

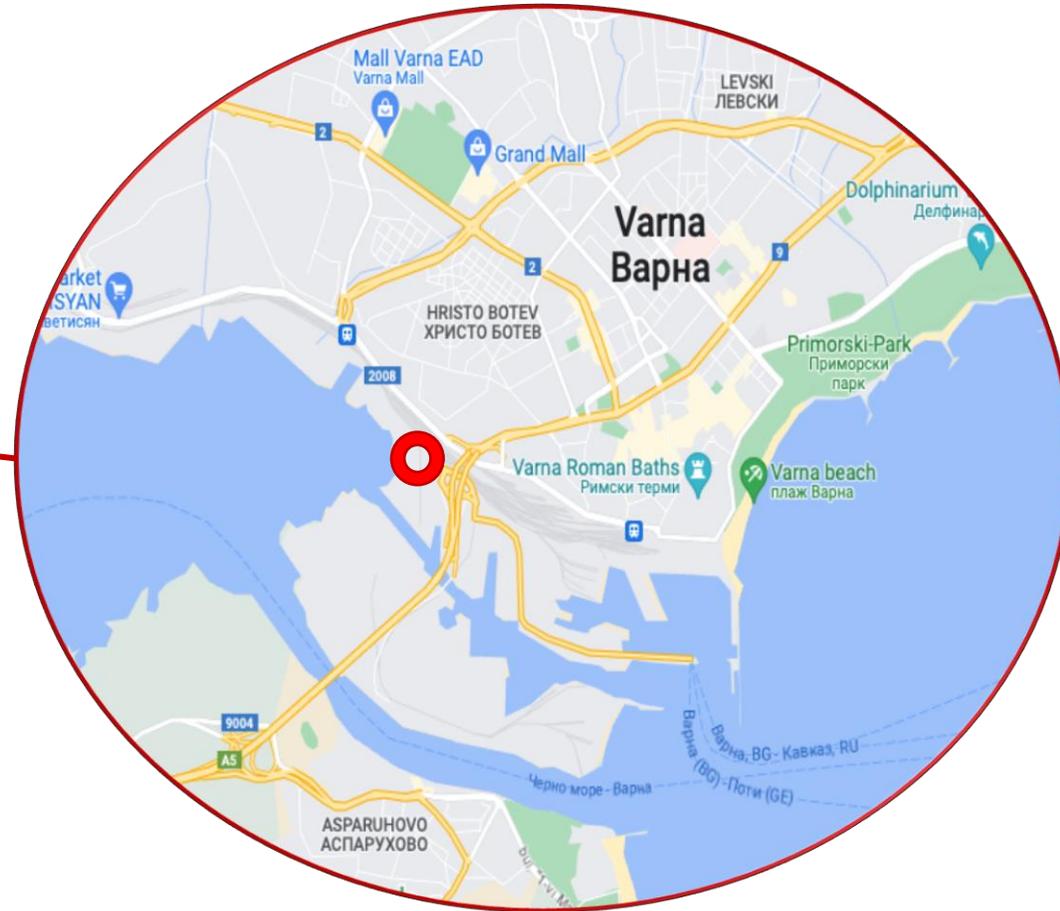
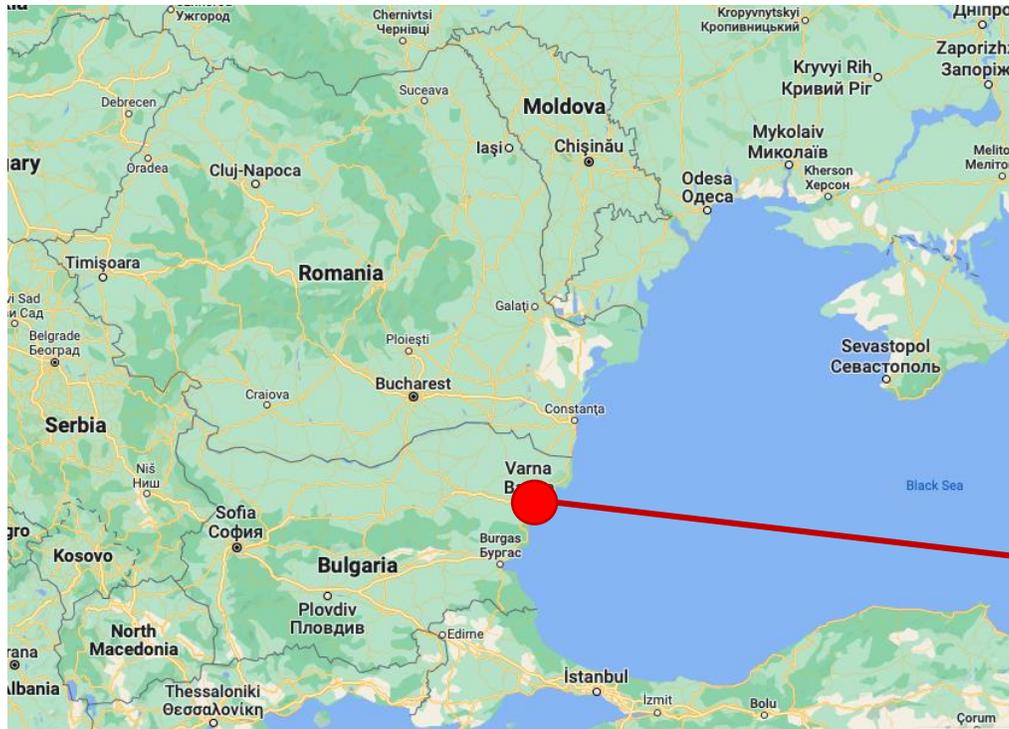


# Environmentally Friendly Quay Wall Solution – Case Study: Port Odesos PBM, Varna



## MAIN FACTS ABOUT THE PORT

# Location



# Port Odesos PBM EAD - before



**Cargo handled:** Breakbulk  $\pm 0.54$  Mt  
**Current draught:** 6.80 m  
**Vessels:** 6000 - 7000 DWT  
**Infrastructure:** warehouses, no specialized

# Port Odesos PBM EAD - after

- Cargo handled:** Breakbulk +2 Mt (4x)
- Future draught:** 12.5 m
- Vessels:** 50 000 – 60 000 DWT
- Infrastructure:** state-of-the-art grain handling facilities, silos, discharging pits, continuous weighing system, sampling, ship loader



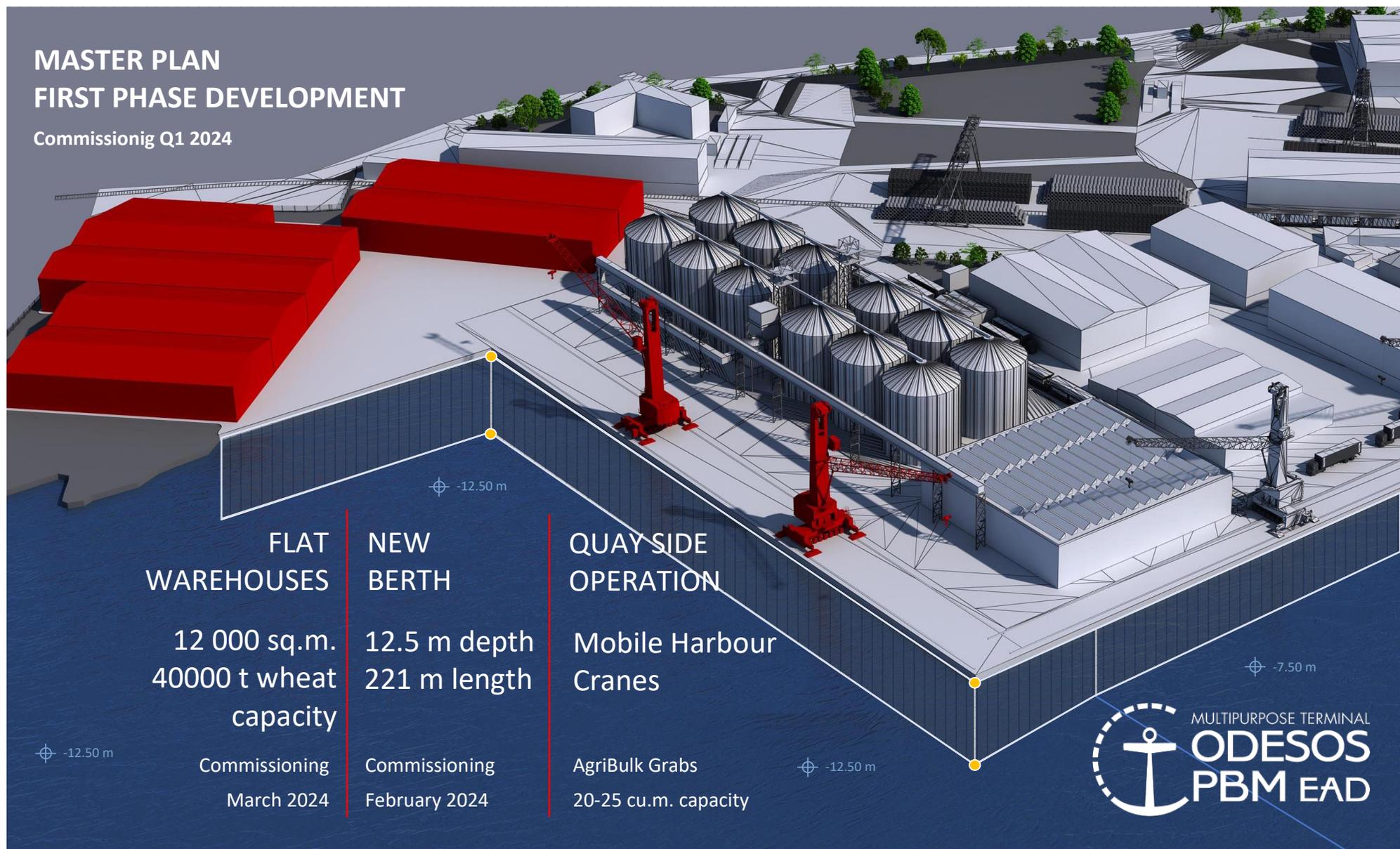
# STAGE I

**Investment:**  
30M EUR

**Commissioning:**  
Q1 2024

## MASTER PLAN FIRST PHASE DEVELOPMENT

Commissioning Q1 2024



**FLAT  
WAREHOUSES**

12 000 sq.m.  
40000 t wheat  
capacity

Commissioning  
March 2024

**NEW  
BERTH**

12.5 m depth  
221 m length

Commissioning  
February 2024

**QUAY SIDE  
OPERATION**

Mobile Harbour  
Cranes

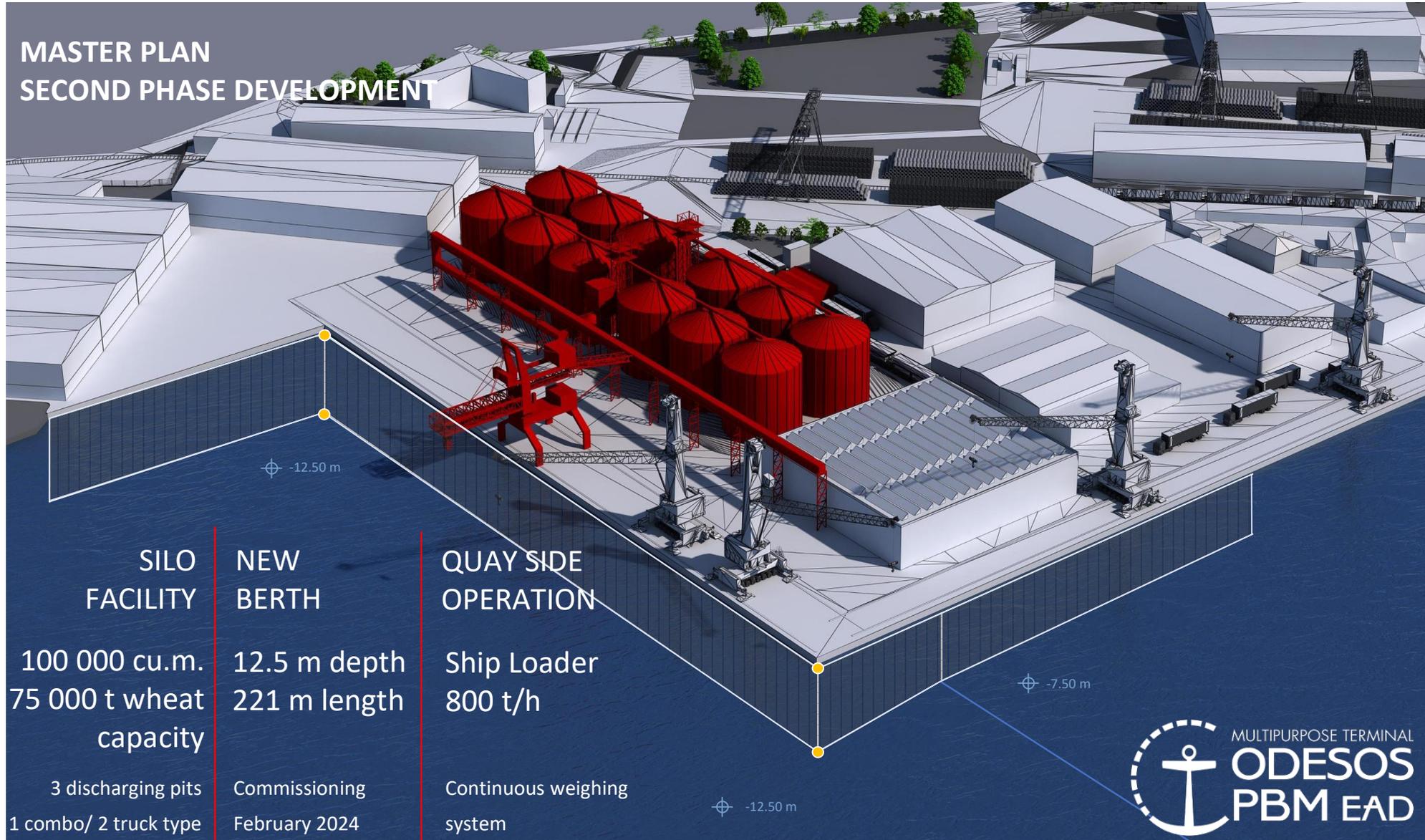
AgriBulk Grabs  
20-25 cu.m. capacity

# STAGE II

**Investment:**  
50M EUR

**Commissioning:**  
Q2 2025

## MASTER PLAN SECOND PHASE DEVELOPMENT



**SILO FACILITY**  
100 000 cu.m.  
75 000 t wheat capacity

3 discharging pits  
1 combo/ 2 truck type

**NEW BERTH**  
12.5 m depth  
221 m length

Commissioning  
February 2024

**QUAY SIDE OPERATION**  
Ship Loader  
800 t/h

Continuous weighing system



# QUAY WALL SOLUTION

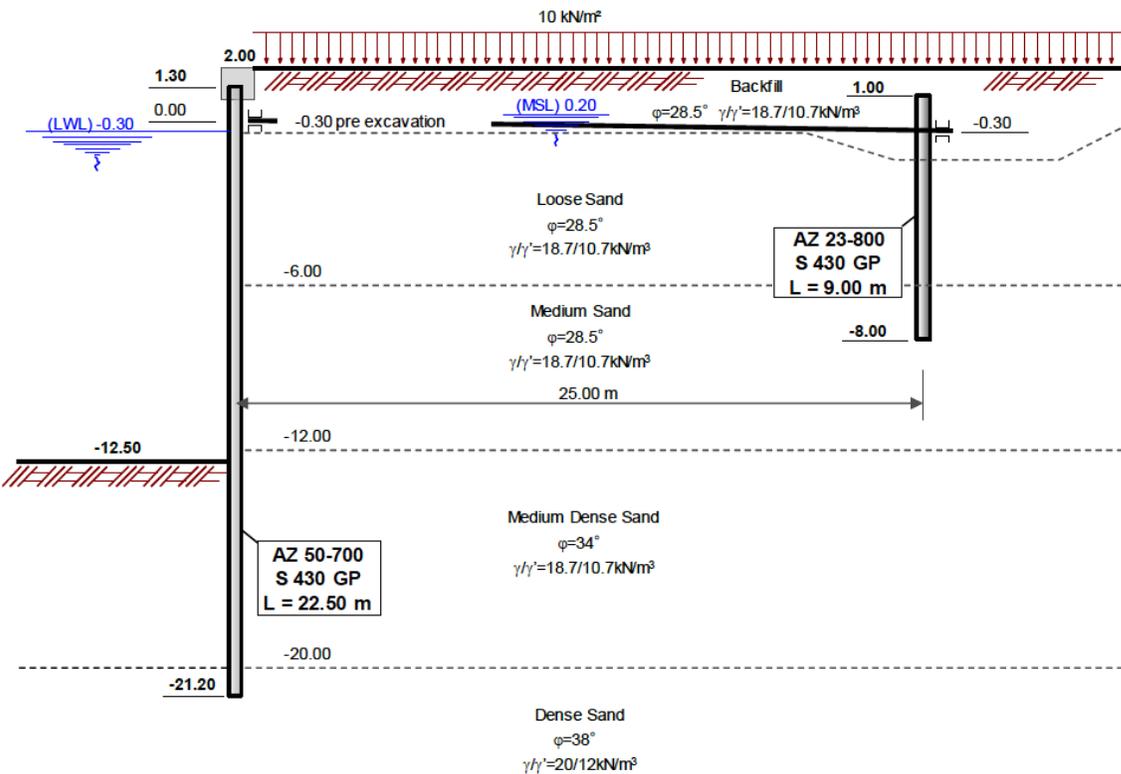
# Layout of the Quay Wall



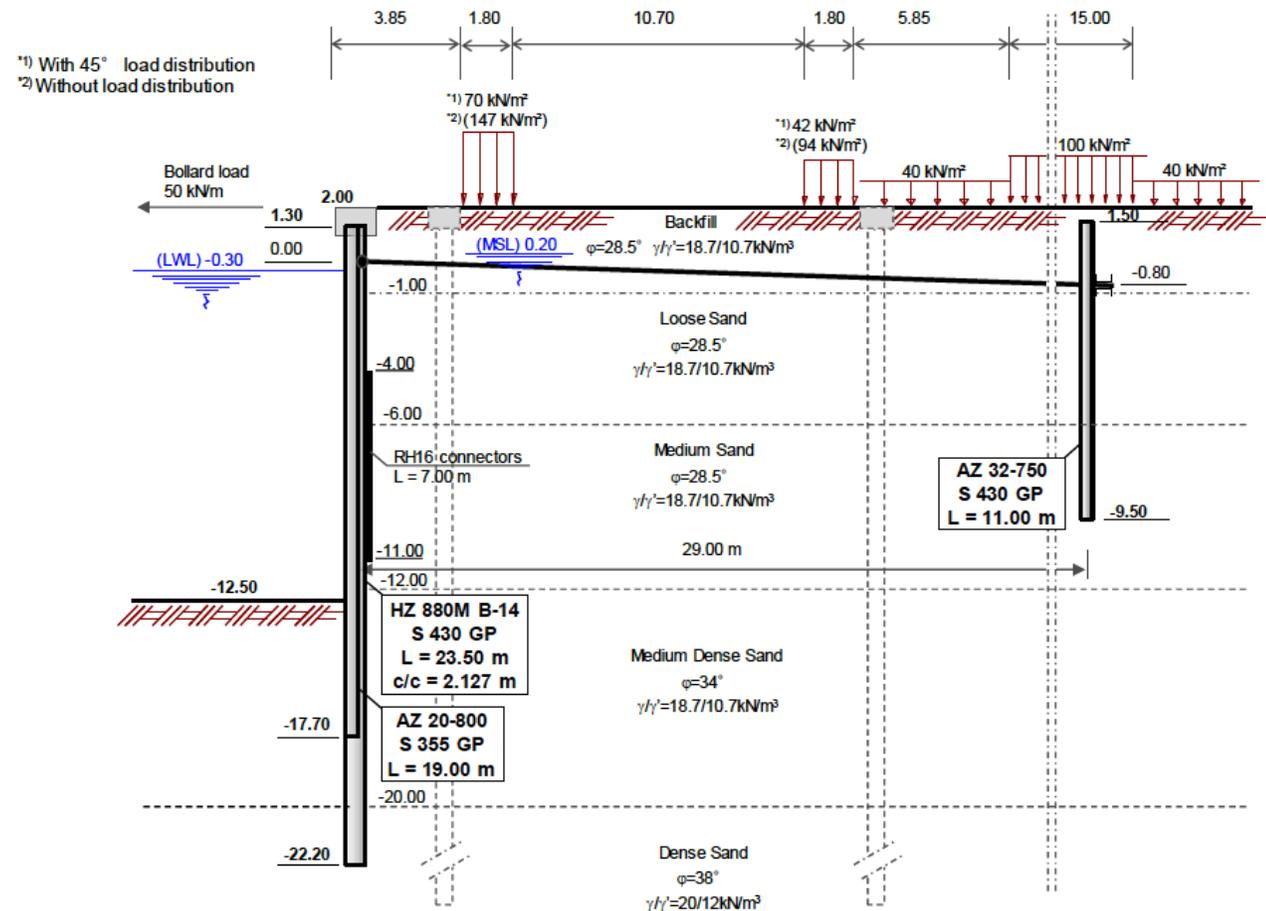
<b>Section 1:</b>	220 m
Front wall	HZM-880M B/AZ 20-800
Anchor wall	AZ 32-750
<b>Section 2:</b>	90 m
Front wall	AZ 50-700
Anchor wall	AZ 23-800
<b>Section 3:</b>	18 m
Front wall	HZM-880M B/AZ 20-800
Anchor wall	AZ 32-750

# Cross-sections of the Quay Wall

## Section 2



## Sections 1 & 3



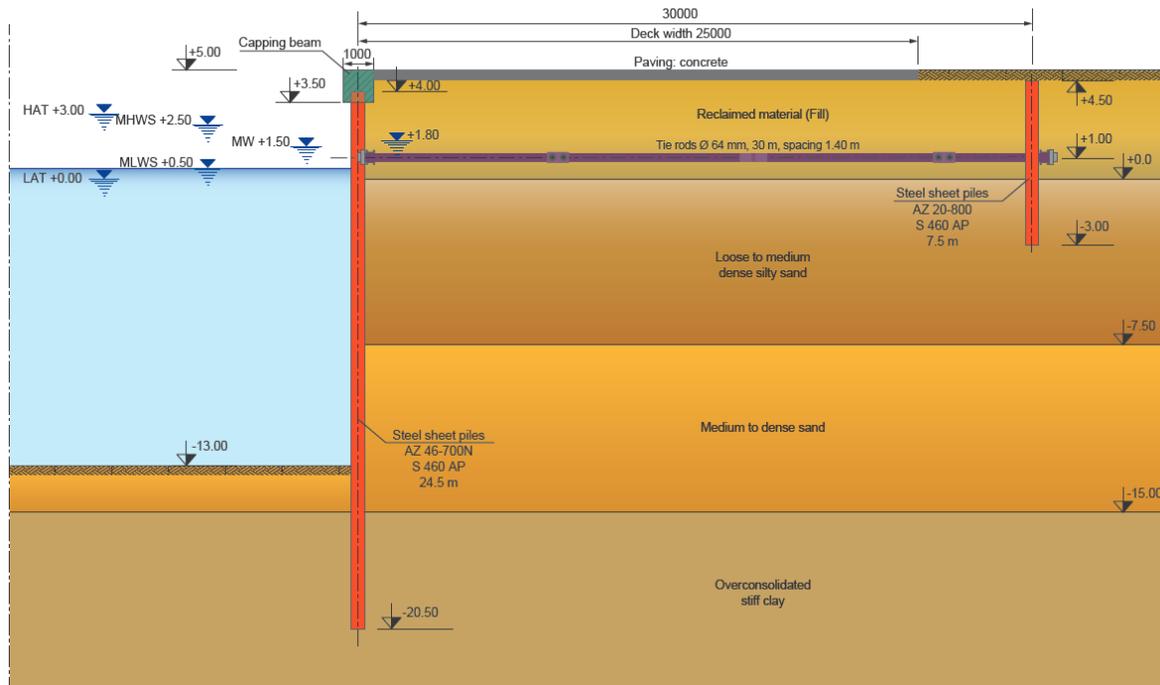


**SUSTAINABILITY**

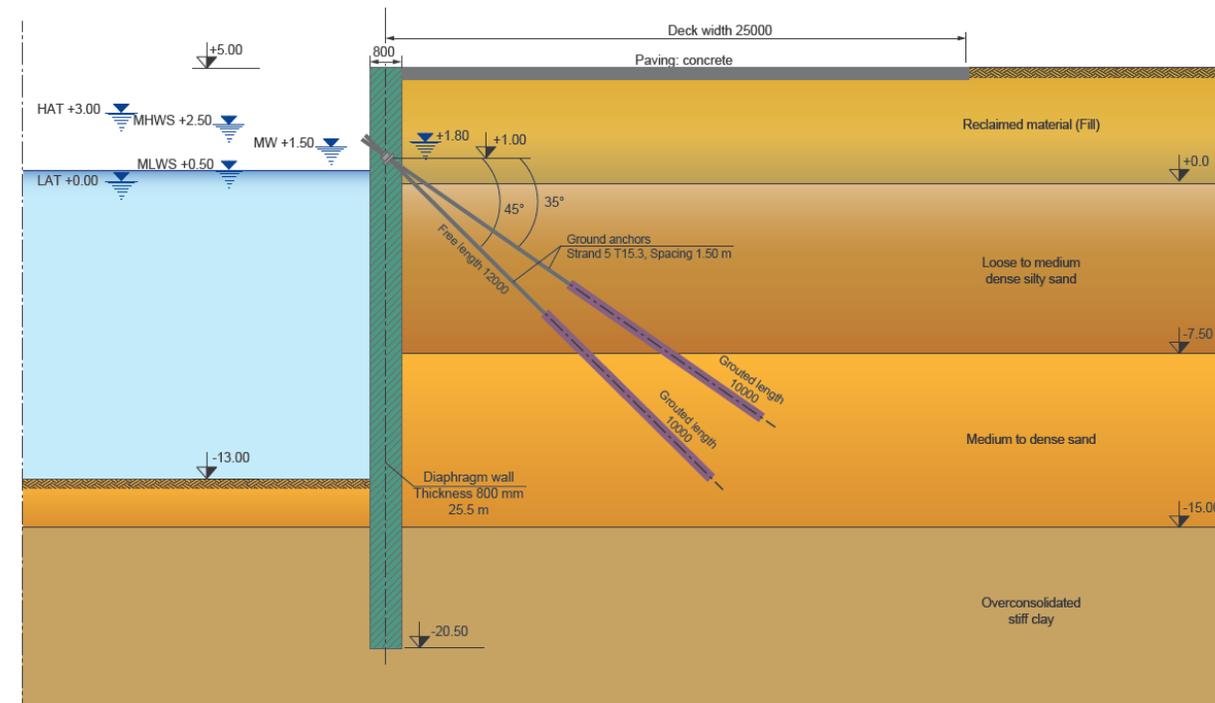
# Concrete vs Steel – *Tractebel Engineering* study

**Length:** 200 m  
**Location:** Port of Antwerp, Belgium  
**Draft:** -13 m

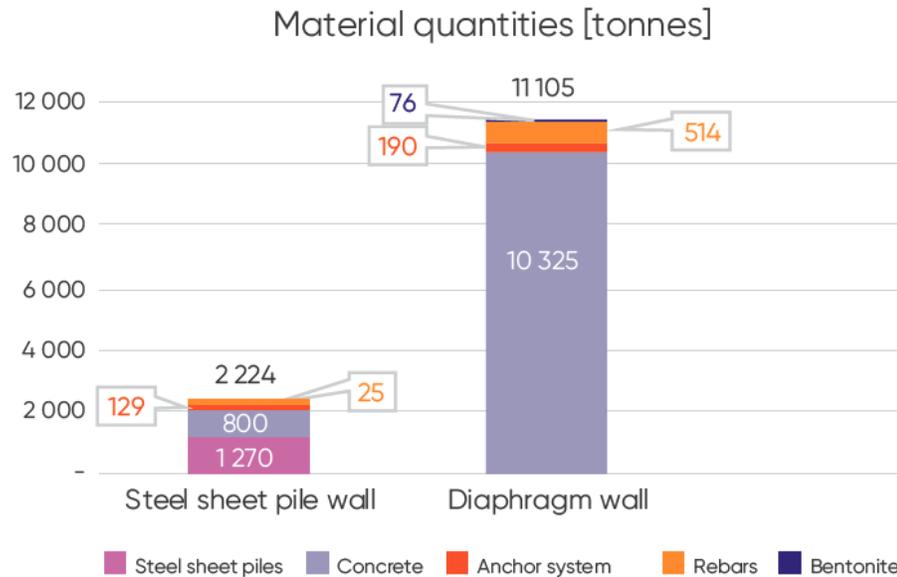
## Sheet Piles



## Diaphragm wall

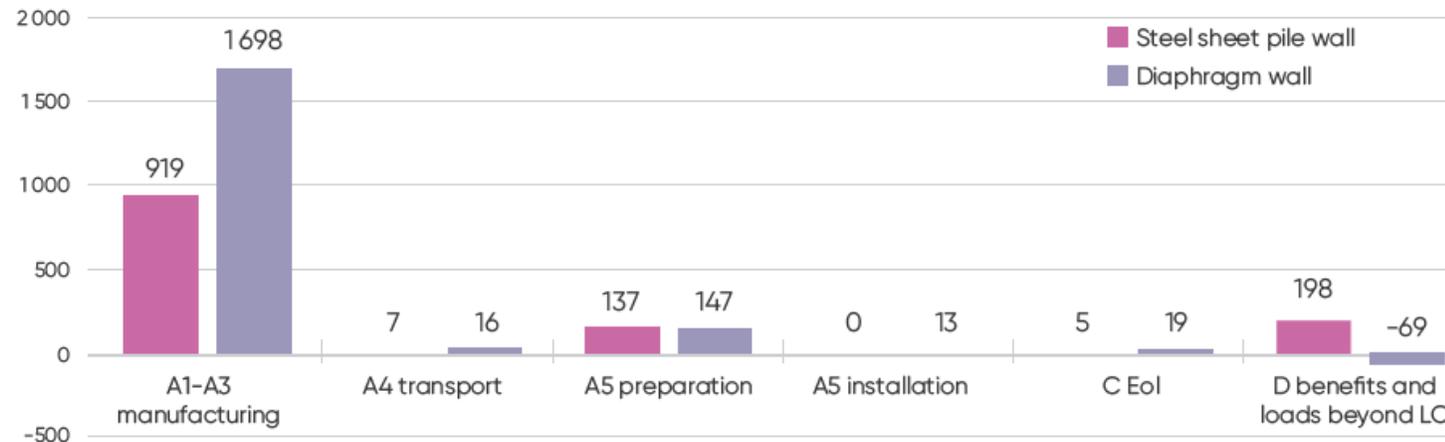
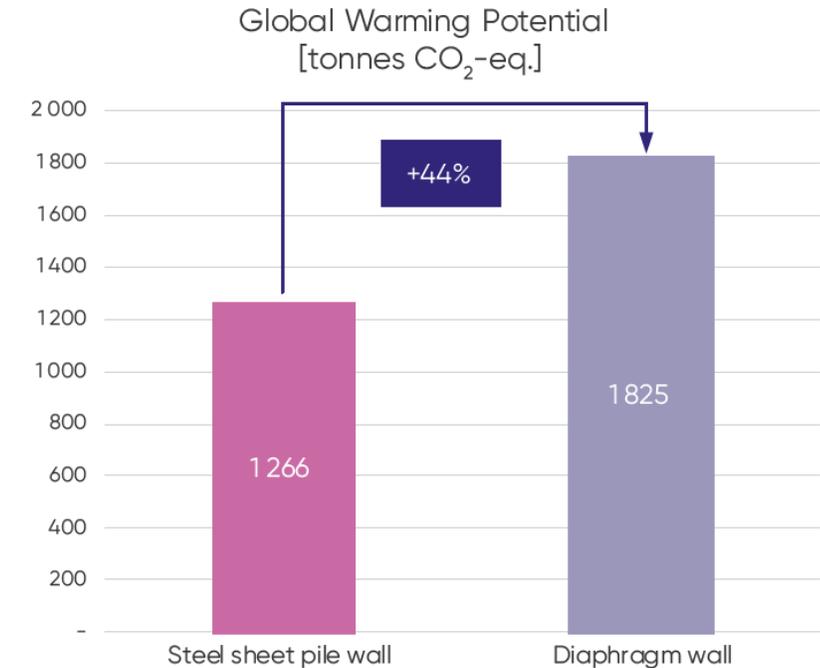


# Concrete vs Steel – *Tractebel Engineering* results



**1 270 mt** of sheet piles  
**1 266 mt** of CO<sub>2</sub> eq.

**± 1 mt** of CO<sub>2</sub> eq.  
 per **1 mt** installed SSP quay wall  
 with the dredging level of **-13 m**



# Concrete vs Steel



Applied the estimate of  $\pm 1$  mt of CO<sub>2</sub> eq. per 1 mt installed SSP:

**Total 2 156 mt** of steel sheet piles = **2 156 mt** of CO<sub>2</sub> eq.

vs. **3 115 mt** of CO<sub>2</sub> of if a concrete solution was used.

**952 mt** of CO<sub>2</sub> less emitted with this quay wall solution.



# INSTALLATION



# INSTALLATION



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