

Substructure: Design and construction. Minimum distance between a railway line and a road

1 Purpose and scope

This chapter stipulates requirements for the minimum distance between a railway line and a road.

The regulations apply in the following instances:

- For appraisals of projects involving new sections of road or for the expansion of existing roads in immediate proximity to existing or future railway lines, i.e. roads that run virtually parallel to or almost touch a railway line.
- In respect of the design of new railway lines that run in immediate proximity to existing or planned roads.
- As a basis of formulating proposals for changes in cases where roads are located so close to railway lines that an improvement of the local conditions may be necessary for safety reasons or to prevent operational problems from arising.

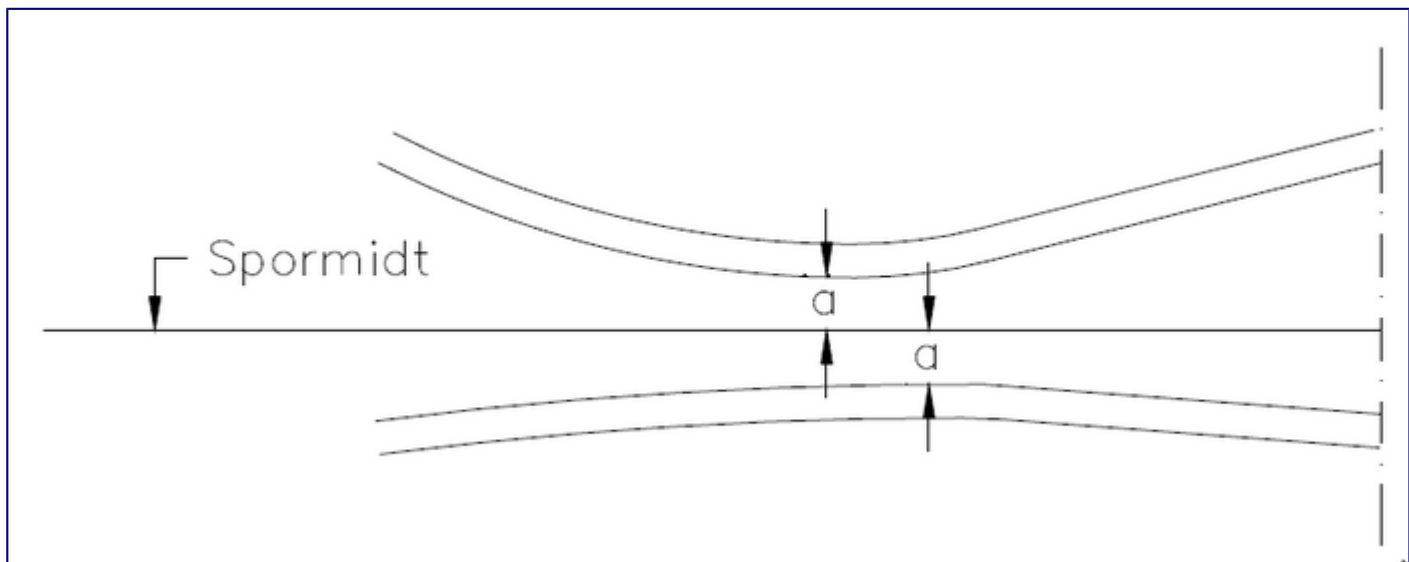
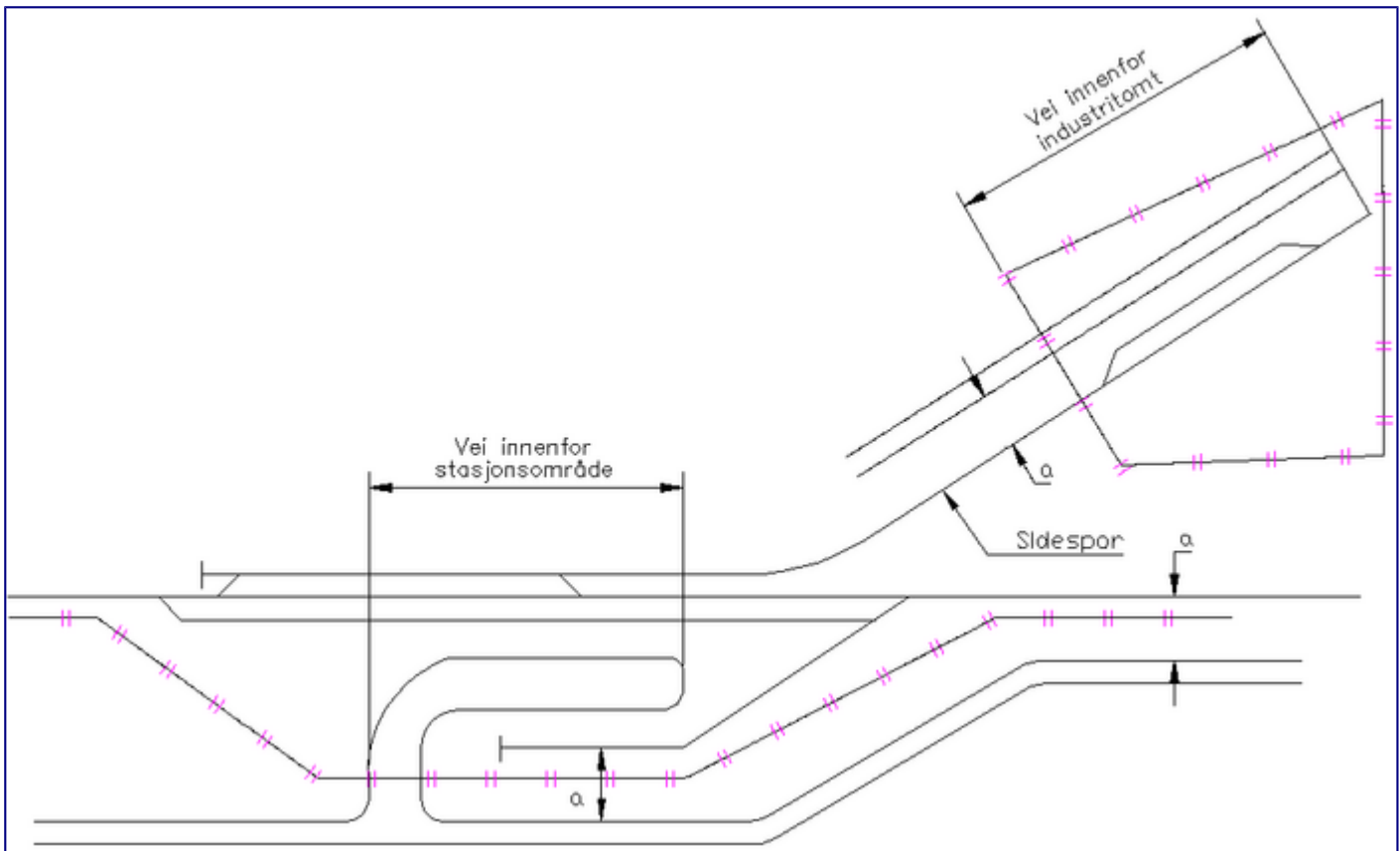


Figure 1: Example of an instance where the regulations must be applied

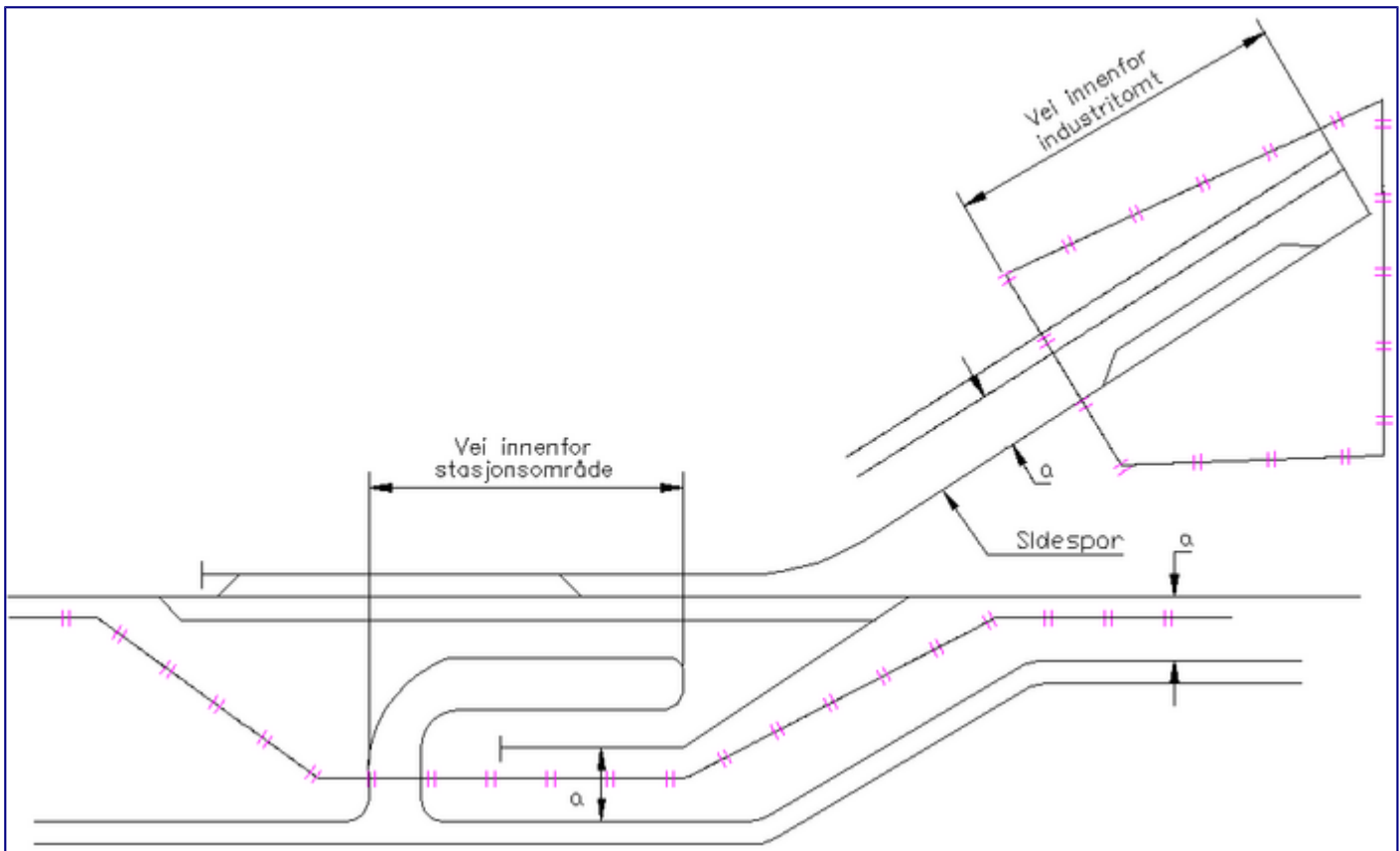
The regulations do not necessarily apply to the following situations:

- When it concerns the distance between the line and NNRA roads within station areas. In such cases, the road may be occasionally used for the temporary storage of snow, for example.
- When it applies to the distance between the line and roads within industrial and port areas.



Figur 2: Example of an instance where the regulations may be applied

The regulations do not apply to minimum distances between roads and railway lines at locations where a secondary road crosses the railway line on the level. In such cases, the minimum distance from the main road to the railway line depends on the required length of the secondary road, from the main road to the level crossing. This specific length is determined by traffic-technical assessments that are not dealt with in these regulations.



Figur 3: Example of an instance where the regulations are not applied

2 Definitions and terms

2.1 Railway lines

'Railway lines' in this context are understood to mean the following:

- the main line, when a road infrastructure project in proximity to an open line is being appraised
- the outermost station track closest to the road, i.e. a train track or other station track, when a road infrastructure project in proximity to a station area is being appraised
- a siding to an industrial or port area

2.2 Roads

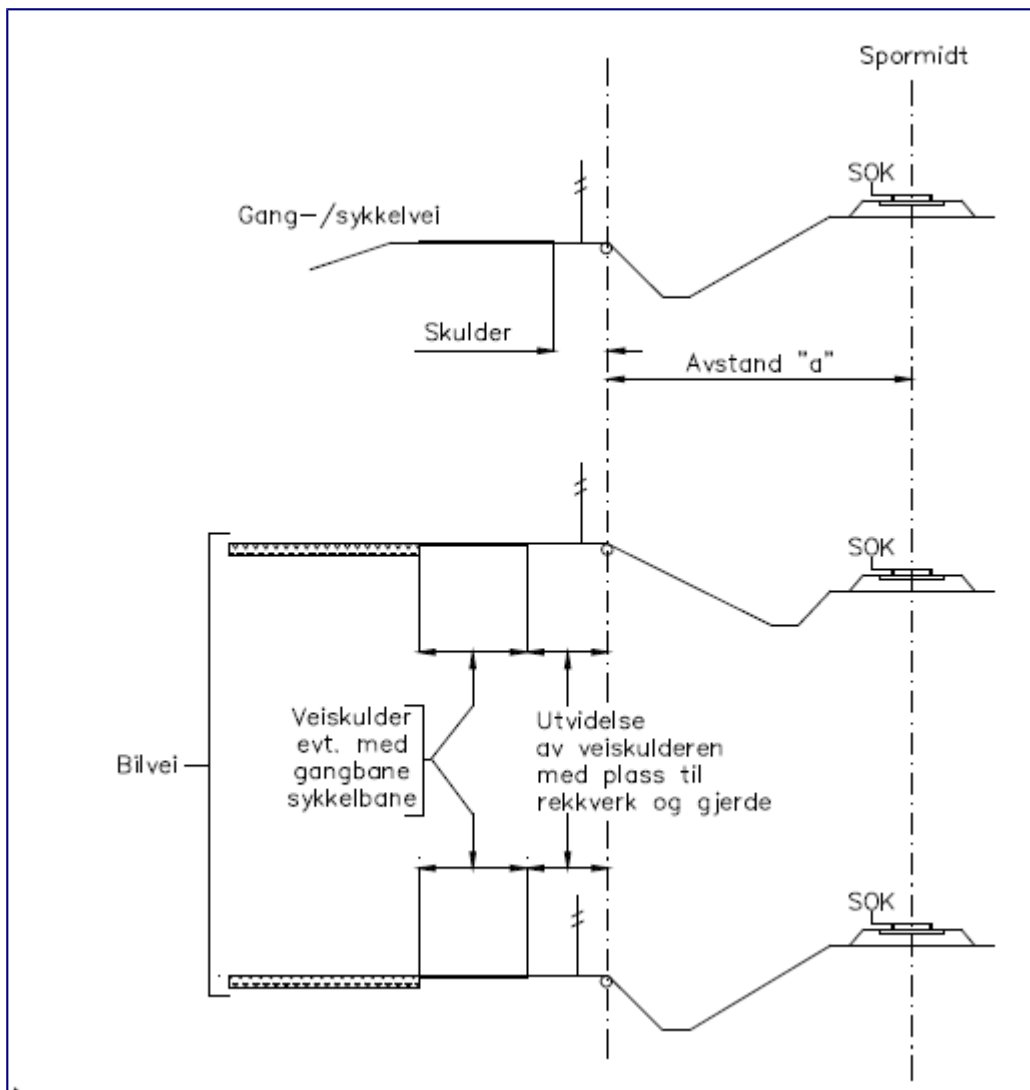
'Roads' in this context are understood to mean the following:

- all roads assumed to be designed for vehicular traffic and which may, in addition, include pedestrian and cycle lanes or pedestrian and cycle tracks.

Separate requirements for distance from railway lines apply to hiking trails and/or dedicated pedestrian and cycleways, refer to [avsnitt 3.2.2](#).

2.3 Distance between railway lines and roads

The distance between railway lines and roads in this context is understood to mean the distance from the centre of the track of the closest (future) railway line to the crown of the road, cf. Fig. 4.



Figur 4: Distance between railway lines and roads

The 'crown' in this context is understood to mean the line of intersection between the shoulder and the embankment or ditch slope.

When applied to pedestrian and cycleways, 'shoulder' in this context is understood to mean the outermost part of the formation on which fencing can be erected.

When applied to roads, 'shoulder' in this context is understood to mean the part of the road formation that lies outside the carriageway and which is completely or partially suitable for driving on. It may include pavements and cycle lanes or cycle tracks. The shoulder may also contain additional width to include crash barriers or fencing, the so-called 'shoulder extension'.

3 Minimum distances between the centre of the track and the crown of the road

The minimum distance between the centre of the track and the crown of the road is determined in accordance with the following considerations:

- Construction-technical considerations
- The risk of the line being blocked and installations damaged as a consequence of vehicles being accidentally driven onto the line
- Considerations regarding snow clearance and snow storage

- Considerations regarding the safety provisions concerning the live parts of overhead contact line systems
- Considerations regarding the working environment on railway land

For each of these considerations, the following section stipulates how minimum distances are determined. The highest value for the distance between the centre of the track and the crown of the road that may be deduced from the above considerations is selected.

3.1 Construction-technical considerations

In the first instance, the distance is appraised based on construction-technical considerations, taking into account terrain conditions, local geotechnical and hydrological factors and the structural potential. From a construction-technical perspective, the minimum distance must increase if it is less than the distances required in accordance with the following considerations.

3.2 The risk of the line being blocked and installations damaged as a consequence of vehicles being accidentally driven onto the line

From a railway perspective, the risk is greatest when the maximum permissible speed of the line is high. The requirements for the prevention of risk resulting from vehicles being accidentally driven onto the line must be stipulated in all instances where the (assumed) maximum permissible speed of the line is 60 km/h or more and also where the sighting distances from the line to points where the road starts to run parallel to the line are regarded as insufficient, cf. Table 1.

3.2.1 Sighting distances on lines with a maximum permissible speed of 55 km/h or less

On lines with a maximum speed of 55 km/h or less, there is a requirement for a minimum sighting distance from the line and on to the point where the road starts to run parallel to the line, cf. Table 1. If the sighting distance is less than the values specified in Table 1, risk prevention measures regarding a vehicle being accidentally driven onto the line must be implemented, cf. [avsnitt 3.2.3](#).

Tabell 1: Sighting distances that require the implementation of risk prevention measures regarding vehicles being accidentally driven onto the line where the maximum speed of the line is less than 60 km/h

Maximum permissible speed [km/h]	Sighting distance less than [m]
55	240
50	200
40	125
30	70
20	35
15	20

When the maximum permissible speed of the line is less than 55 km/h and the sighting distances are greater than the values specified in Table 1, requirements should, however, still be stipulated in respect of risk prevention measures regarding vehicles being accidentally driven onto the line in instances where any closure of the line would have very serious operational consequences. For example, this would apply in instances where the line experiences high traffic density and where traffic could not be transferred to other tracks.

Regardless of the speed of the line, the probability of vehicles being accidentally driven onto the

line must be taken into consideration. This will depend, for example, on the assumed maximum permissible speed of road traffic, the road's alignment (e.g. curve radius) and whether the line runs along the the outer or inner side of the road curve.

3.2.2 Minimum distances that do not require the implementation of safety measures

When the crown of the road is higher than the top of the rail, a minimum distance of $a = H + 9$ m is required, where H is the difference in height between the rail level and the nearest crown.

When the crown is at the same height or a lower height than the rail level, but not lower than 2.5 m below the rail level, a minimum distance of 9 m is required.

When the crown is lower than 2.5 m below the rail level, a specific minimum distance is not required regarding the risk of the consequences of vehicles being accidentally driven onto the line. The distance between the centre of the track and the crown in such cases is determined on the basis of other considerations.

When the crown is at the same level or higher than the rail level, the distance between the centre of the track and hiking trails, as well as any dedicated pedestrian and cycleways, must be at least 5 metres. When the crown is lower than the rail level, a specific minimum distance is not required regarding the risk of the consequences of vehicles being accidentally driven onto the line. The distance between the centre of the track and the crown in such cases is determined on the basis of other considerations.

3.2.3 Satisfactory safety measures

If the minimum requirements regarding the distance between lines and roads in [avsnitt 3.2.2](#) cannot be complied with, satisfactory safety measures must be implemented to prevent vehicles being accidentally driven onto the line.

The following safety measures may be implemented to prevent vehicles being accidentally driven onto the line:

- concrete crash barriers/concrete sections
- steel rail or steel sheet crash barriers, both possessing the same strength as bridge crash barriers (H2 or H4, cf. [Statens vegvesen Håndbok 231](#))
- for hiking trails and/or dedicated pedestrian and cycleways, chain link fencing or similar must be installed as a safety measure

The purpose of crash barriers is to prevent motor vehicles from crashing through a roadside ditch and being accidentally driven onto the line, as well as to protect installations from damage. If such an incident were to occur it could have very serious consequences. Therefore, crash barriers designed for larger vehicles must be used, i.e. strength class H2 or H4 in accordance with NPRA norms. The minimum requirement for steel crash barriers is strength class H2.

Strength class H4 must be used when the speed limit of the road is 90 km/h or more, the maximum speed of the line is 140 km/h or more and/or where the risk of vehicles being accidentally driven onto the line is greater than normal, and where the consequences of vehicles being accidentally driven onto the line would be significant (high-speed line, vehicles falling onto passing trains, etc.), cf. [avsnitt 3.2.3.2](#).

Crash barriers must extend past the area along which the distance to the line is less than that specified in [avsnitt 3.2.2](#). This extension must be calculated on the basis of [Statens vegvesen Håndbok 231 Rekkverk, kap. 4](#). A special risk assessment must be carried out on each individual case to assess whether motor vehicles driving off the road at a point ahead of the risk zone could continue down towards the line behind the crash barrier.

3.2.3.1 Concrete crash barriers/concrete sections

Concrete crash barriers may be constructed from prefabricated concrete sections or cast in situ. The minimum height must be 1.4 m above the carriageway to prevent high-sided vehicles from rolling over the crash barrier.

When the crown of the road is above the rail level and when the minimum possible distance is required between the crown of the road and the centre of the track, it will generally be necessary to provide a retaining wall. A concrete crash barrier may then be constructed as the uppermost part of this wall.

When the crown of the road is at the same height as the rail level, or lower, a concrete crash barrier must be constructed up to 2.5 m below the rail level as a separate structure, or built on top of a retaining wall. Bearing in mind snow clearance, it may be necessary to fit mesh fencing on top of the concrete crash barrier.

3.2.3.2 Steel rail or steel sheet crash barriers

Steel crash barriers are generally made from steel guard rails and steel posts. They must be specially designed to minimise the consequences to both vehicles and the barrier itself. The minimum height of a steel crash barrier must be 1.4 m above the carriageway.

3.3 Considerations in respect of snow clearance and snow storage

Specific strips of land must be maintained at the sides of tracks to allow for the railway's snow clearance and snow storage operations using track cleaners and snow blowers. Such strips of land must be large enough to ensure that the road infrastructure does not mean that there will have to be a significant increase in the railway's snow clearance resources or lead to a reduction in operational safety during extremely unfavourable snow conditions.

3.3.1 Strip of land dependent on number of tracks, adjacent terrain and walkways

The required number of strips of land for the railway's snow clearance operations is dependent on the following factors:

- number of parallel tracks
- gradient of the terrain at the side of the tracks
- any walkways at the side of the tracks
- local conditions with regard to volume of snow and drifting snow

However, the minimum distance between the centre of the track and the crown of the road in accordance with [avsnitt 3.2](#) applies at all times.

3.3.1.1 Strip of land at the side of a single-track line

When there is no requirement for a walkway at the side of the track, a width b of at least 7 m is required, regardless of whether the area at the side of the track is rising or falling. If a walkway is required, the width must be increased to at least 8 metres. A walkway may be necessary, for example, if the track functions as a spur line.

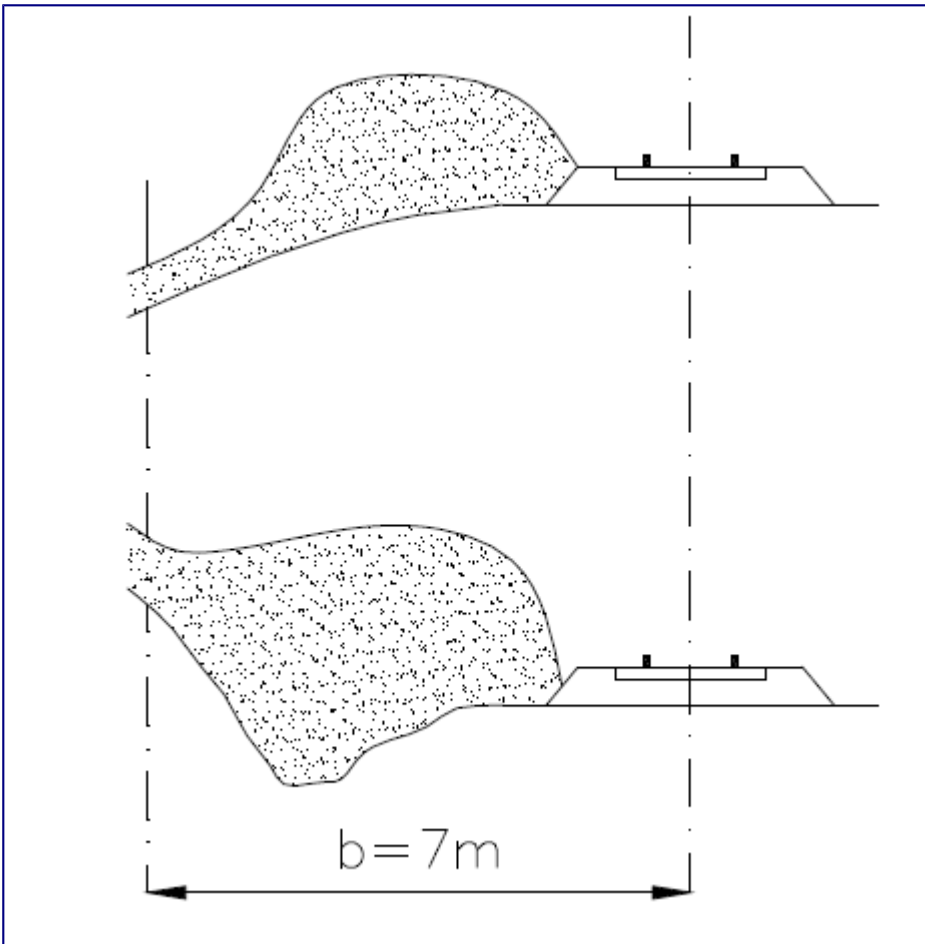


Figure 5: Required strip of land without walkway

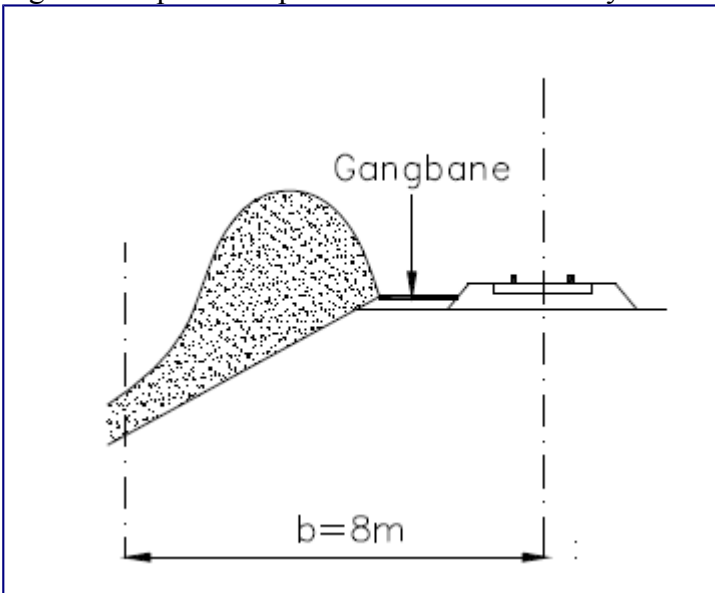


Figure 6: Required strip of land with walkway

3.3.1.2 Strip of land at the side of two or three parallel tracks

When there is no requirement for a walkway at the side of the tracks, a width b of at least 8 m is required. If the area has a gradient greater than 1:1, this requirement is reduced to 7 m. If there is a requirement for a walkway at the side of the tracks, the above dimensions increase to, respectively, 9 m and 8 m.

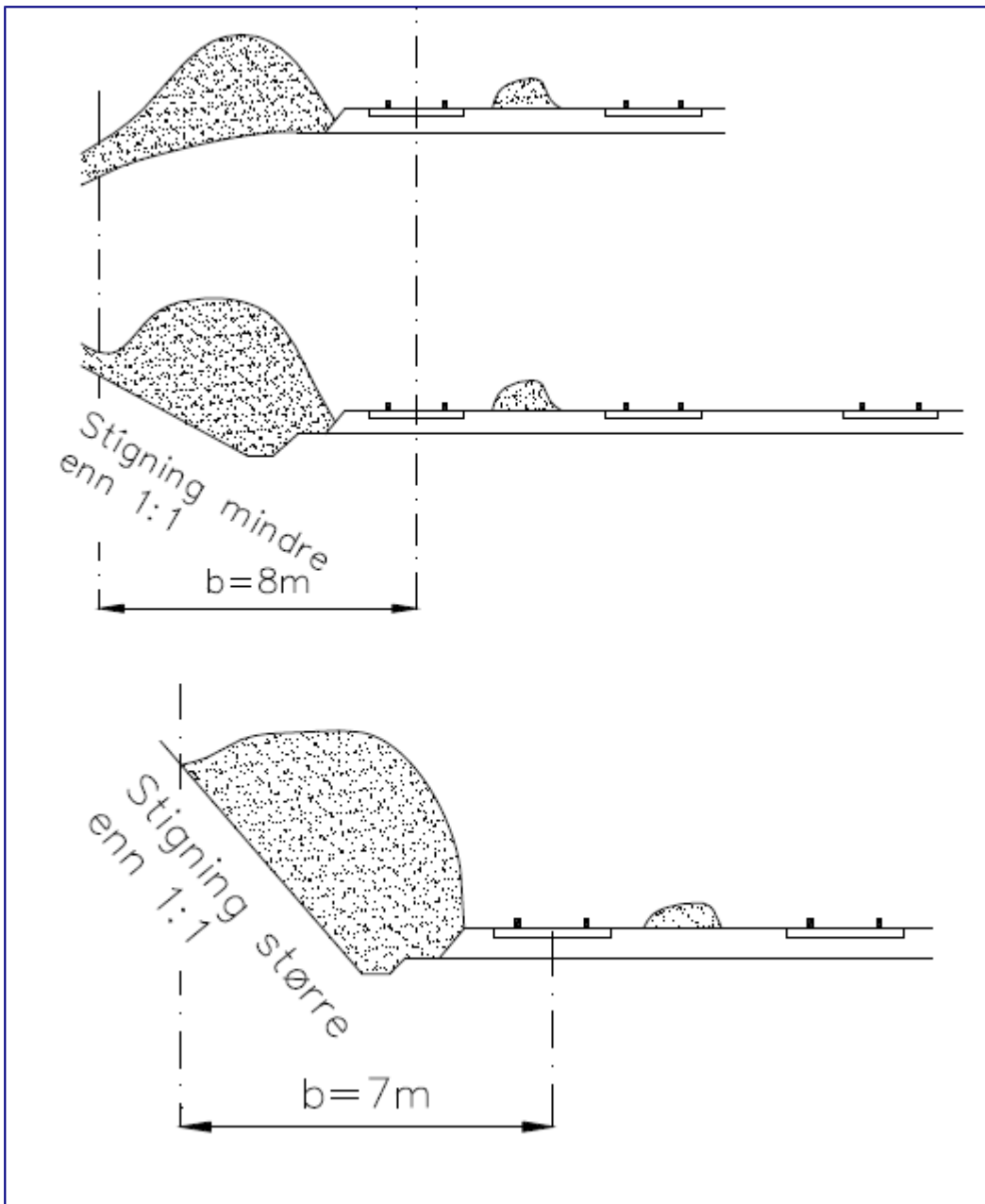


Figure 7: Required strip of land at the side of two or three parallel tracks

3.3.1.3 Strip of land at the side of four or more parallel tracks

Regardless of whether or not a walkway is required at the side of these tracks, a width b of at least 10 m is required, which increases to 12 m when the area has a gradient greater than 1:2. In instances where the gradient is greater than 1:1, a 12 m strip of land cannot be fully utilised for snow storage, although a width of this dimension is also required in this instance to facilitate future levelling in order to simplify the snow clearance problem.

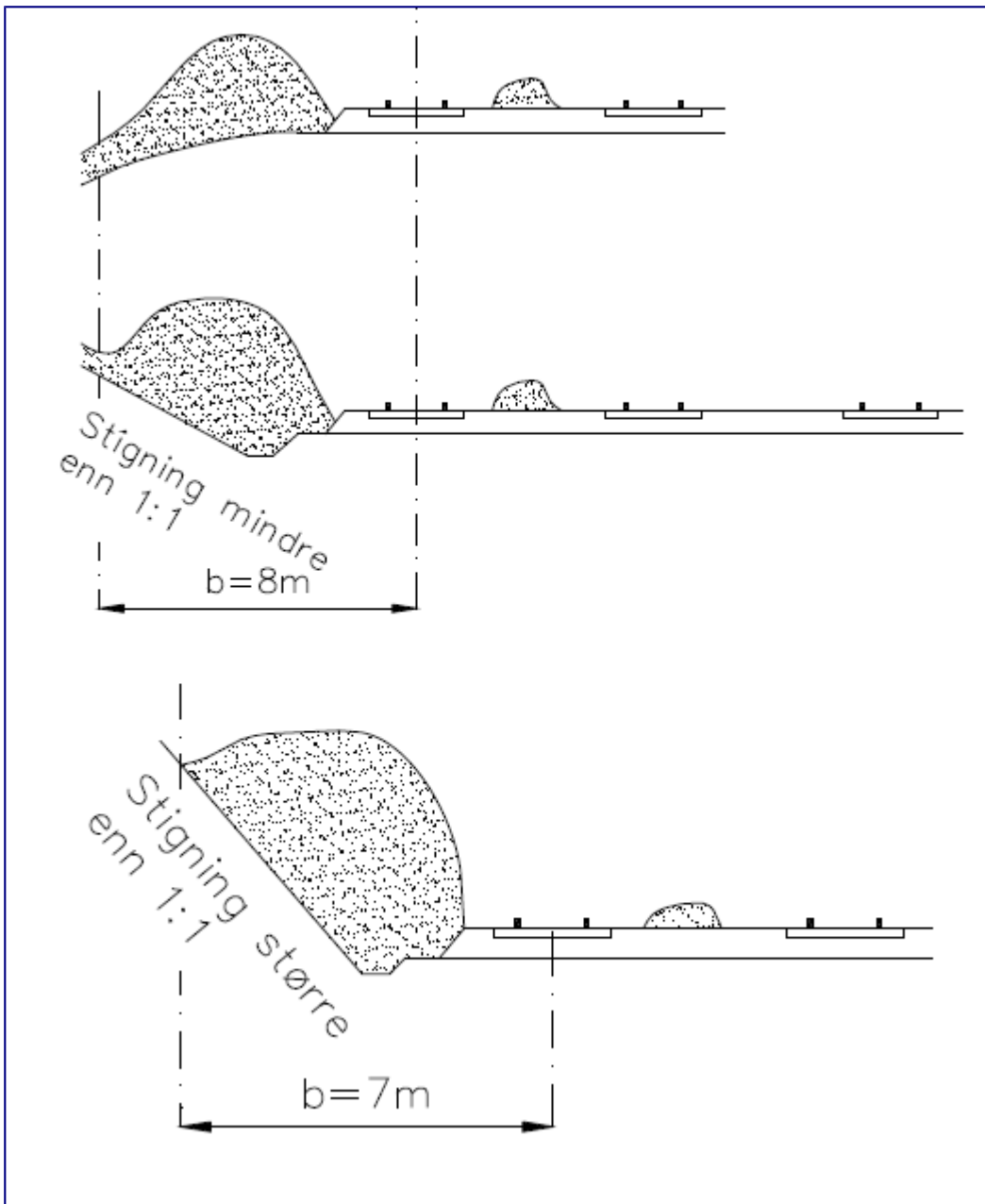


Figure 8: Required strip of land at the side of four or more parallel tracks

3.3.2 Considerations in respect of the space required for the line's and the road's snow clearance

The distance between the line and the road must be great enough for snow clearance operations to proceed effectively, without one operation obstructing the other. The distance between the line and the road is dependent on the line's required strip of land b and the method that the road planner has considered adopting in respect of snow clearance from the road. This method - F1 or F2 - must be clarified before a distance between the centre of the track and the crown of the road is determined.

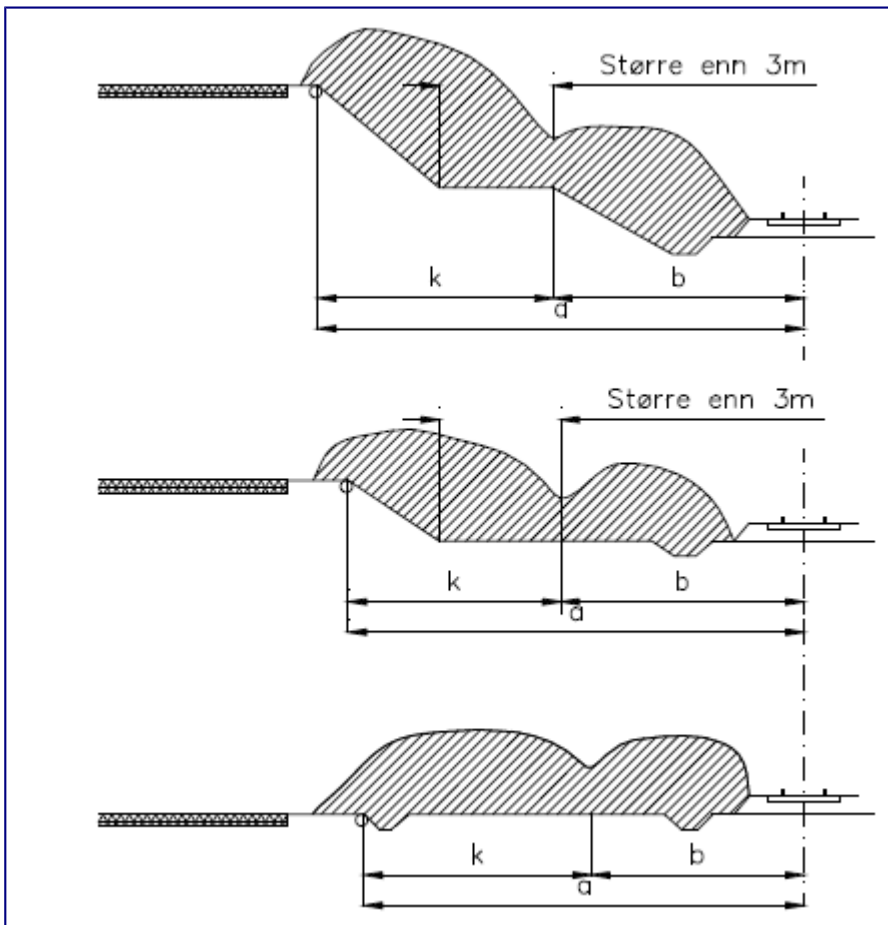
Method F1 – Snow from the road is stored at the side of the road

Snow from the road is stored at the side of the road, i.e. between the road and the railway line. The required width for this purpose, measured from the crown of the road, is called k . This is dependent, for example, on the width of the road and must be determined by the road planners/road authorities.

If the crown of the road is at a higher point than the rail level, the strip of land k will include the slope. In order to avoid snow from the road blocking the land designated for the line's snow

clearance requirements, the land designated for the road's snow clearance requirements will be required to terminate with a horizontal strip at least 3 metres wide between it and the former.

Thus, the total required distance between the centre of the track and the crown of the road will be $a = b + k$.



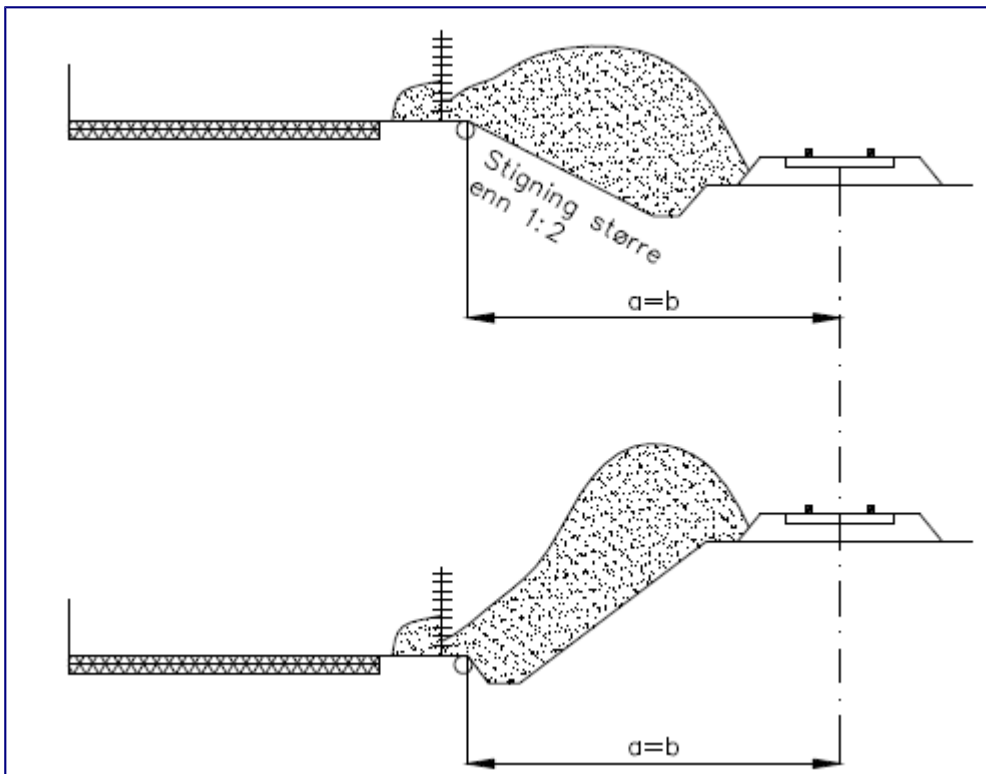
Figur 9: Method F1 - The distance required in respect of the line's and the road's snow clearance requirements

Method F2 – Snow from the road is stored on the shoulder or is removed

Snow from the road is stored on the shoulder or is removed. This method may be relevant when the road planner requires the minimum distance between the centre of the track and the crown of the road and when the road's proximity to the line is limited to a shorter section.

Unless a safety regulation dictates otherwise, the total required distance from the centre of the track to the crown of the road will be $a = b$.

Chain link fencing, 1.8 m or higher, should be erected on the shoulder to serve the following purpose: to prevent road users and railway passengers or personnel from being injured as a result of snow clearance operations on, respectively, the line or the road to prevent the land between the line and the road being utilised for the storage of snow from the road



Figur 10: Method F2 - Minimum distance in respect of the line's and the road's snow clearance requirements

3.4 Considerations in respect of overhead contact line systems

Specific minimum distances are required from roads to live components associated with the railway's overhead contact line system, cf.

[Kontaktledning/Prosjektering/Generelle_tekniske_krav#Nærføringer_og_kryssinger](#). Consequently, this will impact the minimum distance between the centre of the track and the crown of the road in instances where the line is electrified. However, these regulations must also be taken into consideration if the line is not electrified, since it is possible that electrification may occur in the future.

Various additional measures such as protective fencing, mast screens, cantilever insulators, etc. will permit a reduction in this minimum distance.

3.5 Considerations regarding the working environment on railway land

In respect of permanent working areas on railway land, it may be relevant to stipulate requirements for the minimum distance between the road and the line for working environment-related reasons. Such requirements will be assessed on an individual basis.