

Loading gauge enhancement studies

RAG - 27 May 2015

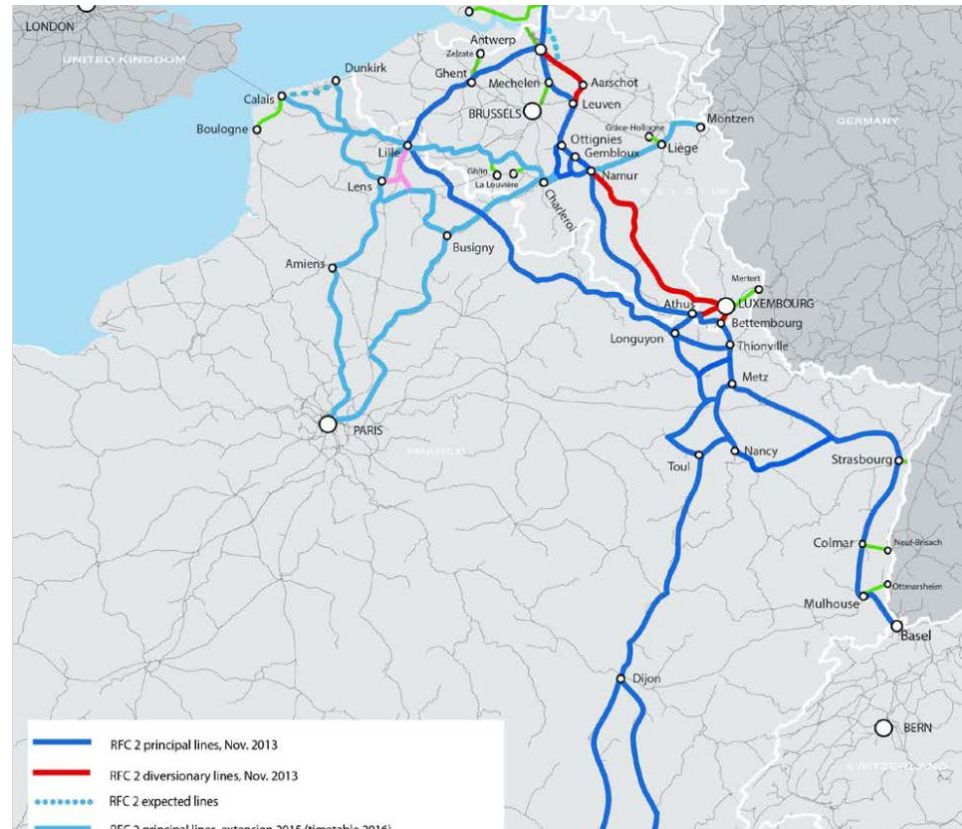


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Trans-European Transport Network (TEN-T)

easier, faster, safer

Geographical scope

- This study focuses on the enhancement of loading gauge on the Calais – Longuyon – Luxembourg - Thionville – Metz – Strasbourg – Basel line
- This line belongs to RFC North Sea – Med and is currently run by international trains
 - from Antwerp to Basel/Italy
 - from the UK to Basel/Italy
 - from Le Havre to Basel/Italy



Customer needs

RFC North Sea – Med RAG members: allowing trains to carry 4m semi-trailers => traffic increase

Examples

- Perpignan – Luxembourg
 - ⦿ 4 returns a day by VIIA + Fret SNCF
- Bettembourg – Lyon
 - ⦿ 1 return a day by CFLMultimodal
- Freiburg – Novara (RFC Rhine Alpine)
 - ⦿ 11 returns a day by RAlpin
 - ⦿ Hupac, BLS, CFF Cargo and Trenitalia
 - ⦿ Bettembourg Trieste (through Germany)



*Photo taken at the FR-LU border on 13/9/2014
(Bettembourg – Lyon service)*

Agenda

1. Studies in France

2. Studies in Luxembourg

3. Studies in Switzerland

Customer needs

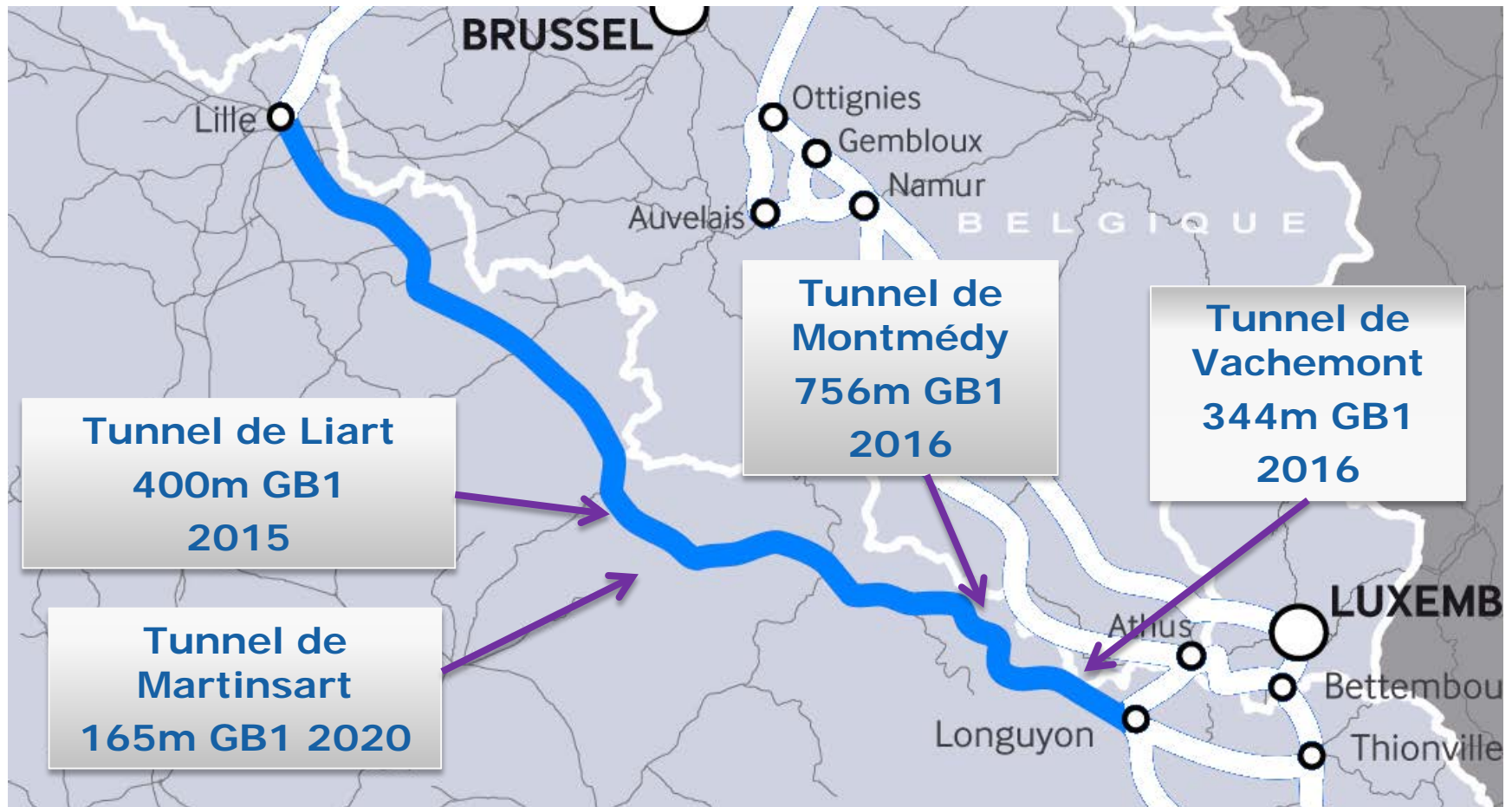
Wagons are usually owned by combined transport operators, not by the RUs. They all agree to request an infrastructure that allows the transport of 4m semi-trailers

- The issue is: 4m above what ?
 - SNCF Réseau launched a market study to know the opinions of RFC North Sea - Med clients
 - SNCF Réseau interviewed 4 European combined transport operators interested by the transport of semi trailers on the corridor
 - SNCF Réseau may interview another one or two
 - Opinions diverge on this issue (total height of 425cm, 427 cm, 433 cm)
 - 427 cm is the highest existing standard that can be considered on conventional lines in France

2 Dimensions et caractéristiques principales	
Longueur hors tampons.....	34 030 mm
Entraxe pivot.....	2 x 14 200 mm
Bogie Y25 Lssi diamètre de la roue neuve.....	920 mm
Empattement du bogie.....	1 800 mm
Hauteur nominale du plancher de la poche au dessus du rail.....	270 mm
Hauteur plancher pour transport de conteneurs ISO 40',45' ou CM à 7,82 m.....	1 155 mm
Longueur de la poche.....	10 650 mm
Largeur de la poche entre longerons mini.....	2 700 mm
Position et Longueur de la partie utile de la poche mesuré	
A partir du pivot côté sellette.....	entre 1 775 et 12 425 mm
Hauteur utile des longerons et traverses de la poche maxi.....	160 mm
Hauteur des longerons au dessus du plan de chargement de la poche	
Au niveau des prises par pinces de la semi-remorque.....	625 mm
Hauteur des longerons au dessus du plan de chargement de la poche	
Au niveau des prises par pinces de la semi-remorque.....	895 mm

Example: characteristics of a TWIN pocket wagon

Calais – Longuyon: date of works



Vachemont (344m) + Montmédy (756m)

- Final studies were done between 2012 and 2014
- Works are planned from 04/2016 to 10/2016
- Total cost of the final studies $\approx 850\text{k€}_{2014}$
- Total cost of renewal + loading gauge enhancement $\approx 10\text{M€}_{2014}$



Photo : Montmédy tunnel

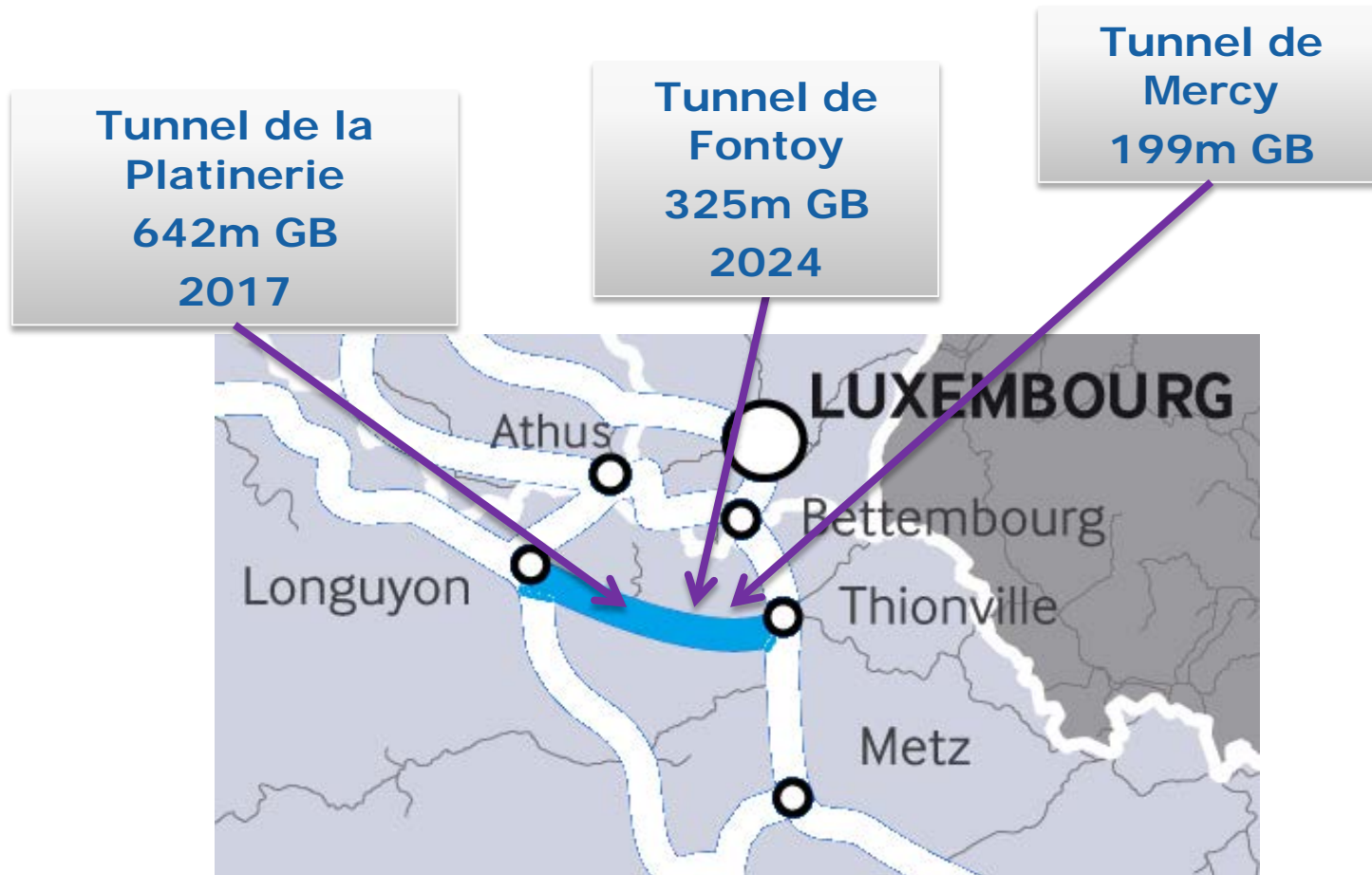
Martinsart (165m)

- Investigation studies started in 2014 and should be finished in 2015
- Works are planned in 2020 and should include a foundation raft
- Total cost of the final studies $\approx 850\text{k€}_{2014}$
- Total estimated cost of renewal + loading gauge enhancement : $4,2\text{M€}_{2010}$; this assumes a total closure of 8 weeks



Photo : Martinsart tunnel

Longuyon-Thionville: date of works



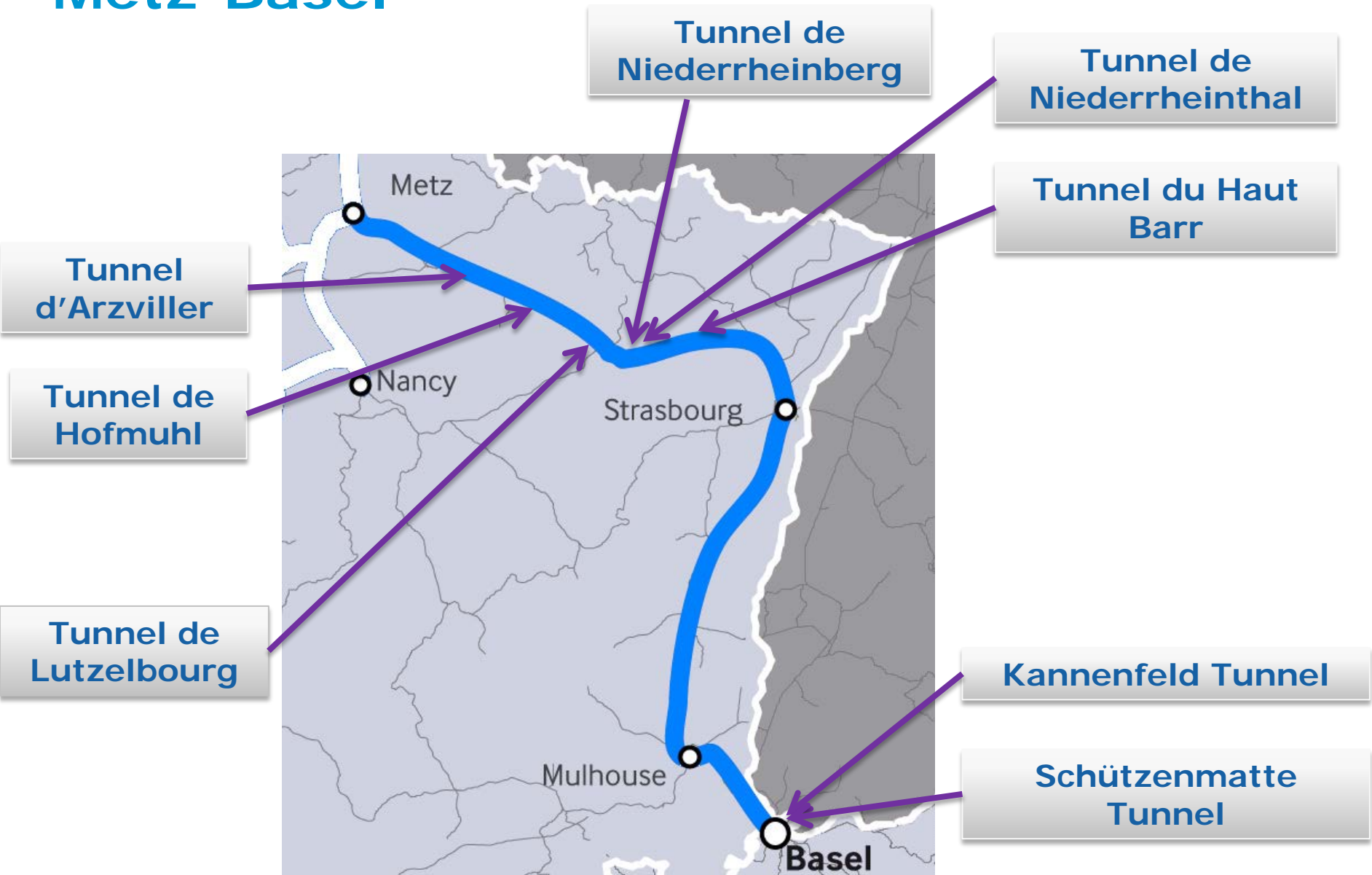
La platinerie (642m)

- Final studies started in 2014; it will be finished before 31/12/2015
- Renewal works planned in 2017 (4 months) with total line closure
- Estimated cost of the works (foundation raft + gauge enhancement): 13M€₂₀₁₃
- Estimated cost of the final studies 1,24M€ at current prices



Photo : La Platinerie tunnel

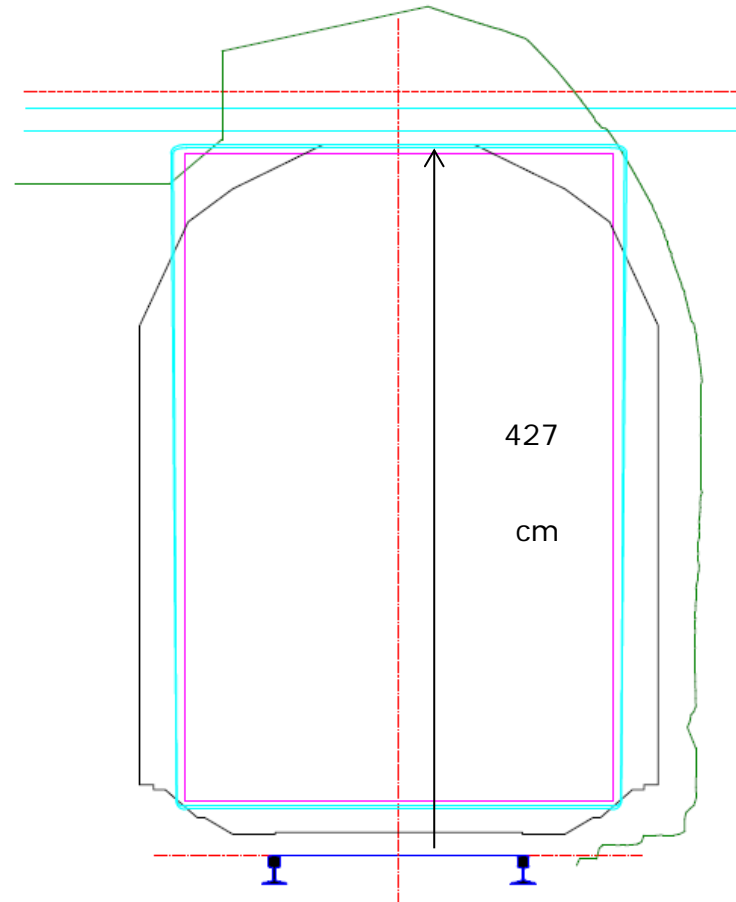
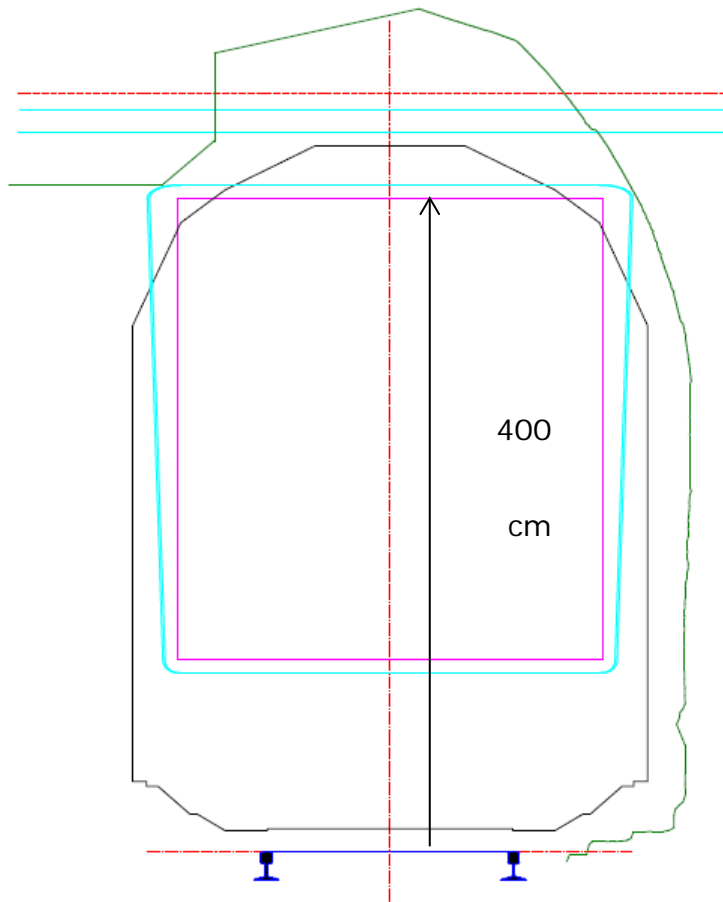
Metz-Basel



Arzviller (2678m)



Arzviller (2678m)



On a floor that is 27cm above the rail head, semi-trailers of more than 373 cm cannot run through the tunnel

Metz-BaseI

Tunnel	Length	Current Gauge	Renewal planned
Arzviller	2678m	GB	2024
Haut Barr	304m		No
Lutzelbourg	439m		2019
Hofmuhl	248m / 328m		2019
Niederrheinberg	400m		2026
Niederrheinthal	493m		2032

Renewals of Lutzelbourg and Hofmuhl:

- in 2019
- only a few tens of meters in each tunnel
- therefore, for the time being, a loading gauge enhancement has not been considered

Hofmuhl : 1 tunnel per track



Preliminary studies

- SNCF Réseau is currently performing preliminary studies for
 - 6 tunnels between Metz and the Swiss Border and
 - 3 tunnels between Calais and Thionville (Liart, Mercy and Fontoy)

The preliminary studies include for each tunnel

- Data collection (geometric measurements)
- Review of the tunnel archives (data, historical works, condition of the structure...)
- Comparative Study of loading gauge enhancements: GB1, GB1 + AFM427, AFG
- Definition of technical solutions
- Compatibility with the condition of the tunnel and renewal works possibly foreseen
- Explanatory note of the technical choices with work conditions, risks and constraints
- Estimated costs and completion dates of work for each loading gauge standard
- Estimated total amount of each transaction on the basis of ratios derived from similar operation
- Summary table of solutions, costs and timing

Conclusion about studies in France

- Between Calais and the Swiss border, 13 tunnels do not comply with the 427cm standard
- For 4 tunnels, SNCF Réseau was able to combine loading gauge studies with renewal studies
 - Works will be done in the next five years
- For the remaining 9 tunnels, preliminary studies are currently underway
 - Decision to do the works will depend on the results of the studies and the possibility to combine these works with renewal works

Combining renewals and loading gauge enhancement

- There is a real interest in mutualising civil works to be done for gauge enhancement and for tunnel maintenance (renewals)
 - Works duration is marginally increased
 - Total impact on railway traffic is minimised
 - Total costs are minimised
- This is also true for studies as they are similar in terms of soundings, plans, structure analysis, diagnostic visits. BUT :
- Because gauge enhancement involves the whole of the tunnel structure instead of specific areas to be renewed. Then the combined studies costs are higher than those involved for maintenance only
 - => $\text{Costs (GE+M)} \approx \text{Costs (GE)} > \text{Costs (M)}$

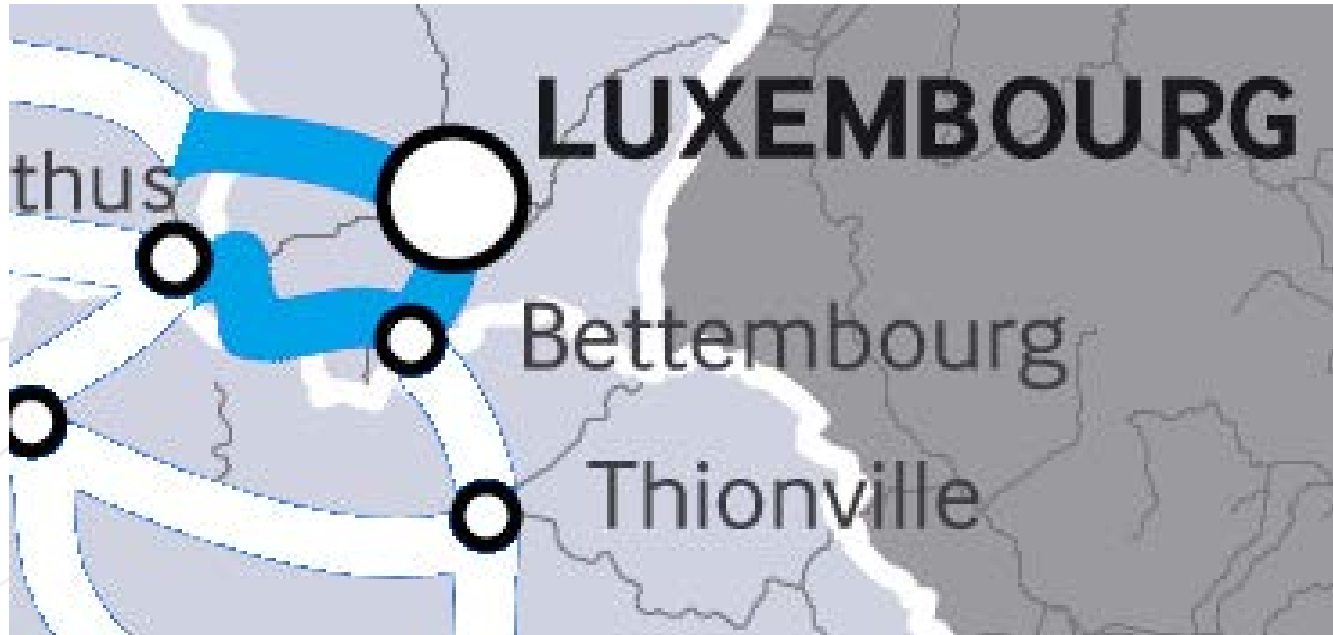
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Studies launched in Luxembourg



Studies launched in Luxembourg

- In 2013 and 1st half of 2014, three measuring campaigns have been done
- The measurement data have been processed and the report sent by the contractor
- The measurement data are being analysed in order to evaluate the works to be done
- The study including the cost evaluation of the works will be finished by the end of 2015

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Switzerland: 4-metre corridor

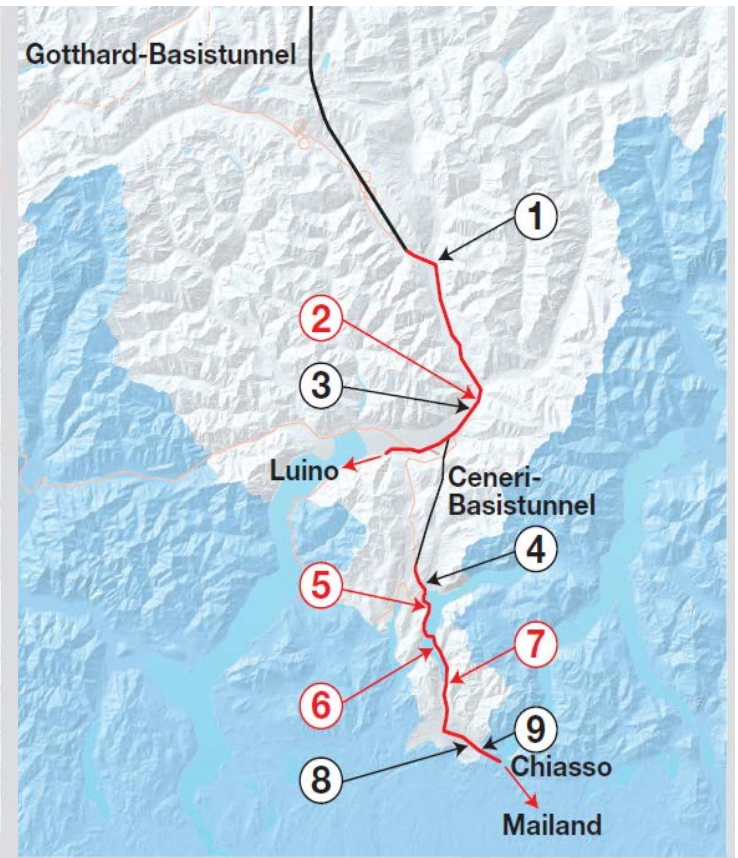
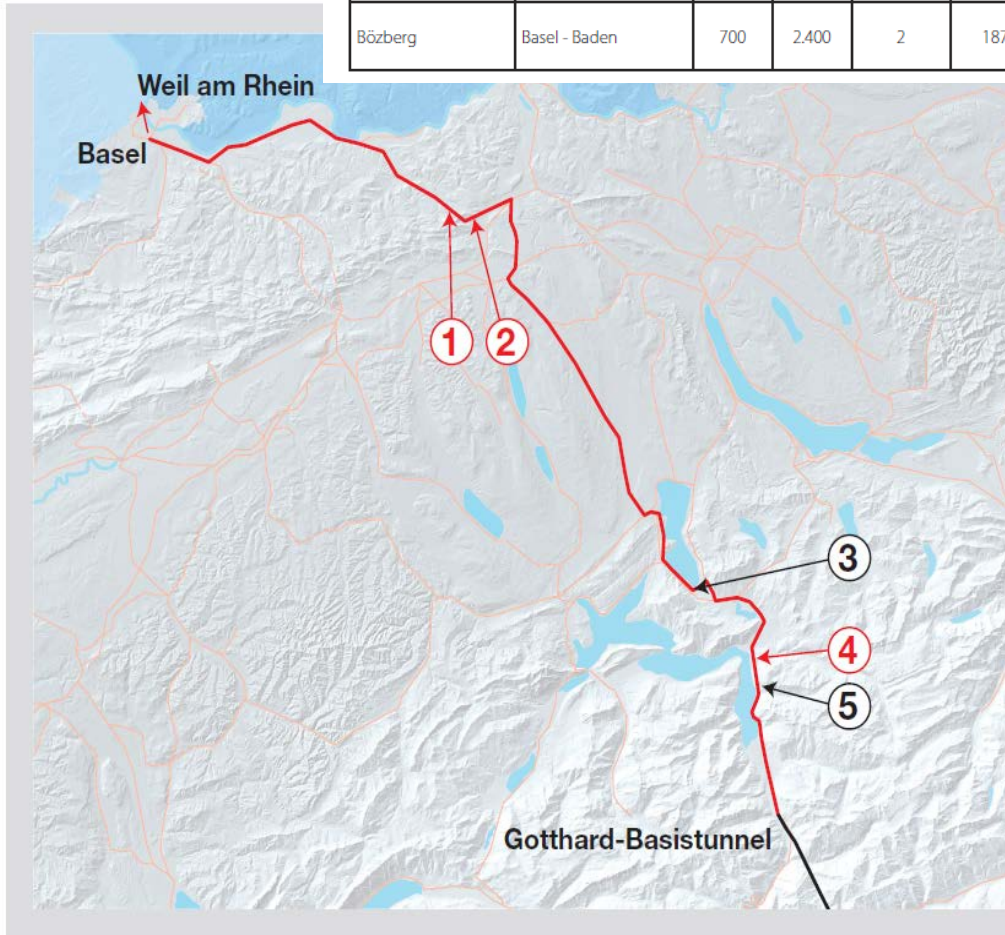


In order to increase the volume of transalpine freight carried by rail rather than road, SBB will (on behalf of the federal government) upgrade the Gotthard route to a 4-metre corridor by 2020. This allows semitrailers with a 4-metre headroom to be carried.

The project, estimated to cost CHF 940M, is an important component of Switzerland's transport policy. In order to create a 4-metre corridor along the entire length of the Gotthard route, some 20 tunnels need to be enlarged and 150 alterations made to platforms, traction current systems, signalling installations and overpasses. In order for the 4-metre corridor to achieve its full potential, sections of lines in Italy will also be upgraded to a 4-metre target. To upgrade the feeder routes in Italy, the Swiss parliament also approved a loan of CHF 230M.

4-Meter-Korridor B Übersicht Nord.

Tunnel Nord-Süd Korridor Aufweitung auf 4,0 m Eckhöhe - zur Zeit in Studie										
Axenberg	Brunnen - Flüelen	600	1.128	1	1880	Malmkalke	geschlossen (bergmännisch)	x?	bis ca. 2020	Aufweitung auf EBV3-Profil
Morschachtunnel	Brunnen - Flüelen	600	1.003	2 (1+1)	1880/1947	Kalke	geschlossen (bergmännisch)	x	bis ca. 2020	Aufweitung auf EBV3-Profil
Stutzleck	Brunnen - Flüelen	600	988	1	1880	Kalke	geschlossen (bergmännisch)	x?	bis ca. 2020	Aufweitung auf EBV3-Profil
Stutzleck	Brunnen - Flüelen	600	128	1	1880	Kalke	geschlossen (bergmännisch)	x?	bis ca. 2020	Aufweitung auf EBV3-Profil
Tellsplatte	Brunnen - Flüelen	600	171	1	1880	Kalke	geschlossen (bergmännisch)	x?	bis ca. 2020	Aufweitung auf EBV3-Profil
Bözberg	Basel - Baden	700	2.400	2	1875	Kalke/Mergel	geschlossen (bergmännisch)	x?	offen	Evtl. Paralleltunnel und/oder umfassende Gewölbeinstandsetzung, Entwässerung



Switzerland

- The Swiss loading gauge enhancement program for the North – South route is very ambitious (see chart)

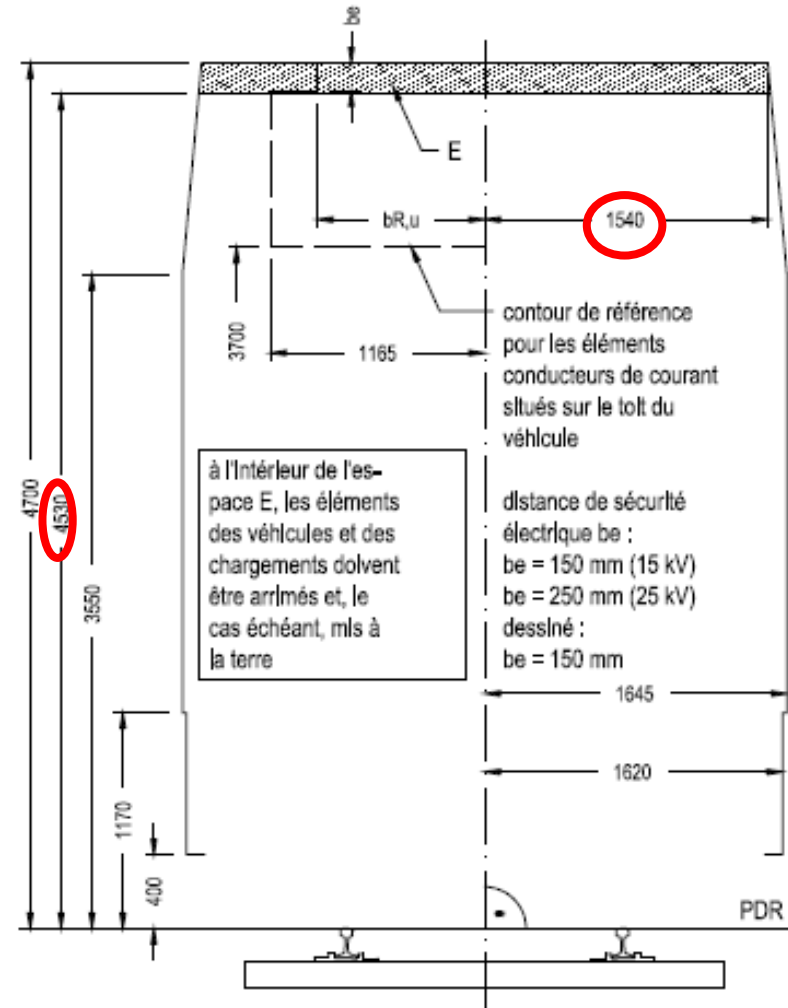
CONTOUR DE REFERENCE OCF 04, PARTIES HAUTES

Il en résulte :

- gabarit limite des obstacles et profil d'espace libre OCF 4 (art. 18, feuilles n° 9 N et 14 N)

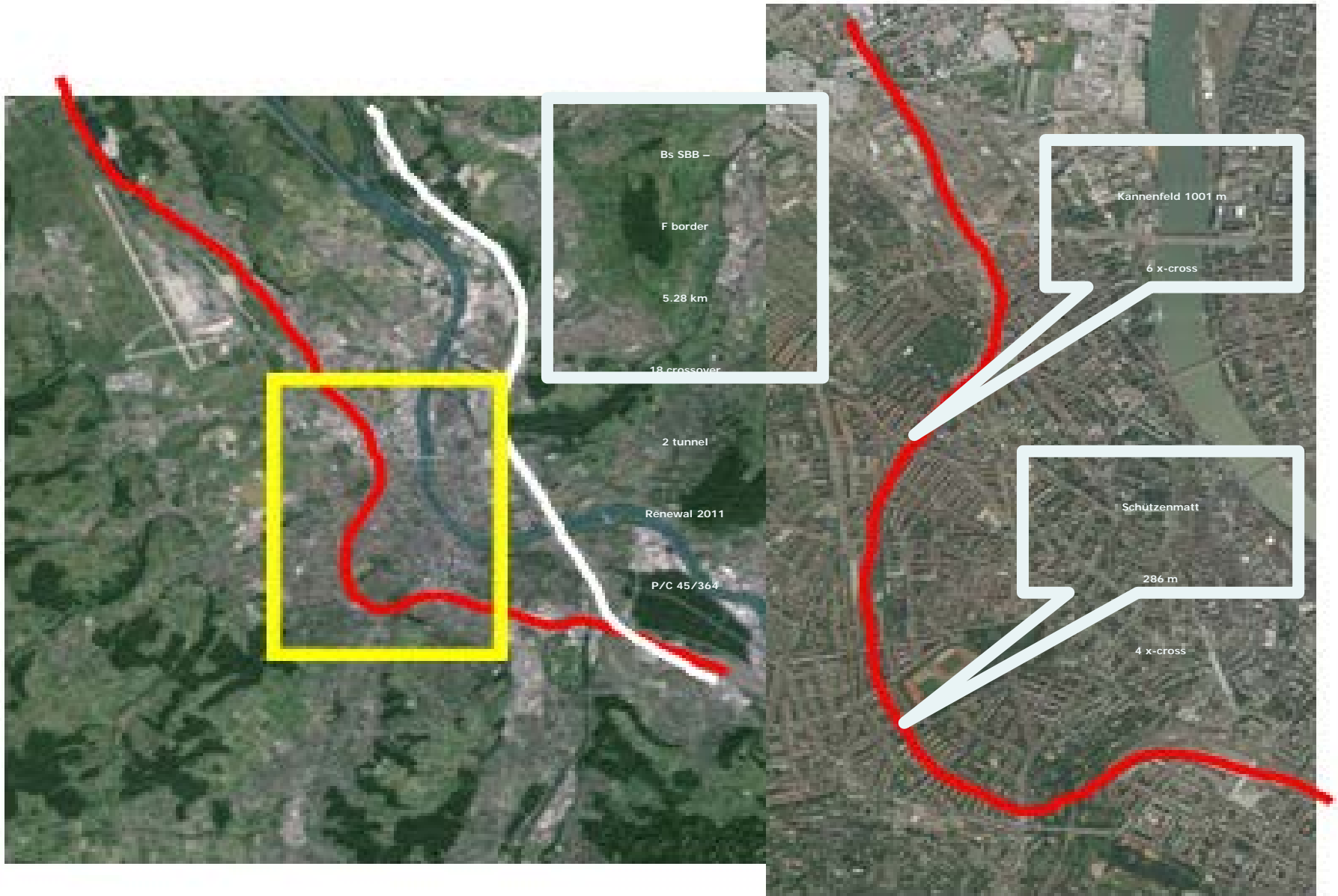
Valable pour :

- installations fixes pour lignes de la transversale nord-sud Bâle – Chiasso
- lignes pour $V > 160$ km/h



valeur $b_{R, u}$: voir feuille n° 11 N
parties basses : voir feuilles n° 4 N à 6 N

Basel area



Switzerland

- In Switzerland, the upgrade of the Kannenfeld and Schützenmatt tunnels between Basel SBB and the French border could cost as much as 400 M€
- A “short life cycle renewal” was performed in 2011
- It might be possible to consider loading gauge enhancement when the next renewal is performed (around 2026)
- It is worth coordinating the Swiss and French projects at the ministry level

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