Structural Safety Alerts are produced by Structural-Safety* incorporating CROSS (Confidential Reporting on Structural Safety) and SCOSS (Standing Committee on Structural Safety) and the HSE (Health & Safety Executive). Structural Safety provides an insight into problems encountered on-site including post failure analysis that identifies what went wrong.

Structural Safety Alerts

Sudden Loss of Ground Support

CROSS (Confidential Reporting on Structural Safety) and SCOSS (Standing Committee on Structural Safety) and the HSE (Health & Safety Executive) provides guidance on precautions that can be taken to identify the potential for sudden loss of ground support. The alert is aimed at the building owners, developers, contractors, architects and structural engineers who are involved in construction projects.

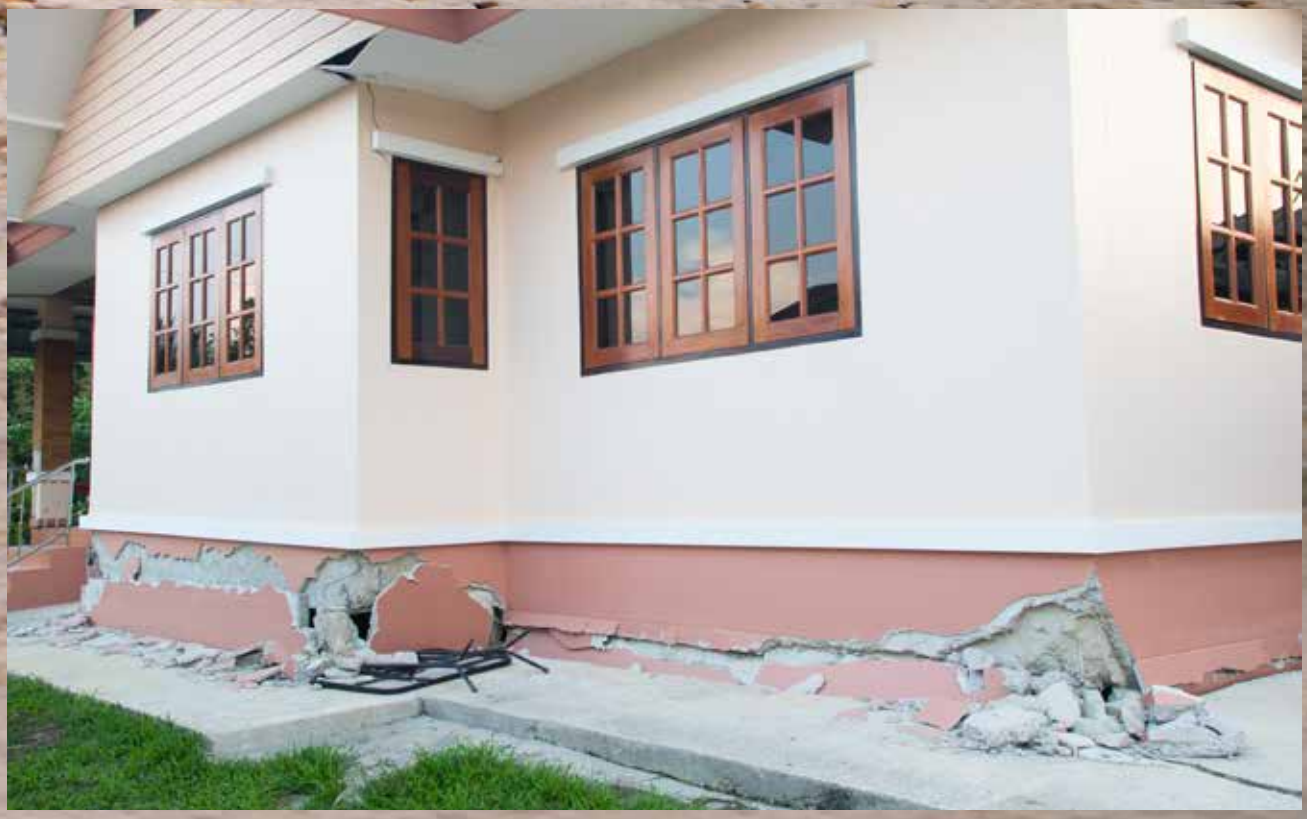
SCOSS has reported several incidents of unstable ground below structures where voids have opened up. In March 2017, press reported that Pinner Primary school in London had to close due to chalk mines discovered beneath it. Voids appearances have been noted in incidents near Newcastle, Greenwich in London or Manchester.

If such a void will developed under a bridge foundation the collapse of the building will not be avoided. In the UK, there are several potential causes of underground voids. Voids might developed where coal has been mined in abandoned mine or quarries. Cities like Bath or in Cheshire ground extractions are excessive. Another reason for voids occurrence is the leakage and washout from degrading drainage systems.

- The hazard of the ground loss is difficult to predict and might occur without warning
- It can affect the public
- It can occur due to wash out from drains or natural causes

The mitigation measure is the careful inspection and the designers are cautioned:

- Be aware of the hazard. In its broadest definition, this is: 'sudden loss of ground support'. A number of causes are possible.
- Consider how gross movement might be triggered by severe weather.
- Ensure all site investigations include searches of historical data bases for potential underground workings such as mineworkings and services. Local Building Control officers may be acquainted with local activity. Obtain a commercially available coal mining or ground stability report.
- If there is reason for concern, ensure the Site Investigation includes ground probing or geophysical surveying such as ground penetrating radar seismic, electrical resistivity or microgravity methods.
- Be aware of the possibility of wash out from leaking culverts, drains, sewers, water mains or pumping mains. As for mines, the exact pipeline location may be unknown, so on site construction may reveal more information.



- If piped services are close to foundations, consider the risk (and consequences) of wash out. Be especially careful if large or high-pressure pipelines are close to isolated shallow foundations which support significant structure (e.g. bridges).
- For all key infrastructure components ensure regular inspections, monitoring for signs of movement. Exercise caution if foundations are exposed to hazards but cannot be checked. Investigate any signs of movement.
- Consider the sensitivity of the design to foundation disturbance and make sure the structure is 'robust'. When doubts exist, opt for foundation forms that are less vulnerable to credible ground loss events (e.g. rafts).
- Ensure structures sensitive to the effects of climate change, such as increased flood potential, are reviewed for the potential to need enhancements to their foundations.
- Ensure all site investigations are robust in their consideration of the potential for the ground to be subject to undermining from soluble subsurface features such as limestone, gypsum and chalk.

Source: The Institution of Structural Engineers, the Institution of Civil Engineers and the Health and Safety Executive

For more information visit the www.structural-safety.org