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A case study of bicycle parking at selected Brisbane rail stations

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Abstract

Dutch investments in secure bicycle parking at stations and modal interchanges since 1985 has made rail travel more competitive with car travel; by 2006 A$250 million is budgeted for bicycle security. In comparison, Australia is doing very little, except for Citytrain in Brisbane who have provided bicycle lockers since 1992 and now have 1,900 free lockers with a waiting list for over 1,000 more. OECD studies show that the high level of bicycle use in the Netherlands (28% of all trips) for 'door to door' trips and accessing railway stations has helped stabilise car fleet greenhouse emissions and constrained road congestion costs. Meanwhile Australian urban emissions and congestion costs escalate.

The Dutch bike/rail experience suggests that Citytrain has only picked up part of the latent demand for bike/rail travel. Even so, this paper shows that Citytrain has demonstrated that able bodied Australians will cycle to a station if the serious problems of bicycle theft and vandalism are addressed with free lockers. After all there is free car parking which costs far more and when 25% of locker users no longer park their cars at the station, it reduces the cost per vehicle parked and optimises the use of car parks.It is concluded that this is Australian best practice. Furthermore, as rail patrons mostly use lockers for commuting to work or places of education on all rail systems, Citytrain's provision of 453 lockers per 10,000 commuters should be accepted as an achievable 5 year target. This target when translated as additional lockers required on other rail systems is: Melbourne 3800, Sydney 8800, Adelaide 240, and Perth 480. The Bicycle Federation of Australia wants these lockers funded out of vehicle parking budgets, and given priority over car parking.This paper supports that view.

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Citytrain has had a successful experience in the design of bicycle lockers and the efficient management of bicycle locker installations on the Brisbane suburban rail system. In December 2002 there will be 1,900 bicycle “lock ups and a demand for around 1,000 more lock-ups (Gardiner 2002). Citytrain's experience with some large installations suggests that there is a latent demand for bike/rail travel in most low density suburbs. Bicycle lockers are provided when funding permits and are constructed in the workshops of the Queensland prison service.

Cycling also plays a role in increasing Brisbane’s intermodal travel through a significant number of bicycles being carried on suburban trains out of peak hours and for travelling contra-flow during peak hours (Austroads 2002). There are practical limitations to the carriage of bicycles during the peak flows in the rush hours so it is necessary to have more secure long term parking of bicycles at railway stations.

The use of lock-ups is the only secure means of storing bikes at unstaffed stations and Citytrain is the only rail system in Australia to provide anywhere near enough secure bicycle parking that is in accordance with SAA standards and Austroads design standards (SAA 1993) (Austroads 1997). In this paper the following definitions of bicycle lockers and bicycle lock-up’s apply.

- Bicycle lockers in Australia are either “single sided” or “double sided”. Single sided lockers store only one bicycle in a wedge shaped sheet metal box; this allows four of them to fit together in quadrant and to fit neatly into a corner.

- Most lockers in Australia and Brisbane are double sided rectangular sheet metal boxes which accommodate two bicycles as is shown on figure 1.

- A “lock-up” is one secure storage space in a locker irrespective of whether it is single sided or double sided locker. The number of lock-ups is the measure of locker installation capacity.

The current Brisbane locker design (figure 1), with only minor changes, originates from a bicycle security product development project conducted in 1991/92 by the Manager of Passenger Intermodal Services. This project involved experimentation with various designs of racks and lockers at several stations (Gardiner 1993) and consultations with bicycle users. Prior to this the Bicycle Institute of Queensland had also been active in lobbying for secure bicycle parking at stations (BIQ 1989). Several designs of lock-ups were trialled but the lock-ups installed conformed to the SAA standard released a year later. The 1991/92 project established that U racks are only suitable for occasional users at staffed stations.(Gardiner 1993).

The vandalism of the bicycle and the theft of parts is a major problem on all Australian rail systems.(Parker 2001 B). This writer consulted with Bicycle Federation of Australia colleagues who are locker users in Brisbane and given

their perception of the bicycle security problem, illustrated on figure 2, it is clear why they are happy with the lockers. (This is not a Citytrain poster)

Figure 1: The most common locker in Australia is double sided.

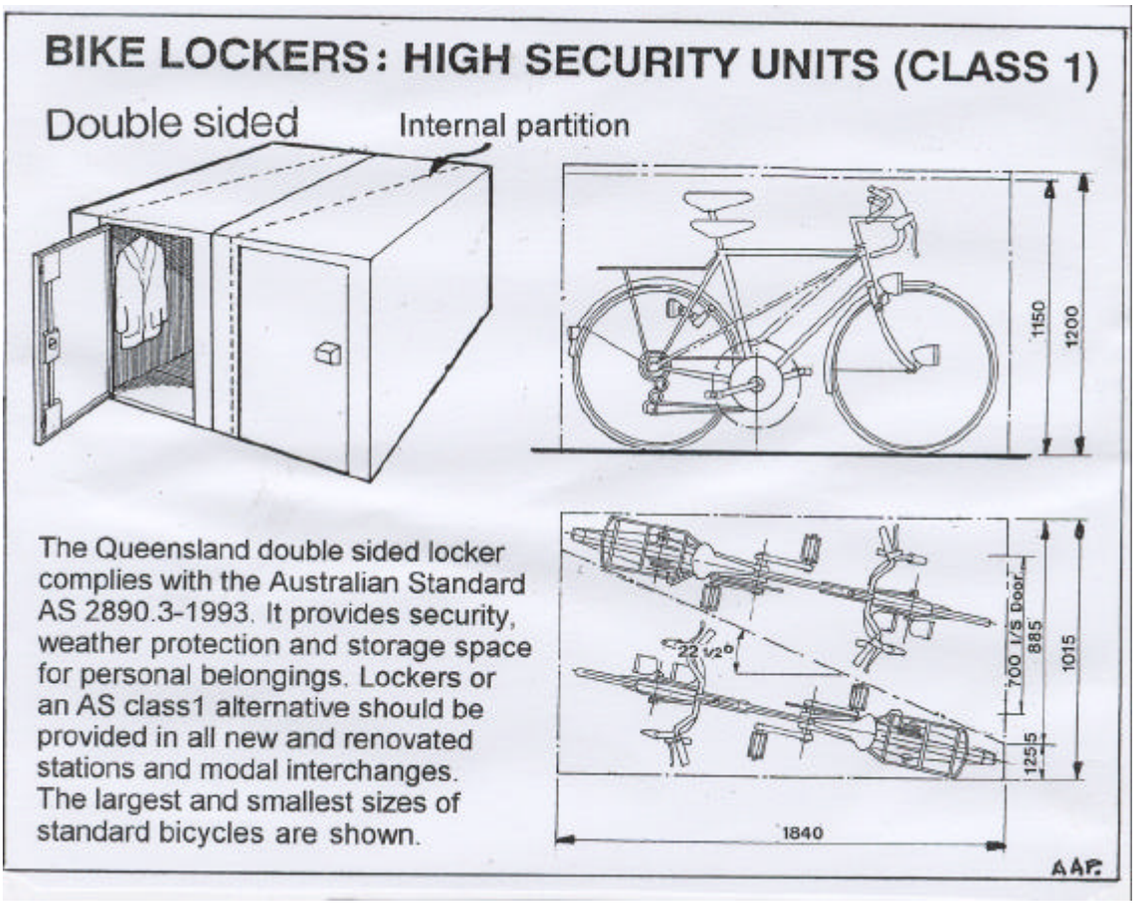

Figure 2: Actions that speak louder than words.

The message that has been received by bike/rail users in Brisbane.

The Integrated Regional Transport Plan for SE Queensland (IRTP 1997) recommended that bicycle lockers be used to increase rail patronage as part of a demand management program to reduce car dependence over the next 20 years. Another more recent manual supports that policy (Austroads 2002). The policy of encouraging bike/rail travel with provision of secure bicycle parking including lockers has been succesfully pursued for 12 years in the Netherlands (ECMT 2001) (Welleman 1997). The Dutch see Bike/rail travel as an important part of an overall national environment plan encourage bicycle use generally and using bicycles to do the following:

1. Substitute for many short urban car trips, mostly made with a polluting cold engine, thus reducing pollution and the demand for car parking.

2. Enable families to save money by avoiding the purchase of second or third cars thus reducing the demand for road space and car parking.

3. Encourage exercise that reduces the risk of heart disease and the costs of health care.

4. Substitute bike/rail trips for long car trips for a large proportion of the population, who are beyond convenient walking distance to stations, but within easy cycling distance of a rail station (Welleman 1997) (CROW 1996) (CROW 1997) (Keijer and Riefield 2001).

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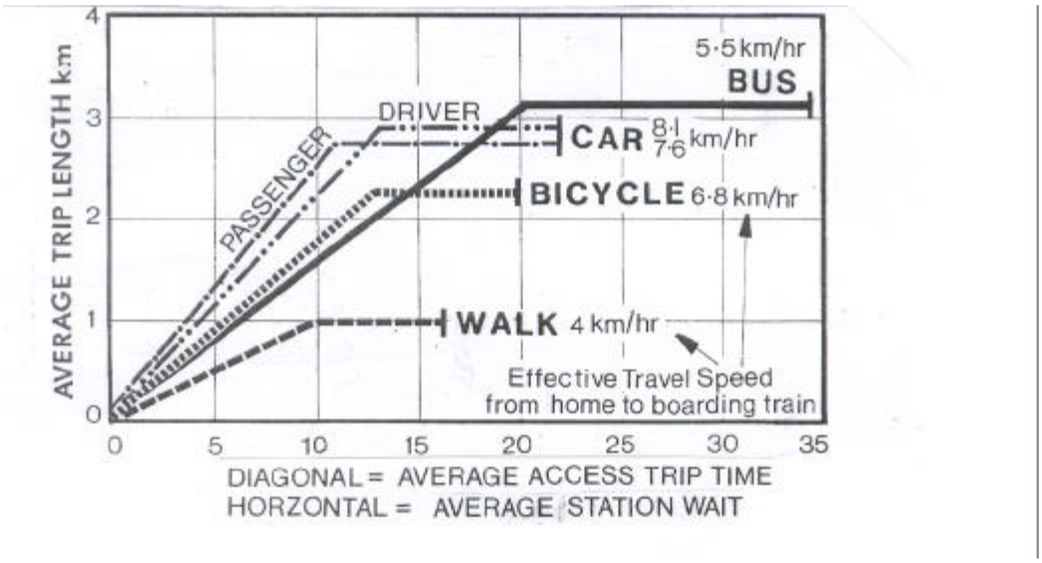
There is sound Dutch research showing that bike/rail travel is the most competitive public transport mode to the motor car for everyday commuting (Welleman 1997). Access to stations by walking is too slow for distances over 500 metres; bus access results in longer waiting times on the platforms; and most important of all car parking is much too costly and space consuming at busy stations. See figure 3

Figure 3: Time and effective travel speed from home to train boarding



The Dutch bike/rail experience suggests that Citytrain has only picked up part of the latent demand for bike/rail travel, but Citytrain has demonstrated that able bodied Australians will cycle to a station if the serious problems of bicycle theft and vandalism are addressed with free lockers.

Bike/rail travel can make rail networks more accessible and competitive with car travel

The growth in bike/rail travel on rail systems in Netherlands,(Nijenhuis 2000) Scandinavia, Switzerland and Germany (Bracker 2000) is well documented (Parker 2001 B). An OECD report (ECMT 2001) shows that the high level of bicycle use in the Netherlands (28% of all trips) for 'door to door' trips and accessing railway stations has helped stabilise car fleet greenhouse emissions and reduce air pollution. As a consequence of implementing the Dutch bicycle master plan, the national rail company NedRail increased its modal share of land passenger transport from 8.5% of all trips in 1985 to 15% of all trips in 1996, mostly due to the increase in the proportion of patrons who ride bicycles to the stations (ECMT 2001). The larger Dutch cities have around 3000 bicycles parked at or under central rail stations.

Bike/rail travel competes better than other station/access modes with car use for commuting to work and places of education. The potential of bike/rail travel is realised when the needs of cyclists for safe access to stations, secure parking facilities, well organised route information and intermodal connections with buses, trains, and ferries is provided (Parker 2001 A).

Dutch investment in secure bicycle parking at stations and modal interchanges since 1985 has made rail travel more competitive with car travel; by 2006 a further A$250 million is budgeted for increased bicycle security(ECMT 2001)(Wellemen 1999). Australian rail companies should monitor the following which the Dutch companies are planning to encourage bike/rail intermodal travel over the next few years.

1. Once the generated demand for secure bicycle access increases ten fold it will be necessary for lock-up rooms or sheds, accessed by swipe cards, to be introduced on stations with high levels of bicycle access. The redundant lockers can then be recycled to stations with low levels of bicycle usage. The per capita cost of secure bicycle storage can in the long term be greatly reduced in this way (Sully 2000)>

2. Mass produced "public transport" bikes will be made freely available to monthly and seasonal ticket holders who park their cars or bikes at stations at the outer edge of cities and need to access destinations in the CBD and the inner suburbs (Langenberg 2001). Similar schemes are being developed in Switzerland and have been applied successfully in the Munich region and Berlin regions (Bordlein 2000).

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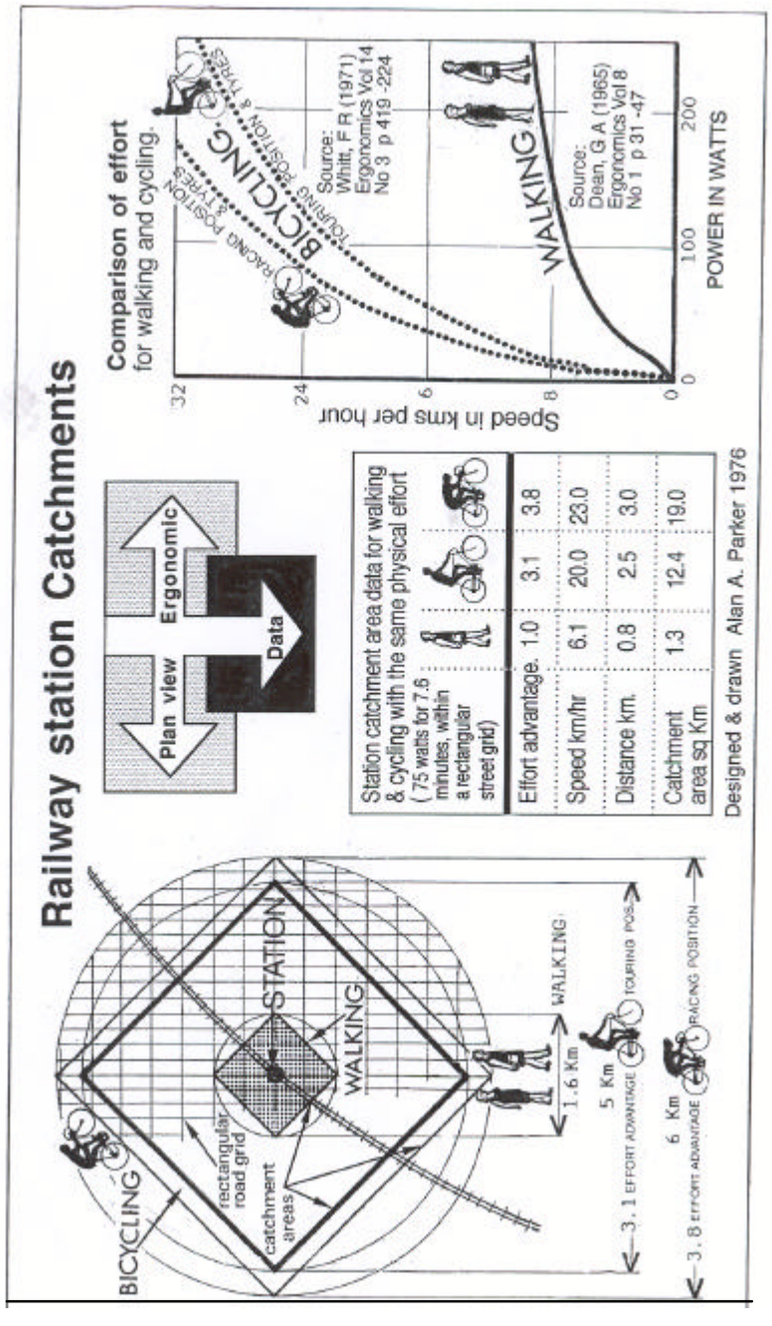
3. Mass produced folding bikes and mountain bikes will be hired out at intermodal interchanges, end of line stations and at international and interstate tourist destination (Haverman et all 2002).

4. More lock-ups will be provided at express bus stops (CROW 1997)(Wellemen 1999).

Bicycle access uses the ergonomic advantage of pedalling over walking to go 3.5 times as far and access ten time the pedestrian catchment area of rail stations. Figure 4 shows the catchment areas for walking and cycling for able bodied people riding bicycles. The size and shape of the catchments around a station within a rectangular road grid are defined (Parker 1989).

Figure 4: bicycle and pedestrian catchment areas at a rail station.



Bicycle locker development in Brisbane 1991/1992

Bike racks have been provided at Brisbane's rail stations since the end of World War 2 when bicycle theft was not such a serious problem as it is today. Since the 1980s the ownership of quality bicycles and an increased level of theft and vandalism have both increased. In 1991/1992 theif proof racks were trialled in locations off the platforms. They had lock-shields and hardened chains to lock both wheels, which could not be cut with the bolt cutters favoured by most thieves. They were rejected because cyclists found the lockshields difficult to use and as a result failed to lock their bicycles securely so that the racks did not stop bicycles being vandalised (Gardiner 1993).

The first batch of lockers to be produced had lockshields protecting padlocks on the doors and were constructed by Queensland prison workshops. In 1993 Queensland railways decided that lockers were the best solution for long term parking at stations as a result of the lock-up trial (Gardiner 1993). This was a sound decision that conformed with the Australian standard for long term bicycle parking (SAA 1993).

The design of the Brisbane locker has changed little since then but the lock shield has been superseded by the pick proof locking system. Today all Brisbane lockers are double sided and have a high quality replaceable lock in case the key is lost or stolen. The lockers are weatherproof with low maintenance costs, but every six months they are opened and dusted with insecticide to prevent infestation by red back spiders. The use of a master key by the manager of intermodal services enables periodic checks to be made of locker utilisation. This procedure ensures a locker occupancy rate of around 70% to 75 % during the working week, which is a high level give that many commuters now work part time. This occupancy rate is much higher than in Melbourne and Sydney (Parker 2001 B).

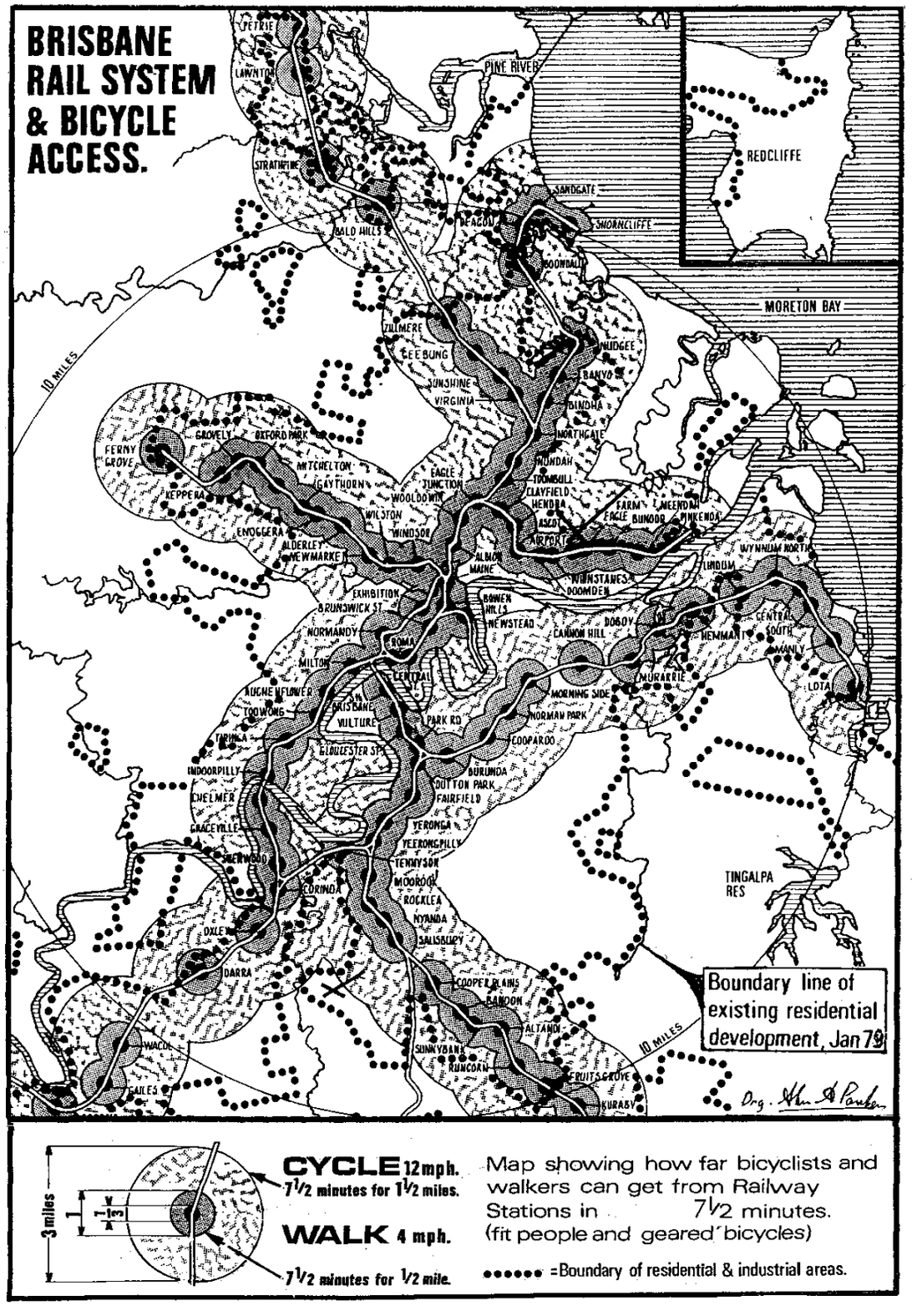
Station staff are happy with the lock-up registration system. Cyclists complete a "Locker usage application form" and pay the deposit of $50 at their local stations. Cyclists get the $50 back when they return the key when they no longer require the lockers. If they do not return the keys or lose them, the $50 deposits contribute to the cost of replacing the locks. There is no problem with making this work because the registration form signed by the cyclists legally commits them to this arrangement. Every three months cyclists are required to re-register or return their locker keys and this ensures that there are few empty lockers during the working week. All that station staff have to do is to stick a leaflet on the locker every three months advising the cyclists to register again. If they do not register again the lockers are opened with a master key and given to someone else after the lock has been changed.

Since the first lockers were installed in 1992 the growth rate of installed lock-ups has averaged out at 170 per year in Brisbane. There are 130 stations in Brisbane in 2001 and 70 have bicycle lockers; in addition, security comes from video cameras at 33 locker installations in car parks.In 2001 there were 850

double sided lockers on the system with a total capacity of 1700 bicycle loch-ups or one lock-up for every 20 rail commuters in Brisbane.

Figure 5: Map of bicycle and pedestrian rail catchment areas in Brisbane

Figure 5 was published in several journals in the late 1970s and shows the bicycle and pedestrian catchment areas to the Citytrain network. Around 85% of the rail network was accessable by bicycle in those days (Parker 1979).



The Brisbane has grown since then but bicycle access today still makes the rail system far more accessable but by how much needs further research.

Six bicycle locker installations at outer Brisbane rail stations

This writer inspected six bicycle locker installations with a total capacity of 312 bicycles, including the largest locker installation in Australia at Lawnton station. See table 1. These installations are located on the North Coast line of “Citytrain Network” between 15 and 27km from the Brisbane CBD.

Table 1. Six Brisbane stations: locks ups and car parking data..

Station and km to CBD		Lock-ups 1992*	Lock-ups 1994#	Lock-ups 2001	Car Park 2001	Car/bike ratio
Zillmere	15 km	0	6	66	218	3.3
Strathpine	19 km	0	0	28	237	8.4
Bald Hills	20 km	20	30	58	147	2.5
Bray Park	23 km	10	30	58	152	2.6
Lawnton	25 km	0	8	82	159	1.9
Petrie	27 km	10	22	66	450	6.8
Total		40	96	338	1363	4.0

SOURCES * Table C5.1 Bicycle Brisbane Plan 1994
Chris Gardener Manager Intermodal Passenger Services QR

Five of the above six stations have lifts for wheel chair users and wheelchair accessible buses connect with Petrie station. On Zillmere, Petrie and Bald Hills Stations there are security cameras in the car parks. On all stations the toilets are open when the station is staffed. There are pay phones and platform help points. On Bray Park Station there are no lifts but there is a ramp on which wheel chairs can be pushed by a helper to access the platforms. There are security cameras located on the platforms.

In Brisbane there are 453 lock-ups per 10,000 commuters, and at the six stations on the Northcoast Line listed on table 1, which are from 15 to 30 km from the CBD along the rail line, the ratio of car parking spaces to bike lock-ups is as low as 4 to 1. This compares with around 25 to 1 in outer Melbourne. These six stations service low density areas and the 4 to 1 ratio of car parking

to bike lock-ups provides an indicator of the level of locker provision that would be viable in similar flat low density areas in other capital cities.

Figure 6 shows two photo graphs of the 66 lockers at Zillmere station

Figure 6 Citytrain Northcoast line

Zillmere station 15 km from Brisbane CBD

No marketing campaign needed for free lockers at stations

The advantage of using the Brisbane pick-proof lock-up is that it provides customer satisfaction which successfully markets the lockers. There have been no recorded break-ins to these lockers. In Brisbane, cyclists using the lockers spread the word about how secure and convenient they are. Contrast this with Melbourne where the cyclist “bush telegraph” states that if you use the racks provided you will either have your bicycle stolen or vandalised, even on stations with security cameras or in racks in a fenced compound (Parker 2001B). There are only 600 lock-ups in Melbourne on a rail system which is twice the size of Brisbane’s. Most of Melbourne's bicycle parking is in racks and many of the locks used by cyclists are pickable and the hasps on the lock or the chain is easily be cut by bolt cutters. A South Australian study confirms that racks are insecure (Hemmings,et al 1995).

The provision of racks is much less costly in the short term but more costly in the long term because cyclists choose to drive to work instead of riding to a station. This is not the best way to protect patrons’ bicycles which often cost in excess of $1,000 and or to retain rail patronage. Citytrain intermodal facilities staff understand that cyclists are often their own worst enemies when it comes to theft protection and provides lock-up with non-pickable locks. The problem with most cyclists is that they only take theft seriously after they have a bicycle stolen for first time so it should come as no surprise that in 1994 it cost Australian cyclists $30 million to replace stolen bicycles (Parker 1994).

In the interests of providing the most secure services possible “Citytrain” has an Intermodal Facilities Supervisor who holds all the locker master keys and is charged with maintaining all the lockers through the entire network. The number of master keys are kept to a minimum to reduce the risk of locker security being compromised (Carmichael 2002). The use of master keys makes it easy measure locker occupancy and maintain locker occupancy rates on weekdays on the entire rail system at around 70% or more. This rate compares well the 40% occupancy rate in Melbourne and Sydney.

Citytrain’s success in generating bike/rail commuting originates from one sound and equitable decision in a report to management which stated:-

> *It was noted that there was no charge levied for car parking spaces and the cost of the provision of a car parking space was considerably greater than the provision of secure bicycle parking. After due consideration of these issues, it was agreed that no charge would be levied for the use of secure bicycle storage facilities* (Gardiner 1993).

Treating bike/rail patrons eqitably is good economics.Car parking at stations can cost up to $8,000 per car space, when the opportunity cost of the land is taken into account, and bicycle locker installations take up far less space. Surveys conducted in Brisbane in the early 1990s showed that 20% to 30% of the lockers were being used by cyclists who previously drove to the station and

parked their cars all day (Gardiner 1995). Freeing up car parking spaces in this way optimises the use of car parks and is clearly a least cost strategy.

The ABS Census data for the trip to work from 1976 to 1996 and other transport data show that people are now walking less often and for shorter distances to access stations (Parker 2001).

Walking to the station in many areas is perceived as a high risk activity by women, the frail and the aged and the children who are the adult rail patrons of tomorrow. Their perception of “stranger danger” are weaker when riding a bicycle and stations are staffed. Their perception of “stranger danger” much stronger on unstaffed stations and overpowering when their bicycles are stolen or vandalised. Management of “Stranger danger” is one reason why most rail authorities over the last 20 years have invested in new car parking but only Citytrain has a treated there more vulnerable bike/rail patrons equitably by providing secure bicycle parking. This partly explains the long waiting list for new lockers. Hopefully they will be provided.

In Melbourne and Sydney rail managements have ignored the bicyclist equity issue. Bicycle theft on the Melbourne rails system was very high and the number of bicycles parked dropped from 2200 in 1979 to 900 in 1989 as a consequence (Parker 1989). According to one rail agency report the period 1985 to 1987 was particularly bad with 35 % of all bicycles being stolen in 1985, 48% in 1986 and 63% in 1987 (Bell, D 1988). Bicycle theft contributed to strength of the “stranger danger” perception and a whole generation of Melbourne’s secondary school children learnt that the easiest way to lose a bicycle was to park it at a station (Parker 2001B). The provision of secure bicycle lock-ups on staffed and unstaffed stations by Citytrain is a most welcome initiative and and model of best practice in Australia.

Lock-ups on other Australian rail systems and Ned Rail 2006

Since 1993 the incidence of vandalism on all urban rail systems in Australia has greatly increased and many bicycles have been irreparably damaged or had parts removed. Brisbane is a useful model for setting targets for the provision of secure lock-ups in all capital cities. The potential for bike/rail commuting is just as high in other Australian cities. There are maps that show the bicycle and pedestrian catchment areas in several publications which recommend the provision of Bicycle lockers in for both Sydney (Faber & Karren 1996) and Melbourne (Austroads 1999). This is also a key recommendation in the Australian national bicycle strategy (Austroads 1997).

The negative environmental impact of excessive reliance on private motor vehicles requires a major upgrade of the public transport system and a safer means of accessing the rail system by bicycle, power assisted bicycle and small electric vehicles used by the disabled.

Table 2 lock-up capacity & lock-up target to catch up with Brisbane.

Rail system	Commuters	Com per lock-up	Lock-ups	Lock-up target
Sydney	207,794	371	560	9,410
Melbourne	97,900	155	630	4,435
Adelaide	7,780	70	110	352
Perth	19,743	48	412	894
Total 4 cities	333,217	194	1712	15,110
Brisbane	37,500	22	1700	Demand growth

From Table 2 we can see that in terms of commuters per lock-up Adelaide and Perth are not far behind Brisbane but Melbourne is a long way behind and Sydney is very poor needing 8,800 new lock-ups to catch up with Brisbane. We can then easily compare Australia's overall performance with the Netherlands; the urban population of Australia in 1996 was the same as the Dutch population. Table 3 below compares the number of secure and insecure bicycle parking spaces on Ned Rail to all the urban rail systems in Australia in 2000.

Table 3. Bicycle parking facilities to promote intermodal passenger transport on the Dutch and urban Australian rail systems

Type of rail station bicycle storage	Netherlands 1999	Urban Australia 2000
Bicycle lockers	16,000	3500
Racks in guarded lock-up rooms	112,000	
Total: secure storage spaces	128,000	3,500
Insecure bikeracks around station	143,000	5000*
Total: all bicycle parking places	271,000	8,500

* This figure is approximate only and includes informal bicycle bicycle parking.
Data source: Nijenhuis, Rosalie (2000)

Table 3 shows that for every secure bicycle parking space at Australian urban stations there 36 secure spaces in the Netherlands. This comparison is only a rule of thumb because it includes Dutch rural rail services but it does show the scale of the difference. For example, if the same proportion of Melbournians used bicycles to access stations as the Dutch there be 70,000 bicycles parked on the rail stations on work days and 60,000 of these would be new rail patrons.

In Sydney even if we take into account the hilly terrain, there would be over 100,000 bicycles parked at stations. Such an increase in patronage would reduce the public transport subsidy in Sydney and ensure that Melbourne's two private rail companies would be making large profits with very large increases in the value of their shares as a consequence. They ignore the potential of bike/rail patronage and are providing ever more car parking to able bodied rail patrons

who come from within easy cycling distance. However, Citytrain's provision of bicycle lock ups for able bodied motorists living within easy cycling distance will encourage bike/rail travel as a substitute for long urban car trips and that is a more sustainable approach.

There needs to be a serious attempt to learn from the report entitled *"National Peer Review; The Netherlands"* (ECMT 2001). The *Review* is important because it written specifically as advice about European best practice for the transport ministers who are responsible for the development of better passenger transport systems in the European Union. *The review* provides the hardest evidence we are ever likely to have of the value of the Dutch approach to implementing to increasing railways modal share. Note that Australia has observer status at the meetings of EuropeanTransport Ministers.

Conclusion and recommendations

It is concluded that, as using trains is far more sustainable than mass car use in cities, Citytrain's provision of secure bicycle parking as part of its station upgrading program represents best practice for bicycle parking in Australia. Citytrain provides cyclists with free parking as is provided for motorists and in doing so frees up car parking spaces. Hopefully they will continue to lead the way and go even further in the next decade. The following recommendations are suggested for other rail authorities and companies to make practical use of Citytrain's experience:-

1. As rail patrons mostly use lockers for commuting to work or places of education on all Australian rail systems, Citytrain's provision of 453 lockers per 10,000 commuters should be accepted as an achievable five year target by other rail systems. This target when translated as additional lockers required on other rail systems is: Melbourne 3800, Sydney 8800, Adelaide 240, and Perth 480. These lockers should be funded out of vehicle parking budgets and given priority over car "park and ride" programs until such time as the five year target figure is achieved.

2. The ratio of car parking spaces to bicycle lockers in low density suburbs is a useful benchmark for other urban rail systems. An accurate benchmark for all the Brisbane low density areas is not yet available; however the data from the six outer suburban Brisbane stations provides a "ball park" measure. This suggests that on other rail systems there should be one lock-up for every four car parking spaces in low density urban areas.

3. There is a need to recognise that a high proportion of women who own bicycles are in the workforce but that walking to the station in many areas is perceived by many women as a high risk activity. Women, the elderly and children who ride bicycles tend to feel more secure than pedestrians, so the further provision of bicycle lock-ups on staffed and unstaffed stations should be supported by advertising which specifically targets the more vulnerable potential rail patrons.

4. There is a high level of bicycle ownership by car drivers in Australia. There is a need for interstate co-operation between all rail agencies both public and private, to trial secure lock-up installations; to effectively manage lock-ups; to insure high occupancy rates and marketing campaigns; and to encourage car "park and ride" patrons to use bicycle lock-ups instead.

5. The provision of secure long term bicycle parking should be considered at the design stage in all station renovations and in the development of all modal interchanges. There is also the need for planning and design staff to monitor new innovations in Europe.

6. In Melbourne and Sydney there is a need to provide non-pickable locks on new lock-ups and to provide free lock-ups with a returnable deposit for the key. Queensland Corrections Prison Industries has expressed an interest in supplying lockers with non-pickable locks to other areas in eastern Australia. (Carmichael 2002) So these lock-ups could be made available for for trialling in Sydney and Melbourne.

Acknowledgements

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