THE LONGEST UNDERSEA TUNNEL IN THE WORLD

THE CHANNEL TUNNEL

Disconnection from Europe, Earlier Attempts to Reconnect and The Reconnection

by

Dr Roger Maddrell

What I will be talking about today

- Ice Ages and the disconnection from Europe
- Earliest ideas for the Channel Tunnel – 1800 onwards
- Some 27 attempts/false starts and objections from the military
- Col. Beaumont's tunnel in the 1880s
- The final serious attempt in the early 1970s
- Studies required for the present Channel Tunnel and
- Its construction, 1987 to 1991
- It opened in 1994

475,000 Years Ago

Major Ice

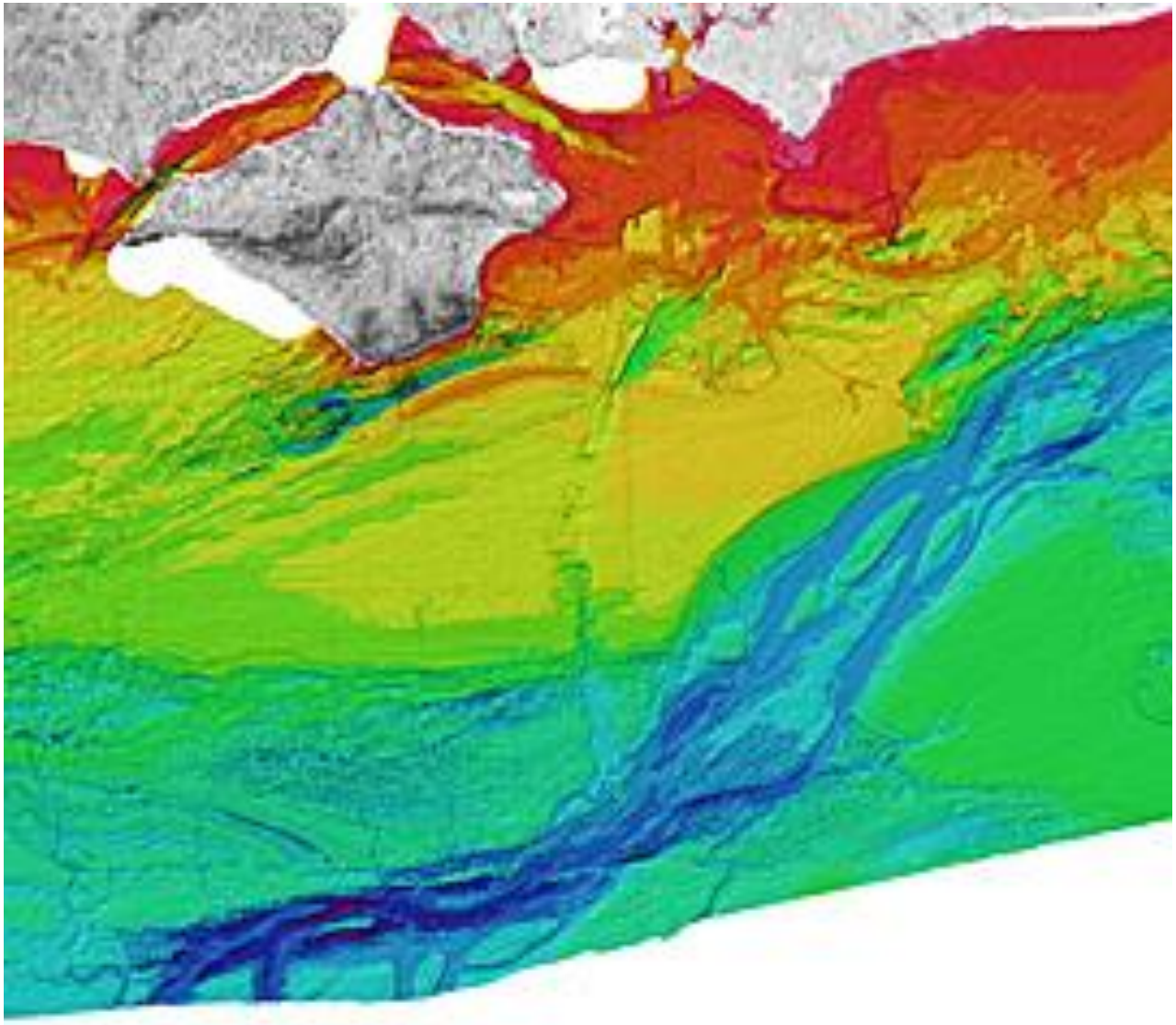
Sheet

Advance,

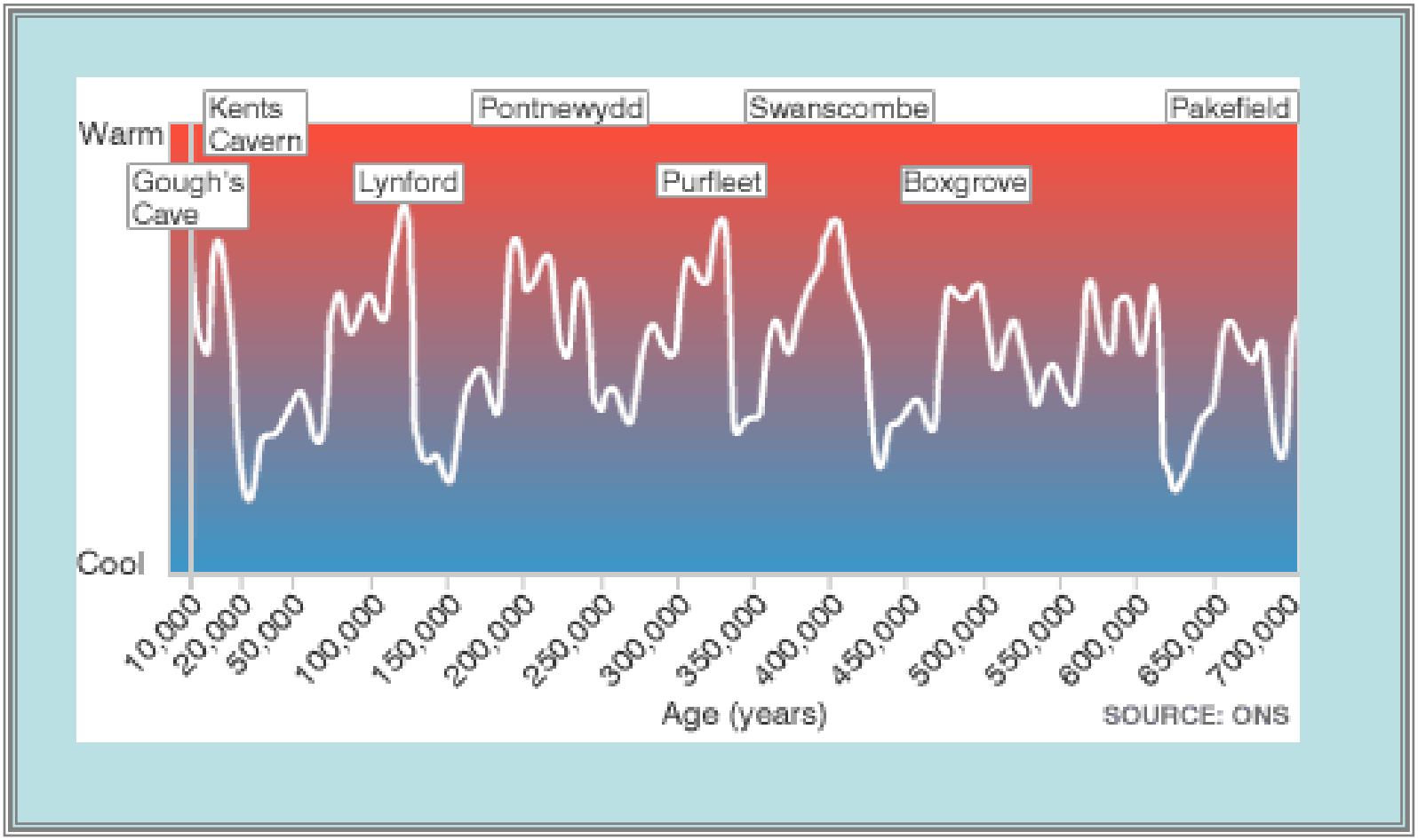
and

Dammed

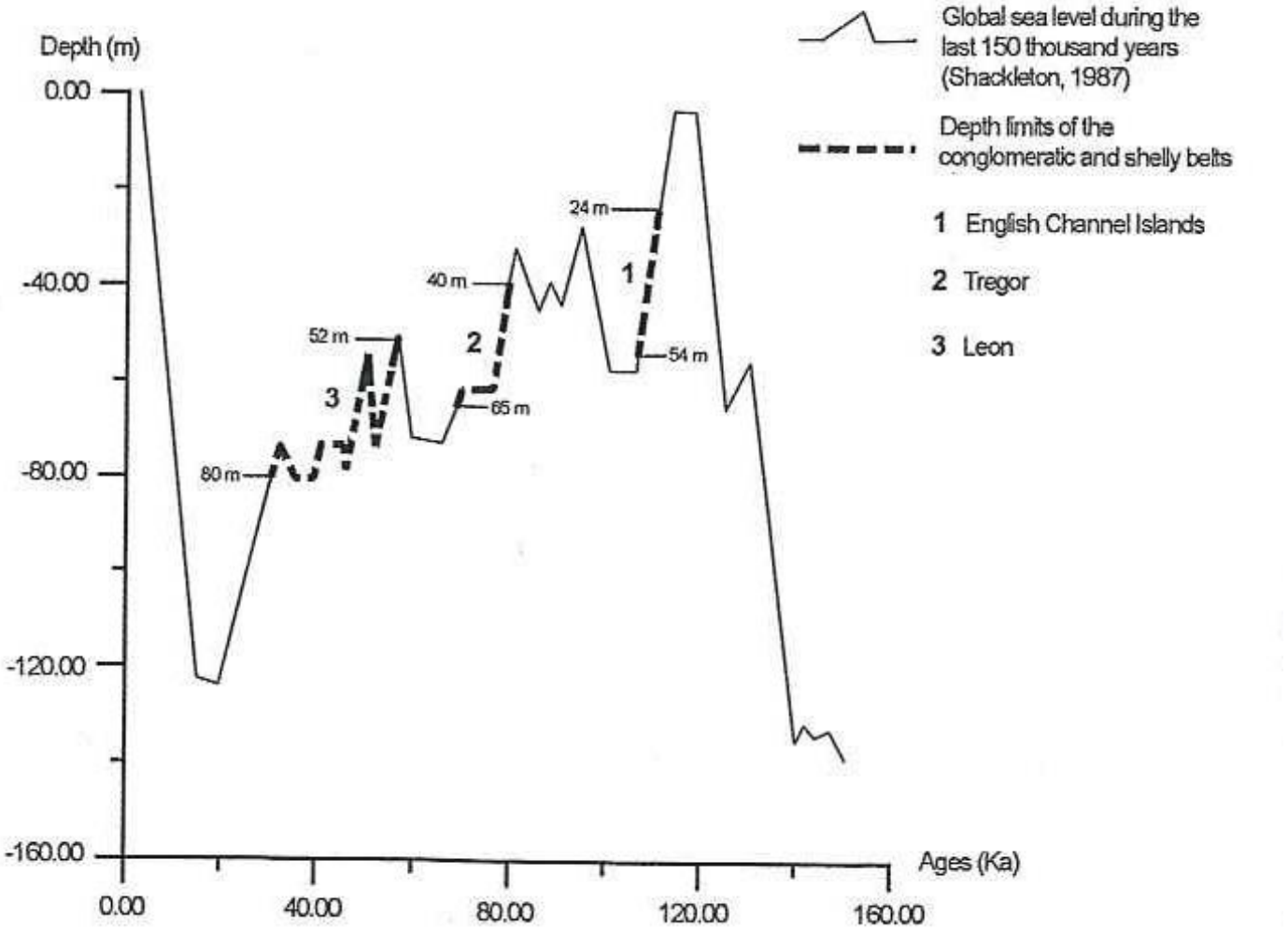
Lake



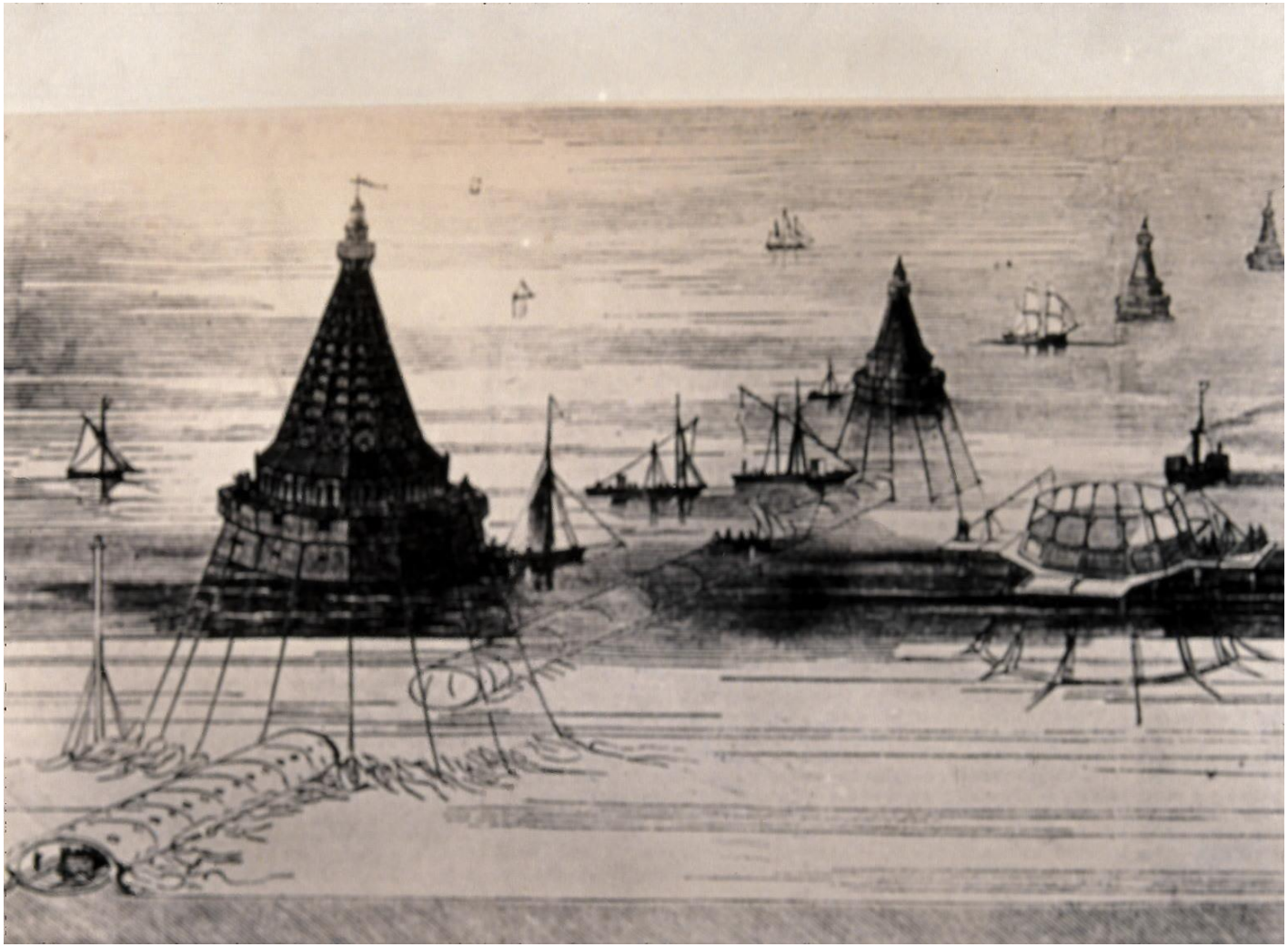
Human Occupation of Britain



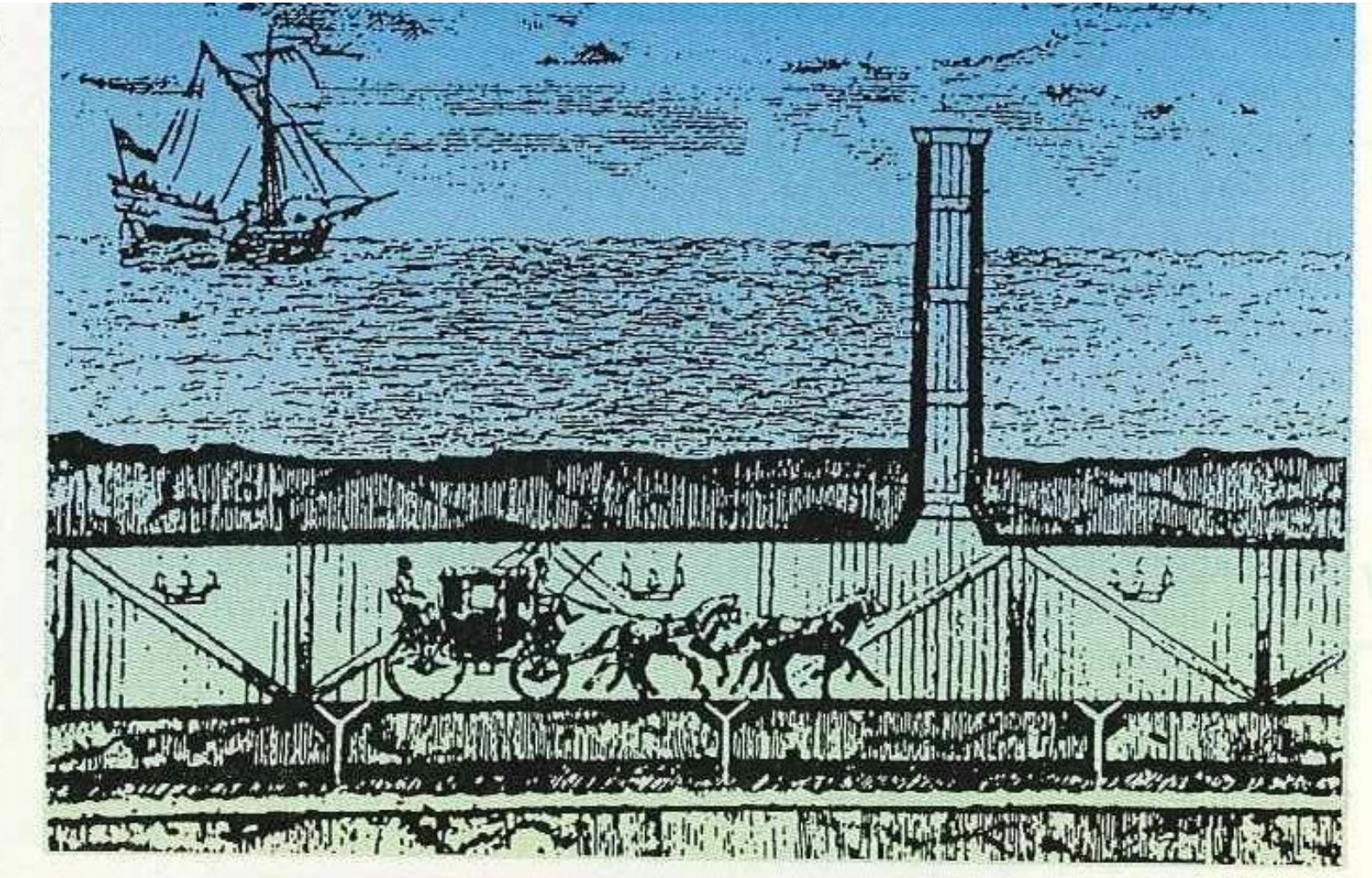
The end of the Ice Age



1800 Early Idea

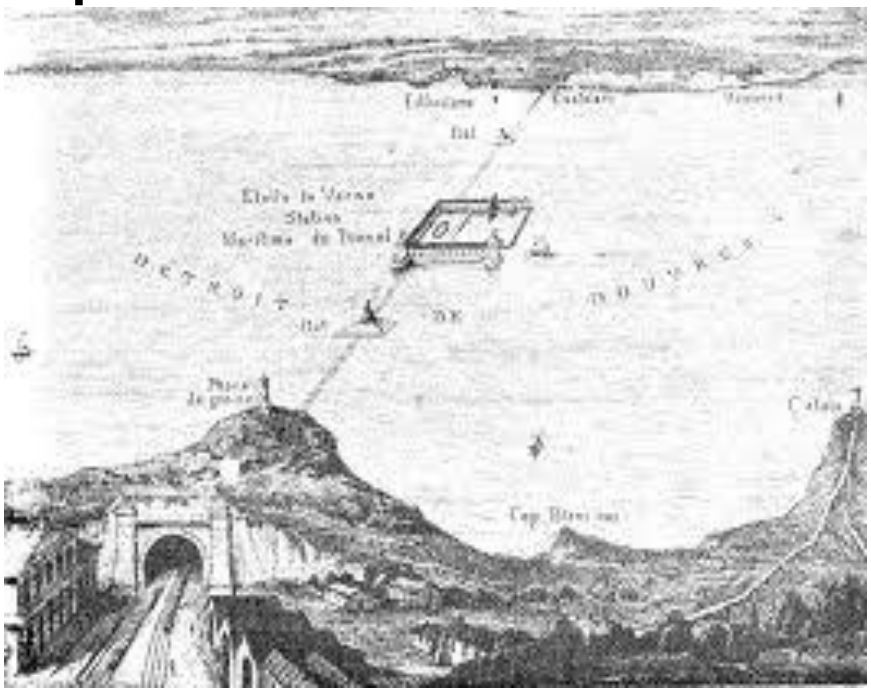


1802 Albert Mathieu-Favier

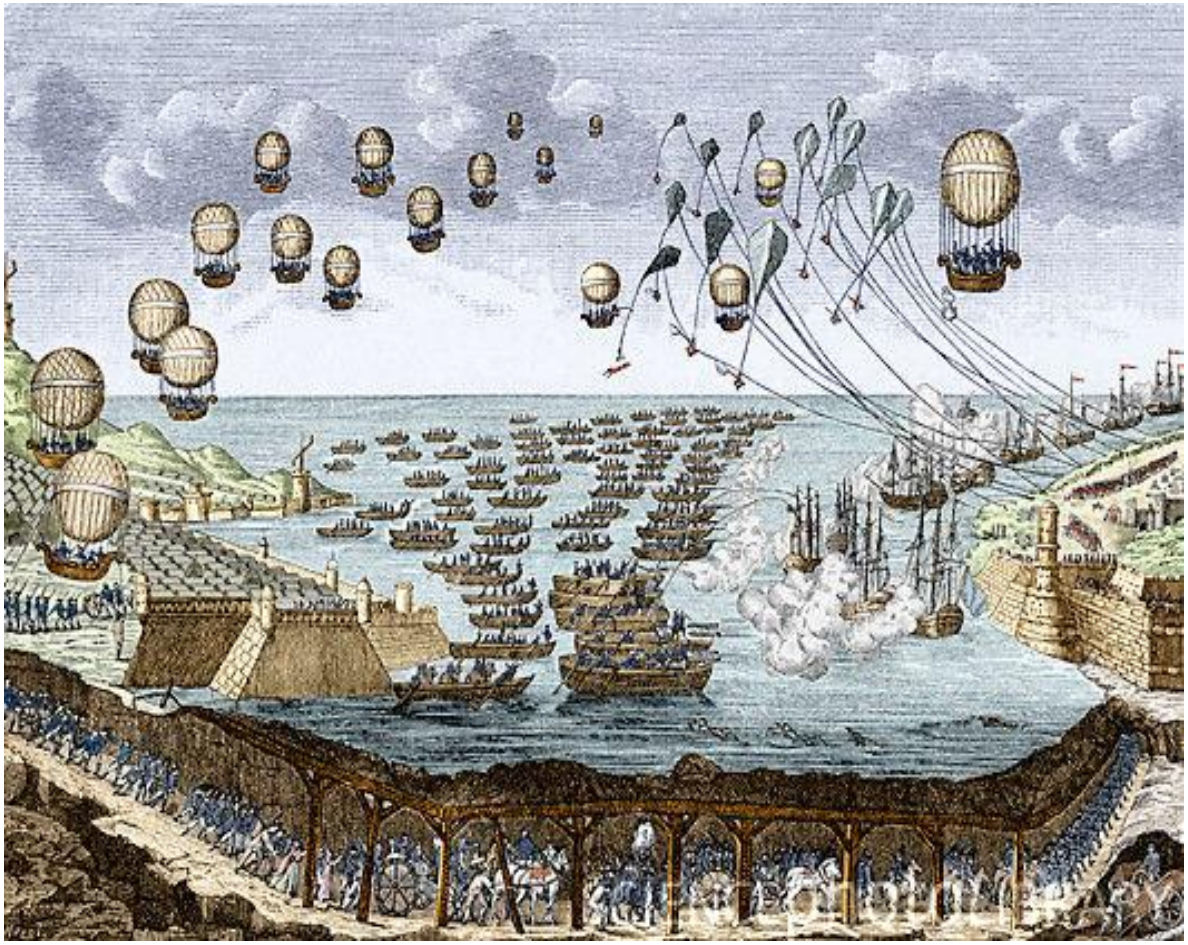


An 1850 idea of de Gamond

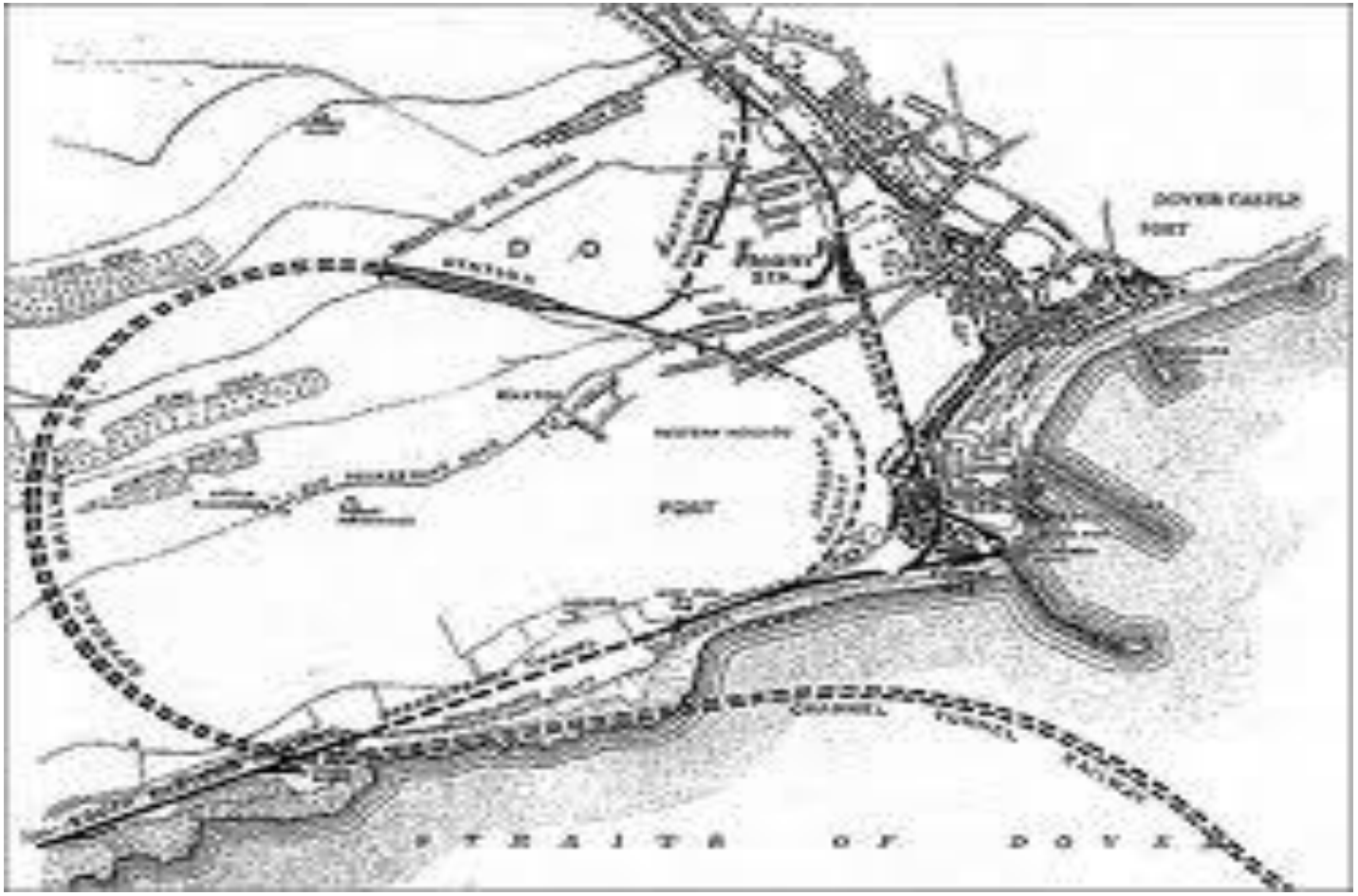
- A more sophisticated idea



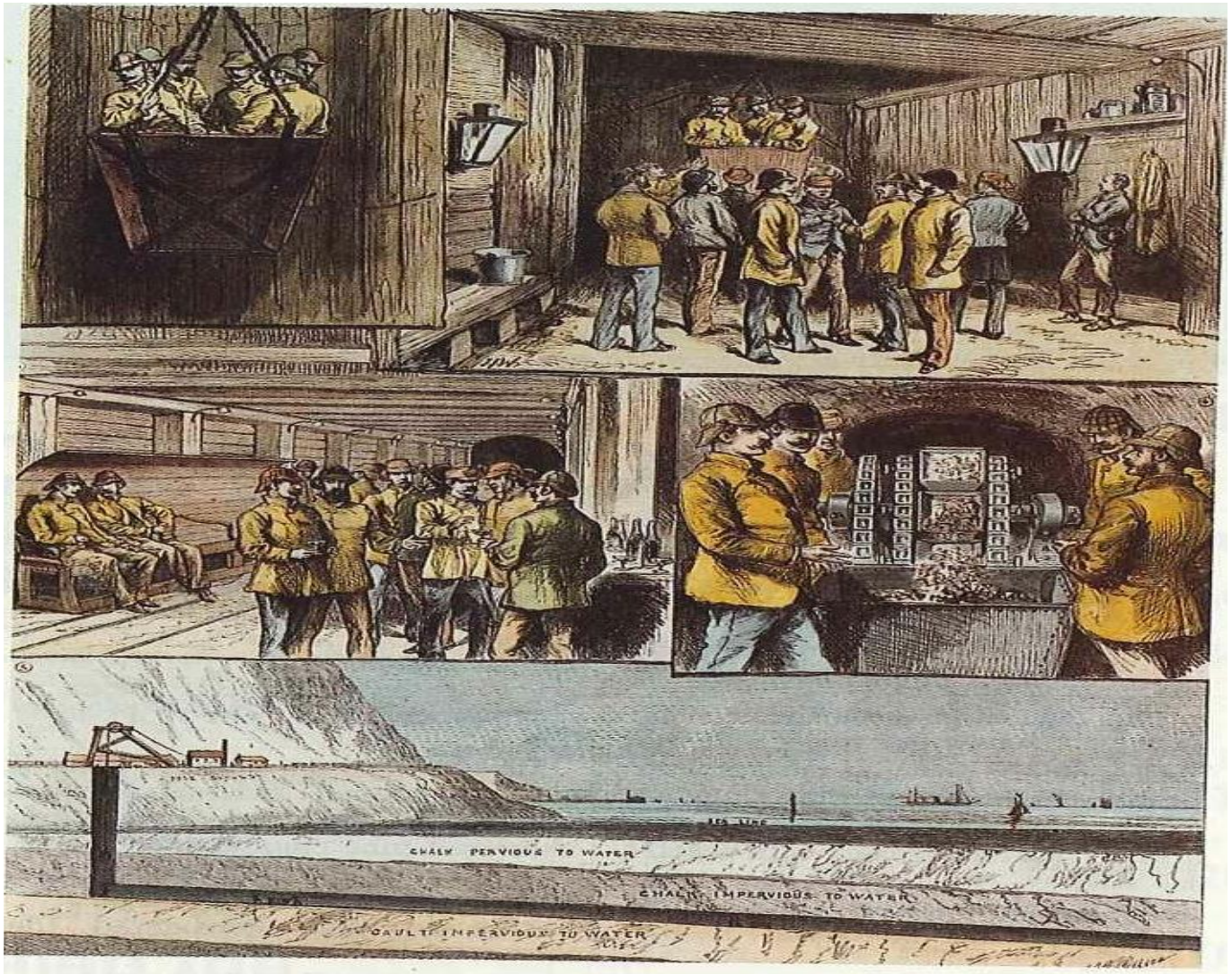
Cartoon in the early 1800s



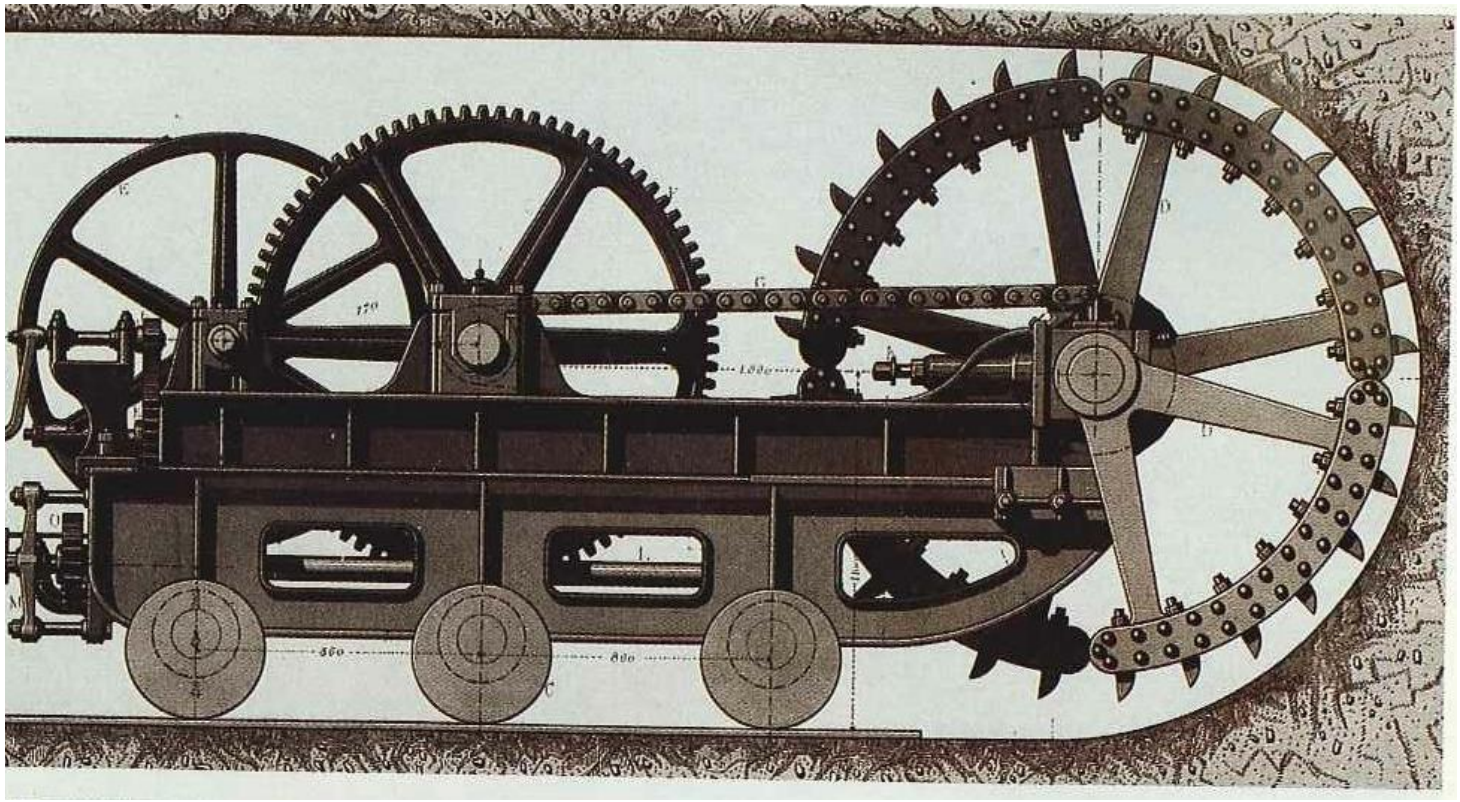
The proposed route in 1880



Colonel Fred Beaumont's Tunnel, The London Illustrated News,1882



Vallauri & Buquet's Machine



Col Beaumont's Tunnel

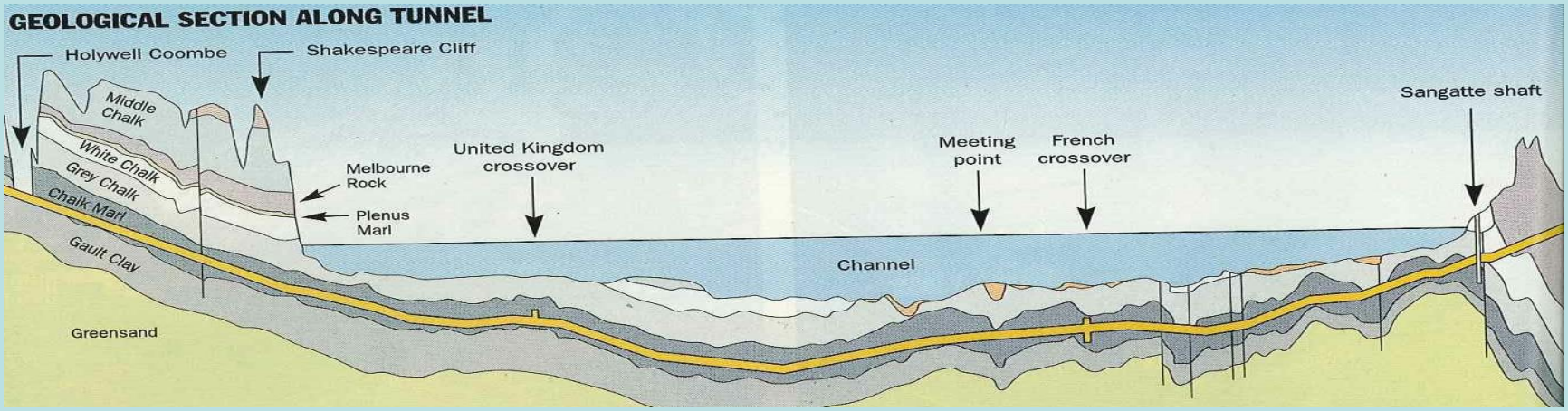
The Graphic

6 March 1882

Col. Beaumont's Actual Tunnel, 1987
7 foot in Diameter - it achieved 12m in 17 hours

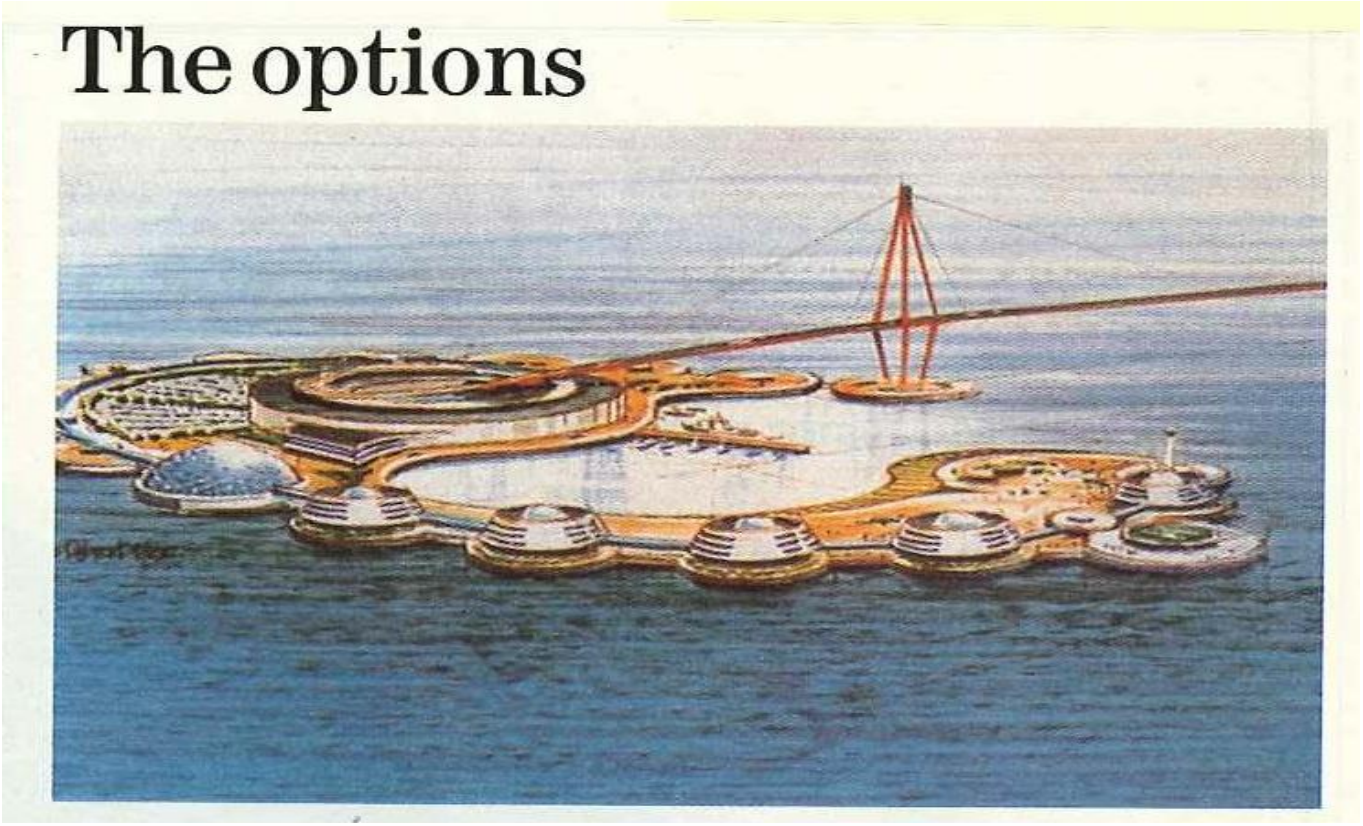
- It was dry and
- in good condition
- 800m completed

  beneath the sea


GEOLOGICAL SECTION ALONG TUNNEL
Holywell Coombe
Shakespeare Cliff
Middle Chalk
White Chalk
Grey Chalk
Chalk Marl
Gault Clay
Greensand
Melbourne Rock
Plenus Marl
United Kingdom crossover
Channel
Meeting point
French crossover
Sangatte shaft

1970s Start
Achieved 600m

A Bridge Alternative

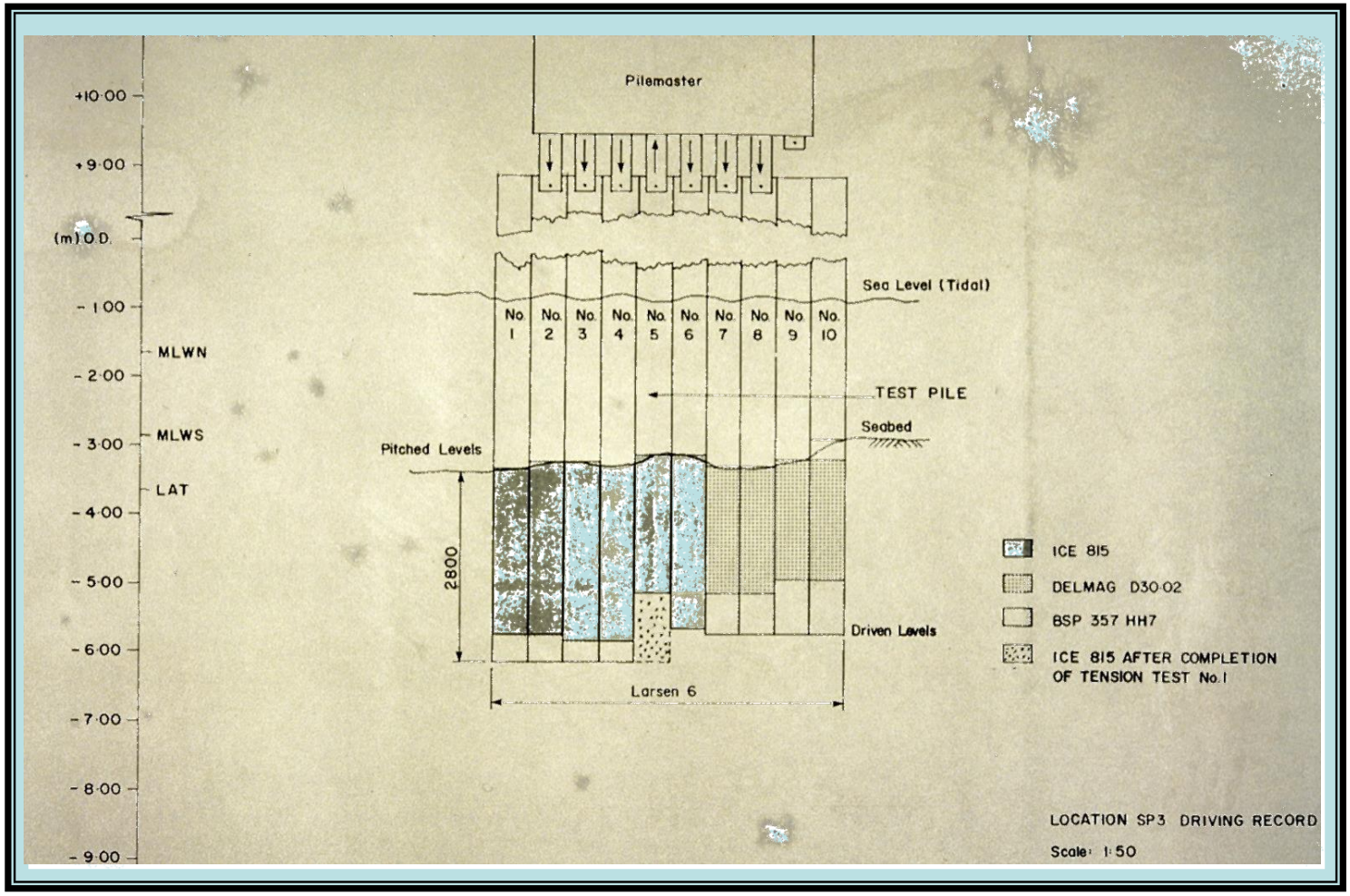


Timetable

- October 1985 – Closing date for proposals
- 13 August 1986 – Concession Signed
- January 1987 – Award Known
- Budget - £5.4 Billion
- Spring 1987 – Treaty Signed
- 23 July 1987 – Royal Assent

Infrared View of the Shakespeare Cliff Site, 1986 Site for the 5Mm of Spoil. Note the Railway Line

Piling Trials, 1986



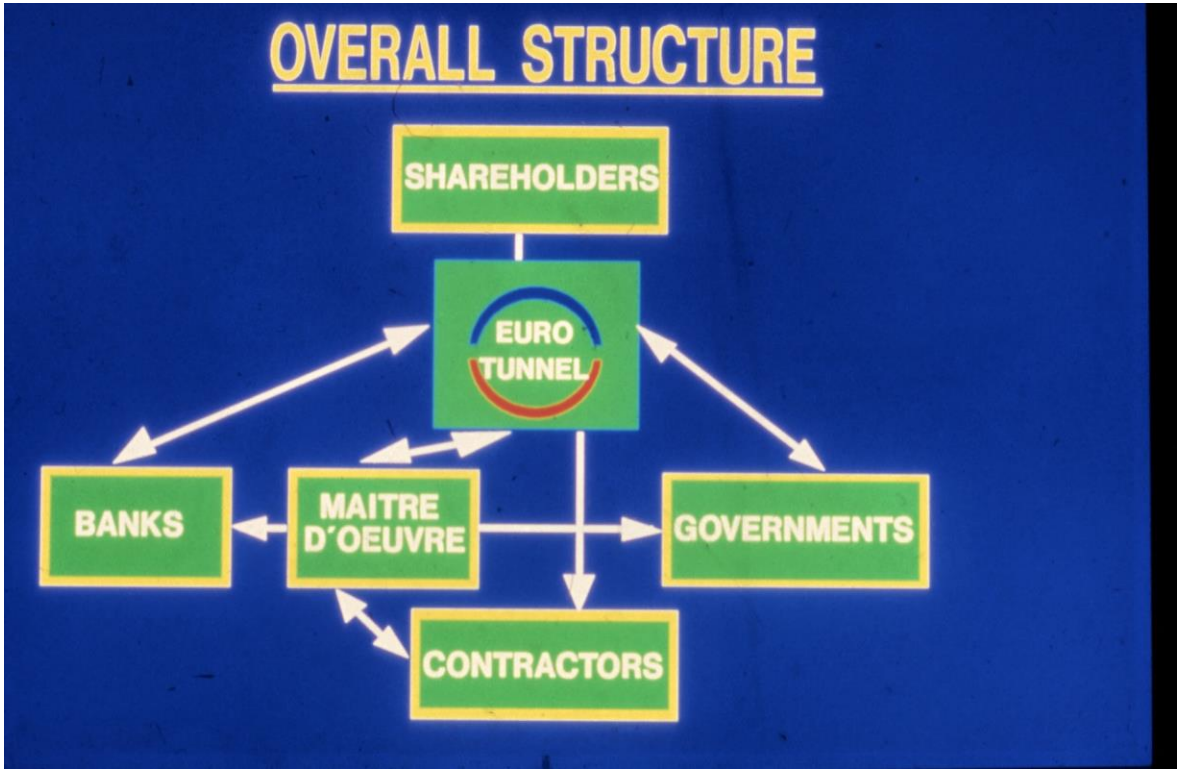
Waters of the Channel

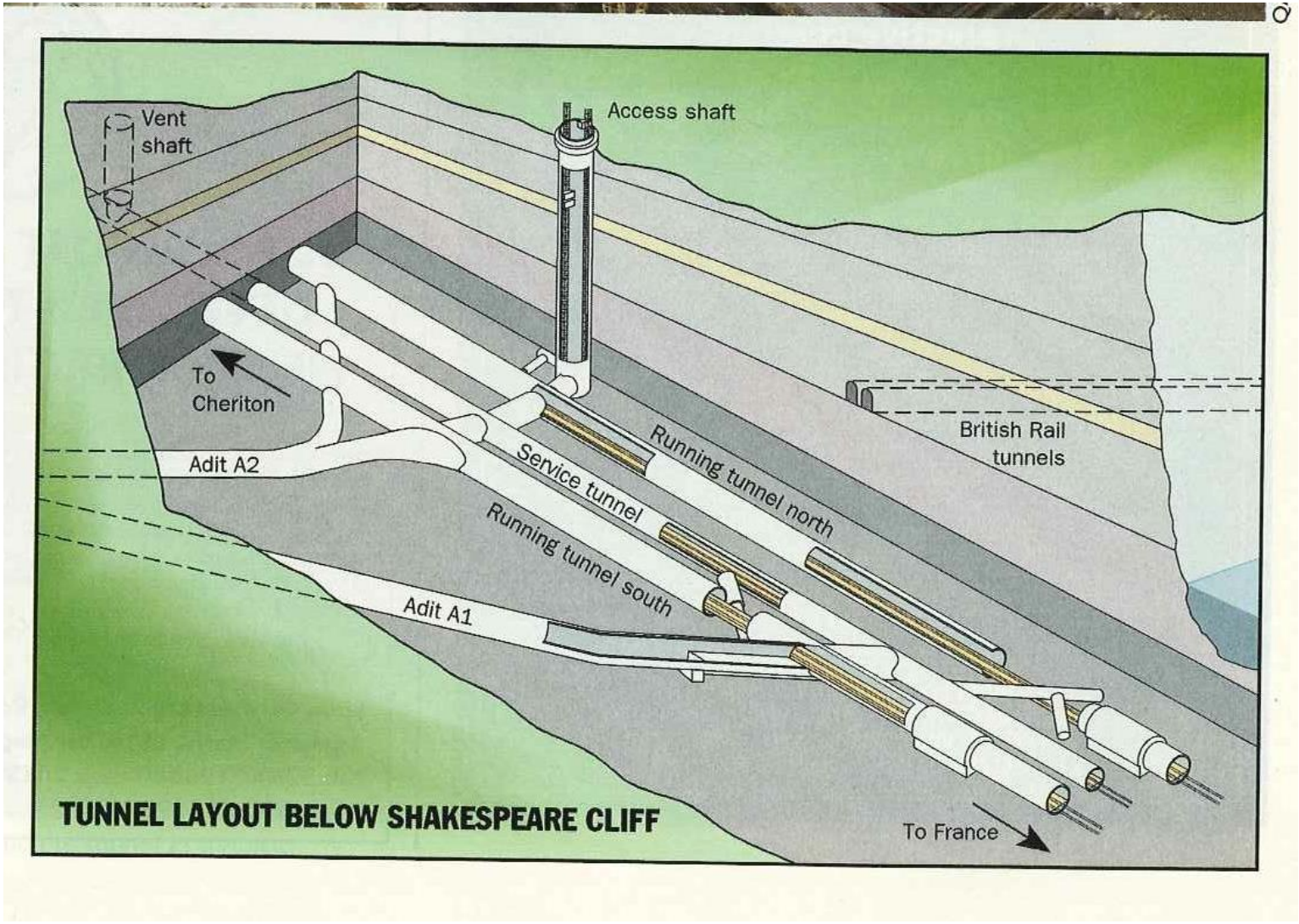
Site for the Reclamation Platform using the Spoil from the Tunnel, 1986. Cost £62 Million

Note the coast protection works for the railway and the old cliff failures

Details of the Channel Tunnel

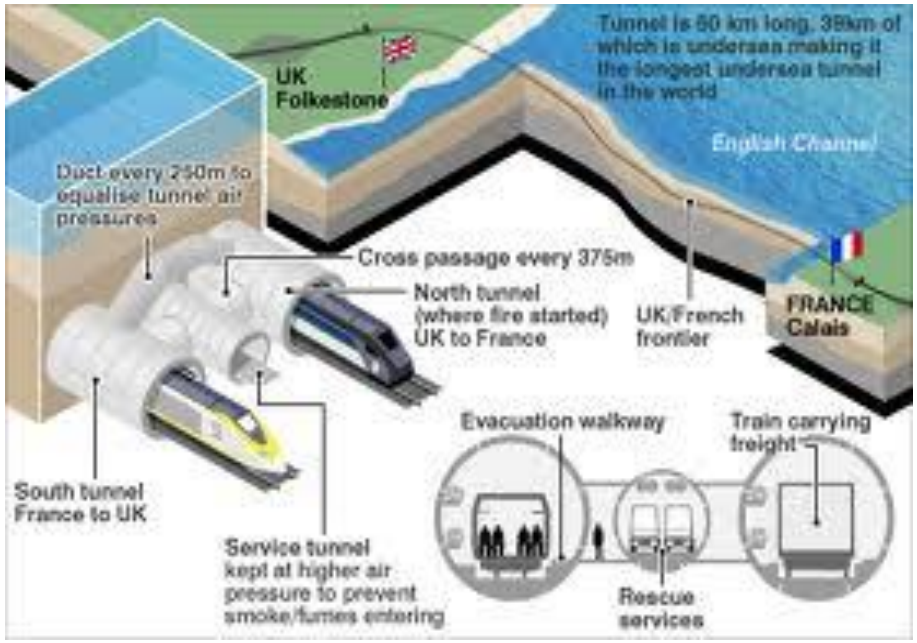
- Two running tunnels, 7.6m internal diameter (8.5m)
- One central service tunnel, 4.8m internal diameter (5.4m)
- Crossovers every 375m, piston relief ducts every 250m
- Route is some 50km long, giving a total of 150km of tunnels
- Some 5.2M cubic metres of spoil produced on the UK side
- Centre of construction activity, Shakespeare Cliff

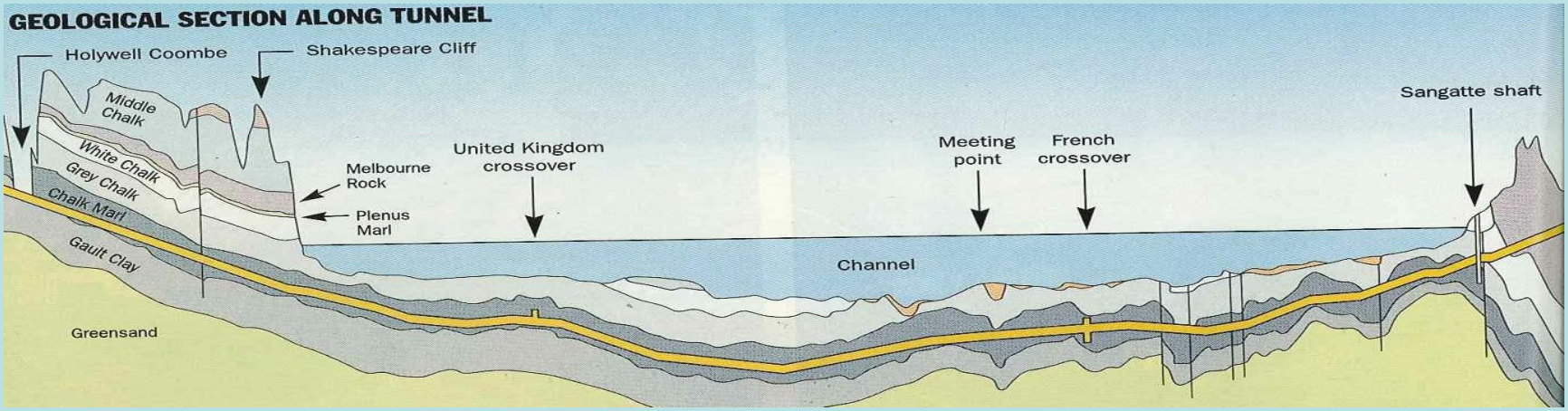

OVERALL STRUCTURE
SHAREHOLDERS
EURO TUNNEL
BANKS
MAITRE D´OEUVRE
GOVERNMENTS
CONTRACTORS



TUNNEL LAYOUT BELOW SHAKESPEARE CLIFF

The Running and Service Tunnels

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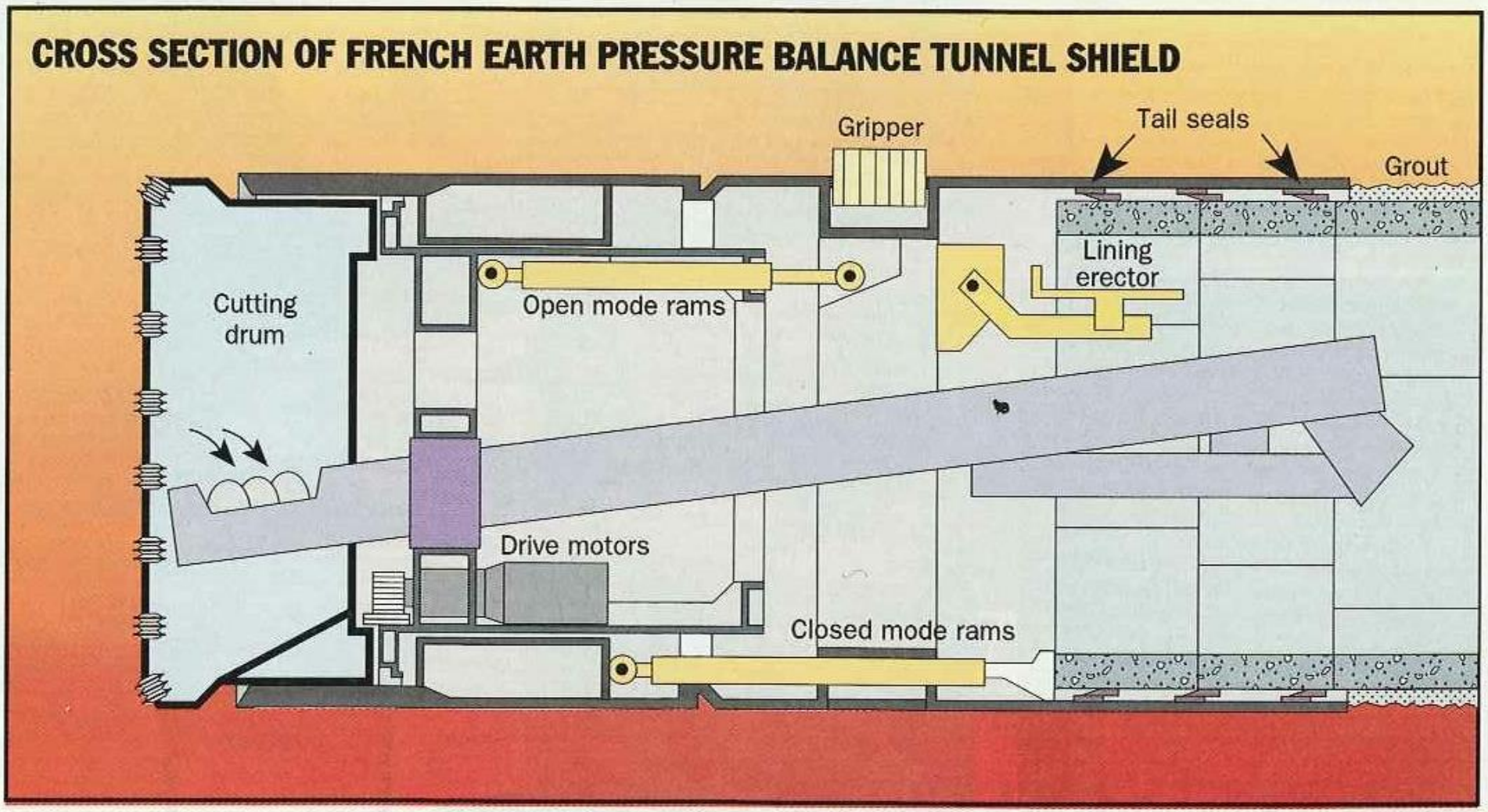
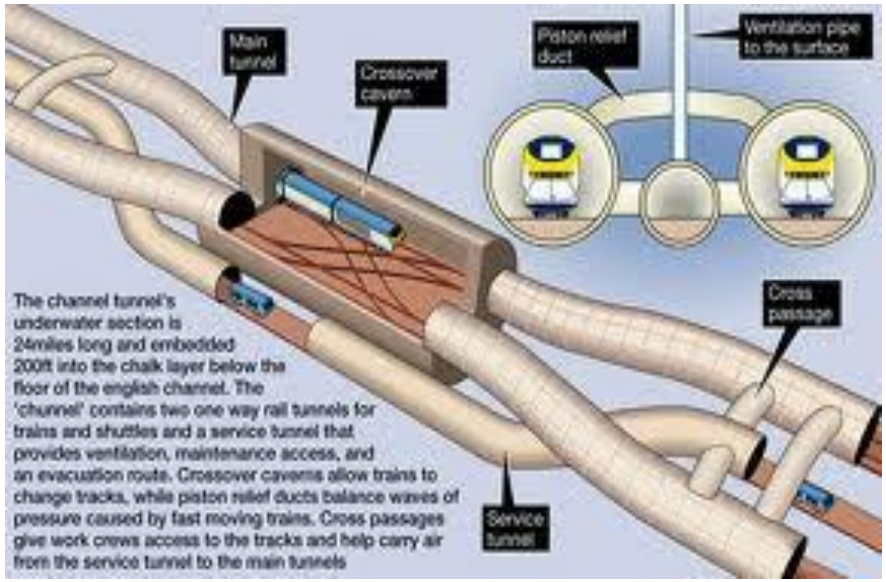
Plenus Marl
United Kingdom crossover
Channel
Meeting point
French crossover
Sangatte shaft

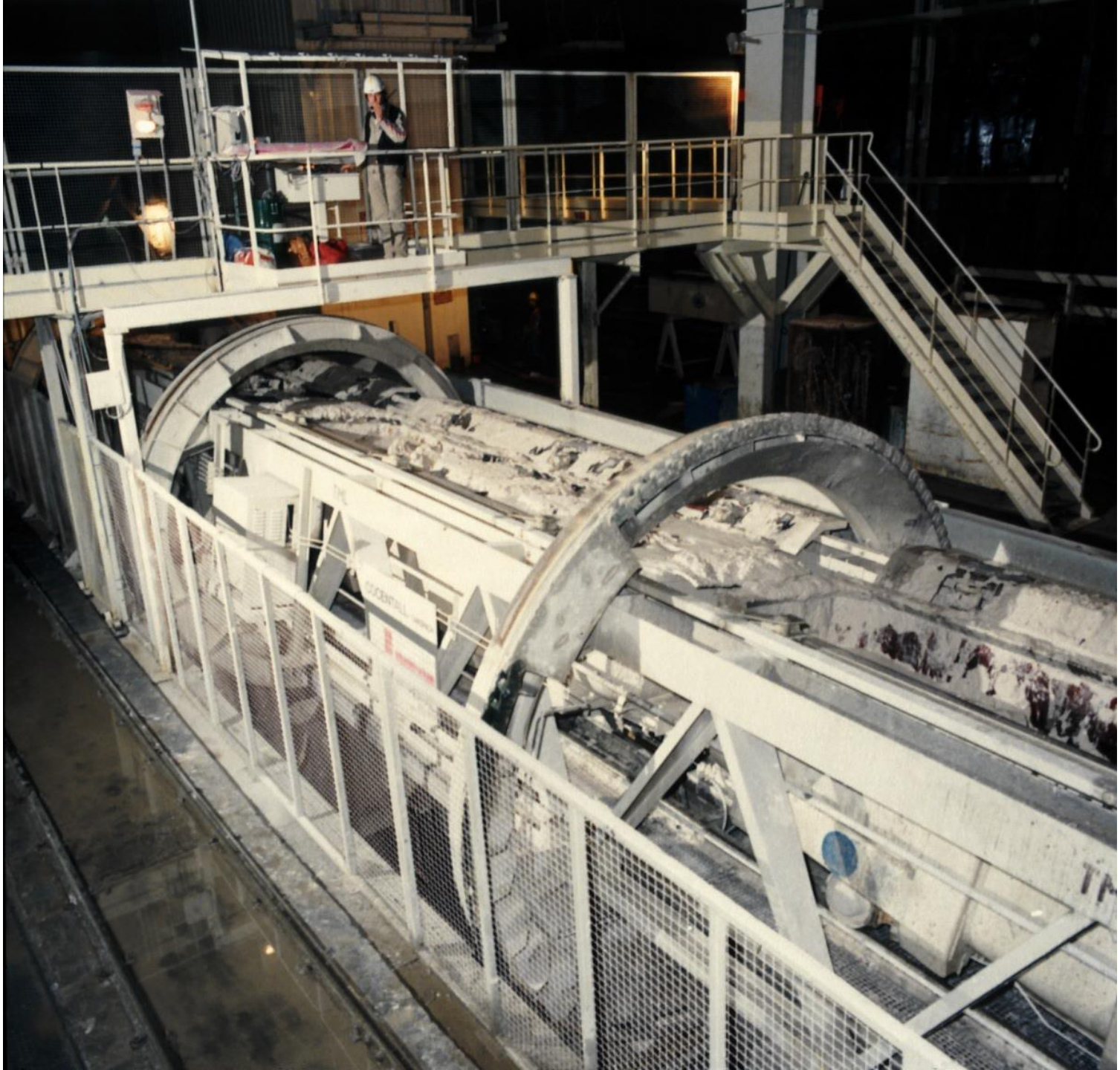
CROSS SECTION OF FRENCH EARTH PRESSURE BALANCE TUNNEL SHIELD

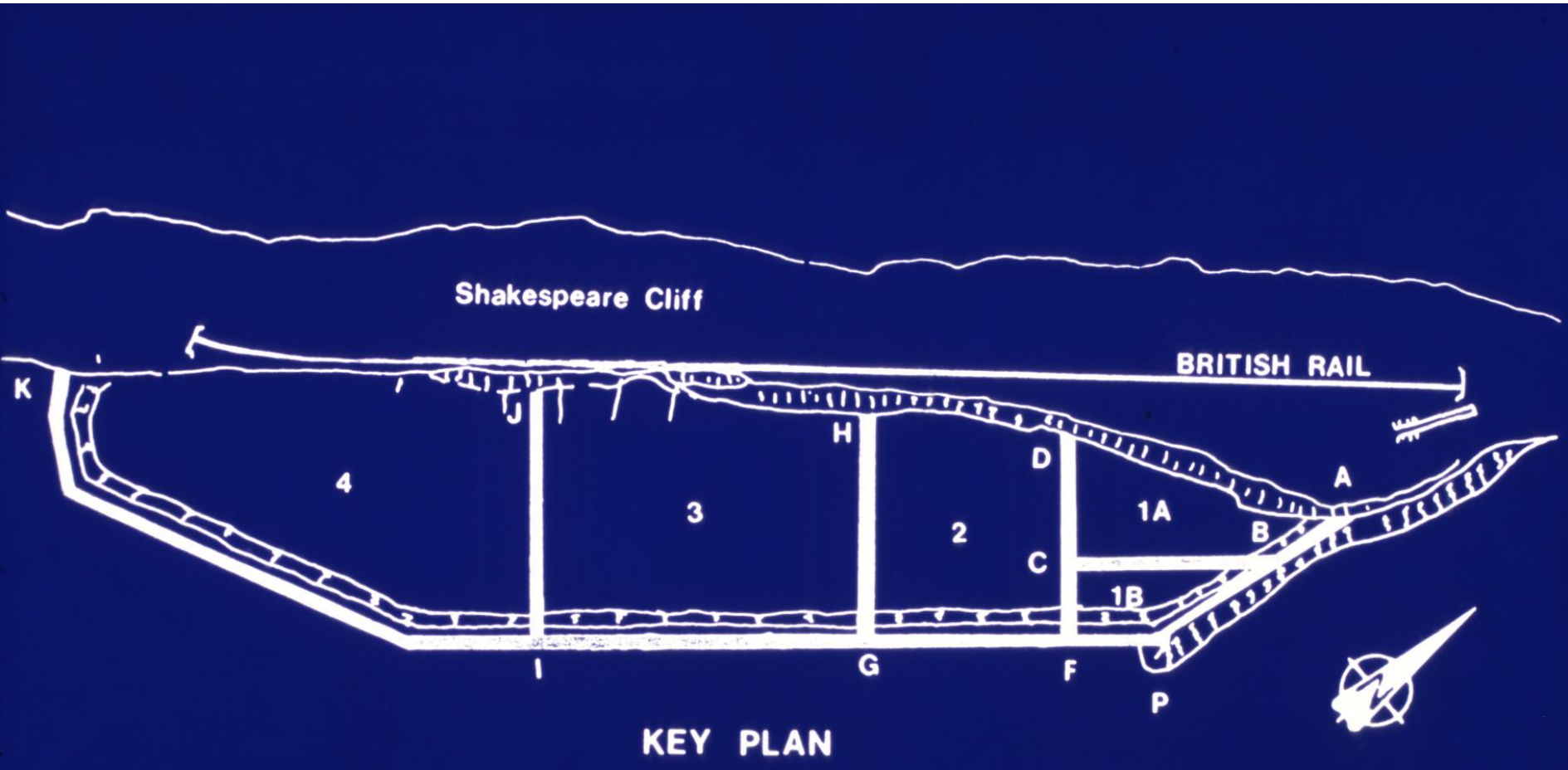


One of the Two Crossovers



'. . . Hi, man! Good to see you again . . . where was it last time! Cairo, Hong Kong . . .?' TML engineer (on first day underground in the Shakespeare tunnels)

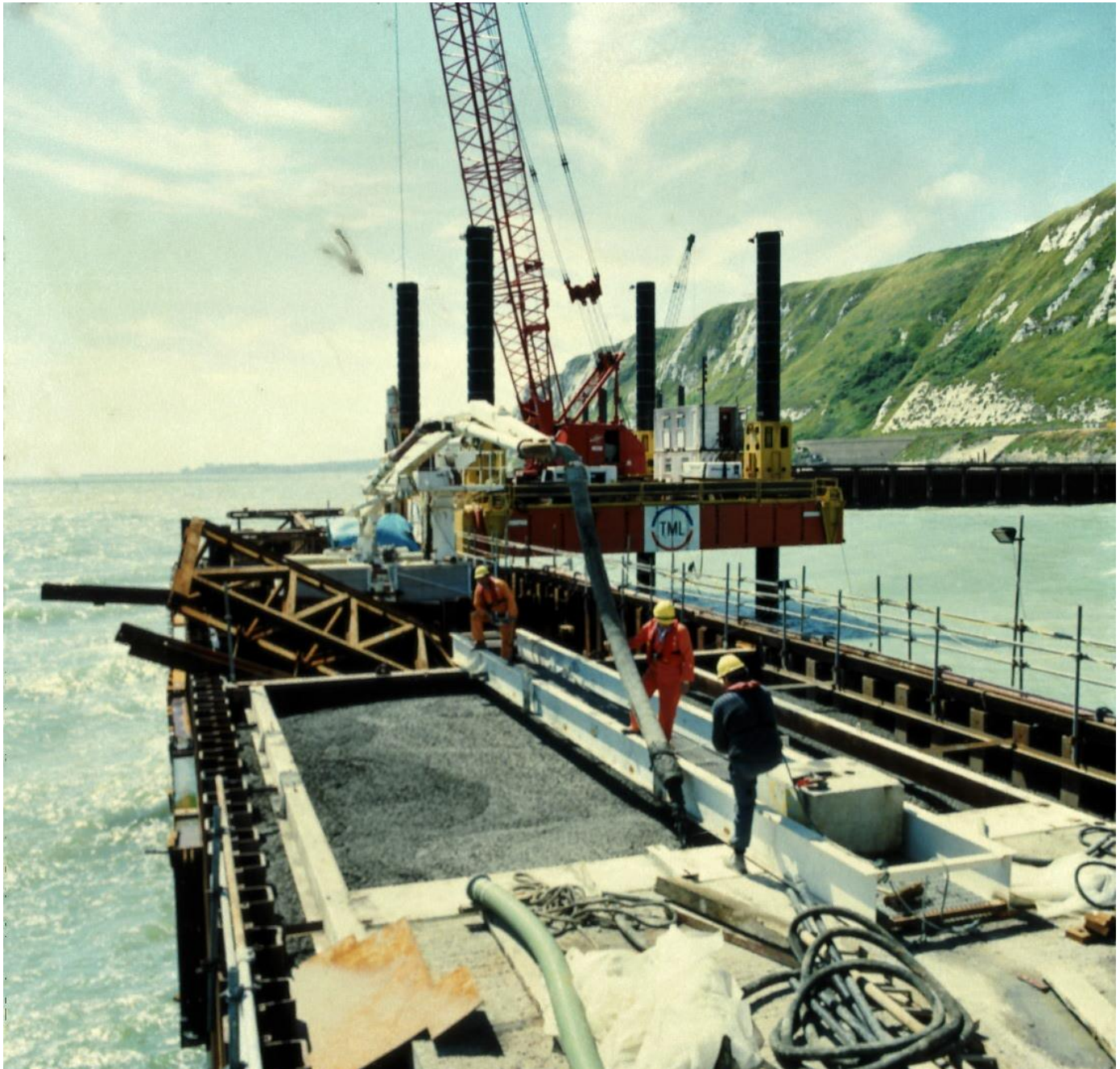




KEY PLAN


CAT
966E
FL004
TEREX
2366


TML

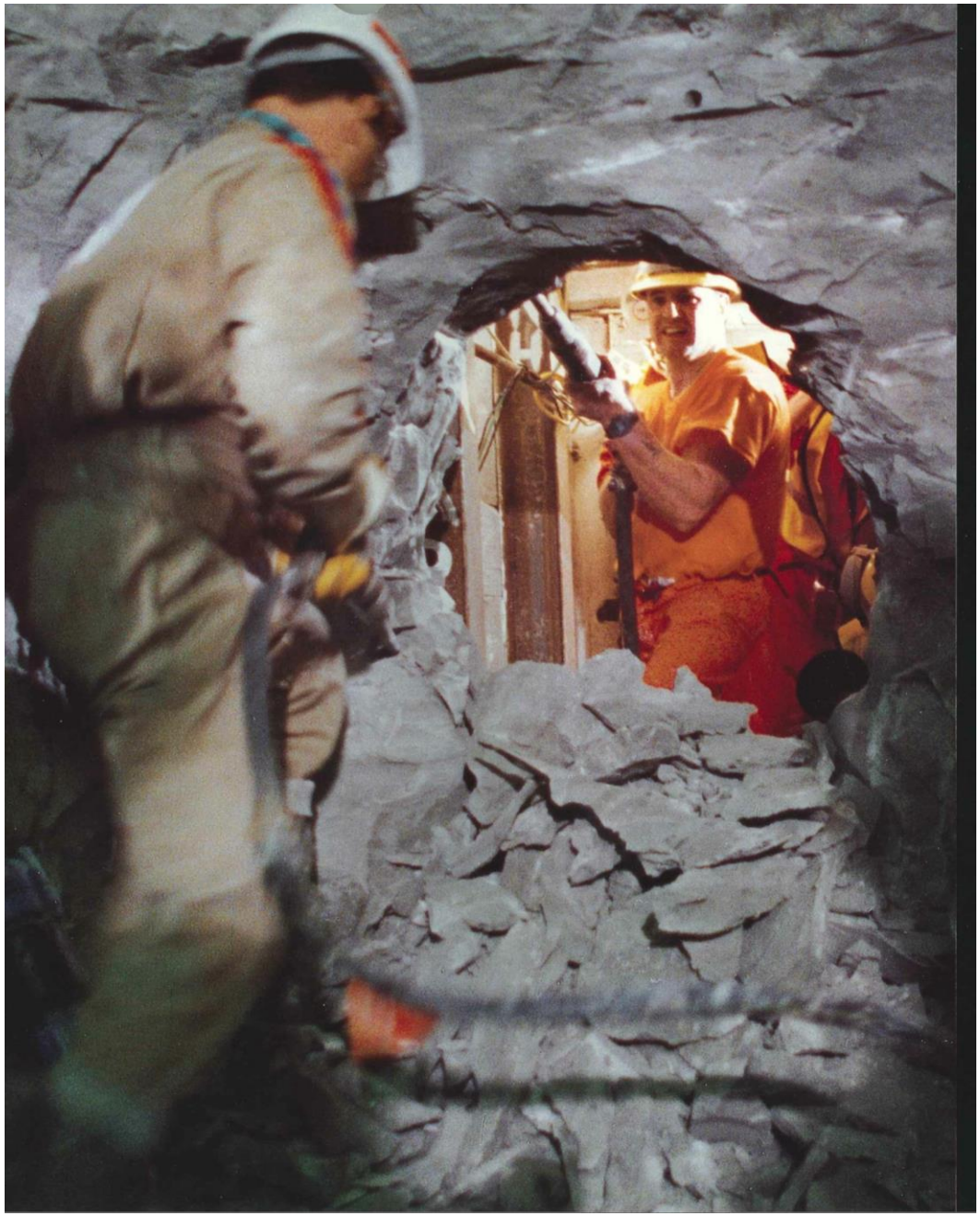

TML


DEMAG
DEMAG
CHANNEL TNEL TUNNEL


EMERGENCY RENDEZVOUS POINT
MÜHLHAUSER RG160
RG160

The Folkestone Terminal


SCHOMA
ILKE




OME
" EUROPA "
BIENVENUE

Like Col. Beaumont!

Fire Damage

Some Facts

- Eurotunnel has a 65 year operating concession
- The estimated cost was £5.2 Billion: it actually cost over £7 Billion. Its financing costs were 140% higher
- At its peak the project employed 15,000 people and spent £3M/day
- 10 killed, of which 8 were British
- In 1995 some 7.3M passengers and 6.4M tonnes of freight went through the tunnel. By 2010 the figures were 17M passengers and 15.3M tonnes of freight
- Daily there are up to 400 trains, carrying 60,000 passengers, 6,000 trucks/coaches & 7,300 cars
- It carries 26% of UK- EU Traded Goods annually

SOME PROBLEMS

- There were fires in the tunnels in 1996, 2006 & 2012
- There was One breakdown in December 2009

- However, no one was killed

THANK YOU FOR LISTENING

- I hope you have learnt something about this £7 Billion project:

  - the geology along the 50km tunnel route

  - how the tunnelling boring machines operated

  - how the two 7.6m diameter running tunnels were built, along with the central 4.8m diameter service tunnel

  - where the tunnel spoil went and how the lagoons in which it was placed were built, and how they were crucial to the whole scheme

  - the layout of the tunnels and its two crossovers, and the linking passages and piston ducts

  - the manufacture of the tunnel lining units on the IoGrain

  - as well as using the tunnel, I hope you manage to visit the 36Ha Samphire Hoe (Shakespeare Cliff Platform), where it all started with Colonel Beaumont in about 1875