

# Capacity requirements

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# 1 Engineering works

## 1.1 Planned major engineering works

See Annex 3 B - Planned major engineering works.

# 2 Pre-arranged paths for international corridors

Pre-arranged paths for international “Rail Freight Corridors” are published in mid-January on each freight corridors website.

Link to freight corridor ScanMed RFC [www.scanmedfreight.eu](http://www.scanmedfreight.eu)

# 3 Capacity restriction

## 3.1 Background

Capacity limitations with high impact on traffic occur on those parts of the railway network where capacity requirement for train paths is higher than the available capacity; applications for train paths cannot then be fully satisfied. On lines with capacity limitations to the Swedish Transport Administration establish the preconditions for the rail traffic that can be supplied with a high standard of transport quality. In order to be able to use the capacity in an efficient way the Swedish Transport Administration establishes a capacity plan for maximum capacity utilization in affected areas and stretches.

## 3.2 Purpose

The capacity plan shall be used as preconditions in the capacity allocation process for the purpose of:

- achieving efficient capacity utilisation
- guaranteeing punctuality by means of robust running timetables

The Swedish Transport Administration’s published capacity plan shall serve as the basis for the applications made by railway undertakings for train paths and the Swedish Transport Administration’s timetable construction.

## 3.3 Traffic Structure

For certain major engineering work and other capacity restrictions that have a high impact on traffic, a specific capacity plan shall be drawn up describing available capacity.

## 3.4 Other capacity restrictions Stockholm

### 3.4.1 North of Stockholm Central

Trains operating on Stockholm Central, shall normally be driven on outer track on the four-track stretch of line Tomtebodavägen – Skavstaby (via Arlanda) – Myrbacken and Tomtebodavägen – Huvudsta. Crossing points<sup>1</sup> however, are located at the branch station Skavstaby. In order to avoid capacity losses, trains that are driven on different tracks, but which lack contact points with each other, make joint use of train path channels where this is possible.

The four-track stretch of line Stockholm Central – Tomtebodavägen (track U1, U3 and N1, N3) enables trains to/from Ostkustbanan and Mälardalsbanan operate independently. North of Huvudsta the number of trains is limited by the capacity situation on the stretch of line Stockholm Central/Stockholm City – Tomtebodavägen and how the partial four-track stretch of line Barkarby-Kallhäll is used.

The double track Citybanan connects at Tomtebodavägen (tracks U2, N2). It is a part of the inner track system within the Stockholm area.

### 3.4.2 South of Stockholm Central

The double track Citybanan connects at Stockholms södra (track 1-2). Trains operating on Stockholm Central shall normally be operated on outer track on the stretch Årstaberget – Flemingsberg (via Södertälje syd) – Järna. Crossing points however, are located at the branch stations Flemingsberg and Järna. In order to avoid capacity losses, trains that are driven on different tracks, but which lack contact points with each other, make joint use of train path channels where this is possible.

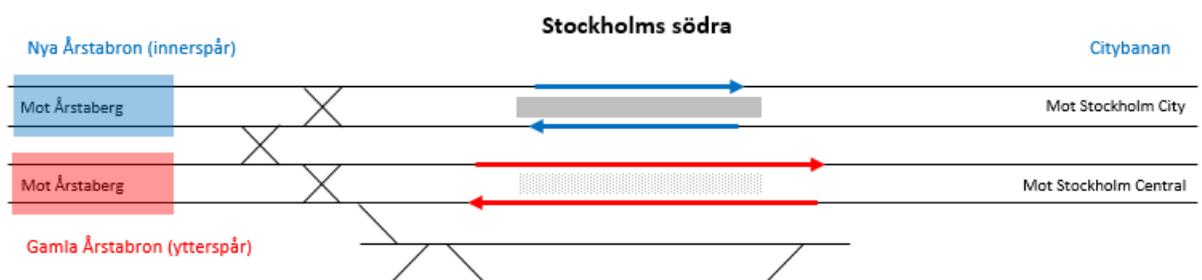


Figure 2: Schematic track plan Stockholms södra. South of Årstaberget the two double tracks changes to one four-track

<sup>1</sup> Crossing points in this context are understood to be points/switch connections where trains are allowed according to plan to be led over from an inner track to an outer track, and vice versa.

### 3.4.3 Citybanan

Citybanan is reserved for commuter train.

The stopping times at Stockholm City are restricted in length to two minutes. During off-peak traffic, exceptions can be made for fulfilling special wishes, for example equip trains and train set changes. On these occasions changing of direction can be done on tracks 1-4.

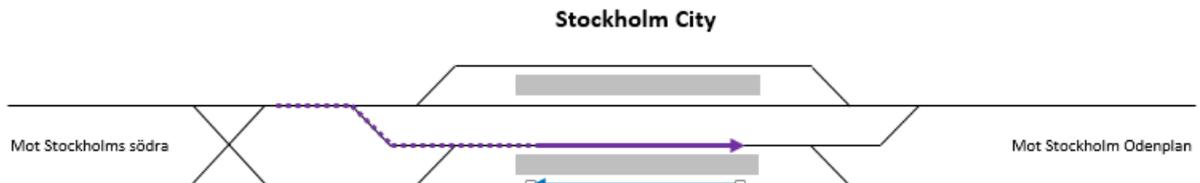


Figure 3: Stockholm City Station: examples of train set replacement to the south due to vehicle faults. The purple line illustrates the new train set coming from the depot in Älvsjö; the blue line shows the train set to be replaced

Trains operating on Citybanan must normally remain on the inner tracks on the four-track stretches of line Tomtebodavägen övre – Skavstaby (via Märsta) – Myrbacken and Tomtebodavägen övre – Huvudsta, Barkarby-Kallhäll and the stretch of line Årstaberget-Flemmingsberg (via Södertälje hamn) – Järna. Crossing points however, are located at the branch stations Skavstaby, Flemmingsberg and Järna.

### 3.4.4 Stockholm Central

In order to achieve better utilisation of the track capacity at platforms, special planning conditions apply for Stockholm Central. These concern primarily passenger traffic, but the capacity available on the platform tracks is also an important precondition in order for the flow of goods trains and other movements to be able to function efficiently without stopping.

The traffic at Stockholm Central is divided into three groups, with in part different preconditions:

- through-trains
- turning trains from the south
- turning trains from the north.

The planning assumptions apply during peak traffic; at other times, exceptions can be made from them in order to meet specific wishes.

#### **Through-trains**

Through-trains from the south shall normally operate on tracks 15-19 and through-trains from the north shall operate on tracks 10-14. Freight trains operate on all through-tracks (10-19) unless they include wagons with special transport conditions

Since platform capacity is limited during peak traffic shall long stops be avoided. The stopping times are restricted in length to ten minutes. During off-peak traffic,

exceptions can be made for fulfilling special wishes, for example night trains with lay-overs, equip delayed trains and at events.

***Coupling and uncoupling of railcar trains***

The coupling together of railcar trains shall be avoided during peak traffic. The changing of train parts between different tracks may only be performed during off-peak traffic since shunting movements consume more capacity.

***Turning trains from the south***

Turning trains from the south should normally operate on tracks 15–19<sup>2</sup>. After the stop at Stockholm Central the trains continues directly to the C-group where turning takes place, Some of the trains continues via E-Group to Karlberg where turning takes place on Track M, V1, D1 or D2 (at least one of the tracks should be available for through-trains). After turning, the trains are driven from C-Group to tracks 10-14.

Turning that requires right-hand track use (referred to as crossing) when approaching or departing from Stockholm Central is only allowed if no train path channels in the opposite direction of operation are put into use.

***Railcar train and loco-hauled train with driving trailer/two locomotives / (SMS train)***

Activity	Time frame
Stop at Stockholm Central (Arrival Tracks 15–19)	10 minutes
Stop at Norra Bantorget (Service Tracks E6–E7)	20 minutes
Holding/turning at Karlberg (Track M, V1, D1 or D2)	30 minutes
Stop at Norra Bantorget (Service Tracks C2–C4)	30 minutes
Stop at Stockholm Central (Departure Tracks 10–14)	10 minutes

***Loco-hauled train***

Locomotive terminal looping is allowed given that no train path channel may be utilized.

***Turning trains from the north***

Turning trains from the north which operates on track N1 shall normally operate on tracks 1-8 and trains which operates on track N3 shall normally operate on tracks 13-16.

Operation of tracks 1-8 is restricted by a number of factors:

- Tracks 1–2 are only available for Arlanda Express airport shuttle services.
- Track- and platform length varies from track to track.
- The possibility for looping on Track 3 is lacking.
- The possibility for simultaneous entry and exit varies between tracks.

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<sup>2</sup> If necessary, trains from the south can turn on track 14

- Movements to and from Track 8 (north side) is dependent on the traffic on Tracks 10–11. Operations on Track 8 shall therefore be limited and must be coordinated with the traffic to Tracks 10–11.

In order to make it possible for sufficient track capacity to be offered, the following time frames shall be applied for turning trains coming from the north.

***Railcar train and loco-hauled train with driving trailer/two locomotives / (SMS train)***

Activity	Time frame
Stop at Stockholm Central without reprovisioning (Tracks 1–8)	45 minutes
Stop at Stockholm Central with reprovisioning (Tracks 1–8)	60 minutes

***Loco-hauled train***

The stopping time for loco-hauled trains with terminal looping is max. 60 minutes at Stockholm Central. Locomotive loop turning, however, cannot always be performed according to wishes for example during peak traffic.

## 3.5 Other capacity restrictions Gothenburg

### 3.5.1 Stretches of line within Gothenburg

The operational point Gothenburg consists of the sub-points Partille, Sävedalen, Göteborg Sävenäs, Olskroken, Göteborgs C, Gubbero, Almedal, Göteborg Marieholm, Göteborg Kville, Pölsebo and Göteborg Skandiahammen. In addition, it includes the sub-points Sävenäs Marshalling Yard och Göteborg norra that are controlled from their own signal box.

The capacity within the operational point is restricted in the first instance by the crossing train paths that occur when grade-separated crossings are not extended to the extent that today's traffic requires.

#### **Hamnbanan**

Göteborgs hamnbana, even though this in its entirety is considered to be located within the operational points Göteborg Kville, Pölsebo and Göteborg Skandiahammen, is in practice a single-track line with densely positioned signals in order to provide ample capacity for trains that are driven in the same direction, but not for oncoming traffic. There are two tracks on the stretch Pölsebo-Skandiahammen but one track is expected to be used primarily for shunting. Göteborgs hamnbana has sufficient capacity to cope with five trains per hour and direction.

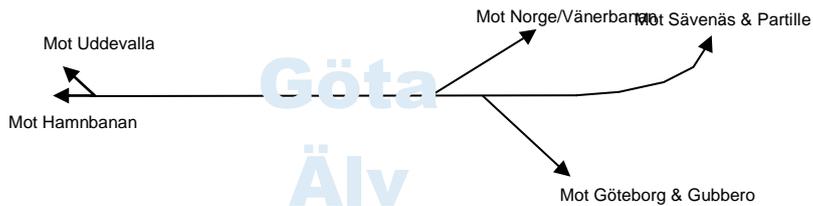
#### **Marieholsbroarna**

In connection with the allocation process, a balance must be achieved between the need for bridge openings and the capacity of the railway. The bridges needs to be opened 18 times per day. This means one bridge opening per hour, excluding the

period between 06:00-09:00 and 15:00-18:00. The opening time for the Marieholmsbroarna is 15 minutes.

The stretch of line from Göteborg Kville over the Göta älv at Marieholmsbroarna has three different destination points:

- Göteborg Marieholm for trains to Norway /Vänerbanan
- Gustavsplatsen for trains to Sävenäs and Västra stambanan
- Olskrokskryset for trains to Gothenburg Central and Gubbero (Västkostbanan and Kust till kust-banan).



Marieholmsbroarna are openable for shipping along Göta älv. In general, rail traffic has precedence over boat traffic.

### 3.5.2 Gothenburg Central

#### General

Gothenburg Central is a terminus with three double-track connections. These are:

- Olskroken-Västra stambanan (tracks 71 and 72)
- Olskroken-Norge/Vänerbanan (tracks 73 and 74)
- Gubbero (tracks 85 and 86).

Adjacent to the platform tracks there is a holding rail yard and a depot with a cleaning hall and two different service halls for vehicles. The rail yard has low-speed operations. The capacity is determined in the first place by the number of crossing trains and shunting routes.

#### Subdivision of platform tracks

In order to create the highest possible capacity, the platform tracks must be used on the basis of a certain pattern in order to avoid crossing train paths between the different lines. Trains that arrive from a certain line may not for the same reason depart towards another line unless the situation is studied in each individual case. The best flow is achieved by using the track groups in accordance with the following table, which was also a precondition when drawing up the bottleneck plans.

Track group	Comprises tracks	Used to/from
A	1–7	Västra stambanan
B	8–10	Norway/Vänerbanan, Bohusbanan
C	11–16	Västkostbanan, Kust till kust-banan

### **Time at platforms**

It is allowed to be at the platform 15 minutes before departure or after arrival. In some cases, longer times at the platforms can be offered.

### **Intervals between trains on platform tracks**

The trains have predetermined departure and arrival times at Göteborgs central every fifth minute. This interval is determined by the fact that it takes about 4.5 minutes from the departure of a train until the next train can arrive as a consequence of intersecting train paths at the terminus rail yard. Tracks 11 and 12 can be used both in track groups B and C, depending on the needs.

### **Shunting**

During the peak traffic periods (06.00–08.00 hours and 16.00–18.00 hours), shunting can only take place after special consideration in each individual case. Each shunting movement shall then be placed on an equal footing with a train movement in a corresponding track section. In order for shunting to be possible, a train path shall thus be unused so that the shunting movement can use the interval in time that will thereby be made available.

### **Locomotive terminal looping**

Loco-hauled trains that arrive and that will then depart with the same hauling locomotive shall have at least 45 minutes between the time of arrival and the time of departure. During this time it must be possible to switch the train to the O-group for locomotive terminal looping and then switch it back to a platform track

## **3.6 Other capacity restrictions Malmö**

### **3.6.1 Coordination with Danish stretch of line**

For Öresundsförbindelsen (the Öresund link), shall the timetables be coordinated so that they also serve on the connecting Danish section from Peberholm to Köbenhavn H (passenger traffic) and the border station Padborg (freight traffic).

For the stretch Malmö central–Hyllie (Citytunneln)–Lernacken only a small number of vehicle types are driven owing to the tunnel restrictions.

### **3.6.2 Malmö central**

In order to achieve better utilisation of the track capacity at platform tracks, special planning conditions apply for the through-tracks 1–4 at Malmö central. These tracks shall be used on the basis of the following principles:

- Trains shall be through-trains, i.e. not have Malmö central as their final or outgoing station.
- The composition of the train shall not be changed, for example in the form of the coupling on or uncoupling of a trainset(s)
- The stopping time shall be between two and four minutes.

These planning conditions apply for the larger part of the traffic day. Certain exceptions can be made, in the first place during off-peak traffic (approximately 19.00–06.00 hours), to fulfil special wishes.

Switching between train track and depot means in most cases crossing movements, and shall be minimised in peak traffic.

### 3.6.3 Helsingborg Central

Platform tracks are optimised for train lengths of up to 160 m. The possibilities to conduct operations using long trains is handled in the timetable process in each individual case.