



## 3.2 TRENCHES

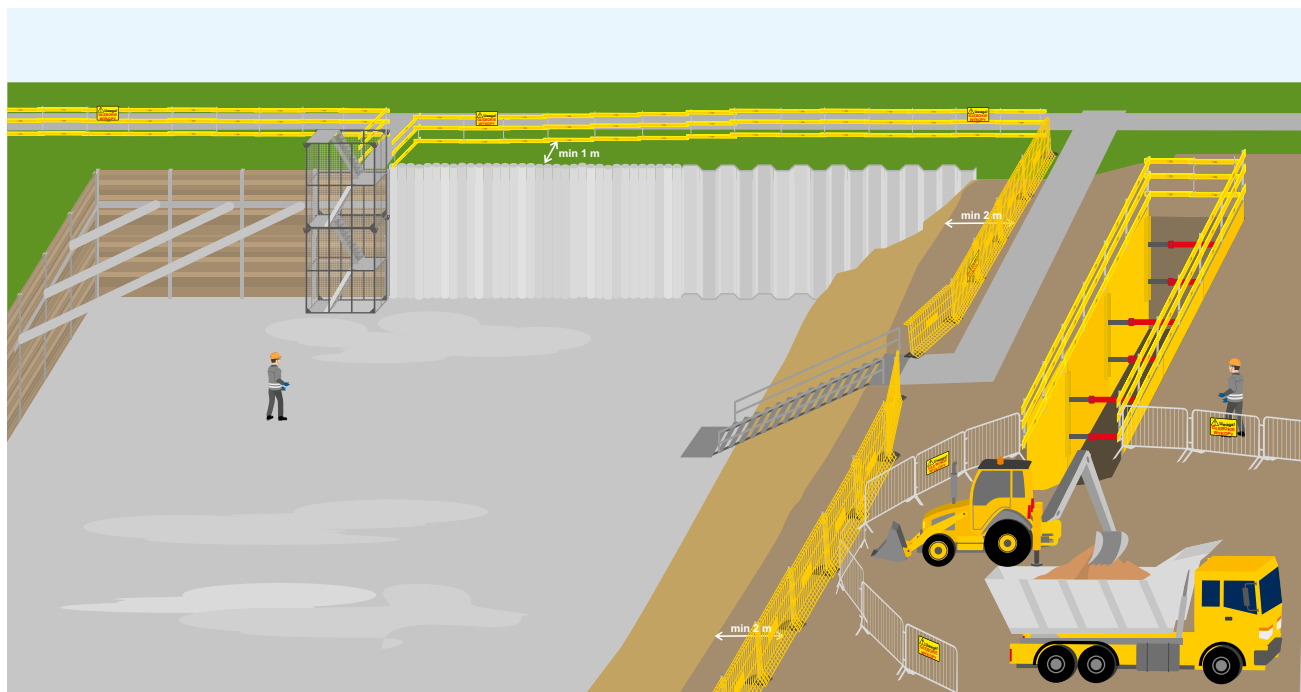
**SCOPE** | Collective protection measures for vertical trench walls / Access to trenches

### GENERAL RECOMMENDATIONS:

- Ensure the planned and adopted solutions are included in ISPW and in the HASP schedule (if applicable).
- Provide Operation and Maintenance Documentation or a design (if required for securing the trench).
- Plan such protective measures that will enable performance of works in a trench.
- Types of protective measures: diaphragm wall, Berliner wall, steel sheet pile walls (e.g., Larssen type), palisades of piles or micropiles, nailed walls, etc.
- Plan traffic routes, and a location and a way to access the trench.
- Plan modular barriers and appropriate marking of trenches.
- Before execution, take into account routing of underground systems and devices.

**When a ground where earthworks are conducted cannot be secured, continuous supervision or other effective technical and/or organisational solutions must be ensured.**

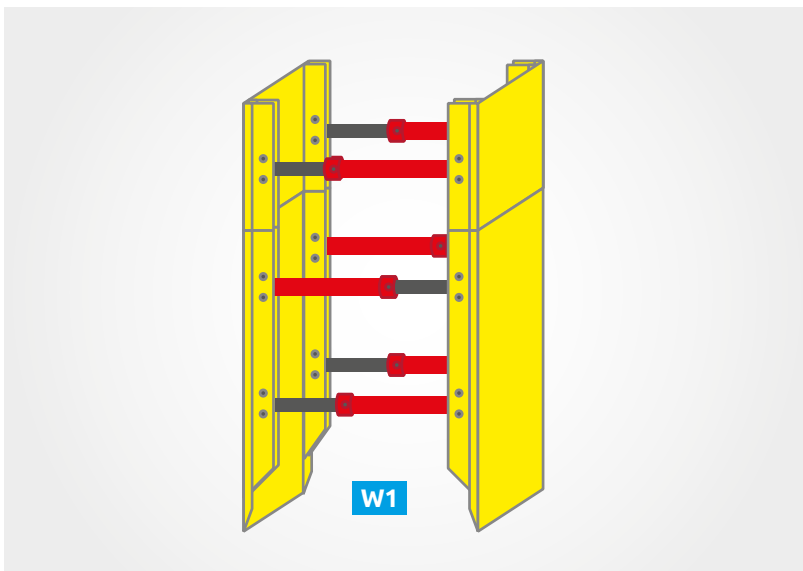
### GUIDELINES FOR TRENCHES



- Take into account safe sloping or collective protection measures at the top of the trench.
- Make sure that dangerous zones were temporary fenced off with openwork meshes and correctly marked
- Ensure a modular access to a trench, and measures for its effective evacuation
- Ensure that vertical transport is performed with self-propelled cranes, tower cranes or an excavator adopted to transport of loads

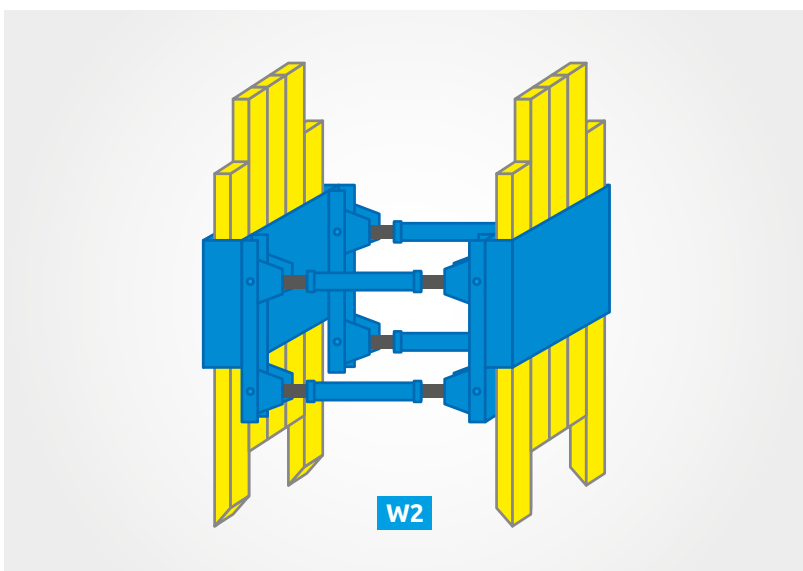
## Modular protection measures for narrow trenches

- Provide Operation and Maintenance Documentation
- Ensure that formworks are appropriate for the trench depth and ground type.
- Take into account the groundwater level and a need to drain a trench
- Plan formworks height appropriate for constructed trenches
- Ensure the quantity of formworks is sufficient for conducted works

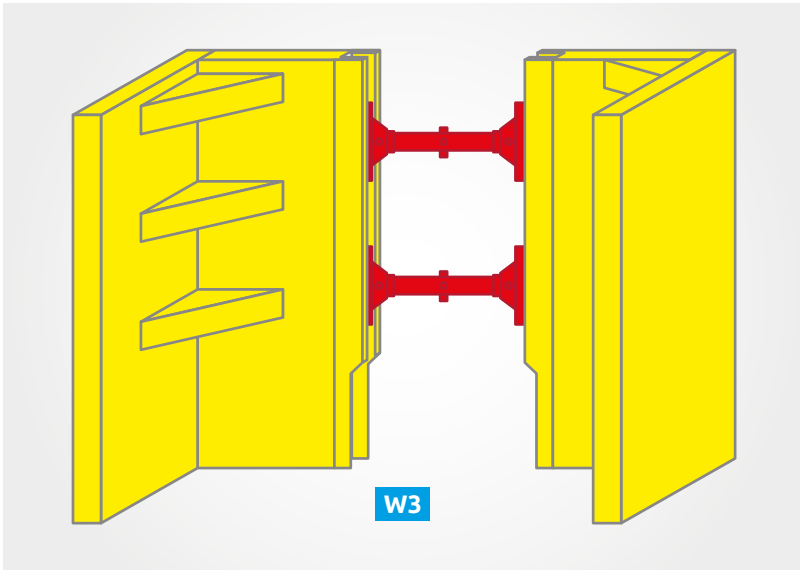


Formworks W1

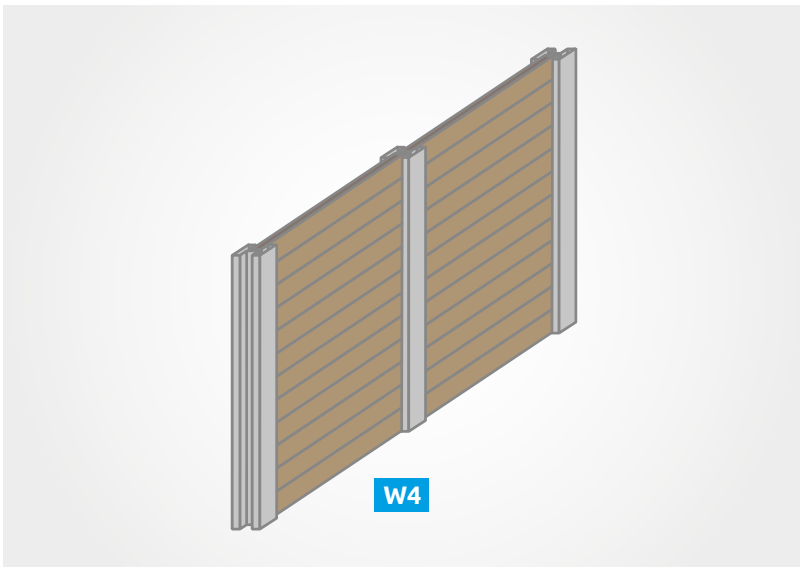
- Provide modular protective measures for narrow trenches, adopted to installation of underground systems and devices.



Formworks W2

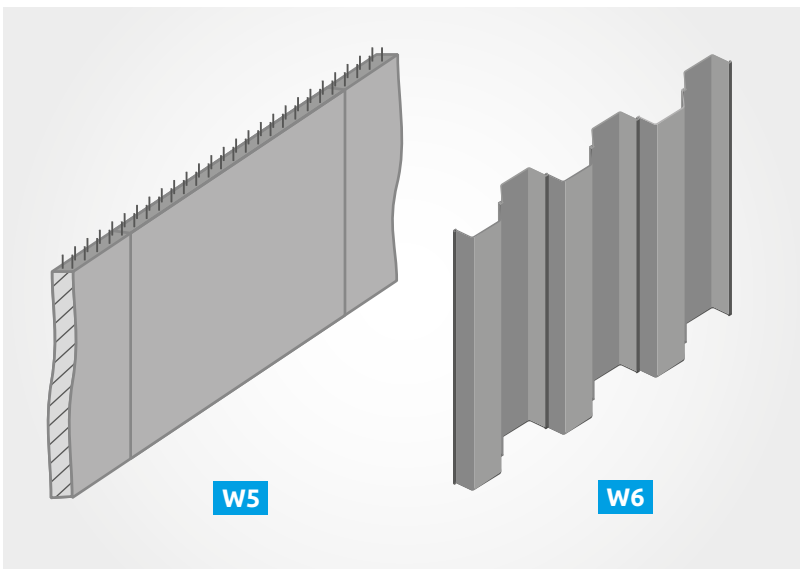


Corner formworks W3



Formworks W4

Securing a trench with the Berliner wall

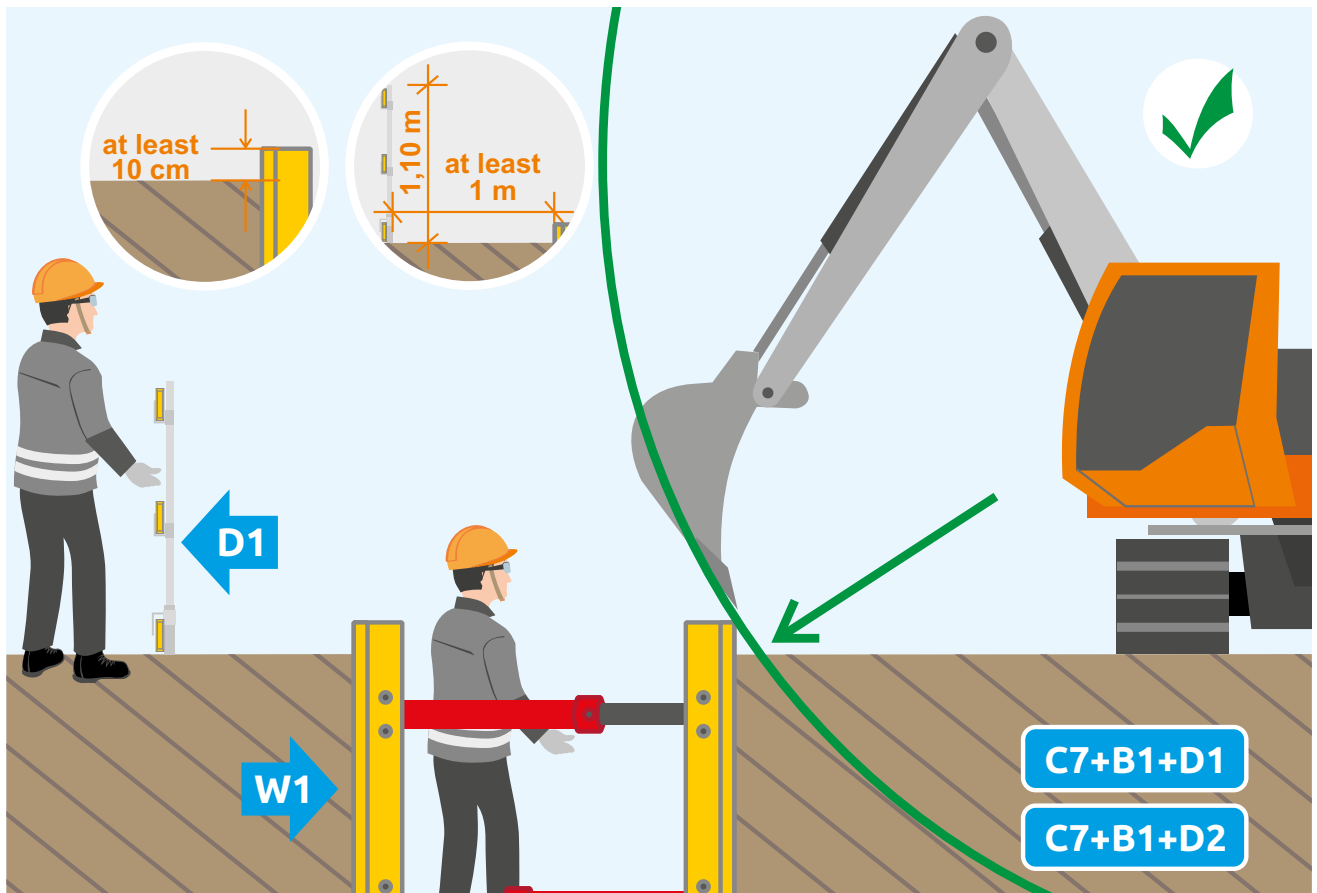


Formworks W5

Securing a trench with a diaphragm wall

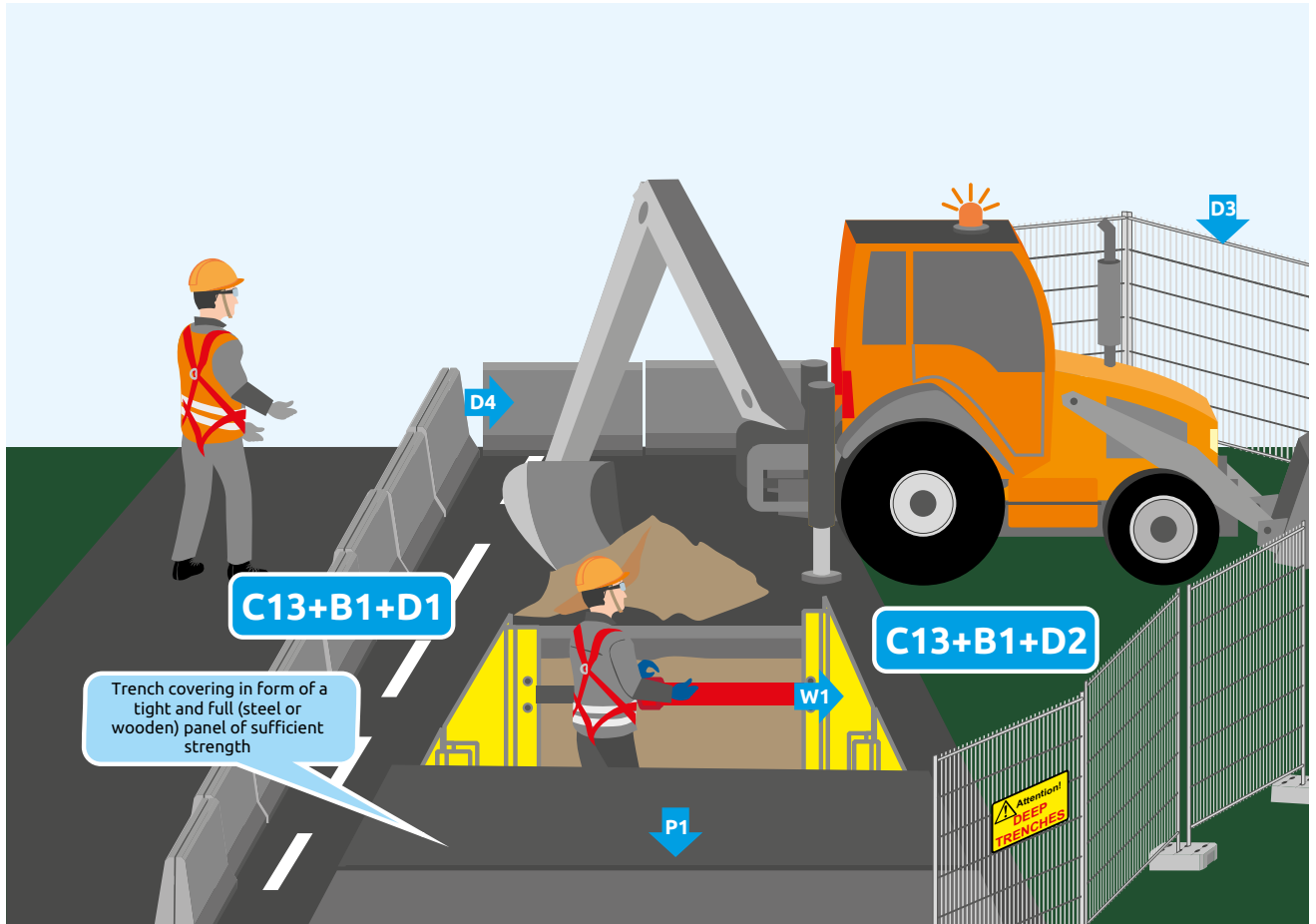
Formworks W6

Securing a trench with a Larssen sheet pile wall.



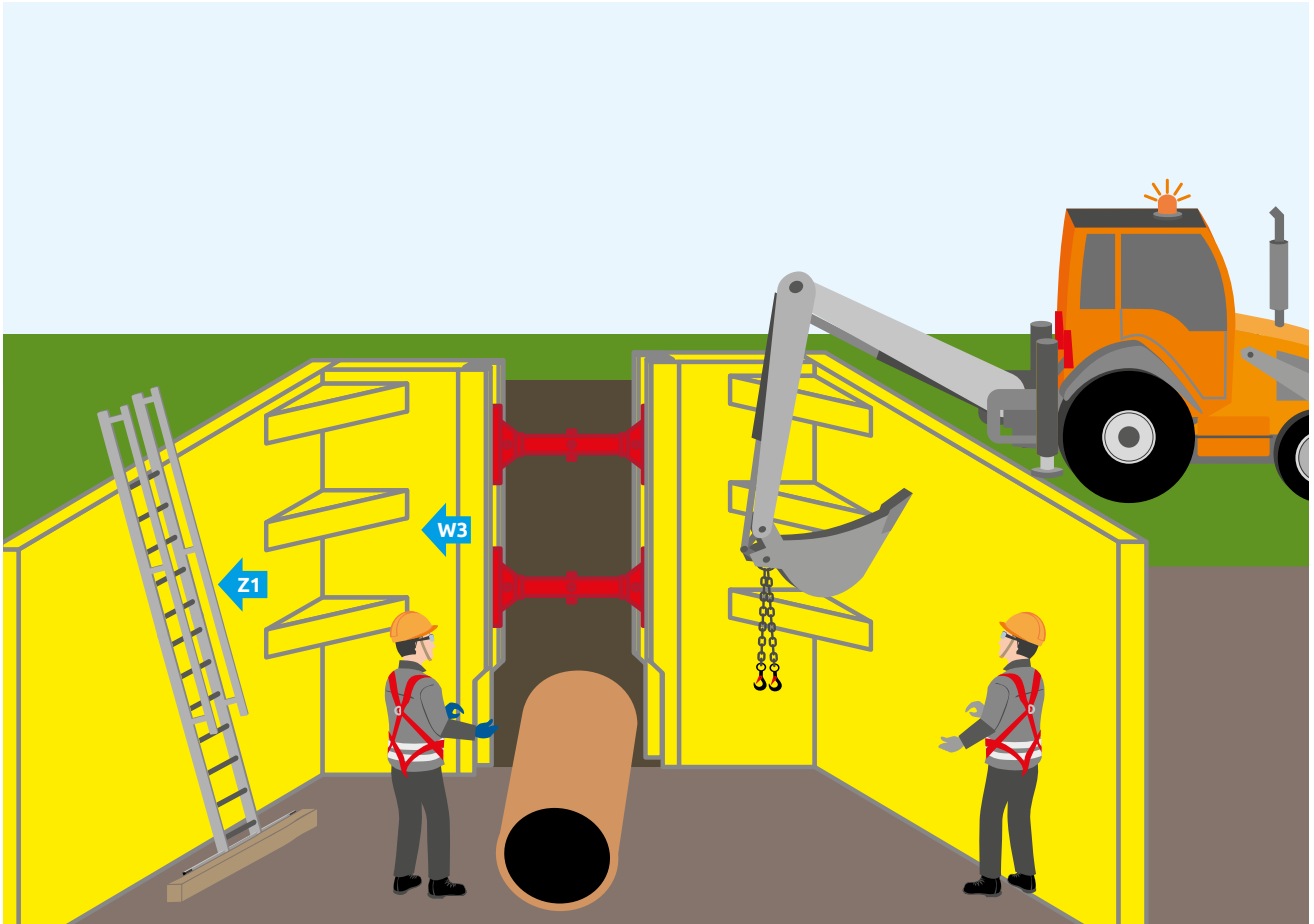
- A dangerous zone for mechanical equipment corresponds to a distance equal to a working range of its arm or a height specified by a manufacturer in the equipment operating manual.
- Fencing off of a trench to a height of 120 cm and a minimum distance of 100 cm of the formworks edge.

When works are not conducted, e.g., at night, ensure the trench is covered with a tight and full (steel or wooden) panel of sufficient strength, as well as that is fenced off and marked appropriately.



## ACCESS TO TRENCHES

- Ensure a modular access to a trench, and measures for its effective evacuation
- Make sure that formworks securing the trench wall reach down to the bottom of the trench and extend at least 10 cm above the ground level.
- The use of a hooked ladder is accepted as a temporary access to a trench, provided it is installed securely, on a stable surface, and attached on a top and a bottom



- A safe access (exit) must be constructed for each trench of a depth exceeding 1 m, and a distance between access points should not exceed 20 m.
- In the case of wide trenches, provide access to the trench via a ramp
- In the cases of trenches secured with a vertical wall (sheet pile, diaphragm, Berliner), provide access to a trench via a modular staircase)

