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reductions were made in services. From 12 August 1968 the weekday evening service was amended to run at 24-minute intervals, while from 9 July 1972 the Sunday service was reduced to 30-minute headways all day.

Commencing on trial from 13 June 1971, all Down trains through Mordialloc after 7.30 p.m. weekdays and all day Sundays were routed through the Up platform in order to reduce the number of station staff required. As the experiment proved successful, the system was introduced permanently four weeks later.

Significant timetable changes to the entire suburban system came into effect from 10 December 1973 when the Mondays to Saturdays off-peak service to Frankston was altered to 20-minute headways. At the same time, the platforms used by Frankston line trains at Flinders Street changed from Nos. 6 and 7 to Nos. 8 and 9 and the services re-routed to run through to the Broadmeadows line. This change did not affect those peak hour services which have for many years arrived and left from platform Nos. 10 and 11 East.

As a result of pressure from local residents, the V.R. opened a new station at a point mid-way between Seaford and Frankston stations, which are located some 4.6 km apart. The new station, known as Kananook, became available for passenger use from 8 September 1975.

Installation of automatic signalling resumed during the 1970's with the conversion of the 2.4 km section from Highett to Cheltenham on 10 December 1972. This allowed the signal box at Cheltenham to be replaced by a signal panel on the same day. The next section converted was from Glenhuntly to Bentleigh (3.1 km) on 10 November 1974, when Ormond signal box closed, followed by those at McKinnon and Bentleigh two weeks later.

From Carrum to Frankston (7.8 km) was treated next with the new signals first being operative on 29 October 1976, enabling the replacement of Seaford box by a signal panel, while on the following 19 December automatic signalling was introduced between Chelsea and Carrum (2.8 km). Signal panels took the place of the old boxes at either end of that section at the same time. The last part of the line to be converted was from Mordialloc to Chelsea (5.6 km) where the more modern form of safeworking was implemented from 23 January 1977, permitting signal frames to give way to panels at Aspendale and Edithvale. On 3 April 1977 a signal panel was provided at Bonbeach.

At the time of writing, work was in progress on building a third track from Glenhuntly to Mordialloc, the work having commenced during 1974. The only section of track not now regulated by automatic signalling is the 5.3 km from Cheltenham to Mordialloc.

Lilydale and Belgrave Lines

The lines to Lilydale and Belgrave were opened in stages over a 40-year period, the first section being constructed by the Melbourne and Suburban Railway Company from Richmond to Pic-nic station (near present-day Burnley) and opened on 24 September

1860. This line connected with the tracks from Prince Bridge to Richmond which had been built by the same company and brought into traffic over 18 months earlier on 8 February 1859. Six months or so later on 13 April 1861, the company extended its line from Pic-nic over the Yarra River to Hawthorn. However, another 20 years were to elapse before the railway progressed beyond Hawthorn.

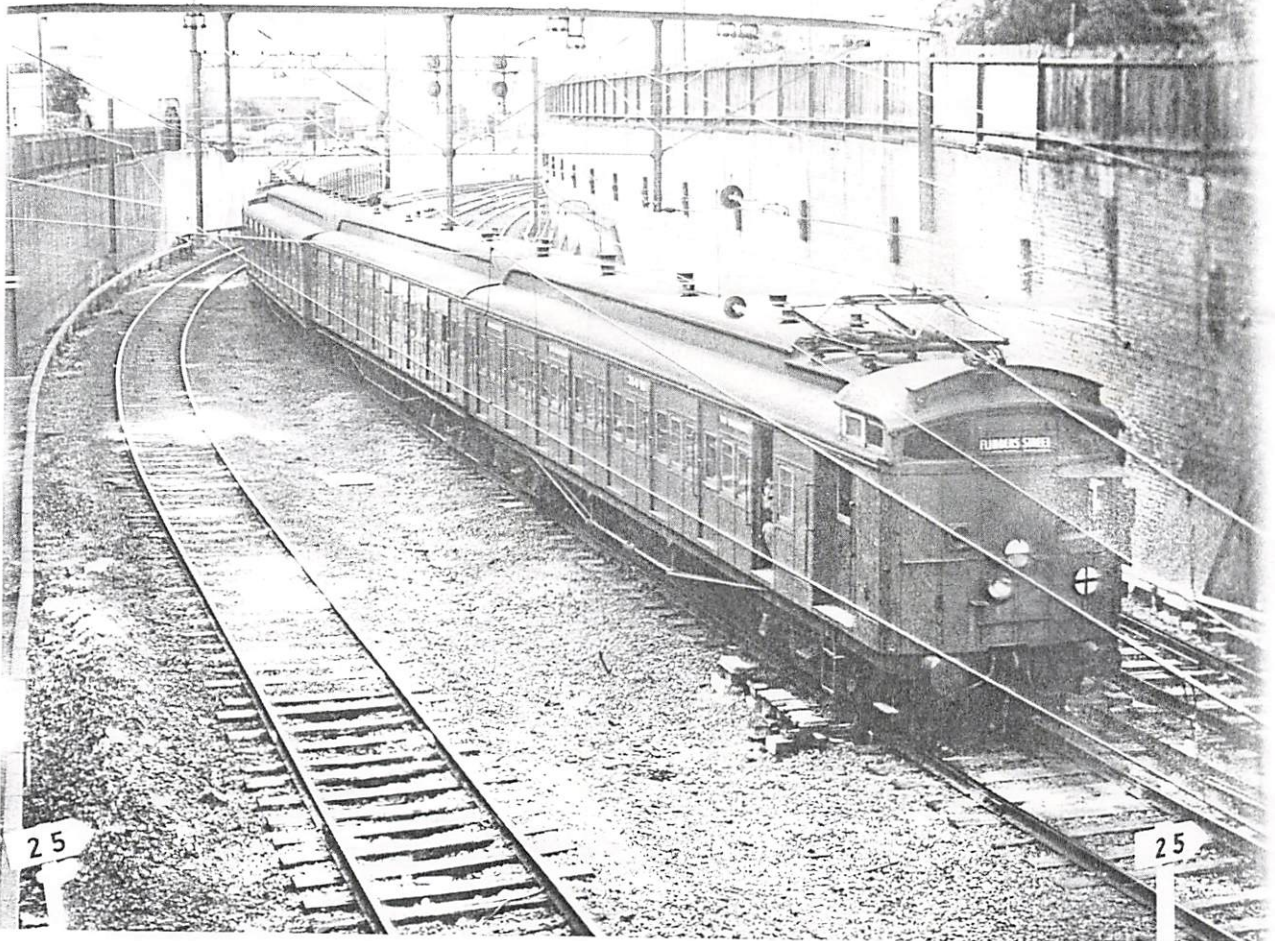
In the meantime, the Melbourne and Suburban Railway Company sold its assets to the Melbourne Railway Company on 31 March 1862, while on 30 June 1865 the latter company amalgamated with the Melbourne and Hobson's Bay Railway Company to form the Melbourne and Hobson's Bay United Railway Company. Another 14 years later, on 1 July 1879, this company was taken over by the Colonial Government, bringing all suburban railway lines under Government ownership.

Soon after the Government assumed control, the line was extended from Hawthorn to Camberwell, where the first train ran on 3 April 1882. From 1 December the same year, a further extension took the railway as far as Lilydale.

The branch from Ringwood to Upper Ferntree Gully was opened on 4 December 1889, while the narrow (762 mm) gauge line from Upper Ferntree Gully to Gembrook first operated on 18 December 1900. This line was built to narrow gauge standards as the Government was trying to contain the costs of railway construction in the years immediately following the financial depression of the 1890's. The Government built a number of such narrow gauge lines in areas where the expenditure involved in providing track to the more usual 1,600 mm gauge would have been prohibitive.

The line to Ringwood was one of the last lines to be electrified in the original electrification programme and was opened in two stages: from Flinders Street to Box Hill on 17 December 1922 and from Box Hill to Ringwood on 30 January 1923. Despite the extremely heavy passenger traffic on the line, it was converted to electric traction only in the final stages of the electrification programme because the section from Hawthorn to Camberwell was being extensively regraded at the time to eliminate all level crossings between those two stations. When electrified, the line consisted of double track throughout and automatic signalling was provided from Flinders Street through to Canterbury (11.0 km), with the exception of Camberwell and Hawthorn stations, which were converted on 22 June 1924 and 14 June 1925 respectively. The remaining 13.5 km of the line from Canterbury to Ringwood retained manual signalling until many years later. It is interesting to note that the 5.9 km of route from East Richmond to Camberwell was the site of the first large-scale installation of ordinary colour light signals in the State, being equipped this way in October 1922.

Pre-electric train services on the Box Hill line (as the Lilydale/Belgrave lines as a group are often called) ran at 20-25 minute intervals to Canterbury, with most trains proceeding an extra three stations (3.9 km) to Box Hill.



Although the Box Hill line was conveying very heavy passenger traffic, it was the last line to be wired in the initial electrification programme because the section from Hawthorn to Camberwell was being extensively regraded at the time to eliminate all level crossings between those two stations. On the approach to Camberwell from the Melbourne side can be seen how this project was achieved by the lowering of the track by some metres. A Flinders Street Tait train passes by. — J. G. Beckhaus

The service beyond there was quite sparse with only 13 trains per day. Upon electrification to Box Hill, the service improved only slightly with a 20-minute service running to Box Hill and the infrequent service being maintained to stations beyond. With the extension of electrification to Ringwood, a considerably improved service was provided to stations beyond Box Hill and in the timetable dated 15 April 1923, every third train proceeded on to Ringwood, giving it an hourly service.

V.R. officials were so impressed with the increase in passenger traffic resulting from electrification that they submitted to Parliament a proposal to electrify the single-track lines from Ringwood to Lilydale and Upper Ferntree Gully. The Government of the day was not keen to go ahead with the entire project immediately and approved an extension of electrification only to Croydon, a distance of 5.3 km. This section opened to electric trains on 28 November 1924. Approval was soon afterwards given for the other extensions proposed and the lines to Upper Ferntree Gully (11.9 km) and from Croydon to Lilydale (8.0 km) were

duly electrified on 12 October and 30 November 1925 respectively.

Following these extensions of electrification, the service as far as Box Hill improved, with trains operating there every 15 minutes. An hourly service continued to run to Ringwood and about ten trains per day were scheduled on each of the routes to Lilydale and Upper Ferntree Gully.

As the use of pairs of swing door electric motor cars hauling Stony Point and Mornington line trains between Melbourne and Frankston had proved to be successful, it was decided to introduce the same type of motive power on certain Warburton and Healesville line trains between Melbourne and Lilydale, which was not only the limit of electrification but also the junction station for the Warburton and Healesville lines. These workings, known as "E" trains, commenced at the time of electrification to Lilydale and continued with little alteration until withdrawn on 1 February 1958. The services were replaced then by rail motors connecting with electric trains at Lilydale.

As with other lines, electrification brought with it additional traffic and this in turn resulted in the opening of a new signal box at Ringwood on 14 November 1926 to control the passage of trains through the junction. Other results of the electrification were the opening of several additional stations: at Ringwood East (between Ringwood and Croydon) on 18 May 1925; at Heathmont (between Ringwood and Bayswater) on 1 May 1926; and at Chatham (between Canterbury and Surrey Hills) on 1 April 1927. The opening of this latter station coincided with the introduction of automatic signalling between Canterbury and Surrey Hills. Further signalling improvements were made to the line on 20 October 1929 when automatic signalling was installed from Surrey Hills to Box Hill, permitting the signal box at Mont Albert to be abolished. This extension of automatic signalling meant that the entire 14.9 km route from Flinders Street to the busy intermediate terminus at Box Hill was equipped with this type of safeworking. No further such extensions took place until after World War II. However a new signal box was installed at Box Hill on 15 June 1930.

Timetables on the route remained fairly static during the pre-war period, the only change of note being the improvement of the Ringwood service by 1934 to a 45 minute instead of the previously hourly headway.

To handle the heavy football and cricket crowds from the Melbourne Cricket Ground, a ramped approach to Richmond station was constructed in 1937. This ramp gave Box Hill line passengers a separate and direct access to their platform and so reduced congestion at the remaining entrances.

Significant changes in the early post-war period included the renaming of Tunstall station to

Nunawading on 27 November 1945 and the introduction of a local service between Croydon and Lilydale at night on Mondays to Fridays from 2 November 1947. Another eight years passed before any further timetable variations occurred when, from 11 July 1955, fast trains to both Lilydale and Upper Ferntree Gully were tabled at about hourly intervals, while the Ringwood service was retained to serve intermediate stations.

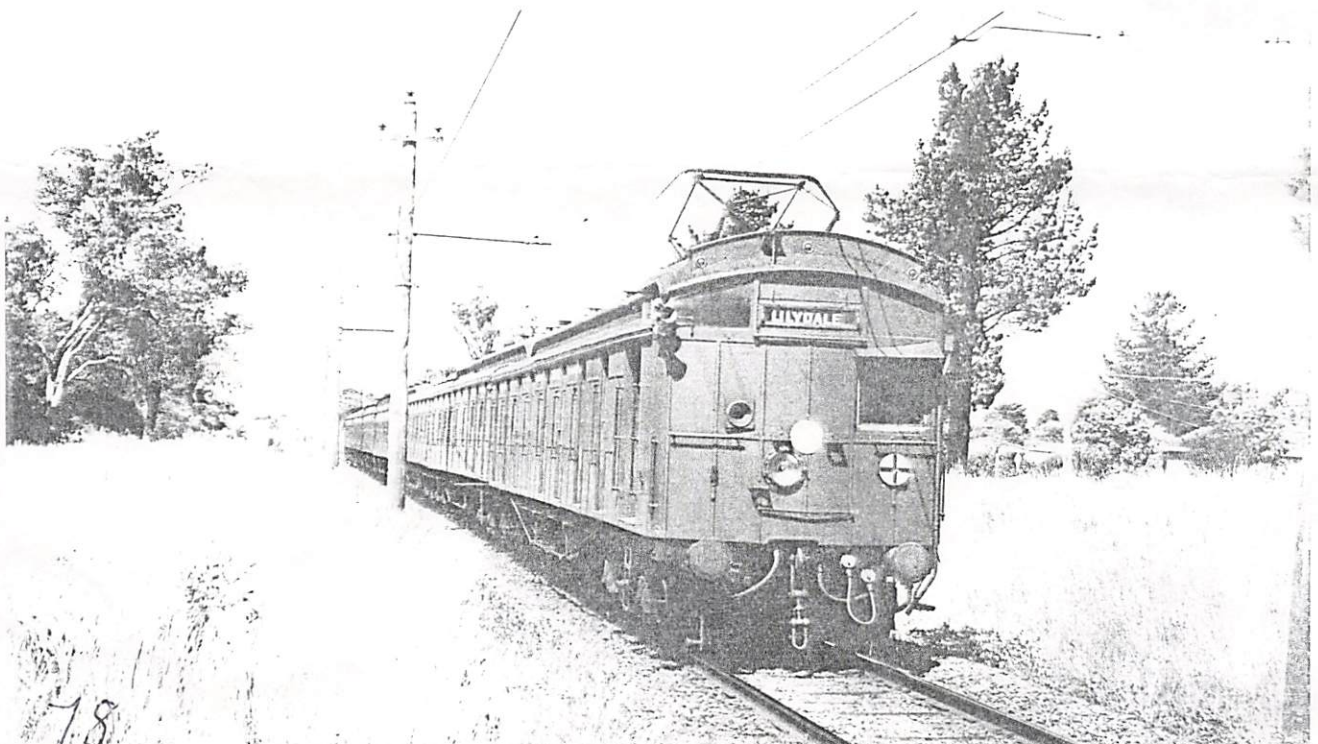
The 1950's witnessed the commencement of unprecedented development in the outer suburban areas and this was particularly so on the Box Hill line east of that station and reaching to the electric termini at Lilydale and Upper Ferntree Gully. The much increased population created a demand for extra rail facilities, notably during the peak hour periods, causing the V.R. to embark upon a programme of upgrading the whole line.

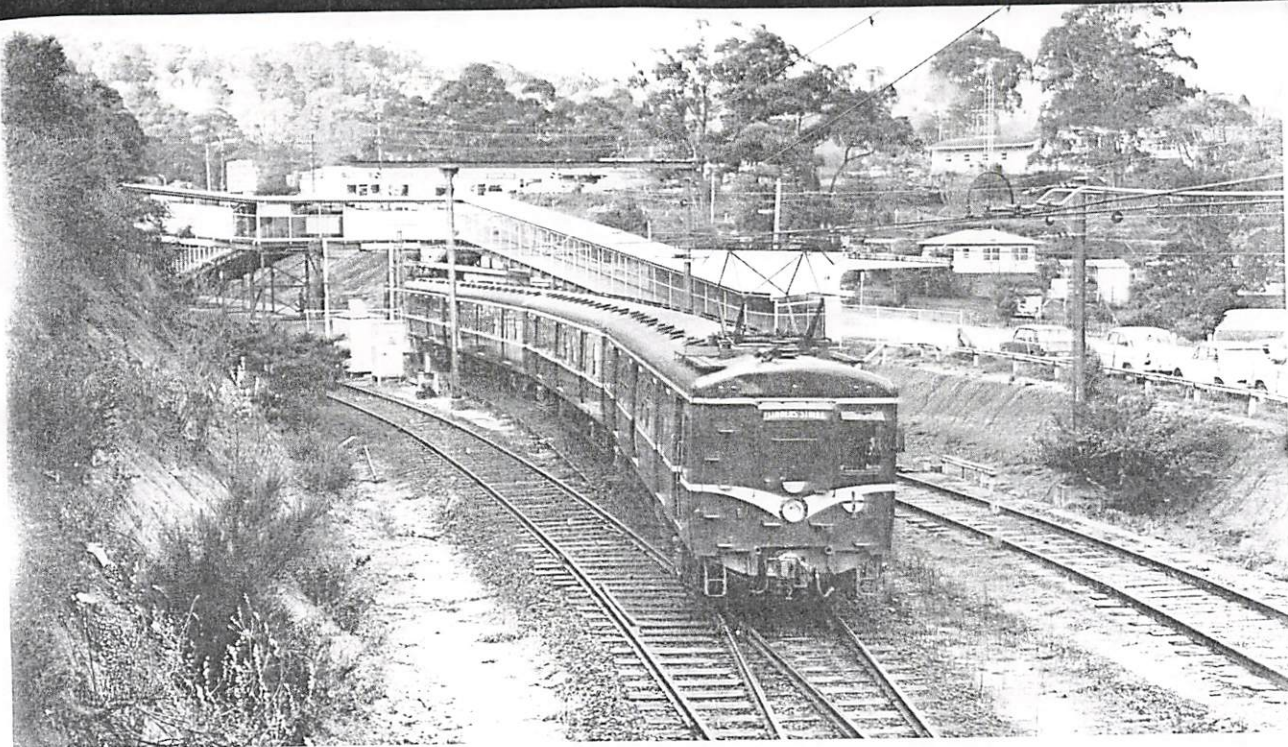
As a first stage, duplication was put in hand between Bayswater and Lower Ferntree Gully (5.1 km), opening on 10 February 1957, and between Croydon and Mooroolbark (3.3 km) opening on 8 September 1957.

The year 1958 saw the introduction of two sections of automatic signalling and the opening of two new stations on the line. On 13 July automatic signalling was installed over the 2.5 km of track between Box Hill and Blackburn and on 7 September the 3.3 km from Mitcham to Ringwood was similarly treated. Simultaneously with the new signalling coming into operation was the addition of a new station within each section, the new stations being Laburnum and Heatherdale respectively. Little more than two years later, on 13 November 1960, automatic signalling was installed to control the 3.8 km intervening section between Blackburn and Mitcham, thus giving

Plans exist for the doubling of this single track section on the Lilydale line between Ringwood and Croydon to join up double track sections at either end. A Lilydale bound Tait train passes through the long grass that has been dried by the heat of the Australian summer.

— C. K. Mottram





As a four-car Harris train sets out from Belgrave on its 41.3 km journey to Flinders Street, little trace can be detected of the former 762 mm line which ran between here and Upper Ferntree Gully. A new station and approaches were built when the electric network was extended to Belgrave on 18 February 1962.

— V.R.

continuous automatic signalling from Box Hill (the 1929 limit of automated signals) to Ringwood, a distance of 9.6 km. With the conversion of the signalling between Blackburn and Mitcham, the opportunity was taken to replace signal boxes at each of those stations with signal panels.

The next stage to be undertaken in upgrading the line's facilities comprised the major extension of the 1,600 mm gauge track from Upper Ferntree Gully for 4.9 km into the Dandenong Ranges to Belgrave. Ever since electric traction had reached Upper Ferntree Gully, consideration had been given to converting the inner portion of the narrow gauge Gembrook line to broad gauge and electrifying it. In 1944 a Parliamentary Public Works Committee recommended that these steps be taken and in December 1948 a Bill passed through the Victorian Parliament authorising construction of a broad gauge line to Emerald and included the possibility of electrification as well.

Despite the authority given to the V.R., no action was taken, but the narrow gauge line continued to present many operating problems, particularly the track formation between Selby and Menzies Creek, which was subject to landslides. No less than three landslides occurred in the 20 year period to December 1952 and on each occasion the line was cleared. Following yet another similar occurrence in August 1953, the V.R. closed the line from 30 April 1954 with the justification that expenses in the year ended 30 June 1953 had considerably exceeded income.

In 1958 it was decided to rebuild and electrify the line as far as Belgrave, some four kilometres short of the landslide-prone site, and work commenced in the same year. In the meantime, in 1954 the Puffing Billy

Preservation Society had been formed with the object of continuing narrow gauge railway operation on the line. After the decision was announced to convert the section to Belgrave to broad gauge and electrify it, the Society concentrated its efforts on the line beyond that point and it now runs a flourishing narrow gauge train service at weekends and holidays between Belgrave and Lakeside.

Considerable efforts were required to prepare the line from Upper Ferntree Gully to Belgrave for electrification. The narrow gauge line comprised some stretches of steep gradients and sharp curves which had to be eased as much as possible. New bridges were constructed at a number of locations, the station at Upper Ferntree Gully re-organised as a crossing station and new platforms built at the sites of the former stations at Upwey, Tecoma and Belgrave. Upwey was laid out as a crossing station (although not initially used as such) while at Belgrave an island platform was provided so that it could serve as a crossing station in the event of electrification ever being further extended.

On 18 February 1962 the first electric train on the line carried the official party, and public service commenced with the first train the following morning. Built as a single track route, manual signalling was provided when the new line opened. All off-peak trains that previously ran to Upper Ferntree Gully were extended to Belgrave, giving passengers on the extension a 45 minute service, but during peak periods some trains continued to conclude their journey at the old terminus. Lower Ferntree Gully was renamed simply Ferntree Gully as from 1 October 1962 and altered again to Fern Tree Gully in 1972.

Until the 1960's, the upgrading programme had

improved travelling conditions beyond Box Hill but had neglected the inner section of the route. In this area more tracks were required to permit some form of express operation through the inner suburbs for trains proceeding to and from stations in the outer suburbs. The problem was particularly acute between Flinders Street, Burnley and Camberwell where one pair of tracks served all trains, both local and express, to Glen Waverley, Alamein, Lilydale and Belgrave, causing somewhat of a bottleneck. To ease the situation, the V.R. belatedly instituted the provisions of "Operation Phoenix", which called for the two tracks as far as Burnley to be increased to four and for one additional track, signalled for bi-directional running, to be built from there to Box Hill. A flyover to allow Down Alamein trains to cross the Box Hill line tracks between Camberwell and East Camberwell was also included in the plans. Construction of this flyover was put in hand in 1954 and the structure brought into operation on 29 November 1959. Track amplification activity beyond Richmond on the Burnley group of lines had commenced seven years earlier in 1952 when widening of the embankment between Glenferrie and Camberwell started, making use of filling obtained from the then current duplication of the Alamein line from Camberwell to Ashburton.

Earthworks and bridge-widening between Hawthorn and Camberwell proceeded slowly during the early 1960's until the new Up track was ready in the middle of 1963, when resignalling of the centre (former Up) track for two-way running started. New platforms were built as required for the extra track except at Hawthorn, where the old Kew line platform, disused since 1952, was returned to use, and at Camberwell which was already provided with a three platform layout. This first four kilometre section of three-track operations from Hawthorn to Camberwell commenced on 8 December 1963. At the same time, all tracks were signalled for closer headways and high speed turnouts were laid in at Hawthorn. The centre track, with its bi-directional running, was subject to Lever Locking and Track Control safeworking. Extension of three-track running by 0.8 km to East Camberwell was brought into use on 8 November 1964.

Work then proceeded on adding a third track west of Hawthorn (back to Burnley) and east of East Camberwell (as far as Box Hill), while quadruplication works were put in hand between Richmond and Burnley. As a preliminary to this stage, the Down platform at Burnley was converted into an island platform on 23 July 1963. The quadruplication involved lowering of the tracks through East Richmond by some 1.2 metres, construction of a new overpass at Burnley and the re-arrangement of East Richmond station, where the number of platforms remained at two, serving the two outermost (or Local) tracks after quadruplication. Also involved was the abolition of East Richmond signal box on 12 March 1965 after the interlocked crossing gates were removed. The new Up track over the 1.7 km section came into use from 1 August 1966 and the Down track on 9 January 1967. From the latter date also the final two platforms at Richmond were commissioned.

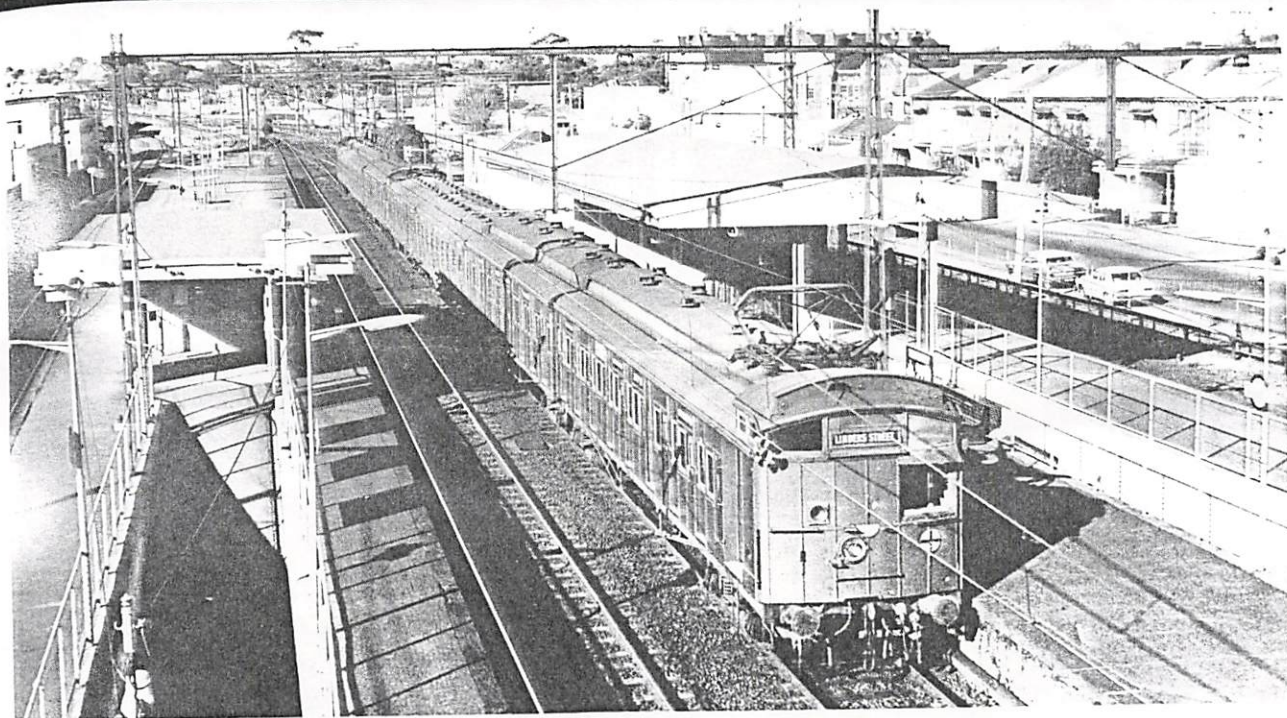
In preparation for the third track from East Camberwell to Box Hill, Surrey Hills good siding was removed and the signal box which controlled it closed on 20 March 1966. The major work in providing a third track in this section was the raising of the level of Canterbury station by over six metres to allow the congested Canterbury Road level crossing to be replaced by a rail overbridge. This project commenced in early 1966 and was completed on 15 September 1968, following the use of temporary tracks while construction of the new bridge and station proceeded. The signal box there had been closed on 20 February 1966 and boom barriers controlled the level crossing during the intervening period. Additional platforms were built at other intermediate stations and a rail overbridge improved traffic over the former Elgar Road level crossing. After almost six years of preparatory work, the third track was finished and bi-directional centre track operation initiated between East Camberwell and Box Hill (5.1 km) on 19 December 1971. The new track enabled additional peak hour express trains to be provided as from the following 24 January.

The last section where three-track running was introduced in Melbourne's eastern suburbs was at the inner end of the Box Hill line from Burnley to Hawthorn, where the earliest sign of activity was the replacement of the Swan Street overbridge, together with its tramway lines, commencing in September 1968. Although only a short section (about 1.5 km), the widening of the crossing over the Yarra River prevented the triplication work from being finished until 13 August 1972. Hawthorn signal box closed at the same time.

To complete the entire track amplification project, work on a flyover located between Flinders Street and Richmond for Down Glen Waverley line trains was begun in the latter half of 1970 and required the replacement of a footbridge adjacent to the Melbourne Cricket Ground. Completion of the flyover and other associated trackwork permitted two additional tracks between Flinders Street "E" Box and Richmond to be brought into use as from 4 February 1973, this being the final step in the improvement of train running for Box Hill and Glen Waverley line trains. Finalisation of the project enabled Glen Waverley and Box Hill trains to use separate tracks as far as the junction of the two lines at Burnley and permitted express running in the direction of peak flow, as well as local trains in both directions, between Burnley and Box Hill, a distance of 10.8 km.

While the track amplification programme was proceeding, other capital works undertaken included installation of automatic signalling on the single track line between Ferntree Gully and Belgrave, a distance of 6.6 km on 17 March 1964. Simultaneously the crossing loop, which had been provided at Upwey at the time of electrification in 1962, was brought into use. All points and signals at Upper Ferntree Gully, Upwey and Belgrave are now motor worked and operated from a control panel at Upper Ferntree Gully.

Although the volume of traffic was rising during peak hours, the reverse was taking place in the off-peak and by 1961 Sunday afternoon and evening services were



When electric traction was introduced through Burnley to Box Hill in 1922, only one pair of tracks was available between Flinders Street and Burnley to cater for all Ringwood, Darling and Kew line trains. Considerable track amplification works in the meantime have converted Burnley station into a four-platform arrangement. A Tait train from the Box Hill line stands at the station before running the last four kilometres into the city.

— C. K. Mottram

operating on the Box Hill line at only 20-25 minute intervals, while from 8 November 1964 Saturday afternoon trains started running every 20 minutes. Despite general cuts in off-peak services, the Lilydale service was improved from 6 April 1964 when the local evening service between Croydon and Lilydale was replaced by through trains from Flinders Street.

Abolished during 1965 was the Lilydale signal box which closed on 28 November, its demise being brought about by the closure some four months before on 29 July of the Warburton line, which had junctioned from the Healesville line at Lilydale.

On 26 February 1968 a new timetable was issued, in which local trains to Box Hill and Ringwood were deleted and all trains ran through to either Lilydale or Belgrave. Each terminus received a 46 minute service, with the common section of the route between Melbourne and Ringwood being serviced by a train every 23 minutes. Timetable variations were again made on 9 July 1972 when a 30 minute service on Sundays was provided to Ringwood. The trains from the city then proceeded alternately to Lilydale and Belgrave and a connecting service provided to the other terminus on the opposite half hour.

Improvements were made to off-peak timetables from 10 December 1973 when on Mondays to Fridays a 20 minute service to Ringwood was begun, trains from Melbourne running in turn to the two outer termini. Just over a year later on 20 January 1975, the business hours off-peak hour service on Mondays to Fridays was upgraded again to a 15 minute service as far as Ringwood and half hourly on each line beyond there.

Signalling works carried out on the two lines from

Ringwood included the introduction of automatic signalling on the single track line to Croydon on 11 November 1973 and on the single track to Bayswater on 30 June 1974.

Kew Line

The 1.5 km Hawthorn to Kew branch was opened for traffic on 19 December 1887 and was converted to electric traction on 17 December 1922, at the same time as the line to Box Hill. The line was single track throughout its existence.

Prior to the inauguration of electric trains, a steam train shuttle service had operated on the line at 20-25 minute intervals, through trains from the city operating during peak hours. With the commencement of electric trains, a 20 minute through service was provided to Kew. From 15 April 1923, Kew trains were through-routed to the Fawkner line at the same 20 minute headway. In December 1924, just as services were improved on the Box Hill Line, Kew line passengers were also given a 15 minute service.

Services remained at this level until 24 November 1930, when through services were reduced to operate only during peak hours. At other times a local service from Hawthorn, using a single ABM type motor car, was provided every 15 minutes on weekdays and 20 minutes on Sundays.

Commencing 29 November 1937, through services to Kew were eliminated during the afternoon peak hour and the paths of these trains between Flinders Street and Hawthorn were taken by trains bound for Ashburton, where an increasing volume of traffic was being handled.