

A retaining wall is a structure which holds back material on one side. These are particularly useful where there is a change in level within a restricted area and insufficient space for banks of appropriate slope. They can also be used to good effect where ground conditions are such that a sloping bank would slump or fail or where there is an awkward junction between adjacent free-standing walls. *Note: retaining walls are costly structures that are clearly artificial: a sloping earth bank of gradient to match local landforms that can carry locally characteristic vegetation is normally preferred in rural locations.*

Construction & design

Retaining walls carry a substantial amount of loading from the retained material. This loading is increased by water building up in the ground behind the wall, so drainage is essential (by weep-holes or by French drainage behind the wall). As a rule of thumb, when building a retaining wall its thickness should be at least half the height of the retained ground.

Retaining walls should be properly designed and constructed under the supervision of a chartered civil engineer, especially if:

- they are over 1 metre high
- they support land carrying structures or trees
- they support land outside your ownership
- there are concerns about ground conditions (including hydrology)

New retaining walls should be carefully designed to respect local distinctiveness: in Harrogate District, retaining walls of local millstone grit are a traditional and characteristic feature of the upland towns and villages.



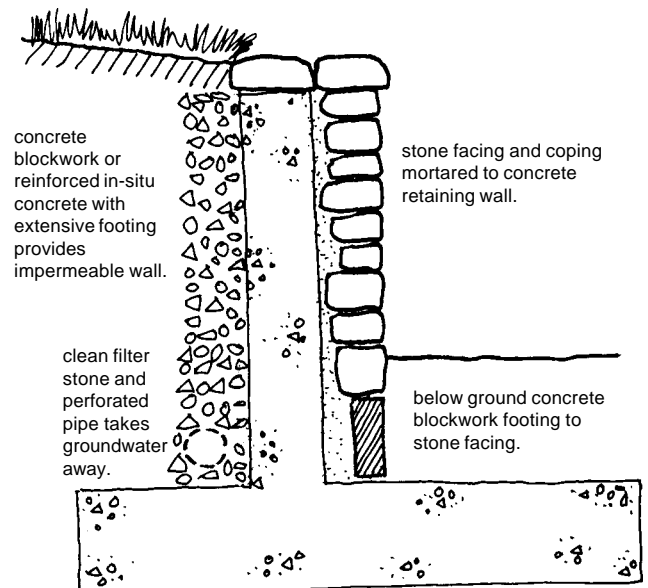
Harrogate, Knaresborough and Ripon offer many fine examples of stone retaining walls

Types of retaining wall:

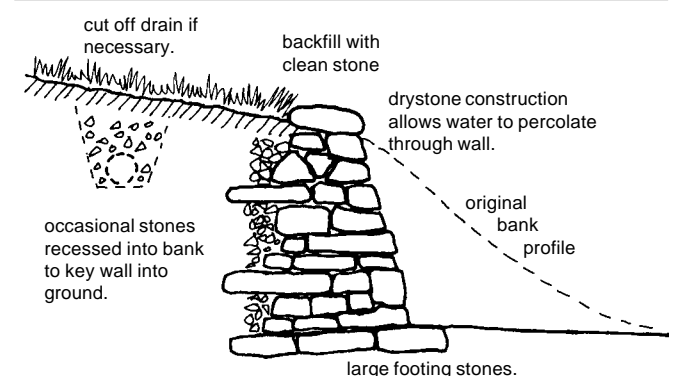
Stone retaining walls

These may be vertical or battered (sloping). Low retaining walls may be dry-stone, which allows good drainage and looks very appropriate in a rural location. Walls over 1 metre high or where significant loading is anticipated are more likely to be mortared ashlar masonry. Good foundations and good drainage are essential elements in the design of stone retaining walls. Provision should be made for excavating and protecting the natural slope behind the wall as part of the construction.

concrete/stone faced retaining wall



drystone retaining wall



Modular retaining walls:

There are several proprietary systems of modular retaining walls. These are characterised by providing a cellular retaining structure which contains open pockets of soil across the face of the structure to encourage vegetation to grow and thereby soften the appearance of the wall, although the small volume of soil available to plants does not suit many species. These walls are generally at a steep, raked slope rather than vertical. The raw appearance of these walls without vegetation cover means they can look rather modern and mechanical which could be harmful in sensitive contexts.



A crib-lock wall before planting up.

Gabions

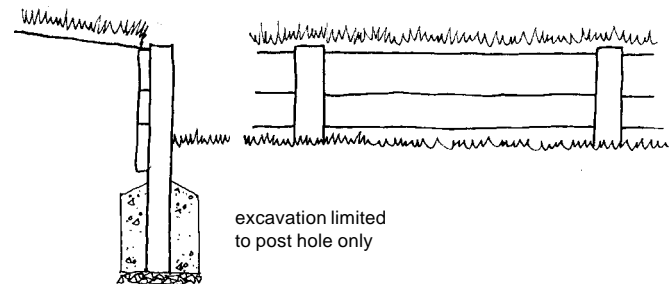
These are “baskets” or cages of wire or plastic mesh which are filled with stone and placed together to form a wall. Gabions allow free flow of water so can be useful as headwalls adjacent to rivers, or where groundwater in retained slopes is a problem. Part-filling the gabions with topsoil can encourage vegetation to grow, although generally the open character of the stone fill means that plants are subject to droughting.



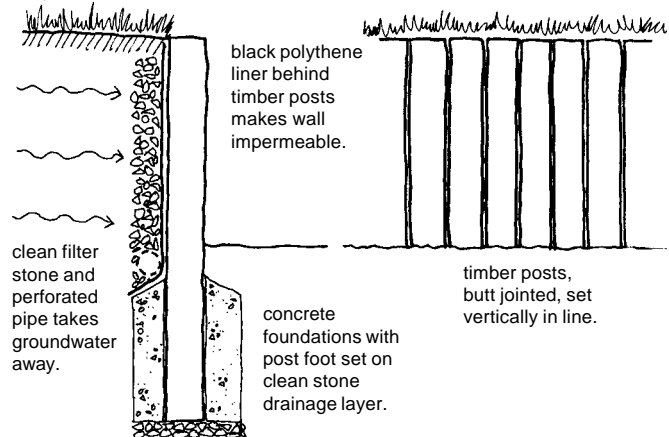
Plank & pile walls and pile walls:

Where vertical excavation is restricted for example by wishing to avoid damage to tree roots, a simple low retaining wall can be constructed by driving piles into

a typical plank & pile wall:



a typical pile wall:



the ground at intervals to miss the sensitive areas and placing planks on the uphill (loaded) side of the piles. Driving piles to form a continuous wall is often used on riverbanks where vertical excavation is not a problem but excavation back into the slope is to be avoided.

Timber sleeper retaining walls:

Timber sleepers or old timber piles from ports are durable and impervious due to the characteristics of the wood itself (e.g. “greenheart”) or because of the preservative processes used in their manufacture (e.g. pressure impregnated with creosote). With proper foundations and fixing these materials can be re-used to form low retaining walls of attractive appearance where significant loading is unlikely.

Soil nailing

Soil nailing and benching are engineering works involving tying back the outer face of a wall or slope into stable ground behind. This work should be designed and supervised by a chartered civil engineer.