited Exhibition Road - MI

Question:	VI			MI		
	Yes	No	Total	Yes	No	Total
Prior knowledge of single surface schemes?	42	29	71	11	31	42
Involved in any single surface campaigns?	25	46	71	3	39	42
Previously taken part in any research on this topic?	33	38	71	5	37	42

App E Ta9. Knowledge/Involvement in Schemes/Campaigns/Research Exhibition Road - VI

Delineator and Control Test Records/Questions

Test	Angle	Pass	%	Fail	%	Total n	%
	VI						
1	1 to 5 ⁰	70	99	1	1	71	100
2	5 to 15 ⁰	71	100	0	0	71	100
3	15 to 25 ⁰	71	100	0	0	71	100
4	25 to 35 ⁰	71	100	0	0	71	100
5	Blister 25 to 35 ⁰	70	99	1	1	71	100
6	No delineator	71	100	0	0	71	100
	MI						
7	90 ⁰	42	100	0	0	42	100
8	Blister 90 ⁰	42	100	0	0	42	100
	Total	508		2		510	

App E Ta10. Pass and Fail results

Test	Angle	Pass with false detection	Total Tests	% Total Tests
	VI			
1	1 to 5 ⁰	10	71	14
2	5 to 15 ⁰	4	71	6
3	15 to 25 ⁰	0	71	0
4	25 to 35 ⁰	2	71	3
5	Blister 25 to 35 ⁰	1	71	1
6	No delineator	1	71	1
	MI			
7	90 ⁰	0	42	0
8	Blister 90 ⁰	0	42	0
	Total	18	510	

App E Ta11. Pass with false detection results

Test	Angle	Detection/ease of crossing score (for passes)										Total	% who scored >5
		1	2	3	4	5	6	7	8	9	10		
	VI	Ease of detection (1 easy, 10 difficult)											
1	1 to 5 ⁰	15	11	13	4	12	4	4	3	2	2	70	21
2	5 to 15 ⁰	22	17	8	3	10	6	0	3	0	2	71	15
3	15 to 25 ⁰	23	8	8	8	12	4	3	3	0	2	71	17
4	25 to 35 ⁰	24	10	11	2	16	3	2	1	0	2	71	11
5	Blister 25 to 35 ⁰	35	12	6	5	8	1	2	0	0	1	70	6
6	No delineator	No detections										-	-
	MI	Ease of crossing (1 easy, 10 difficult)											
7	90 ⁰	13	9	9	3	3	3	0	1	1	0	42	12
8	Blister 90 ⁰	20	8	4	5	3	0	1	1	0	0	42	5

App E Ta12. Ease of detection

Angle	Participant footwear																
	Walking boots/shoes (thick sole)	Trainers	Flat boots/shoes	Mules	Ballet flats	Wedges	High heels										
	Ease of detection (1 to 10 - 1 easy, 10 difficult)												Total	Total	Total		
	1-5	>5	1-5	>5	1-5	>5	1-5	>5	1-5	>5	1-5	>5	1-5	>5			
1 to 5°	11	2	10	2	35	7	2	0	1	0	0	0	1	0	60	11	71
5 to 15°	10	2	10	3	37	5	2	0	1	0	0	0	1	0	61	10	71
15 to 25°	9	3	11	2	35	7	2	0	1	0	0	0	1	0	59	12	71
25 to 35°	11	0	11	2	38	5	2	0	1	0	0	0	1	0	64	7	71
Blister 25 to 35°	11	1	13	0	39	3	2	0	1	0	0	0	1	0	67	4	71
Total	52	8	55	9	184	27	10	0	5	0	0	0	5	0	311	44	355
%	87	13	86	14	87	13	100	0	100	0	0	0	100	0	88	12	100

App E Ta13. Ease of Detection by Type of Footwear -

Test	Angle	Length of delineator crossed					Drainage Channel	Total	%A to B	%A to C
		A	B	C	D					
1	1 to 5°	41	13	8	8	1	71	76	87	
2	5 to 15°	43	15	9	4	0	71	82	94	
3	15 to 25°	35	11	15	10	0	71	65	86	
4	25 to 35°	31	15	16	9	0	71	65	87	
	Total Corduroy 1 to 35°	150	54	48	31	1	284	72	89	
5	Blister 25 to 35°	31	13	19	7	1	71	62	89	

App E Ta14. Length of delineator crossed - VI

	Long Cane User			Guide Dog User			No Aid			
	Foot	Cane	Eyes	Foot	Dog	Eyes	Foot	Eyes		
1 to 5	20	21	0	16	0	0	0	13	1	71
5 to 15	15	26	0	16	0	0	0	13	1	71
15 to 25	15	26	0	16	0	0	0	13	1	71
25 to 35	17	24	0	16	0	0	0	14	0	71
Blister	17	24	0	16	0	0	0	13	1	71
No Delineator	0	1	0	0	0	0	0	0	0	1
Total	84	122	0	80	0	0	0	66	4	

App E Ta15. What detected delineator with - VI

Test Order	Angle	Level of tiredness (0 = not tired, 10 = very tired)										Total	% not tired	% score >5		
		0	1	2	3	4	5	6	7	8	9				10	
	VI															
	Pre-test	27	6	10	7	8	6	3	2	1	0	1	71	38	10	
	Blister 25 to 35°	33	5	8	8	7	4	2	1	1	0	2	71	46	8	
	1 to 5°	30	6	9	8	6	6	1	1	3	0	1	71	42	8	
	No delineator	38	4	8	8	6	1	2	2	1	0	1	71	54	8	
	25 to 35°	32	5	10	9	5	5	1	2	1	0	1	71	45	7	
	15 to 25°	30	6	12	6	5	5	1	3	1	0	2	71	42	10	
	5 to 15°	32	5	12	7	4	3	3	2	1	0	2	71	45	11	
	MI															
	Pre-test	15	1	3	5	0	5	7	4	1	0	1	42	36	14	
	Blister 90°	15	2	5	2	1	5	8	3	1	0	0	42	36	29	
	90°	14	2	4	5	1	5	8	2	1	0	0	42	33	26	

App E Ta16. Level of tiredness

Test Order	Angle	Level of anxiety (0 = not anxious, 10 = very anxious)										Total	% not anxious	% score >5	
		0	1	2	3	4	5	6	7	8	9				10
	VI														
	Pre-test	24	11	10	11	7	1	4	1	1	0	1	71	34	10
	Blister 25 to 35°	30	9	7	8	6	4	2	0	1	0	4	71	42	10
	1 to 5°	30	8	2	10	5	6	1	2	4	0	2	70	43	13
	No delineator	32	9	6	7	5	7	1	1	2	0	0	70	46	6
	25 to 35°	29	9	10	5	7	5	2	0	2	1	0	70	41	7
	15 to 25°	28	9	7	5	8	7	1	0	3	1	1	70	40	9
	5 to 15°	31	11	3	8	9	5	0	0	2	1	1	71	44	6
	MI														
	Pre-test	24	5	4	1	2	3	1	1	0	0	1	42	57	7
	Blister 90°	23	9	2	0	3	2	1	1	1	0	0	42	55	7
	90°	25	5	4	1	1	3	1	1	1	0	0	42	60	7

App E Ta17. Level of anxiety

If you came across corduroy paving on the street, what do you think you would do and why?	No.
Assume crossing point / edge of road	25
Hazard paving	1
Next to steps	15
Would just carry on walking	10
Don't know what signifies	18
No answer	2
Total	71

This table represents a quantification of commentary captured during the interviews

App E Ta18. What would do and why if came across corduroy paving –V1

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