

CROSS Safety Report

Undermining retaining walls adjacent to highways

This month's report raises concerns about incidents involving retaining walls that support the highway.

Report

There have been several incidents involving retaining walls that support the highway, says a reporter responsible for carrying out the technical approval of structural works that affect the highway (including temporary works).

They state that large excavations immediately adjacent to the highway have been undertaken by property developers/owners without sufficient temporary works being in place. The reporter adds they are also aware of retaining walls being constructed on private property which are not designed in accordance with current standards, and where the highway authorities are not approached for technical approval.

The reporter describes one situation where the excavation adjacent to the footpath was not adequately supported and resulted in cracking to the footpath (**Figure 1**). They recount another incident where the highway was left unsupported and began to collapse into the excavation (**Figure 2**). In this example, insufficient barriers were in place which also caused an immediate hazard to the footway users due to the deep excavation. Footway and carriageway closures had to be put into place to prevent further damage and to ensure the safety of highway users. The report shares that, on another occasion, the risk to the highway was deemed to be so high that the highway authority had to undertake emergency remedial works and install a temporary wall.

The reporter believes the underlying cause of these incidents is lack of knowledge. In some of the incidents, property developers/owners sought and were granted planning permission from the planning authority, as well

as building control consent. These agencies did not advise the applicants, and did not appear to be aware, that additional consent is required from the highway authority in accordance with the Highways Act 1980.

In the reporter's experience, very few property developers/owners seem aware of these requirements, and that retaining walls that support the highway require technical approval. They therefore concluded the best learning outcome would be for planning authorities to ensure that property developers/owners are aware of these requirements and to include the requirement for technical approval as a planning condition.

The full CROSS Safety Report, including links to guidance mentioned, is available on the CROSS website (report ID: 1177) at www.cross-safety.org/uk/safety-information/cross-safety-report/undermining-retaining-walls-adjacent-highways-1177.



FIGURE 1: Cracking to top surface of footpath adjacent to excavation



FIGURE 2: Footpath collapse due to unsupported excavation

Key learning outcomes

For clients and the construction team:

- | It is good practice to carry out a risk assessment and method statement for all construction activities. This can ensure the sequencing of work activities, such as trench excavation, are considered and planned
- | Having a competent temporary works designer/adviser in place to supply an engineered solution can ensure all temporary works are carefully considered and planned
- | Verification of temporary works erection by a competent person who can oversee and coordinate the whole process can also ensure the works are installed correctly
- | Regular toolbox talks are a good way of engaging with work crews and highlighting any risks associated with work activities

For civil and structural design engineers:

- | Consider how the design risks, such as the risk of undermining existing structures, can be effectively communicated to contractors on site
- | Ensure the requirements of CDM 2015 for site specific hazards, such as earthwork instability during excavation works, have been clearly communicated to the principal contractor during the project planning stage

Expert Panel comments

CROSS has received many reports about issues related to excavation collapse, and retaining walls being undermined due to inadequate temporary supports and planning (see **Further reading**).

Retaining walls, both permanent and temporary, are a very common structural unit yet their safe design is complex because there are many uncertainties in terms of:

- | backfill type
- | degree of backfill compaction
- | water pressure and potential surcharge
- | loadings conditions in the temporary and permanent state

The proximity of heavy vehicles as well as vibration from lorries, buses and construction plants will also have a dramatic effect on any retaining wall. Vibration may well affect the development as well.

There is also considerable uncertainty in the resistance routes to sliding. It is often not appreciated that wall design forces are very sensitive to height. Peak lateral pressure is proportional to height; lateral force is proportional to height squared; and bending and overturning is proportional to height cubed – so small variations in height can create big differences in the design.

The temporary condition during excavation and permanent wall construction is often more onerous as it is usually a small system with multiple introduction and removal of supports, and so needs to be properly sequenced and designed to minimise any movement. Movement is inevitable, it is all about the degree, especially given its effects on services can be catastrophic for brittle water and gas mains.

CDM Regulations 2015

CDM Regulations 2015 make clear

the importance of ensuring construction work is properly planned, managed and monitored. This applies to both temporary works as well as permanent works. As part of the CDM strategy for a project, the risk of collapse to the highway due to inadequate temporary works should be identified in a risk assessment and included in the pre-construction information file. This should be provided to all parties involved.

Management of temporary works for smaller contractors

There are also risks for designers and contractors, particularly on site, during construction. As mentioned, where a wall is safe in its permanent condition it may be subject to more adverse temporary loads during construction. Contractors should be aware of what they are building, and the temporary works coordinator should review temporary situations which may impact on short term stability.

The HSE's Sector Information Minute on *The management of temporary works in the construction industry* (see **Further reading**) suggests that for smaller contractors the principles of BS 5975 should be in place, if not the formal and specific procedures, in particular:

- | ensuring a suitably competent temporary works designer/adviser is in place to supply an engineered solution
- | adequate information flow
- | design checking to an appropriate level
- | suitable verification of correct erection of the temporary works and someone overseeing and co-ordinating the whole process

The Temporary Works Forum have also published *Information Sheet 6: The safe management of temporary works* (see **Further reading**) which provides a summary of the key components of BS 5975:2019 for those

managing temporary works in small and medium-sized enterprises.

Highways Act 1980

The various statutory duties under the Health and Safety at Work Act, and other associated legislation, always apply if the actions are associated with a work activity. In essence this means that those creating the risk by designing and/or creating the retaining wall have a duty to safeguard anyone who may be affected by their actions. There have been deaths of members of the public due to the collapse of poorly constructed retaining walls near to the highway. In 2012, a company director responsible for a wall that collapsed onto a highway and killed a three-year-old girl received a two-year jail sentence for manslaughter.

Importantly for retaining walls within '4 yards (3.7m) of a street', section 167 of the Highways Act 1980 requires the retaining wall to have approval from the local authority. If this is an adopted public highway, it is a matter for the highway authority, which may not be the local authority. It would be eminently sensible for a planning condition to insist on a proper design and consultation with the highway authority about both the permanent and temporary works designs.

The challenge here is to change the industry approach so that temporary conditions that have effect beyond the site get proper attention. The reporter's idea that planning consents should address this issue is a good one, which the panel hopes will be taken up.

This is perhaps something for the Building Safety Regulator, or the professional bodies supporting the personnel who give planning approval to consider. Party wall requirements give this type of matter attention – so could the highway be considered in a similar vein?

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Further reading

CROSS Safety Reports:

- | **CROSS Safety Report 368: Potentially dangerous excavation:** www.cross-safety.org/uk/safety-information/cross-safety-report/potentially-dangerous-excavation-368
- | **CROSS Safety Report 806: Questionable temporary works used to retain embankment excavation:** www.cross-safety.org/uk/safety-information/cross-safety-report/questionable-temporary-works-used-to-retain-embankment-806

Health and Safety Executive:

- | **The management of temporary works in the construction industry:** http://www.hse.gov.uk/foi/internalops/sims/constrct/2_10_04.htm

Temporary Works Forum:

- | **Information Sheet 6: The safe management of temporary works:** <https://www.twforum.org.uk/viewdocument/twf-information-sheet-no-6-the-s>