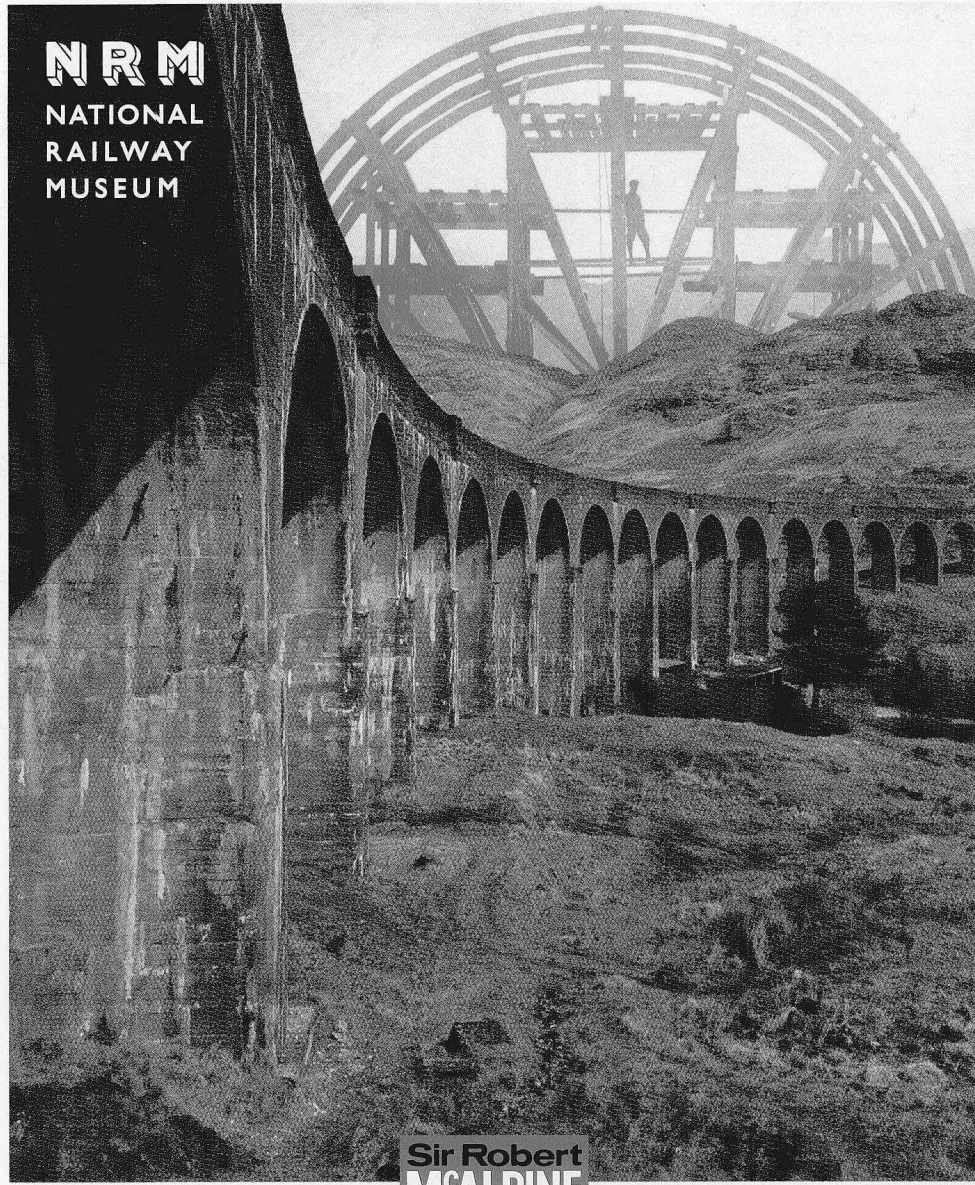


# The Mallaig Railway

## The West Highland Extension

1897-1901



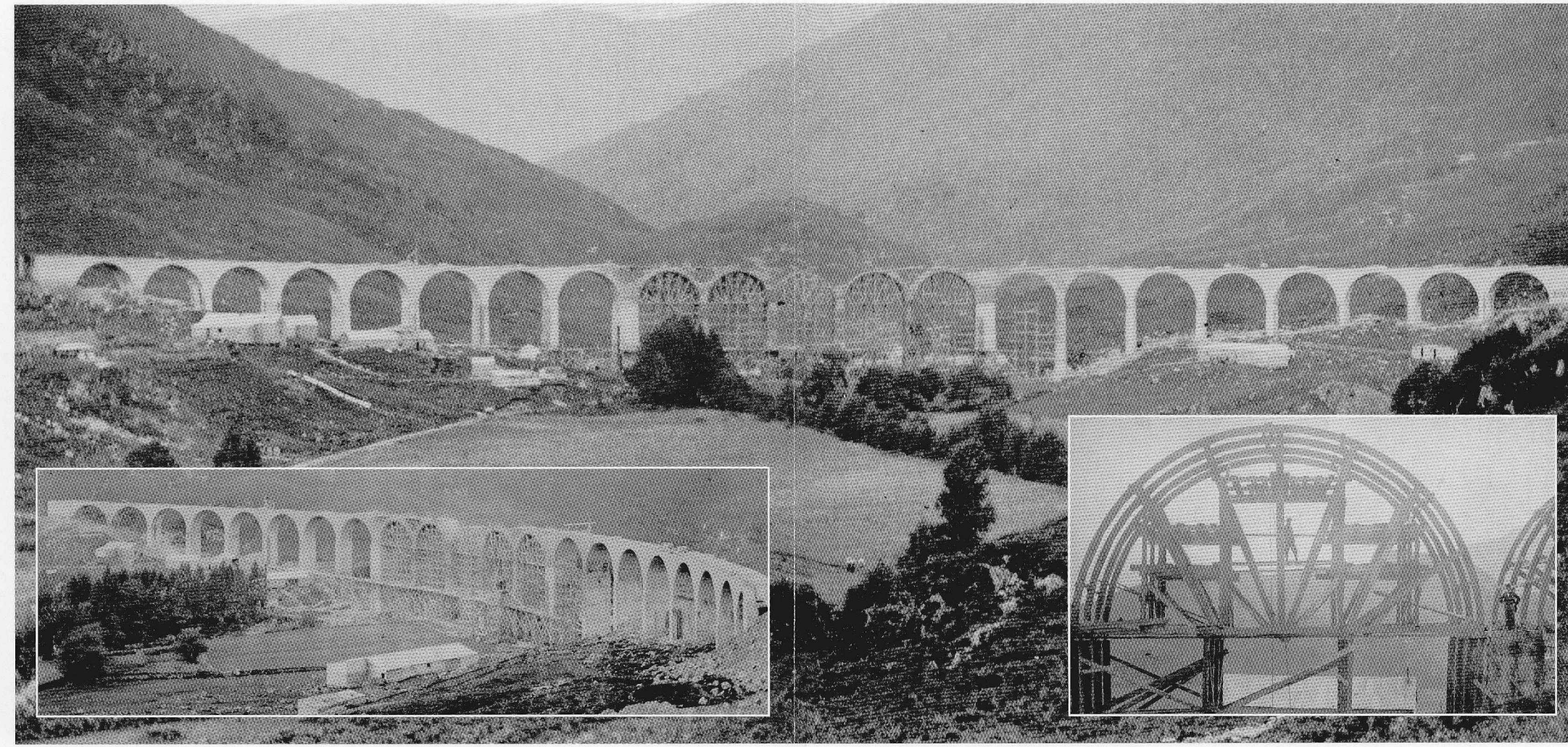
Sir Robert McALPINE

Traversing some of the most beautiful scenery - and some of the most difficult terrain - in the British Isles, the 40-mile (64.5km) extension of the West Highland Railway runs from Banavie near Fort William on the shores of Loch Linnhe to the Atlantic seaboard at Mallaig. Built between 1897 and 1901, it was one of the last major railway enterprises in Britain, and the 'Iron Road to the Isles', as it is known, ranks among the greatest triumphs of Victorian railway engineering and construction. It was the prospect of a lucrative traffic in sea fish which drove the railway company westward from its 1894 terminus, and it was the pairing of the talented and determined engineering and contracting firms of Simpson &

Wilson and Robert McAlpine & Sons which realised that prospect at the formal opening of the line on 1 April 1901, almost one year ahead of schedule. Alexander Simpson (1832-1922) and Robert McAlpine (1847-1934), heads of their respective firms, were both of Lanarkshire origin and had first become acquainted in 1876, the year in which McAlpine first began to use the building material which earned him the enduring nickname of 'Concrete Bob'. His eldest son, Robert Jnr, assisted by one of his younger sons, Malcolm, was placed in charge of contracting work on the Mallaig extension which provided the perfect opportunity for McAlpines to demonstrate to the

world the versatility, strength and relative cheapness of mass concrete used on an extensive scale for major bridge-building purposes. The results were - and remain - truly spectacular, and six concrete viaducts constitute the line's most outstanding engineering monuments. Designed by W S Wilson and built by Robert McAlpine, they are most famously symbolised by the Glenfinnan Viaduct which sweeps dramatically across the valley at the head of Loch Shiel in a great crescentic arc 1,248 feet (380.4m) in length and 100 feet (30.5m) in maximum height on 21 arches of standard 50-foot (15.2m) span, 'a thing so delicate that the fairies might have built it', according to the author J J

Bell. But in other feats of great technical daring, engineer and contractor together took concrete bridge construction literally to new lengths. One of the arches of the four-arched Morar Viaduct (1897) extended the limit of concrete spans from 60 to 90 feet (18.3m to 27.4m), and a little later at the Borrodale Burn, confronted by a local laird's insistence on cladding intermediate piers in expensive granite, Wilson and McAlpine decided upon a breathtaking 127 feet 6 inches (38.9m) for a central span of a three-arched viaduct, where what the world had witnessed prior to the building of this railway.



Glenfinnan Viaduct, with last five central arches under construction. (NRM/100/00) Inset (left) oblique general view of construction works (NRM/118/00) and (right) detail of timber arch centering (NRM/114/00). © National Railway Museum / Science & Society Picture Library

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Further information about the West Highland Railway Extension and about the sites illustrated in this broadsheet is available from the NMRS at the address given above. The NMRS is open Monday to Friday 9.30 - 16.30.

RCAHMS is grateful to The National Railway Museum, York, for permission to reproduce the historical photographs held in its collections.

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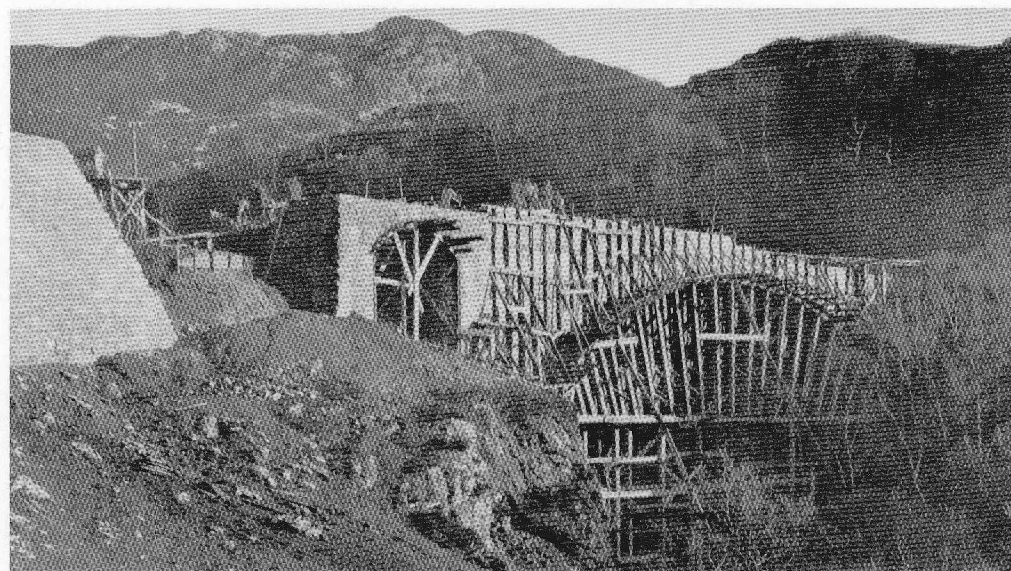
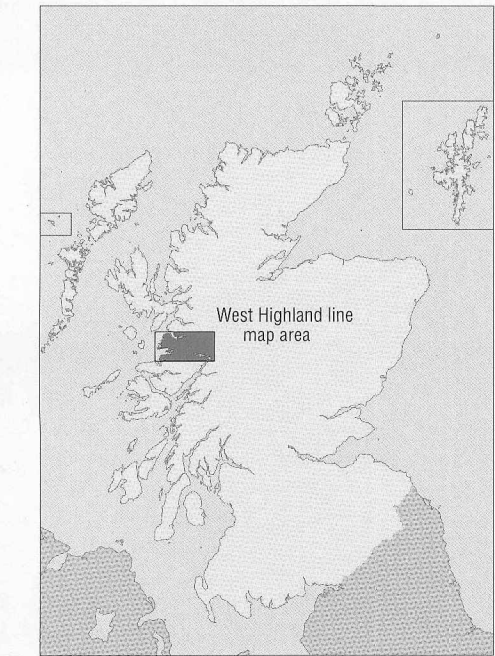
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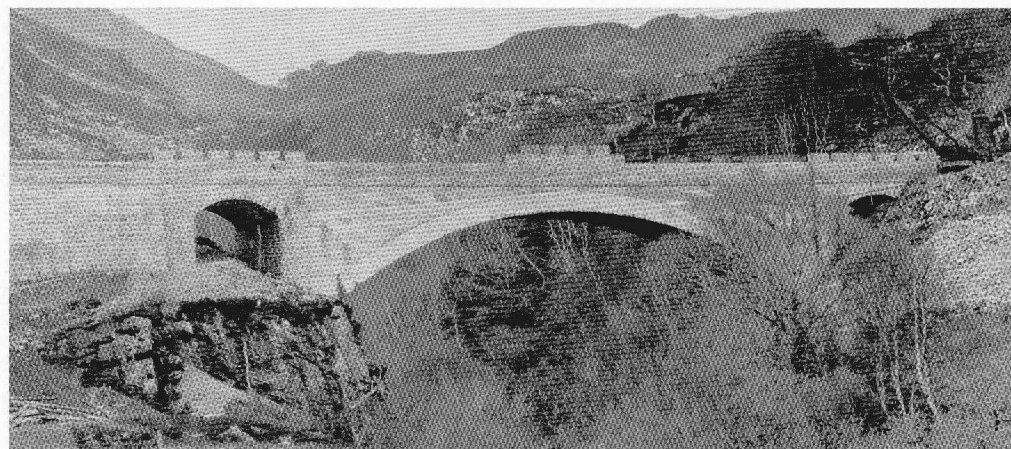
Front cover: Timber arch centering in the construction of Glenfinnan Viaduct, c.1897. Glenfinnan Viaduct from west.

The National Railway Museum (NRM) in York is the world's leading museum dedicated to the 'story of the train'. The NRM collection includes the record breaking *Mallard*, the Japanese 'Bullet Train' and thousands of images of railways past and present. Award-winning imaginative and interactive displays have something for everyone. Admission to the NRM is free although the Museum reserves the right to charge for some special events.

For more information about the Museum telephone 01904-621261 (office hours), 01904-686286 (24 hour information line) or visit the website at <http://www.nrm.org.uk>



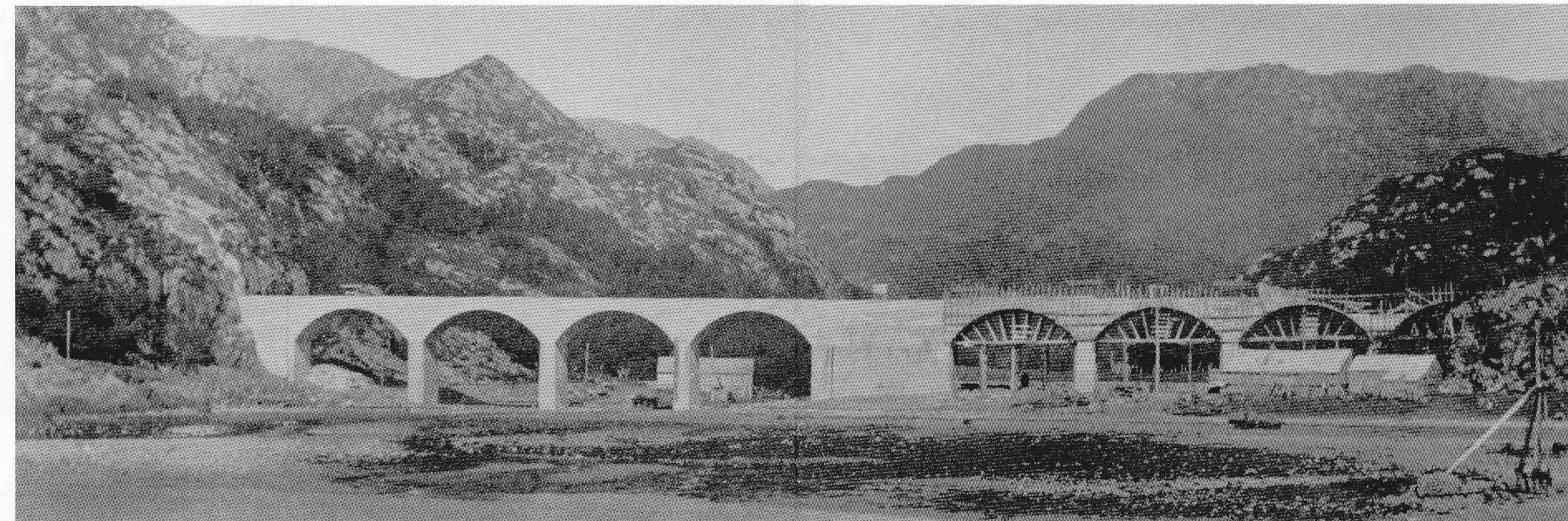
Borrodale Viaduct under construction. (NRM/101/00) © National Railway Museum / Science & Society Picture Library



Borrodale Viaduct on completion. (NRM/128/00) © National Railway Museum / Science & Society Picture Library

The mountainous terrain through which this railway was built required no less than 11 tunnels and almost a hundred rock cuttings. The region is made up of some of the world's hardest rock - mica-schist, quartz and gneiss - which, in the engineer's own words, 'was admirably suited for concrete, [but] was quite impossible to use ... for masonry on a large scale.' Blasting and removing this rock with pneumatic drills was a notoriously difficult operation, made particularly expensive by the fact that the air compressors which

powered the drills were driven by steam engines which consumed much coal. Observing a water-powered drill used by his dentist, the young Malcolm McAlpine suddenly saw the considerable advantages of using water as a power source for the compressors. It was more cheaply available, and the changeover to water turbines immediately brought about a fourfold increase in the rate of drilling, later providing direct power for electric drills. Ironically, in May 1898 Malcolm himself was



Loch nan Uamh Viaduct nearing completion. (NRM/99/00) © National Railway Museum / Science & Society Picture Library



Polish Field Hospital. (NRM/91/00) © National Railway Museum / Science & Society Picture Library



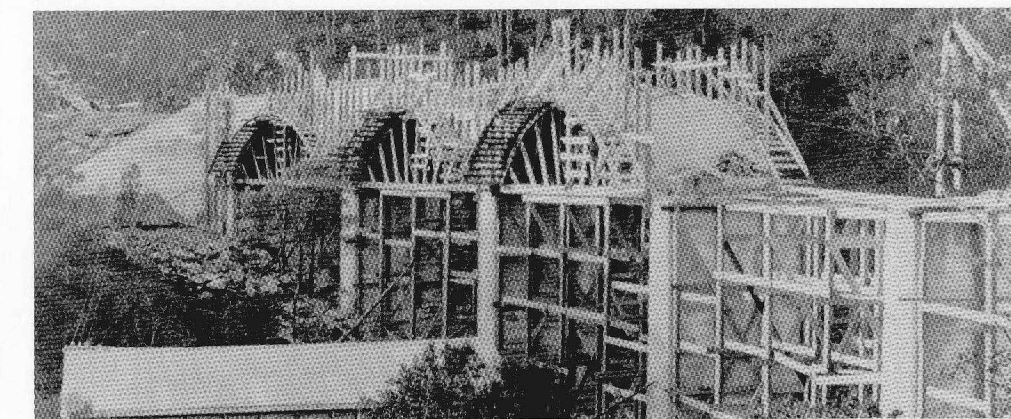
Pneumatic rock drill. (NRM/76/00) © National Railway Museum / Science & Society Picture Library



Steam-powered rock crusher in operation. (NRM/126/00) © National Railway Museum / Science & Society Picture Library



Arieniskill Bridge on completion. (NRM/117/00) © National Railway Museum / Science & Society Picture Library



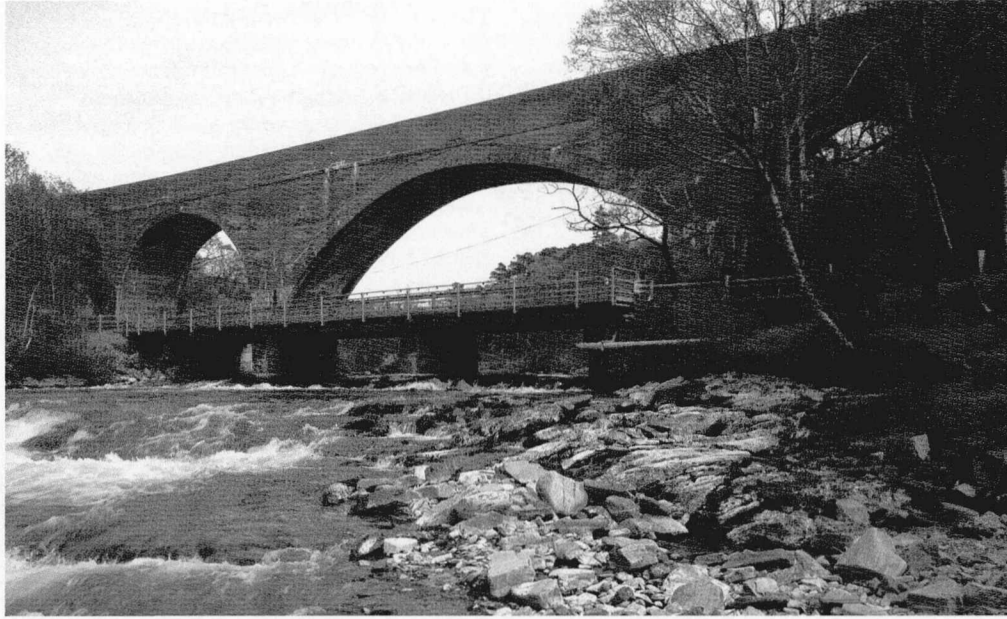
Arnaboll Glen Viaduct in early stages of construction. (NRM/121/00) © National Railway Museum / Science & Society Picture Library

gravely injured in a blasting accident. The story of his emergency treatment by Glasgow's most distinguished surgeon, Professor Sir William MacEwan, and his subsequent long, slow journey with an escort of navvies to MacEwan's nursing home in Glasgow was the single most dramatic human episode associated with this work. Happily, Malcolm made a complete recovery and lived to the ripe old age of 89. Unfortunately, however, such blast injuries were commonplace

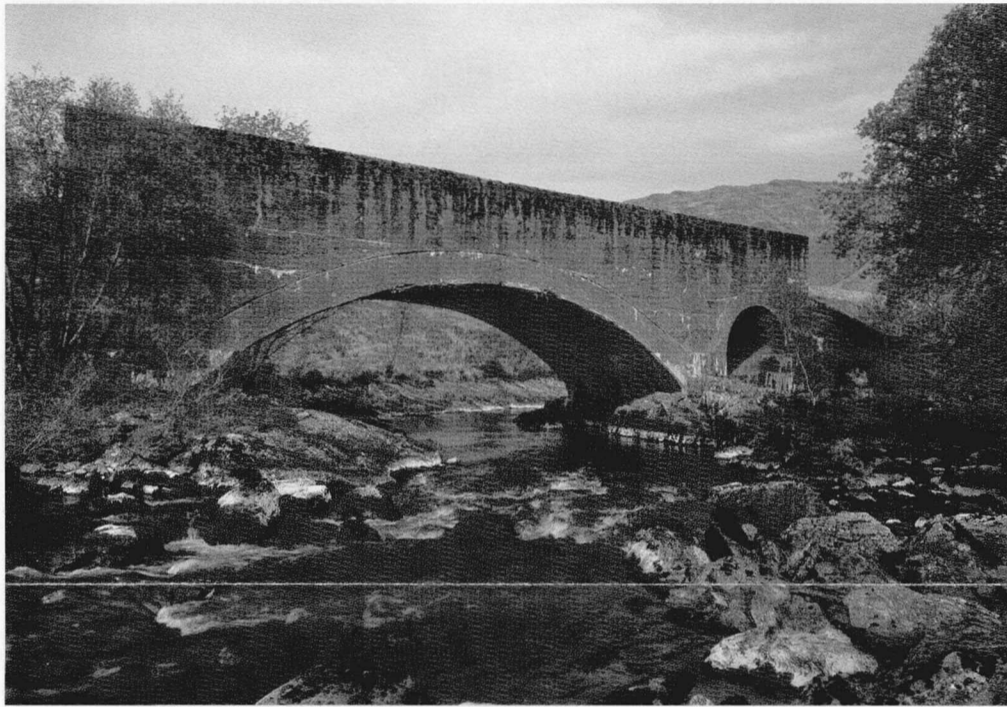
among the workforce, but in order to cope with such accidents Robert McAlpine Jnr can claim the credit for the first field hospital to be set up on a construction site in Britain. Using profits from a licensed canteen which he had instituted in an attempt to curb drunkenness, Robert had converted a schoolhouse at Polnish into an eight-bed hospital staffed by a doctor and two nurses. This was the place where his own brother Malcolm was taken and first treated by MacEwan.

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Morar Viaduct from west-south-west with Falls of Morar in foreground. (RCAHMS: D48106/CN)



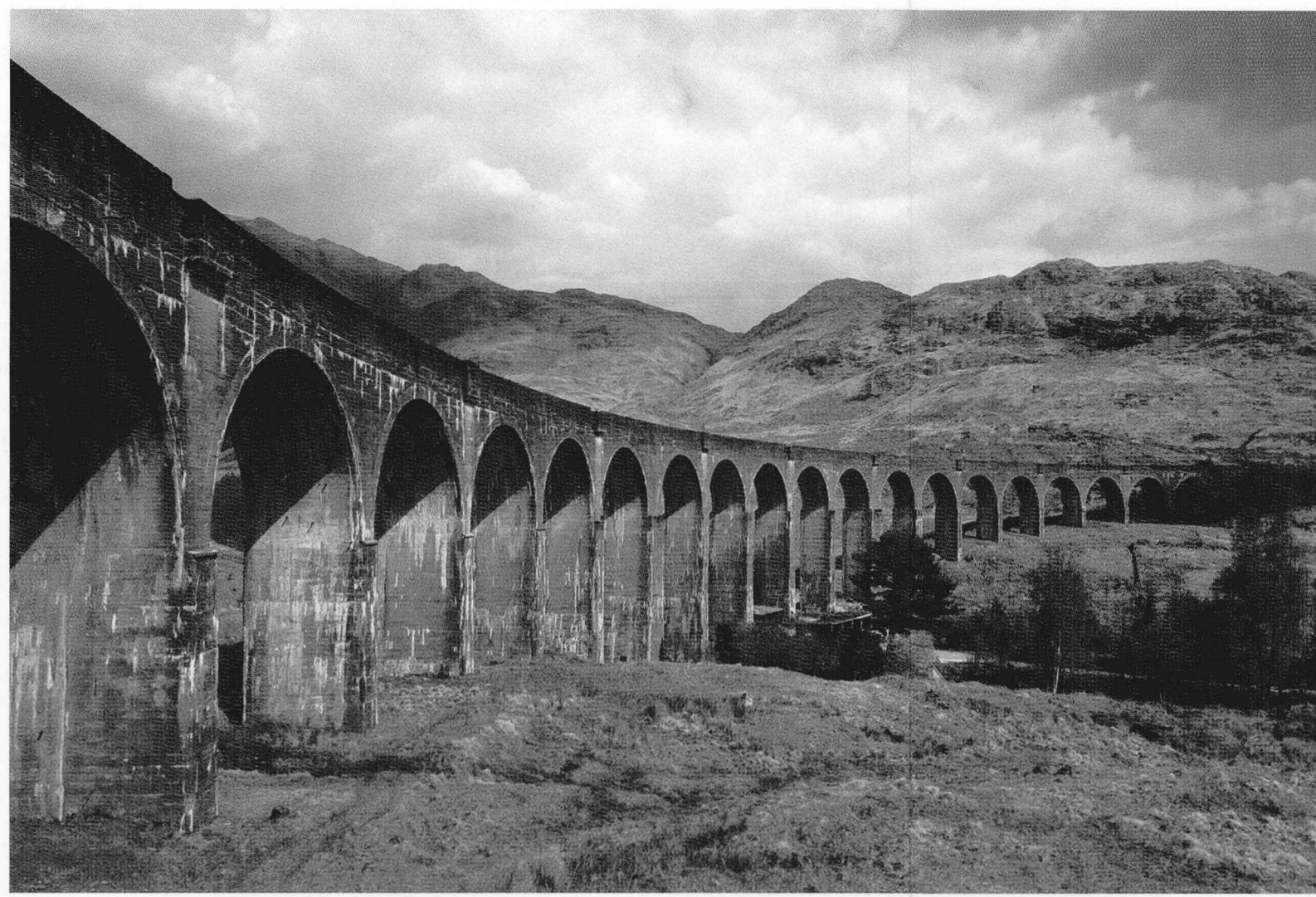
Arrienskill Bridge from south-east. (RCAHMS: D48274/CN)



Specimen small concrete overbridge near Cross. (RCAHMS: D48043/CN)



Larichmore Viaduct, from south. (RCAHMS: D48110)



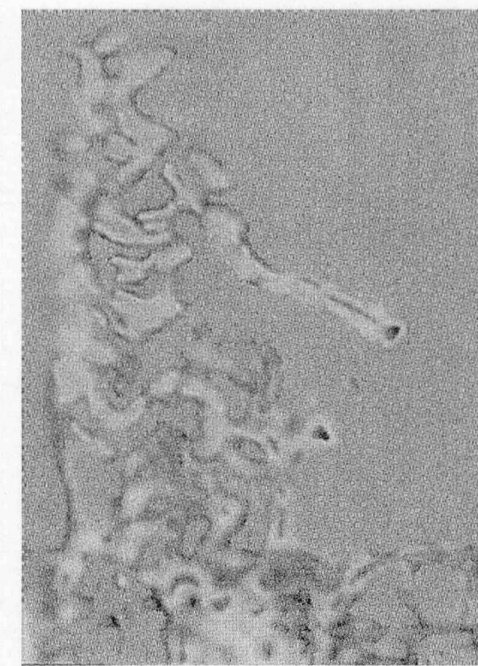
Glenfinnan Viaduct from west. (RCAHMS: D47918/CN)



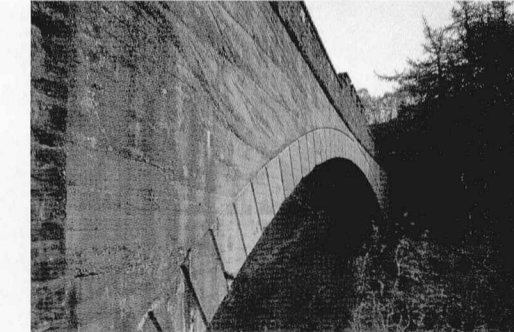
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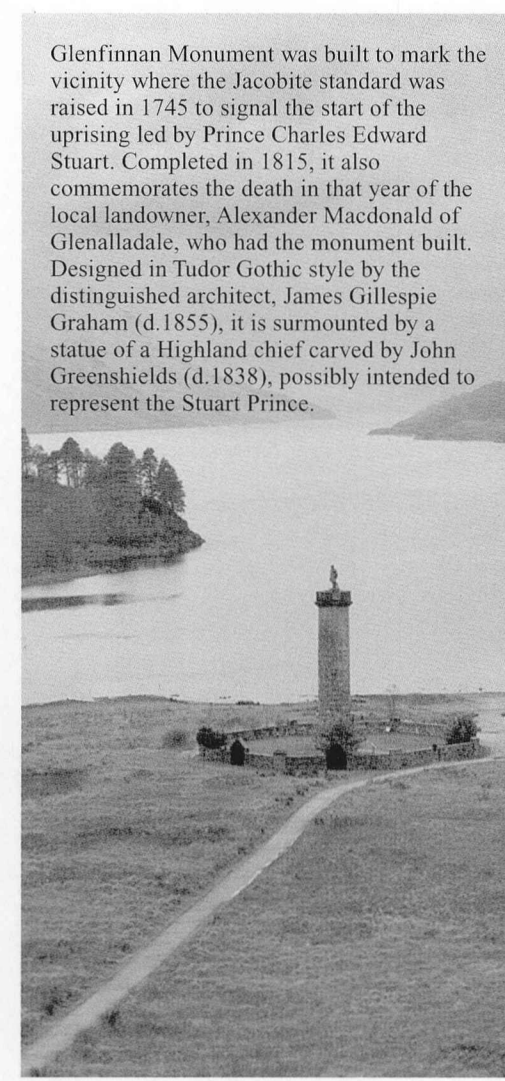
Loch nan Uamh Viaduct from south-east. The white spot indicates the location of the horse and cart. (RCAHMS: D48255/CN)



Borrodale Viaduct; detail of arch ring showing 'voussoirs' simulated in concrete. (RCAHMS: D48291)



Bizarre celebrity status has recently been accorded the 51 feet (15.5m) long central pier of the eight-arched Loch-nan-Uamh Viaduct, for here penetrative radar scans have shown that, among the backfilled rubble, it contains the entombed skeletal remains of a horse and cart which appear to have fallen backwards during tipping operations. Persistent local legend had long associated this event with the Glenfinnan Viaduct but its piers had failed to reveal any such evidence.



Glenfinnan Monument; high-level view from north-east. (RCAHMS: D23553/CN)

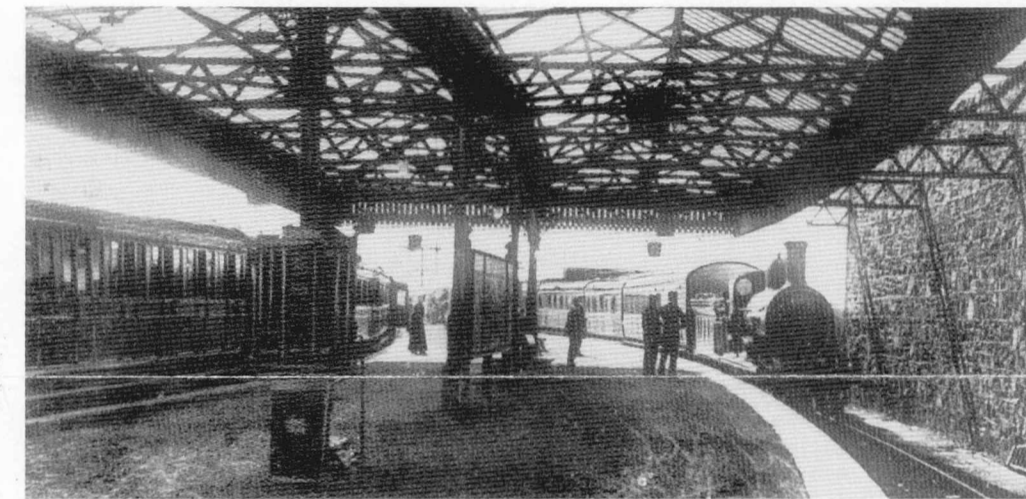
Glenfinnan Monument was built to mark the vicinity where the Jacobite standard was raised in 1745 to signal the start of the uprising led by Prince Charles Edward Stuart. Completed in 1815, it also commemorates the death in that year of the local landowner, Alexander Macdonald of Glenalladale, who had the monument built. Designed in Tudor Gothic style by the distinguished architect, James Gillespie Graham (d.1855), it is surmounted by a statue of a Highland chief carved by John Greenshields (d.1838), possibly intended to represent the Stuart Prince.



Fort William Railway Station, 1952. (RCAHMS, Rokeby Collection: IN/4579)



Glenfinnan Railway Station; former booking office, now a museum. (RCAHMS D48021/CN)



Mallaig Railway Station, 1910. (RCAHMS, Rokeby Collection: B69975)



Banavie; steel bow-truss railway swing bridge over Caledonian Canal from north-east. (RCAHMS: D48394/CN)



Fort William Junction; brick-built signal box from west. (RCAHMS: D48100/CN)



Banavie, Caledonian Canal; aerial view of the eight-flight of locks known as 'Neptune's Staircase' with railway swing bridge bottom centre, 1985. (RCAHMS: A36760)