

BUILDING THE BELL ROCK LIGHTHOUSE

by Doug E. Bell

It is 1804,

and you are an 18-year-old sailor on the HMS York, a former mercantile vessel now outfitted with 64 British cannon and sent to patrol the North Sea during the Revolutionary War with France. You are 11 miles off the east coast of Scotland. It is January. The sea is raging, the wind is cold and strong and getting stronger.

Clinging to a railing as the 174-foot ship slides down into the trough between two huge swells, you glimpse, far-off, a weak twinkle of light. A window on the mainland. Arbroath? Most likely.

You picture a snug, stone-walled room, food on the table, a fire in the hearth, a girl's shining hair. It is the last warm thought you will ever have. You and the other 490 sailors aboard the York will die this night in these frigid, frothing waters—victims not of enemy bombardment but of a foolish and unimaginative government.



On that fateful night the HMS York joined a long, long list of vessels to be terminally impaled on a barely submerged, jagged up-thrust of sandstone known sometimes as Inchcape Island, but more often as Bell Rock.

The shipwreck of the York, and many others, need not have happened.

Five years earlier an ambitious, mostly self-taught civil engineer from Glasgow had drawn up detailed plans for a stone lighthouse tower to be built on Bell Rock. His name was Robert Stevenson and he had worked his way up through the ranks of the Northern Lighthouse Board, starting out as a young man assisting his stepfather in the tending of coal-fired lighthouses and earning the title of Lighthouse Builder by the time he was 25.

His plan for a lighthouse on Bell Rock was spurred by a horrendous storm in December 1799. In one night 70 ships were sunk; they were either broken on the reef or foundered and went down nearby while trying to avoid it.

The Board listened to Stevenson's proposal, and then promptly shelved it. In their eyes, the challenges were too many and the risks too severe:

- How could construction take place upon a reef that is under 12 to 16 feet of water for 20 to 22 hours each day, at lowest annual tides?
- In the North Sea's volatile climate, building would only be feasible during a brief stretch in the summer, and even then only in lulls between rough weather.
- With a worksite 11 miles offshore, both men and materials would be vulnerable to any change in wind or wave patterns during transit.
- The budget Stevenson submitted amounted to 42,685 pounds, 8 shillings, a financial risk that was deemed too great for a lighthouse that many felt could never be completed.
- Finally, and perhaps most fatally for Stevenson's proposal, the

Board would not consider a project of this type because it had simply never been done before. No stone lighthouse had ever been built on rock submerged beneath the sea.

In his journal, Stevenson described the attitude at the Board's hearing as "easy to justify here, but rather harder to explain to a sailor's widow."

The most comparable previous project was the Eddystone lighthouse, built at Devon 50 years earlier. Known as 'Smeaton's Tower' after builder John Smeaton, it was considered a 'sea-washed' lighthouse, with its base vulnerable to much abuse from the sea when both waves and tides were high. Two previous attempts on the site had failed, but Smeaton had come up with several crucial engineering advancements. Flaring widely at the bottom, he described the lighthouse tower as having been inspired by the shape of a sturdy, storm-resistant oak tree. His was one of the first projects to use hydraulic lime for maritime masonry, and he had pioneered a technique of locking stone blocks into each other via complicated dovetail joinery and marble dowels.

Stevenson's design incorporated many of Smeaton's advancements, with some important changes to mass, height and joinery of the stonework for a Bell Rock lighthouse. Stevenson's proposal had also laid out a detailed construction plan that included the construction of two rudimentary wharves on either end of the rock, equipped with hoists to off-load pre-cut stones and other building materials onto the flat-decked freight cars of a miniature railroad, by which means such heavy loads could glide to the building site.

If the government's purse-string minders had cared to look closely they would have seen that Stevenson had anticipated and answered their concerns—with the possible exception of the unavoidable necessity of paying for such a complicated project.

above: Painting by JMW Turner commissioned by Stevenson in 1819 as a frontispiece for his book *Account of the Bell Rock Lighthouse*.