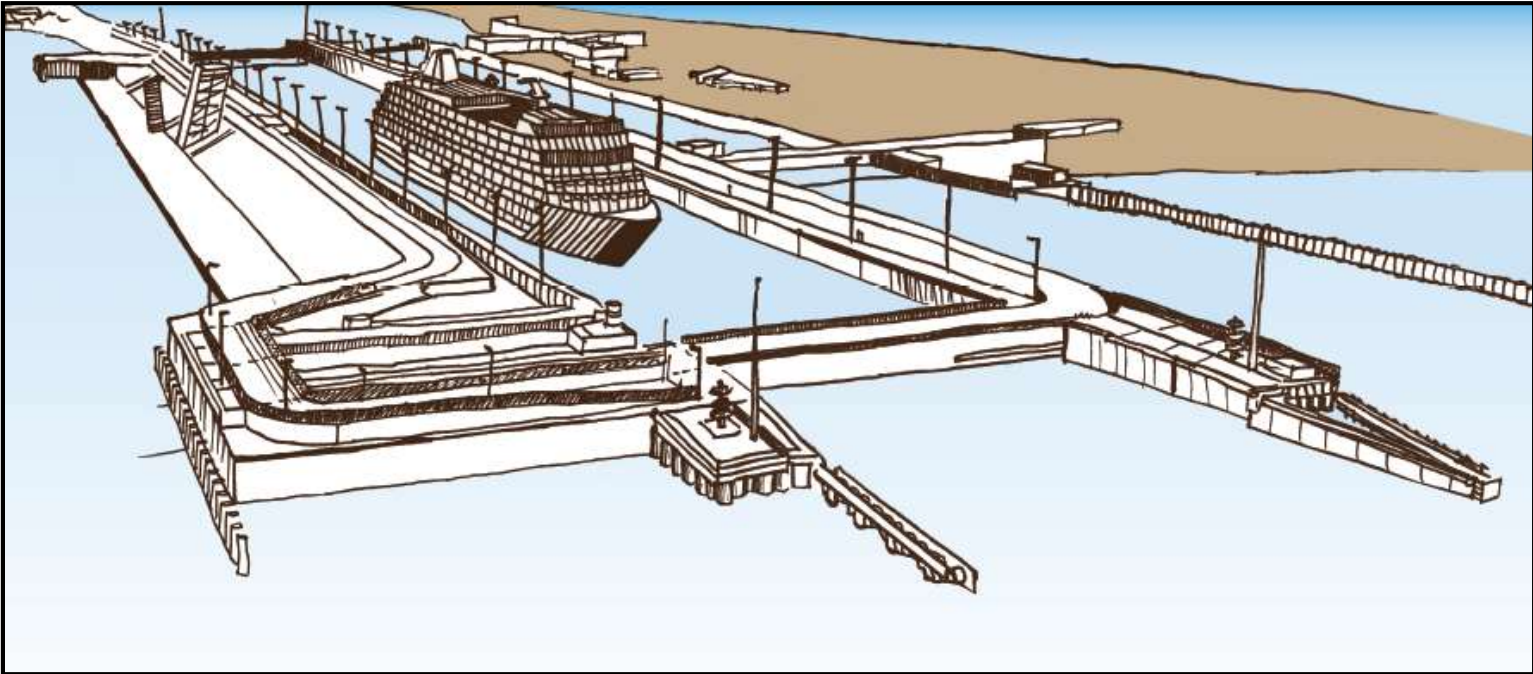


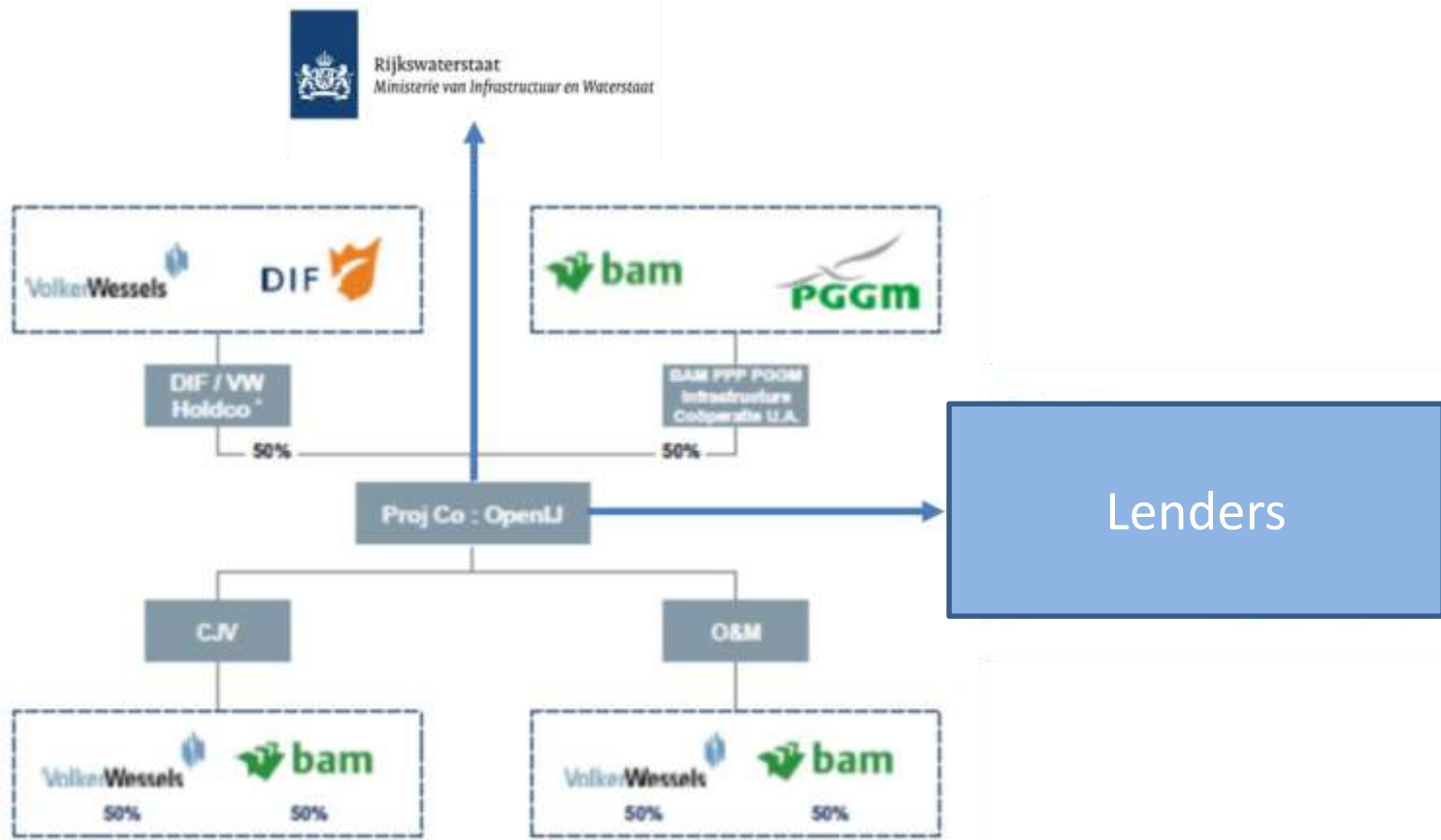
# New Sea Lock IJmuiden



# Topics

- Contractual organization OpenIJ
- Introduction, scope and design principles project
- Facts and figures
- Aerials from the project (historic and current)
- Main construction elements:
  - diaphragm walls, lock heads, lock operation building and lock doors

# Contractual situation



# Introduction project

- Replacement of the Northern Lock in IJmuiden
- A new, larger sea lock to improve the accessibility of the port of Amsterdam and stimulate the economy in the region
- The new lock is 70 meters wide, 500 meters long and 18 meters deep
- Construction started in early 2016 and the new lock will be available for shipping early 2022

# Scope project

- Design, construction and finance the new sea lock
- Clearing the project area, including removal of existing cables and ducts and unexploded ordnance
- 26 years of maintaining the new lock and approach canals
- Dredging to maintain the water bed profiles for the canals of the existing locks
- Maintaining the primary water retaining structure

# Design principles project

- Safety first
- Maintain the integrity of the water retaining structure during the construction of the new lock
- Minimise nuisance, hindrance, dust and noise during construction
- Ensure the stability of the existing lock structures



# Construction methods

- Inner and outer lock head at maximum height for high water retention
- Minimize vibrations during construction:
  - Lock walls, middle wall and leading wall as diaphragm walls
  - Lock heads built by caisson method
  - Anchoring by grouted anchors

# Facts & figures

- 1.650 m diaphragm wall
- 3 sliding gates of 3.000 tons of steel each
- 10.000 tons of sheet piles
- 7.500 tons of tubular piles
- 2.000 anchors
- 290.000 m<sup>3</sup> concrete
- 33.000 tons of rebar
- dredging of 4.500.000 m<sup>3</sup> of soil

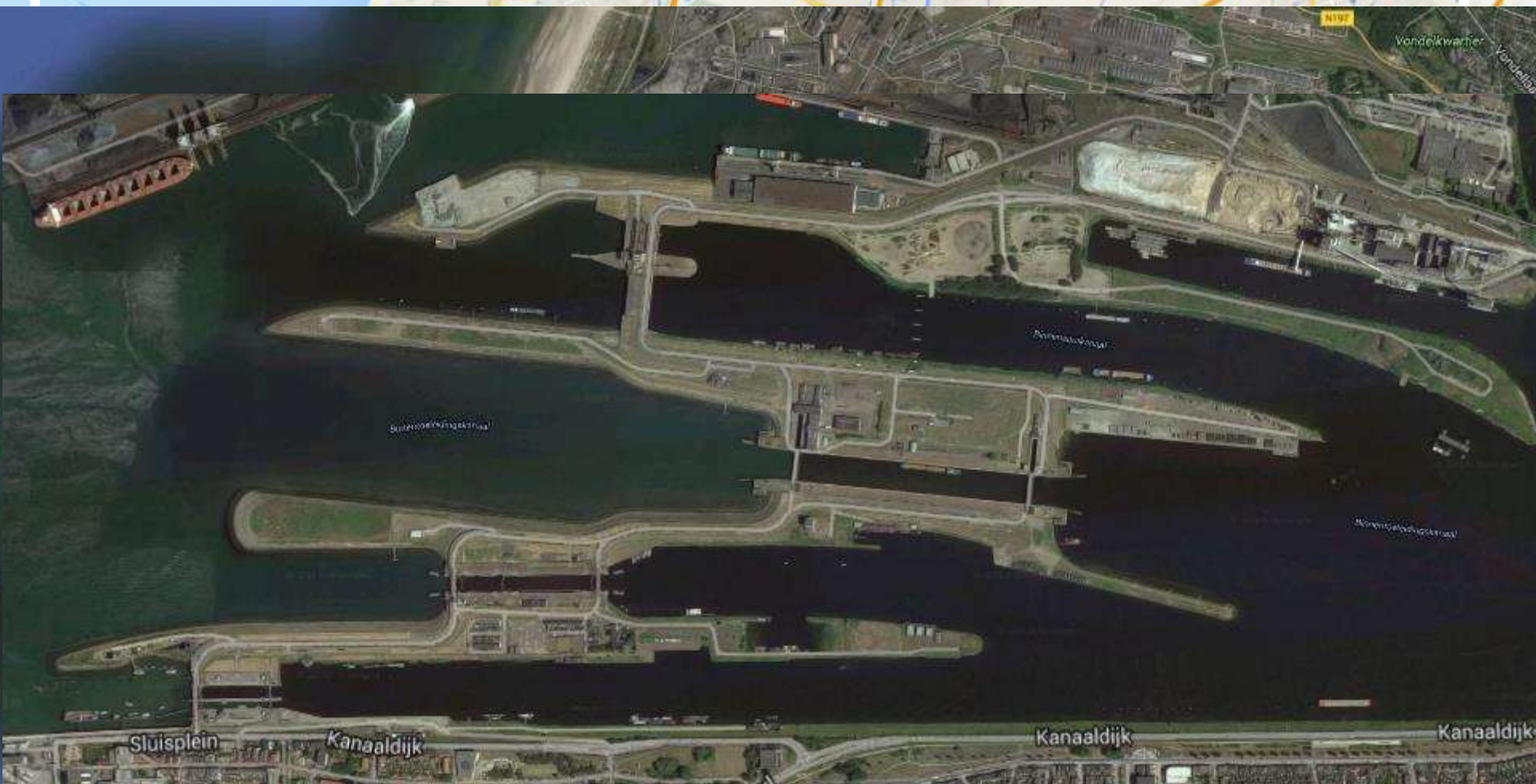


Wilhelmshaven  
Bremerhaven

NB

N197

Vondelkwartier  
Vondellaan



Sluisplein

Kanaaldijk

Kanaaldijk

Ruigenhoek

Hillegom

Schiphol-Rijk

Ouderkerk  
aan de Amstel

Frankfurt  
am Main

Google

E25

A1

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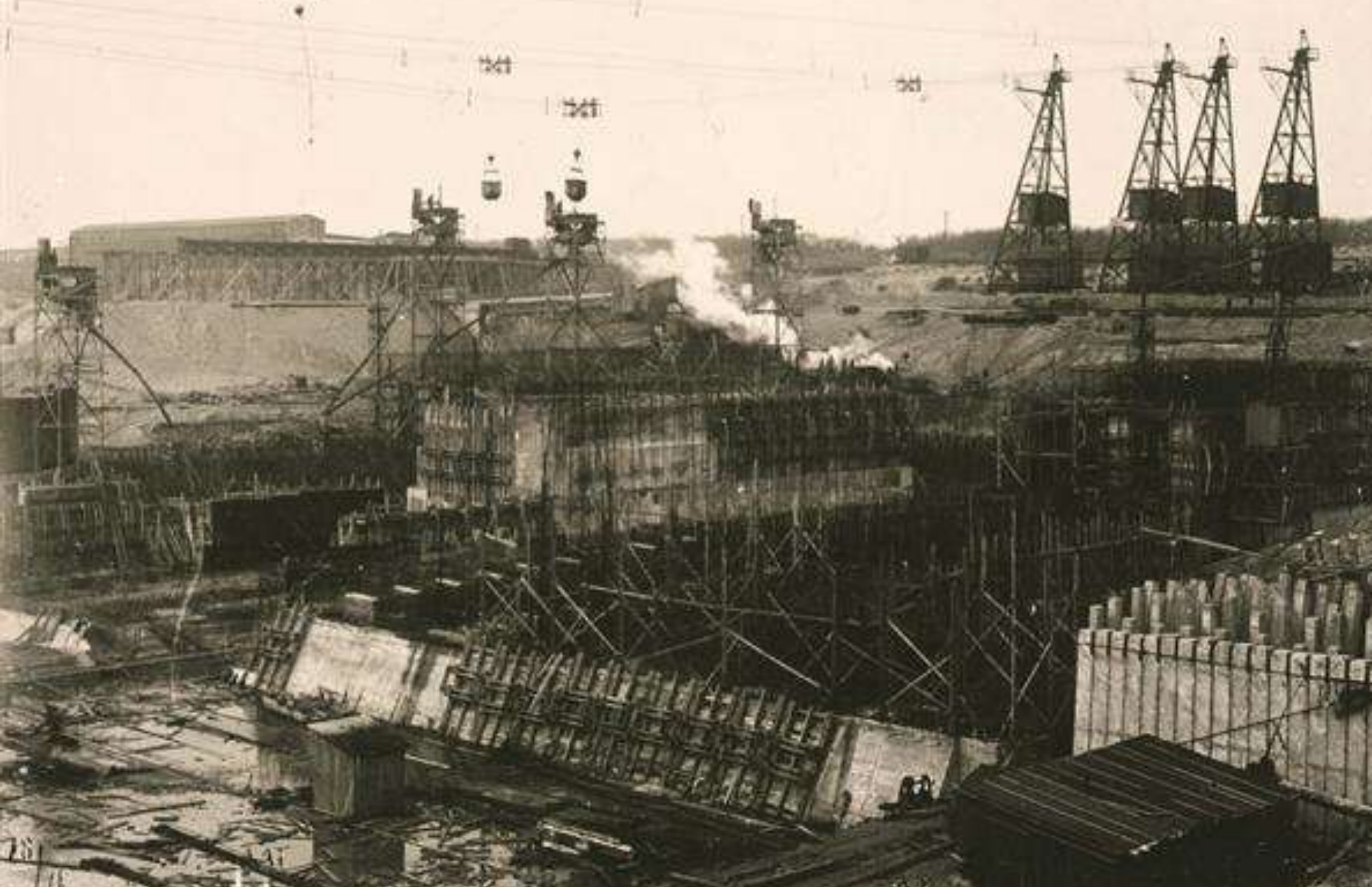
A5



# Construction Northern Lock(1921-1928)



# Construction Northern Lock(1921-1928)







March 2016





July 2016





January 2017





July 2017





January 2018





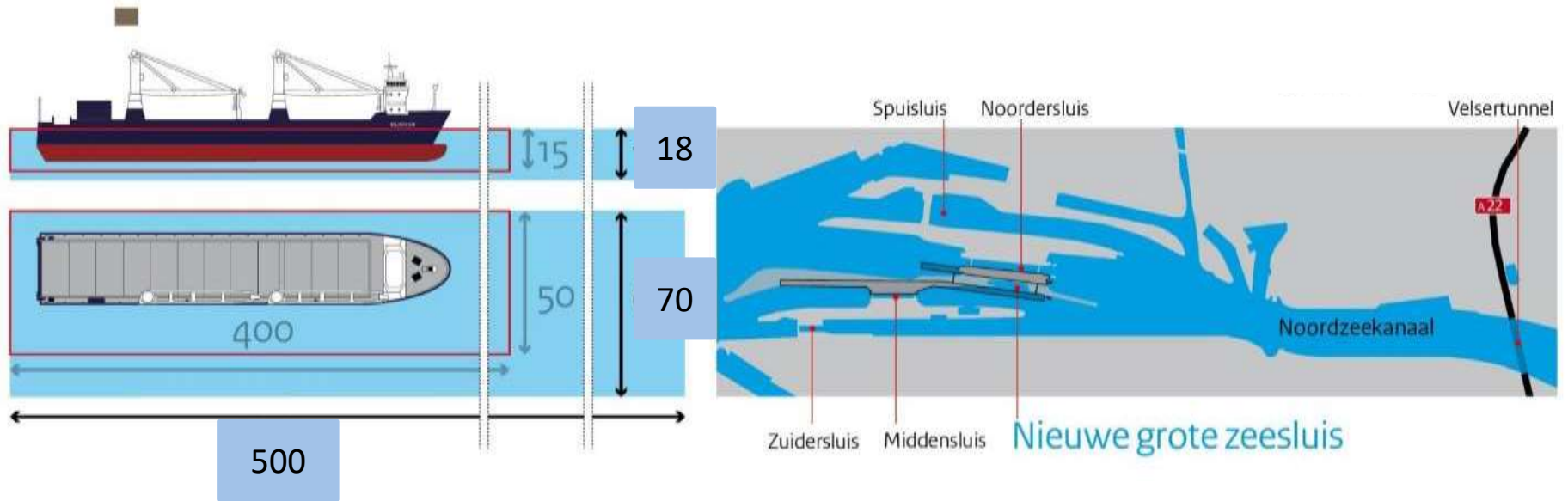
November 2018





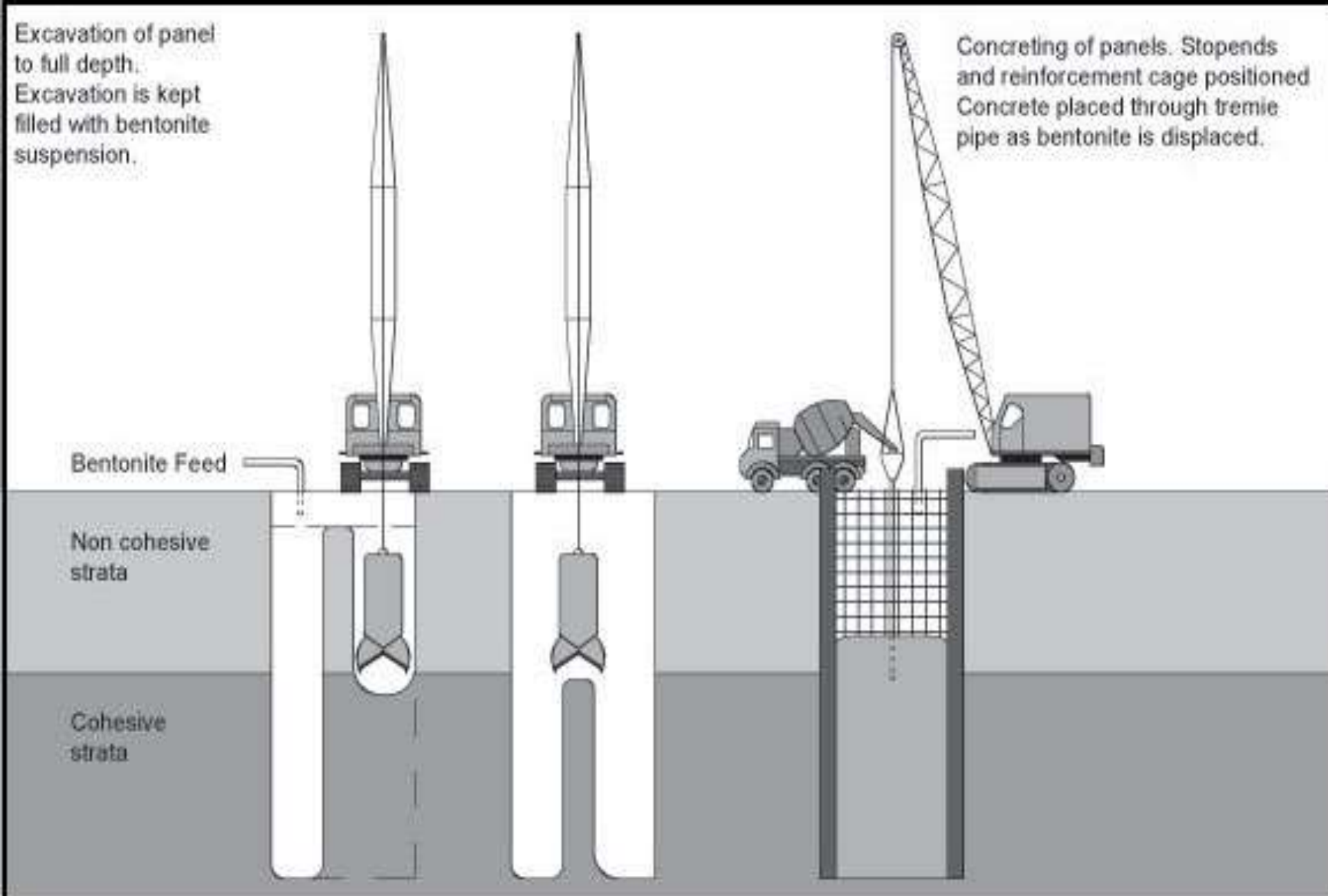
Logistic centre in Amsterdam

# New Sea Lock IJmuiden



Excavation of panel to full depth.  
Excavation is kept filled with bentonite suspension.

Concreting of panels. Stopends and reinforcement cage positioned.  
Concrete placed through tremie pipe as bentonite is displaced.



## Diaphragm walls





# Immersion outer lock head

- Dimensions 26 m wide x 81 m tall x 28 m high
- 24/5 immersion activities in two teams
- 24/7 real time monitoring of entire construction
- Unique combination of dimensions and techniques
  - Computer controlled immersion
  - Real-time monitoring
- Daily consultations between designers, engineers and management





Outer lock head

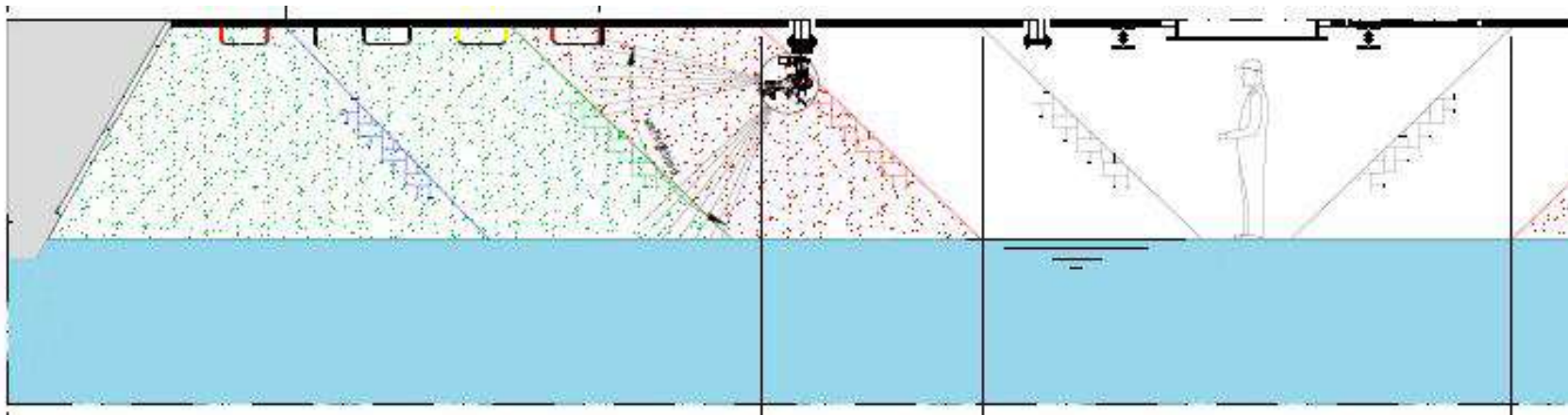
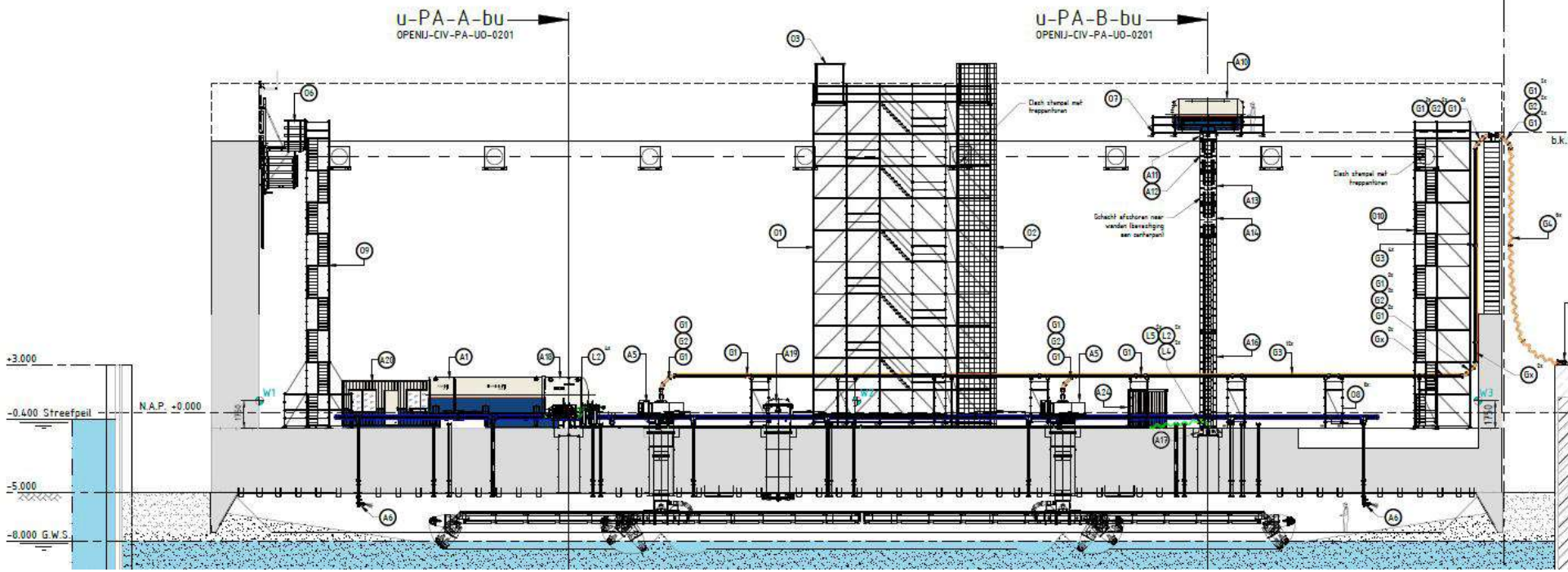






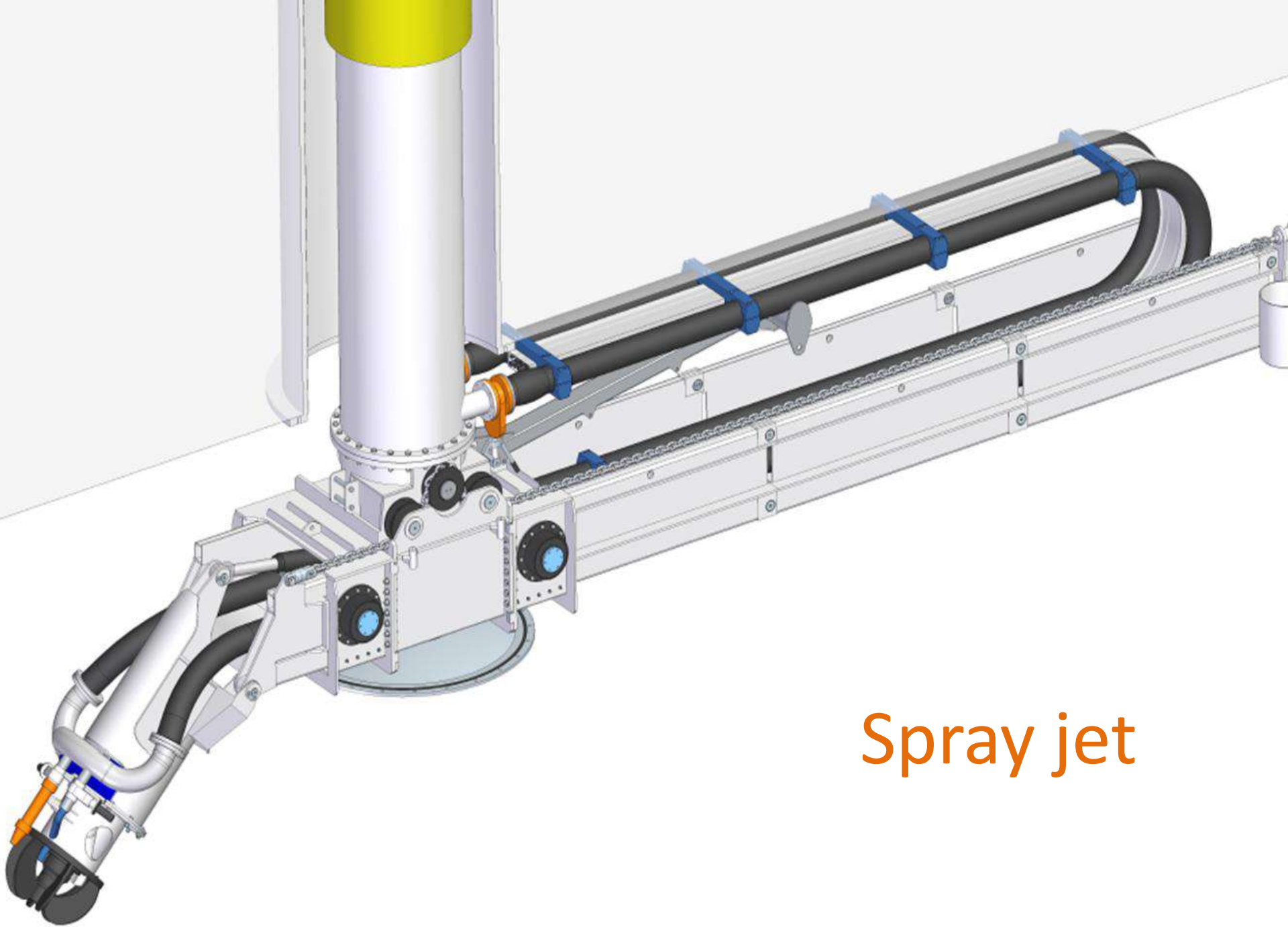






Section over outer lock head

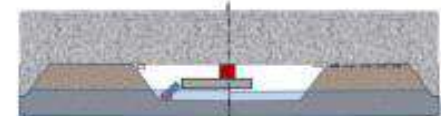
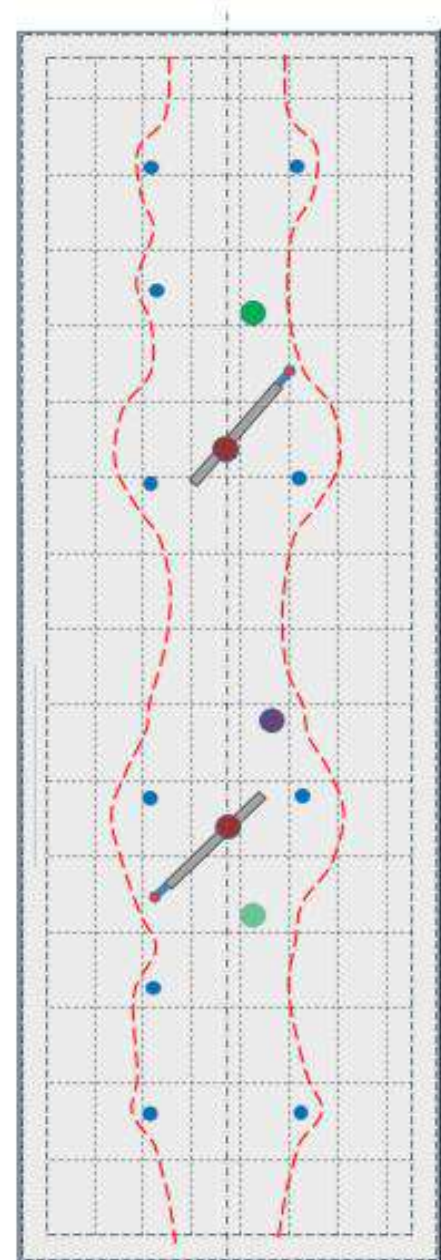
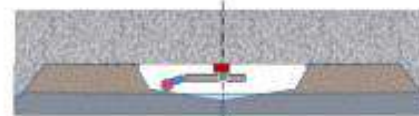
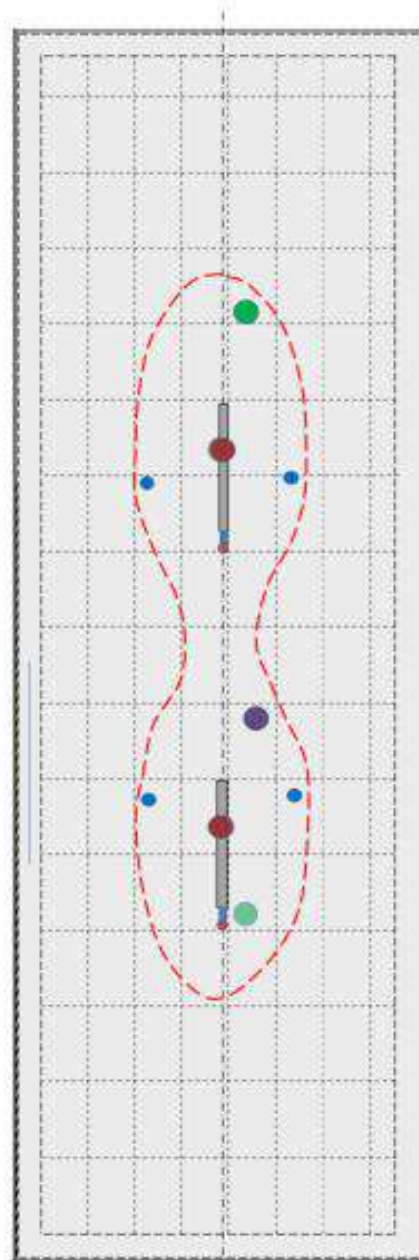
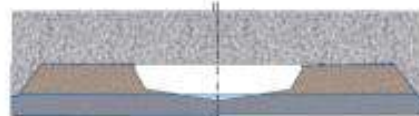
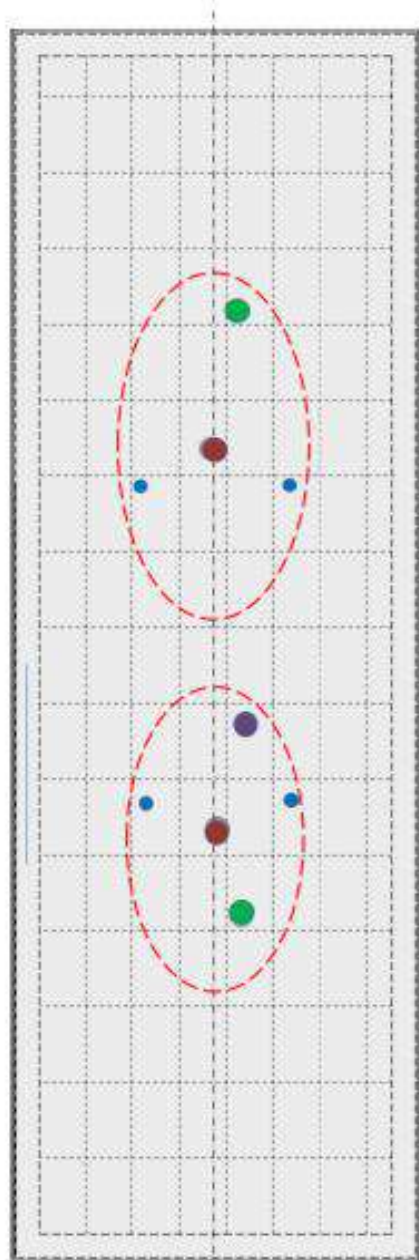
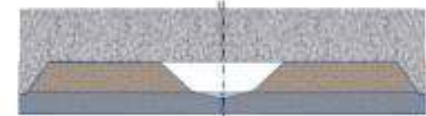
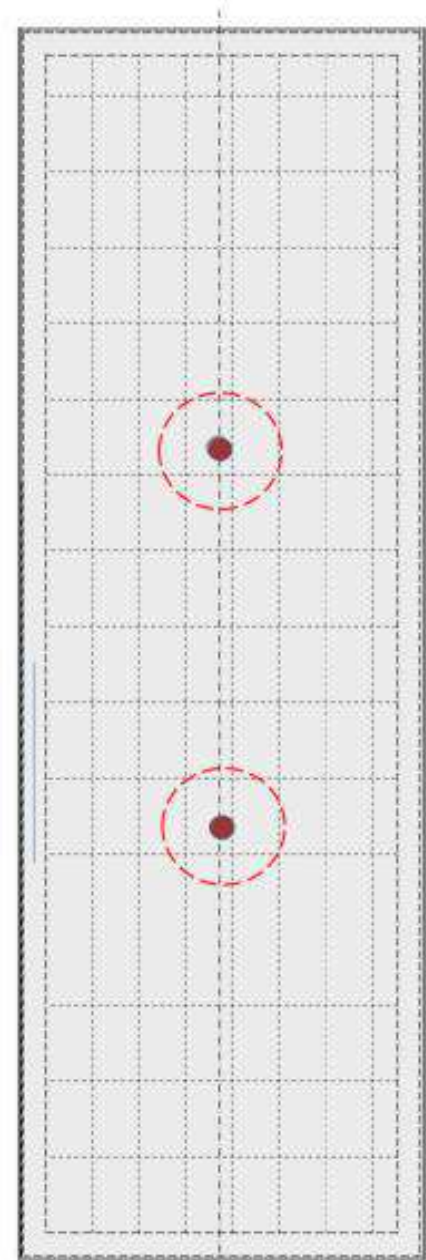




Spray jet





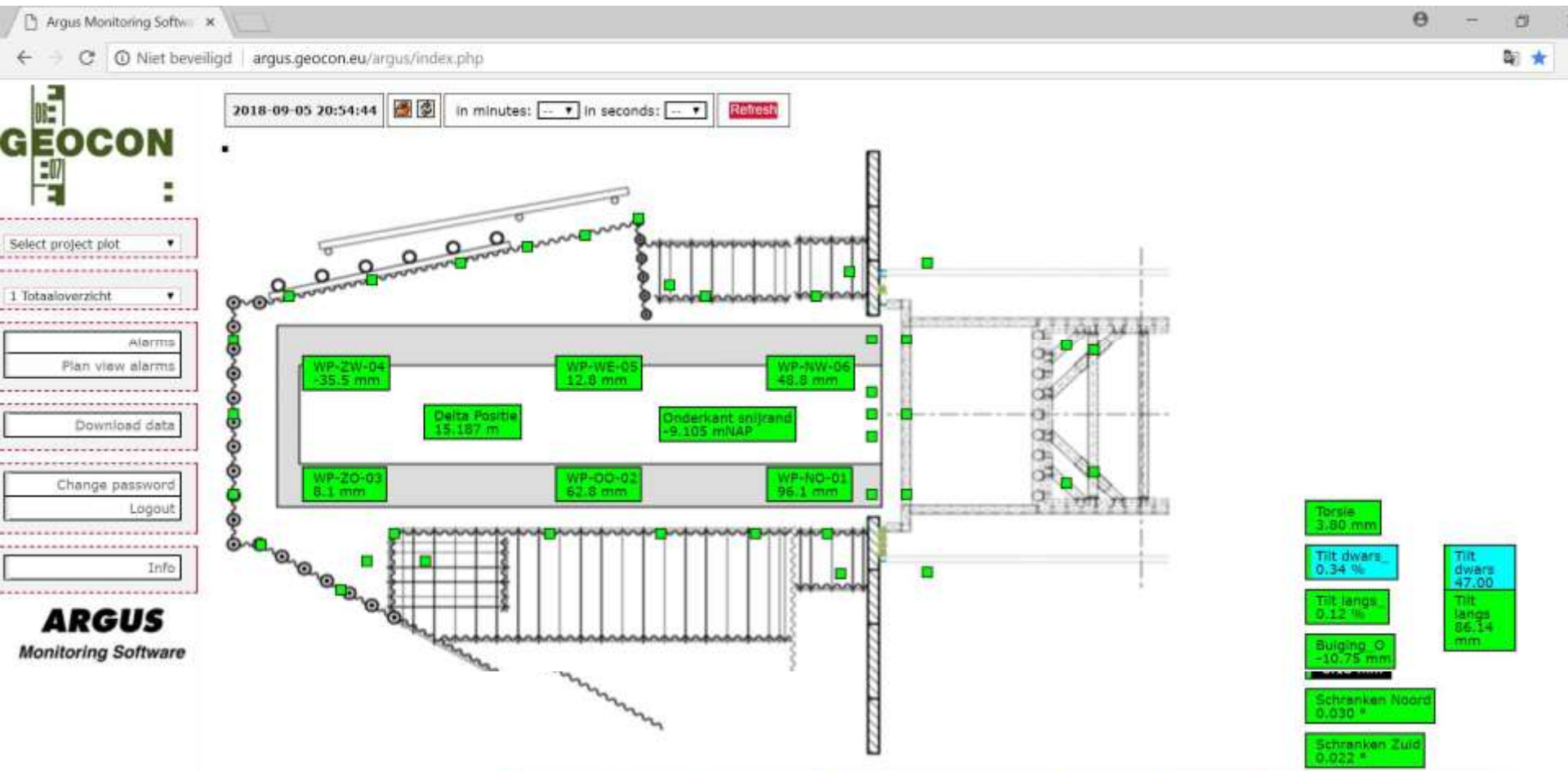




# First day of lowering the caisson



# Real time monitoring



Scheefstand	Grenswaarden			Interventiewaarde			Signaalwaarden		
	%	Dwars [mm]	Langs [mm]	%	Dwars [mm]	Langs [mm]	%	Dwars [mm]	Langs [mm]
NAP-7,5 / - 15 m	1,0	140	728	0,40	56	291	0,30	42	218
NAP-15 / - 20 m	0,4	56	291	0,32	45	233	0,24	34	175
Onder NAP-20	0,3	42	218	0,24	34	175	0,18	25	131
NAP -24,3 m	0,1	14	73						

# Real time monitoring

Part	Type of sensor	Number	Measuring frequency per day
Ground water level	Monitoring well sensors	2	1440
Deformation coffer dam caisson	Total station	20	1
Deformation steel beams in dooropening of the caisson	Distance sensors	2	288
Forces on auxiliary constructions in cofferdam threshold	Strain gauges	32	1440
Tilt and deformation	Level gauges	6	288
Tilt and deformation	Tilt sensors	6	288
Position of caisson (roughly)	GPS and total station	3	12
Position of caisson (detailed)	Total station	3	288





Volker S



43.6

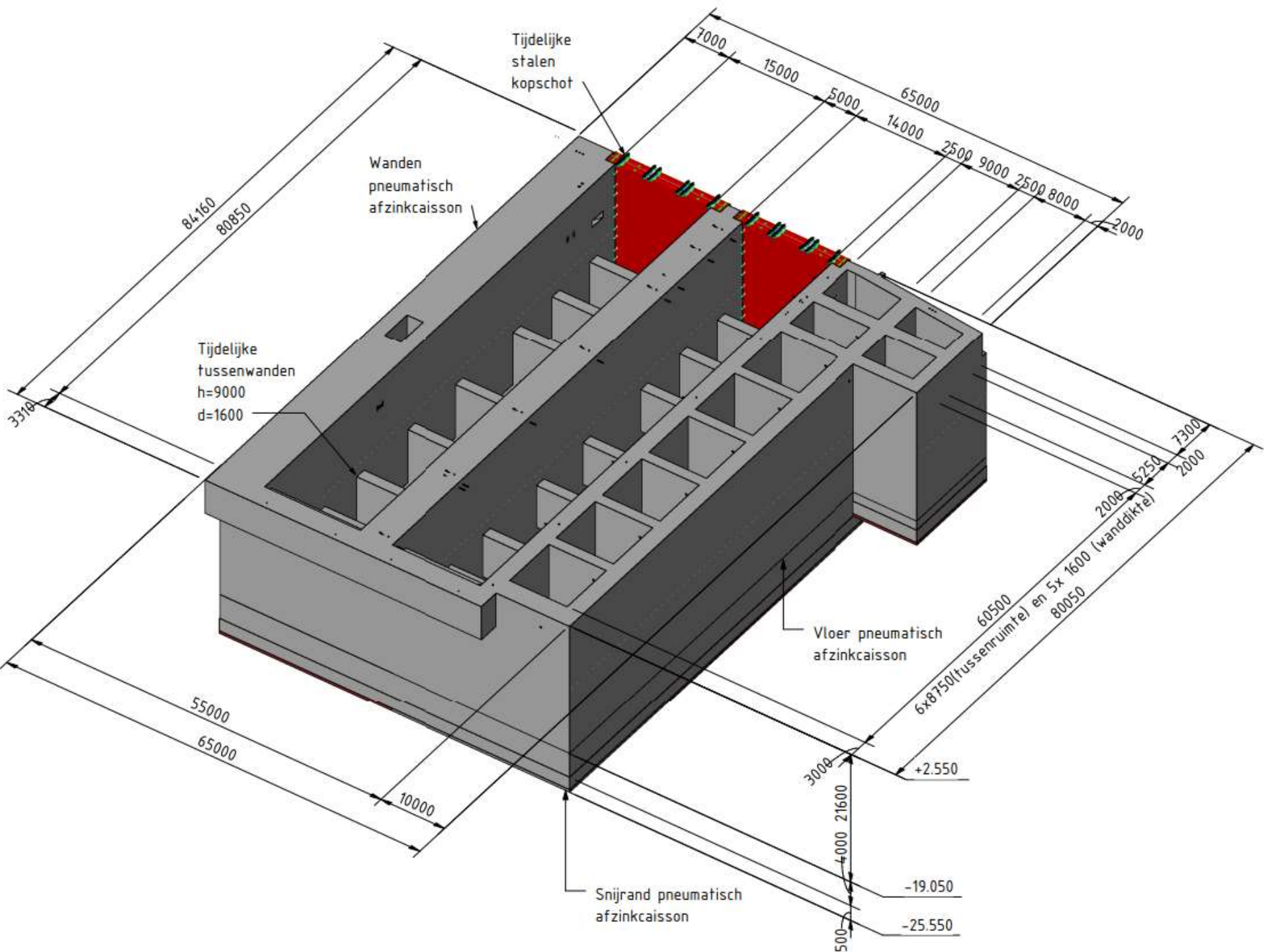






Inner lock head









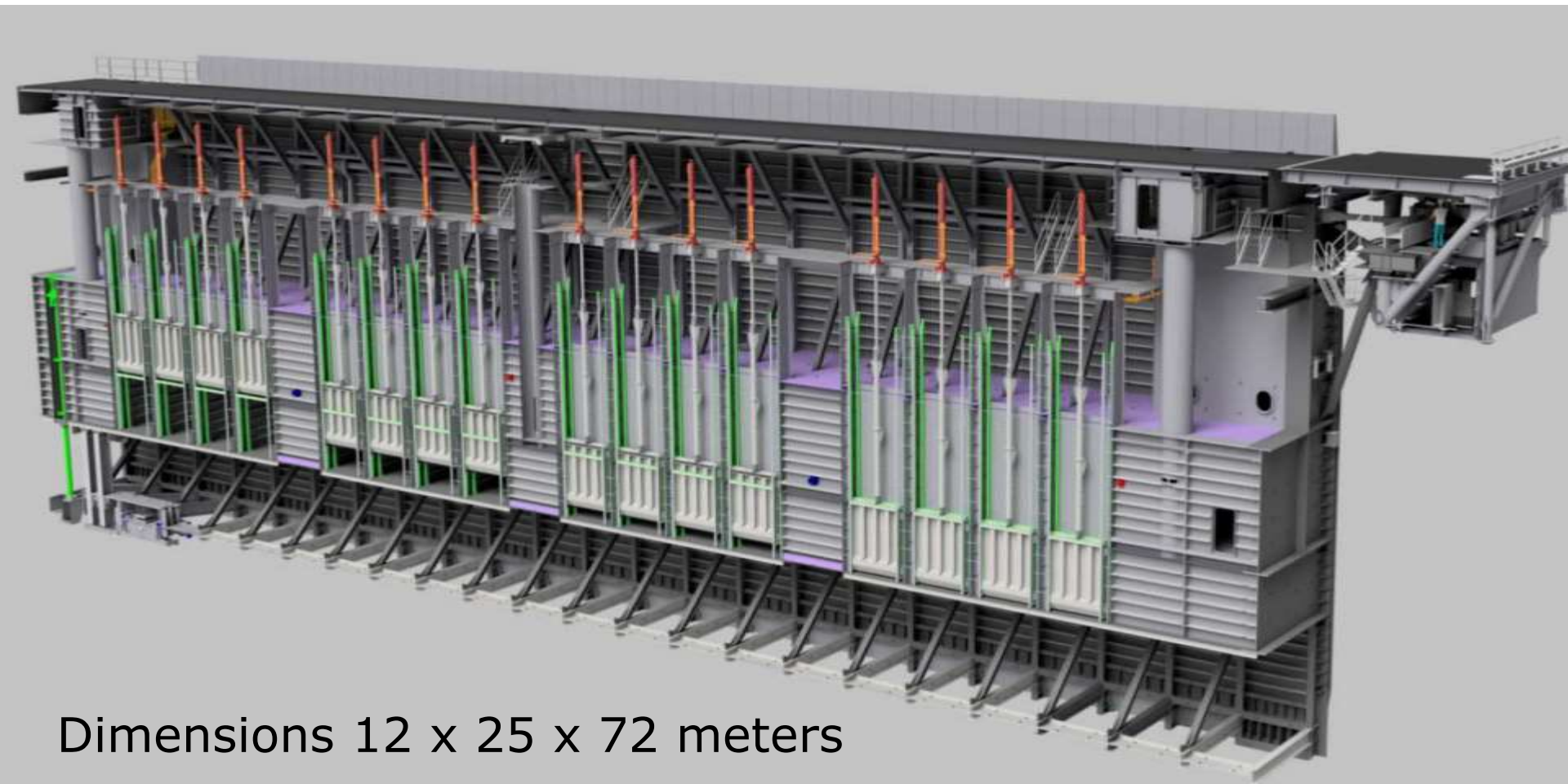
Artist impression lock operation building





Lock operation building

# Design lock gates



Dimensions 12 x 25 x 72 meters



# Lock gates during construction



# Lock gates “on the move”







Thank you for your attention