# Community Severance

# Appraisal Tool

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**Transport and Health Study Group Meeting**

## Severance is caused by road infrastructure

## …and motorised traffic

## …and pedestrian crossing facilities

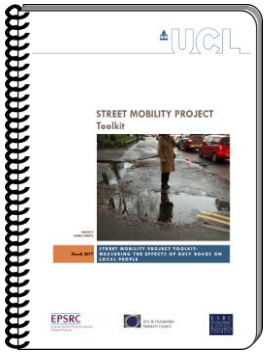
# Street Mobility Project (Jan.2014-Mar.2017)

**Developed tools to understand and measure community severance**

**Project funded by:**

**Main output:**
**Street Mobility toolkit**

http://www.ucl.ac.uk/street-mobility/toolkit




# Project for Highways England (Nov.2017-Mar.2018)

**Refinement of valuation method: stated preference survey**

Hereford (A49)

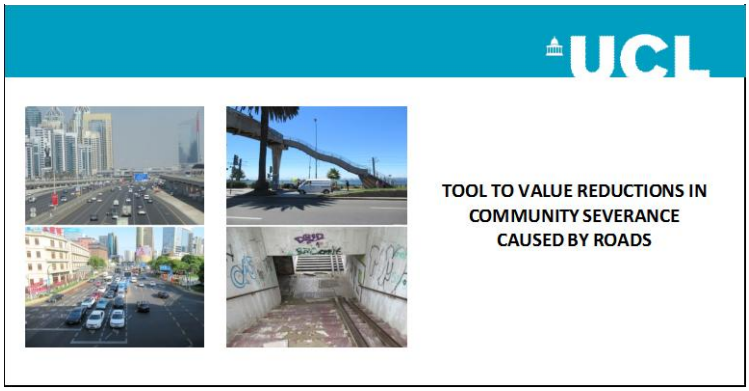
305 participants

Hull (A63 and Ferensway)

348 participants

# EPSRC Impact Acceleration award
# + Transport for Greater Manchester funding
## (June-Dec.2019)

**Conversion of results as a tool**




## Stated preference exercise 1

**Informal road crossing (varying road characteristics) vs. walking time**

Now please look at this screen. Looking at the road conditions on the left, which of the three options would you choose?

| | |
|---|---|
| Number of lanes in each direction | 2 |
| Central reservation? | Not present |
| Traffic density | Medium |
| Traffic speed | 30mph |

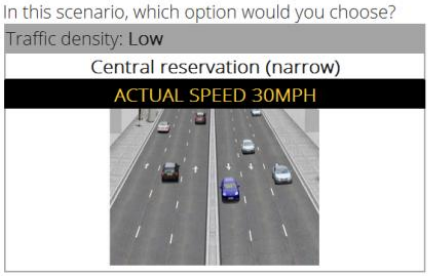
| Option A | Option B | Option C |
|---|---|---|
| | | Don't make this trip |
| Cross at this point<br>(not at pedestrian crossing) | Use covered over road<br>Adds 8 minutes to your journey | |

○ Option A ○ Option B ○ Option C

# Stated preference exercise 2

## Informal road crossing (varying road characteristics) vs. money

Now please look at this screen. In this scenario, which option would you choose?




**In this scenario, which of the two options would you choose?**

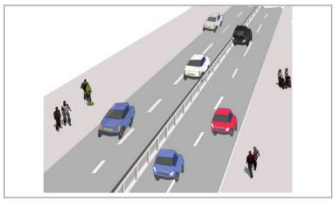
| Option A | Option B |
|---|---|
| Cross at this point Saving 40p off your bill | Do not cross the road and pay the current bill |

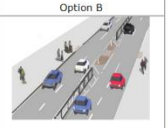
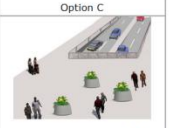
◯ Option A ◯ Option B

# Stated preference exercise 3

## Formal road crossing (varying types of facilities) vs. walking time

Looking now at this road scenario and the four available options, what would you choose to do?

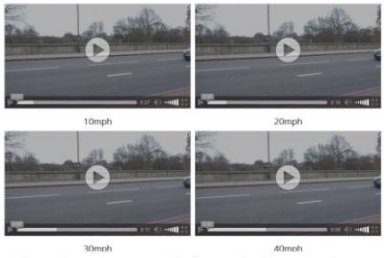


| Option A | | Option B | | Option C | | Option D |
|---|---|---|---|---|---|---|
| Use footbridge (with steps and ramp) Adds 3 minutes to your journey | OR |  Use pedestrian refuge Adds 10 minutes to your journey (plus 1 minute waiting time) | OR |  Use covered over road Adds 16 minutes to your journey | OR | Don't make this trip |

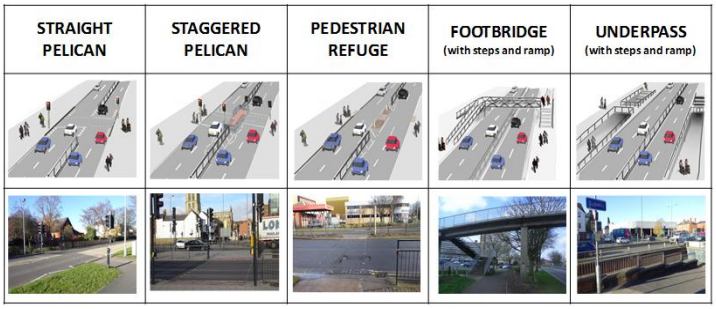
# Avoiding pitfalls of stated preference studies

## Make sure participants understand attributes

Show videos to better illustrate the different raffic speeds




Show representations and photos of pedestrian crossing facilities




# Avoiding pitfalls of stated preference studies

## Make sure scenarios are realistic

Which of the following are within walking distance of where you live, regardless of whether you go there or not? Please tell me whether there is one of these places within walking distance on your side of the A1079 Ferensway or within walking distance on the other side of the A1079 Ferensway or not within walking distance at all.

| | Within walking distance, on my side of A1079 Ferensway | Within walking distance, on other side of A1079 Ferensway | Not within walking distance/not applicable |
|---|---|---|---|
| City centre | ☐ | ☐ | ☐ |
| Workplace | ☐ | ☐ | ☐ |
| A local corner shop/newsagent | ☐ | ☐ | ☐ |
| A supermarket | ☐ | ☐ | ☐ |
| A park (or playing field) | ☐ | ☐ | ☐ |
| A local school or childcare facility | ☐ | ☐ | ☐ |
| A community centre or leisure centre | ☐ | ☐ | ☐ |
| A GP or health centre | ☐ | ☐ | ☐ |
| A chemist or pharmacy | ☐ | ☐ | ☐ |
| A pub, restaurant or café | ☐ | ☐ | ☐ |
| Train station | ☐ | ☐ | ☐ |
| Bus stop | ☐ | ☐ | ☐ |
| The home of someone you know, e.g. friend or relative | ☐ | ☐ | ☐ |

## Customize questionnaire by trip purpose

| Segment | | Saving by crossing |
|---|---|---|
| Work | | salary |
| Shopping | | bill |
| Leisure | Pub, restaurant, or café | price |
| | Park, playing field, community/leisure centre | voucher |
| | House of someone | bus fare |

# Avoiding pitfalls of stated preference studies

## Consider other factors affecting choices

Daytime scenario

Now please look at this screen. Looking at the road conditions on the left (at day-time), which of the three options would you choose ?

| | |
|---|---|
| Number of lanes in each direction | 3 |
| Central reservation? | Present (narrow) |
| Traffic density | Low |
| Traffic speed | 30mph |

| Option A | Option B | Option C |
|---|---|---|
| | | Don't make this trip |
| Cross at this point (not at pedestrian crossing) | Use covered over road Adds 4 minutes to your journey | |

○ Option A ○ Option B ○ Option C

Night-time scenario

Now please look at this screen. The road conditions are the same as in the last question but **now it's night-time**. Which of the three options would you choose?

| | |
|---|---|
| Number of lanes in each direction | 3 |
| Central reservation? | Present (narrow) |
| Traffic density | Low |
| Traffic speed | 30mph |

| Option A | Option B | Option C |
|---|---|---|
| | | Don't make this trip |
| Cross at this point (not at pedestrian crossing) | Use covered over road Adds 4 minutes to your journey | |

○ Option A ○ Option B ○ Option C

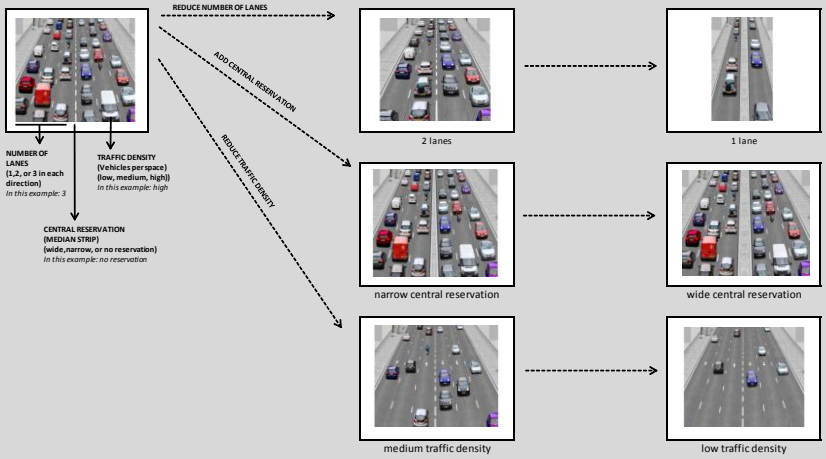
UCL

**TOOL TO VALUE REDUCTIONS IN COMMUNITY SEVERANCE CAUSED BY ROADS**

## ROAD CHARACTERISTICS AND CROSSING FACILITIES SUPPORTED BY THE TOOL

### ROAD DESIGN AND TRAFFIC DENSITY

ROAD DESIGN AND TRAFFIC DENSITY




### TRAFFIC SPEED

The following values are supported:
When choosing inputs, please consider that traffic speed depends on traffic density
The combination of high traffic density with 40mph is unrealistic, because of congestion

| | | |
|---|---|---|
| 10 | mph | 16 km/h |
| 20 | mph | 32 km/h |
| 30 | mph | 48 km/h |
| 40 | mph | 64 km/h |

### CROSSING FACILITIES

The tool supports the assessment of the crosing facilities represented below
The tool does not support the assessment of zebras (marked unsignalised crossings) or signalised crossings other than pelicans (e.g. puffins, toucans)

| PEDESTRIAN PLATFORM | PEDESTRIAN REFUGE | STRAIGHT PELICAN | STAGGERED PELICAN | FOOTBRIDGE | UNDERPASS |
|---|---|---|---|---|---|
| | | | | | |
| A place where the road goes through a tunnel and pedestrians can cross at the surface | Combination of a traffic island with dropped kerbs (and possible colour/tactile warnings). Not signalised | Signalised crossing where user can push button to wait for green | 2-stage pelican crossing, with an offset in the middle. Also known as Danish offset | Bridge over road, with steps and ramp | Subway under road, with steps and ramp |

# DIRECT

## STEP 1

**Insert general information about the road and projects**

- TIP: Demand is the sum of all walking trips by all people. It is recommended the tool is used in roads with values above 1,000/day
- TIP: Demand of trips depends on factor such as land uses on both sides of the road and location of bus stops along the road

| | | | |
|---|---|---|---|
| Name of the road segment | Euston Road | | |
| Road segment length (100-5000m) | 1,000 | metres | *If left blank, the tool will assume a default value of: 1000m* |
| Demand for walking trips | 10,000 | walking trips/day | *Have more detailed information? Fill it in Demand page* |
| | | | *If demand left blank, the tool will use a default value of 1,000* |
| Lifetime of the projects | 5 | years | *If left blank, the tool will assume a default value of 10 years* |
| Annual discount rate | 5 | % | *If left blank, the tool will assume a default value of 5%* |

## STEP 2

**Choose road conditions for each option from dropdown menus in green cells below**

*Want to insert more detailed information? Do it in Design page*

| | Number of lanes | Central reservation | Traffic density | Traffic speed |
|---|---|---|---|---|
| *choose from* | *1,2,3 (each direction)* | *wide, narrow, no* | *low, medium, high* | *10, 20, 30, 40 mph* |
| **Do-nothing** | 3 | no | high | 40 |
| **Option 1** | 1 | no | high | 40 |
| **Option 2** | 3 | no | low | 40 |
| **Option 3** | 3 | no | high | 40 |

## STEP 3

**Choose crossing facilities in the middle and extreme points of the road segment from dropdown menus in green cells below**

**Leave blank if there are no facilities**

*Want to insert more detailed information? Do it in Design page*

| | Extreme Point | Middle | Extreme Point |
|---|---|---|---|
| **Do-nothing** | Underpass | | Underpass |
| **Option 1** | Underpass | | Underpass |
| **Option 2** | Underpass | | Underpass |
| **Option 3** | Straight pelican | | Straight pelican |

**Choose from**

*Pedestrian refuge*
*Straight pelican*
*Staggered pelican*
*Footbridge*
*Underpass*

# DEMAND

**In the Direct page, you said that the demand was 10000 walking trips per day**

**If you have information on who wants to make those 10000 trips (age group), how (walking speed) and why (trip purpose), please fill it below**

- TIP: Examples of leisure trips: trips to restaurants/pubs/cafés; parks/playing fields/community/leisure centres, house of friends or relatives

## WHO WANTS TO WALK

**What is the % of each age group in total demand?**

| | | | | |
|---|---|---|---|---|
| Age 18-34 | | | 33 | % |
| Age 35-64 | | % | 33 | % |
| Age 65+ | | % | 33 | % |
| Total | 0 | % | Total 100 | % |

!! You did not specify any value. The tool will allocate the values as follows

## HOW THEY WALK

**The tool uses a default walking speed of 4.86 km/h. Here you can specify different values**

| | | | | |
|---|---|---|---|---|
| Age 18-34 | | km/h | 4.86 | km/h |
| Age 35-64 | | km/h | 4.86 | km/h |
| Age 65+ | | km/h | 4.86 | km/h |

!! You did not specify at least one of the values. The tool will allocate the values as follows

## WHY THEY WALK

**What is the % of each trip purpose in the trips made by each age group?**

**Age 18-34**

| | | | | |
|---|---|---|---|---|
| Work | | % | 33 | % |
| Shopping | | % | 33 | % |
| Leisure | | % | 33 | % |
| Total | 0 | % | Total 100 | % |

!! You did not specify any value. The tool will allocate the values as follows

**Age 36-64**

| | | | | |
|---|---|---|---|---|
| Work | | % | 33 | % |
| Shopping | | % | 33 | % |
| Leisure | | % | 33 | % |
| Total | 0 | % | Total 100 | % |

!! You did not specify any value. The tool will allocate the values as follows

**Age 65+**

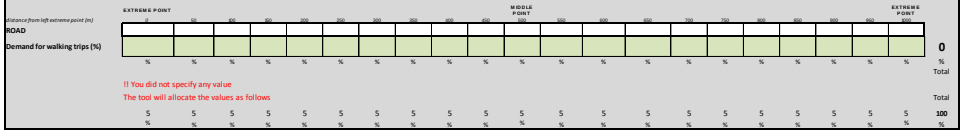
| | | | | |
|---|---|---|---|---|
| Shopping | | % | 50 | % |
| Leisure | | % | 50 | % |
| Total | 0 | % | Total 100 | % |

!! You did not specify any value. The tool will allocate the values as follows

**If you have information on the location where those 10000 trips would ideally cross the road, please fill it below**

**TIP: Please think of an ideal world, where the road cause no severance at all. Pedestrians would cross at their desire lines, i.e. using the most direct route across the road to go from their origins to their destinations**

## WHERE THEY CROSS THE ROAD



## DESIGN

**In the Quick tool, you specified the general road and traffic characteristics in the Do-Nothing and in the 3 options.**
**In this page, you can add more detail by changing these characteristics in some parts of the road segment**
**You can also identify the parts of the road where there are guard railings or other physical barriers to movement across the road**
TIP: You may want to assign a slower speed and higher traffic density near juntions, to account for cars platooning at traffic signals. Near junctions, the number of lanes may also increase.
TIP: A traffic island for pedestrians may exist in a specific point along the road. That counts as a "central reservation"
TIP: The default is what you specified in the Quick page. Click on the CLEAN buttons to revert to the default

**In the Quick tool, you also specified the crossing facilities that exist in the extreme points of the road segment and in the middle point, in the do-nothing and in the 3 options.**
**In this page, you can add more detail by specifying crossing facilities that are not in those points.**
**If you choose signalised crossings or pedestrian refuges, you can also add average waiting time for pedestrians to cross the road**

**Legend:**

| | |
|---|---|
| R | Pedestrian refuge |
| P | Straight pelican |
| S | Staggered pelican |
| F | Footbridge |
| U | Underpass |

**Add information about road and crossing facilities in the road segment representations below**
**The 2 extreme points and middle point of the segment are identified above the representation. Below, you can see the distance from each point to the left extreme point of the segment**
TIP: Press the CLEAN button to copy over the default values for the whole segment that you specified in the Direct page. You can then change the cells one by one, as required

### DO NOTHING

| distance from left extreme point (m) | EXTREME POINT 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | MIDDLE POINT 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | EXTREME POINT 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of lanes | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Central reservation | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no |
| Traffic density | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high | high |
| Traffic speed (mph) | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Guard railings | | | | | | | | | | | | | | | | | | | | | |
| Type of crossing | U | | | | | | | | | | | | | | | | | | | | U |
| Waiting time (0-5 mins.) | | | | | | | | | | | | | | | | | | | | | |

Press this button to clean everything and restore the values inputted in the Direct page — CLEAN

### OPTION 1

| distance from left extreme point (m) | EXTREME POINT 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | MIDDLE POINT 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | EXTREME POINT 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of lanes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Central reservation | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no | no |

**(...)**

## OUTPUT

### OVERVIEW OF SEVERANCE ASSESSMENT

Option highlighted in green is the best options

| | Do-nothing | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Overall severance index (0-100) | 50 | 37 | 42 | 29 |
| Severance cost per trip | £1.46 | £1.04 | £1.21 | £0.82 |
| Average detour to walking trips | 229 | 162 | 217 | 232 |
| Average delay to walking trips | 2.8 | 2.4 | 2.7 | 2.9 |
| Trips crossing informally/year | 46,328 | 470,822 | 187,226 | 33,809 |
| Trips crossing in crossing facilities/year | 3,557,343 | 3,150,945 | 3,427,918 | 1,583,635 |
| Suppressed trips/year | 46,328 | 28,295 | 34,856 | 32,562 |
| Total severance cost/year | £5,297,315 | £3,798,994 | £4,406,296 | £2,084,910 |
| Benefit of the option (1st year) | - | £1,498,322 | £891,019 | £2,312,806 |
| Present value of benefit over the lifetime of the project | - | **£8,811,297** | **£4,090,529** | **£10,513,300** |

### DETAILED SEVERANCE ASSESSMENT

Places highlighted in pink have severance index above 50%
Places highlighted in red have severance index above 75%

### DO-NOTHING

| distance from left extreme point (m) | EXTREME POINT 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | MIDDLE POINT 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | EXTREME POINT 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crossing facilities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Severance index | 29 | 33 | 38 | 42 | 47 | 51 | 55 | 60 | 64 | 68 | 71 | 68 | 64 | 60 | 55 | 51 | 47 | 42 | 38 | 33 | 29 |
| Cost per trip | £0.80 | £0.94 | £1.08 | £1.22 | £1.35 | £1.49 | £1.63 | £1.77 | £1.91 | £2.05 | £2.19 | £2.05 | £1.91 | £1.77 | £1.63 | £1.49 | £1.35 | £1.22 | £1.08 | £0.94 | £0.80 |
| What was the demand to cross here (per year) | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 | 173,810 |
| How many of those trips cross here (informal) | 341 | 457 | 615 | 830 | 1,124 | 1,530 | 2,092 | 2,875 | 3,970 | 5,504 | 7,652 | 5,504 | 3,970 | 2,875 | 2,092 | 1,530 | 1,124 | 830 | 615 | 457 | 341 |
| How many of those trips cross here (using facilities) | 173,127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 173,127 |
| How many cross in other places (informal) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| How many cross in other places (using facilities) | 0 | 172,895 | 172,580 | 172,150 | 171,561 | 170,749 | 169,675 | 168,059 | 165,870 | 162,802 | 158,506 | 162,802 | 165,870 | 168,059 | 169,625 | 170,749 | 171,561 | 172,150 | 172,580 | 172,895 | 0 |
| How many trips are supressed | 341 | 457 | 615 | 830 | 1,124 | 1,530 | 2,092 | 2,875 | 3,970 | 5,504 | 7,652 | 5,504 | 3,970 | 2,875 | 2,092 | 1,530 | 1,124 | 830 | 615 | 457 | 341 |
| Average detour of trips (m) | 0 | 50 | 99 | 149 | 197 | 246 | 293 | 338 | 382 | 422 | 456 | 422 | 382 | 338 | 293 | 246 | 197 | 149 | 99 | 50 | 0 |
| Average delay of trips (mins.) | 0.0 | 0.6 | 1.2 | 1.8 | 2.4 | 3.0 | 3.6 | 4.2 | 4.7 | 5.2 | 5.6 | 5.2 | 4.7 | 4.2 | 3.6 | 3.0 | 2.4 | 1.8 | 1.2 | 0.6 | 0.0 |
| How many trips from other places cross here | 1,684,798 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,526,291 |
| Total number trips crossing here | 1,858,266 | 457 | 615 | 830 | 1,124 | 1,530 | 2,092 | 2,875 | 3,970 | 5,504 | 7,652 | 5,504 | 3,970 | 2,875 | 2,092 | 1,530 | 1,124 | 830 | 615 | 457 | 1,699,760 |

### OPTION 1

| distance from left extreme point (m) | EXTREME POINT 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | MIDDLE POINT 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | EXTREME POINT 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crossing facilities | Underpass | | | | | | | | | | | | | | | | | | | | Underpass |
| Severance index | 29 | 31 | 32 | 34 | 36 | 37 | 39 | 40 | 42 | 44 | 45 | 44 | 42 | 40 | 39 | 37 | 36 | 34 | 32 | 31 | 29 |

**(...)**

## Current/next steps

- Trial of tool in Greater Manchester
- Refinement of tool based on feedback from trial
- Discussions with DfT and Highways England to incorporate research results and tool into official guidance

## More information

Anciaes, P., Jones, P. (2020) A comprehensive approach for the appraisal of the barrier effect of roads on pedestrians. *Transportation Research Part A: Policy and Practice* ***134****, 227-250*