The Hills Are Alive

When retaining walls start moving, the details of their construction can really bury you. Backfill with knowledge before a claim hits.

By Kurt Ahlich

Mountainous or merely hilly—whether urban, suburban or rural—the Northwest’s topography requires us to build roads, driveways, homes, businesses and yards on slopes. Often, these improvements or structures are built next to property lines or an adjacent structure, thus prohibiting simply grading the hillside soil back to a stable, maintainable slope. In these cases, the hillside soil is excavated to vertical face, or bank. These vertical soil faces, which are inherently unstable, must be retained against any future earth/soil movement that would adversely affect anything in front (downhill) of the soil face, as well as what might be behind, or uphill. The structure that is designed and built to retain this soil face is called, appropriately enough, a “retaining wall.”

It should be noted that retaining walls can also consist of basement, underground parking, or roadway cuts/tunnel walls, to name a few. However, the focus of this article will be on walls that might be encountered at typical residential or light commercial developments.

From a general engineering standpoint, retaining walls are quite simple. Their function is to prevent movement of the soil that is intended to be retained—that is, the soil located behind the wall. This soil exerts a lateral (horizontal) force on the wall. In addition, other forces exert lateral loads on the wall. These consist of hydrostatic (water pressure) and surcharge forces related to loads located behind the wall, such as sloping or built-up soil, buildings or stored items. All of these horizontal loads tend to topple, rotate, deflect or otherwise destabilize the retaining wall. These forces are countered by the weight of the wall, a foundation system or some type of lateral bracing.

One dilemma is whether or not retaining walls need to be designed by an engineer and permitted by an appropriate authority. An adjuster may find that a retaining wall that has failed was “built-by-owner.” Often, local building codes would require that the wall be designed and permitted; the general rule of thumb is that any retaining wall that is over four feet in height, as measured from the bottom of the retaining wall including footing, needs to be permitted. This rule can be restricted by the presence of local code requirements, site geometry and the presence of structures, including terraced retaining walls, located behind the retaining wall.

There are multiple types of retaining walls that are commonly constructed. However, these walls fall into a few basic categories, including gravity walls, walls that require some type of foundation, and mechanically stabilized earth. Gravity walls, with respect to residential and light commercial construction, are generally low in height. These walls rely on the weight of the wall itself to counteract the various lateral loads described above. These walls typically consist of landscaping retaining structures and are not intended to retain soil greater than a few feet in height. They typically consist of stacked block or rockers (stacked rock).

A more common type of retaining wall is that which requires a foundation. This foundation can consist of a spread-type footing, often constructed of concrete and in a “T” or “L” configuration, or a drilled caisson (hole drilled into earth) backfilled with concrete and a vertical structural member (typically steel or pressure treated lumber). Another common retaining structure is what is known as a “mechanically reinforced earth” materials that might contain lead or asbestos must be wetted to reduce dust dispersal. Contractors must also give neighbors notice of the work to be performed. More cities in Oregon may adopt similar ordinances. A state senator who co-sponsored a bill passed last year giving cities more authority to regulate lead and asbestos in demolitions said he can see Portland’s ordinance becoming a model for the rest of the state. The city’s Bureau of Development Services says the rules will affect more than 700 demolitions each year.
Failure can occur as a result of a design or construction defect, a change in site conditions or, in some cases, deferred wall maintenance.