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Heathrow Express – from disaster to success and how NEC helped



About the speakers: Gren

- BAA plc - July 1976 - Mar 2009
- Heathrow, Gatwick and Stansted
- Managing portfolios of major projects, including Stansted Satellite buildings, Heathrow, Terminals 1, 2,&4 major redevelopments, **Heathrow Express, including recovery of collapsed tunnelling works**, Group Head of Airfield Civil Engineering. Group Head of Health and Safety.
- BAA first client Project Manager on a large NEC contract

About the speakers: Barry

- Stansted Airport Development
- Heathrow Express
- CTRL
- London Underground PPP
- East London Line

The New Engineering Contract

- **January 1991** - The New Engineering Contract was drafted for consultation with the industry and trialed on a number of projects.
- **March 1993** – The first edition of the New Engineering Contract was published as a ‘main contract’ for use by an Employer and Contractor together with a subcontract version with back-to-back clauses. **Early adopters of the contract include the BAA, ESKOM, National Power and Scottish Hydroelectric.**

Overview

- BAA plc – pioneers in the use of the NEC
- Heathrow Express Rail link (HEX)
- First major project in the UK to use what was then known as “The New Engineering Contract” – 1 single contract



**Heathrow
Express**



Why did BAA plc use NEC?

- 30% of BAA plc projects ran over budget and time
- Time for a new approach
- David H Williams – Group Construction Director BAA plc (a pioneer and inspiration)



HEX – the *works*

- Construction began in 1993.
- Two 6.8 km (4.2 miles) single-bore tunnels (including eight escape shafts) and underground stations at Heathrow Central Terminal Area (CTA) and Terminal 4
- Electrification of the Great Western Main Line between Paddington and Airport Junction.
- Stockley Flyover was constructed to connect the tunnel to the Great Western Main Line

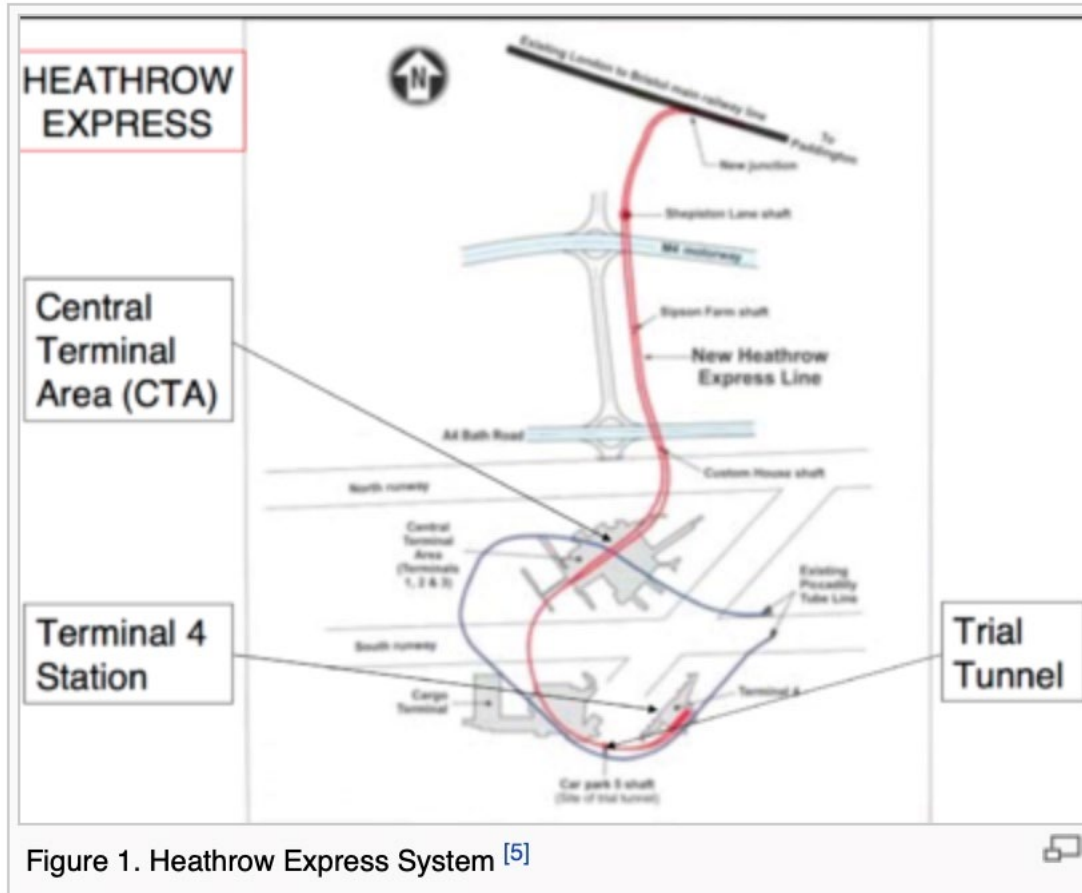


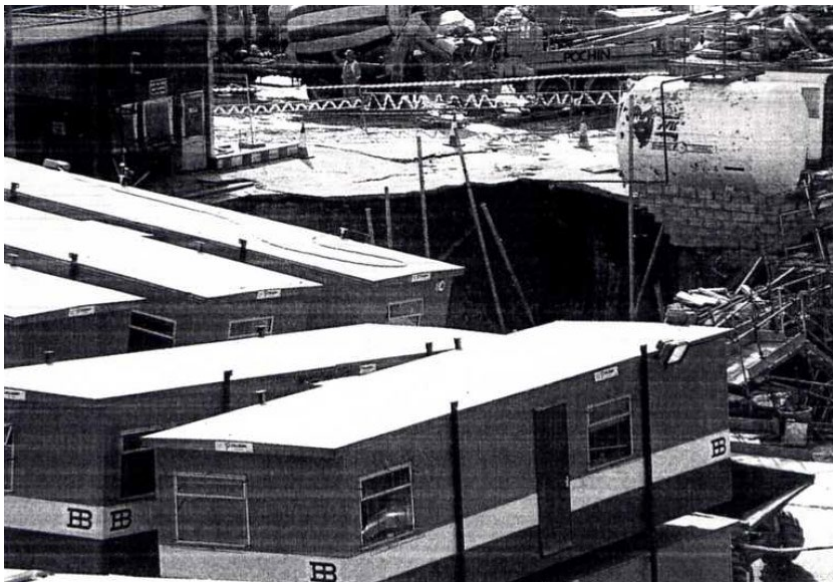
Figure 1. Heathrow Express System [5]

21st October 1994

- The tunnels collapsed in the early hours of Friday 21 October 1994 and continued to fail over a number of days. The failure brought chaos to the heart of Heathrow Airport. Fortunately, no one was killed or injured in the accident.
- The original contract for the tunnels package was £62m. The contract was circa 30% complete when the collapse occurred
- Recovery of the tunnel package cost circa £150m
- The Heathrow Express operational only 6 months late!



← HEX project
team offices



Project Background

- DESIGN AND CONSTRUCTION OF THE HEATHROW EXPRESS
- This article reports a meeting of the British Tunnelling Society on the design and construction of the Heathrow Express route, held on 15 May 1997. The route will run from London Paddington to Heathrow Airport, using an existing main line to Airport Junction, after which it will enter long twin tunnels. The tunnels descend in open cut, followed by 500m of cut and cover, followed by bored tunnels to the Airport's Central Terminal Area; they then continue to Terminal 4. A Myers explained how the project was revived, after a serious tunnel collapse on 21 October 1994, and described the various sections of the contract. G Tipper briefly reviewed the project, and explained how the British Airports Authority (BAA) formed and managed the formation of one team to resolve the problems that occurred as a result of the collapse. T Deane explained that the team was faced with an incredibly complex design problem, and that its major concern was to ensure that the project was truly design+construct. It decided that sprayed concrete lining (SCL) was the correct technique to use, but that it required further development. In the investigation of the collapse, different answers had to be sought. The article includes a route map.
- **Availability:**
 - Find a library where document is available. Order URL: <http://worldcat.org/issn/0041414X>
- **Corporate Authors:** Miller Freeman
- Calderwood Street
London, United Kingdom SE18 6QH
- **Authors:**
 - Smith, C
- **Publication Date:** 1997-9
- Language

Aftermath Criticism of NEC

- ICE past president Sir Alan Muir Wood, one of the world's leading tunnelling experts criticized and blamed the New Engineering Contract
- The New Civil Engineer received what it described at the time as “an avalanche of defense” for the NEC

The Recovery

- BAA plc
 - As an operational business needed to find a way forward
 - A prolonged dispute could take 10 years to go through the courts
 - Sir John Egan BAA CEO put blame aside to focus on recovery
 - For the first time BAA had taken out a 'Project' insurance policy
 - Insurance did not cover the whole loss
 - The massive recovery cofferdam offered business opportunities
 - The single team approach began the day of the collapse

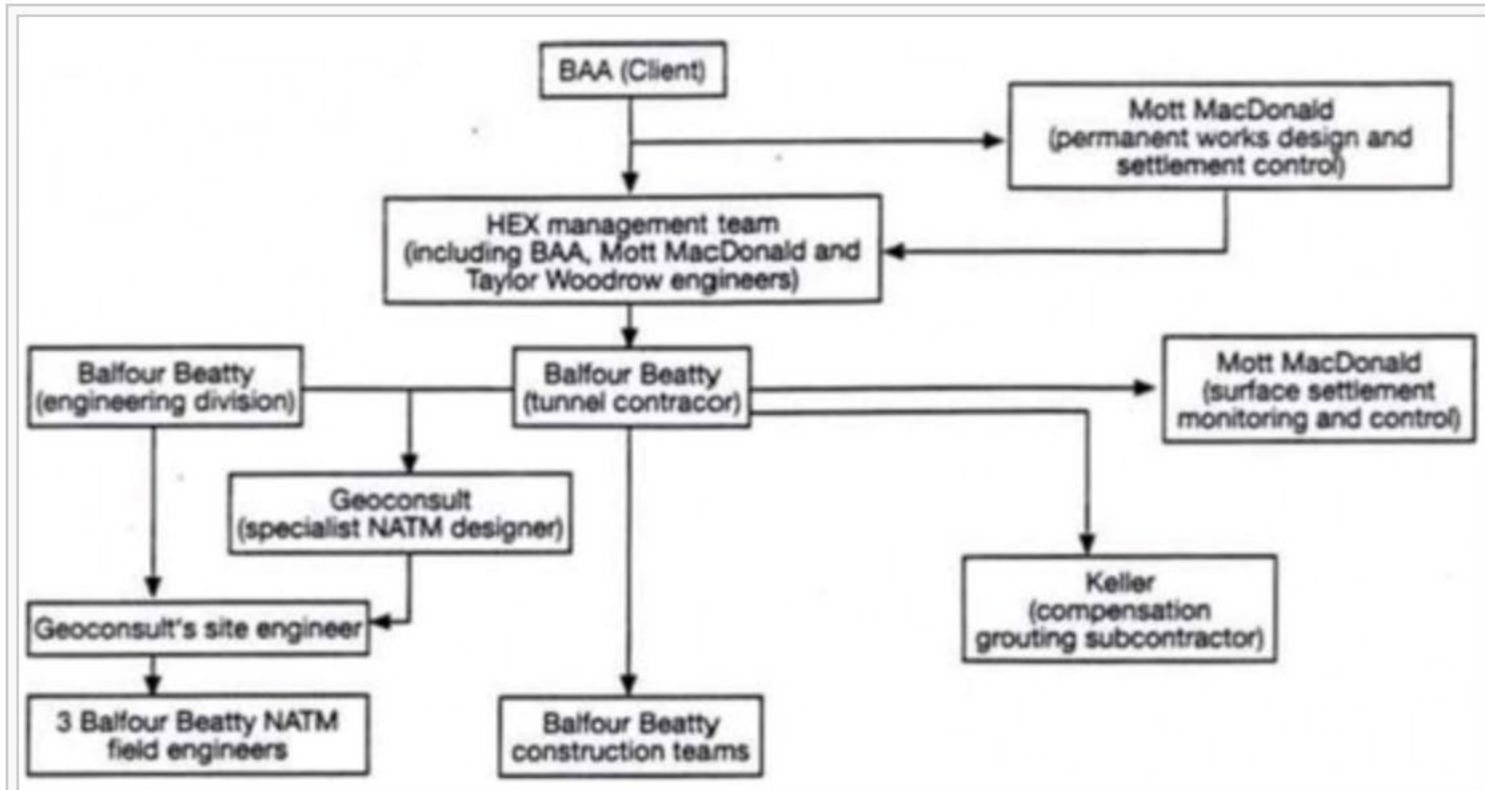
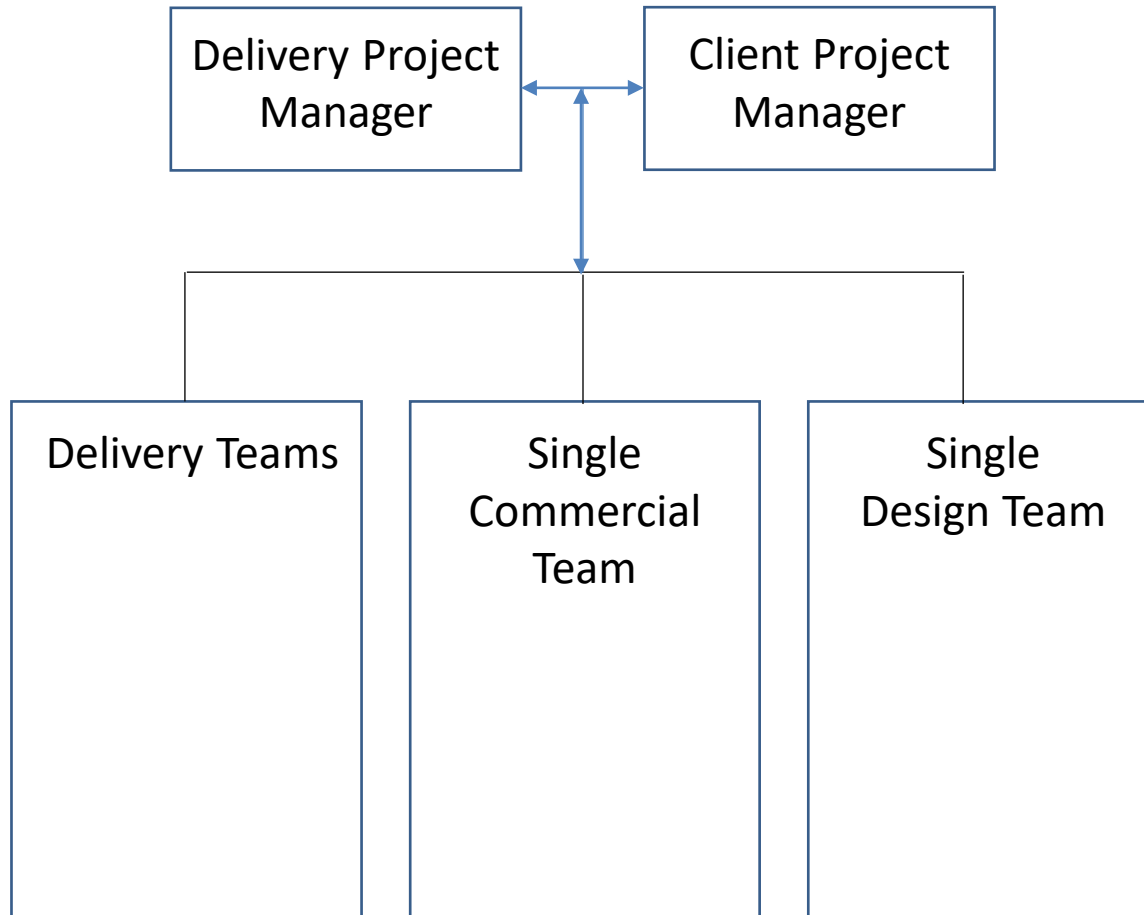


Figure 2. Organizational chart of the project [4]

Pre-collapse organisation



NEC role in the Recovery

- Even before the tunnel collapse the NEC was being operated as it was designed to be
- The proper implementation meant that the Parties to the contract understood where there were and enabled discussions on the contract's recovery
- Dr Martin Barnes mentored us in the successful use of the contract

Learning

- We did not truly understand the risk
- Although we executed the contract in the spirit of NEC ...
- Operating as a single team from the night of the collapse transformed the client/designer/supplier relationship
- Project managers under the contract had adjacent interconnecting offices. Doors never closed
- Records of Discussions (RODS)
- The problem/optimum solution/agreed action
- Single project/design/commercial team
- The client was very much in the team leading from the front
- 24/7 foamed concrete to stabilise the CTA?



Benefits of NEC

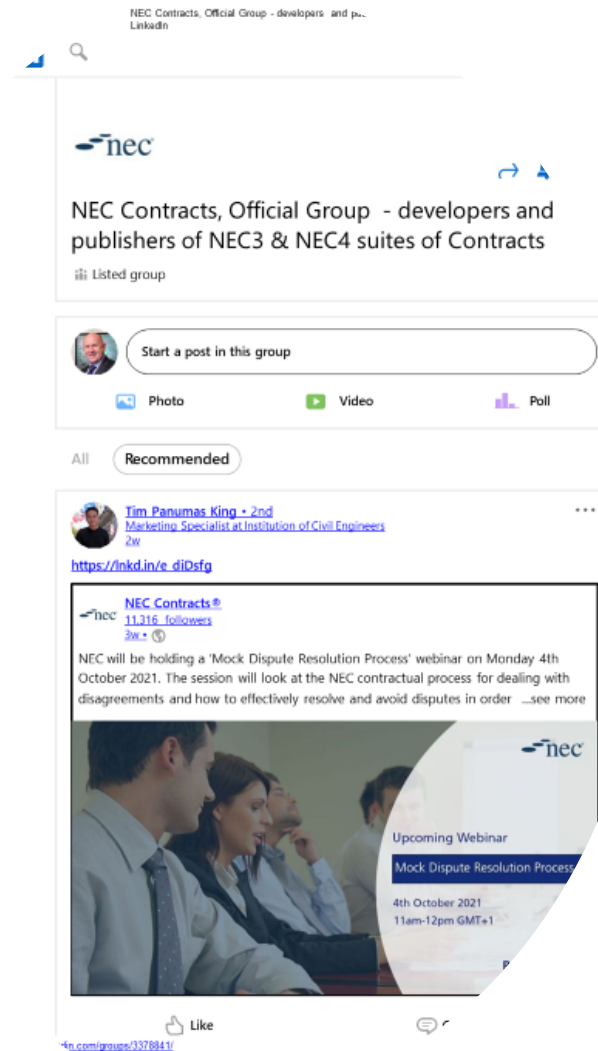
- How much more effective it is to work together
- The need to implement the contract
- The need for the ‘right behaviours’
- The benefits of an integrated team using NEC
- The need to talk to each other

Questions and answers



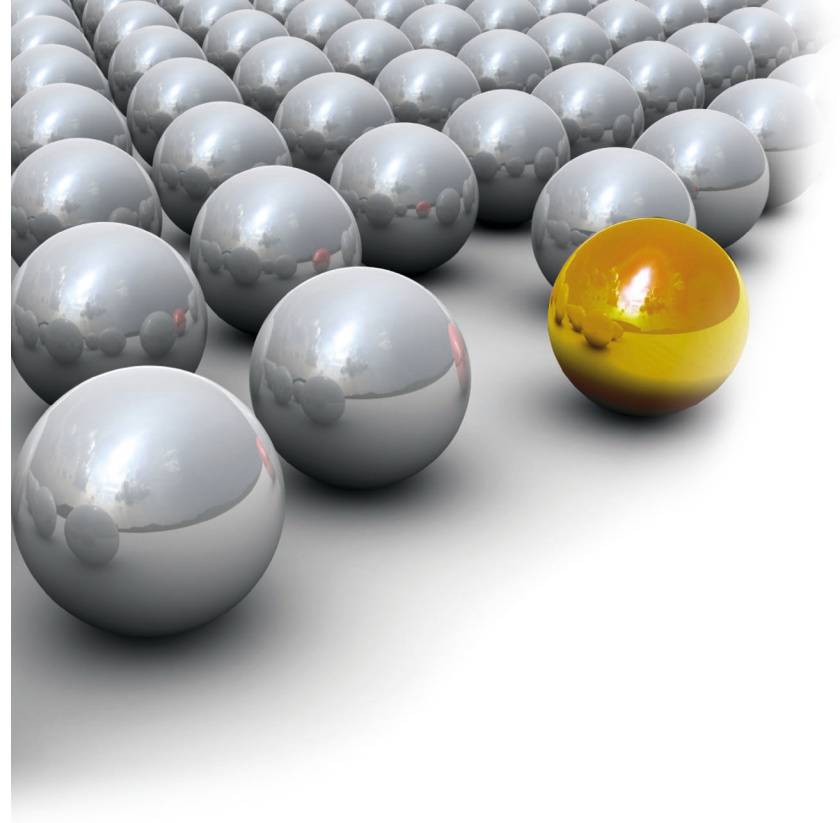
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