Leverandørkonferanse

Stad skipstunnel – Den nye sjøvegen

Project Stad ship tunnel, Gardermoen 31.01.2023

www.kystverket.no/skipstunnel

Stad SKIPSTUNNEL | DEN NYE SJØVEGEN

KYSTVERKET

Why hold a supplier conference?

1. To inform contractors and suppliers about the Stad ship tunnel project
2. To prepare the contractor market for the upcoming competition
3. **To get input for the tender documentation**

'The Norwegian Coastal Administration is working on the tender documentation for the construction of the Stad ship tunnel. The work is planned to be announced as one large turnkey contract with a fixed price, procured by competition with negotiation. The work is expected to be announced after summer 2023.'

Agenda

10:30 – 12:00: Presentation in plenary session

- General introduction to the project
- Tender and contract
- Specific details and challenges in the project
- Summary and questions

12:00 –13:00: Snacks and mingling in common area

13:30 –: One-on-one conversations with registered turnkey contractors

Sailing out the ship tunnel at Moldefjorden.

Who is here today?

NORWEGIAN COASTAL ADMINISTRATION, Stad ship tunnel project:

- Terje Skjeppestad, project manager
- Per Åge Havnegjerde, technical manager
- Ingve Hølland, contract engineer
- Mads Solberg Eriksen, contract advisor (Marstrand)
- Linn Grimstad, document controller
- Sveinung Nedregotten, communication and public relations

MULTICONSULT:

- Bård Solberg, head of project
- Magni Vestad, geology/technical, rock

What is the Norwegian Coastal Administration's role?

'The Norwegian Coastal Administration's vision is to make the Norwegian coast and sea areas the safest and cleanest in the world.'

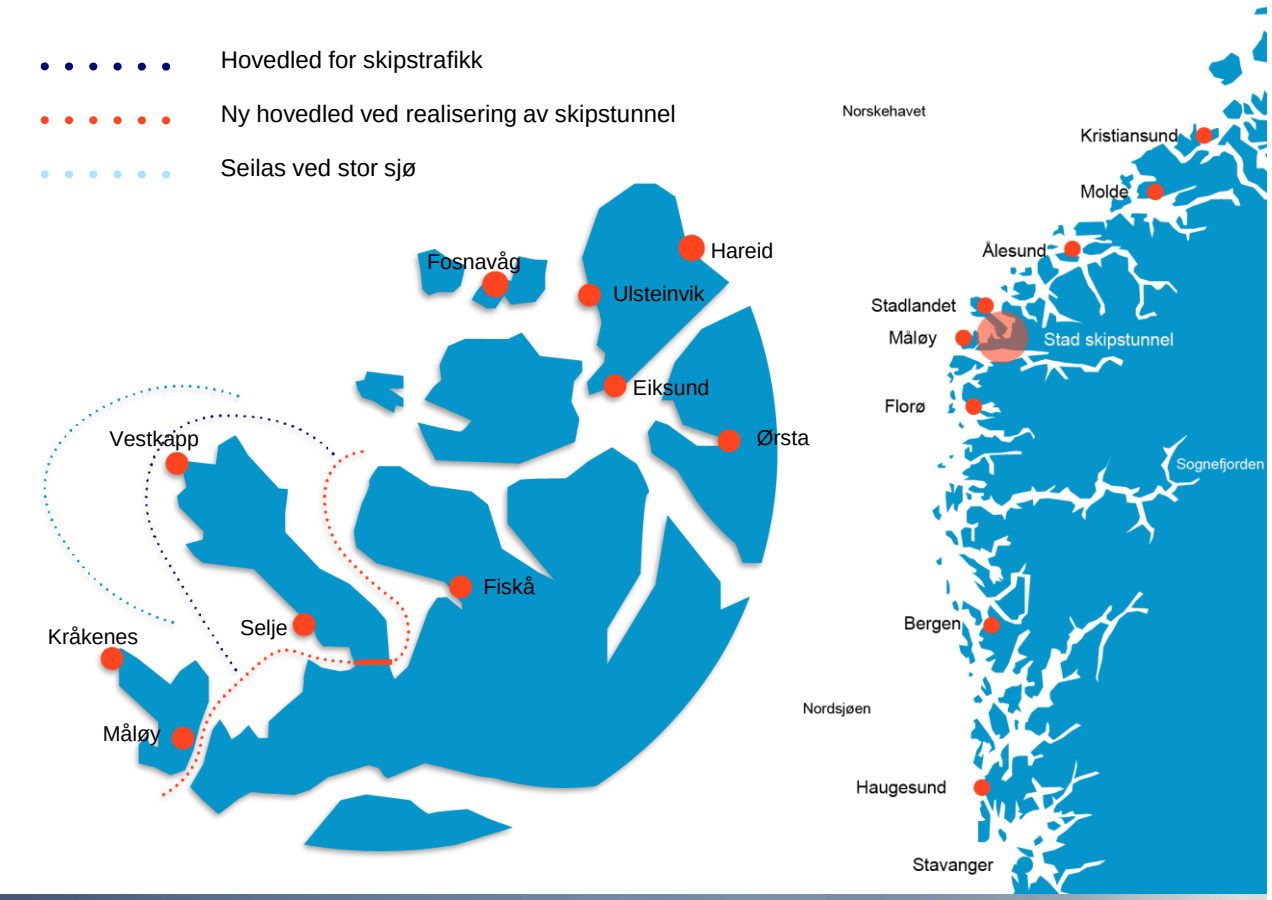


Foto: Helle Frogner

Stad ship tunnel

- The Stadhavet Sea is one of the most exposed and treacherous stretches of water along the Norwegian coast.
- **The goal of the project is to ensure a safer passage, and increase the regularity of shipping traffic past Stad.**
- Utilisation of resources and benefits are to be optimised in the project.


Hovedled for skipstrafikk
Ny hovedled ved realisering av skipstunnel
Seilas ved stor sjø
Norskehavet
Kristiansund
Molde
Ålesund
Stadlandet
Måløy
Stad skipstunnel
Florø
Sognefjorden
Bergen
Nordsjøen
Haugesund
Stavanger
Hareid
Fosnavåg
Ulsteinvik
Eiksund
Ørsta
Vestkapp
Fiskå
Selje
Kråkenes
Måløy

Dimensions

Veitunnel (ca. 7 m)
Road tunnel

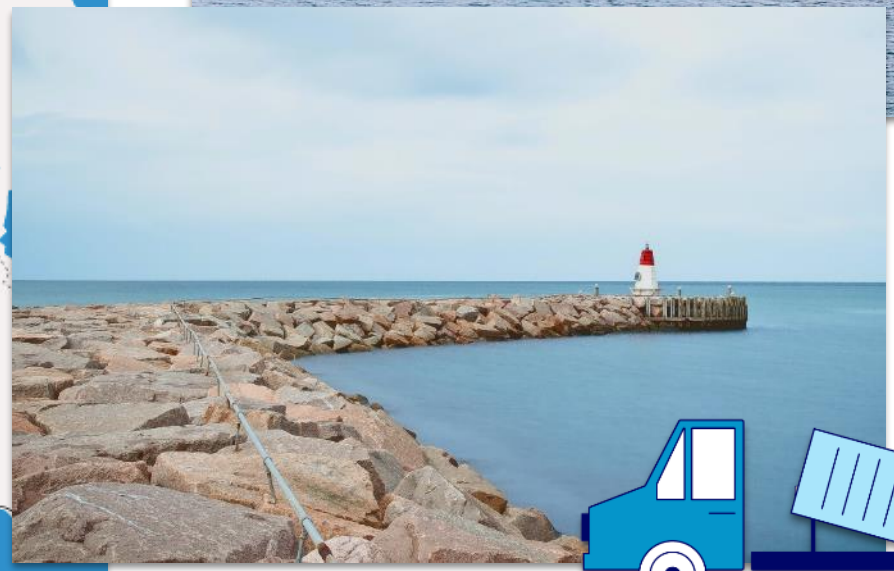
Skipstunnel (50 m)
Ship tunnel

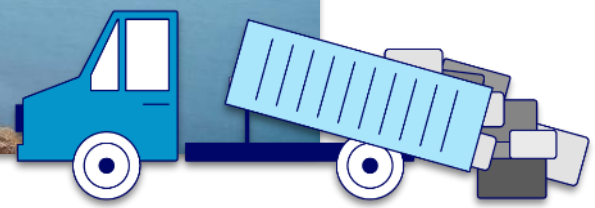
Ålesund rådhus (40 m)
Ålesund town hall

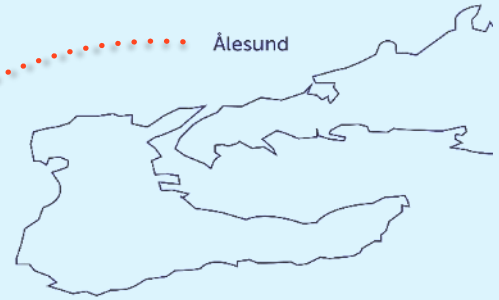
Triumfbuen, Paris (50 m)
The Triumphal arch

5.4 million m³ of blasted rock to be removed from the tunnel

Use of rock masses







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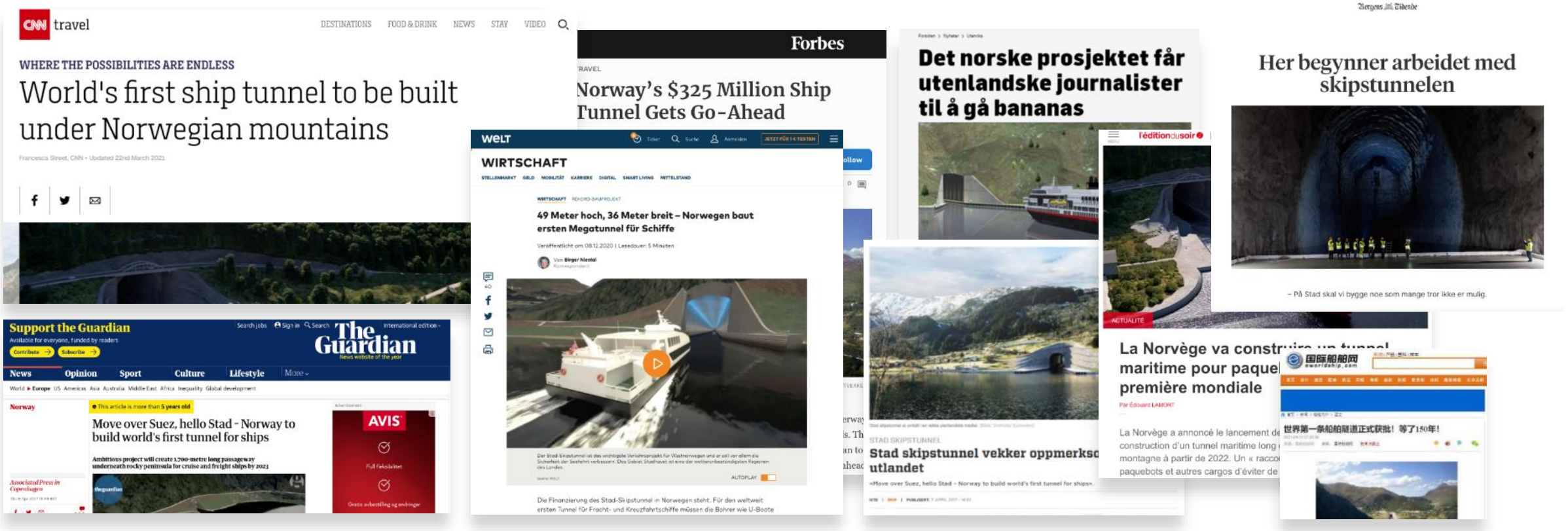
Synergies – after construction

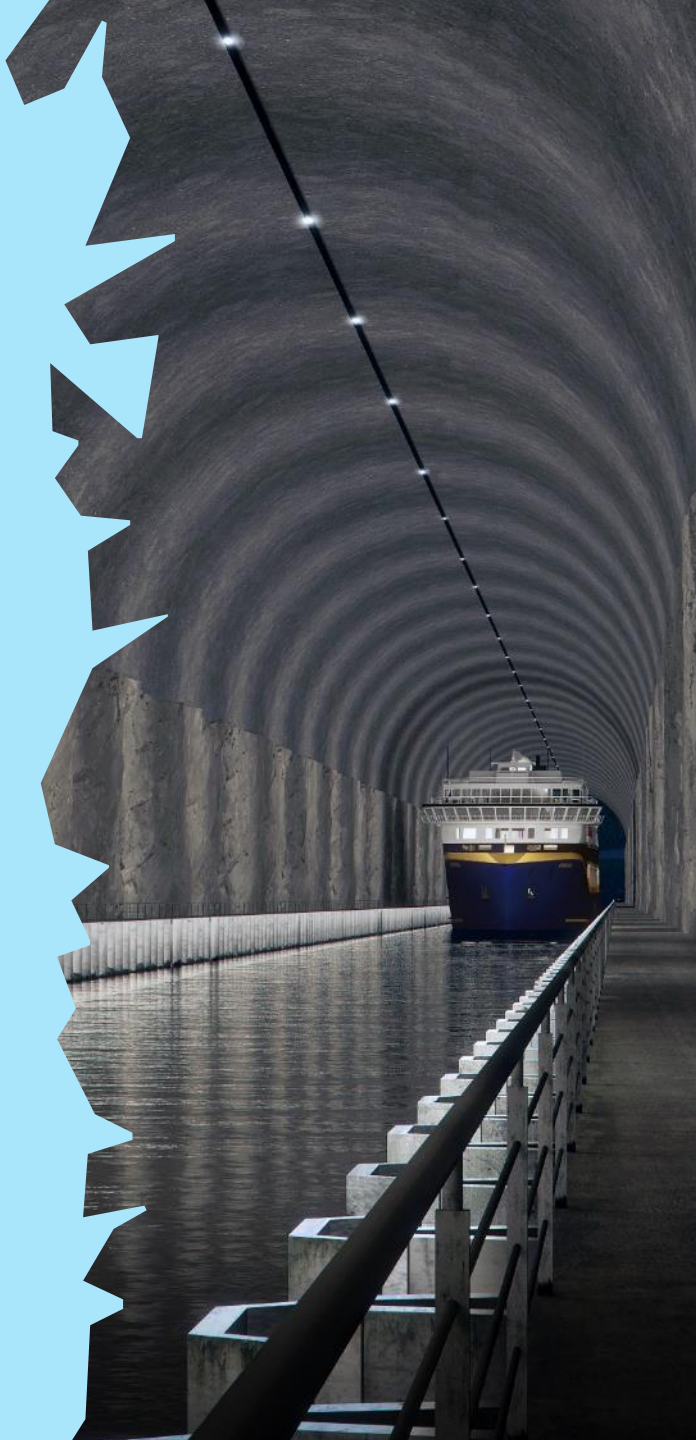
- **Safer and more efficient sea route**
- Commercial purposes and beneficial to society (new commercial areas, jobs, desirable areas to live)
- Aesthetic and beneficial solutions – in and near the tunnel
- ‘Show piece’ – tourism
- New coastal express routes, connecting Ålesund and Bergen
- Can facilitate more sea transport (road to sea)
- Environmental benefits – save fuel and reduce emissions

Enormous interest



How will the ship tunnel and portal areas look?

‘We do not want to just leave behind a hole in the mountain.’

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HAVILA KYSTRUTEN
BERGEN KIRKENES BERGEN
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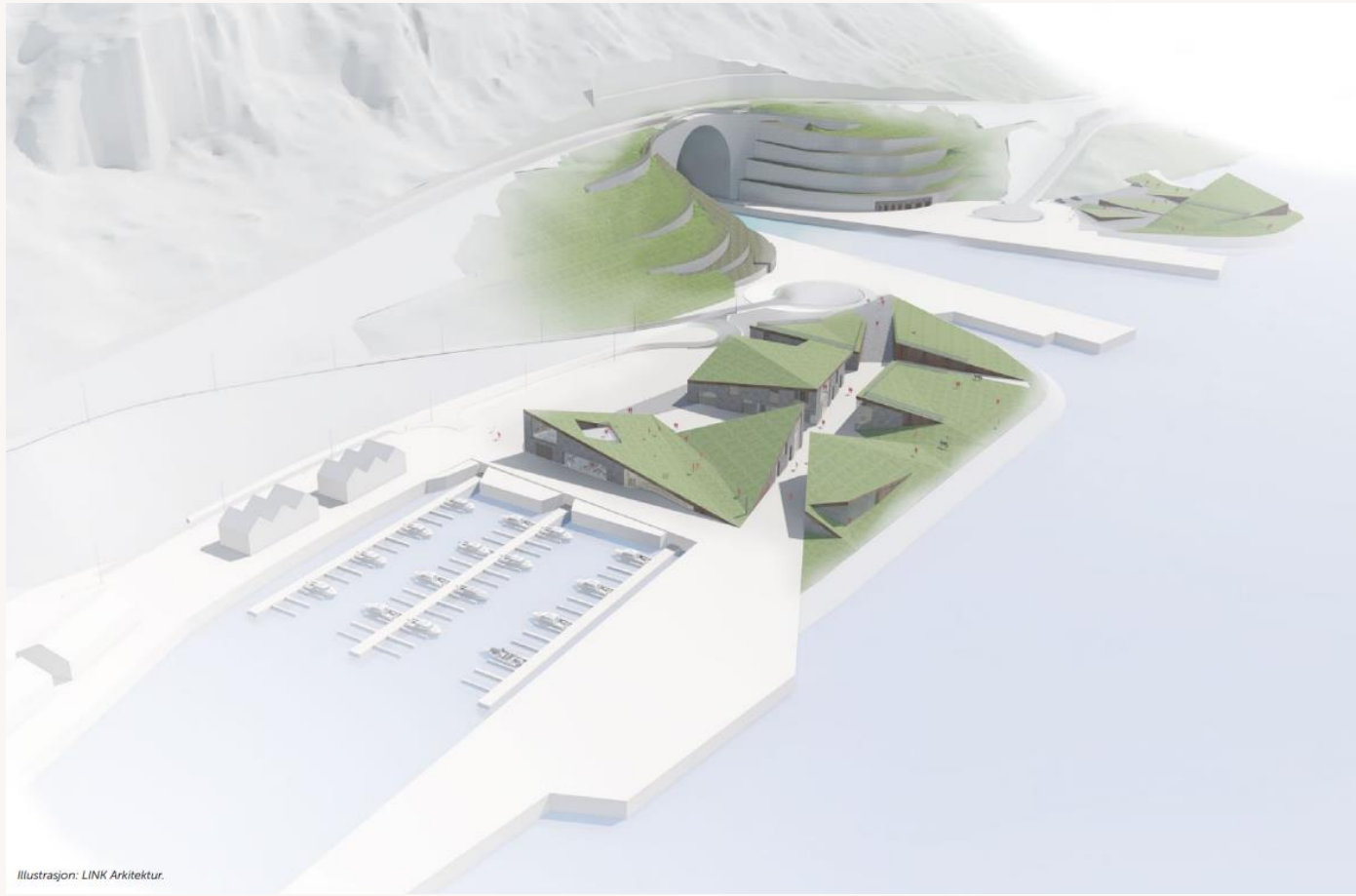
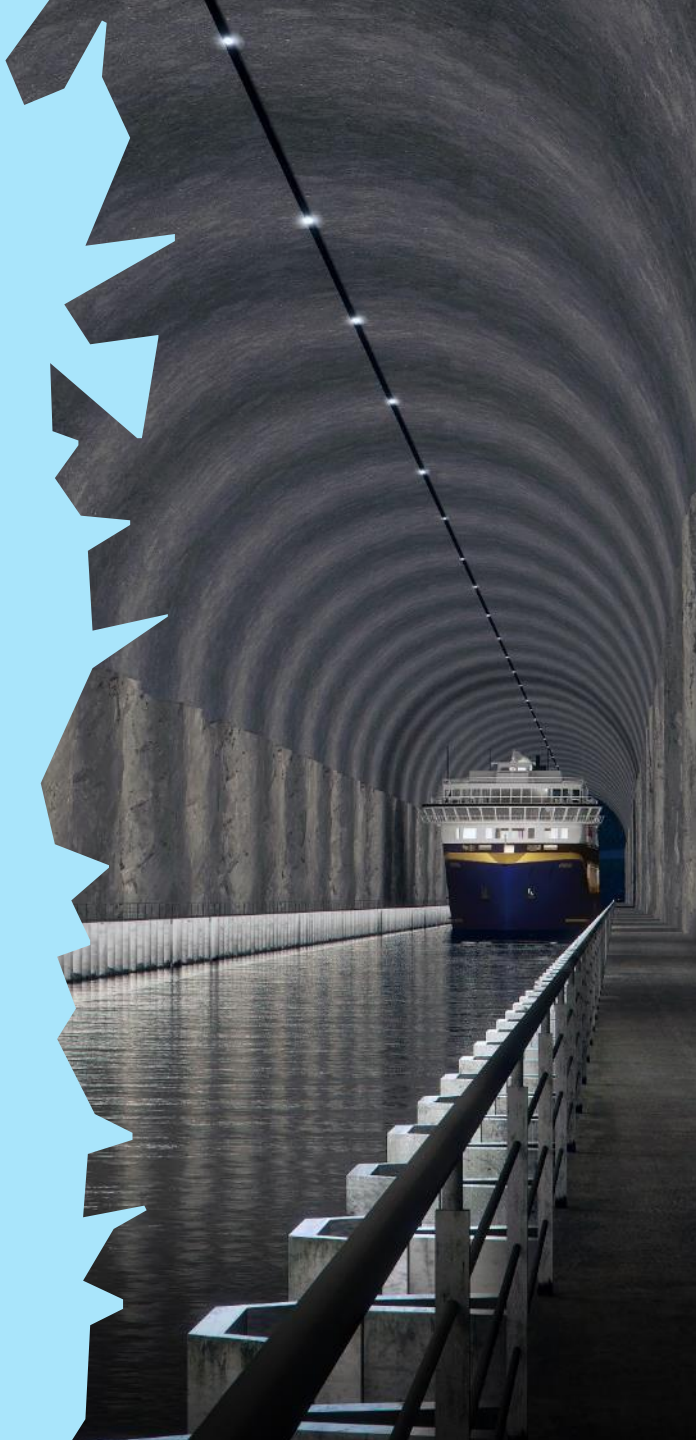
Development in phases – contractor delivers phase 1



Moldefjorden north. To the left is phase one, while phase two is to the right.

Contract strategy



Contract strategy – selected factors

FEATURES

- World's first ship tunnel
- Contractor gives completion date
- Large rock mass surplus
- Contractor bears responsibility and risk

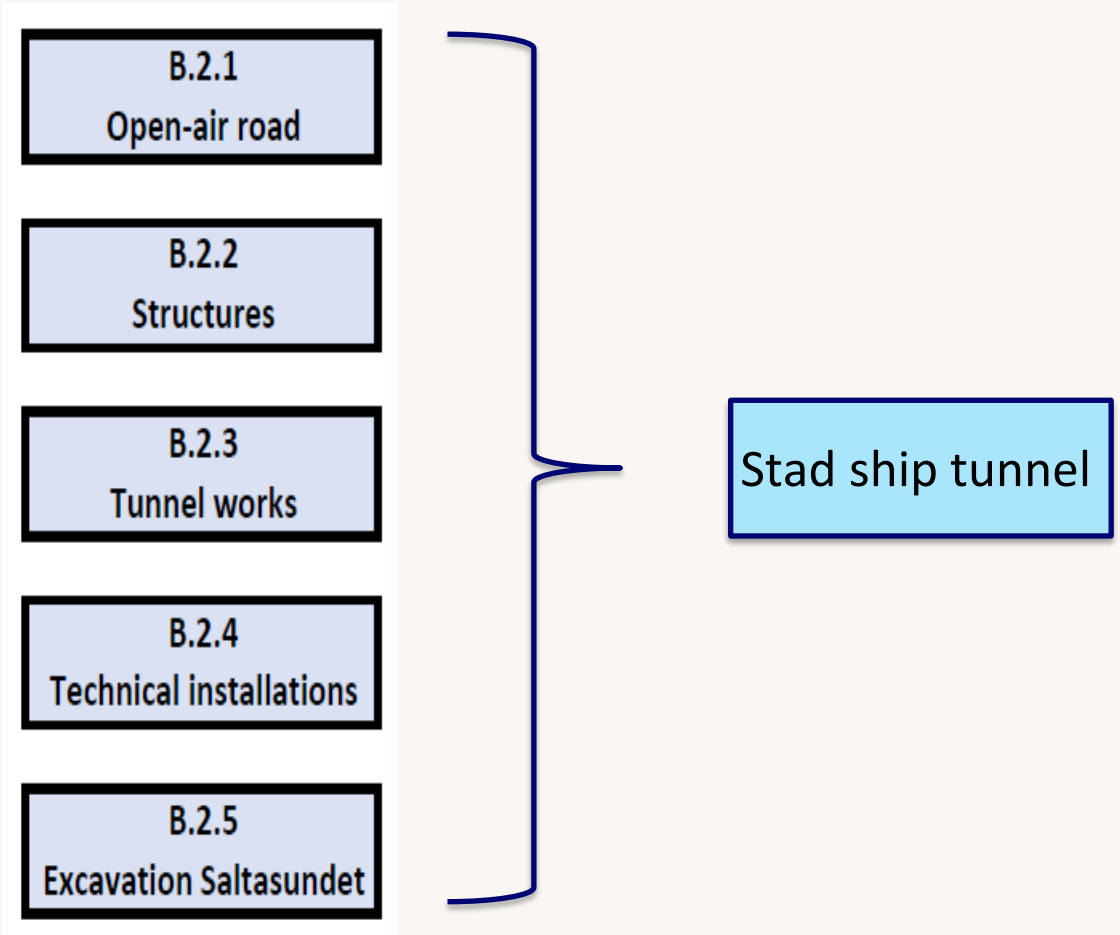
ORGANISATION

- Compact developer organisation
- Project content and size are new for Norwegian Coastal Administration
- Few internal tools for construction phase

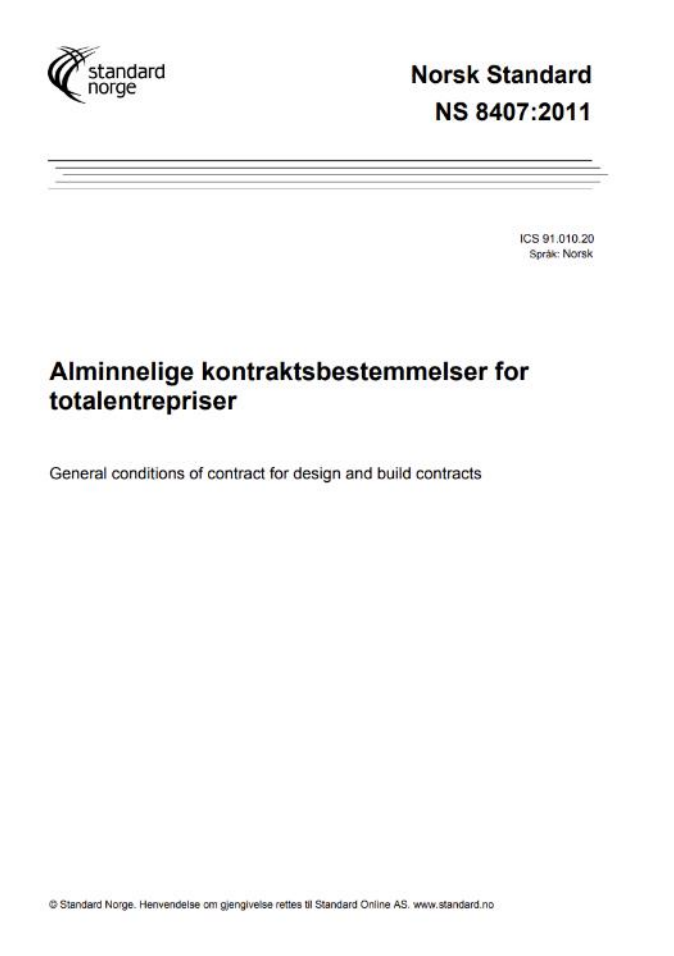
MARKET

- Market dialogue

Contract strategy – structure



Contract strategy – type, terms, and documents of contract



standard norge

Norsk Standard
NS 8407:2011

ICS 91.010.20
Språk: Norsk

Alminnelige kontraktsbestemmelser for totalentrepriser

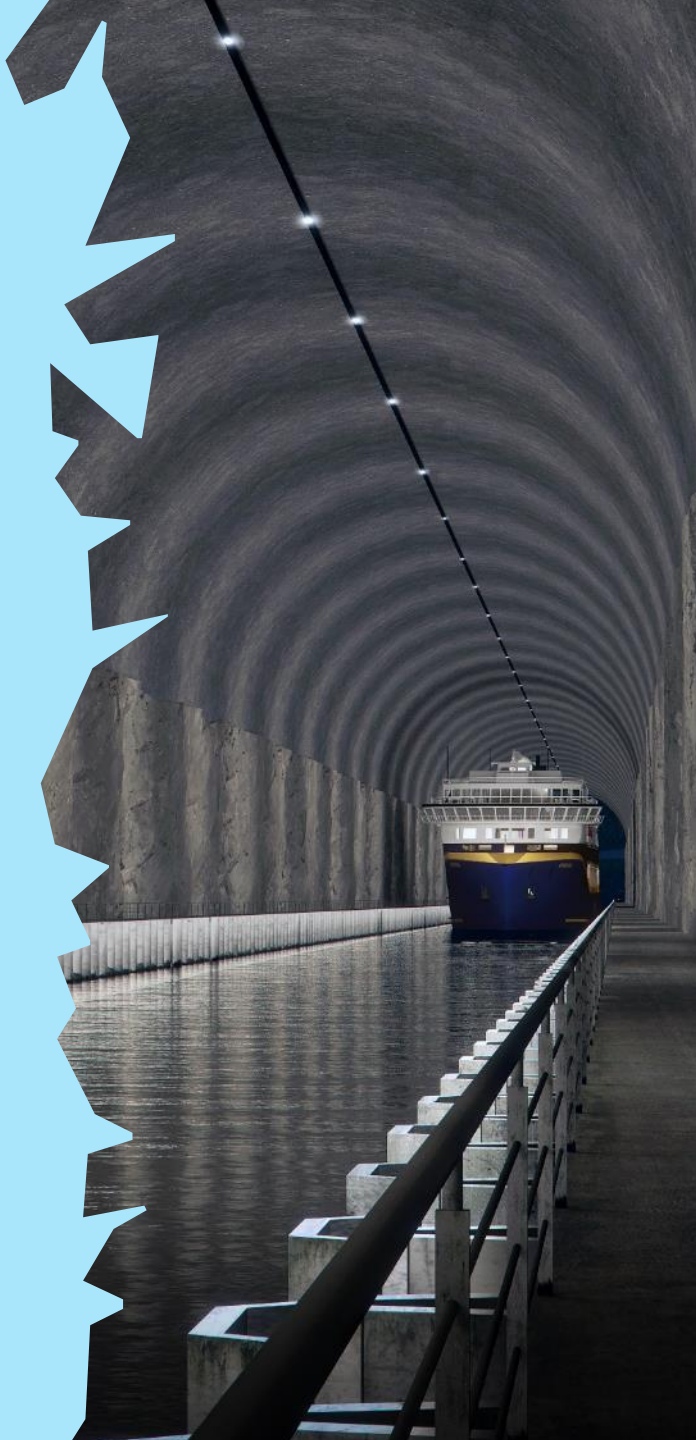
General conditions of contract for design and build contracts

Kapittel A Informasjon om kontrakten	Kapittel B Konkurranseregler	Kapittel C Kontrakts-bestemmelser	Kapittel D Beskrivende del	Kapittel E Svardokumenter	Kapittel F Informasjon til leverandørens orientering
A1 Oversikt over kontrakten	B1 Konkurranseregler	C1 Alminnelige kontrakts-bestemmelser	D1 Funksjons-beskrivelse	E1 Svardokumenter kvalifikasjon	F1 Informasjon til leverandørens orientering
A2 Invitasjon og orientering	B2 Kvalifikasjonskrav	C2 Spesielle kontrakts-bestemmelser	D2 Vedlegg	E2 Svardokumenter tilbud	
	B3 Tildelingskriterier	C3 Frister og milepæler	D3 Garanti-bestemmelser		
		C4 Helse , miljø og sikkerhet			
		C5 Seriøsitetskrav			
		C6 Administrative krav			
		C7 Skjemaer			
		C8 Avtaledokument			

Contract strategy – remuneration format

- Fixed price
- Unit prices for securing rock - settlement by security class
- Unit prices for cost-plus work (changes)
- Traditional price regulation (Statistics Norway’s index for mountain tunnel)
- Consider incentive schemes

Risk management and framework conditions



Risk management – principles

- Dialogue about risk in the procurement process
- Risk management in the design and construction phase

Risk management – construction time

- The contractor gives a deadline.
- No competition on construction time in principle.
- Gives considerable leeway for the contractor.
- The contractor bears the risk for all factors that may lengthen the construction time.
- 24/7 operation is desirable for developer.

Risk management – ground conditions

- The contractor bears the risk for ground conditions.
- The developer bears the risk for conditions that materially deviate from what the contractor had reason to expect.

- Dialogue before signing the contract about what basic ground conditions the contractor can expect, and what will constitute a material deviation.
- The contractor must provide an explanation of his assessment of the ground conditions along with the tender.

Risk management – choice of solutions

- The contractor has a large degree of freedom in choosing solutions.
- The contractor is therefore also responsible for the end result and functionality.
- Warranty period after takeover.

Framework conditions

HSE

- Large influence on solutions, production and construction time.
- Recognised HSE requirements.
- Attention to securing weak areas.

Project management

- Detailed requirements for project management.
- Use and sharing of real-time data.
- Contractor to keep developer updated on ongoing basis.

Third parties

- Noise, T-1442.
- Neighbours, landowners.
- Public authorities and authorisation.
- Security clearance.

Systematic completion

Desire to follow best practice for systematic completion.

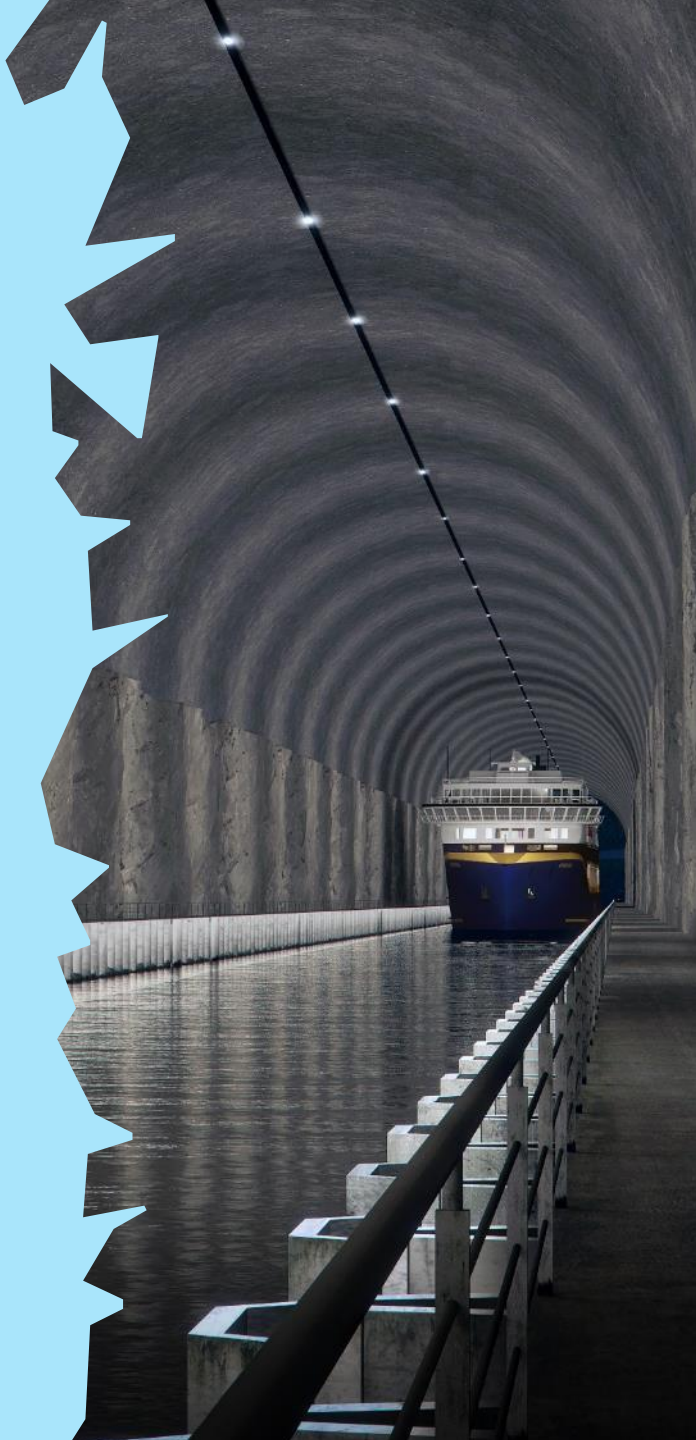
Dispute resolution

- PRIME or similar.

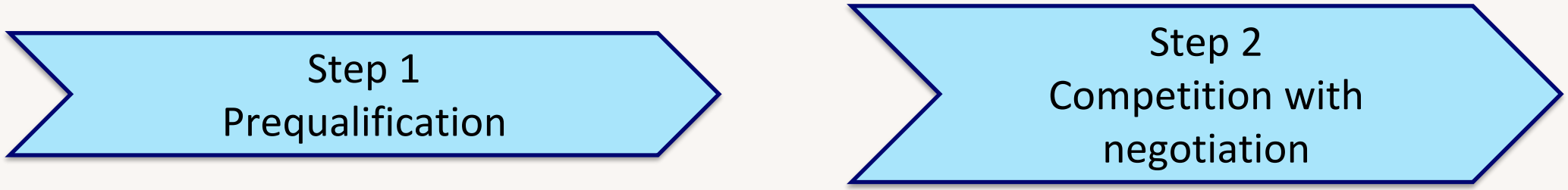
Sustainability and environment

- Under preparation.
- Topic at 1-1 meetings.
- Open to input.

Execution of the procurement



About the procurement



- Two-step competition with negotiation.
- 3-5 contractors invited to step 2.
- Expected timeframe
  - Anouncement Q3 2023
  - Awarded Q3 2024
  - Prioritise time for tender work and negotiations
- COVID and Ukraine, sanction legislation.

About the procurement

Step 1
Prequalification

Trinn 2
Konkurranse med forhandling

Qualification criteria

Qualification criterion 1 – Organisational
Qualification criterion 2 – Organisational
Qualification criterion 3 – Quality man. system
Qualification criterion 4 – Environment man. system
Qualification criterion 5 – HSE management system
Qualification criterion 6 – Finances
Qualification criterion 7 – Finances
Qualification criterion 8 – Experience in construction
Qualification criterion 9 – Experience in project planning and design

Selection criteria

<u>Experience in construction</u>
- High cuttings in rock face (drilling, blasting, securing).
- Traditional tunnelling and piledriving (large cross sections).
- Rock mass management and logistics.
- Comparable geotechnical and geological conditions.
- Works at and from sea (constructions, filling, dredging).
- Electrical work and management, regulation and surveillance.
- Management of subcontractors and suppliers.

<u>Experience in project planning and design</u>
- Interdisciplinary planning of complex projects.
- Large cuttings and cavern incl. securing.
- Technical systems and installations.
- Large quay structures.

About the procurement

Trinn 1
Prekvalifisering

- Process
- Award criteria
  - C1 - Price
  - C2 - Organisation
  - C3 – Execution plan

Step 2
Competition with negotiation

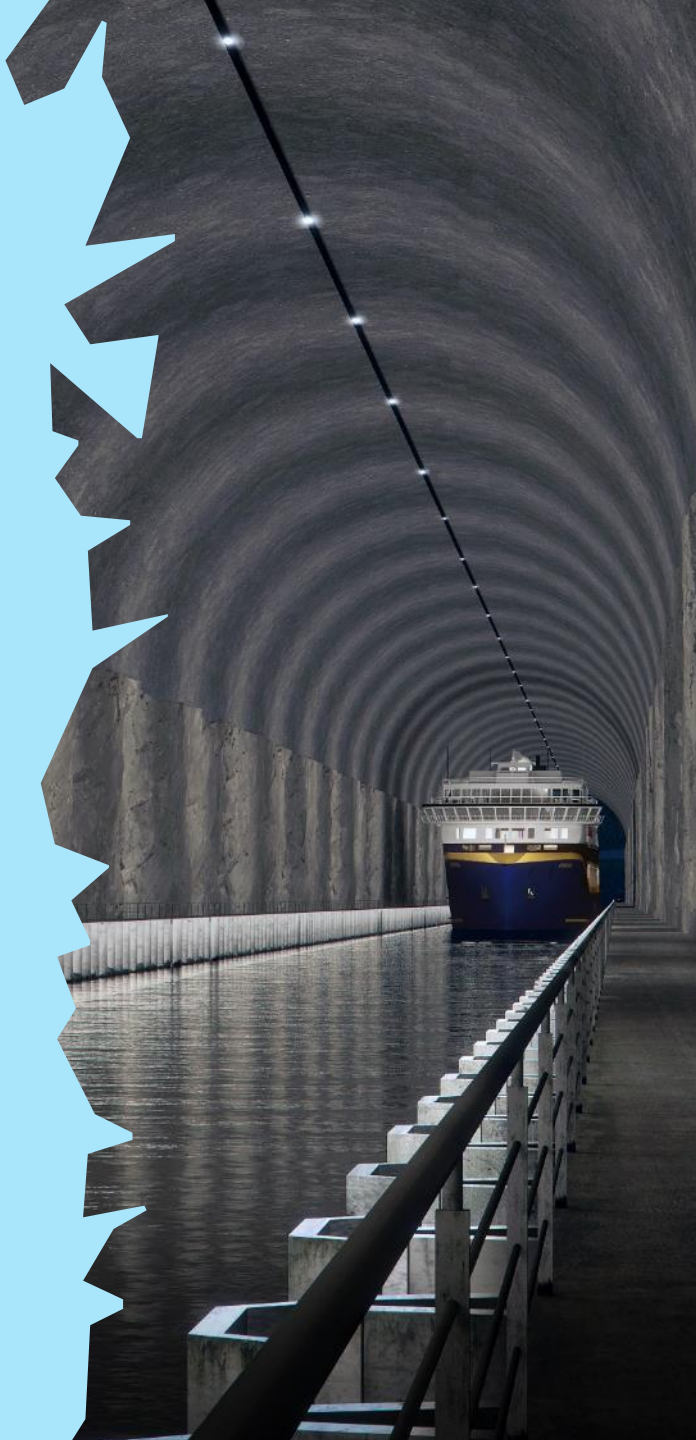
C2 - Organisation

- Description of organisation
- CV key personnel

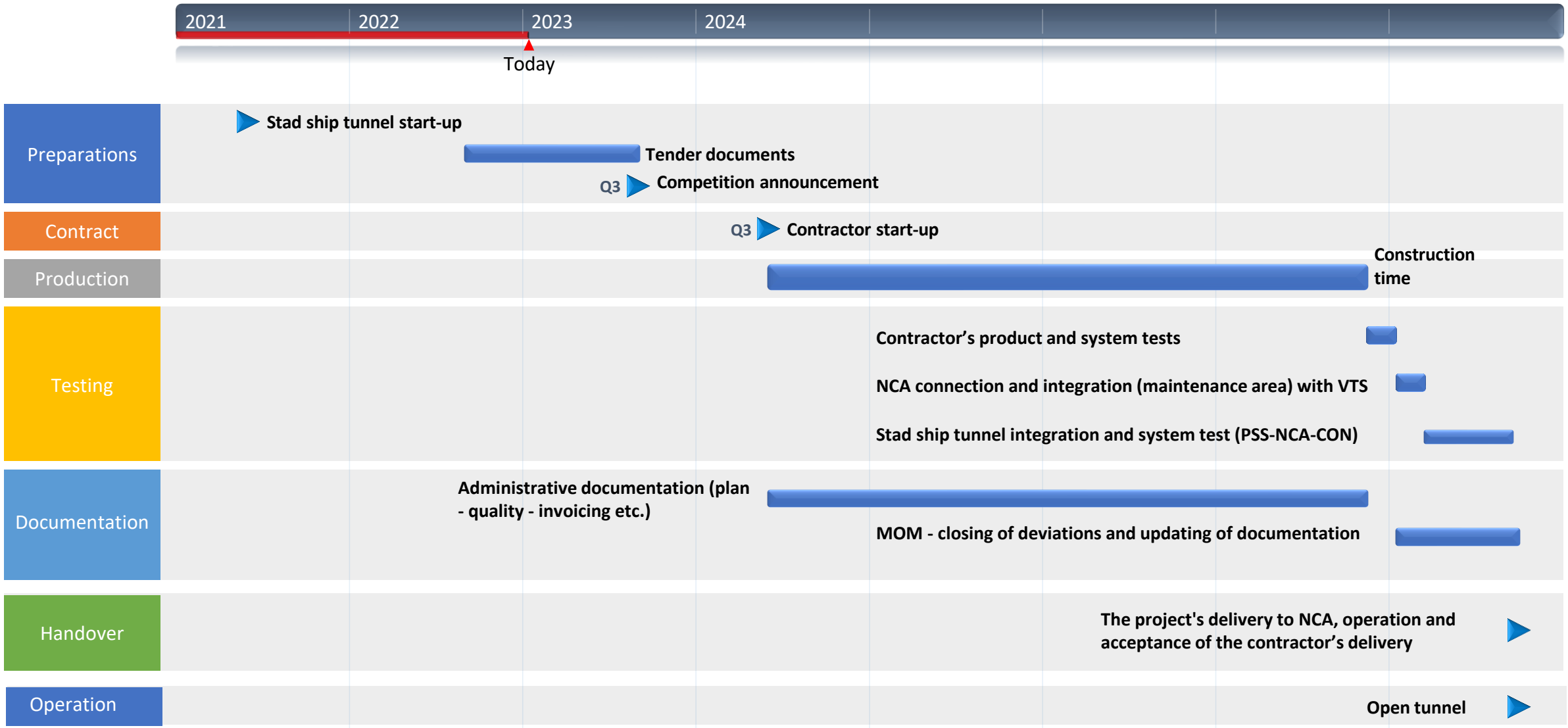
C3 – Execution plan

- Risks
- Plan for project design and execution
- Third parties
- Disposal of rock mass
- Management and systematic completion

Scope and technical function description



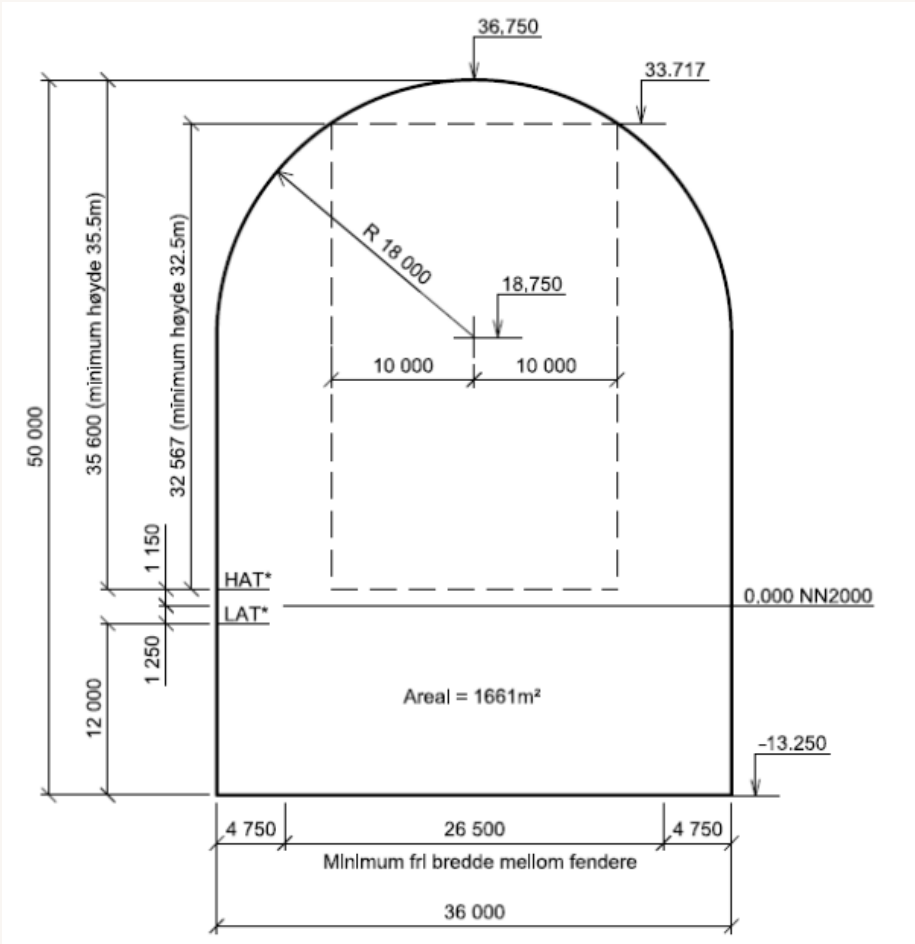
Stad ship tunnel plan concept



Technical function description

- **Tunnel – physical measurements and volumes**

Tunneldimensjoner	Meter
BREDDE	
Mellom tunnelvegger	36,0
Mellom fendere i tunnelen	26,5
Bredde dimmensjonerende skip	21,5
HØYDE	
Fra bunn av tunnel til senter tunnel heng	50,0
Ved høyeste høyvann til senter tunnel heng	35,5
Ved høyeste høyvann til tunnel heng 10 meter fra senter	32,5
Seilingshøyde	33,0
DYBDE	
Ved laveste lavvann til bunn av tunnel	12,0
Dypeste dimmensjonerende skip	8,0
TVERRSNITT NORMALPROFIL	1661 m²
LENGDE	1 700,0



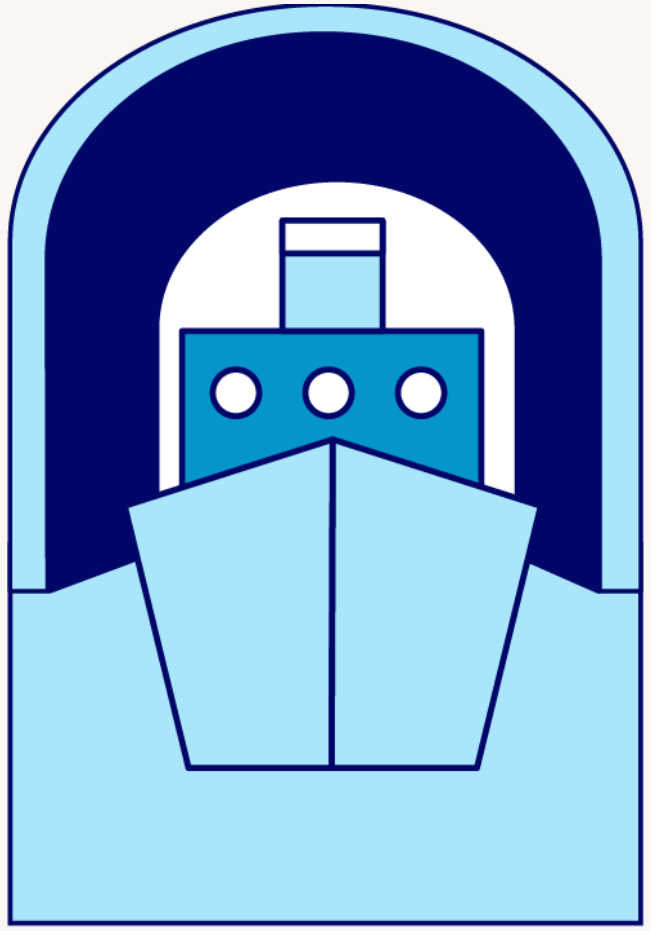
Overarching concept

- Designed and constructed for a 100-year lifespan
- Operation and uptime of the tunnel are important, and must be particularly emphasised in the project planning and design
- Maintenance procedures must be drawn up and provided for all maintenance objects

Tunnel – characteristics

- First and only ship tunnel in the world
- Largest cross section in this length?

- Innovative thinking, creativity and experience are needed to find the best solutions for the functional requirements



Geology and geotechnics

Investigations:

- Many geological and geotechnical investigations carried out by several actors, over a long period of time.
- A geological report summarising the available material will be prepared.
- The contractor must assess whether the available information is sufficient or whether further investigations are necessary. All additional investigations/reports are at the contractor's expense.

Investigations lacking:

- Strength/stability in an old scree above spudding in point – Moldefjorden
- Lack of geological/geotechnical reports on auxiliary tunnels
- Core drilling along the entire length of the tunnel is being considered
- Perceived risk due to lack of information must be priced, as we want the contractor to take responsibility for the ground conditions.

Design of rock support and simulation of the behaviour of the rock mass

- Numerical modelling in 2D and 3D
- The supplier’s geologist must be present at all times during piledriving
- A structured plan must be drawn up for the inspection and maintenance of rock support installed during the operational phase
- Concept for safety approval prepared by DNV, as well as functional description, provides detailed information on what is to be used as the basis for project planning and execution

Cuttings

- Great heights - up to 80 metres
- Reinforcement of the spudding in point, with bolts and castings to ensure sufficient stability
- Portal reinforcement in the tunnel
- The cuttings are designed as in the visualisation images, in a step-like formation, recessed and fan-shaped.

Tunnel – water and frost protection

- Not the same requirements for water and frost protection as in a car tunnel or train tunnel
- There will be partial water and frost protection of the roof dip, with a frost-free downpipe to the sea. Walls can be secured with ice nets.
- Cable racks and all technical installations must be protected from water and the formation of ice.

The scope of water and frost protection has not yet been clarified.

Tunnel – contractor's project model

- Great freedom as regards the project model
- Zoning plans facilitate the establishment of auxiliary tunnels
- Rock mass logistics – a success criterion
- More geological specimens – greater flexibility – reduces risk
- Quick access to rock masses for road construction/work hut area

Ensuring the stability of loose rock above cuttings

Kjøde

- Estimated volume of loose rock is 69,000 m3
- Relatively small distance between top of cutting and county road
- Loose mass thickness of 6-8 metres above cutting
- Must be secured with a pipe pile retaining wall or similar

Ensuring the stability of loose rock above cuttings

Moldefjorden

- Estimated volume of loose rock is 66,000 m3
- The spudding in area will be on a steep slope, with old scree masses of unknown strength
- Stabilisation of the overlying scree masses must be given sufficient attention
- Loose mass extraction in general must be assessed in relation to stability, and necessary measures must be considered.

Bridge over portal at Moldefjorden

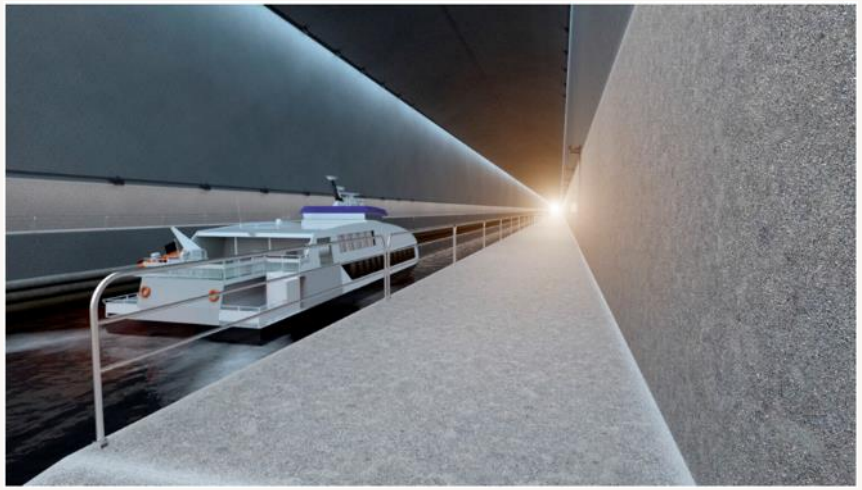
- Bridge that is within standard regulations, and must be easy to operate/maintain.
- The bridge must be a concrete construction and be designed with a separate walkway.

Tunnel – guide and entrance structures

- The guide and entrance structures are envisaged in concrete, with partial storage at the lowest level of the step-like formation.
- The guide and entrance structures must be designed to withstand collision loads.
- Study in progress. Project planning development must be assumed for solutions relating to dimensioning, size and type of fenders. #innovasjon

Tunnel – guide structures

- The guide structures on each side will guide ships through the tunnel
- They must have longitudinal deflector fenders
- The guide structures must function both as an evacuation route and access for operation and maintenance
- Guide structures are to be equipped with mooring points, rails and emergency cabinets, etc.



Tunnel – characteristics for technical installations

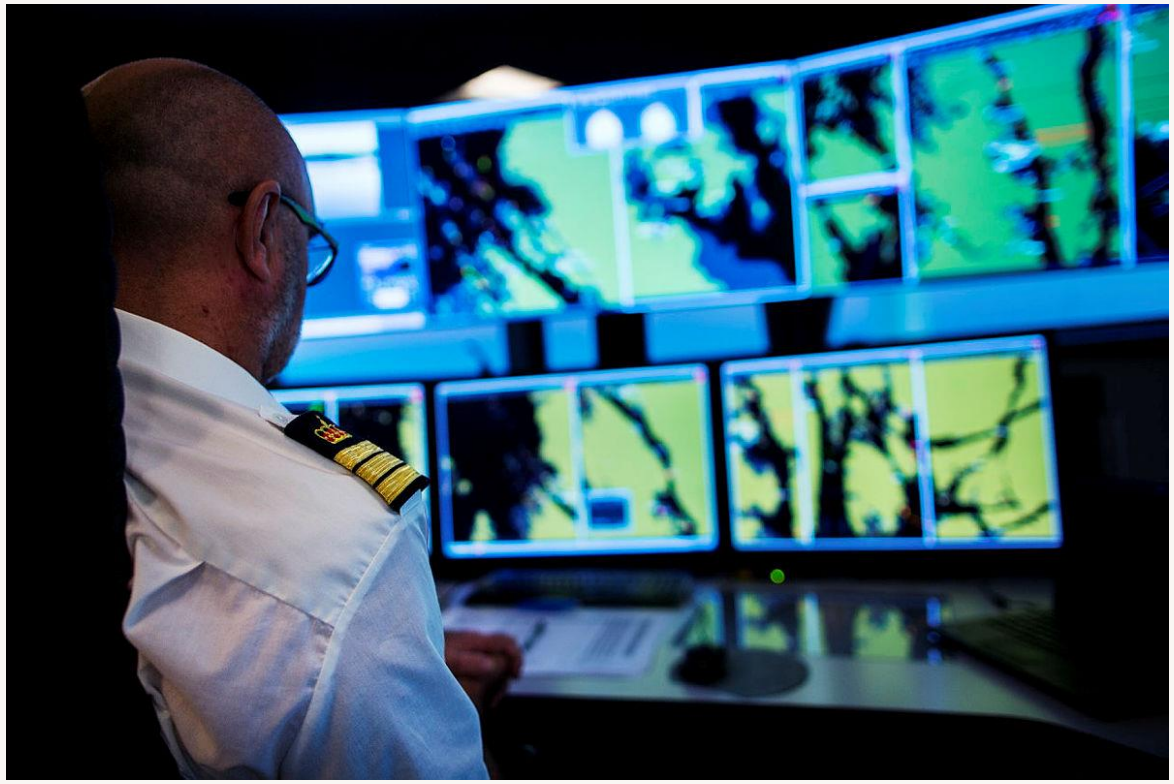
- Special features for technical solutions are that analyses and calculations must be designed to meet the functional descriptions, where the tunnel's dimensions, and the fact that it is a sea route, are given special consideration.

- Established frames of reference may not be relevant.

- All installations are in an aggressively corrosive environment, which means that the quality and choice of solutions for products and systems must take this into account.

Tunnel – technical installations

- SOS – cabinets and booths
- Camera surveillance
- Detection
- PA system
- Emergency lighting
- Sailing lighting
- Weather and sea data measurements
- Measuring of gasses
- Monitoring of rock protection/tensions and deformation



Environment, metallurgy and durability

- Extremely corrosive/stressful environment - high humidity - risk of salt spray - moisture in walls all year round - ice formations
- Strict requirements for material quality, steel, concrete, density, functionality
- Strict requirements for corrosion protection on quay equipment, safety devices etc.
- Reinforcement cover
- Designed for cathodic protection of concrete structures
- All technical bolts, cable racks, brackets and technical installations must be made of rustproof, acid-resistant materials
- The risk of galvanic reactions must be avoided
- The degree of density of the various installations is specified as a minimum requirement. The supplier must ensure the necessary degree of density through its own assessment of durability, in relation to environmental impact and safeguarding of function.

Technical construction

- To be built according to a template from the Norwegian Public Roads Administration
- Must be incorporated into/blend in with the cuttings as best possible
- Two constructions on each side of the tunnel
- Two constructions in the centre tunnel

Technical equipment – testing concept

- Testing to be carried out in phases on all installations at product and system level
- SAT (site acceptance test)
- All technical installations must be able to be controlled/programmed in synch with each other in a test rig
- Connection to the Vessel Traffic Service (VTS) – carried out by the Norwegian Coastal Administration in the maintenance room
- System test/6-month test – the supplier must provide resources to assist the developer to the extent necessary, until the system test is accepted.

Auxiliary tunnel at Kjøde

- Zoning plan to include facilitation of a potential auxiliary tunnel at Kjøde
- Possibility for spudding in point up by the county road, on the north side of the portal, or at beach zone level

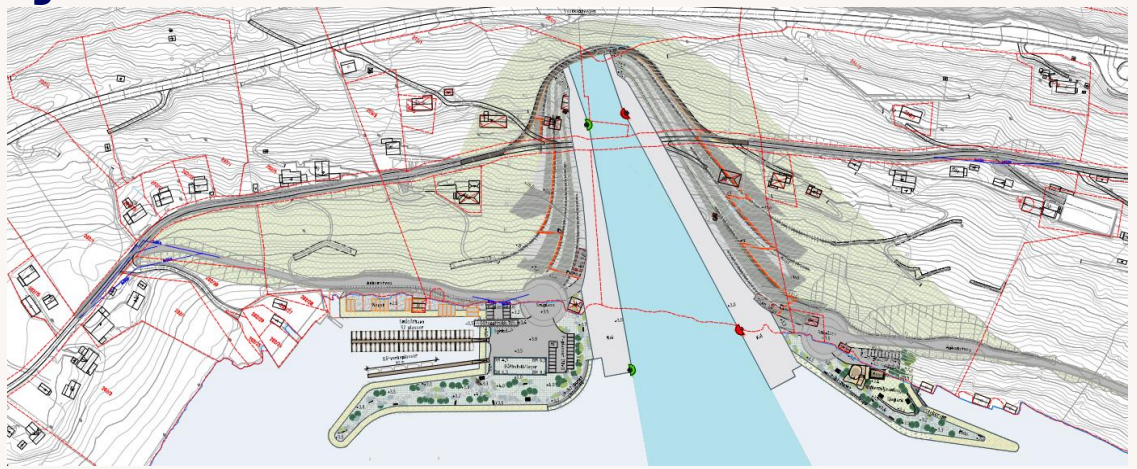
Auxiliary tunnel at Moldefjorden

- Facilitation of a potential auxiliary tunnel at Modefjorden
- Possibility for spudding in point up by the county road, on the north side of the portal

New roads at Kjøde and Moldefjorden

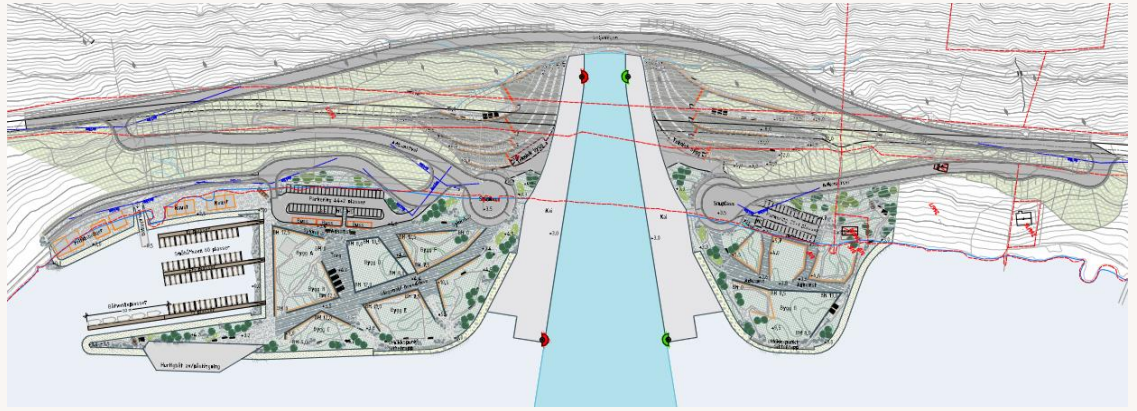
Kjøde

- New roads to the entrance areas
- Improvement of intersections
- Improvement of turn-off to community centre
- Turning heads at the end of an old municipal road



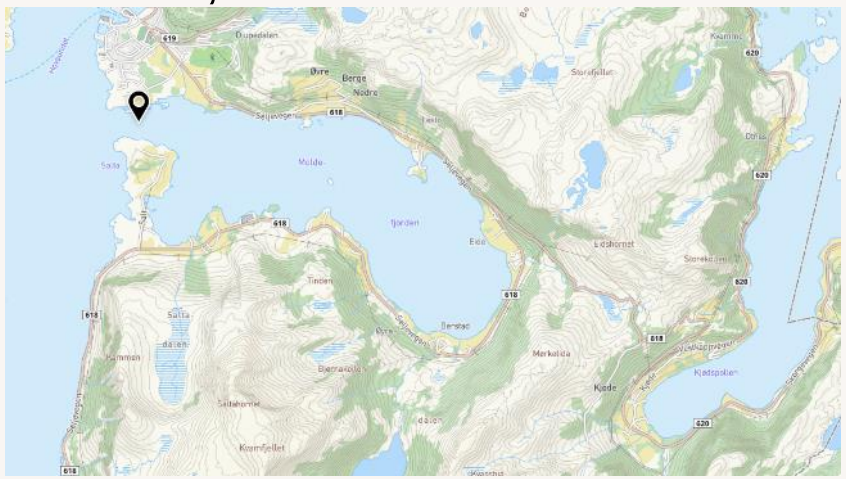
Moldefjorden

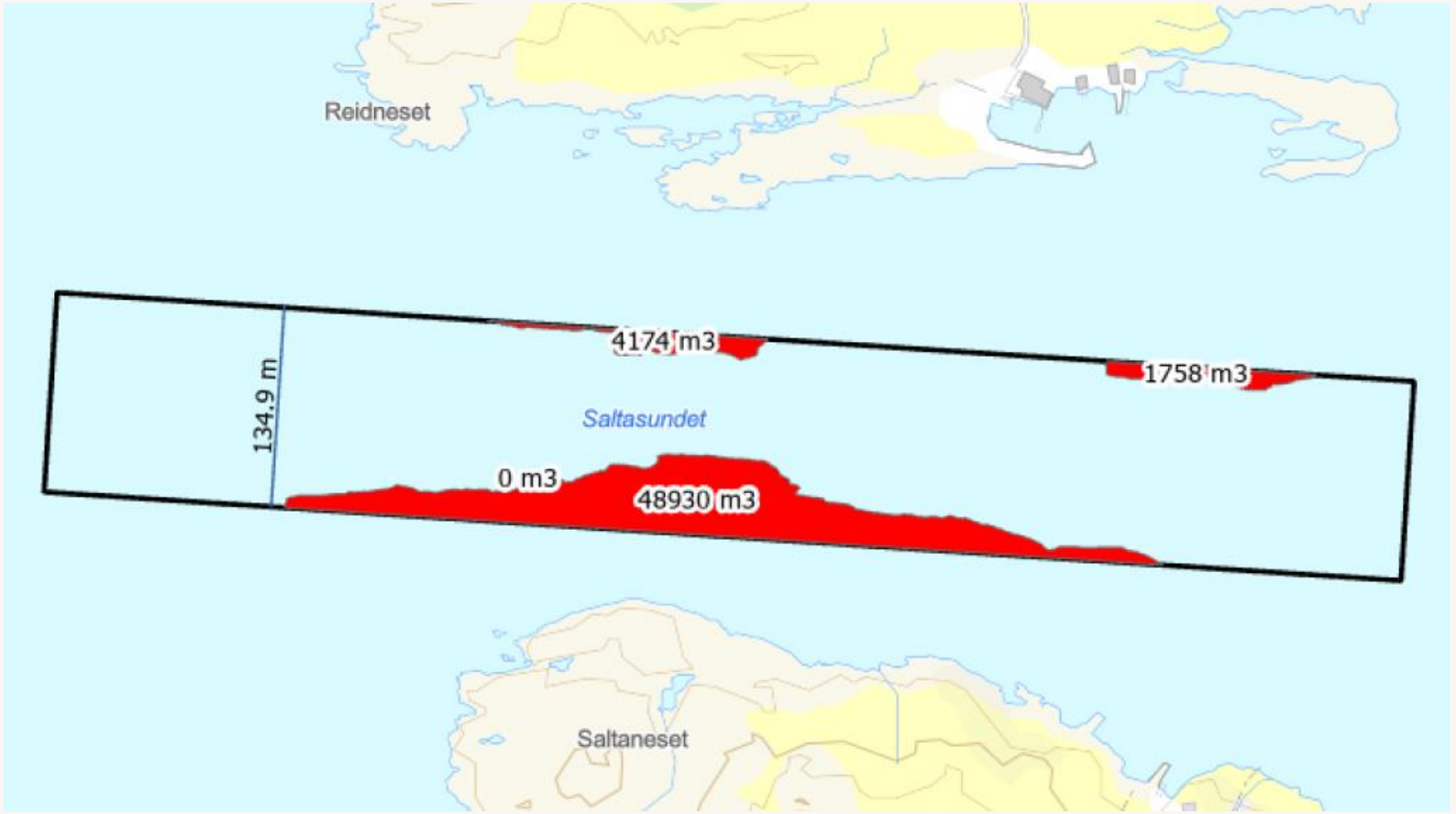
- Temporary diversion of county road FV 620
- New county road FV 620, with bridge.
- New roads to entrance areas
- Maintenance and re-establishment of the existing road network



Saltasundet – excavation and dredging

- Excavation down to -14.3m
- Expansion in width to 134.9m
- Three areas for excavation
- Total volume: approx. 55,000m3



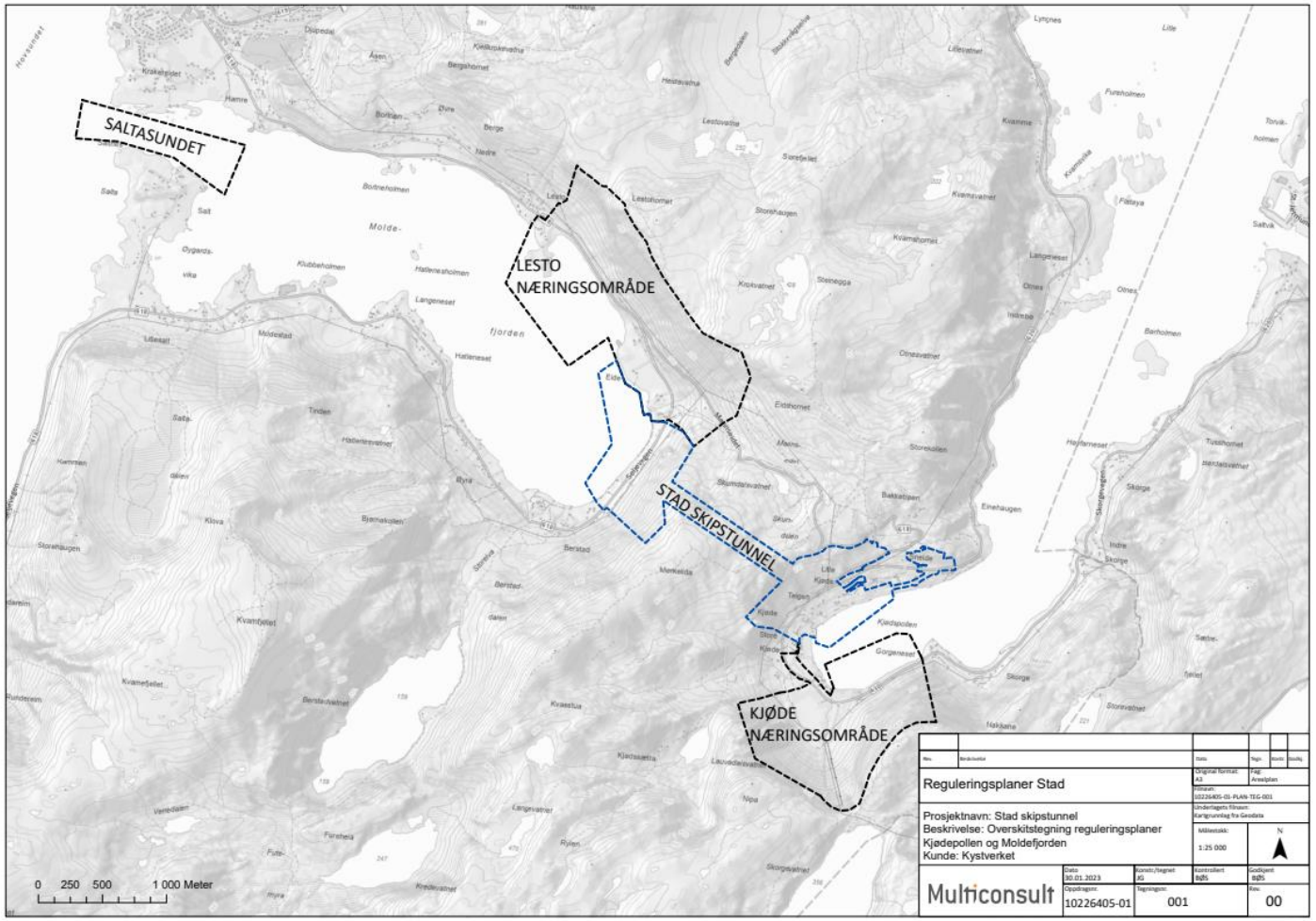


Zoning plans and disposal of rock mass

Zonings plans linked to the Stad ship tunnel project

- **Zoning plan for Stad ship tunnel from 2017 - approved**

- **Ongoing zoning plans due for completion in 2023:**
  - Detailed zoning plan Stad Skipstunnel
  - Detailed zoning plan Kjøde industrial area
  - Detailed zoning plan Lesto industrial area
  - Detailed zoning plan Saltasundet



Expected rock mass disposal plan

Design manual and landscape plan

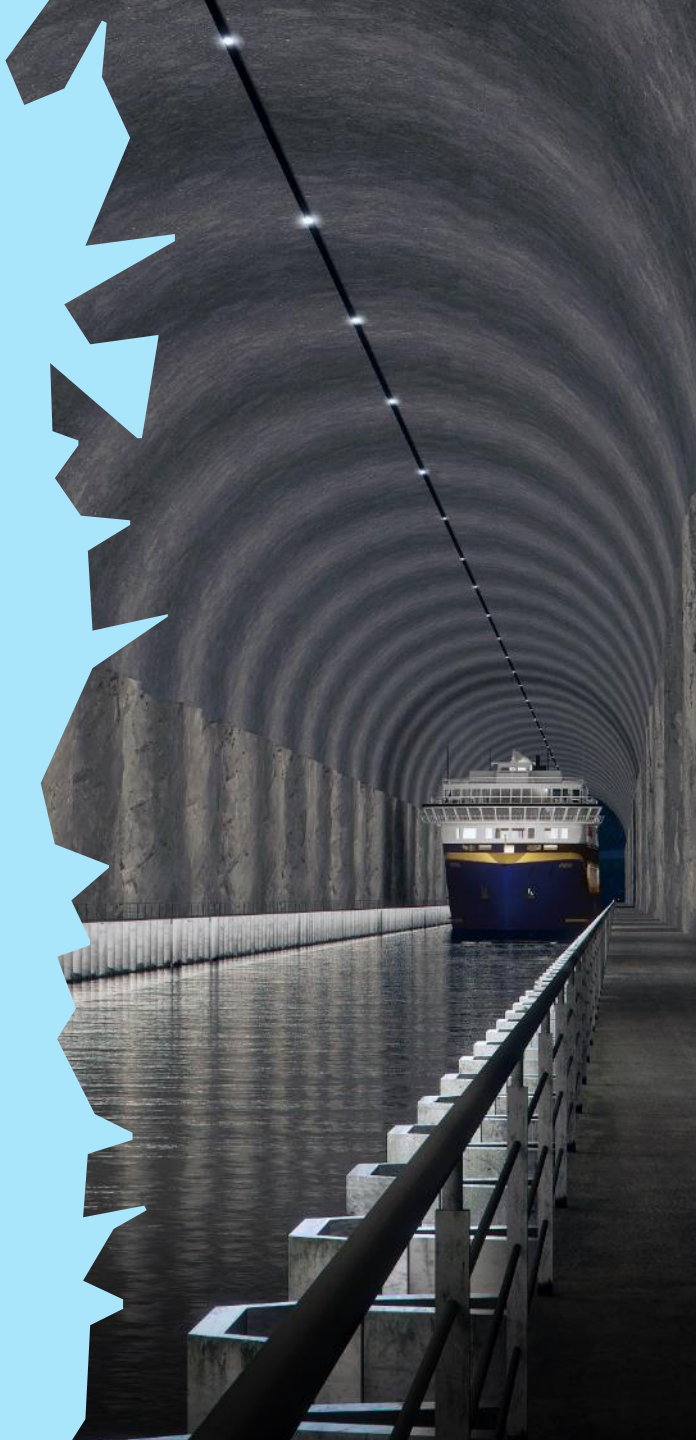
- The design manual and landscape plan entails requirements and guides for how the tunnel portal and portal areas should look.
  - The documents must ensure good landscape qualities, architectural qualities, and generally ensure a good sense of form.
- We require a holistic development of tunnel portals and land areas, inspired by Stadlandet's character and identity.
  - Phased development (particularly at Moldefjorden) – the Norwegian Coastal Administration and the contractor shall deliver phase 1.

General information

- Relevant work hut areas in Selje and Leikanger (Stad municipality), and in Åheim (Vanylven municipality)
- The local authorities in the area have drawn up a list of suppliers, giving an overview of local suppliers and suggestions for work hut areas etc.
- Power: 2.5 MW on each side of the tunnel
- Water: The contractor must, in principle, establish access to water, but we are working on alternative solutions
- We will publish the presentation, the list of participants and the local authorities' list of suppliers on our website after the conference, www.kystverket.no/entreprenor

How will the ship tunnel and portal areas look?

Run film




Visualisering laget av Mir.
Multiconsult
LINK Arkitektur
Stad
SKIPSTUNNEL
KYSTVERKET

Summary

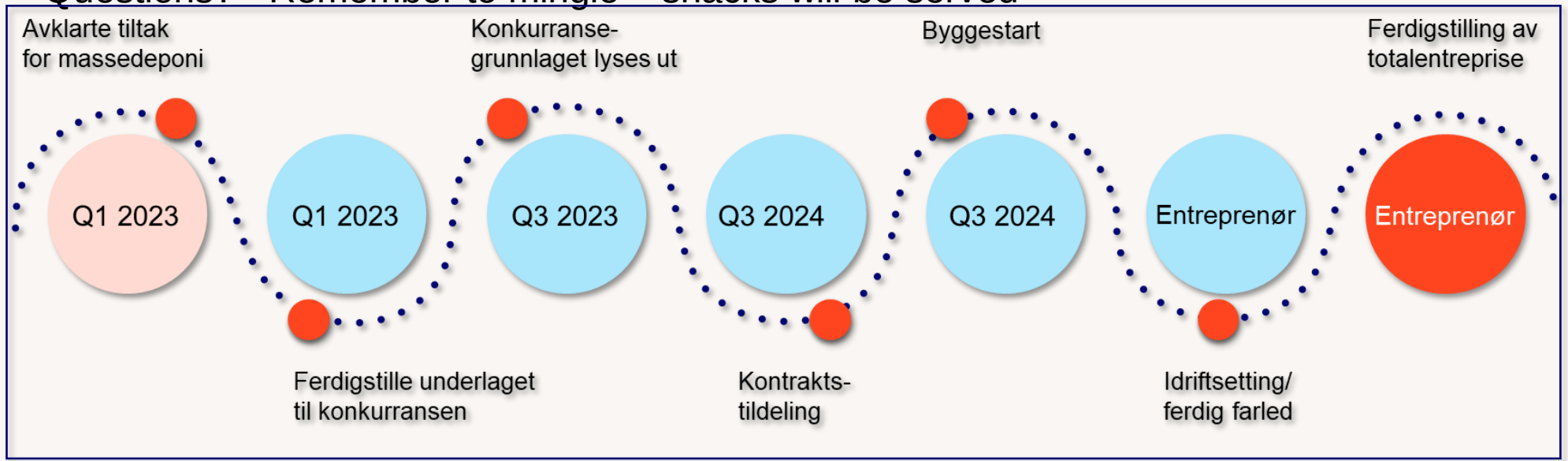
Why hold a supplier conference?

1. To inform contractors and suppliers about the Stad ship tunnel project
2. To prepare the contractor market for the upcoming competition
3. **To get input for the tender documentation**

'The Norwegian Coastal Administration is working on the tender documentation for the construction of the Stad ship tunnel. The work is planned to be announced as one large turnkey contract with a fixed price, procured by competition with negotiation. The work is expected to be announced after summer 2023.'

Summary and the road ahead

- Thank you for your keen interest and support for the conference :)
- Being involved in the construction of the world's first ship tunnel with be a spectacular and challenging experience!
- We look forward to our further cooperation with you
- We repeat again: We would like written feedback on questions and submitted tender documents by 15 February - stad.skipstunnel@kystverket.no
- Questions? - Remember to mingle – snacks will be served



Leverandørkonferanse

Stad skipstunnel – Den nye sjøvegen

Thank you for your participation.

www.kystverket.no/skipstunnel

Stad SKIPSTUNNEL | DEN NYE SJØVEGEN

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