

Afzinken Scheldetunnel

TTOW ITA-avond 2025



Agenda

- Introductie project
- Bouw elementen & transport
- Ontwerp
 - Horizontaal verhaalsysteem
 - Verticaal afzinksysteem
- Afzinkvoorbereiding
- Insluiten, verhalen & Afzinken
- Post-immersion activities

Oosterweel verbinding



Contract 2: “Scheldetunnel & Droogdok “Het kroonjuweel”



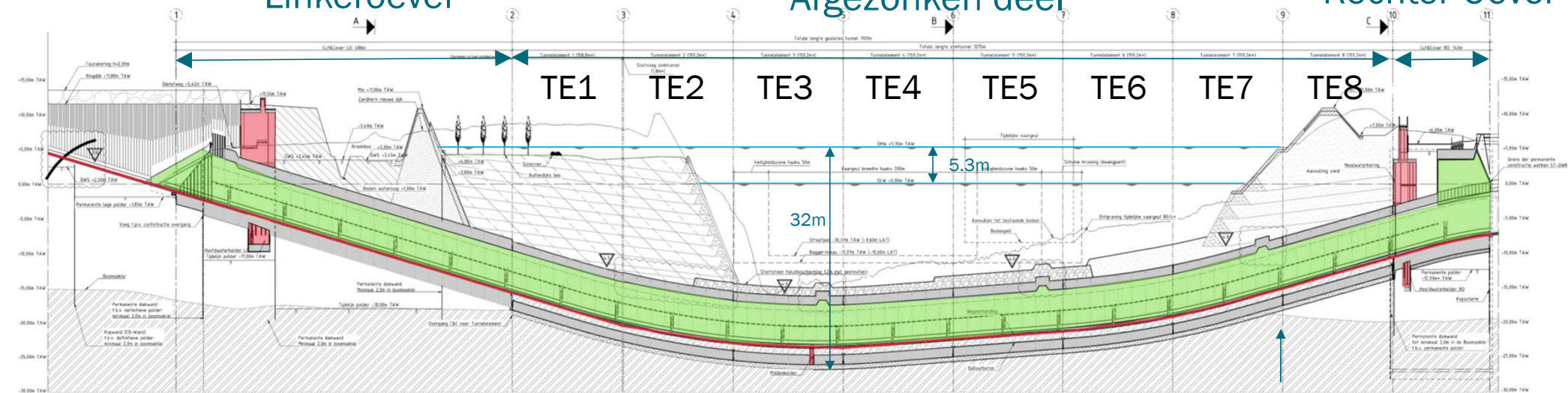
Langsprofiel

- Totale lengte ca. 1800m
- TE Afmetingen $\approx 159.2 * 41.3 * 9.9$ meter
- TE Gewicht ≈ 60.000 ton

Linkeroever

Afgezonken deel

Rechter Oever



Sluitvoeg

Projectlocaties

1. Bouwdok Zeebrugge
2. Parkeerlocatie Doeldok
3. Afzinken te Oosterweel



Bouwdok Zeebrugge – April 2025

Onder water zetten droogdok – Mei 2025

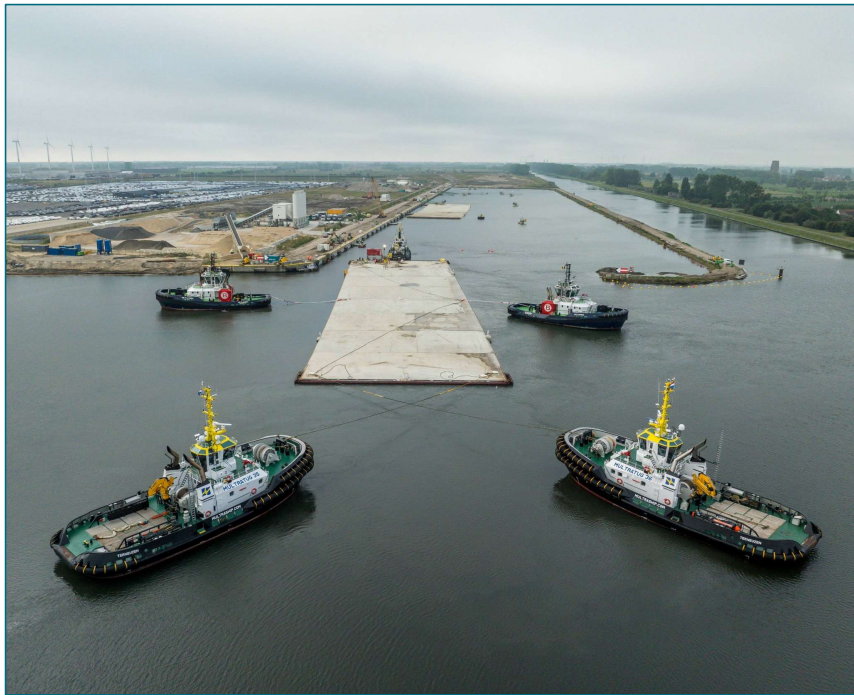
Opdrijven TE1



Afmeren elementen

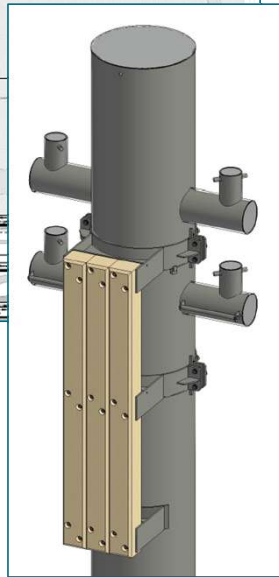
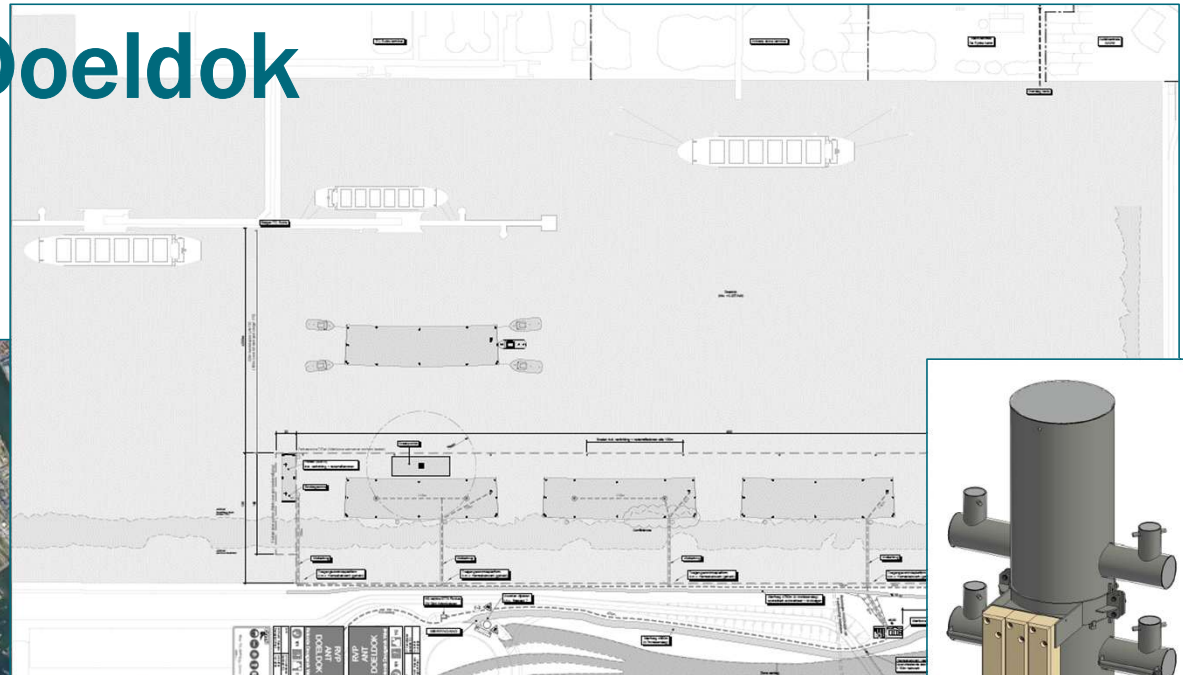
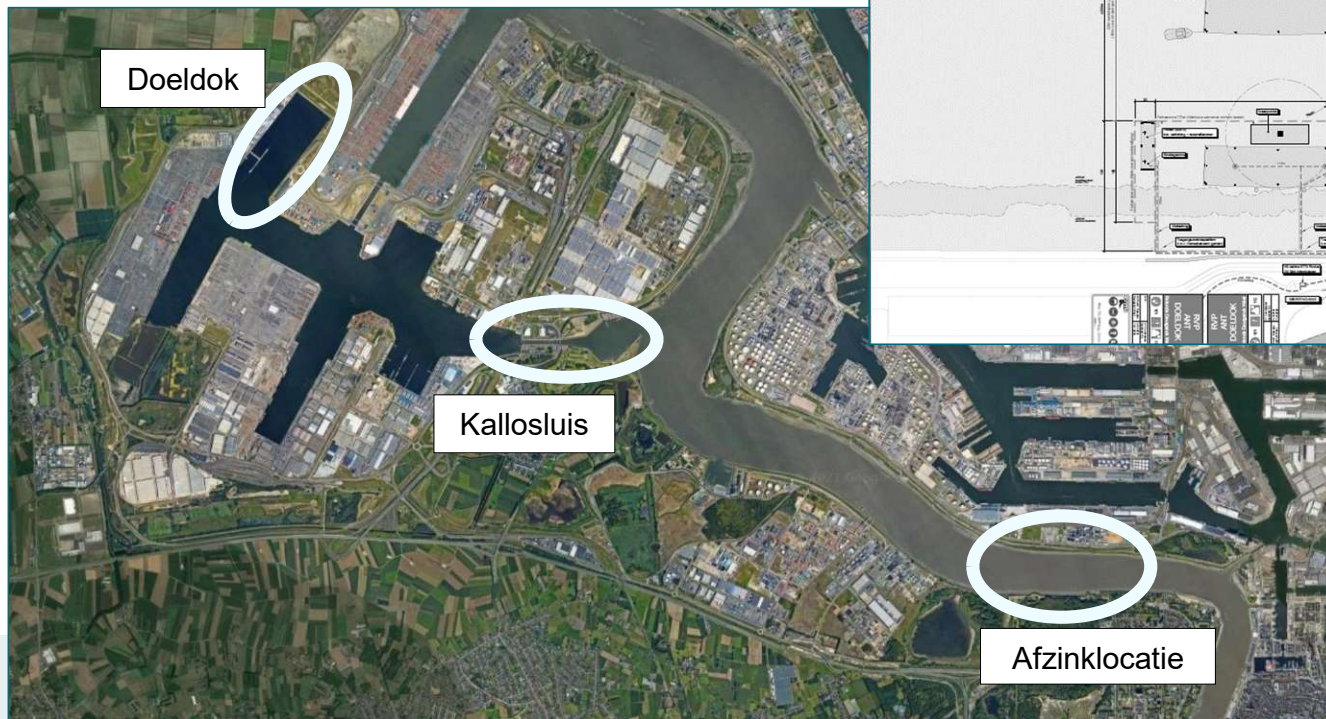


Transport naar Antwerpen



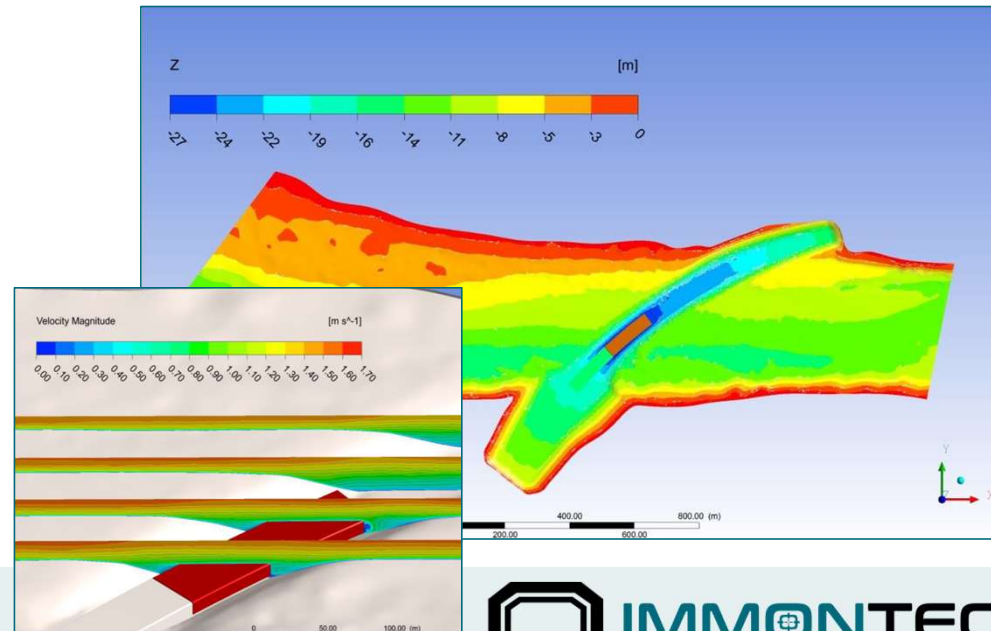
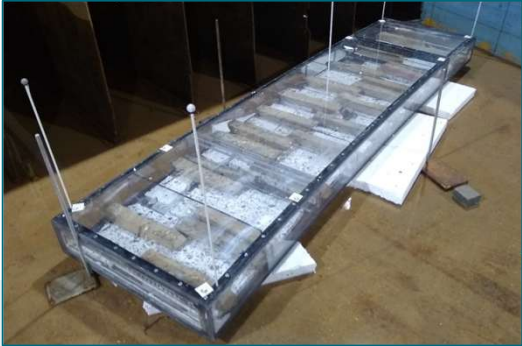
Parkeerlocatie - Doeldok

- Commissioning TE



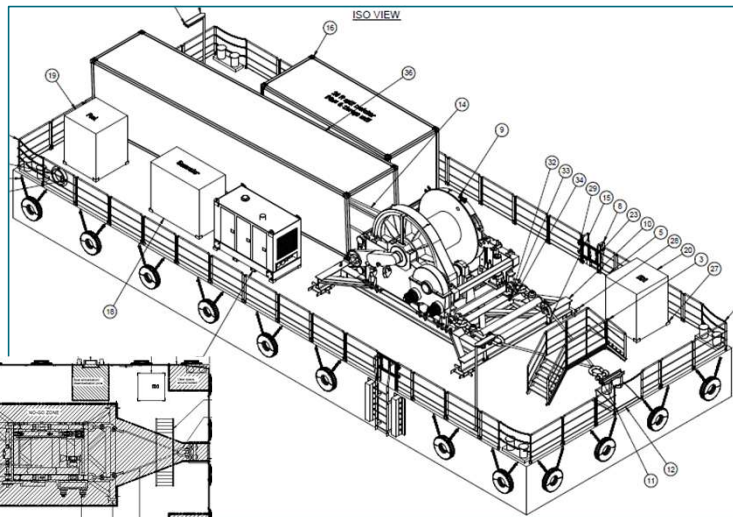
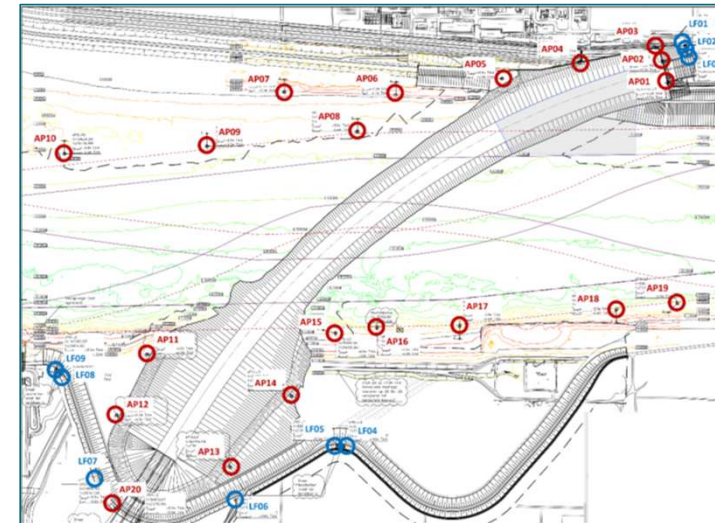
Ontwerp - Dwarsverhaalsysteem

- Fysieke modeltesten (HR Wallingford)
- Numerieke modeltesten (IMDC)



Ontwerp - Dwarsverhaalsysteem

- Maatgevende stroming op verhaalsysteem
- Ankerpunten op land & water
- Lieren op land & pontons



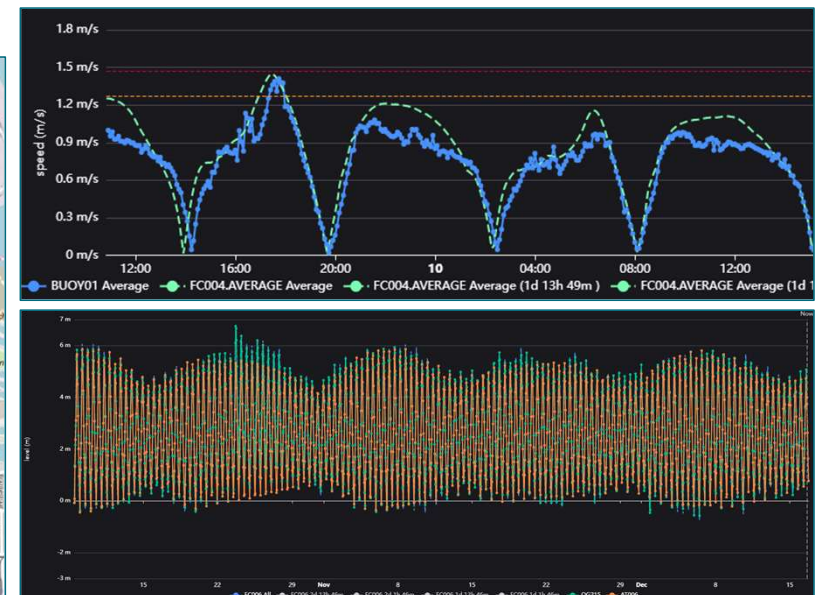
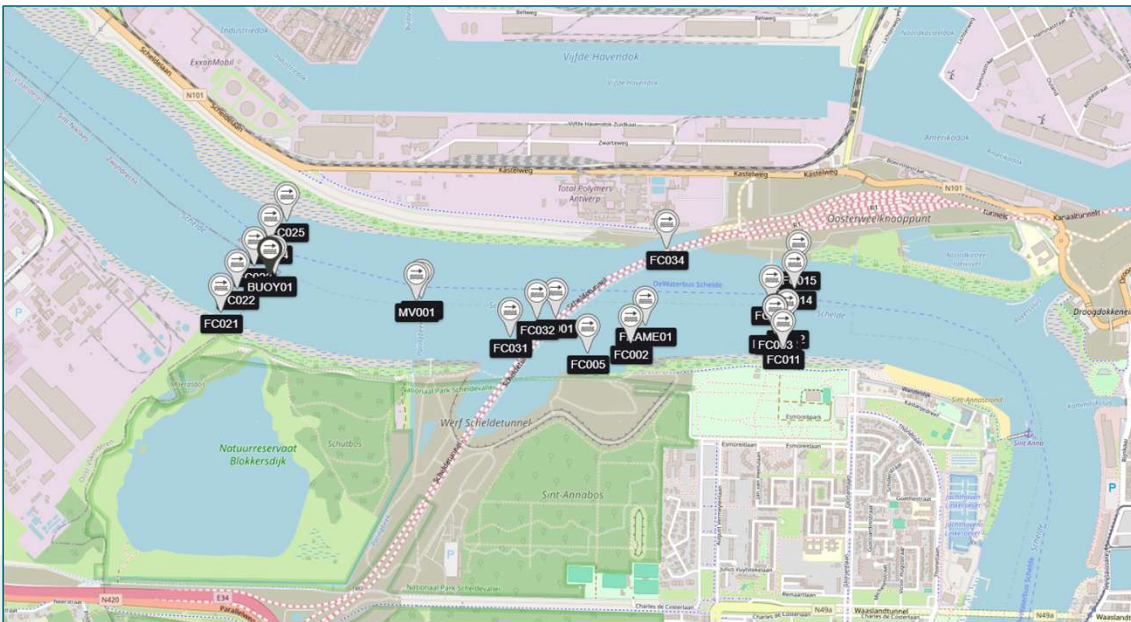
[tonnen]	Horizontale verhaalbelasting
ULS	Ongewenste situatie
SLS	Dynamische component
SLS-20	+10% van statische component
	+90% van statische component
15	Voorspanning
0	Ongewenste situatie

Transport- & insluitsimulaties



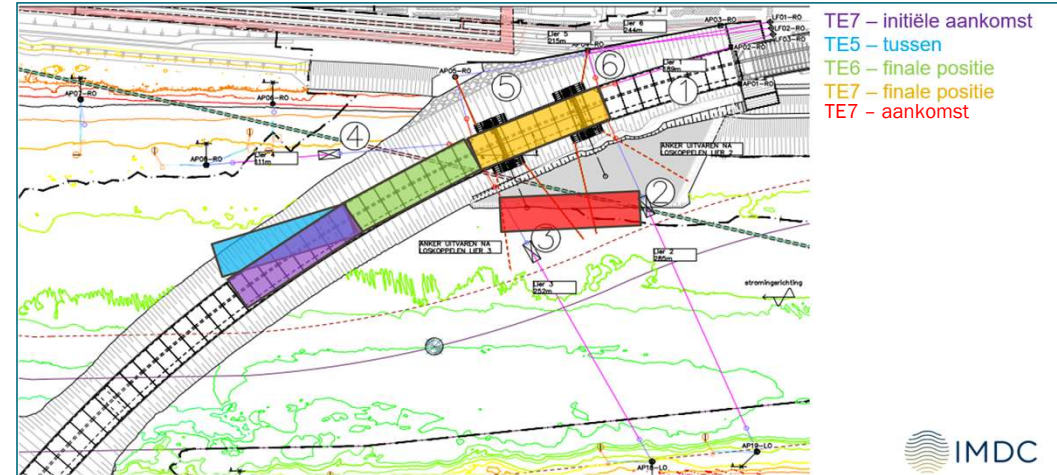
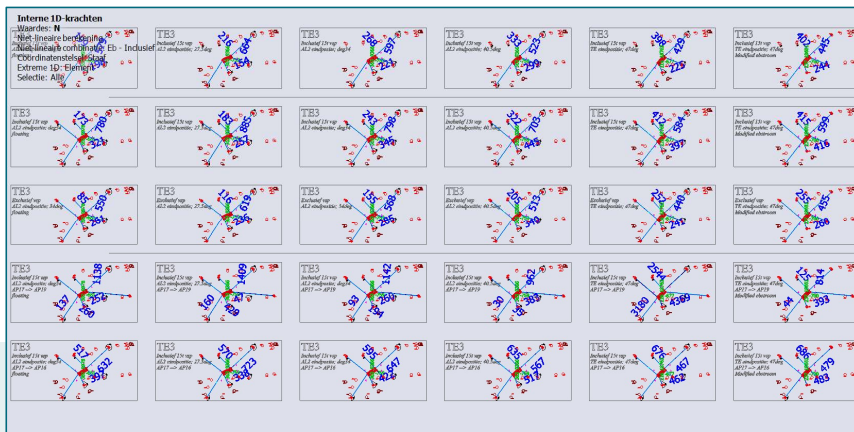
Operationeel Forcecast System (OFS)

- Historie, realtime metingen & voorspellingen in één systeem
- Waterpeil, saliniteit, stroming, etc.



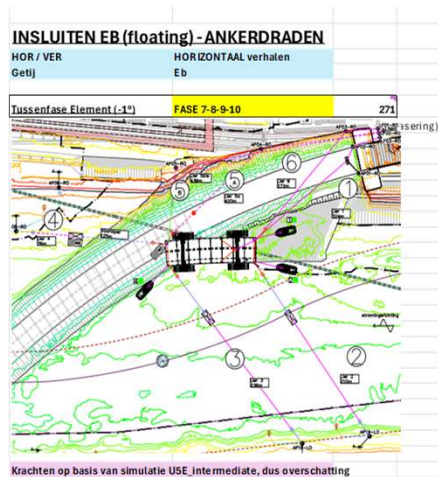
Voorspellingsmatrix horizontaal systeem

- Bepaling draadkrachten tijdens gehele transport & verhalen
- Krachten variëren op basis van:
 - Gebruikte ankerpunten per element
 - Stroming behorend bij getijde
 - Positie van het element

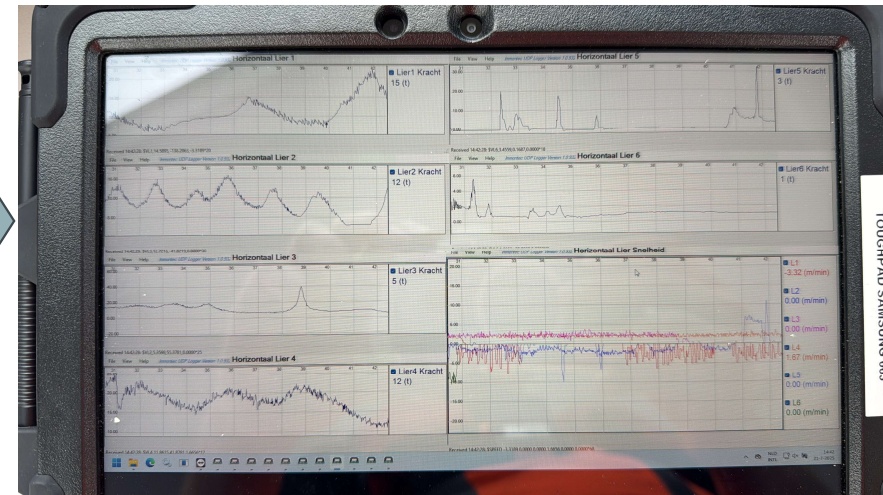
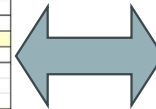


Voorspellingsmatrix horizontaal systeem

- Voorafgaand operatie: Best guess met voorspelde stroming
- Tijdens operatie: Hydraulic engineer in Command Unit
Lead engineer aan boord van TE



		AL1	AL2	AL3	AL4	AL5	AL6
	Dynamica in rekening te brengen	20	20	20	20	20	20
	Std. dev. in rekening te brengen	4	3	2	2	2	2
	Voorspanning in rekening te brengen	0	10	10	10	10	0
	evt. Correctiefactor tijdens operatie	1	1	1	1	1	1
	Operationeel - Gemeten snelheid						
	v =	0.55					
	factor	0.21					
		AL1	AL2	AL3	AL4	AL5	AL6
TUSSEN1	-5 deg - CW						
	96°						
	Statische belasting	21	32	22			
	statisch + dynamisch	0.25	0.44	0.23			
TUSSEN	91°						
	Statische belasting	22	30	23			
	statisch + dynamisch	0.27	0.43	0.24			
	5 deg - CCW	42	50	43			
86°	Statische belasting	24	29	24			
	statisch + dynamisch	0.28	0.41	0.25			
		44	49	44			
		0.53	0.69	0.46			



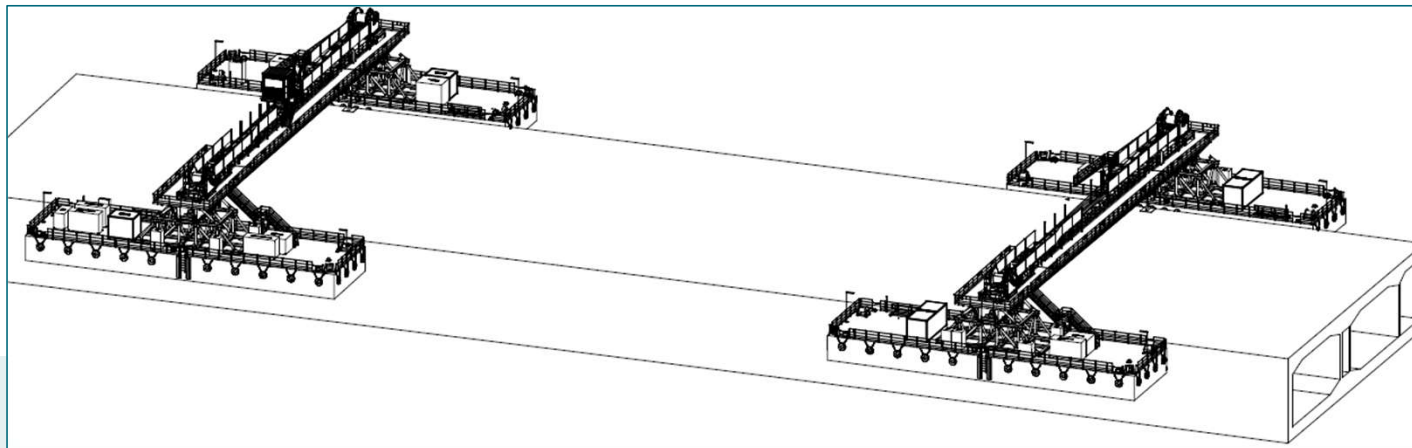
Afzinkcatamarans



Afzinkcatamaran

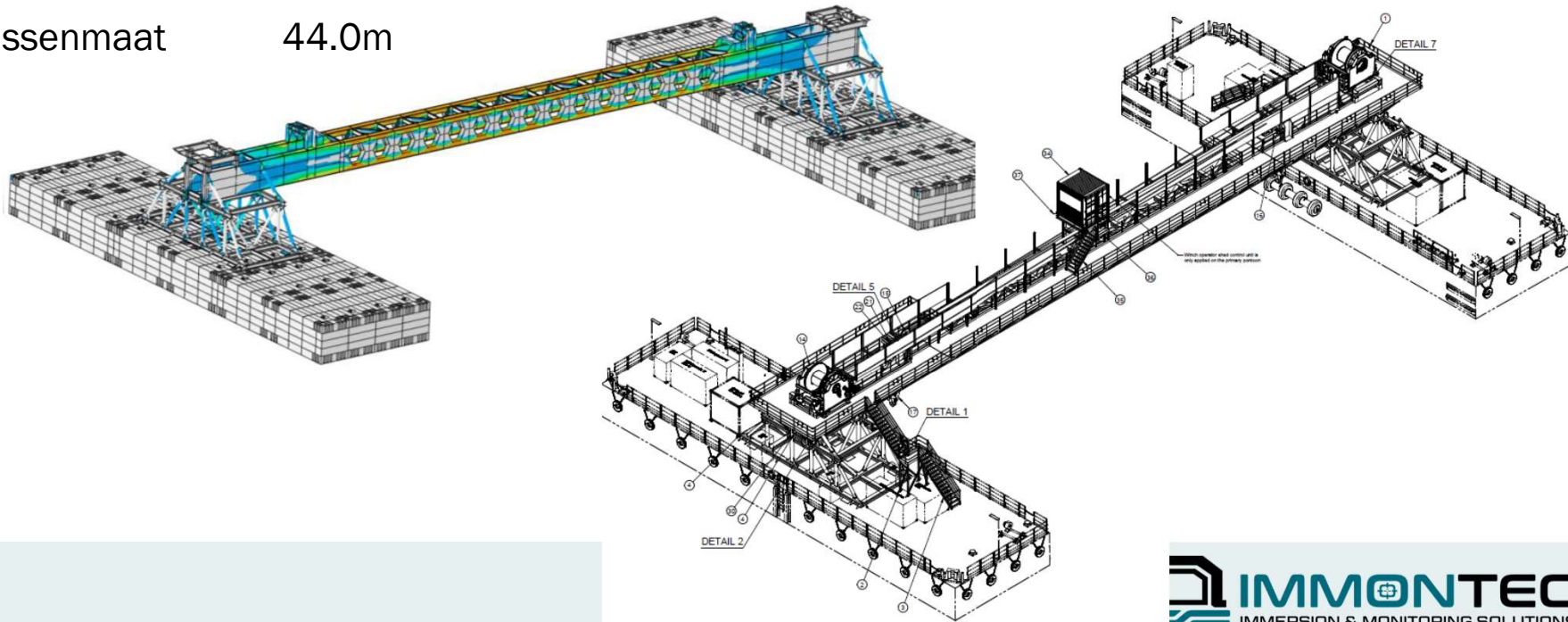
- 4 hijspunten → 2 catamarans, met 2*278 ton hijspuntbelasting
- Water verplaatsing
 - Unloaded: 840m³
 - Loaded: 1400m³
- Gecertificeerd onder klasse via Bureau Veritas→

I 10 ⌘ HULL • MC
Worksite Unit Lifting capacity (556 t)
EUR , ⌘ ALP

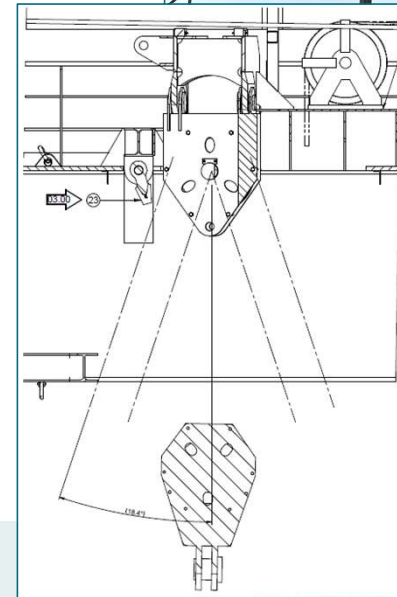
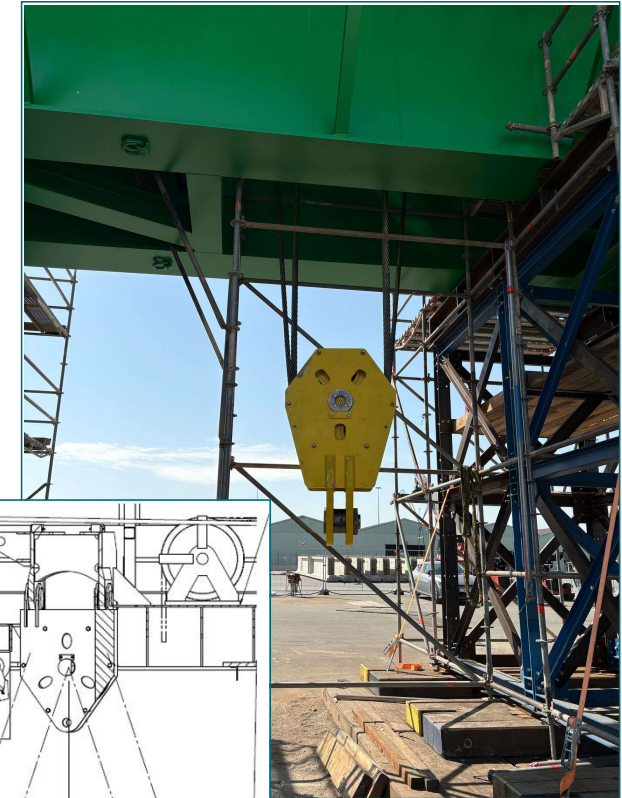
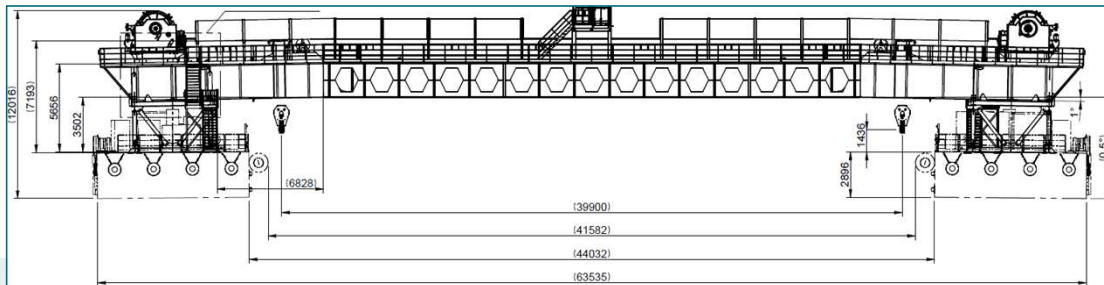


Afzinkcatamaran

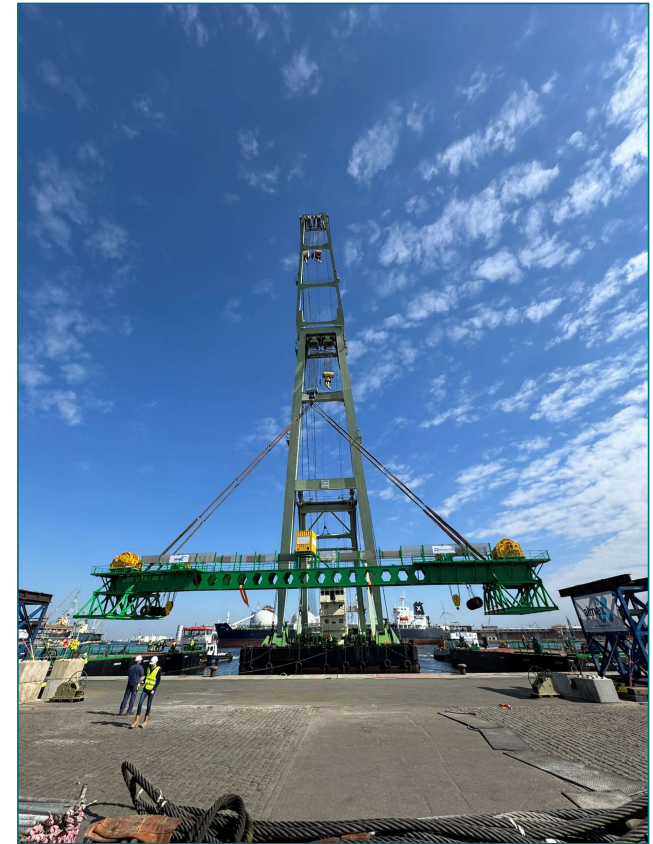
- Hoogte 12.0m (incl pontoons)
- Breedte 63.4m
 - Tussenmaat 44.0m



Afzinkcatamaran



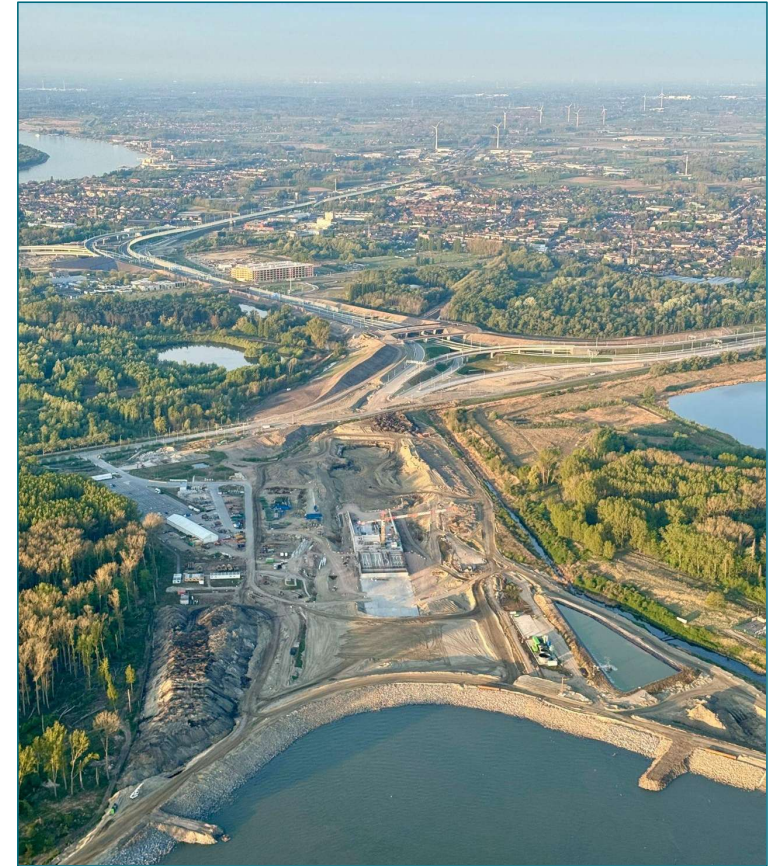
Plaatsen traversebalk



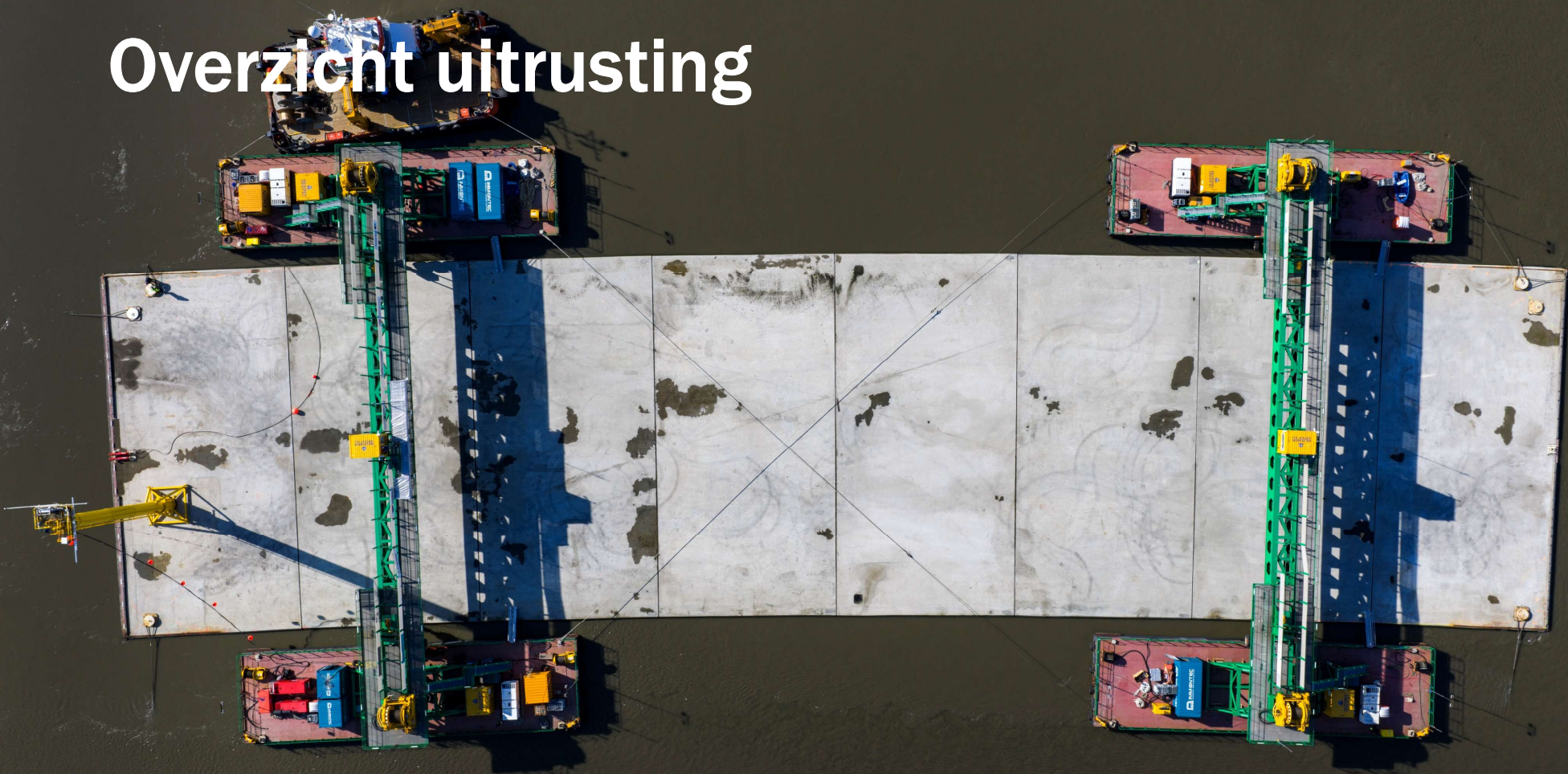
Plaatsen tegels



Inundatie Linkeroever



Overzicht uitrusting



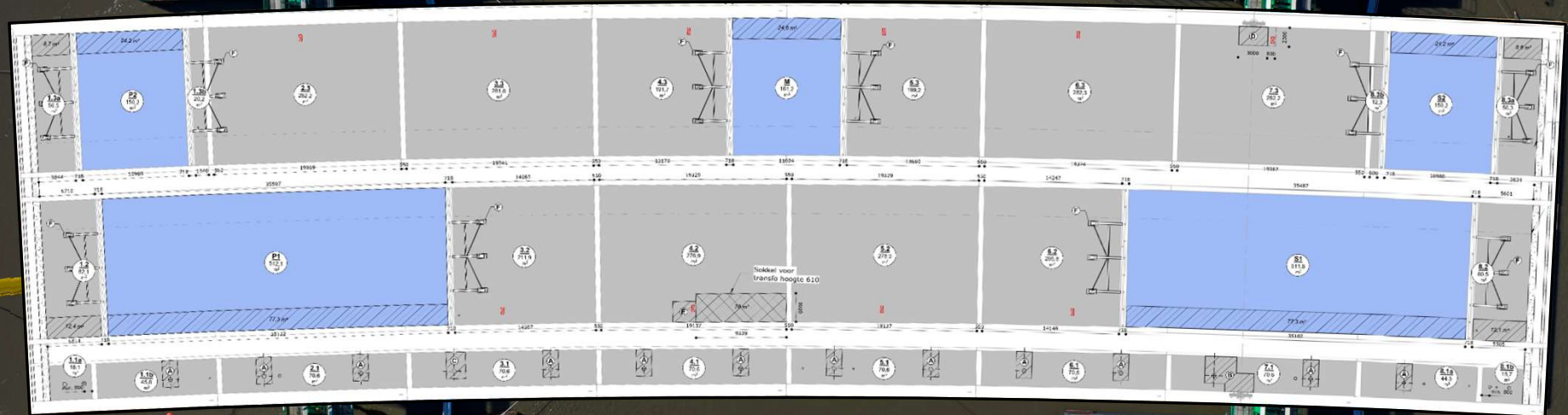
Deck layout



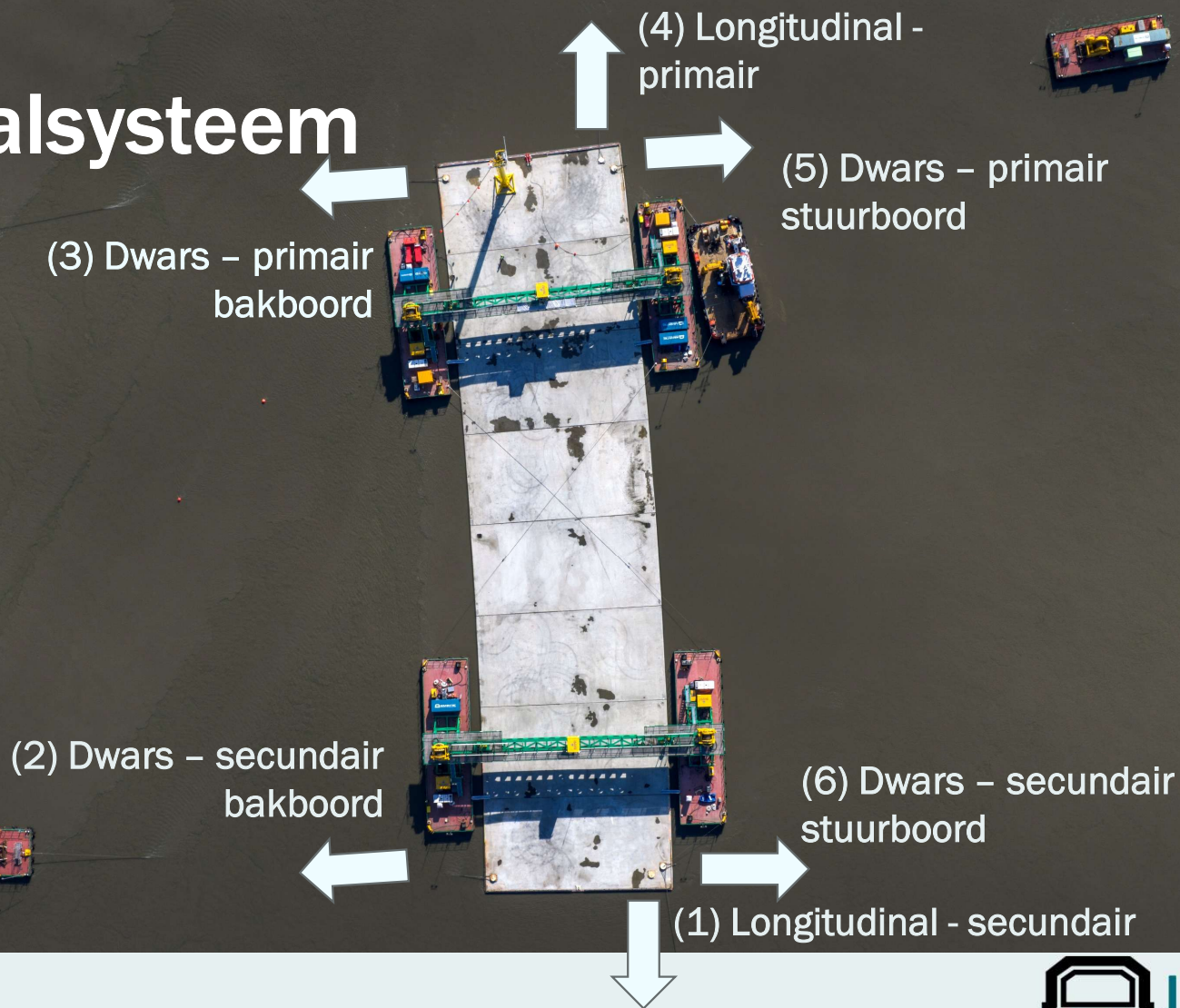
Afzinkcatamarans



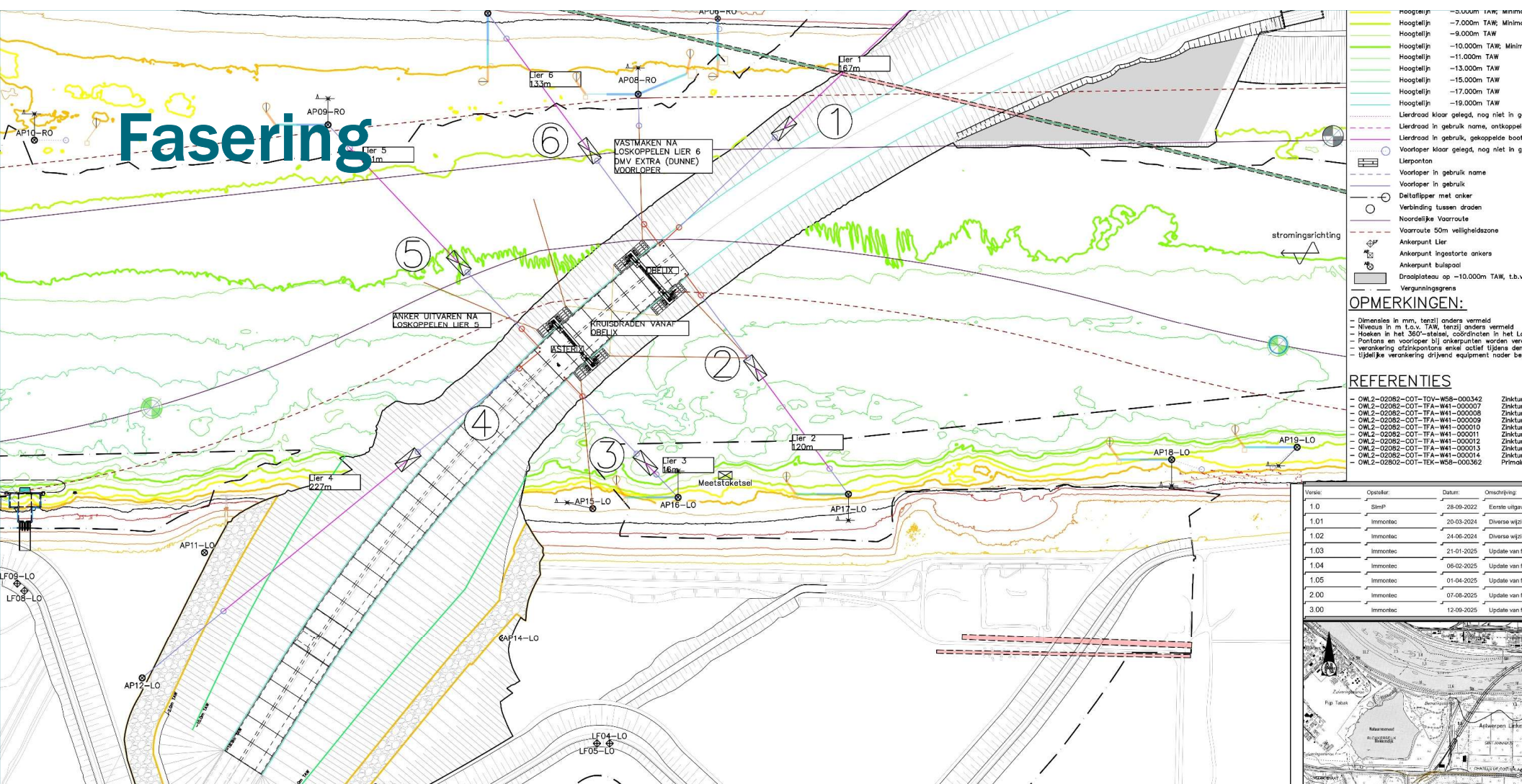
An aerial photograph showing two large oil tankers at sea. The tanker in the foreground is a dark-hulled vessel with a complex network of pipes and structures on its deck. The tanker in the background is a lighter-hulled vessel, also with visible deck structures. The text "last tanks" is overlaid in large, white, sans-serif font across the upper portion of the image.



Verhaalsysteem



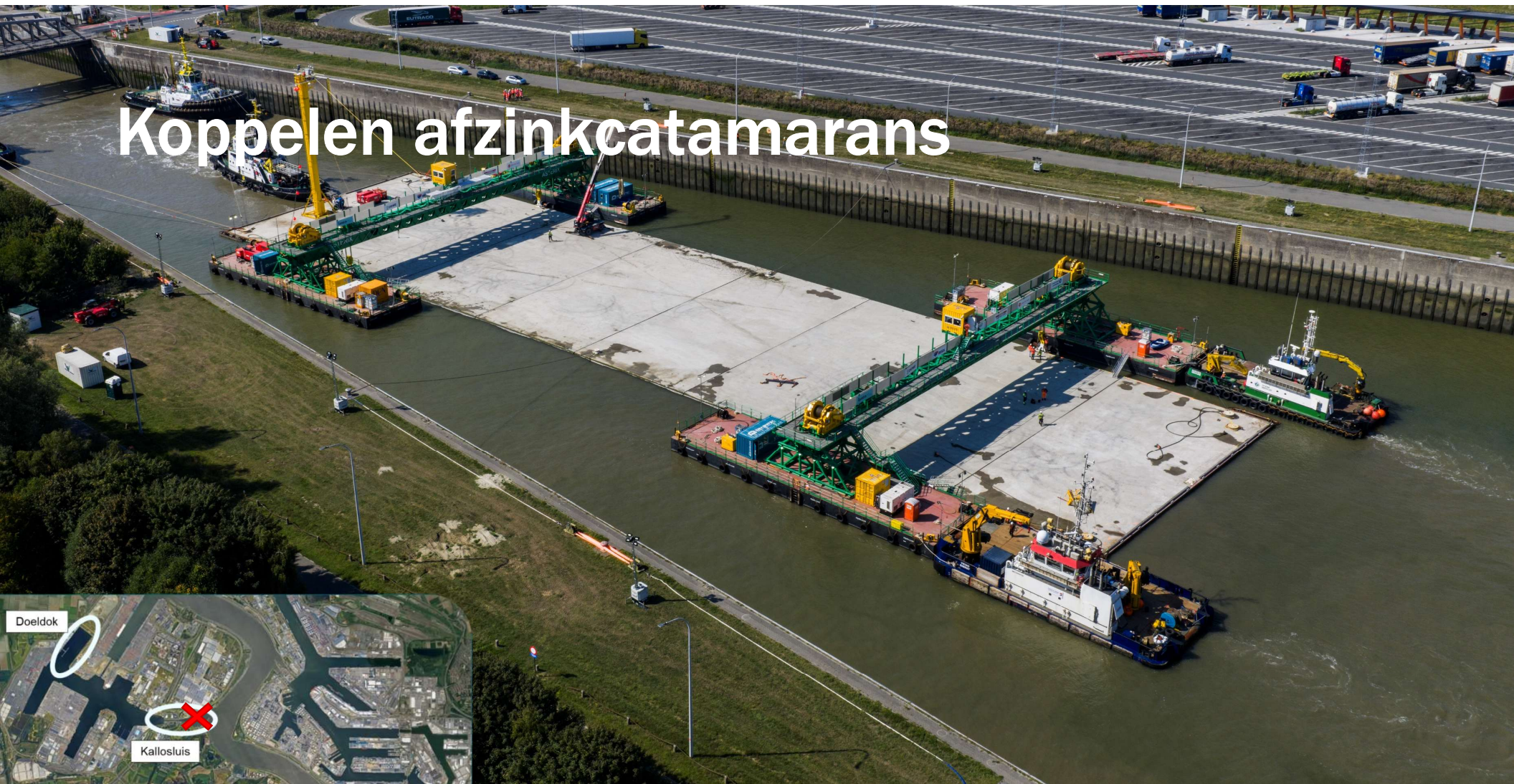
Fasering



Vertrek Doeldoek, naar Kallosluis



Koppelen afzinkcatamarans



Loadtest hijspunten & catamarans



Vertrek kallosluis



Aankomst Oosterweel



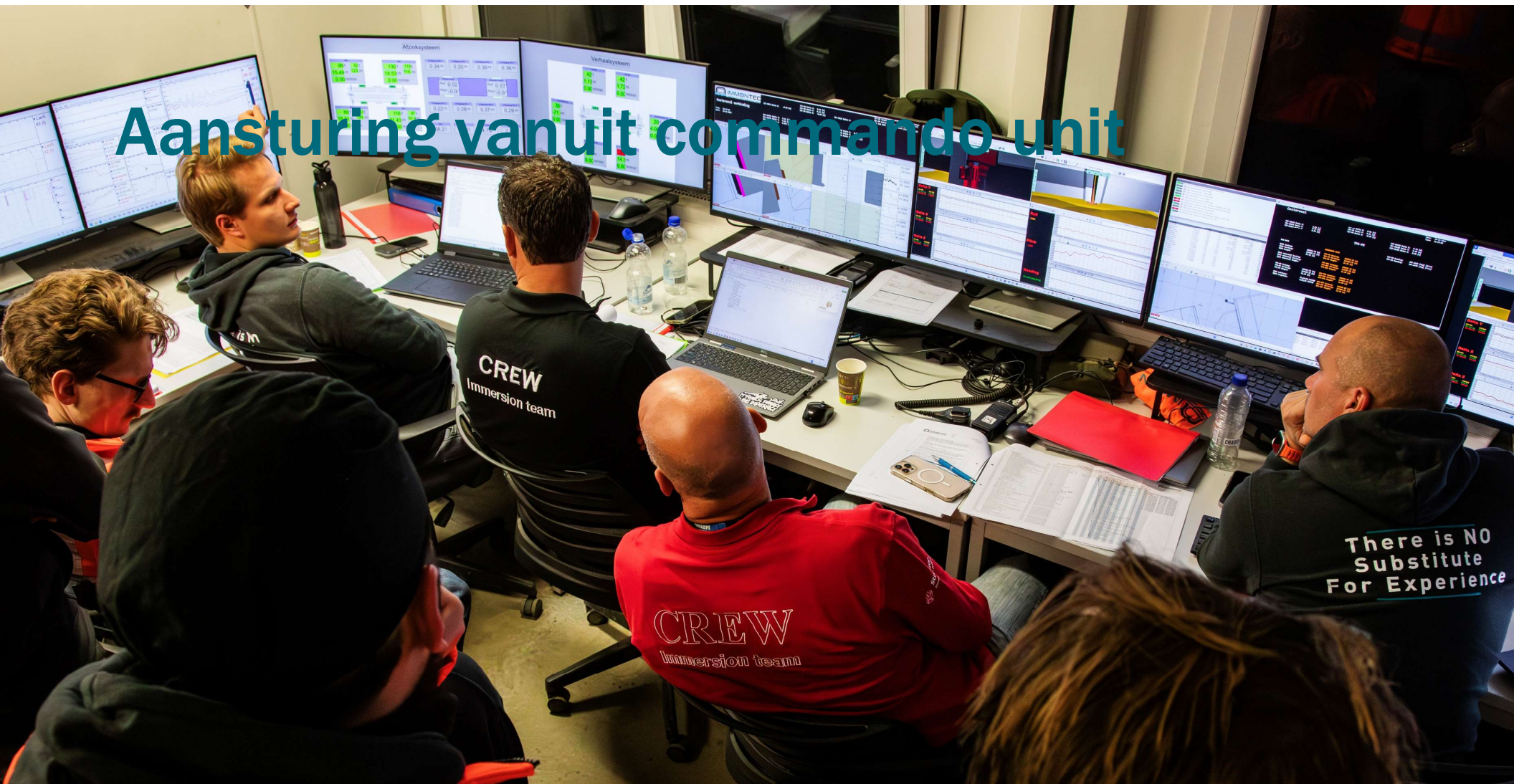
Koppelen ankerdraden



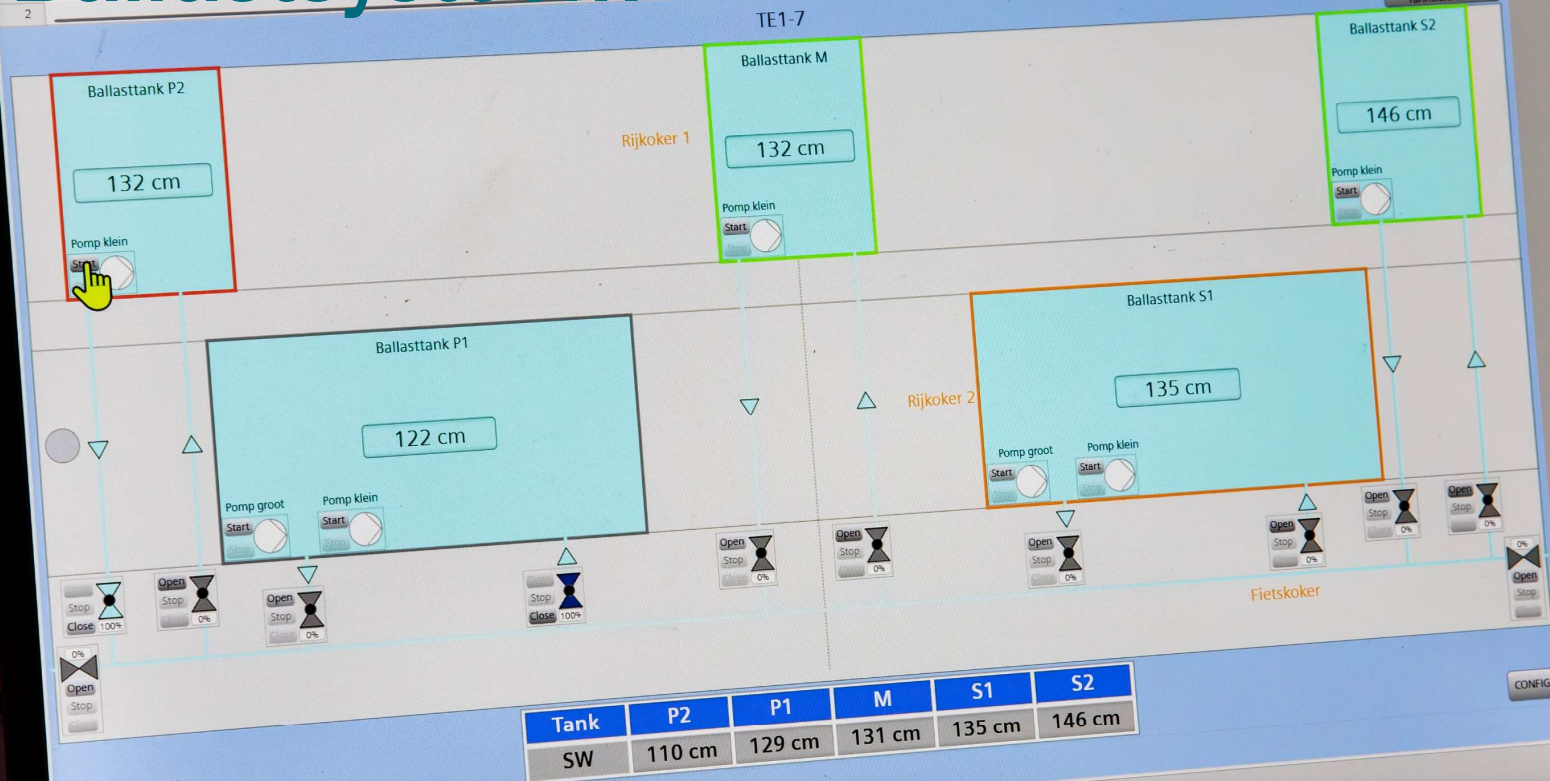
Verhalen tunnel element



Aansturing vanuit commando unit



Ballastsysteem



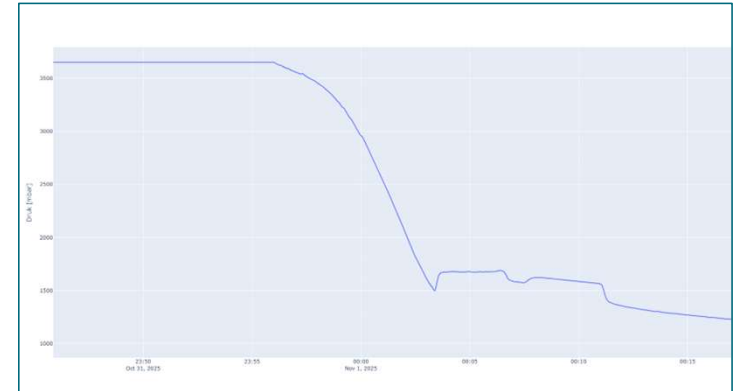
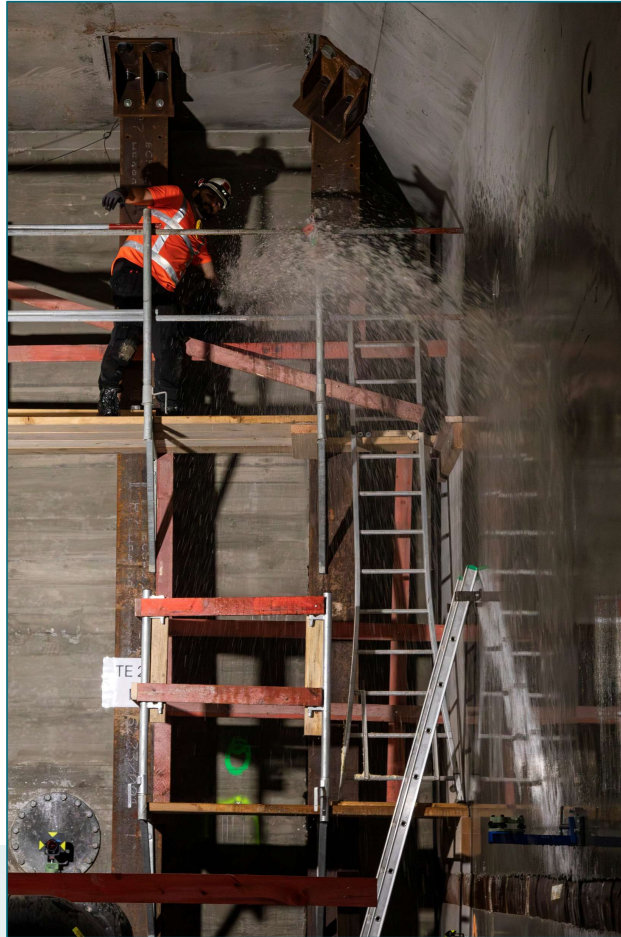
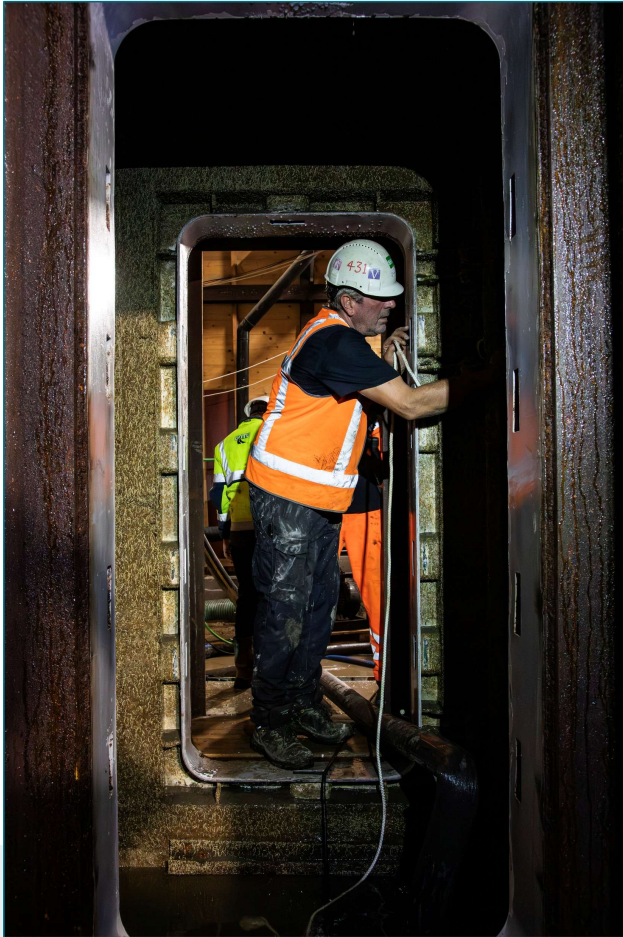
Element door de waterlijn



Element op opleggingen

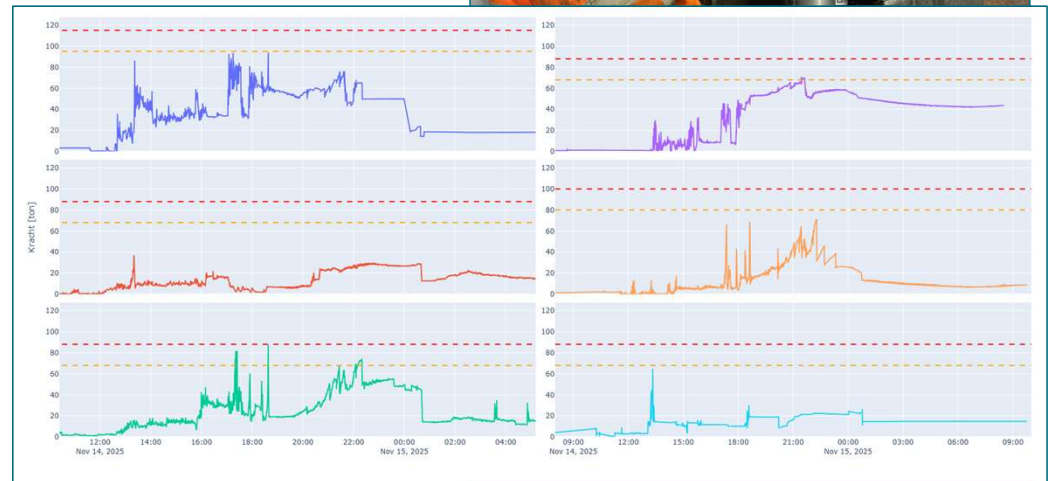


Legen zinkvoeg

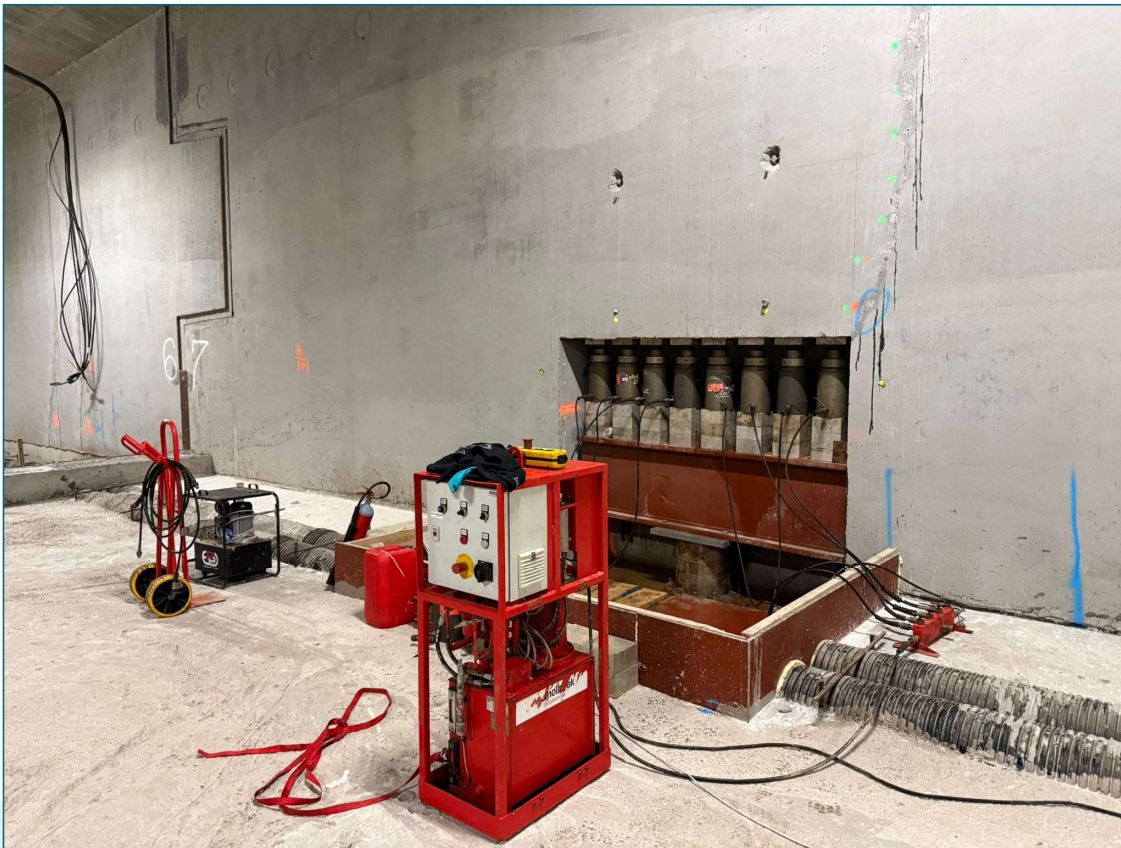


Monitoring

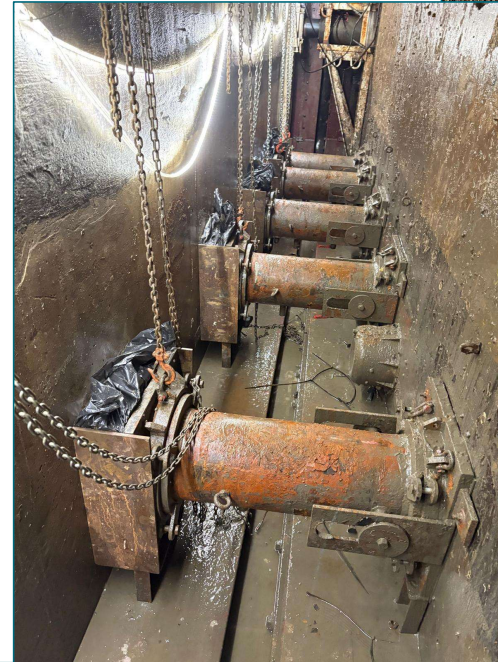
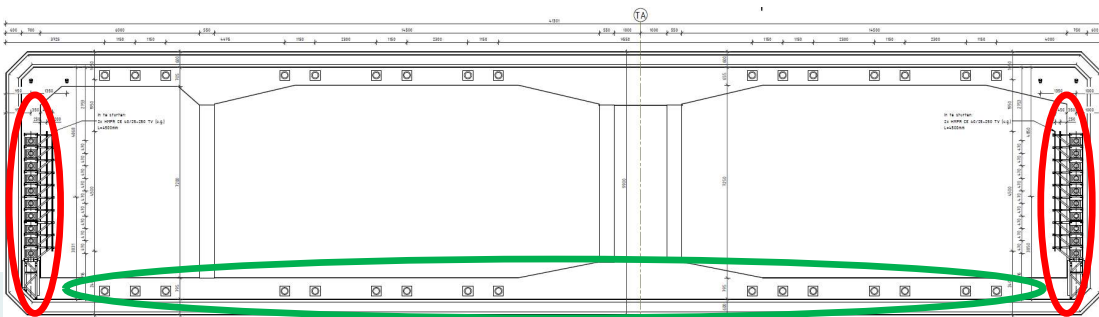
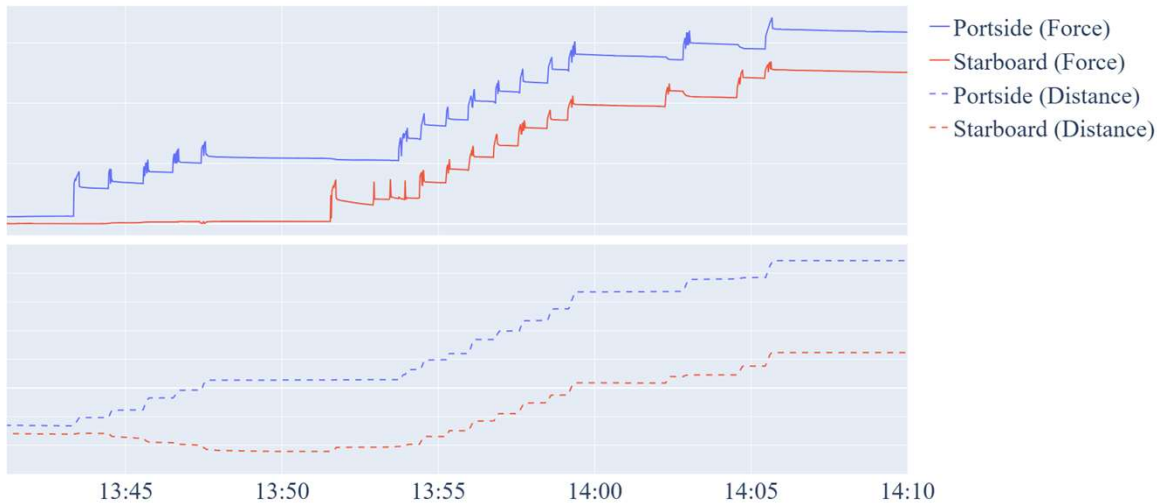
- Lierkrachten, -snelheid en -lengte
- Waterdruk sensoren
- Positie
- Hydrauliek
 - Opleggingen primar & secundair
 - Kwispelsysteem
- Indrukking GINA-profiel



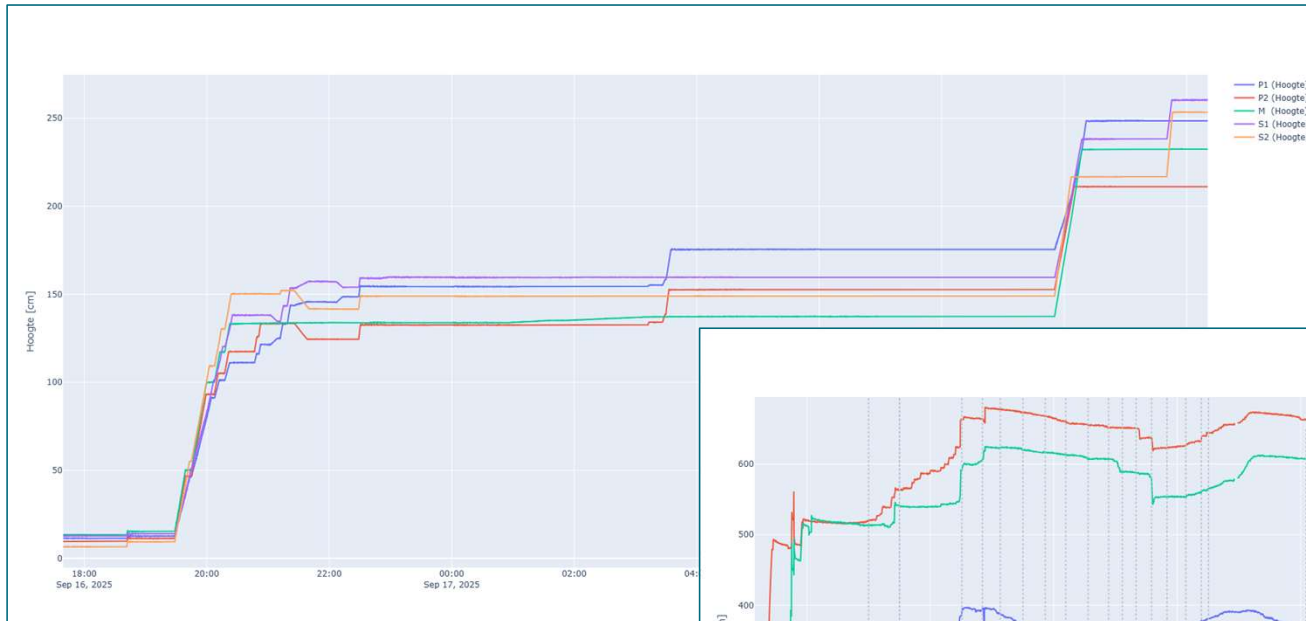
Hoogte correctie secundair



Kwispelen & Locking

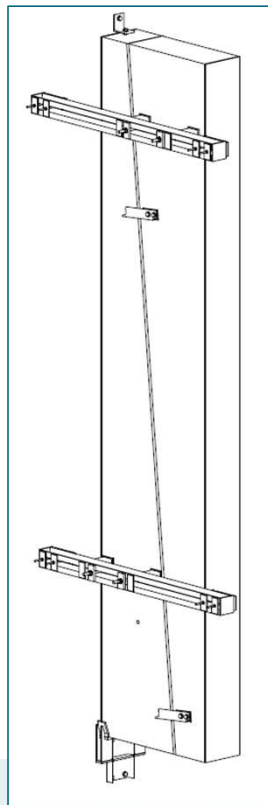
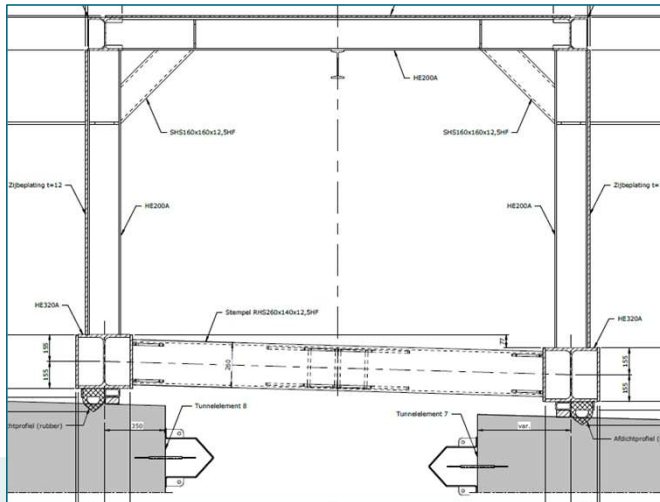


Afballasten & onderstromen



Sluitvoegkist

- Vloerpaneel,
- Wiggen
- Hoedpaneel, 2 wandpanelen





From Tailored Solutions to Solid Success



Arne de Jong

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Timelapse TE6



From: De Oosterweelverbinding
<https://www.youtube.com/watch?v=aQMg2NJ7CPg>