Developing a Strategic Approach for a Station and Modal Interchange Upgrade Program

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1 Introduction: A Strategic Approach

Efficient and effective modal interchanges are a key component of any successful multi-modal system. Operating a successful multi-modal system requires development work to enhance all aspects of that system: from new rolling stock, line upgrade and new bus services, through to the key links in the chain — modal interchanges.

This paper outlines the strategic and structured approach undertaken by the Victorian Department of Infrastructure and consultants Parsons Brinckerhoff in developing a station and interchange upgrade program. Upgrading key links in the public transport network chain, supporting Government policies such as Activity Centre policies, and ensuring fiscal responsibility all needed to be part of an integrated solution. To achieve this, a Targeted Gap approach was developed.

The Targeted Gap approach enabled upgrade priorities to be set for interchanges whose facility standards were well below the level that should reasonably be expected. The approach also enabled quantitative assessment of Activity Centre proposals, many of which were supporting 'aspirational' or 'visionary' planning proposals.

The paper outlines the background, focusing on improvement needs and objectives for a 'targeted gap' upgrade program. It then discusses the classification system and standards used, including hierarchy development, and describes how the system was applied through comprehensive audits, project scoping and costing. Finally, policy application, prioritisation and funding are summarised.

In 2006, funding of $130 million over 10 years was approved by the Victorian Government, as part of the *Meeting our Transport Challenges* initiatives, for a series of upgrade works now referred to as the Stations and Modal Interchanges (SAMI) program.

2 Background

Approaches to achieve efficient and effective passenger access and transfers include superior coordination between services, high service frequencies, and provision of appropriate and well-located facilities (see Figure 1). The upgrade program concentrated on the infrastructure component of the transfer equation, namely provision of appropriate and well-located access and interchange facilities.

In Melbourne, apart from the Connecting Transport Services (CTS) program (2000–2003), there has been little attention paid to upgrading access facilities since the Station Upgrade Programs of the early 1990s. Development of the CTS program included background research, review and analysis work undertaken by Booz Allen Hamilton (BAH) for the Department of Infrastructure (DOI) as part of the preparation of the *Melbourne Bus-Rail Interchange Development Study*, Final Report, June 1998 (see also Currie & Willis, 1998).

The BAH 1998 study included international literature review and surveys, and development of a four-level interchange hierarchy for investment with links to facility types.

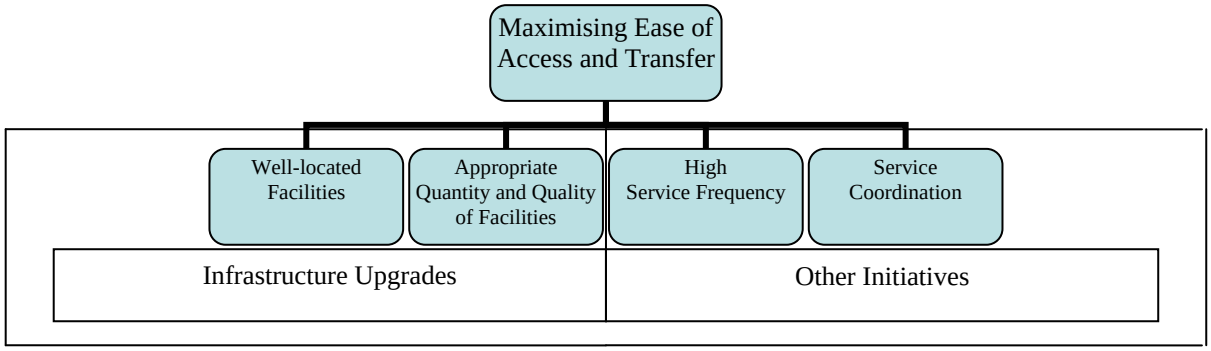

Figure 1: Approaches to maximise ease of access and transfer

Recent surveys undertaken by the DOI indicate that approximately 50% of patrons are seeking improvements to facilities, and improvements to service frequency and coordination at interchanges. These survey results were generally similar to the results of surveys undertaken by the then Public Transport Corporation in 1991 and in 1998 (BAH, 1998). DOI 2002 surveys also highlighted that works need to be carefully targeted to be effective. Micro-design issues matter. Reviews of the CTS program indicated that in some cases the works undertaken were simply not noticed or, alternatively, quickly forgotten or taken for granted by patrons. To change passenger behaviour, improvement works must be recognised as such. Care needs to be taken to ensure that resources for upgrade works are targeted to areas of most need and where the best results can be obtained for improving modal transfers for patrons.

Growing public transport patronage is a key goal of public transport operators, yet deteriorating quality of facilities, inadequate capacity to accommodate expanded services and poorly located facilities all have a negative impact on maintaining existing patronage, let alone increasing patronage. The negative impact of long waiting times can be exacerbated by poor quality access facilities (Horowitz & Thompson, 1994). is the quality of these facilities is doubly important when multi-modal trips are being made; in multi-modal trips, access and transfer costs can constitute up to half of the total costs of a trip as perceived by passengers (BAH, 2000). Further, increasing patronage through the successful implementation of other Victorian Government projects and programs, such as SmartBus, Local Area Bus Service Review and TravelSmart, will also be influenced by provision of quality access and transfer facilities.

In Melbourne, modal interchanges are anticipated to become more important to the overall public transport trip. Projections indicate an increasing proportion of patronage growth will be by trips requiring interchange between modes, particularly between bus and rail. This will increase the importance of modal interchanges in the public transport system. The main reason for the expected growth in interchanging comes from the limited opportunities to grow single-mode trips. Growth from local walk-in catchments will be limited by mostly stable catchment demographics, while the capacity to increase car parking around major public transport stops, especially train stations, is limited, very costly and poor transport policy as it may lead to an overall increase in private motor vehicle trips (although there may be a reduction in vehicle kilometres travelled (VKTs)).

3 Links to Policy Support for Activity Centres – Integrating Transport and Land Use Planning

To enhance integration of transport and land use planning, land use planning policies and the presence of other public transport planning projects were used to prioritise sites for upgrades. Factors considered include:

- the status of the Activity Centre at which the interchange is located (i.e. Transit City, Principal Activity Centre, Major Activity Centre)
- whether it would be directly supportive of the success of other DOI projects (e.g. SmartBus roll-out, Local Area Bus Service Improvement Program)
- targeting interchange sites that have the greatest potential for patronage growth.

The Victorian Government's metropolitan strategy — *Melbourne 2030: Planning for Sustainable Growth* — outlines the key strategic planning directions for Melbourne. Promoting and supporting development in Activity Centres underscores a number of the key directions. It is at these key Activity Centres that the most important modal interchanges are to be found.

Numerous interchange locations across the Metropolitan public transport system have access and transfer environments that are considered poor. When these locations are Activity Centres, this has a detrimental impact on more than just the public transport service; it affects the ongoing success of the centres themselves. The situation has evolved over time through factors such as how the urban form has developed through the compounded results of property decisions, changes in service patterns, changing customer demands and the piecemeal approach taken to interchange improvement. There is generally no quick fix.

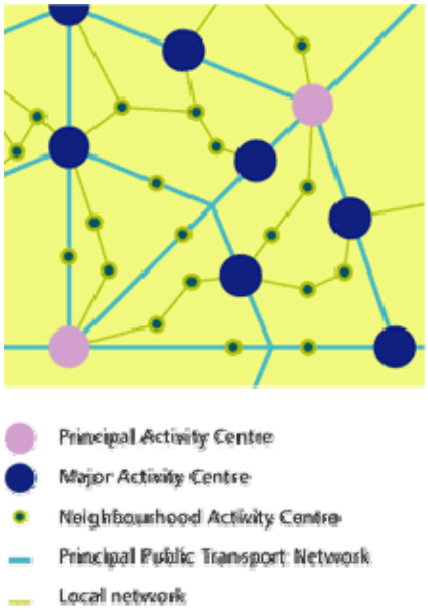

Figure 2 is an extract from *Melbourne 2030*. It provides a stylised illustration of the network of key Activity Centres and public transport routes including the Principal Public Transport Network (PPTN). Promotion of enhanced and well-designed development within centres, and better public transport connections with local and regional catchments, are seen as important contributions to improved liveability and sustainability in Melbourne. A great deal of the efforts by state and local governments to better integrate transport and land use planning are focused on these key centres.

Modal interchanges are, in some respects, at the core of the issues affecting Activity Centres and the development of the Principal Public Transport Network.

Figure 2: Bringing land use and transport together (Melbourne 2030)

Pressure is substantial to upgrade interchanges across all Activity Centres and other key sites to achieve the policy aspirations, and a number of grand visions are being promoted for centres. Controlling scope creep, managing stakeholders and targeting the right works at the

right locations are crucial. Resources clearly are not unlimited so defining the scope of works and prioritising sites for upgrades are critically important.

4 Focus for Improvements

International research into modal interchange and modal transfers indicates the following key priorities:

- Maximise system-wide user benefits, system legibility and temporal connectivity.
- Maximise internal security, safety and reliability, while minimising disorientation and confusion.
- Maximise the reliability of the transfer, safety and security of mode operations, and the efficiency of access and egress.
- Minimise institutional barriers, waiting and physical barriers to transferring (Horowitz & Thompson, 1994).

There is a risk, between meeting the operational requirements of each transport mode and the demands of architectural design, that passengers will not receive appropriate priority. To eliminate this risk, the modal interchange development process takes a passenger-centred approach to modal interchange design that focuses on two specific areas: passenger safety and passenger accessibility.

While safety, security and access have priority, other design objectives should also be considered. These are shown in Figure 3.

Maximise	**Minimise**
Safety and security of modal operations	Physical barriers to transferring
Safety	Disorientation and confusion
Efficient access and egress	Modal path conflicts
Weather protection	Barriers
Directness of modal paths	Path length
Directness of pedestrian paths	Conflicting paths
Pedestrian assists (e.g. elevators)	Physical barriers to the handicapped
Flexibility for expansion	
Quality of architectural design	

(Horowitz & Thompson, 1994)

Figure 3: Transfer priorities

A series of surveys undertaken by PTD and its predecessors in 1991, 1998 and 2002 have confirmed these results. These results were used as an input into development of the Program objectives, which in turn directed the interchange standards to be developed.

5 Objectives for an Upgrade Program

5.1 Four Objectives

Objectives developed to guide the Stations and Modal Interchanges program are linked to the overarching objectives for the public transport system and the role modal interchanges play within that system. The objectives developed for the upgrade program were as follows.

Objective 1: Making sure the public transport links/services work

Mode transfer will increase in importance as public transport patronage grows; thus, the capacity of modal interchanges to cater for this growth needs to be considered. This is particularly the case in those areas where new or expanded public transport services are being introduced.

Outcomes to achieve this objective focus on ensuring the interchange has better system legibility, provides quality passenger information and has better system coordination. These could include cross-modal real-time information displays, traffic segregation signage, and upgraded paving, line marking and kerbing.

Objective 2: Seamless passenger transfers between modes

For a seamless transfer between modes, transfer penalties must be minimised. There is a significant drop in patronage when a mode transfer is required, but making the transfer as seamless as possible will help reduce this drop. Reducing the distance patrons are required to travel and minimising the impact of grade changes when transferring between modes will also help reduce the access penalty.

Outcomes sought to achieve this objective include spatial connectivity, minimal barriers to movement, as well as improved safety and security. Standards sought would include ensuring that the interchanges are well located, and that they contain adequate waiting facilities, pedestrian priority areas, pathways that enabled segregation of pedestrians and vehicles, and directional and safety signage.

Objective 3: To minimise perceived transfer costs and other travel disincentives for passengers

It is recognised that micro-design issues matter, particular at the passenger level. Passenger perception of a 'transfer penalty' associated with interchanging due to poor quality of passenger experience (such as poor amenity, inadequate security or lack of weather protection) present disincentives to undertake mode transfer and discourage patrons from using the public transport system. Minimising the negative aspects of the mode transfer will help lower passenger transfer costs and improve the potential for patronage growth. Adequate quantity of facilities, such as seating and waiting spaces, and suitable quality of soft variables, such as overall appearance and condition, all play a role in reducing transfer disincentives.

Outcomes sought to achieve this objective would include having an adequate standard of weather protection, passenger comfort and visual amenity. This might include providing shelter coverage (including sheltered walkways), seats, kiosk facilities and vending machines, landscaping, attractive design and finishes, and lighting.

Objective 4: Recognising and supporting the role interchanges play at Activity Centres

The Victorian Government has a number of policy initiatives to improve Activity Centres across Melbourne, including the Transit Cities program and Creating Better Places grants for amenity upgrades. Modal interchanges provide the 'front door' for many people entering Activity Centres. In a number of instances they provide a less-than-desirable 'first impression', compromising the efforts from other government initiatives.

The outcomes sought from objectives 1, 2 and 3 all combine to achieve the desired outcome sought for objective 4.

5 Classification System and Standards

The development of the interchange hierarchy built on earlier work undertaken by Booz Allen Hamilton for the Department of Infrastructure in 1998, and the preceding designation of railway stations into 'premium' and non-premium' stations. It broadens the earlier work by considering bus–bus, tram–train, tram–bus, and train–tram–bus interchanges, in addition to train–bus interchanges. A direct relationship by facility type, classification and what the program was trying to achieve as defined by the objectives was also established (see Figure 4).

5.1 Hierarchy Purpose

The hierarchy of modal interchanges recognises that different modal interchanges have different roles to perform. The hierarchy:

- provides a strategic approach to considering the modal interchanges in the public transport system
- helps define what is expected of each modal interchange
- focuses attention on considering how the interchange performs its role
- directs resources to ensuring facilities match the role of each interchange
- provides direction on scale and type of desired works for other complementary projects
- helps ensure that some interchanges are not over-developed, and others under-developed
- helps balance interchange facility provision across the network
- provides direction on how modal interchange improvements are delivered across the network.

Over time it is anticipated that the role of some interchanges will change as patronage grows and the role and importance of some interchanges increase. An interchange hierarchy, linked to thresholds, provides forewarning on potential resource implications of patronage growth at interchanges.

5.2 Defining the Hierarchy

Key factors applied when determining the hierarchy were:

- patronage at the interchange
- the number of patrons transferring between modes.

A two-stage structure to the interchange hierarchy classification was applied, namely:

- primary — A, B, C and D
- (2) secondary — 1, 2 and 3.

Primary classification is determined by the total number of patrons using the interchange. This number is usually the railway station boarding and alighting estimates; however, a number of non-heavy rail locations are also classified. Using the total patronage figure as the primary classification recognises that interchanging also involves non-public transport trip legs, such as walking. Secondary classification is based on the number of patrons transferring between modes. In most examples, this represents patrons transferring between

train and bus. However, in a small number of examples the transfer is between train and train, and care needs to be taken when interpreting the results.

The hierarchy resulted in 12 classification types, from A1 to D3.

The passenger volumes applied were:

- A >3,000; B =1,500–3,000; C = 750–1,500; D <750
- 1 >1,000; 2 = 100–1,000; 3 <100.

Refinement of the passenger volumes cut-offs was targeted specially to the Melbourne system. A reasonableness test was applied to these volumes to determine if a suitable range of different types of interchanges were allocated within the hierarchy and if they were consistent with the perceived wisdom of the relative importance of existing sites.

The 1998 BAH study applied a four level rail-bus interchange hierarchy based on perceived interchange role ie premium, regional, neighbourhood and local (see BAH, 1998; Currie & Willis, 1998). In contrast, this study applied a 12 level category system based on both total passenger volumes and transferring passenger volumes. This approach assisted the targeting of benefits and helped provide an understanding of how many persons were to benefit from which proposed works at each site. This method allowed high-volume sites with lower number of routes or smaller catchments to be weighted appropriately. It also meant that non-train-based interchanges could be readily incorporated into the hierarchy.

5.3 Facilities by Classification in the Hierarchy

Table 1 outlines the type of facilities, based around the program objectives, that are anticipated to be required based on the position of an interchange within the hierarchy.

The list was developed by applying the weightings given to soft variables and other interchange attributes derived from a composite of local and international studies augmented by customer surveys undertaken by DOI on facility preferences at interchanges. Inputs into consideration of what facility type to consider included the work undertaken by Copley, Bouma and de Graaf (1994), Horowitz and Thompson (1994), Douglas and London Transport (1997), Booz Allen Hamilton (1998 & 2000) and the review of this work that was undertaken in preparing the Draft Modal Interchange Strategy (DOI, 2003 (unpublished)).

A key component of classification and facility refinement included the review of the list by the working group, which included representatives of stakeholders, and a series of trials undertaken at representative sites. This helped to ensure that the list was directly relevant to conditions found in the Melbourne public transport network.

5.4 Standards and Ratings

The hierarchy of the 251 stations and modal interchanges was used to define the facility standard on each classification level. The general principles in determining the rating standard for each classification level included:

- Facilities of modal interchanges with higher patronage level are rated with higher standards.
- Facilities of modal interchanges with a lower interchanging level, and thus with a high number of direct users (walk and car access) — specifically, facilities that serve direct users — are rated with higher standards.

- Facilities that improve safety and security concerns are considered basic requirements and are thus rated with a high standard, irrespective of level of patronage and interchanging.
- Improving attractiveness and landscaping receive the same rating standard, irrespective of modal interchange level.

An example of the facility standard ratings by classification is outlined in Table 2.

6 Targeted Gap System, Audit, Scope and Costings

Parsons Brinckerhoff (PB) was engaged by the Department of Infrastructure (DOI) to carry out a comprehensive audit of 251 modal interchanges throughout metropolitan Melbourne.

A framework was developed to measure the existing interchange conditions relative to agreed rating standards. A gap analysis was then used to identify the required level of improvement at each interchange in order to bring interchanges up to agreed minimum standards.

In undertaking the study, PB brought together a team of engineers, transport planners and project management specialists, and employed as subconsultants:

- HASSELL planning and architectural consultants, for urban design input
- the Allen Consulting Group (regional economists), to undertake the economic evaluation to assist with prioritising investment priorities.

The comprehensive program of interchange audits was undertaken using a multi-criteria framework to categorise interchanges by type. The audited facilities were examined to determine whether they complied with the appropriate rating standard and requirements. Each facility was analysed by reviewing the following conditions: quantity of facility, quality of facility, and appropriate location of facility.

For example, to analyse seats at an interchange, the auditor would analyse the number of seats, the condition of those seats and whether the seats were located appropriately. In relation to shelter, the auditor would determine whether the amount of shelter giving cover is sufficient, the condition of that shelter and whether the shelter is in the most appropriate location.

The Smartlink database was then developed as:

- the receptacle for storing field audit checklists for each interchange
- the tool for undertaking the gap analysis and measuring the difference between the existing field condition, rating etc. relative to agreed ‘functional baseline’ data guidelines
- the means of identifying those items that failed to meet the requirements of an agreed functional baseline.

Table 1: Facility guidelines by objectives and interchange classification

INTERCHANGE FACILITIES	CLASSIFICATION			
	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
	A1, A2, A3	B1, B2, B3 C1, D1	C2, C3	D2, D3
Objective: Network Integration — Making sure the public transport links / services work				
NETWORK LINKS				
Linkages				
1 access prioritisation for buses (and if applicable for tram)	✓	✓	D	
2 bus/tram routes approaches are direct	✓	✓		
3 car park access	✓	✓	✓	✓
Facilities				
4 car parking	StS	StS	StS	StS
5 motor bike parking	StS	StS	StS	StS
6 bicycle lockers / racks / cages	✓	✓	✓	✓
7 kiss-and-ride facilities	✓	✓	D	D
8 taxi rank	✓	✓	D	D
9 ticketing facilities	✓	✓	S / D	S / D
OPERATIONS				
10 adequate bus bays/lay-over areas	✓	✓	✓	✓
11 intermodal real-time info for bus drivers	✓	✓	D	
12 bus driver facilities	✓	✓		
13 segregated car/bus operations	✓	✓	D	D
Objective: Seamless passenger transfers between Modes				
CONVENIENCE				
Layout				
14 minimum distances between modes	✓	✓	✓	✓
15 defined pedestrian paths between modes	✓	✓	D	D
16 appropriate condition of pathways between modes	✓	✓	✓	✓
17 minimum path conflicts	✓	✓	D	D
18 convenient ingress/egress points	✓	D	D	D
19 special pedestrian priority facilities	✓	D	D	D
20 optimised staff/customer interfaces	✓	✓	D	D
ACCESSIBILITY				
General				
21 minimum level changes/gradients	✓	✓	✓	✓
22 level and even ground surfaces	✓	✓	✓	✓
23 lifts for major level changes	D			
DDA compliance for bus stops and tram stops only				
24 DDA-compliant furniture	✓	✓	✓	✓
25 accessible toilets	✓	✓		
26 DDA carparking	✓	✓	✓	✓
27 DDA facilities signage	✓	✓	✓	✓
28 large-type information	✓	✓	✓	✓
29 low-height bus entries	✓	✓	✓	✓
30 coloured tactile markings	✓	✓	✓	✓
INFORMATION				
Fares & Ticketing				
31 fares and ticketing information	✓	✓	✓	✓
32 alternative ticketing sources information	✓	✓	✓	✓
Timetabling				
33 PA system	✓	✓	✓	✓
34 modal real time displays	✓	✓	D	D
35 cross-modal real time rail displays at bus bay areas	✓	✓	D	D
36 cross-modal real time bus displays at train platforms	✓	✓	D	D
Location & Direction				
37 interchange	✓	✓	✓	✓
38 interchange layout maps (incl. routes/bus bays)	✓	✓	D	D
39 regional maps showing all routes, locations and areas served	✓	✓		
40 local area street maps displaying key features of the area	✓	✓	✓	✓

INTERCHANGE FACILITIES	CLASSIFICATION			
	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
	A1, A2, A3	B1, B2, B3 C1, D1	C2, C3	D2, D3
Objective: To minimise transfer costs and other disincentives for passengers				
SAFETY / SECURITY				
Security				
41 CCTV covering train station / bus stop / tram stop	✓	✓	✓S	✓S
42 CCTV covering carparks	✓	✓	S / D	S / D
43 CCTV covering 'kiss and ride'	✓	✓	S / D	S / D
44 CCTV covering pathways to carparks	✓	✓	S / D	S / D
45 CCTV covering bike lockers	✓	✓	S / D	S / D
46 CCTV covering taxi ranks	✓	✓	S / D	S / D
47 CCTV for Environs	✓	✓	S / D	S / D
48 security lighting in stations and adjoining access ways/car parks	✓	✓	✓	✓
49 help points	✓	✓	✓	D
50 security patrols	✓	✓	S / D	S / D
51 mirrors	✓	✓		
52 no blind corners/recesses	D	D	D	D
53 common waiting area with PA announcements	✓	✓		
54 co-located waiting & staff areas	D	D		
Safety				
55 adequate passenger capacity at bus waiting areas	✓	✓	✓	✓
56 avoid buses reversing	✓	✓	D	D
57 pedestrians separated from bus movements	✓	✓	D	D
COMFORT				
58 shelter	✓	✓	✓	✓
59 sheltered walkways	✓	✓		
60 seating	✓	✓	✓	✓
61 sheltered seating	✓	✓	✓	✓
62 clocks	✓	✓	✓	
63 rubbish bins	✓	✓	✓	D
64 vending machines	✓	✓	D	
65 telephones	✓	✓	D	D
66 toilets	✓	✓	D	D
67 non-transport facilities (e.g. kiosk, café, newsagency)	✓	✓		
68 adequate platform capacity / bus stop / tram stop	✓	✓	✓	✓
69 baby change	✓	✓		
Objective: Recognising and supporting the role interchanges play at Activity Centres				
AMBIENCE				
Condition at Interchange				
70 attractive design / layout	✓	✓	D	D
71 attractive landscaping	✓	✓	D	D
72 clean	✓	✓	✓	✓
73 graffiti free	✓	✓	✓	✓
74 community art	D	D		
Condition of linkages				
75 well located interchange relative to other facilities	✓	✓	D	
76 attractive entrance way to environs	✓	✓	D	
77 attractive pathways leading to environs	✓	✓	D	
78 design and condition enhances location (Activity Centre)	✓	✓	D	

Note: These are desirable conditions to be used when developing new or highly modified modal interchanges. Whether all or any facilities are appropriate at a particular location will depend on the existing conditions, the cost of provision, available funding and space, stakeholder acceptance and longer term plans. Desirable conditions will often only be achievable at reasonable cost in greenfields locations or as part of a wider implementation program.

Legend

✓ = Required
S = Stations only
StS = Subject to Park & Ride Strategy
D = Desirable (esp at new locations)

Table 2: Example of facility standards by interchange classification

Rating Standard			***Rating Standard Guide***	**Rating for Each Modal Interchange Level**											
Area	***Item***	***Description***		**A1**	**A2**	**A3**	**B1**	**B2**	**B3**	**C1**	**D1**	**C2**	**C3**	**D2**	**D3**
station general	amenity condition	does station/concourse require facelift	yes or no	N	N	N	N	N	N	N	N	N	N	N	N
	main entrance way to station	attractiveness	very good, good or fair	G	G	G	G	G	G	G	G	G	G	G	G
	2nd entrance way to station	attractiveness	very good, good or fair	G	G	G	G	G	G	G	G	G	G	G	G
	3rd entrance way to station	attractiveness	very good, good or fair	G	G	G	G	G	G	G	G	G	G	G	G
	4th entrance way to station	attractiveness	very good, good or fair	G	G	G	G	G	G	G	G	G	G	G	G
	soft landscaping (access/ingress)	approach ambience	very good, good or fair	G	G	G	G	G	G	G	G	G	G	G	G
		safety	very good, good or fair	G	G	G	G	G	G	G	G	G	G	G	G
		maintained	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		open or closed	open or closed	O	O	O	O	O	O	O	O	O	O	O	O
	interchange to other modes	clearly defined thru linemarking and signage	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	interchange layout maps	available (or nearby)	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	regional maps	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
	local area street maps	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	alternative ticketing sources info	signage detailing nearest location	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	co-located waiting & staff area	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	common waiting room	condition	as new, good, fair	AN	AN	AN	G	G	G	G	G	G	G	G	G
		seating-condition	as new, good, fair	AN	AN	AN	G	G	G	G	G	G	G	G	G
		seating-quantity (no of pass catered for)		15+	15+	15+	15+	15+	15+	15+	15+	10+	10+	10+	10+
	toilets	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
	non-transport facilities	record type (1-kiosk, 2-café, 3-newsagency, 4-other, 5-none))		1,2,3	1,2,3	1,2,3	1,3	1,3	1,3	1,3	1,3	5	5	5	5
	vending machine	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
	telephone	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	clocks	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
	baby change	available	yes or no	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N

PB designed and implemented a purpose-built web portal for the project. This 'virtual project office' provided on-line access for the consultant team and for representatives of PTD and PDG to all project information e.g. drawings, bills of quantities, sketch elevations, audit and gap analysis reports. The web portal access screen is shown in Figure 4.

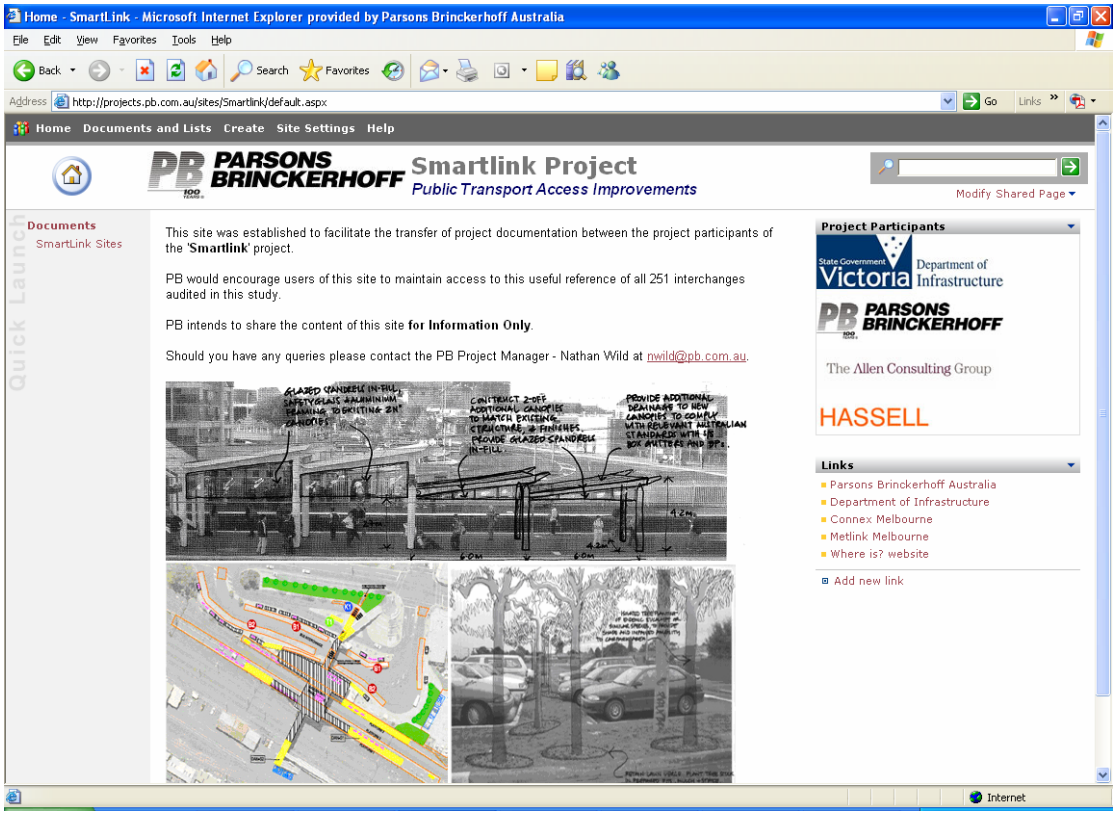

Figure 4 Smartlink web portal

Functional concept designs were then developed to address identified gaps in individual interchanges, with an emphasis being placed on the need for improvements for intermodal movement and in passenger comfort e.g. shelters, walkways and car parks.

The cost of improvement plans for each interchange was then calculated using a unit-rate-based analysis of all the interchange elements.

7 Economic Evaluation

Benefit–cost analysis was conducted to determine the economic viability of the individual modal interchanges.

The benefits that can be derived from each modal interchange are based on a generalised user cost function comprising the cost of the fare plus the time required to travel. Reducing the time element represents a surplus or benefit to the users.

The proposed improvements were expected to provide the following types of benefits to existing users of public transport:

- infrastructure improvements —the value perceived by users of public transport accrued as a result of cleaner, more convenient, safer and aesthetically pleasing facilities
- operational improvements —improvements that save consumers time by reducing the distance between modes of transport.

The valuation of benefits due to infrastructure improvement was based on the relevant contingency valuation studies available (BAH, 2000; Douglas, 1997; Copley, Bouma & de Graaf, 1994). These studies estimated a public transport consumer's willingness to pay for different types of interchange facility improvements.

In addition to the infrastructure improvements, another benefit is the distance and time that may be saved as a result of operational or logistical changes and improvements. The 'distance reduced' benefits were translated into time savings (i.e. reduced walking time) by applying a walking speed assumption of 5 km/h on average, which is equivalent to 0.1 minutes spent per metre of walking, to the patron group that benefited from the improvement. Recommended Value of Time (VOT) applied was that referenced at the time in the Department of Infrastructures Investment Appraisal and Evaluation Guidelines; it is given as 16.7 cents per minute.

Two types of BCRs were calculated — capped and uncapped. The capped BCR was applied to limit the cumulated benefits from proxy values given for individual improvement elements. Total infrastructure benefits were capped at 7% of the average fare. For the short-listed sites, the combined average capped BCR was 2.0. The value of works proposed at each site varied significantly, ranging from around $0.3 to $8m.

8 Policy Application, Prioritisation and Funding

8.1 Applying Policy and BCRs

Prioritisation was based on weightings for patronage, policy and other program support, and a BCR weighting calculated from the scoped cost and potential beneficiaries.

The level of support provided to policy and other programs is the criterion used to determine the relative importance of modal interchanges in the context of government policy objectives. The criterion considers the following:

- the Activity Centre at which the interchange is located (i.e. Transit City, Principal Activity Centre, Major Activity Centre) — the more important the centre, the higher the weighting
- links with the Principal Public Transport Network (PPTN)
- interchange links between rail and tram
- whether the improvements directly support the success of other DOI projects (e.g. SmartBus roll-out, Local Area Bus Service Improvement Program)
- potential for patronage growth — interchange sites that have the greatest potential for patronage growth (Growth Areas) are targeted.

The first stage of prioritisation was conducted using the first two criteria (patronage and policy support) to limit the priority list to a manageable level. Initially, the top 100 modal interchanges were selected to form part of the First Priority list. An additional 13 modal interchanges were included in the list to consider all the major activity centres and all the A1 and A2 modal interchange levels. The second stage of the prioritisation process also included the BCR criteria. Criterion 1, patronage, was not included in the second stage

because it was already captured in the BCR criterion. There were some changes in the priority list due to the result of the economic analysis. A short list of priority sites for action was then produced.

8.2 Prioritisation within Short-listed Sites

A more detailed review of the short-listed sites is provided below to nominally determine a recommended prioritisation for the upgrade program — the priority works project. These elements are more subjective and move beyond the standardisation approach taken in earlier priority identification work.

In undertaking this prioritisation review, the following assessment criteria were applied:

- Objectives — very high level of support to overall program objectives
- Clarity — high clarity present on the preferred direction of local planning
- Conflict — low conflict with planning objectives from other agencies
- Complements — complements other government projects being undertaken
  Regeneration support — supports and/or triggers wider centre regeneration
- Support for other PT projects — does not conflict with other public transport projects being undertaken
- Duplication risk — large part of the upgrade project is being developed by other projects or programs.

Insights gained from the overall process included that there was a general correlation between sites in key activity centres and important modal interchanges. However, there was a wider variation between the scope and cost of works required to bring each interchange up to a consistent standard. Some important sites appear to have missed out on upgrades a number of times in the past. As anticipated, there were also a number of interchanges — generally perceived to be of secondary importance — that had a standard of facility well below that which might be considered warranted.

It also came apparent that caution was required when applying estimated and modelled passenger transfer volumes at interchanges, which was one of the figures used to select hierarchy classification. Some of the interchanges examined might be reasonably described as ‘dysfunctional’, with design or location of separate modes significantly discouraging transfers. The application of the policy and program criteria helped to flush out interchanges that perhaps should be functioning a lot better. A review of these sites, particularly through the detailed short listing process, helped refine the list of sites for upgrade that would best see ‘value for money’ in a stations and modal interchange upgrade program.

8.3 Conclusion — Funding Results

The strategic approach to interchange assessment and program development has created understanding of the relative condition and importance of the 251 major modal interchanges across Melbourne. In the 2007–08 State Budget, the government announced $20.5 million for the first four sites identified and recommended in the Stations and Modal Interchanges (SAMI) program.

The program was developed at the same time as the *Meeting our Transport Challenges* (MoTC) initiatives. Within the MoTC initiative, the government announced $130 million over 10 years for SAMI upgrades, of which the 2007–08 budget announcements represented Stage 1 of program delivery.

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