

Measuring Walkability

- Consumer Satisfaction Surveys -



What is Walkability?

- It is not the “**performance of walking**” i.e. John Cleese
- It is the “**performance of the environment when walking**”
- Performance:
inviting, functional, safe, aesthetic, secure, comfort, convenience, continuity, system coherence, compliance, accessible, pleasant, legible, people populated, legal, seductive, social interaction, convivial, connected...
- Walkability: the extent to which the built environment is walking friendly

How is walking improved at the moment?

Practitioners consider important:

73% engineering compliance
71% community perception
68% accessibility
65% safety from traffic
56% personal security
49% urban design
45% cleanliness

Local Authority prioritisation:

25% use judgement
23% significant public influence
17% politically determined
15% benefit/cost
14% other
6% don't prioritise
100%

These lists are not complementary

Provision vs. quality



What is this?



Is it basically this?

Photo Source: Living Streets (UK)

Do we always get quality right?



Southampton Street, looking north 1887



Southampton Street, looking north 2004

add 117 years of (so called) 'improvements' to Reading UK

Photo Source: Intelligent Space Partnership

How do you measure walkability?

- Walkability is very difficult to measure because it is based on consumer satisfaction i.e. people
- *“Count what is countable...measure what is measurable...
What is not measurable, make measurable”*
Galileo - (February 15, 1564 – January 8, 1642)
 - “I’m $\frac{3}{4}$ happy today”
 - ...but what questions do I ask myself to determine happiness?
 - ...do I want to be more ‘happy’ than ‘content’?
 - ...if I’m $\frac{3}{4}$ happy, are you?
 - ...what would make me more happy?

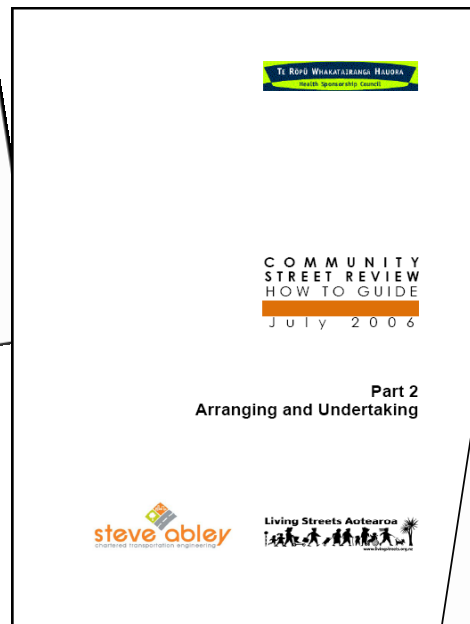
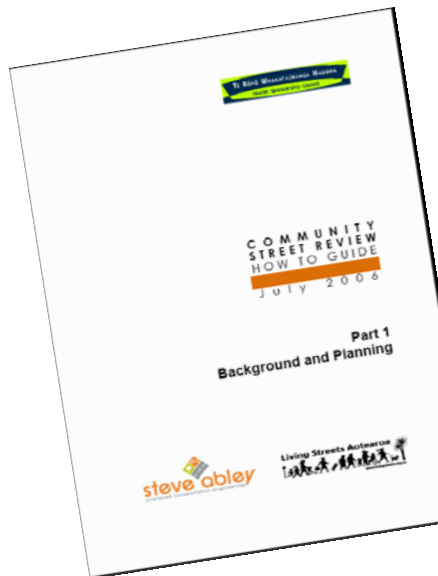
What we've done...(part 1)



= "Community Street Review"



How it looks today....



How it might be published tomorrow...



How it works...

- Minimum group of 5 participants, minimum age 15 years, no max age
- “Path lengths” and “Road Crossings”
- 4 types of user groups
 - Not impaired – can see, are mobile
 - Mobility impaired – can see are not mobile
 - Sight impaired – can not see are mobile
 - Sight and mobility impaired – can not see, are not mobile
- There are groups within groups
- Have to do a lot more collecting of data (Land Transport NZ)
- Have to make level of service calculations easy

Two main forms...

COMMUNITY STREET REVIEW ⁰²

Path Length

Step one:
 Your name: _____ Participant number: _____
 Date: _____ Section number: _____

Step two:
 What is your opinion of the Section? (tick box)




| | Very Bad | Bad | Slightly Bad | Neutral | Slightly Good | Good | Very Good |
|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Overall | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Walkable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Characteristics | | | | | | | |
| Safe from traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Safe from falling | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Obstacle free | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Secure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Efficient | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Pleasant | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Step three:
 What problems did you identify? (write comment)

Step four:
 How much would your 'Walkable' opinion change if the following variable was improved? (tick box)

| | None | A little | A lot |
|---|--------------------------|--------------------------|--------------------------|
| Traffic Variables: | | | |
| More priority over motor vehicles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| More separation from roadway | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fewer cyclists or skateboarders etc | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better view of vehicles crossing path | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Less traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Engineering variables: | | | |
| More direct route | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Gentler side slope across path | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Gentler slope along path and/or no steps | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| More or better tactile and visual aids | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better street lighting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Smoother and more even surface quality | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Wider path | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Environment variables: | | | |
| Better streetscape or public art | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better landscaping or more greenery | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cleaner | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fewer footpath obstructions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| More seats, drinking fountains etc | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| More street activity and natural surveillance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Step five:
 What opportunities did you identify? (write comment)

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COMMUNITY STREET REVIEW ⁰³

Road Crossing

Step one:
 Your name: _____ Participant number: _____
 Date: _____ Section number: _____

Step two:
 What is your opinion of the Road Crossing? (tick box)




| | Very Bad | Bad | Slightly Bad | Neutral | Slightly Good | Good | Very Good |
|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Overall | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Walkable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Characteristics | | | | | | | |
| Safe from traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Safe from falling | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Delay | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Direct | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Obstacle free | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Step three:
 What problems did you identify? (write comment)

Step four:
 How much would your 'Walkable' opinion change if the following variable was improved? (tick box)

| | None | A little | A lot |
|--|--------------------------|--------------------------|--------------------------|
| Traffic Variables: | | | |
| More priority over motor vehicles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Slower traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Less traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better view of approaching traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Engineering variables: | | | |
| More direct route | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Narrow roadway | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Gentler slope of kerb crossing approach/exit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Tactile and visual aids | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better street lighting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Smoother and more even surface quality | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Wider kerb/gutter crossing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Advance 'walk' signal before motor vehicles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Longer 'walk' signal time | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Audible 'walk' signal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Add traffic island | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Less delay waiting to cross | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Step five:
 What opportunities did you identify? (write comment)

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Road Crossing example

Step one:

Your name: Steve Abley Participant number: 12
 Date: Saturday 4 Nov 2006 Section number: B

Step two:

What is your opinion of the Section? (tick box)

| | | Very Bad ☹ | Bad | Slightly Bad | Neutral ☺ | Slightly Good | Good | Very Good ☺ |
|--------------------------|--|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| Overall | | | | | | | | |
| Walkable | "I feel this Path Length is walking friendly" | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Characteristics | | | | | | | | |
| Safe from traffic | "I feel safe from traffic danger" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Safe from falling | "I feel safe from trips, slips, and falls" | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Obstacle free | "I was able to move around unhindered by physical features" | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Secure | "I feel safe from intimidation or physical attack" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Efficient | "I was not impeded by others" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Pleasant | "I enjoyed being in this place, to interact with others and it wasn't just for movement" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Road Crossing example (cont)

Step three:

What problems did you identify? (write comment)

Hurt when I fell into big pothole

Step four:

How much would your 'Walkable' opinion change if the following variable was improved? (tick box)

| | None | A little | A lot |
|--|-------------------------------------|-------------------------------------|-------------------------------------|
| Traffic Variables: | | | |
| More priority over motor vehicles | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| More separation from roadway | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fewer cyclists or skateboarders etc | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better view of vehicles crossing path | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Less traffic | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Engineering Variables: | | | |
| More direct route | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Gentler side slope across path | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Gentler slope along path and or no steps | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| More or better tactile and visual aids | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Better street lighting | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Smoother and more even surface quality | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Step five:

What opportunities did you identify? (write comment)

Thought planters were nice but tulips would be better

Walkability descriptors

Level of Service Comparisons

| |
|----------------|
| Opinion |
| 😊 Very Good |
| Good |
| Slightly Good |
| 😐 Neutral |
| Slightly Bad |
| Bad |
| 😞 Very Bad |

Walk21 Melbourne (only last week)



Flinders Street



Collins Street



Problems

Street A

- Noisy
- Rubbish
- Narrow footpath
- Uneven footpath
- Driveways
- Not sufficient street life
- Obstacles
- Holes in footpath
- Closed up buildings
- Road works
- Polluted (suspect emissions)
- Broken glass
- Too many levels
- Overhead safety

Street B

- Noisy
- Litter
- Footway width varies
- Surface variations
- Lots of vehicles
- No one stopping to enjoy
- Lots of people

Opportunities

Street A

- Public art on walls
- Open up buildings
- Lanes could be more interesting
- Better view of driveway vehicles
- Wider footpath
- Resurface area
- Shade
- More control of construction site

Street B

- Public art
- Volume on the iHub
- More public seating
- More greenery
- Tourist signage
- Better control of café dining areas
- Drinking fountains

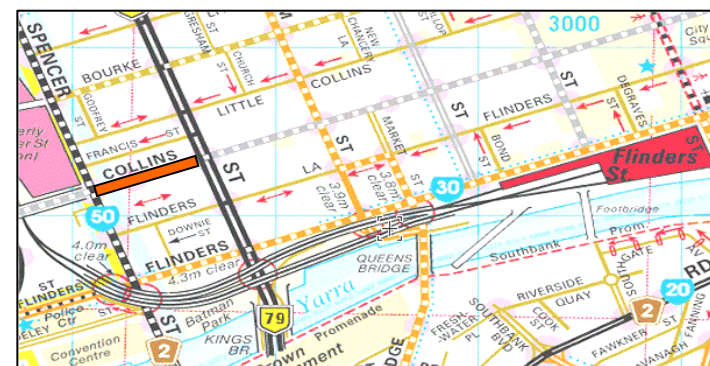
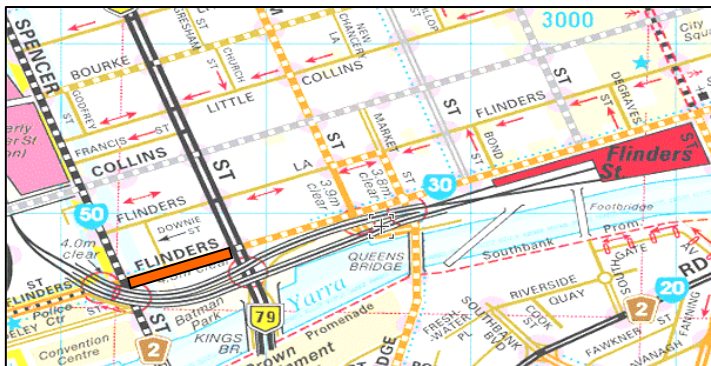
Level of Service

Flinders Street (Street A)

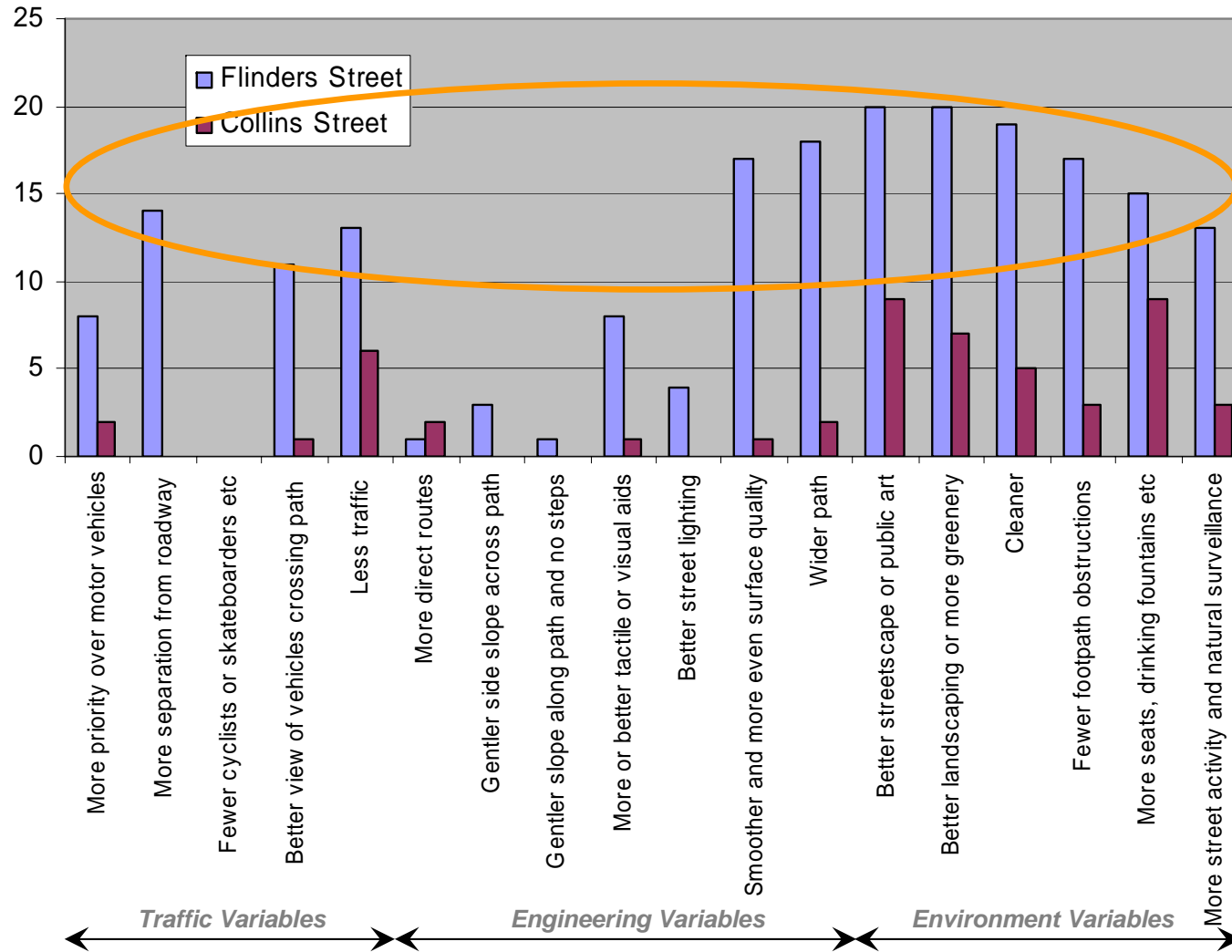
-  E Walkability
-  D Safe from traffic
-  E Safe from falling
-  D Obstacle free
-  D Secure
-  D Efficient
-  F Pleasant

Collins Street (Street B)

-  B Walkability
-  A Safe from traffic
-  B Safe from falling
-  B Obstacle free
-  A Secure
-  B Efficient
-  B Pleasant



What variables and how much improvement?



Community Street Reviews

- Are strongly supported by Land Transport New Zealand
- Need promotion – practitioners need to understand usefulness
- Are labour intensive – but not necessarily expensive
- Need experienced operators (especially when so new)
- Used as transportation planning tool – doesn't replace thinking


Walkability Tools Research - Microsoft Internet Explorer

File Edit View Favorites Tools Help


Back Forward Stop Home Search Favorites

Address <http://www.levelofservice.com/> Go Links

Google [w,levelofservicxe.com](http://www.levelofservice.com/) Go Bookmarks 0 blocked Check AutoLink AutoFill Send to www Settings



Land Transport NZ
Ikiiki Whenua Aotearoa



steve abley
chartered transportation engineering

Walkability Tools Research

This web site collects walkability measurements from **Community Streets Review** surveys and measurements from **physical and operational characteristic** surveys.

Walkability is: the extent to which the built environment is walking friendly.

The collection of perception and physical and operational data will enable a later modelling building project to be developed where walkability will be inferred from the built environment measurements. This will enable practitioners to quickly and inexpensively measure the walking network and ultimately enable practitioners to identify areas of poor walkability and walking limitations, proposed improvements and funding priorities. This project provides the linkages with the built environment measurements in a similar manner that Community Street Reviews provide for walkability measurements.

A Community Street Review is a survey where a Community Street Audit and numerical rating system are combined to enable a practitioner to measure walkability.

- A Community Street Audit is a technique for assessing walkability that was developed by Living Streets UK in 2002. Community Street Audits are used for "evaluating the quality of public spaces – streets, housing estates, parks and squares – from the viewpoint of the people who use it, rather than those that manage it".
- A rating system enables problem environments to be identified analytically and comparisons made with other walking environments. Consequently funds can be used wisely where value or benefit/cost considered greatest.

database login

username

password

[login help](#)

A background research paper on Walkability can be downloaded [here](#) (1.28mb)

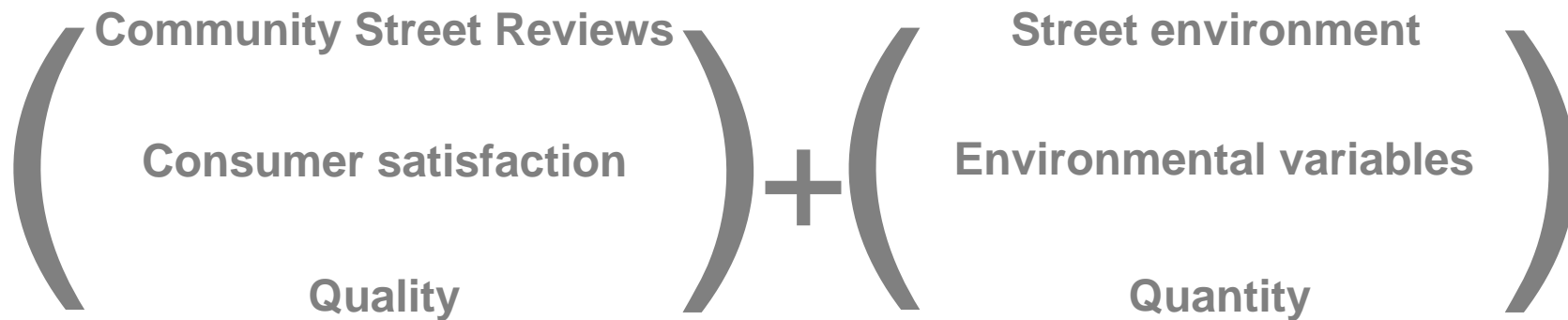
The methodology for measuring walkability physical and operational characteristics can be downloaded [here](#) (4.25mb). We are inviting comment on this preliminary document, please email steve@abley.com

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<http://www.landtransport.govt.nz/> Internet

Ability to enter and write report for FREE

What we've done...(part 2)



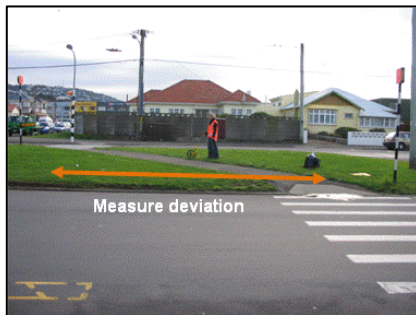
= Mathematical model to infer
Community Street Reviews

Variables in the environment



- Effective width
- Footpath cross fall
- Footpath longitudinal fall
- Area adjacent footpath walkable
- Adjacent land use
- Footpath materials
- Deviation around obstacles
- Source of smells
- Quantity of litter
- Stumbling hazards
- Height of buildings
- Distance from moving vehicles
- Quantity of greenery
- Shared path
- Directional information
- Posted speed limit
- Street activity
- Road width
- Vandalism
- Detritus
- Temporary hazards
- Weather
- Vehicle speed
- Density of people
- Comfort features
- Utility features
- Trip hazards
- Tactile aids
- On street parking
- Use of vehicle access ways
- Visibility to driveways
- Designed steps
- Protection from hazards

Measuring the environment



Walkability Tools Research - Microsoft Internet Explorer

Address: http://www.levelofservice.com/topadmin.php?task=116&date=2006-07-31&pc=29&site=8

view / update / verify CSR survey data: Path length

Sections: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 | Participant variables: complete

Step 1 Name: Nelson Crisp Site: Queens Drive, Date: 2006-07-31
 Number: 29 Section: 01 Status: complete
 CSR Manager: Andrew McLeod CSR Organisation: Duffill Watts & Tse Limited

Step 2 How you consider it today

| | very bad | bad | slightly bad | neutral | slightly good | good | very good |
|-------------------|-----------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| Walkable | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Safe from traffic | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Safe from falling | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Obstacle free | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Secure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Efficient | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pleasant | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Step 3 What problems did you identify

Footpath too narrow

Step 4 How much would your walkable rating change...

| | none | a little | a lot | | none | a little | a lot |
|--|----------------------------------|-----------------------|-----------------------|--|----------------------------------|-----------------------|----------------------------------|
| More priority over motor traffic | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | Better street lighting | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| More separation from roadway | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | Smoother and more even surface quality | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Fewer cyclists or skateboarders etc | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | Wider path | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Better view of vehicles crossing path | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | Better streetscape or public art | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Less traffic | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | Better landscape or more greenery | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| More direct route | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | Cleaner | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Gentler side slope across path | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | fewer footpath obstructions | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Gentler slope along path / no steps | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | More seats, drinking fountains etc | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| More or better tactile and visual aids | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | More street activity or natural surveillance | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Tasks to do...

- Finish main CSR methodology document (in conjunction with LTNZ)
- Complete data entry and validation (contract end of Part 2)
- Undertake mathematical model development to infer CSR (by others)
- Promote Community Street Reviews (real end of Part 1)
- Promote mathematical model (real end of Part 2)
- Energise practitioners and provide training on walkability issues

Questions?

Walkability: the extent to which the built environment is walking friendly



It is not the “performance of walking”
It is the “performance of the environment when walking”