

# 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.

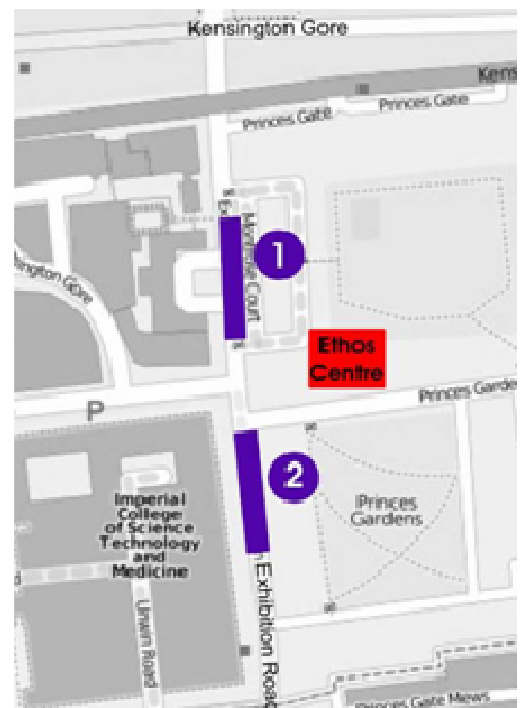
## Test sites

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

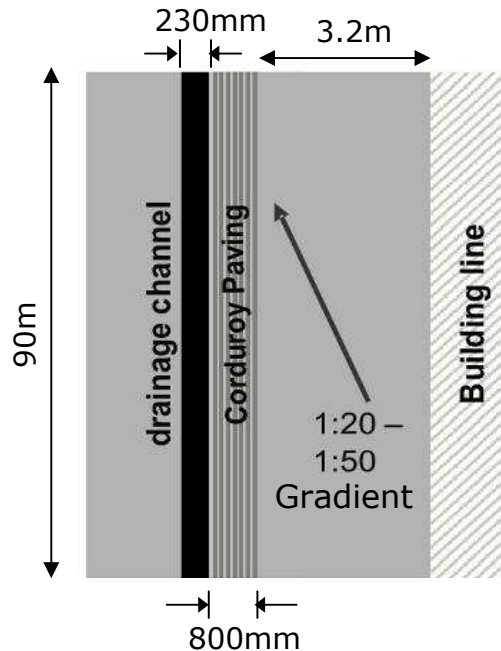


**Figure E1: Test location plan**

## Summary

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 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

## Summary

- 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.

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.

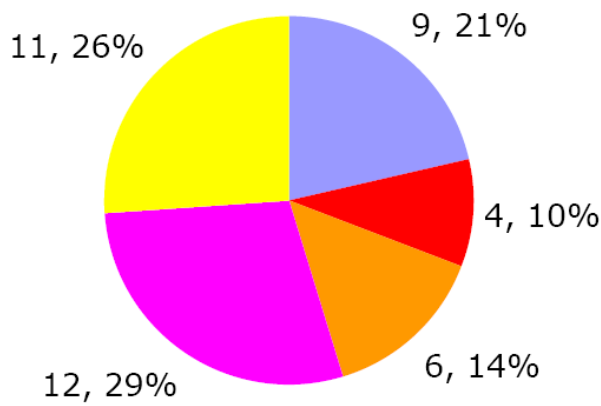
VI participants undertook corduroy tests at the following angles: 1 to 5 degrees; 5 to 15 degrees; 15 to 25 degrees; and 25 to 35 degrees. They also undertook two control tests: blister paving (25 to 35 degrees); and no delineator.

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

## The Results

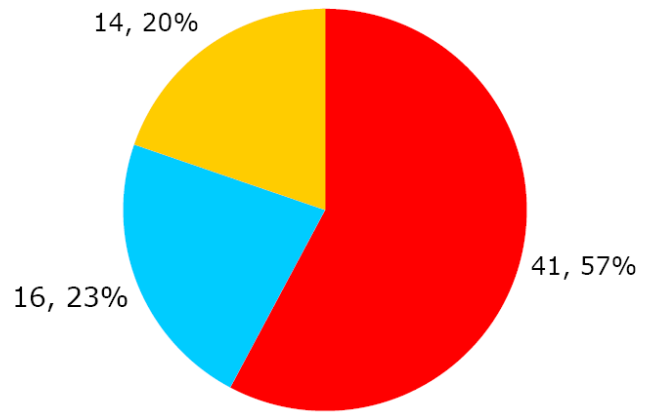
A total of **71 VI participants** and **42 MI participants** took part in the testing. The breakdown of different MI and VI groups can be seen in **Figure E3** and **Figure E4** (shown as number and percentage of participants).

Summary



- Wheelchair user
- Crutches, sticks, wheeled walker
- High heels
- Trolley style luggage
- Pram/pushchair

Figure E3 MI Participants



- Long Cane User
- Guide Dog User
- No Aid Used

Figure E4 VI Participants

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:

## Summary

- 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.