The Shelter Business

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Abstract
Absence of investment rationales and design standards for high quality waiting environments at bus stops has led to varying degrees of neglect of the "shop window" of Auckland's bus system (including feeder buses to rail and ferry), save at a minority of stops where attractive-looking shelters have lately been provided by advertisers. This paper is intended to address the current absence of a formal rationale for bus shelter investment in the public sector, and to address the parallel absence of design standards as well. The first major class of shelter investment rationales developed in this paper is health benefits. Only at bus stops do old people wait for long periods outdoors without doing anything to keep warm, so bus stops may be key to many winter ailments. The second major class of investment rationales is patronage benefits both in the peak, and off-peak. Off-peak patronage is likely to be most sensitive to the waiting environment, and influences total system capacity available for congestion relief in the peak. Funding has not yet been sought to test or quantify the various shelter benefits beyond a preliminary level. However the evidence so far available suggests that such benefits may be large enough to render the lifetime cost of shelters a minor consideration. Details of shelter design for storm-proofing, personal safety and attractiveness are also addressed with a view to eventual establishment of regional or national standards.

Introduction

Surveys and public requests show a constant unmet demand for “more and better designed bus shelters.” It has also been argued by some commentators that shelters are the “shop window” of public transport. Despite these pressures for improvement, objections of frontagers and concerns about the costs of vandalism have ensured that transport shelter has remained inadequate New Zealand-wide.

Medical research strongly suggests that waiting at chilly and exposed transport stops helps to explain the annual “winter crisis” of increased death rates and hospitalisation, particularly among the elderly. Economic research also shows that the need to wait at transport stops is perhaps the largest disincentive to the use of public transport by those who have other options. Much of this negativity may derive from undignified, absent, or exposed locations in which to wait, as opposed to waiting itself. For example, waiting a location in which it is not possible to read a newspaper because there is no protection against strong winds. Or, where there is a shelter, but only a very basic one, which has not been cleaned lately. Lack of shelter perhaps most strongly discourages off-peak travel where significant waiting is involved, and this in turn constrains the size of bus fleets, so that they are then inadequate for the peak.

In the past the public sector has been responsible for bus shelters, and it is fair to say that the public sector in New Zealand has in recent decades provided inadequate numbers of shelters. Shelters have often been of poor quality and appearance as well. More recently, transport shelters have been offered to councils by advertising agenciesm in an innovative public-private partnership that has transformed the look of many city streets. Advertising shelters are

free to councils and have a quality appearance. They are brightly lit at night, and are kept clean and free of graffiti by the providers.

But advertising shelters are not a complete solution. First, such shelters are not provided at every bus stop or even at the most heavily used stops. They are provided at locations where the hoarding is likely to be seen by the largest number of pedestrians or motorists. Some contracts between councils and advertisers have required advertising shelters at regular intervals in well-trafficked streets to produce a uniform streetscape. But to extend this level of provision to every suburban bus route would likely require a subsidy. Second, advertising shelters are of an open design so that the hoardings can be seen. Depending on the prevailing wind, open designs can be unsuited to exposed locations, although some advertising shelters are more open than others, and new types of hoarding may allow a higher degree of enclosure in the future. Third, there is community objection to advertising outside of what may broadly be termed 'commercial' locations and the advertisers themselves may wish to avoid oversaturation. Fourth, the large hoardings typical of advertising shelters can cause sightline problems at some sites in the road reserve.

The fact that advertising shelters are not a complete solution has stimulated a fresh look at the public model. In the past the public model stressed short term cost saving. However, the advertising model accepts higher costs in return for a service (advertising space). It is argued here that the public model should be similarly placed on a more businesslike footing. In place of advertising space, the benefits to the public sector comprise reduction in winter ailments and waiting time disincentive. Better design and more robust rationales for shelter will also reduce frontager objections and associated consenting costs. These arguments are supported by evidence and experience gained under North Shore City Council's bus shelter programme. The supporting evidence includes some preliminary technical conclusions on bus shelter design.

Background

In 1999, North Shore City Council carried out a consultation exercise called Project FaB (Ferries and Buses), to find out what public transport users wanted. Project FaB won the 2000 New Zealand Post Management Excellence Award (Community Relations) and was adopted by North Shore City Council as an Action Plan.

The FaB Action Plan included more and better-designed bus shelters. Bus shelters are the "front window" of the public transport service. But no codes of practice seem to exist for bus shelter design. The public charge current bus shelters with being (variously) deteriorated, in an unsafe location, easy to loiter behind, with potential for entrapment at a single narrow entrance, or not stormproof. Shelters are also charged with being dark and needing to be lit.

A small number of bus shelters were initially purchased in an attractive design with a barrel-vaulted roof and two entrances. The design was revised and a further contract let. This contract contained three distinctive elements:

- First, the design was specified in detail by NSCC.
- Second, the quantity was large, 300 shelters over three years.
- Third, bidders were exhorted to apply industrial techniques of production.

The winning bidder has been able to produce maximally stormproof shelters for $4,500 each net of GST (local authorities do not pay GST) including some value-adding extras, but before lighting, for continuous delivery in batches of 20. An example of one of these is shown as

Figure 4. This includes 10 mm safety glass, which is more expensive to replace than the traditional 6mm glass but also harder to break.[1] Installed cost is $6,000. With lighting the installed cost would be just under $8,000. It is thought that lighting may pay for itself by reducing costs associated with vandalism.

These costs are significantly less than the costs of similar but slightly larger shelters previously acquired under small annual contracts. This cost control results in savings to Council over 300 shelters of $1.4 million. Perhaps more importantly, the benefits of new bus shelters are being quantified for the first time.

The traditional treatment of publicly-provided bus shelters: a cost centre

Traditionally, bus shelters have been treated by Council as a cost item with little systematic attempt to assess benefits and set these off against costs. This is in keeping with the general absence, anywhere, of standards for bus shelter design or management, and perhaps also, with a wider emphasis in public transport economics to dwell on cost minimisation.[2] Partly for this reason, shelters tended to be under-maintained and were also subject to very onerous procedures for approval, precisely because they were unattractive.

Although innovative, the advertising model does not challenge the traditional view of the shelter as a cost centre. Yet shelters do produce benefits, or we would not erect them in the first place. To develop a business model for those shelters which advertising will not fund, we need to become systematic at recording benefits.

Health benefits of shelter

The most obvious benefit of a shelter is shelter itself. That this is a basic need and not a luxury to be set off against relatively minor RMA planning considerations is underscored by the research of Professor W R Keatinge of London University who has, in the *British Medical Journal* and elsewhere, identified poor (or non-existent) transport stop shelter, in association with long transport headways, as a factor in excess winter mortality:

> With influenza causing such a small proportion of excess winter deaths, measures to reduce cold stress offer the greatest opportunities to reduce current levels of winter mortality. Warm housing is important but it can coexist with high winter mortality, and outdoor cold stress has been independently associated with high excess winter mortality. Campaigns to reduce exposure to cold outdoors provide obvious scope for future preventive action.[3]

In spite of a warmer climate, New Zealand's excess of winter mortality is actually worse than that of Britain! According to the NZ Ministry of Health Information Service, the death rate in New Zealand rises by 2.8% for every 1 degree C drop in temperature, versus 2.0% in Britain.[4] To the extent that this is caused by *indoor* exposure to cold, this may reflect rudimentary insulation code requirements. Only indoor sources of exposure to cold seem to have been analysed so far by the Ministry of Health. However, the research of Keatinge *et al* specifically identifies transport stops as an *outdoor* location where old people are likely to suffer cold injury following long waits for off-peak buses, and this has also been followed up in British media accounts.[5]

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[1] This was initially laminated but thermally toughened glass is also being trialled.

[2] David Lewis & Fred Williams, *Policy and Planning as Public Choice: Mass Transit in the United States* (Ashgate, 1999).

[3] G C Donaldson, W R Keatinge, 'Excess winter mortality: influenza or cold stress? Observational study', BMJ 2002; 324: 89-90 (12 January)

[4] As currently processed and reported for the WHO by Professor Bob Lloyd, Otago University.

[5] J Meikle, 'Cold stations and bus stops blamed for winter deaths', *Guardian*, 11 January 2002.

The important thing about transport stops in this context is that people walk to them and then stop moving and stand still, or sit, for a period of time, and thus become chilled. Elderly people are also major users of public transport, perhaps the major users in the off-peak when frequencies are low and waits are long. As such, unsheltered transport stops are a form of public infrastructure almost purpose-designed to cause chilling of old people. To the extent that wind chill compounds cold exposure, exposure at transport stops is made worse. Although New Zealand is warmer than Britain, this country is nonetheless windier. It is possible that the combination of infrequent public transport, lack of transport shelters, and wind chill is a significant factor in New Zealand's in producing a higher winter mortality excess in 'warm' New Zealand than in Britain. It should be added here that Britain is itself regarded as a poor performer, and that nothing like such an excess of winter mortality is seen in countries such as Sweden or Germany, countries that are (much) colder still than Britain in winter.

Mortality is the tip of a much larger iceberg of winter ill-health, the annual "winter crisis" that overloads our hospitals. Mortality aside, the need to prevent hospitals buckling under the strain of winter ailments is one driver of recent proposals for improvement to insulation codes, the other one being energy saving. But if we are going to reform insulation standards, in order to save energy but more importantly to increase health standards, we should reform transport shelter standards at the same time.

There are also likely to be indirect health benefits of shelter. Bus shelters support transport services, that in their turn encourage walking and exercise. A better public transport system can also keep older (and younger) people independently mobile.[6] Space prohibits extensive discussion of these, but they are also clearly significant. I have focused on the more direct health benefits here however, as they seem to be a new concept in the New Zealand debate.

Patronage benefits of shelter

North Shore City has carried out some limited patronage surveys at bus stops in 2000 and also a fully exhaustive, 24-hour survey of all bus stops (1100) in June 2002. In August 2002 a particularly large, 6m bus shelter was installed at a busy stop in Glenfield. A re-survey in June 2003 showed that am peak patronage had gone up from 30 to 55.

Based on the Government's present Patronage Funding formula, this single shelter is generating a potential Patronage Funding stream of up to $700 a week and also an additional revenue stream of up to $500 a week for the bus operators, or up $1,300 in total. The "up to" reflects the fact that the shelter may be cannibalising patronage from other, less attractive stops. Patronage benefits will be evaluated more accurately by a follow up 24-hour survey in the winter of 2004 or 2005. However the preliminary results at Glenfield suggest that there is a significant patronage benefit, which soon adds up to the cost of the shelter itself and also considerably exceeds the cost of its maintenance.

A patronage benefit not so far measured is the possible effect whereby an attractive waiting environment causes more people to use the buses off-peak. This then allows more buses to be acquired, since off-peak patronage exercises an important influence on total bus fleet size and therefore bus fleet capacity in the peak. In Auckland, it is common at present for peak period users to be unable to board buses that are full. Attention to the off-peak user may be key to better peak period services.

[6] Cf Lewis and Williams (1999).

Shelter cost in relation to other projects
At an conservatively assumed cost of $10,000, which would allow for a significant number of double-sized shelters and also the lighting of all shelters, North Shore City bus shelters of the new type would cost $9 million to install at all non-advertising bus stops in North Shore City including stops where people do not board but only wait to cross the road. Patronage benefits can generate a sustainable funding stream to pay off and maintain the shelters. Avoided resource consent costs under a policy of universal installation, and avoidance of adverse health outcomes, can be set off as additional benefits of a high-quality shelter programme.

Management of vandalism and social problems
Frontager objections are caused by unattractive appearance and the perception that shelters will be associated with social problems such as congregation for public drinking. Cost concerns are also driven by vandalism and the need for repairs. These issues need to be independently controlled in any programme that makes shelters 'normal'. I will start with appearance. Because of the less attractive appearance of past shelters, North Shore City until recently required notified resource consent for all new bus shelters in addition to a mandatory form of notification under the Local Government Act. A District Plan change to make non-advertising bus shelters a permitted activity subject to design controls has recently been obtained.

Glass walls are desirable to control loitering and vagrancy, but are vulnerable to vandalism. Graffiti can be controlled by instant response. Where window-smashing is serious and intractable, perforated metal screening can still provide an effectively transparent surface. Perforated metal can remove nearly as much of the wind-chill factor as glass and will also block nearly all storm rain in practice. A further point in its favour is that perforated metal makes graffiti less visible than a solid surface. Perforated metal can be attractive and is used electively on much high-value public street furniture and on buildings. So even in the most vandalism-prone areas, it is possible to provide bus shelters of the same design as elsewhere, by substituting perforated metal for glass.

Lighting is desirable to create a sense of security, and may well pay for itself in terms of vandalism reduction. At the present time, solar lighting units costing $1,700 are being installed at ten shelter sites. It is thought that these may be cheaper to install than mains-powered lighting once the trenching- and safety requirements of the latter are taken into account.

Conclusion
Based on the above, it appears that the 'grassroots', or 'shop window', of the public transport system, and its corridors, has been surprisingly neglected, perhaps in favour of larger and more conspicuous projects. It is a mistake to treat bus shelters as a cost to be incurred to some arbitrary level and minimised otherwise. Shelters should be treated as an investment with an important range of benefits in an explicit social business model. This model should focus in a 'joined up way' on the shelter-mediated connections between transport and health, and between the off-peak public transport user with strong shelter requirements and peak-period system capacity. The conventional allocation of bus shelters to stops that are 'busiest' may be of little scientific use in this respect. Formal systems to fund a general provision of shelter at every bus stop from health- and patronage-benefit funding may, however, be useful. The funding of more detailed research into shelter benefits and/or the development of standards may also be useful. Ultimately, it is hoped that a growing awareness of the issues involved will normalise the well-designed transport shelter as a normal and attractive piece of corridor infrastructure, in place of its current status as something both objectionable and objected-to.