

# The Minimum Viable Tunnel between Helsinki and Tallinn

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Alkutieto Oy

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# The Minimum Viable Tunnel

A tunnel with enough features to enable feasible operation and optimize capital spending, with various options left open for future extensions

Development of the pre-feasibility study made by Sweco

- Splitting the project to functionally and economically feasible phases
- Focusing to the largest volume service in the tunnel for the first phase
- Leaving the maximum variety for future expansions

# The Minimum Viable Tunnel

A tunnel with enough features to enable feasible operation and optimize capital spending, with various options left open for future extensions

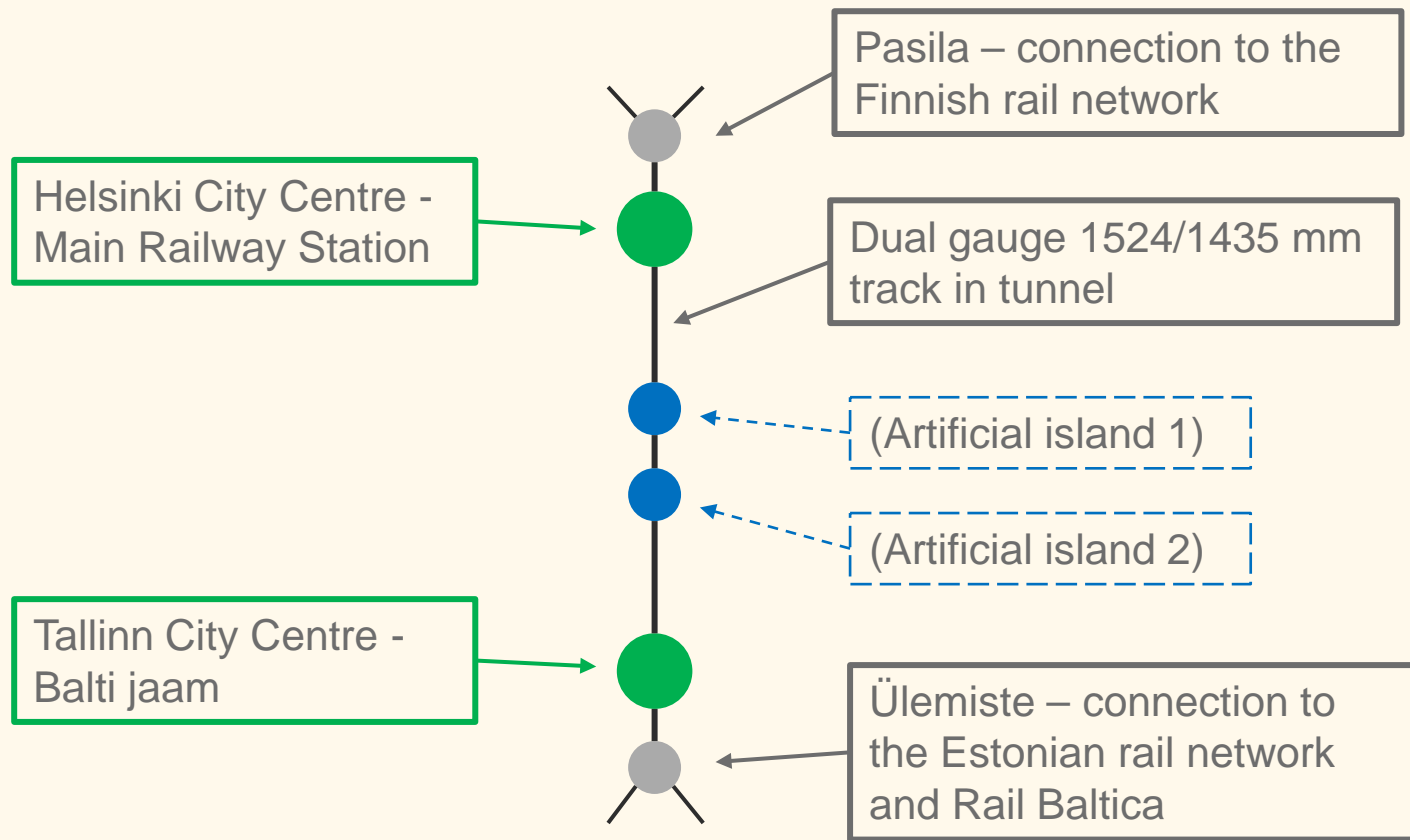
- The primary target: To enable **daily** commuting and road vehicle transportation between Helsinki and Tallinn
  - Commuter trains represent 75 % of trains passing through the tunnel and 79 % of the incomes of the tunnel company
- The main stations: **Helsinki railway station** and **Balti jaam**, with connections to existing rail networks in Pasila and Ülemiste
- Long range passenger traffic and freight transportation enabled to Estonian rail and Rail Baltica
- Options: Airport tunnel to Helsinki-Vantaa Airport, Connection to Pisara loop in Helsinki, Gauge exchange facilities in Tallinn, etc.

# Besides commuting...

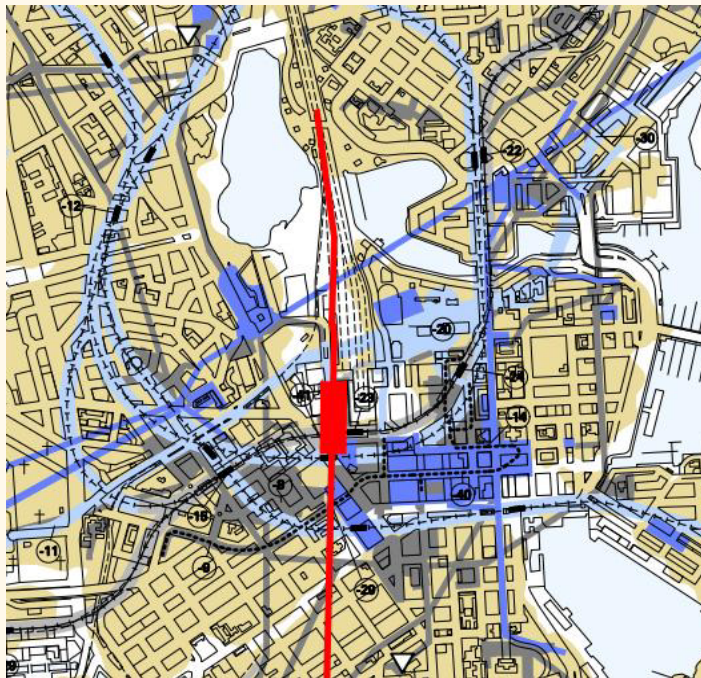
Daily commuting forms the basis of a feasible business case for the tunnel. There are also other potential benefits.

- **Other transportation:** Freight transportation and long range passenger trains will add value on top of the primary use case of the tunnel, i.e. commuting.
- **Artificial islands:** Excavation waste may be turned to business with urban development, and the business potential of the islands should neither be underestimated.
- **The service tunnel:** Electricity cable and data cables can be assembled in the service tunnel, as well as other potential use cases.
- **Technical expandability:** TSI-compatible (EU Technical Specification for Interoperability) tunnel may be expanded and connected to any functionality of the railway and logistic systems.

# The Route



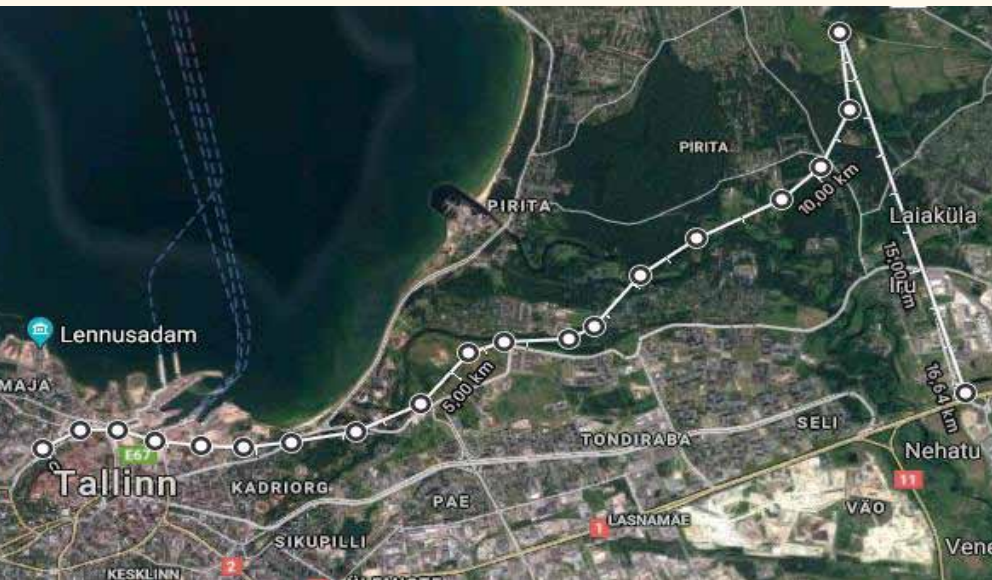
# The Route – Helsinki city centre



- Tunnel levelling in Helsinki between current metro tunnel (-23 m) and Pisara railway loop reservation (-46 m).
  - With benefit of concrete and steel structures instead of solid rock.
- Shortest possible escalator and lift connection between FinEst, on ground railway, metro and planned Pisara loop stations.
- Connection to railway network between Helsinki and Pasila opens all possible future extension options.



# The Route – Tallinn city centre



- Partially tunneled railway line from Viimsi to Balti jaam.
  - For freight trains a deviation to Muuga track possible as in Sweco pre-feasibility study.
- Direct connection to platforms between FinEst and Balti Jaam stations.
- Connection to railway network west of Balti jaam opens all possible future extension options.

# Commuting to Helsinki area

- More than 100 000 Finnish employees commute daily to Helsinki area.
- About 20 000 Estonians commute weekly from Estonia to Finland.
- Over 50 000 Estonians live permanently in Finland.
- What if Tallinn were 30 minutes away from Helsinki?

Area	Total number of employed	Number of commuters	Percentage of employed
Commuting zone B	114 400	26 700	23,4 %
Commuting zone A	118 100	60 000	50,8 %
<b>Total</b>	<b>232 500</b>	<b>86 700</b>	<b>37,3 %</b>
<b>Source of data:</b> Tilastokeskus 2012, HSY 2015			

**Commuting zone B:** Inkoo, Lohja, Karkkila, Loppi, Riihimäki, Hyvinkää, Hausjärvi, Mäntsälä, Porvoo, Pornainen, Askola, Pukkila, Myrskylä, Loviisa

**Commuting zone A:** Kirkkonummi, Siuntio, Vihti, Nurmijärvi, Tuusula, Järvenpää, Kerava, Sipoo



**Commuting zone C:**  
Tallinn area



# Commuting between Helsinki and Tallinn with tunnel

- The tunnel turns daily commuting between Helsinki and Tallinn as easy as using railway services around Helsinki.
- Based on current Helsinki commuting statistics, number of daily commuters in tunnel may be 36.000–64.000 persons.
- The future challenge may be the capacity of the tunnel.

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**Commuting zone A:** Kirkkonummi, Siuntio, Vihti, Nurmijärvi, Tuusula, Järvenpää, Kerava, Sipoo



**Helsinki area:**  
Helsinki, Vantaa,  
Espoo, Kauniainen

**Commuting zone C:**  
Tallinn area

# The Business Model – demand

Traffic type	Train pairs/day	Train pairs/year	Load/year	Note
Commuter trains	100	32.000	13.1 M trips	Based on current commutins statistics in Helsinki area
Road vehicle trains	17	6200	121.000 vehicles	Vans & trucks on tain
Regio trains	9	3300	3,9 ton- kms/year*)	App. 5 coach trains
Freight trains	3	1100	3,1 M tons	
Sleeping train	1	365	0,7 ton- kms/year*)	To Warsaw / Berlin

\*) The invoicing base for other operators' trains is train tonne kilometers.

# The Business Model

## Tunnel company sells daily commuter travelling services and tunnel track capacity

- The tunnel connects the main public transport nodes of Tallinn and Helsinki.
- Commuter ticket pricing equals to current ferry ticket and accommodation expenses.
- Tunnel company owns the tunnel and manages commuter trains.
  - Commuter train rolling stock can be purchased or leased.
  - Rest of the rolling stock used in the tunnel is to be TSI-compatible.
- Operating result to cover tunnel investment is 210 M€/year

Operation and maintenance	Expenses	Income
Commuter trains	58 %	79 % (tickets)
Road vehicle trains	11 %	14 % (road vehicle fees)
Tunnel	31 %	7 % (capacity sales)

# The Timing

After 20 years of pondering and tinkering, now is the time to act, because...

- Long term interest rates are low
  - During Channel tunnel construction interest rates were 10–15 %
- The Tunnel Boring Technology is ripe
  - Tunnel Boring Machines have replaced drilling and blasting technology
- Environmental issues are more relevant than ever
  - Both ferries and trucks operate with fuel, trains are electrically operated
  - Ship traffic of Primorsk, St. Petersburg and Ust Luga harbours is expanding
- Security of Supply is critical
  - Both Baltic states and Finland depend on Baltic sea to stay open
- The Twin Town is the future

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