



Statens vegvesen

Work on and along roads

Requirements and guidelines regarding warning and protection

SPECIFICATIONS

Manual 051



Manual 051

Work on and along roads

Norwegian Public Roads Administration Manuals

This is a Level 1 Manual (Guidelines) in the Norwegian Public Roads Administration's series of manuals, a collection of consecutively numbered publications intended first and foremost for use within the NPRA.

The manuals can be purchased by interested parties outside the NPRA at fixed prices.

The Norwegian Directorate of Public Roads has the primary responsibility for compiling and updating the manuals.

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Work on and along roads – requirements and guidelines for warning and protection

No. 051 of the Norwegian Public Roads Administration's series of manuals

(5th edition, previous title: Arbeidsvarsling 2006 [Roadwork safety 2006])

Editor: Pål Hauge

Illustrations:

Layout:

Print run: XX

Printed by: Directorate of Public Roads

ISBN: 978-82-7207-641-1

Preface

The Norwegian Directorate of Public Roads has with legal basis in Section 35 of the Sign Regulation of 7 October 2005 laid down technical specifications and guidelines for Chapter 14 of the Sign Regulation, "Temporary signing etc. in connection with roadwork safety and arrangements on public roads". These rules replace earlier rules set out in Manual 051 "Roadwork safety" (2006).

The provisions with legal base in the Sign Regulation are binding for the sign authority; that is to say, all provisions concerning the use and design of warnings, for example traffic signs.

A distinction is made in the manual between warning and protection.

- Warning involves use of technical equipment to direct, warn and control traffic.
- Protection is physical protection of workers and road users to reduce the probability of harm and minimise the consequences of any harm.

The point of departure for the manual is the interests of safety for road workers and road users. A focal point is the Norwegian Public Roads Administration's zero vision, which means that we shall prevent loss of life and health by limiting harm in those accidents we fail to prevent.

The manual targets all those who work on roads, particularly those responsible for warnings and protection, and planners of roadwork safety, Construction Client, the authorities etc.

The manual has not been compiled for use in designing warning and sign plans for arrangements, but can nevertheless form a basis for designing roadwork safety plans for different types of arrangements.

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Directorate of Public Roads, January 2011.

Responsible department:

Roads and Transport Department / Traffic Management

Revised 1.1.2012

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0 Introduction

In this manual, “roadwork safety” means all use of warnings and protection to warn, direct and regulate traffic safely and efficiently past roadworks sites on or along public roads.

There are provisions concerning warning and protection of work on roads (roadwork safety) in various bodies of legislation and regulations. The most important basis for this manual is the Road Traffic Act and Chapter 14 of the Sign Regulation, “Temporary signing etc. in connection with warnings of roadworks and arrangements on public roads”. Other important acts are the Public Roads Act and the Working Environment Act with regulations. The Road Sign Regulations provide a legal basis for the Directorate of Public Roads to issue binding technical rules (specifications) for the use of signs, signals etc. These rules are published in manuals 048, 049, 050 and 051.

This manual supplements the other three with special rules concerning work on roads. The rules concerning signing, signals and markings are binding for all sign authorities, including municipalities and the police.

The manual contains both specifications and guidelines.

Extracts from acts and regulations are marked with this background colour.

Specifications concerning signs, signals and road markings are marked with a black frame. These frames have a number in the lower right-hand corner. The number can be used as a reference in controls, audits or inspections to show the rule from which noncompliance has been noted.

0.0.0.1

Important rules concerning protection are shown in boxes with a blue frame. These rules have two starting points:

- Safety for workers: The Working Environment Act with regulations and the Norwegian Public Roads Administration’s attitude to safety as the Construction Client and assignor for operation of roads.
- Safety for road users: The zero accident vision adopted by the Storting (no deaths or serious traffic injuries) and the NPRA’s goals for construction and operation of roads.

The safety rules are to be followed in all work on or along roads for which the NPRA has direct or indirect responsibility as road authority, Construction Client or assignor. The rules shall also be followed for work where municipalities have been delegated responsibility for road maintenance by the NPRA, and accordingly also authorisation to approve roadwork safety plans.

0.0.0.2

The book also contains guidelines without any special marking.

In both the drafting of the Sign Regulation's rules concerning warning of roadworks and in the supplementary specifications and guidelines in this manual, account is taken of relevant provisions in the Working Environment Act with regulations.

The NPRA's manuals have primarily been compiled for the NPRA itself, but this manual is also intended to be an important tool for all those who through their work have responsibility for:

- performing work on roads,
- daily supervision of roadwork safety,
- ensuring that the roadwork safety rules are followed up,
- preparing roadwork safety plans,
- approving roadwork safety plans,
- carrying out roadwork safety inspections.

The specifications shall apply to all warnings and protection on roads and streets in the public roads network. The NPRA may allow departures from the specifications. The meaning of the terms 'shall' 'should' and 'can', and who has the authority to deviate from the technical requirements, is shown in the table below. Applications for departures shall be made on a special form.

The form and instructions (in Norwegian) are to be found on www.vegvesen.no (or direct address: <http://www.vegvesen.no/Fag/Publikasjoner/Vegnormaler/Fravik>). Before the appropriate authority approves departures from the requirements, the consequences should be considered.

| Verb | Meaning | Authority to deviate from requirements |
|---------|----------------|---|
| Shall | Requirement | The Directorate of Public Roads allows departures from the requirements. Reasons shall be given for departures. |
| Should | Requirement | The Regional Roads Department can allow departures from the requirements. Reasons shall be given for departures, and the Directorate of Public Roads shall be notified and have the opportunity to countermand the dispensation within 3 weeks (6 weeks in the period 1 June to 31 August). |
| Can/may | Recommendation | Departures may be allowed on the basis of a technical assessment without special requirements for approval procedures. The Regional Director of Roads is to be informed. |

It is desirable that experiences and information with a bearing on the specification, including proposed amendments, be sent to the Directorate of Public Roads regularly to form a basis for subsequent revisions.

0.1 The purpose of roadwork safety

The purpose of roadwork safety is to:

- protect workers and road users,
- ensure traffic flow past the work site with the least possible delay and inconvenience to road users
- make efficient and economical operations possible.

To achieve these objectives, detailed planning and precise execution of traffic control associated with work on or along roads is important.

In order for road users to be able to behave correctly, all warnings and protection shall be correct, clear, consistent and uniform.

0.1.0.1

Traffic poses a danger to road workers because they can be run over while doing their work. This risk can be substantially reduced by means of correct and proper warnings and protection of the roadworks.

Roadworks can pose a danger to road users because the situation deviates from what is normal. The work may entail unforeseen obstacles in the carriageway, rerouting of roads or lanes and other disruptions. The disruptions may vary from minimal, for example in the case of work outside the trafficked area, to the road user having to make detours because the road is closed.

Safety for workers

Provision is made for worker safety by:

- warning vehicle traffic and diverting it from the roadworks area,
- in addition to warnings (signs, marking, signals), different types of safeguard are used (railings, fences etc.) that prevent vehicles or persons from entering the work site by accident,
- energy-absorbing equipment is used on vehicles and works machinery,
- The work site is planned and arranged such that driving in and out, access on foot, storage of materials etc. entails a minimum of conflict with passing traffic.

Safety for road users

Provision is made for the safety of drivers by:

- notifying them in time, so that they can adapt their behaviour to the situation in question,
- directing them safely past the work site, so that no danger arises in relation to other road users, road workers, the surroundings or the road user personally.
- warnings shall be issued in such a way that the speed level is geared to the situation in question,
- no doubt arises as to the correct location of vehicles, giving way etc.
- protection is used in such a way that it also takes care of road user safety and reduces the severity of any damage or injuries.

Provision is made for the safety of pedestrians and cyclists by:

- not using pavements and footpaths and cycle tracks for storage areas or parking; this shall take place in part of the carriageway or outside the road area,
- if necessary, establishing a temporary walkway and cycle track past the worksite that as far as possible provides the same safety as before the work started,
- vulnerable road users shall be protected against vehicle traffic and against construction machinery, construction pits etc.,
- the protection is clearly visible or noticeable, also in poor lighting conditions and for the visually impaired,
- if extraordinary crossing of roads is necessary, it must be possible for this to take place safely.

Passage

All traffic user groups shall be assured of satisfactory passage past the work site.

- Pedestrians, cyclists, prams, wheelchairs and any other groups with impaired mobility shall be assured of safe and comfortable passage past the work site.
- Vehicle traffic shall not be delayed more than necessary, and work should take place at a time when the capacity past the roadworks area is sufficient to allow traffic flow.

Efficiency

In order to achieve the aforementioned objectives economically and efficiently, it is necessary for the enterprises that are to do the work on and in connection with the road to have a sound knowledge of the rules applying, and for them to draw up and establish good procedures for following these rules. Work that has the proper warnings and protection will be efficient and result in efficient traffic flow.

0.2 Key definitions

The following are definitions of the most central concepts used in this manual.

| | |
|-----------------------------------|---|
| Safety manager | One or more named person(s) in the "safety enterprise", i.e. the agency or contractor with responsibility for carrying out and following up warnings and protection in connection with the work (according to Section 33.3 of the Sign Regulation). The safety manager shall have a valid course certificate for a type 2 course. |
| Work site | The part of the roadworks area where roadworks are in progress or have been started. |
| Roadwork safety plan | Plan that shows how roadworks are to be warned of and protected. The plan shall contain an easily understandable sketch or map and can be supplemented with plans for the various stages and special rules. The roadwork safety plan can be divided into a sign plan (for warnings) and a protection plan. |
| Rules of the roadwork safety plan | The part of the roadwork safety plan that contains special rules for the work, for example requirements regarding the various stages or periods when work cannot proceed. |
| Roadwork safety signs | All temporarily erected traffic signs forming part of a roadwork safety plan. |
| Mobile work | Work that is carried out with or in connection with vehicles or works machines that are either in continuous motion or move at short intervals. |
| Buffer zone | The stretch between transverse protection and the area to be safeguarded. If the transverse protection is driven into, it will be pushed into the buffer zone, and there must therefore be no persons or equipment or other items that may be harmed or inflict harm in this zone. |
| Construction Client | Any physical or legal person who has building or construction work carried out. |
| Long-term work | Work that proceeds at a particular site for more than about 12 hours. |
| Short-term work | Work that proceeds at a particular site for less than about 12 hours. |
| Logbook | An overview with the times of initiating and terminating all types of warnings and protection within a roadworks site. Shall provide documentation of the regulatory and safety measures used at any time in the construction period. |
| Manual control | Situations where there is a need for periods longer than a few minutes to direct traffic by stopping a flow of traffic in order to let other traffic proceed. |
| Risk assessment | An assessment of what can go wrong and what consequences it will have, what can be done to prevent it going wrong, and how the consequences can be minimised if something happens. |
| Safety zone | From Manual 231: An area alongside the carriageway where there must be no risk factors such as dangerous obstacles, dangerous slopes etc. Within the safety zone, risk factors must be removed, replaced with a yielding type or protected with railings or impact attenuation devices. |
| Protection | All use of material that provides physical protection of workers and road users. |
| Protection plan | The part of the roadwork safety plan that shows which protective measures must be used, and where and how they must be positioned. |
| Sign authority | The party that has been delegated authority according to the Road Sign Regulations to make decisions about the use of public traffic signs, road markings and traffic light signals, and that is authorised to approve roadwork safety plans. |

| | |
|---------------------------------|---|
| Sign plan, warning plan | The part of the roadwork safety plan that shows the location of traffic signs, traffic light signals and road markings. |
| Truck-mounted attenuators (TMA) | Large vehicles with approved shock-absorbing equipment mounted on them, used as mobile transverse protection. |
| Site safety supervisor | Person who is on the work site while the work is in progress and who is required to supervise and ensure that warnings and protection are at all times in line with the roadwork safety plans, and to maintain a logbook. |
| Safety enterprise | The enterprise that according to the approved roadwork safety plan has been delegated and has assumed responsibility for ensuring that warnings and protection are at all times consistent with the approved plan and the requirements in Manual 051. |
| Warning | All forms of work that proceed in the road's safety zone, and which imply risk factors that call for warnings and/or protection. |
| Roadworks | Alle former for arbeid som foregår i vegen eller sikkerhetssone, og som medfører fare-momenter som tilsier varsling og/eller sikring. |
| Roadworks area | The whole area or stretch where temporary warnings have been established. |
| Road owner | The party that in practice is responsible for operating the road. Is normally both road and sign authority for roadwork safety. |
| Road authority | The party with authority according to the provisions of the Public Roads Act. |

1. Acts and regulations

1.1 Overview

Work on roads is covered by a number of acts and regulations. Some of the most central are:

The Road Traffic Act

- The Traffic Rules
- The Road Sign Regulations

The Public Roads Act

The Working Environment Act (Act relating to working environment, working hours and employment protection)

- The Internal Control Regulations (Regulations relating to systematic health, environmental and safety activities in enterprises)
- The Construction Client Regulations (Regulations relating to safety, health and working environment on building and construction sites)

In addition, provisions in the following acts may be applicable:

- The Administrative Procedures Act**
- The Damage Compensation Act**
- The Penal Code**
- Local police bye-laws**

In the following chapters, acts and regulations that are regarded as the most central to work on and in connection with roadworks are discussed.

In addition there are rules in many other manuals and specifications that also have to be followed. Some of the most important are:

- Sign and traffic control equipment that is used in connection with roadworks shall be consistent with the requirements in **Manual 062 [Trafikksikkerhetsutstyr] Traffic safety equipment**.
- If railings are used as protection, the provisions in **Manual 231 Rekkverk [Guardrails]** must be complied with.
- Risk assessments should be made in accordance with **Manual 271 Risikovurderinger i vegtrafikken [Risk assessments in road traffic]**.
- Temporary areas for vulnerable road users shall satisfy the requirements in **Manual 278 Veileder i universell utforming [Guidelines for universal design]**

Acts and regulations undergo amendment, and when a period of time has passed since the manual was published, it must be checked to see whether significant changes have been made.

1.2 The Road Traffic Act with regulations

1.2.1 The Road Traffic Act

The Road Traffic Act (LOV-1965-06-18-4, last amended on 1 January 2010) applies to all motor vehicle traffic and other traffic on roads or in areas generally used by motor vehicles.

§ 3. The basic rules of traffic state that “a driver shall show consideration and be alert and cautious so that he does not cause damage or risk, and so that other traffic is not unnecessarily obstructed or inconvenienced.” These basic rules also apply to road workers, both with respect to one another and in relation to other road users. On the other hand, Section 3 requires that other road users must pay particular attention when they come to places where roadworks are in progress.

Section 5. Road signs etc., require that road users observe the prohibitions and instructions issued by means of road signs, light signals and road markings.

Official road signs, signals and markings must not be used without the permission of the “authority concerned”, i.e. the sign authority. Nor may other signs be set up that can be confused with public signs. Illegal signs may be removed or ordered to be removed by these authorities.

It is prohibited to change, remove or damage traffic signs etc. This means that in connection with roadworks it is illegal to change warnings and protection unless this is indicated by an approved roadwork safety plan for the work.

A person who sets up, changes or removes signs illegally may be punished in accordance with the Norwegian Penal Code.

Section 7. Special traffic prohibitions is the main legal basis for all traffic regulation in connection with roadworks.

The provision provides a legal basis for complete or partial road closure due to roadworks, and for introducing other restrictions, such as a lower speed limit. The section also provides a legal basis for manual traffic direction and for the use of traffic lights, road markings or other signing to the extent that this is necessary on account of the roadworks. The decision-making authority for such regulations is as a general rule the same sign authority as for permanent regulations. However, the decision-making procedure is somewhat different from that pertaining to decisions for permanent signs.

The provision also provides a legal base for other types of regulations. It can be used for special regulations in connection with large arrangements. This has given the NPRA a legal basis similar to that provided by Section 9 of the Road Traffic Act for the police. Signing and other regulation in connection with arrangements is in principle not covered by this manual, but the manual can nevertheless provide some good guidelines for planning of signing in connection with different types of arrangements.

Section 9. Traffic regulation, provides the police with a legal basis for departing from traffic control that is laid down by the roads authorities pursuant to Section 7, for example. The section applies only to the police.

Ordinary traffic regulation in connection with roadworks shall be decided upon by the sign authority for roadwork safety pursuant to Section 7. The authority of the police pursuant to Section 9 is of a temporary or supplementary nature, and allows them to intervene if an extraordinary or unforeseen situation arises.

Section 11. Exemptions for emergency vehicles etc. provides a legal basis for laying down provisions that allow for deviations from what is laid down in a number of sections in the Road Traffic Act for drivers of emergency vehicles, drivers of vehicles in the service of the police and drivers of machines or vehicles that are being used for work on or along roads. Provisions in this respect are laid down in Sections 2 and 14 of the Traffic Rules.

1.2.2 The Traffic Rules

Regulations relating to vehicle and pedestrian traffic (traffic rules) FOR-1986-03-21-747, last amended 2008-02-29.

Section 2. Area of application, departure from road traffic provisions etc., makes it possible to depart from most of the road traffic provisions under certain conditions, but:

- The basic rules of Section 3 of the Road Traffic Act shall nonetheless never be departed from.
- Vehicles used for roadworks shall always observe rules concerning speed, traffic lights and policemen's signals.

Departure from the rules must be necessary or substantially facilitate the work. It is never sufficient that departure from the rules makes the roadwork more convenient. When there is departure from the traffic rules, a yellow flashing light shall be used (see the comments to Section 14).

Section 14. Signals or signs, provides rules to the effect that a yellow flashing light shall be used with roadworks when this is necessary to prevent danger and when there is departure from the traffic rules.

A flashing yellow light does not allow departure from applicable rules (for example incorrect parking for reasons of convenience) and does not provide legal immunity. Incorrect use of a yellow warning light may make the individual driver liable for both compensation and a penalty.

Section 3. Instructions, describes the “ranking” of different types of rules and regulations:

- Basic rules are issued in the Traffic Rules.
- Signed traffic regulation takes precedence over the Traffic Rules.
- Light signals take precedence over signs (for example a give-way sign on a signal post).
- Manual traffic control takes precedence over light signals (for example a green light).

The section does not provide authorisation for manual traffic control, for example. Such authorisation must follow from other provisions. In the case of roadworks, this is Section 7 of the Road Traffic Act.

1.2.3 The Road Sign Regulations – general provisions

The Regulations relating to public traffic signs, road marking, traffic signals and directions (the Road Sign Regulations), FOR-2005-10-07-1219, last amended 2010-09-01.

Section 1. Introductory provisions

1. Public traffic signs, road markings and traffic signals are the signs, markings and signals described in these regulations, with design, colour and significance as stipulated here.
2. It is forbidden to attach to signs or any other public traffic control device anything that does not concern the purpose of the sign or device.
3. The definitions in the traffic rules and in the regulations on technical requirements for vehicles apply to these regulations unless anything else is expressly stipulated. The same applies to the provisions in the traffic rules as to which road users are regarded as driving and which as walking.
4. These regulations also apply to drivers of trams to the extent that they are applicable.

Section 2. Validity, scope etc.

1. Public traffic signs, road markings and traffic light signals are valid only when they are set out according to a decision by the competent authority. Public traffic signs apply according to their content from the moment they are set up and uncovered.
2. Public traffic signs, road markings and traffic light signals apply to the road in the permitted driving direction and to the road user category to which they are directed. If there is more than one lane in the driving direction and public traffic signs have been set out in the middle of a lane, the sign applies only to the lane in question. Exceptions from the provisions **in the number here** may be made for individual signs or groups of signs.
3. Public traffic signs may be designed such that the sign can alternate between two or more different symbols or texts. In such cases, the design and colour may differ from what is specified in these regulations.

Section 1 contains a ban on attaching to signs anything that does not concern the purpose of the sign or device. This is to ensure that attention is not distracted from the sign, and to prevent doubt as to whether it is a public sign. The prohibition also applies to the attachment of other equipment to signposts and portals etc. Thus it is not permitted to set up types of sign other than traffic signs on the same post as a public traffic sign or traffic signal. Nor should other devices be attached to such posts. This applies, for example, to promotion material for contractors, floodlights etc.

Traffic regulating signs (give way and priority signs, prohibitory, mandatory or information signs with associated supplementary plates) are only valid when they are set out in accordance with an approved plan and a decision from the correct authority. Road users must assume that such a decision exists, and must accordingly observe the signing as soon as it has been set up and displayed. If the police intervene in connection with driving in contravention of the signing and this results in a penalty notice, fine or other penalty, and it proves subsequently that there is no valid decision applying, the penal sanction must be dropped.

The setting up of traffic signs without a valid decision may result in a penalty or liability for compensation if the signing results in accidents, injuries or damage.

It is important to be aware of the provisions in Section 2-2 on which part of the road and in which direction the signs apply, so that there is no risk of misunderstanding if the traffic is diverted in connection with roadworks.

Section 25. Instructions issued by the police

This section applies only to the police. Manual traffic control in connection with roadworks takes place with legal basis in Section 7 of the Road Traffic Act.

Section 26. Authorisation for speed limits etc.

1. The Directorate of Public Roads may decide on a higher speed limit for a specific stretch of road than that following from Section 6, second paragraph of the Road Traffic Act.

A decision may be made to impose a lower speed limit for a specific stretch of road than that following from Section 6, second paragraph of the Road Traffic Act. Decisions of this kind are made for national, county and private roads by the regional roads department and for municipal roads by the municipality. If a zone also includes a road other than a municipal road, the decision is made by the regional roads department.

The police shall have the opportunity to express their view before a decision is reached pursuant to the first or second paragraph. The municipality shall also have an opportunity to express a view before the regional roads department reaches a decision.

In connection with work on public roads, temporary decisions can be made for a lower speed limit pursuant to Chapter 14 of these regulations. In the case of private roads, these decisions are made by the regional roads department. For roads where the municipality has been delegated responsibility for maintenance pursuant to the Public Roads Act, these decisions are made by the municipality.

2. The regional roads department can make decisions pursuant to Section 6 second paragraph of the Road Traffic Act as to whether an area is to be regarded as urban, and set the limits for the urban area. The police and the municipality shall have an opportunity to express a view before the regional roads department reaches such a decision. If the area only contains municipal roads, this decision shall be taken by the municipality after the regional roads department and the police have had an opportunity to express a view.

The regional roads department may make a temporary decision to impose a lower speed limit in connection with roadworks on national, county and private roads.

The municipality may make a temporary decision to introduce a lower speed limit for municipal roads, as well as for national and county roads for which the municipality has been delegated responsibility for maintenance. Note that the municipality cannot have such authority for private roads.

Section 27. Authority for priority roads, motorways etc.

1. Regional road departments can decide to set up or take down signs 202 "Give way", 204 "Stop", 206 "Priority road", 208 "End of priority road", 210 "Priority crossing", 212 "Give way to oncoming traffic" and 214 "Oncoming traffic must give way". The police and the municipality shall have an opportunity to express a view before a decision is reached.

2. The Directorate of Public Roads may decide to set up or take down signs 502 "Motorway", 503 "Motor vehicle road", 504 "End of motorway" and 505 "End of motor vehicle road" and also sign 308 "Transport of dangerous goods prohibited".

For other signs, exemption is granted specifically in connection with roadwork safety (see Section 26-1 fourth paragraph for speed limits, Section 28-3 fifth paragraph for traffic control signs, Section 29-2 for other traffic signs and Section 30-4 for traffic light signals and road markings).

No separate rules for decisions have been made for priority roads and motorways with respect to roadwork safety warnings. This means that any temporary decisions for the signs in Section 27 must be made by the regional roads department or the Directorate of Public Roads according to the same rules as for permanent decisions.

Section 28. Authority for traffic regulatory signs

1. For public and private roads in the municipalities of Oslo, Bergen, Trondheim, Stavanger, Kristiansand, Tromsø and Drammen, the police can make decisions to put up or take down

- a) prohibitory signs and mandatory signs except signs subject to the provisions in Sections 26 and 27.

b) the signs 508 "Collective lane", 509 "Combined use lane", 510 "End of collective lane", 511 "End of combined use lane", 512 "Bus stop", 513 "Tram stop", 514 "Taxi stop", 518 "Footway", 520 "Cycle track", 521 "Cycle lane", 522 "Footway and cycle track", 526 "One-way driving", 548 "Home zone", 550 "End of home

c) any supplementary plates to these.

In areas other than those mentioned in the first paragraph, these decisions are taken by the regional roads department.

Until further notice, temporary regulation no. 38 of 12 January 1996 concerning decisions relating to speed limits and sign authorities applies to Bærum, Stavanger and Steinkjer municipalities, Akershus, Rogaland and Nord-Trøndelag counties with reference to Regulation no. 262 of 17 February 1994, Regulation no. 263 of 17 February 1994 and Regulation no. 264 of 17 February 1994 concerning the same municipalities.

Until 31 December 2007, Regulation no. 1827 of 18 December 2003 concerning attempts at differentiation of municipal responsibilities under the Public Roads Act and the Road Traffic Act with appurtenant regulations applies to Drammen Municipality, Buskerud County.

In municipalities with solid traffic expertise, the decision-making authority for municipal roads can be partly or wholly delegated to the municipality.

In special cases the police can give one-off dispensation from the provisions for sign 306.1 "No entry for motor vehicles" or 548 "Home zone" for a particular motor vehicle. The sign authority may grant dispensation to persons with limited mobility from the ban on parking following from signs 373 "No parking", 552 "Parking" or 376 "Parking zone".

An authority as mentioned in Regulation no. 92 of 25 January 1990 concerning the use of vehicles, Section 5-11 subsections 1 and 2, can grant dispensation from the prohibition sign 314 "Height limit".

2. For national, county and private roads the regional roads department can make decisions to set up or take down the signs 516 "Pedestrian lane", 524 "Meeting place", 528 "Elective driving lane", 530 "Merge", 531 "Lane for building up speed", 532 "Lane ends", 534 "Lane begins", 536 "Joining traffic continues in own lane", 538 "Lane divides", 539 "Change in driving pattern", 540 "Home zone", 542 "Home zone ends" and 560 "Information sign". The municipality can make these decisions for municipal roads.

3. If a decision pursuant to subsections 1 or 2 is of particular importance or particularly affects municipal interests, the municipality shall have an opportunity to express its view before a decision is made. Similarly, those responsible for private roads shall have the opportunity to express their views if the decision will apply to the private road.

Before the police reach a decision pursuant to subsection 1 for a national or county road, the regional roads department shall have the opportunity to express its view. Before the police or the regional roads department reaches a decision pursuant to subsection 1 for a municipal road, the municipality shall have the opportunity to express its view. Before the regional roads department reaches a decision pursuant to subsections 1 or 2, the police shall have the opportunity to express its view. Before the municipality reaches

a decision, the regional roads department and the police shall have an opportunity to express their views.

Exempt from comments as mentioned in this number are the signs 324 "Stop for specified purpose", 326 "Stop for toll", 406 "Mandatory roundabout", 518 "Footway", 520 "Cycle track", 521 "Cycle lane", 522 "Footway and cycle track", 524 "Meeting place", 528 "Optional driving lane", 520 "Merge", 531 "Lane for building up speed", 532 "Lane ends", 534 "Lane begins", 536 "Joining traffic continues in own lane", 538 "Lane divides", 539 "Change in driving pattern" and 560 "Information sign". Nor is circulation for comment required for the signs 312 "Breadth limit", 314 "Height limit", 316 "Length limit", 318 "Total weight limit", 320 "Axle load limit", 322 "Bogie load limit", 402 "Mandatory driving direction" or 404 "Mandatory lane" when the restriction is a result of purely technical road factors.

Temporary decisions can be made for a period of up to three months without statements being called for as mentioned in this subsection.

The police can regulate road traffic with signs pursuant to Section 9 of the Road Traffic Act. The authority in question can regulate road traffic with signs pursuant to Section 7, second paragraph of the Road Traffic Act. For roads where the municipality has been delegated responsibility for maintenance pursuant to the Public Roads Act, the municipality has this authority.

The usual requirements concerning circulation for comments do not apply to decisions in connection with roadwork safety.

The provisions concerning temporary decisions with a validity limited to three months shall not be used in connection with decisions regarding roadwork safety signs, and roadwork safety decisions may apply for a longer period than three months. However, the provision may be used if a temporary change in yield regulation is necessary in connection with roadworks.

The same rules as in Section 28, last paragraph, also apply to decisions as mentioned in Section 26-1 fourth paragraph, Section 29-2 and Section 30-4.

The same applies to temporary decisions in connection with arrangements. These are treated in the same way as roadwork safety decisions.

Section 29. Authority for other public traffic signs

1. The regional roads department make take decisions to put up or take down public road signs other than those subject to the provisions in Sections 26-28 for national, county and private roads. The municipality has this authority for municipal roads. The regional roads department's decisions may nevertheless also apply to signage on municipal roads if necessary, if the signs on the national, county or private road have to be supplemented with signs on a crossing municipal road. The municipality's authority does not apply to signage for municipal roads on crossing national roads or county roads.

2. An authority as specified in Section 28-3 fifth paragraph can also use these signs.

Section 30. Authority for traffic light signals and road markings

1. The Directorate of Public Roads may reach decisions about setting up or taking down traffic light signals for public and private roads. Authority may be delegated to a regional roads department.

Before decisions are reached pursuant to the first paragraph, the police and the municipality or the party responsible for the private road shall have the opportunity of expressing a view.

A decision on 1096 "Flashing light signals before railway lines" can be reached after the railway authority in question has had an opportunity to express a view.

2. 1098 "Yellow flashing light" must only be used by the party responsible for the light signal, traffic sign or road device in connection with which it is used.

3. The regional roads department can reach decisions on marking of national roads, county roads and private roads in the interests of traffic safety. The municipality has this authority for municipal roads.

4. An authority as specified in Section 28-3 fifth paragraph can also reach decisions as mentioned in this section.

An authority as specified in Section 28-3 fifth paragraph is also the roadwork safety authority for signals and road marking.

Section 35. Technical provisions (specifications) etc.

More detailed technical provisions and guidelines (specifications) for the use, design, size and placing of public traffic signs, traffic light signals and road markings shall be issued by the Directorate of Public Roads. Such provisions are not regarded as regulations pursuant to the Public Administration Act. The provisions are binding for the decision-making authorities.

These specifications are issued in the following manuals from the Directorate of Public Roads:

- Manual 048 Road traffic signal systems (Signalnormalen [the Signal Specifications])
- Manual 049 Road markings (Oppmerkingsnormalen [the Road Markings Specifications])
- Manual 050 Road traffic signs (Skiltnormalen [the Sign Specifications])
- Manual 051 Work on and along roads

The specifications in these manuals are binding for all sign authorities (including the municipalities and the police) and may not be departed from without permission from the Directorate of Public Roads.

Section 36. Decisions, sign register

1. All decisions pursuant to Sections 26 - 30 and 32 shall be made in writing and kept safely. Storage can take the form of electronic storage in a computer system or on a paper printout for filing.
2. The Directorate of Public Roads may decide that the sign authority shall keep a register of public traffic signs that are set up on public and private roads. The Directorate of Public roads provides more detailed rules for keeping of the sign register.

These decisions shall be archived for a minimum of 10 years. This requirement also applies to all roadwork safety plans and logbooks.

Section 37. Ordinary provisions about coverage of sign expenses

Expenses for public traffic signs, traffic light signals and road markings are covered as road expenses pursuant to the rules in the Public Roads Act of 21 June 1963, provided that no decisions have been made with legal base in Section 45 to the effect that the party responsible for a private road or others shall cover the expenses.

The signs authorities can claim that expenses in connection with roadwork safety for other parties should be defrayed, completely or in part, by the party who has been granted a work or excavation permit pursuant to Section 32 of the Public Roads Act.

Section 37 gives the sign authorities the possibility of having their expenses covered for the roadwork safety of others

This covers situations such as when an inspection reveals a discrepancy between the roadwork safety that has been carried out and the roadwork safety plan. If the party executing the roadwork fails to bring order to the situation after being ordered to do so, the sign authority may ensure that the roadwork safety is carried out according to plan for the account of the executing party.

The costs of the NPRA in connection with processing of the roadwork safety plans shall not be required to be covered by the applicant.

1.2.4 The Road Sign Regulations – special provisions for roadworks

Section 32. General provisions

1. This chapter applies to warning and protection of all works and arrangements on or near public roads. The provisions apply in addition to the other provisions in these regulations.
2. The regional roads department is the sign authority for national roads and county roads, and the municipality is the sign authority for municipal roads. The municipality is the sign authority responsible for national roads and county roads for which the municipality has been authorised pursuant to Sections 17 and 18 of the Public Roads Act. The regional roads department can transfer authority pursuant to the first paragraph to another regional roads department. A municipality that has such authority can transfer the authority to another municipality that has the same authority.

The agencies that have sign authority with respect to roadwork safety are specified in subsection 2. See also a similar specification in Section 26-1 fourth paragraph, Section 28-3 fifth paragraph, Section 29-2 and Section 30-4.

It is the authority at the site where the work is to be performed that shall approve plans for temporary signing etc. of work on public roads; see also Section 33-1. This implies:

- The NPRA is the sign authority for roadwork safety on national roads and county roads if the municipality has not been delegated operating authority pursuant to Sections 17 and 18 of the Public Roads Act.
- The municipality is the sign authority for municipal roads and those national and county roads for which the municipality has authority pursuant to Sections 17 and 18 of the Public Roads Act.
- There is no “overlapping authority” so that the NPRA can make decisions on municipal roads.
- The provisions apply only to public roads. In the event of a need for sign-related decisions for roadwork safety on private roads, the NPRA will be the sign authority as for decisions concerning permanent use of traffic signs on private roads.

Section 33. Responsibilities

1. The sign authority where the warning is to take place shall approve the sign plan and make the necessary decisions.
2. Responsibility for carrying out and follow-up of the plan at the roadworks site shall be given to the agency or contractor performing the work.
3. The agency or contractor performing the work shall at each individual work site appoint a person who is responsible for ensuring that the warnings are correct and in accordance with the plan. A copy of decision, logbook, safety plan and any conditions that have to be laid down for the work in question shall exist and be available at the worksite. The person responsible shall ensure that the necessary warning and protection material is present, and that warning and protection at the worksite at all times are in accordance with an approved plan. In the event of illness, holidays etc., responsibility shall be transferred to another qualified person. The name and telephone number of the person responsible shall be supplied to the sign authority.

Responsible authority

Section 33-1 explains which sign authority can approve the sign plan and make decisions regarding signs in connection with roadwork safety.

A plan shall be prepared that shows use of warning and protection and other rules for the work that is necessary in the interests of the safety of road workers and road users and ease of passage.

The requirements regarding traffic safety and ease of passage are set by the NPRA or the municipality as the roads and sign authority pursuant to both the Public Roads Act and the Road Traffic Act. Although responsibility for safety and ease of passage is not specifically

mentioned in these acts, these are responsibilities that the road-owner has in any case, and which must be observed when work on the road is authorised.

Roadwork safety plan

In practice, it is simplest and most advisable to incorporate all these requirements in an overall roadwork safety plan that must encompass:

- sign plan (public traffic signs, road markings and traffic light signals that are to be used or changed in connection with the roadworks) with appurtenant sign decisions,
- protection plan for measures to maintain satisfactory traffic safety and ease of passage for all types of traffic past the roadworks area (road-owner's general responsibility for traffic safety and ease of passage), and a plan for protecting road workers (the HSE responsibility of both Construction Client and employer).
- any other provisions.

It is the sign authority who must approve the roadwork safety plan and stipulate the necessary requirements for follow-up of the plan.

According to Section 33.2, the execution and follow-up of the plan at the roadworks site shall be done by the **agency or contractor performing the work**. This means that the responsibility for carrying out and follow-up of signing and protection of the roadworks site must be transferred to a party other than the sign and road authority. Requirements can then be made of the party that undertakes this responsibility.

As a rule it will be the same agency/contractor that both performs the actual construction work and assumes responsibility for roadwork safety.

The name of one (or more) responsible person (safety manager) shall be supplied in connection with an application for approval of the roadwork safety plan. This person shall be responsible for ensuring:

- that the application for approval of the roadwork safety plan contains relevant information about the work to be carried out, including a risk assessment
- that an assessment of the risk entailed by the work is made when preparing the proposed roadwork safety plan, and that warning and protection measures are proposed that reduce the risk to an acceptable level for both workers and road users,
- that the manner in which it is proposed that the work be carried out does not entail unreasonable delays or passage problems for any types of road user,
- that there be proposals as needed for roadwork safety plans adapted to different stages of the work,
- if necessary, contributing to a revised draft of the roadwork safety plan if the sign authority finds this necessary,
- familiarising him- or herself with any changes made in the roadwork safety plan in connection with the approval,

- ensuring that the warning and protective equipment necessary to execute the roadwork safety plan is available before work starts,
- ensuring that the roadwork safety plan with conditions is made known to all those who will be working at the site, including all subcontractors,
- ensuring that safe procedures are established for setting out, changing and dismantling warning and protective equipment,
- establishing procedures for inspection to ensure that warning and protective equipment is consistent with the approved roadwork safety plan, and that defects are remedied,
- ensuring that special requirements in the roadwork safety plan, for example about different signing during and outside working hours, are complied with,
- ensuring that any changes in permanent signs and markings are carried out as required and that they are returned to their previous state if necessary when the work is completed,
- preparing and applying for changes to the roadwork safety plan if this proves necessary in the course of the work.

In order for the safety manager to be qualified to follow up these tasks, the person concerned is required to have taken and passed roadwork safety course type 2.

In the event of sanctions pursuant to Section 34, the right to be responsible for roadwork safety may be withdrawn, either from the individual who has been responsible, or from the whole safety enterprise.

Subcontractor as safety enterprise

In some cases the main contractor will bring in a subcontractor who will be responsible for roadwork safety, i.e. the subcontractor will be the safety enterprise. This should preferably be done so early that the subcontractor can be involved in preparing the proposed roadwork safety plan. If not, the main contractor must prepare the proposal and appoint a person to be responsible during the approval period. It must then be specified that another person is to be responsible during the construction period, and that this person must be appointed and approved before the work starts.

The party that is to be the subcontractor with responsibility for the execution of the roadwork safety plan should enter into an agreement with the main contractor that clearly describes the responsibilities in situations where the roadwork safety plan is not followed or cannot be followed. It is the subcontractor who will lose the right to have responsibility for roadwork safety in the event that an inspection reveals major departures from the approved roadwork safety plan. However, this also means that the main contractor has to stop work until another party is found who can assume responsibility.

Alternatively, the main contractor can retain the function of safety enterprise with a safety manager, and hire in a subcontractor as site safety supervisor. See below.

All major main contractors should have at least one person at managerial level who can take responsibility (have completed a type 2 course), even if a subcontractor is to be used as safety enterprise.

Section 33-3 requires that the safety enterprise shall appoint one person (safety manager) to be responsible for:

- ensuring that the warning is correct and in accordance with the plan,
- Ensuring that the necessary warning and barrier equipment is present, and that warning and barrier protection of the work site is at all times in accordance with an approved plan.

Additional requirements are:

- that in the event of illness, holidays etc. responsibility shall be transferred to another qualified person. The name and telephone number of the person responsible (safety manager) shall be supplied to the sign authority.
- that a copy of decisions, logbook, roadwork safety plan and any conditions that have to be stipulated for the work in question exist and are available at the work site.

This is primarily the responsibility of the safety manager. Because the safety manager will often be responsible for more than one site and often not able to be present in person, in many cases it will be necessary to also appoint a site safety supervisor for daily, local checking that warnings and protection on the work site are in order. This person should be present while the work is in progress, or be able to reach the site in a very brief space of time.

A subcontractor can be used as site safety supervisor.

The responsibilities of the site safety supervisor are primarily the first two bullets above, i.e. supervising and ensuring that warning and protection are at all times in accordance with the approved roadwork safety plan.

All persons who have completed the new type 1 course (6 hours) will normally be qualified to be site safety supervisors. In the event of specially demanding roadworks, the Construction Client or sign authority may require that a site safety supervisor with course type 2 be appointed (see Chapter 2.3).

The responsibilities of site manager can be divided between more than one person, but in that case there must be a duty roster or similar to ensure that in practice there is always somebody with this responsibility.

It is primarily the **safety enterprise** and the **safety manager** who shall ensure that there is adequate warning and protective equipment and that procedures are established for inspection of and correction of any defects in the warnings and protection. The site safety

supervisor must alert the **safety manager** if there are defects or deficiencies that cannot be resolved locally at the work site.

When preparing roadwork safety plans, the safety manager must consider whether there is a need for a site safety supervisor. If the safety manager himself is not going to be at the work site most of the time while work is in progress, a site safety supervisor should be appointed as well.

Applications for responsibility for roadwork safety should always contain the name and telephone number of both the person(s) with responsibility on behalf of the **safety enterprise**, i.e. the safety manager (with type 2 course) who can be contacted both during the case processing and while the work is in progress. The name and telephone number of any site safety supervisor(s) can be given as well.

Section 34. Sanctions

1. Any work can be stopped by the sign authority or the police until the necessary protective measures have been implemented if the situation may constitute a hazard. Work may also be stopped if warnings or site barriers are not in accordance with an approved plan etc. and the work seriously obstructs traffic flow.
2. Delegation of responsibility pursuant to Section 33-2 for the execution and follow-up of sign plans may not be given to or may be withdrawn for a shorter or longer period of time from a public agency or a contractor that does not comply with instructions issued by the sign authority, the road authority or the police.

Section 34-1 provides the sign authority with a legal basis for stopping any roadworks if **special hazardous situations** arise. Because roadworks often imply an extra hazard, this must be a hazardous situation that is either not foreseen in the roadwork safety plan, or which has become substantially more serious than it was considered to be in connection with approval of the roadwork safety plan.

Work can also be halted if the warning or protection is not in accordance with the roadwork safety plan or if there are material breaches of other rules issued in the roadwork safety plan, if this **substantially obstructs traffic flow**.

In addition to this, all work can be halted if there is no work or excavation permit or approved roadwork safety plan, or if the work carried out is not in accordance with what is described in the approved roadwork safety plan.

Section 34-2 makes it possible to withdraw the responsibility the executive agency or contractor has been given to carry out warning and protection at the work site. In such case, work must stop until there is a new safety manager who has been approved by the sign authority.

An assessment must be made on the basis of the situation of whether it is the one appointed safety manager the whole safety enterprise that must be relieved of responsibility for the execution of roadwork safety plans.

In the event of repeated observations that a responsible, executive agency/contractor fails to discharge the responsibility that it has been given, the enterprise may lose the right to have such responsibility for a period, for example until more persons have completed a type 2 course.

1.3 The Public Roads Act

Veglov, LOV-1963-06-21-23. last amended 2009-06-19.

1.3.1 The road authority

The Norwegian Public Roads Administration (NPRA) is normally the authority for national roads and county roads and the municipality is the authority for municipal roads.

Section 17 of the Public Roads Act provides a legal base for the Directorate of Public Roads to stipulate that stretches of national road in a municipality can be maintained by the municipality.

Section 18 of the Public Roads Act provides a legal base for the county council to stipulate that stretches of county road in a municipality shall be maintained by the municipality.

Municipalities that are delegated this responsibility pursuant to Section 17 or Section 18 shall have their expenses refunded according to guidelines issued by the Ministry of Transport and Communications.

1.3.2 Permission for work on or along roads

According to Sections 32 and 57 of the Public Roads Act, no party may engage in work on, under, over or by public roads without the permission of the road authority. Section 32 applies in particular to pipework, while Section 57 applies to all types of "intervention".

The prohibition in Section 32 applies even if the road authority does not own the ground on which the facility is to be. The land owner must thus obtain permission even if the whole of the work can be carried out on property that does not belong to the road authority.

Section 57 states that it is forbidden to damage public roads or to damage or remove devices that belong to public roads. In the area belonging to public roads it is forbidden without

permission of the road authority to:

- excavate, blast, remove material, cut down trees etc.,
- put up promotion material, lay timber, building materials etc.,
- throw away rubbish or direct waste water or drainage water.

In the proximity of public roads it is moreover not permitted to place rubbish etc. in such a way that it may be offensive to road users or an obstacle to operation of the road, without authorisation from the road authority.

1.3.3 Remedial costs

According to Section 58 of the Public Roads Act, the roads authorities can remedy breaches of the provisions in Section 57 at the expense of the party responsible or the owner.

Parties that carry out work without a permit also undertake to cover the costs of the remedial work.

1.4 The Working Environment Act with regulations

The Act relating to working environment, working hours and employment protection etc. (Working Environment Act), (LOV-2005-06-17-62 last amended by LOV 2010-06-25-31).

The Working Environment Act with appurtenant regulations governs the relationships between employer and employee and among employees with respect to health, safety and working environment. Correct warnings and protection form an important part of employee safety. Working environment rules can only be departed from where this is expressly stated in the Act or the regulations, or where the departure results in better protection for the employees than would be the case under the rules of the Act.

Section 3-1 of the Act stipulates requirements regarding systematic health, environment and safety work and Section 3-2 specifies special precautionary rules for ensuring safety.

In practice, preparing and executing roadwork safety plans will be a very central task in this safety work in enterprises that are to carry out work on and along roads.

The Working Environment Act implies the following for roadworks:

- that the contractor must draft a roadwork safety plan including a risk analysis; see Sections 3-2.3 and 3-1.2 c) of the Working Environment Act.
- that those persons in management who are to be responsible for implementation of the roadwork safety plan have a type 2 roadwork safety course; see Section 3-2.1 b) of the Working Environment Act.

- procedures must be established that clearly allocate responsibilities for the execution of the roadwork safety plan with inspections and changes when this is necessary, cf. Section 3-1.2 e), g) and h) of the Working Environment Act,
- that all employees who are to work on roads have taken a type 1 roadwork safety course; cf. Section 3-2.1 a) of the Working Environment Act,
- that all employees are familiarised with the approved roadwork safety plan and the conditions in it; cf. Section 3-2.1 a) of the Working Environment Act.

The Working Environment Act also has rules for workplaces with employees from several firms (Section 2-2) and rules for employee's responsibility (Section 2-3). The latter implies orders to use protective equipment approved for roadworks and responsibility for knowing the roadwork safety plan well enough to be able to remedy simple defects oneself, or to report the occurrence of more serious defects.

Regulation relating to workplaces and work premises

This regulation (FOR-1995-02-16-170, most recently amended by FOR-2006-09-04-1042), applies to both permanent and temporary workplaces. Outdoor workplaces are discussed in particular in Chapter 5, Sections 42 – 50.

The provisions in this regulation mainly concern internal conditions at the workplace, such as safety during work or in connection with movements within the workplace. The provisions have a bearing on the design of protection against passing traffic. Manual 051 will not go further into conditions "within the workplace".

The Internal Control Regulations

The "Regulations relating to systematic health, environmental and safety activities in enterprises" (FOR-1996-12-06-1127), last amended by FOR 2005-28-51) apply to all activities to which the Working Environment Act applies, including public enterprises. Internal control is used in a number of areas as a control and supervisory principle. Many activities are subject to internal control requirements from a number of different acts and regulations.

Drafting and following up procedures for supervision of roadwork safety will usually be described in the internal control system of the individual enterprise.

The Construction Client Regulations

The regulations relating to safety, health and working environment on building and construction sites (FOR-2009-08-03-1028) require the "Construction Client" to coordinate measures for safety, health and working environment at workplaces where activities and those involved change over time. The regulation applies to all building and construction activity, including maintenance.

A Construction Client is any physical or legal person who has a piece of building or construction work carried out.

From a formal point of view, the county council is the Construction Client for county road construction and operation, with the NPRA as Construction Client's representative. For the sake of simplicity, the NPRA is also called the Construction Client for county road projects paid for by the county council.

An **HSE** (health, safety and working environment) plan shall be drawn up for all building and construction work. The roadwork safety plan is a very important part of this HSE plan for work on and along roads.

Roadwork safety plans shall observe both the objectives of the Road Traffic Act and the Road Sign Regulations concerning traffic safety and the objectives of the Working Environment Act and the Construction Client Regulations concerning safety, health and working environment at construction workplaces.

The roadwork safety plan must therefore be a part of the HSE plan, and the procedures for complying with the roadwork safety plan must be an important part of HSE responsibility, for which there must be sound procedures. Both the Construction Client and the contractor (employer) have important commitments here.

Roadworks always entail a risk of injury to the workers because of passing traffic. For both the NPRA and other Construction Clients, this means:

Section 5 of the Construction Client Regulations imposes responsibility for safety, health and working environment at the construction site on the Construction Client. During the performance of the work, the Construction Client shall take account of safety by coordinating the work if there is more than one enterprise at the workplace. HSE including roadwork safety must therefore be on the agenda at all construction progress meetings.

In Section 6 of the Construction Client Regulations, the Construction Client is required to assess the risk situation already during the planning/design phase and to incorporate the risk factors revealed into the basis for tenders.

Section 7 of the Construction Client Regulations requires the Construction Client to ensure that a written HSE plan is drawn up which describes how the risk factors in the project are to be handled. The roadwork safety plan must be a part of this plan. The HSE plan shall be readily available and made known at the work site; similar requirements apply for the roadwork safety plan. Section 19 also requires the employer to provide information about the HSE plan and hence the roadwork safety plan.

Section 8 of the Construction Client Regulations states that the HSE plan shall be based on risk assessments geared to the work in question. For roadworks, this means that the risk assessments must cover not only risk factors within the working area, but also risk with

respect to passing traffic. Risk assessments for the roadwork safety plan shall also assess risk for road users passing the roadworks area. The HSE plan shall also contain procedures for nonconformity treatment, i.e. what to do when situations arise that are not in compliance with the HSE plan.

Section 9 of the Construction Client Regulations states that the Construction Client shall stipulate special requirements concerning preventive measures. A very important preventive measure is the contractor's drawing up of procedures for checking roadwork safety both at start-up and while the work is in progress, and the Construction Client should spend time at both construction meetings and inspections to follow up whether these procedures function. This requires that the Construction Client be well acquainted with the roadwork safety plan. These procedures shall also form a part of the contractors' HSE work, and according to Section 11, the Construction Client shall also stipulate requirements regarding this work.

Section 18, targeting employers, also deals with sound HSE procedures.

In addition to the Construction Client Regulations, the following apply to the NPRA:

- the zero accident vision of no deaths or serious injuries in traffic, which includes roadworks sites,
- the NPRA's own Construction Client strategy: "The NPRA's Construction Client organisation shall be an example in all HSE work. Implicit in this strategy is that the NPRA places emphasis on maintaining a higher level than the minimum requirements in applicable acts and regulations."
- the HSE declaration in Manual 214 HSE which reads:

"The goal of the NPRA, as employer and Construction Client, is that all the authority's activities shall be accomplished without harm to humans, property or the environment.

This goal shall be achieved by:

- prioritising health, safety and the environment in all our activities, from planning start until the tasks has been completed.
- the interests of progress and the economic situation shall never be at the expense of HSE.
- all employees have a commitment to their own safety and well-being and that of their workmates."

1.5 Other general provisions

Other central provisions concerning roadwork safety include:

- The Public Administration Act
- The police bye-laws
- The Act relating to Compensation
- The Penal Code

A short account follows of how the different types of decision are affected by the Public Administration Act, and what the contents of the local police bye-laws may be.

The Public Administration Act

Sign decisions, and accordingly also approval of the sign section of the roadwork safety plan, are not regarded as individual decisions pursuant to the Public Administration Act. Case processing rules are set out in Sections 26-30 of the Sign Regulation, and it is not possible to appeal these decisions.

Requirements regarding protection in the roadwork safety plan are made by the NPRA as "landowner", in the interests of safety and ease of passage. Also these requirements are not regarded as individual decisions pursuant to the Public Administration Act.

Nor are sanctions in the event of defects or deficiencies in roadwork safety, such as instructions to rectify defects, withdrawal of responsibility for roadwork safety or having the defect rectified by the sign authority at the expense of the safety enterprise, regarded as individual decisions that can be appealed.

Police bye-laws

A number of municipalities have adopted police bye-laws that may also contain rules about roadworks. In some places night work must be approved by the chief municipal medical officer.

Normative police bye-laws drawn up by Norges Byforbund (the Union of Norwegian Cities) and Norges Herredsforbund (the Norwegian Association of Regional Municipalities), approved by the Ministry of Justice on 18 February 1964, contain rules as to which cases require permission to be obtained from the police.

When it comes to work on public roads, the police bye-laws go further than the Roads Act and the Road Traffic Act, as they also apply to private roads and activities other than roadworks. The bye-laws appear to be directed primarily at the public and to a lesser extent at other public authorities. The bye-laws do not really have any independent significance for public roadworks apart from a certain duty of information to the police. The question for the roads and sign authorities is mainly what procedures should be planned in relation to the police.

2. Planning and execution

This chapter is a brief description of the procedure in connection with application for, approval and execution of roadwork safety on public roads.

1. Construction Client shall assess risk and incorporate an account of this in the basis for the tender; see Section 6 of the Construction Client Regulations.
2. The Construction Client or safety enterprise prepares or arranges for the preparation of a proposed roadwork safety plan based on a risk assessment of the plans for how the work is to be carried out. Great emphasis shall be placed on the safety of both road workers and road users, while at the same time satisfactory passage must be maintained for all types of road users.
3. The executive enterprise (the enterprise responsible for roadwork safety) sends a proposed roadwork safety plan to the NPRA (for highways and county roads). At the same time, an application for excavation or work permission is submitted if this has not been done previously. Applications should be submitted well before the work is due to start.
4. The NPRA, as road authority, checks first that an excavation/work permit has been or can be granted before the roadwork safety plan can be approved by the NPRA as sign authority. If the proposed roadwork safety plan with associated risk evaluation is deficient, the NPRA can return the proposal with notice of what needs to be rectified. The sign authority can also amend or supplement the proposed roadwork safety plan before it is approved.
5. The sign authority approves the roadwork safety plan when it is satisfactory and at the same time makes necessary decisions regarding traffic control. Approval/decisions shall also specify that the responsibility for execution of the roadwork safety plan is transferred to the safety enterprise.
6. The safety enterprise must if necessary adjust its HSE plan to the approved roadwork safety plan and prepare and follow up necessary procedures for following the roadwork safety plan, including keeping a logbook.
7. When the NPRA is Construction Client, the Construction Client organisation shall also maintain supervision to ensure that the roadwork safety plan is complied with and determine whether there is a need to change the plan as the work changes. Compliance with the roadwork safety plan shall be on the agenda at all construction progress meetings.
8. The NPRA may carry out controls, audits or inspections of roadwork safety plans and follow-up of these.
9. When the work is completed, all equipment used for warning and protection shall be removed and the safety enterprise and Construction Client shall check that all permanent signage, road markings and any signs are in place and functioning as they should be.

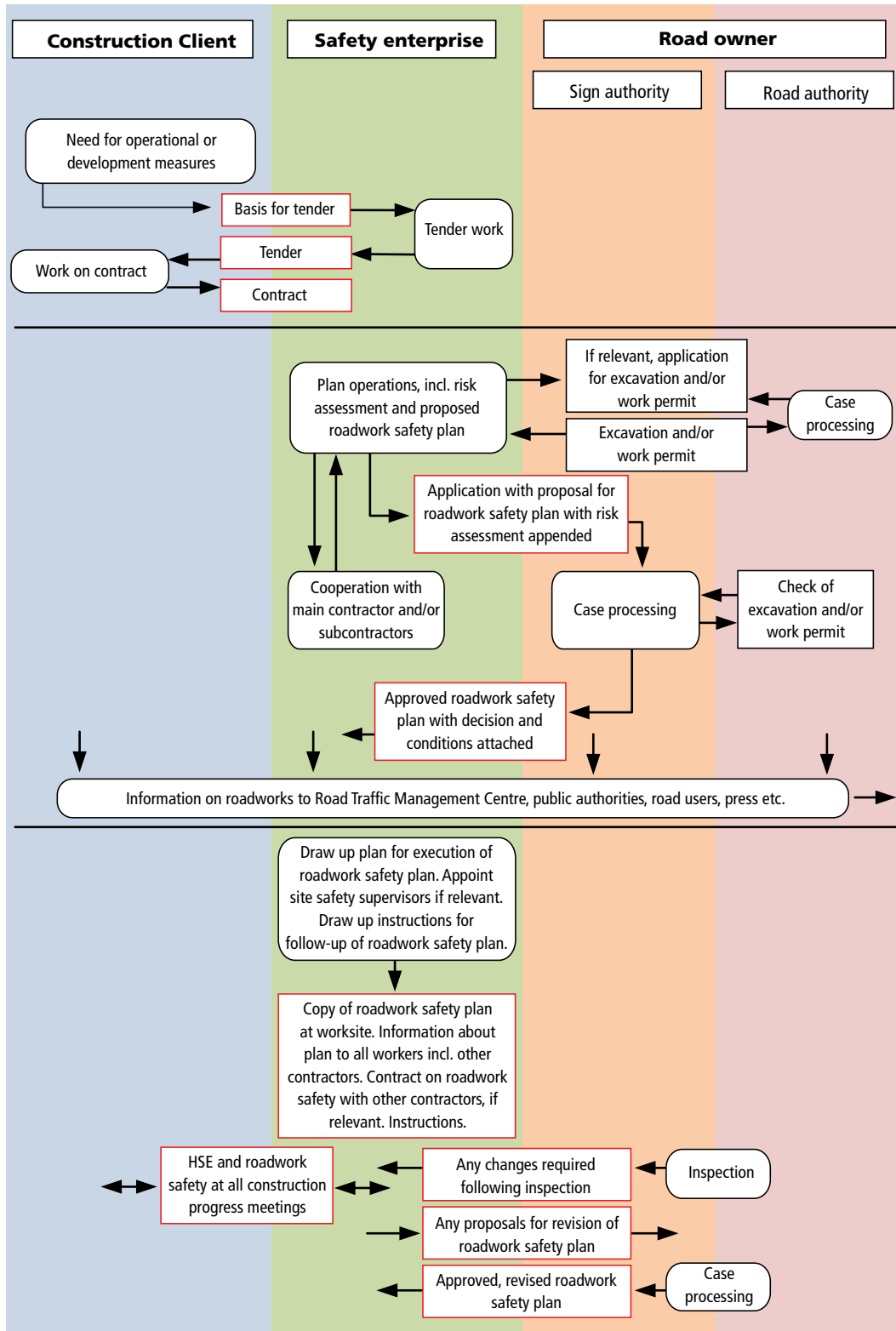


Figure 2.1 Flow chart showing parties involved, responsibilities and important documents

2.1 Applications

In most cases, applications for excavation permits and for approval of roadwork safety plans will be handled at the same time and by the same government agency. It is therefore often advisable to send these applications in together, but if desired the roadwork safety plan can be prepared after the permit for excavation and/or work or a promise of a permit has been given.

An application for approval of the roadwork safety plan should be sent to the sign authority for the road in question. The NPRA is the safety authority for national roads and county roads, and the municipality is the sign authority for municipal roads.

For national roads and county roads for which the municipality has been authorised pursuant to Sections 17 and 18 of the Roads Act, the municipality is the responsible sign authority and warnings and applications for approval of roadwork safety plans should be sent to the municipality.

For private roads that are open to public traffic, applications for permission to excavate shall be sent to the road-owner, while an application for approval and use of public signs should be sent to the relevant region of the NPRA.

2.2 Preparation of roadwork safety plans

2.2.1 Who should prepare roadwork safety plans?

Roadwork safety plans should normally be prepared by the enterprise that is to be responsible for roadwork safety while the work is in progress. If this is not the main contractor, the main contractor must nevertheless be involved in preparing the plans to ensure that the roadwork safety plan is consistent with the work set-up the main contractor wants to use.

The Construction Client can also prepare a preliminary roadwork safety plan as a basis for soliciting tenders. Important conditions for how the work is to be carried out can be specified here.

If the party responsible for drawing up a roadwork safety plan is not capable of preparing satisfactory roadwork safety plans, this service must be procured from enterprises with adequate expertise.

The responsibility of the sign authorities will normally be limited to assessing and if relevant approving roadwork safety plans and adding special rules. If the draft roadwork safety plan is not satisfactory, the sign authority can return it and ask for an improved draft to be prepared before going further with processing of the plan.

In some cases, the sign authority may assist in preparing a roadwork safety plan. The sign authority should be involved in an advisory capacity during the planning phase of major works. If the work must be expected to have particular consequences for schools and public transport companies, they should be involved in the preparation of the plans at an early stage, so that problems can be clarified and hopefully eliminated before the physical work commences. This collaboration must be coordinated by the sign authority.

2.2.2 Risk assessment

A risk assessment must be made in connection with the preparation of roadwork safety plans. The risk assessment is made in order to detect risk factors with respect to the traffic passing the works area. This risk assessment is intended to supplement the risk assessment that has to be made of the internal conditions within the works area.

The risk assessment for the roadwork safety plan shall consider both risk to the workers posed by traffic and risk to the traffic posed by the roadworks. The risk assessment shall provide a basis for proposing necessary warning and protection measures in relation to the road traffic.

The risk assessment shall be appended to the application for approval of the roadwork safety plan so that the sign authority can see what assessments form the basis for the proposed measures. Applications without satisfactory risk assessments shall be returned to the party responsible with the requirement that a new risk assessment be prepared.

2.2.2.1

According to the Construction Client Regulations, the Construction Client shall carry out a risk assessment during the design stage, and mention risk when inviting tenders for the work. When the NPRA is the Construction Client, important basic data for the risk assessment such as volume of traffic, current traffic regulation etc. should be specified in the tender documents. Risk assessments are described in more detail in NPRA Manual 271 "Risikovurderinger i vegtrafikken" [Risk assessments in connection with road traffic].

The Construction Client shall also ensure that a HSE plan is drawn up, and the roadwork safety plan for roadworks must form a part of or a supplement to the HSE plan. The HSE plan shall also be based on risk assessments. A special aspect of the roadwork safety plans is that they must be approved by the sign authority, because they are also intended to provide for the safety of road users.

Risk assessments are crucial to the choice of correct measures in the roadwork safety plan. Three simple questions must always be included in such an assessment:

- What can go wrong?
- What can we do to prevent this?
- What can we do to mitigate the consequences if it should happen nevertheless?

When preparing a risk assessment for the roadwork safety plan, the following constitute an important point of departure:

- what sort of road and traffic: speed level, traffic volume – driving, walking and cycling (volume and type),
- where is the work to be carried out: on the road, right by the road (within the road's safety zone),
- what sort of work is to be carried out, what risks does it entail: excavation, placing of heavy objects including vehicles near the road, workers close to passing traffic,
- what warning is required to provide for the safety of workers and road users, what hazards should be warned of, what should the speed level be, how to achieve this speed level?
- what is required in terms of protection, both transversely across the road before the work site and along the work area, what is there space for?
- ease of passage for road users.

If necessary, the sign authority can prepare a more thorough risk assessment, and on the basis of this demand more extensive warning or protection.

2.2.3 Content of roadwork safety plans

The roadwork safety plan shall show and describe all:
traffic signs, road markings and traffic light signals that are to be used or changed in connection with the road works.

road closures, any use of manual traffic control and convoy escort vehicles,
other measures, for example protection and lighting,
relevant spacing/distances,

measures that are necessary to ensure passage for all groups of road users,
any requirements associated with the execution of the work, such as times when work can take place, the order in which operations have to be carried out, when inspection is required of the roadwork safety measures etc.

If the work is of such a nature that it entails major changes over time, and that it will accordingly be necessary to make major changes in warning and protection, plans can be drawn up for the different stages.

When the roadwork safety plan is submitted for approval, it must be stated who is to be the safety manager.

If the plan is submitted long before the work is to be carried out, an interim safety manager may be used as contact person during the case processing. This person must also have passed a type 2 course.

cont. →

Before the work starts, the names of the safety manager during the construction period and of any site safety supervisors must be given to the sign authority. The mobile phone numbers of these persons must also be provided.

2.2.3.1

2.2.4 General roadwork safety plans

In connection with operation and maintenance of roads and associated installations there is a regular need to do work that requires approved roadwork safety plans. To avoid the contractor having to submit a proposed roadwork safety plan in each individual case for the same type of work, the sign authority can approve "general roadwork safety plans" for this type of work.

These general roadwork safety plans will be particularly relevant for mobile or short-term roadworks, as a rule tasks that are covered by a function contract. These plans can also be made for other, short-term work that occurs relatively frequently, such as vehicle rescue, clearing up after accidents involving wildlife etc.

The following apply to the sign authority:

- General roadwork safety plans shall never apply for more than a year.
- The area and roads to which the plan applies shall be specified.
- Any special conditions for the use of the plan shall be specified.
- A separate approval must be written for each executive contractor who is to use the plan, specifying who the safety manager is.
- General roadwork safety plans shall not be approved by the person/persons with daily responsibility for following up the work contract with the responsible contractor.
- Logbooks must be submitted at least every three months.

2.2.4.1

These plans should not be too general. For example, the same plan should not apply to both a county road with a low volume of traffic and a low speed level and to motorway traffic with a speed limit of 90 km/h.

If the plan applies to roads with heavy traffic, it must be made a condition that the work is not to be carried out during the most heavily trafficked periods.

If possible, the risk factors to which particular weight should be attached in follow-up assessments should be specified.

The following apply to the contractor:

- The contractor's safety manager shall have a copy of the approved general plans and be thoroughly familiar with the special conditions applying to their use.
- The safety manager shall ensure that the contractor and any subcontractors have sound procedures that ensure that each time the plan is applied:
 - o a risk assessment is made first
 - o there is a procedure that ensures that the person who actually does the work is thoroughly familiar with both the plan and the risk assessment
 - o a logbook entry is made immediately after the work
- A copy of the general roadwork safety plan that is being used shall be available at the actual site while the work is being carried out.

2.2.4.2

2.2.5 Enterprise with responsibility for carrying out and following up roadwork safety (safety enterprise)

The safety enterprise must be able to document that named personnel have the qualifications required to be responsible for the execution and follow-up of roadwork safety for the individual work operation.

At locations with complicated conditions, the sign authority may stipulate further requirements regarding experience and expertise than the training requirements in Appendix 2.

Enterprises that do not follow up the requirements stipulated in the roadwork safety plans may be refused responsibility for carrying out and following up roadwork safety.

2.2.5.1

When announcing the work, the Construction Client can make it a requirement that contractors only use workers who have passed roadwork safety courses that are required for working on roads, or require a declaration to this effect in the same way as with HSE declarations.

For large works, the Construction Client and the sign authority should consider together whether it should be required in the invitation for tenders that the construction site must have a site safety supervisor who has passed a type 2 course.

2.2.6 Contact between applicant and sign authority

When processing and approving the roadwork safety plan, the sign authority shall check that safety and ease of passage are satisfactorily taken into account. If necessary, the sign authority can request that the roadwork safety plan be revised.

The sign authority can make special requirements with respect to when the roadworks can be carried out, or require more frequent checks of the warnings than is usual.

There may be a need to discuss these measures in more detail, and applicants should therefore submit the name of a person in the enterprise who has sufficient qualifications and authority to discuss this type of question.

The sign authority shall be responsible for contact with other authorities in connection with approval of the roadwork safety plan.

2.2.6.1

2.3 Approval and decisions

2.3.1 Approval of roadwork safety plan

An approved roadwork safety plan shall contain:

- reference to the plan drawings and any other provisions or documents that the roadwork safety plan consists of. These documents shall be marked in such a way that no doubt can arise as to which version of the roadwork safety plan has been approved.
- a listing of the requirements associated with the plan, if this is not evident from the other plan documents.
- indication that the approval is also a decision pursuant to Section 29 of the Road Sign Regulations for public traffic signs other than the traffic regulatory signs, and pursuant to Section 30 for road marking.
- indication that special decisions for traffic regulatory signs and use of traffic light signals are appended; see Sections 26, 28 and 30 of the Road Sign Regulations.
- if relevant, a provision to the effect that the executive enterprise can use manual traffic control, and the conditions for this; see Section 7, second paragraph of the Road Traffic Act.
- transfer of responsibility for execution and follow-up of roadwork safety for the executive enterprise on given conditions.

All the documents that are involved in the approval of the roadwork safety plan must be signed by a person who has been delegated the authority to give such approval. They should have at least the same qualifications as those required of the safety manager.

2.3.1.1

Executive officers should not be authorised to approve roadwork safety plans for operational or development tasks in cases where they are also to function as Construction Client.

Employer must ensure that executive officers who are given responsibility for approving roadwork safety plans have or are given the opportunity to build up sufficiently broad expertise to enable them to perform this work properly.

Executive officers shall not approve roadwork safety plans if there is any doubt as to whether the information in the application is relevant or complete.

It must be considered whether it is necessary to set specific conditions for how the work is to be carried out, in addition to what is set out in the application. Examples of this are:

- times when it is not possible to work because of heavy traffic,
- a requirement for a site safety supervisor who has passed Course 2 on complicated roadworks, or a procedure that ensures that checks are made several times a day that the roadwork safety is correct and relevant,
- a requirement that the plan be supplemented with procedures or plans for how the roadwork safety should be changed as the roadwork itself changes.

2.3.2 Special decisions regarding traffic regulating signs etc.

A decision concerning use of traffic regulating signs to enable the implementation of a temporary ban on traffic, restrictions on traffic on a road or reduced speed in connection with work on roads is a local regulation. This means that in principle the decision is subject to the rules concerning regulations in the Public Administration Act. However, exemption has been given from the requirement of publishing notices of traffic regulating signs in the Norwegian Legal Gazette, because the setting up of signs is regarded as sufficient notification. The duty of providing advance warning and obtaining statements is similarly regarded as taken care of if the procedures that are described are complied with.

Special decisions concerning traffic regulating signs and signals or manual direction of traffic shall contain:

- the name of the administrative body that has made the decision.
- a clear reference to the provision that authorises the decision (Section 7, second paragraph of the Road Traffic Act and Section 32.2 of the Road Sign Regulations).
- the regulations and signs that are covered by the individual decision, with reference to the relevant legal basis in the Road Sign Regulations (Section 26. 1, fourth paragraph, Section 28.3 fifth paragraph or Section 30.4, alternatively Section 7 of the Act).
- a reference to the roadwork safety plan where the traffic regulation is shown, if necessary with a more precise specification of the location.

cont. →

- any restrictions on the period of validity, and requirements regarding logging of when signs are put up and taken down.
- an indication that responsibility for the implementation of the regulation is given to a safety enterprise (safety manager), if relevant with a requirement of reporting to the sign authority and/or the police.

The decision shall be dated and numbered. The decision shall be signed by the person who has been given written authorisation to take such decisions.

2.3.2.1

2.3.3 Contact between sign authority and other authorities

The sign authority is responsible for ensuring that other authorities and bodies are informed and have the opportunity to present their views with respect to treatment of the roadwork safety plans. This applies both to the time of implementation and measures to maintain safety and ease of passage.

Other authorities

For works on roads with heavy traffic or works that entail extensive road closure, both the roadwork safety plan and the times for carrying out the work shall be determined in consultation with the police. If necessary, other emergency response agencies shall also be consulted.

If work on national or county highways has consequences for the municipal road network, the municipalities shall be informed and if necessary take part in the evaluations. The municipalities are similarly obliged to consult the NPRA if roadwork on municipal roads has consequences for national or county highways.

The roads authorities shall always notify the police, fire department and ambulance service of work that entails closing roads or reducing traffic flow. This requires that procedures be established for when the safety enterprises must report to the roads authorities. The police shall also have a copy of all sign decisions, even if the duty of notification according to the above rules has been complied with.

2.3.3.1

Public transport

When work is planned on public transport routes where traffic flow problems must be expected, the public transport companies in question must be contacted well before the start of work. Information must be provided about the work and its duration and the consequences it will have for public transport. It is recommended that the sign authorities

cooperate with the public transport companies on the timing of the work, to minimise the inconvenience to public transport.

It may also be advisable to adjust schedules or make temporary changes in routes for public transport, or to move bus stops etc. The public transport companies shall be kept constantly informed during the work, so that they have sufficient time to plan changes and to inform both drivers and transport-users of the changes. Satisfactory access to bus stops etc. shall continue to be provided during the construction period.

Schools

If the route children take to school is substantially affected by roadworks, the school should be informed about the forthcoming work. In the case of major works it is an advantage for the school management to be consulted with regard to the timing of the work and what safety measures are necessary. This also applies to day-care centres etc.

Others

If there are other groups who are strongly affected by the roadworks, they should be informed as early as possible. The authorities should ensure that satisfactory access is ensured to all properties in the area throughout the construction period. If disputes arise as to what is satisfactory access, the sign authority should obtain professional advice, but if there is question of liability for compensation, this is primarily a matter between the land-owner and the Construction Client/executive enterprise.

2.4 Information about road work

The road authority has a duty to provide information to road users generally and in some situations to specific traffic groups and/or authorities. This information can be provided in various ways, depending on the target group and the situation. Information can be provided to users of the stretch of road in question in the form of signs or via the Road Traffic Management Centre.

Information about roadworks must be given to the public authorities and other authorities in connection with the approval of roadwork safety plans and while the work is in progress.

Direct to road users

When road closures or traffic obstructions of long duration are planned, the road owner should arrange for announcements in relevant local newspapers. If the closure only affects very local traffic and detours can be signed locally, direct information to those concerned can be used instead (letters etc.). In the case of major roadworks, a good means of information to road users may be to use sign 560 Information sign for the stretches in question.

The information shall be provided so early that road users can plan accordingly. Good and correct signing will also have positive information value in itself. Such use of sign 560 shall always be mentioned in the roadwork safety plan. This is discussed in more detail in Chapter 3.

In the case of major roadworks with extensive road closures and detours, it may also be advisable to produce brochures for distribution to households in the area or distribution in some other way. This information can also be provided by local radio or television and the daily press just before the work begins.

It is the task of the road owner to ensure that information is provided. The task of providing information may be left to the Construction Client or the executive enterprise. If the NPRA is the Construction Client, the Construction Client should assume responsibility for this. If some other party is the Construction Client, the party responsible for operation of the road should assume responsibility for information.

Road Traffic Management Centre

The guidelines for the road notification service are published in the NPRA's Manual 210 "Vegmeldingstjenesten [Road Traffic Management Centre]"

Road closures or serious obstructions to passage on the main road network shall be reported to the regional road traffic management centre. The centre passes on the information to others according to special guidelines.

2.4.0.1

The party that has approved the roadwork safety plan shall ensure that relevant authorities such as the police, fire department, ambulance service, Norwegian State Railways, public transport companies, ferry companies etc. are directly notified according to need in accordance with applicable guidelines.

Executive enterprises with responsibility for roadwork safety will normally be informed through the roadwork safety plan of the situations in which notification shall be given to the NPRA or the municipality about restricted passage, and who should then be notified.

2.5 Execution of the roadwork safety plan

The executive enterprise responsible for roadwork safety shall itself establish procedures for checking that roadwork safety is in compliance with the roadwork safety plan and that equipment fulfils its intended function.

It is also important that the enterprise familiarises itself with the requirements in the roadwork safety plan as soon as it has been approved by the sign authority, particularly if changes have been made to the draft plan that was submitted for approval.

The party responsible shall ensure that warning and protection are carried out correctly. The roadwork safety plan may contain requirements that inspections be performed. If deficiencies are discovered, the party responsible shall take the initiative to have them rectified as fast as possible.

The party responsible shall check that all warning signs etc. and safety equipment are removed as soon as the work is completed, and that any permanent signing and road markings are reinstalled.

2.5.0.1

Logbook

The executive enterprise shall keep a logbook. The logbook shall contain times and/or information (such as placing) about:

- when and where warning signs and safety equipment are set out,
- when warning and protection are in place,
- placing of the warnings and protection and any changes (specification in kilometres),
- any road closures,
- time and duration/stretch of manual traffic direction, traffic light regulation or use of a convoy escort vehicle,
- all departures from the roadwork safety plan,
- all events that affect traffic flow or warnings/protection,
- all accidents and near-misses,
- any internal or external inspections,
- police presence,
- when warnings and protection are removed,
- when warnings and protection have been removed and the normal situation has been re-established.

The logbook shall be sent to the sign authority (the party that has approved the roadwork safety plan) when the roadworks are finished. In the case of long-term work, more frequent submission of the logbook may be required.

The sign authority shall check that the logbook is sent in and ensure that it is archived.

2.5.0.2

2.6 General requirements regarding safety and ease of passage

2.6.1 Lighting

The lighting on roads with lighting should be maintained during the construction period.

On lit roads with pedestrians and cyclists there must be lighting also during the construction period.

If provisional roads are constructed with a notably poorer standard than the road they are replacing, notice to this effect should be given and temporary lighting should be set up to prevent accidents and ensure acceptable traffic flow.

2.6.1.1

The use of lighting should also be considered in connection with work on stretches or at places that do not have permanent lighting, but where lighting can contribute to greater safety and ease of passage.

2.6.2 Pedestrians and cyclists

The area used by pedestrians and cyclists must be kept free of tools, machinery, materials and similar.

If a barrier makes it necessary pedestrians have to ascend/descend from a pavement, passage for wheelchair users, prams etc. must be facilitated by evening out the difference in levels over a sufficient stretch. Barriers shall be designed so that they do not constitute a danger to the visually handicapped.

If road users are directed to the other side of the road, this must be at a safe place, for example an existing pedestrian crossing. Signs requesting road users to use the pavement on the other side of the road can then be set up.

Moving of pedestrian crossings, or establishment of new pedestrian crossings should be avoided. If this is nevertheless done, all the requirements in the criteria for pedestrian crossings (Manual 270) shall be satisfied.

2.6.2.1

Roadworks often pose special problems for children. It is therefore important to take the following into account:

- If road closures lead to children's route to school being used as a detour, the children's safety shall not be compromised. Lower speeds and the use of speed-reducing measures should be considered.

- Work sites must be protected especially well. Remember that work sites attract children, also after working hours.
- With excavation works it must be ensured that children cannot inadvertently or accidentally fall into ditches, etc., or obstruct construction machinery.
- Materials, machines or parked vehicles shall not be placed such that they prevent passage on pavements footpaths or cycle tracks, or reduce visibility where school children cross the road.

2.6.3 The work site

The boundaries of the worksite must be marked so that it is clear which area is closed to road users.

2.6.3.1

Narrowing of the carriageway should be marked with at least 3 barrier markers. If more than half of a lane is blocked, a warning plate should be used to mark the closure.

Barrier markers, traffic cones and traffic cylinders can be used for warnings alongside a work site. A yellow-green 560 Information sign with the text "Roadworks end" can be used to mark the end of the roadworks area.

All entry of work machines and transport of goods or materials into or out of the work area should take place in such a way that the protection is not opened towards the traffic direction.

Materials, machinery etc. shall not move outside the work site without the implementation of special measures.

2.6.3.2

The works should if possible remain within the protection. In the case of work in the left-hand lane of roads with four or more lanes, workers shall take the shortest way (cross as few lanes as possible) to get to or from the work site.

Medians must not be used to spend time on, or to store machinery or equipment.

Waiting machines and vehicles must be parked in such a way that traffic safety and traffic flow is maintained.

Private vehicles must not be parked in the work area, thereby unnecessarily increasing the area of the work site. Nor must these vehicles be parked where they will create traffic problems.

The provisions of the traffic rules relating to parking must be followed.

2.6.3.3

2.6.4 Lane widths

The width of a remaining lane may be difficult to assess if it varies, for example as a result of warning and protective equipment that has been set up.

To avoid accidents due to incorrect assessment of the road width, and to ensure passage, the remaining carriageway should have space for either one or two lanes, and not one-and-a-half lanes.

When a carriageway with traffic that is in principle two-directional has a width of 6.0 m or more, the width available between protection and/or warnings that have been set up should be:

- Maximum 3.5 m for one lane,
- Minimum 6.0 m for 2 lanes.

Lane widths of 3.6 - 6.0 m should be avoided.

2.6.4.1

If exemption from these requirements has to be applied for, a risk assessment must be made which considers:

- Can wide vehicles, including special transports that are wider than ordinary vehicles, be referred to other roads, or can the lane be expanded if transports of this kind have to pass?
- If the carriageway is too narrow for two vehicles to meet, can meeting places be constructed, or must the traffic be regulated so as to avoid meetings?

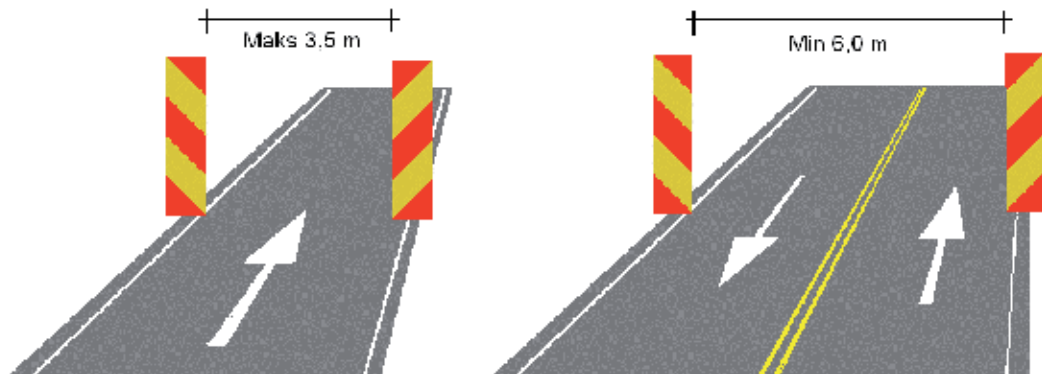


Figure 2.6.1 Minimum lane widths

2.6.5 Traffic flow

Roadworks should be organised so that road users are not unnecessarily subjected to major delays. It may nevertheless be necessary to close roads or lanes for short periods, or the capacity may become so reduced that queues and delays result.

Unless otherwise decided in the roadwork safety plan or in some other manner, delays greater than specified in Fig. 2.6.2 must be avoided. Similarly, closure of roads or lanes should not take place in periods other than those shown in Fig. 2.6.3.

| AADT Vehicles/day | | Acceptable delay |
|----------------------|---------------------------|------------------|
| Road with < 4 lanes | Road with 4 or more lanes | |
| <= 5000 | | 15 min |
| 5-10 000 | <= 30 000 | 10 min |
| > 10 000 | > 30 000 | 5 min |

Figure 2.6.2 Greatest acceptable delay (to be used in the event of short-term closures or queue formation as a result of reduced capacity)

| AADT Vehicles/day | | Permitted work period |
|----------------------|---------------------------|-----------------------|
| Road with < 4 lanes | Road with 4 or more lanes | |
| <= 5000 | | 24 hours |
| 5-10 000 | <= 30 000 | 09-14 and 19-06 |
| > 10 000 | > 30 000 | 21-06 |

Figure 2.6.3 Periods when roadworks that obstruct traffic should not take place (applies to short-term closure of lanes to prevent unacceptable delays)

When approving roadwork safety plans, it must be considered whether there are additional special factors that must be taken into account .

- ferry terminal nearby, avoid delays just before ferry departure
- roads and times when departure traffic is particularly heavy
- special arrangements like major sports arrangements, fairs and the like

Restrictions on when capacity can be reduced shall be specified as special conditions when the roadwork safety plan is approved.

2.6.6 Work in tunnels

Work in tunnels with a length of over 500 m shall take place with the aid of manual traffic control and a convoy escort vehicle; cf. Manual 269 "Sikkerhetsforvaltning av vegtunneler" [Safety management of road tunnels], Appendix 8, "Instruks for styrt trafikkavvikling ved arbeid i tunneler som er åpne for trafikk" [Instruction for controlled traffic flow in connection with work on tunnels that are open for traffic].

As stated in the instructions, applications may be made for a waiver of this requirement in the case of long tunnels and tunnels with little traffic. In such cases, and for tunnels less than 500 m long, sign-110 "Roadworks" must still be used before the tunnel, and a speed reduction must be signed. The necessary measures that must be implemented in these cases shall be described in the emergency preparedness plan for the individual tunnel.

2.7 Sanctions

The Sign Regulation provides a legal basis for three types of sanctions:

1. Section 34-1 provides a legal basis for halting any work if the warning or protection measures are not carried out in accordance with an approved plan or similar, and this causes road users considerable inconvenience.
2. Section 34.2 provides a legal basis for delegation of responsibility for the execution and follow-up of the roadwork safety plan not to take place or to be withdrawn for a shorter or longer period if the safety enterprise does not comply with instructions.
3. Section 37 provides a legal basis for requiring the covering of any expenses the sign authority might have in connection with other parties' roadwork safety.

According to Section 34-1, any work can be halted by the sign authority or the police until the necessary measures have been implemented if the situation represents a hazard.

Roadworks always constitute a hazard compared with the normal situation, but this hazard is reduced through the requirements made in the roadwork safety plan. A hazard that dictates that work must be halted must normally imply a serious departure from the roadwork safety plan, or a situation that was not foreseen in the plan.

In order to be able to order the enterprise to stop work, a serious hazard of this nature must first be shown to exist. The situation must also be such that the hazard is reduced by halting the work.

In most cases, the establishment of warning and protection in compliance with the roadwork safety plan will be the most effective means of eliminating the hazardous situation.

The sign authority ought therefore first to issue instructions that the situation be rectified. If the safety enterprise does not comply, instructions to immediately halt work shall be issued with legal basis in Section 34-1. The sign authority may if necessary have the warning remedied for the account of the safety enterprise; see Section 37 of the Road Sign Regulations.

Instructions to remedy the roadwork safety or to halt the work may initially be verbal, but shall as soon as possible be followed up by written instructions from the sign authority.

All such instructions shall be archived as a basis for any subsequent refusal of the right to have responsibility for roadwork safety.

2.7.0.1

According to Section 34-1, work may also be stopped if warnings or protective measures are not carried out in accordance with an approved plan etc. and this substantially obstructs traffic flow.

Work may also be halted pursuant to Section 34 even if the roadwork safety plan is followed, if the situation may constitute a hazard. The sign authority shall then ensure that the roadwork safety plan is modified and approve the revised plan before the work can continue.

Section 34-2 of the Road Sign Regulations states that delegation of responsibility for execution and follow-up of sign plans may be postponed or withdrawn for a shorter or longer period of time if the executive enterprise does not comply with instructions issued by the sign authority, the road authority or the police.

This presupposes that the enterprise has at least twice failed to comply with instructions issued pursuant to Section 34-1, or instructions to remedy roadwork safety issued after an inspection. These instructions should contain a warning that failure to comply with instructions will or may lead to withdrawal of responsibility for execution and follow-up of the sign plan. It should also be indicated how long it may be relevant to withhold responsibility for execution and follow-up of the sign plan.

If advance warning is given, responsibility for execution and follow-up of the sign plan for roadworks may be withdrawn from an enterprise while work is in progress. There must then have been previous situations in connection with this work where instructions have not been complied with. Such refusal of responsibility may mean that the work must be stopped until the enterprise has found someone who can assume responsibility for the roadwork safety while the work is being completed.

When the sign authority finds that an enterprise shall not be granted responsibility for roadwork safety for a period because several orders have not been complied with, the enterprise shall be notified of this in writing. The notification shall contain a reference to the orders that have not been complied with, and indicate the period for which the enterprise is to be refused responsibility. The notification shall also mention any right to appeal.

The first time an enterprise is refused responsibility, the period should be for 3-6 months; later this should be increased to a year. Before the enterprise is again given responsibility for roadwork safety, it should also be required that the enterprise can document the necessary expertise.

In addition to the sanctions described here, the road authority may with legal basis in Section 58 of the Roads Act remedy defects in the road (for the executive enterprise's account) after the works have been completed, for example signs that have not been reinstalled, or road surfacings that have not been put in proper order.

In addition to what has been mentioned previously in this chapter, the NPRA may stop all work on national and county highways immediately if:

- there is no work or excavation permit
- there is no approved roadwork safety plan
- the work done is not in compliance with an approved roadwork safety plan

Before the work is stopped, it must be considered whether this will result in a traffic hazard and whether the enterprise carrying out the work should be ordered to carry out warning and protective measures before the work is halted.

2.7.0.2

3. Warning

A distinction is made between warning and protecting. The objective of warning is to:

- make road users aware that roadwork is taking place,
- inform road users about the type of works,
- regulate traffic,
- guide traffic safely past the worksite.

Warnings provide increased safety for workers and road users when they are correctly set up and followed. They provide no safety for workers and road users if an accident should occur.

Signed traffic regulation shall not be valid for a longer stretch of road than necessary, and the warning equipment should be placed so that it is clearly visible to traffic in both directions where the roadworks site begins and ends.

Warning shall be such that road users can adapt their speed and driving behaviour in a timely manner according to the conditions present, and so that there is no doubt how to drive past the roadworks site.

The termination of the roadworks site and stretches of road that are specially regulated shall be clear.

3.0.0.1

The significance, design and use of road traffic signs, road markings and traffic signals are described in the Road Sign Regulations and the specifications (Manuals 048 Trafikk-signalanlegg [Road traffic signal systems], 049 Veggmerking [Road markings] and 050 Trafikkskilt [Road traffic signs]). This manual (051) provides detailed specifications on both the design and use of signs, traffic signals and road markings in connection with roadwork safety.

These rules may differ from the rules that apply to the permanent use of such equipment.

If roadwork safety plans are to be drawn up that require more specialised use of signs, signals or markings than is described in this manual, Manuals 048, 049, 050 and other relevant manuals and guidelines shall be used as a basis for the planning.

3.0.0.2

Technical requirements for warning and safety equipment are given in **Manual 062, Trafikksikkerhetsutstyr [Road traffic safety equipment]**.

3.1 Road traffic signs, general

3.1.1 Size, design and quality

Sign size

Medium size signs (MS) shall be used to warn of roadworks on normal roads. On motorways and roads with speed limits over 80 km/h, a large size sign (LS) shall be used.

Other sign sizes may be used in the following cases:

In cases where risk assessment has revealed special needs, large signs may be used, including over-sized signs (OS)

If the median or shoulder of the road is narrow, smaller sign sizes may be used, but it must be ensured that the signs are adequately visible. Signs smaller than under-size (US) shall not be used.

When signs are combined, the signs shall be adapted to each other so that the road user perceives the signs to be of equal size. The size of the smaller sign shall then be increased.

3.1.1.1

Sign design

Signs that are used to warn of roadworks shall have a standard design in accordance with Manual 050 unless otherwise stated in this manual. This also applies to requirements for the height of the text, borders etc.

The colour of the signs shall be as described in Figure 3.1.1.

3.1.1.2

Use of signs with fluorescent yellow-green and orange background colours.

The Road Sign Regulations:

Hazard sign, Section 3-2: "Hazard signs that are used for temporary signing in connection with **roadworks** can have a yellow background."

Section 8 The individual prohibitory signs: Sign 362 "Speed limit": "When the sign is used for **temporary regulation**, it may have a yellow background."

Section 12 The individual information signs:
"Signs 530-539 have a design that is adapted to the number of traffic lanes and direction at the location. When hazard signs are used for temporary signing in connection with **roadworks**, they can have a yellow background."

560 Information sign: "In the case of **temporary** information, the sign can have a yellow background, black border and black symbol or text. Signs providing information about detours can have an orange background, black border and black symbol or text. "

Section 14-2 Direction signs, standard specifications: "Signs 701-719 and 725 shall have the following colours: -For **temporary** road directions: orange background and black text."

Section 17-2 Supplementary plates, standard specifications: "Supplementary plates to main signs that are used for temporary signing in connection with **roadworks** can have a yellow background."

Section 9-2 Deviation of route signs, standard specifications: "**Temporary** indication signs may have a red background and yellow or white symbols."

When the Road Sign Regulations use the term "yellow background" for temporary signing, a fluorescent yellow-green colour is meant, cf. Manual 062 part 1.

3.1.1.3

The regulations state that a yellow-green background can only be used in connection with roadworks for hazard signs, supplementary plates and sign numbers 530-539. This means that such signs cannot be yellow-green for arrangements and other temporary signing.

In addition, the Directorate of Public Roads has established specifications (mandatory for all sign authorities) that say that for signs 362 and 530-538, the yellow-green colour shall only be used in connection with roadworks and not in connection with arrangements or other temporary signing.

Sign 539 shall always have a yellow-green background. All temporary 560 signs shall have yellow-green background, even though the regulations allow for the use of an orange background for information about detours.

| Sign | Background colour | |
|---|-----------------------|-----------------------|
| | Roadworks | Other temporary |
| Hazard sign | Yellow-green | As for permanent sign |
| The duty to yield and priority signs | As for permanent sign | As for permanent sign |
| Prohibitory sign | As for permanent sign | As for permanent sign |
| Exception: Sign 362 | Yellow-green | As for permanent sign |
| Mandatory sign | As for permanent sign | As for permanent sign |
| Information sign | As for permanent sign | As for permanent sign |
| UExceptions: Signs 530-538 Sign 539 Sign 560 | | |
| | Yellow-green | White |
| | Yellow-green | Yellow-green |
| | Yellow-green | Yellow-green |
| Supplementary plate | Yellow-green / White* | As for permanent sign |
| Deviation of route signs | Red | Red |
| Direction signs | Orange | Orange |

Figure 3.1.1 Colour on signs that are used to warn of roadworks

*White background on supplementary plates for main signs with white background.

Technical requirements

| | |
|---|---------|
| <p>All temporary signs for roadworks, with the exception of the signs 362/364 at the termination of a stretch with a particular speed limit, shall have class 3 sign foil; cf. Manual 062 parts 1 and 4.</p> <p>Colour coordinates shall satisfy requirements specified in Manual 062 part 1.</p> | 3.1.1.4 |
|---|---------|

There are separate requirements for variable signs used to warn of roadworks in **Manual 053 Bruk av variable trafikskilt [Use of variable road traffic signs]**.

Requirements for use of temporary signs

| | |
|--|---------|
| <p>During use, temporary road traffic signs used for roadworks shall satisfy the following requirements:</p> <ul style="list-style-type: none"> • light reflecting capacity shall not be significantly impaired due to wear of the sign surface or soiling, • at least 90% of the sign symbol or board shall be undamaged. | 3.1.1.5 |
|--|---------|

The following method may be used to check light-reflecting capacity:

The sign shall be easily visible in the dark at a distance as specified in Figure 3.1.2, when viewed from the driver's seat in a stationary passenger car with low beam lights on, while another vehicle facing it and with low beam lights on is positioned 10 m beyond the sign.

Stability

Signs that are used to warn of roadworks shall tolerate loads from passing traffic and normal weather and wind conditions without tipping over, turning or moving sideways.

3.1.1.6

Foundations

Movable foundations placed on the ground can be used if the stability requirements are satisfied.

Foundations in areas with pedestrian traffic shall be designed, marked or placed in such a way that they present no risk of tripping anyone, including the visually impaired.

The foundations ought to be able to be driven over and designed so that there is no risk of damage if they are collided with or run over. Foundations that may not be driven over shall be marked and possibly secured if placed in such a way that there is great collision hazard.

3.1.1.7

Posts and fasteners

The requirements of Manual 062 shall be satisfied, aside from the fact that fasteners that are more easily opened when setting up or taking down the signs may be used.

3.1.1.8

Sign edges and back sides

Sign equipment with sharp edges must not be placed where it is a hazard to pedestrians on pavements or footpaths and bicycle paths. Signs must either be placed higher than 2.2 m or so that the sign edge is protected.

If signs or sign equipment are placed in such a way that there is a risk that pedestrians or moving vehicles will collide with the back side of the sign equipment, the post or the sign's back side shall be made more visible with red, orange or yellow-green retro-reflective tape. These markings must not be confusable with ordinary signs.

3.1.1.9

Collapsible signs

Collapsible signs may be used for short stops on roads without especially demanding traffic environments, for special work such as vehicle salvaging, registration and inspections. Collapsible signs may deviate from the height requirements.

When workers or road users are at high risk, a flashing yellow signal above the sign should additionally be used.

3.1.1.10

3.1.2 Placement of road traffic signs

General

Signs shall be placed so that they constitute the least possible risk or obstruction to road users. Sign equipment (foundation, post, sign) shall not be dangerous should there be any collision or conflict with unprotected road users.

Sign posts shall be as close to vertical as possible.

3.1.2.1

Signs used to warn of roadworks shall be placed so that there is a clear view to the sign from a minimum distance as shown in Figure 3.2.1.

3.1.2.2

| Speed limit | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|----------------|----|----|----|----|----|-----|-----|-----|
| Visibility (m) | 30 | 40 | 50 | 70 | 90 | 100 | 120 | 140 |

Figure 3.1.2 Minimum requirements for a clear view to temporary road traffic signs in connection with roadworks.

Distance between signs

The distances between permanent signs and temporary signs in connection with warning of roadworks should not be less than 50 m outside urban areas and not less than 30 m in urban areas.

3.1.2.3

Sign combinations

Temporary signs should not be placed on the same post as permanent signs that are to be visible during the roadworks period.

3.1.2.4

If permanent signs are changed as a result of roadworks warnings, this may be done by removing them, covering them or replacing them with roadworks warning signs. Individual signs may also be in part or wholly disabled by means of sign tape, see 3.1.3.

Signs on both sides of the road

On ordinary two-lane roads, roadworks warning signs are placed only on the right side of the road, but a risk assessment may indicate a need for signs on both sides of the road.

On motorways, other multiple-lane roads and roads with high speed limits or heavy traffic, signs ought to be set up on both sides of the carriageway.

Sign 362, Speed limit, shall be set up on both sides of the road where the speed limit is reduced. Terminating a special speed limit with sign 364 can be done by placing a sign only on one side.

3.1.2.5

Placement

Signs should be placed outside of the carriageway, but should if possible not stand more than 3 metres from the edge of the carriageway. If the distance is greater, the sign size or text height should be increased.

If there is a pavement along the road, the signs shall be placed in such a way that they are not unnecessarily in the way of pedestrians. Free pavement width past the sign and sign foundation shall be a minimum of 1.7 m. The same requirement applies to footpaths and bicycle tracks. Signs on pavements or footpaths and bicycle tracks must either be placed high (see height requirements) or have protected edges, so that the edge of the sign cannot harm those passing it.

Signs that are placed on road shoulders shall be set up in such a way that the sign and support structures represent the least possible risk to road users. If equipment is left standing on the road shoulder when it is not in use, it shall be marked with cones or barrier markers.

In winter, the signs must not be placed in such a way that they make snow clearing difficult, and the sign support structure must be stable enough to tolerate snow clearing.

Signs can be placed on trailers, vehicles or work equipment.

3.1.2.6

Otherwise, the rules in **Manual 050** with respect to placement of road traffic signs apply.

Sign height

When positioning signs, the risk of damage to vehicles and injury to road users shall be considered when determining the height from the ground to the lower edge of the lowest sign plate.

The height from the ground to the lower edge of the lowest sign should not be less than 1.0 m. This does not apply to barrier markers and signs placed on vehicles.

The height from the ground to the lower edge of the lowest sign in places with pedestrian and cycle traffic shall not be less than 2.2 m. Where this requirement cannot be met, a sign support system must be built that ensures road users cannot injure themselves on sharp sign edges, posts etc.

Collapsible signs that are only used for up to 4 hours can deviate from the height requirements.

3.1.2.7

3.1.3 Altering, covering, removal of signs

Altering signs by means of tape

The information signs 530-538, sign 560 "Information sign" and service and directional signs can be partly or wholly disabled by means of sign tape.

Sign tape is an orange tape with a black border; cf. **Manual 062, part 4**. Other types of tape shall not be used.

Other signs shall be removed or covered; orange tape shall not be used on these signs. Nor shall orange tape be used on yellow-green signs.

When a single destination on a route direction sign is not to apply, this shall be indicated with sign tape placed horizontally over the destination. The width of the tape depends on the height of the text, cf. **Manual 062 part 4** and **Manual 050 part 1**.

Individual symbols may be disabled on signs 530-538 by means of tape placed in a cross over the symbol, but it should be considered whether a temporary sign with a yellow-green background colour should be used instead.

If the entire sign is to be disabled, a tape width of 75 mm shall be used to make a cross over the sign.

3.1.3.1

Signs that can be altered with orange tape:



Figure 3.1.3 Examples of signs that can be altered with orange tape

In the case of signs 530-539, new signs with a yellow-green background colour are used instead of altering them with orange tape. Destinations that are removed from directional signs should receive a new indicator on an orange sign.

Temporary sign 560 Information signs shall not be altered with tape. Here, the text should be reformulated so that the message is clear.

Covering or removal of permanent signs

The roadwork safety plan shall clearly state which permanent signs are not to apply during the roadwork period. In addition, special decisions shall be taken with respect to regulatory signs (priority, give way, prohibitory, mandatory and information signs).

Permanent signs that shall not apply during roadworks and that cannot be disabled with tape shall be removed, covered or turned so that the sign message is not visible.

If the sign is covered, this shall be done so that the covering is not destroyed during the roadworks by weather, wind, vandalism or other causes. Variable, luminous signs must not shine through the cover. Inspections shall be made to ensure the covering still functions as intended.

In the interests of the workers' safety, it may in certain cases be appropriate to turn the sign so that the sign face is turned away from the road. In this case, it must be checked to ensure that no misunderstandings can occur because the sign is visible to other road user groups. The signs shall be fastened in such a way that no damage or injury can occur if they loosen, and that no unauthorised person can turn the sign so that it is once again visible to road users. It shall also be ensured that there is no risk of injury due to a collision with the sign from the side, e.g. due to poor visibility during difficult light conditions.

3.1.3.2



Figure 3.1.4 Examples of signs that cannot be altered with orange tape

Altering and removing roadworks warnings

Roadworks warning signs that are not to apply, e.g., during the night or at weekends, shall be covered or removed according to the same rules as for permanent signs.

All signs that have been used to warn of roadworks shall be removed once the work is finished.

If permanent signs have been removed or covered during the roadworks, these shall be set up or made operable again.

3.1.3.3

3.2 The individual road traffic signs:

The signs referred to here are only those that are most relevant in connection with roadworks warnings. Discussion of the individual signs is not complete and shall be understood as additional rules and information to what is described in **Manual 050 Trafikskilt [Road traffic signs] Parts 1-5**.

3.2.1 Hazard signs

Sign 106 "Road narrows"



In the case of roadworks, sign 106.1 may be used regardless of which side of the road the work is taking place.

For major works or works of a longer duration that entail a narrowing of one side of the road, signs 106.2 and 106.3 may be used. When signs 106.2 and 106.3 are used, they shall be set up correctly in accordance with the side of the road that narrows.

3.2.1.1

Sign 108 "Uneven road ahead"



Sign 108 shall be used if there is a risk of unevenness of which road users must be made aware.

3.2.1.2

Sign 109 "Speed hump"



The sign shall only be used in connection with roadworks when special speed humps have been installed at the worksite.

3.2.1.3

Sign 110 "Roadworks"



Sign 110 is used to warn road users that they will shortly come to a site where roadworks are taking place and that they must therefore be cautious. The sign warns that people may be working on or near the road, that machinery or vehicles may be on or near the road and that the road or parts of it may be blocked off or other conditions present that require particular caution.

The sign should be the first warning road users receive that roadworks are taking place. Sign 110 can be repeated as needed.

Sign 110 can be used in combination with supplementary plate 802 "Distance", which shows the distance to the worksite, or supplementary plate 804 "Extent", which shows the extent of the stretch of roadwork.

The sign may also be used together with supplementary plate 808 "Text" to indicate what kind of roadwork is taking place. The texts to be used are discussed under sign 808.

In combination with other signs, sign 110 shall be placed highest. Exceptions from this can be made when the sign is part of an element in a warning panel; cf. the section on combining warning equipment, or the symbol is used on a variable sign.

3.2.1.4

Sign 112 “Loose chippings”

The sign shall be used before stretches of road where there is a high risk of stone chippings from car wheels, for example in the case of surface treatment, newly gravelled roads etc.

The length of the stretch of road can be shown on supplementary plate 804 “Extension”.

3.2.1.5

Sign 116 “Slippery road ahead”

The sign can be used when special conditions make the carriageway slippery. When a risk is registered of such slippery conditions that the sign must be used, measures shall be taken to reduce the risk in addition to setting up the sign immediately. The sign shall therefore only be used for short periods or together with other measures.

The reason may be given using sign 808 “Text”

3.2.1.6

Sign 117 “Soft shoulder ahead”

The sign is used when the conditions of the road shoulder implies a hazard, for example when the load-bearing ability of the shoulder is poor.

3.2.1.7

Sign 132 “Temporary traffic lights ahead”



The sign shall be used as advance warning of temporary traffic lights.

The speed limit sign when signal regulation is used shall be maximum 60 km/hr. 3.2.1.8

An evaluation must be made of how long a queue may develop, and whether the risk of a queue should be warned of with sign 149.

Sign 148 “Two-way traffic”



The sign shall be used when one lane on a multiple lane road is closed, and the other lane is used for two-way traffic without temporary guardrails to separate the driving directions. The sign shall be combined with sign 334 “No overtaking”.

The sign shall be repeated as necessary, and can have a supplementary plate 804 “Distance”

The sign can also be used in new road systems if there is a risk that road users will not understand that the carriageway has two-way traffic. 3.2.1.9

Sign 149 “Queue”

The sign can be used where there is special risk of queues in connection with roadworks, where the end of the queue may be at a place with poor visibility, for example, just behind a swing, over a hilltop or after a tunnel. The sign may use the supplementary plate 804 “Extension”

The sign should normally be combined with sign 110, as the first warning of roadworks that may result in a queue.

3.2.1.10

Sign 156 “Other hazards”

The sign can be used to warn of hazards that cannot be warned of by other hazard signs. The type of hazard shall be specified on a supplementary plate, see supplementary plate 808.

3.2.1.11

3.2.2 Duty to yield/give way and priority signs

Changing permanent give way rules should be avoided in connection with roadworks.

Decisions with respect to signs shall be taken by the sign authority for permanent decisions according to Section 27, not by the sign authority for roadworks warnings.

When converting or establishing new intersections at locations with priority roads or yield regulation, it shall be ensured that traffic from side roads cannot drive into priority roads without a give-way sign being set up.

When establishing roundabouts, it shall be ensured that all arms get roundabout yield regulation at the same time. If an adjacent road is a priority road, the roundabout must be regulated for yielding as soon as it is opened for traffic.

3.2.2.1

Right-of-way for meeting traffic

When the lane has a narrowing on one side, it is the traffic direction that has a narrowing on its side that must yield to oncoming traffic, cf. Section 7 of the Traffic Rules. In some individual cases it may nonetheless be appropriate to make the traffic direction without a narrowing yield for reasons relating to traffic flow, visibility at the location or other factors. Signs 212 and 214 are used in this case.

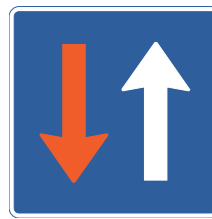
Sign 212

“Give way to oncoming traffic”



Sign 214

“Oncoming traffic must give way”



Traffic regulation using signs 212 and 214 should only be used when local conditions make driving in accordance with Section 7-6 of the Traffic Regulations difficult for traffic flow.

When the amount of traffic is greater than 500-1000 vehicles/24 hours, or when the narrow road stretch is more than 50 m, a signal system or manual traffic control shall be used.

Sign 212 should only be used when there is visibility after the priority section for the same distance as the length of this section. When sign 212 is used, sign 214 shall be set up for traffic in the opposite direction.

cont. →

Advance warning of sign 212 can be given using the same sign and supplementary plate 802 Distance.

Decisions to use signs 212 and 214 shall be made according to the same procedures as for permanent signs.

3.2.2.2

3.2.3 Prohibitory signs

Sign 302 "No Entry"



Sign 302 shall not have a supplementary plate. Temporary one-way driving with exceptions for cyclists should not be introduced.

If the sign is used to regulate a one-way stretch of road, sign 526 "One-way traffic" shall also be used.

Sign 302 shall be set up on both sides of the road. When the sign is used for temporary regulation in connection with road works, it should be supplemented with temporary road directions for the traffic that must choose driving routes other than the normal ones.

3.2.3.1

Sign 306.1 "Motor vehicles prohibited"



Sign 306.1 with supplementary plate 808 "Text" with the text "Does not apply to site traffic" can be used when existing roads or streets are blocked off, and only site traffic is allowed to pass the barrier.

Sign 306.1 shall usually not be used if other road users are allowed to pass the sign. As an exception, an approved supplementary plate such as 808.317 "Does not apply to buses and taxis" can be used in addition to "Does not apply to site traffic".

cont. →

Sign 306.1 used in connection with road works shall never have more than two supplementary plates, and these shall be approved, cf. rules for sign 808.
 The sign shall not be used to prohibit unwanted driving in construction areas that have not yet been opened to general traffic.

3.2.3.2

To make the prohibition against driving in construction areas known, a sign shall be used that cannot be confused with traffic signs. Such signs shall not be placed together with public traffic signs, but can be placed on closure material in the construction area.

Prohibition against large vehicles:

Sign 312

“Width limit”



Sign 314

“Height limit”



Sign 318.1

“Total weight limit”



Sign 318.2

“Total weight limit”



Sign 320

“Axle load limit”



Sign 322

“Bogie load limit”



These signs are to be used when it is not possible to give the road past the worksite a satisfactory standard. Vehicles that cannot pass shall be directed to a by-pass with the help of temporary directional signs.

3.2.3.3

Signs 312 and 314 can also be used for advance warning of the use of road lanes on multi-lane roads, for example in combination with sign 538 “Lane divides”. The signs must in addition be set up where the regulation begins, preferably placed over the traffic lane concerned or placed at the side of the road with supplementary plate “Applies to --- lane”

For example:

- At the narrowing of a multi-lane road, the left lane can be marked narrower than usual and reserved for vehicles with a maximum width of 2.0 m.
- When building bridges over multi-lane roads open to general traffic, the clearance over the right lane may be less than normal, and this lane should have a sign for an authorised height of 4.3 m.

If a lower permitted height than usual is introduced at the location and it implies an especially great risk if the prohibition is not respected, an obstruction can be mounted at a fixed height to prevent high vehicles from passing.

3.2.3.4

Examples of this can be the building of bridges over the road where impacting the formwork can lead to:

- serious injury to workers working up on the formwork,
- the formwork falling down and damaging other passing vehicles,
- long-term closure of the road.

A risk analysis shall always be carried out in such situations.

Turning and U-turns prohibited:

Sign 330 "Turning prohibited"



Sign 332 "U-turn prohibited"



Sign 330 can be used alone or as a supplement (preliminary warning) to sign 302.

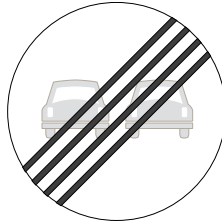
When signs 330 or 332 are used for temporary regulation in connection with roadworks, they should if necessary be supplemented with temporary road directions for the traffic that must choose other than the usual driving routes.

3.2.3.5

Sign 334 “No passing”



Sign 336 “No passing ends”



Passing prohibited can be used in temporary traffic regulation when:

- visibility conditions are worse than usual,
- temporary medians or other physical measures are used on the centre line,
- there is two-way traffic on one side of the median on a multi-lane road,
- there is considerable risk that construction vehicles will come out onto the road in the lane that is used for passing.

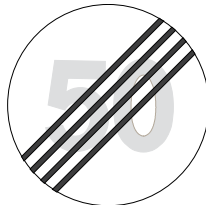
For short stretches without intersections, the prohibition distance is stated on a supplementary plate. On long stretches, sign 334 must be repeated after intersections or otherwise according to a needs analysis.

3.2.3.6

Sign 362 “Speed limit:”



Sign 364 “End of special speed limit”



Use of speed limits near roadworks

The need to lower the speed limit in connection with roadworks shall be evaluated on the basis of concern for the safety of workers and road users.

The speed limit shall not be set lower than is necessary to maintain acceptable safety while passing the worksite. The stretch of road with a lower speed limit shall not be longer than necessary.

During periods where traffic flow is normal and when it is seen to be appropriate, the temporary speed limit may be increased or removed.

In order to make a lower speed limit effective, other speed reducing measures, such as narrowing the lane or adding speed humps, should also be considered. Such measures shall be used if the average speed proves to be over the specified speed limit, or the speed level (85% fractile) is more than 5 km/h above the speed limit.

3.2.3.7

Selecting the speed limit

For roadworks where there is a need to use special speed limits, ideally 70, 50 or 30 km/h should be used.

A speed limit of 50 km/h is used towards temporary traffic lights and on roads where ordinary speed limits or the speed level before roadworks is 70 km/h.

Other speed limits shall only be used if a risk assessment shows that they provide significantly greater safety.

3.2.3.8

70 km/h is used as a special speed limit to mark that roadworks are underway on the stretch of road and that safety is reduced due to a lack of guardrails, storage of machines and equipment just outside the carriageway and similar.

The 70 km/h speed limit shall not be used if there are no risks along the stretch of road that call for a lowering of the speed limit.

On roads with speed levels of over 80 km/h, the 70 km/h speed limit is usually supplemented by speed-reducing measures such as closely spaced barrier markers to ensure that the speed level is approximately the same as the speed limit.

cont. →

The speed limit should be removed when road workers have come so far that the road appears safer than the adjacent road stretches without special speed limits.

The stretch of road with a speed limit of 70 km/h should not be longer than necessary and not over 5 km in length.

3.2.3.9

60 km/h can be used towards temporary traffic lights over a stretch of at least 300 m, or longer if there is a risk of long queues. A different speed limit may be used in the opposite direction.

60 km/h can also be used on roads where the ordinary speed limit or level before the roadworks is 70 km/h, or if a risk assessment shows that 70 km/h is too high a speed limit.

Otherwise, the same rules apply as for use of the 70 km/h speed limit.

3.2.3.10

50 km/h is used for shorter stretches of road where geometry, road surfacing or possible safety measures are so poor that a higher speed cannot be justified.

50 km/h is also used during periods of the day when construction machinery is often on or very near the carriageway, or unprotected workers are less than 3 m from the carriageway. In such situations, the speed limit should be raised to 70 km/h when there is no work being done.

On stretches of road with a temporary speed limit of 50 km/h, visual speed-reducing measures should be used in addition to speed limit signs to ensure that the speed level does not become significantly higher than the speed limit. These measures shall be used if the speed measurements show that the speed level is too high, see the discussion of speed-reducing measures.

Stretches of road with 50 km/h due to poor standard should not be longer than 1 km. Work should also be organised so that the speed limit of 50 km/h due to on-going work near the carriageway is not used for continuous stretches longer than 1 km.

3.2.3.11

30 km/h is used only for stretches of road shorter than 300 m and for short periods when work is taking place that requires workers to be near or next to the carriageway. A higher speed limit shall be used when such work is not taking place.

30 km/h can also be used by way of exception for very short stretches of road when the roadworks do not make it possible to maintain a road standard that will justify a higher speed limit.

The 30 km/h speed limit shall always be used in combination with speed-reducing measures to ensure that the speed level is as low as desired.

When a speed limit as low as 30 km/h is used, the road must first be checked to see that it will have sufficient traffic flow capacity. If this is not the case, an alternative solution must be considered such as the use of guardrails to protect workers or carrying out the work at times of the day when there is less traffic.

3.2.3.12

Signing speed limits

Advance warning: If the temporary speed limit is more than approx. 20 km/h lower than the local speed level, advance warning of the temporary speed limit should be given. If the temporary speed limit is not significantly lower than the speed level, advance warning is not necessary.

Any advance warning is done with sign 362 with a specification of the new speed limit, and a supplementary plate, 802 "Distance". The distance between the signs must be adjusted to the speed level and the local conditions, but shall not be less than 150 m.

On two-lane roads, the advance warning is placed on the right side of the road; on multi-lane roads, advance warnings should be used on both sides of the road.

3.2.3.13

New speed limit: Where the new, temporary speed limit begins, sign 362 shall be set up on both sides of the carriageway.

To warn of a temporary new speed limit, a larger sign size than usual may be used on the stretch of road.

3.2.3.14

Repeats: Temporary speed limits in connection with road work shall be repeated at a maximum of 250 m apart. Repeats are placed on the right side of the road. On roads with several lanes in the same direction, the repeat signs shall be set up on both sides of the carriageway.

The temporary speed limit should also be repeated after any intersections.

3.2.3.15

End of temporary speed limit: If the stretch of road after the worksite is to have a general speed limit of 80 km/h, sign 364 shall be used. In all other cases, sign 362 with a white background colour and speed limit for the following stretch of road shall be used.

Signs that terminate temporary speed limits can be placed only on the right side of the road, but on larger roads, should be put on both sides of the road.

Termination of the speed limit should occur immediately after the last risk factor is passed, and therefore ought not to be put in the same place as the speed limit in towards the worksite is signed for traffic in the opposite direction.

3.2.3.16

Conditions that shall be considered in connection with temporary lowering of the speed limit:

- whether there is work taking place on the carriageway, and how near passing vehicles come to the workers or work machinery.
- what speed levels detours, temporary side displacements or other changes in the alignment dictate.
- any risk of loose chippings, slippery road surface etc.
- whether there is an increase in the risk of driving off the road due to lack of guardrails, unprotected obstacles or equipment on side of the road, large height differences (ditches) etc.

A balance will always have to be struck among the safety measures that are used and a prudent speed level. A very low speed limit shall never be used to avoid using safety equipment.

If a very low speed limit is used, speed-reducing measures must usually be used. Very low speed limits can also lead to capacity problems.

Speed-reducing measures

Such measures shall be used if the average speed proves to be over the specified speed limit, or the speed level (the 85% fractile) is more than 5 km/h above the speed limit.

3.2.3.17

An assessment shall be made of the expected speed level when compiling the roadwork safety plan to establish the need for speed-reducing measures.

Measuring speed

If, after a specific speed limit is established, there is reason to suspect the average speed or speed level is too high, individual speed measurements should be taken to check this. This can be done by measuring the time a minimum of 50 passing vehicles use to pass through a 60 or 100 m long stretch. If the measurement shows the speed level to be too high, the roadwork safety plan must be revised with more use of speed-reducing measures.

The following measures are the most appropriate:

Clear speed limit signs: Larger sign size at the commencement of the speed limit and frequent repetition of the speed limit.

“Port” at the beginning of the stretch of road with a lower speed limit.

- Wide two-lane road: mandatory arrow/barrier markers in the middle of the road and warning panel or other markings on the right side that visually narrow the lane width.
- Multi-lane road: narrowing of the number of lanes, or lane widths with a “port” of, e.g., sign 904 on both sides of the carriageway.

“S bend”: On multi-lane roads with high speed levels, an “S” may be created by displacing the sides first to the left and then to the right after passing the “port”. The S is marked by barrier markers or similar that are not placed far apart.

“Visual narrowing”: The edge of the carriageway is marked with barrier markers, cones or cylinders standing no farther apart than specified for sign 906 in 3.2.7. On wide, two-lane roads, such markers can also be used along the centre line. The carriageway or lane widths can be made narrower than usual, but must not be less than specified in Chapter 2.6.4.

Speed hump: Temporary speed humps of plastic, rubber or similar, which cause many road users to drive very slowly over them, ought not to be used. Temporary speed humps ought to have the same design as permanent speed humps for 30, 40 or 50 km/h. Speed humps must be marked with a hazard sign.

Capacity when the speed limit is lowered

When speed limits are used for roadworks, capacity is usually also reduced. This is due not only to the speed limit, but also to the fact that warning and protective equipment has been set out along the road, the road geometry is changed, there is activity very close to the road, and some motorists become uncertain and very cautious. Thus the time interval between vehicles is longer than usual.

Conditions will vary a lot from worksite to worksite, but the following values are used for traffic in one direction along a stretch of road as a basis for evaluating the collective effects on capacity:

| Speed level | Time interval | Capacity |
|-----------------|---------------|-----------|
| approx. 30 km/h | 6 sec | 600 veh/h |
| approx. 40 km/h | 5 sec | 720 veh/h |
| approx. 50 km/h | 4.5 sec | 900 veh/h |

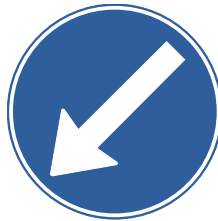
If traffic must stop often due to construction traffic or other regulation, capacity will be significantly lower.

3.2.4 Mandatory signs

Sign 404 “Mandatory lane”



404.1



404.2

The sign can be used in connection with warning of roadworks in the following situations:

- At the termination of temporary medians to show the side of the sign on which traffic should pass.
- If there is a need to indicate the side on which traffic should pass an obstacle.

Sign 404 shall never be used if there may be oncoming traffic in the lane the mandatory arrow points down towards.

When sign 404 is used in connection with medians, the sign shall be placed above sign 906 Barrier markers.

A smaller sign size than D=40 cm shall not be used for sign 404.

An over-sized sign 404 can be used on warning panels and similar in connection with roadworks. The size is to be adapted to the warning panel. The sign shall not cover parts of other signs, for example sign 930 Closure marker.

Attention must be given to ensure that oversize signs do not obstruct visibility for drivers and pedestrians.

3.2.4.1

3.2.5 Information signs

Altering signs 530-538

If roadworks on a multi-lane road with signs 534 "Lane begins", 536 "Joining traffic continues in own lane" or 538 "Median between traffic lanes in opposite directions" means that the number of lanes is reduced, this can be indicated by applying a cross in orange tape over the arrows that represent the lanes that are closed. Nonetheless, it is recommended that signs with a yellow background and the correct arrows are used instead. For signs 530, 531 and 532, new temporary signs with a yellow-green background should be made. Nonetheless, if it is decided to apply orange crosses on parts of the permanent signs, it should be considered whether this could be misunderstood.

If the entire original white sign is disabled, two diagonal stripes of orange tape in a cross from corner to corner can be used. This solution can only be used if it is useful for road users to see the information on the sign even though it does not apply. If this is not the case, the sign should be covered.

Orange tape shall not be used on yellow signs.

3.2.5.1

Sign 530 "Merge"



In the case of road work over a long period of time (for example longer than a month) and where the narrowing is designed and marked as it would be for a permanent road, sign 530 with a yellow background should be used.

The sign shall not be used when one or more lanes are closed temporarily on roads with several lanes in the same direction if the road design and marking is not first altered. Instead, sign 532 shall be used to warn of narrowing and to indicate what yield conditions apply at the lane change from the lane that is closed.

3.2.5.2

Sign 532 “Lane ends”



532.V01



532.V02

This sign shall be used to warn road users that the lane ends when one of several lanes in the same direction is temporarily closed. The sign requires that drivers in the lane that ends change lanes while yielding right of way.

Where more than two lanes merge into one lane, the end of each individual lane shall be individually signed.

In the interest of traffic safety, lane endings should be done from left to right.

3.2.5.3

Sign 539 “Altered driving patterns”



Sign 539 can be used to show temporary lane changes in connection with roadworks along a stretch of road, e.g. that the lane is diverted to the opposite side of the median or that a lane swings around the worksite.

Sign 539 shall only be used for temporary regulation and shall always have a yellow-green background.

The sign design shall be adapted to the conditions at the site.

The sign shall not be used to show lanes at intersections.

3.2.5.4

Temporary changes of lanes at intersections should be warned of using orange sign 707 Lane orientation sign.

Sign 560 "Information sign"



Use and content of sign 560

Sign 560 used in connection with roadworks shall only be used to inform about road or traffic conditions that are important for traffic safety or traffic flow, and that are relevant for road users at the location the sign is placed or refers to.

Sign 560 shall contain only traffic-related information, and not be used for campaigns or advertising.

The name of the road authority may be given if it is considered important, but shall then be as short as possible, e.g. "Statens vegvesen" or "Østfold fylkeskommune". Logos shall not be used. The name of the division of the Norwegian Public Roads Administration, or the municipality, shall not be indicated.

It is not permitted to use logos or the names of contractors on the signs. Refer also to the rules in Manual 050.

3.2.5.5

Placement of sign 560

Sign 560 shall always stand alone and never together with other traffic signs.

Information signs shall be placed at locations where traffic conditions are simple and road users have sufficient time to read the sign message. The sign should stand at least 100 m from intersections, acceleration lanes, merging lanes, difficult curves, narrowing or other locations that require extra attention.

The information signs shall be placed so that they do not compete for attention with other traffic signs or signals, or obstruct the view of these. The sign shall not stand closer to other traffic signs than 50 m outside urban areas and 30 m in urban areas.

3.2.5.6

Information about roadworks

In cases of large road worksites of a longer duration with great traffic congestion, sign 560 may be set up with a brief description of the work as a service to road users. This should especially be done for roadworks that cause noticeable inconvenience such as long delays, detours, greatly reduced speeds etc. The usefulness of the information signs shall be assessed as greater than the inconvenience of setting them up.

The text shall be as brief and informative as possible and clearly legible from a long distance. Symbols may be used, but only symbols that are specified in the Road Sign Regulations (road traffic signs or parts of road traffic signs):

The number of words on sign 560 should not exceed 8. A group of figures or a symbol count as one word. The name of the authority placed at the bottom of the sign counts as one word.

The text shall be limited to maximum 4 lines of text and maximum 4 words per line. Any authority's name counts as one line.

3.2.5.7

The sign can be used to inform road users that a road or part of a road is or will be **closed to traffic**. Road closures should be announced well in advance of the closure.

- If this applies to work on the road stretch where the sign stands, the following layout should be used:
 - 1) what is to be done, type of work
 - 2) location, extension if relevant
 - 3) advice/information/duration (finished or to be opened for traffic)
- If this applies to work on an intersection, or a good way from where the sign stands, this layout should be used:
 - 1) location
 - 2) what is to be done, type of work
 - 3) advice/information/duration (finished or to be opened for traffic)
- If the closure applies only to individual road user groups, this should be specified first.

If there are large permanent **traffic detours**, it is important to warn road users in advance about the impending change. Such warnings may be made using sign 560. Information shall then also be brief and simple so that it can be comprehended while travelling.

- Avoid location description such as: "Near Aby". Here, it is unclear whether it is before or after Aby. Instead use "After Aby", so that it is clear that road users can actually drive to Aby.
- It is often unnecessary to state the reason for the closure. This information can be left out if there is a lot of other text on the sign.
- It is important to provide information about opportunities to detour, for example, "Detour sign" or "Detour via Rv 999".



Figure 3.2.1 Examples of sign 560, work on the same road link



Figure 3.2.2 Examples of sign 560, work on intersections or far away

Design of sign 560

Sign 560 in connection with roadworks shall have a yellow-green background and both text and symbols that are indicated in the Road Sign Regulations can be used.

Orange tape shall not be used on yellow-green sign 560 to show that it does not apply. If the text is not correct at the moment, the sign must be covered or turned so that road users cannot read it.

The minimum text height that can be used is $H=105$ mm. Outside urban areas, text height should be minimum 140 mm, on multi-lane roads 175 mm. On motorways and other roads with equivalent standards and speed levels, text heights less than $H=210$ mm shall not be used.

In the case of more than 6 words, the need to increase the text height shall be considered, see Manual 050, Part 1, Appendix 1.

3.2.5.8



Figure 3.2.3 Examples of sign 560, with the name of the road authority

Texts on sign 560 mounted on warning panels

Text on mobile text boards on warning panels shall be based on the same principles as indicated above. Such boards will have a limited amount of space and the text must be adapted to this.

See also Manual 053 Bruk av variable trafikkskilt [Use of variable road traffic signs].



Figure 3.2.4 Examples of sign 560 on warning panels

Profiling of contractors or government agencies at the worksite shall not be done on road traffic signs or in such a way that the promotion is contrary to regulations or ss (Manuals 050 Trafikkskilt [Road traffic signs] and 190 Reklame og trafikkfare [Advertisements and traffic hazards]).

Directions to the site office or for delivery of equipment and materials should be given by means of a standard route sign, sign 713, with a white background. These shall only have text using the traffic alphabet and company logos may not be used.

Sign 560 “Information sign with standard texts”

A number of temporary 560 signs that are often used in connection with roadworks have been standardised:

| Sign no. | Text | Placement |
|----------|---|--|
| 560.610 | Convoy escort vehicle Follow me | On the roof of the convoy escort vehicle |
| 560.611 | Convoy escort vehicle | On the roof of the convoy escort vehicle |
| 560.612 | STOP Wait for the convoy escort vehicle | At the place where vehicles wait for the convoy escort vehicle |
| 560.615 | If red light stop here ↙ | Approx. 5 m before shuttle light signals |
| 560.689 | Roadworks ends | |
| 560.699 | Free text | |

Figure 3.2.5 Standard texts on sign 560 for use in connection with roadworks

3.2.6 Supplementary plates

Supplementary plates shall be designed to fit the main sign, for example in terms of width and text height, see Manual 050.

A yellow-green supplementary plate shall only be used if the main sign has a yellow-green colour.

Supplementary plates shall only be used in combination with certain signs, as shown in Manuals 050 or 051.

Types of supplementary plates other than those described in these manuals shall first be approved by the Directorate of Public Roads.

3.2.6.1

Sign 808 “Text”



Sign 808 can be used as a supplementary plate as indicated in Fig. 3.2.7. Other text variations should not be used for the conditions indicated.

cont. →

If distance to or extension of a hazard is to be indicated, this shall be on a separate supplementary plate 802 or 804.

If there is need to use another supplementary plate 808 as a hazard sign, or other main sign, the rules in Manual 050 shall be followed.

If a need arises to use other variants of sign 808 than those indicated in Manual 050 or 051, this shall be approved by the regional roads office, which in such cases shall decide on the supplementary plate's text. The Directorate of Public Roads shall be notified of the regional roads department's decision and stipulate any possible new sub-number. Until this is clarified, a temporarily approved 808 sign is called 808.799.

3.2.6.2

| Supplementary sign no. | Text | Can be used with sign no |
|------------------------|---------------------------|--------------------------|
| 808.701 | Vehicle accident | 156 |
| 808.702 | Accident | 156 |
| 808.703 | Loading | 156 |
| 808.704 | Guardrail missing | 156 |
| 808.706 | Bridge inspection | 110, 156 |
| 808.712 | Asphalt work | 110, 112, 116 |
| 808.713 | Site traffic | 110, 156 |
| 808.714 | Cable work | 110 |
| 808.715 | Ditch/trench cleaning | 110 |
| 808.716 | Road marking | 110 |
| 808.717 | Grading | 110, 112 |
| 808.718 | Snow clearing | 110 |
| 808.719 | Inspection | 156 |
| 808.720 | Surveying | 110 |
| 808.721 | Blasting | 110, 156 |
| 808.722 | Traffic interview | 156 |
| 808.723 | Longitudinal asphalt edge | 156 |
| 808.724 | Tunnel work | 110 |
| 808.725 | Edge trimming | 110 |
| 808.726 | Snowplough markers | 110 |
| 808.727 | Manual traffic control | 110 |
| 808.728 | Registration | 110 |

| Underskilt nr. | Tekst | Kan brukes til skilt nr. |
|----------------|---|--------------------------|
| 808.730 | Tree felling | 156 |
| 808.731 | Tractor crossing | 156 |
| 808.740 | Rock reinforcement | 110 |
| 808.741 | New asphalt | 116 |
| 808.742 | Timber operations | 110, 156 |
| 808.743 | Oil spill | 116 |
| 808.744 | Cleaning | 110 |
| 808.745 | Clearing of rubbish | 110 |
| 808.746 | Sowing | 110 |
| 808.747 | Exercise | 110, 156 |
| 808.748 | Main road regulated by signals Wait and follow traffic flow | 156 |
| 808.799 | Used for text temporarily approved by the region, notification shall be sent to the Directorate of Public Roads | |

Figure 3.2.6 Permitted texts for supplementary plate 808 with yellow-green background for roadworks

3.2.7 Deviation of route signs

Temporary deviation of route signs shall have a red background and fluorescent yellow-green markings.

3.2.7.1

Sign 902 "Background markers"



902.H



902.V

Sign 902 can be used to indicate unusually sharp turns (usually $R < 50$ m and more than 45° directional change).

Sign 902 can also be used in intersections if the road ahead is closed and all traffic must turn to the right or left. If both turn directions are possible, sign 930 "Closure marker" should be used.

Sign 902 shall not be used to mark narrowing of the road.

Sign 902 shall be placed so that the lower edge of the sign is 80 to 120 cm above the carriageway. The signs shall be placed perpendicular to the driving direction into the curve, or in the vehicle's line of sight towards the sign.

3.2.7.2

Sign 904 “Directional markings”



904.H



904.V

Sign 904 can be used when it is particularly important to show the shape of the curve, especially if:

- the radius changes (conjoined curves),
- the curve is long (major change in direction),
- there is little outside the road to show the shape of the curve.

A minimum of 3 times sign 904 shall be used to show the change, and at least two signs shall be visible at once. The distance between the signs when using sign 904 depends on the curve radius, see Figure 3.2.8. The signs shall stand at right angles to the driving direction into the curve, or in the vehicle’s line of sight towards the curve.

Sign 904 shall be placed so that the lower edge of the sign is 80 to 120 cm above the carriageway.

Sign 904 can also be used to mark closure of a lane on a multi-lane road where the traffic is directed into another lane. The signs shall then be in LS, and shall be placed lower than specified above, cf. the examples.

Sign 904 shall not be used when a two-lane road is narrowed; 906 “Barrier markers” is then used instead.

3.2.7.3

| Radius | 50 m | 100 m | 200 m |
|----------------|------|-------|-------|
| Distance apart | 10 m | 15 m | 20 m |

Figure 3.2.7 Recommended distances between sign 904s in curves

Sign 906 “Object markers”



Sign 906 can be used to mark:

- narrowing of a two-lane road,
- obstacles near the carriageway
- lane separators,
- a separator between the lane and the worksite,
- longitudinal and transverse protection.

When a lane on a multi-lane road is closed, sign 904 should be used instead.

Sign 906 can also be used as a speed-reducing device by placing the signs on both sides of the carriageway or lane with a reduced, special speed limit. There should be a distance of 2-4 m between signs. Rules for carriageway and road lane width are given in 2.6.3.

The distance between signs for longitudinal warnings shall not be greater than shown in Figure 3.2.9.

The signs shall be placed so that the stripes point down toward the side on which traffic is to pass.

A minimum of 3 signs shall be used to mark narrowing, cf. the examples.

3.2.7.4

| Speed level | Metres between object markers |
|-------------------|-------------------------------|
| 50/km/h and lower | 6 m |
| 60/km/h and lower | 12 m |

Figure 3.2.8 Maximum distance between object markers when they are used as longitudinal warning.

| Desired speed level | Metres between barrier markers |
|---------------------|--------------------------------|
| 50/km/h and lower | 2 m |
| 60 km/h | 4 m |
| 70 km/h | 6 m |

Figure 3.2.9 Recommended distance between object markers when they are used as speed-reducing devices

Sign 908 “Barrier marker”



Sign 908 “Barrier marker” shall be used to mark barriers across or above the roadway. Used on the roadway the sign may be placed on booms, warning panels, vehicles or construction machinery. This marks that part of the carriageway or the entire carriageway is closed. The lower edge of the sign on booms should be 0.85 m above the carriageway. Sign 908 shall also be used to mark obstructions above the carriageway if the clearance above the carriageway is reduced to less than 5.0 m while work takes place.

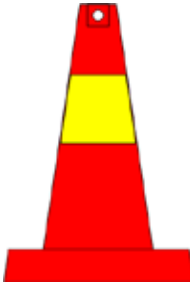
If the clearance is less than 4.7 m, height restrictions shall also be introduced using sign 314 “Height restriction”.

Used in connection with road works or under other temporary circumstances, the size of the sign may be adjusted to fit the actual application.

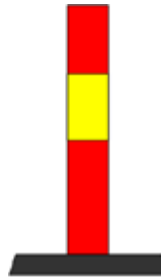
3.2.7.5

3.2.8 Traffic cones and traffic cylinders

Sign 940 “Traffic cone”



Sign 942 “Traffic cylinder”



Traffic cones and traffic cylinders can be used as longitudinal warning to mark:

- a separator between two traffic directions,
- protective measures,
- other types of obstacles in the carriageway or on the pavement.

For warnings when it is dark, sign 906 “Barrier markers” shall be used instead of traffic cones or traffic cylinders. The maximum distance between traffic cones and traffic cylinders along a worksite shall be determined in relation to the speed at the locations, but shall not be greater than shown in Fig. 3.2.9 for barrier markers.

If traffic cones or cylinders are to be used as visual speed reducing measures, they should be placed at distances as shown in Fig. 3.2.9.

3.2.8.1

New traffic cones and traffic cylinders shall satisfy the requirements in **Manual 062, part 4.**

Cones and cylinders shall be kept clean while in use so that most of their reflective ability is maintained during use.

Cones and cylinders shall no longer be used when more than 15% of the retro-reflective surfaces are gone, or when these surfaces are so damaged that it is clear they will not function as intended in the dark.

3.2.8.2

3.2.9 Directional signs

Use of temporary, orange directional signs

Section 15 of the Road Sign Regulations. General provisions:

1. Directional signs provide information about place names, businesses, road routes, lane choices, road choices and distances to destinations.
2. Signs 701-719 and 725 shall have the following colours:
 - for geographical destinations: blue background and white text for motorways, yellow background and black text for other roads.
 - for other purposes: white background and black text
 - for temporary road directions: orange background and black text.

Signs for destinations of particular interest to tourists can have a brown background and white text.

Only directional signs 701-719 (“Advance warning signs” and “Route directions”) and 725 “Distance sign” can be orange when they are used to temporarily show route directions. Other temporary directional signs shall retain their usual colour.

The specifications in Manual 050 for the use, design and placement of directional signs shall also be used for temporary route signs, unless otherwise specified in this manual.

Planning temporary detour signs

Temporary route directions, for example directions for detour roads, can be done by:

- including the changed text in orange fields on existing route direction signs,
- setting up new, orange route direction signs, if relevant in combination with existing signs,
- altering existing route direction signs with orange tape over the destination to be altered and supplementing with an orange route sign.

It is important that the entire detour is well signed. Once traffic has been directed off a main road, it must be directed back onto the main road without unnecessary problems.

Detour roads that are used shall have the same authorised axle load as the road they replace, and preferably be of the same performance grade. Permission shall be obtained from the road owner before municipal and private roads may be used as detour roads.

If detour roads offer limited passage for large vehicles, information about this shall be given in good time with the help of signs, and alternative routes should be shown for these vehicles.

Road numbers and symbols for detour routes

On detour roads for numbered roads, the number of the road the detour is replacing shall be used in the following instances:

- On directional signs before the detour. On short and simple detour routes without important intersections, it is not necessary to use the road number.
- On road number signs after intersections on detour routes. This is most relevant on routes with long-term signed detours. The road number sign for detour routes is placed together with any other road number signs.
- On road number signs between intersections on detour routes, if intersections are far apart. Road number signs shall be placed approx. every 5-10 km along the detour route.

The number of the road the detour is replacing shall have a stippled border and be placed under any road number with a solid line border. In certain situations, it may be appropriate to use a symbol (signs 723.61-66) to designate the detour route, for example in the following instances:

- On roads that are not signed with a road number.
- Where two or more detour routes cross one another, to avoid confusing the detour routes.

Temporary information signs (signs 701-709)

Temporary information signs are made as separate signs or as temporary modifications of existing, permanent signs. Permanent text can also be covered or disabled by means of orange tape.

Small information signs are set up as needed along the detour route.

Horizontal black lines (sign 723.61) can be used on information signs, if these do not contain road numbers, other symbols for the detour route or destinations.

Use of variable signs for detour signage

Advance warning and directions can also be given by means of variable signs, cf. **Manual 053 Bruk av variable trafikkskilt [Use of variable road traffic signs]**. This is most relevant for highly trafficked roads that often have to be closed for roadworks, for example tunnels. This will not be further discussed in this manual.

Sign 713 “Standard route sign”



To indicate detour routes, sign 713 with an orange background should usually be used.

If destination, road number or other detour symbols cannot be used, a horizontal black line is used instead. Horizontal black lines can also be used on sign 711 “Composite directional sign” or 715 “Exit route”, with an orange background, if these do not contain road numbers, symbols for the detour route or destinations.

Signs with black lines or other detour symbols may remain in place, even if the detour only takes place at certain times of the day. Detour signs with names or road numbers may be misunderstood if the ordinary road is open.

3.2.9.1

Sign 723 “Other detour routes”



723.61



723.63



723.65



723.62



723.64



723.66

Detour symbols shall be black on an orange field. When the symbol is used on signs with a background other than orange, there shall not be a border around the field.

When the detour symbol is used, road users should be instructed in advance on sign 560 Information, to follow the symbol for the detour route. In such instances, the symbol shall be used along the entire detour route.

The black horizontal line (723.61) ought primarily to be used as detour symbol.

Sign 723.65 should only be used in special cases. In some countries, this symbol is used to indicate the detour route for hazardous goods.

Sign 723.66 can be used so that the black arrow shows the direction of the detour.



3.2.9.2

Temporary route sign for pedestrians and cyclists



749 “Route sign for pedestrian traffic”



751 “Route sign for cyclists”

A sign with normal text can normally be used to show detours for footpaths and/or cycle tracks. “Temporary footpath” or “Temporary footpath and cycle track” may also be used. If pedestrian traffic is most important, sign 749 is used; if cyclists predominate, sign 751 is used.

In addition, sign 518 “Footpath”, sign 520 “Cycle track” or sign 522 Footpath and cycle track can be used to show where the temporary road goes and indicate that it is reserved for these road traffic groups.

Sign 741 “Detour for certain vehicle groups”



Sign 741 with an orange background is used where, due to a prohibition against driving in connection with roadworks, there is a need to indicate a temporary detour for heavy, wide, long or high vehicles. Symbols and text shall be black. Other signs that are placed on the sign shall retain their original colour.

At the top of the sign, the road number and/or destination(s) of the main road can be shown.

The line for the detour road shall be shown on the same side of the main road as the detour route takes from the main road.

Symbol 723.41 “Detour for large vehicles” can be used by the line for the detour and one of the prohibition signs in Fig. 3.8.1 on the line for closed road.

The distance to the detour point shall always be given under the detour symbol on sign 741.

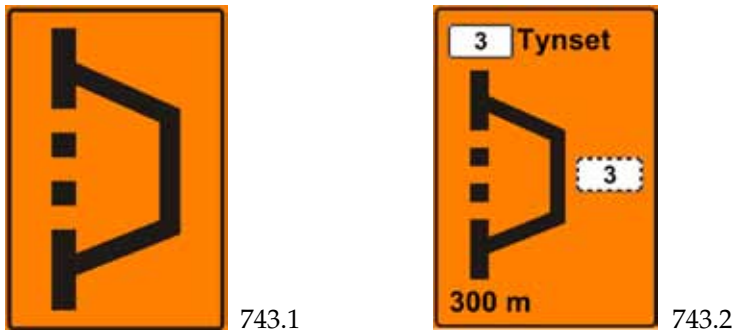
The sign is placed according to the same rules as for sign 743.

3.2.9.2

| Sign no. | Sign name | Sign no. | Sign name |
|----------|------------------------------------|----------|---|
| 306.5 | Lorries and road trains prohibited | 318.1 | Total weight limit for vehicles |
| 312 | Width limit | 318.2 | Total weight limit for heavy goods vehicles |
| 314 | Height limit | 320 | Axle load limit |
| 316 | Length limit | 322 | Bogie load limit |

Figure 3.2.10 Prohibition signs that can be used on orange sign 741

Sign 743 “Temporary detour”



Advance warning of temporary detours shall be given with sign 743. Advance warning can be supplemented with information on sign 560 Information and if necessary with orange directional signs.

3.2.9.3

If the detour is only a partial moving of the existing road over a short stretch, use of sign 743 can be omitted, but the difference in routes must be indicated in another way.

Advance warning with sign 743 can take one of the following forms:

| Sign no. | Description |
|-------------|---|
| 743.1 | Simple background design with only the detour symbol |
| 743.1 + 802 | Simple background design with the detour symbol and supplementary plate 802 for the distance to the start of the detour |
| 743.2 | Basic design with detour symbol and additional information |

Figure 3.2.11 Permitted variations of sign 743

On the sign, the line for the detour road shall be shown on the same side of the main road as the detour route takes from the main road. Sign 743.1 shall be placed 150-400 m before

the beginning of the detour, depending on the speed limit, local conditions and other traffic signs. The distance to existing information boards and other traffic signs shall be minimum 50 m.

Sign 743.1 shall be accompanied by supplementary plate 802 Distance:

- if the sign is placed at a distance other than 150-400 m before the beginning of the detour,
- on highly trafficked and important roads with a high speed level, regardless of the distance to the beginning of the detour,
- where there are many intersections, so that there is no doubt about which intersection is concerned.

Sign 743.2 "Temporary detour" can contain the following additional information:

- Either: the road number for the **main road** (with stippled border), placed by the detour line
- Or: the road number (with a solid line border) or symbol for the **detour route**, placed by the detour line
- The road number for the main road and/or a destination on the main road, placed above the detour symbol.
- Distance to the beginning of the detour, placed under the detour symbol. On sign 743.2, the distance to the beginning of the detour shall always be given, regardless of the distance to the detour.

Sign 743.2 ought to be used for complicated detour routes on the following roads:

- national roads,
- other heavily trafficked and important roads.

Sign 743 should be placed on both sides of the carriageway on the following roads:

- motorways and roads for vehicle traffic
- Euroroutes and main roads,
- other heavily trafficked roads or important roads where local conditions make it especially important to attract attention

Sign 745 Termination of temporary detour



Sign 745 is used only where it is necessary for special reasons to inform road users that the detour has ended. The sign is used for detours for which both sign 743.1 and 743.2 have given advance warning.

The sign ought to be used in the following situations:

- At the termination of long detour routes.
- At the termination of complicated detour routes with many intersections.
- At locations where it is unclear where the detour route ends, for example where the standard of the closed road and the detour road are similar.
- At locations where, due to other reasons, it is not clear where the detour route ends.

The sign is placed 50-100 m before the detour route re-joins the road and at least 50 m from other traffic signs at the location.

The detour symbol shall be shown in the same direction as the detour route took off from the main road.

3.3 Road markings

Changing road markings in connection with roadworks shall always be approved by the sign authority, cf. Section 30-4 of the Road Sign Regulations. This also applies to the temporary removal of existing markings.

For regulatory markings, i.e. pedestrian crossings, barrier lines etc., a special written decision must exist in the same way as for traffic regulating signs.

In the case of long-term work that results in road users being directed contrary to existing road markings, or where the road markings are misleading, either this marking shall be altered or removed, or warning equipment shall be used that clearly shows where driving shall take place contrary to the road markings.

If barrier lines have to be crossed during short-term works, or if driving is to take place on the wrong side of the road or over a yellow centre line, the temporary lane shall be marked with barrier markers on both sides.

If the carriageway is too small to have one lane in each direction, but a centre line is marked in the remaining lane, the centre line shall be covered or removed if the work lasts more than a week.

To ensure satisfactory optical guidance, temporary carriageway reflectors can be placed on the carriageway while the work takes place. In such instances, the permanent markings shall be removed or covered.

3.3.0.1

Complete rules for road markings are given in **Manual 049 Vegoppmerking [Road markings]**.

When markings are removed, any remaining markings or traces after removal must not, under any light conditions, be able to be perceived as a marked line. This is especially important during the period before any new road markings are applied.

If tape is used to temporarily cover existing road markings in connection with roadworks, almost all previous markings shall be invisible once they have been covered.

3.3.0.2

The requirements for visibility of markings given in Manual 111 also apply to roadwork areas.

After new asphalt surfacing has been laid, new road markings should if possible be applied within the time limits that are specified in Manual 111.

Preliminary line marking should be done immediately after laying a new road and preliminary markings must be renewed if it will take a long time before the marking is carried out.

3.3.0.3

3.4 Traffic light signals

Traffic light signals require decisions; cf. Section 30-4 of the Road Sign Regulations.

Use or changes in connection with roadworks of signals 1080-1096, with the exception of signal 1092 and use of flashing yellow lights, requires decisions in the same way as for regulatory traffic signs.

3.4.0.1

Complete rules for traffic signals are given in **Manual 048 Trafikksignalanlegg [Traffic signal systems]**, and **Manual 142 Trafikksignal, planlegging, drift og vedlikehold [Traffic signals, planning, operation and maintenance]**.

3.4.1 Roadworks near permanent traffic signal systems

If it is necessary to change signal systems in connection with roadworks, plans for this shall always first be submitted and approved by those responsible for operating the signal system concerned. This will be the case if lanes are closed so that traffic in the lane concerned must instead use a lane that is regulated in another way.

If the system cannot function as required, a flashing yellow light shall be turned on during short-term works.

If the system cannot function as it is supposed to for more than 24 hours, electricity to the signal heads shall be cut and the signal heads covered to show that the system is not operating. It shall be ensured that signs on the signal posts (e.g. yield signs or turn regulations) remain visible.

cont. →

When the system is in normal operation, vehicles used for roadworks shall not be placed in such a way that they affect a vehicle detector and call up a green light at the wrong time.

If roadwork vehicles must carry out tasks in the intersection itself, the signal system shall be set to a flashing yellow light. This applies for example for snow clearing (with the exception of snow clearing with normal traffic flow on a green light).

3.4.1.1

3.4.2 Temporary signal system for crossing traffic

If the signal system is used to regulate crossing vehicle traffic flows, the system shall have a three-light head (signal 1080) for all flows of vehicles through the intersection and function in the same way as ordinary traffic lights at an intersection.

If a temporary signal system is used for pedestrians, the system shall satisfy the same requirements as for permanent systems of the same type.

Decisions related to these types of temporary signal systems cannot be made by the authority mentioned in Section 28-3, fifth paragraph, cf. Section 30-4, of the Road Sign Regulations but shall be made by an expert on signal traffic regulation designated by the regional roads department.

3.4.2.1

3.4.3 Temporary shuttle signal systems

Temporary shuttle signal systems can be used to regulate traffic at locations outside intersections where only one traffic direction can be used at a time, cf. **Manual 048** and **Manual 142**. The sign authority makes the decision to use traffic light systems such as shuttle signal systems in connection with works on national, county and municipal roads in the same way as for temporary regulation in the case of roadworks.

Such systems should be governed by traffic so that the size of the flow of traffic affects signal changes. Technical requirements for such systems are given in **Manual 062 part 3**.

Manually governed systems can be used by way of exception. The prerequisite for these to function properly is that the person controlling the system has a good view of both sites where queues may develop, or has contact with a helper at the other end of the stretch by means of radio or telephone. This can be an alternative to manual traffic control.

A shuttle signal system shall NOT be used when:

- the speed limit is higher than 60 km/h,
- the grade is greater than 6%,
- there are intersections or exits along the stretch that cannot be regulated properly (if traffic from a side road can see the queue at both sets of signals, the side road can be signed with hazard sign 156 "Other hazard" with the supplementary plate 808.748: "Main road regulated by signals - wait and follow the traffic flow",
- traffic is so heavy and the stretch so long that the system's capacity is periodically exceeded (see values for limits in the table for recommended green times below, cf. also **Manual 142**),
- the stretch is so short (and the traffic so light) that it can be regulated with the provisions of the traffic rules about priority for oncoming traffic, or with the signs 212 and 214 (priority for oncoming traffic),
- the equipment does not function satisfactorily,
- there is no contact between the signal units at each end.

3.4.3.1

Placement

The signal units should be placed on the right in the traffic direction so that waiting vehicles do not obstruct oncoming traffic. When necessary, sign 560 with the text "Stop at red light here" and a downward pointing arrow is used to indicate the desired stop location (cf. illustration under sign 560 Information sign).

The signals or the queue of waiting vehicles before the signals shall not appear suddenly to oncoming vehicles.

3.4.3.2

Advance warning

Sign 132 "Traffic signal" with the supplementary plate 802 "Distance" shall warn of the shuttle signal system in connection with roadworks. When posting the advance warning, it should be ensured that the sign also makes road users aware in time of any queue in advance of the signal. If necessary, warning shall also be given with hazard sign 149 "Queue".

The signal shall be continually visible over a distance at least equivalent to that specified in Fig. 3.9.1.

3.4.3.3

| | | | |
|--------------------|----|----|-----|
| Speed limit (km/h) | 30 | 50 | 60 |
| View (m) | 40 | 80 | 110 |

Figure 3.4.1 Requirements for minimum uninhibited view to a temporary signal system

In general, the signal regulated stretch should be as short as possible for capacity reasons and to prevent delays for road users. The stretch ought not to exceed 300 m without special capacity calculations being made.

More specific rules for programming (time setting) of shuttle signal systems are given in Manual 142.

Figure 3.4.2 shows the necessary clearing time in seconds. The clearing time is calculated on the basis of the distance between signal systems, expected average driving speed along the stretch plus an additional 5 seconds.

| Distance, m | Expected average driving speed km/h | | | | |
|-------------|-------------------------------------|----|----|----|----|
| | 20 | 25 | 30 | 40 | 50 |
| 50 | 14 | 12 | 11 | 10 | 9 |
| 75 | 19 | 16 | 14 | 12 | 10 |
| 100 | 23 | 17 | 14 | 12 | 11 |
| 150 | 32 | 27 | 23 | 19 | 16 |
| 200 | 41 | 34 | 29 | 23 | 19 |
| 250 | 50 | 41 | 35 | 28 | 23 |
| 300 | | 48 | 41 | 32 | 28 |
| 350 | | | 47 | 37 | 30 |
| 400 | | | | 41 | 34 |
| 450 | | | | 46 | 38 |
| 500 | | | | 50 | 41 |

Figure 3.4.2 Clearing time according to the length of the stretch and speed. Clearing time is given in seconds. Clearing times of over 50 seconds should be avoided.

The table is based on the assumption that there is an exit capacity for the stretch of 1500 vehicles/h. Times are found by entering the average clearing time for the stretch and the road's hourly traffic rate.

Capacity is lower if the standard of the regulated road stretch is poor. Maximum hourly traffic is 8-15% of AADT; 15% should be used if it is a road with typical departure traffic on weekends or especially heavy summer traffic.

Fig. 3.4.3 shows the recommended values for green time in each direction and the time of the cycle for time-governed systems.

| Clearing time in seconds | 6 | 10 | 20 | 30 | 40 | 50 |
|--|---|----------|----------|----------|----------|----------|
| Traffic veh/h Total both directions | Green time for one direction / cycle time | | | | | |
| 50 | 6 / 30 | 6 / 38 | 6 / 58 | 6 / 78 | 6 / 98 | 6 / 118 |
| 100 | 6 / 30 | 6 / 38 | 6 / 58 | 6 / 78 | 6 / 98 | 6 / 118 |
| 200 | 6 / 30 | 6 / 38 | 6 / 58 | 6 / 78 | 8 / 102 | 10 / 126 |
| 300 | 6 / 30 | 6 / 38 | 7 / 60 | 10 / 86 | 13 / 112 | 16 / 138 |
| 400 | 6 / 30 | 6 / 38 | 10 / 66 | 14 / 94 | 19 / 124 | |
| 500 | 6 / 30 | 8 / 42 | 14 / 74 | 20 / 106 | 26 / 138 | |
| 600 | 8 / 34 | 11 / 48 | 19 / 84 | 27 / 120 | | |
| 700 | 10 / 38 | 14 / 54 | 25 / 96 | 36 / 138 | | |
| 800 | 14 / 46 | 19 / 64 | 34 / 114 | | | |
| 900 | 18 / 54 | 26 / 78 | 46 / 138 | | | |
| 1000 | 28 / 74 | 37 / 100 | | | | |
| 1100 | 40 / 98 | 57 / 140 | | | | |
| 1200 | Signal regulation should not be used | | | | | |

Figure 3.4.3 Green time for one direction / cycle time in time governed systems.

Figure 3.4.3 is based on equal traffic loads in each direction. If the two directions have different traffic loads, the times shall be adjusted according to the following rules:

- If the green time in direction 1 is increased, the green time in direction 2 is reduced by the same number of seconds.
- The total of red + green in each direction is kept constant.

If the green time is governed by traffic, a minimum and maximum green time shall be defined.

- Minimum green time should be as low as possible (3 seconds). It should be adapted to the detector configuration before the stop line.
- Maximum green time should be considered in each individual instance and be seen in relation to real traffic loads along the stretch. To prevent delays in the system, the maximum time should not be set too high. As a starting point, the maximum time can be set 20% higher than the green time shown in Fig. 3.4.3.

It is recommended that Manual 142 be used to correctly set up and use a shuttle signal system. In addition, there should be personnel present the first time there are periods of espe-

cially heavy traffic and uneven traffic distribution:

- morning and afternoon rush
- Friday and Sunday afternoon on roads with heavy departure traffic
- for special events that imply heavy traffic: popular football games, exhibitions and the like

These personnel must have sufficient expertise to change the time settings of the shuttle signal system if necessary.

3.4.4 Flashing yellow signal

Signal 1098 Flashing yellow signal



According to Section 24 of the Road Sign Regulations, the flashing yellow signal indicates that road users must pay particular attention and act cautiously. The signal can be used together with public traffic signs to indicate special traffic situations, or at locations where road users should be particularly cautious.

Either one or two alternating flashing yellow lights shall be used when extra attention to a sign or sign combination is required.

To mark changes in the traffic direction, guide lights can be used, cf. Manual 62 part 3. The lights can be mounted above sign 902 "Background markings", Sign 904 "Direction markings" or sign 906 "Barrier markers".

3.4.3.1

3.4.5 Light arrows

Signal 1100 Flashing light arrows



Light arrows can be used on warning panels to specify the side of the panel on which the vehicle should pass.

The same rules apply for use of light arrows as for sign 404. Light arrows shall not be used if the lane the arrow points down towards may have oncoming traffic.

The signal can be used individually, but should be used together with sign 404 on roads with a high speed level.

When flashing light arrows are used, the warning panel must not simultaneously use a flashing yellow light.

3.4.4.1

See **Manual 048** and **Manual 062 part 3**.

3.5 Manual traffic control

3.5.1 What is considered manual traffic control?

Situations in which it is necessary for periods longer than a few minutes to regulate traffic by having a traffic controller stop the traffic flow to allow other traffic to proceed are considered manual traffic control situations.

3.5.1.1

Stopping traffic for a short time to allow construction vehicles out of or into the road, or road closure for blasting, are not considered manual control and require neither special decisions nor that personnel are trained or use special equipment. It is nonetheless important that in such situations clear signs are given to traffic and that the people who give such signs are dressed so that they are clearly visible and perceived as people with responsibility for the situation concerned.

Traffic shall obey directions given by traffic controllers, cf. the Traffic Rules:

Section 3-2 of the Traffic Rules: Instructions issued by the police, the NPRA, Customs and Excise authorities or the military police take precedence over instructions given by other means. The same applies to instructions given by other persons authorized to regulate traffic or inspect vehicles, cargoes or drivers.

Traffic controllers nonetheless do not have police authority and cannot physically try to stop or turn away road users that do not follow the instructions issued.

In the case of heavy traffic/or long stretches where traffic is regulated, traffic flow problems can arise. The method described in 3.4.3 Temporary shuttle signal systems can be used as a starting point to assess the capacity.

Manual traffic control is normally used where there is only one lane that can be used for traffic, and the traffic can only go in one direction at a time. Such stretches cannot have intersections with heavy side road traffic. If there are smaller intersections or larger exits within the stretch, a separate traffic controller should be placed there; alternatively the side road traffic must be warned by a sign or similar and at least one of the traffic controllers should have a good view of this exit.

3.5.2 Requirements for persons who direct traffic manually

Persons who direct traffic manually shall:

- be over the age of 18
- have a class B driving license
- be healthy enough to perform the task
- have undergone special training (course in manual traffic control),
- use a signalling disc
- show clear signs to road users,
- be able to communicate with road users in Norwegian.

To enhance the visibility of personnel who direct traffic manually in connection with roadworks, they shall always wear a certain type of jacket that manifests the special function they have vis à vis drivers.

This jacket shall be used by everyone who directs traffic manually except on-duty police.

This type of jacket shall only be used when manually directing traffic.

3.5.2.1

The jacket for manual traffic control and the signal disc are described in more detail in **Manual 062 part 4**.

Persons who control traffic manually are especially vulnerable and it is important that the traffic direction is done correctly and clearly. The person directing the traffic shall be clearly visible to road users and have a complete overview of the traffic in case of any points of conflict.

A person shall not be responsible for more than one conflict point. If the stretch is more than approx. 50 m, there shall be two persons to direct traffic. (This may be appropriate for shorter stretches as well.) If there is not sufficient visual contact, there shall be contact in another way, for example by means of radio or telephone.

cont. →

The traffic shall be stopped using a signalling disc. When traffic is to be stopped, the person shall stand facing the traffic that is to be stopped. The signalling disc is held in the right hand and lifted with the red side towards the traffic. In order to additionally signal that road users must reduce speed, the left hand can be waved up and down.

When traffic can pass, the signalling disc shall be lowered with the red side turned away from the traffic. In addition, the left hand shall signal clearly to the road users that they can drive.

A person shall not direct traffic for more than 2 hours at a time without a break. If manual traffic control is required for longer periods, relief shall be arranged.

When there is manual traffic control, the speed limit shall be maximum 50 km/h.

3.5.2.2

3.5.3 Use of convoy escort vehicles

Guidelines for the use of convoy escort vehicles during asphaltting have previously been issued as NA circular 2006/14. These have now been replaced by the following rules, which apply to the use of convoy escort vehicles during all types of roadworks.

Requirements for convoy escort vehicles

- The vehicle shall be of a size that is practical to turn within the road's width.
- The vehicle's weight shall not exceed 3.5 tons (class B driving license).
- There shall be no advertisements on the vehicle.
- Logo is permitted, but not on the back of the vehicle.
- A sign with the text "Convoy escort vehicle - Follow me" in two lines shall be mounted on the roof of the vehicle, so that it can be read by road users behind the convoy escort vehicle.
- The opposite side of the sign shall bear the text "Convoy escort vehicle".
- The sign shall be designed as sign 560 "Information sign", with a fluorescent yellow-green background. The text shall be black with a height of 105 mm.
- In addition to the sign, the vehicle shall be equipped with flashing yellow lights that shall be visible from all sides.

3.5.3.1

It is important that the stretches where a convoy escort vehicle is used end at places where it is safe to turn the convoy escort vehicle efficiently. In heavy traffic, the time it takes to turn the convoy escort vehicle can be of great significance for the capacity of traffic flow past the worksite.

Use of convoy escort vehicle:

- A convoy escort vehicle shall only be used when there is an approved roadwork safety plan.
- Usually manual control should be used to stop traffic that is coming towards the regulated stretch of road.
- When manual control is used, the speed limit shall be maximum 50 km/h for traffic towards the regulated location.
- If it is possible that the a convoy escort vehicle and following convoy traffic will be driving faster on parts of the regulated stretch than the temporary signed speed limit at the turning point, a higher speed limit must be signed after the turning point. The driver of the convoy escort vehicle must then ensure that the convoy maintains an adequately low speed past places where there are special hazards.
- The traffic controller shall warn the driver of the first vehicle in the queue of what is taking place and the expected waiting time. If possible, more drivers should be informed. Otherwise, the usual rules for manual traffic control shall be followed.
- The roadwork safety plan can show that cones or the like shall be used to indicate that the lane is not to be used by traffic. If this is not done, it is very important that the convoy escort vehicle drives so that the following convoy is never in doubt about where on the carriageway they are to drive.
- The convoy should be of a length that allows the driver of the convoy escort vehicle to maintain the necessary overview of the end of the convoy.
- Manual control may on occasion be replaced by sign 560 with text "STOP wait for convoy escort vehicle". In addition the lane must be closed with cones or similar. This regulation is used only with very light traffic, and if it does not entail great hazards or inconvenience if someone does not stop. These signs shall not be used when there is manual traffic control.

3.5.3.2

The convoy escort vehicle is used when it is important that the speed past the worksite or through the roadwork area is as low as a risk assessment of the work shows to be necessary.

Examples of such situations are:

- past road pavers where workers must stay very close to passing traffic,
- past worksites in tunnels (if traffic is accepted in the tunnel while work is underway),
- on stretches of road where permanent surfacing or newly laid surfacing can be damaged by traffic at high speed, or where stone chippings are a major hazard.

If the distance between the turning points for the convoy escort vehicle is very long, it may be necessary for the convoy escort vehicle to maintain a relatively high speed (50-70 km/h), while the speed is reduced to 20-30 km/h where the work is taking place. In this case, the signed speed limit must be adjusted to this. It is not necessary to sign very low speed limits past the worksite if there is a convoy escort vehicle that determines the speed.

However, the convoy escort vehicle must drive so that the entire convoy maintains a prudent speed past the worksite.

Convoys should not be too long. Vehicles that arrive at the regulated location after the convoy has left the location must not be allowed to try to catch up with the convoy.

If signs alone are used instead of manual control, the driver of the convoy escort vehicle should first lead the convoy past the barrier, then stop to set up cones or similar in the carriageway behind the convoy and so continue to drive. This may be necessary when using convoy escort vehicles through tunnels if work in the tunnel is carried out at night.

3.6 Combination of warning equipment

Pursuant to Section 1 of the Road Sign Regulations, it is prohibited to attach to signs or other public traffic control devices anything that does not apply to the sign's or the device's purpose. Traffic signs can however be placed on trailers or vehicles when this is specified in the roadwork safety plan.

Combinations of signs shall moreover follow rules given in **Manual 050**. Sign 110 shall always be on top except when it is used on a warning panel.

Warning panel and warning trailer

Warning panels are a combination of two closure markers (sign 930) and two alternating flashing yellow lights (signal 1098). In addition, the warning panel may be equipped with other traffic signs, for example a hazard sign with supplementary plate, information sign, mandatory sign or light arrow.

It must be possible to conceal the lower barrier marking when the warning panel is just behind other deviation of route signs.

Warning panels can be mounted on temporary sign racks, on trailers (warning trailers) or on construction vehicles.

The warning panel's design, size and placement shall be adapted to the individual vehicle, piece of construction equipment or sign racks the panel is to be mounted on. Signs that are used on the warning panel shall be size MS or larger.

The warning panel shall have two flashing yellow lights that flash alternately (signal 1098). The lights shall be turned on when the panel is in use, except when the light

cont. →

arrow is used or placed in or near a traffic signal that is in operation. Lights shall be of an approved type and have the dimensions given in **Manual 062, part 3**. The light arrow shall fill a square that is minimum 1.6×1.6 m.

When in use, no form of symbol or signal shall be shown on the back side of the set-up that could be confused with messages or signals to road users.

Construction machinery or vehicles with warning panels mounted on them shall in addition have at least one warning light that produces a flashing yellow light visible from all sides, cf. Section 28-3, point 3 of the Regulations concerning vehicles.

Requirements for the design of the warning panel are given in **Manual 062, part 4**.

3.6.2.1

Warning panels shall be used to mark that one or more lanes are closed to traffic.

Warning panels can also be used to indicate that parts of a lane or the road shoulder are closed, or to inform about on-going work.

If sign 904 "Direction markers", sign 906 "Barrier markers", 940 "Traffic cones" or 942 "Traffic cylinders" are used just in front of the warning panel to mark that the road narrows, the lower panel with sign 930 "Closure markers" on the warning panel must be covered or concealed. This shall be done in order to avoid many red-yellow signs creating an untidy visual impression that is difficult for road users to interpret.

When the warning panel is not in use, no arrow symbol that may be misunderstood shall be shown, on either the sign or the signal.

Other signs on the warning panel shall only be shown when it is relevant to the on-going roadwork.

3.6.2.2



Warning panel with:

- Signal 1098 “Flashing yellow light signal”
- Signal 1100 “Flashing light arrows”
- Sign 930 “Closure markers” and
- Sign 404.2 “Mandatory driving lane”



Warning panel with:

- Signal 1098 “Flashing yellow light signal”
- Sign 930 “Closure markers” and
- Sign 110 “Roadworks”

Figure 3.6.1 Examples of warning panels

3.7 Marking of personnel, machines, containers etc.

3.7.1 Personal protective equipment

All employees who work on public roads that are open to general traffic shall use CE approved protective clothing. This also applies to short-term visits in connection with inspections etc.

Protective clothing shall alone or together meet the requirements of Protection Class 3 – Reflection Class 2, cf. NS-EN 471 “High-visibility warning clothing”.

A special jacket shall be used for manual traffic control, cf. **Manual 062 part 4**.

3.7.1.1

Only requirements regarding the visibility of personal protective equipment are discussed here. See also Section 7 of the Regulations concerning the use of personal protective equipment at the workplace.

3.7.2 Marking of construction machinery etc.

Construction machinery shall be equipped as specified in Section 28-3 of the Regulations concerning vehicles.

3.7.1.2

See also Section 2 “Area of application, exemptions from road traffic provisions etc.” and Section 14 “Signals and symbols” of the Traffic Rules.

Note that a flashing yellow light can only be used when departures are made from the traffic rules, and only when it is necessary in order to prevent a hazard. The light shall be visible from all sides.

3.7.3 Marking and placement of containers and similar on public roads

Section 57 of the Public Roads Act limits the general population’s use of the road area. It is prohibited, without permission from the road authorities, to place items anywhere other than a special public depot designated for this purpose. Similar rules are also often found in police bye-laws.

Conditions may be set which have to be met before permission is granted to place objects on the road (carriageway, shoulder, pavement or pedestrian or bicycle path).

The following general rules shall form the basis for national and county roads:

- All objects that are not registered or equipped with a licence plate shall be clearly marked with the owner’s name, address and telephone number. This information shall be placed so that it is clearly visible and not easily removed.
- Tools, equipment etc. that are or could be dangerous in the case of a collision, shall be secured and a warning given in the same way as for roadworks. This also applies in relation to pedestrians and cyclists. The road authorities decide in each individual case if the object concerned can represent any such hazard as they are placed. Where speed limits are higher than 50 km/h, the requirements of **Manual 231 Rekkverk [Guardrails]** regarding safety zones shall be used as a basis for the assessment.
- All equipment at or next to places where there is heavy pedestrian and cycle traffic shall always be secured so that the visually impaired are not injured and shall not prevent passage by the disabled.

cont. →

- Permission may be given to place containers and similar on public roads with a speed limit of 50 km/h or lower if the traffic is so light that these do not present an unacceptable obstruction to traffic and there are no other special hazards. Containers shall be equipped with reflective markings placed on all corners. A reflective plate should be min. 50 cm high and min. 10 cm wide, and have a design similar to sign 906 "Barrier markers" with red and fluorescent yellow-green colours. The diagonal stripes shall point down toward the outer edges of the container. The reflective quality shall be the same as that used on traffic signs.
- On roads where the speed limit is over 50 km/h, containers and similar shall be secured in the same way as in a normal roadworks area. Only in special cases should permission for such placement be given on such roads.

3.7.3.1

3.8 Warning of vehicle rescue

In the case of vehicle rescue etc., the usual rules for warning of roadworks shall be followed as far as possible.

Work to start vehicles or have them towed, or to get a vehicle up on the road shall take place according to a separate roadwork safety plan. It is especially important to place the warning at such a distance that collisions do not occur with rescue vehicles, the disabled vehicle or vehicles that have stopped and are standing in a queue.

Roadwork safety plans valid for a certain time period shall be prepared and be available in the rescue vehicle.

If the work implies especially hazardous situations or especially great traffic flow problems, the person responsible shall notify the Road Traffic Management Centre as soon as possible. An assessment shall then be made of whether carrying out the operation can wait until another time of day.

3.8.0.1

4. Protection

4.0 General

Validity

The requirements for protecting roadworks apply to all roadworks on and along roads where the Norwegian Public Roads Administration has the overall responsibility for construction, operation and maintenance.

The requirements also apply if the maintenance responsibility, and thus the responsibility for approval of the roadwork safety plans, is transferred to the municipalities.

The municipalities can prepare their own rules or choose to make use of the rules for protection in this manual.

4.0.0.1

Protection is the use of physical measures to:

- prevent collision with workers and equipment
- prevent road users from entering the work area such that damage or injury occurs,
- limit injury to road users if they collide with the protective equipment.

We distinguish between the following types of protection:

- transverse protection against motor vehicles: shall prevent traffic that does not observe the warning from driving into the worksite,
- longitudinal protection against motor vehicles: shall prevent traffic that drives past the worksite from driving into the worksite,
- protection against unprotected road users: shall prevent pedestrians and cyclists on pavements and footpaths and cycle tracks from entering the worksite.

It is important that the safety equipment is used correctly because incorrect use can result in major, unforeseen consequences with respect to the safety of both workers and road users.

The Working Environment Act and regulations stipulate a series of requirements with respect to safety for workers. In addition, the road authorities have responsibility for the safety of road users. An attempt is made to protect these interests by means of protective equipment as shown in the examples.

Risk analysis

A **risk analysis** shall always be made to establish what types of protection and warning to use in the individual instances.

- Protection shall be adapted to the different road user groups and local hazards.
- There shall be a correlation between the protective measures and the speed limit past the worksite; a very low speed limit shall not be used to avoid using safety measures.
- The warning shall be adapted to the hazards in question and the type of safety protection used.

4.0.0.2

When the need for, selection and design of safety equipment is assessed, emphasis shall be placed on:

- volume of traffic,
- speed level at the location, both before and during the work period,
- which road user groups are to be protected,
- what type of work is to be carried out and its duration,
- what hazards workers and road users may be exposed to.

Key dimensions

The size of the following zones shall be set as a basis for preparing the roadwork safety plans:

- The length of the buffer zone after transverse protection.
- Safety zones for roadworks, i.e. the need for guardrails (see later).
- Any width needs for guardrails, including workspace.

4.0.0.3

Requirements for safety equipment

Safety material shall not in itself lead to or increase the risk of injury. Safety material shall be stable enough to tolerate the strains it may be exposed to.

Protection shall be adequately visible under all light conditions. This can be achieved by means of warning equipment, or by other clearly visible material that is fixed to the safety equipment.

4.0.0.4

Technical requirements for safety equipment are described in more detail in **Manual 062 part 4** and **Manual 231 Rekkverk [Guardrails]**. All safety equipment shall only be used in the manner for which it has been tested and approved.

An overview of approved guardrails and masts is found at:

<http://www.vegvesen.no/Fag/Publikasjoner/Vegnormaler/Rekkverk+og+master>

A similar overview of approved impact attenuation devices is found at:

http://www.vv.se/PageFiles/11958/forteckning_av_godkand_tma.pdf?epslanguage=sv

4.1 Transverse protection against traffic

This will be the first safety measure road users meet when they approach a worksite.

Transverse protection is a physical obstacle that shall ensure that the road user that does not pay attention to the warning equipment that has been set up:

- does not enter the work area and inflict injury on him- or herself, the workers or the equipment.
- does not injure him- or herself by driving into equipment, machinery or structures or by driving into a work trench.

Buffer zone

There shall always be a buffer zone in front of a worksite even if only warning equipment, and no protective equipment is used. There shall be no people, machinery or equipment in the buffer zone. The buffer zone's length will depend on the expected speed level in the case of collisions and the type of protective equipment used.

The length of the buffer zone shall be specified in the roadwork safety plan.

4.1.1.1

Transverse safety equipment and the buffer zone shall function as follows:

- It shall slow vehicles that drive into the protection in such a way that no major damage or injury is inflicted on the vehicle or persons in the vehicle.
- This is often achieved by the protection being pushed along the carriageway towards the worksite. During this movement, the protection shall not collide with people or equipment.
- Therefore, there shall always be a buffer zone between transverse protection and the worksite itself.

The buffer zone's length will depend on what safety product is used. The protective equipment's buffer zone shall be in accordance with specifications for the safety product, if this is standardised and tested.

Transverse safety equipment may be:

- vehicles placed in front of the worksite.
- equipment specially developed to be transverse protection, placed on the carriageway, often energy absorbing.
- vehicles with energy absorbing equipment mounted on them, placed in front of the worksite.

By energy-absorbing protection is meant protection that does not stop the road user immediately, but reduces the load by either deformation or movement of the protection.

In a number of instances, longitudinal protection will be such that it can also function as transverse protection.

Energy absorbing

When transverse protection is used, an assessment should be made of what injuries or damage be inflicted on any vehicle drivers who drive into the protection.

At speed levels of 60 km/h or higher, the transverse protection shall be energy absorbing.

For work on multi-lane roads with speed limits of 60 km/h and higher, impact attenuation vehicles shall be used as protection for short-term roadworks, including setting out or taking in warnings and protection for long-term roadworks.

For work in boom lifts (cherry pickers), where the work vehicle must stand on or by the carriageway, another vehicle shall be used as protection, and it shall be an impact attenuation vehicle if the speed limit is 60 km/h or higher.

4.1.1.3

More specific descriptions of some of the equipment for transverse protection are given in **Manual 062 part 4**.

4.2 Longitudinal protection against traffic

Longitudinal protection is a physical obstacle in the form of guardrails, fencing or other barriers that shall ensure that road users:

- do not enter the work area and inflict damage or injury on the workers, the equipment or structures.
- do not injure themselves by driving into equipment, equipment or structures or by driving into a construction trench, etc.
- do not enter the wrong parts of the road: over into an oncoming traffic lane or into areas for unprotected road users.

Risk assessment

A risk assessment shall always be made to determine the need for longitudinal protection. Risk can be reduced somewhat by reducing the speed level, but it will not always be possible or desirable to achieve a speed level that is so low that the use of protective material is unnecessary. Use of speed limits is discussed under sign 362.

Application

Longitudinal protection ought to be used in the following situations:

- when people work in an area that is very close to traffic,
- when equipment or structures are located close to an area with traffic, and significant damage or injury will occur in collisions with these,
- when there are construction trenches close to traffic, and significant damage will occur if a vehicle drives into the construction trench,
- when the terrain on the side of the road is such that guardrails will also be necessary for the finished road.
- when the altered alignment implies a high risk that the vehicle will enter the area for unprotected road users or oncoming traffic.

Such protection shall be made adequately visible for road users by means of barrier markings or other suitable equipment.

4.2.1.1

Longitudinal protection is most often temporary guardrails, and guardrails are more specifically discussed in Manual 231. Guardrails intended for permanent use (classes N and H) may be used, but usually guardrail classes T1, T2 and T3 (T = temporary) are most appropriate.

Guardrail requirements

When guardrails are used, they shall only be used in accordance with the user instructions and under the conditions that apply for approval of the product.

Guardrails shall be mounted as intended, with respect to both connecting the individual parts of the guardrail and anchoring it to the base.

There shall always be an area behind the guardrail corresponding to the guardrail's workspace, and in this area there shall be no machines, workers, stored equipment, structures or construction trenches that could lead to injury or damage should there be a collision with the guardrail resulting in it being pushed into this area.

4.2.1.2

When using longitudinal protection, it is also important to assess any risk of collision with the ends of the protective equipment. Such ends shall be terminated in accordance with the rules in **Manual 231**.

4.2..1.3

Guidelines for assessing longitudinal protective measures

The following guidelines are presented primarily as recommendations, but when experience of using these rules has been acquired, it is intended stipulating similar binding rules in the course of a few years:

Safety zone

A simplified calculation of safety zones is used for roadworks according to the rules in **Manual 231 Rekkverk [Guardrails]**. The safety zone is measured from the edge of the carriageway (white stripe). The following values are used for the safety zone in roadwork areas:

| | | | | | | |
|--------------------|------|----|----|----|----|-----|
| Speed limit (km/h) | <=50 | 60 | 70 | 80 | 90 | 100 |
| Safety zone (m) | 3 | 6 | 7 | 8 | 9 | 10 |

Figure 4.2.1 Simplified safety zone in connection with roadworks

Hazards in the safety zone

In the safety zone in connection with roadworks, there shall not be hazards such as:

- construction pits deeper than 1 m,
- steep slopes, height differences that should normally be protected with guardrails, cf. Manual 231,
- heavy objects that are dangerous to collide with in the case of driving off the road: rock crags, construction machinery, structures.

If such hazards do exist in the safety zone, additional protective measures such as guardrails or a lower speed level must be used.

Use of guardrails is described in Manual 231. Use of temporary speed limits is described in Chapter 3.2.3 of this manual. Lower speed limits must not be used without simultaneously using speed reducing measures that ensure the speed level corresponds to the speed limit. Use of guardrails and use of speed limits must be assessed together.

Special rules for protecting road workers

Road workers shall not work closer to the edge of the carriageway than 3 m for more than one hour when the speed limit is over 50 km/h, if they are not protected by guardrails or are in a machine.

When road workers work for longer periods in the safety zone on roads with speed limits of 80 km/h, the speed limit shall be lowered to 70 km/h.

Special rules for protection of unprotected road users

If a sidewalk, pedestrian or cycle track has previously been established and these must be temporarily realigned much closer to the carriageway or out into what was previously the carriageway, guardrails should be used between vehicle traffic and unprotected road users if the speed limit is 50 km/h or higher. The type of guardrail depends on the risk assessment.

For a worksite nearer the pavement or footpaths and bicycle track than 1 m, pedestrian fences or similar ought always to be set up along the worksite, see also Chapter 4.3

Special rules for removal of existing guardrails

If existing road guardrails are temporarily removed for more than one workday, the speed limit shall be lowered to 70 km/h on roads with a speed level of 80 km/h or higher. If the speed limit is 70 km/h, the speed limit shall be lowered to 60 km/h.

Risk assessment as the basis for approval of deviations from these rules

These rules may be departed from if a risk assessment has been carried out that shows acceptable safety can be achieved without these rules being adhered to. The same applies if the risk assessment shows that adhering to the rules will imply an increase instead of a decrease in the risk.

Risk assessment can also indicate that more comprehensive safety measures must be used than these simplified rules describe.

4.3 Protection against pedestrians and cyclists

It is important that the work areas are protected when pedestrians and cyclists, especially children and the disabled, are affected by roadworks. This applies both when these road users' own traffic area (pavement, footpaths and cycle tracks) are directly affected, and when machines or vehicles move around in or directly next to the pedestrian and bicycle areas.

Protection shall be established that prevents these road users from inadvertently entering the work area. The protection shall also be stable enough to maintain its function if road users fall against it or cycle into it. Usually, a temporary pedestrian fence is used for this. The fence must have a low edge that can be perceived by visually impaired persons with white canes.

The protective equipment shall not be placed in such a way that it represents a hazard or could otherwise injure road users. When placing protective equipment, special consideration shall be given to the visually impaired. Requirements with respect to width and standards of temporary pavements, footpaths and cycle tracks shall also be met. Foot supports for fences shall not be a tripping hazard or significantly reduce the path's width.

If pedestrians or cyclists are directed out into the carriageway, they shall be protected against other traffic, if necessary with guardrails, see 4.2.

Protection in the case of work on pavements may take the form of temporary, protected footpaths or directing pedestrians to the other side of the road to a safe place. If road users are directed to the other side of the road, this shall take place at a safe location, for example over existing pedestrian crossings.

Appendix 1: Inspections

Objective

The objective of inspection of roadworks protection is to quality assure the work of both the enterprise and the sign authority.

Responsibility

The sign authority is responsible for ensuring the roadwork safety plan makes the necessary provision for safety and passage, based on the information they have received on how the work is to be carried out, what sort of work is to be carried out, how the work is planned to be carried out etc.

In connection with approval of the roadwork safety plan, parties other than the sign authority are given responsibility for carrying out and following up warnings and protection. Other enterprises thus have responsibility for setting up signs and equipment and for ensuring that it functions according to plan. It shall therefore be required and if necessary checked that the enterprise is qualified to do this. In addition, the roadwork safety plan will normally contain special requirements for how the warning and protection are to be carried out.

The enterprise has the responsibility for ensuring that all measures indicated in the roadwork safety plan are implemented, and that all requirements for inspection are met. In this connection, the enterprise's officer in charge shall if necessary appoint one or more named persons to assume local responsibility for the daily supervision of warnings and protection at the location, and for remedying deficiencies when this is necessary.

The enterprise also has responsibility for the establishment of internal procedures that ensure such inspections and deficiency correction are carried out as expected, and that any other requirements in the roadwork safety plan are complied with.

Legal basis

The sign authority can conduct inspections to ensure that the enterprises follow the roadwork safety plans pursuant to Section 14 of the Road Sign Regulations. In addition, the police or the Norwegian Labour Inspection Authority can carry out inspections with legal basis in other statutory provisions.

Inspection carried out by the sign authority

The inspection is usually carried out by the person who has approved the roadwork safety plan or by a person with such authority.

This type of inspection will usually cover issues such as whether:

- an approved roadwork safety plan exists, and if it is relevant for the work that is currently taking place,

- the approved roadwork safety plan and appurtenant rules are being followed,
- the roadwork safety plan is available and the workers on site are familiar with it; whether a log book is being kept,
- the person responsible has completed course 2 and all the others course 1.

The sign authority's inspection can/will result in a list of points that must be corrected. The list shall be sent to the person responsible for roadwork safety with a deadline for corrections.

In the case of serious defects or deficiencies, the work can be stopped until the deficiency is corrected, and in the case of very serious deficiencies, the right to have the responsibility for carrying out the roadwork safety plan can be withdrawn.

Traffic safety audits and inspections

Traffic safety audits and inspections shall be performed by approved traffic safety auditors, and this type of inspection will usually be ordered by the regional roads department or the county division. It will consist of an audit of the roadwork safety plan and the work to prepare and approve this, and an inspection of how the roadwork safety is carried out, i.e. warning and protection in relation to both the approved roadwork safety plan and the actual conditions at the roadworks site. The inspection will also comprise the Construction Client's and the contractor's procedures to ensure that the roadwork safety plan is relevant and that it is adhered to.

The traffic safety auditor reports to those who have ordered the audit, and follow-up, with requirements for the contractor will come from the Construction Client (if this is The Norwegian Public Roads Administration) and/or the sign authority.

The Construction Client's inspection

When the Norwegian Public Roads Administration is the Construction Client, the Construction Client's representative at the roadworks site should have a thorough knowledge of the approved roadwork safety plan and regularly check to see that the plan remains relevant for the work that is actually carried out and that the plan is followed. The roadwork safety plan shall be on the agenda in connection with HSE at all construction meetings, and registered defects and deficiencies ought to be discussed and mentioned in the minutes of the construction meetings and followed up with an inspection to see that the deficiency has indeed been corrected.

Other

A form has been prepared to simplify the inspection process, called "Inspection of warning and protection for work on or along roads". The form can be downloaded in Excel format from www.vegvesen.no.

Appendix 2: Training

General qualification requirements

All workers that perform work on roads shall have the necessary training in roadwork safety.

The training requirements apply to everyone who is to perform work on national and county roads, irrespective of whether it is paid work or not (see the definition of roadworks). This requirement also applies when municipalities have been delegated the authority for roadwork safety on national and county roads.

The employer is responsible for seeing that the necessary training is given.

Specialised tasks, such as driving convoy escort vehicles and impact attenuation vehicles, are conditional on the necessary training being given in addition to the courses outlined in this appendix. Such training must be given by people with the necessary qualifications who are not subject to the rules for the approval of course instructors for roadwork safety courses.

When the Norwegian Public Roads Administration is Construction Client, the basis for tender ought to include the condition that only personnel with approved training be used, or that a statement is required from the contractor that only such personnel shall be used.

The road owner can require documentation that all workers have the necessary training.

The sign authority shall require that all enterprises that accept responsibility for roadwork safety have adequate expertise.

Enterprises that cannot document adequate qualification shall not be given responsibility for roadwork safety, and must in this case hire expertise elsewhere in order to be able to carry out work on or near roads.

Courses

Overview of courses and minimum duration of teaching

| Course | Duration * | Type of course | Required course | Valid for |
|------------------|----------------|--|-----------------|-----------|
| 0 (basic course) | 1-3 h ** | For everyone who will be sporadically working on roads | | 1 yr |
| 1 | 6 h | For everyone who will be regularly working on roads | | 5 yrs |
| 2 | 12 h | Course for those responsible for roadwork safety (safety managers) | | 5 yrs |
| 3 | 3 h + practice | Course in manual traffic contro | 1 or 2 | 5 yrs |
| 4 | 2-5 days | Special courses: a. Sign authority personnel | | – |
| | 5 days | b. Course instructors (in cooperation with NTNU) | | 5 yrs |

* : Effective time **: Possibly PC based

All courses shall be documented by means of course certificates. For courses 1-4, the requirement to receive a course certificate is that the test is passed.

The basic course qualifies personnel to work on or along the road for up to 2 months within a year.

Courses 1, 2 or 3, when passed are valid for 5 years. After 5 years, a new course is required. Courses held before 01.01.2011 are also valid for 5 years, but an old course 1 does not qualify a person to be locally responsible for roadwork safety (site safety supervisor) unless the person concerned has a minimum of 1 year of relevant work experience.

Only courses with course instructors approved by the Directorate of Public Roads will be approved as satisfactory training.

The Norwegian Public Roads Administration's regional departments and the Directorate of Public Roads shall oversee course arrangers to ensure that the training is of satisfactory quality.

For more complicated protection and warning, the sign authority may require more comprehensive training than the minimum requirements.

Below is a short description of the requirements set for the different courses. The Directorate of Public Roads may prepare more detailed course requirements.

Course 0 (basic course)

Target group:

Persons who do not regularly work out on the road, and who are not to have any responsibility for warning or protection of road workers. Will often be escorted on visits to the roadwork site, or will be doing roadwork that only requires spending limited time on the carriageway. For example:

| | |
|--------------------|----------------------------------|
| Picking up rubbish | Façade work |
| Inspection | Loading (e.g. timber transport) |
| Study visit | Sporadic work in the safety zone |

The course is required only for work that requires an approved roadwork safety plan.

Topics

- The purpose of “roadwork safety”: protection, warning.
- The need for attention, both as a motorist and when working on roads. When there is too much concentration on the work, too little attention is paid to the surroundings.
- Measures to sharpen attention: warnings, making hazards visible (includes protective clothing).
- Measures to reduce the need for attention: work outside trafficked areas, directing traffic around the work.
- Measures to reduce the consequences of lack of attention: protection.
- Very briefly on the rules and regulations (adapted to the target group):
 - o What work does not need special permits?
 - o When is course 1 required?
 - o What requires work/excavation permits?
 - o What is a roadwork safety plan, and what does it entail?
- Use of and requirements for a protective vest.

Duration:

1-3 hours without test, to be offered as a PC course sometime in the future .

Course 1

1. Objectives of the training

Provide the participants with a basic knowledge and understanding of their own and others' safety when working on or along roads, and what must be taken into account. They shall furthermore have knowledge of the formal procedures that are to be followed before the works start and during the work.

2. Target group and competency achieved

Employees of contractors and other employers with work tasks that regularly require spending time in places where an approved roadwork safety plan is required.

Those who have passed course 1 can take local responsibility for supervision of warning and protection at individual worksites. This is conditional upon the employer having a with a type 2 course certificate.

Those who have passed a type 1 course do not need a type 0 course.

3. Course instructor requirements

Responsible course instructors shall have valid authorisation from the Norwegian Public Roads Administration / the Directorate of Public Roads.

4. Work methods

Training shall take the form of classroom education. In special cases, the course may focus on the special type of work the participants will be doing.

Training shall include or finish with a short test that shows that the content of the course has been understood. This may also be included as part of the group tasks where appropriate.

5. Duration of the certification

The duration of the certification is 5 years. If the test is not passed, a new complete course with examination shall be taken.

6. Re-certification

Re-certification is done by completing a new full course 1 within 5 years.

7. Subject and time distribution

| Subject | Time | Notes |
|---|-------|---|
| Introduction | 00:10 | |
| Laws and regulations | 00:15 | Legislation, manuals |
| Personal safety | 00:15 | Particular considerations for work on roads |
| Responsibility for warning and protection | 01:00 | Personal responsibility, site responsibility, safety manager |
| Physical laws in traffic | 00:30 | |
| Warning | 01:30 | Significance and use of the most important signs, set-up, cleaning |
| Protection | 01:00 | Longitudinal and transverse protection, protection of pedestrians |
| Ease of passage | 00:30 | Public transport, pedestrians, cyclists, the disabled, universal design |
| Keeping a log book | 00:20 | |
| Examination | 00:30 | See also 4. |

Simplified course 1

Upon application to the Directorate of Public Roads, course 1 can be adapted and included in course plans for special areas such as vehicle rescue and inspection activities.

Course certificates for such courses shall clearly specify that they apply only to the work tasks for which the course is intended.

Course 2

1. Objectives of the training

The objective of the training is to provide participants with the theoretical basis that is considered necessary to enable them to fulfil their role as safety manager adequately.

2. Target group and expertise

Employees who are to have the role of site safety supervisor.

Candidates should master both written and oral Norwegian.

In the case of large roadworks, the sign authority may require that the site safety supervisor has completed course type 2 instead of just course type 1.

3. Course instructor requirements

Course instructors shall have valid authorisation from the Norwegian Public Roads Administration / the Directorate of Public Roads.

4. Work methods

Training shall take the form of classroom education.

Training shall include or finish with a short test that shows that the content of the course has been understood. This may also be included as part of group tasks where appropriate.

5. Duration of the certification

The duration of the certification is 5 years. If the test is not passed, a new complete course with examination shall be taken.

6. Re-certification

Re-certification is done by completing a new full course 1 within 5 years.

7. Subject and time distribution

| Subject | Time | Notes |
|--|-------|---|
| Introduction | 00:10 | |
| Laws and regulations | 00:30 | The Road Traffic Act, Construction Client Regulations |
| Chapter 14 of the Road Sign Regulations | 01:00 | Special provisions for works on roads |
| Excavation and work permits | 00:20 | |
| Preparation, approval and inspection of roadwork safety plans | 01:00 | Review of procedures |
| Risk assessments | 00:45 | |
| Purpose of different types of warnings | 02:00 | Hazard warning, sharpening of attention, information, directing, regulating, incl. capacity calculation |
| Warning equipment requirements | 01:00 | Technical requirements, set-up, cleaning, inspection |
| How different types of protection function and when they can/shall be used | 02:00 | Longitudinal protection against traffic Protection against unprotected road users Transverse protection on the carriageway Transverse protection on vehicles |
| Worksite requirements | 01:00 | Lighting, standard of measures for unprotected road users, Driving in and out, rigging placement, storage, parking. |
| Passage for everyone | 00:30 | Public transportation, pedestrians, cyclists, disabled. Universal design. |
| Inspections and sanctions | 01:00 | |
| Examination | 00:45 | See also point 4 |

Simplified course 2:

Upon application to the Directorate of Public Roads, course 2 can be adapted and included in course plans for special areas such as vehicle rescue and inspection activities.

Course certificates for such courses shall clearly specify that they apply only to the work tasks for which the course is intended.

Course 3: Manual traffic control**1. Objectives of the training**

The objective of the training is to provide participants with a basic knowledge of the requirements the sign authority makes of those who are to perform manual traffic control on national and county roads. After attending the course, participants shall know how manual traffic control is to be carried out in practice, the hazards that a traffic controller is exposed to and how the person concerned can best protect him- or herself while carrying out the work.

2. Target group and qualifications

The target group for course 3 is personnel who are to carry out manual traffic control on national or county roads.

A course 1 or 2 certificate and a valid class B driving licence are required to take course 3. Exemption from the requirement of a class B driving licence may be given if the training takes place as part of other relevant training, but a certificate shall not be issued before the candidate has such a driving licence.

The candidate shall master Norwegian orally.

3. Course instructor requirements

Responsible course instructors shall have valid authorisation from the Norwegian Public Roads Administration / the Directorate of Public Roads.

4. Work methods

Training shall take the form of classroom instruction followed by practical training. This shall take place on a trafficked road and must take place in accordance with an approved roadwork safety plan.

5. Duration of the certification

The duration of the certification is 5 years. If the test is not passed, a new full course shall be completed.

6. Re-certification

Re-certification is done by completing a new full course 3, including the practical training, within 5 years.

7. Subject and time distribution

| Subject | Time | Notes |
|----------------------------------|-------|--|
| Introduction | 00:15 | Legislation, manuals, equipment (jacket, signalling disc) |
| Personal safety | 00:15 | HSE, St John's Ambulance |
| Braking distance, reaction times | 00:15 | Vehicle characteristics, drivers' behaviour |
| Signalling and conduct | 01:00 | Importance of correct conduct, routines |
| Convoy escort vehicle | 00:30 | Procedures for use, special conditions for work in tunnels |
| Traffic flow, capacity | 00:30 | Acceptable waiting times, use of convoy escort vehicles, shuttle signals etc |
| Warning requirements | 00:15 | |
| Practical training | – | See below |

8. Practical training

The practical training in manual traffic control shall take place on a trafficked road and last a minimum of 20 minutes per participant. Other participants shall observe the directing during the period they themselves are not directing traffic.

Only the two candidates who are directing and the instructor should be clearly visible to road users at all times while the training takes place. The other participants ought to stand away from the road in order not to distract candidates and road users.

Under complicated traffic conditions, consideration should be given to whether one of the two traffic controllers should be instructor no. 2.

Requirements for course arrangers and course instructors

In order for courses in roadwork safety to be valid, the courses shall be held by persons who are approved by the Directorate of Public Roads as course instructors. For approval as a course instructor there will normally be requirements with respect to:

- solid background in traffic planning or similar,
- experience as an instructor,
- course for course instructors passed.

To retain approval as a course instructor, it will normally be required that the course holder:

- complies with instructions from the Directorate of Public Roads,
- has held several courses during the approval period (5 years),
- has regularly participated in follow-up under the auspices of the Directorate of Public Roads, for example at instructor meetings that are held once a year.

Course organisers shall:

- at least four weeks before the course and/or as soon as possible send information about the location, times and type of course to the regional roads department in which the course is to be held, information about any vacant places, course fees etc.
- hold an examination for the participants,
- issue a course certificate to participants who have passed the exam.
- main an overview for 5 years of those who have completed the course.

Up to a third of the course lecture time may be used by instructors without authorisation, but they shall have specialised and relevant expertise, for example HSE or law.

As quality assurance, representatives of the Norwegian Public Roads Administration must have the opportunity to be present during all or parts of the course, and they may be unannounced.

Applications for approval shall be sent to the Directorate of Public Roads within a month of passing course 4 for course instructors.

Course instructor authorisation is valid for 5 years. Applications for an extension of authorisation shall be sent to the Directorate of Public Roads at the latest 6 months before expiration.

Appendix 3: Examples

The examples are not minimum requirements for warning and protection of worksites, but an attempt has been made to show good solutions for a number of different situations.

A proposal for the roadwork safety plan shall be prepared for each individual roadworks, on the basis of risk analysis, manuals, the examples, local conditions and plans for executing the work.

For the examples, cf the original in Norwegian.

Appendix 4: Important changes in this edition of Manual 051

2011:

Requirements for the executive enterprise (safety enterprise), the person responsible for roadwork safety (safety manager) and persons responsible for roadwork safety locally at the site (site safety supervisor).

Requirements for the Construction Client's role (especially the Norwegian Public Roads Administration).

Requirement for risk assessments as attachments to all roadwork safety plans.

Requirements for the use and submission/ archiving of a log book.

Clarification of when a sign with a yellow-green background can and cannot be used.

Rules for covering signs and the use of orange tape for signs that do not apply.

New rules for the use of temporary speed limits.

Requirements for capacity assessments for work on roads with heavy traffic.

New rules for sign 560 Information sign.

New rules for traffic signals in connection with roadworks.

New rules for the use of manual traffic control and the use of convoy escort vehicles.

New rules for safety measures, especially with respect to the increased use of guardrails as longitudinal protection.

New rules about inspection.

New course requirements, with increased course length and more detailed requirements for the content of courses.

A number of new or changed examples.

2012:

Revision of The Road Signs Regulations

Changed the text under sign 908

Deleted sign 930



Statens vegvesen

Håndbøker bestilles fra:

Statens vegvesen Vegdirektoratet
Publikasjonsekspedisjonen
Bok 8142 dep.
0033 Oslo

Tlf. 22 07 35 00
Faks. 22 07 37 68
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ISBN ISBN 978-82-7207-641-1