

The Times

June 2015

A journal of transport timetable history and analysis



Inside: Chicken and Egg in the Intermodal World

**RRP \$4.95
Incl. GST**

Image courtesy of Sydney Ports Corporation

The Times

A journal of the Australian Timetable Association Inc. (A0043673H)

Print Publication No: 349069/00070, ISSN 0813-6327

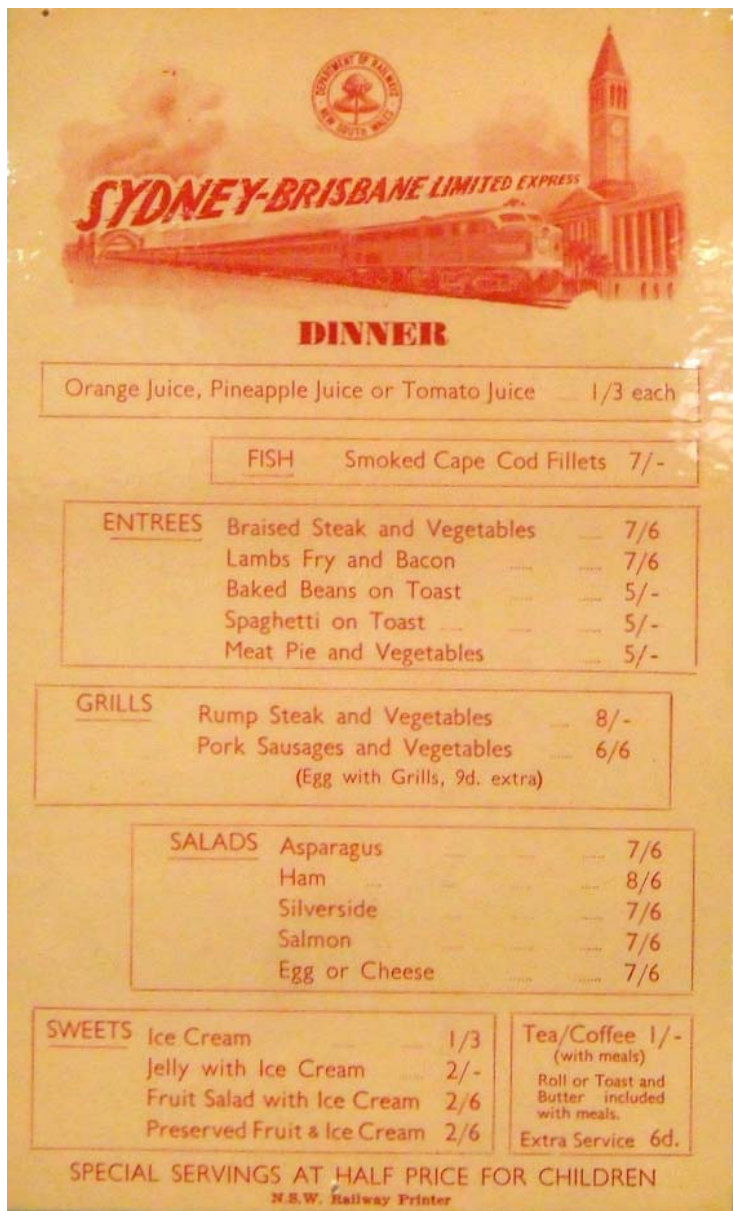
June 2015

Vol 32 No. 06, Issue No. 307

The Times welcomes all contributions. Our Authors' Guide is available on our web-site at <http://www.austta.org.au>
Reproduction Material appearing in The Times may be reproduced in other publications, with an acknowledgement.
Disclaimer Opinions expressed in our magazines are not necessarily those of the Association or its members.
Editor, The Times Geoff Lambert 179 Sydney Rd FAIRLIGHT 2094 NSW G.Lambert@inet.com.au
 A full ATA contact list can be found periodically in Members News, at <http://www.austta.org.au/newsletter.pdf>

—CONTENTS—

AUTHOR	TITLE	
GEOFF LAMBERT	CHICKEN AND EGG SCENARIO	3
HILAIRE FRASER	CANBERRA'S BLUE RAPID	9
DEREK SCRAFTON	OTTAWA (LETTER)	12\
GEOFF LAMBERT	ON THE E70	13



Sydney Buses Timetable

Manly & Balgowlah Heights
to City & Warringah Mall

▶ Effective 10 June 2012

<p>131 171</p> <p>132 E71</p> <p>E70</p>	
---	--

Route 131

Daily evening loop service between Manly, Balgowlah Heights, Seaforth, Bantry Bay, North Balgowlah, Balgowlah Heights and Manly

Route 132

Daily daytime service between Manly, Balgowlah Heights, Seaforth, Bantry Bay, North Balgowlah, Manly Vale and Warringah Mall

Route E70 PREPAY

Monday to Friday peak hour bus service between Manly, Sydney Rd, Seaforth, Spit Jn, Cremorne Jn, Neutral Bay and City - Wynyard.

Route 171, E71

Monday to Friday peak hour service between Manly, Balgowlah Heights, Seaforth, Spit Jn, Cremorne Jn, Neutral Bay and City - Wynyard

Chicken and Egg Scenario

Which comes first? The timetable or the Intermodal Yard? - **GEOFF LAMBERT**

Four years ago, Transport Minister Anthony Albanese gushed that Woolworths was about to start transporting yoghurt from Brisbane to Sydney and Melbourne on ARTC's overnight trains (*The Australian*, 6-May-2011). A classic case, he implied, of ARTC improving its network to become competitive with trucks.

It never happened.

It never happened because the logistical difficulties of getting the yoghurt out of a Queensland cow, onto a truck and then onto a train (and reversing the process in Sydney) negated the fresh food imperative of Woolworths. Who wants yoghurt that has been hanging about in Acacia Ridge and Chullora for 6 hours along the way?

Across the Pleurisy Plains in Western Victoria—and also across the Nullarbor—ARTCs Melbourne to Adelaide and Perth intermodal trains are “fleeted” going one way on one day of

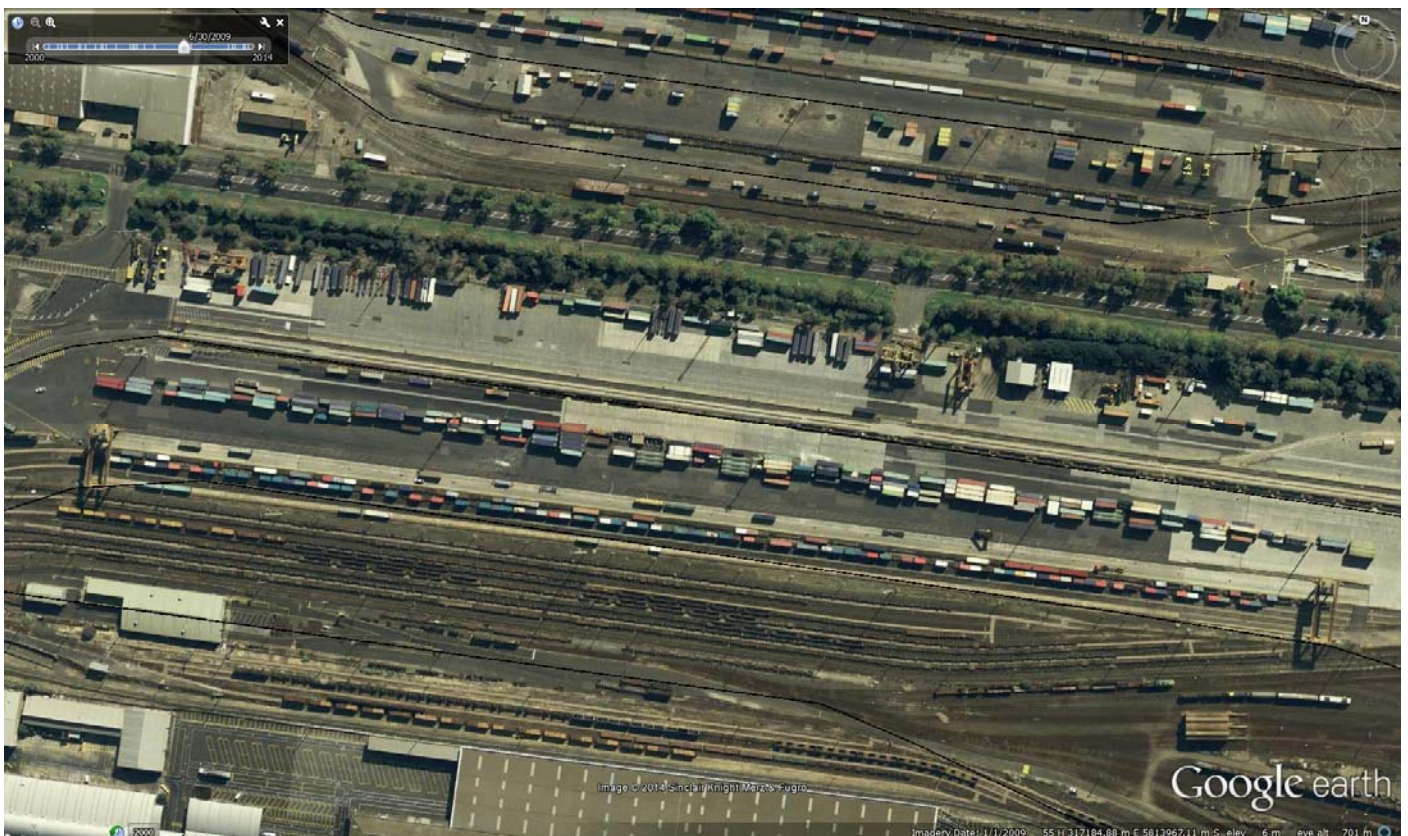
the week and the other way the next day. This behavior is partly driven by single line crossing exigencies, but also by the need to avoid congestion in intermodal yards—especially Dynon complex in Melbourne.

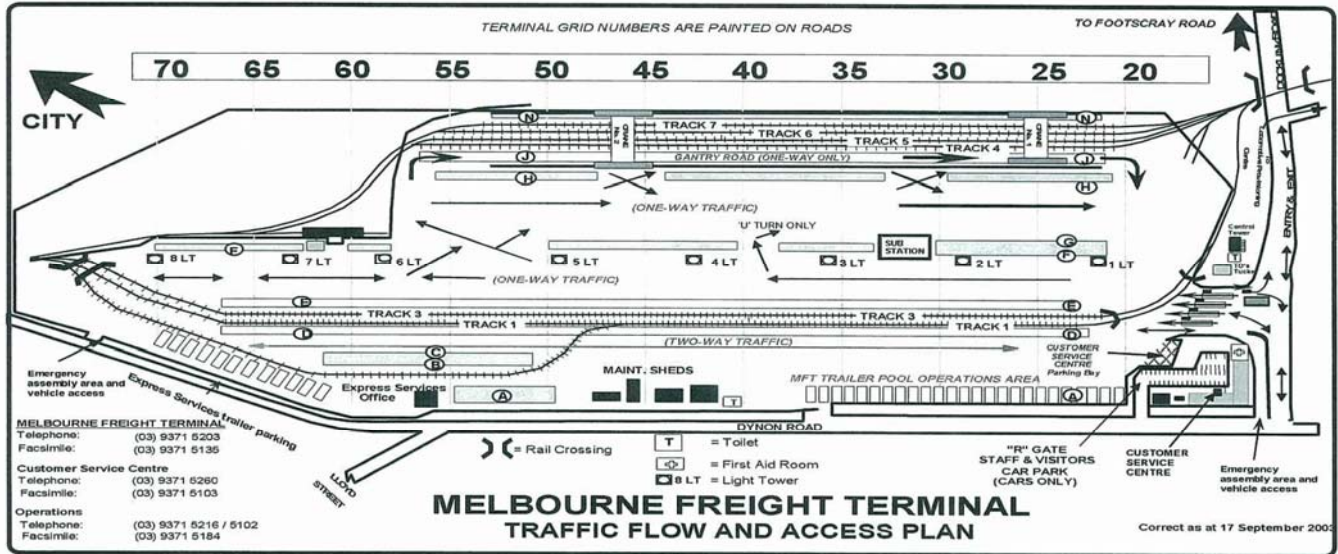
This article will examine the interaction between main line and intermodal rail yard schedules.

A recent article in *Trains Magazine* pointed out that the modern imperative in scheduling is not that of the train, but of the individual shipment, represented by a single car or single TEU—or even a single tub of yoghurt?

In a vertically integrated railroad, the skill of the schedule planners lies with the fitting together of hundreds of complementary yard-to-yard car schedules into a train schedule (see Victor Isaacs' article in our April issue). In Australia, with its vertically disaggregated rail system, there is no single body to do this. ARTC has to fly by the seat of its pants—essentially

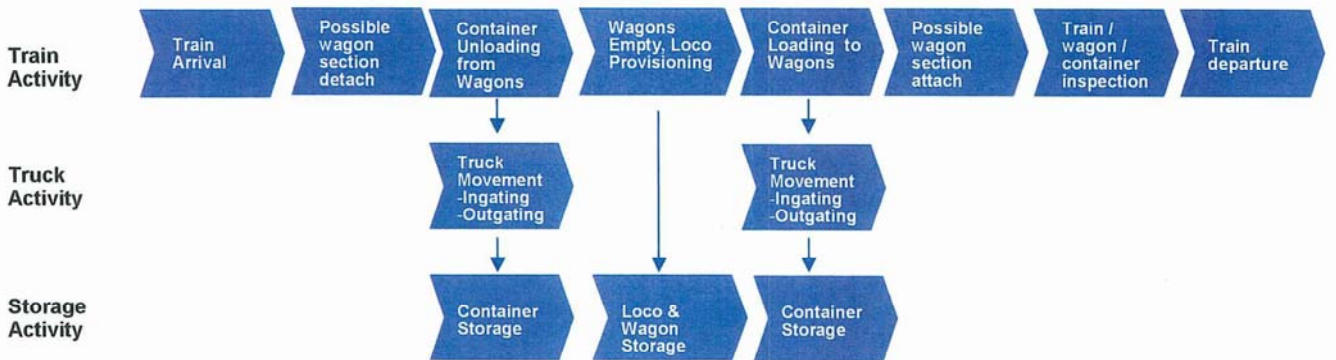
Australian cows do not determine the timetable of a yoghurt train. American cows do.





Train Load / Unload Process Considerations

(Process to fill available capacity, ie does not require investment for expansion)



- Considerations**
- Time of day?
 - Day of week?
 - Length of Train?
 - Available track space?
 - No of sections to breakup?
 - How to manage variations?
 - Commencement date?
 - Within terminal operating hours?
 - How many sections to detach?
 - Any through city section?
 - Where will sections be placed?
 - Are shunt locos available?
 - How many containers to be unloaded?
 - How many containers to be stored?
 - Sufficient lifting equipment?
 - Trucks and containers receipted automatically?
 - Sufficient in-gate truck handling capacity?
 - Type of containers to be unloaded?
 - Trucks scheduled with train arrival?
 - How many hours before loading task commences?
 - Where will wagons and locos be positioned?
 - Are shunt locos available?
 - Where will locos be provisioned?
 - Will load activity follow unload activity immediately?
 - How many containers to be loaded?
 - How many containers to be removed from storage?
 - Sufficient lifting equipment?
 - Trucks and containers receipted automatically?
 - Sufficient in-gate truck handling capacity?
 - Type of containers to be loaded?
 - Trucks scheduled with train arrival?
 - How many sections to attach?
 - Any through city section?
 - Where will incoming sections be sourced?
 - Are shunt locos available?
 - How will a faulty wagon or container be corrected?
 - Who will correct non-loading faults?
 - Who will provide information to Track Access providers and other authorities?
 - Train departure clashes;
 - Sufficient time for variation management?
 - What if Track Access provider will not accept train?

second-guessing what it hopes will optimize some (undefined) customer need.

Australia has some 60 intermodal (rail—road) yards. Every day some 10,000 containers (TEUs) are loaded on or unloaded from some 130 trains. These yards handle some 10,000 B-

doubles or semi-trailers each day. While this might seem to be taking a lot of trucks off Australian roads, it represents only a small proportion of the number of long-distance truck journeys per day—about 15%.

Rail intermodal traffic is small fry—but that doesn't mean that that inter-

modal yards lie idle—in fact most of them are hives of activity. Indeed, yard congestion and logistics seem to be one of the major factors holding back intermodal traffic.

Intermodal scheduling.

Intermodal transport in Australia, in-

DYNON INTERMODAL TERMINAL

Master Track Utilisation plan

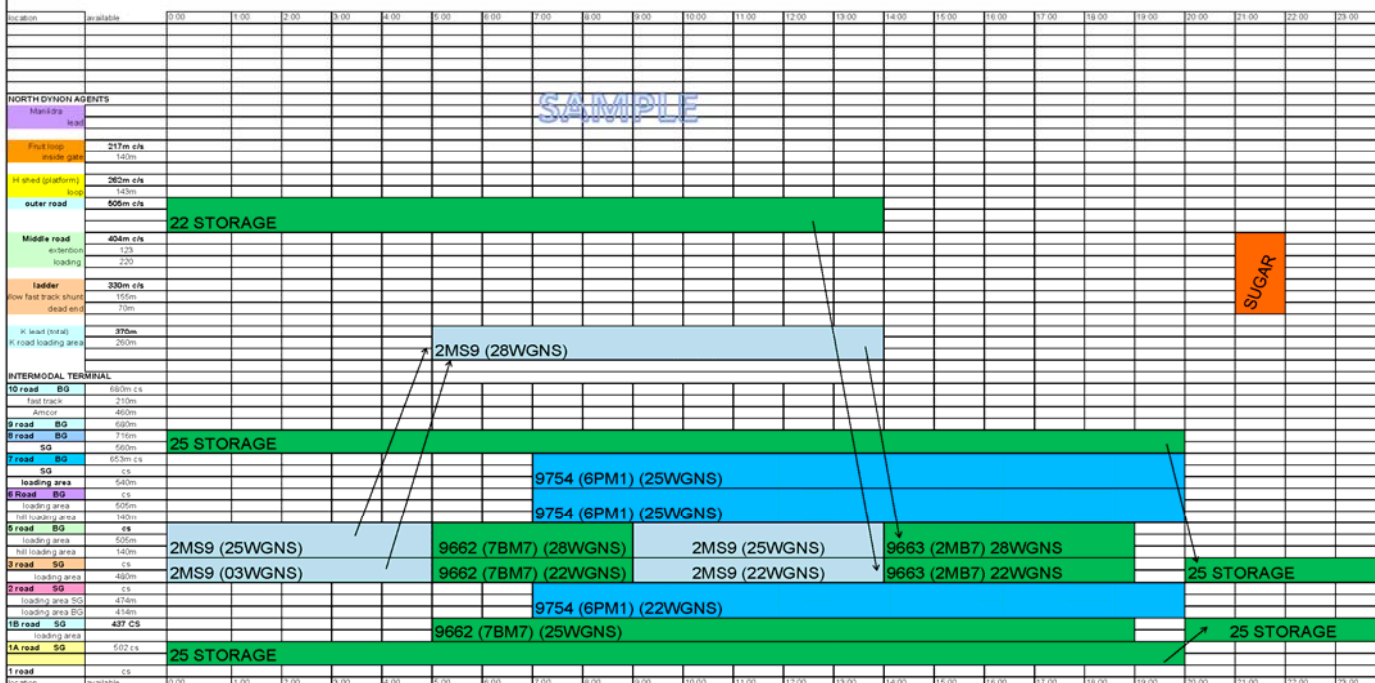
VERSION 1
EFFECTIVE 24.03.11

COMMON USER AREA
[company paying access fee]

ON DUTY

PAO FORK/LIFT
VICTRACK CO-ORDINATOR
INTERRAIL CO-ORDINATOR
INTERRAIL SHUNT CREW
POTA SHUNT CREW

MONDAY



volves a long and diffuse supply chain:

#	Identity	Example
1.	Customer	Woolworths
2.	Freight Forwarder	Austpac
3.	Urban truck (2 of)	Linfox
4.	Yard Owner (2 of)	Victrack
5.	Yard Operator (2 of)	Asciano
6.	Train Operator	Aurizon
7.	Track Owner	ARTC

It wasn't always like this. Once upon a time, the supply chain had only 1 link—"the railways". We have Margaret Thatcher and Fred Hilmer to thank for getting us into "another fine mess."

In theory, Woolworth's wish is ARTC's command but, as Bob Hawke once famously said, "Life isn't like that". To be fair, when ARTC was being set up, it engaged consultants to test the market - i.e. to poll all links of the supply chain. Unfortunately not everybody gave straight answers or the consultants misinterpreted what they heard or they formed their own opinion. The result was an overly ambitious "Field of Dreams" to make rail the dominant player in interstate non-bulk transport. This was what Albanese tried to convince us was already happening in 2011—but it was a

chimera then and it is a chimera now. Unfortunately the Rail Yard "link" has been barely examined. This is a pity because it is possibly the weakest link.

How does an intermodal rail yard work?

Here I examine the case of the Dynon intermodal complex in Melbourne, which, in 2011, handled about 220 intermodal trains per week. The Dynon complex is a special case in point because it also handles a great deal of sea-rail and sea-road intermodal traffic. Furthermore, Dynon is more or less in the demographic centre of the city and is only a stone's throw from the CBD. These factors require a concentration of effort and seamless logistics seldom seen in the average Australian intermodal terminal.

"Dynon", in generous terms, is a complex comprised of the following "yards" (with the main operator and the maximum siding length):

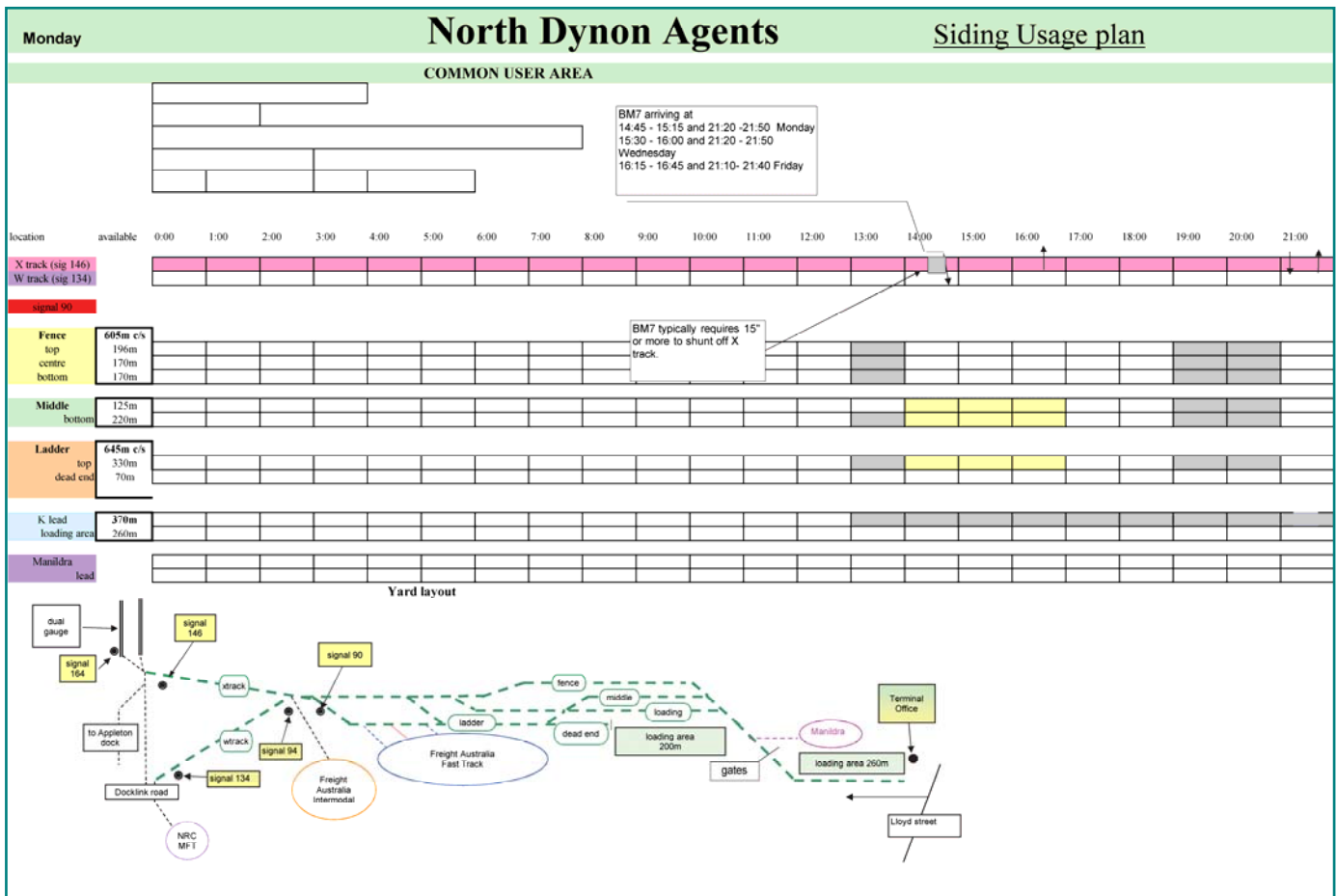
- North Dynon (Qube, 500m)
- South Dynon (PN, 1200m)
- West Swanson (DPW, 565m)
- East Swanson (Patrick, 1500m)
- Victoria Dock (Qube, 550m)

- Steel Terminal (PN, 250m)
- Creek Siding (Victrack, 400m)

Dynon operates sidings with fork-lifts and straddle cranes. These sidings are where trains are put together and taken apart—necessary bugbears because the siding lengths usually cannot accommodate today's trains of 1800m (East-West) and 1500m (North South).

Woolworth's yoghurt tubs will take up, perhaps, 1 TEU. This TEU has to be interdigitated with hundreds of other containers from diverse customers, of diverse logistical and scheduling needs, on to the handful of trains which are dispatched to a destination yard in Perth, Adelaide, Sydney or Brisbane. This is a big ask for the train and track operators and—for time-sensitive traffic—it may be sufficiently iffy to repel the customer.

Most of the yard operators produce extensive documentation on how freight forwarders or their agents are supposed to access each Intermodal yard. I consider here, the working only of South Dynon, operated by Pacific National (aka Asciano), for the yard owner, the Victorian Essential Services Commission (ESC). A map from



PN's 2009 South Dynon Terminal Guide appears on page 4 .

For our tub of yoghurt to find an arrival slot in the yard, it (that is to say, Woolworth's freight forwarder) first must find a train on which to arrive. If there is not a suitable train, then a new timetable must be made. The job of requesting a train timetable, at least in theory, falls to the Access Seeker (Aurizon, say), who will petition ARTC for a suitable path. ARTC may or may not have one up its sleeve—most likely not. If this process meets a dead end, then the yoghurt will travel by truck instead.

But if ARTC has, or can create, a timetable for Aurizon, Aurizon (as the yard Access Seeker) then goes to Asciano to request access to a "Terminal Service". There are, of course, a number of protocols for this. The most frequently used is "Reference Service 1 (b)", (regular service for trains of up to 1500 metres) described as follows:

(i) *load planning* - The planning of the loading of the train matching containers to wagon types to ensure all

track loading outlines are met as well as ensuring the slot utilisation is maximised.

(ii) *shunting* - Break up of trains on arrival of up to four shunts to place onto loading roads or marshalling yard, removal of red cards and marshalling of train for departure. The Access Holder can choose to have either Pacific National provide locomotive(s) and crew for only two of the four shunts (Option A) or for all four shunts (Option B) provided for in this service.

(iii) *truck ingate process* - Process to collect customer booking information, weigh the truck/trailer to obtain accurate container weight, integration of electronic information, inventory management of the container.

(iv) *load/unload process*- Unloading of containers from wagons onto truck or onto ground, moving of containers to storage area, loading containers onto truck from storage area, unloading containers from truck to ground/wagon, load containers from ground to wagon.

(v) *train inspection*- Mechanical inspection of wagon to ensure fitness to run on the network), checking of load security, provision of a train inspection certificate.

(vi) *attaching and detaching locomotives*- Coordination of the detaching of locomotives on arrival and coordination of the attaching of outgoing locomotives before departure. Locomotives to be crewed by the Access Holder.

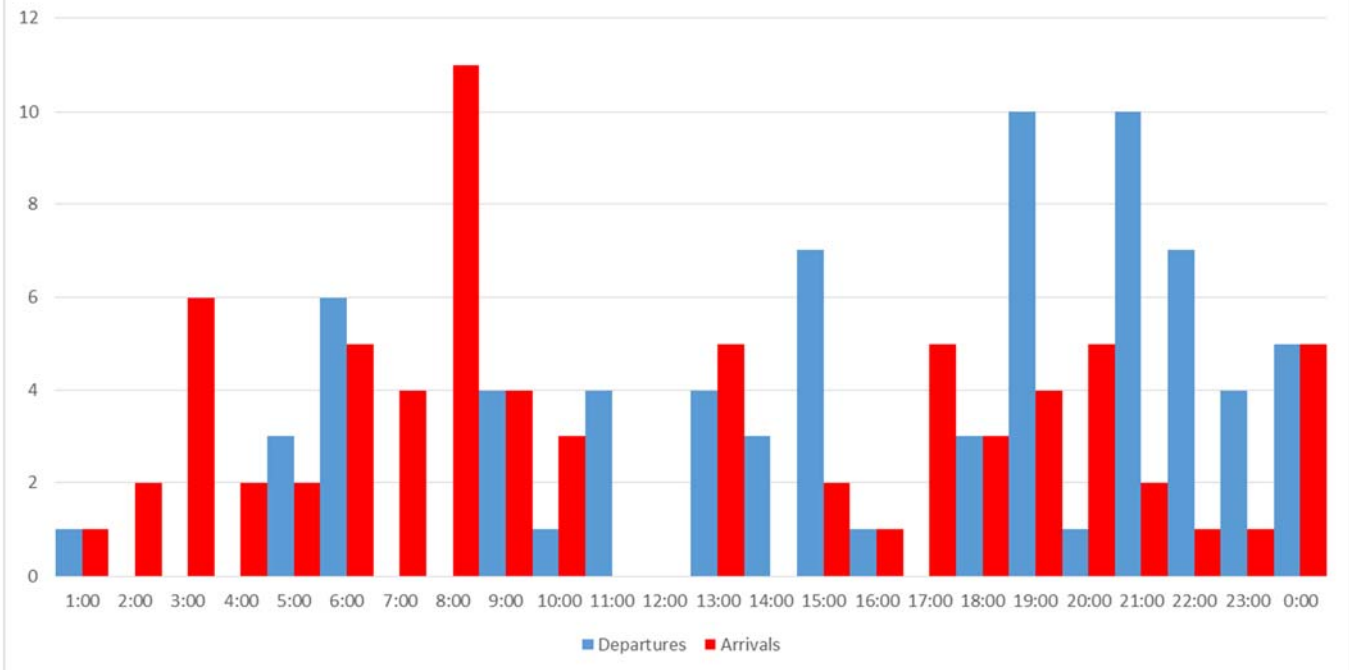
(vii) *truck outgate process*- Completion of the truck visit to the terminal, matching of release numbers to container numbers and integration of electronic information for ending possession of the container.

(viii) *ongoing administration related to the management of Access Holder*;
(ix) *customer interface*; and

(x) *basic container storage*- Provision of an allowance of storage time for a container from time of arrival into the terminal till departure. For outgoing containers by rail 12 hours and incoming containers by rail 24 hours.

A flow diagram for the allocation of

Freight Trains by the hour (weekly totals)



services, including the considerations over which Asciano ponders, appears as the second diagram on page 4.

There is an additional factor, not mentioned here—this is whether there are competing claims on the “slot”. If there are, Asciano is allowed to select the Access Seeker which maximizes Asciano’s own financial return. Given that Asciano is also an Access Seeker (as Pacific National) there is a potential for favouritism here. This, however, is covered by a separate clause which prohibits Asciano from favouring “itself”. Tricky.

All of this costs money, a factor that will also enter into Woolworths yoghurt decision (Option B as at 2009):

- \$2,006 per train
- \$47 per TEU

The basic train charge, indexed to fuel prices, has since been reduced by about 40% (for other reasons).

If a slot can be found at South Dynon, then both truck and yard shunting and storage timetables need to be created.

Truck timetables

There is a timetable (of course) and it is computer driven (of course). Incoming trucks “take a ticket” as in a parking lot, telling them where to drop or where to pick-up their load. Because

there is storage capacity, there are leeway allowances on the incoming and outgoing loads (part of Reference Service 2):

- Incoming 24 hours
- Outgoing 12 hours.
- \$42 per TEU per day

This means that trucks can come and go during working hours (for South Dynon 5AM to 6PM), even if the trains come and go in the middle of the night—not good for yoghurt, but convenient for other types of loads. In the absence of storage, truck deadlines are 2 hours before departure (cut-off time) and 2 hours after arrivals (bump out time).

Whether it be to/from storage or to/from the loading area, the computer knows; furthermore it also knows the truck timetables, and so has placed, or will place, the TEU in spots that guarantee a smooth flow, with no block of access. The map on page 4 shows, with directional arrows, the routes over which a truck must take its load.

Yard timetables

In 2009, reference Service 1(b) allowed for trains of up to 1,500 metres and, because the longest tracks in South Dynon are 1,200 metres, trains longer than this have to be split up. On the East-West routes, we have 1800

metre trains, exacerbating this requirement. There is a shunting timetable and a track occupancy timetable for all of this (Pages 5 & 6).

In some circumstances, an incoming train has a quick turn-around and makes an exit a few hours later. This is encouraged and it is one of the factors which drives “fleeting” in the timetables. “Turnaround” times for trucks and trains are vaguely specified, but Asciano will investigate complaints about “excessive” times.

These yard movements can be organised entirely by Asciano (expensive) or shared equally with the Access Seeker (half the cost).

The wash-up

As can be imagined, the creation of the timetable for an intermodal yard is a fraught business and would be much more so if Intermodal traffic over short distances such as Melbourne-Sydney ever takes off again (unlikely in the extreme).

The chart on the top of this page, compiled from an ARTC Master Train Plan, shows the hourly distribution of arriving and departing freight trains at Sims St, totaled over 1 week. Not all are intermodal, but a lot of them are. Not all come and go from South Dynon, but a lot of them do.

The peaking of arrivals at 7-8AM in the morning and departures at 6PM-8PM in the evening is only partly driven by “just-in-time” scheduling of traffic like yoghurt. There is certainly a degree of competition out of Acacia Ridge in Brisbane for PN and Aurizon Brisbane-Melbourne trains (BM4 and BM7) and they follow one another in elephant fashion as far as Sydney, 20 minutes apart. Timetabled arrival at South Dynon and North Dynon, however, is usually 4½ hours apart.

On a weekly basis, the sixty arrivals and departures from Dynon are somewhat scattered among the days of the week (chart on the right of this page). Nothing moves on Saturdays, presumably because rail transport defers to the footy. The nine trains shown for Sunday are probably not serviced by trucks on that day, but on Saturday (departures) and Monday (arrivals). No yoghurt on the Sunday trains, then.

Timetable disruptions

Trains run late; of course they do. It is hard to attribute blame but, according to ARTC, most run late because of reasons attributable to the train operators. Late-running trains can attract penalties in some jurisdictions, but it seems pointless for a terminal to exact penalties when lateness is spread all over the supply chain. Instead, the terminal agreement specifies as follows:

6. Daily Variations

(a) The Access Holder will use its best endeavours to provide 12 hours notice to the Terminal Manager if a Train is likely to arrive before or after its scheduled arrival time.

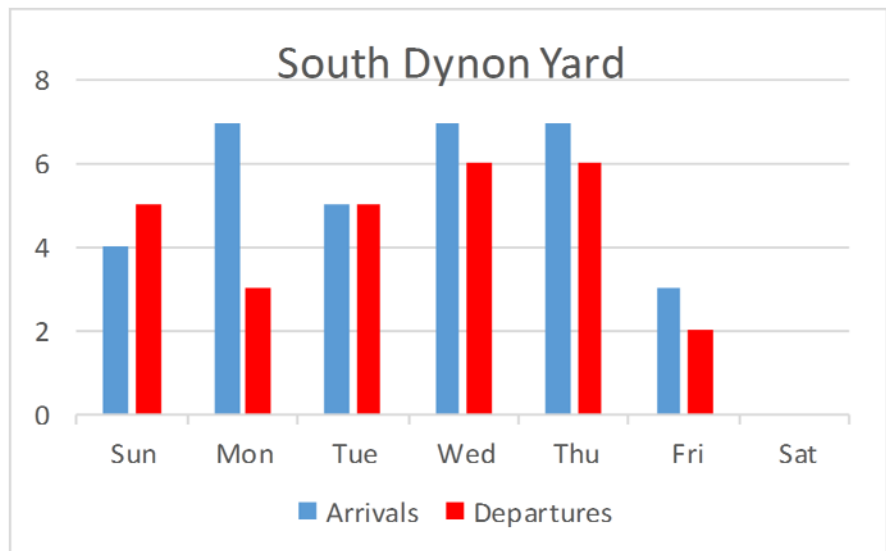
(b) In respect of arriving Trains:

(i) For Train arrivals at or before the scheduled arrival time in the Timetable, the Terminal Manager will provide the Services and use its best endeavours to ensure that the Train departs on time.

(ii) For the avoidance of doubt, nothing in paragraph (a) above will require the Terminal Manager to disrupt Trains which arrive and depart in accordance with their specified arrival and departure times.

(iii) For train arrivals after the scheduled arrival time in the Timetable:

(A) the Terminal Manager and Access



Holder will co-operate to forward plan for the arrival of those Trains;

(B) where it is possible, the Terminal Manager will allocate resources and amend its operating plan to service the Access Holder's late arriving trains in a timely fashion;

(C) the Terminal Manager will use its best endeavours to provide the Services so as to have the train arrived into the Terminal as soon as is practical, subject to the Terminal Manager's obligations to other Access Holders and provided the Terminal Manager considers it is efficient to do so (in the Terminal Manager's absolute discretion);

(c) In respect of departing Trains:

(i) The Access Holder may:

(A) request the Terminal Manager to give priority to the provision of Services to certain of the Access Holders Trains;

(B) request the Terminal Manager to vary Cut-Off Times or train departure times to accommodate variations; and

(C) request the Terminal Manager to prioritise the container loading to meet customer expectations.

(ii) The Terminal Manager will:

(A) use its best endeavours to comply with such requests subject to the Terminal Manager's obligations to other Access Holders and provided the Terminal Manager considers it is efficient to do so (in the Terminal Manager's absolute discretion); and

(B) if it becomes apparent to the Terminal Manager that a train cannot be completed on schedule, the Terminal Manager will advise the Access Holder no later than two hours prior to the scheduled departure time of the train in order to allow crewing issues to be addressed.

(d) If a Train fails within the Terminal, the Terminal Manager will: (i) use all reasonable endeavours to minimise disruptions to other Access Holders; and (ii) as soon as is practical subject to its obligations to other Access Holders, clear the failed Train.

7.3 Late Running Trains

Pacific National will use its best endeavours to accommodate trains that present at the South Dynon Terminal more than 20 minutes after the designated arrival time.

7.4 Priority to On-Time Trains

Nothing in clause 7.3 above will require Pacific National to disrupt trains which arrive and depart the South Dynon Terminal in accordance with their specified arrival and departure times.

From all of the above, we might say that train timetables are created from a pastiche of competing interests in the supply chain, all acting in a manner that Fred Hilmer would say maximizes the return of each link. Thus, the operations of intermodal yards, like in a planetary ecological system, both determine, and are determined by, the operations of other components of the system. Train planners at the NSW Department of Transport call train timetabling an “art”.

It is.

So— Australian cows do not determine the timetables of a yoghurt train. In America, they do. As for the chicken and the egg, we can only wonder.

Canberra's Blue Rapid

HILAIRE FRASER

In the 1960s Canberra was to outgrow the plan developed by Walter Burley Griffin. It was decided to extend Canberra by means of several satellite towns, so that Canberra would not be characterised by the usual urban sprawl. In 1964 construction started on Woden Valley, the first satellite town, to the south west of Walter Burley Griffin's original city. In 1966, Belconnen another satellite town was established to the north west of the original city. In 1968 construction of the first suburbs in Weston Creek, an offshoot of Woden Valley commenced. In 1974 residents moved into Kambah the first suburb of the Tuggeranong satellite town to the south. In 1991 Gungahlin, Canberra's fourth town outside the original city was commenced to the north. Current populations of these towns are Woden Valley/Weston Creek 56,000, Belconnen 93,000, Tuggeranong 87,000 and Gungahlin 50,000.

In addition Molonglo Valley a new town west of the original city commenced in 2011. Molonglo Valley lies between Weston Creek and Belconnen and is expected to contain 13 suburbs with a total population of between 50,000 and 73,000. Molonglo Valley deviates from the 1967 "Y" plan for Canberra with Woden Valley and Tuggeranong to the south, Belconnen to the north-west and Gungahlin to the north. Inner Canberra, the original city, is located at the junction of the two arms of the "Y". Molonglo Valley is placed on what was originally a green corridor and provides residential land closer to the city centre. This policy of urban consolidation was reinforced by the devastating bushfires of 2003 which also cleared the pine forests which at that time occupied the Molonglo Valley. In 2015 Coppins Crossing Road, formerly a two lane rural road between Weston Creek and Belconnen, is now a four lane road broken by formed intersections complete with inoperative traffic lights. From these intersections roads will be built into the new suburbs of Molonglo Valley. On 1st September 2014 Molonglo Valley received its first bus service operated by ACTION, the ACT government bus service, route 83 (983 at weekends) from Woden Town Centre to the Coleman Court Shopping Centre at Weston Creek via Wright.

Currently the Blue Rapid Bus Service operated by ACTION provides a high-frequency service linking the town centres of Tuggeranong, Woden Valley, Inner Canberra (i.e. Canberra City Centre) and

Belconnen and comprises the following seven weekday routes identified by a route number in the 300 series:-

- 300 Tuggeranong-Woden-City-Belconnen
- 313 Tuggeranong-Woden-City-Belconnen-Charnwood-Fraser
- 314 Tuggeranong-Woden-City-Belconnen-Page-Scullin-Flynn-Fraser
- 315 Tuggeranong-Woden-City-Belconnen-Melba-Spence
- 318 Lanyon-Gordon- Tuggeranong-Woden-City-Belconnen
- 319 Lanyon-Banks- Tuggeranong-Woden-City-Belconnen
- 343 Tuggeranong-Woden-City-Belconnen-Macgregor-Dunlop-Fraser

The weekday the off-peak timetable provides a 7/8 minute frequency as shown by the northbound services between 11.01am and 12.01pm in the table below

The same pattern of services operates southbound during the weekday off-peak.

The Belconnen Interchange closed in 2009 and has been replaced from east to west by the Belconnen Community Bus Station (adjacent to Cameron Officers), Westfield Bus Station (at the shopping centre) and Cohen St Bus Station (adjacent to Belconnen Bus Depot). All services pass through each bus station. The above times are at

the Westfield Bus Station.

In the off peak routes 314 315 318 and 319 do not run and suburbs beyond Belconnen and Tuggeranong town centres are served by 30 minute feeder services as follows:-

- 14 Belconnen-Page-Scullin-Flynn-Fraser
- 15 Belconnen-Melba-Spence
- 18 Tuggeranong-Gordon-Lanyon
- 19 Tuggeranong-Banks-Lanyon

Northbound morning weekday peak hour services between 7.00am and 9.00am are formed as following:-

- 313 Tuggeranong-Woden-City-Belconnen-Charnwood-Fraser (every 30 minutes)
- 318 Lanyon-Gordon- Tuggeranong-Woden-City-Belconnen (every 20 minutes approximately)
- 319 Lanyon-Banks- Tuggeranong-Woden-City-Belconnen (every 20 minutes approximately)
- 343 Tuggeranong-Woden-City-Belconnen-Macgregor-Dunlop-Fraser (every 30 minutes)

Additional 300 services provide an overall Blue Rapid service of every five minutes.

Return southbound evening weekday peak hour services between 4.00pm and 6.00pm are formed as followings:-

Route	Tuggeranong	Woden	City	Belconnen
313	11.01	11.17	11.32	11.51
300	11.08	11.24	11.39	11.58
343	11.16	11.32	11.47	12.06
300	11.23	11.39	11.54	12.13
313	11.31	11.47	12.02	12.21
300	11.38	11.54	12.09	12.28
343	11.46	12.02	12.17	12.36
300	11.53	12.09	12.24	12.43
313	12.01	12.17	12.32	12.51

313 Fraser-Charnwood-Belconnen-City-Woden-Tuggeranong (every 30 minutes)

318 Belconnen-City-Woden-Tuggeranong-Gordon-Lanyon (every 15 minutes)

319 Belconnen-City-Woden-Tuggeranong-Banks-Lanyon (every 15 minutes)

343 Fraser-Dunlop- Macgregor-Belconnen-City-Woden-Tuggeranong (every 30 minutes)

Additional 300 services provide an overall Blue Rapid service of every three minutes.

Southbound morning weekday peak hour services between 7.00am and 9.00am are formed as followings:-

313 Fraser-Charnwood-Belconnen-City-Woden-Tuggeranong (every 20 minutes)

314 Fraser-Flynn-Scullin-Page-Belconnen-City-Woden-Tuggeranong (every 20 minutes)

315 Spence-Melba- Belconnen-City-Woden-Tuggeranong (every 20 minutes)

343 Fraser-Dunlop- Macgregor-Belconnen-City-Woden-Tuggeranong (every 20 minutes)

Additional 300 services ensure an overall Blue Rapid service of every five

minutes.

Return northbound morning weekday peak hour services between 4.00pm and 6.00pm are formed as followings:-

313 Tuggeranong-Woden-City-Belconnen-Charnwood-Fraser (every 15 minutes)

314 Tuggeranong-Woden-City-Belconnen-Page-Scullin-Flynn-Fraser (every 20 minutes)

315 Tuggeranong-Woden-City-Belconnen-Melba-Spence (every 20 minutes)

343 Tuggeranong-Woden-City-Belconnen-Macgregor-Dunlop-Fraser (every 15 minutes)

Additional 300 services provide an overall Blue Rapid service of every three minutes.

In the peak routes contraflow 314 315 318 and 319 do not run and suburbs beyond Belconnen and Tuggeranong town centres are served by 20 to 30 minute feeder services as follows:-

14 Belconnen-Page-Scullin-Flynn-Fraser

15 Belconnen-Melba-Spence

18 Tuggeranong-Gordon-Lanyon

19 Tuggeranong-Banks-Lanyon

In the evening northbound 30 minute services on 313 and 343 operate until 9.30pm supplemented by hourly northbound ser-

vices from the City on 314 and 315. Then 15 minute services operate on 300. Southbound services 30 minute services operate on 313 and 343 supplemented by hourly southbound services on 318 and 319 until 8.37pm.

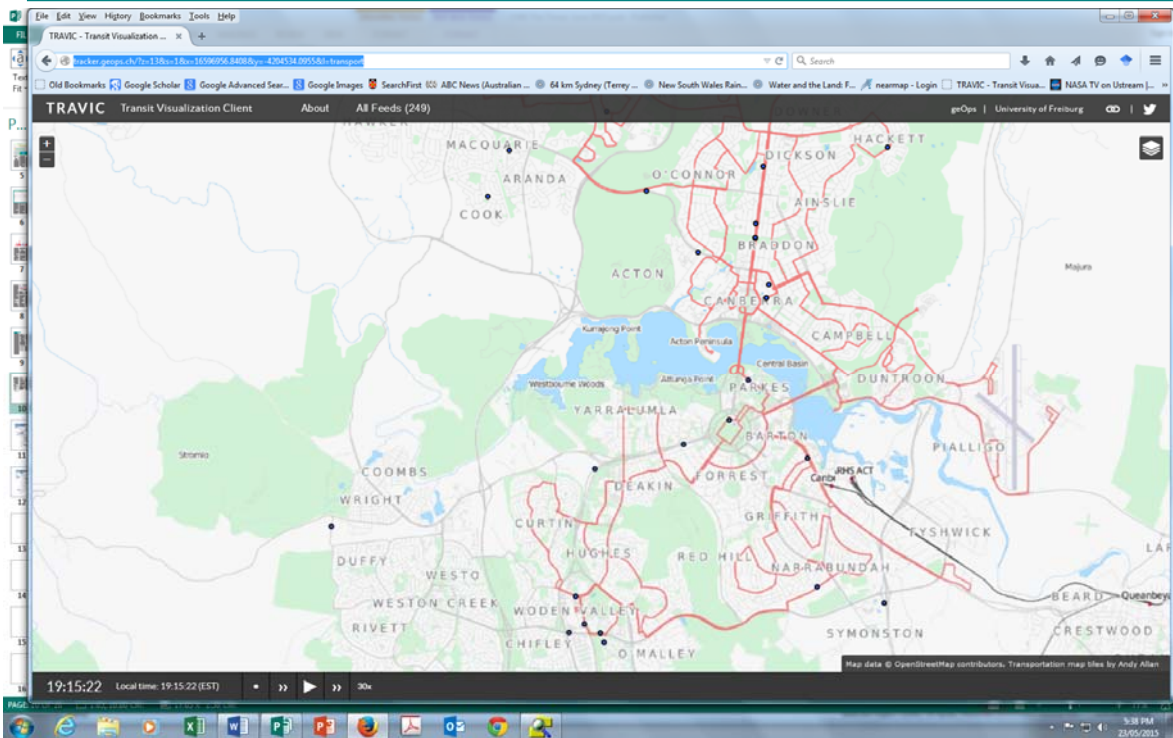
Canberra has a weekend bus network somewhat different from the weekday network. All weekend routes are numbered in the 900 series. This 300 Tuggeranong-Woden-City-Belconnen becomes 900 making a detour via the Erindale Shopping Centre, Wanniasa.

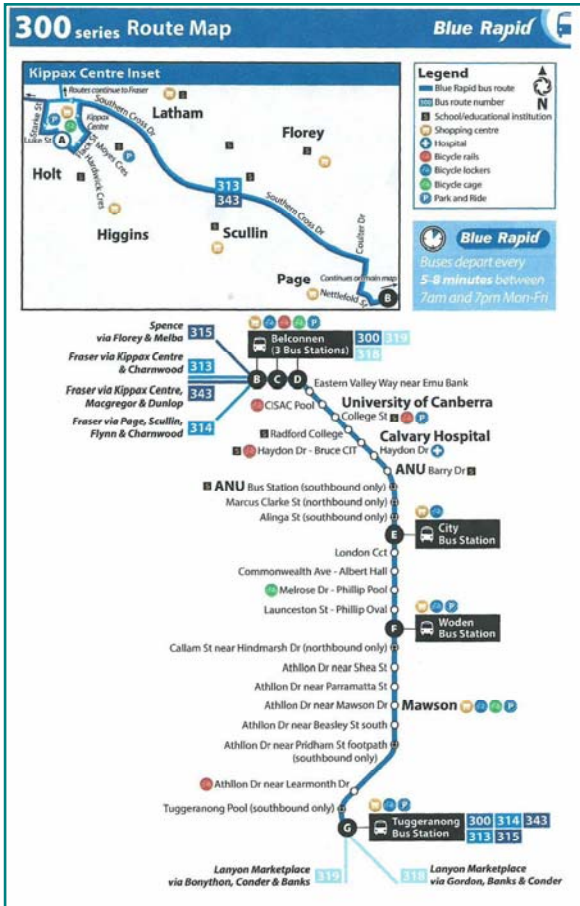
On Saturdays a 15 minute southbound 900 Belconnen-Tuggeranong bus service operates from 6.31am until 11.01pm. Supplementary 30 minute Belconnen-Woden services operate from 10.53am until 3.53pm. On Sundays a 15 minute services operate from 7.31am until 7.01pm

On Saturdays a 15 minute northbound 900 Tuggeranong-Belconnen bus service operates from 6.30am until 11.15pm. Supplementary 30 minute Woden-Belconnen services operate from 11.46am until 4.46pm. On Sundays a 15 minute services operate from 7.30am until 7.15pm .

Weekend feeder services operate every 60 minutes excepting Sunday nights.

Watch the Blue Rapids on the move at:
<http://tracker.geops.ch/?z=13&s=1&x=16596956.8408&y=-4204534.0955&l=transport>





Letter re Ottawa

DEREK SCRAFTON writes in response to “Unstationary Stations” in our May issue

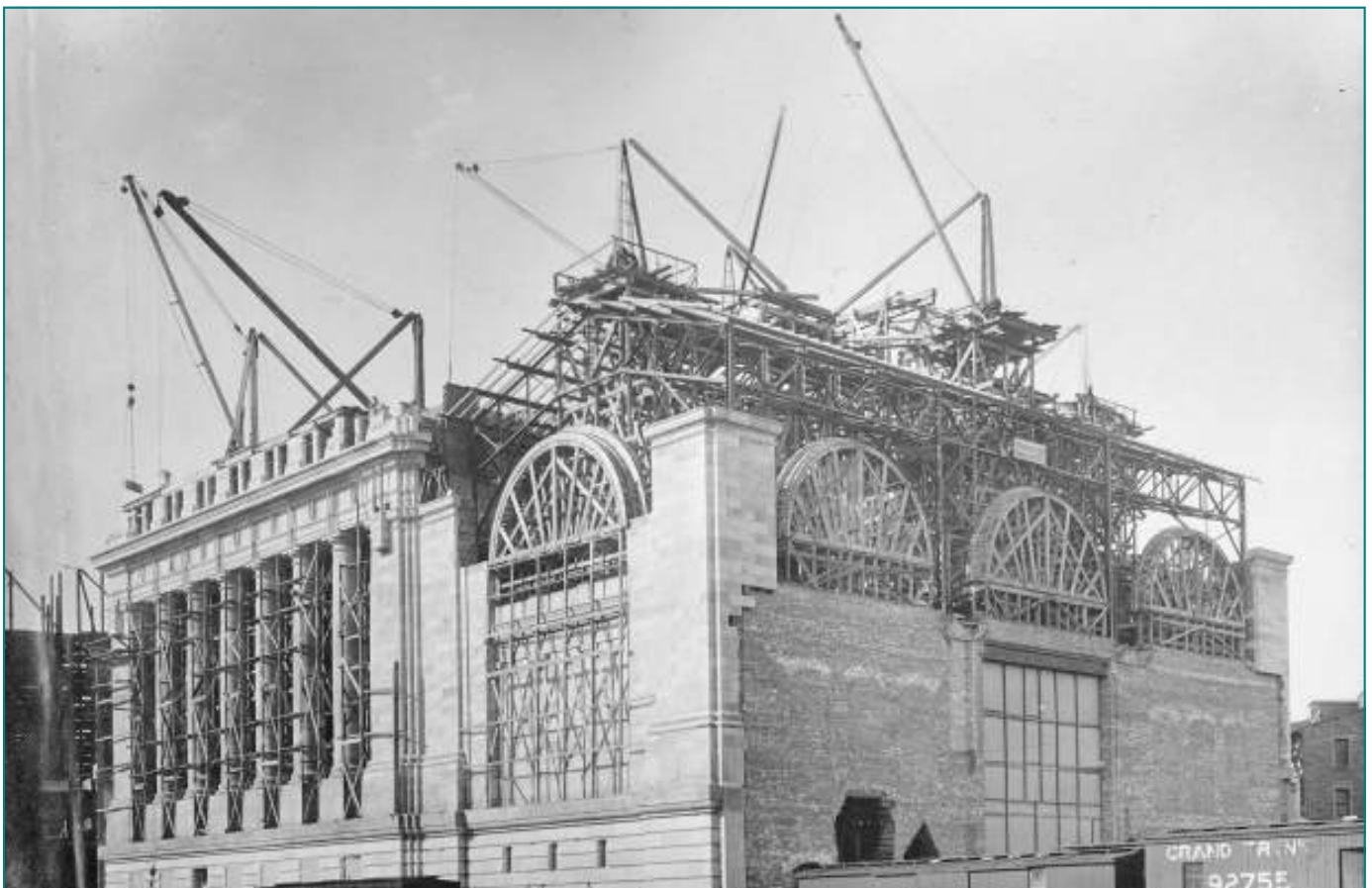
As a regular user of Ottawa rail station, I would like to set the record straight. The station is not ‘way out’ of the city; locals would regard the Tremblay Road location as an inner suburb of the Ottawa Metropolitan Region. It has covered access to a station on the Transitway network, indeed it takes as long to walk from the train to the concourse as it does from the concourse to the Transitway platform.

Buses on the Eastern Transitway are frequent (a wait of five minutes at most) and almost all west-bound buses head downtown taking around five minutes for the journey to the Rideau Interchange, stopping at the Hurdman Interchange en route. Another couple of minutes and the buses run through the east-west downtown streets.

Like many non-CBD stations, Ottawa is only served by inter-city trains, mostly from Toronto and Montreal. This is not unlike the long distance terminals at Perth, Canberra and Adelaide; we

need to bear in mind that all travellers on such trains are not coming from or headed to the CBD, and parking provision is therefore an important feature of such stations. In the case of Ottawa, the Transitway link gives good public transport access to the eastern suburbs (direct), the southern suburbs (via Hurdman) and the rest of the Metro area via interchange with other routes in the CBD. Access to the inter-provincial routes of the Gatineau transit network, serving the Quebec side of the Ottawa River, is only a short walk, under cover, through the Rideau Shopping Centre.

Incidentally, when you have lived through an Ottawa winter you really appreciate the importance of frequent service and good interchange arrangements in public transport.



On the E70 bus

GEOFF LAMBERT

I have recently begun travelling to the University of Western Sydney Macarthur Campus, where I have set up a laboratory. I live in Fairlight and have never held a driver's licence, so public transport is the only way to travel between these two spots. Fairlight-Macarthur is rather a long trip. Optimising it is worthwhile.

There are clearly a myriad ways to make this trip, but what I sought was a quick and reliable trip at my preferred time of day. It became apparent that doing this by traditional Frimbo mechanisms (*The Times* March 2014) was going to drive me nuts, especially when I attempted it while riding on public transport. The options—even the sensible options—seemed endless.

Some sort of planning tool seemed attractive. I consulted Google about Trip Planners and it straightaway gave me the address of TfNSW's *Plan Your Trip* ("PYT") website. The information on PYT was interesting and will be discussed in our August issue.

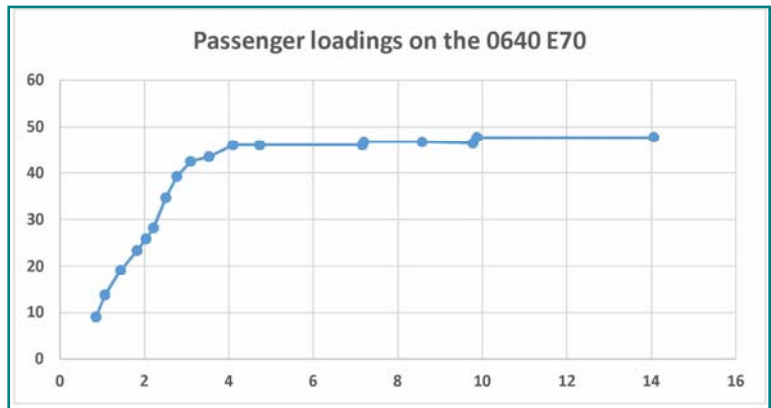
It was fairly clear, even without a Trip Planner, that my best bet was to step onto a pre-peak period E70 Wynyard-bound bus at my front gate and then onto an Airport Line (T2) train to Macarthur at Wynyard. The rest of this article is about my adventures with the E70 buses and their timetables.

Published timetables.

There is both a paper and a PDF timetable for the E70. Both are wrong. Dated 10-June-2012, they are carry-overs that have not been updated. One can, however, find an updated timetable inside PYT. However even it can sometimes be one or two days out of date. There are timetable sites such as Travic and web apps such as TripView which suffer the same latency.

However TfNSW has an on-line timetable on its Transportnsw.info (TNI) page. This is the only site that can be trusted.

TNI and PYT receive their updated data from an XML file that is updated once or twice per week—usually Tuesday and Friday respectively—which is why the latter is sometimes behind. TfNSW also makes available full timetables in GTFS format for App providers. This is updated at 5 PM on Friday. The PYT and GTFS timetables are superior to the published timetable, because the times



at ALL stops can be made visible. This is true even for Metrobuses, for which no published timetables are available. In the GTFS database, bus stop timings are sometimes given to the nearest 15 seconds. (see page 15). GTFS and XML timetables will be explained in *Top Table Talk* in July.

A useful tool for virtually any timetable on the planet can be found at transitfeeds.com. This site takes the GTFS feeds and converts them to viewable timetables and maps, in a standard form. A sample feed for the E70 appears on page 16.

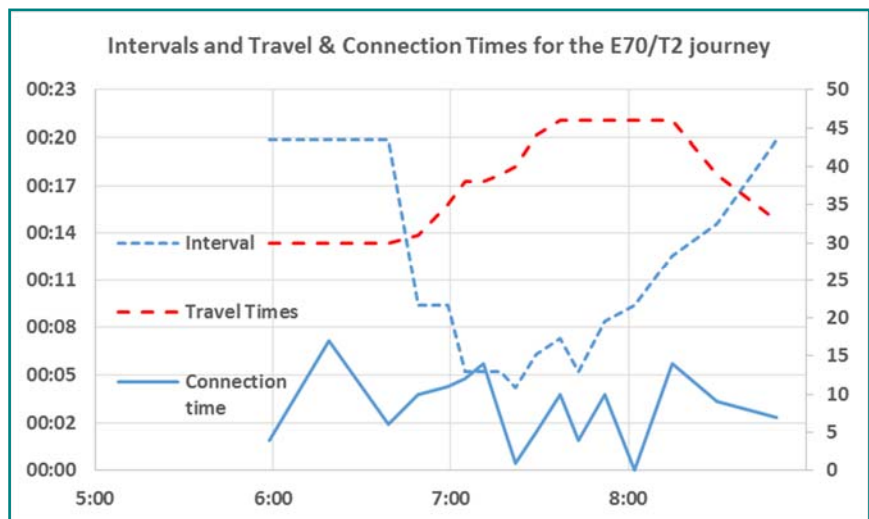
Anyway, all of this means that the planner's timetable is superior to the published timetable. For instance, the paper and PDF timetables for the 06:40 E70 bus show 07:09 as its arrival time at Wynyard, but the Trip Planner gives 07:08. I assume this indicates an amendment to the timetable rather than an error. It doesn't sound like much – but it matters a lot in the Wynyard rat-race.

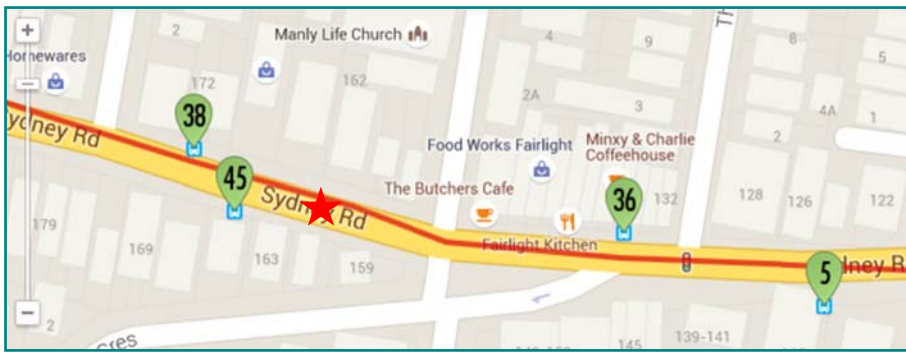
The E70 Bus

The E70 service began in the dark days of Sydney Ferries when that organisation was riddled with corruption, inefficiencies, lateness, cancellations, breakdowns and smashes. Some bright spark in Sydney Buses saw an opportunity to capture market share. She or he was proved

correct. The service was an immediate success, remains so, and carries about 600 passengers between 07:01 and 07:59. This is equivalent to the patronage on the 07:30 Sydney Harbour Ferries trip. An added advantage was and continues to be that the E70 is much cheaper than the Ferry (\$4.50 vs \$7.60 in 2015). Many customers therefore choose to ride the E70 from Manly, especially where bus departure times lie midway between ferry departure times. The majority of these folk step on board between Fairlight and Seaforth, which is about 4 km from Manly (see passenger loading chart above). Fairlight is about the break-even point between walking to the ferry versus catching a bus to the city. For a Fairlight resident there will be times in the 07:15 to 8:15 period, when it is faster to walk to the ferry and catch that, than it is to hop onto an E70 bus at the front door. PYT can cope with this – this factor seems to be built into it by its "Fastest" criteria. This will be discussed in our August issue.

Some statistics for the E70 service and its connection times to the T2 train (taken from the printed timetable rather than GTFS) are shown in the chart below. The full timetable, which I made from the GTFS, is on page 15.





My Trip

First, I needed to tweak my requirements a little. I live on Sydney Rd 63 metres from the inbound stop “near Cohen St”, # 209440. These stop numbers are based on the local postcode. GTFS also specifies that each stop for each trip be given a sequence number. For the E70 stop 209440 is sequence #5 for all trips– see the bottom map on page 16.

This Stop is not normally my preferred choice because I like to visit the newsagent down the road at the Fairlight shops to buy newspapers to read on the trip. From there I would naturally catch the bus at the Thornton St stop, #209438. Rather than choose my home address as my starting point, I therefore chose instead the generic term “Fairlight” expecting that would be the Fairlight CBD. It wasn’t. The exact location of this vague description is unclear, but it seems to be on the North side of Sydney Rd about mid-way between Cohen St and William St, at the red star outside Sandy’s house in the transitfeeds.com map above. This corresponds with what Google Earth and Google Maps consider to be “Fairlight” – although they make the exact location as the *middle* of Sydney Rd. The PYT walk instructions from this location involved walking down Sydney Rd to the Woods Parade intersection, crossing Sydney Rd and then walking back to the Cohen St stop. This appears to be driven by pedestrian road rules. In some of my analyses I have tweaked the times to allow me to walk to the paper shop, buy a paper and catch the designated service from there - Thornton St.

Peak period vs off-peak

The E70 is a peak-period only 17-trip service, which depart Manly between 06:00 and 08:50. Sydney Trains considers its morning peak period to cover the 3.5 hours between 06:45 and 10:15. Its peak Station Entry time is 08:30. For the E70 bus, peak travel density (shown by the minimum of the frequency graph on page 13) is at about 07:20. This gives a peak arrival time in the city of 08:00. The E70 bus service peak therefore starts, peaks and finishes before that of Sydney Trains. Sydney Buses’ concept of “peak” is more

in line with the peak traffic flows on Military Rd. This route is often bumper to bumper in some spots as early as 06:30. There is some truth in the oft-made observation that the peak of morning travel is becoming earlier – it certainly seems to be doing so on Military Rd.

Frequency of service

The service frequency offered by the E70 matches customer demand. At the peak, it offers a bus every 6 minutes. Sydney Ferries, cannot match this and offers a 30 minute frequency (except for one 20-minute interval between 08:00 and 08:20). Manly Fast Ferries (MFF) offers a 10-minute headway for the hour between 07:55 and 08:55—still less frequent than the E70 bus.

Variability of Travel Time

At the peak, amid the congestion, E70 timetabled trip durations increase from 30 to 46 minutes (see chart on page 13), This is a well-known phenomenon and has been much studied in the transportation literature. Sydney Buses clearly allows for this. Passenger loading also increases and so, in consequence, do loading times. The research literature tries to make some allowance for this by padding out dwell times at stops. There is usually a certain minimal dwell time, plus so many seconds for each boarding or disembarking passenger per door. Typically this might be a fixed 5 seconds, plus 3 seconds per passenger. My observations on the E70 suggest that this is about right. It is unclear whether the Hastus software, which is used to construct the Sydney Buses timetables takes this into account. Sydney Buses GTFS feed clearly does not because the arrival and departure times at each stop are always simultaneous.

One can perhaps see from the Ibray chart at right (*The Times* June 1996) that the area of congestion and slowness shifts as the peak progresses. At about 7AM it lies on the Spit Hill, but after 8 AM it has moved to the Harbour Bridge approaches. This is probably related to bus lane congestion. TfNSW is attempting to address this problem, by shifting some buses on to the Cahill Expressway.

The chart second from the top on the back

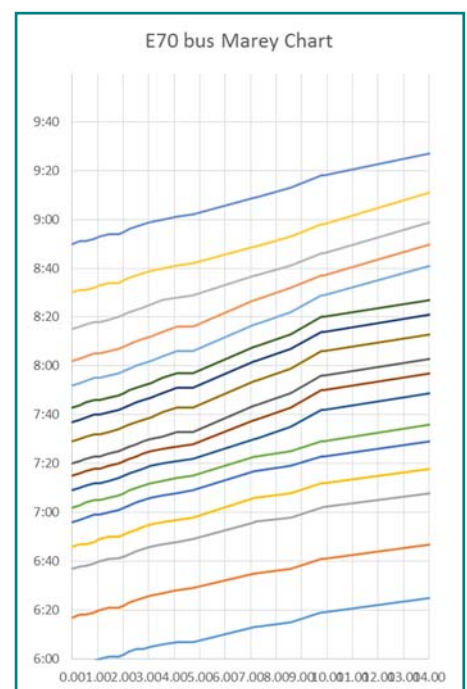
cover, constructed in Google Earth from my GPS, shows how a typical trip can pan out. There we can see, in order:

- the constant stopping to pick up passengers along Sydney Rd to Seaforth
- the steady run down into and up out of the Spit Bridge
- the stop-start through the traffic lights approaching Spit Jct
- the speedier run through to Neutral Bay
- the sprint from Neutral Bay to Wynyard, where we arrived 2 minutes late with 59 passengers on board

Connection Time

My preferred trip at 06:40 has only 1 mode change. The E70 bus arrives at Wynyard 7 minutes before the train departs. This seems healthy enough for me because it takes me only 3 minutes to reach the platform from the street. PYT doesn’t say what it allows, but I suspect that it is 5 minutes. It is unclear what strategy PYT uses to determine if a connection is feasible. As we shall see in August, some bus-to-bus transfer times at the same stop are as short as 2 minutes. One would think that it might be advisable to allow some minimal non-zero time for insurance sake because of jitter in performance, but this does not appear to be the case.

Further, because of varying intervals between bus trips (5 to 20 minutes) and varying intervals between T2 trains (mostly 15 minutes, but also 12, 18 and 30 minutes), connection times at Wynyard vary wildly (see the chart on page 13). This produces a kind of sawtooth pattern in the connection times – one wouldn’t want to try for anything less than 5 minutes, even if all went well. This rules out four trips from contention. Of course, I can



catch a later bus or, if the bus runs late, wait for a later train. This is a zero-sum game.

Wait then walk?

For many trips that involve changing segments, where walking is required to make the connection, the PYT advises a short time to draw breath before setting out on the connecting walk, so that one will arrive at the next departure point at the exact departure time. No rational person would make a connection in this manner. They would adopt a “Walk then Wait” strategy, so as to join the inevitable queue at the next stop. Why PYT suggests the obverse of this is baffling.

Trip reliability

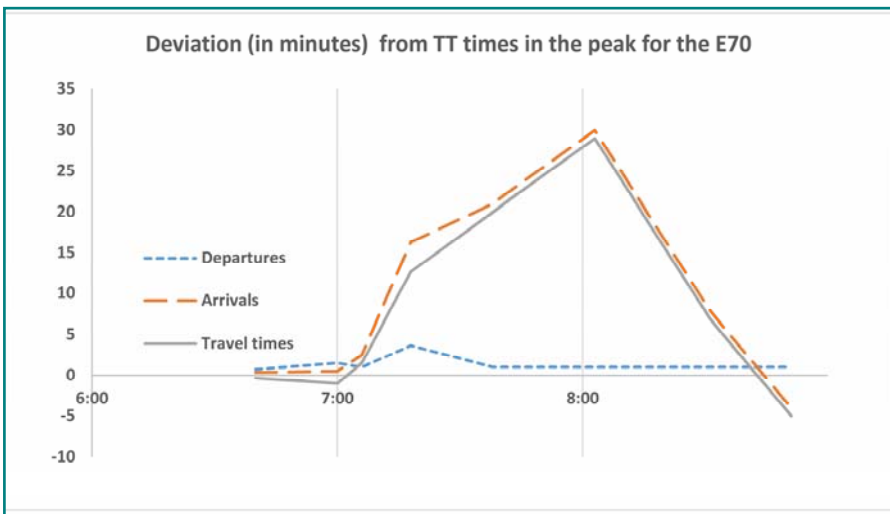
A thing that cannot be modelled by PYT is reliability of arrivals and hence of connections. Reliability decreases as congestion increases. This is a well-known and well-studied phenomenon. The travel time for the E70 is both longer and less reliable after 7AM – there is average of 6 minutes late arrival for departures in the 07:00-07:30 departure window (see chart on page 16).

The reliability of the inbound service is complicated by another factor – the E70 service is provided by a limited number of buses, some of which return empty to Manly to start their next trip. The returning buses also must cope with outbound congestion and often arrive back in Manly after the time of their next inbound trip. Their starting times from Manly become less and less reliable as the morning wears on (average of 3 minutes late for those which depart in the 07:00-07:30 slot. Sydney Buses cannot really adjust for this by shifting the goal posts – that is, by lengthening the travel times, because this would rule out the ability of buses to make up time. A case in point is the 06:40 E70 which can leave 3 minutes late, degrade to 6 minutes late and then, when there is no room for more passengers, swing out of the bus lane and scamper to Wynyard, gaining 3 of its lost minutes. Reliability of E70 services in the mid-peak can be very poor – as much as 20 minutes late on a 46 minute trip. In one exceptional case when there was an accident on the Bridge, the 07:18 service arrived 30 minutes behind time.

These reliability considerations are worse when the number of segments increases –

the so-called knock-on delays. Prudence would dictate that any and every service might be cancelled and that any or every consequent connection might not be made. This snowballs like compound interest. If one must meet a vital target (the doctor, a flight to Bali), one should allow for every connection to go haywire and then add some extra leeway. For my preferred 2-segment trip, this would involve catching the 06:00 bus instead of the 06:40. This spirals out of control for multi-segment trips.

At the time I began writing this article I had a 100% success rate for three 06:40 trips – but only because, on one trip, both the E70 and the train ran 3 minutes late. In statistics, 95% is the gold standard for making decisions. Sydney Buses does not seem to specify “lateness” in the way that Sydney Trains does—5 minutes for any journey. There is a certain amount of literature that deals with the situation where an incoming leg has a variable arrival time, but the outgoing leg. Departs on time. There is very little on the situation where both are variable – on-the-fly transfers. I had to fly by the seat of my pants – always the best option for bus travel.



Full E70 timetable for all set-down or pick-up stops

Stop Name	Stop number	Elapsed distance	STOP TIMES																
Belgrave St Stand F, Manly	209511	0.00	5:57	6:17	6:37	6:46	6:56	7:02	7:09	7:15	7:20	7:29	7:37	7:43	7:52	8:02	8:15	8:30	8:50
Sydney Rd opp Ivanhoe Park, Manly	209537	0.28	5:58	6:18	6:38	6:47	6:57	7:03	7:10	7:16	7:21	7:30	7:38	7:44	7:53	8:03	8:16	8:31	8:51
Sydney Rd near James St, Manly	209538	0.54	5:58	6:18	6:38	6:47	6:58	7:04	7:11	7:17	7:22	7:31	7:39	7:45	7:54	8:04	8:17	8:31	8:51
Sydney Rd near Thornton St, Fairlight	209438	0.85	5:59	6:19	6:39	6:48	6:59	7:05	7:12	7:18	7:23	7:32	7:40	7:46	7:55	8:05	8:18	8:32	8:52
Sydney Rd near Cohen St, Fairlight	209440	1.06	6:00	6:20	6:40	6:49	6:59	7:05	7:12	7:18	7:23	7:32	7:40	7:46	7:55	8:05	8:18	8:33	8:53
Sydney Rd near Bellevue St, Fairlight	209441	1.44	6:01	6:21	6:41	6:50	7:00	7:06	7:13	7:19	7:24	7:33	7:41	7:47	7:56	8:06	8:19	8:34	8:54
Sydney Rd near Austin St, Fairlight	209442	1.83	6:01	6:21	6:41	6:50	7:01	7:07	7:14	7:20	7:25	7:34	7:42	7:48	7:57	8:07	8:20	8:34	8:54
Sydney Rd near Hill St, Balgowlah	2093141	2.03	6:02	6:22	6:42	6:51	7:02	7:08	7:15	7:21	7:26	7:35	7:43	7:49	7:58	8:08	8:21	8:35	8:55
Sydney Rd near Condamine St, Balgowlah	2093142	2.22	6:03	6:23	6:43	6:52	7:03	7:09	7:16	7:22	7:27	7:36	7:44	7:50	7:59	8:09	8:22	8:36	8:56
Sydney Rd near Woodland St, Balgowlah	209330	2.51	6:04	6:24	6:44	6:53	7:04	7:10	7:17	7:23	7:28	7:37	7:45	7:51	8:00	8:10	8:23	8:37	8:57
Sydney Rd near West St, Balgowlah	209331	2.77	6:04	6:25	6:45	6:54	7:05	7:11	7:18	7:24	7:29	7:38	7:46	7:52	8:01	8:11	8:24	8:38	8:58
Sydney Rd near Wanganella St, Balgowlah	209332	3.09	6:05	6:26	6:46	6:55	7:06	7:12	7:19	7:25	7:30	7:39	7:47	7:53	8:02	8:12	8:25	8:39	8:59
Sydney Rd near Coral St, Balgowlah	209334	3.52	6:06	6:27	6:47	6:56	7:07	7:13	7:20	7:26	7:31	7:41	7:49	7:55	8:04	8:14	8:27	8:40	9:00
Manly Rd near Heaton Av, Clontarf	209335	4.10	6:07	6:28	6:48	6:57	7:08	7:14	7:21	7:27	7:33	7:43	7:51	7:57	8:06	8:16	8:28	8:41	9:01
Manly Rd near Avona Cr, Seaforth	209212	4.72	6:07	6:29	6:49	6:58	7:09	7:15	7:22	7:28	7:33	7:43	7:51	7:57	8:06	8:16	8:29	8:42	9:02
Spit Rd at Clifford St, Mosman (SET-DOWN)	2088243	7.16	6:13	6:35	6:56	7:06	7:17	7:23	7:30	7:38	7:44	7:54	8:02	8:08	8:17	8:27	8:37	8:49	9:09
Spit Rd near Military Rd, Mosman	2088190	7.20	6:13	6:35	6:56:15	7:06	7:17	7:23	7:30	7:38	7:44	7:54	8:02	8:08	8:17	8:27	8:37	8:49	9:09
Military Rd near Cabramatta Rd, Cremorne	209059	8.58	6:15	6:37	6:58	7:08	7:19	7:25	7:35	7:43	7:49	7:59	8:07	8:13	8:22	8:32	8:41	8:53	9:13
Military Rd at Watson St, Neutral Bay (S-D)	208960	9.77	6:19	6:41	7:02	7:12	7:23	7:29	7:42	7:50	7:56	8:06	8:14	8:20	8:29	8:37	8:46	8:58	9:18
Military Rd near Watson St, Neutral Bay	208912	9.87	6:19	6:41	7:02	7:12	7:23	7:29	7:42	7:50	7:56	8:06	8:14	8:20	8:29	8:37	8:46	8:58	9:18
Wynyard Station, York St - Stand N, Sydney (S	200035	14.06	6:25	6:47	7:08	7:18	7:29	7:36	7:49	7:57	8:03	8:13	8:21	8:27	8:41	8:50	8:59	9:11	9:27

E70 route and stops

