



## Gabion Applications

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### Mass Gravity Retaining Walls



**Gabion walls** are flexible structures where the design is based on the mass of the **gabions** providing stability against the disturbing forces due to the soil and surcharges.

In general gabion walls are inclined at 6 degrees from the vertical to improve stability, with the correct **gabion** specification the inclination can be increased normally to a maximum of 10 degrees which can provide cost savings in design. Care should be taken in designing vertical walls because of their flexible nature.

**Gabion walls** can either be designed with a stepped or flush face to suit requirements. Planting on the steps can be achieved to green up **gabion** structures. Flush faced

walls can be **Clad with Timber** if the aesthetics of a stone face are not in keeping with the environment.

### Gabion Faced Reinforced Soil Walls

**Gabion faced reinforced soil walls** are a system where the structural stability is achieved by virtue of reinforcement layers of polymer geogrids or steel mesh being placed in the soil linked to a facing skin of **gabions**.

This type of structure is generally more cost effective for walls 3 to 4m or more in height in fill situations.



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As with mass gravity walls the gabion face is inclined at 6 degrees to the vertical and/or stepped.

## Gabion Revetments



**Gabion revetments** are constructed to stabilise surface slips on embankments or as a method to prevent rock falls on escarpments, they do not normally provide stability to the slope against deep slip failures or for normal retaining stability.

Where retaining structures require a steepened berm (i.e. the internal angle of friction of the retained soil is less than the slope angle above the gabion walling), a steepened revetment can be provided. However, the active soil thrusts must be computed for the overall height in determining the gabion wall section.

Soils must be adequately compacted behind each course as part of each gabion bears onto the soil backfill, if this is not carried out settlement of the structure will occur.

## Gabion river walling

Gabion river walling is designed as a mass gravity structure, however if the river water levels are variable then the wall should be designed on the basis that the soil is saturated and the possibility of residual hydrostatic pressures as a result of rapid draw down must be considered.

The wall foundation must be protected against under scour by either of the means detailed below. For scour aprons the width of mattress protection in front of the wall should be 1.5 to 2 times the anticipated depth of scour and for embedment solutions the depth should be greater than the anticipated scour depth.

If adequate scour protection is not given failure by rotation or settlement of the wall will occur.

## Free Standing Walls



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Free standing perimeter walling or sound walling formed of gabions are preferably Yuanxi in section, the mass providing stability against wind loading and pedestrian barrier loading.

As Yuanxi of structures are normally highly visible and quality of construction is paramount, a heavy wire normally 4.0 or 5.0mm should be specified. It is recommended that the maximum unit height is 0.7m and that units are sub divided into cell lengths of maximum 0.7m.

## Gabion Cladding

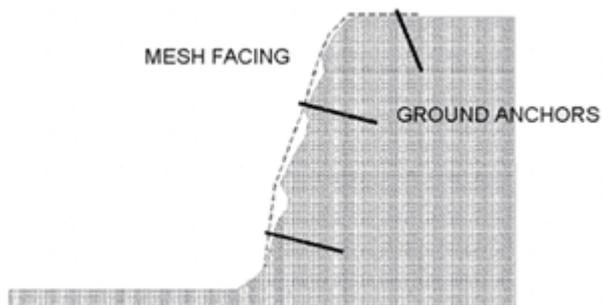


This application of **gabions** is relatively new, the purpose is to achieve a textured finish to buildings and other structures.

Normally a thin vertical face of gabions 0.3 to 0.5m thick is secured to the main body of the building with clamp bars. Sizing of the cells of the units is important for constructional and aesthetic reasons and should not exceed a face area of 0.7 x 0.7m, otherwise deformation of the face can occur. The minimum wire diameter for the gabions should be 4mm for cladding up to 4 to 5m. Above this height a 5mm diameter should be used for the lower 4 to 5 m with a 4mm wire above.

Where a gabion facing is required with a sloping face, Yuanxi gabions can be used with the face inclined and the rear face vertical. It may be possible to design this type of cladding as an effectively free standing wall not physically tied back to the main structure.

## Rockfall Protection



Rock and chalk escarpments can be provided with a mesh facing (curtaining) to prevent or guide spalling rocks and debris on the face so that they do not cause injury.

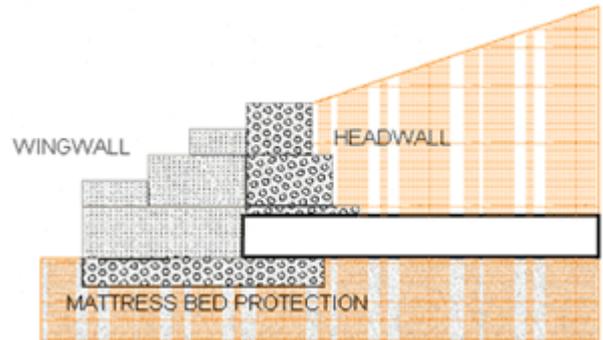
Generally on rock faces the mesh is anchored and cabled at the top and bottom whereby the falling rock is guided to the base of the escarpment.



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On chalk escarpments where the particle size is smaller, it is preferable to secure the mesh to the face in a grid pattern to prevent the debris from falling. Where the debris is smaller than the mesh, a secondary finer mesh or biodegradable fabric should be used behind the principle protection mesh.

Specification for mesh fabric is generally as for gabions, but material is supplied in roll form.



## Gabion Outfall And Structures

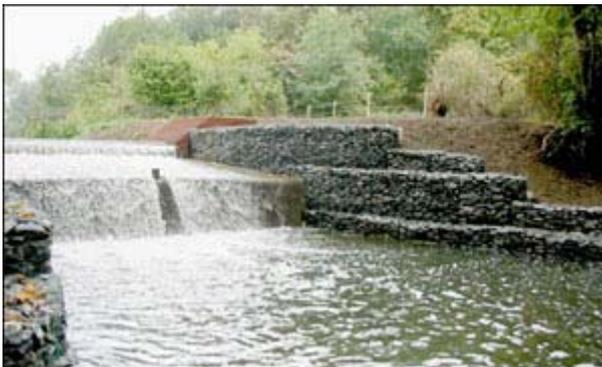
**Yuanxi** of **structures** generally combine a retaining wall with wing walls and a scour protection apron often form part of a river wall protection scheme where drainage pipes discharge into water courses.

The **gabions** may also be used only as scour apron protection to concrete outfall or inlet structures to provide erosion protection.

Due to the nature of discharge of the outfalls, consideration of the turbulent flow conditions occurring is required when determining the depth of gabion protection.

The design considerations are similar to those encountered in culverts and around bridge piers.

## Gabion Applications-Weir Structures



**Weir structures** are used where there is a sudden change in river bed levels or on steep gradients in water courses to reduce water velocity. The weir is effectively a dam which allows water to flow over the crest controlled by introducing a notch that can be rectangular or shaped.

The water can flow over the notch to a lower bed level, the weir is designed as a retaining structure with an apron protection to prevent erosion of the bed. In instances where there are high flows over the weir, it may require a stilling pool to be included in the design generally with an additional counter weir. These structures require the hydraulic conditions within the water course to be considered to determine the protection of the river bed on the down stream side. The flow conditions are turbulent and the mattress protection depth will be greater than for normal gabion mattress protection works.

Where a large change in bed level is required over a short distance a series of concurrent drops can be created



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known as a cascade structure.

In some instances a sloping weir may be necessary which results in increased water velocity. The slope is protected with a mattress or gabion system. Consideration is required for the erosive nature of high water velocities and the down stream river bank and bed protection.

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