The ground you work on...

As well as being aware of everything happening on site, all contractors need to know and understand the ground they are working on. Failure to do so can have serious and life-changing consequences.

The load that machinery places on the ground is in many cases simply the weight of the machine. But it can also include the weight of a load being lifted – for a mobile crane, this can mean a massive increase in the forces being applied through the outriggers, which will change as the load is moved. The force exerted on the ground can also be a lot more than the weight of the machine and load. For example, an excavator pulling a sheet pile also has to overcome the friction/gripping force of the ground holding the sheet. These loads are increased by the natural forward tipping movement of the excavator, transferring weight and force to the front of the tracks – often close to the edge of the excavation it is working on.

If the ground gives way, the machine could move unexpectedly, or completely overturn. This can be caused by something as simple as an outrigger punching through a tarmac surface, or a more complex failure of soil strata some metres below the surface. The types of ground that need to be taken into account are as varied as construction sites, and includes natural undisturbed ground, areas that have been worked in the past or as part of the current project, embankments, spoil heaps, roadways, car parks, docks, and other structures. The surface can also hide drains, culverts, tunnels and other underground features that can seriously affect the strength of the ground.

Whenever a machine loses control or overturns, there is always the possibility of serious or fatal injuries to the driver, and those working in the area. Even if no injury occurs, there will be serious losses, as not only is production disrupted, but the recovery operation can be difficult and costly. Research work by the HSE found that for every £1 recovered through insurance following an incident, a further £8 to £36 could not be recovered.

The principal contractor in charge of the site has ultimate responsibility for assessing and managing the capability of the ground. They must work with equipment companies, sub-contractors and ground engineering specialists as necessary to minimise the risk of ground failure. Assessment and management of ground conditions must be part of the planning process with two key areas considered. One is the selection of machine and determining the nature and scale of the loads and forces it will apply to the ground. The second is to gather information about the ground and its bearing capacity. When sufficient information is gathered, an assessment is made as to whether the ground will take the loads imposed by the selected machine. This may mean that the machine needs to be changed, or that the job needs to be done differently, or that work needs to be done to improve the ground's strength.

Information about the ground itself may already be available from previous assessments, or records, plans and specifications from work which has already been completed. Sometimes, however, investigations on site are required. This may involve digging trial pits, or a collection of samples using bores. The level of detail in the ground investigation and assessment needs to reflect the complexity of the job, the reliability of the information, and the margins of safety that result from the selection of machinery. Monitoring and management of ground conditions needs to continue as work progresses, not only to take account of changes in the task being done, but also changes to site conditions as a result of rain, snow, flooding or other influences.

The Strategic Forum Plant Safety Group recently published new guidance on Ground Conditions, in conjunction with the HSE, Temporary Works Forum and other industry bodies. The new work emphasises the importance of the principal contractor's coordinating role, and that by ensuring that the supply chain communicates and works together, overall levels of risk can be driven down. When sectors work in isolation, responsibilities and liabilities are frequently displaced to others, without actually reducing the overall risk level.

The new guidance can be downloaded from the CPA website at: www.cpa.uk.net

A Liebherr LTM1500 which overturned in Scotland after the ground under one of its outriggers gave way