



**GULL WING  
LOWESTOFT**

# **2024 NSIP Conference**

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# Lowestoft, Suffolk

Lowestoft, in the County of Suffolk, is the most easterly town in the UK

It has a significant history as a fishing port and a seaside resort

The Gull Wing will be the Third Crossing point of Lake Lothing in Lowestoft.

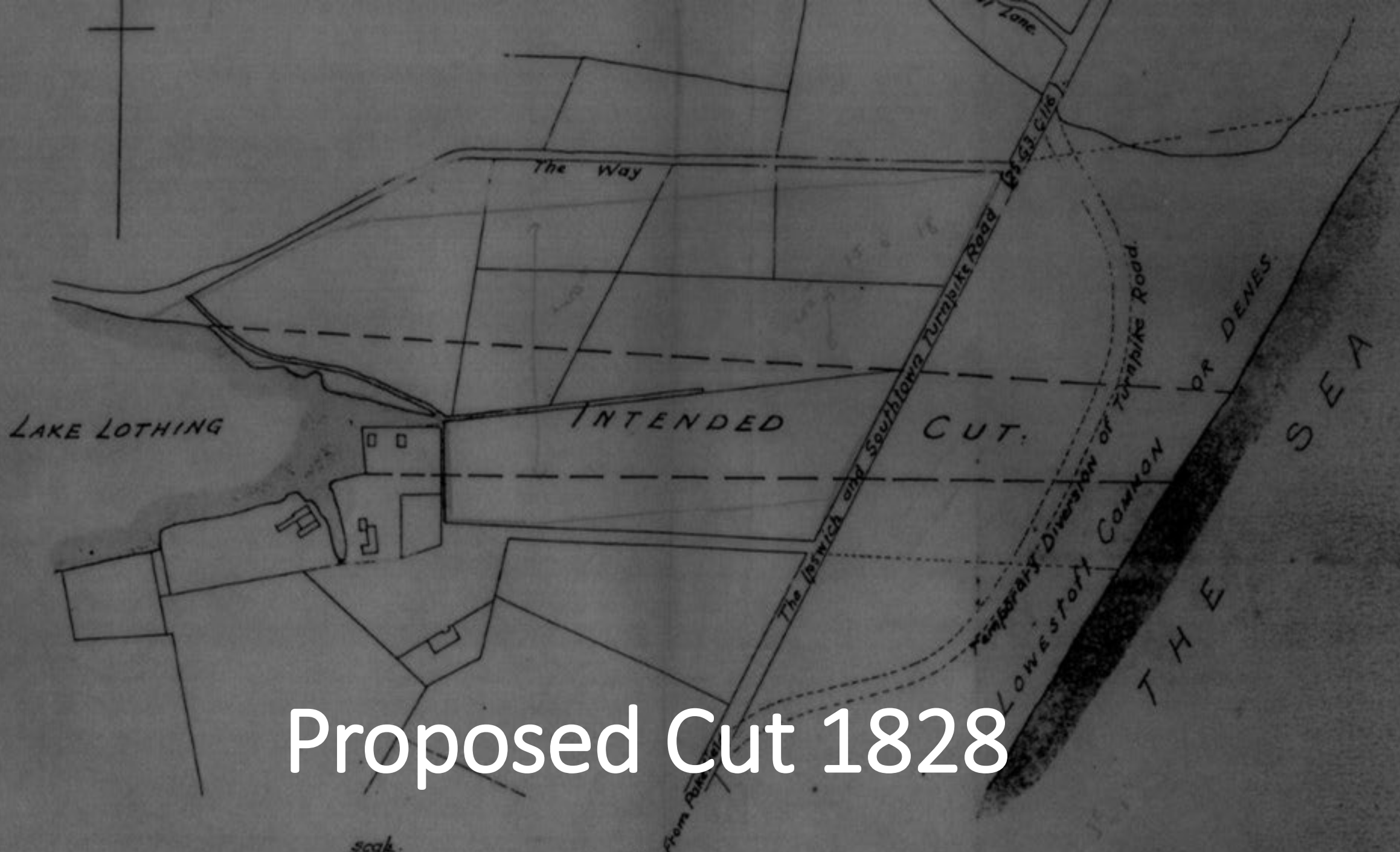
The first two crossing points have been closely linked to the development of the town and surrounding area for more than 200 years.





# Muntford Bridge 1790

First Crossing Point



# Proposed Cut 1828

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# 1st Bridge opened 9<sup>th</sup> June 1830

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- Cast-iron double leaf swing bridge
- 102ft / 31m long
- 52ft / 16m opening arch
- 240 tons
- Operated by four men turning two large crank handles.



C.1870

> **1883, Lowestoft's  
purpose-built herring  
and mackerel dock  
opens**



Fishermen unloading fish at the port, c1890.



> **Bascule Bridge  
opened in March  
1972**







CEFAS ENDEAVOUR





# The Third Crossing





## The Problem

- Existing two Crossings in the east and the west are inadequate for traffic demand
- Due to its low height, the east bascule at the harbour entrance opens for virtually every vessel
- Congestion is a serious disincentive to people coming to the town and discourages existing businesses from expanding or new firms investing in the area
- The connecting roads in the north and the south have already been built – the third crossing is the missing link

# Strategic Objectives

- AIM:
  - To stimulate regeneration, sustain economic growth, and enhance Lowestoft as a place to live and work in, and to visit.
- OBJECTIVES:
  - To open up opportunities for regeneration and development in Lowestoft
  - To provide the capacity needed to accommodate planned growth
  - To reduce community severance between North and South Lowestoft
  - **To provide a design that inspires people**



# Our Journey 2016 to 2024



DCO (Development Consent Order)

# Environmental Assessment (EA)

Need for the Scheme and  
Alternatives

Existing Environment

Air Quality

Cultural Heritage

Visual Impact

Nature Conservation

Geology, Soils and  
Contamination

Noise and Vibration

Materials

Road Drainage and Flood Risk



Tunnel



Western



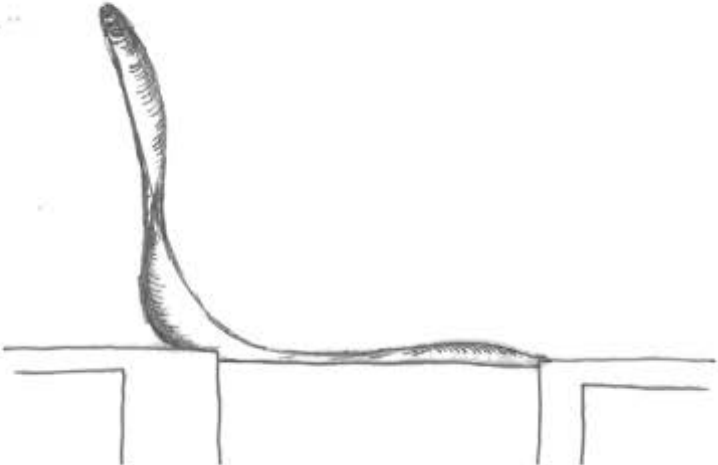
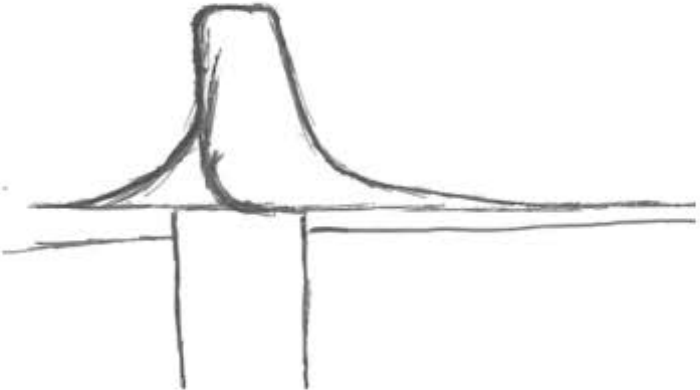
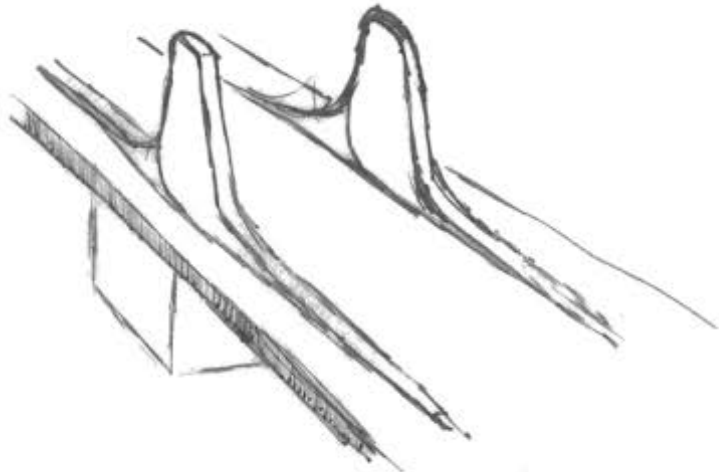
Central

## Bridge/ Tunnel Location Options Development

The consideration of alternatives in the development of the Scheme covered four main issues:

- The broad location of the Scheme i.e. an eastern, western or central crossing of Lake Lothing
- The constraints associated with the chosen central option corridor and the northern and southern junction arrangements;
- Bascule Bridge design alternatives

# Concept Development – Design Prompts



Te Matau ā Pohe or  
“The Fishhook of Pohe”  
New Zealand

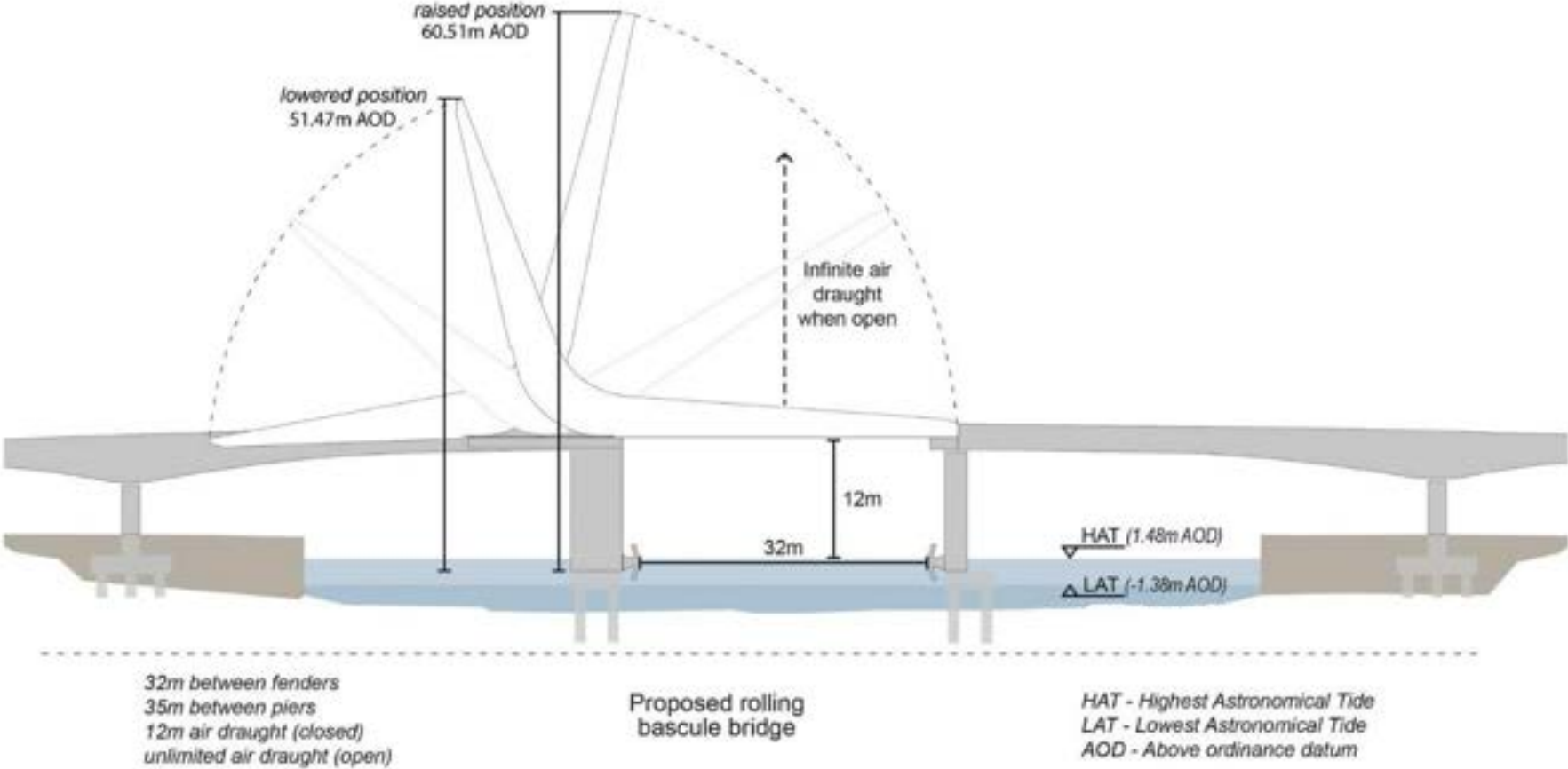


Herring Gull



North Sea Offshore Wind Farms

# Selected Rolling Bascule Option



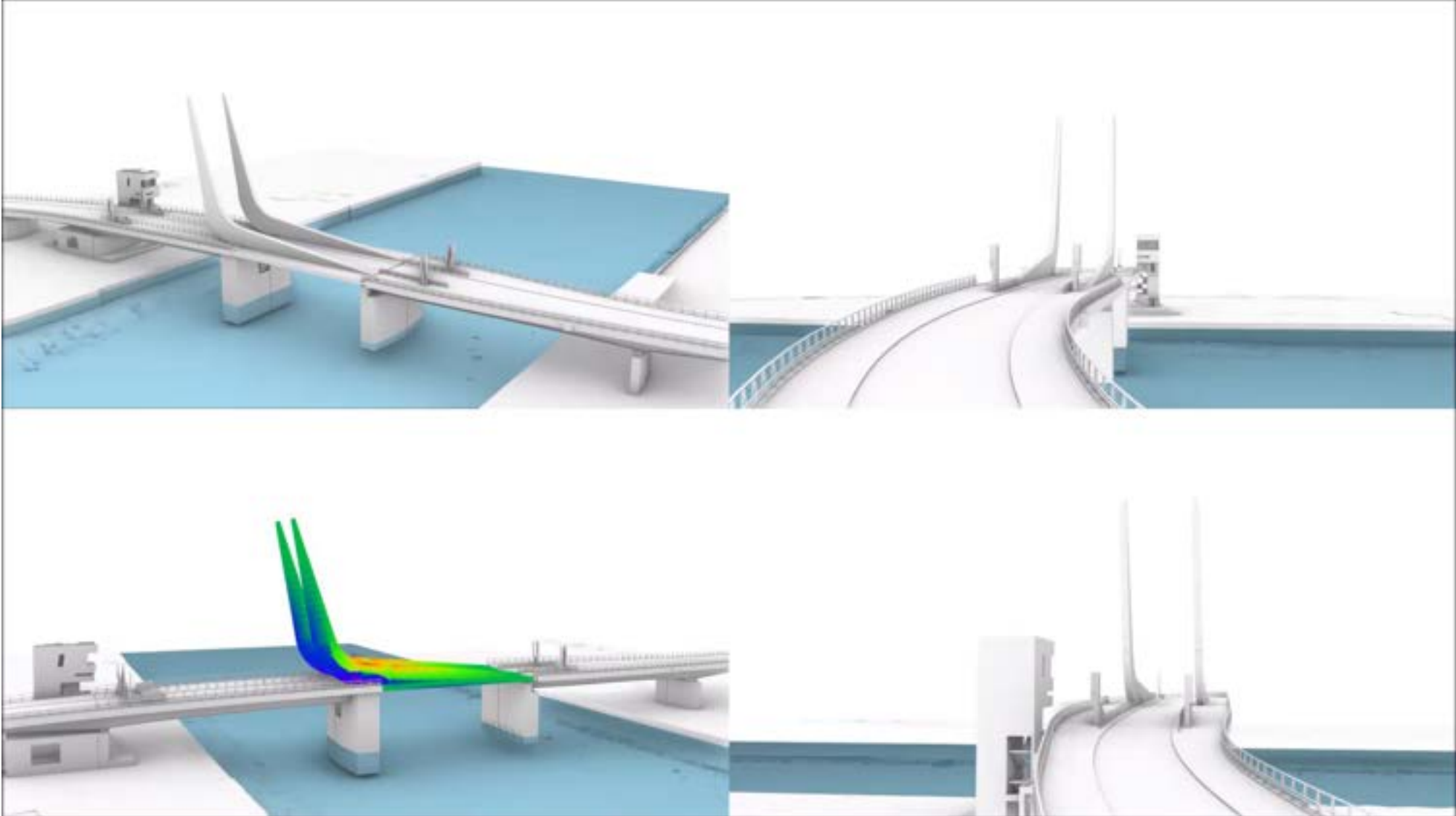


# Gull Wing Phase 1 Contract

- The Phase 1 Contract for the Gull Wing was let to BAM Nuttall
- Lead designer was Arup
- Mechanical Engineer was Eadon
- Architect was Moxon



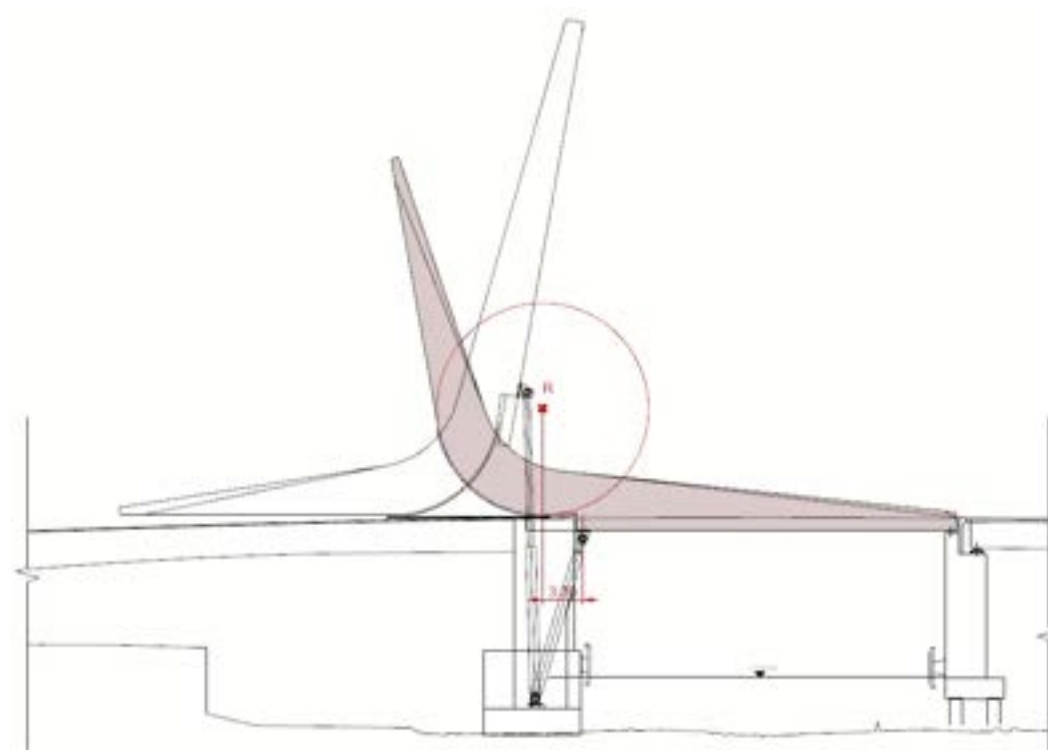
# Rolling Bascule Bridge Development



# Bascule Bridge

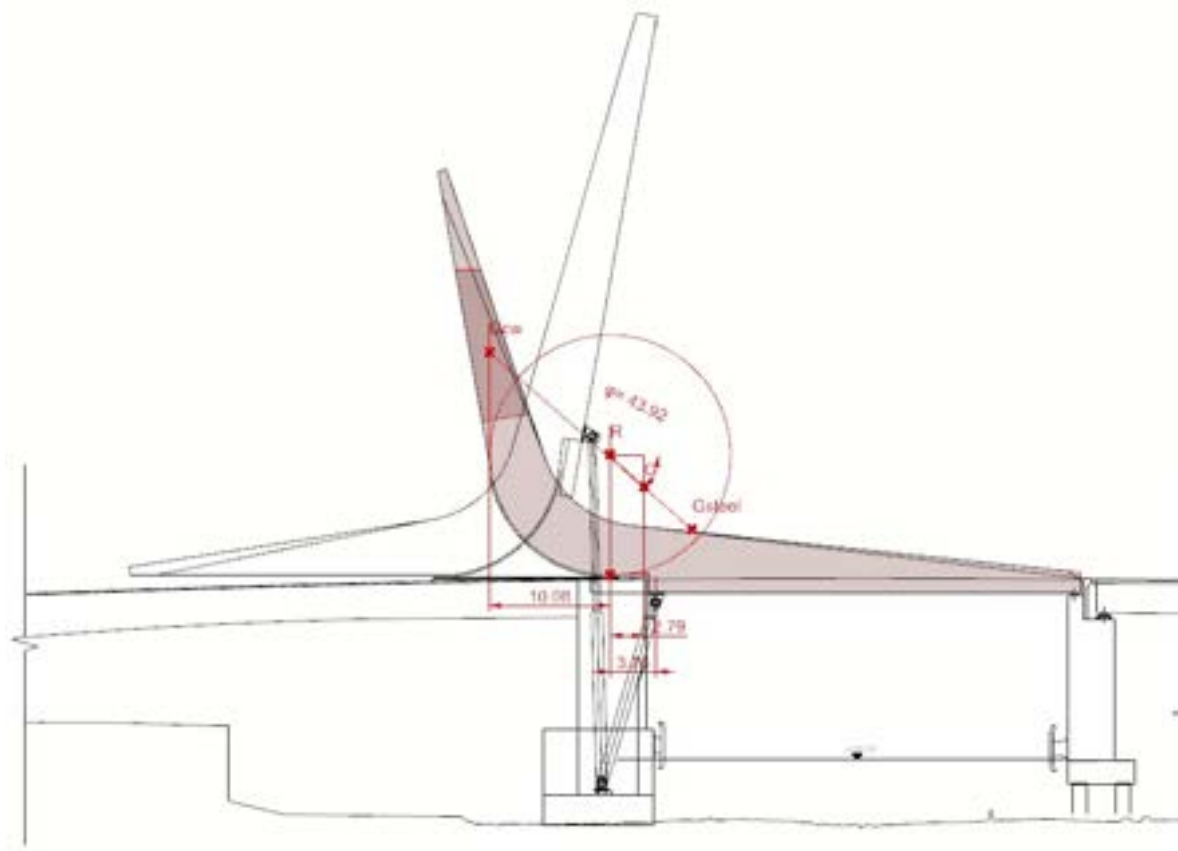
## Counterbalanced rolling bascule bridge

- Up to 10 openings per day for 120 years
- Opening time 110 seconds
- Rotation and translation
- Rolling on rack
- Ram stroke increases (15m → 30m)
- Distance between rack & hydraulic ram increases

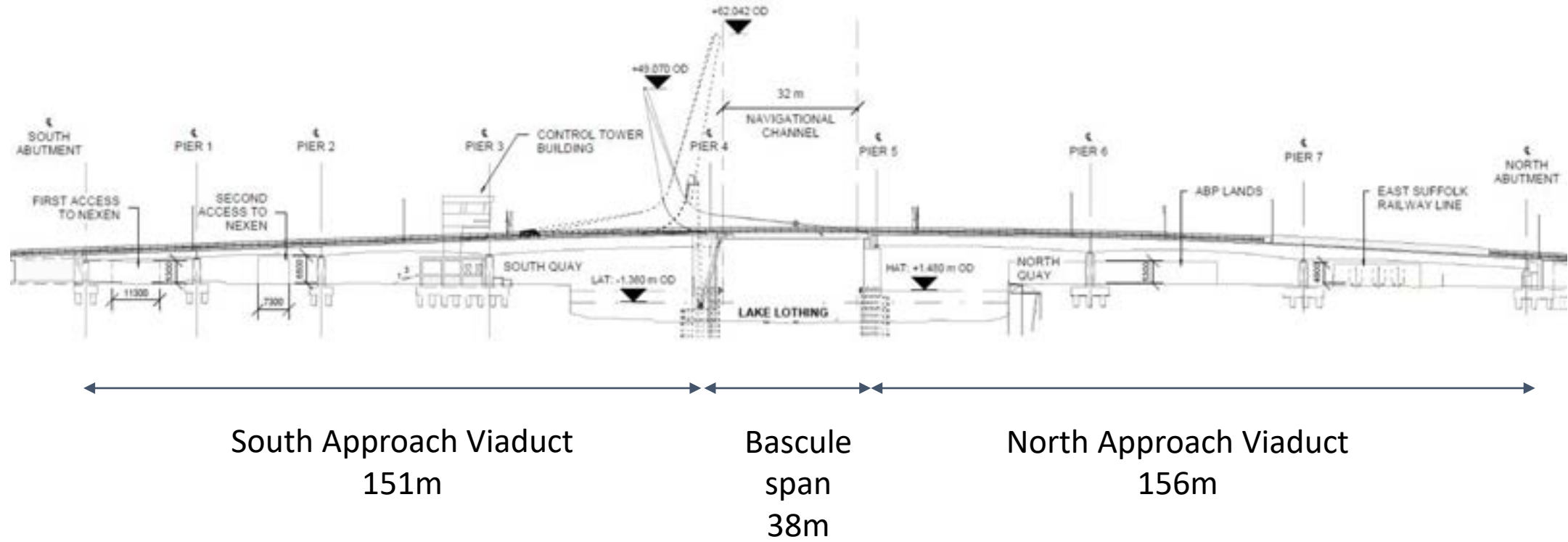


# Bascule Bridge

## Counterbalanced rolling bascule bridge

- Total bridge weight 1150 tonnes
  - Counterweight located in “tail”
  - Combined Centre of Gravity needs to be between rack and hydraulic cylinders
- 
- Optimised for power requirement, nose end preponderance, minimisation of rack plate wear, minimise stresses in structure

# Eight Span Viaduct





# Gull Wing Selected Design

- Bridge will be 350 metres in length
- Scheme Length 1 Km including Approach Embankments
- Links into existing strategic road network forming a 'bypass'
- Cycle and Pedestrian facilities on both sides that will link to existing network
- 116 seconds to raise the Bridge, 106 seconds to lower the Bridge
- 12 metres clearance (approx. 39 ft) below bridge when closed - around 5x higher than existing bascule bridge (less openings and traffic disruption)
- Spans over main railway line and several highways
- Bascule Span Open: Top of Blade 60 m above water.



<b>Steel in Viaducts</b>	35,000 T
<b>Total Bascule Weight</b>	1,100 T
<b>Total Concrete Volume</b>	20,000 m <sup>3</sup>
<b>Total Nr of Piles</b>	> 1300



# Gull Wing Construction



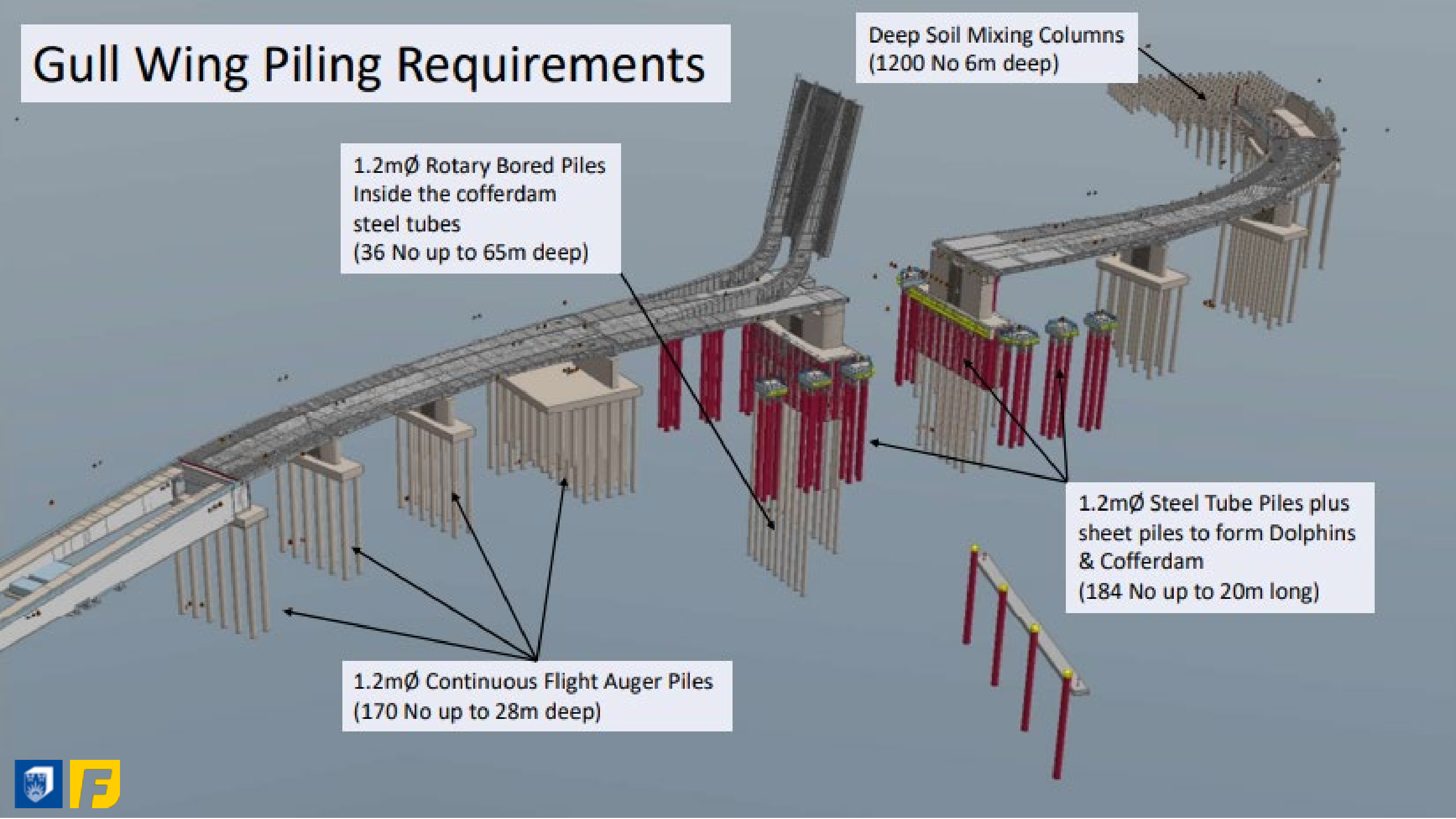


# Gull Wing Phase 2 Contract

- The Contract for the Completion of the Design and the Construction of the Gull Wing was let to Farrans in December 2020
- Construction works commenced on site in April 2021
- Construction is in final stages and due for completion in 2024
- Social Value to Lowestoft was an SCC tender requirement. Farrans has delivered as follows:
  - Procurement opportunities for local supply chains
  - Job and work placement opportunities
  - Educational Outreach to local schools
  - Community Volunteering



# Gull Wing Piling Requirements



Deep Soil Mixing Columns  
(1200 No 6m deep)

1.2mØ Rotary Bored Piles  
Inside the cofferdam  
steel tubes  
(36 No up to 65m deep)

1.2mØ Steel Tube Piles plus  
sheet piles to form Dolphins  
& Cofferdam  
(184 No up to 20m long)

1.2mØ Continuous Flight Auger Piles  
(170 No up to 28m deep)



Autumn 2021

**CFA Piling**



Autumn 2021

# Pile Caps and Concrete Pour





Winter 21/22

Rebar





Winter 21/22

**Shuttering and finished concrete**



**Finished Concrete Piers**



# NAV 1 Arrival





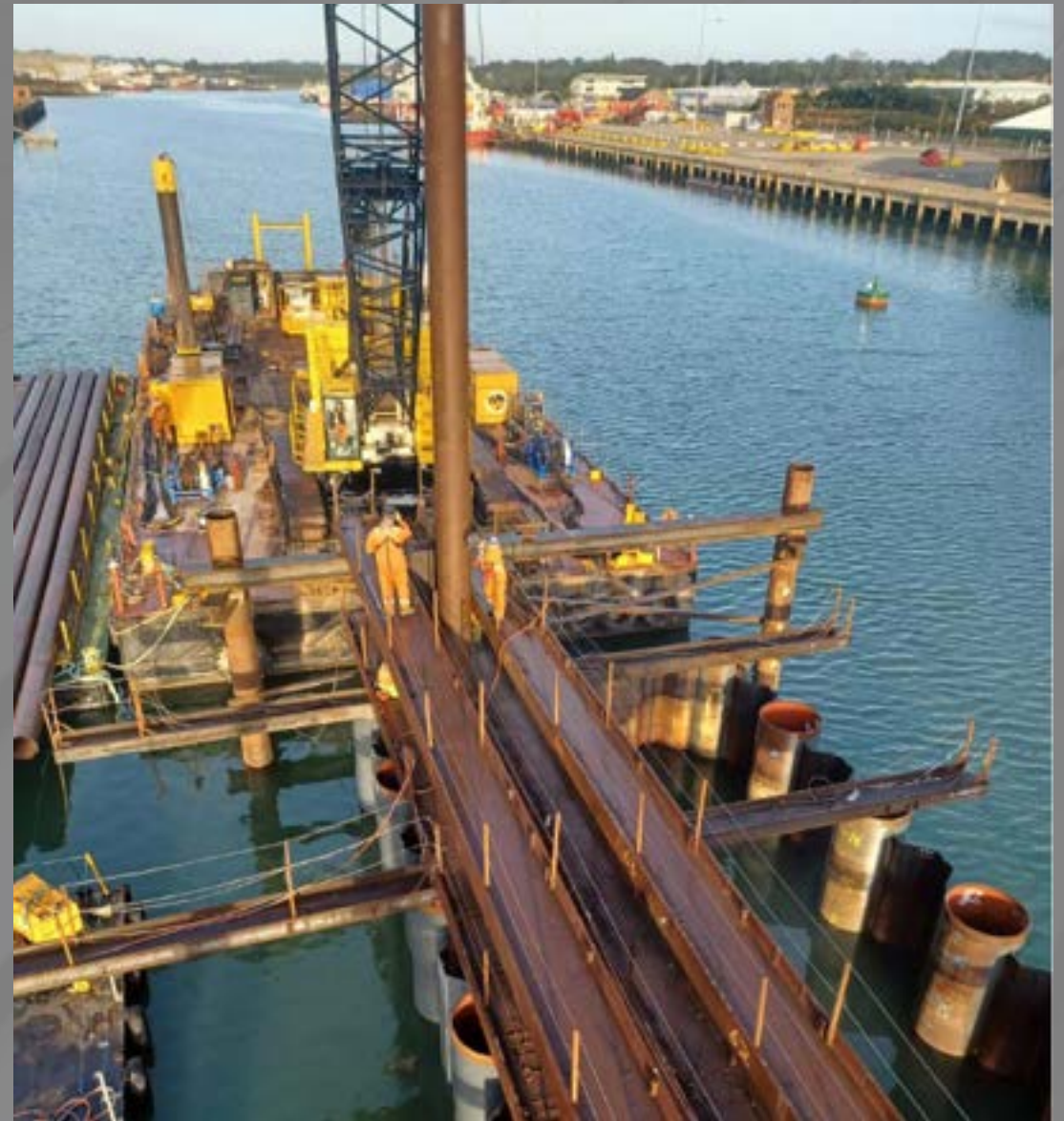
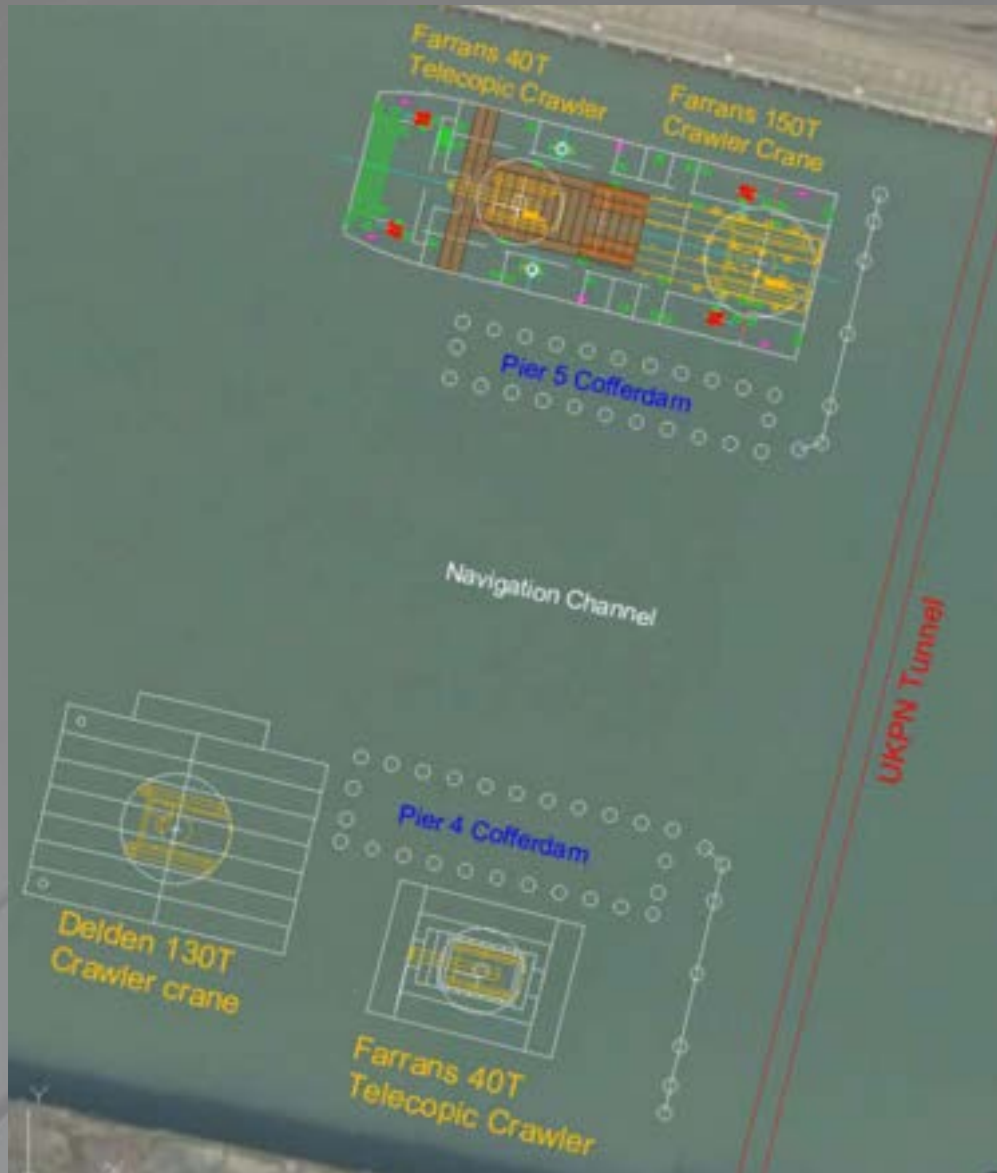
## 'Off-Line' Deck Preparation





**Moved into Place During 50 hour closure of the railway**



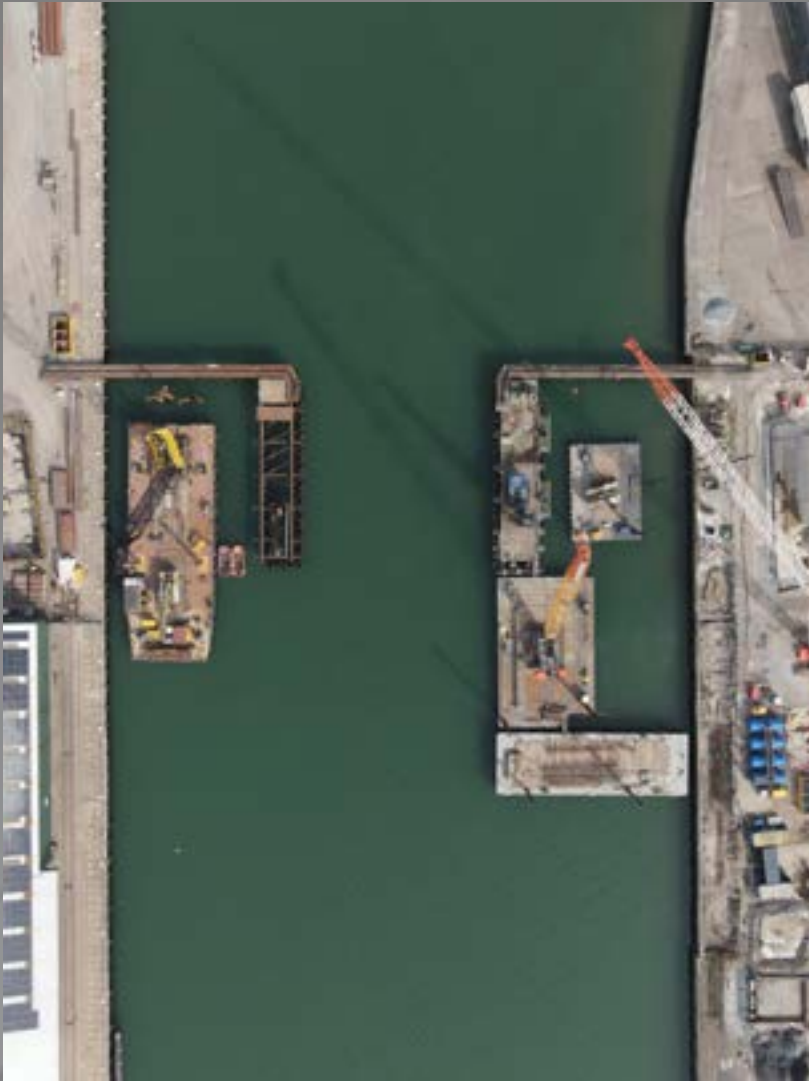


**Cofferdam Installation**



Bored Piling (up to 65m depth)





**Cofferdam Works**



# NAV2 & NAV3 Arrival

GULL WING  
LOWESTOFT





SAV 1 & 2





SAV 3

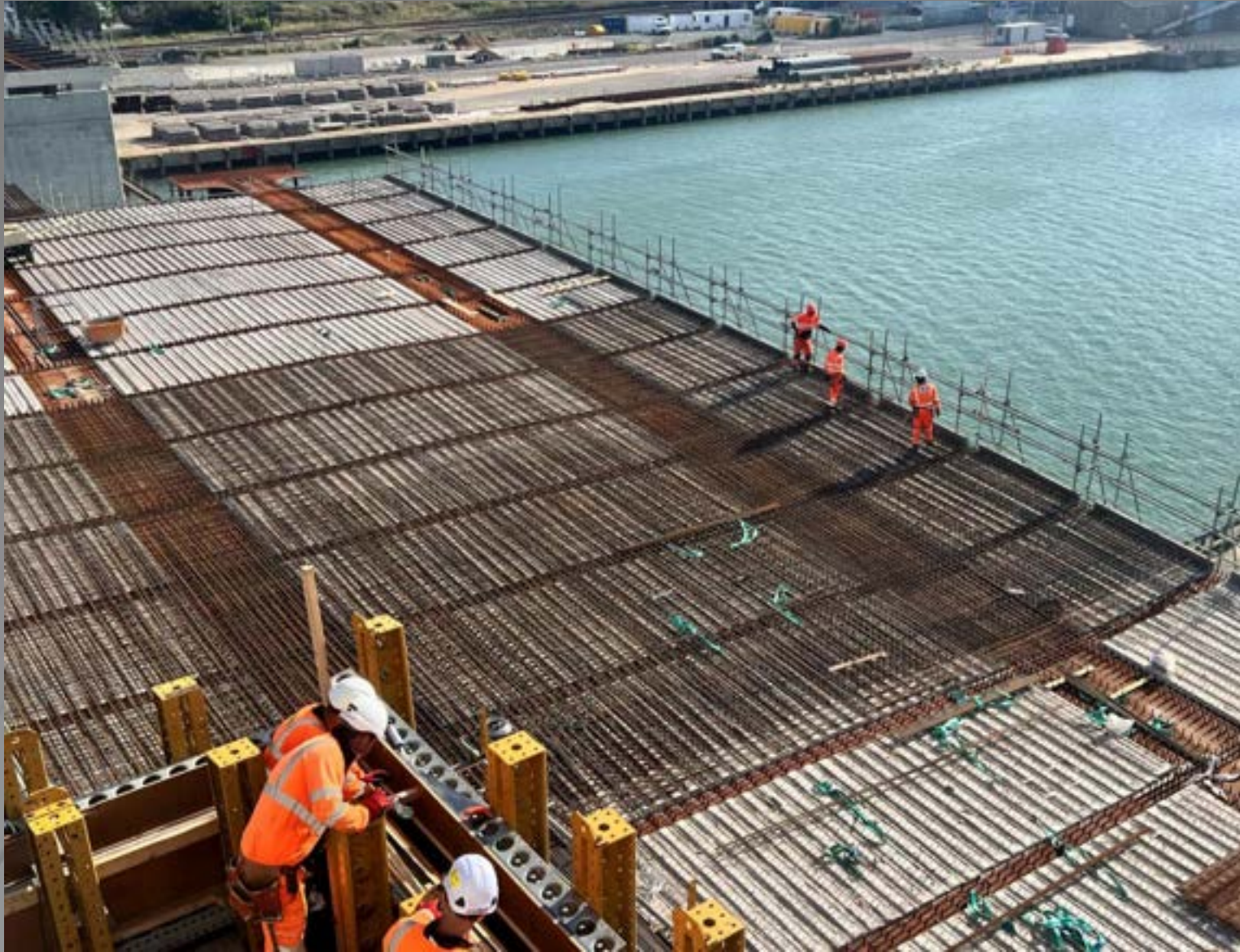


SAV 4





# Omnia Plank and Rebar



**Rebar and Concrete Pour**



**Precast Edge Beam and base course**



# Control Tower & Plant Room



Hydraulic Power Unit Installation



SAV 4 – Inside and Underside









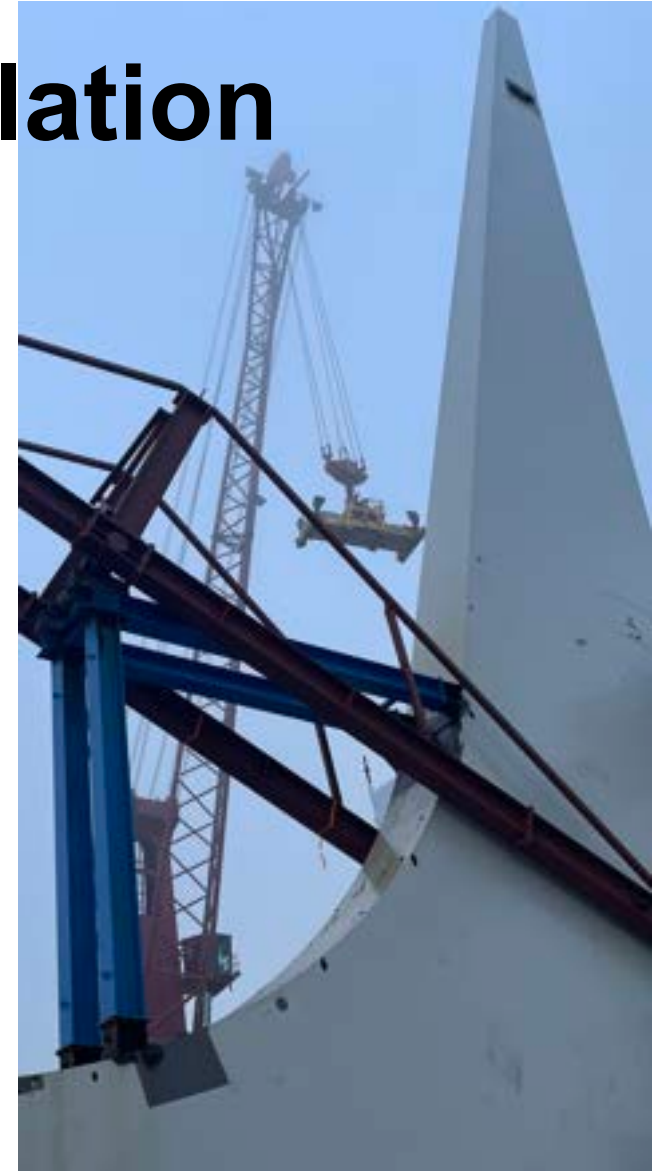


# Bascule Bridge Installation

- Bascule located in Westdorpe, NL at pre-assembly yard
- Enabling works carried out ahead of a 3 week closure of the Lake Lothing Navigation Channel in March 2024



# Curved Rack Milling and Installation



# Bascule delivery - Monday 4th March



# Bascule installation - Sat 9th March





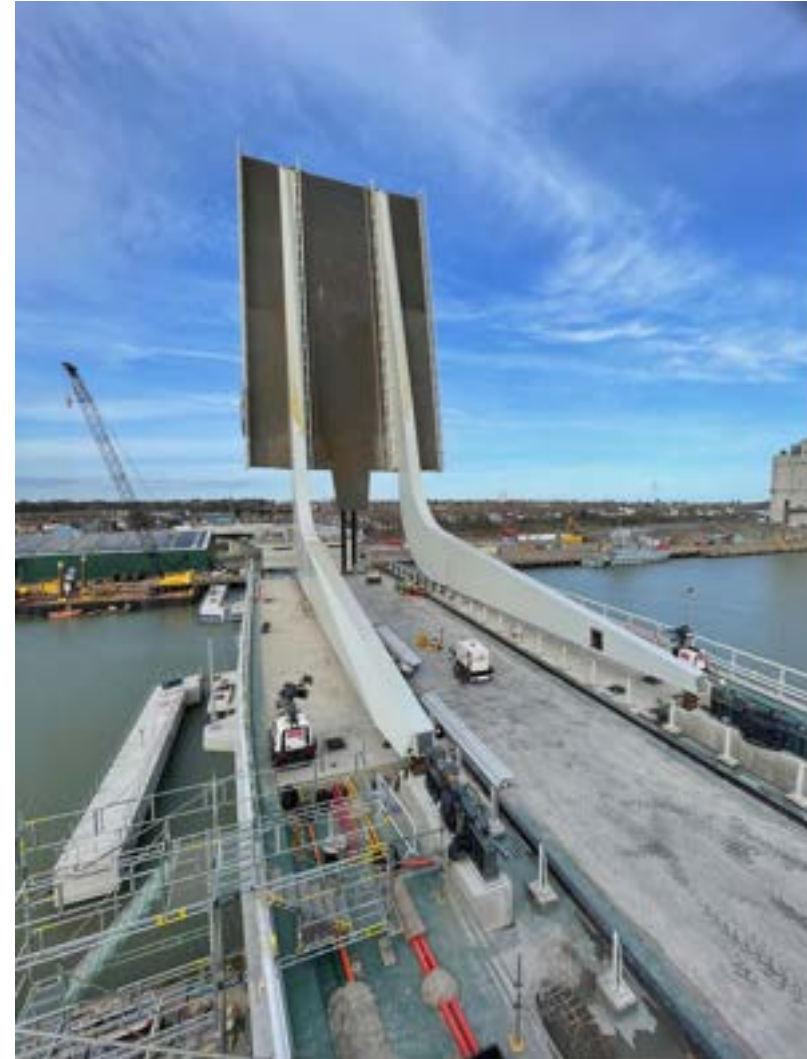
# Kentledge Removal



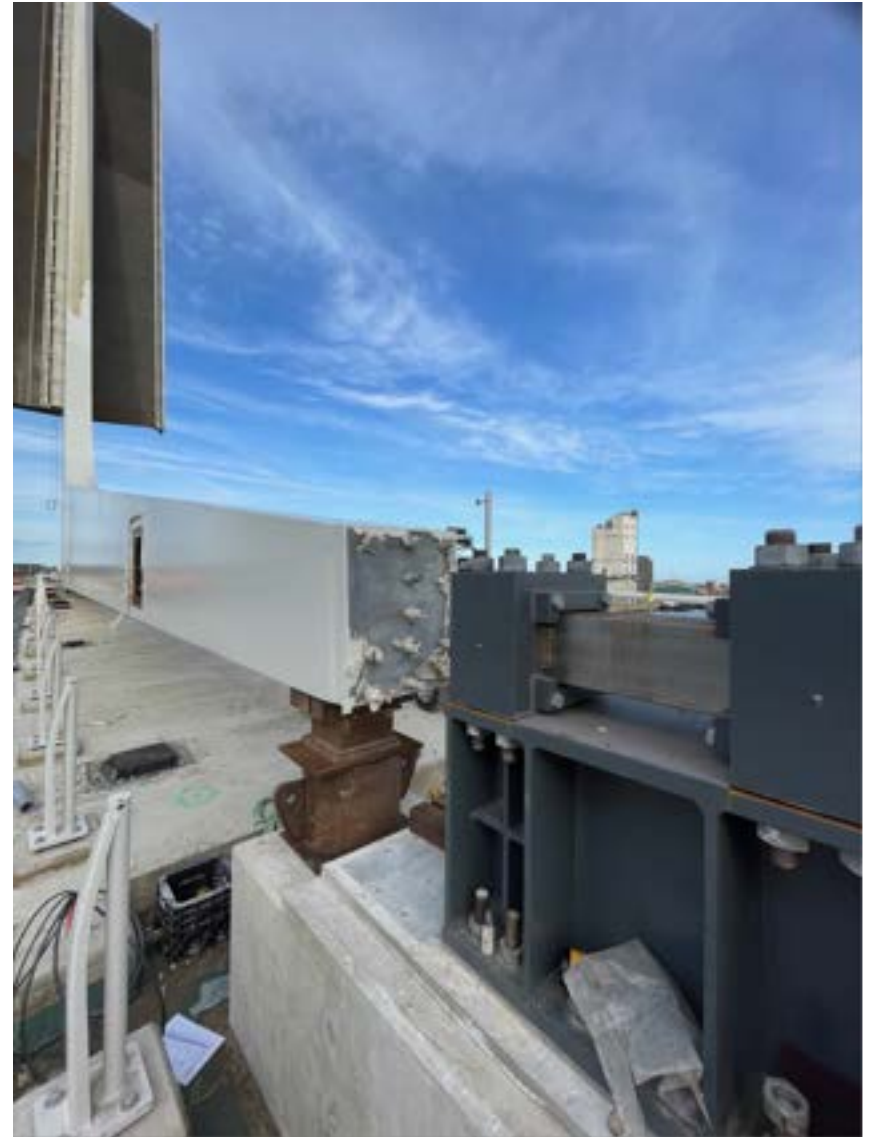
# Counterweight Pour - Monday 11th March



# Bascule first lift - Sat 16th March

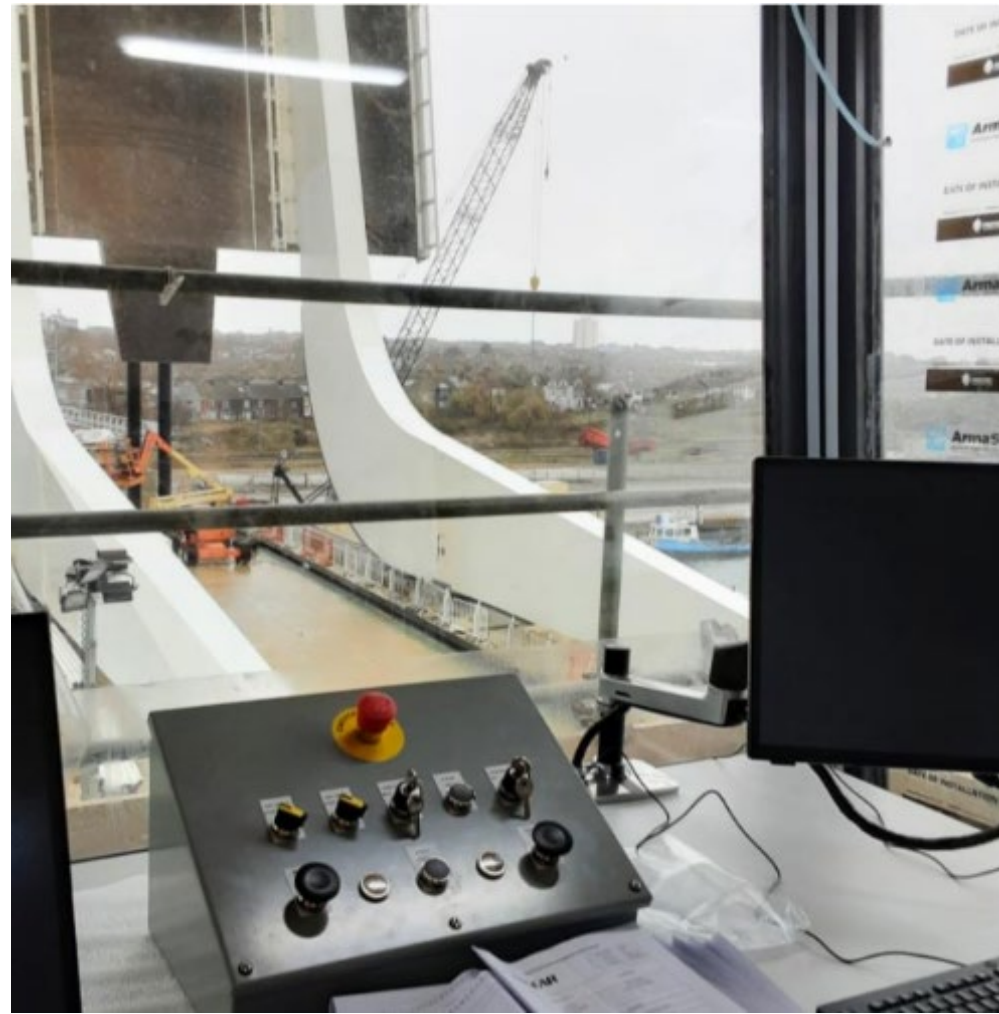
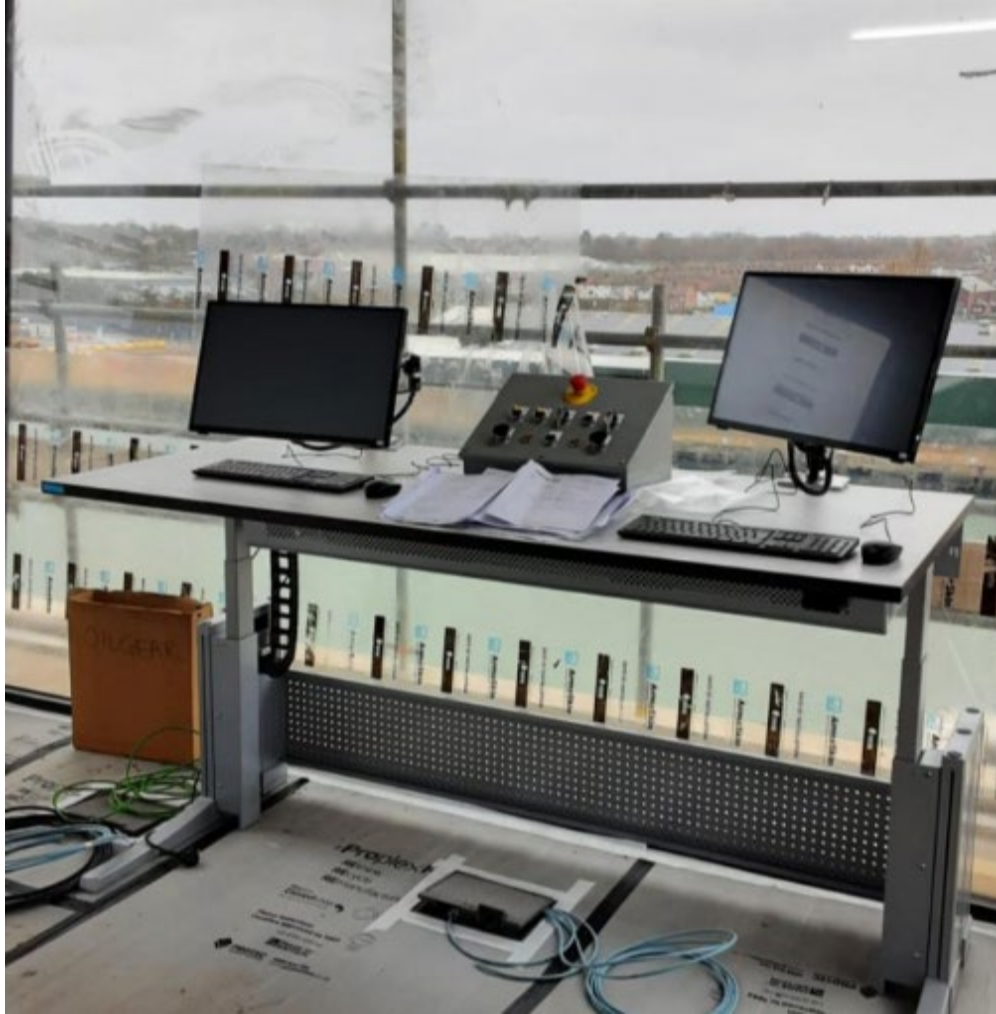


# Bascule first lift - Sat 16th March





# Control Room Desk



# Still to Complete....



- Final Commissioning of all of the mechanical, electrical, and hydraulic systems including the software control system (SCADA)
- Final road surfacing across the viaduct
- Landscaping and Fencing
- Final fit-out of welfare rooms and plant building
- Health & Safety files, As-builts and O&M documentation



THANK YOU



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