

HOW TO DOUBLE THE CAPACITY OF THE DANDENONG LINE WITHOUT NEW INFRASTRUCTURE

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SUMMARY

Connex have convinced the State Government to provide a third track on the Dandenong line. This line will cost up to a billion dollars, and disrupt services during a construction period estimated at over a decade. This report argues that the third track is unnecessary and a distraction from the real problem, which is poor planning and management by Connex and the Office of the Director of Public Transport.

The Dandenong line carries around 60,000 passengers per day, of whom less than 11,000 travel in the peak direction during the two-hour morning peak (7:30 to 9:30 am). These figures are much lower than the actually carrying capacity of an efficiently-operated urban rail line. In fact, dividing the 11,000 passengers in the morning peak by the 21 trains scheduled in this period gives an average of 524 passengers per train, less than the number of seats.

Problems of crowding and late-running on the Dandenong line are due to poor timetabling and management, not a lack of infrastructure. Specifically:

- on most weekdays, numerous trains are cancelled or late, resulting in trains picking up two or three loads of passengers at stations
- even when all trains do turn up on time, the current timetable provides an inefficient service pattern, with long gaps in service followed by crowded trains, which are then followed at short intervals by trains with seats to spare
- the Siemens trains operated on the Dandenong line are poorly-designed, with only two doors per carriage instead of three; this produces crowding around the doorways and slows boarding and alighting. These trains should be moved to quieter lines and replaced with better-designed X-Trapolis trains.

The justification offered for the irregular service pattern on the Dandenong line is the need to accommodate V/Line express services from the LaTrobe Valley. This excuse is not convincing, however. Two decades ago, V/Line express trains were accommodated without causing the problems found currently: relatively 'smart' timetabling has been replaced with 'dumb' timetabling.

Employing efficient timetabling principles and practices would enable more express trains, plus more stopping trains, plus more V/Line services to be provided, utilising the existing infrastructure (especially the third track and platform at Oakleigh, which is currently unused). This would permit more than twice the current volume of passengers to be carried.

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Background

The Dandenong rail corridor (which serves suburban trains on the Pakenham and Cranbourne lines, as well as V/Line trains to the LaTrobe Valley) is said to be a critical choke point on Melbourne's rail system. Both Connex and the Director of Public Transport blame poor reliability on the lack of carrying capacity on this line.

The proposed solution, set out in the 2005 *Meeting Our Transport Challenges* statement, is the addition of a third track between Caulfield and Dandenong (there are already four tracks, shared with Frankston trains, between Caulfield and the city). The proposal is presumably inspired by the third track constructed on the adjacent Frankston line during the 1970s. Given this context, it may be worth noting that daily Frankston line patronage is around 25% lower than it was before the third line was built (see next page), suggesting that it was probably not needed.

The Dandenong line triplication is predicted to cost up to a billion dollars and take at least a decade to complete. The first stage, between Caulfield and Springvale, is due to commence (not finish) between 2006 and 2011; the second stage, to Dandenong, between 2011 and 2016, and the final stage, a fourth platform at Dandenong, some time after 2021¹. This very long time-frame, to add 19 kilometres of single track, can be contrasted with Perth's new 71-km Southern Railway, which includes a tunnel under the city centre and two underground stations, and will open on 29th July after a construction period of only three years².

Connex has already flagged that it will use the Dandenong line works as an excuse for not tackling the current extremely poor reliability levels³, so the community is basically being told that poor services on the Dandenong line will continue for at least a decade, despite the billion-dollar investment in triplication.

This report argues that the proposed third track is an expensive distraction from the real issues. The problems of overcrowding, late-running and cancellations are actually a result of poor timetabling and management, not of infrastructure limitations. The problems could be solved quickly and inexpensively if the real problems were dealt with forcefully.

¹ MOTC, pp. 40-41.

² www.newmetrorail.wa.gov.au

³ Stateline 9/2/07; transcript available at www.abc.net.au

Current patronage on the Dandenong line

There is no publicly available data that gives a current, detailed picture of Dandenong line usage. In 2001, daily boardings on the Dandenong line were estimated at 50,327, which made Dandenong the second-busiest corridor after Ringwood (75,891 boardings)⁴. The Frankston line is less busy, with only 44,000 passengers per day: this contrasts with the situation in 1964 (i.e. before the third track was added to the Frankston line), when the Frankston line carried 59,000 per day and Dandenong 50,000⁵. Current daily boardings on the Dandenong line are some 20% higher than in 2001, giving a figure of approximately 60,000 per day.

By international standards, 60,000 daily boardings makes Dandenong a lightly-loaded urban rail corridor. The outer terminal station of Toronto's Yonge subway line (Finch station) handled 91,336 passengers a day in 2006⁶, while the whole line carried around 450,000, with only two tracks and similar trains to Melbourne. Two-track lines on European metros carry up to a million passengers per day, while Vancouver's Expo light rail line carries around 180,000. Professor Vukan Vuchic's urban transit planning 'bible' cites 60,000 passengers as the hourly single-direction capacity of a well-managed urban rail line⁷.

Meeting Our Transport Challenges states that in the two-hour morning peak, the Dandenong line carries 12,000 passengers⁸, but this includes passengers travelling against the peak (i.e. away from the City in the morning), so the actual peak period, peak-direction load is less than 11,000. The peak point load is even lower than this, because not all peak-direction passengers travel the whole way into the city (for example, a passenger may board at Dandenong and alight at Clayton, with the seat then used a second time by someone boarding at Clayton for the City). The true peak-point load is likely to be close to 10,000 passengers over the 2-hour period, but the following discussion will use the higher figure of 11,000 to be conservative.

The current Dandenong timetable already provides enough seats

The current Connex timetable shows 21 Dandenong line suburban trains arriving at Flinders Street between 7:30 and 9:30 am (see Figure 1), so the morning peak load of 11,000 in the peak direction represents an average of 524 passengers per train. A 6-car X-Trapolis train seats 548 passengers, while a Siemens train seats 528, so the current service actually provides enough capacity to give every passenger a seat. Why, then, are there crowding problems?

⁴ Booz Allen Hamilton (2002) *Northern Central City Corridor Study: Appraisal of Transit Strategy Results*, Department of Infrastructure, Melbourne, p. 13.

⁵ Melbourne Transportation Study, *Vol. 1: Survey*, Melbourne, 1969, p. 45.

⁶ TTC Operating Statistics 2006, available from www.ttc.ca.

⁷ Vuchic, V. R (2005) *Urban Transit: Operations, Planning and Economics*, John Wiley & Sons, New Jersey, p. 94.

⁸ MOTC, p. 27.

Figure 1: Dandenong line morning peak timetable 2007

Monday to Friday		Pakenham & Cranbourne to City																								
Station		AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	
Pakenham	Dep	6:13	6:26	*	..	..	6:41	6:46	6:53	..	..	7:03	7:11	7:24	..	..	7:29	..	7:44	..	7:49	..	..	8:10	8:25	
Officer		6:18	6:31	*	..	..	..	*	6:51	*	..	..	7:08	*	*	..	..	7:34	*	*	..	7:54	..	..	8:15	*
Beaconsfield		6:22	6:35	*	..	..	..	*	6:54	*	..	..	7:11	*	*	..	..	7:38	..	*	..	7:58	..	..	8:19	*
Berwick		6:25	6:38	Service	..	..	6:50	6:58	7:02	..	..	7:15	7:20	Service	..	..	7:41	..	Service	..	8:01	..	..	8:22	Service	
Narre Warren		6:29	6:42	..	..	..	6:54	7:02	7:06	..	..	7:19	7:24	..	..	7:45	..	..	7:45	..	8:05	..	..	8:26	..	
Hallam		6:32	6:45	Service	..	..	6:57	7:05	7:09	..	..	7:22	7:27	Service	..	..	7:48	..	Service	..	8:08	..	..	8:29	Service	
Cranbourne	Dep	..	..	V/Line	6:46	..	..	..	..	..	7:10	..	..	V/Line	..	7:38	..	..	V/Line	7:54	..	..	8:10	..	V/Line	
Merinda Park		..	..	..	6:48	..	..	..	..	..	7:12	..	..	..	..	7:40	..	..	..	V/Line	7:56	..	..	8:12	..	V/Line
Dandenong	Dep	6:38	6:52	6:55	6:58	7:01	7:05	7:12	7:16	7:19	7:22	7:29	7:34	7:41	7:45	7:50	7:55	7:58	8:01	8:06	8:15	8:18	8:23	8:36	8:43	
Yarraman		6:41	6:55	*	7:01	7:04	7:08	7:15	7:19	7:22	7:25	7:32	7:37	*	7:48	7:53	7:58	8:01	*	8:09	*	8:21	8:26	8:39	*	
Noble Park		6:43	6:57	*	7:03	7:06	7:10	7:17	7:21	7:24	7:27	7:34	7:39	*	7:50	7:55	8:00	8:03	*	8:11	*	8:23	8:28	8:41	*	
Sandown Park		6:45	6:59	*	7:05	7:08	7:12	7:19	7:23	7:26	7:29	7:36	7:41	*	7:52	7:57	8:02	8:05	*	8:13	*	8:25	8:30	8:43	*	
Springvale		6:47	7:01	*	7:07	7:10	7:14	7:21	7:25	7:28	7:31	7:38	7:43	*	7:54	7:59	8:04	8:07	*	8:15	8:22	8:27	8:32	8:45	*	
Westall		6:49	*	*	7:09	7:12	7:16	7:23	7:27	7:30	7:33	7:40	7:45	*	7:56	8:01	8:06	8:09	*	8:17	*	8:29	8:34	8:40	8:47	*
Clayton		6:52	7:04	*	7:12	7:15	7:19	7:26	7:30	7:33	7:36	7:43	7:48	7:52	7:59	8:04	8:09	8:12	8:15	8:20	8:27	8:32	8:37	8:43	8:50	8:53
Huntingdale		6:54	*	*	7:14	7:17	7:21	7:28	7:32	7:35	7:38	7:45	7:50	*	8:01	8:06	8:11	8:14	*	8:22	*	8:34	8:39	8:45	8:52	*
Oakleigh	Dep	6:57	7:08	*	7:17	7:21	7:25	7:31	7:35	7:38	7:41	7:48	7:53	*	8:04	8:09	8:14	8:17	*	8:25	8:30	8:37	8:42	8:48	8:55	*
Hughesdale		6:59	*	*	7:19	7:23	7:27	*	7:37	7:40	7:43	*	7:55	*	8:06	*	*	8:19	*	8:27	*	8:39	8:44	8:50	8:57	*
Murrumbeena		7:00	*	*	7:20	7:24	7:28	*	7:38	7:41	7:44	*	7:56	*	8:07	*	*	8:20	*	8:28	*	8:40	8:45	8:51	8:58	*
Carnegie		7:02	*	*	7:22	7:26	7:30	*	7:40	7:43	7:46	*	7:58	*	8:09	*	*	8:22	*	8:30	*	8:42	8:47	8:53	9:00	*
Caulfield		7:06	7:14	*	7:26	7:30	7:34	7:37	7:44	7:47	7:50	7:54	8:02	8:05	8:13	8:15	8:20	8:26	8:28	8:34	8:36	8:46	8:51	8:56	9:03	9:06
Malvern		7:08	*	*	7:32	*	*	7:46	7:49	7:52	*	8:04	*	8:15	*	*	8:28	*	8:36	*	8:48	8:53	*	*	*	*
Armadale		7:10	*	*	7:34	*	*	7:48	7:51	*	*	8:06	*	8:17	*	*	8:30	*	8:38	*	8:50	*	*	*	*	*
Toorak		7:12	*	*	7:36	*	*	7:50	7:53	*	*	8:08	*	8:19	*	*	8:32	*	8:40	*	8:52	*	*	*	*	*
Hawksburn		7:14	*	*	7:38	*	*	7:52	7:55	*	*	8:10	*	8:21	*	*	8:34	*	8:42	*	8:54	*	*	*	*	*
South Yarra		7:16	7:20	*	7:32	7:40	7:40	7:43	7:54	7:57	7:57	8:00	8:12	*	8:23	8:21	8:26	8:36	*	8:44	8:42	8:56	8:59	9:02	9:09	*
Richmond		7:19	7:23	7:25	7:35	7:43	7:43	7:46	7:57	8:00	8:00	8:03	8:15	8:14	8:26	8:24	8:29	8:39	8:38	8:47	8:45	8:59	9:02	9:05	9:11	9:15
Parliament		7:22	7:26	..	7:38	..	7:46	7:49	8:00	..	8:03	8:06	8:18	..	8:29	8:27	8:32	8:42	..	8:50	8:48	9:02	9:05	9:08	9:14	..
Melbourne Central		7:24	7:28	..	7:40	..	7:48	7:51	8:02	..	8:05	8:08	8:20	..	8:31	8:29	8:34	8:44	..	8:52	8:50	9:04	9:07	9:10	9:16	..
Flagstaff		7:26	:30	..	7:42	..	7:50	7:53	8:04	..	8:07	8:10	8:22	..	8:33	8:31	8:36	8:46	..	8:54	8:51	9:06	9:09	9:12	9:18	..
Spencer Street		7:28	7:32	..	7:44	..	7:52	7:55	8:06	..	8:09	8:12	8:24	..	8:35	8:33	8:38	8:48	..	8:56	8:54	9:08	9:11	9:14	9:20	9:27
Flinders Street	Arr	7:32	7:36	7:29	7:48	7:47	7:56	7:59	8:10	8:04	8:13	8:16	8:28	8:18	8:39	8:37	8:42	8:52	8:42	9:00	8:58	9:12	9:15	9:18	9:24	9:20

Source: Connex and V/Line printed timetables

The first reason is that most mornings less than the full complement of 21 services actually runs, and those trains that do run are often late. Even a train which meets the current standard for on-time running, by being 5 minutes 59 seconds late, may have two train-loads of passengers waiting for it. This is why former Auditor-General Ches Baragwanath recommended in 1998 that the standard for on-time running be raised from 5 minutes (the standard before privatization) to 3 minutes (the current standard in Perth), at least for peak services; instead, the standard was relaxed to 6 minutes⁹.

The second reason is that the current timetable provides very poor utilisation of those 21 services, with the result that even when all scheduled trains run on time, some trains are overcrowded while others have seats to spare. This is a product of the uneven scheduling of services, and the poor arrangement of express and stopping services.

To illustrate this point, consider a City-bound passenger travelling from Carnegie in the morning peak. Figure 1 shows that there is:

- a train at 7:02 am, followed by a 20-minute gap then three trains at 4-minute intervals (7:22, 7:26, 7:30)

⁹ See the accompanying paper *The Reliability of Melbourne's Trains 1993-2007*, pp. 3-4.

- then a ten-minute gap followed by three trains at 3-minute intervals (7:40, 7:43, 7:46)
- then gaps of 12, 11, 13, 8 and 12 minutes (7:58, 8:09, 8:22, 8:30, 8:42), followed another group of 3 trains close together (8:42, 8:47, 8:53).

Apart from being confusing, this service pattern actually provides the lowest level of service to Carnegie precisely at the time when most passengers wish to travel from this station (7:50 to 8:40), while ensuring that other trains (e.g. the 7:26, 7:43 and 8:53) have empty seats (at least when the trains preceding them run, and turn up on time).

The justification offered by Connex for this inefficient service pattern is the need to accommodate express suburban services and V/Line services from the LaTrobe Valley. The Director of Public Transport supports this view, arguing that:

Once you mix these different types of service on the same tracks, you begin to eat away at the capacity of the network: you can't have an express running into the back of a stopper, so you have to separate them out. That means building intervals into the rail timetable which chew up time and limit your ability to run more services¹⁰.

This is not the case for the Dandenong line, however: the current patronage and service levels fall so far short of the actual capacity of the line that it is possible to run more express services, more V/Line services and more stopping services than at present, and to spread services more evenly to balance loads and prevent overcrowding. The only proviso is that services are timetabled and operated efficiently.

The third problem is the poor design of Siemens trains. Siemens trains provide only two doors in each carriage which results in an uneven distribution of standing passengers, and ultimately in crowding at the doors. It would be a better idea to use X-Trapolis trains on the Dandenong line and to re-deploy the Siemens trains on quieter lines.

How the current timetable wastes line capacity

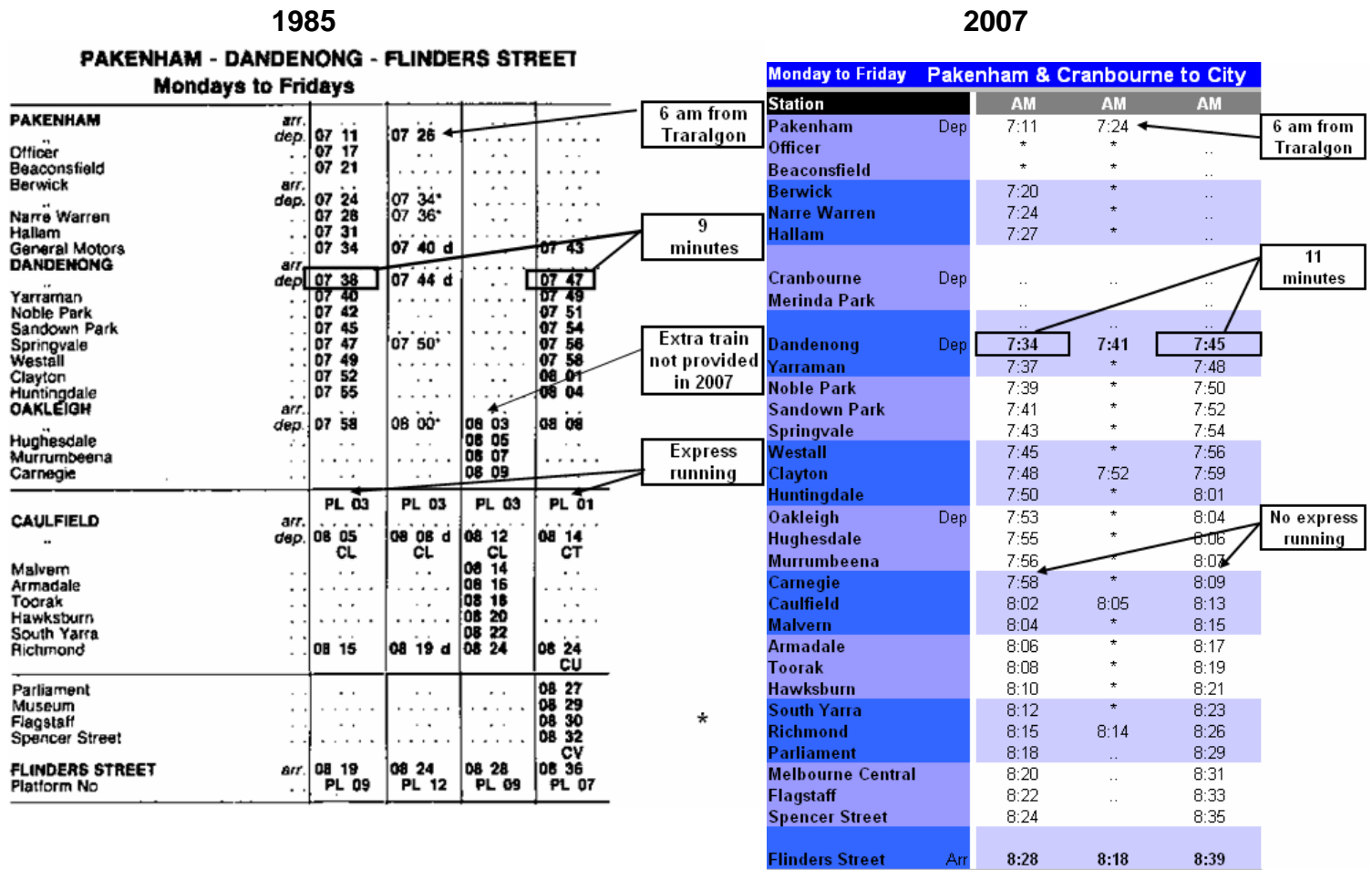
Let's consider the issue by looking at one of the worst examples of overcrowded trains, the 7:45 am from Dandenong. This train has to carry a lot of passengers because it follows an 11-minute gap in suburban services from Dandenong. Because the train stops all stations, it picks up passengers from the outer and inner sections of the line; by the time passengers close to the city wish to board the train, it is full.

A V/Line train (the 6 am from Traralgon) runs in the 11-minute gap before the 7:45 suburban service, so at first glance this looks like an illustration of the

¹⁰ *Truth and Untruth*, by J. Betts, February 2007; available at www.gamutcentre.org.

difficulty caused by the need to accommodate different types of service, and therefore a problem that requires a third track to solve it. But this is not the case, as can be seen by comparing the current timetable with the way the same V/Line service was slotted into the suburban network two decades ago (Figure 2).

**Figure 2: Smart and dumb timetabling:
The 6 am from Traralgon and suburban trains**



* Times are 'pass throughs', not stops
Sources: 1985 working timetable; Figure 1

The 1985 timetable accommodated the V/Line service plus three suburban trains within 9 minutes - two expresses plus a stopping all stations train from Oakleigh - compared to two stopping-all-stations trains within 11 minutes in 2007. The current timetable accommodates the same V/Line train as in 1985, but in an inefficient way that gives suburban passengers one less train, less express running, longer waits and overcrowding. The basic differences in approach are:

- In 2007, the V/Line service is scheduled to follow a stopping-all-stations service; this creates a big difference in running time between Dandenong and Caulfield, necessitating a long gap between the two trains. In 1985 it was scheduled behind an express (from Oakleigh),

enabling a shorter gap between the suburban service and the V/Line train following it.

- The 7:45 suburban service leaves Dandenong 4 minutes after the V/Line train in 2007, compared with a 3 minute gap for the equivalent train in 1985. The combined impact of this with the difference identified above is that the gap between suburban trains at Dandenong is now 11 minutes, compared with 9 minutes in 1985.
- In 2007, a stopping all stations train from Dandenong is the first service scheduled after the V/Line train. In 1985 it was an express; this reduced the delay for city-bound passengers compared with the current pattern.
- In 1985 a third service was provided, leaving Oakleigh station (utilizing the third platform there) shortly after the V/Line service passed through, thus preventing a long wait at stations like Carnegie. In 2007 there are no services originating at Oakleigh, so passengers at stations like Carnegie must wait for the stopping all stations service to come all the way from Dandenong; to add insult to injury this train is overcrowded by the time it reaches them.

Another example of inefficient timetabling is provided by the following V/Line service, the 6:40 from Traralgon, which did not operate in 1985. This train leaves Dandenong at 8:01 am, three minutes behind the 7:58 stopping-all-stations train (see Figure 1), and crawls along behind this train to Caulfield, before finally overtaking it on the extra tracks between Caulfield and Richmond. The slow suburban travel wastes most of the time saved by skipping country stations like Trafalgar. This time, it is V/Line passengers who are disadvantaged by the inefficient timetabling rather than Connex passengers, but the point is the same: the problem has been created by bad planning, not by inadequate infrastructure.

What infrastructure is available?

The Dandenong line is not simply a two-track line. The section between Caulfield and the city has four tracks, or two per direction, enabling express trains to overtake slower service in both directions at all times of the day. These tracks are shared with Frankston line services, but the Frankston line has lower patronage (see above) and slower projected growth in demand than the Dandenong line, which services a major growth corridor. There are also third tracks and platforms at Oakleigh and Dandenong, enabling services to terminate at both those stations without getting in the way of continuing services.

Figure 3: Oakleigh Station, showing 3 platforms



The third platform at Oakleigh (Figure 3), which was built 90 years ago, is particularly significant. Until about 15 years ago, it was used to enable trains to originate and terminate at Oakleigh, stopping all stations to the city and allowing most peak services from Dandenong to run express from Oakleigh (see Figure 2). This service pattern, which is also found on the Perth Northern Suburbs line, is called ‘zonal’ operation, and Vuchic points out that it enables services to be speeded up, as well as increasing the efficiency with which rolling stock is utilised¹¹. Because Oakleigh is only four stations from the beginning of the four-track section of line at Caulfield, these Oakleigh services can be added to the timetable without significantly limiting the potential to offer express services, which can overtake the Oakleigh services at or after Caulfield.

It is also important to note that the signalling along the Dandenong line is relatively modern, having been upgraded during the 1990s, and that both suburban and V/Line trains have superior speed and acceleration to the ‘red rattlers’ and ‘Harris’ trains that were widely used until the late 1980s.

This means that instead of operating a less efficient timetable than that provided in 1985, it should be possible to offer a more efficient service, with shorter intervals between trains and thus more frequent services.

¹¹ Vuchic, pp. 128-130.

Trends in demand along the line

Before moving to prepare a new timetable, it would be necessary to obtain accurate and detailed information on patronage levels and trends along the line. Because such information is not publicly available, this task is only dealt with briefly here. The trends in demand along the Dandenong line can be charted using census data (and can then be updated early in 2008, when the 2006 census data becomes available). The data reveal a clear pattern over the last two decades¹².

- Peak-period patronage on the innermost section of line, between Oakleigh and the City, has increased substantially, due to gentrification, which has increased the size of the resident workforce and the share of workers employed in the city centre.
- Peak patronage along the middle section, between Oakleigh and Dandenong, has declined and become more localised (i.e. fewer people travelling all the way to the city), due to population and workforce declines, but also to a trend to increased self-containment (i.e. people working in their local area, rather than the city centre).
- Patronage along the outer section (Dandenong to Pakenham and Cranbourne) has increased due to population growth, but represents a very small share of the total workforce. Self-containment is high in this area, meaning that only a small share of the workforce is employed in the city centre. Very few of those employed elsewhere travel by train.

To illustrate these points, compare the suburbs¹³ of Caulfield (which includes Carnegie), Dandenong and Cranbourne. While 23% of workers resident in Caulfield were employed in the City of Melbourne at the 2001 census, the share for Dandenong workers was 7%, and for Cranbourne workers only 5%. While Dandenong and Cranbourne had 44,000 resident workers between them compared with 36,000 in Caulfield, they produced only 2683 workers travelling to central Melbourne between them, while the smaller Caulfield workforce accounted for 8173, more than three times as many. For both Dandenong and Cranbourne workers, the City of Monash was a much more important destination than the City of Melbourne. Few of those workers travelled by train in 2001, but those that did would have alighted at stations between Springvale and Oakleigh.

Significantly, current and recent service planning on the Dandenong corridor has headed in the exact opposite direction to passenger demand. Demand for services between Oakleigh and the city has increased, but these services have been eliminated; the share of workers from beyond Dandenong wishing to travel to the city centre is low and falling, but it is currently proposed that a billion dollars be spent to speed travel for this small minority of patrons, largely

¹² For more detail on this issue, see A. Lin (2006) *Triplication of the Dandenong Rail Line: Analysis and Evaluation*, Urban Planning Honours Thesis, University of Melbourne, chapter 4.

¹³ These are former municipalities, now classified as 'Statistical Local Areas' by the ABS.

ignoring the much bigger number of workers wishing to reach intermediate destinations.

What an efficient timetable would look like

Best practice in urban rail timetabling is about providing service patterns that:

- are easy to operate reliably,
- make the most efficient use of infrastructure and rolling stock,
- are easy to understand and remember for passengers; and
- simplify the task of providing connecting bus services.

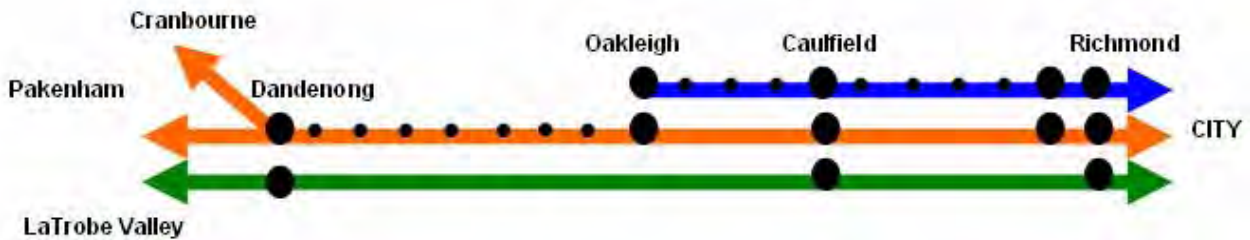
The current Dandenong timetable satisfies none of these criteria; it appears to have evolved through ad-hoc alterations over many years, and consists of different service types arranged apparently at random without any logical pattern. Cranbourne line passengers in particular receive a very poor service, with long waits between trains and little express running, which results in many residents driving to stations along the better served Pakenham line, adding to crowding problems. The 2007 timetable is basically that operated in 2001, with the addition of two extra suburban services and one V/Line service. These services were simply slotted into gaps in the existing timetable, rather than being used as an opportunity to re-think the service provision approach. This seems to be a result of a lack of timetabling expertise at both Connex and the Public Transport Division of DOI.

The correct approach, as set out in manuals like those of Professor Vuchic, is to adopt a regular service pattern using a recognised model like 'skip-stop' or 'zonal' operation (both types of service are used on the Perth suburban system). A regular service pattern is recommended because it is easy for operators and passengers to remember, facilitates the timetabling of connecting bus services, and allows the development of recovery strategies to deal with delays (see discussion below). The following proposal is based on the 'zonal' model, which seems most suited to the pattern of demand along the Dandenong corridor: it should be noted that it is only one example of what is possible.

Three service types would be operated, as illustrated in Figure 4: a stopping all stations service between Oakleigh and the City; alternating suburban services to Pakenham and Cranbourne, all running express between the City and Oakleigh and connecting with stopping services at Oakleigh; and finally, V/Line services (or possibly a mixture of V/Line services and 'super-express' suburban trains) running express between Pakenham and the City¹⁴. Under such a model, the maximum service provision achievable is 20 trains per hour: four V/Line or super-express services; 8 Pakenham/Cranbourne expresses and 8 Oakleigh stopping services, operating on a regular pattern that repeats every 15 minutes. An illustration of how this model could operate to the City in the busiest hour of the morning peak is provided in the Appendix.

¹⁴ Appendix A shows these services skipping Clayton, but a stop can be added here without disrupting the service pattern.

Figure 4: 'Zonal' service pattern



Providing 20 trains per hour on this model across the whole 2-hour morning peak requires 26 suburban train sets (not counting those required to operate the 4 V/Line services per hour), compared with 21 trains for the current service. Allowing for passengers travelling part-way along the line (and therefore some seats being filled twice) and no more than 20% standees, such a pattern would allow 22-25,000 passengers to be transported in the city-bound direction in the two-hour morning peak, compared with 11,000 at present. Running the same pattern on a 10/20 minute service cycle instead of 7.5/15 would only require 20 train sets, but would still give a two-hour capacity of around 17-19,000 passengers.

Capacity constraints and on-time running

The primary capacity constraint under this model is around Oakleigh station. The strategy for dealing with this is based on the approach adopted for the 1985 timetable. The availability of the third platform is used to allow Oakleigh stopping trains to depart immediately after the V/Line express service has passed the signal half way to Hughesdale station. A V/Line train travelling at 75 km/h will reach this point less than 40 seconds after passing through Oakleigh; once it does so, the following train can depart Oakleigh (Appendix A allows a full minute for this).

Under the high-frequency service model shown in Appendix A, less 'slack' is allowed in the timetable for late-running trains than at present. Rather than unreliability being a consequence of capacity problems, it is actually a cause of them, if it requires unnecessarily large gaps in service to be provided to cater for late-running. The correct approach is to adopt a culture of rigorous on-time adherence, as found in well-run urban rail systems, such as those in Perth and Zurich. This is primarily a matter of training, skills and corporate culture, but it is assisted by the operation of a regular, comprehensible service pattern.

Under such a model, disruptions to service are dealt with through pre-planned recovery strategies, which can be developed because only a limited number of service types are operated. Typical recovery strategies are designed to allow delays to be ironed out within the regular cycle time (15 minutes in Appendix A). An example of such a recovery strategy might be a series of

protocols about what to do if a 'stopping' train is late leaving Oakleigh, and might range from skipping stations to sending the next express train through ahead of the stopping service. The idea is to pre-plan recovery strategies to minimise disruption to passengers, rather than doing nothing and allowing delays to be perpetuated throughout the whole of peak period.

Why hasn't efficient timetabling been considered?

An important question arises at this point. Perhaps Connex might be excused for not knowing about the timetabling approaches set out in Vuchic's text (although it is the international 'bible' on the subject); perhaps they might be forgiven for not seeking the current author's advice. But how can Connex have failed to simply check the timetable for the Dandenong line from two decades ago, before asking the government for an extra billion dollars? And even more importantly, why did the Director of Public Transport and his 340-plus staff fail to do so before rubber-stamping Connex's request?

The most charitable explanation is that both Connex and the Director of Public Transport lack not only the expertise, but also the motivation, needed to provide the public with the best possible rail service at the lowest cost and with the least delay. The real deficiency is with 'organisational infrastructure', not physical infrastructure. This conclusion should provide grounds for optimism: institutional infrastructure can be fixed more rapidly and with less expense than physical infrastructure, provided the political will exists to do so.

With time organisations have a tendency to develop a pattern of operation that is convenient for personnel, rather than for passengers and long-term operating efficiency ... This pattern of operations is not easy to change, because in an organization a resistance to change develops that may be designated as "self-defense of incompetence" ... The less competent employees are, the more they resist any changes ... Management must undertake energetic steps to break the pattern of service deterioration, decreasing economic efficiency, and resistance to innovations. In some cases, to introduce changes, management may need support of political leaders, external advisors, citizen advisory groups, and other bodies to get a better perspective on the conditions of service, needed improvements, and obstacles that should be overcome.¹⁵

¹⁵ Vuchic, p. 317.

Appendix A

Possible Dandenong line timetable

Monday to Friday Pakenham & Cranbourne to City																							
Station		AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM		
Pakenham	Dep	6:46	6:57	..	..	..	7:01	7:12	..	..	..	7:16	7:27	..	..	..	7:31	7:42	..	..	..	7:46	7:57
Officer		6:50	*	..	..	..	7:05	*	..	..	..	7:20	*	..	..	..	7:35	*	..	..	..	7:50	*
Beaconsfield		6:54	*	..	..	..	7:09	*	..	..	..	7:24	*	..	..	..	7:39	*	..	..	..	7:54	*
Berwick		6:58	*	..	..	..	7:13	*	..	..	..	7:28	*	..	..	..	7:43	*	..	..	..	7:58	*
Narre Warren		7:02	*	..	..	..	7:17	*	..	..	..	7:32	*	..	..	..	7:47	*	..	..	..	8:02	*
Hallam		7:05	*	..	..	..	7:20	*	..	..	..	7:35	*	..	..	..	7:50	*	..	..	..	8:05	*
Cranbourne	Dep	..	..	..	7:08	..	..	..	..	7:23	..	..	..	..	7:38	..	..	..	..	7:53	..	..	..
Merinda Park		..	..	..	7:10	..	..	..	..	7:25	..	..	..	..	7:40	..	..	..	..	7:55	..	..	..
Dandenong	Dep	7:12	7:18	..	7:20	..	7:27	7:33	..	7:35	..	7:42	7:48	..	7:50	..	7:57	8:03	..	8:05	..	8:12	8:18
Yarraman		7:15	*	..	7:23	..	7:30	*	..	7:38	..	7:45	*	..	7:53	..	8:00	*	..	8:08	..	8:15	*
Noble Park		7:17	*	..	7:25	..	7:32	*	..	7:40	..	7:47	*	..	7:55	..	8:02	*	..	8:10	..	8:17	*
Sandown Park		7:19	*	..	7:27	..	7:34	*	..	7:42	..	7:49	*	..	7:57	..	8:04	*	..	8:12	..	8:19	*
Springvale		7:21	*	..	7:29	..	7:36	*	..	7:44	..	7:51	*	..	7:59	..	8:06	*	..	8:14	..	8:21	*
Westall		7:23	*	..	7:31	..	7:38	*	..	7:46	..	7:53	*	..	8:01	..	8:08	*	..	8:16	..	8:23	*
Clayton		7:26	*	..	7:34	..	7:41	*	..	7:49	..	7:56	*	..	8:04	..	8:11	*	..	8:19	..	8:26	*
Huntingdale		7:28	*	..	7:36	..	7:43	*	..	7:51	..	7:58	*	..	8:06	..	8:13	*	..	8:21	..	8:28	*
Oakleigh	Dep	7:31	*	7:34	7:39	7:41	7:46	*	7:49	7:54	7:56	8:01	*	8:04	8:09	8:11	8:16	*	8:19	8:24	8:26	8:31	*
Hughesdale		*	*	7:36	*	7:43	*	*	7:51	*	7:58	*	*	8:06	*	8:13	*	*	8:21	*	8:28	*	*
Murrumbeena		*	*	7:37	*	7:44	*	*	7:52	*	7:59	*	*	8:07	*	8:14	*	*	8:22	*	8:29	*	*
Carnegie		*	*	7:39	*	7:46	*	*	7:54	*	8:01	*	*	8:09	*	8:16	*	*	8:24	*	8:31	*	*
Caulfield		7:37	7:39	7:43	7:45	7:50	7:52	7:54	7:58	8:00	8:05	8:07	8:09	8:13	8:15	8:20	8:22	8:24	8:28	8:30	8:35	8:37	8:39
Malvern		*	*	7:45	*	7:52	*	*	8:00	*	8:07	*	*	8:15	*	8:22	*	*	8:30	*	8:37	*	*
Armadale		*	*	7:47	*	7:54	*	*	8:02	*	8:09	*	*	8:17	*	8:24	*	*	8:32	*	8:39	*	*
Toorak		*	*	7:49	*	7:56	*	*	8:04	*	8:11	*	*	8:19	*	8:26	*	*	8:34	*	8:41	*	*
Hawksburn		*	*	7:51	*	7:58	*	*	8:06	*	8:13	*	*	8:21	*	8:28	*	*	8:36	*	8:43	*	*
South Yarra		7:44	*	7:53	7:52	8:00	7:59	*	8:08	8:07	8:15	8:14	*	8:23	8:22	8:30	8:29	*	8:38	8:37	8:45	8:44	*
Richmond		7:47	7:49	7:56	7:55	8:03	8:02	8:04	8:11	8:10	8:18	8:17	8:19	8:26	8:25	8:33	8:32	8:34	8:41	8:40	8:48	8:47	8:49
Parliament		7:50	..	..	7:58	..	8:05	..	..	8:13	..	8:20	..	..	8:28	..	8:35	..	..	8:43	..	8:50	..
Melbourne Central		7:52	..	..	8:00	..	8:07	..	..	8:15	..	8:22	..	..	8:30	..	8:37	..	..	8:45	..	8:52	..
Flagstaff		7:54	..	..	8:02	..	8:09	..	..	8:17	..	8:24	..	..	8:32	..	8:39	..	..	8:47	..	8:54	..
Spencer Street		7:56	..	..	8:04	..	8:11	..	..	8:19	..	8:26	..	..	8:34	..	8:41	..	..	8:49	..	8:56	..
Flinders Street	Arr	8:00	7:53	8:00	8:08	8:07	8:15	8:08	8:15	8:23	8:22	8:30	8:23	8:30	8:38	8:37	8:45	8:38	8:45	8:53	8:52	9:00	8:53

Working timetable (showing pass-through times)

Monday to Friday Pakenham & Cranbourne to City																								
Station		AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM			
Pakenham	Dep	6:46	6:57	..	..	..	7:01	7:12	..	..	..	7:16	7:27	..	..	..	7:31	7:42	..	..	..	7:46	7:57
Officer		6:50	(7:00)	..	..	..	7:05	(7:15)	..	..	..	7:20	(7:30)	..	..	..	7:35	(7:45)	..	..	..	7:50	(8:00)
Beaconsfield		6:54	(7:03)	..	..	..	7:09	(7:18)	..	..	..	7:24	(7:33)	..	..	..	7:39	(7:48)	..	..	..	7:54	(8:03)
Berwick		6:58	(7:06)	..	..	..	7:13	(7:21)	..	..	..	7:28	(7:36)	..	..	..	7:43	(7:51)	..	..	..	7:58	(8:06)
Narre Warren		7:02	(7:09)	..	..	..	7:17	(7:24)	..	..	..	7:32	(7:39)	..	..	..	7:47	(7:54)	..	..	..	8:02	(8:09)
Hallam		7:05	(7:11)	..	..	..	7:20	(7:26)	..	..	..	7:35	(7:41)	..	..	..	7:50	(7:56)	..	..	..	8:05	(8:11)
Cranbourne	Dep	7:08	7:23	7:38	7:53
Merinda Park		7:10	7:25	7:40	7:55
Dandenong	Dep	7:12	7:18	..	7:20	..	7:27	7:33	..	7:35	..	7:42	7:48	..	7:50	..	7:57	8:03	..	8:05	..	8:12	8:18	
Yarraman		7:15	(7:20)	..	7:23	..	7:30	(7:35)	..	7:38	..	7:45	(7:50)	..	7:53	..	8:00	(8:05)	..	8:08	..	8:15	(8:20)	
Noble Park		7:17	(7:21)	..	7:25	..	7:32	(7:36)	..	7:40	..	7:47	(7:51)	..	7:55	..	8:02	(8:06)	..	8:10	..	8:17	(8:21)	
Sandown Park		7:19	(7:23)	..	7:27	..	7:34	(7:38)	..	7:42	..	7:49	(7:53)	..	7:57	..	8:04	(8:08)	..	8:12	..	8:19	(8:23)	
Springvale		7:21	(7:24)	..	7:29	..	7:36	(7:39)	..	7:44	..	7:51	(7:54)	..	7:59	..	8:06	(8:09)	..	8:14	..	8:21	(8:24)	
Westall		7:23	(7:26)	..	7:31	..	7:38	(7:41)	..	7:46	..	7:53	(7:56)	..	8:01	..	8:08	(8:11)	..	8:16	..	8:23	(8:26)	
Clayton		7:26	(7:28)	..	7:34	..	7:41	(7:43)	..	7:49	..	7:56	(7:58)	..	8:04	..	8:11	(8:13)	..	8:19	..	8:26	(8:28)	
Huntingdale		7:28	(7:30)	..	7:36	..	7:43	(7:45)	..	7:51	..	7:58	(8:00)	..	8:06	..	8:13	(8:15)	..	8:21	..	8:28	(8:30)	
Oakleigh	Dep	7:31	(7:33)	7:34	7:39	7:41	7:46	(7:48)	7:49	7:54	7:56	8:01	(8:03)	8:04	8:09	8:11	8:16	(8:18)	8:19	8:24	8:26	8:31	(8:33)	
Hughesdale		(7:32)	(7:34)	7:36	(7:40)	7:43	(7:47)	(7:49)	7:51	(7:55)	7:58	(8:02)	(8:04)	8:06	(8:10)	8:13	(8:17)	(8:19)	8:21	(8:25)	8:28	(8:32)	(8:34)	
Murrumbeena		(7:33)	(7:35)	7:37	(7:41)	7:44	(7:48)	(7:50)	7:52	(7:56)	7:59	(8:03)	(8:05)	8:07	(8:11)	8:14	(8:18)	(8:20)	8:22	(8:26)	8:29	(8:33)	(8:35)	
Carnegie		(7:34)	(7:36)	7:39	(7:42)	7:46	(7:49)	(7:51)	7:54	(7:57)	8:01	(8:04)	(8:06)	8:09	(8:12)	8:16	(8:19)	(8:21)	8:24	(8:27)	8:31	(8:34)	(8:36)	
Caulfield		7:37	7:39	7:43	7:45	7:50	7:52	7:54	7:58	8:00	8:05	8:07	8:09	8:13	8:15	8:20	8:22	8:24	8:28	8:30	8:35	8:37	8:39	
Malvern		(7:39)	(7:41)	7:45	(7:47)	7:52	(7:54)	(7:56)	8:00	(8:02)	8:07	(8:09)	(8:11)	8:15	(8:17)	8:22	(8:24)	(8:26)	8:30	(8:32)	8:37	(8:39)	(8:41)	
Armadale		(7:40)	(7:42)	7:47	(7:48)	7:54	(7:55)	(7:57)	8:02	(8:03)	8:09	(8:10)	(8:12)	8:17	(8:18)	8:24	(8:25)	(8:27)	8:32	(8:33)	8:39	(8:40)	(8:42)	
Toorak		(7:41)	(7:43)	7:49	(7:49)	7:56	(7:56)	(7:58)	8:04	(8:04)	8:11	(8:11)	(8:13)	8:19	(8:19)	8:26	(8:26)	(8:28)	8:34	(8:34)	8:41	(8:41)	(8:43)	
Hawksburn		(7:42)	(7:44)	7:51	(7:50)	7:58	(7:57)	(7:59)	8:06	(8:05)	8:13	(8:12)	(8:14)	8:21	(8:20)	8:28	(8:27)	(8:29)	8:36	(8:35)	8:43	(8:42)	(8:44)	
South Yarra		7:44	(7:46)	7:53	7:52	8:00	7:59	(8:01)	8:08	8:07	8:15	8:14	(8:16)	8:23	8:22	8:30	8:29	(8:31)	8:38	8:37	8:45	8:44	(8:46)	
Richmond		7:47	7:49	7:56	7:55	8:03	8:02	8:04	8:11	8:10	8:18	8:17	8:19	8:26	8:25	8:33	8:32	8:34	8:41	8:40	8:48	8:47	8:49	
Parliament		7:50	..	..	7:58	..	8:05	..	..	8:13	..	8:20	..	..	8:28	..	8:35	..	..	8:43	..	8:50	..
Melbourne Central		7:52	..	..	8:00	..	8:07	..	..	8:15	..	8:22	..	..	8:30	..	8:37	..	..	8:45	..	8:52	..
Flagstaff		7:54	..	..	8:02	..	8:09	..	..	8:17	..	8:24	..	..	8:32	..	8:39	..	..	8:47	..	8:54	..
Spencer Street		7:56	..	..	8:04	..	8:11	..	..	8:19	..	8:26	..	..	8:34	..	8:41	..	..	8:49	..	8:56	..
Flinders Street	Arr	8:00	7:53	8:00	8:08	8:07	8:15	8:08	8:15	8:23	8:22	8:30	8:23	8:30	8:38	8:37	8:45	8:38	8:45	8:53	8:52	9:00	8:53	