Placement of railway stations with respect to track profile

The Swedish Transport Administration's governing document currently lacks requirements regarding how new meeting tracks/bypass tracks should be positioned in terms of profile. The general requirement is that tracks allowed for freight traffic should not incline more than 10 per thousand (with the exception of 12.5 per thousand for shorter distances). However, placing a meeting track/bypass track in such a way that the entire track is at a 10 permille grade is not appropriate for several reasons listed below, nor have meeting stations been placed that way historically when our existing railroads were built. Any new requirements could partly apply to medium gradients on tracks where freight trains are expected to stand still waiting for other trains, but it could also be relevant to require gradients in close proximity to meeting tracks/bypass tracks.

Content of the project

Aspects that could be researched in connection with the question

- Mean slope on meeting track/bypass track:
  - Capacity. If the meeting track/bypass track slopes upwards in the train's direction of travel, it takes longer to start.
  - Stuck driving. During extreme slippage (e.g. leaf slippage) it can be difficult to get started and pick up speed with a freight train.
  - Freezing. Locomotive drivers on freight trains normally release the train brake when the train has stopped and instead stand still with the locomotive brake applied. This is especially important in winter when there is otherwise a risk of the train freezing if you need to have the train brake applied to stand still. If the meeting track/passing track is inclined too much, it can therefore lead to freight trains "freezing" in winter.
  - Electricity consumption. Starting uphill increases electricity consumption.
  - Arrangement of carts. Emergency set-up is made more difficult if there is a strong slope, or if in the future you want to build a track in connection with the
meeting track/bypass track intended for setting up, for example, broken wagons or maintenance vehicles.

- Slope on tracks adjacent to meeting tracks/bypass tracks:
  - If the meeting track/passing track is placed on a high point in the profile, it is faster to get up to speed when starting in both directions. For bypass tracks on one side of a double track, it is most relevant that it slopes downhill in the normal direction of travel of the train.
  - Electricity consumption. The same reasoning as for capacity, if trains normally start downhill, electricity consumption is reduced.
  - Signal location. The fact that trains sometimes need to stop at the entrance signal speaks against strong gradients in connection with meeting tracks/bypass tracks. This is likely to be less of a problem as new meeting stations/bypass stations are normally built with simultaneous access.

Student competencies

Mechanics and railway technology.

Supervisors

Cedric Hanneberg, cedric.hanneberg@trafikverket.se, +46 10 123 6387

Elena Kabo, elena.kabo@chalmers.se, +46 31 772 1302

Anders Ekberg, anders.ekberg@chalmers.se, +46 31 772 3480