# KEYSTONE RETAINING WALL SYSTEM

**CONSTRUCTION OF THE WALL SHALL BE IN ACCORDANCE WITH THE UK HIGHWAYS AGENCY SPECIFICATION FOR HIGHWAY WORKS SERIES 600.**

The following is an outline construction sequence to assist the contractor in the construction of a Keystone Wall System.

## 1 - PREPARATION

Excavate down to Formation level.

Formation shall be tested to verify an acceptable bearing strata exists for the support of the retaining wall. Minimum Allowable Bearing Capacity requirement of 120kPa or as otherwise stated on the design drawings.

Install ST2 mass concrete levelling strip 600mm wide x 150 deep minimum 450mm below finished ground level for reinforced earth walls. Alternative foundations may be required depending on the prevailing ground conditions.

## 2 - INSTALLING THE BASE COURSE OF BLOCKS

The first course is critical for accurate and acceptable construction.
The wall will build at a nominal face inclination of 128:1. Setting out for the base course should allow for the wall inclination.
Bed the first course of Keystone Compac units side by side on the levelling strip setting the pinholes in adjoining blocks 305mm centre to centre. The blocks should be bedded on a cement: sand mortar (1:3 ratio) ensuring that the top of the block is uppermost (recess on top of block) and lifted using the lifting handles provided.

Ensure that the units are level front to back, side to side and to the correct alignment. Align the blocks with a string line placed on the back of the block, or for radius walls to the appropriate radius, but using the back of the block as the datum.
Allow the mortar bed to cure before laying additional courses.

## 3 - INSERTING THE INTERLOCKING PINS

Place a pair of fibreglass pins into the pinholes to correctly locate the next course of blocks. The blocks will build at a nominal face inclination of 128:1.

## 4 - INSTALLATION OF DRAINAGE MATERIAL AND BACKFILL TO REINFORCED EARTH WALLS

Fill all voids in, between and immediately behind the Keystone blocks with an angular drainage medium hand tamped to avoid settlement. This granular fill material to all voids must be a crushed coarse aggregate 4/20mm in accordance with BS EN 12620: 2002 +A1 2008. Pea gravel or other rounded aggregates must not be used. The drainage zone should extend a minimum of 300mm behind the Keystone block units.

The drainage layer shall extend up cut slopes to intersect any water seepage.

Structural granular fill is placed and compacted in 100/200mm layers to correspond with the height of the blocks. The fill shall be placed by mechanical plant with an opening bucket, such that it causes the fill to cover the geogrid in a uniform manner. Fill material to be HA Class 6I in accordance with HA Specification for Highway Works.

When placing and compacting fill care should be taken to avoid contact with the facing units by any of the compaction plant and the following restrictions should apply:
All construction plant, including compaction equipment with a mass exceeding 1000kg should be kept at least 2m from the face of the wall. Compaction plant within 2m of the wall should be restricted to vibrating rollers having a mass per metre width not exceeding 1300kg or plate compactors with a mass less than 1000kg

Compaction should always occur parallel to the face and commence nearest the facing units, working away towards the free end of the grid. Compaction shall be in accordance with the Highways Agency Specification for Highway Works Series 600 Table 6/4. The contractor should use this table to select his plant, compaction layer thickness, and number of passes of compaction plant. If there is any doubt regarding the degree of compaction obtained then site trials should be undertaken.

**5 - INSTALLATION OF TENSAR GEOGRID AND ADDITIONAL BLOCK COURSES TO REINFORCED EARTH WALLS**

Ensure that the compacted fill is generally level to receive the geogrid. Sweep the blocks clean to remove all debris.

Layers of Tensar geogrid are to be incorporated at the specific levels as detailed on the elevation and cross section. This is generally on top of the base course of blocks and then at 400mm or 600mm vertical centres. The length of the geogrid required for stability is shown on the elevations and cross sections.

The required length of Tensar geogrid is cut from the roll. Trim the ribs so that they project 50mm in front of the transverse bar that runs across the 1.3m width of geogrid. For heavier grids the 50mm projection may not be possible and in this case the use of packers may be required.

Place the prepared end of the grid over the pins and the recess in the top of the Keystone block and locate the blue moulded connectors around the transverse bar such that the blue moulded connector is trapped between the transverse bar of the geogrid and the back face of the recess in the block. Ensure that each aperture of the geogrid is covered by a connector. The connectors may be split where necessary.

Position the geogrid and connector assembly neatly into the recess and push down firmly. The next course of blocks is placed over the fibreglass pins, locating the kidney-shaped holes over the pins and taking care not to disturb the geogrid and connector in the block below and using the lifting handles provided. Repeat this procedure for the whole course ensuring that adjacent lengths of geogrid are abutted at the wall face. When positioning the geogrid around curved wall sections it may be necessary to cut the geogrid along its length to create narrow strips to maintain the full connection between the geogrid and the recess in the top of the Keystone Compac block.

The block being placed should be centred over underlying blocks and pushed towards the front of the structure until it makes full contact with both pins. Make minor adjustments to the alignments as necessary. Where necessary and to achieve a level surface the use of packers between courses may be required – trimmed strips of geogrid are ideal for this. There may also be the need to grind the top surface of some blocks to ensure the wall is level when the next course is laid.

The placing of the blocks may act to loosen the connection of the geogrid and blue connector. The geogrid should therefore be lightly tensioned so that the blue connectors are trapped tight between the transverse bar of the geogrid and the back face of the recess in the block. To maintain the tension in the geogrid temporary pegs should hammered into the underlying fill at the rear of the geogrid.

Repeat steps 3, 4 and 5 to construct the wall to the required height. Check for line and level front to back and side to side every 2 to 3 courses of blocks and adjust as necessary by use of shims. Alignment should be checked using the rear of the blocks as the datum.

The 300mm drainage stone to the rear of the blocks should be stopped 500mm from the top of the wall although the drainage stone should used to fill the voids in the blocks up to the full height of the wall. Step the Keystone Compac blocks along the top of the wall to the required gradient of the ramp. The top Keystone Compac block should be bonded to the underlying block using four spots of construction adhesive provided by the block supplier. A min 300mm deep layer of impermeable general fill shall be used to cover the structural fill and the surface drainage above the wall should be designed such that water is directed away from the wall face.

## 6 - TOP OF WALL DETAIL (where applicable)

The top of the wall should be stepped to the required alignment and a Keystone Cap block fixed using Fibreglass pins and bonded onto the underlying Compac Block using adhesive supplied by Anderton Concrete Products.