

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

## CAMBRIDGE LIBRARY COLLECTION

Books of enduring scholarly value

### Technology

The focus of this series is engineering, broadly construed. It covers technological innovation from a range of periods and cultures, but centres on the technological achievements of the industrial era in the West, particularly in the nineteenth century, as understood by their contemporaries. Infrastructure is one major focus, covering the building of railways and canals, bridges and tunnels, land drainage, the laying of submarine cables, and the construction of docks and lighthouses. Other key topics include developments in industrial and manufacturing fields such as mining technology, the production of iron and steel, the use of steam power, and chemical processes such as photography and textile dyes.

### Life of Robert Stevenson

Published in 1878, this biography of the civil engineer Robert Stevenson (1772–1850) was written by his second-youngest son David (1815–86), also a civil engineer and uncle to the author Robert Louis Stevenson. Having already published *The Principles and Practice of Canal and River Engineering* in 1872 (also reissued in this series), he set about writing this survey of his father's life and works, based on extracts from Robert's professional reports, notes from his diary, and communications to scientific journals and societies between 1798 and 1843. Perhaps most widely known for his practical and persuasive leadership in building many lighthouses for the Northern Lighthouse Board – including that on the notorious Bell Rock, over which he came into conflict with engineer John Rennie regarding the design – Stevenson ensured that the Scottish coastline became a much safer place for shipping for decades to come.

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

Cambridge University Press has long been a pioneer in the reissuing of out-of-print titles from its own backlist, producing digital reprints of books that are still sought after by scholars and students but could not be reprinted economically using traditional technology. The Cambridge Library Collection extends this activity to a wider range of books which are still of importance to researchers and professionals, either for the source material they contain, or as landmarks in the history of their academic discipline.

Drawing from the world-renowned collections in the Cambridge University Library and other partner libraries, and guided by the advice of experts in each subject area, Cambridge University Press is using state-of-the-art scanning machines in its own Printing House to capture the content of each book selected for inclusion. The files are processed to give a consistently clear, crisp image, and the books finished to the high quality standard for which the Press is recognised around the world. The latest print-on-demand technology ensures that the books will remain available indefinitely, and that orders for single or multiple copies can quickly be supplied.

The Cambridge Library Collection brings back to life books of enduring scholarly value (including out-of-copyright works originally issued by other publishers) across a wide range of disciplines in the humanities and social sciences and in science and technology.

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

# Life of Robert Stevenson

*Civil Engineer*

DAVID STEVENSON



CAMBRIDGE  
UNIVERSITY PRESS

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

**CAMBRIDGE**  
UNIVERSITY PRESS

University Printing House, Cambridge, CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.  
It furthers the University's mission by disseminating knowledge in the pursuit of  
education, learning and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781108070584](http://www.cambridge.org/9781108070584)

© in this compilation Cambridge University Press 2014

This edition first published 1878  
This digitally printed version 2014

ISBN 978-1-108-07058-4 Paperback

This book reproduces the text of the original edition. The content and language reflect  
the beliefs, practices and terminology of their time, and have not been updated.

Cambridge University Press wishes to make clear that the book, unless originally published  
by Cambridge, is not being republished by, in association or collaboration with,  
or with the endorsement or approval of, the original publisher or its successors in title.

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

LIFE OF ROBERT STEVENSON.

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

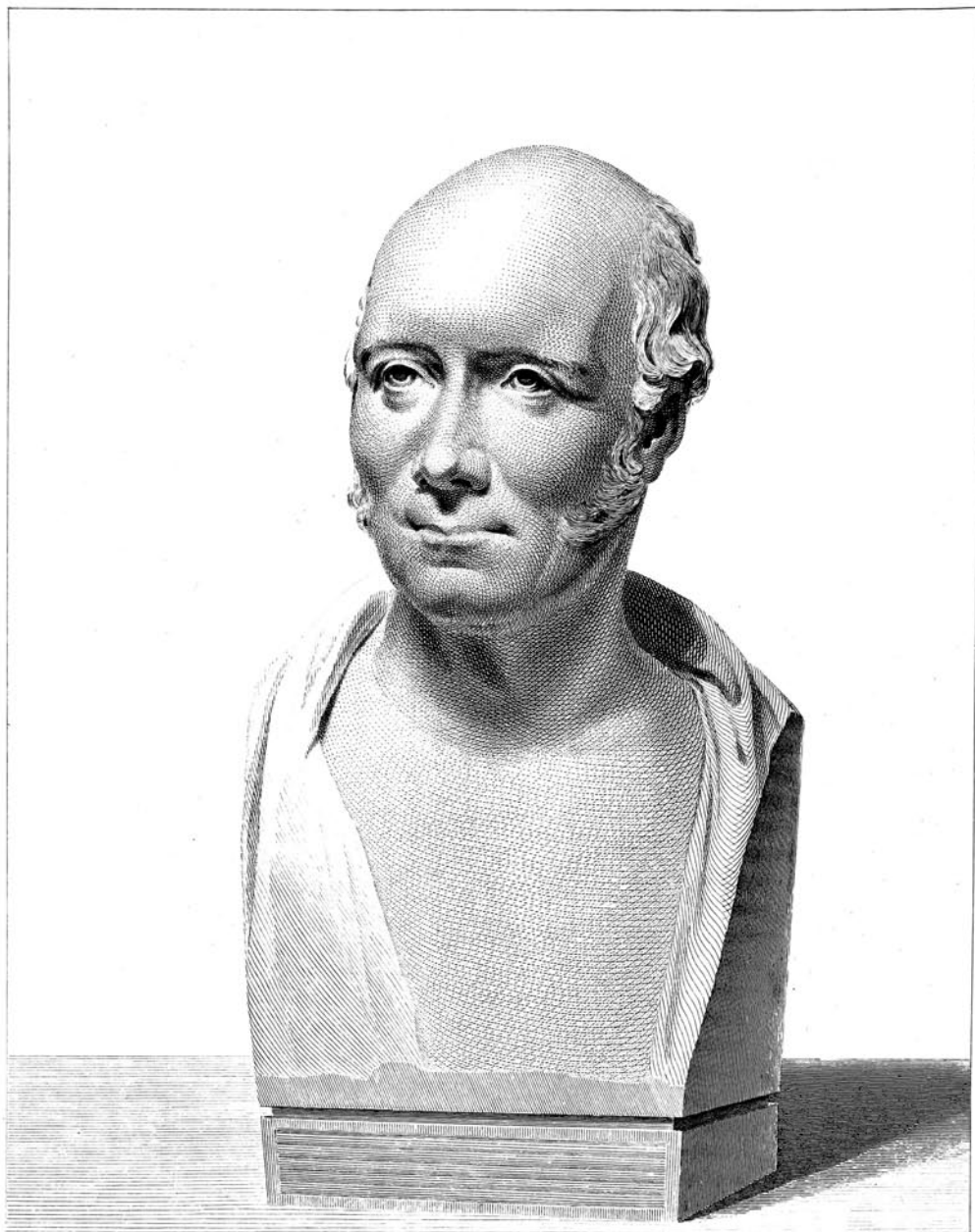
Edinburgh University Press :

THOMAS AND ARCHIBALD CONSTABLE, PRINTERS TO HER MAJESTY.

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)



J. SYME DELINEAVIT.

J. HORSBURGH SCULPSIT.

ROBERT STEVENSON F.R.S.E.

CIVIL ENGINEER.

*From a bust by Joseph, placed in the Library of the Bell Rock Light house by the Commissioners of the Northern Light houses.*



Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

# LIFE

OF

# ROBERT STEVENSON

CIVIL ENGINEER

FELLOW OF THE ROYAL SOCIETY OF EDINBURGH ; FELLOW OF THE GEOLOGICAL SOCIETY OF LONDON ;  
FELLOW OF THE ASTRONOMICAL SOCIETY OF LONDON ; MEMBER OF THE SOCIETY  
OF SCOTTISH ANTIQUARIES, OF THE WERNERIAN NATURAL HISTORY  
SOCIETY, AND OF THE INSTITUTION OF CIVIL ENGINEERS.  
ENGINEER TO THE COMMISSIONERS OF NORTHERN LIGHTHOUSES AND TO  
THE CONVENTION OF ROYAL BURGHS OF SCOTLAND, ETC.

BY

DAVID STEVENSON

CIVIL ENGINEER

VICE-PRESIDENT OF THE ROYAL SOCIETY OF EDINBURGH ;  
MEMBER OF COUNCIL OF THE INSTITUTION OF CIVIL ENGINEERS, ETC.

ADAM AND CHARLES BLACK, EDINBURGH  
E. AND F. N. SPON, LONDON AND NEW YORK  
1878.

Cambridge University Press  
978-1-108-07058-4 - Life of Robert Stevenson: Civil Engineer  
David Stevenson  
Frontmatter  
[More information](#)

---

## P R E F A C E.

THE addresses made to the Royal Society of Edinburgh, and the Institution of Civil Engineers, at the opening meetings of the session—1851, contained obituary notices of Robert Stevenson. The late Alan Stevenson, his eldest son, also wrote a short Memoir of his father, which was printed for private circulation.

But Robert Stevenson's long practice as a Civil Engineer—the important works he executed—and the valuable contributions he made to Engineering and Scientific literature, seem to me to require a fuller notice of his life than has hitherto been given.

This has been attempted in the following Memoir, which will be found to consist of extracts from Mr. Stevenson's Professional Reports—of notes from his Diary—and of communications to Scientific Journals and Societies, between the years 1798 and 1843, when he retired from active practice.

These papers embrace a wide field of Engineering, including Lighthouses, Harbours, Rivers, Roads, Railways, Ferries, Bridges, and other cognate subjects.

Some of them describe Engineering practice which is now obsolete, but not on that account, I think, uninteresting to such modern Engineers as have regard for the antiquities of their Profession.

Some of them, I am aware, can only be appreciated by those who are specially interested in the city of Edinburgh.

All of them will, I venture to think, be found worthy of preservation as interesting Engineering records of an era that has passed away. It formed no part of my duty to criticise them, in the light of modern Engineering, and, unaltered in form of expression or statement of opinion, they are now reproduced as they came from my father's pen.

I offer no apology for presenting these Extracts as the outlines of the life of one who occupied a prominent place among the Civil Engineers who practised during the beginning of the present, and end of the last century, shortly after British Engineering, with Smeaton as its founder, may be said to have had its origin.

D. S.

EDINBURGH, *July* 1878.

## CONTENTS.

### CHAPTER I.

#### EARLY LIFE.

	PAGE
Birth—Mr. Smith's improvements in Lighthouse illumination—Origin of the Scottish Lighthouse Board—Acts as Assistant to their Engineer—Student at Andersonian Institution, Glasgow, and University of Edinburgh—Succeeds Mr. Smith as Engineer to the Northern Lighthouse Board—Tour of inspection of English lights in 1801—Is taken for a French spy, . . . . .	1

### CHAPTER II.

#### BELL ROCK LIGHTHOUSE.

Resolves to practise as a Civil Engineer—Journals—Reports—Design for the Bell Rock Lighthouse—Improvements on Smeaton's design—Application to Parliament for Act in 1802—Act of Parliament passed in 1806—Works begun in 1807—Tender breaks adrift—Life in the floating light—Boating between the lightship and the rock—Anxiety for workmen—Sunday work—Life in the Barrack or Beacon—Visits the Eddystone in 1813 and 1818—Sir Walter Scott's visit to the Bell Rock, . . . . .	12
---	----

### CHAPTER III.

#### LIGHTHOUSE ILLUMINATION.

Early modes of illumination—Facet reflectors and lamps—Silvered copper reflectors and Argand lamps—Isle of May coal light—Improvements in catoptric lights—Distinctions for lighthouses invented by Mr.	
---	--

	PAGE
Stevenson, viz., flashing, intermittent, and double lights—Floating light lantern—Lighting of stage of Covent Garden Theatre—Dioptric system of lighthouse illumination, . . . . .	48
CHAPTER IV.	
ROADS.	
Early roads and road-making—Edgeworth and M'Adam's systems of roads—Stevenson's system of roads—Cast iron and stone tracks, . . . . .	64
CHAPTER V.	
IMPROVEMENT OF EDINBURGH.	
Design for approaches to Edinburgh from the East by Regent and London Roads, and opening up access to the Calton Hill—Sites for the new Jail and Court of Justiciary, and buildings in Waterloo Place—Regent Bridge—Feuing Plan for Eastern District of Edinburgh—Improvement of accesses to Edinburgh from the West and North, and from Granton—Removal of old "Tolbooth" Prison—Removal of University Buildings, . . . . .	74
CHAPTER VI.	
FERRIES.	
Ferry Engineering—Extracts from Report on the Tay Ferries—Reports on various Ferries—Orkney and Shetland Ferry, etc., . . . . .	101
CHAPTER VII.	
RAILWAYS.	
Canals and Railways on one level—Haulage on Railways—Railways in Scotland—Edinburgh and Midlothian, Stockton and Darlington, and Edinburgh and London Railways—Uniform gauge proposed—Notes on Railways for the Highland and Agricultural Society—Letter from George Stephenson, . . . . .	111

## CONTENTS.

ix

## CHAPTER VIII.

	PAGE
HARBOURS AND RIVERS, . . . . .	130

## CHAPTER IX.

PRESERVATION OF TIMBER, . . . . .	155
-----------------------------------	-----

## CHAPTER X.

## BRIDGES.

Marykirk, Annan, Stirling, and Hutcheson stone bridges—High-level bridge for Newcastle—Timber bridge of built planks—Winch Chain Bridge—American bridges of suspension—Runcorn Bridge—Menai Chain Bridge—New form of suspension bridge, . . . . .	160
---	-----

## CHAPTER XI.

WOLF ROCK LIGHTHOUSE, . . . . .	168
---------------------------------	-----

## CHAPTER XII.

CARR ROCK BEACON, . . . . .	177
-----------------------------	-----

## CHAPTER XIII.

CRANES, . . . . .	181
-------------------	-----

## CHAPTER XIV.

FISHERIES, . . . . .	184
----------------------	-----

## CHAPTER XV.

MARINE SURVEYING, . . . . .	196
-----------------------------	-----

b

## CONTENTS.

## CHAPTER XVI.

## CONTRIBUTIONS ON ENGINEERING AND SCIENTIFIC SUBJECTS.

	PAGE
Contributions to <i>Encyclopædia Britannica</i> and <i>Edinburgh Encyclopædia</i> —	
The alveus or bed of the German ocean—Sectio planography—	
Wasting effects of the sea at the Mersey and Dee—Density of fresh	
and salt water—The Hydrophore, . . . . .	203

## CHAPTER XVII.

## EXTRACTS FROM EARLY REPORTS.

Wide range of subjects on which Mr. Stevenson gave advice—Reports on ruins of Aberbrothock Abbey—St. Magnus Cathedral, and Earl's Palace, Kirkwall—St. Andrews Cathedral—Montrose Church Spire —Melville Monument, Edinburgh—Lipping of joints of masonry with cement—Provision for flood waters in bridges—Hydraulic mortar—Protection of foreshores—Cycloidal sea wall—Checking drift sand—Night signal lamps—Cause of heavy seas in Irish Channel— Sea routes across Irish Channel—Build of Ships—Prospective in- crease of population—Tidal scour—Unscrewing of bolts by the waves —Cement Rubble cofferdams—Buoyage system—Observations on fog signals—Regulations for steam vessels—Notes on shipwrecks, . . . . .	236
--	-----

## CHAPTER XVIII.

RETROSPECT OF MR. STEVENSON'S LIFE, . . . . .	264
APPENDIX, . . . . .	274
INDEX, . . . . .	277



## LIST OF PLATES.

FRONTISPIECE, . . . . .	<i>To face Title-page.</i>
I. ELEVATION OF BELL ROCK LIGHTHOUSE, .	<i>To face page 25</i>
II. SECTION OF BELL ROCK LIGHTHOUSE, . . . . .	„ „ 25
III. VIGNETTE OF BELL ROCK LIGHTHOUSE, WITH FACSIMILE OF LINES WRITTEN IN BELL ROCK ALBUM BY SIR WALTER SCOTT, . . . . .	„ „ 47
IV. PLAN OF APPROACHES TO EDINBURGH BY REGENT AND LONDON ROADS, 1814, . . . . .	„ „ 77
V. DESIGN FOR BUILDING ON THE CALTON HILL, EDINBURGH, . . . . .	„ „ 90
VI. ELEVATIONS OF ANNAN AND MARYKIRK BRIDGES, . . . . .	„ „ 160
VII. ELEVATIONS OF HUTCHESON AND STIRLING BRIDGES, . . . . .	„ „ 160
VIII. DESIGN FOR HIGH LEVEL ROAD BRIDGE AT NEWCASTLE ON TYNE, . . . . .	„ „ 161
IX. DESIGN FOR WOLF ROCK LIGHTHOUSE, . . . . .	„ „ 174
X. CARR ROCK BEACON, . . . . .	„ „ 179
XI. MOVEABLE JIB AND BALANCE CRANES, . . . . .	„ „ 182
XII. CHART OF THE NORTH SEA OR GERMAN OCEAN, WITH SECTIONS OF THE DEPTHS OF WATER, 1820, . . . . .	„ „ 207