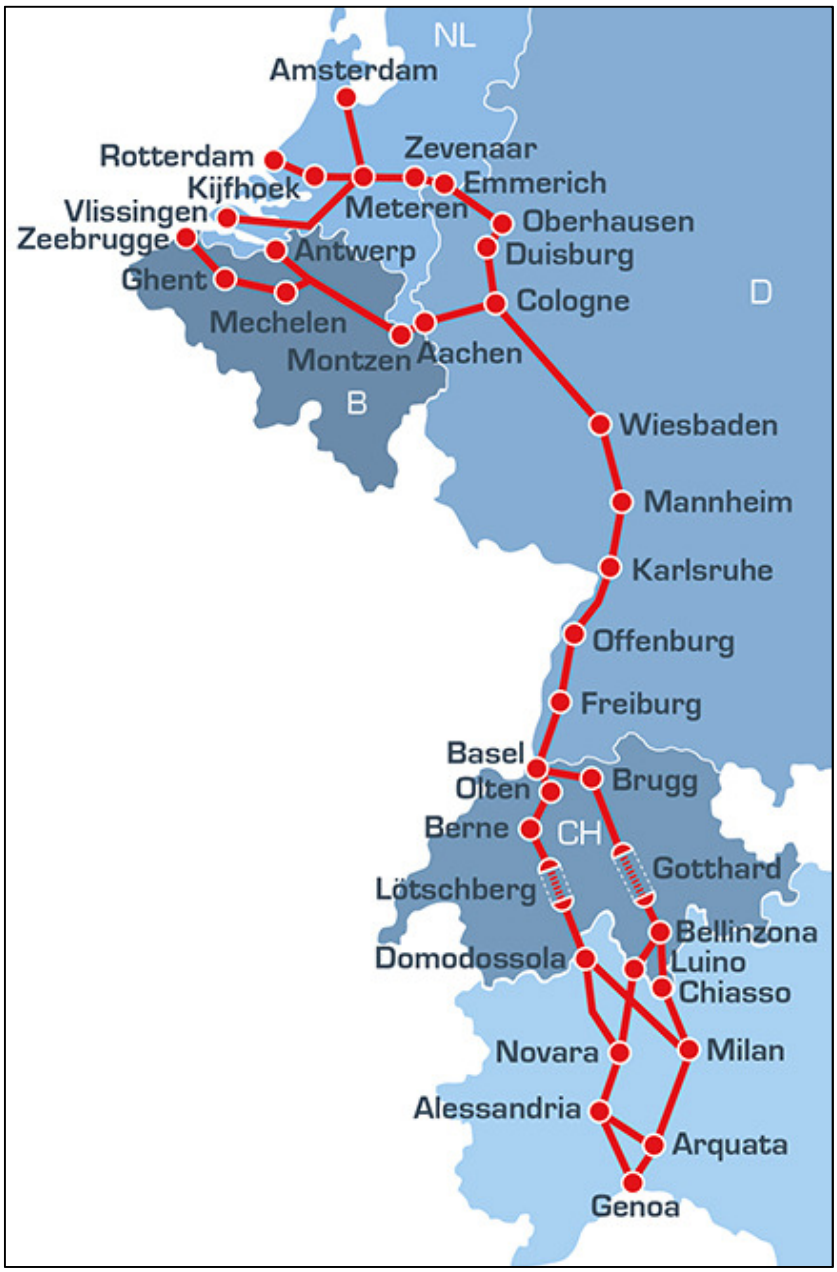
RFC Rhine-Alpine

IMPLEMENTATION PLAN Update 2018

ANNEX 5C:
Capacity Bottleneck Analysis (CBA)



Date of issue: 21 September 2018

This CBA was done in 2017,
based on data collected from 2015-2016

The Capacity Bottleneck Analysis 2018 is still ongoing

Development of Capacity Bottlenecks

The MB of RFC Rhine-Alpine regularly conducts a capacity bottleneck analysis. This document includes the version from 17 May 2017

To be able to use this information in MoTs decision processes, this bottleneck information in shown in different ways. These different ways actually represent the remaining bottlenecks looking to the status of decision making on the project planning and investments on the corridor. These decision processes are not the same in all the countries but using the available information we distinguish between three stages in decision making:

- Secured (S), meaning that all necessary decisions are taken and money is available.
- Planned (P), meaning that already first decisions are taken and financial reservations are planned.
- To be decided (TBD), meaning that solutions how to solve problems are known, but no formal decisions are taken yet and financial funds are not yet known.

The used project information can for this analysis can be found in annex 10.

First the Capacity Bottlenecks in all the different situations will be mentioned. At the end the results will be compared with the analysis made last year.
In different tables will be shown how many sections are Capacity Bottlenecks. Not every section has the same length. The number of sections with Capacity Bottlenecks only gives a global indication of the shortage of capacity on the entire corridor.

Present situation
In the present situation Capacity Bottlenecks occur in Switzerland and Italy. The exact sections are shown in annex 1. The demand on these sections exceeds the available capacity.
Most of the bottlenecks in Switzerland are due to an increase in demand for more passenger trains which exceeds the available capacity. In the Lötschberg base tunnel, the single-track section limits the capacity for freight trains. However, the surplus of freight trains are rerouted via the mountain line. With this, the total capacity of the Lötschberg-line is sufficient for freight trains.
In Italy the demand is going over the acceptable limit.
For most bottlenecks plans are made, but they still have to be ‘Secured’ and built.

Number of sections with Capacity Bottlenecks in 2015	Current infrastructure
Netherlands	-
Belgium	-
Germany	-
Switzerland	5
Italy	1

However, it has to be stated, that part of the bottlenecks in Switzerland are related to connecting lines and have no direct influence on corridor operation.

Situation 2020
In 2020 the situation deteriorates on several parts of the corridor. In annexes 2 to 4 this is shown for the different statuses of decision making.
This is due to growth of the demand on the one hand and infrastructure plans that are not yet 'Secured' or not yet built on the other hand.

In the Netherlands, Germany and Switzerland Capacity Bottlenecks appear in the future. Only in Belgium there are no Capacity Bottlenecks. Again, it has to be stated, that part of the bottlenecks in Switzerland are related to connecting lines and have no direct influence on corridor operation.
For a certain number of sections in Italy the Capacity Bottlenecks in 2020 can be eliminated after the decisions are taken that the 'Planned' infrastructure will be secured. Besides that the demand is not known for all the Italian sections. Maybe after all the information is given, new Capacity Bottlenecks will appear.

Number of sections with Capacity Bottlenecks in 2020	Infrastructure with plans S	Infrastructure with plans S+P	Infrastructure with plans S+P+TBD
Netherlands	1	1	1
Belgium	-	-	-
Germany	3	3	3
Switzerland	6	6	6
Italy*	4	1	1

* About 15 sections in Italy are not yet known

Situation 2025
In 2025 the image of the problems varies, as can be seen in annexes 5 to 7: in the Netherlands, Belgium and Italy the situation worsens slightly compared to 2020, but gets better when the 'P' and 'TBD' plans are realised. In Germany no improvement can be seen in 2025.
In Switzerland the situation improves compared to 2020, but still some problems remain.
This means that decision making is necessary to solve the Capacity Bottlenecks in all these countries.

Number of sections with Capacity Bottlenecks in 2025	Infrastructure with plans S	Infrastructure with plans S+P	Infrastructure with plans S+P+TBD
Netherlands	2	1	-
Belgium	2	2	1
Germany	3	3	3
Switzerland	4	4	4
Italy*	7	2	0

* About 15 sections in Italy are not yet known

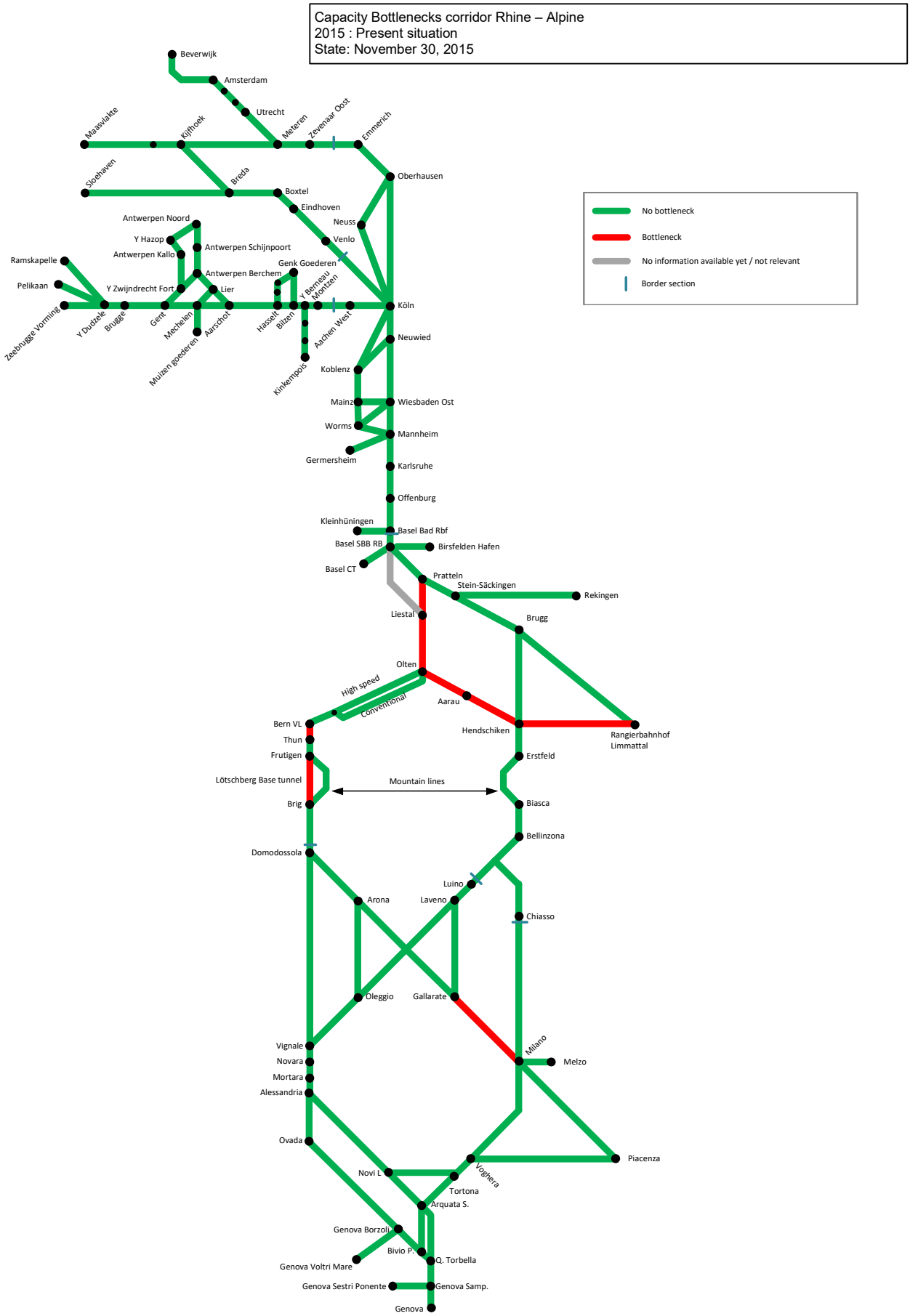
Conclusion
Even if all the infrastructure plans (S, P, TBD) from CIP are realised in 2025, there will still be Capacity Bottlenecks remaining. In the Netherlands, Belgium and Italy there are 0 or 2 Capacity Bottlenecks in the situation 2025 (S+P+TBD). In Germany and Switzerland 3 to 4 Capacity Bottlenecks, partly on connecting lines, will remain, but there are plans known to solve these problems.
To give a quick insight on the changing situations annexes 8 and 9 are added, showing an overview of the Capacity Bottlenecks in the various stages of decision-making.

Compared to last year
In **the Netherlands** and **Belgium,** the situation is the same as last year. Nor the demands, nor the capacity has changed.

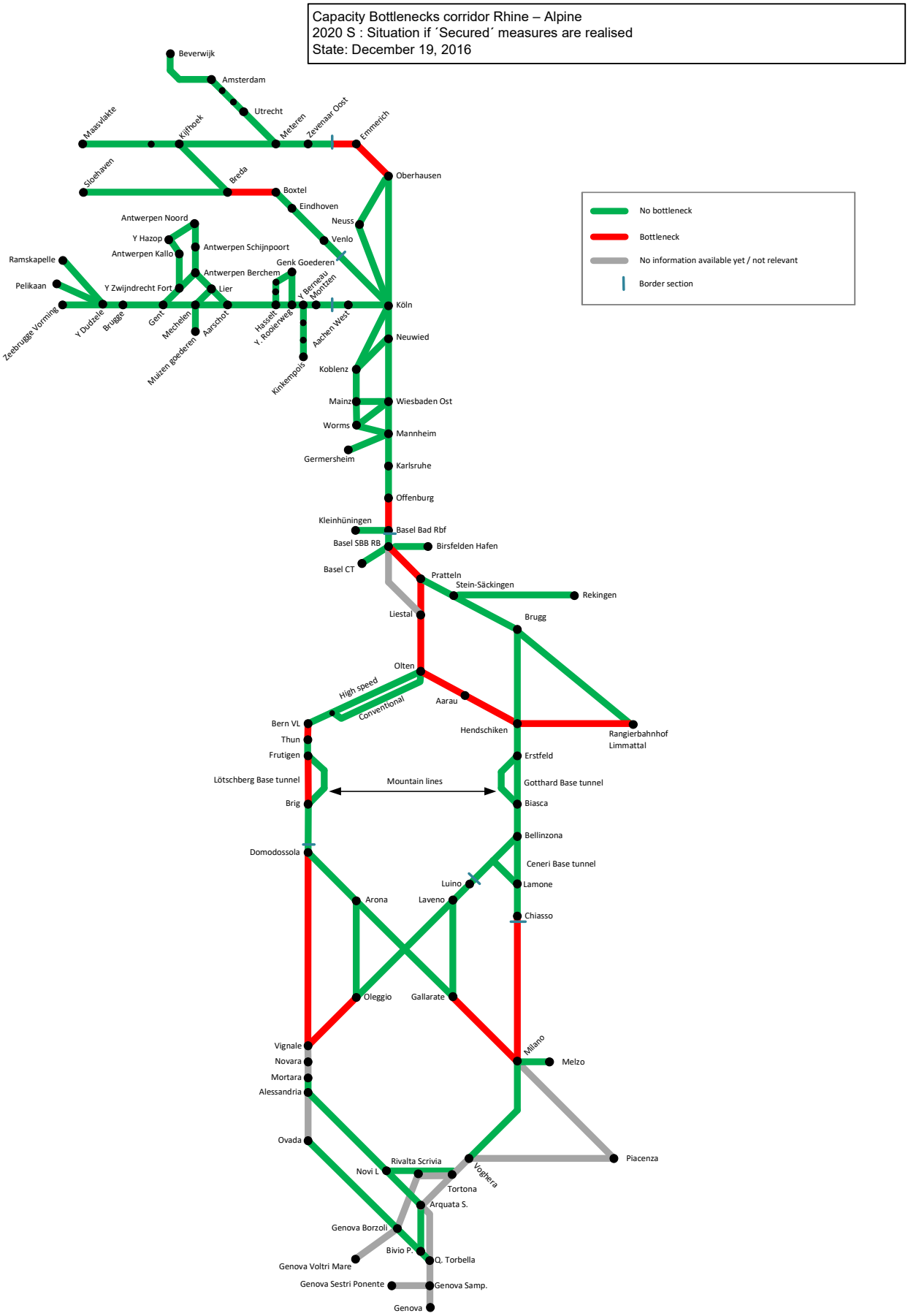
In **Germany** the situation changed on 1 section, NL Border – Oberhausen. Due to the fact that the building permit is not yet existent. This is the reason that in 2025 (S+P and S+P+TBD) a Capacity Bottleneck is shown.

In **Italy** a new Capacity Bottleneck is shown, due to the fact that the realization of the 3rd and 4th track on Chiasso and Monza is delayed. Information that is still missing, can cause new Capacity Bottlenecks.

Annex 1: Capacity Bottlenecks on the present infrastructure

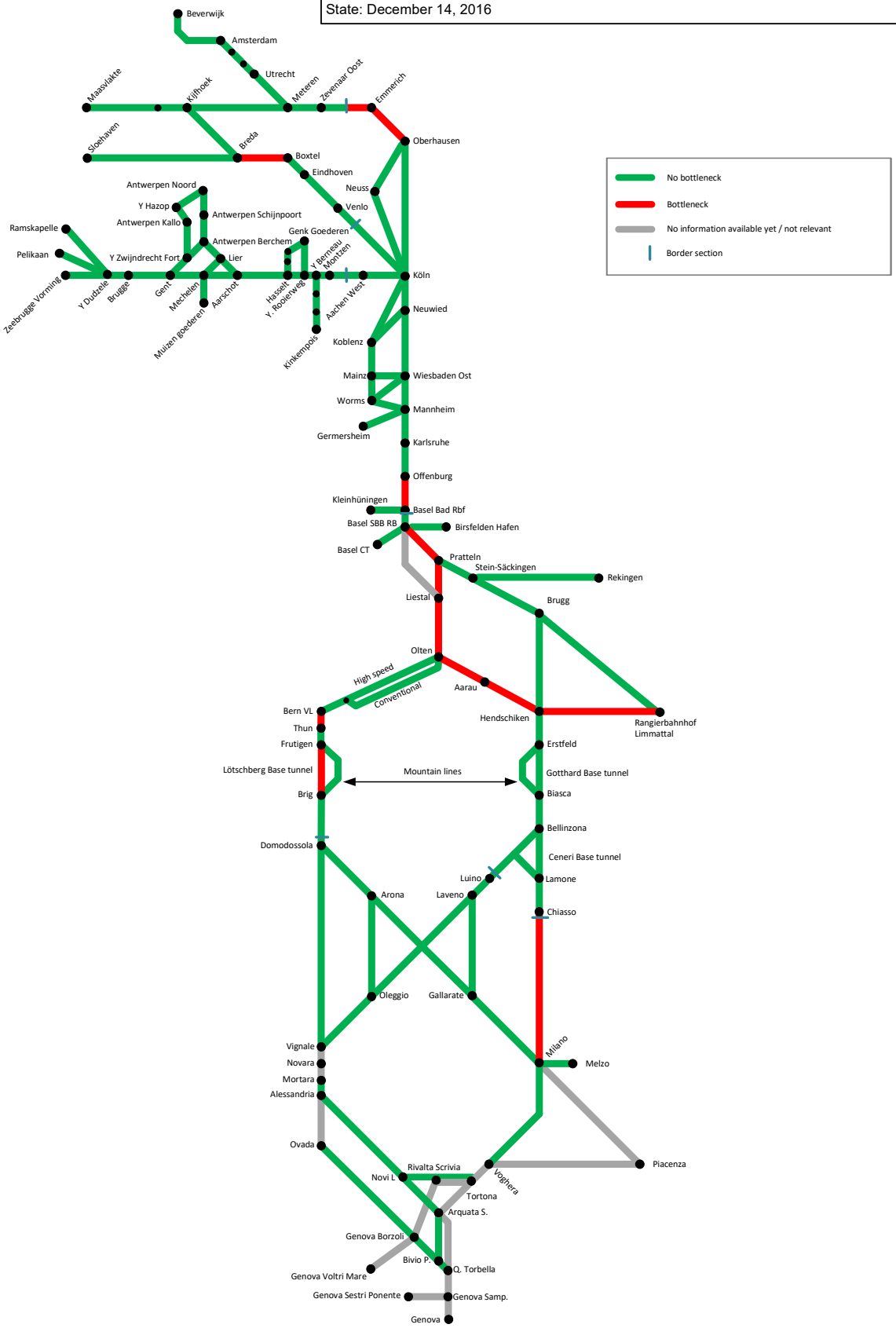


Annex 2: Capacity Bottlenecks in 2020 (S)



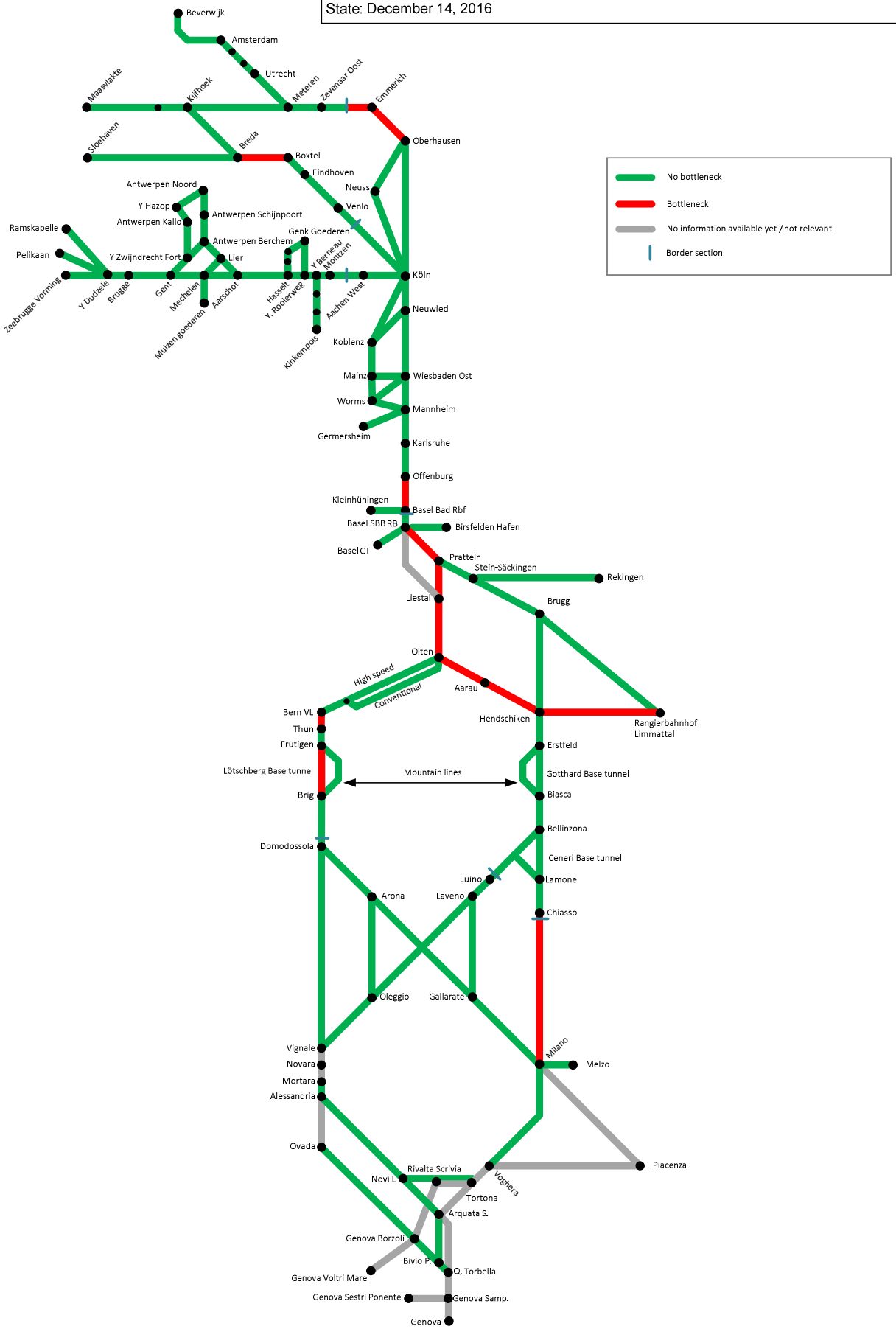
Annex 3: Capacity Bottlenecks in 2020 (S + P)

Capacity Bottlenecks corridor Rhine – Alpine
2020 S + P : Situation if ´Secured´ and ´Planned´ measures are realised
State: December 14, 2016



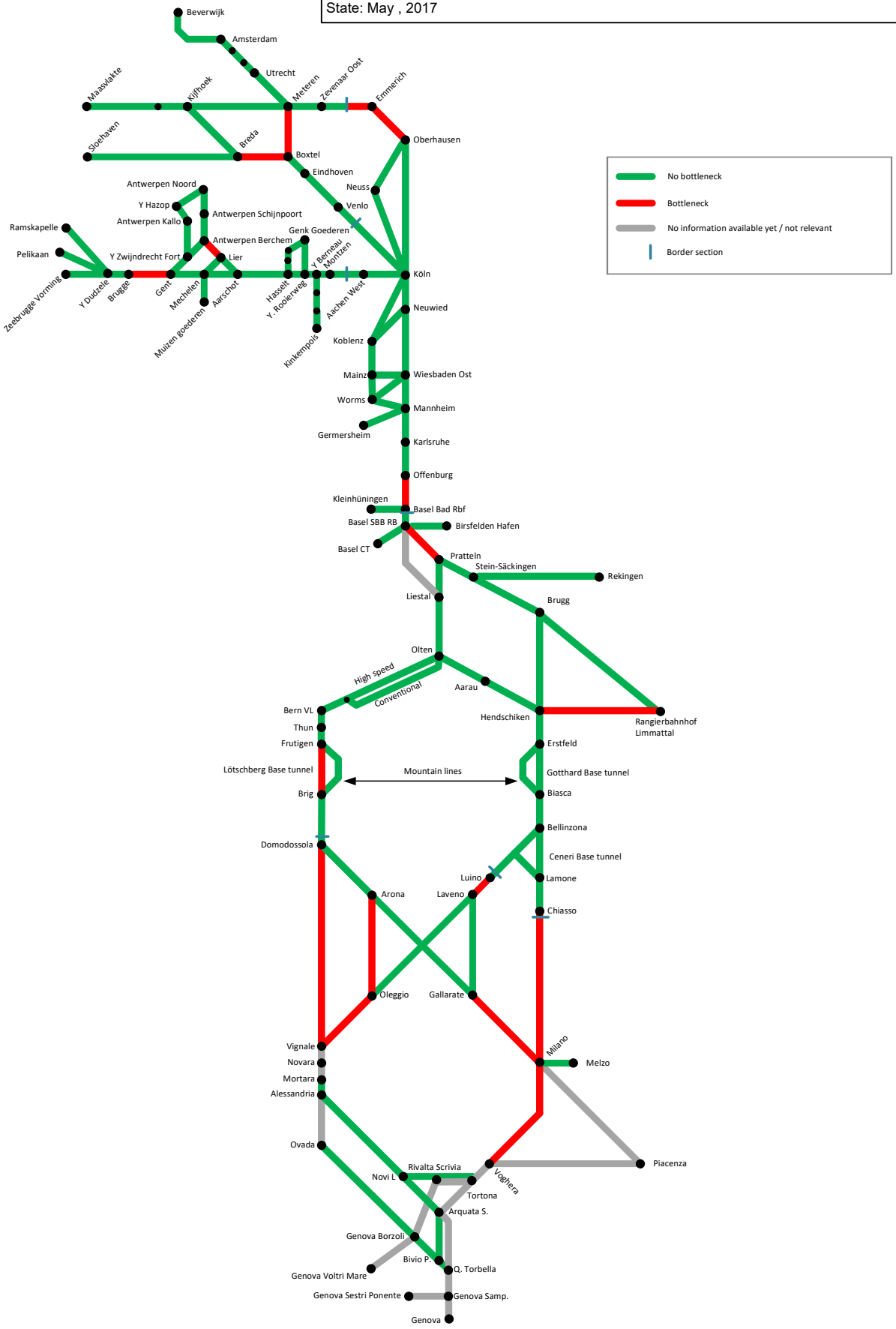
Annex 4: Capacity Bottlenecks in 2020 (S + P + TBD)

Capacity Bottlenecks corridor Rhine – Alpine
2020 S + P + TBD : Situation if ´Secured´, ´Planned´ and ´To Be Decided´ measures are realised
State: December 14, 2016

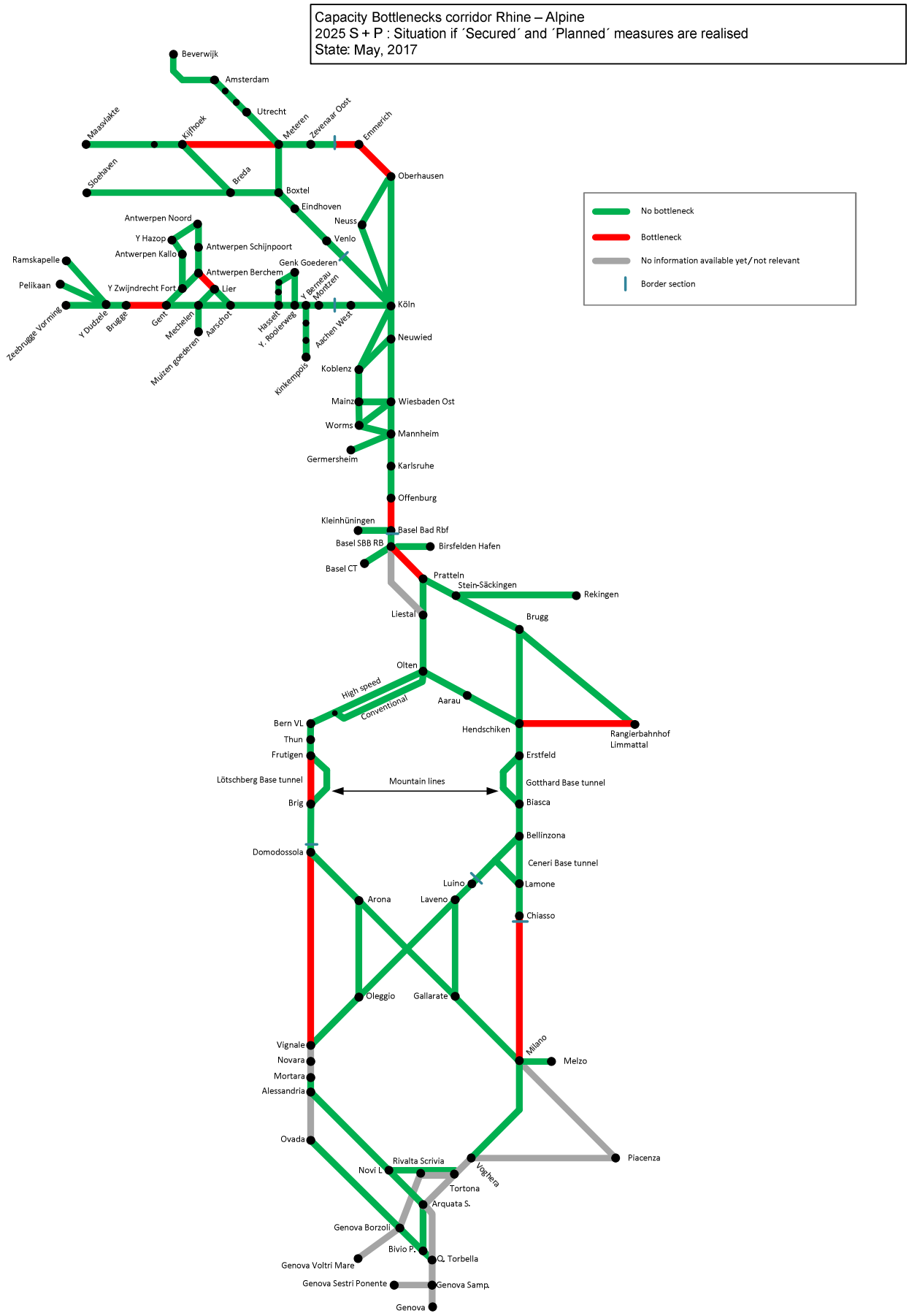


Annex 5: Capacity Bottlenecks in 2025 (S)

Capacity Bottlenecks corridor Rhine – Alpine
2025 S : Situation if ´Secured´ measures are realised
State: May , 2017

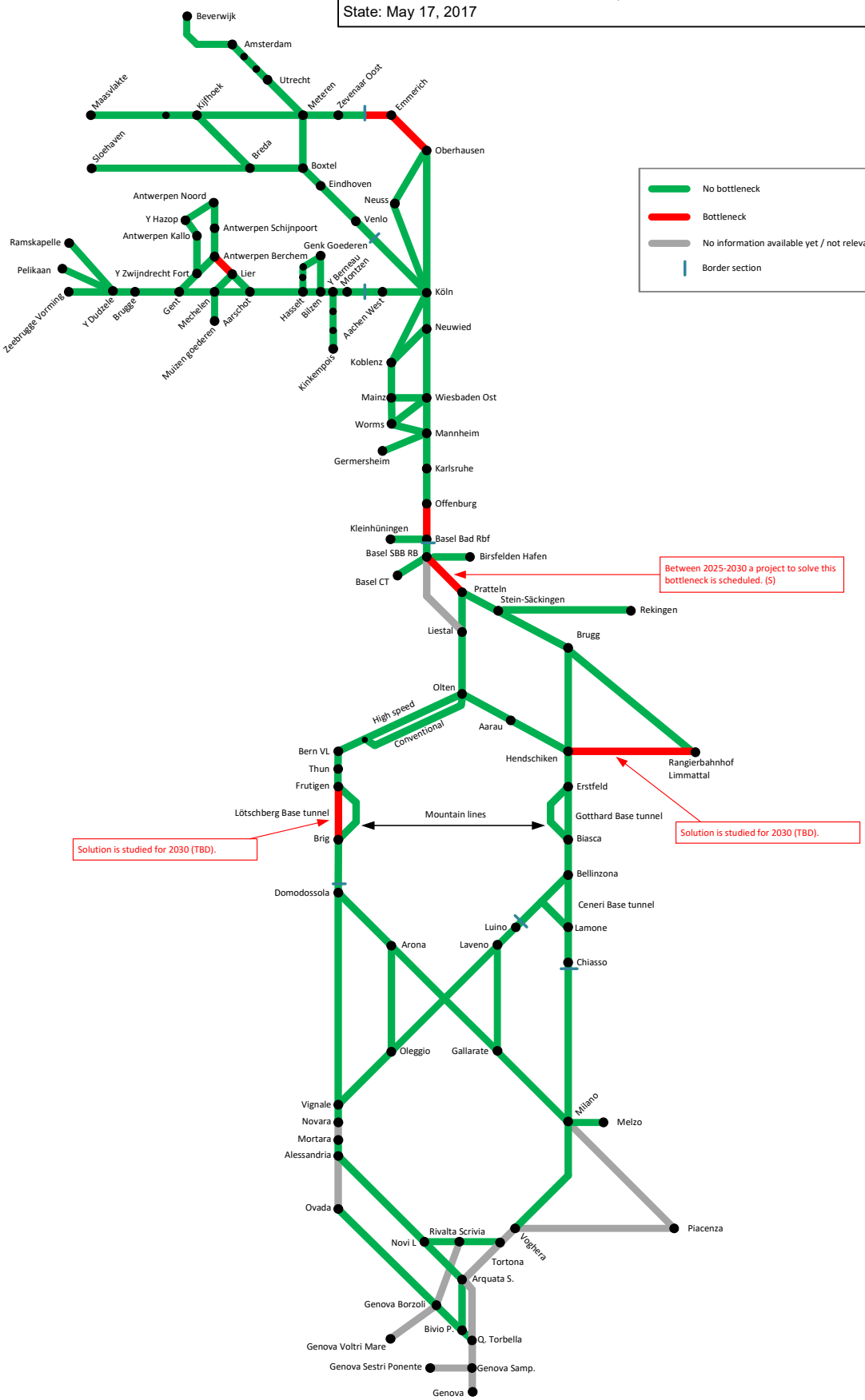


Annex 6: Capacity Bottlenecks in 2025 (S + P)

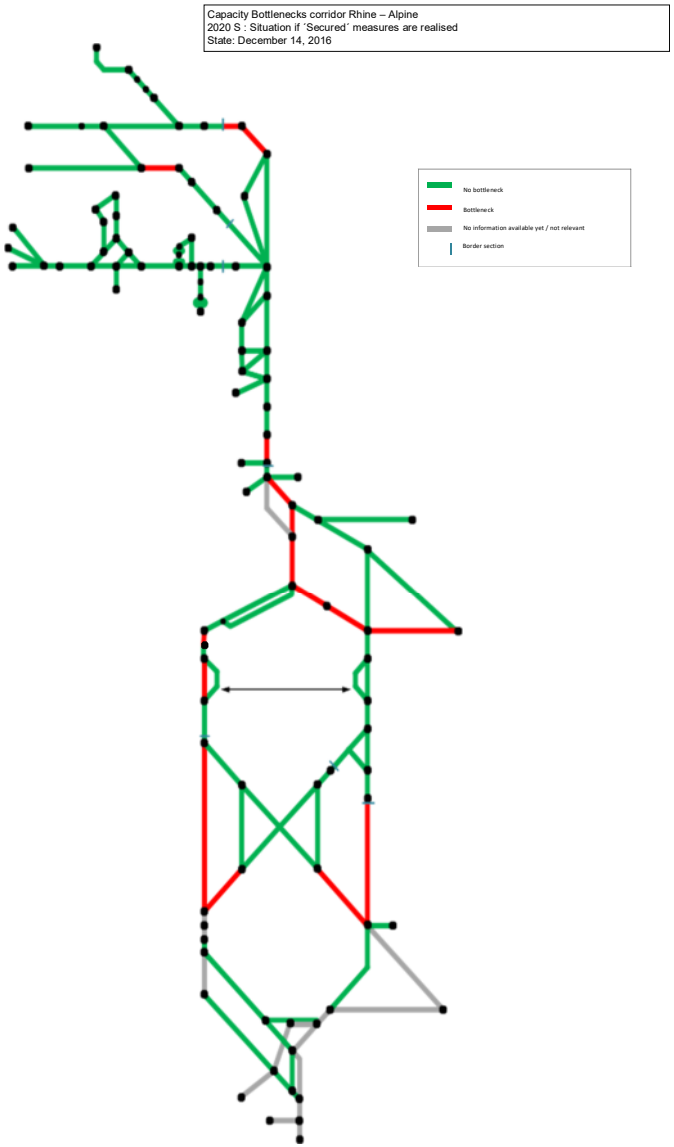


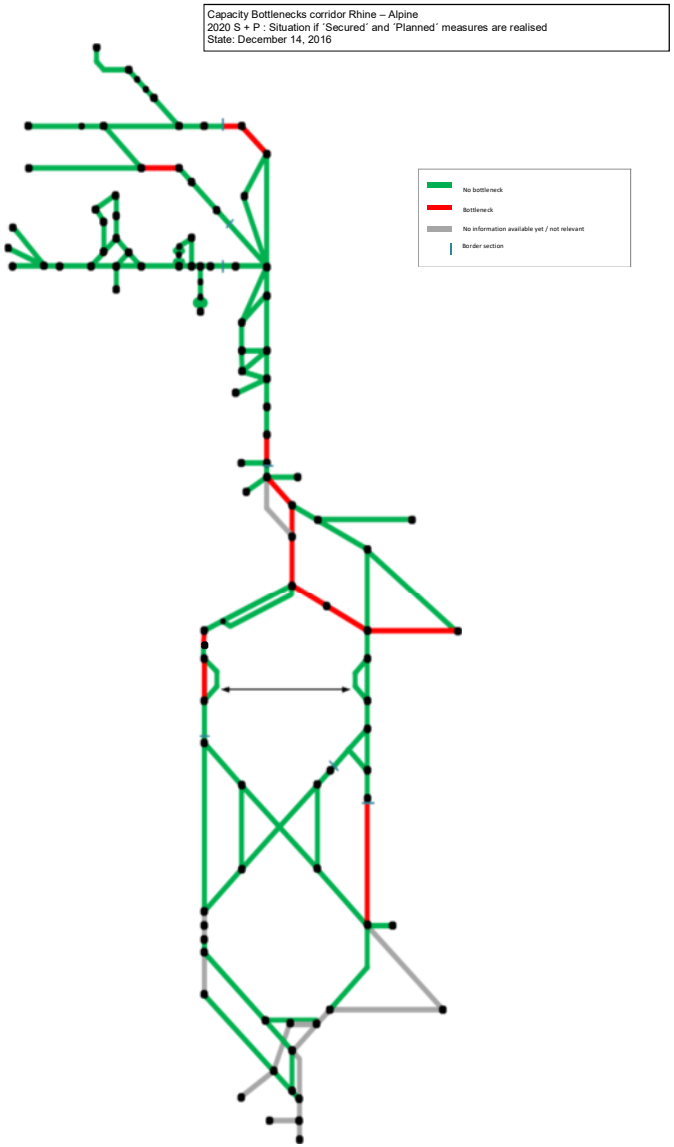
Annex 7: Capacity Bottlenecks in 2025 (S + P + TBD)

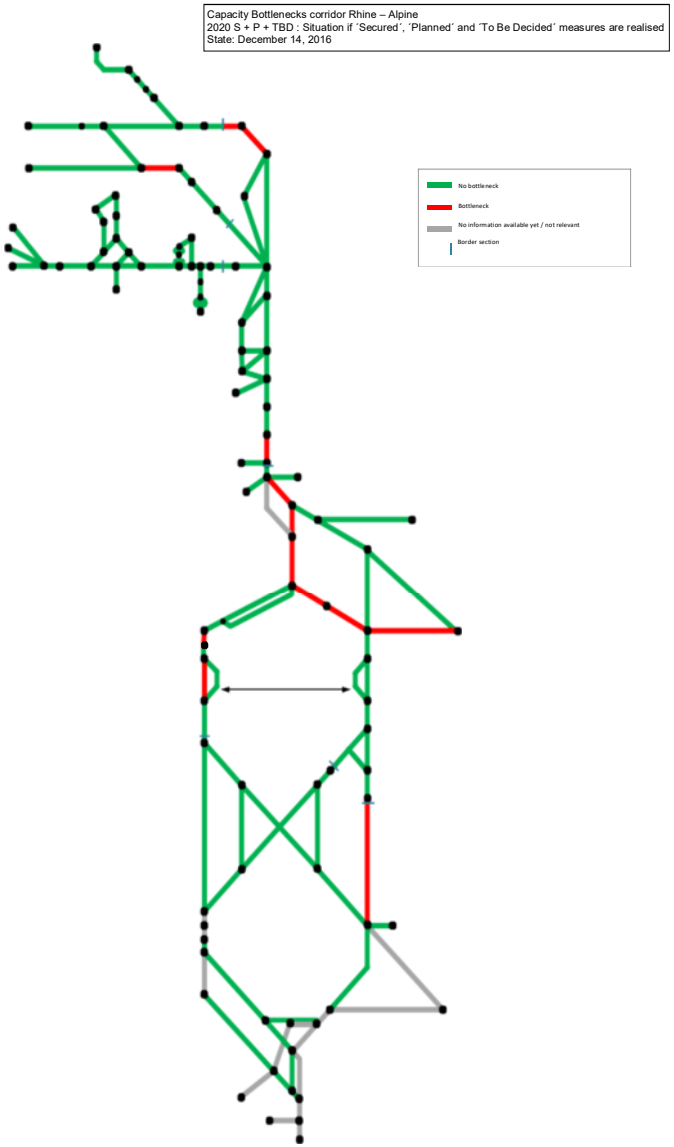
Capacity Bottlenecks corridor Rhine – Alpine
2025 S + P + TBD : Situation if ´Secured´, ´Planned´ and ´To Be Decided´ measures are realised
State: May 17, 2017



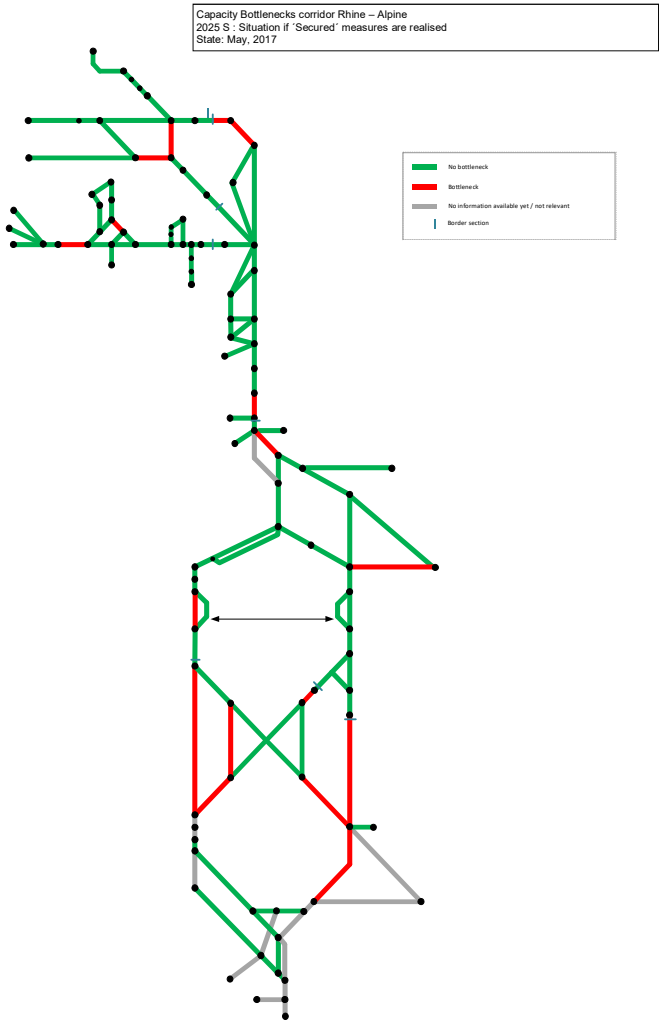
Annex 8: Capacity Bottlenecks in 2020

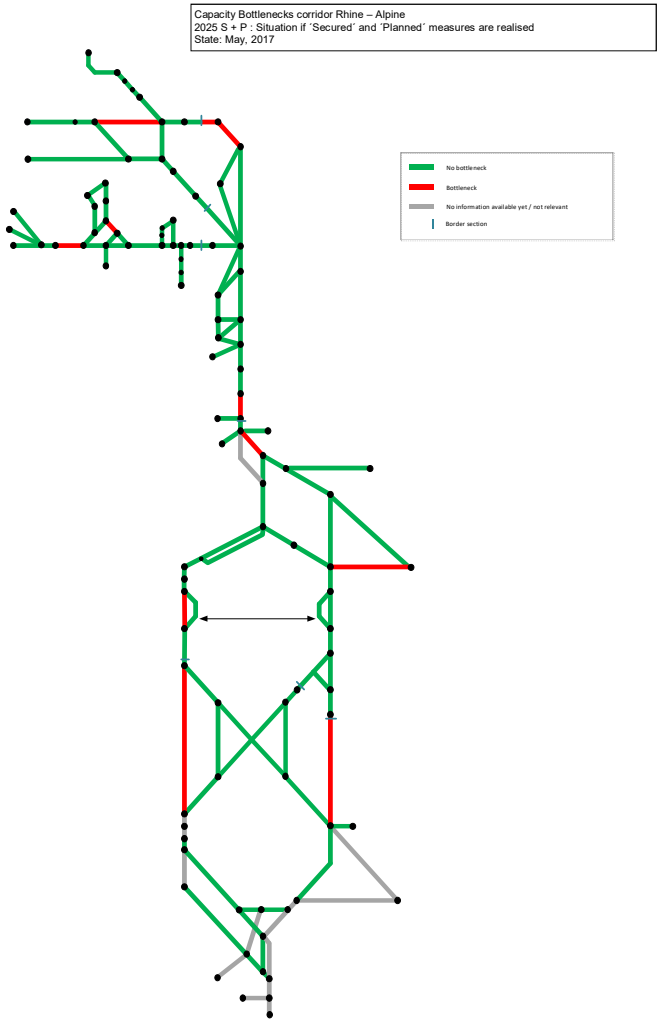


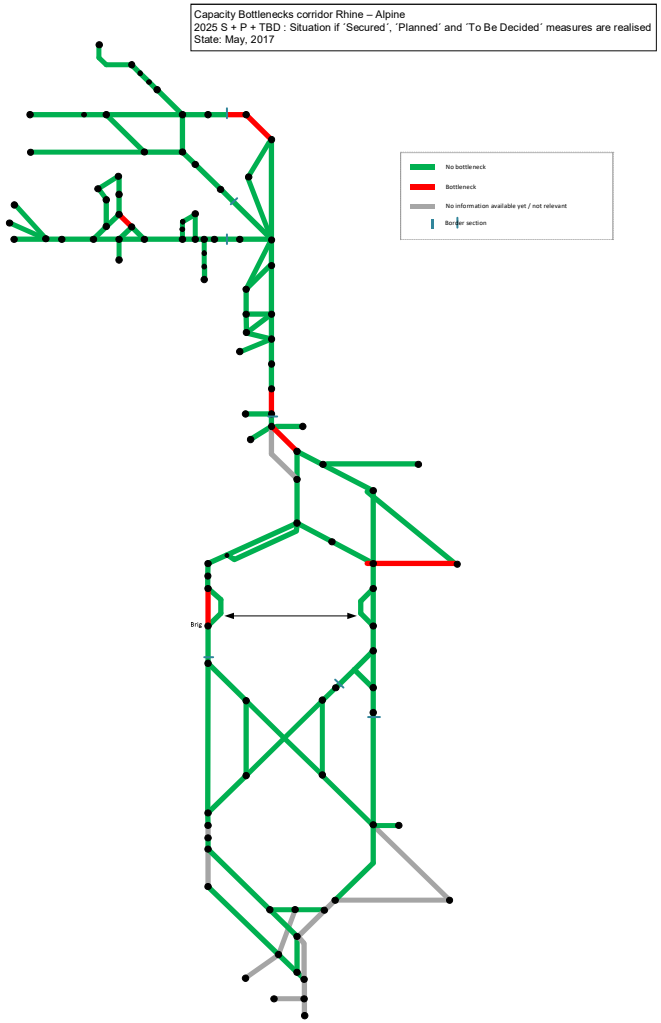




Annex 9: Capacity Bottlenecks in 2025







Annex 10: CIP project information

Project Id	Country	Project Nam e	Project Description	Year of Im plem entation	Decision Status
30156274	NL	4 tracks and free crossing at Vught	construction of 4 tracks and free crossing at Vught	2025	P
30156171	NL	Amsterdam Dijksgracht - free level crossing	free entrance to Amsterdam Westhaven	2025	P
30162482	NL	Beverwijk reconstruction freight tracks	extend freight tracks to 740 meters	2016	S
30156136	NL	Construction South-West curve at Meteren	connection Betuweline (Kijfhoek) - 's-Hertogenbosch	2025	P
499646	NL	ERTMS Eindhoven - Venlo border	Implementing ERTMS between Eindhoven and Venlo border	2027	P
499438	NL	ERTMS Haarlem e.o.	Implementing ERTMS on Beverwijk - Amsterdam	2024	P
30156239	NL	ERTMS level 2 Kijfhoek - Roosendaal border	introduce ERTMS level 2	2024	P
499542	NL	ERTMS Meteren - Eindhoven	Implementing ERTMS between Meteren West and Eindhoven	2026	P
499613	NL	ERTMS node Utrecht	Implementing ERTMS in the node Utrecht	2028	P
499506	NL	ERTMS Roosendaal - 's Hertogenbosch	Implementing ERTMS between Roosendaal and 's Hertogenbosch	2025	P
499579	NL	ERTMS Utrecht - Meteren	Implementing ERTMS between Utrecht and Meteren	2027	P
499681	NL	ERTMS Vlissing - Roosendaal	Implementing ERTMS between Vlissingen Sloehaven and Roosendaal	2032	P
30156062	NL	Harbourline - 25 kV connection Betuweline	change catanary supply 1,5 kV to 25 kV	2029	TBD
30155954	NL	Harbourline - New Theemsweg tracÃ©	Partial new track Harbourline to avoid crossing with waterway	2020	S
30155991	NL	Harbourline - Oude Maas river crossing	improving connection to Botlek Freightyard	2028	TBD
499471	NL	Implementing ERTMS in node Amsterdam	Implementing ERTMS in Amsterdam	2029	P
30157378	NL	Improving capacity Sophiatunnel	Upgrading tunnel capacity from 6 trains/hour to 10 trains/hour	2028	TBD
30158241	NL	Iron Rhine	New routing of the Iron Rhine (original: Budel grens - Vlodrop grens) through the Netherlands	2030	TBD
30063413	NL	Kijfhoek - Zevenaar, Construction Betuwe Line	Construction of the Betuwe Line	2007	S
30063447	NL	Maasvlakte II - Maasvlakte I	New line + Marshalling Yard	2012	S
30156097	NL	Railconnection Harbourline - Betuweline ERTMS	eliminate restrictions ATB island	2014	S
30164979	NL	Railmap ERTMS	Railmap future ERTMS deployment on RFC Rhine-Alpine	2032	P
30162515	NL	Redesign Geldermalsen / third track	free level track Geldermalsen - Beesd	2021	P
30162552	NL	Venlo PHS 740 Meter Trains	Extending 1 or 2 freight tracks to support handling 740 meter trains	2028	TBD
30156027	NL	Waalhaven Zuid, Redesign freightyard	redesign freightyard for containers	2020	P
30063515	NL	Zevenaar - Border -> 25 kV AC (Zevenaar 2)	Zevenaar: - change power supply 1500V into 25kV Zevenaar - border; - change power supply 1500V into 15kV border - Emmerich	2016	S
30063482	NL	Zevenaar - Border ERTMS deployment (Zevenaar 1)	ERTMS level 2 V2.3.0d from Zevenaar to Zevenaar Border	2014	S
30158673	NL	Zevenaar - Border installation third track	Installation of a third track	2022	S
30158611	NL	Zevenaar - Zevenaar Grens upgrade	ERTMS installation, change of power supply from 1500 V DC to 25 KV AC, construction of third track (see subprojects)	2022	S

Project Id	Country	Project Nam e	Project Description	Year of Im plem entation	Decision Status
30154424	BE	Bocht Ter Doest	New curve - a single track connection between the line to Zeebrugge and the line to Knokke. Trains can now roll directly between the different areas of the port without having to go to Brugge first and then return	2012	S
30156758	BE	ETCS equipment	Equipment of the Belgian part of the corridor with ETCS	2020	P
30156723	BE	Iron Rhine (other related projects)	Future modernisation works on the Belgian part of the Iron Rhine	open	TBD
30154490	BE	Iron Rhine: Electrification Herentals - Mol	Electrification of L15 between Herentals and Mol (part of the Iron Rhine)	2015	S
30156983	BE	Junction Krijgsbaan	Modernisation of junction Krijgsbaan (L27A) to provide a better access to the port of Antwerp	2025	TBD
30156803	BE	Junction Ledeberg & Schellebelle + Merelbeke	construction of junction	2021	TBD
30156948	BE	Junction Oude Landen	Construction of junction at Oude Landen (L27A) to provide a better access to the port of Antwerp	2025	TBD
30157016	BE	Level crossing removal	Level crossing removal on the Belgian part of RFC1	2025	TBD
30154523	BE	Liefkenshoek Rail Link	The new 16.2 km rail section between the left bank and the right bank of the port under the river Scheldt	2014	S
30156836	BE	Masterplan port of Zeebrugge	Extension and modernisation of Zeebrugge Formation with a new hub of 24 tracks in Zwankendamme and a fan of sidings in Zeebrugge	2022	TBD
30157135	BE	Port of Antwerp: left bank	Various extension and renewal works on the left bank of the port of Antwerp	2025	TBD
30157169	BE	Port of Antwerp: Right bank	Various extension and renewal works on the right bank of the port of Antwerp	2023	TBD
30157236	BE	Port of Gent	Various extension works in the port of Gent	2025	TBD
30157203	BE	Port of Zeebrugge	Various extension works in the port of Zeebrugge	2025	TBD
30157066	BE	Second rail access	Construction of a second access to the port of Antwerp	open	TBD
30157099	BE	Side tracks 750m	Construction of side tracks 750m on Belgian part of RFC1 apart from major projects where this is already included in other works	2025	TBD
30156915	BE	Third and 4th track Gent - Brugge	Building of 3rd and 4th track between Brugge and Gent (L50A)	2024	TBD
30156869	BE	Third track Brugge - Dudzele	Building of a third track between Brugge and Dudzele (L51, L51A and L51C)	2024	TBD

Project Id	Country	Project Nam e	Project Description	Year of Implementation	Decision Status
30111633	DE	ABS/NBS Karlsruhe-Basel, Karlsruhe - Rastatt	Construction tunnel	2024	S
30111846	DE	ABS/NBS Karlsruhe-Basel, Offenburg - Basel	Construction 3rd + 4th track	2031/2035	TBD
30130046	DE	ABS/NBS Karlsruhe-Basel, Rastatt-Offenburg	Construction 3rd + 4th track	2004	S
30104843	DE	Border NL/D - Oberhausen	ERTMS equipment existing line A relevant date/year for going-live can only be given once the building permit has been approved	open	P
30057833	DE	Border Emmerich - Oberhausen	3rd track A relevant date/year for going-live can only be given once the building legislation is existent	open	P
30109645	DE	Border NL/D - Dalheim - Rheydt Iron Rhine	Construction track Border NL/D-Dalheim, upgrade between Dalheim - Rheydt	open	P
498644	DE	ETCS equipment in the node of Basel	ETCS equipment on the DB Netz tracks in the node of Basel	2017	TBD
30112440	DE	Mainz/Wiesbaden - Mannheim	Construction High-Speed Line	open	TBD
30112233	DE	Oberhausen - Basel	ERTMS equipment existing line	2022	S

Project Id	Country	Project Nam e	Project Description	Year of Im plem entation	Decision Status
30065310	CH	Basel - Bellinzona - Chiasso Headway reduction	Block headway 3', Bellinzona, incl 750 m Bellinzona - Chiasso	2023	S
30065102	CH	Basel Rhine Bridge	Basel Construction of 2nd Rhine Bridge and renewal 1st bridge	2016	S
30065276	CH	Bellinzona - Luino upgrade	Bellinzona Luino line upgrade 750 m	2018	S
30065035	CH	Bern - Thun Headway 2	Bern - Thun Headway reduction 2'	2015	S
30154172	CH	Brig (Part SBB) Upgrade of station	Brig Upgrade of Station and signalling system (Part SBB)	2015	S
30158297	CH	Brig upgrade (Part BLS)	Upgrade of Station and signalling system	2015	S
30065349	CH	Ceneri Base Tunnel	Construction of Ceneri Basel Tunnel	2020	S
30065135	CH	Corridor Lines ERTMS	Corridor Lines Equipment with ERTMS	2018	S
30065425	CH	Corridor Lines Profile upgrade to 4m	Corridor Lines Profile upgrade to 4m	2020	S
30065540	CH	Disentanglement Liestal	Liestal - Construction of crossover possibilities	2025	S
499121	CH	Efficiency improvement Chiasso	Extension of sidings up to 750m	2020	S
30164418	CH	Eppenberg Tunnel	new tunnel, additional 2 tracks - total 4 tracks Däniken - Wöschnau	2020	S
498480	CH	ETCS equipment in the node of Basel (CH)	ETCS equipment on German tracks in CH	2017	TBD
30164486	CH	Fly over Muttenz	Level free crossing	2025	S
30164451	CH	Fly over Pratteln	Level free crossing	2027	S
30065467	CH	Gümligen - Münsingen 3rd track	Gümligen - Münsingen construction of a 3rd track	2029	S
30065240	CH	Gotthard Basel Tunnel	Gotthard construction of the Base Tunnel	2016	S
30056540	CH	Lötschberg Base Tunnel (LBT)	Construction of Lötschberg Base Tunnel (LBT): - Single line tube Frutigen - Mitholz - Ferden - Excavation of 2nd tube Mitholz - Ferden - Double line (2 tubes) Ferden - Raron - Connexions to existing network	2007	S
30056486	CH	Lötschberg Base Tunnel, 2nd track middle part	Equipment of the section Ferden-Mitholz (2nd tube) with railway infrastructure. Optional also the excavation of a 2nd tube between Mitholz and Frutigen is evaluated. Strategic development project of CH. Foreseen in the National Network expansion step 2025 for the National offer step 2030. Decision through Swiss Parliament is expected for 2018. Start of realisation not before 2025.	2035	TBD
499087	CH	Node Bellinzona	Upgrade marshalling yard San Paolo	2019	S
30065002	CH	Rütti - Zollikofen 3rd track	Rütti - Zollikofen building of a 3rd track	2013	S
498909	CH	Replacement control center Chiasso	Construction of a new control center	2021	S
499155	CH	Rupperswil-Mägenwil	Capacity expansion	2023	TBD
30154826	CH	Spiez upgrade	Upgrade of station. renewal of tracks and switches	2016	S

Project	Count	Project Name	Project Description	Year of Implementati	Decision Statu
30064657	IT	Chiasso-Milano SM sidings upgrade to 750m	The project will remove the last bottleneck regarding train length on the relation Chiasso-Milan.	2016	S
30064454	IT	Chiasso-Milano SM technology improvement Phase1	Enhancement of the performance of the signalling sections to reduce travel time and increase capacity. The project will be developed between the stations of Chiasso - Monza - Milano Smistamento, including the overall reconfiguration of the station in Monza.	2018	S
30163515	IT	Chiasso-Milano SM technology improvement Phase2	Enhancement of the performance of the signalling sections to reduce travel time and increase capacity.	2018	P
30064763	IT	Chiasso-Milano upgrade to PC/80	Upgrade to PC/80	2015	S
30159978	IT	Chiasso-Monza installation of 3rd + 4th track	Chiasso-Monza installation of 3rd + 4th track	2027	P
30163201	IT	Domo-Rho implementation remote control	Implementation of remote control technology ACC-M	2019	P
30163444	IT	ERTMS Border-Luino and Border-Domodossola	ERTMS installation	2016	S
30163394	IT	ERTMS Chiasso-Milano Smistamento	ERTMS installation	2018	S
30163862	IT	ERTMS Completion Corridor Rhine - Alpine	Step by step completion of the whole corridor ERTMS Installation.	open	P
30064412	IT	ERTMS Domodossola - Novara (Via Borgomanero)	ERTMS Installation	2017	S
30163814	IT	ERTMS Milano - Genova	ERTMS Installation	2020	P
30160053	IT	Gallarate-Parabiago installation 3rd Track	Gallarate-Parabiago installation 3rd Track	2025	P
30064694	IT	GE Borzoli-GE Succursale new link	New connection between Genova Borzoli and Genova Succursale. The project is still in feasabiltity phase.	2025	TBD
30159829	IT	Genoa-Campasso station upgrade	Genoa-Campasso station upgrade in preparation to the new planned connection of the Succursale line to Genova Marittima (port).	2020	P
30160092	IT	Gronda Ovest - 2nd tracks Luino-Laveno-Cadenazzo	Gronda Ovest	2033	P
30163274	IT	Luino-Milano/Novara - Profile upgrade to PC 80	Upgrade of the profile agreed with the Swiss Ministry	2020	S
30068100	IT	MI Rogoredo-Pieve Emanuele track quadrupling	Four Tracks in the section Milano Rogoredo-Pieve Emanuele	2023	P
30163677	IT	Milano - Genova upgrade to PC/80	upgrade to PC/80	2025	TBD
30163563	IT	Milano Lambrate terminals upgrade - Phase1	Improvements of the terminals Milano Lambrate	2022	S
30064799	IT	Milano terminals upgrade	Improvements of the terminals Milano Segrate and Milano Smistamento	2020	P
30064727	IT	Milano upgrade power supply	Upgrade of power supply	2020	P
30065068	IT	Milano-Pavia headway 3'	Reduction to 3' of the headway in order to increase capacity	2020	P
30163481	IT	Milano-Pavia technology improvement	Enhancement of the performance of the signalling sections to reduce travel time and increase capacity.	2020	P
30163631	IT	Novara - Genova upgrade to PC/80	Upgrade to PC/80	2025	TBD

Project	Count	Project Name	Project Description	Year of Implementati	Decision Statu
30068214	IT	Novara bypass	Bypass of Novara	open	P
30065620	IT	Novara station upgrade-Phase 1	Upgrade of the node of Novara to a better access also for the Ro-Ro Terminal	2021	P
30068179	IT	Oleggio-Arona installing second track	Second track on the section Oleggio - Arona	2024	P
30066037	IT	Parabiago-Rho upgrade to 4 tracks and link -Y-	Quadrupling of the section Rho-Parabiago and Y link	2019	P
30163711	IT	Pieve Emanuele - Pavia track quadrupling	Four Tracks in the section Pieve Emanuele - Pavia	2026	P
30065654	IT	Program to allow trains up to 750 m Luino-Milan	The program encompasses five project in different locations along the section Luino-Milan whose realisation will allow to offer paths for trains up to 700m and to 750m in limited amount.	2018	S
30064375	IT	Program to prolong sidings up to 750 m Domo-No/Mi	The program includes several projects all aiming at increasing up to 750m the train length allowed on the involved sections. Addressed relations are those from Domodossola to Novara and from Domodossola to Milan. The overall program foresees ten stations to be upgraded that are located on the connections: Domodossola-Novara both via Borgomanero and Arona and Domodossola-Milan via Arona-Sesto Calende.	2016	S
30161975	IT	Program to update the train length from Milan to Genoa	The program includes investments to allow longer trains between Milan and Tortona, being the longer trains to Genoa assured by the project "Giovi Pass".	2025	P
30161932	IT	Program to update the train length from Novara to Genoa	The program includes projects to increase the allowed train length on the connection from Novara to Genoa via Ovada. The section that is under implementation within the project "Giovi Pass" is excluded.	2025	P
30066111	IT	Rho bypass	Bypass of the station of RHO	2020	S
30160017	IT	Seregno - Bergamo - Trevigilio, Gronda Est	Bypass Milano node	2027	P
30163747	IT	Seregno-Treviglio-Voghera expected new line	Expected new line	2035	TBD
30159935	IT	Terzo Valico (Giovi pass) new line construction	Terzo Valico (Giovi pass) new line construction connecting the port of Genoa with Tortona.	2022	P
30066220	IT	Tortona-Voghera quadrupling of line	Upgrade to 4 tracks of the section Tortona-Voghera	2027	P
30163597	IT	Upgradng stations Pavia and Rho	Improvements of the stations Pavia and Rho	2016	S
30068066	IT	Vignale-Oleggio installation second track	Doubling of the section	2022	P
30159864	IT	Voltri - Brignole, structural upgrade-Phase 1	Genoa Voltri - Genova Brignole, Structural upgrade of line	2017	S