



David Stevenson
(1815-1886), by unknown
engraver

Stevenson, David (1815-1886), civil engineer, was born in Edinburgh on 11 January 1815, the third surviving son of Robert Stevenson (1772-1850), a civil engineer, and his wife, Jane (c.1779-1846), daughter of Thomas Smith (*bap.* 1752, *d.* 1815), engineer to the Northern Lighthouse Board. He was the brother of Alan Stevenson and Thomas Stevenson. He was educated in Edinburgh at the high school in 1824-30 and attended classes at the university in 1831-5 under professors Wallace, Forbes, Hope, and Jameson while undergoing an exemplary engineering training in his father's office. Before commencing his apprenticeship Stevenson gained experience in working with iron and wood with a leading Scottish millwright, James Scott of Cupar, Fife, and was taught mechanical drawing by his son David Scott. In 1832 he gained experience on bridge works being conducted by his father over the Clyde at Glasgow, and the Forth at Stirling, where he dressed at least one arch stone, and also at the cotton works of James Smith of Deanston, agricultural engineer. In 1833-4 Stevenson's training included surveying for the Tay navigation improvement and with William Mackenzie (1794-1851), contractor, setting out and starting work on a 22-mile section of the London and Birmingham Railway in Warwickshire and on the construction of Edgehill Tunnel, Liverpool.

In 1835 Stevenson studied road making in Ireland and diving bell work at Kingstown harbour and made a survey of and supervised road construction on the Calf of Man. His earliest papers were read to the Royal Scottish Society of Arts on the subjects of the Liverpool and Manchester and Dublin and Kingstown railways, in 1835 and 1836 respectively, the former earning him a medal from the society. Late in 1835, aged twenty, Stevenson declined an invitation from Marc Isambard Brunel to work as a resident engineer on the Thames Tunnel, preferring the post of resident engineer at Granton harbour, where he worked under his father on quarry opening, pier construction, and road building. In 1837 he resigned this post and gained wider experience in North America, France, Switzerland, Germany, and the Netherlands. This tour led to the publication of his influential and now historically valuable *Sketch of the Civil Engineering of North America* (1838, 2nd edn, 1859), which influenced the introduction into Britain of faster steam vessels, with fine lines and long-stroke pillar engines and cost-effective timber construction.

In May 1838 Stevenson entered into partnership with his father and brother Alan and the firm became known as Robert Stevenson & Sons. As 'managing partner' he immediately became responsible for the entire management of the firm's general business. Work in Scotland included navigational improvement on the Forth, Tay, Clyde, and Nith, and harbour construction. English projects included improvements to the Dee, Lune, Ribble, Wear, and Fossdyke, and in Ireland, the Erne and Foyle. Other work included Mullagmore and Morcambe harbours, Allanton Bridge, Newfoundland lighthouses, Peebles railway,

Birkenhead docks, and opposing railway crossings of the Tay and Dee. On 3 June 1840 Stevenson married Elizabeth (1816–1871), daughter of James Mackay, a goldsmith from Edinburgh. They had four sons and four daughters. Only two sons survived childhood; they were David Alan Stevenson (1854–1938) and Charles Alexander Stevenson (1855–1950) [*see under* Stevenson, David Alan], who continued the family engineering tradition.

Stevenson also advised on salmon fishing disputes and in 1842, in connection with the Dornoch fishings, first categorized the different physical characteristics of a river in to the well-known terms 'sea proper', 'tidal', or 'river proper'. This work led to his paper 'Remarks on the improvement of tidal rivers' read to the Royal Society of Edinburgh in 1845, which was also separately published, under the same title, that year (2nd edn, 1849); in it he argued conclusively that if the duration of tidal influence was extended, the hydraulic head would be lessened and the velocity of tidal currents decreased. Stevenson also correctly propounded the theory of the origin of bars at the mouths of rivers and defined effective measures for their removal. He emphasized the necessity for accurate data upon which to base improvements and wrote *A treatise on the application of marine surveying and hydrometry to the practice of civil engineering*, which was published in 1842. Stevenson's practice of marine engineering was extensively promoted through his article 'Inland navigation' in the *Encyclopaedia Britannica* (8th edn, 1857), enlarged into *Canal and River Engineering* (1858). This became a definitive work which continued to be used well into the twentieth century and established his national reputation.

In 1846, when railway projects, and to a lesser extent public health bills, were overwhelming the Admiralty and Woods and Forests departments, Stevenson held courts of inquiry under the Preliminary Inquiries Act for at least twenty proposed bills. His findings were accepted in every case, except for the Caledonian Railway's proposed crossing of the Clyde at Glasgow, which was at first opposed by the Admiralty but later approved. In 1849–50 he reported on fishery board proposals at Lybster and Scallisaig harbours which led in 1851 to his becoming at his own request joint engineer to the board with his brother Thomas for more than thirty years. In 1853 Stevenson succeeded his brother Alan as engineer to the Northern Lighthouse Board and the following year achieved construction of Britain's most northerly lighthouse at North Unst (Muckle Flugga) under difficult circumstances. In 1855, again at his own instigation, he became joint engineer to the board with Thomas. In 1855–80 they designed and executed some twenty-eight beacons and thirty lighthouses, two of which, Dhu Heartach in 1872 and Chicken Rock (Isle of Man) in 1875 were works of particular difficulty on isolated rocks.

The general business of what had become the firm of D. and T. Stevenson continued to flourish under Stevenson's management until his retirement because of ill health in 1884. In addition to marine work the firm was also engaged on public health improvements, including Edinburgh and Leith sewerage in 1863, the city's first such major scheme, which involved the construction of the Water of Leith sewer to an outfall in the Forth. Abroad, the firm's lighthouse practice extended to India, New Zealand, and Japan, including the organization of complete systems for the two latter countries. For Japanese lighthouses in earthquake zones Stevenson devised an 'aseismatic' joint to mitigate the effect of shocks on lighting apparatus, but according to Richard Henry Brunton (1841–1901), the site engineer the firm had recruited, it did not prove effective in practice. Stevenson played a leading part in developing and promoting the use of paraffin in place of the more expensive colza oil in lighthouse illumination from about 1870, which resulted in enhanced light intensity at a lower cost and considerable savings worldwide.

In 1844 Stevenson was elected a fellow of the Royal Society of Edinburgh (vice-president in 1873–7), and also a member of the Institution of Civil Engineers; he contributed papers to both bodies. Stevenson was also a member of the Société des Ingénieurs Civils, Paris, and other learned societies. He was twice president of the Royal Scottish Society of Arts, in 1854 and 1869, his latter presidential address being entitled 'Altered relations of British and foreign industries and manufactures'. He was also engineer to the

convention of royal burghs of Scotland and to the Highland and Agricultural Society. Other writings by Stevenson included 'Our lighthouses' in *Good Words* (1864), which was also separately published in book form in the same year, *Reclamation and Protection of Agricultural Land* (1874), and the definitive life of his father published in 1878. His many interests included the improvement of agricultural implements, better endowment of professorial chairs of the University of Edinburgh, art and art criticism, and the formation of a valuable collection of etchings and engravings.

Stevenson was a man of sound judgement, upright, kind, open, and easily accessible. He died at Anchor Villa, West Links, North Berwick, of apoplexy on 17 July 1886 and was buried at Dean cemetery, Edinburgh.

Roland Paxton

Sources

Proceedings of the Royal Society of Edinburgh, 14 (1886–7), 145–51 · *PICE*, 87 (1886–7), 440–43 · C. Mair, *A star for seamen: the Stevenson family of engineers* (1978) · J. K. Finch, *Engineering classics of James Kip Finch* (1978) · D. Stevenson, *The principles and practice of canal and river engineering*, rev. D. A. Stevenson and C. A. Stevenson, 3rd edn (1886) · business records of Robert Stevenson & Sons, NL Scot., Acc. 10706 · private information (2004) · d. cert.

Archives

NL Scot., business records of Robert Stevenson & Sons, Acc. 10706

Likenesses

engraving, repro. in Mair, *A star for seamen* [see *illus.*]

Wealth at death

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