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Local Group Secretaries

London	G. C. Bird, 44 Ravensmede Way, London W4 1TF
North West	G. Leach, 5 Tabley Close. Knutsford, Cheshire WA16 0NP
North East	D. B. Slater, 8 Granger Avenue, Acomb, York YO2 5LF
West Midlands	R. M. Shill, 100 Frederick Road, Stechford, Birimingham B33 8AE
East Midlands (acting)	S. Birch, 48 Arundel Drive, Bramcote Hills, Beeston, Nottingham NG9 3FN
South West (acting)	A. Richardson, 25 Boscombe Crescent, Downend, Bristol BS16 6GR

Co-ordinators of Special Interest Groups

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Road Transport	P. L. Scowcroft, 8 Rowan Mount, Doncaster, South Yorkshire DN2 5PJ
Waterways History Research (including. Docks & Shipping)	D. I. Foster, 10 Mill Cottages, Distington, Workington CA14 5SR
Railway Chronology	D. R. Steggles, 8 Buckerell Avenue, Exeter EX2 4RA
Air Transport Group	N. Wood, 'The Poplars', Barnstone Road, Langar, Nottingham NG13 9HH

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JOURNAL OF THE RAILWAY & CANAL HISTORICAL SOCIETY

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Contents

The Manchester & Leeds Railway In and Around Todmorden, 1840 – 1847

BY JEFFREY WELLS

The Manchester & Leeds Railway Company's main line between Manchester and Goose Hill Junction, Normanton, opened in four stages: Manchester to Littleborough – 4 July 1839; Goose Hill Junction to Hebden Bridge – 5 October 1840; Summit Tunnel (east portal) to Hebden Bridge – 31 December 1840; the Summit Tunnel – 1 March 1841. The line throughout (50½ miles) was opened for passenger traffic on 1 March 1841 following a delay in the opening of the Summit Tunnel. As can be seen, the penultimate section of line to be opened lay between the eastern portal of the Summit Tunnel and the village of Hebden Bridge. Within this section lay the Lancashire town of Todmorden (population, 6,000 in 1842), a settlement located on the periphery of the Lancashire cotton, and the West Riding woollen areas.

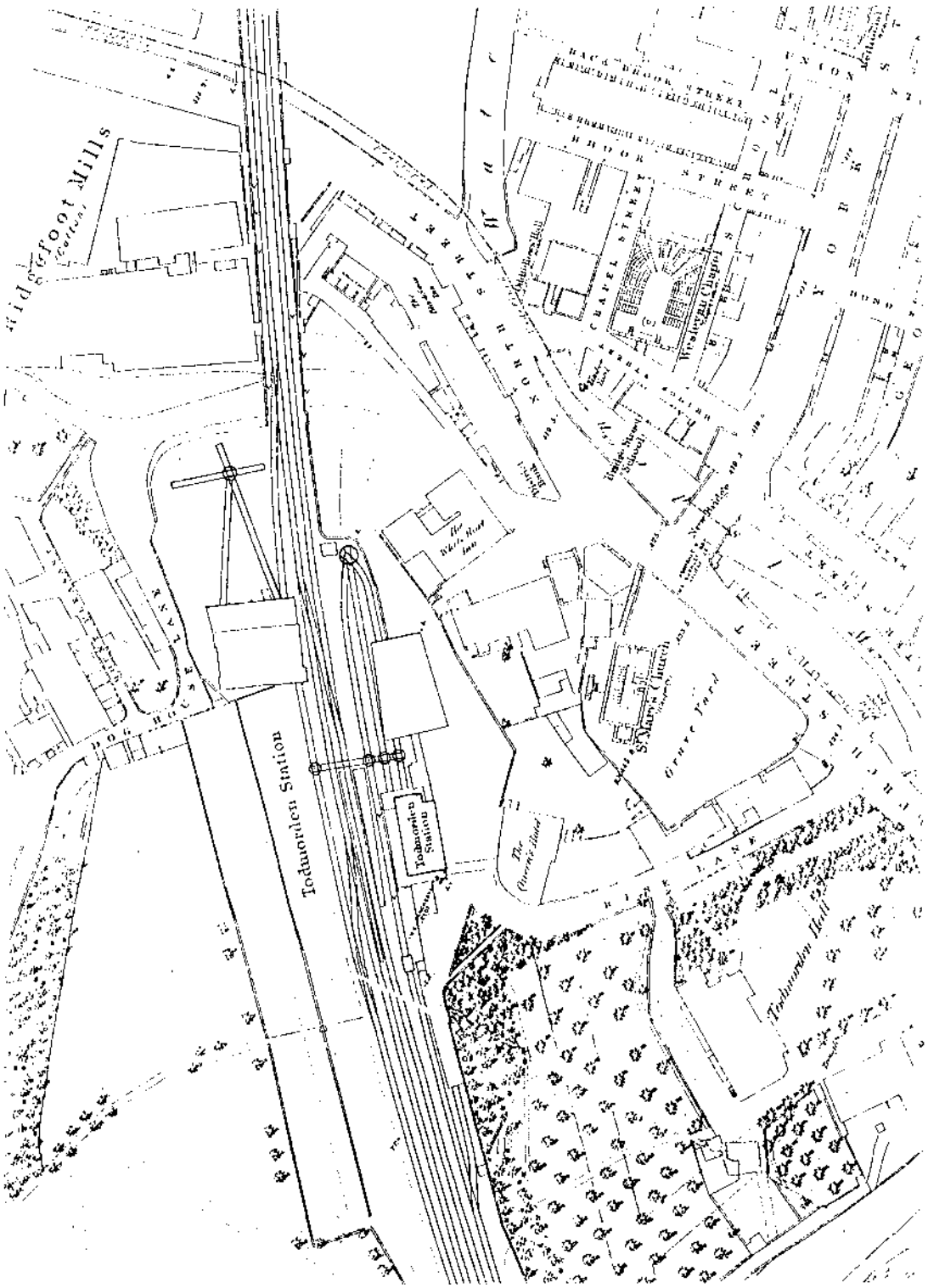
The Company had placed a contract advert in the *Manchester Guardian* on 2 May 1838 which focused on a stretch of line to be constructed on either side of the town. The Contract was designated "The Todmorden Contract", the advert reading as follows:

> To make and maintain the railway with all its excavations, embankments, tunnels, culverts, drains, fences, and gates complete, including the laying and ballasting of the permanent way and sidings, and furnishing the necessary stone blocks (but exclusive of wooden sleepers, rails, chairs and fastenings), as also the Gauxholme Viaduct, commencing at a point about 5 chains to the north east of Clough Mill and terminating at about 12 chains to the north east of the road from Todmorden to Burnley being a distance of about 1 mile 22 chains, exclusive of the length of the Gauxholme Viaduct.

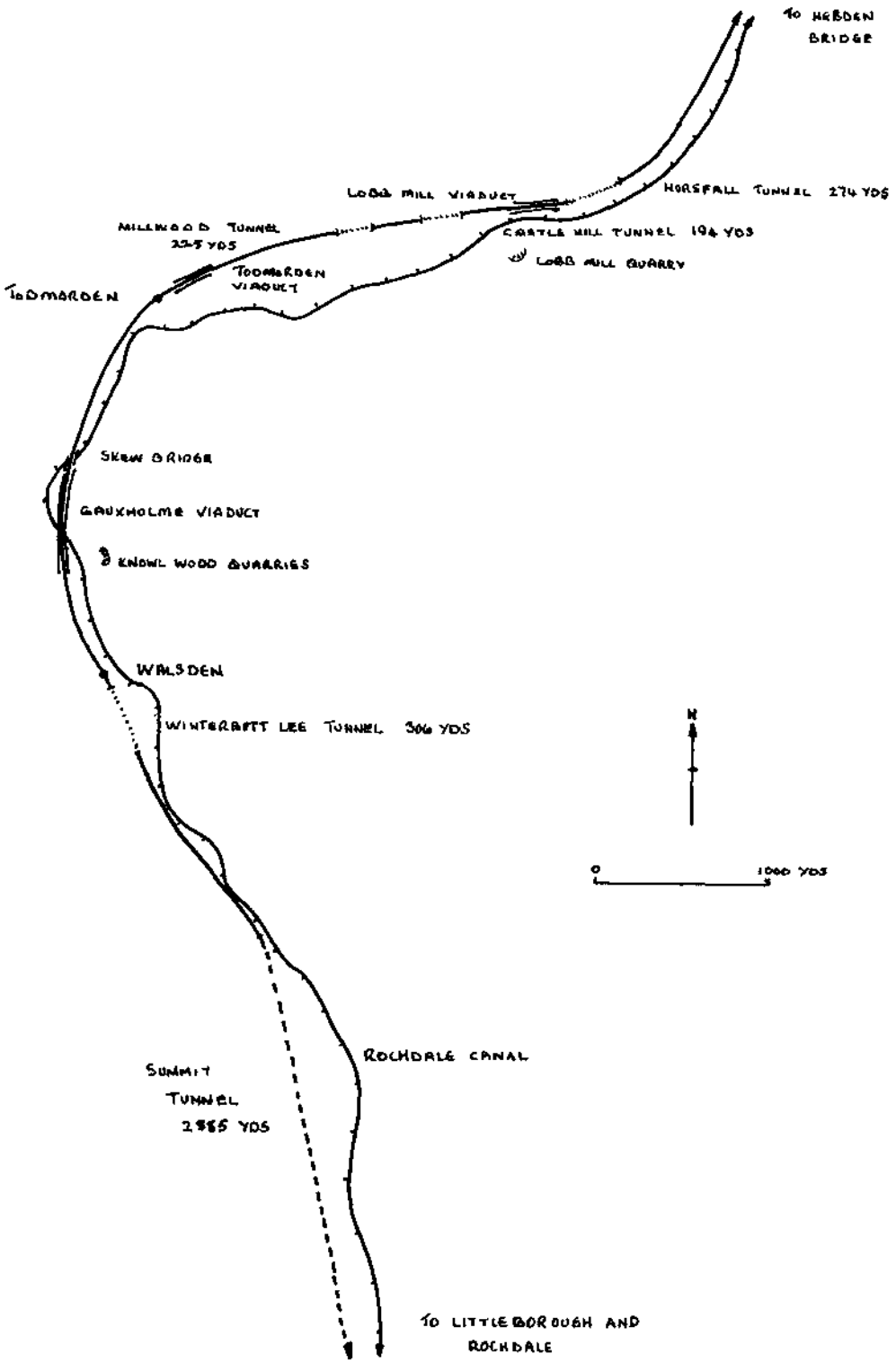
The Contract was awarded to Hiram, Craven & Sons for the tender of £63,000, on 25 June 1838. Between the beginning of October and the close of December 1840, Todmorden lay in a veritable no-man's land located on an unfinished section of railway stretching from Hebden Bridge to the eastern portal of the Summit Tunnel. This essay is concerned with the construction and early use of the line at Todmorden and its environs.

One of the first references to the section of line under consideration appeared in *The Railway Times*, 14 September 1839, being part of a report given by George Stephenson and Thomas Gooch (the M&LR Engineers) to an assembly of Directors:

> The works between the Summit Tunnel and Hebden Bridge... are comprised in the following contracts -
>
> Winterbutt Lee Contract: One half the earthwork, and nearly the whole of the masonry is complete; and the tunnel which is 275 yards in length, proceeding satisfactorily. [Refers to the Walsden Tunnel]. Gauxholme Viaduct: This work is very nearly finished, and is well-executed.
>
> Todmorden and Millwood Contracts: The principal features of these contracts are, a large embankment across the Burnley valley, a large iron bridge over the Rochdale Canal, and the Castle Hill Tunnel. The embankment consists of 364,000 cubic yards, of which 190,000 are already executed. The bridge is in progress, and is to be completed by May next. The Castle Hill Tunnel is proceeding favourably. Some slips



Ordnance Survey 1:1056. Plan of Todmorden station, 1849 (reduced)



The Manchester and Leeds Railway route c1845

have occurred in the cuttings, but as the material is required for the embankment, they are not of very great importance.

A further Engineer's report appeared in *Herapath's Railway Magazine*, 21 March 1840, and related to the progress which had by then been made:

> The portion of the line extending from the west end of the Summit Tunnel to Hebden Bridge, a distance of about 73/4 miles, contains the heaviest works, and those which will require the longest time to complete, comprising the Summit Tunnel and some smaller ones, as also several viaducts and some deep cuttings and embankments; and though the cuttings and embankments have been delayed, and some of the loose ground rendered troublesome by the very wet season, yet the viaducts and other masonry, from the exertions which were made during the dry weather in the early part of the year, are in a forward state.

Whilst work proceeded at a slow rate, the people of Todmorden were given a glimpse of things to come. The massive stone viaduct which now dominated the centre of the town had been completed and put into use, as the *Manchester Guardian* recorded, 23 May 1840:

> Thursday last witnessed the passing of the first waggon over the viaduct at Todmorden, the first stone of which was laid on the 21 February 1839. It consists of nine arches, seven of which are 60 feet span each and two of which 30 feet; the height from the surface of the turnpike road leading to Burnley to the level of the permanent rail is 54 feet 6 ins. The viaduct is built wholly of the best stone[1] for which the district is so justly celebrated; and its appearance is extremely noble and striking, reflecting great credit not only upon the engineer, but also upon the contractors, Messrs Hiram, Craven & Sons.

The same newspaper, 10 June 1840, under the banner "A Glance at the Leeds and Manchester Railway", and borrowing the piece from the *Bradford Observer*, described the scene near to Todmorden as seen by a press reporter:

> The shafts of the Summit Tunnel, perched along the mountain side, vomit from their throats the internal material, which is shot down the steep, and affords specimen of the varying structure of the strata. Above Gawksholme [sic], the turnpike road is elevated and altered, the canal is displaced, and the natural stream has been bedded and lined with masonry. An immense range of arch carries the railway above the village; whilst another range at Todmorden, where the rival roses divide their empire, is equally striking to the eye. Here the immense range of works belonging to Mr Fielden MP, distinguished by a lofty loop-holed chimney comes into sight. The railway passes behind the old hall where the Crossleys have resided for so many centuries.

Note the reversal of the cities in the title of the account, inferring that the reporter was a Yorkshire man, putting Leeds before Manchester.

On the 10 September 1840, Stephenson and Gooch at their Hunt's Bank railway office in Manchester, were able to announce that:

> The works between Littleborough and Hebden Bridge are in such a state of advancement as to enable us to report with great confidence, upon there being ready for opening the whole line during this year.

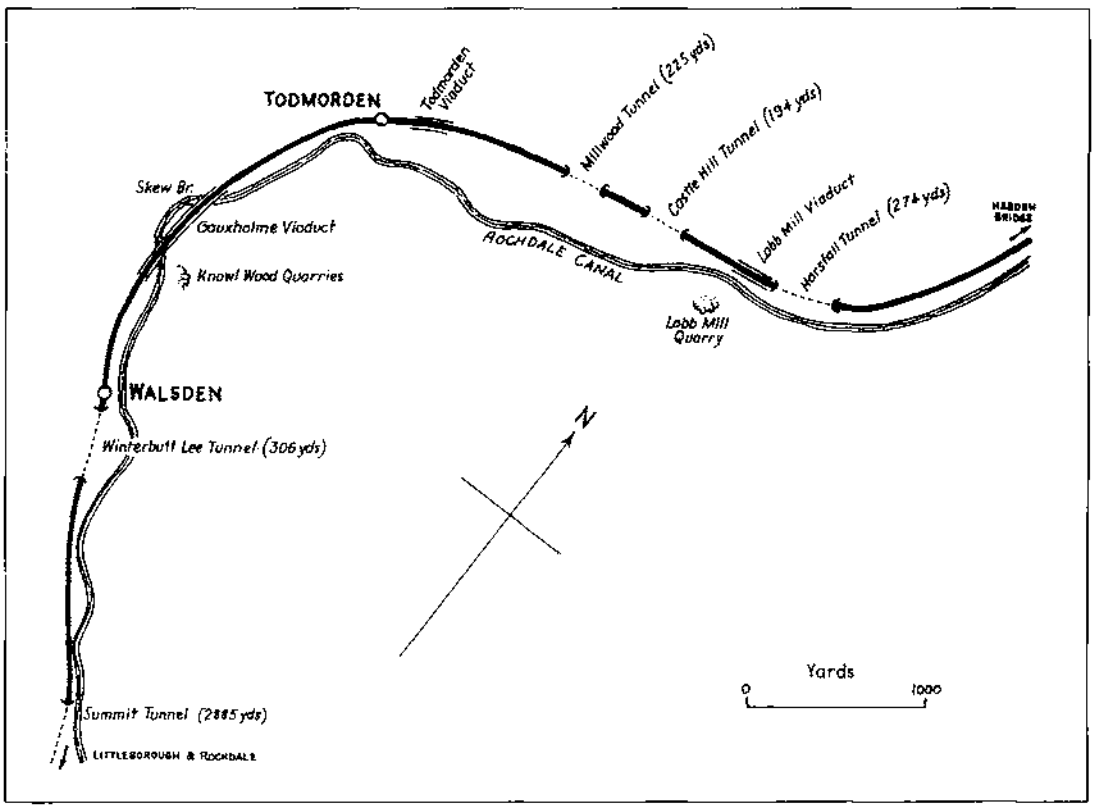
A great deal of emphasis was placed on the progress of the Summit Tunnel, but the engineers went on to state that,

> Much progress has been made at Todmorden, Millwood, Horsfall, and all the works on the other contracts upon this district of line, and our principal difficulties have been overcome.

The public opening of the line between Leeds and Hebden Bridge, which took place with great ceremony on Monday, 5 October 1840, no doubt prompted a sense of greater urgency towards the competition of the unfinished section. To bridge the gap between Littleborough and Hebden Bridge, it was necessary to employ railway-owned horse-drawn coaches which conveyed travellers over the uneven turnpike road.

First reports that the last brick had been laid at the Summit Tunnel on Wednesday, 9 December 1840 heralded the imminent opening of the line throughout. Such hopes that men had, however, were dashed by a report on the 19 December that a portion of the Tunnel had fallen in at the eastern end. Much to the dismay and chagrin of the Engineers and Directors, the Tunnel floor, or invert, had been forced upwards for a length of about 60 yards, an unexpected event which was to delay the opening of the line for a further two months while the invert was modified with heavier masonry.

This did not prevent the passage of an experimental trip from Manchester to Normanton taking place on Monday, 21 December, the passengers consisting of Directors and other interested parties. The upheaval in the Tunnel was inspected by the ensemble which was



The Manchester and Leeds Railway through the Todmorden area c1845

assured by the Engineers that the set-back was merely a temporary one. *Herapath's Magazine*, 2 January 1841, gave an abridged account from the *Manchester Guardian*, lucidly describing the journey on leaving the Tunnel, and worth recording in part:

> From the short tunnel [the one beyond the elliptical shaft] we emerged into a basement of natural mud, in which it had been found necessary to support the walls of the cutting for the line by piles driven into the soft silt. Shortly afterwards, the train entered Winterbut Lee Tunnel, which is about 300 yards in length, and thence kept the turnpike road on the right or east of the line to Clough Mill. The next great work approached on the line was the Gauxholme Viaduct and Bridge – a noble structure[2]. The line passes through Gauxholme, leaving the road to Bacup and the warehouses of the Rochdale Canal Company to the left or west. Over the Rochdale Canal the line passes by a splendid cast iron skew bridge, with handsome abutments of solid masonry[3]. This is believed to be the finest specimen of the skew bridge in the world. The span is 102 feet, and it crosses the canal at a height of 40 feet from the surface of the water, and at an angle of skew of 27 degrees. The corner of the pier on one side of the canal is only about 12 feet behind the line drawn across the canal from the corner of another pier. [At Todmorden] the line is carried on a viaduct of seven arches, and thus the scenery of the valley is more fully displayed to the traveller. The hilly nature of the country again compels the line to seek its way through the bowels of the earth; it passes through Millwood Tunnel, a distance of 220 yards, and the train emerges from this tunnel by a very handsome stone arch ...the line then continues by alternate cuttings and embankments to Horsfall Tunnel, which is about 270 yards in length.

On the 19 December 1840, *Herapath's Magazine* informed its readers of a proposal to build a branch line from Todmorden to Burnley:

> This scheme appears to us to be an exceedingly feasible one. At present there is no railway connection between Hull, Leeds and the Ribble, excepting passing a long way round through Manchester far out of the line to the south, and the large trading town of Blackburn, with a population of 27,000, is completely isolated. The proposed line will start from Todmorden, just where the Manchester and Leeds Railway begins to dip rapidly to the south, and pursue an almost direct course to Blackburn to Preston...

Of which more anon.

The Railway Times, 6 March 1841, cheerfully announced the opening of the line throughout, which had officially taken place five days before, concluding its report with the news that:

> The regular passenger and goods trains commenced running at an early hour and several passed through the tunnel [the Summit Tunnel] before the half past nine o'clock special train.

The first public timetable indicated that 'On and after Monday, 1 March 1841, the trains will depart from the respective stations as shown in this table', twenty miles from Manchester, 'Todmorden for Burnley, etc.' station was served by nine trains either way on weekdays, with three trains on Sundays. The M&LR had, as early as September 1839, decided to run trains on the Sabbath despite the prevailing censorious stance of the Sabbatarian movement. The appellation 'Todmorden for Burnley' was somewhat premature since, of course, no railway

existed between the two towns. A service of six stage coaches plied between Todmorden and Burnley in April 1845, according to Captain Laws, the M&LR General Manager

References to Todmorden for Burnley station are few during the 1840s. The following appeared as a contract advert in the *Manchester Guardian*:

> 5 July 1843 – Contract for the erection of sheds and warehousing. The Directors of the Manchester & Leeds Railway will meet at their offices at the Oldham Road station, Manchester, on Monday the 10 July next to receive tenders for the erection of a warehouse at Todmorden station.

Passengers who wished to travel from Todmorden station from the first days of the operating railway bought their tickets in a room in the adjacent White Hart public house, and having done so, reached the level of the rails by way of a wooden staircase which led upwards from street level. Passengers alighting at Todmorden left the station by the same means. The nearby Queen's Hotel was connected to the station by a covered pedestrian walkway which enabled travellers to pass from the station to the hotel dining area in safety. In this respect, Todmorden could boast that it was a victualling point equalling the convenience of Normanton station, which served a similar function. The Queen's Hotel was a 'compensation building', erected at the insistence of Todmorden's town guardians at the M&LR's expense in compensation for the disruption that the railway had wrought on the town.

A further contract advert appeared in the same newspaper:

> 30 September 1843 – Contract for the erection of station and dwelling house. The Directors meet at their offices, Oldham Road, Manchester, on Monday, 9 October next for the purpose of receiving tenders for the erection of a station and dwelling house at Todmorden, to be built of parrpoint stone[4].

At a Half Yearly meeting held in Manchester on the 14 March 1844 it was announced that 'Arrangements have been made at Todmorden (where the Directors had long been opposed by local authorities) for a permanent station, in the construction of which considerable progress has been made'.

It was not until 1844 that the Company projected a line via the Cliviger Gorge to Burnley, leaving the main line at Todmorden east of the station, and entering Burnley at Thorneybank station. Todmorden might have remained a relatively minor stopping place had it not been for the construction of the Burnley Branch which, when completed, conferred a junction status on the town. The report for the Select Committee on the proposed Burnley Branch Bill outlined the reason for which the line was needed:

> That the present means of conveyance and communication between the termini of the proposed branch are insufficient for those agricultural, commercial, manufacturing, or other purposes which the proposed branch railway is calculated to serve. That the existing traffic between the immediate termini is very considerable, and there exists a large traffic in passengers, goods, and agricultural produce, between the district travelled by the proposed branch and Manchester and Liverpool, and places south of those towns on the one hand, and the various other towns in Yorkshire, and the Midland Counties on the other.

The Manchester & Leeds Act for the Burnley Branch was authorised on 30 June 1845, planned as a single line, and not completed until two years elapsed after the formation of the Lancashire & Yorkshire Railway. The Branch left the main line about three chains

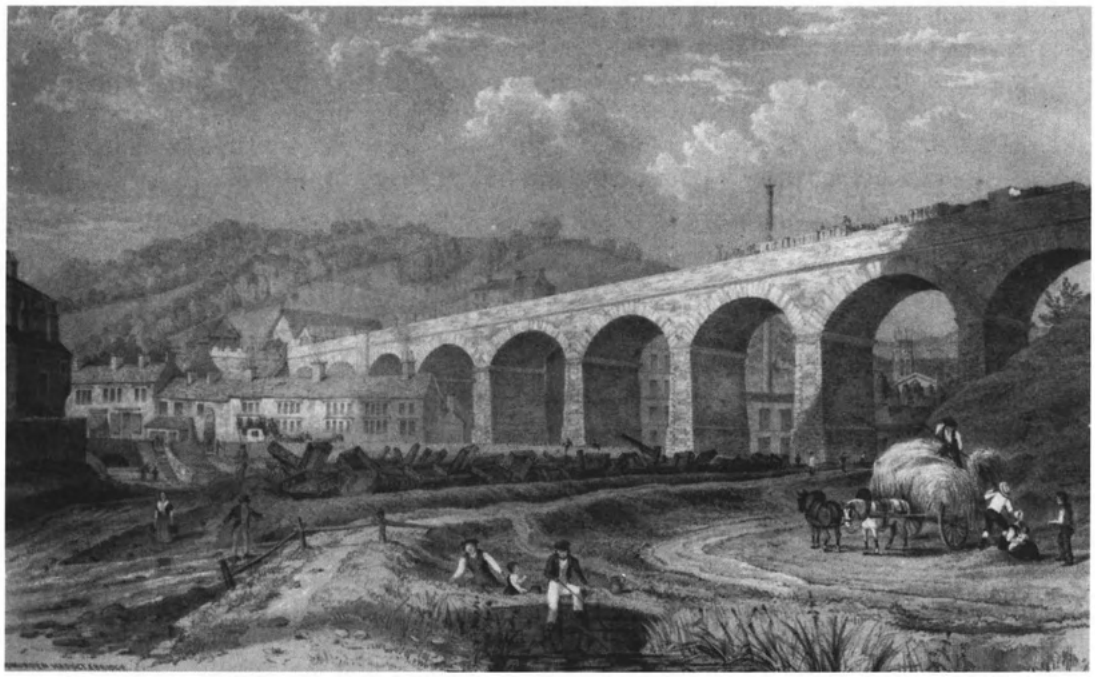
east of the viaduct and entered a ten chains radius curve which passed over a road on the level, described at the time as being 'in the township of Stansfield'. The road was designated 'road number 56' (as portrayed on a plan) and reasons were given in 'Resolutions to the Standing Committee', reported in *The Railway Times*, 10 May 1845, as to why a bridge had not been built:

> With respect to the first road numbered 57 in Stansfield, the present road is so very steep that to raise it and pass it over the railway by a bridge would make it steeper that it is at present; by passing on the level the principal inclination of the part affected (namely 1 in 6) will be maintained, and the remaining inclination improved. The road is not much more than a foot and cattle road, and is of little consequence.

A paragraph in the engineer's report, given by John Hawkshaw who had taken the office of chief engineer in 1845, quoted *The Railway Record*, 13 March 1847, summarised the Company's intention to double the line in the future:

> In accordance with the instructions of the Directors, the works on this branch – originally designed for one – are now proceeding with sufficient dimensions for the two lines of way... At least nine months will be necessary to complete it[5].

It appears that few accidents accompanied the undertaking of the Todmorden Contract, a surprising circumstance bearing in mind the terrain involved and the number of difficult engineering works. By contrast, the incidence of accidents had been high on the Summit Tunnel Contract which had been a daunting task for both the contractors and rank and file workers. Elsewhere, there had been viaduct collapses: at Wakefield, November 1838,



Approach to Todmorden. From the engraving "Views on the Manchester & Leeds Railway", from the author's collection

Manchester (the Manchester Viaduct) in October 1842. Isolated fatalities and injuries caused by carelessness, or unforeseen incidents occasioned by roof falls, rock falls, earth slips, and mechanical failure of plant and equipment. All part of a day's work the navvy on the job would probably averred. One example will suffice to illustrate the nature of such incidents. The *Manchester Guardian*, 18 May 1839, reported that,

> On Friday evening, a shocking accident occurred at the excavation for the tunnel of the Manchester and Leeds Railway in Walsden, near Todmorden. A large quantity of stone came suddenly loosened and fell upon five workmen. One of them was killed on the spot and the others seriously injured.

Serious accidents which occurred on the operating railway involved either servants of the Company or the public, or both. It could be argued that Company servants should have known better than to ride on wagon buffers of a moving train, or to stand on the running boards of carriages while collecting tickets. But this they did, the former an act of complete indifference to danger, the latter an accepted method of carrying out the job. The public regarded the railway as a blessing, a means of mobility hitherto unknown. Yet to temper this eager acceptance of the railway, some members of the public failed to realise the weight of power of the steam locomotive.

Accidents to young and old, caused by genuine innocence were legion. Not so an accident reported by *The Railway Times*, 30 April 1842:

> On Tuesday week, an accident which had nearly been of serious moment, occurred on the Manchester and Leeds line near Todmorden. No blame whatever can be attached to the servants of the Company for the accident was occasioned in opposition to the remonstrances of the officer of the line, by the obstinacy of two young men who opened the gates of an accommodation road across the level of the line, and drove cattle upon it at the time when a passenger train was coming up. One cow was killed and another injured; and on Thursday Mr Forrester, the Inspector of the Line, took out a warrant against the parties for the offence. Their names are George Halstead and Henry Horsfall; the former a gamekeeper and the latter a labourer in Stansfield. The offence with which they are charged is under Lord Seymour's Act for wilfully obstructing the free passage of the train.

Mechanical failure also contributed to the cause of mishaps. *The Railway Times* again, 20 January 1844:

> As the luggage train, which left Manchester for Leeds on Monday evening last at 12 o'clock, there being one engine in front and another behind, when approaching Gauxholme, near Todmorden, one of the waggon wheels broke overthrew the waggon containing pigs; five of them were killed on the spot and other seriously injured. The owner of the pigs is from Mirfield, in Yorkshire, and was dangerously hurt.

Todmorden station is now operated by the West Yorkshire Transport Executive (Metro Train) and is served by Northern Spirit and North Western Trains. From Monday to Saturday, the station handles 33 Up trains (to Manchester) and 31 Down trains (to Leeds). As a manned station, it is far from moribund. The Up platform buildings of L&YR vintage accommodate the ticket office and waiting room, and also served as the base for the Todmorden Steam Trust which has, through a number of schemes, ensured that the railway heritage of the town is maintained. Over 150 years of railway presence in Todmorden is set to continue, forging a link with the pioneering days of the Manchester & Leeds Railway.

Notes

1 Most of the stone for the Todmorden Viaduct is reputed to have been extracted from Lobb Quarry, to the east of the town.

2 Most of the stone for the Gauxholme Viaduct was derived from Knowl Wood Quarries, above the district of Gauxholme.

3 The stone for the piers of the skew bridge also came from Lobb Quarry.

4 Parrpoint stone was quarried at Brighouse and was used in the erection of the Hunt's Bank offices, Manchester, in various sections of the Summit Tunnel, and other structures. It was a fine-grained, sand-coloured rock, very attractive in appearance.

5 The Burnley Branch was, in fact, completed and opened for traffic on the 12 November 1849, two years after the M&LR had changed its name to the L&YR. Doubling of the Branch was to be completed by 1860.

An Analysis of Proposed Routes for the London and Brighton Railway Line[1]

BY PETER S RICHARDS

Before any railway line could be built its construction had to be authorised by Parliament. The success of the Stockton and Darlington Railway inspired the building of many other railway lines. Stephenson's 'Rocket' proved the possibilities of the steam locomotive and this, too, encouraged the building of railways. So many railway lines were built during the years 1845 – 1861 that this period is known as 'The Railway Mania'. This paper attempts to analyse the proposed routes for a railway between London and Brighton and see why the final one was chosen.

There were many proposed routes, but four only merited serious consideration for a line joining London and Brighton:

1. Sir John Rennie's Direct Line
2. Mr Stephenson's Line
3. Mr Gibbs's Line
4. The South Eastern Line

A consulting engineer, Captain Robert Alderson RE was appointed to choose the most favourable line from those proposed. He had to balance the costs of buying land, the physical nature of the land and the economic advantages of linking certain towns. The engineer doing this analysis claimed to have read carefully the evidence given to the

Committee [presumably a sub-committee of the House of Commons] and attentively compared the several plans and sections submitted to him. He also took a general survey of the 'sites' of the different lines, examining more attentively those portions where important works were proposed.

He described and commented upon each of the four main submissions.

The nature of the task

The chief problem was whether the 'natural' route running west of Forest Ridges through Horsham and down the valley of the river Adur to Shoreham and eastwards along the coast to Brighton should be used or the shorter 'distance' route with several tunnels.[2]

The Proposals:

The first proposal for a route connecting London to the already famous seaside resort of Brighton came from William James. In 1823 he published a pamphlet advocating the building of a horse operated line from Waterloo Bridge to Brighton and Shoreham, but nothing came of it. The idea of building a railway line linking London and Brighton was first seriously discussed in 1825, when a Company retained Sir John Rennie to survey a possible route. No concrete steps were taken until ten years later by which time no less than six rival lines had been projected, but only four of these, apparently, were submitted to Parliament.

There was some opposition to the building of this line from the proprietors of mail coaches and landowners whose property was to be intersected by the line. Violent disagreements existed amongst the supporters of the railway themselves as to which was the best route for this line to take. Of the six companies promoted to construct this line between London and Brighton, one of them, the Vignoles line, was not a serious competitor. Gundy produced a scheme similar to Stephenson who accused him of stealing his plans.

Rennie's first proposed line of 1825 was extremely ambitious: a railway from London to Bristol via Brighton, Southampton, Salisbury, Westbury and Bath. A properly constituted company was formed: The Surrey, Sussex, Hants, Wilts and Somerset Railway. According to the prospectus the whole cost was not to exceed £650,000. This was remarkably low for such an ambitious scheme and it is not surprising it never materialised. It attracted much attention but sufficient capital was not forthcoming and it collapsed because of lack of support and it was thought to be impossible.[3]

Sir John Rennie's earlier line was re-surveyed in 1833 and the plans duly deposited.[4]

The ambitious scheme, outlined in the previous paragraph had two connections with these proposals for a railway line between London and Brighton. The directors were the same in both cases and Rennie's route of 1825, the direct line, as far as Brighton was very similar to the schemes of 1833 and 1836/37 via Croydon, Merstham, Haywards Heath and Hassocks. Sir John Rennie was assisted by Mr Rastrick and as its name suggests, the proposed line was the shortest, 47.5 miles. It adopted the Greenwich Railway terminus at London Bridge and then would use the railway communication already sanctioned and under construction as far as Croydon and go from its junction with the Croydon Railway, near Croydon, to Church Street, Brighton, near the centre of the town, via Merstham. Balcombe, Haywards Heath, and Clayton, involving five miles of

tunnels. This line needed no inclines between Croydon and Brighton or on its branches; but there would be one on the Croydon railway which it was proposed to work by an assistant (banking) locomotive engine (as opposed to a stationary one and rope).

Palmer's project of the same year was vastly different. The motive power would be by a system of sails; the cars would be suspended on an elevated central line, on the monorail principle. The uncertainty of the wind meant the idea was impracticable and never got off the ground[5]. It was to run from a junction with the South Eastern Railway south of Oxted to Lewes and thence to Brighton. His proposed route was eventually adopted by the South Eastern Railway, inevitably with a different motive power, namely, locomotives.[6]

Not surprisingly, considering Stephenson's reputation, his line was eventually considered, from the engineering point of view, as preferable to any of the others. His route would have followed the valleys of the river Adur and the river Mole and so avoided the heavy cuttings involved in climbing the chalk ridges of the North and South Downs. Except for two short tunnels, one at Epsom, through the London Clay and the other at Dorking through indurated sand and sandstone, there were only such ordinary difficulties to contend with as are necessary consequent on undertaking similar in nature and extent.

His proposed line had no planes (very severe gradients) which would require to be worked by assistant engines, either stationary or locomotive. For this line Mr Stephenson adopted the terminus of the London and Southampton Railway at Nine Elms, near Vauxhall Bridge, (eventually this line was to be extended to Waterloo) with a depot on the banks of the Thames, branching from this line at Wimbledon Common, five and a half miles from the terminus, and lead to the depot in the parish of Hove, with a further extension of forty-four yards into the parish of Brighton. It would take an easterly course by way of Leatherhead, Dorking, Horsham and Shoreham and make use of the valleys of the Mole and Adur as stated earlier. Although its length was fifty-five miles it would involve only one mile of tunnelling. One of the unfortunate features of this line was the fact it did not go far into the heart of London.

Mr Gibbs's proposed line would also go from the Greenwich Railway's terminus at London Bridge, and use the line already sanctioned and under construction as far as Croydon; it would then go from its junction with the Croydon Railway to North Street Brighton. Again there would not be any planes on this line which would be required to be worked by an assistant engine, either stationary or locomotive, but it would adopt the Croydon Railway line described above.

The South-Eastern Line of the South-eastern, Brighton, Lewes and Newhaven Railway, would have its terminus at London Bridge and use the line under construction as far as Croydon; it would also use twelve miles of the Dover Railway as far as Oxted, nineteen miles south of London, to near Dorset Gardens in Brighton. On this line, too, there would be no planes which would have to be worked by an assistant engine, either stationary or locomotive. It would, however, adopt the Croydon Railway as its outlet and there would be the plane noted above.

Four bills, advocating all these routes, except those of Palmer & Vignoles, were put forward to Parliament and they were referred to a Parliamentary Committee which had been instructed to make a special report:

> 'on the engineering problems of the four competing lines to determine which to

send back for the purpose of having the landowners heard and their claims settled.'

The engineer's report considered the terrain of the various lines with reference to the accommodation they would afford to the Metropolis at one end and Brighton at the other. One problem did not have to be considered. Each of the proposed lines would avail itself of a terminus which had already been built, or for which an Act of parliament sanctioning its construction had already been obtained. He argued that if one took the Middlesex side of Blackfriars as a centre, and described concentric circles with a radius of one, one and a half and two miles thus including with in the last an area of over twelve [square ?] miles of the densest population of the world with the exception of Nine Elms, which was two miles outside the outermost circle, the proposed terminus at London Bridge was very near the centre of the circles. Thus he fairly inferred that Stephenson's London terminus was not so conveniently situated as that of the other lines, particularly for an extensive passenger traffic, as that of any line connecting Brighton with the Metropolis was sure to provide. But matters were not so simple. The Greenwich Railway was built on a viaduct sufficiently wide for a double track and the Engineer thought that the accommodation would be insufficient for the proposed increase of traffic, especially as on this line trains would start every quarter of an hour.

The Greenwich Railway Company, however, owned enough ground on each side to enable the viaduct to be widened to meet the probable increase of traffic and estimates had been obtained for the cost of this work to be carried out as soon as possible.

There was, however, an important objection to any new line adopting either side of the Southampton terminus (Nine Elms), namely, the necessity of limiting the distance between its rails to the width already laid down.

At Brighton, Stephenson's line, as in London, stopped at the western end of the town, at Chalybeate Street which would be very inconvenient for passengers. In addition one of the advantages of connecting Shoreham with Brighton was the supply of cheaper coal than formerly; it was important to bring it as far as possible into the town. Much seaborne coal came into Shoreham, and once a new gasworks was built at Brighton the demand for coal increased, and a basin and coal depot was provided at Shoreham.[7]

Gibbs's line, which would enter nearly at the same point as Stephenson's did, was planned, however, to extend its terminus further into the town and thus would be better than his.

The South-Eastern on the other hand would enter Brighton at the north-eastern part of the town, at Carlton Hill, and nearly as much to the eastward as Stephenson's was to the westward, and, could not therefore without great additional expense put a branch to Shoreham. This was equally true for Stephenson's and Gibbs's lines, with reference to the Lewes and Newhaven branches.

The Decision of the Parliamentary Committee came on the 25th April 1837.[8] The report of the Engineer was considered and the following points were made:

Stephenson's line both at London and Brighton, was inconvenient to the public. It was circuitous and several miles longer than the others which were under consideration. Thus the journey would have taken up more time and the engines consumed more fuel. Neither did it afford facilities for communication with the harbour of Newhaven, the town of Lewes and the eastern parts of Surrey and Sussex. This committee could not

recommend the House to sanction it, despite its superiority from an engineering point of view.

The Members of the Committee had nothing to say about Mr Gibbs's line and the South-Eastern line, except to reject them.

With the Direct Line of Sir John Rennie and Mr Rastrick, the case was made to the satisfaction of the Committee and it recommended the House of Commons to adopt it. They were prepared to meet the objectors to this line. It was shorter and it was claimed could be travelled at less expense to the public (Fares were fixed on a mileage basis) and the termini were central and convenient to the public. It would interfere with little ornamental property. The nature of the soil through which it would pass was favourable to the construction of earthworks. It would connect the ports of Shoreham and Newhaven and the town of Lewes with Brighton and the Metropolis. It would run through the centre of Surrey and Sussex, and would afford great facilities of communication both east and west. It was claimed to have much support from Brightonians and finally there was no appreciable difference between the gradients of the Direct and any other of the projected lines. The Committee felt no hesitation in recommending the House to send back the Direct Line for the purpose of having the landowners' cases proceeded with, and the clauses settled.[9] But this was on the second attempt. All the proposals were rejected in 1835 and they reappeared in 1836. There was some hard hitting between Stephenson and Sir John Rennie. Rennie's counsel said that Stephenson preferred Shoreham to Brighton and coals to passengers. Sergeant Merewether waxed lyrical on the impossibility of crossing the Downs by the 'direct' route. Like so many Bills from Liberal Governments in the nineteenth century the bill was passed by the Commons but rejected by the Lords. (The same had happened to the bills to authorise the construction of the London and Birmingham Railway).[10]

This, however, was not the end of the matter. Although Stephenson's projected line was longer than Rennie's it would be much less costly. In 1837 the contestants came back for another round and this time Capt. R E Alderson RE was there in person. Though well disposed to Stephenson's route he finally found favour with Rennie's, which had been resurveyed in the meanwhile. Meanwhile the rivals had already sunk their differences and apportioned the authorized share issue among themselves. Stephenson's company got almost as good terms as Rennie's who complained that his plans had been submitted behind his back to Stephenson – 'whom I do not consider a proper judge of these plans' – and disappeared from the scene.

The London and Brighton Railway was incorporated by an Act of 15 July 1837 to build a line from a junction with the London and Croydon 'at or near Selhurst Farm' (south of Norwood Junction Station), to Brighton, with branches from there to Shoreham, and to Newhaven and Lewes. The engineer was John Urpeth Rastrick; work on constructing the line started in July 1838; the ceremonial opening as far as Brighton took place on Tuesday 21st September 1841, and public traffic began the same day.

The final line was boldly planned and well laid out, striking directly southward across the grain of the Weald. A switchback profile with three gable summits, five tunnels and numerous earthworks resulted in surprisingly modest gradients of 1 in 1264 for the most part, and an absence of sharp curves. From Norwood there is a seven mile rise at 1 in 264 towards the Merstham Gap in the crest of the North Downs. Use is made of the deep dry valley in which South Croydon and Purley are laid out. Beyond Coulsdon South (15.5 miles from London Bridge there is a long cutting through the chalk before Mersham

Tunnel 1,831 yards) is reached. Then follows 1.25 miles of down grade, again at 1 in 264, over the Vale of Holmesdale, through a gap in the Greensand Ridge (where Redhill later grew up) and out onto the level Weald Clay plain. Shortly before Horley the line begins its 7.5 mile climb at the usual 1 in 264 to the next summit at Balcombe Tunnel (1,141 yards). The descent is 8.5 miles long, which brings the line to a point just short of Wivelsfield station (40.5 miles from London Bridge). Between Balcombe and Haywards Heath the wide Ouse Valley is crossed by the 37 arched Ouse Viaduct, with a maximum height of 100 feet. One final gable summit occupies the remaining 11.5 miles, by which the line negotiates the South Downs. The crest is pierced by Clayton Tunnel, 2,259 yards and up to 230 ft. below the surface. Notable features of the tunnel are the classic Gothic entrances built of white brick and Caen stone.[11] No figure has been found, but obviously much money had been spent in getting Parliamentary sanction for the construction of this line, as with others[12] before even a square yard of land was bought.

REFERENCES

1 Based on a report, 1837, by Captain Robert Alderson RE, Military Engineer, appointed in pursuance of an address of the House of Commons to his Majesty (King William IV). The Instruction came from His Majesty's Secretary of State for the Home Department. *Mechanics' Magazine, Museum, Register, Journal and Gazette* pp 219 – 223.

2 Gilbert, E.W., 1949, 'The Growth of Brighton', *Geographical Journal* Vol. CXIV, p. 42

3 Long, M.F., 1909, 'The Genesis of the London, Brighton and South Coast Railway', *Railway Magazine*, No 24, 394.

4 Long M.F., *Railway Magazine* No 24, p399; DALE, A., 1944, 'The Construction of the London to Brighton Railway', *Sussex County Magazine* No. 8., 395.

5 Long M.F., *Railway Magazine* No. 24, pp.392

6 Ibid Long M.F., *Railway Magazine* no. 24 pp. 399.

7 Brookfield, H.C., 1955, 'Three Sussex Ports', *Journal of Transport History*, Vol. II, No. 1, p. 39.

8 Anon, 1837, 'Report from the Committee on the London and Brighton Railway Bill', *The Mechanics' Magazine, Museum, Register, Journal and Gazette*, No 721 June, p.142.

9 Ibid, p. 143.

10 Richards, Peter S., 1965, 'The Struggle to Obtain Parliamentary Sanction for the Building of the London and Birmingham Railway Line', *Journal of the Stephenson Locomotive Society*, Vol. XLI, No. 484 November pp 318 – 322.

11 Long M.F., *Railway Magazine* No. 24.

12 Richards P.S. Ibid.

How a Canal almost came to Ludlow

BY BRYAN HEATLEY

Canal mania was at its peak in 1793 when decisions were made which, if implemented, would have brought a canal to Ludlow. Already the new waterways existed in the newly industrialised areas and by this date several rural canals were planned.

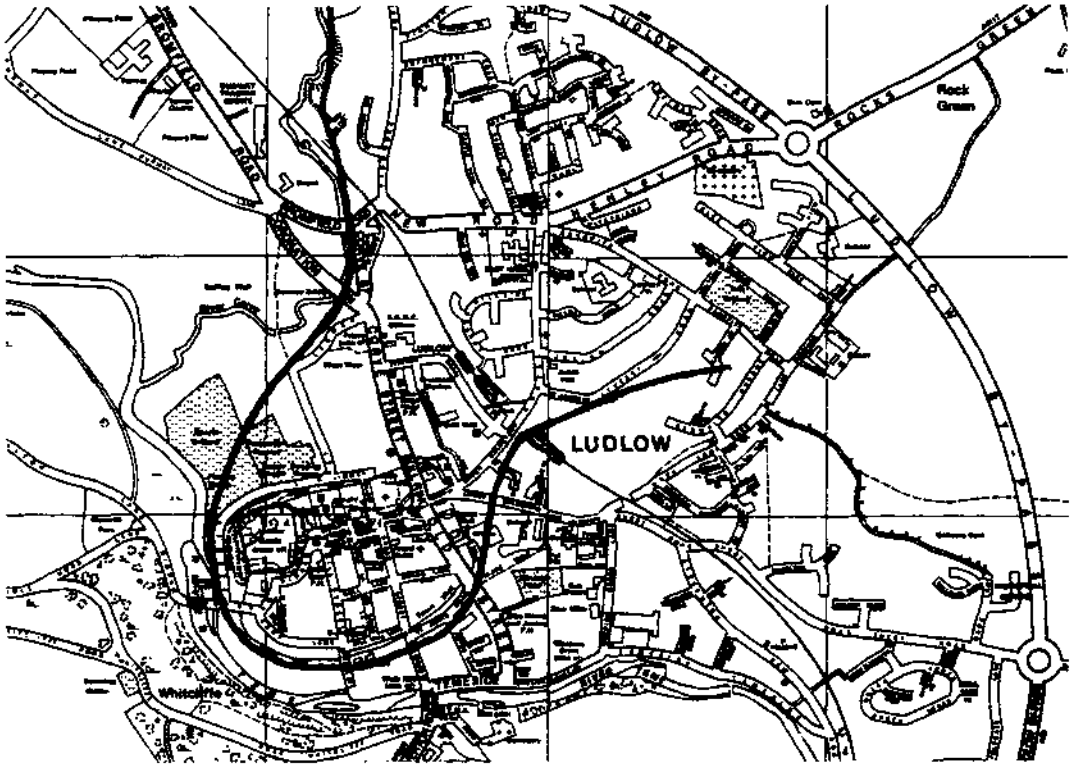
The reason for the wild enthusiasm for this new means of transport was effectively the low resistance of water. A pack-horse could move, perhaps, one eighth of a ton. The same animal could move five-eighths of a ton by stage wagon on soft roads, but 30 tons by river barge and as much as 50 tones when dragging a narrow boat along a canal with no current. It is clear that the advent of the inland canals was indeed a transport revolution.

In the Ludlow area there were major transport problems. Coal was expensive because of the distance it had to be moved to the town. The long established forge at Bringewood on the Teme, close to where Downton Castle now stands, was moving iron by pack-horse but when it progressed to the production of tin plate this form of transport proved unsatisfactory as the material arrived at its destination damaged. The manufacture of plate was moved to Stourport where the river allowed smoother transit. The turnpike roads were not to exist for some years: it appeared that there was a clear need for a canal.

Then, in 1777, one Robert Whitworth reported to certain gentlemen of Herefordshire that he proposed a canal from 'somewhere near Bridgnorth and through several collieries in that country and down the Corve Dale for some distance, and then over the country to the extremity of Herefordshire near Leintwardine'. He goes on to comment on the expense of bringing the canal from Corve Dale to Leintwardine, saying that he feels that if the cost was excessive the line could 'be brought with the greatest of ease down to Ludlow, and from thence to the proposed line (of the projected Leominster canal) from Stourport, near Orleton'.

The people of Leominster had long been interested in water transport. A plan using flash locks to make navigable the River Lugg to its confluence with the Wye had been attempted in 1714 but the engineer, a Mr. Chinn, carried out his work 'so improperly, ignorant and unskilfully' that the undertaking proved abortive. He absconded and his security was obliged to refund a great part of the money. He did not build proper locks but put in flood gates at bridges. The remains of some of these gates may be seen today. Chinn built a basin and wharf at Eton Bridge. The bells from Leominster Priory were taken to Chepstow via the Lugg for re-casting and subsequently returned 'when increased to eight' by the same route.

In 1791 William Faden of Charing Cross published a map showing the line of the proposed Kington, Leominster and Stourport canal (otherwise referred to as the Leominster) with a branch heading NW from the southern part of Leominster to Leintwardine and crossing the Lugg just SE of Mortimers Cross. Why Leintwardine features in two canal proposals is not clear. Perhaps it was to tap the traffic generated by the Bringewood forge, or to connect with the Teme which itself had been a candidate to be made navigable. Efforts to improve such a fast flowing and shallow stream would have been fruitless, although the eighteenth century was a time for making waterways



The route for the proposed Ludlow Canal – forming a loop just outside, and three-quarters of the way around the town hall

navigable. (A major work, carried out by Dutch engineers, was the canalisation of the Dee to the West of Chester).

Canals in the Marches were built. There was the Montgomeryshire, the Kington, Leominster and Stourport, and the Hereford and Gloucester. The closest to Ludlow, the Leominster, never reached any of the three towns mentioned in its title but an eighteen mile stretch was constructed and used between a point one mile north of Leominster and a wharf near Mamble, a short distance from Newnham Bridge. The opening of this canal was marked by the movement of coal in boats, built by a Mr. Bird at Tenbury, to Wooferton. Freight expected to bring revenue to the new canal included coal, grain, cider, timber and Leominster 'ore' (wool). On the Montgomeryshire the traffic was also of an agricultural nature, the bulk being limestone from the quarries south of Oswestry to be converted to lime and spread on the fields The new iron founding industries had made available cheap ploughs and tools which gave the farmers confidence to improve their land to achieve a greater yield for the increasing population.

A reprint of the surveyor's fine plan for Leominster is currently available. Its line can still be traced and a walk about some of the remaining structures proves rewarding. The three span aqueduct in Little Hereford is impressive although it was in part demolished early in the 1939–45 war. Another major brick aqueduct exists near Newnham Bridge; some grandiose embankments can be seen and a few canal bridges remain including one at

Easton Court. Wharf House on the A49 north of Leominster still stands, although much modified. This was the terminus of the canal. At the eastern end of navigation the southern portal of the never used but partially collapsed Southnet tunnel remains.

The engineer for the Leominster was James Dadford Junior. His father had been principal assistant to that great early builder, Brindley. Young Dadford surveyed the route for a canal to join the Leominster canal in Montgomeryshire and on 11 November 1793 deposited a plan with the Justices of the Peace of Salop. It included a list of landowners and occupiers 'of the lands through which the canal is intended to be made from Garthmyl in the County of Montgomery to the aqueduct carrying Leominster canal over the river Teme south of Ludlow in the county of Hereford'. It also included a table showing the rise and fall of the canal.

The planned route was as follows:– Garthmyl (or Garthmill) – River Severn at Cae Howell – Turnpike at Stalloe – Stepping Stones – Churchstoke – Bishops Castle – Snead Church – A tunnel at Lydham Heath – the Bishops Castle to Ludlow road at Stank Lane – Brockton – Red House – Little Brompton – Long Meadow End – Common Field at Newton – Onibury – Bromfield – Ludlow – Steventon – Ashford Carbonel – Wooferton – Little Hereford.

The total distance was to have been 3226 chains and 95 links (a little over 40.33 miles). The rise in height from Garthmyl near Montgomery to Lydham Heath near Bishops Castle was to have been 298 feet. The summit level would have stretched from the proposed tunnel at Lydham to Brocton (1.5 miles south of Bishops Castle), a distance of just 3 miles 286 yards. It is not known from where the summit level would have drawn water. The stretch of just over 22 miles from Brocton to the Leominster at the Little Hereford aqueduct was planned with a fall of 349 feet. Such a total rise and fall would have required the construction of some 80 locks! Dadford's plan does not indicate precisely where these were intended. The cost estimated by the surveyor was £140,000 and the annual tonnage was forecast to be 9,000. Comparative costs for other canals were:–

Loughborough Navigation (1776–8) 9.25 miles for £9,200, i.e. £994.6/mile

Leicester (1791–4) 18 miles for £91,500, i.e. £5083.3/mile

Bishops Castle/Ludlow estimate (1793) 40.33 miles for £140,000, i.e. £3471.4/mile

Dadford's original estimate for the Leominster was £83,000 in respect of the 31 mile canal from Leominster to Stourport, an average of £2,677.4/mile. Although inflation in 1791 was about 10% per annum it can be seen that this was totally unrealistic, especially as the eighteen miles completed was the least difficult engineering task of the planned 31 miles. Both the Leominster and the proposed line through Ludlow were highly speculative agricultural canals. The Bishops Castle/Ludlow estimate seems extremely low when compared with the actual cost of the constructed Leominster. Expenditure would also have been influenced by the number of locks; 16 in the 18 miles of the Leominster compared to 80 for the 40 miles of the proposed Bishops Castle/Ludlow.

It appears that the canal would have entered Ludlow from Bromfield and then was to have squeezed between the walls of the castle and the Teme, continuing across Broad Street just below the Broadgate and to have left the town via Old Street for Steventon and Ashford Carbonel. Had it been built and remained to this day then Ludlow would have been a very different place: perhaps even more attractive!

On the 11th September 1793 it was reported in the Hereford Journal 'that application is to be made to Parliament in the next session for leave to bring a Bill for making a navigable canal from the Montgomeryshire Canal to the Leominster Canal'. The

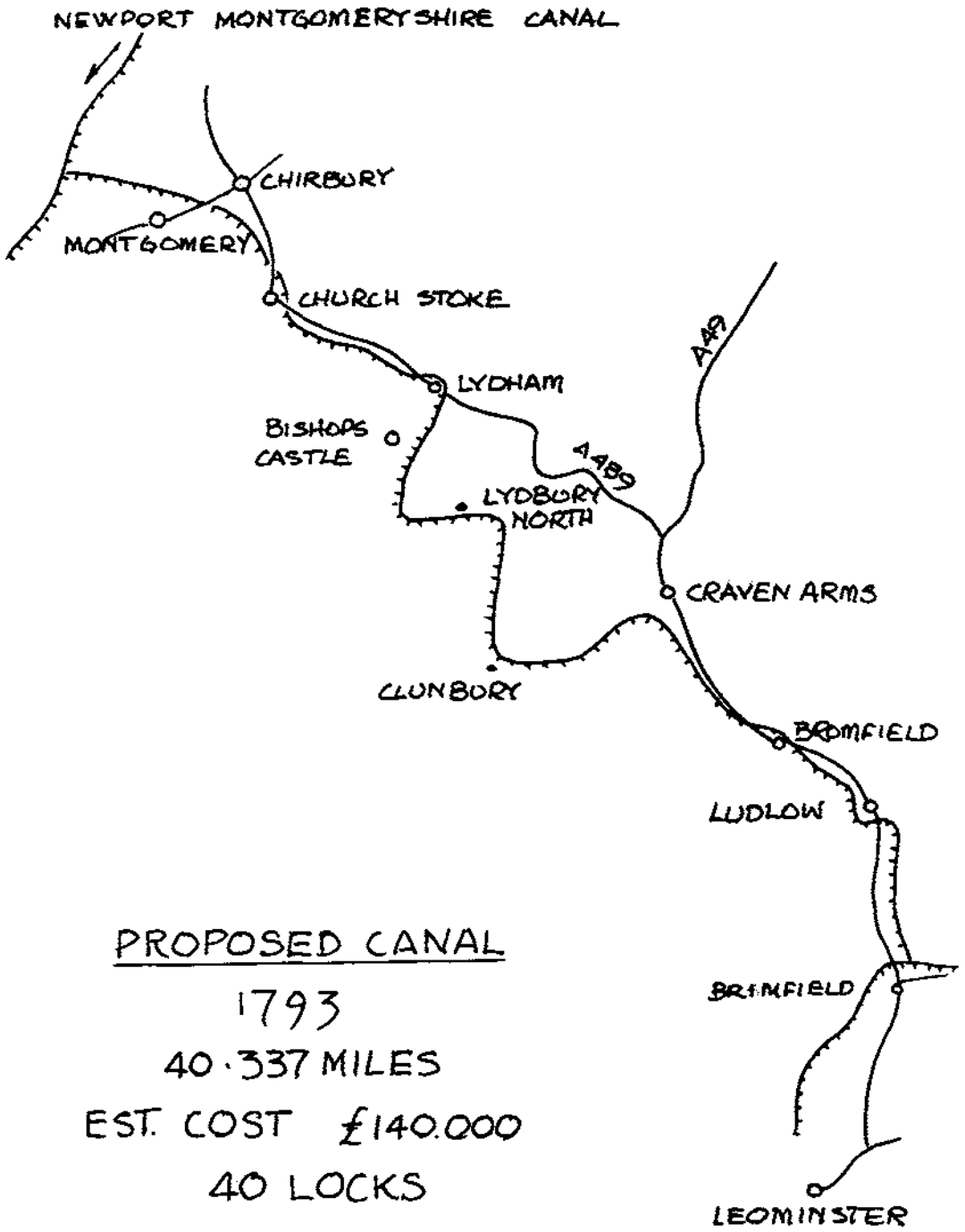
townships through which it would have passed are listed. Such a Parliamentary Bill was called for in order that money could be raised by the sale of shares. The petition was presented to Parliament signed by Lord Clive and twelve 'Gentlemen Freeholders and others of the Counties of Salop and Hereford and parts Adjacent'. Some of the signatures to the petition are illegible but include T or J Beale, T H or J H Lowe, James Hastings, Thos. Wellings, J Plymley (?), J P Roberts, James Hunnersley Jones, Samuel Sneade, Richard James, Isaac Frowd, Thos. Arkwright (?) and Tom Davies.

In considering why these worthy gentlemen should be so anxious to enter into such a speculative venture it is necessary to read the newspapers of the time. Britain was at war with France, the industrial revolution was apparent in Ironbridge and the West Midlands, grain prices were rising and the opportunity existed for the entrepreneur to succeed. The war had generated a boom in ship building with a subsequent demand for oak which existed in Shropshire. Regular advertisements appeared in the press for the sale of oak plantations. It may be that the landowners saw the canal as a means of moving oak planks to the Bristol Channel. The industrialisation of Britain brought with it a change from the use of charcoal to the more efficient combustion of coal. The Leominster reduced the price of coal at Wooferton from 30 shillings per ton to 15 shillings. The Montgomery brought to Western Shropshire limestone which greatly improved the fertility of the countryside. All these factors and others which it is not possible to visualise must have influenced their judgement. It appears that the area around bishops Castle had more to gain from the project than did Ludlow.

A meeting was held in the Town Hall, Bishops Castle on 18th December 1793 'for receiving subscriptions for carrying into execution the intended canal to link Liverpool and Bristol'. The notice advertising the meeting is headed 'The Ludlow and Montgomery Canal. The Chairman of the meeting, the Rt. Hon. Lord Clive, 'resolved that the full project was too expensive and to be withdrawn but it appears to the meeting that a canal from the Leominster Canal at Little Hereford to or near the turnpike road on Lydham Heath (part of the original plan) may be exercised with advantage to the country in general. It was resolved that a subscription be entered into and that application be made to Parliament in the present session for carrying into execution subject to the following conditions – that of the estimate of £73,000 50% must be subscribed before any part of the canal be commenced, nor should any start be made until after six months after the conclusion of the present war. The meeting be adjourned to the Crown Inn at Ludlow on 8th January 1794'. The resolutions were to be published in the General Evening Post, Hereford and Shrewsbury and in Aris's Birmingham papers.

The effects of the changes proposed at this meeting were to abandon plans for the northern part of the proposed route linking Bishops Castle to the Montgomeryshire Canal and to reduce by almost 50% the estimated costs. This northern section would have proved difficult to construct as it crossed hilly country with a rise of 298 feet in less than 14 miles from its junction with the Montgomeryshire. The cancelled portion was that which was the more expensive to construct representing only 34.8% of the planned length but appearing to include 46% of the proposed locks. The gentlemen of Bishops Castle were obviously more anxious to encourage trade links with the already prosperous south of England than with the industrially developing north country.

It is interesting to note that some 72 years later the plan to build a railway from Craven Arms to Montgomery was similarly curtailed. The line, which never made a profit, reached Lydham Heath from where a branch was built to Bishops Castle, but the planned



The planned route of the Ludlow Canal linking the Montgomery Canal near Newtown to the Leominster Canal

Ludlow's Broadgate, in front of which the proposed Ludlow Canal would have passed

route on to Montgomery was never constructed. The hills and the low density of population which would have ensured low freight receipts killed both the proposed rail and canal links.

The reference in the Hereford Journal to the linking of Liverpool and Bristol is an example of the extreme enthusiasm which brought about canal mania. The two cities were already linked by the canal system through the Midlands although it is true that this would have provided a shorter route. It seems highly improbable that the trade between the two ports could have been carried on more economically by canal than by coastal shipping, but the dangers of sailing vessels in the late 18th century cannot be over emphasised.

The meeting at the Crown at Ludlow was adjourned more than once and seems never to have taken place. The Parliamentary Bill, if it were ever to be drafted, never became an Act and the construction of the Ludlow Canal as it had become known was never commenced.

There is no record of the events which brought about the abandonment of the project but it is possible to imagine what some of the factors may have been. It would have been obvious that Dadford's estimates of cost were highly suspect. It is possible that the quality of his work may already have been questioned as it was by that great canal engineer John Rennie in the following year. The war and inflation may have dented confidence. The future market for oak and grain after the end of hostilities may have appeared uncertain. The industrial revolution was bringing about the closure of rural industries, such as Bringewood Forge, and concentrating metal working near the

coalfields. Even the corn mills which had constituted profitable assets of country estates were closing as water power gave way to steam.

Rural canals were not proving profitable. For example, the Leominster investors had bought shares at £100, no dividend was ever paid and when the canal was purchased by the Shrewsbury and Hereford Railway Company in 1860 for £12,000 the investor received just £16 per share. It was reported in Leominster that by 1808 the cost of running the canal had caused the price of coal to rise to £1-10-0d per ton, just what it had been before the cut was built. A glance at the stock exchange price listings of the period confirms the plight of the rural canal. At the same time some of the industrial navigations, notably the Loughborough, the Coventry and the Stourbridge were prospering.

An undated strip map of the road from Bristol to Chester by John Ogilby shows what appears to be a canal running east to west below the Ludlow Broadgate. This inclusion, as fact, of items planned but never begun was not unusual at the time. Another such example is the work of Priestly who in his 'Navigable Rivers and Canals' published in 1831 refers to 'The Leominster, or Kington and Leominster Canal' as running from Kington to Stourport. In fact the canal never reached either of these two towns. Canal mania was not limited to investors.

One thing that does not seem to have changed over the last 200 years is the optimism of the estimators of the costs of major civil engineering projects.

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The Problem of the *Experiment*

BY J.C. MANN

For the formal opening of the Stockton and Darlington Railway on 27 September 1825, George Stephenson ordered the construction of a railway coach in which the 14 directors of the company and their guests would ride in triumphal progress from Brusselton to Stockton. This coach does not survive, and indeed its precise form and shape have been the subject of much debate, not to say controversy.

According to the *Durham County Advertiser* (issue of 1 Oct. 1825), the vehicle was "fitted up on the principle of what are called the Long Coaches, the passengers sitting face to face along the sides of it". Further information derives from the bill presented by the makers of the coach, quoted by W.W. Tomlinson, *The North Eastern Railway*, 1914, p. 109: 'One coach body with a door at each end, glass frames to the windows, a table and seats for the inside, top seats and steps'. The vehicle was cushioned and carpeted, as might be expected of one intended for the use of the directors.

A leading article in the *Scotsman*, describing the opening of the line, states that the coach would hold '16 or 18 inside passengers', while a further article in the same journal describes it as 'an elegant covered coach'.

The name of the coach, Experiment, and the company's motto, '*periculum privatum,*

utilitas publica', were painted on the side of the coach. The mention of top seats and steps indicates that, as with contemporary stage coaches, there were seats for outside passengers on the roof, reached by a stairway or step-ladder.

The 'Long Coaches' mentioned by the *Durham County Advertiser* were clearly something which the newspaper expected would be familiar to its readers. Now a few years later, the *Mechanics Magazine*, in its issue of 8 August 1829, described the new 'omnibuses' being introduced to the streets of London by George Shillibeer as 'only a revival of the long stage coach which was common to England about 20 or 30 years ago'.

A clue as to what these long coaches, or long stage coaches, may have looked like is perhaps provided by a painting of Blackfriars Bridge in 1798 (illustrated in T.C. Barker and Michael Robbins, *A History of London Transport*, 1975, Vol. 1, plate 2). This shows a long, six-wheeled passenger road vehicle with a single door and step at the rear, but with the bodywork on each side below the waist curving in sufficiently to warrant the description of a similar vehicle in 1810 – in the diary of L. Simond (*An American in Regency England*, ed. C. Hibbert, 1968, 26–7) – quoted in Barker and Robbins, op. cit., vol. 1, p. 323, note 48, that it 'resembled a ship on four wheels; a sort of half cylinder, round below, flat above, very long and divided into three distinct apartments'. This gives a clue as to the construction of the vehicle on Blackfriars Bridge in 1798: was it not actually three stage coach bodies, placed together – not end to end as in early first class and composite railway carriages, but side to side, with the internal sides reduced to vestigial partitions between the 'three distinct apartments'? Such a vehicle could carry three passengers in each half apartment, making 18 altogether.

Long stage coach, from W H Pyne, **Microcosm** *(London 1806): Stage coach plate Fig 3*

A rather shorter 'long stage coach' is suggested by an illustration, reproduced in Peter Smith, *The Turnpike Age* (1970), from W.H. Payne, *Microcosm, or a Picturesque Delineation of the Arts, Agriculture and Manufactures of Great Britain* (London, 1806), as 'Stage Coaches Plate 1, fig. 3 "One of the Long Stage Coaches" '. This shows what looks very much like the equivalent of two coach bodies side by side rather than three. Such a coach (it had four wheels) would have held twelve passengers, and it may be a coach of this size that E.T. Svedenstierna encountered (Svedenstierna's *Tour of Great Britain, 1802–3*, David and Charles 1973, p.24) plying between London and Bath. He describes it as a '"long coach" for twelve persons'.

A larger version of a long coach, this time with eight wheels, appears in a print of 1794, reproduced in John Copeland, *Roads and their Traffic* (David and Charles, 1968), fig. 1b at p.32.

The *Experiment* must surely have looked something like such 'Long Coaches', if it could be described as fitted up on the principle of the latter. While we do not perhaps have enough evidence to essay a reconstruction drawing, we can surely strike out the garden shed portrayed by Samuel Smiles (*Lives of the Engineers*, 1879, p. 139). The vehicle shown by Smiles is in fact described as a second class carriage of the Stockton and Darlington Railway (R. Young, *Timothy Hackworth and the Locomotive*, 1923, figure on p. 123, reproducing Plate 1 of Theodore West, *Outline History of the Locomotive Engine*, 1885). We must also reject the vehicle shown in J.R. Brown's drawing of the opening of the railway – which wrongly shows the company's name on the side – and also Dobbin's painting, which shows no seats on the roof.

We can however envisage a reasonably comfortable vehicle, a sort of luxurious omnibus – but one with seats, perhaps back to back, on the roof – good enough to be used on the line for a while alongside the stage coaches with railway wheels which carried most of the early passengers. It was destroyed in a fire in 1827 or 1828, so that it is not perhaps surprising that no acceptable contemporary drawing or painting seems to have survived.

(It is interesting that when the Swansea and Mumbles Railway began horse-drawn passenger services in March 1807, it provided 'a carriage somewhat resembling the long coaches in use near the metropolis carrying 16 passengers', in the words of an early guide book, *A Description of Swansea and its Environs*, 1813. A rather sketchy drawing of this vehicle survives, and appears in J.R.S. Phillips, 'The Earliest Passenger Carrying Railway Vehicle?' in *Transport History*, vol.5, 1973, pp. 152–4, in a plate at p. 217. The drawing shows a long coach-like vehicle, which seems to have seats down each side. Like all Swansea and Mumbles vehicles, there was a door on one side only – the landward side. Apart from that, it looks more or less like our descriptions of a Long Coach).

Best thanks are due to Dr. Michael Lewis for his help, especially for information on Long Coaches.

The Failure of Inverythan Bridge, 1882

BY THOMAS DAY

On 27 November 1882 the railway bridge that spanned the Aberdeen to Banff turnpike road at Inverythan, Aberdeenshire, failed as the 4.00pm train from Macduff to Inveramsay crossed it. The accident and its aftermath were widely reported in local newspapers[1], and an artist's impression of the accident and a report were published in *The London Illustrated News*.[2] The failure of this bridge, together with the failures in 1847 of the Dee bridge at Chester and in 1891 of the Portland Road bridge at Norwood Junction, all under the weight of passing trains, were significant events that influenced the use of cast-iron girders for the construction of railway underbridges.

The failure of the Dee bridge, after an investigation and the publication of a Royal Commission report, discredited the use of composite cast-iron girders with wrought-iron ties.[3] The accident at Inverythan resulted in a recommendation from the railway inspectorate that cast-iron beams should not be used in the construction of new underbridges. Following the accident at Norwood Junction it was recommended that all cast-iron beams used in underbridges should be replaced by wrought-iron girders.

The inquiry by the Royal Commission examined the design of trussed-girder bridges and in doing so exposed lapses in the application of current theoretical knowledge. The recommendations expressed in the Board of Trade reports of the failed bridges at Inverythan and at Norwood Junction, although not as notable as the findings of the Royal Commission, had far-reaching results.[4] It is intended in this essay to use contemporary sources to examine the failure of the bridge at Inverythan by considering the accident under the following headings: the detail design and construction of the bridge, the use of cast-iron girders for bridge construction, the reason for its failure, and the recommendations of the Board of Trade inspector.

At the time of the accident the bridge at Inverythan, about two miles north of the Aberdeenshire village of Fyvie, carried a branch line between Inveramsay and Macduff of the Great North of Scotland Railway over the Aberdeen to Banff turnpike road.[5] This branch from the main GNSR line from Aberdeen to Inverness was built in three sections: the first section from Inveramsay to Turriff was opened in September 1857, the second, from Turriff to Banff Bridge in June 1860, and the final section to Macduff in July 1872.[6] The first section, where the bridge was located, was constructed for the Banff, Macduff and Turriff Extension Railway, but by the date of the accident the three sections had come under the control of the GNSR.

Parliamentary authorisation for the construction of the first section of the line, the eighteen miles from Inveramsay to Turriff, was obtained on 15 June 1855.[7] The line, with little engineering work and easy gradients, was constructed as a single track with passing loops. The GNSR was a major subscriber to the line, and on 8 February 1856 it was reported at a board meeting of the company that 'Mr John Brebner Railway Contractor Aberdeen had obtained the Contract for the construction of the line and stations at £109,550.'[8] In the same year Alexander Gibb was appointed engineer to the GNSR, and during the following year obtained a similar appointment to the Banff, Macduff and Turriff Extension Railway.[9] Considerable use was made throughout northeast Scotland of iron girder bridges, and the ironwork for the girder bridges on this

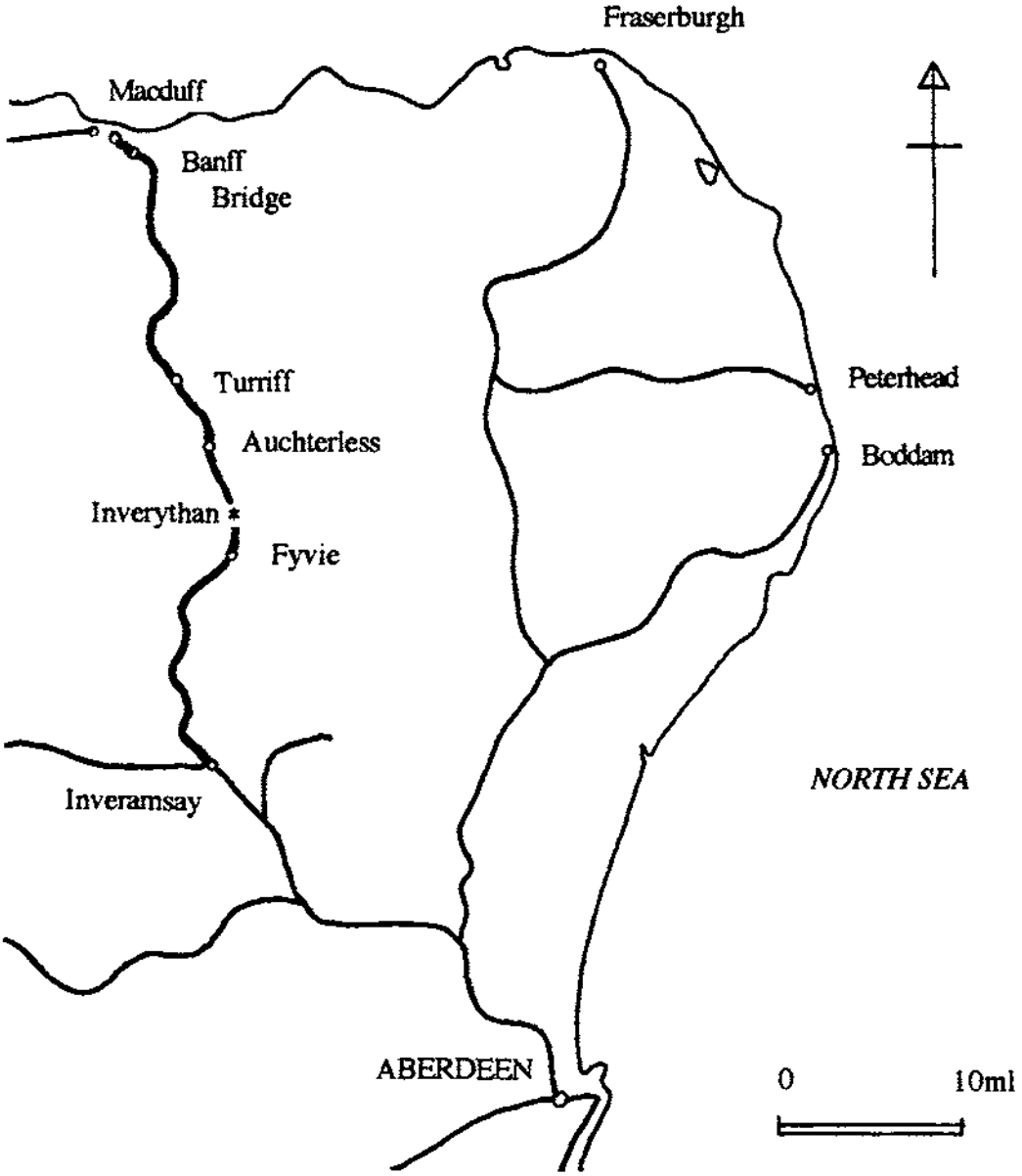


Figure 1. Inveramsay-Macduff branch of GNSR

line was cast in Aberdeen at the Ferryhill Foundry of James Abernethy and Son.[10]

To fully appreciate why the failure of this bridge assumed such importance, it is necessary to examine the main details of its construction. These details can be found in the Board of Trade report of the accident along with a description of the gradients and alignment of the track on the approaches to the bridge.[11]

From the north, the direction in which the train was travelling toward the bridge, there was a falling gradient of 1:650 to a point 498 yards north of the bridge whence there was a

rising gradient of 1:100 to a point 1036 yards south of it. The bridge carried a single track, and, from the north, the line ran north-south for three quarters of a mile to a point 130 yards north of the bridge before entering a curve to the east of 880 yards radius which terminated in another straight section that commenced 38 yards south of it.

The bridge had a span of 34 feet 8 inches on a skew of 60° to the line of the turnpike road, and there was a clearance of 15 feet 4 inches above the roadway below.[12] The main structural elements of the bridge were a pair of longitudinal cast-iron girders, 38 feet 11 inches long and 3 feet deep at mid-span. These girders had a bottom flange 18 inches wide at the centre and 12 inches wide at either end, and a top flange 6 inches wide throughout its entire length. The metal of both of the flanges and the web of the girder was 2 inches thick.

The girders were cast in halves, and these were connected together at a central joint. The joint was composite. There were four pairs of 1¾ inches diameter wrought-iron bolts that passed through vertical flanges at the ends of the castings, and, in addition, bosses 2⅝ inches deep projecting below the lower flanges that were held together by a shrunken wrought-iron ring.

Abernethy[13], when testifying to the Board of Trade inquiry, stated that it was usual for beams of this sort to be cast on their side with the web of the casting slightly below the horizontal joint that separated the upper and lower parts of the mould. During casting molten metal would be poured simultaneously into either end of the mould, and there would have been four 'flow gates' along the line of each flange to allow air to be expelled from the void in the mould as the molten metal flowed in.[14] Visual inspection of the girders after the accident supported this account of the casting process.

A timber deck was supported between the inside lower flanges of the girders. The main transverse elements of the deck were creosoted timber cross-bearers, 12 inches deep by 10 inches wide and 10 feet 4 inches long spaced at 3 feet centres along the length of the bridge. Spaces between the cross-bearers were filled with timber planks, 8 inches wide by 4 inches deep, raised on packing pieces at either end to ensure the top surface of these planks was flush with the top of the cross-bearers. Longitudinal planks, 12 inches wide and varying in thickness from 3 inches on the inside of the curve to 4½ inches on the outside, formed the surface to which the rails were fixed and gave the super-elevation required for the curvature of the track.

To prevent horizontal displacement, the girders were tied together by four wrought-iron tie rods that passed through their webs, with one tie at each end and one adjacent to each joint. At the ends of the girders there were bearing lengths 2 feet 2 inches long where the girders were supported on granite pad-stones, 3 feet square by 1 foot 3 inches deep, built into the masonry of the abutments. These abutments, on either side of the roadway, were built of old red sandstone and founded 6 feet below ground level on 'sticky clay'.

At the time of the accident 313 underbridges on the GNSR were constructed with cast-iron girders, and 34 of them were on the line between Inveramsay and Macduff. The bridge at Inverythan was the longest span on this line, and there were two other underbridges of similar construction that had spans of between 30 and 35 feet.[15] The use of cast-iron girders for railway bridges was not uncommon, and early use of this type of bridge had occurred on the Liverpool-Manchester railway. Jointed girders were less common. Forty years before the accident at Inverythan, Pope[16] and Dobson[17] had noted

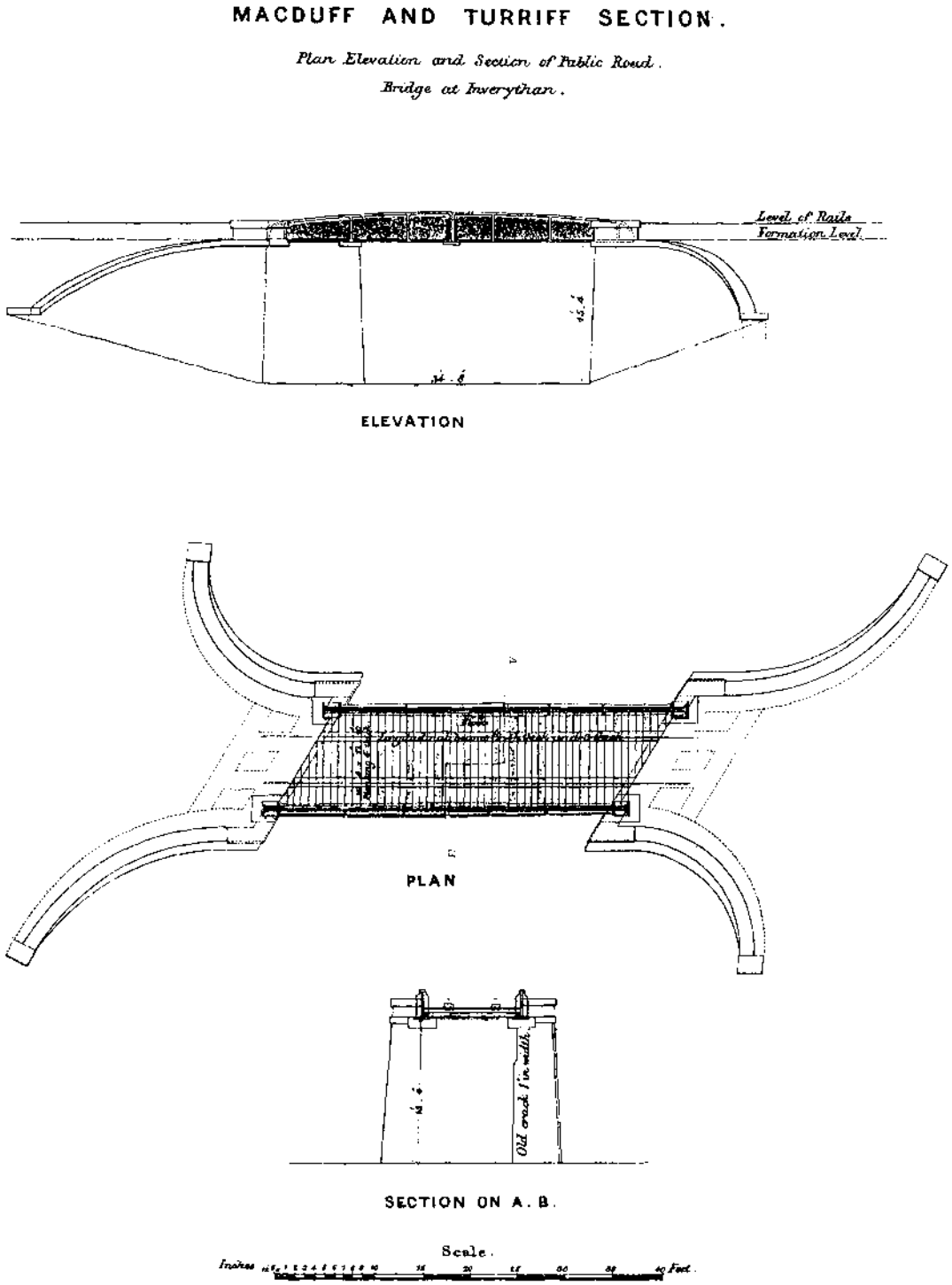
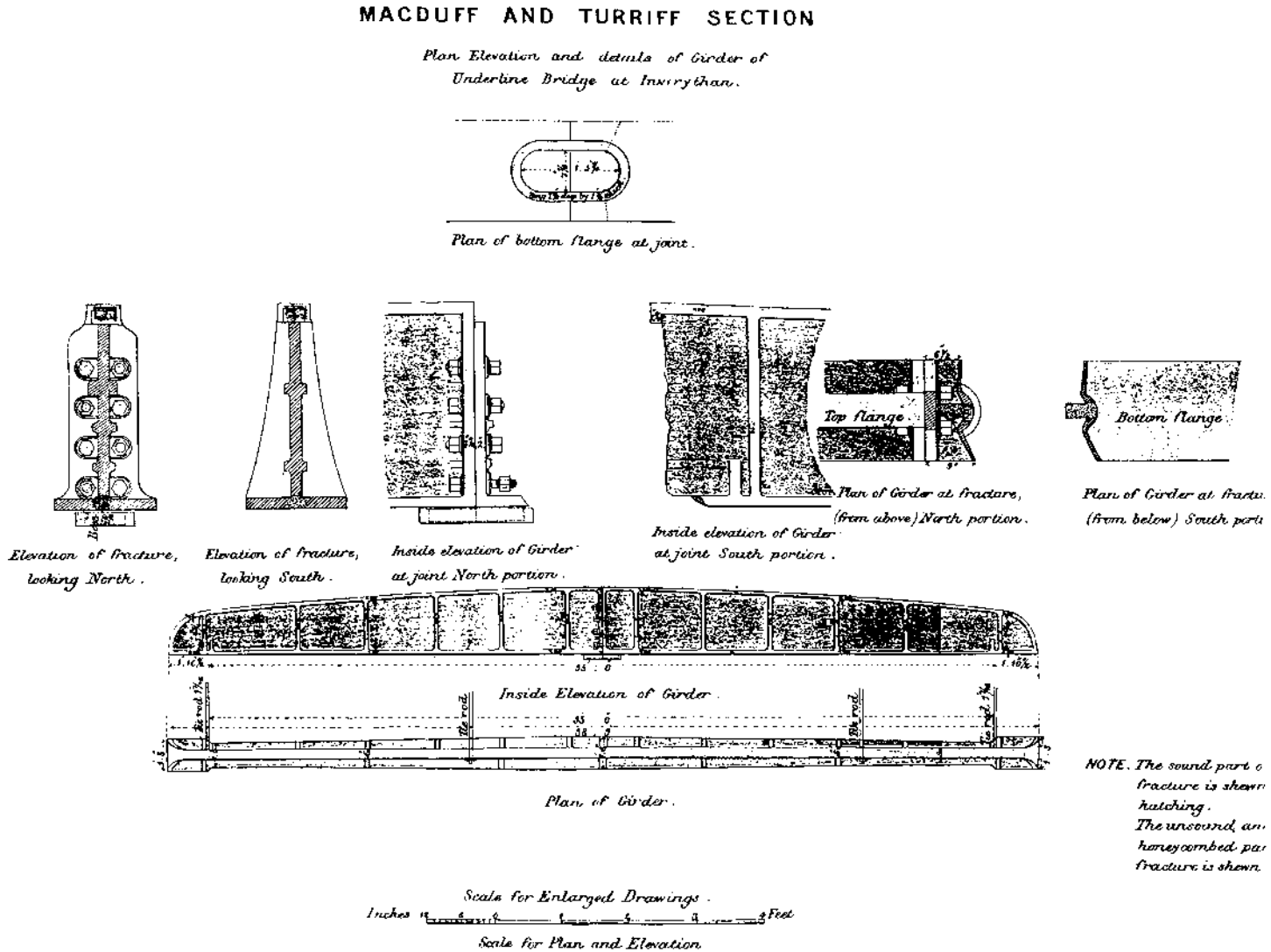


Figure 2. Elevation, plan and section of Inverythan bridge

Figure 3. Plan, elevation and details of cast-iron girders



the potential for the use of iron girders for bridges which allowed a reduction in construction depth and the cost of earthworks, the ability to obtain a constant clear height beneath a bridge, and the simplified construction of skewed spans.

On 28 November 1882, the day after the accident, there was considerable local reportage of the disaster and of eye-witness accounts of the events that ensued. It was reported that

> A train on the Macduff and Turriff section of the railway [GNSR], while running between Auchterless and Fyvie, fell though a bridge about a mile and a half north of the latter place...[18]

On the following day, when the newspaper frenzy for personalised detail of the accident had diminished, a more detailed report was published.

> There can also be little doubt as to the fact that the accident was caused by the breaking of one of the two main-supporting beams or girders of the bridge. The fatal girder was on the east side of the bridge, and it now lies on the roadway in two distinct halves. It appears to have snapped directly in the centre, where there would seem to have been something of the nature of a joint. The "break" is rude and irregular, leaving rough jagged edges on either half at the point of separation.[19]

The girder on the west side of the bridge remained intact and in position. Five people died as a result of the accident and fourteen were injured. Of the four members of the train crew only one, the 'brakesman' or assistant guard of the train received more than superficial injuries.

On leaving Macduff the train comprised a bogie locomotive with a four-wheeled tender, a passenger luggage brake van, two third-class carriages, a first-class carriage and a third-class break carriage. The 'brakesman' was travelling in the luggage break van at the front of the train and the guard at the rear. At Turriff five loaded open box wagons, positioned between the locomotive and the front brake van, were added to the train. It left Turriff on time and ran normally to the next station at Auchterless. From here it departed at 4.52pm, and was scheduled to run the 3½ miles between Auchterless and Fyvie in 10 minutes. As the train approached the bridge a minute or so before 5.00pm its speed was estimated to be between 25 and 30mph.[20] The main cast-iron girder on the east side of the bridge failed as the train passed over it.

The engine, tender and two of the open box wagons crossed the bridge. Despite the considerable concussion originating from the accident which caused the engine to 'jump up and sway up and down two or three times' and the right-hand trailing spring of the engine to disintegrate, it remained on the track. It was pulled up 150 yards south of the bridge. The tender, still coupled to the engine, was dragged behind it with its wheels off the rails to the right-hand side. After the accident the first wagon came to rest on its wheels on the roadway south of the bridge whilst the second wagon, also on its wheels, was standing on the embankment a few yards from the south abutment of the bridge. The third wagon was broken into two parts, one part atop the southern abutment and one part in the roadway below. The fourth and fifth wagons were piled in the roadway on the wreckage of the third. The front brake van was in the roadway beneath the bridge with the leading third-class carriage resting on it with its wheels against the masonry of the south abutment. The second third-class carriage was on its end in the roadway with the front end of the first-class carriage supported on it whilst the rear end of this carriage rested on the north abutment of the bridge. The rear brake van remained on the rails

undamaged north of the bridge.

On Tuesday 28 November 1882 the company's officials and engineers made a visit of inspection to the scene of the accident. They were accompanied by John Willet[21], civil engineer, David Abernethy of James Abernethy and Co., and Mr J. H. Bisset, an Aberdeen builder. Two days later, on Thursday 30 November, Major F. A. Marindin, the Board of Trade inspector appointed to investigate the accident, visited the site of the bridge.[22] He was accompanied by GNSR officials and by John Gray, a director of an Aberdeen iron foundry.[23] It was reported that this party 'made a long and thorough inspection of the broken girder..., the quality of the metal of which the beam is composed being tested, and particular attention paid to the nature of the break.'[24] At the time of this inspection much of the wreckage had been cleared, particularly the timber from the carriages and wagons which had been burnt to provide lighting for the rescuers and for clearance work. The day after the inspector's visit to the site, the Board of Trade inquiry for the examination of witnesses was convened in the GNSR offices in Aberdeen.[25]

The printed report of the Board of Trade inquiry shows that evidence was taken from fifteen witnesses. These included the crew of the ill-fated train, the crew of the last down train that safely crossed the bridge, the permanent way men responsible for the section where the bridge was located, the company's resident engineer Patrick Moir Barnett, their locomotive superintendent William Cowan and his assistant William P. Cowan, and David Abernethy and John Gray.

Some evidence, particularly that of Barnett, Abernethy and Gray, was more germane in establishing why, after 25 years of use, the girder had failed. Before examining the evidence of these three witnesses it is appropriate to note briefly other evidence given to the inquiry. The crew of the train, crossing the bridge when it failed, described events at the time of the accident, and the crew of the earlier down train stated that they had experienced nothing unusual when crossing the bridge two hours before the disaster. The men responsible for the section of the permanent way reported that the superstructure of the bridge was regularly inspected, and that they were unaware of any defects in the bridge apart from a vertical crack in the northern abutment beneath the granite pad stone that supported the failed beam.[26]

The evidence given by William P. Cowan mainly described the position of the train after the accident[27] but also stated

> There was nothing of the bridge left in position except the west girder. The east girder was broken in half, the south portion being at the bottom of the wreckage and the north portion standing at an angle, with the small end still on the abutment ... I examined the girder ... it was broken in two near the back of the joint. The joint was quite intact with all the bolts in position. I found a bad blow hole in the centre of the bottom flange

He thought that the entire fracture, with the exception of the blow hole, appeared to be fresh.

Similar evidence, but with additional information, was given by Patrick Barnett, resident engineer of the GNSR.[28] He was able to provide plans of the bridge that were signed by Alexander Gibb who was engineer to the GNSR when the girders were cast. Barnett stated that he had

found on inspection that the east cast-iron girder of the bridge had failed near the joint in the centre of the span ...

and continued

> I examined the fracture and found that at or near the junction of the vertical web and the lower flange the casting is honeycombed, with an opening in it extending laterally for three or four inches, but which had not originally shown on the outside, and does not show now; ...

Barnett considered, from his visual inspection of the girder, that the iron was 'good quality' and that the girder was a 'sound casting'. He offered an explanation of the possible mode of failure and opined that it was attributable to the formation of a crack that originated at the honeycombing and propagated, '... until it reached the point at which it [the girder] was unequal to bear the strain brought upon it.'

Barnett calculated that the girder would carry, at failure, a load of 78 tons, and pointed out that the greatest live-load weight due to the GNSR rolling stock that worked the line was equivalent to a load of 20.40 tons placed centrally on the girder, and in addition the girder had to support a total distributed dead weight load of 15 tons. He had first hand knowledge of Gibb's requirements for testing beams, and although these rules had been applied to bridges built after the construction of Inverythan bridge, he thought Gibb would have used similar criteria when testing the girders to be used for this bridge. Barnett having, on occasion, acted for Gibb when tests were made stated that Gibb's

> ... rule in testing cast-iron girders was to apply a weight at the centre of the top [of the] girder equal to one ton per foot of span ... If the girder showed a greater deflection of ¼₀in. per foot of span it was rejected ... He [Gibb] was exceedingly careful, and attached great importance to the testing of girders.

In his evidence Abernethy confirmed that the girder had failed adjacent to the central joint, and described the location and geometry of the fracture.[29] This ran vertically up the web of the girder, close to the fillet between the connecting flange and the web, and broke out horizontally through the vertical connecting flange beneath the top flange of the girder. At the bottom, the lower flange of the girder was fractured vertically some 9 inches from the joint, and the lower part of the web had fractured diagonally towards the connecting flange. He confirmed that the bolts and the shrunk wrought-iron ring of the joint had not failed. (See Figure 3 for details of the fracture)

Abernethy did not consider that the girder was badly honeycombed, and took no measurements of the defect apart from pushing the end of a pair of callipers 3 to 4 inches into the honeycombed metal matrix. Reporting on the condition of the fracture he noted that the web appeared to be newly fractured and that although the fractured edges of the lower flange appeared new '... it [the fracture] was not in my opinion quite fresh throughout the whole length.' He noted that part of the fracture was rusted and part fresh and that ' ... about 2½ ins. at each end of the total length of 18 ins. were quite freshly broken, but the remainder of it appeared to have been fractured for some little time.' Having noted his conviction that the lower flange of the girder might have been part-fractured some time before the accident, he thought that the crack, because it was hidden from view by the shrunken iron ring around the bosses below the bottom flange, would have been difficult to detect.

John Gray's evidence added more detail about the extent of the honeycombing which he

described as

> ... a pretty extensive honeycomb at the bottom of the web, which extended inwards and downwards, probably through the bottom flange into the boss on the under surface of the bottom flange.[30]

He measured the honeycombing to be 4½ inches deep and estimated the affected area to be 3 inches wide. Unlike Abernethy, Gray suggested that the sharpness of the fractured surfaces indicated that the fracture was 'quite fresh', and further disagreed stating his belief that 'a cast-iron girder if it goes at all must go at once, and not a little one day and a little the next.' His explanation of the apparent gradual failure of a part of the lower flange, suggested by Abernethy, was put down to the formation of a 'cold shot' that occurred during casting when two streams of molten metal had not properly fused together. Despite care being taken during casting operations, Gray thought that it was 'almost impossible to avoid' flaws in castings. From an external examination he considered the girder to have been 'a good and well turned-out casting,' and that there was, with a casting of this type, no way of determining whether honeycombing was present.

Major Marindin, the Board of Trade inspector, having heard the evidence of the witnesses, drew conclusions about the cause of the accident and made recommendations to prevent a similar accident happening again.[31] He ruled out the possibility that the accident had been caused by any wheel(s) of the train leaving the track prior to it crossing the bridge, and by the settlement of the foundations that caused the crack in the northern abutment of the bridge. He concluded that 'the joint itself was quite sound, the bolts and nuts being tight and perfectly in position ' and that any damage to the joint had been caused by the fall.

Marindin dealt in detail with the honeycombing in the bottom flange and gave a comprehensive set of dimensions that showed the real extent of the critical flaw in the casting. In completing his report he noted that the honeycombing

> measured 3½ins. across at the face, and narrowed to about 1½ins. inside, 2⅝ins. in extreme depth, and 6ins. in extreme length, extending inwards and downwards into the boss, but not within 1½ins. of the outer face of the joint flange. The total capacity of the hole, measured by filling it with water, was 15½ins. cubic inches,

He pointed out that the void could be considered larger as the metal surrounding it was unsound. Using his measurements he estimated that 'The sectional area of the bottom flange would at one place be reduced from 36ins. to only 28ins.', and that the strength of the girder would be substantially reduced. It was thought that the 'cold shot' because of its position within the vertical fillet between the web and the end connection did not adversely reduce the strength of the girder.

If the girder was considered sound, its breaking weight, resulting from a load applied at the centre of the span, was calculated to be 80 tons. Even when taking into account the use of heavier locomotives by the GNSR, this value was considered just adequate to accommodate the Board of Trade design criteria of strength that were current at the date of the accident. The breaking weight of 62 tons, calculated using the reduced flange cross-section caused by the honeycombing, did not satisfy current strength criteria.

Marindin concluded

> that the failure of this girder was due to the gradual extension of a flaw commencing

at the honeycomb and working outwards until the strength at this point was so reduced that the girder was unable to bear the weight of the engine, and gave way suddenly.

He considered that 'proper care and attention' were lacking when the girder was cast, and that after casting it was not possible to detect the flaw in the girder. He though no blame should be apportioned to the GNSR company's engineer and that the failure of the girder did not reflect any lack of supervision or carelessness by those responsible for the maintenance of the bridge. Theoretically the girder had sufficient strength when cast, and it had been in constant use for 25 years with a latent defect that was not externally visible.

Whilst acknowledging it was difficult to specify steps necessary to prevent future failures and that 'The unreliability of cast-iron under tensile strains [stresses] ... has long been well known', Marindin recommended that cast-iron girders should not be used for railway underbridges unless the bridges were short span and had an increased factor of safety against failure. He was particularly damning about the use of girders cast in two sections, the type used at Inverythan, and stated

> Girders cast in two segments, ... are more liable to contain draw-holes or honeycombs, should never on any account be used; and I am of opinion that it would be advisable to limit the length of the spans upon which the use of cast-iron girders under the railway, other than arched girders, should be allowed.'

Marindin was not aware whether the GNSR used a larger proportion of bridges with cast-iron girders than other railway companies but recommended that existing bridges with this form of construction should be subject to 'a special examination, accompanied by [an] actual test', and that the cast-iron girders of any bridge that showed signs of weakness should be immediately replaced by girders constructed of wrought iron. Lastly he adjured the GNSR company to make use of wrought-iron girders for the construction of underbridges on any new line that they might build, and to use this form of construction for strengthening bridges on the company's Deeside line where refurbishment work was about to start. The company subsequently acted upon the last recommendation.

Footnotes

1 *Aberdeen Journal*, 28, 29 and 30 November, and 1 and 2 December 1882.
East Aberdeenshire Observer, 28 November and 1 December 1882.
Moray and Nairn Express, 2 December 1882.

2 *The Illustrated London News*, 9 December 1882, pp.595-96.

3 *Report of the Commissioners appointed to inquire into the Application of Iron to Railway Structures*, 26 July 1849.

4 PRO:Rail 1053/71: Board of Trade Report, GNSR (Inverythan Bridge), Inspecting Officers' Reports 1882. (Public Record Office, Kew).

PRO:Rail 1053/80: Board of Trade Report, LBSCR (Portland Road Bridge), 1891.

5 One mile six hundred and sixty yards north of Fyvie station.

6 R. A. Cook, *Great North of Scotland Railway and Highland Railway*, Railway and Canal Historical Society 1977, map GNS 2.

7 18 Vict., cap. 57.

8 SRO:BR/GNS/1/2: Minutes and Reports, p.374. (Scottish Record Office, West Register House).

9 H. A. Vallance, *The Great North of Scotland Railway*, David St John Thomas 1991, app.

Details of Gibb's engineering activities can be found in *Min. of Proc. ICE*, 27(1867-68), pp.587-89.

10 PRO:Rail 1053/71, pp.89.

11 PRO:Rail 1053/71, pp.85-6.

12 Prior to the opening of the line the square span dimension of the bridge was given as 31 feet, the skew dimension as 35 feet and the angle of skew as 60°. These figures are not mathematically determinate, and it seems likely that the square dimension was reduced to 30 feet as this value equates with the skew dimension given in the Board of Trade report.

13 David W. Abernethy, partner, James Abernethy and Co., Aberdeen.

14 PRO:Rail 1053/71, p.89.

15 In 1882 there were in use on the GNSR forty-one underbridges with spans between 30 and 40 feet and two with spans that exceeded 40 feet. Of these bridges eight had jointed girders, but only one of those exceeding 40 feet was jointed. Seven bridges within the span range 30 to 40 feet had jointed girders. PRO:Rail 1053/71, p.96, app.vii.

16 J. Pope, 'Description of a bridge for a Railway crossing above a Turnpike Road ...', *Min. Proc. ICE*, 1(1841) pp.87-8.

17 E. Dobson, 'Description of the Iron Skew Bridge across the Regent's Canal on the Eastern Counties Railway', *Min. Proc. of ICE*, 2(1842) p.90.

18 *Aberdeen Journal*, 28 November 1882.

19 *Aberdeen Journal*, 29 November 1882.

20 PRO:Rail 1053/71, pp.86-7.

21 For details of Willet's engineering career see obituary in *Min. Proc. of ICE*, 107(1891-92) p.414-16, and

J. Marshall, A Biographical Dictionary of Railway Engineers, David and Charles, Newton Abbot 1978, p.238.

22 Major Francis Marindin (later Col. Sir, KCMG). J. Marshall, p.152.

23 John Gray was a director of the local iron founders William McKinnon and Co., Spring Garden Ironworks, Aberdeen. This firm cast the ironwork for a number of beam and arch bridges that were designed by Alexander Gibb for the Speyside Railway. This line was opened in 1863.

24 *Aberdeen Journal*, 1 December 1882.

25 *Aberdeen Journal*, 2 December 1882.

26 The crack, almost vertical, had been reported to Barnett six years earlier. It was then ¾ in. wide and was thought to be only in the front wall of the abutment. Having been

filled with mortar, it was monitored regularly and, although widening slightly, it was considered that the subsequent slight movement was of no importance. PRO:Rail 1053/71, p.88.

27 PRO:Rail 1053/71, pp.87-8.

28 PRO:Rail 1053/71, p.88.

29 PRO:Rail 1053/71, p.89.

30 PRO:Rail 1053/71, p.90.

31 PRO:Rail 1053/71, p.92-4.

From the RCHS Photographic Collection No 11

Print RAC 108/109

As suspected, both of these views lay on the West Lancashire, Liverpool, Southport and Preston Junction Railway line from Southport to Hillhouse Junction, that was later taken over by the Lancashire & Yorkshire Railway. Print RAC108 was Barton station (later renamed Downholland), and this was the most southerly of the stations on the route lying above the junction. It opened in November 1887 and served as the terminus for trains from Southport, although through trains were operated to Altcar and Hillhouse (CLC) until 1926. The station closed in 1938. The second view (Print RA Cook 109) was Halsall station, situated to the north of Barton. The line closed in 1952.

My thanks once again to John Edgington for his help in locating these views.

From the RCHS Photographic Collection No 13

Print LGRP 27540

Another unlabelled print from the Ray Cook collection, numbered in the LGRP series, but not in the National Railway Museum collection or in the registers. The adjacent numbered print which is identified, is of Skelmersdale, suggesting this is a Lancashire site.

If you can identify the location or provide information about the view, please contact Stephen Duffell, Hillcroft, Ford, Shrewsbury, SY5 9LZ, or telephone 01743 851154 (weekends), or 01625 514828 (office hours), or
e-mail Stephen.Duffell@ctl.astrazeneca.com.

Correspondence

Deaths of the engineers

I am much indebted to Messrs. Barnett, Bertinat, and Graham for their corrections to the article 'Deaths of the engineers'.

Although the Duke of Portland had an estate just over the county boundary at Berriedale in Caithness, this was an inexcusable error which can only be attributed to a wandering mind. Moreover, as the organiser of the exhibition in Wick to celebrate the centenary of the opening of the line beyond Helmsdale I cannot even plead honest ignorance of the history of the area!

The question of life expectancy is a tricky one and I take Mr. Bertinat's point. I took my figure from the Encyclopaedia Britannica. Only an actuary could give an average life expectancy for the adult population. The Institute of Actuaries was founded in 1848 so they might have this information for the early years. Each engineer reached adulthood in a different year which serves to complicate matters further as average life expectancy increased.

The underlying aim of my article was to support a plea for an expanded new edition of John Marshall's biographical dictionary and I leaned heavily on this unique work for my information. May I plead that Sacre's resignation was given by Mr. Marshall as 1885 which I accepted as gospel truth. But even Homer nodded! I have a personal interest in Sacre as he seconded Dugald Drummond's proposal of my father as MIMechE. In 1888. How the years roll by! 1855 was careless proof reading for which I must take the blame.

I hasten to disown p262 line 5 and p269 last para. which are Mr. Faulkner's exclusive property. J RAPLEY

Deaths of the engineers and Chronologers

Re the article Deaths of Engineers, George Granville William Leveson Gower was third Duke of Sutherland, not Portland.

If any member is interested in some of the lists mentioned by Peter Kay in his article Danger – Chronologers at Work, I can supply copies of Highland Railway Station Locations and Dates at a cost of £2 including postage. Cheques should be made payable to the Highland Railway Society.

Copies of the list of Great North of Scotland stations can be obtained from GNSR Publications, Craighall Cottage, Guildtown, Perth, PH2 6DF. Price is £1 and cheques should be made payable to GNSR Association. K. FENWICK

Danger chronologers/lists at work

Graham Bird's letter in the last issue of *Journal* well illustrates the many problems faced by those preparing chronologies. With regard to closures, I have always argued for quoting the last day of public service, but even this requires qualification, since the last public train may well have worked after midnight. Thus his example of the DLR stations has to be noted as "*after traffic* on 8 January 1999" since the last public service train left Island Gardens (I) at 01.06 on 9 January. As he suggests, the "on and from" convention

can lead to a great deal of confusion when one or more days intervene without public service (for whatever reason).

The only important dates for openings are surely also those relating to *regular public service*, since ceremonial openings can occur long before or even after public service has started and are more related to the convenience and commitments of the openers, royal or otherwise, than the use of the railway. The running of enthusiast or other special trains after closure to continuous public service, which some people delight to quote, is perhaps of no great relevance, though emergency diversions of public trains over a line closed to regular traffic are perhaps more important and at least deserve a footnote.

There are and will continue to be many cases where the historian is doomed to frustration if he seeks to go beyond quoting just the month and year for openings and closures. Even reports in local newspapers cannot always be trusted, since material may have been prepared and printed in advance of an event which was postponed at the last minute and subsequently ignored in later issues of the paper.

So far as I know, no one has ever satisfactorily defined what can be assumed to be an "official station name" – does such a beast exist? The various sources Graham Bird mentions will certainly often yield variants and here lies a minefield for those seeking precision. ALAN A. JACKSON

The Clinker Lecture

Like M. Robbins, I greatly appreciated John Hibbs's 'Some rail replacement bus services in the Eastern Region 1929–1969'. My experience and research for The Rural Transport Problem (Routledge and Kegan Paul, 1963) were mainly West Country, but surprisingly similar, again the nationalised Tilling companies being less willing to come to any kind of agreement with railwaymen than those within B.E.T. Thus while the Devon General at least tolerated some outright competition, such as cheaper rail fares for special events, the Tilling ones almost invariably vetoed at the joint rail-bus committees that for decades after the passing of the 'evil' 1930 Road Traffic Act effectively prevented the public benefiting from sensible liaison. Having been forced to sell their bus operations, yet remaining substantial shareholders, the railways could neither co-operate nor compete. It utterly prevented any bus route being run as part of the railway system, and when branch lines began to be closed the 'replacement' buses were often a public disgrace. There was no attempt at timetable liaison, so buses frequently arrived after the train they were supposed to meet. Absurdities included following the exact rail route even at (as say Yelverton) that meant continuing subsidies to go down to a station that had lost all its train services.

But then it should come as no surprise to historians to realise that both rail and bus managers could seldom be relied upon either to serve the public's best interest or even their own selfish commercial interests if that involved a touch of foresight and lateral thinking. To take one example, timetables are generally better presented today than they were by the private companies, certainly in the Grouping era.

The reason was probably arrogance, such as that displayed in relationships not only between different railways (look how Midland locomotive men took the micky out of L.N.W.R. ones, insisting ones, insisting on double heading out of Euston when there was absolutely no need, or the chronicle of warlike attitudes between the G.W.R. and

Southern in the West Country that continued well after nationalisation) but even between departments within the same railway. Well do I recall the shouting matches between the operators and engineers over the length of weekend route closures generating attitudes that were not relaxed even at social or sporting occasions.

The reason? Probably arrogance, dating form the days when the railway was king, when to be a senior official gave enormous power and security and the very idea of a review of performance would have been laughable. This is perhaps not surprising when one considers that a century ago just about half the stocks and shares by volume traded on the London Stock Exchange were in railway companies. Never before or since was such power enjoyed by a single industry. Accountable? Accountable to who? So widespread and deep routed was arrogance that once road services provided serious competition there was total inability to react quickly enough or in adequate detail. It was more reassuring to continue antagonistic attitudes.

All this is true despite many individual noble efforts. Thus on the L.M.S., the contrast between a handful of excellent expresses made no real impact on the system as a whole or even its profitability. In some ways the G.W.R. was the best run of the pre-nationalisation companies, but outstanding named expresses and generally well run docks did not prevent continually overlooking improvements in rural services. A big name had to get really angry about his bladder before a single corridor coach was added to the Taunton-Barnstaple line trains, taking two hours en route, for example. And when the Beeching closures were headline news, following the party line with promotion in mind was generally far more important than pragmatic consideration and action. Common sense railwaymen such as Gerry Fiennes were very much the exception. Hubert Walker and his pupil John Elliot were almost in a class of their own, mainly because they were pragmatic and ran the Southern more like a normal business and less like a railway... so tension rose among those hoping for a salary increase when the appropriate board meeting was being held. Maybe the Southern succeeded because its start was so unpromising, though it undoubtedly needed a first-class man at the top.

In my submission, the unsatisfactory relationship between rail and bus was symptomatic of an increasing rot within the self-opinionated normal railway management, which became utterly unable to adjust to changing circumstances and so inflicted much unnecessary loss and suffering on the public. That, of course, is not to say that there were not many fine individual railwaymen, some trying to buck the trend, or carry ever more summer Saturday passengers on four or five peak days when turning business away would have been socially beneficial, it only being when motorists avoided jams on the Exeter Bypass that, for example, South Devon and Cornwall finally enjoyed staggered travelling and a longer season. In his own way, John Hibbs, as a former bus operator, was of course no ordinary railwayman. But that does not deter from the overall truth that through sheer arrogance most managers enjoyed fighting each other and the bus and coach companies as their preferred way of life, disregarding common-sense suggestions from the press and travelling public.

The quality of railway management is rarely even touched upon in current literature, most histories of branch lines indeed not even covering train services and the traffic they carried in any depth. May this year's Clinker Lecture do something to change this emphasis. DAVID ST JOHN THOMAS

Request for information
George Palmer

I am writing a detailed account of the Portsmouth & Arundel Canal. In or about 1830 George Palmer became the largest shareholder. In April 1833, he wrote to James mangles MP, deputy chairman of the Wey & Arun Junction Canal, stating that "I have had too much experience in canals to be daunted... I have sacrificed my own business frequently to attend to the affairs of the company". He threatened to resign from the company and may have done so in May 1833. Except for Palmer's reference to his 'experience in canals', nothing is known of his past or future. Does any member know what was his own business? Does any member know the whereabouts of any of the Company's annual reports after 1831? P A L VINE

Railways and inn signs

I am sure that Tim Edmonds is right in suggesting (*Journal* no.175, p.273) that 'Narrow Gauge' as the name of public houses in Neath and Merthyr Tydfil refers to what is otherwise known as standard gauge. This was normal practice in south Wales and no doubt in other frontier zones, such as the west Midlands. Just one example (of many), which comes from W.H. Jones, *History of the port of Swansea* (Carmarthen: 1922), p.265:

> [the South Wales Railway]... was laid down, unfortunately, upon the old broad guage [sic] system, which, whilst adding to the comfort of passenger traffic, was wholly unsuited for goods, and especially in South Wales, where all the lines which had already been made were of the narrow guage [sic]

Incidentally, is any word so consistently mis-spelt as 'gauge'?

The establishment of the *Narrow Gauge Inn* in Neath can be dated fairly precisely to between 1871 an 1873. In south Wales all broad and mixed gauge track was converted to narrow (or standard) gauge in 1872, something which the commercial interests of the region had long been pressing for. The choice of name for the new inn can thus be seen as marking an important contemporary event, just as the *Neath & Brecon Inn*, which first appears in a directory for 1867, marks the opening of that railway to passenger traffic in the same year.

The origins of the *Narrow Gauge Inn* in Merthyr are not so obvious. The earliest date that I have been able to trace for the name is 1891 and the present building would appear to be roughly of that date. There was a beer house on the site before 1891 but its name was the *Green Fields of Erin*. This name goes back to at least 1851 and was still in use in 1874. The beer house changed hands between 1878 and 1880 so possibly the new owner (who was not an Irishman!) decided the time had come for a change of name. Even so, 'Narrow Gauge' would seem to be a rather strange choice, since by then the question of gauge was no longer an issue in south Wales. The inn is not particularly near a station, although it is closer to the broad-gauge Vale of Neath station than to the narrow-gauge Taff Vale.

The *Narrow Gauge* in Neath closed in about 1970, but the Merthyr *Narrow Gauge* is still in business. To confuse matters further, the present inn sign shows the 1804 Penydarren locomotive, probably derived form the well known Cuneo painting. P R REYNOLDS

Book Reviews

PORTRAIT OF THE CHESHIRE LINES COMMITTEE, Nigel Dyckhoff, 128 pp, c150 illustrations, 2 maps, boards, Ian Allan Publishing, 1999, ISBN 0 7110 2512 5, £15.99.

As the title implies this book is a portrait of the Cheshire Lines, an attempt – and a successful one – to give an impression of what the railway was really like. Although dates are given for most of the developments of the system, it does not pretend to be a comprehensive history of the CLC, which is still to be written. Even so the book does contain a wealth of interesting detail.

Chapter 1 covers the genesis of the Committee, with emphasis on the personalities involved, pre-eminently Sir Edward Watkin. The next five chapters look at developments in particular areas – Manchester, Liverpool, Chester, Southport and the smaller but still important centres such as Northwich. A whole chapter is then devoted to the mixed fortunes of the Winsford Branch, on which the CLC was forced to maintain an uneconomic passenger service as the results of a judgment by the Court of the Railway & Canal Commission in 1891.

Unlike the M&GNJt and the S&DJt railways, the CLC never owned any locomotives, motive power – often somewhat run down – being provided by the MS&LR and its successors. The leading charges for this service were a source of constant irritation to the other owners of the line, as mentioned in the chapter on locomotives and rolling stock.

In his chapter on stations and signalling, the author characterises these features as unique, distinctive or even idiosyncratic. The designs of stations and signal boxes were certainly diverse, though the signals, with their symmetrical spectacle plates and rather half-hearted movement were uniform throughout the system. The penultimate chapter on living and working on the line includes reminiscences of employers and users: while the brief epilogue covers changes in services following nationalisation.

All aspects of operation are very well illustrated, with evocative pictures of trains, stations, signals, advertisements and handbills. The captions are generally informative, though that accompanying the illustration on page 75 of Birkenhead Docks station on the Wirral Railway suggests that it was the CLC's Birkenhead passenger station. The two maps, however, are inadequate: many of the junctions mentioned in the text are not shown and the limits of the CLC are not clear. Really to understand the developments, around Stockport in particular, readers must furnish themselves with the relevant RCH diagrams of the areas concerned. That said, the work reads easily, and certainly gives the flavour of a line which served industrial, dockland and rural areas as in independent concern until nationalisation. STEPHEN BRAGG

THE ARCHAEOLOGY OF RAILWAYS, Richard Morriss, 192 pp, 170x245, 108 monochrome and 32 colour illustrations, hard covers, Tempus Publishing, 1999, ISBN 0 7524 1430 5, £19.99.

When a new book appears with the same title as an old one, inevitably comparisons are made, particularly when, as in this case, the older one, P J G Ransom's of 1981, was very

good. Sad to say, the new book is quite the opposite. Over sixty mis-spellings, missing words or bad grammar in 192 pages is quite a feat, for which the publishers must share the blame. Add to them 28 incorrect, muddled or misleading statements, and some of the shine is taken off a Master's degree in Industrial Archaeology.

The main part of the book is in three sections: Introductory, Civil Engineering, and Buildings. They are more a history of railway construction than archaeology, but as such they are well structured, although the author's time at Ironbridge is reflected in a geographical balance that tilts towards the west midlands and Wales. There is not a lot about Scotland, and nothing about East Anglia and Cornwall. There follows a glossary of terms, most of which have not appeared in the text, while those that have generally have been explained already. There are some oddities, and others are self-explanatory like 'horse-drawn' and 'green' (but not 'red' and 'yellow'). The real archaeology comes in a gazetteer section containing a representative selection but which is very skeletal. Divided into types of structures, it gives the place, railway, designer, date and grid reference; nothing about a site's importance or features to look for.

It comes as a relief to be able to commend the generous number of well-produced illustrations, some in colour and most of them relevant. GORDON BIDDLE

RAISING STEAM ON THE LMS, THE EVOLUTION OF LMS LOCOMOTIVE BOILERS,

A.F. Cook, 233pp, approx. 145 monochrome illustrations and diagrams, hard covers, RCTS, Hazlehurst, Tiverton Road, Bampton, Devon, EX16 9LJ, 1999k, ISBN 0 901115 85 1, £24.95 incl. p&p.

Some R&CHS members can be disparaging about locomotive history. This book should discourage that view. Arthur Cook wrote several books about LMS locomotives – all carefully researched, full of detail, well written and well illustrated. This one is well up to his standard. Unfortunately, it completes his *oeuvre* as he died before it was published.

Every type of boiler fitted to LMS locomotives is described. Their origins in pre-grouping designs are traced as are their subsequent use or amendment in the BR standard designs. Comparisons are drawn with surrounding practice in such matters as the debates about superheater design and the choice between round-topped and Belpaire fireboxes.

The boiler is a much more complicated thing than the outside view of it would suggest. There are so many competing issues in boiler design that the risk of producing a new design which does not work at all well is high. The story of the early Stanier boilers, told in detail here, illustrates this well – the Jubilee class boilers were a prime example of a design which performed badly at first for no apparent reason. Readers of this book may learn more about such things as choice of tube diameter and design of stays than they ever though would interest them. The illustrations are well chosen and the diagrams and drawings informative. In short, this book takes an aspect of our subject into greater, well researched detail than before and makes the result surprisingly interesting. MARTIN BARNES

THREE HUNDRED YEARS WITH THE PENNSYLVANIA TRAVELER, William H. Shank, 156 pp, 118 monochrome photographs, 12 maps, 73 drawings & notices, soft covers, American Canal & Transportation Center, 809 Rathton Road, York PA, 17403, USA, ISBN 0 933788 00 2, $20.

This book provides a comprehensive overview of the development of transport systems in Pennsylvania, America's 'Keystone State'. Initial chapters deal with Indian trails and early road networks and river travel. The canal era, with details of each of the state canal lines, gets comprehensive cover, with special mention of the various engineers and their innovations.

The chapters on railways consider the various rail companies and their networks. Special mention is made of incline planes and gravity railways.

Subsequent chapters examine the Plank Road, the role of the bicycle, tramways and trolley routes and their modern derivatives offering mass transit. Air travel is not neglected, with the works of Frank N Piasecki in the development of rotary wing vehicles getting special mention. The final chapter considers future travel opportunities in the state and elsewhere.

This well researched, comprehensively illustrated and readable book is the culmination of some 60 years study of transport in Pennsylvania. It offers the transport historian a wonderful overview of a microcosm of American transport development and represents good value at $20. ROGER SQUIRES

WATERWAYS JOURNAL, Boat Museum Society, South Pier Road, Ellesmere Port, Volume 1, 1999: 72pp and Volume 2, 2000: 74pp, numerous illustrations, soft covers, ISSN 1466-3732, each volume £5.95, or £6.50 post paid (£10.00 for both volumes: cheques payable to Boat Museum Society) from Di Ascott, 68 Eastham Village Road, Estham, Wirral CH62 0AN.

This new annual Journal has been founded by the Boat Museum Society in order to share the results of research. Edited by our member Tony Burnip, each volume comprises four long articles, copiously illustrated, mainly with historical photographs form the extensive Boat Museum archives. Both volumes include previously unpublished pieces by the former Bridgewater Department manager, the late Alfred Hayman. The first features a long log of a 1939 holiday cruise on the Shropshire Union branches, including the Shrewsbury line, much of which has since disappeared. This volume is completed by a thoughtful piece by Mike Clarke on continental influences upon British waterways development and an illustrated account of successive proposals for large new waterways form the 1880s onwards by Tony Burnip.

The second volume includes a history of the Weaver by Tony Hirst and two articles on aspects of boating. Tony Lewery's account of horse boating includes reports of recent clearance work at Minshull Stables on the Middlewich Branch, while Terry Kavanagh's discussion of early steam tugs on the Birmingham & Liverpool Junction Canal leans partly on patent evidence.

All pieces are referenced. Some undoubtedly add to knowledge, whilst others are entertainingly related, all to scholarly standards. The photographs, drawings and maps are well reproduced. Some minor editing problems in the first volume seem to be have been resolved by the second volume, which uses a denser font. In general, this new journal represents a very creditable initiative; only the price may deter the more casual enthusiast. JOSEPH BOUGHEY

THE WILTS & BERKS CANAL, Doug Small, 128pp, 165x235mm, 205 illustrations, 2 maps, card covers, Tempus of Stroud, 2000, ISBN 0 7524 1619 7, £9.99.

The author makes no bones of the fact that he has heavily drawn on the history of the canal published in 1971 by L. J. Dalby, who produced a worthwhile publication from mainly secondary material. So it is not surprising that most of the photographs from Dalby's work appear in this publication. A number have been added from other sources which have since been located, although the R&CHS was not asked to assist.

Rightfully the book confines itself to the canal and does not stray into other areas where it owned property or cover its own barges which operated on the river Thames.

The book has two aims, one to tell the reader of the canal's history, the other to show how restoration is currently proceeding. On both accounts it succeeds. From which direction the waterway will be first restored to Swindon is conjecture at this stage, but the pictures graphically show what action is being taken and how the canal looked at the end of its first life. The photographs are not accompanied by a one line sentence, but rather short paragraphs explaining their place in the history of the canal.

The book is to be recommended for making the outline of the canal's history readily accessible to those who are now working so hard to restore it. HUGH COMPTON

THE ELEVEN TOWNS RAILWAY, Jeffrey Wells, 96pp. 224x248mm. [landscape], 33 photos, 6 maps, 21 diagrams, 14 litho plates, soft covers, R&CHS, Keighley, 2000, ISBN 0 901461 21 0, obtainable through Atlantic Transport Publishers, Trevithick House, West End, Penryn TR10 8HE, £12.95.

This is the second recent book from the R&CHS in a near square but landscape format. Both cover a very limited if specific period in the physical history of their subject. In this latest book the format is justified by the inclusion of the reproductions of 14 lithographs by A.E. Tait. The title itself is enigmatic in that the 11 towns are unidentified and the Manchester & Leeds Railway as built never reached Leeds. Production and reproduction are on the whole good though some of the illustrations could have been larger. The author has used a judicious mix of sources, company records, technical, local and national press (perhaps at the time the Manchester Guardian was not yet 'national').

Mr. Wells' style makes for easy reading yet is tightly written and highly factual. Of the ten chapters, the last two are almost appendices since they are concerned with the connections with the line of Bramwell Bronte and Thomas Edmondson. Curiously in the latter case no mention is made of the Edmondson deposit in the John Rylands Manchester University Library (Deansgate building). It is clear that most of the material for the chapter comes form that source which includes his letters patent.

The offering is a good and apparently accurate read about the creation of an outstanding piece of railway engineering, large numbers of the components of which have withstood the tests of time and Pennine weather remarkably well. The book will not fit comfortably on many bookshelves but it is well worth finding it a place. PAT McCARTHY

BEATTY'S RAILWAY, Philip Marsh, 238pp., 20 monochrome illustrations, map, soft covers, New Cherwell Press, 7 Mount Street, Oxford OX2 6DH, 2000, ISBN 1 900312 45X, £15 (special price for R&CHS members £12.50 including postage from Mrs Jane Marsh, 1 Alstonfield, Claremont Lane, Esher, Surrey KT10 9DP).

This is the story of the railway from Balaclava to Sebastopol, built to relieve the crushing transport problems of the British army during the Crimean War. The story is told by Charles Beatty, the young civil engineer working for Peto, Brassey and Betts, who was project manager for designing and building the railway and for bringing it into operation. The late Philip Marsh wrote Beatty's story for him, drawing upon Beatty's letters to his wife and many other contemporary sources.

The Prime Minister agreed to Peto's plan for the railway on 1st December 1854. It was fully opened on 26th March 1855. With the appalling logistical problems navvies and staff falling to disease and enemy fire, obstruction form the military and other difficulties, this was a major achievement of engineering project management for the day and for all time.

Marsh tells Beatty's story factually and graphically so that the book is not only a work of history but a fascinating read. He gives 'cameo' parts to great figures of the war including Lord Raglan and Florence Nightingale. Faults are minimal, the engines which powered the inclines were not 'stationery' and the cliché count is high in the early chapters. Very good value and highly recommended. MARTIN BARNES

IMMINGHAM AND THE GREAT CENTRAL LEGACY, Brian Mummery and Ian Butler, 128pp, 195 photographs, maps, etc., card covers, Tempus Publishing, 1999, ISBN 0 7524 1714 2, £9.99.

This is a picture book, one of Tempus' wide-ranging "Images of England" series. A picture is equivalent to a thousand words, they say, and this volume, which draws on North East Lancashire Libraries and the Immingham Museum among other sources, proves that assertion. Immingham Dock was one of the high points of the GCR's enterprise in pre-1914 days and its development is traced here in carefully chosen photographs and documents (posters, timetables, letters, programmes, invitations, etc.), from the original rural village to the building of the dock and its grand opening in July 1912. Later there is a section on the Immingham Electric Railway plus many dock scenes (with shipping) and photos of railway and even road, connections. Immingham's part in both world wars and the Norwegian cruises of the twenties and thirties are covered more than adequately. Reproduction is decent rather than luxurious; but strongly recommended at the price. PHILIP SCOWCROFT

BRITISH SMALL MINES (NORTH), A.J. Booth, 112pp, 240mm x 180mm, 143 photographs, 30 plans, soft covers, Industrial Railway Society, 31 Acorn Bank Close, Wistaston, Crewe, Cheshire CW2 6TP, 2000, ISBN 1 901556 15 8, £15 (incl. p&p). There is also a hardback edition ISBN 1 901556 14 X, £18.

This volume contains sketch-plans, photographs, and extended captions for the surface sites (only) of 28 mines (two in Scotland) for coal, fireclay, iron, lead, barytes, or fluorspar. Many of the mines have since closed, and some sites have been cleared.

Most of the plans and photographs are precisely dated from the period 1980 – 1999.

National Grid references are given and, variously, dates of opening and closure, changes of ownership, minerals worked and some indication of output, workforce employed, etc. Information is given most consistently on the technical aspects of trackwork and haulage systems, which latter included horses, battery-operated locomotives, stationary winding engines, conveyors, dump-trucks, lorries, etc. Only Bullhouse mine, near Penistone, had a standard-gauge connection to the national rail network. Information is mostly from conversations on-site.

This book constitutes a useful record of these small mines and their railways. A companion volume covering the southern part of England is in preparation. PAUL SOWAN

LA MUSICA DEL TREN [RAILWAY MUSIC], Juan Carlos Rubio Aragonés, 332pp, 743 illustrations, many in colour boards, UVEUVE EDITOR, Paseo del Pinto Rosales 8, 28008 Madrid, Spain, ISBN 84 89043 11 6, 9800 pesetas.

A comprehensive survey of railways and music has long been needed; this beautifully produced volume is an excellent shot at it, albeit available only in Spanish. Two long general historical chapters are succeeded by an even longer section on Spanish train music, a brief one on Mexican and two lengthy ones on the United States. The final pages are devoted to pop music's railway connections, again with a North American emphasis: An English language edition is desirable; this shall contain more on British and less on Spanish, developments, interesting though the latter are. Meanwhile let us Salute Señor Rubio's wide-ranging research. PHILIP SCOWCROFT.

Short Reviews

ROYAL DEESIDE'S RAILWAY, Dick Jackson, 74pp, approx. 40 colour and monochrome pictures, maps, timetables, soft covers, Great North of Scotland Railway Association, 1999, ISBN 0 902343 09 2, £4.95 inc. p&p form GNSRA, 20 Farquhar Road, Huntly, AB54 8FH.

A well written and informative history of the railway up the Dee valley from Aberdeen to Ballater. It includes a full variety of illustrations, most of good quality and covering the whole life of the line from 1852 to 1966. The Deeside line was particularly well known for its royal trains to and from Ballater for Balmoral. These are intriguingly described and well illustrated. There are large scale O.S. map reproductions of station layouts. There is a bibliography but no references or index. A very good local history researched and written with enthusiasm – and a very reasonable price.

HISTORY OF THE STEAM TRAM, H. A. Whitcombe, 75pp, 28 monochrome photographs, 2 drawings, hard covers, Adam Gordon, Priory Cottage, Chetwode, Buckinghamshire MK18 4LB, 2000, ISBN 1 874422 28 1, £13.25 inc. p&p from the publisher.

An elegantly bound direct reprint of a paper published in the Journal of the Institution of Locomotive Engineers, vol XXVII no 137 May–June 1937. The paper is a thorough review of the history and design of steam tram engines in the U.K. with some references to other

aspects of tramway operation. There is also interestingly written wider background history including the anecdote that the Coalbrookdale Company used iron on its rails for the first time as a means of using the iron to some purpose before trade picked up and it could be sold as pig iron. The main paper is wonderfully detailed and the discussion afterwards includes some intriguing contributions. A schedule of tramways giving all their routes and distances operated by steam is included.

THE LAST DAYS OF STEAM ON THE LMR, Eric Sawford, 148pp, approx. 220 monochrome pictures, hard covers, Sutton Publishing, 2000, ISBN 0 7509 2259 1, £19.99.

This album is mainly locomotive shots, mostly photographed on shed. Captions are brief but do say where and when the photographs were taken. The photographs are clear but unexciting. They cover nearly all the ex-LMS and constituent steam classes active on the London Midland Region of British Railways from about 1955 until the end of steam.

THE GIANTS CAUSEWAY TRAMWAY – IRISH RAILWAYS IN PICTURES NO.4, Michael Pollard, 40pp, approx. 80 photographs, maps, timetables, etc., soft covers, Irish Railway Record Society, London Area, 7, High Ridge Road, Hemel Hempstead, Hertfordshire HP3 0AG, 2000, ISBN 0 902564 07 2, £3.95 (£4.45 p&p included).

An attractive album full of pictures and information about the Giant's Causeway, Portrush and Bush Valley Railway and Tramway – opened 1883, closed 1950. Originally steam hauled, services on this line provided for substantial tourist traffic until road transport inevitably took the traffic away. This book contains a lot of tourist pictures and postcard reproductions but also some very well reproduced photographs of operational aspects. A three foot gauge line eight miles long, it had aspirations to extend as seems to have been the norm for small lines initiated at the end of the nineteenth century. Full text accompanies the pictures with intriguing historical detail. No index or sources.

THE AIRE & CALDER NAVIGATION, compiled by Mike Clarke in association with the Waterways Museum, Goole, 128pp, A5, 95 monochrome photographs, 11 diagrams, 12 maps, soft covers, Tempus Publishing Ltd, The Mill, Brimscombe Port, Stroud, GL5 2QG, 1999, ISBN 0 7524 1715, £9.99.

This attractively presented book is part of the Images of England series. It is a book of archive photographs, maps & drawings. The quality of the photographs is very good. The Aire & Calder Navigation is well known for the container boats called 'Tom Puddings' used for moving coal. The book starts with a brief history of the Navigation. The next seven chapters give a pictorial history of many aspects of the canal, with maps and contemporary photographs. The book covers the people, the navigation, Goole & the tideway, Tom Puddings, boat-building & repairs, traffic carried and the navigation today.

[Pages 428-458 see Bibliography]

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Other interesting material included the G A Hookham Collection of negatives of British Railways sold for £1265, a GWR cast iron towing path sign £621, a brass Doncaster No 2036 1948 works plate £632, a run of Great Central Railway Journal Vols. 1 to 6 and 8 to 13 £575 and a single vendor collection of Airey's and Railway Clearing House maps totalled over £3000.

Nameplates continue to sell well as seen in Dominion of New Zealand for £6820, Princess Eugenie £4510, Earl Bathurst £4730, Twineham Court £4950 and Excalibur £4510. The coat of arms Crewkerne in vitreous enamel from SR West Country Class No 34040 realised £4180 and the smokebox number plate 6018 from GWR King Henry VI £2640. Two oval cast brass plates from LMS Royal Scott Class Locomotives Lancashire Witch and Velocipede realised £2640 and £3300 respectively. Most recently GWR/BR Athelney Castle sold with associated paperwork for £7200. It had been purchased by the vendors father from BR in 1964.

We have also sold a fine collection of dining car and railway hotels silver-plate for £10,360, an important collection of locomotive works plates that totalled £18,386, the private antiquarian railway library of Norman Kerr of Cartmel for £33,000 and the railway contents of Wolferton Station Museum, the former royal station for Sandringham for £70,000.

The Poster sales include many travel posters of the 1920's and 1930's published by the Big Four Railways, London Underground, Shipping Companies and Airlines. Prices for these have risen sharply in recent years and they continue to grow in popularity along with early British Rail examples. A fine collection of LNER and early BR posters sold for a total of £160,000 in 1996. The rarest example was The Night Scotsman by Alexander Alexeiff which realised £11,000. These had been discovered by a woman from East Anglia when she was moving house. Her late husband had worked for British Railways as an area maintenance engineer in the late 1950's and salvaged them from Liverpool Street Station when they wee being thrown out with other advertising material.

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