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In the 1980s the Costain Group had operations in contracting, mining, housing and property. At one stage, the mining operations were producing coal at the rate of more than 15 million tonnes per year in the United States, Australia and the United Kingdom. The Costain Group, at this time, was working in 50 countries and in every continent.

In 1982, Costain completed one of its largest ever projects (in joint venture) – the Thames Barrier. Work began at the Barrier site in 1974 and construction was largely complete by 1982. In addition to the Barrier itself, the flood defences for 11 miles down-river were raised and strengthened. The Barrier was officially opened on 8 May 1984 by Her Majesty Queen Elizabeth II. Total construction cost was around £534m (£1.3 billion at 2001 prices) with an additional £100m for river defences.

Built across a 520-metre (570 yd) wide stretch of the river, the Barrier divides the river into four 61 metre (200 ft) and two about 30 metre (100 ft) navigable spans. There are also four smaller non-navigable channels between nine concrete piers and two abutments. The flood gates across the openings are in cross section, and they operate by rotating, raised to allow "underspill" to allow operators to control upstream levels and a complete 180 degree rotation for maintenance. All the gates are hollow and made of steel up to 40mm thick. The gates fill with water when submerged and empty as they emerge from the river. The four large central gates are 20.1 metres (66 ft) high and weigh 3,500. Four radial gates by the riverbanks, also about 30 metres (100 ft) wide, can be lowered. These gate openings, unlike the main six, are non-navigable.

In the 1980s, Costain was also heavily involved in the Channel Tunnel project. Eleven tunnel boring machines, working from both sides of the Channel, cut through chalk to construct two rail tunnels and a service tunnel. Tunnelling commenced in 1988 and the Tunnel began operating in 1994. In 1985 prices, the total construction cost was £4,650 million (equivalent to £10,501 million today<sup>1</sup>), an 80% cost overrun. At the peak of construction, 15,000 people were employed with daily expenditure over £3 million.

In the late 1990s, the Costain family ceased to have direct involvement in the Company. It was a volatile period for the Company and the decision was taken, partly due to difficult market conditions and a biting recession, to focus on the core construction activities and cease the mining and housing operations. John Armitt, who subsequently became Chief Executive of Network Rail and then Chairman of the Olympic Delivery Authority (ODA) for the London Olympics 2012, was brought in as Chief Executive in 1997 and the Company staged a successful recovery ensuring that the Costain name remained a leading brand in the construction industry. John Armitt's successor was Stuart Doughty who held the position from 2001 to 2005. During this time the Company embarked on a major growth strategy.