

THE APPROACHES TO SAPPERTON RAILWAY TUNNELS

Tony Youles

The final link in the line from Swindon to Gloucester was completed when the section from Standish Junction to Kemble, was opened to traffic on the 12 May 1845. From Standish the line after passing Stroud, climbs steeply above the Chalford Valley at a ruling gradient of 1 in 60 to the western portal of Sapperton Tunnel, continuing at 1 in 90 to the summit. In steam days the gradient added significantly to the line's working expenses, trains frequently needing assistance from the banking engine which was stationed at Brimscombe.

I. K. Brunel, the engineer to the Cheltenham and Great Western Union Railway, planned, and partly constructed, a longer tunnel at a lower level which involved a much less steeply graded approach from Chalford. In his article on the Sapperton Tunnel, Humphrey Household implies that no work was done in the Chalford Valley on this lower line, and the documentary evidence supports this, yet there are some puzzling man-made features in Frampton Wood near the tunnel mouth which seem to be associated with the earlier proposed alignment.

What follows is a brief account of the circumstances relating to the construction of the tunnel, a description of the structures in Frampton Wood, and a discussion of their possible significance.

The earliest line proposed in 1835 included the remarkable feature of a tunnel on a curve at Sapperton; however at the first General Meeting of the Cheltenham and Great Western Union Railway in October 1836 "Your Directors have further to report that they have secured the valuable superintendence of Mr Brunel in the construction of the railway and he will be enabled to introduce several improvements affecting the general character of the line and the objectionable curve in the proposed tunnel at Sapperton will be avoided."² Nevertheless, Brunel's plans for the whole line, deposited in 1836, featured the curved tunnel, changed to a straight line by a "deviation" plan deposited in 1838.

At the second General Meeting in May 1837 "preliminary shafts to investigate the geological strata of this tunnel have been carried to a considerable depth and are still in progress". These shafts were sunk on the straight line, ahead of the formal deposition of the deviation plan.

At the fourth General Meeting in November 1838, "your directors propose to advertise contracts for sinking permanent shafts in the tunnel at Sapperton, as that operation will occupy several months and no advantage will be gained in proceeding with the line from Kemble towards Gloucester until that work is completed." This refers to the decision made in November 1837 to concentrate on building the line from Cirencester to a junction at Swindon with the GWR line to London, then building, in the expectation of attracting revenue for the minimum of expenditure. For the company was already in financial difficulty.

The section from Cheltenham to Gloucester, which was to be operated jointly with the Birmingham and Gloucester Railway, was completed by the latter company and opened on the 4th of November 1840, whilst the Cirencester to Swindon via Kemble section was opened in May 1841. However, an embankment near Swindon persisted in slipping, being eventually

stabilised only after some fairly desperate, at times even hair-raising engineering, which the company could ill-afford. The story is well told in Cohn Maggs' book *The Swindon to Cheltenham Line*.⁴

Meanwhile, the sinking of five permanent shafts for the tunnel continued. At the ninth General Meeting in May 1841, the Directors reported "that they had received Tenders for driving the Headway through Sapperton Hill and for sinking four additional working shafts, which it is reported would greatly facilitate the operation, the whole to be executed within eight months, at the cost of about £8,000. The advantages of getting this work done were so obvious, under every probable contingency, that the Directors were convinced of the expediency of affecting them at that moderate expense; they therefore let this work to a very respectable contractor [Fowler] on the first day of January last." But, they continued, "as the ultimate completion of the railway will not be materially affected by delaying other works during the progress of the Headway" they decided against such further works until approved by a General Meeting of shareholders. In other words, until the company could afford it. In the event, it never could.

The heading was to be 4ft wide and 5ft high, the top was to be at the level of the proposed line of rails. It was apparently driven from the shafts but not from the ends, Brunel reporting in October that "drainage of the water is obtained into the lower Oolite, without pumping, at one of the intermediate shafts, and of course at the lower extremity of the Headway". The driving of a small heading to explore the strata, establish an alignment and provide drainage was a technique known to Brunel; he and his father Marc, when working together on the Thames Tunnel from Rotherhithe to Limehouse, were aware of the heading 3ft wide and 5ft high started by Trevithick in 1808 and subsequently abandoned. A drawing in the Brunel Archive of Bristol University Library, signed "M I Brunel 1st May 1831" shows "Size of the opening attempted in 1808 compared with the size of the Tunnel".

The nine shafts were completed, but work on the heading seems to have ended sometime before May 1842, when the last payment to Fowler was minuted. The financial situation was now becoming desperate, despite stringent economies made by the Board at their meeting on 3 September 1841, which included cutting the Secretary's salary, reducing the Director's allowances, and "Mr Brunel stated that he should not make any charge to the Cheltenham and Great Western Union Railway, for his services, after the 25th instant, until the works are again resumed". The Directors were attempting to sell the company to the Great Western Railway, seeing this as the only way out of their difficulties. This was eventually achieved after lengthy negotiations. Brunel, as Engineer of the Great Western, lost no time in awarding a contract for the completion of the tunnel. According to Humphrey Household, it was "signed by the Great Western and Jonathan Nowell of Wickwar on June 2, 1843, even before the sale had been confirmed."

The tunnel was mentioned in 1870 in a paper, which included a section drawing (Figure 1), by John H. Taunton, engineer of the Thames and Severn Canal, from information supplied by R.P. Brereton, who had been Brunel's Resident Engineer in charge of its construction.⁵ According to Brereton, financial considerations had forced Brunel to drive the tunnel on the same line, using the existing shafts, but at a higher level, some 45 ft. above the original proposed level at the western portal, thereby significantly reducing its length and cost.

The 6 inch 0.5. map, 1st edition 1888, Figure 2, shows the approach to the tunnel as built. The documentary evidence, noted above, indicates that no work was undertaken on the earlier lower route, yet at point A on the map, beside the stream and below the culvert by which it pierces the embankment, is another culvert, built of what appears to be blue “engineering” brick. The stream by-passes it in an artificial channel. The hillside to the east and west of the abandoned culvert is characterised by mounds and hollows which, though thickly wooded like the surrounding ground, appear artificial rather than natural. Furthermore between points B and C on Figure 2, there is a stone wall approximately 150 metres long, corresponding to the solid line demarcating the boundary between the track and field number 162 and part of 158 to the south. Solid lines denote a fenced road; dotted lines an unfenced one. The northern boundary of the track, against field number 161, is a hedge, now much overgrown. The remainder of the track to east and west is marked in dotted lines, and is indeed unfenced.

This structure has all the appearance of a retaining, rather than a mere boundary wall. It is about 2.5 metres high, well built with a pronounced slope or batter. At its western end, the wall returns into the hill at a right-angled corner. Its style of construction is similar to, though smaller than, the massive wall at Bakers Mill, SO 915028. This wall retains the lower part of the earthworks supporting the railway on the steep hillside above, which without it would encroach on the road and canal below. This wall also returns to the hill at its western end.

The wall B-C on Figure 2, and the culvert at point A, appear to have no useful function. Could they be related to the projected earlier, lower line of railway?

The relevant section of Brunel’s 1836 map (reference 3) on a scale of 4 inches to a mile, compares closely to the 6 inch 0.S. map. Brunel’s map shows the track, variously described as “Parish Road” and “Highway”, as unfenced, bounded to the north by field number 33, which corresponds to the OS. field number 161. Similarly, the 1836 map’s field numbers 34 and 35 correspond to numbers 160 and 212 on the 0.S. map.

Unfortunately the 1836 map, though in good condition, could not be photocopied, but a tracing was made. The 1838 deviation map is to the same scale and identical to the earlier one apart from the amended line of railway. This later line was added to the tracing. Finally the 0.S. map was reduced photographically to the 4 inch scale, and the tracing laid over it. A close correspondence was achieved, and the as-built line of rail was added to the tracing. Figure 3 shows the result. The 1838 tunnel entrance is not marked on the deviation map, but would be a little to the west of the present portal. Figure 1 seems to indicate that the heading did not completely penetrate the hillside to reach the open air, but even if it did, all traces would have been obliterated by the earthworks leading to the present tunnel entrance.

It can be seen from Figure 3 that both the 1836 and 1838 lines would have passed close to the parish road at a higher level, necessitating an embankment and a retaining wall to avoid encroaching on the “highway”, as a visit to the site confirmed. The abandoned culvert and the retaining wall and, more speculatively, the lie of the land adjacent to the culvert, seemed to be consistent with the 1838 line. It being March, the trees were bare, so movement over the steep ground was possible, though not easy. In summer the woods are almost impenetrable.

The evidence on the ground points to the conclusion that, contrary to the opinion of Humphrey Household, some work was done on the approach to Sapperton tunnel at the earlier, lower level only to be abandoned before the earthworks had got very far. As against this, it has to be said that the documents so far examined point to the opposite conclusion. However the Minutes of the Cheltenham and Great Western Union Railway, which with the deposited maps are the sole primary source so far identified (a search of the Brunel Archive at Bristol University proved fruitless), whilst recording payments to contractors, give few details of the contracts to which they refer. Moreover, only two of the original three volumes are to be found in the Gloucester Record Office. It is inconceivable that work such as that described would have been undertaken without a contract. The C.&G.W.U. Railway contracts, if they have survived, are likely I am informed, to be in the Public Record Office at Kew. Unfortunately I have so far not been able to follow this up, though I hope to do so some time in the future. Meanwhile, if GSIA members can offer suggestions or are in possession of other relevant information not dealt with in this work, I shall be glad to hear from them.

References

1. Household, Humphrey "Sapperton Tunnel" *Railway Magazine* vol. 96 February 1950.
2. Minutes of the Cheltenham and Great Western Union Railway, Gloucester Record Office D3798/5 .
3. GRO Q/RUM 146 and 151/2 respectively.
4. Maggs, Cohn G. *The Swindon to Cheltenham Line* Alan Sutton 1991. The author incorrectly describes Brunel's 1838 deviation as being to the later, higher line. Taunton, John H, "Sapperton Tunnel on the Thames and Severn Canal", *Proceedings of the Cotteswold Naturalists Field Club*, vol. 5 1872

LONGITUDINAL SECTION OF GREAT WESTERN RAILWAY TUNNELS

LONG TUNNEL 1760 YARDS IN LENGTH
SHORT DO 320 DO

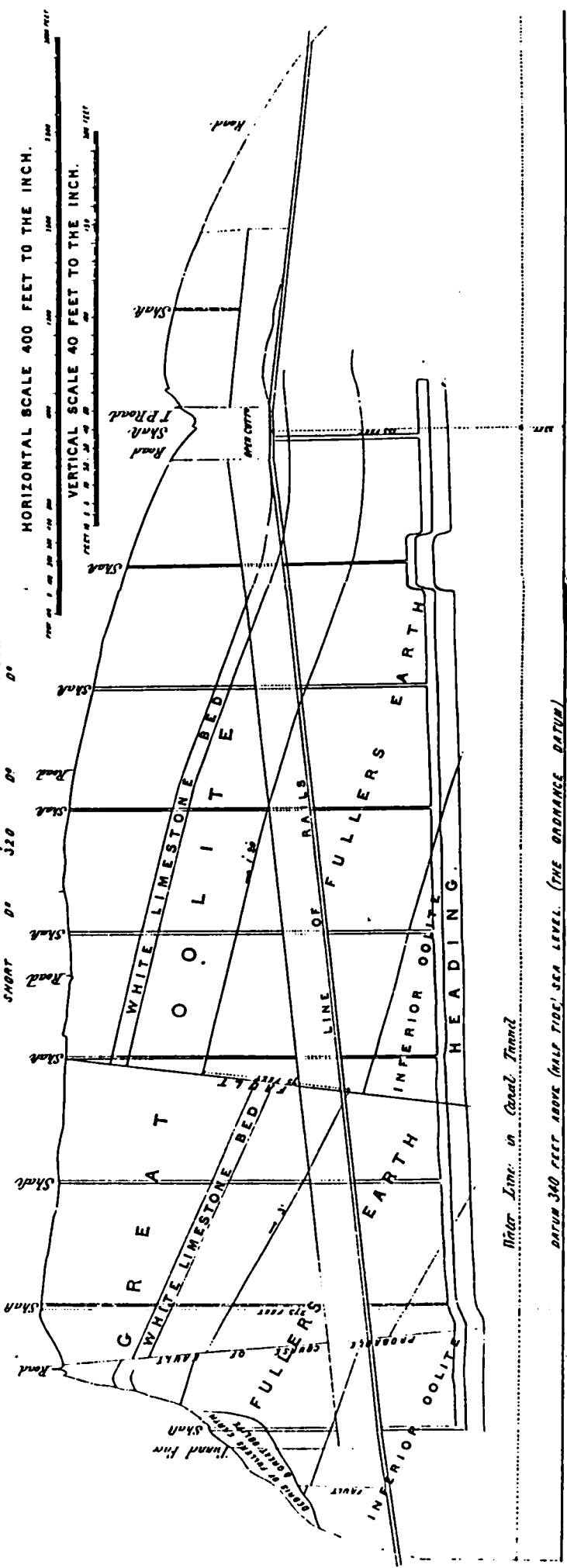


Figure 1. Section of tunnel and abandoned heading, John Taunton 1870.

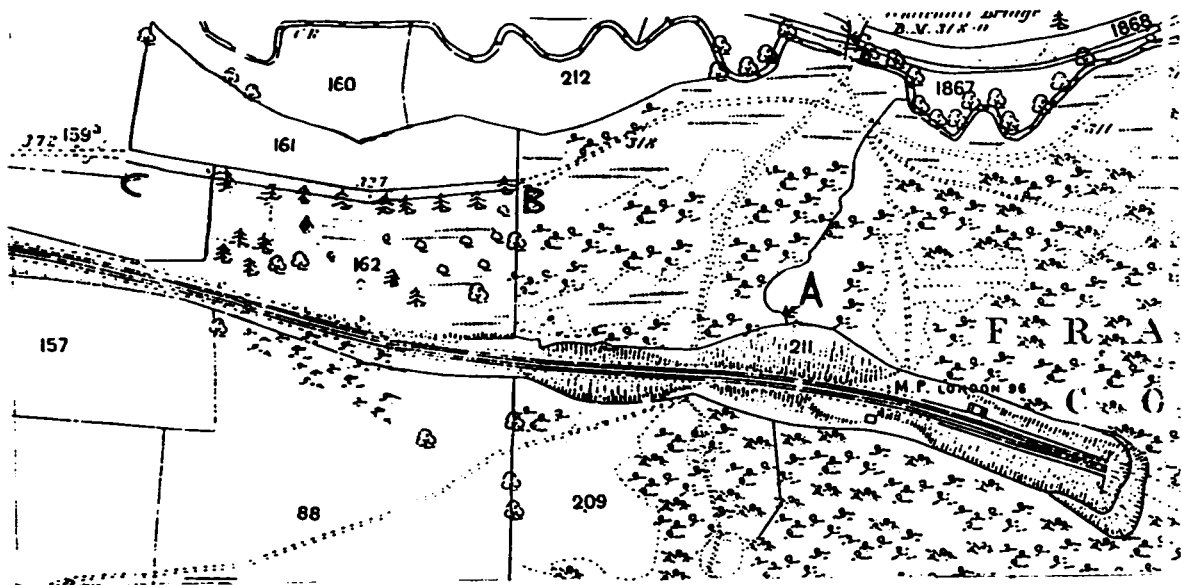


Figure 2. Ordnance Survey 6 inch, 50 NE & NW, 1st edition 1888.

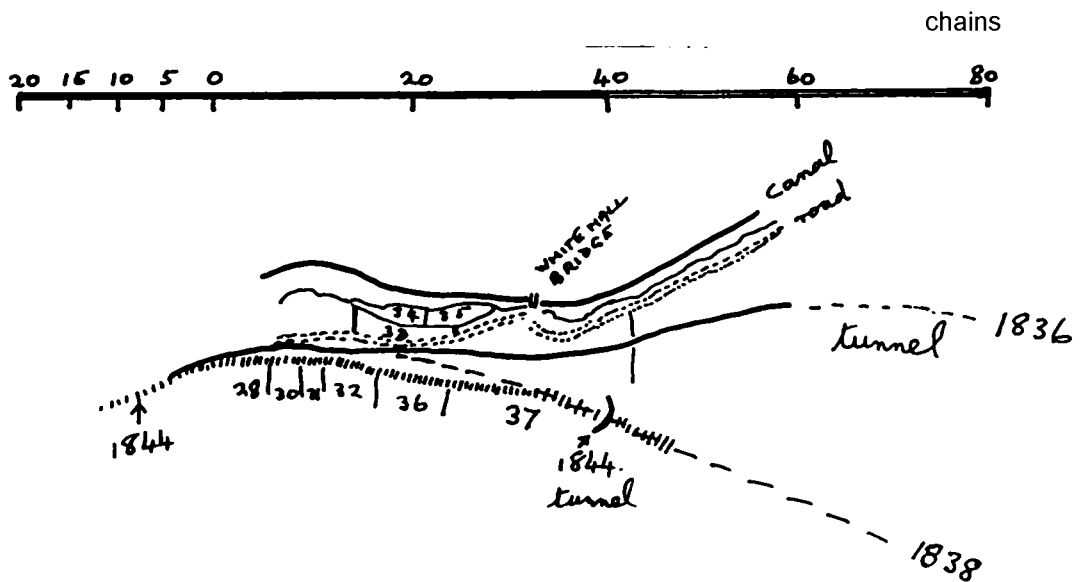


Figure 3. Approaches to the tunnel as proposed and as built in 1844.