



Anchor Diamond[®] 25 installation guide

Segmental retaining wall system

Introduction

Charcon and Anchor Wall Systems

Charcon is a major manufacturer and supplier of commercial hard landscaping solutions. We make it our mission to manufacture and supply high quality materials, on specification, on time and on budget to our customers, offering a full design and support service from concept to completion.

Our focus is firmly on the commercial sector, providing high quality, innovative, and integrated solutions to architects, civil engineers, landscape professionals, housebuilders and contractors in almost every aspect of the construction industry.

Our product range provides all the necessary materials to furnish a hard landscaping scheme, from large public realm projects to educational and health facilities, delivering projects from concept to completion as a supply partner. Furthermore, as part of Aggregate Industries, Charcon has unrivalled access to the highest quality raw materials, concrete technology and research teams. This expertise is constantly being channelled into developing new, innovative products.

Delivering value in construction materials and services

We see our goal as not only the provision of the highest quality and most sustainable materials, but also through working closely with our customers, clients and others in the supply chain to find the best solution.

By continually developing new techniques, production processes and delivery solutions, we are able to offer our clients the highest quality and most appropriate products at the best value and commercially attractive prices.

Charcon offer nothing but the highest quality products and services to our clients. We thrive on solving the complex needs that come with each unique and individual project and we

are 100% committed to the success of our customers, making sure every project is delivered on time and to budget.

First for quality

All products manufactured by Aggregate Industries are produced in accordance with BS EN ISO 9001:2008 with factory compliance to BS EN ISO 14001*.

First for product innovation

We appreciate that, despite our comprehensive range, some schemes have challenges that can only be met with bespoke products. This is one of the areas in which we excel and have a history of working with clients to produce products to their individual specification and design.



Our partnership with Anchor Wall Systems

Charcon have joined forces with Anchor Wall Systems, Inc. from Minneapolis, USA.

The combination of the expertise of one of the world leaders in segmental retaining wall systems with the manufacturing and customer service capabilities of Charcon give our customers and clients the opportunity to use the optimum solution for all their retaining wall requirements.

Anchor Wall Systems are the world leader in segmental retaining wall systems and have developed a wide array of concrete retaining wall products, from small do-it-yourself products through to large commercial and structural wall systems.

Anchor research, design, test, market and license products to manufacturers in the United States and more than 20 other countries.

The Anchor product range includes the best-selling Diamond® 25 wall system, the innovative and versatile Vertica® system and the Landmark® wall system; the only segmental retaining wall system in the world that has undergone rigorous evaluation by the British Board of Agrément, the US - based Highway Innovative Technology Evaluation Centre and the California Department of Transportation.

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Please refer to the glossary of Terms and Definitions found on page 30 for clarification and understanding of the various technical definitions used throughout this guide.



Introduction

Technical and design assistance

Every project is different so we recognise the importance of understanding and responding to the precise needs of each individual client.



From the first planning stages, through engineering design and product approvals and onwards to construction advice on site, our dedicated team is available to help. We aim to offer the best solution to the challenges of each project – every scheme will be safe, practical to build, cost effective and aesthetically pleasing.

Our team is made up of expert architects, engineers and technicians who can offer wide experience gained from building Anchor walls around the world to support clients throughout the project cycle.

Our services include:

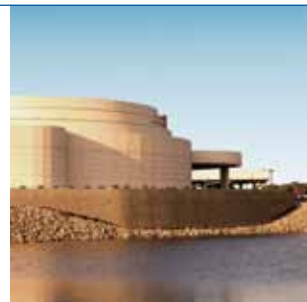
- Free design advice
- CAD drawings
- Take-off schedules
- Installation advice and support
- Professionally indemnified design package*
- Engineering support through independent geotechnical consulting engineers
- NBS details and specifications
- Free comprehensive samples service.

Our website also contains comprehensive technical data sheets on each product, available to download at your desktop.

* Please note: A fee may apply for fully indemnified designs.

Technical helpline: Tel: 01335 372222

www.charcon.com



Introduction

System components

No mortar, no pins, no misalignment. Anchor rear lip locating technology ensures perfect alignment and a consistent batter is always achieved.

The clean lines and easy installation of the Diamond® 25 retaining wall system have long made it the obvious choice for residential and light-commercial wall projects.

The natural appearance of split stone ensures that this landscaping classic will enhance any project.

Diamond® 25 units are easy to handle and the rear-lip locator helps make the system quick, simple and cost effective to install.

The system is completed with a complementary cap unit.

- Build gravity walls up to 900mm high

- Taller walls can be built using geosynthetic reinforcement or the Anchorplex™ retaining wall system when designed by a qualified engineer

- Minimum outside radius, measured on the top course to the front of the units: 600mm
- Minimum inside radius, measured on the base course to the front of the units: 1.20m.



Diamond® 25 block
Weight - 23 kgs
Dimensions H 150 x W 435 x D 250 mm
Coverage - 16 per square metre



Corner block
Weight - 12 kgs
Dimensions H 150 x W 217 x D 250 mm
Coverage - n/a



Cap
Weight - 11.5 kgs
Dimensions H 75 x W 450 x D 330 mm
Coverage - 2.3 per linear metre



Introduction

How to use this guide

Advance planning, careful preparation and layout at the job site help ensure a successful retaining wall project. Read and understand the information provided in this guide. This guide is designed to provide you with an understanding of what type of wall needs to be constructed, ideas and information on product use and installation procedures.

Please ensure you have read and understood the glossary of terms and descriptions found on page 30.

While this manual provides general guidelines, installation contractors must always refer to construction drawings provided by a suitably qualified engineer for final design, layout and construction specifications for any Anchor Diamond® 25 walls that are higher than 1000mm or for walls being built in sloping or unusual ground conditions and locations.

If you have any doubts about whether engineering design and support is required, contact our design specialists and technical department on 01335 372 222 to obtain our advice and guidance on whether an engineer must be involved in designing the wall.

Use this guide and this checklist to ensure that you have covered all the important issues involved in successfully building an Anchor Diamond® 25 wall:-

- Understand and propose a wall solution that meets the clients requirements
- Understand and note the wall location and layout
- Wall length (in metres) _____
- Wall height (in metres) _____
- Maximum wall height at any point along the wall _____
- What additional features or details are required?
 - Curves (see inside curves, page 22, outside curves, page 24) Yes____ No____
 - Corners (see inside corners, page 18, outside corners, page 20) Yes____ No____
 - Caps (see capping walls, page 17) Yes____ No____
 - Steps (see steps, page 26) Yes____ No____
 - Terraced Walls (see terraces, page 29) Yes____ No____



Introduction

How to use this guide

- Fencing (see fences, page 28) Yes_____ No_____
- What drainage details will the wall require?
Is the wall longer than 15m? (see drainage, page 16) Yes_____ No_____
- Do the ground levels slope by more than 150mm along the wall length?
(see stepping up the base, page 14) Yes_____ No_____

- What type of wall is required (Gravity Wall or Reinforced Wall)? - Use retaining wall basics, page 8, with the maximum wall height measurement from above to determine what type of wall is required. Note: If a Reinforced Wall is needed, design advice and guidance will be required from a suitably qualified engineer. If you have any doubts about whether engineering design and support is required, contact our design specialists and technical department on 01335 372222 to obtain our advice and guidance on whether an engineer must be involved in designing the wall.
- Make sure all the relevant Installation Guidance required for the wall has been read and understood
- All Walls - Use basic installation, page 10
 - Reinforced Walls - Also use installing with reinforcement, page 13
 - Additional features and details - Use appropriate construction details (as identified above)
 - Drainage requirements
- Before installation begins
- Review the site plan to confirm boundary lines, wall location, length and elevations. Prepare a drawing of the site with the wall location, length and elevations.
 - Confirm the location of underground utilities and seek all necessary building permission or authorisation.
 - Check the block (and cap) deliveries to ensure they are the correct colour and quantity.
 - Check the geogrid to confirm that it is the strength and weight specified in the engineering plans.
 - Check the delivered aggregates conform to the required specification.
 - Ensure all site activity and operations conform to or exceed relevant health and safety guidance and legislation.
 - Appropriate personal safety equipment must be worn at all times. Plant and machinery must be operated and handled in accordance with the supplied operating instructions.



Retaining wall basics

Wall types

Diamond® 25 segmental retaining walls (SRW's) fall into one of two categories depending upon the maximum wall height involved. These two types of wall are commonly known as gravity walls or reinforced walls.

For walls which are 1m high or less, with minimal slopes above and below the wall, and are being built in good ground conditions, a simple gravity retaining wall will perform satisfactorily.

Provided it is constructed in accordance with this guidance, the wall will give a long lasting retaining wall solution.

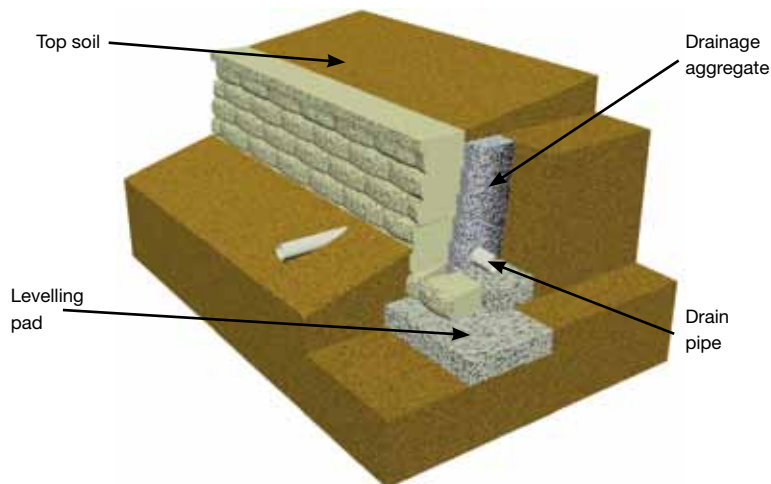
For any walls which are more than 1m high at any point along their length, or are being built in poor ground conditions, a geosynthetic reinforced

retaining wall will be required. If a reinforced wall is needed, design advice and guidance will be required from a suitably qualified engineer. Contact our design specialists and technical department on 01335 372 222 for further information and assistance.

Under no circumstances must any Anchor Diamond® 25 wall of more than 1m in height be designed and built without the design advice and guidance of a suitably qualified engineer. The safety and satisfactory

performance of any wall higher than 1m can only be guaranteed when an engineer has taken all the variables (soil and ground types, loads and surcharges, water and drainage etc.) into consideration and undertaken a design methodology based on proven engineering techniques.

Failure to follow this advice could have serious consequences in respect of the performance of the wall and its ability to remain structurally sound and safe.



Gravity wall - typical layout



Retaining wall basics

Wall types

Consideration can be given to using separate terraced walls, each being less than 900mm in height to achieve greater overall heights - see page 29 for further information.

Gravity walls

Typically for walls up to 900mm high, with no slopes above and below the wall, built in good ground conditions.

A gravity wall is a retaining wall that does not use soil reinforcement. For Diamond® 25, a gravity wall has a height limitation of 900mm. Advantages of this type of retaining wall are the simple construction and a smaller work area behind the wall.

A gravity wall relies on the weight and batter of the block to resist the soil forces being exerted on the wall. The completed wall must include drainage fill immediately behind the wall blocks to ensure free drainage of water will take place.

Reinforced walls

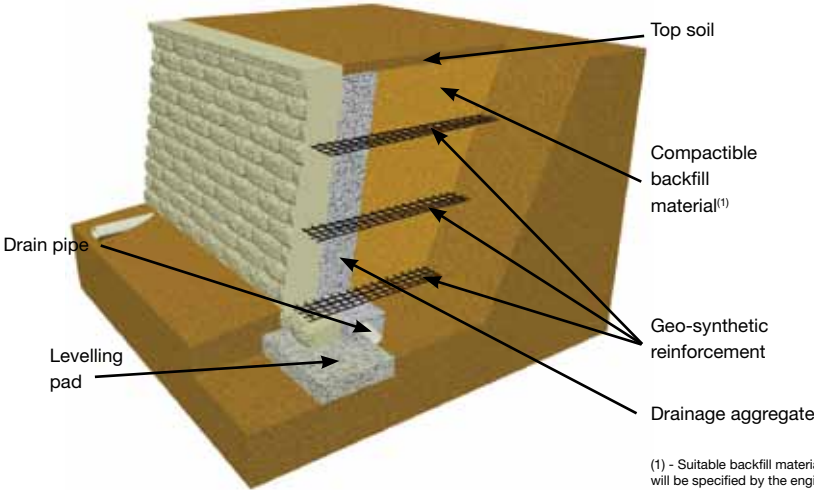
Typically for walls higher than 900mm, or for walls with slopes above and below the wall, or walls being built in poor ground conditions.

The second category is a geosynthetic reinforced wall, which needs to be designed by a suitably qualified engineer. A reinforced retaining wall is capable of withstanding much higher loads than a gravity wall.

They require more work area behind the structure. The block of soil is stabilized by introducing

reinforcement layers into the ground behind the facing blocks.

The larger the stabilized mass, the stronger the wall. The geosynthetic reinforcement extends past the theoretical failure plane and serves to create a large, rectangular mass of block and reinforced material, restraining the retained soil.



Reinforced wall - typical layout

(1) - Suitable backfill material will be specified by the engineer during the design process



Installation

Basic installation

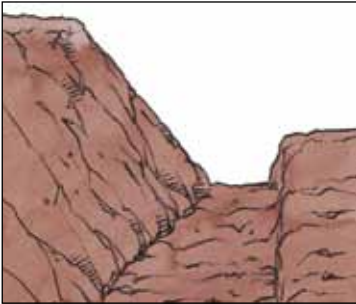


Diagram 1

Setting out the wall and excavation - see diagram 1

- Mark out the wall placement. Verify the locations with the client and engineer if required/ appropriate
- Mark out the location of the excavation trench so that, when dug, the wall blocks will run centrally down the middle of the trench with equal spacing between the front and back of the blocks to the front and back of the trench
- For Diamond® 25 walls make the excavation 600mm from front to back, and 350mm deep, unless design assistance has specified this differently
- Firmly compact the soil in the base of the trench, using either a hand tamper or a vibrating plate compactor before installing the levelling pad.

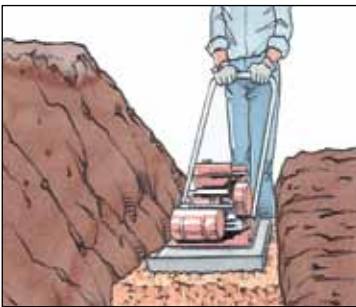


Diagram 2

Levelling pad (footing) - see diagram 2

- An aggregate levelling pad is made of a good compactible base material - MOT Type 1, 20mm aggregate with fines, crusher run or similar
- The pad must be 150mm deep (after compaction) and must extend the full width of the excavation trench
- Fully compact the aggregate, using either a hand tamper or vibrating plate compactor, making sure it is level front-to-back and side-to-side
- If the ground levels along the wall length slope by more than 150mm, the levelling pad must be stepped up to match the slope of the ground. See page 14 for further details on stepping up the base.

Base course – see diagram 3

- The most important step in the construction process
- Always randomly select and mix blocks from a minimum of three packs to help achieve a balanced colour blend
- Begin laying blocks at the lowest elevation of the wall
- The base course blocks must be fully bedded and lie completely flat on the levelling pad. Either remove the rear lips from all the blocks that form the base course, or alternatively form a groove in the levelling pad in which the rear lips can sit
- Lay the first block, levelling it front to back and side to side
- Place the blocks side by side, flush against each other, making sure the blocks are in full contact with the levelling pad. Ensure blocks are level in both directions with a spirit level
- Use a string line along the back of the blocks to align the wall units, or evenly align the back of the units (not the front) to form smooth and consistent curves



Diagram 3



Installation

Basic installation



Diagram 4

- If the wall site is on an incline, do not slope the blocks; step them up so they remain consistently level. See page 14 for further details on Stepping up the base.

Construction of the next course - see diagrams 4 & 5

- Clean any debris off the top of the blocks
- Always randomly choose and mix blocks from a minimum of three packs to help achieve a balanced colour blend
- Place the second course of blocks on top of the base course. Maintain running bond by placing units in a staggered relationship to the course beneath, pulling each unit forward until the rear lip is securely in contact with the units below
- Backfill with drainage aggregate directly behind the block, adding 150mm at a time followed by full compaction. Ensure the aggregate is fully compacted before installing the next course
- The drainage aggregate should be 15-20mm clean or No Fines aggregate and should extend at least 300mm back from the rear of the wall
- Fill all voids between each wall unit with drainage aggregate. The block cores must also be fully filled
- Fully compact as close to the rear of the blocks as possible whilst avoiding any damage to any blocks from contact with the compaction machinery
- For best results, consider using a filter fabric, either placed directly behind the wall units, or to the rear of the drainage fill, extending from the bottom of the main course to the middle of the top course. This will minimise fine soil or fill material coming through the joints between the wall units.



Diagram 5

Drainage design - see diagrams 6 & 7

- Each project is unique. The ground levels on the site will determine at what level to install the perforated drainage pipe, but generally the drainage pipe is positioned as low as possible behind the wall so water drains down, out and away from the wall into a storm drain, or to an area lower than the wall
- The perforated drainage pipe should be placed in the middle point of the 300mm drainage zone
- You may need to place and backfill several courses to achieve the proper drainage level. For best results, consider covering the perforated drainage pipe with a geotextile sock to act as a filter. See page 16 for further details on drainage.



Diagram 6



Installation

Basic installation

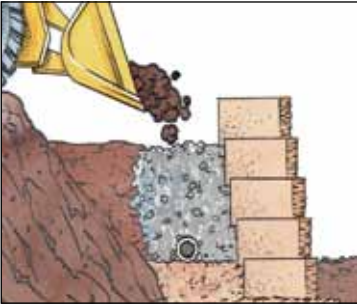


Diagram 7

Compaction - see diagram 8

- Shovel suitable compactable backfill material behind the drainage aggregate and compact with a hand-operated compactor
- Make sure the aggregate is level with or slightly below the top of the base course
- Place soil in front of the base course and compact. The base course must be buried
- Continue to fill and compact as each course is constructed.

Reinforcement - for walls above 900mm high

- Geosynthetic reinforcement is required for walls taller than 900mm
- For walls taller than 900mm a suitably qualified engineer must be consulted for design assistance. Contact our design specialists and technical department on 01335 372 222 for further information and assistance
- See page 13 for further details on installing with reinforcement.

Capping walls

- See page 17 for further details on capping walls.

Finish levels and surface drainage

- Protect the wall with a finished ground level at the top and bottom
- To ensure proper water drainage away from the wall, use 150mm of soil with low permeability. This will minimize water seeping into the soil and drainage aggregate behind the wall.

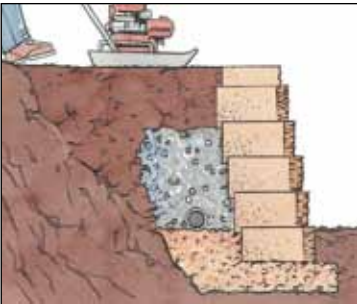


Diagram 8

Site cleaning and restoration

- Brush off the wall and clean up any debris from the construction process
- Following these best practices for construction will ensure the successful construction of an Anchor Diamond® 25 wall.

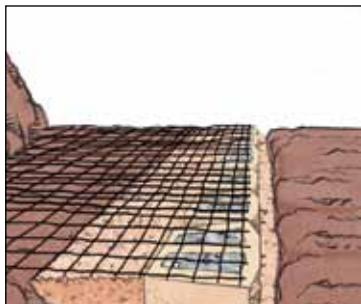
IMPORTANT SAFETY NOTE

Ensure all site activity and operations conform to or exceed relevant health and safety guidance and legislation. Appropriate personal safety equipment (hands, eyes, ears and feet) must be worn at all times. Plant and machinery must be operated and handled in accordance with the supplied operating instructions.



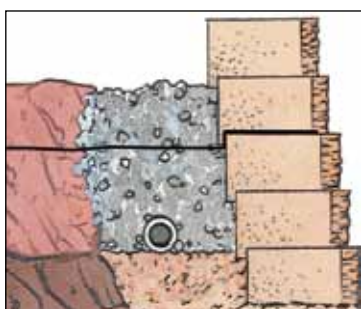
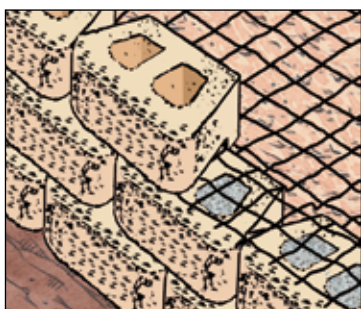
Installation

Installing with reinforcement



Geosynthetic reinforcement is recommended for walls taller than 900mm and they require a suitably qualified engineer must always be consulted for the final wall design against which construction will take place.

- Check the wall construction plan (produced by a suitably qualified engineer) for which courses will need reinforcement grid
- Clean any debris off the top layer of blocks
- Add an extra 225mm to the design length shown in the plan and cut the reinforcement to this measurement. The extra 225mm allows for the additional grid that is held between the blocks when the wall is built
- Know how the reinforcement works. The reinforcement has a design strength direction, which must be laid perpendicular to the wall
- Place the front edge of the reinforcement on the block below, 25mm back from the face of the block. Correct placement ensures that maximum connection strength between the wall and the grid is achieved
- Install the next course of block to secure the reinforcement in place, pushing the block forward to ensure the rear lip is tight against the block below
- To keep it from wrinkling, pull the reinforcement taut and pin the back edge in place with stakes or staples
- Add the drainage aggregate behind the blocks, then add the compactable backfill material (to the engineer's specification) and fully compact
- Fully compact as close to the rear of the blocks as possible whilst avoiding any damage to any blocks from contact with the compaction machinery
- A minimum of 150mm of backfill (above the installed grid) is required prior to operating any vehicles on the reinforced zone. Avoid sudden turning or braking whilst operating vehicles on the reinforced zone.



ADHESIVE

Anchor Wall Systems recommend the use of gun applied adhesives to bond caps and cut units. The selected adhesive should be industrial grade, suitable for external use in moist/damp conditions and applied to clean, dust free surfaces, and applied in accordance with the manufacturers instructions.



Construction details

Stepping up the base

Anchor Diamond® 25 walls must always be constructed with levelled, horizontal courses.

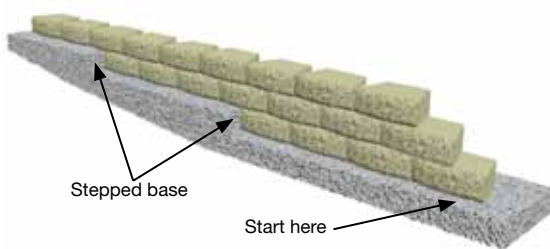
See basic installation, page 10 for further information.

Courses should not be sloped to match the slope of the surrounding ground levels.

Walls built on a sloping ground levels require a stepped base (footing or levelling pad) which steps up in 150mm increments up the slope, as often as required.

Lowest point

Begin excavation at the lowest point and dig a level trench into the slope until it is 300mm below the surrounding ground level. This is deep enough to accommodate the base material and one entire block.



Form the base and lay the first course of blocks, starting at the bottom of the slope, working upwards.

Step up

At this point, step up the next section of the trench 150mm and begin a new section of base trench, maintaining the level from this point.

Once compacted, the base (footing or levelling pad) must be exactly level with the top of the course of blocks previously installed.

Continue to step up as needed to top of slope. Always bury at least one full unit at each step.



Construction details

Running bond

Straight walls

Proper installation of an Anchor Diamond® 25 retaining wall requires that running bond be maintained.



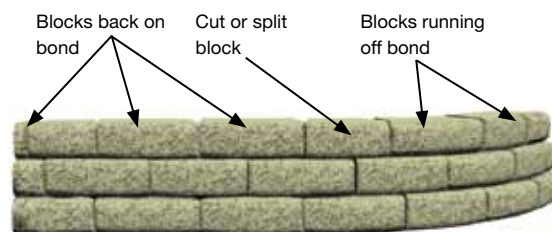
Running bond occurs when the blocks are centred over the vertical joints of the previous course.

This significantly adds to wall stability and makes the wall more pleasing to look at.

Curved walls

Any wall that is curved will eventually run off bond, due to the batter of the wall.

When this happens, skip a block position and place the next block into the next place where it is back on bond.



Measure the remaining gap and cut or split* a block to fit.

Once the partial unit is in place, bond with a recommended adhesive. See page 13 for bonding agent details. Partial units must not be less than 215mm and should not be placed directly on top of each other. If the gap is larger than the length of one block, divide the measurement by two and put two partial units in place.

*Cutting or splitting blocks - Use a hydraulic or mechanical splitter, or split manually by using a hammer and chisel to score the block on all sides. A circular masonry saw may also be used. Safety Note: See page 12.

See inside curves, page 22, and outside curves, page 24 for further information, including the minimum radiuses achievable with Diamond® 25 blocks.

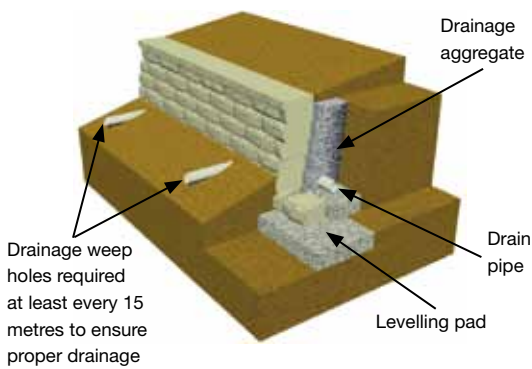


Construction details

Drainage

Drainage

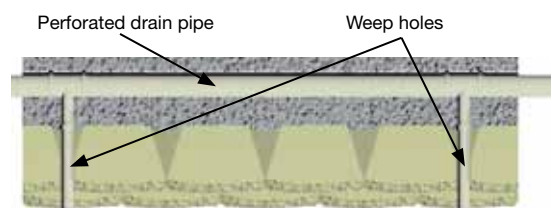
Good drainage is critical to ensuring the long term performance of an Anchor Diamond® 25 wall.



Water collected from the drainage fill behind the wall must be able to drain down and away from the wall into storm drains or an area lower than the wall, either at the end of the wall, or through drainage weep holes.

First course

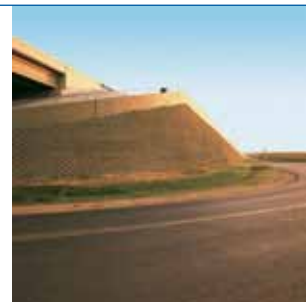
If the wall is longer than 15m, drainage weep holes must be installed through the wall face, no more than 15m apart.



Remove 50mm off the front of two adjacent blocks to provide sufficient space for the drain pipe to exit through the face to form the weep hole.

Next course

Build this and remaining courses using standard construction techniques.



Construction details

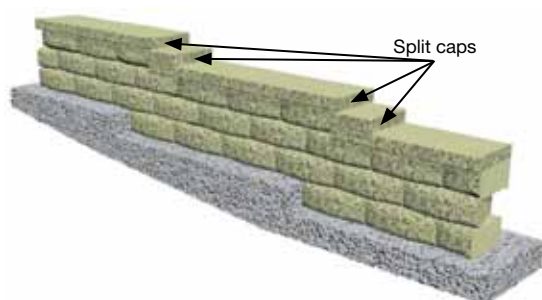
Capping walls

Cap units

Caps are split on one side, smooth on the other. Decide which finish is the preferred one and ensure all caps are laid with the preferred finish to the front of the wall. Always start capping from the lowest elevation and work towards the higher elevations in the wall.

It is recommended that all caps are laid in place before any are bonded to the wall, so that final adjustments can be made to minimise cutting and waste, particularly at curves and corners. After layout is complete and caps are saw-cut or split to size, carefully bond the caps in place. See page 13 for bonding agent details.

Stepping up caps



If a wall elevation changes, caps can be stacked where the wall steps up.

Begin laying caps at the lowest elevation level and work your way towards the next step up.

If a split finish is preferred, split a cap unit to create a rough face on the exposed side. Place the half unit directly on top of the capped portion of the wall with all three split faces exposed.

Corners

On a 90° corner wall, the corner caps need to be saw-cut to achieve a 45° mitred corner.

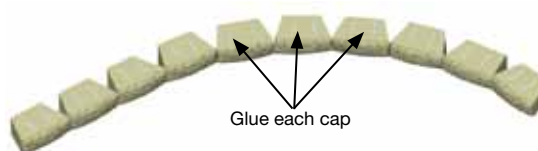
Outside curves



Lay out cap units, leaving a gap between each which is just less than one length cap in size on the front of the wall.

Ensure they are laid with the preferred finish showing to the front of the wall. Position a cap unit over each gap, aligned to the front edge of the caps below, and use the edges of these caps to mark the ones below for cutting. Cut the marked caps, reposition in place, allowing the full caps to fit between them.

Inside curves



Lay out cap units, leaving a gap between each which is just less than one length cap in size on the back of the wall.

Ensure they are laid with the preferred finish showing to the front of the wall. Position a cap unit over each gap, aligned to the front edge of the caps below, and use the edges of these caps to mark the ones below for cutting. Cut the marked caps, reposition in place, allowing the full caps to fit between them.

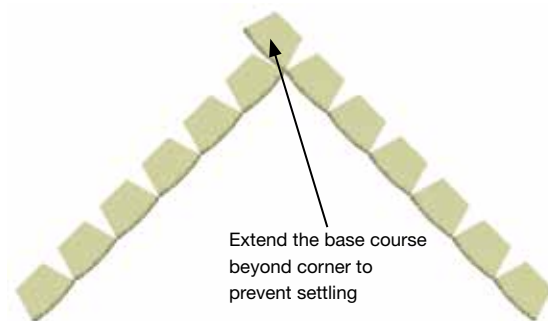


Construction details

Inside corners

Base course

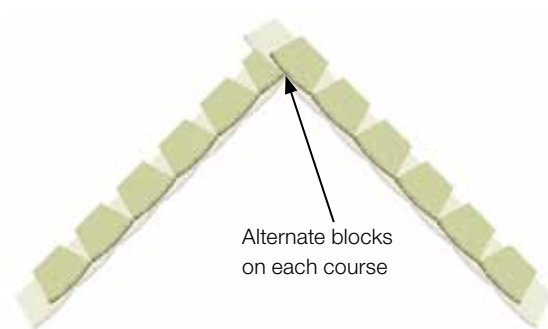
To create an inside 90° corner, begin by placing a block at the corner. Then lay a second block perpendicular to the first and continue laying out the rest of the base course working from the corner out.



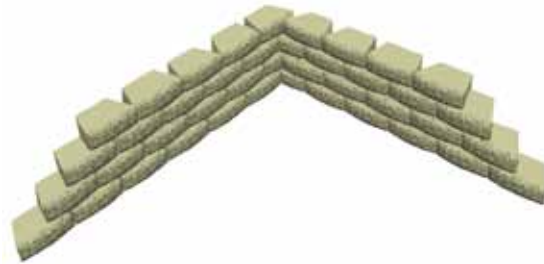
Ensure the base course is constructed according to the basic installation details shown on page 10.

Next course

On the second course, place all blocks in a running bond along one side of the corner. Once the second course of one wall is established, begin the second course of the adjacent wall.



Several blocks away from the corner, position full blocks in a running bond.



Continue the running bond back towards the corner, until the gap becomes less than a full unit.

A split unit* will then be required to maintain running bond away from the corner. Measure the length of the unit required and split to fit.

Block placement in the corner must alternate in direction with each succeeding course.

The rear lip of the blocks that run over each other in the corner must be removed, and these units should be bonded in place using a recommended adhesive. See page 13 for bonding agent details.

*Cutting or splitting blocks - Use a hydraulic or mechanical splitter, or split manually by using a hammer and chisel to score the block on all sides. A circular masonry saw may also be used. Safety Note: See page 12.

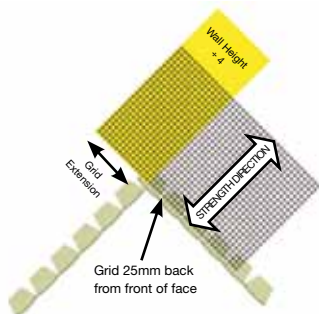


Construction details

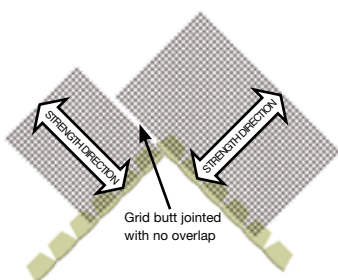
Inside corners - reinforcement

First course with reinforcement

To install reinforcement on an inside 90° corner, begin by checking the wall plan to determine reinforcement lengths and elevations. Cut reinforcement to the lengths shown in the wall plan, paying attention to the reinforcement strength direction.



Next, determine the proper placement of the reinforcement by dividing the proposed height of the wall by four. This represents the distance that reinforcement must extend beyond the front of the adjoining wall. Measure this distance from the front of the adjoining wall and begin the grid placement here.



Example: If overall wall height is 1.2m, the reinforcement extension would be 300mm.

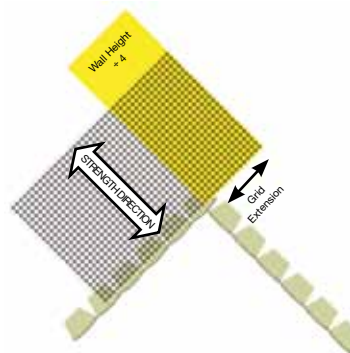
Make sure the grid is placed 25mm back from the face of the block below and runs along the back of the adjoining wall.

Place the next section of reinforcement on the adjoining wall. The reinforcement must not overlap and should lie

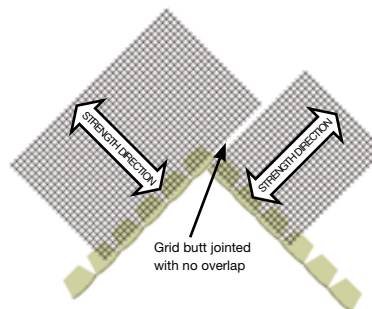
flush with previously placed sections. Once reinforcement is in place, the next course of blocks can be installed.

Second course with geogrid

The first section of grid on this course is placed using the same formula that determines placement in front of



the adjoining wall. Alternate the reinforcement extension to the previous reinforced course on each course where reinforcement is required.



Place the next section of reinforcement on the adjoining wall. The reinforcement must not overlap and should lie flush with previously placed sections. Once reinforcement is in place, the next course of block can be installed.

Ensure the reinforcement grid is installed in accordance with the installing with reinforcement details shown on page 13.

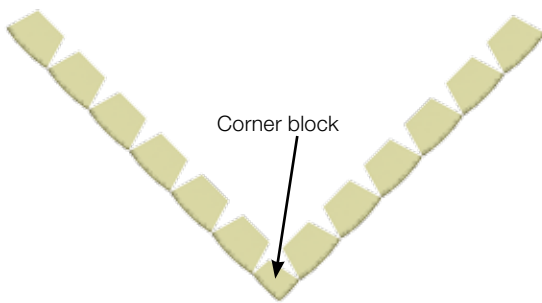


Construction details

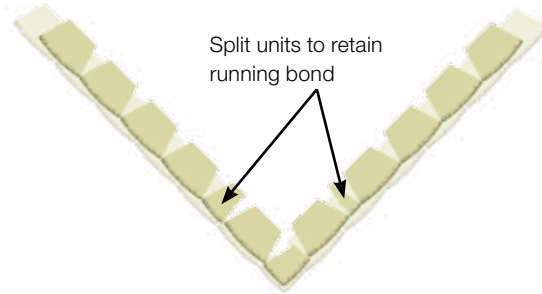
Outside corners

Base course

Form the corner using the special corner blocks.



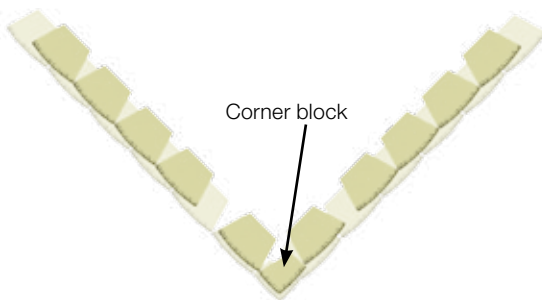
Two or three blocks away from the corner lay full blocks, maintaining running bond with the course below. Lay these blocks back towards the corner leaving space for the final split units required to complete the course.



To build an outside 90° corner, begin by placing the corner block in place, then layout the base course by working away from the corner in both directions.

Use split units between the two full blocks to complete the course.

Second course



Continue to alternate the corner blocks orientation with each course below and always use a concrete adhesive on all corner blocks and all the split units.

Use split units as necessary, always one full block away from the corner block to maintain running bond.

See page 13 for bonding agent details.

*Cutting or splitting blocks - Use a hydraulic or mechanical splitter, or split manually by using a hammer and chisel to score the block on all sides. A circular masonry saw may also be used. Safety Note: See Page 12.

Lay a corner block perpendicular to the one below and fix the block in place with concrete adhesive. Place one full block next to the corner along both sides of the wall.

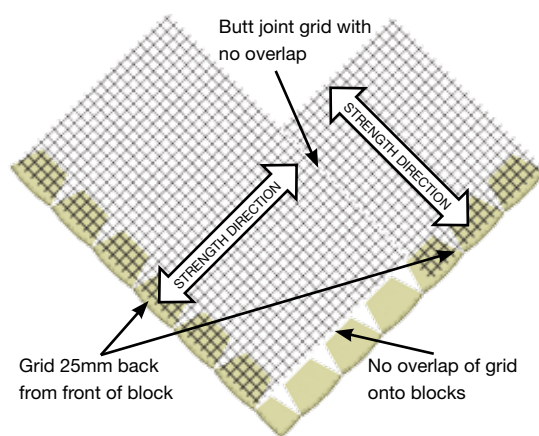


Construction details

Outside corners - reinforcement

First course with reinforcement

Begin by checking the wall plans from the engineer to determine reinforcement lengths and elevations.



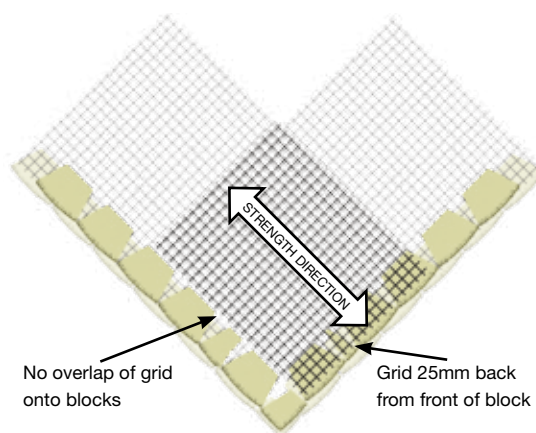
At each reinforced course, lay a section of reinforcement near the corner wall, ensuring that it is placed 25mm back from the wall face in one direction, whilst running along the back, but not overlapping the adjacent wall.

Ensuring no grid overlap occurs, continue the grid reinforcement along both legs of the wall, to the reinforcement lengths specified.

At this stage, there will still be several blocks which are not in contact with any reinforcement.

Grid must not be directly overlaid, so this reinforcement must be incorporated at the next block level up.

Lay the next course of blocks and before backfilling, mark the portion of the wall without reinforcement. This is important, because once the backfill is in place this cannot be seen.

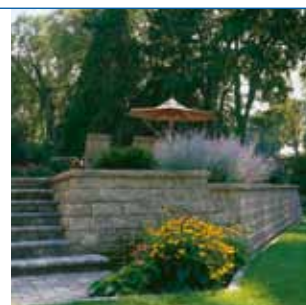


Back fill and compact behind the course of blocks. Cut an additional length of grid to correspond to the marked section of blocks.

This grid should be cut to the length shown in the drawings and laid so that it is placed 25mm back from the wall face, whilst running along the back, but not overlapping the adjacent wall.

Repeat this procedure at each reinforced layer within the wall, alternating the alignment of the additional layer of reinforcement at each elevation.

Ensure the reinforcement grid is installed in accordance with the installing with reinforcement details shown on page 13.

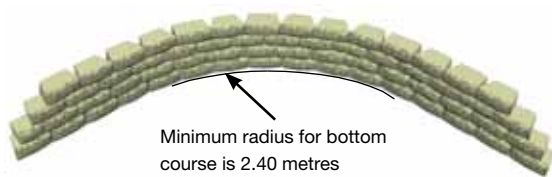


Construction details

Inside curves

Minimum radius

When building an inside curve, the minimum radius allowed (when measured to the front face of the block) for an Anchor Diamond® 25 wall is 2.40m.



Check the wall plan to ensure the radius of the base courses of any inside curves are greater than 2.40m.

Base course

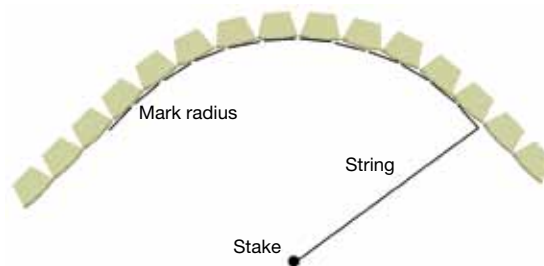
Begin by driving a stake into the ground at the desired centre of the curve. Attach a string and rotate it in a circle around the stake to mark the radius in the levelling pad (footing or base).

Align each block face with the radius curve and ensure level placement from side to side and front to back.

Additional courses

On each course, the rear lip of each block must be in contact with the units below to ensure structural stability.

The setback of the block will cause the radius of each course to gradually increase and eventually affect the running bond of the wall.



To maintain proper running bond, use split units* as needed. Once a split unit is cut to size, bond in place with a recommended adhesive. See page 13 for bonding agent details.

*Cutting or splitting blocks - Use a hydraulic or mechanical splitter, or split manually by using a hammer and chisel to score the block on all sides. A circular masonry saw may also be used. Safety Note: See page 12.



Construction details

Inside curves - reinforcement

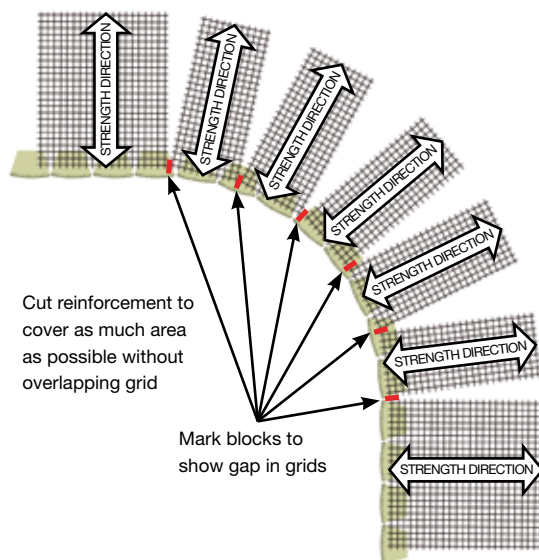
Retaining walls are designed assuming 100% coverage of the reinforcement. When building a curve the reinforcement will have gaps.

To ensure 100% coverage, additional lengths of reinforcement are used to fill those gaps on the next course of blocks.

Never overlap the grid on one course to avoid slippage.

First course with reinforcement

Cut reinforcement to the lengths specified in the wall plan.



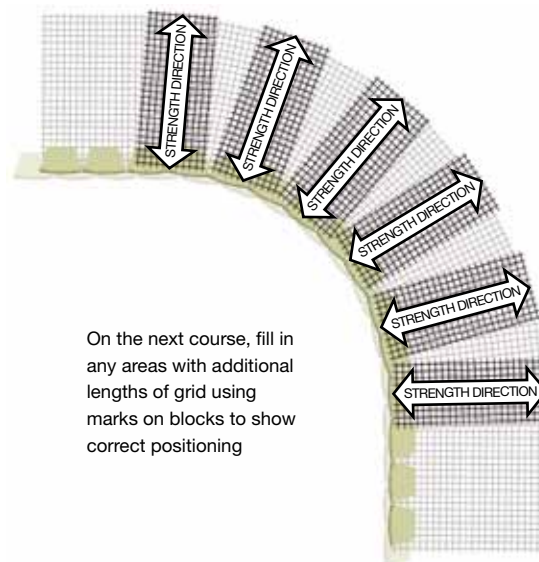
Lay segments of reinforcement within 25mm of the face of the wall, making sure that the strength direction of each section is perpendicular to the wall face.

Place the next course of blocks, marking the backs of blocks to identify the middle of non reinforced areas.

Backfill and compact.

Next course

On the next course, centre subsequent sections of the reinforcement on the marked blocks to ensure full reinforcement coverage.



This step is important because when this course is backfilled, it is impossible to locate the non reinforced areas.

Repeat this procedure throughout the construction of the radius curve when reinforcement is required.

Ensure the reinforcement grid is installed in accordance with the installing with reinforcement details shown on page 13.



Construction details

Outside curves

Minimum radius

The radius of the top course of an Anchor Diamond® 25 wall will always be less than the radius of the base course because of the batter of the wall.

For Diamond® 25 walls built with outside curves the minimum radius of the top course of blocks must not be less than a radius of 1.20m.

The table below shows the minimum allowed radius of the base course for various wall heights. For each wall height, provided that the actual base course radius is greater than the minimum shown, the radius of the top course will always be greater than the allowed minimum of 1.20m.

Wall Height (metres)	Minimum allowed radius of base course (metres) to back of block
1.80	1.57
1.65	1.54
1.50	1.51
1.35	1.47
1.20	1.44
1.05	1.40
0.90	1.37
0.75	1.34
0.60	1.30
0.45	1.27
0.30	1.23
0.15	1.20

Example: A 1.65m wall is being built with an outside curve. The radius of the base course is 1.70m. The minimum allowed radius of a base course for a 1.65m high wall is 1.54m, so the curve can be built successfully.

Base course



Drive a stake into the ground at the desired centre of the curve. Attach a string and rotate it in a circle around the stake to mark the radius in the levelling pad (footing or base).



Align the back of the block (not the front) with the radius curve and ensure level placement from side to side and front to back.

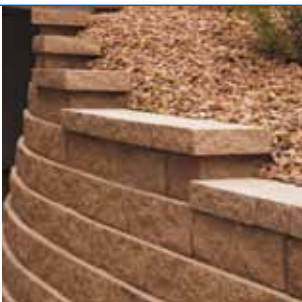
Additional courses

On each course, the lip of each block must be in contact with the back of the units below to ensure structural stability.

The setback of the block will cause the radius of each course to gradually decrease and eventually affect the running bond of the wall. To maintain proper running bond, use split units* as needed. Once a split unit is cut to size, bond in place with a recommended adhesive. See page 13 for bonding agent details.



*Cutting or splitting blocks - Use a hydraulic or mechanical splitter, or split manually by using a hammer and chisel to score the block on all sides. A circular masonry saw may also be used. Safety Note: See page 12.



Construction details

Outside curves - reinforcement

Retaining walls are designed assuming 100% coverage of the reinforcement.

When building a curve the reinforcement will have gaps.

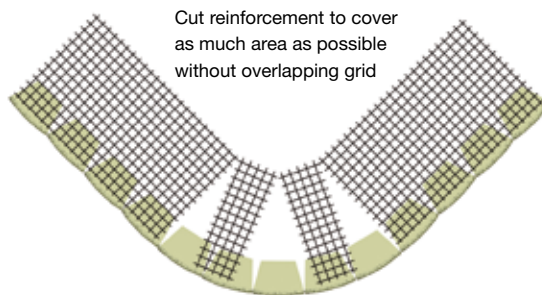
To ensure 100% coverage, additional lengths of reinforcement are used to fill those gaps on the next course of blocks.

Do not overlap the grid on one course to avoid slippage.

First course with reinforcement

Cut reinforcement to the lengths specified in the wall plan.

Lay sections of the reinforcement within 25mm of the face of the wall with the strength direction perpendicular to the wall face.

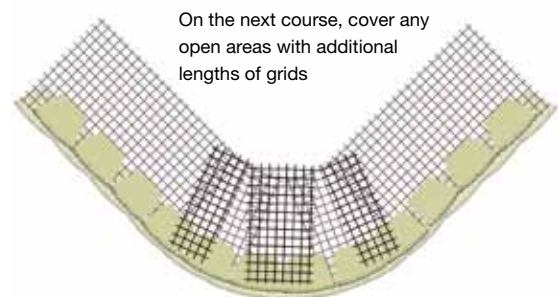


Avoid overlapping the reinforcement by separating each section.

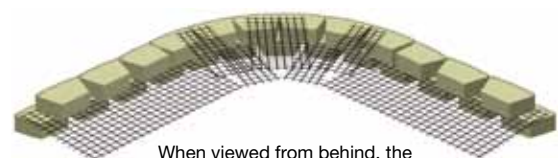
Next course

Place the next course of blocks, marking the backs of blocks to identify non reinforced areas.

This step is important because when this course is backfilled, it is impossible to locate the non reinforced areas.



Use the marked blocks as a guide, placing subsequent sections of reinforcement to overlap the gaps left on the previous course. This will ensure total reinforcement coverage.



Repeat this procedure throughout the construction of the radius curve whenever reinforcement is required.

Ensure the reinforcement grid is installed in accordance with the installing with reinforcement details shown on page 13.

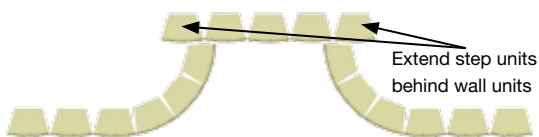


Construction details

Steps

Base course

Lay out the first course of the step, using standard units.



These should be laid so that they extend beyond the back of the walls that are adjacent to the steps. Construct and fill behind the walls as shown in the basic installation, page 10.

Immediately behind the units that form the step, form a concrete base that extends back 250mm and which is level with the top of these blocks.

First step course

Once the concrete behind the step has set and fully hardened, place the next step run in position, in running bond to the previous course.



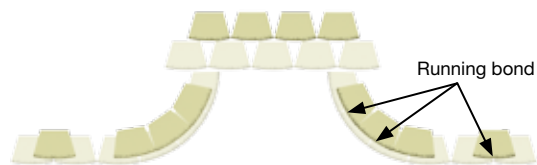
Once correctly placed, these units should be fully bonded in place, directly on top of the concrete base using the recommended adhesive. See page 13 for bonding agent details.

The front of these units should be level with the back of the units below. Once the adhesive has cured, form

another concrete base behind the step that extends back 250mm and which is level with the top of these blocks, as previously.

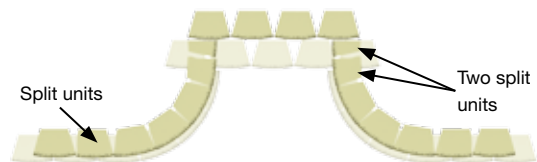
First block course

Place standard blocks on the curve, maintaining running bond with the base course below.



Measure and cut or split blocks to fit the space remaining between the step unit and the course of the wall.

Use two blocks to avoid creating cut units which are less than 215mm long in size.



Place the units in the wall, making sure that edges fit tight against both the step and standard units. Remove the rear lip on the blocks when necessary and fix all split or cut units with a concrete adhesive.



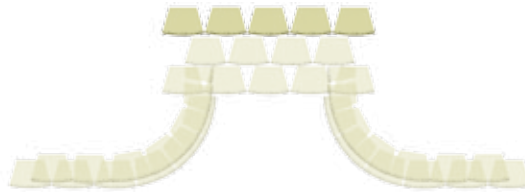
Construction details

Steps

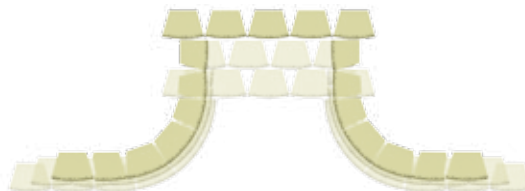
Construct and fill behind the walls as shown in the basic installation, page 10. Behind all the steps, form a concrete base that extends back 250mm and which is level with the tops of the blocks.

Next step courses

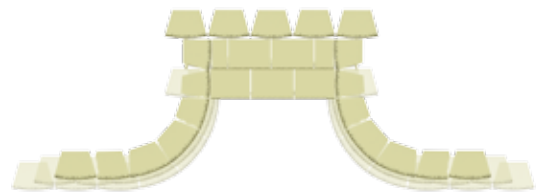
Position and form the next step course, following the same procedure as outlined above.



Repeat these steps for each course of the wall, ensuring that the steps and wall blocks remain level.



Once all the steps have been formed, bond cap units to the top of the steps using the recommended adhesive. See page 13 for bonding agent details.



The cap units can be used with either the split face or the smooth bull-nosed face to the front.

*Cutting or splitting blocks - Use a hydraulic or mechanical splitter, or split manually by using a hammer and chisel to score the block on all sides. A circular masonry saw may also be used. Safety Note: See page 13.



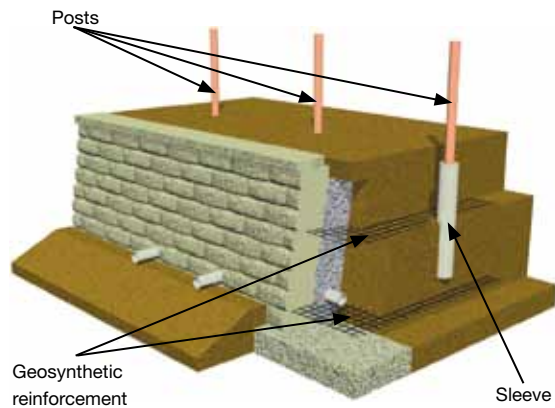
Construction details

Fences

Know the specific dimensions of the fence to determine the placement of the sleeves.

Sleeves should be at least 25mm larger in diameter than the fence posts to allow for mortar and grout.

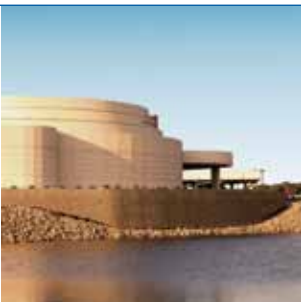
Install the sleeves according to the wall plan during the construction of the wall. If the fence is at least 900mm back from the wall, generally no additional reinforcement is required.



If the fence is installed within 900mm from the back of the wall, there may be some load transferred to the wall from wind or pedestrians and additional reinforcement around the fence sleeves will be needed.

Consult a suitably qualified engineer. Contact our design specialists and technical department on 01335 372 222 for further information and assistance.

Grout the fence post into the sleeve after the wall is built.

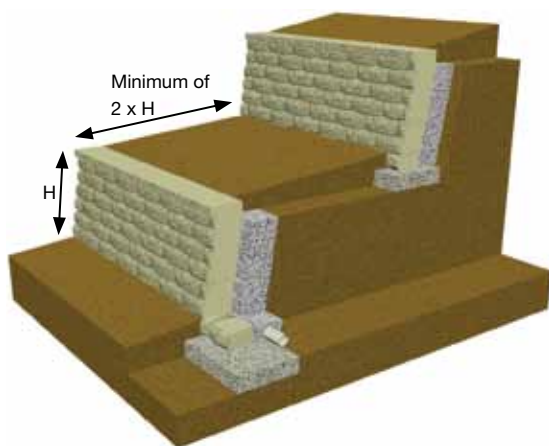


Construction details

Terraces

Independent terraced walls

For each wall to be independent of others, it must be built using a 2:1 ratio — the upper wall must be built a distance away from the lower wall of at least twice the height of the lower wall. In addition, the upper wall must also be equal to or less than the height of the lower wall.



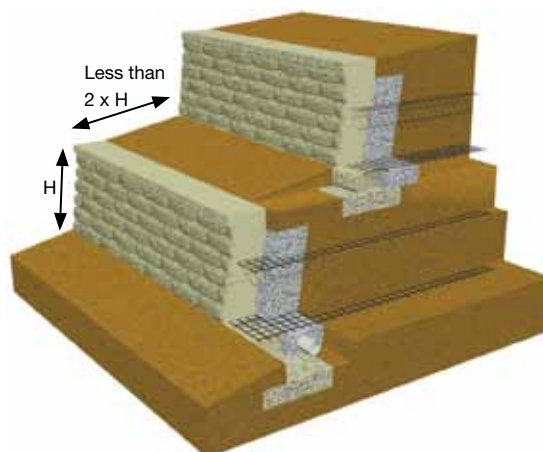
Exceptions to this general rule include weak soil conditions or where slopes exist above, below or between wall locations.

Example: The lower terrace wall is 900mm tall. The distance between the terraces must be at least 1800 mm (1.80m) and the upper wall must not be higher than 900mm.

Dependent terraced walls

When the distance between the lower and upper walls is less than twice the height of the lower wall, the walls become structurally dependent on each other.

In this situation, it is important to take global stability (the resistance to overall mass movement of the whole SRW system in a circular or sliding mode) into account, incorporating additional reinforcement - and longer layers - into the wall plan. In addition, structurally dependent walls require even more excavation, backfill and time.



For dependent walls, consult a suitably qualified engineer. Contact our design specialists and technical department on 01335 372 222 for further information and assistance.

Drainage

Drainage is vital to maintaining stable, long-lasting terraced walls. Drainage pipe must be installed so that the water is directed around or under the lower wall (never place the drain tile outlet for the upper wall above or behind the lower wall).



Terms and definitions

Base course: A full course of blocks which are buried so that the top is level with the surrounding ground height.

Batter: The facing angle measured from a vertical line drawn from the bottom of the wall, expressed in degrees.

Compactible backfill material: Used to fill the excavated area behind the wall. Usually a granular material, specified by the engineer at design stage, that forms the reinforced zone behind a reinforced wall.

Compaction: Compressing or densifying the material used for the base and backfill. Use a manual or self-propelled compactor.

Drainage aggregate: Drainage fill placed within and immediately behind the segmental retaining wall (SRW) units, and in other areas, for free drainage of water.

Fines: The smaller particles of aggregate.

Footing: Also known as the 'leveling pad'. Constructed from a compactible, free draining aggregate (not concrete), the footing forms the base on which the first course of blocks are laid.

Geogrid: A synthetic material formed into a grid-like structure for use in soil

reinforcement. Usually comprised of polypropylene, polyester or polyethylene.

Geosynthetic: A generic term used to describe synthetic or plastic materials used in soil, such as fabrics, geogrids, drainage composites or erosion-control mats.

Geotextile: A textile-like material used in soil drainage and reinforcement applications. Usually comprised of polypropylene or polyester, it can be woven or non-woven.

Gravity wall: A retaining wall that does not use soil reinforcement. A gravity wall relies on the weight and batter of the block to resist the soil forces that are being exerted on the wall.

Ground conditions: Good ground conditions are free draining soil predominantly made up of sand or gravel. Poor ground conditions are heavy soil or clay which is not free draining.

Levelling pad: Constructed from a compactible, free draining aggregate (not concrete), the levelling pad (base) on which the first course of blocks are laid. See 'Footing'.

Load: The forces being applied to a wall. These come from the retained

ground, or from other sources (cars, buildings, water, footing etc.) around the wall location. See surcharge.

Reinforced zone: The area of a soil-reinforced SRW which contains the soil reinforcement.

Reinforced wall: A retaining wall that uses soil reinforcement to increase the loads the wall can retain.

Retained zone: The area of a SRW which is immediately behind the reinforced zone.

Running bond: A staggered vertical alignment used to create a consistent pattern. It may be necessary to use split or partial units to maintain a running bond.

Segmental retaining wall: (SRW) A wall system built with modular blocks to retain soil.

Stepping up the base: Used to maintain a level wall on a slope. See page 14 for more information.

Surcharge: An external load, usually applied at the top of a SRW. A roadway or building foundation can be a surcharge.

Terraced walls: There are independent and dependent terraces. See page 29 for more information.

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