

Norconsult 

Bybanen - Light Rail in Bergen, Norway

Extension to Fyllingsdalen including new pedestrian / bicycle tunnel

Thomas J. Potter
thomas.potter@norconsult.com
+47 9574 7275



Agend

- ▶ Status of light rail in Bergen
 - ▶ Phases 1 to 3
- ▶ Description of line 2 to Fyllingsdalen (Phase 4)
 - ▶ Stations
 - ▶ Parallel tunnel for pedestrians and bicycles
- ▶ Phase 5 – Northern extension to Åsane
 - ▶ Challenge with UNESCO World Heritage site - Bryggen

Bybanen

Planned network

- Light-rail system is the backbone of the public transport system in Bergen
- Buses serve both as feeder lines to important terminals along the lines
- Regional buses still directly serve Bergen city centre





Bybanen Phases 1-3 Line 1

Bergen sentrum – Flesland airport

Phase 1, Bergen sentrum - Nesttun:

- Opened in June 2010
- 9,8 km - 15 stops

Phase 2, Nesttun - Rådalen:

- Opened in August 2013
- 3,6 km - 5 stops

Phase 3, Rådalen – Flesland airport:

- Opened in August 2016
- Airport terminal opened in April 2017
- 6,8 km - 7 stops

Bybanen - Line 2 in Bergen from Bergen city centre to Fyllingsdalen

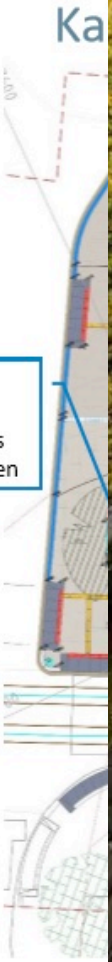
Phase 4

- 9 km double-track line
- 2 tunnels with a combined length of 4,2 km
- 2 pedestrian/bicycle tunnels
- A mountain hall with space for 18 42-meter long trams
- 24 km overhead wire and 485 masts
- 126 railway signals connected with over 80 km signal cables
- Approximately 200 trees first moved and then repositioned along the alignment
- 8 new stops including the system's first underground station at the regional hospital
- System is 100% accessible
- Official opening 18th November 2022 / first day of normal operation 21st November 2022

Phase 4 – New line from Bergen city centre to Fyllingsdalen

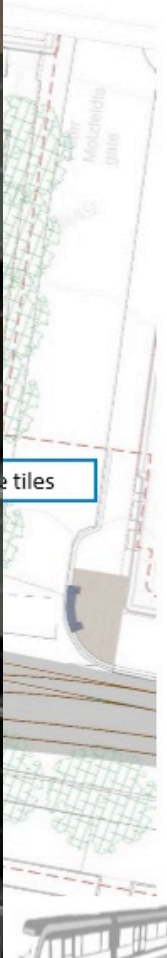


Complicated terminal in the city centre for lines 1 and 2



tree
crate:
same as
Byparken

Line1
terminus



tiles

The Bergen Variobahn – 42 meter, 100% low-floor tram

- ▶ 6 new LRVs for line 2
- ▶ Total fleet: 34 vehicles (201 – 234)
- ▶ Expected to be final delivery of Variobahn to any city
- ▶ Each can carry over 250 passengers with approx 90 seated.



Consistent station design

- ▶ Level boarding
- ▶ Shelter and benches
- ▶ Real-time information
- ▶ Ticketing*
- ▶ Heated platform
- ▶ Information display
- ▶ Waste bins
- ▶ Landscaping
- ▶ Integration with nearby areas
- ▶ Universal design with tactile surface to lead sight-impaired



Mindemyren – development area



First underground station 30 meters under the regional hospital



Line 2 –western extension to Fyllingsdalen



Fyllingsdalstunnelen



Multi-use tunnel for pedestrian and cyclists

- ▶ Parallel to the rail tunnel
- ▶ Evacuation of rail passengers with frequent connections
- ▶ Approximately 8 meters wide
- ▶ Space for two lanes of bicycle traffic and a pedestrian area



Facts about the Fyllingsdalstunnelen

- ▶ Length: 3 km
- ▶ Pedestrian lane: 2,25 meters
- ▶ Bicycle lanes: 3,5 meters
- ▶ Safety:
 - ▶ Open : 05.30 – 23.30
(closed nights from 2330 to 0530)
 - ▶ Video surveillance along the entire length of the tunnel
 - ▶ Emergency call stations at regular intervals
 - ▶ Mobile telephone coverage tin the tunnel
- ▶ **Opening: 15th April 2023**

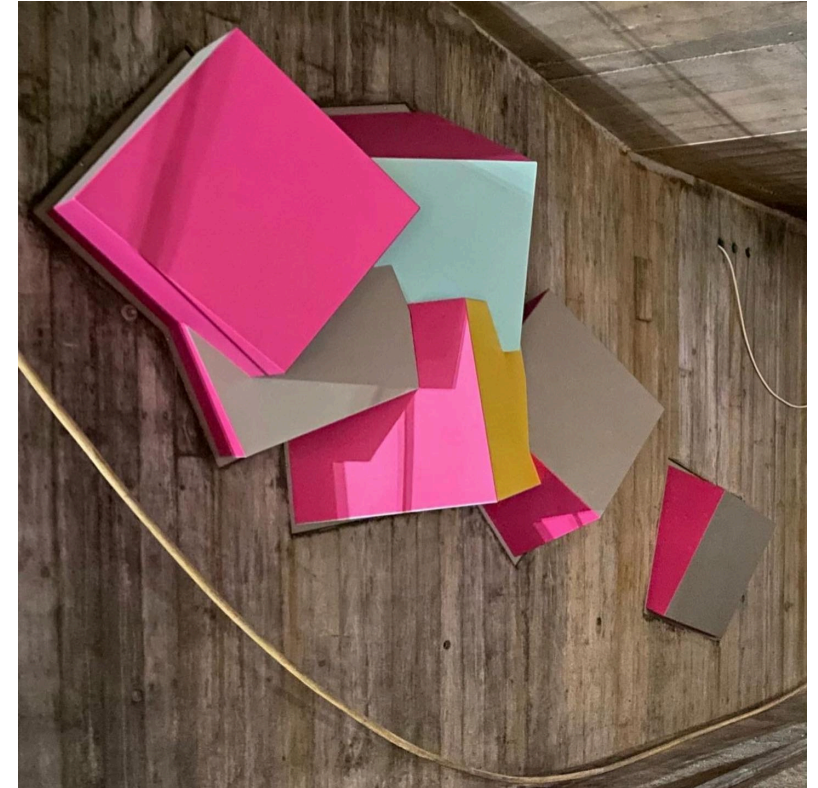


Special surface in tunnel for pedestrian area



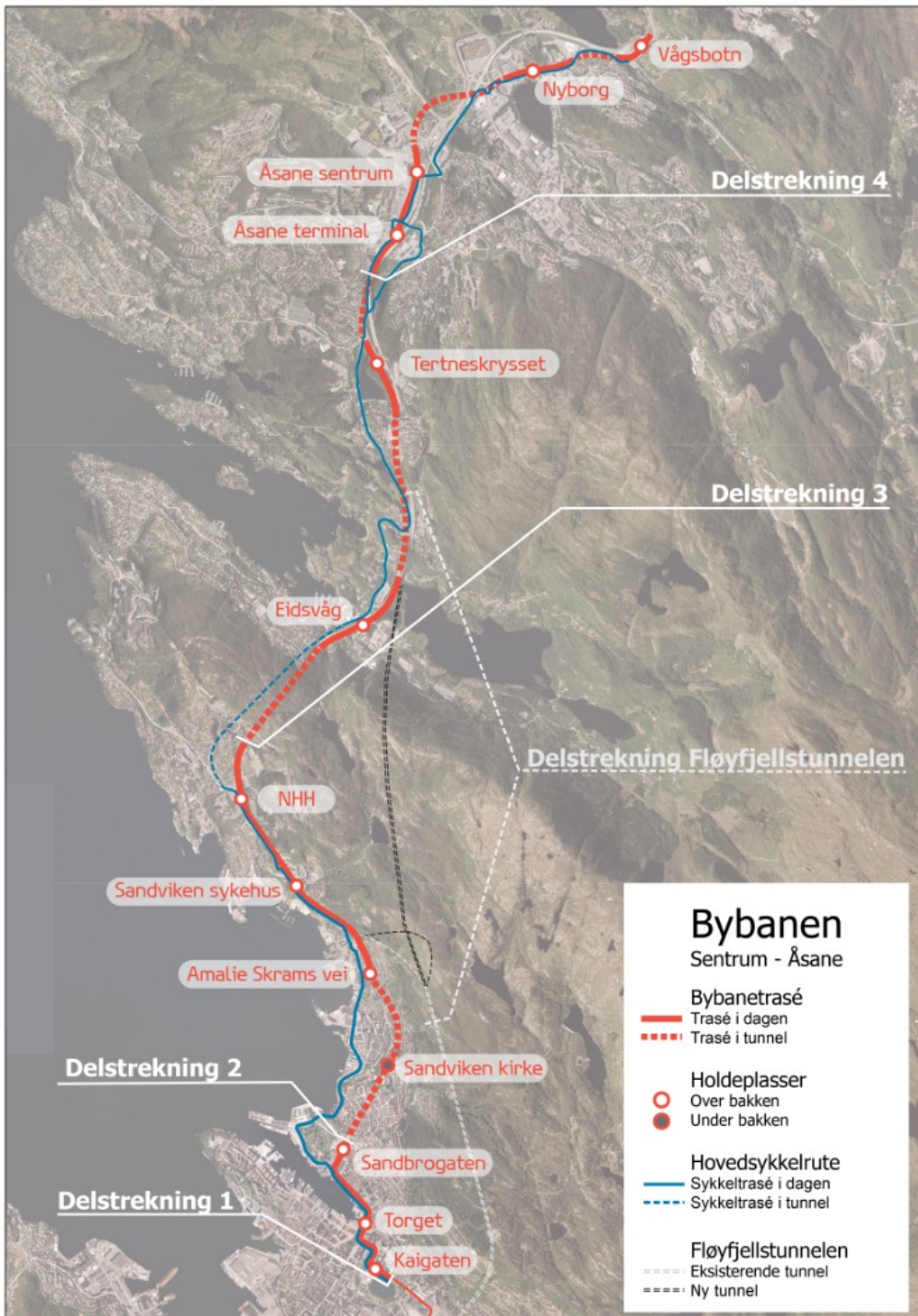
Rest area in the middle of the tunnel

Tunnel is enhance with other artistic elements



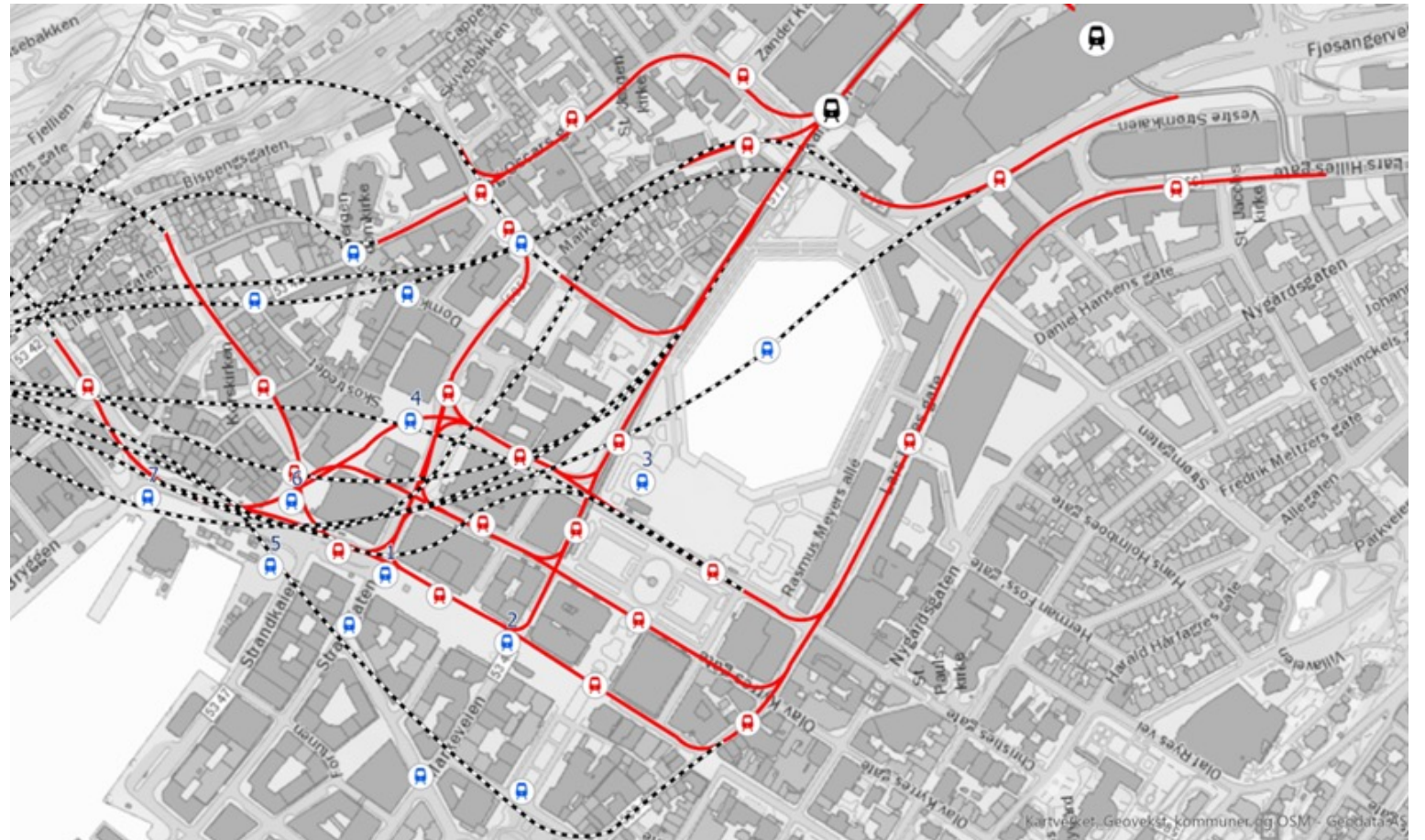
Phase 5 – Northern extension Bergen city centre – Åsane

- ▶ 12,5 km and 13 stops
- ▶ Dependent on the the extension of an existing road tunnel (Fløyfjellstunnelen) to release road space for light rail and bicycle lanes through Sandviken
- ▶ Controversial – especially daylight section through the city centre and in front of the Bergen Wharf area Bryggen, a UNESCO World Heritage site



Phase 5 – Northern extension to Åsane

- ▶ Tunnel or daylight route through the city centre
- ▶ Conclusion that daylight route is more accessible for the public and less expensive to build and operate
- ▶ However, major disruption to activities in the city centre
- ▶ Area plans are expected to be approved in 2023
- ▶ Opening dependent on financing sometime after 2032



Removal of traffic in front of the Bergen wharf is a challenge



Truth in advertising





Every day we improve everyday life

Thomas J. Potter
thomas.potter@norconsult.com
+47 9574 7275