PUBLIC TRANSPORT ACCESSIBILITY LEVELS

Presented by Steve **Abley**

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Abstract: *Public Transport Accessibility Levels (PTALs) is a methodology developed by the London Borough of Hammersmith and Fulham for the measurement of an accessible public transport network. The PTAL methodology has been adopted by Transport for London (TfL) for application across London.*

Abley Transportation Engineers Limited (ATEL) were commissioned by the Christchurch City Council to develop a citywide walking network for the calculation of PTALs for the whole of the Christchurch metropolitan area. The objective was to test how well the Regional Council and Christchurch City were performing when providing the public transport system in terms of accessibility rather than simply provision of a public transport system. Essentially what is the quality of the system in terms of spatial accessibility and were some areas provided better accessibility than other areas and if so what could be done to improve areas where accessibility was low.

The results of this study show that accessibility to public transport can be measured and the use of GIS walking networks can have a variety of applications.

INTRODUCTION

Public transport is a necessity for the provision of a sustainable transport system. This is because due to public resources, more people can be carried by public transport per hour than by any other transportation means. A comparison between moving people in private vehicles verses moving people via public transport, weather it is via bus or train is that public transport is more cost effective for communities. The inclusion of public transport as part of an overall sustainable public transport system then is a forgone conclusion, but what about the quality of that system?

The balancing act between simply providing an opportunity to use public transport verses providing a system that is well patronised and favoured above other means of transport because of the quality of provision, is in the authors opinion, critically important. A public transport system should not be seen as a 'second choice' mode of transport and rather should be viewed by all members of the community, rich and poor alike, as a highly desirable transport choice. The provision of a public transport system that simply caters for people with limited opportunity is neither equitable nor sustainable.

The problem is then, how is an equitable public transport system measured. Obviously there are a number of variables that affect the quality of experience that patrons have using a public transport system. Some of these are cleanliness, ride quality, crowding, comfort and cost. Other variables include speed of service, interchange, access to information and 'does the public transport system take me to where I want to go?' These are all important variables for the measurement of the public transport system but what about the first leg of the public transport journey, the forgotten leg, the walking leg.

The walking trip is the first and last trip of every public transport journey. It is also the trip that, combined with the services at the public transport stop, often determines if public transport is the chosen transport mode. Effectively it is the journey leg that may contribute more to competition between public transport and the choice to use another transportation mode. It is therefore important to measure how well this leg competes against other locations and ultimately how well public transport competes against all other transport modes. This is especially important where public transport is being encouraged to be a favoured transport mode.

Accessibility modelling is the mechanism by which transport journeys, to specific necessary land uses for everyday life, can be measured. Today true accessibility modelling in New Zealand is still a light on a nearby horizon due to data constraints, the quantum of calculations and the dilemma when selecting core land uses and thresholds for attainment. Nevertheless accessibility modelling is coming to New Zealand and when implemented, the authors consider it will be implemented to the highest standard where New Zealand will be the benchmark by how other countries could measure their transportation systems. In the mean time though, work continues.

BACKGROUND

Current practices for measuring the success of accessibility to the public transport system are typically simplistic. They generally involve using distance from a point to access the public transport system. An example from the Canterbury Regional Land Transport Strategy (RLTS) is shown in Figure 1 that shows from the point of interest (household) access to a bus stop is not within the maximum 400m. This example shows that if the RLTS standard for new subdivision accessibility was applied to this existing household it would fail this test. Alternatively, and recognising this test maybe too onerous for older neighbourhoods that have not been built with good public transport at the forefront of design decisions, the Environment Canterbury Passenger Transport Plan measure of PT access is that more than 90% of all households will be within 500m radius of a bus route, this example is shown in

Figure 2 and shows that using this measure, the household would pass this test.

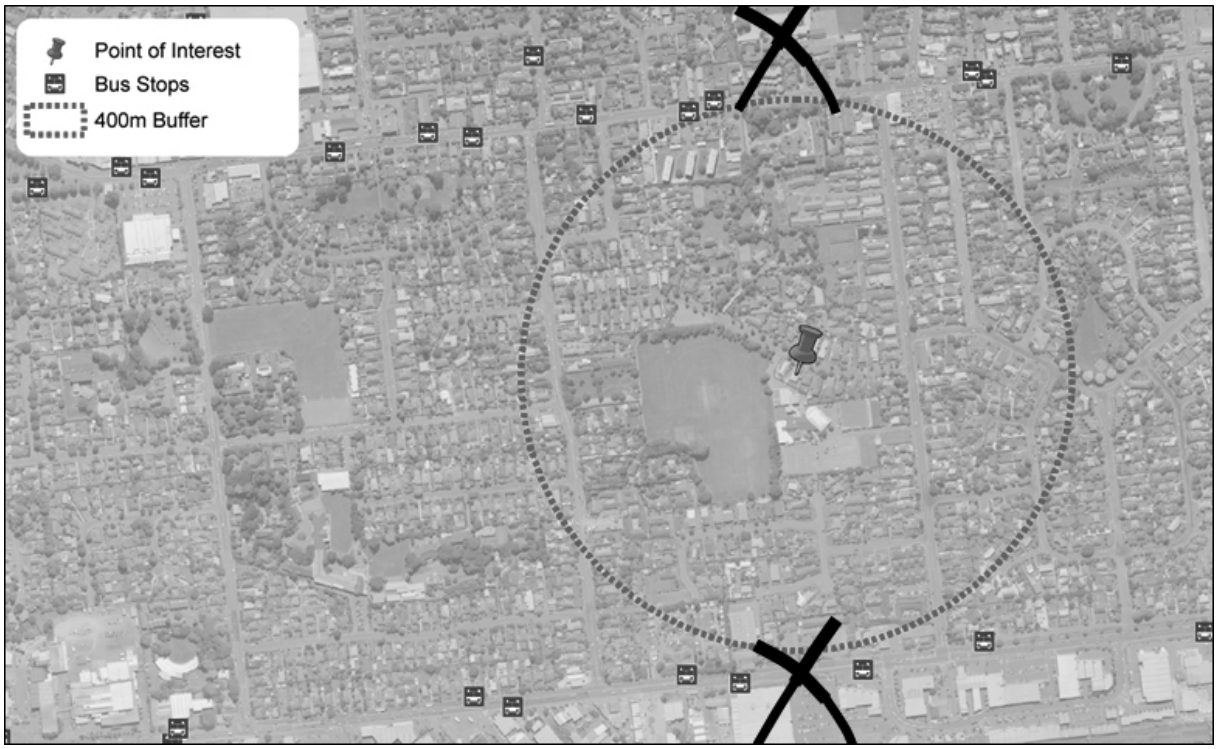

Figure 1 ECan RLTS measure of PT access, 400m to bus stop for subdivisions

Figure 2 ECan PT Plan measure of PT access, >90% 500m to bus route

Unfortunately though, the use of a straight line distance 'as the crow flies' distorts this performance measure and disguises poor performance as shown in Figure 3 if this same distance was mapped on the street network.

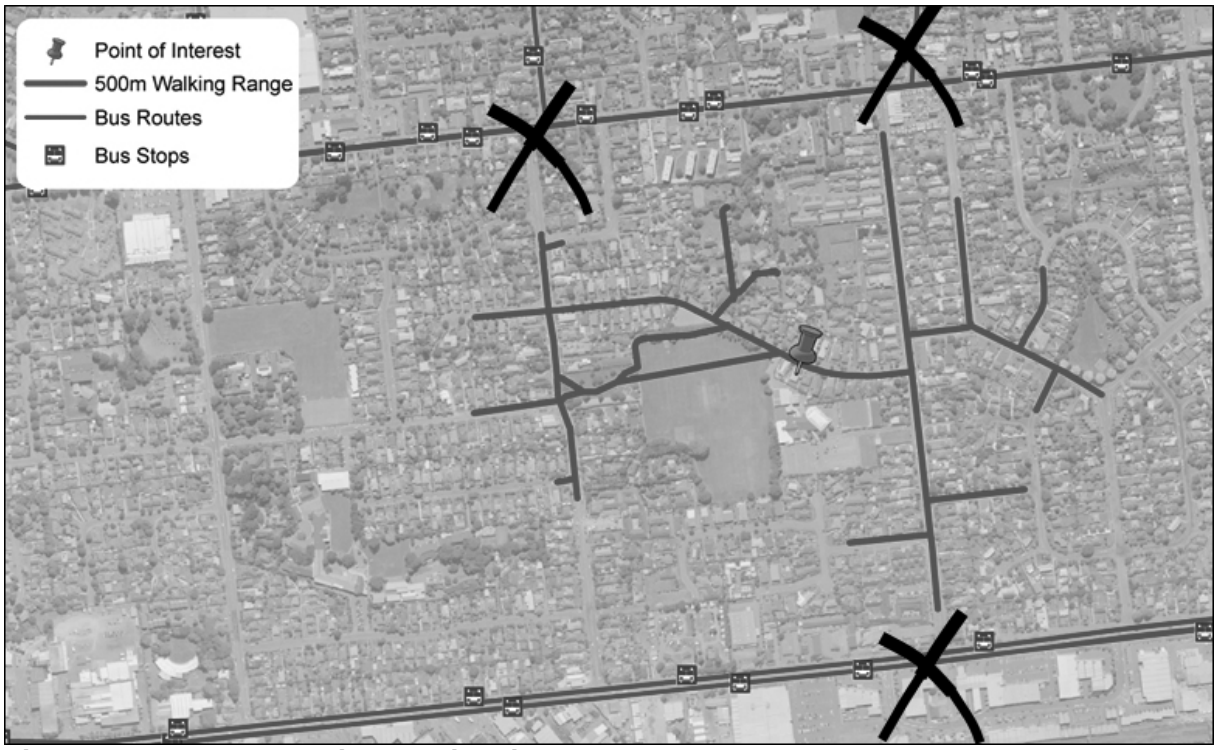

Figure 3 500m on road network to bus stop

There are a number of better methodologies for measuring the quality of a public transport system including measuring the variables above as well as reliability, frequency, access locations, services and ease of walking. Litman (2008) lists a number of methodologies that have been developed including Local Index of Transit Availability (Rood 1997), Transit Level of Service Indicator (Kittelson & Associates and URS, 2001), Transit Service Accessibility Index (Polzin et al., 2002) and many others. This paper describes another methodology that does not appear[1] to have been identified by Litman that was developed by the London Borough of Hammersmith and Fulham in 1992. The methodology named 'Public Transport Accessibility Levels' (PTALs) was later adopted by Transport for London (TfL) and is a specific methodology published as best practice in TfL's 'Transport assessment best practice guidance document' (2006), Appendix B. The document notes *"The current methodology was developed in 1992, by the London Borough of Hammersmith and Fulham. The model has been thoroughly reviewed and tested, and has been agreed by the London Borough-led PTAL development group as the most appropriate for use across London"*

The confidence that TfL have in the methodology lead Abley Transportation Engineers Limited (ATEL) to recommend the methodology to the Christchurch City Council (Council). Council asked ATEL to itemise the public transport performance of each of the commercial centres in Christchurch. In partnership with Council the brief was developed whereby the whole of the metropolitan area was assessed to test the performance of the supply[2] of public transport in Christchurch. Essentially, what is the quality of the system in terms of spatial accessibility and were some areas provided with better accessibility than other areas? If enclaves of poor accessibility were identified, what could be done to improve accessibility in these areas?

[1] 'Public Transportation Accessibility Level' is noted as a methodology developed by Hillman. This is thought to be different to 'Public Transport Accessibility Levels' developed by London Borough of Hammersmith and Fulham.

[2] PTALs only measure the supply of public transport, they do not measure the demand for public transport i.e. where people want to go.

MODEL DEVELOPMENT

There are a number of inputs to the PTAL methodology, very simplistically they include:

- Where are the bus stops, rail stations or ferry terminals? In Christchurch only bus stops were assessed due to limited other modes. These are 'service access points'.
- How many services use each 'service access point', for Christchurch this is principally, how many bus services visit each bus stop?
- How reliable is each service at each 'service access point' i.e. within how many minutes should a bus arrive at each bus stop?
- What is the frequency for each service, for Christchurch how many buses visit each bus stop per hour for each service?
- The walking distance that is expected to reflect a maximum walking time that a user will tolerate.
- The walking speed that is used to determine the maximum walking time.

Several of the above base variables were supplied by Environment Canterbury, these included bus stop locations, bus routes, bus frequency and reliability. A number of the variables for the calculation were populated with standard information from the TfL guidance such as walking speed (1.3m/s) and the maximum walking time of 8 minutes. Additional data was developed such as the creation of a detailed walking network that modelled crossing delays depending on crossing type and traffic volume. The creation of the walking network is a significant asset to Council and as far as the authors are aware, is the first citywide and detailed network in New Zealand. The walking network has since been used on other Council projects.

The application of the walking network and the calculation of PTAL was complex and involved a significant amount of technology using ArcGIS Network Analyst and Python scripting. A grid was developed and at 100m intervals a PTAL was calculated, this involved calculating PTALs at some 20,000 points. The result of the analysis is shown in Figure 4.

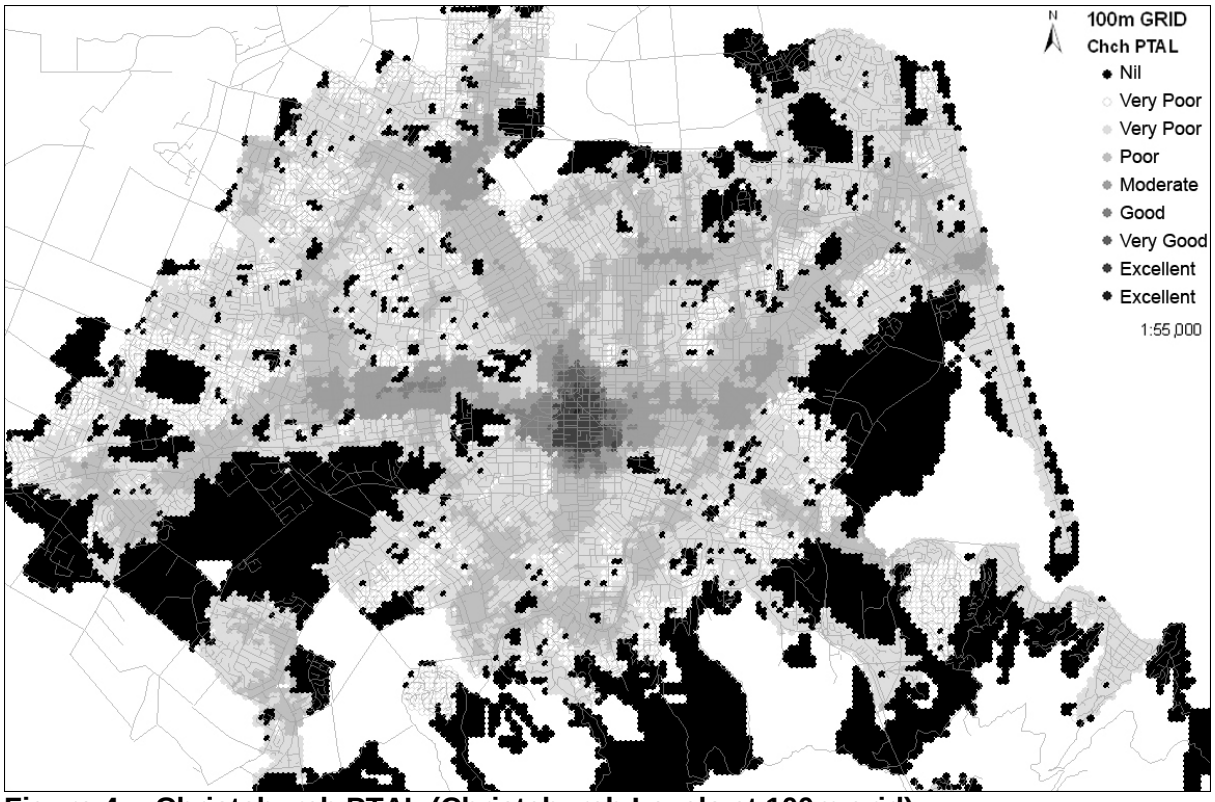

Figure 4 Christchurch PTAL (Christchurch Levels at 100m grid)

MODEL TESTING

The analysis showed that the location shown in Figure 1 to 3 performed extremely poorly and a PTAL was not able to be calculated because a bus stop was not able to be accessed within 8 minutes. Two alternative options for increasing PTAL at this location were tested. One involved a new walking link and the other a re-routed bus service. The new walking link increased PTAL at four locations close to the point of interest. The other option increased PTAL at six locations as shown in Figure 5. The intensity of results varies between the options; the walking link produced high intensity around the point of interest whereas the rerouted bus route produced lower intensity but over a wider area.

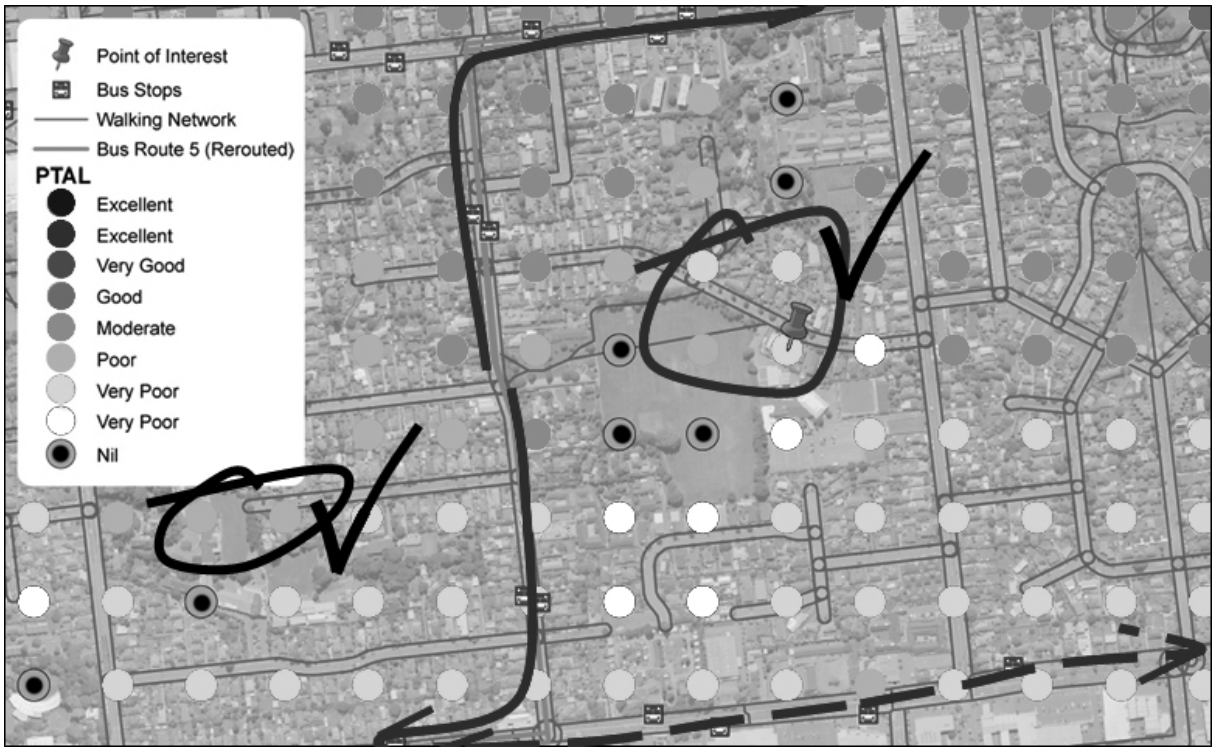

Figure 5 Rerouted bus route increased PTALs in 6 locations (3xPoor, 3xVery Poor)

CONCLUSION

The authors have discussed that the quality of public transport is important for the level of success that public transport provides towards a sustainable public transport system. Measuring the supply of public transport is critically important to manage this significant public resource. True accessibility modelling will ultimately provide the mechanism by which the whole of the transport network will be tested to determine how well public transport is competing with other transport modes, and if a gap exists, by how much. In the mean time though it is important that work continues, PTALs are part of this important work.

RECOMMENDATIONS

Abley Transportation Engineers recommend that:

- Benchmarking of PTALs in other New Zealand cities is undertaken.
- Develop PTALs specific to New Zealand, mindful of the London levels.

REFERENCES

Litman, T. (2008). Evaluating Public Transit Benefits and Costs - Best Practices Guidebook. *Victoria Transport Policy Institute*, http://www.vtpi.org/tranben.pdf.

Transport for London (2006), Transport Assessment Best Practice - Guidance Document, http://www.tfl.gov.uk/assets/downloads/corporate/TAGuidance_LQ.pdf