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Station Access on Four Continents

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STATION ACCESS ON FOUR CONTINENTS

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ABSTRACT

Significant attention is invariably focused on the line-haul aspects of mass transit networks, but the question of how passengers *get to a station* tends to be under-resourced and under-researched. With station access comprising a substantial component of the overall journey involving transit, improvements to access infrastructure and amenity should flow through into increased ridership, or improved travel experiences.

Station access, to state the obvious, is invariably by walking, cycling, feeder transit - or by car-based means. The facilitation of more robust access by feeder transit would demand strong design, station configuration, and network planning approaches. The delivery of better conditions for walking and cycling also demands a particular set of design, planning and infrastructure treatments. Some networks are actively prioritising the more sustainable of these modes in actual infrastructure and design decisions, while others mainly emphasise sustainable access *rhetorically* - in planning documentation perhaps.

In this paper, we analyse and compare station access figures in a selection of major transit networks from the USA, Europe, Asia and Australia. The analysis provides clear figures to contextualise an intuitive understanding – namely, that different urban rail networks depend on different access modes overall, and on specific modes in greater and lesser degrees at particular locations. Empirical analysis of observed station access patterns across the case study networks forms the primary research method, but these observed outcomes are cross-referenced to planning documentation and context of local transit stakeholders.

The paper charts the conditions, methods and measures that might support increasing levels of access by the more sustainable, more cost-effective modes of station access into the future.

Keywords: mass transit; station access; rail stations; urban design; transport planning

INTRODUCTION – THE EXPLANATORY POWER OF ACCESS MODE SHARE FIGURES

Oftentimes, in Australia at least, the generic discussion around "getting more people to use public transport" falls back onto a time-worn cliché that *more parking* should be provided at rail stations. This catch-all "solution" is invariably afforded the supreme luxury of not being exposed to detailed scrutiny - or to any checks of logic or fact. But as a specious and convenient response to a complex problem, the idea of building ridership and access through the development of ever-greater parking supply is being brought into question, not least because of; the substantial cost involved in the provision of new parking supply, its questionable urban design impacts, the lost opportunity for other uses of station area land, and the limited ridership impact of even the largest parking facilities with regard to the profound people-movement capacity that urban rail offers (see Semler & Hale 2010). A first-principles approach to ridership-development through access enhancement would need, firstly, to take account of the relative importance of various modal options in the overall mix of rail access in particular cities and systems, or perhaps with reference to some cross-comparison between different weightings observed in quite different rail networks and cities (see Hale 2011a; Givoni & Rietveld 2007; Martens 2004). Far from being a pointless sampling approach, engagement and cross-reference across different station access contexts may well hold the key to unlocking an understanding of the opportunities that planners, urban designers, transit engineers and economists face when choosing access-related strategies to boost ridership in a given project or locational circumstance. 'Comparisons' between quite different rail systems are acknowledged to be controversial among some academic or industry perspectives – but this paper has been developed and written from a perspective that embraces the value and usefulness of standardised analysis applied across different transit system 'samples'.

Actual observations of access mode splits seem to be telling us, firstly, that park and ride provides a relatively small component of station access opportunity in the world's major urban rail systems (Martens 2004; WMATA 2010; BART 2008; RailCorp 2010). At this most basic statistical and analytical level, the heroic assumption toward unbridled growth in the provision of parking begins to break down. A simple question needs to be asked, namely: "*If access to stations is relatively uncommon by car, then what is the point of an overwhelming focus on building more parking*...?" If our observations are demonstrating a profound role for other modes, then a much more useful question should be asked, namely: "*Under what conditions do non-car modes flourish, and to what degree can they be relied-on and enhanced in new station access planning and infrastructure initiatives*...?" The facilitation of increased ridership via "tricky" access paradigms such as feeder-buses needs a solid analytical base. While feeder transit is a logical ridership-enhancement strategy, there is only limited guidance available on how to do it better. In this sense, the analysis that follows will begin by identifying locations where, at the very least, the prevailing feeder access and transfer conditions are worth studying.

Aims and research methods

The paper aims, through data analysis and interpretation, to identify locations (or stations) where some notable station access attribute can be observed. To do this, we mobilise and break-down transit agency access mode share data on a system-wide basis, and then in a careful sub-selection of exemplar locations or stations in which some interesting or peculiar outcome is presenting itself. Data has been sourced directly from the agencies themselves in the cases of Hong Kong MTR, BART, WMATA and Munich MVV – whereas for Sydney, openly-published data has been mobilised. The analysis is backed by the researcher's multiple field visits to the case study locations and systems between 2007 and 2011 particularly, and with reference to localised documentation on access and network planning.

2. AUSTRALIAN CASE: SYDNEY

Sydney has developed a position of national leadership in the Australian context with its transit-centric metropolitan planning paradigm. While other Australian cities espouse transit-oriented planning, Sydney has "runs on the board" in terms of the quantum of new housing being delivered in transit accessible locations, and the successful development over time of several city-alternative TOD-style business centres. As a "city of cities", Sydney also has the advantage of one of the world's largest metropolitan rail networks by number of stations and network length – and sees robust daily ridership on this *CityRail* system (Hale 2011b; NSW Transport & Infrastructure 2010). Sydney is also notable for a rail/bus transit paradigm – with modes such as light rail and ferries playing visually prominent, yet limited overall roles in actual transport movements. In this context, it will be intriguing to analyse the degree to which Sydney's rail and bus offerings interface effectively (or not) to create a multi-modal transport movement opportunity. International readers may also find interest in Sydney's circumstances of being "not quite European, yet not quite American" in its transport infrastructure and movement characteristics. This generally plays itself out via central, inner and middle city areas that are clearly highly transit focused, in contrast to peripheral or newly-emerging locations that are overwhelmingly car-based.

System-wide Station Access – analysis and commentary

The system-wide access mode share splits (described in Chart 1.) suggest a network that is reasonably balanced in its access paradigm, and one where cars play quite a modest role in overall access - compared to the "car-centric" assumptions of Australian cities. Buses are represented at 8.6% access mode share – and while this could be considered 'reasonable' at face value, the same figure could also be interpreted as somewhat weak when compared to the overall role that buses play in Sydney's essentially bi-modal (rail/bus) public transport offering. On the figures mobilised for this analysis, bicycles are assumed to be represented under the 11.8% of access trips by "other" modes. Without access to clearer data on bicycle access numbers it is difficult to draw specific conclusions.

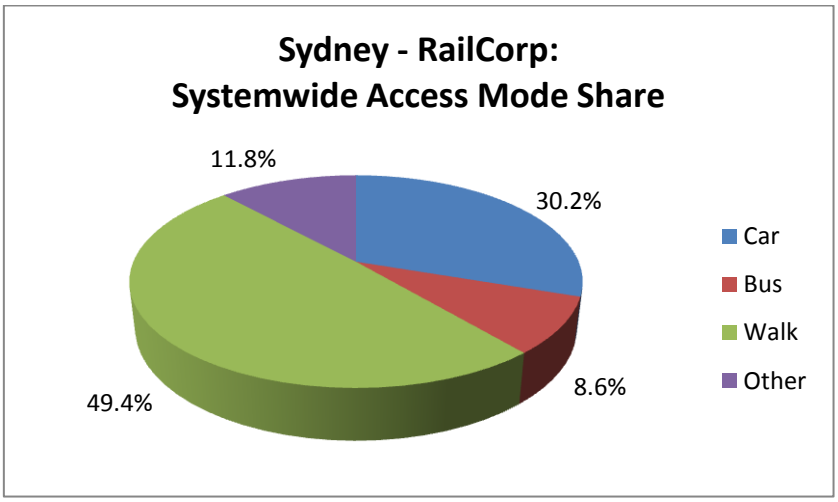

Chart 1 – Railcorp 2008/09 system-wide indicative home-origin station access mode shares.
Data source: RailCorp (2010, p35)

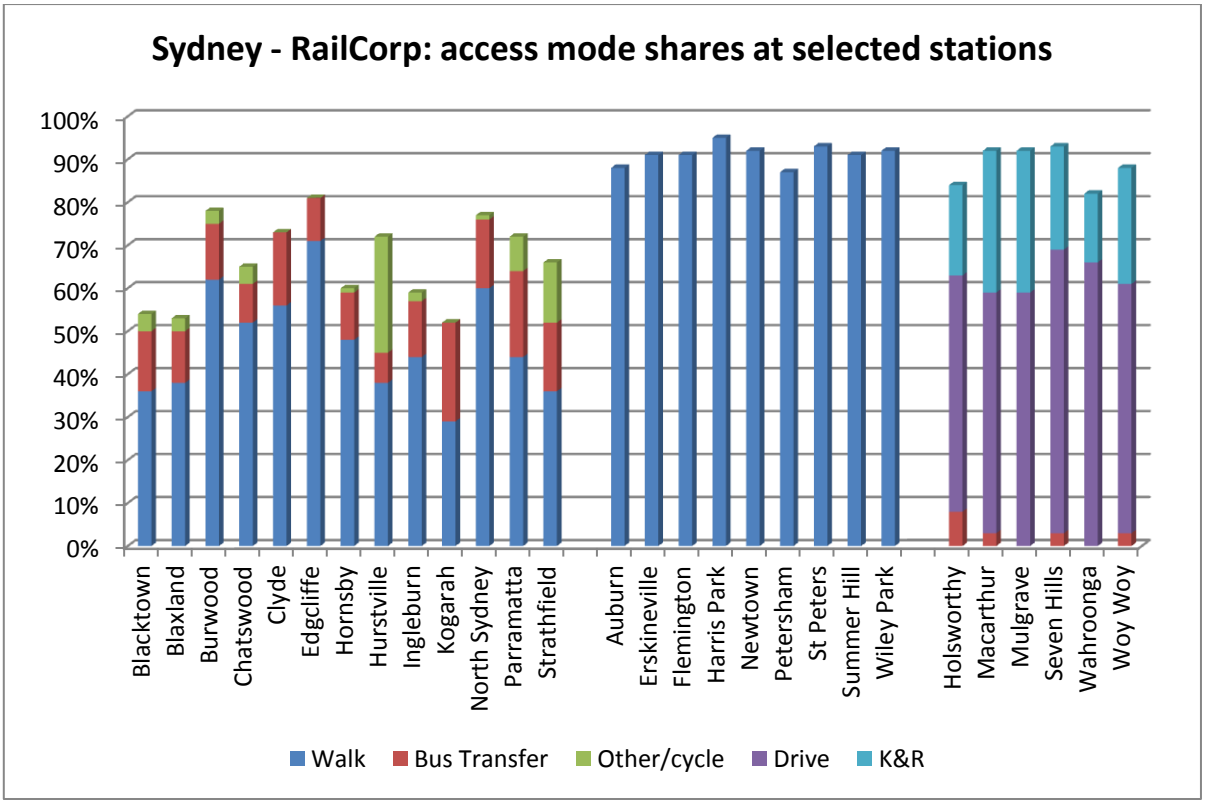

Chart 2 – RailCorp AM station access mode shares, selected stations. Data source: RailCorp (2010, p85-88)

Station Access at select locations – analysis and commentary

For the analysis presented in Chart 2, a grouping of three clusters of stations was developed – based on salient attributes that were felt to be novel or instructive with respect to the over-arching figures presented in Chart 1. The first cluster collects stations that could be described as having "transit oriented" access characteristics – in which some mixture of robust sustainable mode access is demonstrated. This cluster was based to some degree on concepts developed in an earlier paper on station access (Hale 2011a) – and each of the stations listed in the cluster are notable for achieving at least 50% of their access by sustainable modes (walking, bus, and a presumed amount of cycling – based on the "other" figures). This grouping includes a selection of recognised "TOD centres" in the Sydney metropolitan landscape, such as; Chatswood, North Sydney, Parramatta and Strathfield. But other more determinedly suburban stations are also listed here – demonstrating that car-dependent access is not a pre-ordained outcome for the suburbs of Sydney.

The second cluster demonstrates a group of stations in which access mode share outcomes are overwhelmingly based on *walking*. Certain of these (Newtown, Petersham) are recognisably inner-urban or inner-suburban locations, where walking access is expected at high levels. Others are more middle-suburban. In summary, they demonstrate that stations in the Sydney context can indeed function on the basis of a 'walk-up' dominated paradigm (at over 80% access mode share in these cases). A starting point for the third "mega park-and-ride" access category was outlined in Hale (2011a), and a step beyond this starting point has been taken in the analysis above – where both 'drive alone' and 'kiss-and-ride' numbers are accumulated. The notable attribute of these stations is not so much their car-dependence perhaps, rather - the very weak development of bus-based access movements they present. New guidance emerging in Sydney (Transport for NSW 2012) seems to presage a more 'balanced' ideal on station access – and perhaps these car-dependent locations are a logical starting-point for that updating process.

3. USA CASE: SAN FRANCISCO BAY AREA (BART)

The San Francisco Bay Area's BART network is notable for being one of the USA's two leading "new" major heavy rail systems (along with Washington DC's Metro) - which were developed during the late 20th century and which currently carry relatively large numbers of passengers on a daily basis. This position of pre-eminence, based on strong ridership and network innovation, is further enhanced by the recognised *policy leadership* that BART and other Bay Area stakeholders demonstrate in the US context on topics such as; transit oriented development, network renewal and expansion, and through relatively robust cost recovery and financial efficiency (see Hale 2011b; TCRP 2004, ch18; BART 2003; Cervero 1998). BART is also a world leader at present in having a conscious and well-articulated station access planning framework (BART 2008; 2006; 2005), which; a) explicitly recognises station access as a core transit service issue; b) is clear about the challenges associated with BART's traditional park & ride emphasis, and c) seeks to actively develop and enhance access by the sustainable modes through planning, design, infrastructure and service-provision measures over time.

System-wide Station Access – analysis and commentary

Based on observed figures, the BART system currently presents a 'mixed' access paradigm – not greatly unlike the outcomes presented in the Sydney example. Some interesting differences are recognisable however – in a system which is substantially smaller and newer than the Sydney network, but where metropolitan or regional populations are very similar. Firstly, BART demonstrates lower levels of overall sustainable mode share access (than Sydney), with a combined share of around 51% observed for walking, cycling and feeder or transit transfer access. Car access share is correspondingly higher by roughly the equivalent +20%, when compared to round interpretation of Sydney's figures. This overall figure for car-based access is quite high (at some 49%) – and despite recent efforts to shift emphasis away from park and ride, it is clear that the late 20th century BART network is still living with the outcomes of the car-based suburban access paradigm chosen and implemented during initial planning and development phases during the 1960s through 1980s.

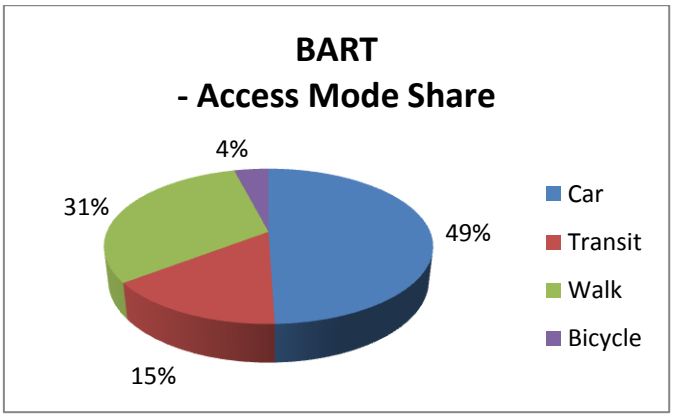

Chart 3 – BART System-wide Station Access Mode Shares (BART 2008, p8)

Besides this greater role for car-based suburban access, BART is notable for almost doubling Sydney's access share by various forms of feeder transit. As a stand-alone figure, the 15% access share by transit appears to be a reasonable accomplishment for a North American city in network integration terms. Access by bicycle is limited at 4%. As an over-

arching comment – it might be fair to say that BART access is quite car-dependent, but also reasonably strong in transit-based forms - hence *walking and cycling* are the key sustainable access options which deserve further development and attention over the medium term. Alternatively, we may ponder whether the high levels of transit feedering and transfer seen at many BART stations could not be replicated at certain of its more car-dependent locations.

Station Access at select locations – analysis and commentary

For the analysis in Chart 4, two clusters of stations were grouped and presented, and according to the manner of BART's data, they feature a mixture of "home" (H) and "non-home" (NH) origin access journeys. Firstly, a cluster of stations is listed at left of chart for which very high levels (+40%) of transit-based access is observed (through bus feedering, light rail-to-heavy rail transfer, or both). This demonstrates the benchmark at which various BART stations could potentially orient their feeder transit and transfer goals, depending on localised circumstances. This cluster seems to demonstrate that BART riders are ready, willing and able to transfer and to use feeder transit in accessing BART– *where those options are well catered to through station configuration, network design, or feeder service offering*. These figures could be interpreted to suggest there is no logical reason for car-dependent access paradigms to remain entrenched across BART. A forward solution based on quality transit-based access outcomes would presumably have a reasonable chance of acceptance by riders - in proportion to the level of acceptance shown for transit-based access in our first cluster (which represents a mixture of urban and suburban contexts).

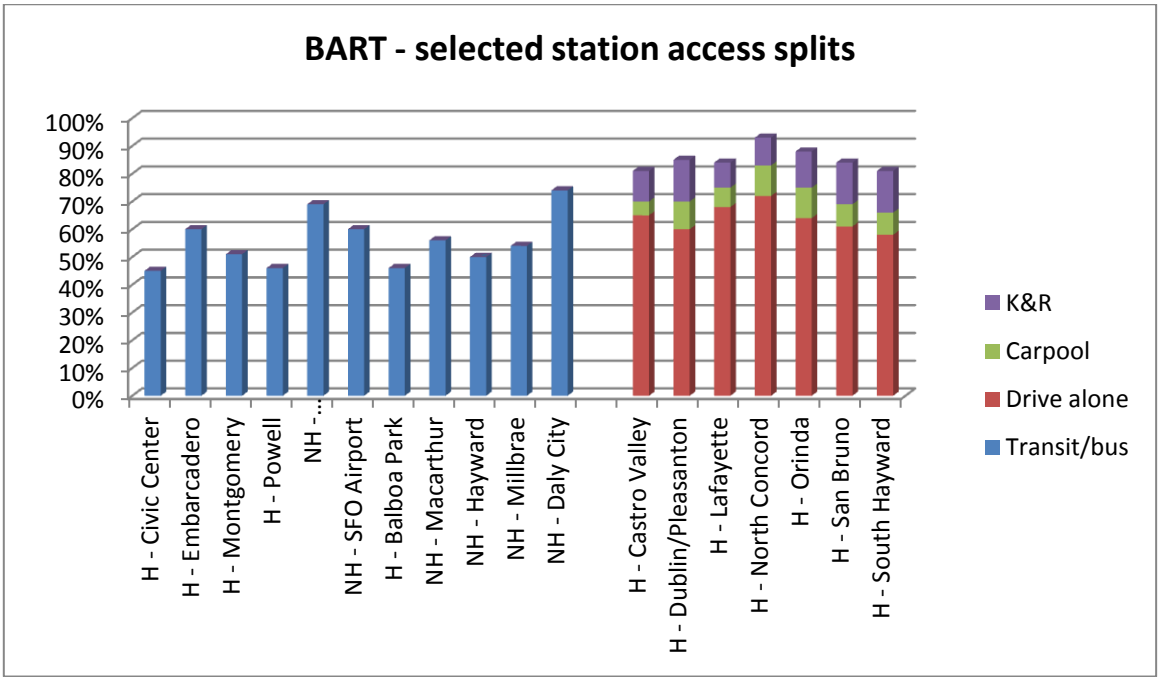

Chart 4 – BART System-wide Station Access Mode Shares (BART 2008, p8)

This idea of enhancing feeder transit access infrastructure and services in the cluster at right of chart 3 is generally foreseen in BART's more recent access planning documents (BART 2007; 2006). But the exaggeratedly car-dependent access paradigm of this right-hand cluster (dominated by home-origin park-and-riders) is worthy of note. A deeper philosophical engagement might query whether these car-reliant outcomes are either "accidental", "circumstantial", or perhaps merely the unavoidable result of the application (during previous decades) of car-oriented access planning techniques and assumptions at these locations.

4. USA CASE: WASHINGTON DC AREA (WMATA/METRO)

The Washington DC metropolitan area's METRO network (run by WMATA) operates extensively in the District of Colombia, Maryland and Virginia – and is the second of the USA's "great late 20th century" urban rail success stories, alongside BART (see Schrag 2006). WMATA shares BART's pre-eminence in sound planning and policy platforms, and is almost unique alongside BART worldwide in having clear, explicit, publically-available, evidence-based documentation regarding station access conditions and intentions (see WMATA 2010; 2008). Reading the station access documentation of WMATA and BART, a sense emerges that these agencies understand and take the access planning issue *seriously*, where the bulk of transit agencies across the English-speaking world simply do not... Metro shares the Bay area's mixed urban/suburban operating context - so any comparative analysis of access statistics in the two systems will be instructive (so far as we are willing, as analysts, to suspend any reluctance to compare outcomes in different cities). Clearly Washington DC and the Bay Area are different cities, with different transit systems and access conditions – but this should not render us unwilling to engage in useful cross-analysis and comparison in the service of the emerging science of transit access planning.

System-wide Station Access – analysis and commentary

Based on observed figures, WMATA's Metro network is reasonably sustainable in its station access outcomes. Metro features relatively high rates of walking access (at over 60%) and a noteworthy 17% component of transit feedering (from a range of bus services and providers, depending on location). Cycling appears (on these figures) to be severely under-developed, whereas the 20% figure for car-based access appears "healthy and balanced" – given Metro's heavily suburbanised outer reaches. In practice this figure would be very roughly doubled on the home-origin journey leg, placing WMATA alongside BART and Sydney as systems with car access playing a strong role in suburban rail travel patterns.

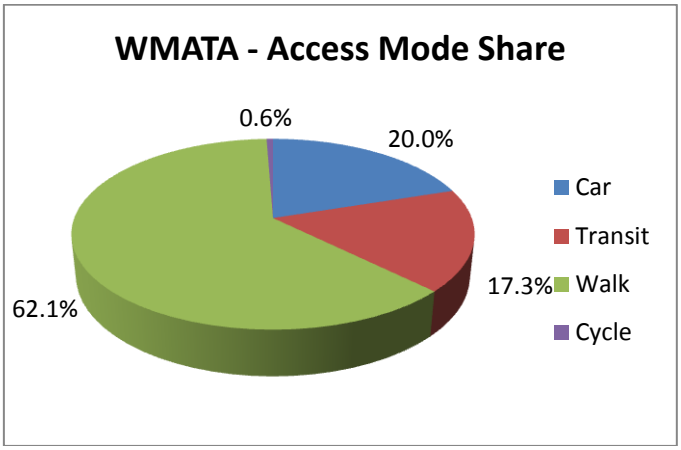

Chart 5 – WMATA System-wide Station Access Mode Shares

In simple terms though, WMATA's levels of overall car-based access appear to be a healthy (low) benchmark against which other New World (North American or Australian) transit systems could orient themselves. Equally, WMATA emerges here as something of an international leader in successful transit feedering and walk-up access.

Station Access at select locations – analysis and commentary

Three station clusters have been developed in Chart 6 below – with a "car-dependent" cluster at left, a "strong transfer" cluster at middle, and an "active" cluster at right (whose stations are mostly positioned within the urban core of DC). While Metro is recognised for a large number of suburban park-and-ride dominated locations (as per the left cluster) it is surely worth noting that a significant number of stations across a mix of urban contexts are able to achieve high levels of transit transfer access (primarily from feeder buses – as per the central cluster). The analyst is compelled to point out that car-dependence is a common, but not *overwhelming* phenomenon in DC – to the degree it is in Sydney or the Bay Area. In this context we would surely be looking to understand and re-apply the principles and success factors facilitating greater levels of transfer and feedering at the middle-of-chart cluster. This "feeder and transfer" cluster includes notable exemplars such as Anacostia and Fort Totten – both of whom see in excess of 50% of their station access counts occurring via other transit modes (buses). These two locations essentially represent middle suburban and suburban contexts respectively – hence their feeder transit service offering must be worth observing and re-applying both in Metro itself, and for other systems and suburban stations in the USA and internationally.

The right-of-chart cluster demonstrates extremely high levels of walk-up access at mostly core urban locations – with all of the selected locations handling in excess of 80% of their access task by walking (and some level of cycling). The lesson from these stations is clear and simple – in that transit riders are ready, willing and able to make their access journey on foot where localised urban conditions facilitate that outcome.

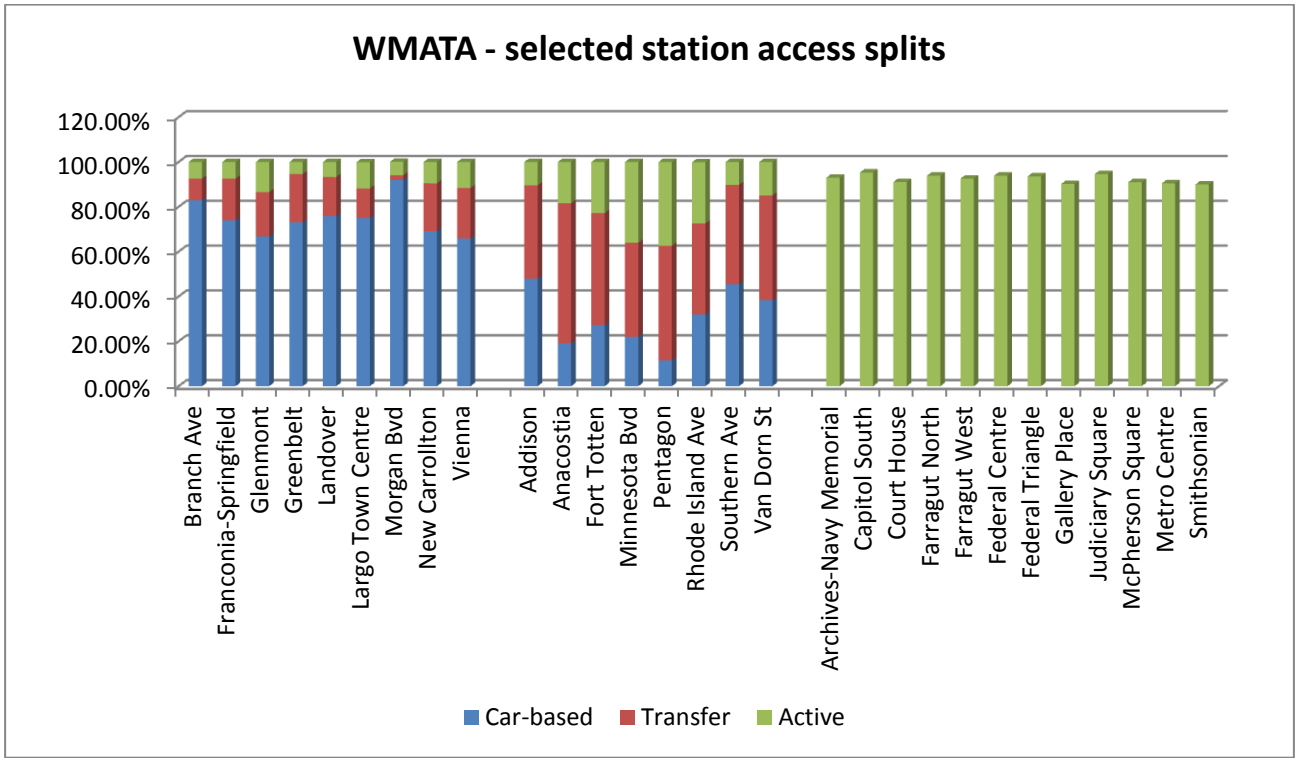

Chart 6 – WMATA Selected Station Access Mode Shares

5. EUROPEAN CASE: MUNICH (MVV/S-BAHN)

From Australia and the USA to Europe – where public transport usage in major cities is traditionally substantially higher (see Martens 2004), and where urban development patterns and street networks tend to be more supportive of walking and cycling movements. It has also been widely documented that the major European cities tend to have more extensive and modern "full-service public transport networks" (Bratzel 1999; Cervero 1998) rather than the radial rail systems and imperfect integration between lines and modes often observed in the New World (to paraphrase). In these contexts, a European case study such as Munich should provide us with noteworthy divergence of station access patterns from which to draw comment.

Munich is recognised as a leader even within the pro-public transport European context. Its highly-developed and extensive public transport network features multiple and integrated tiers (bus, tram, U-Bahn, S-Bahn and regional rail) and offers comprehensive metropolitan coverage (refer RSB 2005). Public and sustainable transport usage in Munich is unsurprisingly very strong – with car movements in a minority overall when compared to the combined shares of transit, walking and cycling. But the access paradigm for transit stations in Munich is less extensively documented than other aspects of transit infrastructure and service, and thus an opportunity is provided here perhaps for new commentary and analysis regarding an important topic.

System-wide Station Access – analysis and commentary

The figures, unsurprisingly, indicate a level of sustainable mode access to S-Bahn stations in Munich well in excess of those seen in the Australian or USA case studies (at around 90% total share). Notable is the outstanding level of walking access - at 70% (with MVV's folding of "other" access modes into the walking figures being cryptic and abstract enough to largely ignore). Equally, the +10% for cycling access is ahead of that encountered in the New World, and perhaps roughly typical of European conditions, while not being quite at the level of European bike access leaders such as the Netherlands (see Martens 2004; 2007).

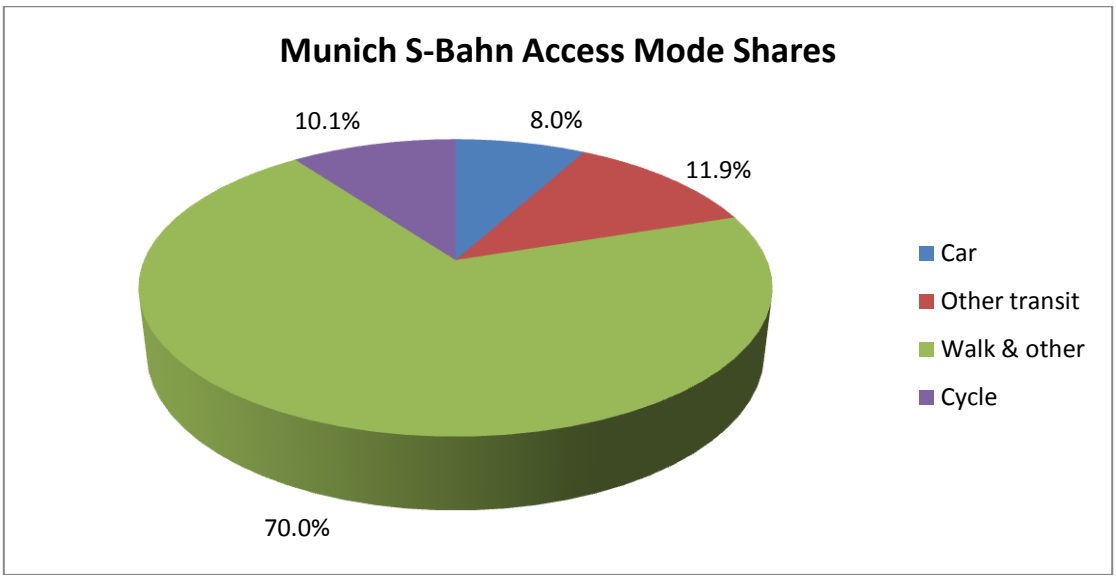

Chart 7 – Munich S-Bahn system-wide station access mode shares

Transit-based access (by bus and tram) is somewhat curious – in that it doesn't quite meet initial expectations, by not exceeding the figures observed in Washington DC or the Bay Area (17% and 15%). Perhaps this is partially due to the local view that buses are "gap fillers" into locations where rail or tram does not reach (rather than being a 'feeder' mode, per se) (see RSB 2006; 2005).

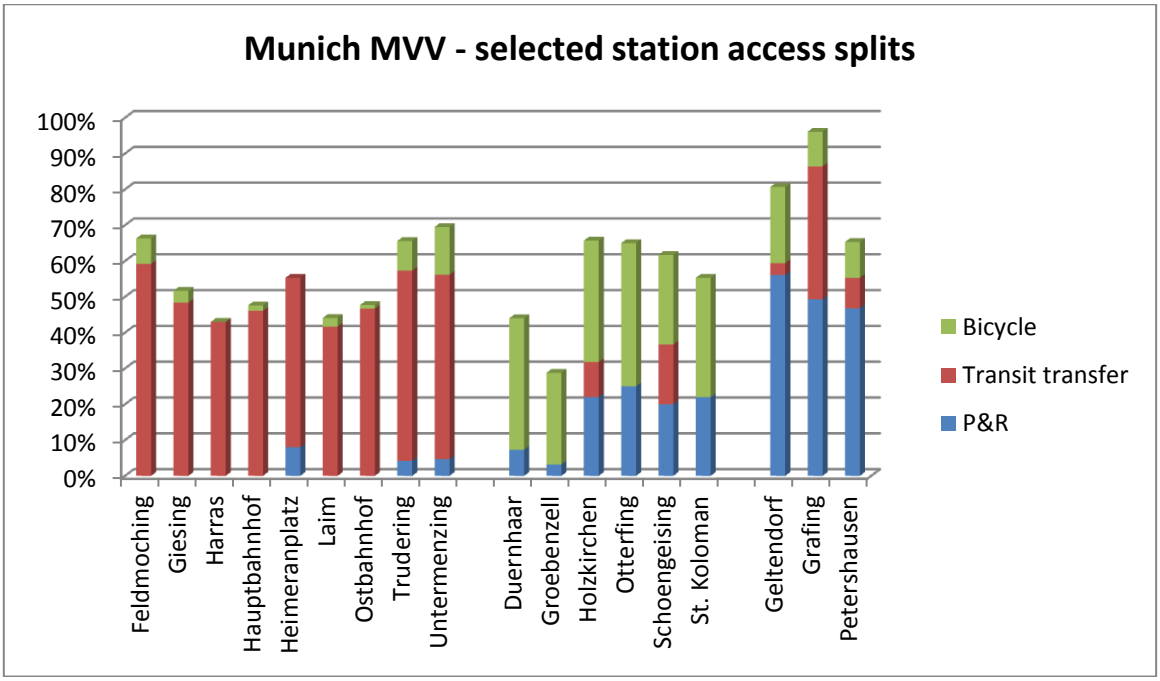

Chart 8 – Munich S-Bahn selected station access mode shares

Station Access at select locations – analysis and commentary

The three clusters presented here from the Munich data are based respectively on: high rates of transfer; high rates of bike access; and a small group of three stations with substantial amounts of "American and Australian-style" park-and-ride dominance.

The transfer cluster is considered noteworthy because of the *very high* rates of transfer observed (over 40% of access journeys in each case, and close to 60% for certain specimens). These stations are in a mix of urban and suburban contexts. Like certain of the Washington DC stations, they tend to push our perceptions of what can be achieved with a high level of transit transfer service and infrastructure provision. The "bicycle" cluster similarly pushes the boundaries and expectations (especially for US or Australian transit professionals). These specimens are essentially mostly suburban – and underline the outcomes potentially achievable where European-style bike infrastructure is in place (mainly *dedicated bike paths*, rather than high quality lockers, in Munich's case). One way to view these figures is to ponder the extent of car parking facilities that might be required at these locations, were they not to exhibit the same access count by biking... And finally, just to prove there is an exception to every rule or assumption – Munich also features a small number of S-Bahn stations (at right of Chart 8) that exhibit high levels of car-based access, in excess a 40% benchmark level. In simple terms, bike-heavy stations like Holzkirchen might need to double their car parking provision if they were accessed in a car-oriented manner such as that observed in Geltendorf.

6. ASIAN CASE: HONG KONG (MTR)

Hong Kong distinguishes itself as a mass transit network from the other cities listed in this paper via its extremely high levels of daily movement by rail (at some 4 million trips). While all the cities and systems appraised here are relatively "large" in both population and rail trip terms, Hong Kong is *larger again* – in every aspect other than system length, according to which dimension it is one of the smaller of the case studies (see Hale 2011b). In this sense "intensity" and "density" are the operative concepts – and Hong Kong provides an extremely useful case study regarding access performance and paradigms at this upper end of the mass transit ridership and urbanisation scale. While none of the other case studies exhibit the overall density or people-movement intensity that MTR deals with, they all feature certain stations and sections of certain corridors at which these higher levels of critical mass are approached. There is also another basic, yet extremely relevant and interesting question to be answered via a Hong Kong case study, namely: "...*how does a transit system cope and perform when the ability to get passengers to-and-from their local station by car is almost entirely absent*...?" The resounding answer might be; "...quite comfortably"... Hong Kong reminds us that passenger rail and park-and-ride are not the automatic partners they are often assumed to be in the North American or Australian transport culture.

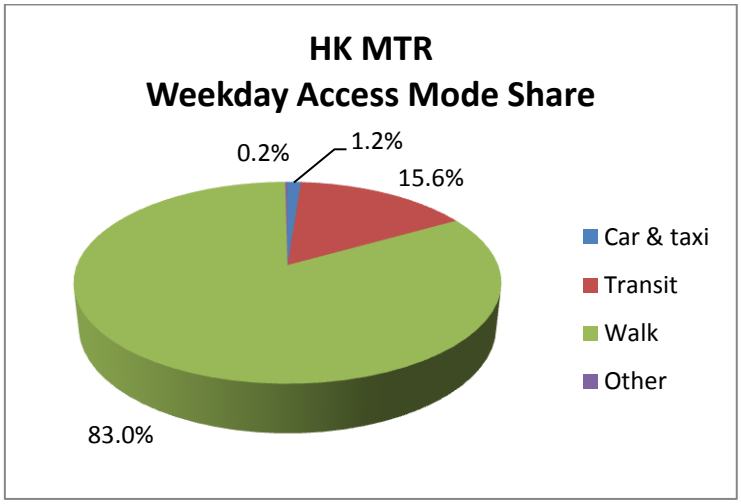

Chart 9 – Hong Kong MTR system-wide atation access mode shares

System-wide Station Access – analysis and commentary

As would be expected, Hong Kong's access paradigm is overwhelmingly based on walk-up, to a degree that essentially renders MTR "walking access dependent". In this context, the analyst might naturally raise an expectation that the quality of pedestrian access infrastructure convergent on MTR's stations would be exemplary. But in field observation this is not always the case. Street level pedestrian conditions are often poor, but elevated walkways do tend to connect effectively between surrounding buildings and a given station. Transit transfer (from bus, mini-bus, ferry, or tram) sits at a solid but somewhat un-spectacular and perhaps under-developed +15%. While rail-bus interchanges are indeed present in Hong Kong, they do not seem to take on the excellent integrative design characteristics of certain Singapore equivalents (for example). Car access and cycling (via "other") are miniscule in the overall mix. Low-levels of cycling access may seem expected at face value (due to heavy urbanisation, humidity, generally steep terrain, and lack of traditional cycling infrastructure or culture) – with Atkins (2004) nominating a 0.5% territory-wide mode share figure for cycling. But the researcher's repeat field visits to Hong Kong tended to leave the impression that bike access was possibly neglected to a greater degree

than latent demand would suggest advisable. Hong Kong's non-centrally located stations invariably feature numerous bikes chained in an ad-hoc manner outside station entrances – but proper lockers and other infrastructure are simply not available.

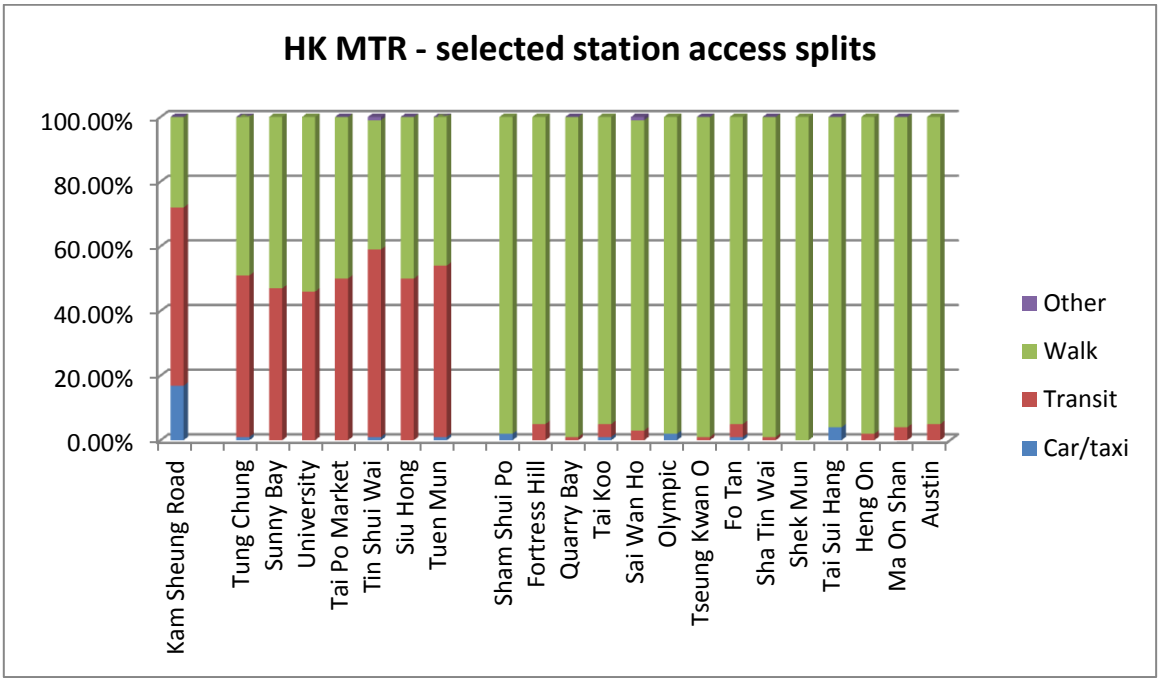

Chart 10 – Hong Kong MTR selected station access mode shares

Station Access at select locations – analysis and commentary

Three clusters are listed above – representing respectively: HK's only "park-and-ride" facility of note; a list of stations with relatively high levels of transfer and interchange access; and a selection of Hong Kong's most heavily urbanised locations where walk-up access is virtually "absolute" (while not including Central, Admiralty, or downtown Kowloon-side stations).

Kam Sheung Road's suprisingly *suburban* setting is reciprocated with a large parking lot and a not inconsiderable +16% of access by car (and taxi). As with certain Munich examples, if nothing else, this proves the adage of an exception to every assumption. Conversely, Hong Kong's transfer-heavy stations (listed here where they exceeded 40% transit-based access) are not surprising – unless we ponder the observance that such facilities and these robust levels of transfer access are relatively uncommon in Hong Kong overall.

As expected, the "walk-up" station cluster dominates our analysis of access modes observed across Hong Kong - as comprehensively as mass transit and pedestrian movements dominate these very locations. The pedestrian conditions provided for accessing these stations at times do not seem to match the observed levels of pedestrian demand. But they nonetheless tend to represent lively, exciting, and genuinely "sustainable" locations and urban conditions (if somewhat cramped). A city or precinct based on mass transit and pedestrian dominance is perhaps not "perfect" (if we take these Hong Kong locations as exemplars) but it is certainly a vibrant and people-focused domain – attractive for locating offices, retail businesses, or simply for providing convenient access to the necessities of daily life. Recent years have seen the beginnings of a sustained, formalised pedestrianisation process around high volume MTR stations (see Mannings 2010).

7. INTERPRETATIONS AND REFLECTIONS

The systems surveyed here represent a reasonably diverse set of network paradigms and levels of intensiveness. They represent a somewhat 'like' set of locations – in being within a medium-scale city band clustered around Sydney's 5 million-strong population. Munich, the smallest city in the sample at around 2 million, demonstrates that strong ridership can be generated from a limited population base. This outcome should be acknowledged as a function of the quality and convenience of access to rail stations afforded across the urban and suburban conditions prevailing in Munich. The 'new world' systems are varied too – and demonstrate a predictably greater role for suburban park-and-ride. But even with BART, as the most P&R-dependent system in the sample, car-based access fails to comprise a majority – and sustainable modes predominate by a slim margin.

Systems & Access Paradigms – a summary					
System	*System-wide access split car/transit/ walk/cycle*	*No. Stations*	*System Length km*	*Daily ridership (approx.)*	*Comments*
BART	49/15/31/4	43	170	360,000	Relatively small system for major metropolitan region. Urban areas served at SF, Oakland, Berkeley stations. P&R dominated suburbs
Sydney	30/9/50/11	307	1,600	1 million	Large system – substantial suburban coverage. Intensive in middle/inner suburbs
WMATA	20/17/62/1	89	170	750,000	More intensive system than BART for similar length. P&R in suburbs but feeder buses also prominent. Urbanised core stations.
Munich MVV	8/12/70/10	148 S-Bahn 100 U-Bahn	540	2 million (combined)	S-Bahn (from which analysis performed) actually quite 'suburban' – yet sustainable access modes dominate. Bikes relatively prominent
HK MTR	1/16/83/0	85	175	4.4 million	Intensive usage. Similar system scale to WMATA – serving larger pop. A system based entirely on walk-up and transfer access

Table 1 – System characteristics & access splits. System figures from Hale (2011b). Approximate only.

Two messages seem to emerge from interpretation of the figures from these samples. The first is that car-based access is notably less important than the other modes combined – and hence its prominence in access planning and resourcing needs greater scrutiny. The second, perhaps more important point, is that access behaviour should be understood as an outcome of localised infrastructure and service-provision. Even in a range of highly suburbanised contexts, those stations offering substantive feeder bus service integration (for example) are consistently observed to attain higher rates of access by that mode. This point is logical and obvious – but it needs to translate into the actions and decisions of transport professionals.

8. RECOMMENDATIONS FOR 21ST CENTURY ACCESS PLANNING AND INFRASTRUCTURE EFFORTS

The station precinct of the 21st century will hopefully be an active, reasonably intensively developed, mixed-use area – which affords quality pedestrian and cycling access and movement opportunities, and in some locations the facilitation of robust levels of transit feedering through frequent service and convenient interchange configuration. It will be an active and vibrant location – focused on people and streets, rather than roads and vehicles.

The station precinct of the late 20th century was often created and moulded with aims that were less clear, and on the basis of assumptions and tendencies, rather than evidence, advanced design techniques, or specific goals. In locations like Hong Kong and Munich, these "tendencies" tended toward sustainable mode access paradigms. Although another interpretation might suggest that European cities such as Munich have always pursued a more evidence-based transport approach (see RBS 206; 2005) than has been mobilised in the USA or Australia. In any case, it is still debatable whether station access has ever been a major priority for transit agencies or other stakeholders like local governments worldwide. The evidence of direct observation would suggest that for the most part, stations are planned and configured within a certain property boundary (owned by the transit agency), and what occurs beyond that footprint has been a largely separate and ignored phenomenon. Mass transit agencies have focused on the movement of trains between stations (a challenging task in its own right) and have not traditionally been enamoured of any suggestion to step beyond that particular and somewhat narrow sense of their engineering-based activities and operations. Where "access" *has* been considered in the US or Australia, it seems that it was very often addressed in the context of large new park and ride lots at new stations in suburbanising areas. But park-and-ride lots tend to fill up quickly, and certain agencies (such as BART and WMATA) have more recently been expressing a clear view that unadulterated dependence on parking growth in suburban locations is not sustainable in financial, built-form, design or environmental terms (WMATA 2008; 2010; BART 2008).

Station access design and infrastructure as a "new" field

In these contexts, it seems a new approach is required in order to re-establish the people-friendly integration of mass transit into its suburban and urban settings. Equally, the concept of "service" to passengers may need to extend beyond the experience encountered between station A and station B while seated on a train. The transit-based journey is inherently multi-modal, and this linked-trip paradigm must receive greater recognition and working application in the skills-set of transit agencies, local government and other stakeholders, and among the very professionals who design, engineer, plan, finance, and operate our transit systems.

Toward this end, it is recommended that transit station access, alongside transit station design, should be cultivated to emerge as a dual-aspect specialised vocation in years to come. The skill-sets of this new profession should encompass the ability to assess and appraise access conditions, the ability to propose and sort-through a selection of potential interventions and options, and the ability to implement those solutions via emphasis on walking, cycling and feeder transit infrastructure and service-provision.

The skills and techniques required for 21st century station access projects are foundation skills for the creation of the 21st century suburb and city.

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