

## **M7-EN.2 PROJECTING OF ROAD WORKS**

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### **M7-EN.2.1 Introduction**

In this chapter the general projecting and marking of road works are described. The aim of the chapter is to:

- describe the most ordinary hazards in connection to road works
- describe what the risks consist of
- provide prevention measures

#### **(M7-EN2-1.jpg)**

Before road works start, a plan must be made for the marking of the works and the way of access to the site. A plan also has to be worked out for how the marking is inspected and maintained. The plans must be approved by the road authorities, and a copy of this should always be available at the workplace.

It is often appropriate to prepare the marking plans simultaneously with the planning of the project itself, so that the direct connection between the markings and the work to be carried out is taken into account.

When working out the marking plans it is important to keep in mind that:

- the workers must be protected as much as possible
- traffic is to be handled as safely as possible
- inconveniences for the workers, the neighbours to the workplace and the road users are reduced as much as possible

### **M7-EN.2.2 Height of the road**

Construction or repair of bridges can result in the normal road clearance under the bridge being reduced temporarily. Reduced road clearance can be a great inconvenience to trucks and other tall vehicles, which will have, in this case, to find alternative routes. So remember to notify relevant authorities if the road clearance is reduced. It is recommended to use methods of construction, which do not cause reduced road clearance.

#### **Risk factors**

- Risk of collapse if tall vehicles hit the bridge

#### **Safety measures**

- If the temporary road clearance is less than the normal 4.2 m, it is marked by the

sign “Limited height of vehicle”. On main roads and motorways where the normal road clearance is 4.5 m, marking is also needed though the reduced road clearance is more than 4.2 m. The temporary road clearance is stated as -0.5 m

- Establish measuring portal/indicator, possibly with photocells
- Consider closing the underpass to tall vehicles

### **M7-EN.2.3 Width of the road**

During road works, the width of the road will often be reduced temporarily. As with reduced road clearance, this may be of importance to big vehicles, which may have difficulty passing the workplace. Particularly if the workplace is in connection with sharp curves or unusual transversal banks/slopes, it has to be considered in the marking plan. Remember to notify relevant authorities

#### **Risk factors**

- Collisions at the workplace involve risks for both road users and road workers

#### **Safety measures**

- Close the road for certain type of vehicles if the width of the road is less than 3 m. On not so busy roads, a temporary width of 2.6 m could be accepted
- If the width of the road is between 3 and 4.5 m the traffic should be regulated

### **M7-EN.2.4 The scope of the marking**

When planning the marking of a working site, there is a number of conditions that should be taken into consideration, such as:

- Whether the working site is stationary or mobile, e.g. in connection with marking of road stripes
- The surroundings of the working site
- The road type, i.e. motorway, main road, residence road, etc.
- The visibility of the road users
- The composition and intensity of the traffic

When marking an area, the works area, working space and safety zone must be included and be marked off with cones and lamps where necessary. A safety zone must never be used as a work area or for storing plant or materials. In case any temporary footways exist in the carriageway, or obstructions such as spoil or plant, that are not already within the working space, they must also be signed and guarded.

#### **Risk factors**

- Unnecessary use of markings and signs jeopardizes the trust and respect of the markings.
- The markings are visible even when visibility is low

#### **Safety measures**

- The marking of road works must be satisfactory and motivated

- The working site and markings may be reduced at times when no work is being done on the site.
- Make an assessment of the needs for markings and signs in line with the progress of the work
- Set up initial warning signs well in advance of the working site. Initial warning is normally the use twice of the stop sign.

### **M7-EN.2.5 Works Area**

Work areas include the excavation, chamber opening, etc. Working space is the space around the works area where the workers will need to store their tools, excavated material, equipment, etc.

It is important that workers have enough working space ensuring that the movement and operation of the plant (e.g. swinging of jibs and excavator arms) is clear of passing traffic and is not encroaching into the safety zone.

When drivers visit the work area, they must switch on their roof-mounted amber beacons, if they have any, before signalling to enter the works. This will help to ensure that other drivers will follow and enter the coned-off area as well.

Works area must always have proper signs, cones, lights and barriers that are clean and in correct place. Regular inspection is important when there is no one is on site. Damaged or displaced equipment must be replaced promptly. Emergencies should be dealt immediately.

When works are completed, all plant, equipment and surplus materials must be removed promptly from the site. All signs, lighting or guarding equipment must also be removed.

The safety zone is the zone provided to protect workers from traffic and to protect the traffic from the workers.

Workers must:

- not enter the safety zone in the normal course of work
- not store or place materials and equipment in the zone
- only enter the zone for maintaining cones and other road signs

The Safety Zone consists of:

- The length of the lead-in taper of cones, which varies according to the speed limit and the width of the works
- The logway clearance, which is the length between the end of the lead-in taper of cones and the working space. It varies according to the speed limit
- The sideways clearance, which is the width between the working space and the moving traffic. It is measured from the outside edge of the working space to the bottom of the conical sections of the cones on the side nearest to the traffic. It also varies according to the speed limit
- The exit taper, that is always at 45 ° to the kerb line or road edge

If pedestrians are diverted into the carriageway, a safety zone must be provided at all times between the outer pedestrian barrier and the traffic.

Some examples of site layout and signs used are given below:

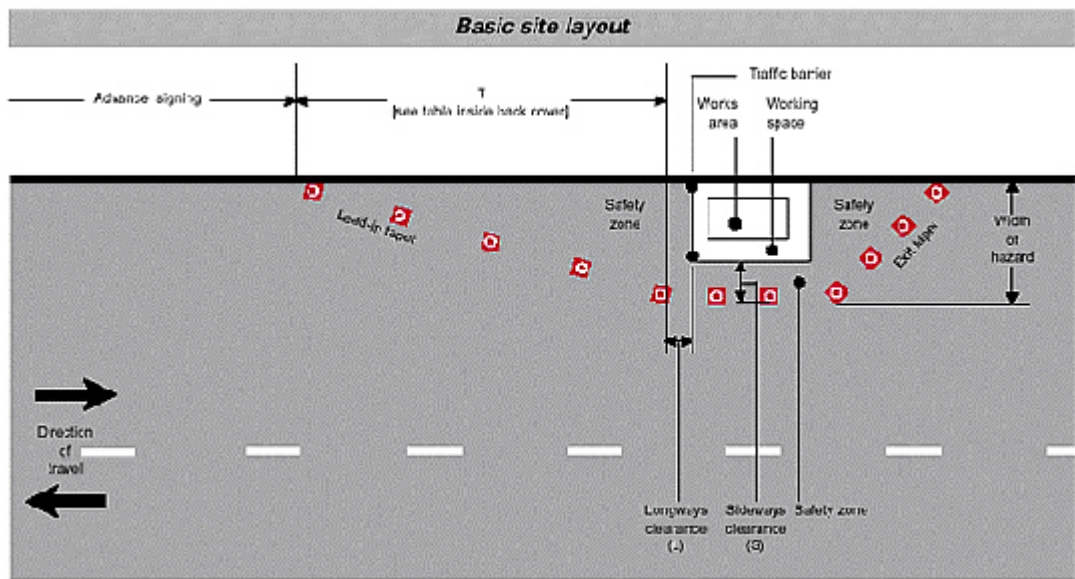


Figure 1

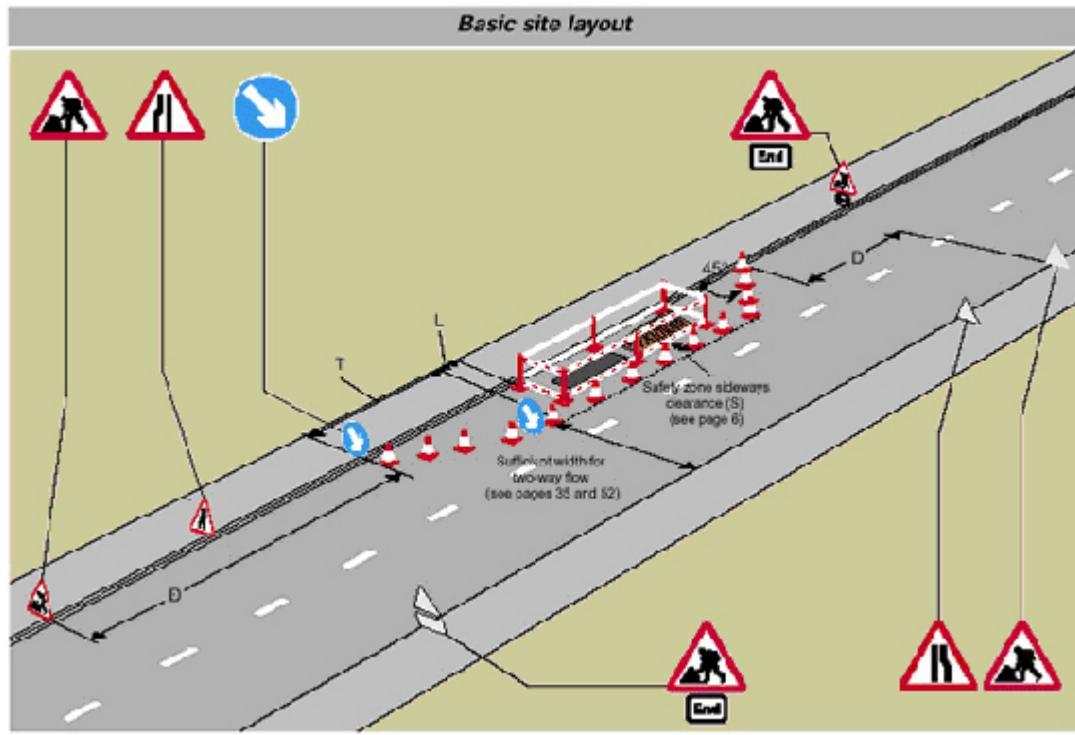


Figure 2

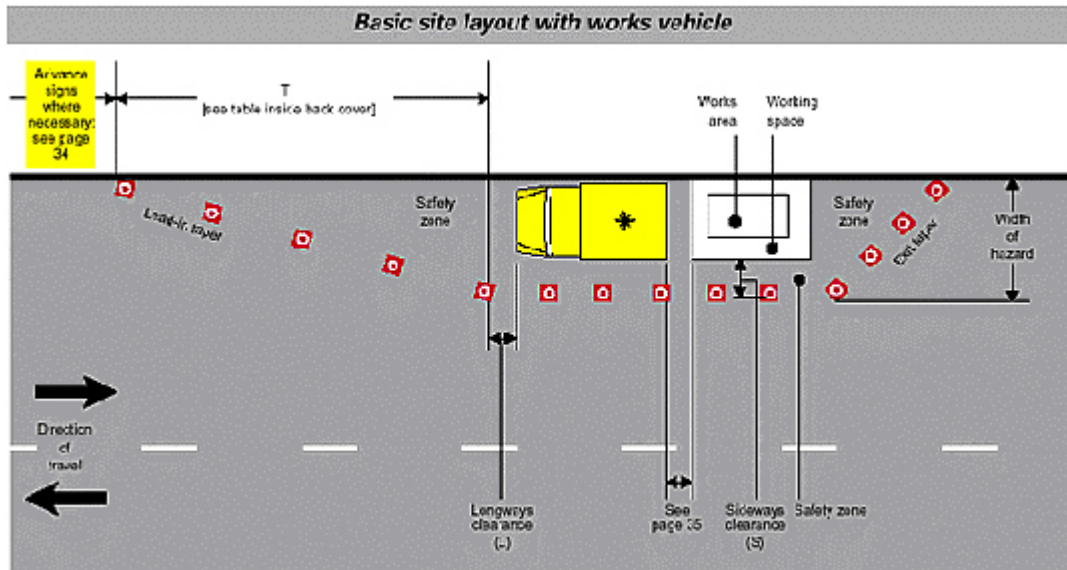


Figure 3

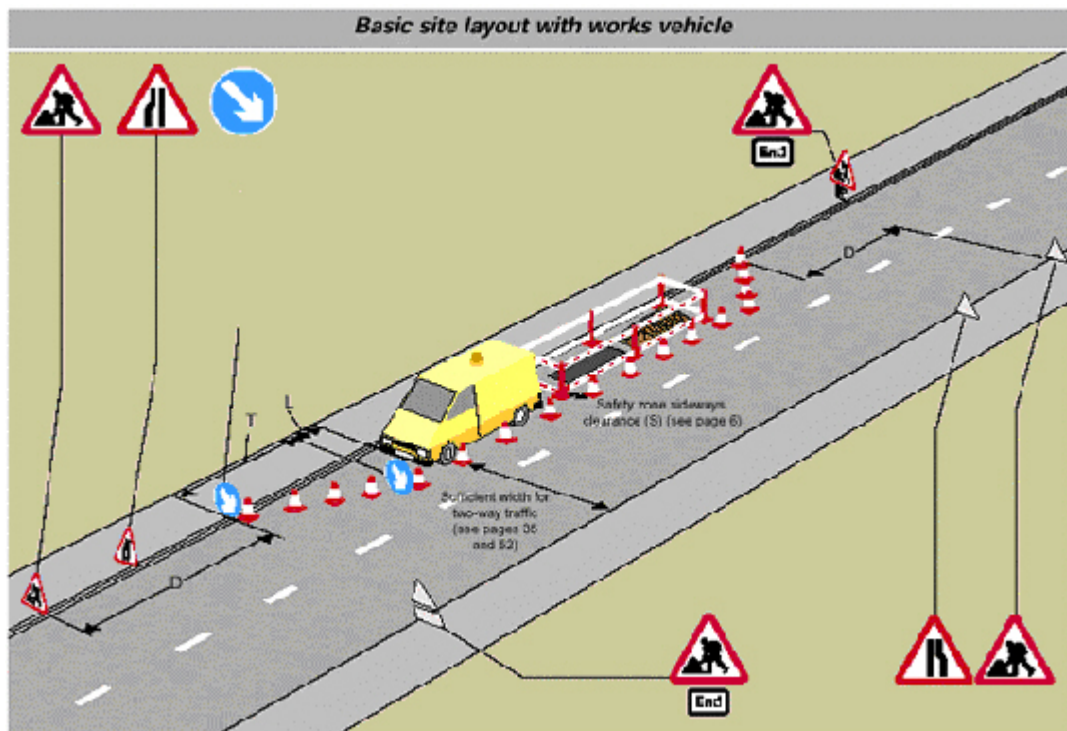


Figure 4

Source : <http://www.streetworks.fsnet.co.uk/acoppdf/saswandrw.pdf>

### M7-EN.2.6 Traffic regulation and Flaggers' safety

If the width of the road is reduced to less than 4.5 m, due to road works, it is necessary to regulate the traffic, so that accidents and traffic congestion are avoided. We distinguish between three types of traffic regulation: priority, traffic light control and one-way traffic. A fourth option is to close the stretch of the road completely.

Priority means giving one direction of traffic preference to the other. Marking is made with the corresponding signs.

Signal regulation is made by means of traffic lights or signalling, which function as ordinary traffic signals. Regulation by signalling is used for short-term reduction of the width of the road.

One-way traffic or closing of lanes is to be preferred if it is possible to make an appropriate diversion. Markings are made by signposts, information signs and on interim roads by edge lines.

### **(M7-EN2-2.jpg)**

During road works, a number of employees work as flaggers, indicating the works and aiding the traffic.

#### **Risk factors**

- Narrow road stretches add to the risk of traffic congestion and accidents, which may result in serious injuries on workers and road users
- High speed traffic might cause accidents, resulting in injuries, sometimes fatal for the flaggers
- Angry or aggressive drivers can cause injuries or stress to the flaggers

#### **Safety measures**

- Use priority only for minor road works and for not busy roads
- Use traffic lights – clock or traffic controlled – for road works of short duration.
- Cover the lights when they are not in operation
- Regulation by signalling is done by two persons – one at either end of the working area. Signalling is made by means of signal flags, indicator panels or traffic lights, red for stop and green for go.
- Pay attention to the personal markings of the signal workers
- During their work, flaggers can protect themselves by being visible and by wearing protective equipment such as:
  - high visibility clothing (orange or yellow vests, retro-reflective vests for night work)
  - other protective equipment (hard hats, long-sleeved shirt and pants, appropriate clothes for expected weather)
- Flaggers must concentrate on their work all the time. They must:
  - Stand in clear view
  - Never stand in the open traffic lane
  - Have an escape route planned in case of emergencies
  - Not conflict hand signals with the traffic ones
  - Respect drivers. They must not fight or respond to anger