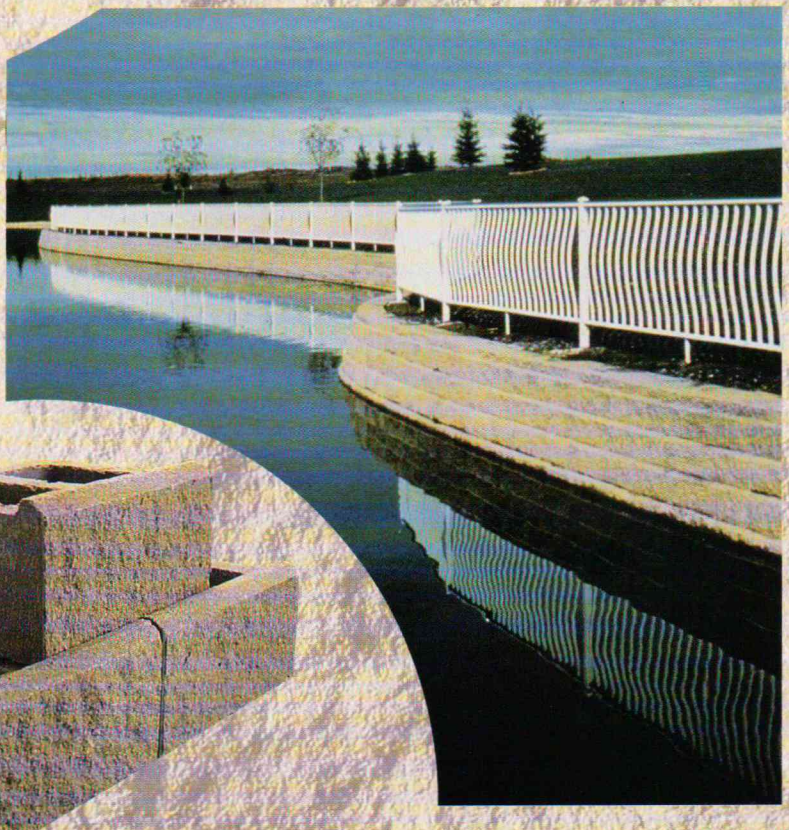
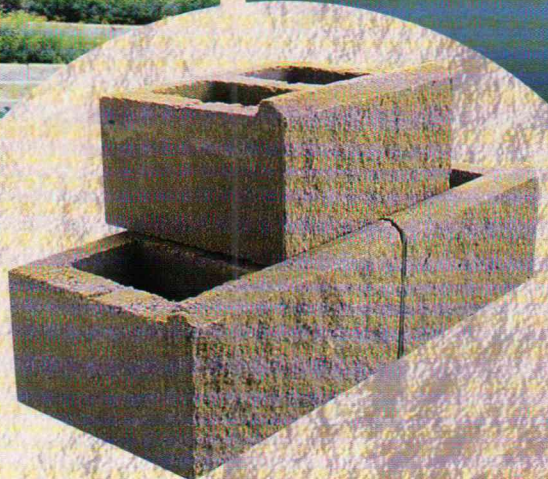
# ALLAN BLOCK™
## RETAINING WALLS
## *DESIGN MANUAL*



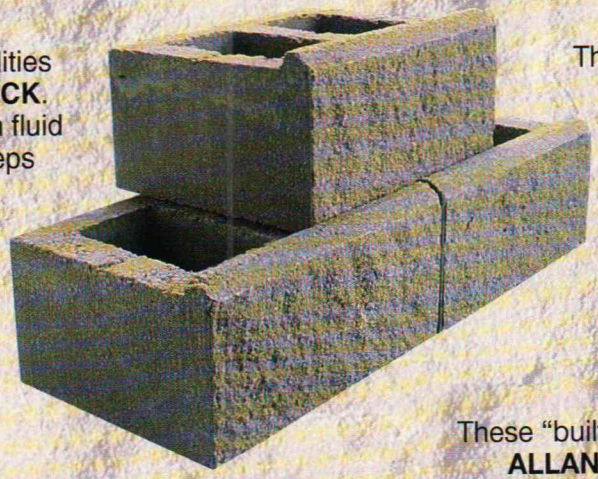


## THE SYSTEM

**ALLAN BLOCK** is a mortarless, stackable, concrete block retaining wall system. The patented interlocking lip automatically locks each row of blocks in place as they are stacked. The simplicity and flexibility of the **ALLAN BLOCK** system make it the perfect choice for smaller landscape applications. The strength, durability and engineering options of the **ALLAN BLOCK** system make it the logical choice for major structural walls.

## THE DESIGN

An endless array of design possibilities can be achieved with **ALLAN BLOCK**. Use the three block shapes to form fluid curves, perfect corners, angles, steps and beautiful straight walls. With the look and feel of hand laid stone, **ALLAN BLOCK** is available off the shelf in grey or tan. A rainbow of additional custom colors is available. Ask your **ALLAN BLOCK** dealer for details.



## THE ENGINEERING

The "built-in" engineering features of the **ALLAN BLOCK** make it the most efficient, cost effective and versatile wall product on the market.

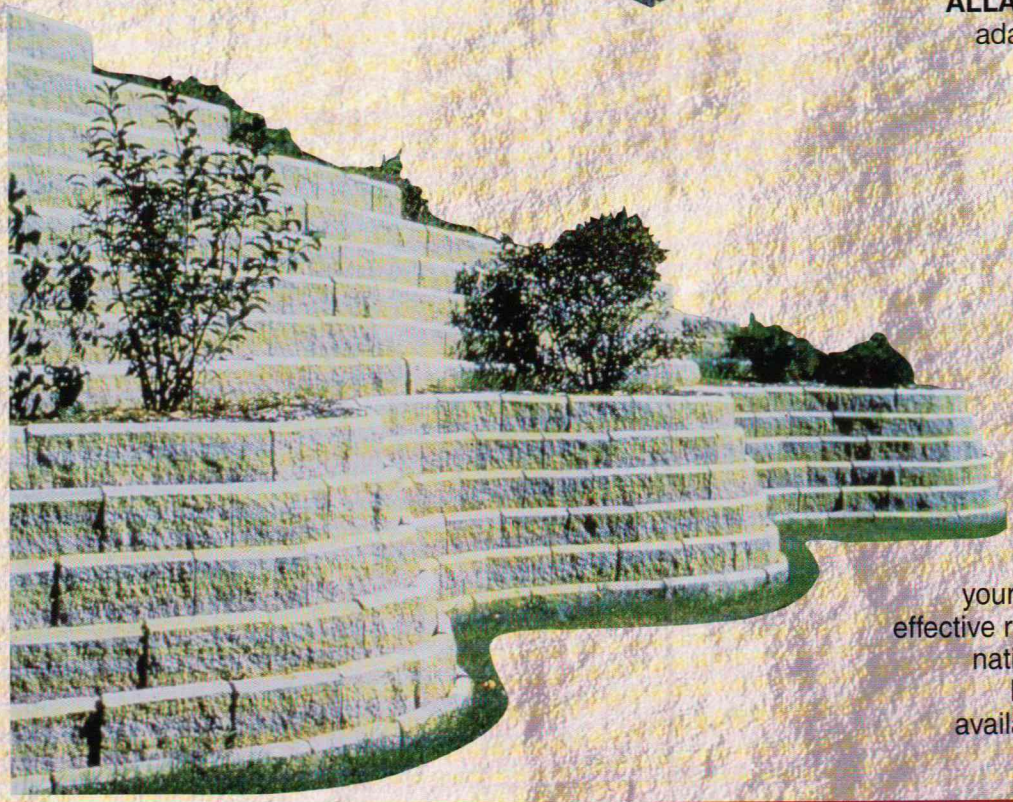
**"Built-In" Interlock** - No pins, clips or fancy connectors.

**"Built-In" Drainage** - Hollow core provides self draining capability.

**"Built-In" Setback** - Automatically establishes the optimum setback.

These "built-in" engineering advantages make **ALLAN BLOCK WALLS** easy to build and adaptable to virtually any site condition.

Strong, durable and proven - **ALLAN BLOCK WALLS** perform.



## THE ANSWER

Attractive, durable, versatile, easy to handle and install, and fully engineered– no other retaining wall system offers this unique combination of qualities. We call it the **"ALLAN BLOCK ADVANTAGE."** Let these advantages work on your next project to provide the most cost effective retaining wall you can buy. And let our nationwide network of Dealers show you how price, quality, color selection and availability make **ALLAN BLOCK** the best retaining wall product to specify.

*Welcome to ALLAN BLOCK. We have put this Design Manual together to provide you with a handy reference guide for the design and installation of ALLAN BLOCK retaining walls. Inside you will find a broad array of information to help you develop a quality solution for your retaining wall project. Since we began building ALLAN BLOCK walls in 1986, we have learned a great deal about our product and its capabilities. With over five million square feet of retaining walls installed, we can provide you with a complete package — product, price and service — to answer your retaining wall needs. Thanks for selecting ALLAN BLOCK.*

***Robert Allan Gravier***

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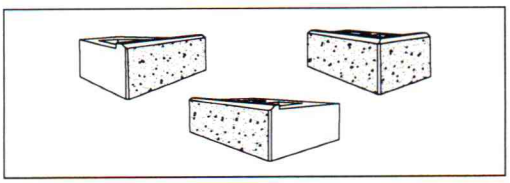

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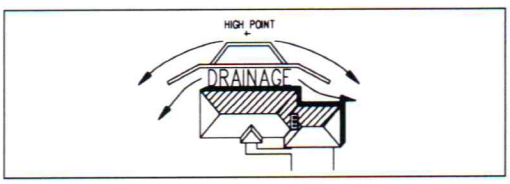


- **INSTALLATION GUIDELINES**
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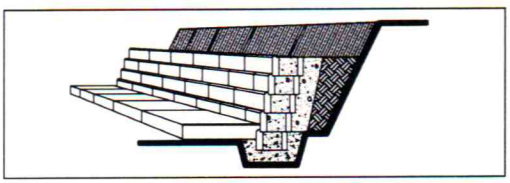

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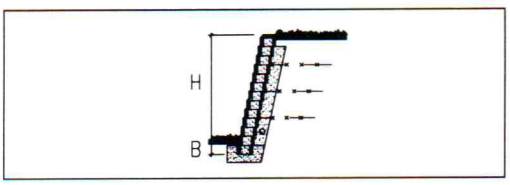


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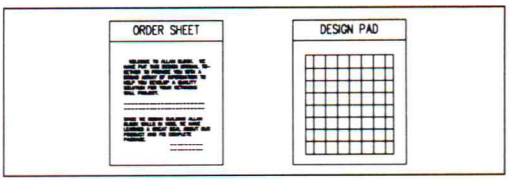




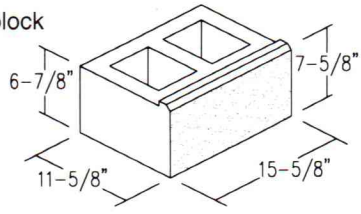
This manual covers a wide array of retaining wall situations. If your project falls outside the scope of the information provided, our trained wall experts are available for specific project assistance. Simply phone **1-800 899-5309** for help on your specific wall project.

# PRODUCT OVERVIEW

## PRODUCT SPECIFICATIONS

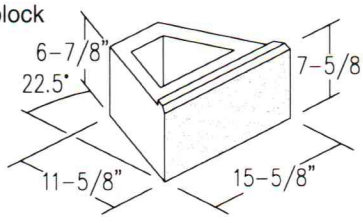
### STANDARD BLOCK

• Weight .....55 lbs/block



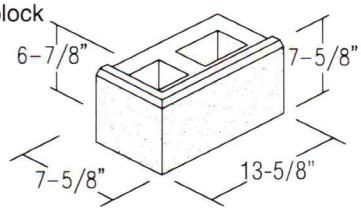

### ANGLE BLOCK

• Weight .....45 lbs/block




### CORNER BLOCK

• Weight .....50 lbs/block

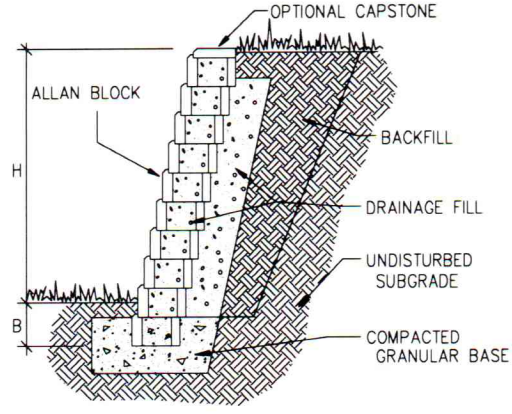



**GENERAL**

• Coverage ..... .75 sqft/block
13 blocks/10 sq. ft.

• Set Back..... 1-1/2"/block
12° from vertical

**ALLAN BLOCK WALL TYPICAL SECTION**



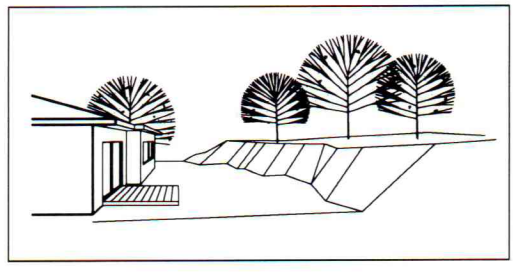

### CAPSTONES

• Capstones are available at most locations. Call your nearest ALLAN BLOCK Dealer for specifications.

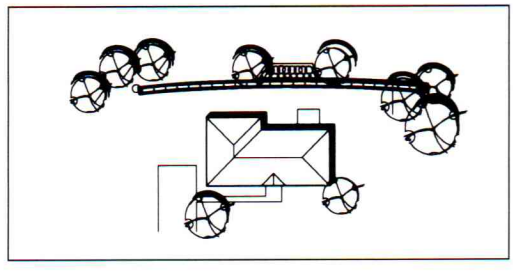
**Note: Weights are approximate. Dimensions may vary due to rock face finish.*

## INSTALLATION OVERVIEW

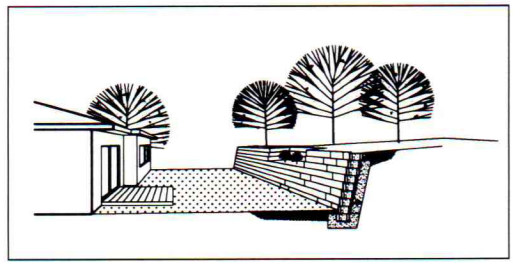
**PLAN** Begin your retaining wall project by developing an accurate plan of the site. Locate all lot lines, utilities, building structures, driveways and parking areas. Note any permanent trees or vegetation. Indicate the drainage patterns and site contours. Identify the soil type and classification, and note slopes above and below the wall location. Indicate dimensions and elevations in the area of the proposed wall. A careful site analysis will help in the design process.



**DESIGN** With the site layout and analysis complete, you can begin the design of the retaining wall. Develop a layout that will maximize drainage and direct the flow of water around the wall and away from buildings and structures. Select a reinforcement option for taller walls using the manual. As you develop the wall layout, be sure to consider the job site conditions for material and equipment access. Try to minimize the excavation and hauling of soil and fill. And of course, develop a wall design that reflects the style and character of the surrounding landscape.



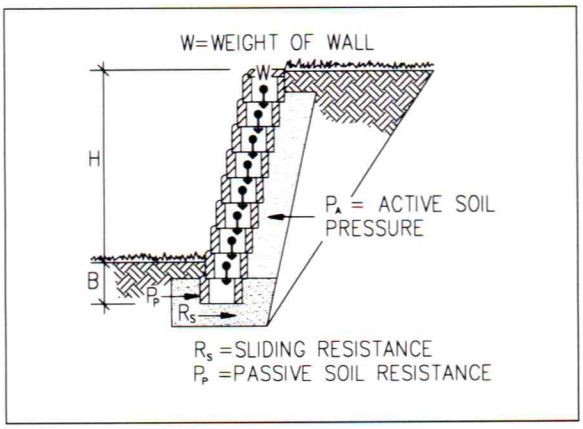
**BUILD** With the design complete, use the order form in the back of this manual to calculate and order the materials for your project.The basic construction techniques are outlined in the following section of this manual. Begin the construction of the retaining wall at the lowest point and work upwards. Always build on stable, well compacted ground. By spending some extra care and preparation on the base and bottom row of block, the rest of the wall construction will go smoothly. As each new row of block is stacked, take a moment to make minor adjustments in alignment and leveling.



## ALLAN BLOCK ENGINEERING

The Allan Block Retaining Wall System combines basic engineering principles with a construction form known and used worldwide for over 75 years — masonry block. Developed by a Civil Engineer in 1985, over five million square feet have since been installed throughout North America providing structurally sound solutions on a wide variety of difficult sites.

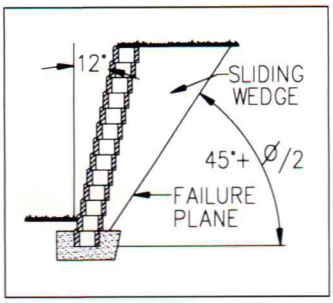
From drawing board to job completion, Allan Block Corporation provides the level of service needed to see each project through. For projects that fall beyond the scope of this manual, call the **ON-LINE ENGINEERING** number — **1/800-899-5309**. Our trained personnel stand by to provide preliminary engineering and construction details as needed. When specific working drawings and on-site engineering are required, access our nationwide network of licensed geotechnical experts.

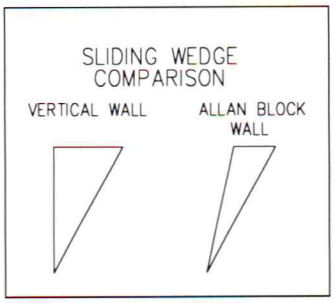



## ENGINEERING ADVANTAGES

### INCLINED WALL SURFACE

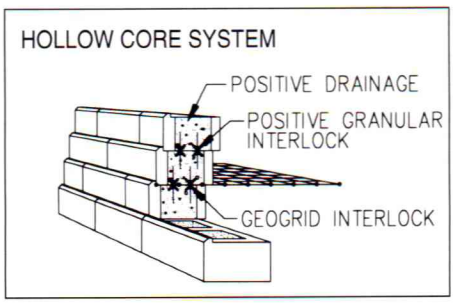
Retaining walls are engineered to counteract the forces and pressure from a sliding wedge of soil that exists behind that wall. This "sliding wedge" is the soil that extends beyond the natural angle of repose for that soil type. When the wall surface is inclined at an angle of 12° — the slope of an ALLAN BLOCK wall — the size of that wedge is greatly reduced. And so is the amount of soil being retained! That significant reduction in the size and weight of the "Sliding Wedge" yields lower soil pressures on the wall, lower reinforcement requirements, and greater system potential.




### HOLLOW CORE SYSTEM

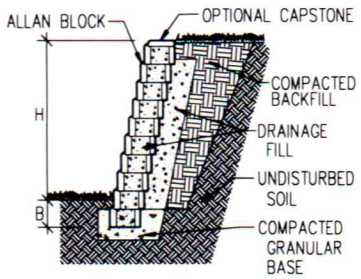
ALLAN BLOCK'S hollow core system provides numerous advantages over solid wall products.The lower unit weight allows for easier installation at the site, and less chance for back injuries from lifting heavier products. Once the core is filled with granular material the ALLAN BLOCK takes on the same unit mass as a solid block, providing equal retaining potential. The granular infill material creates a "drainage zone" within the wall and reduces the amount of drainage fill required behind the wall. And the granular material provides a positive interlock between the blocks, and a positive interlock with geogrid reinforcement fabrics.



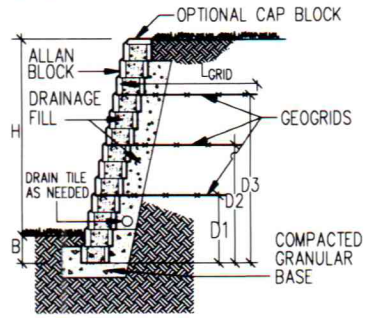

## SYSTEM OPTIONS

ALLAN BLOCK walls can be adapted to meet the structural requirements of any retaining wall site. Lower profile walls can often be built without any reinforcement using the Gravity System. Taller walls can be strengthened with either Geogrid or Masonry. To select the best system for your project turn to pages 12 through 19.

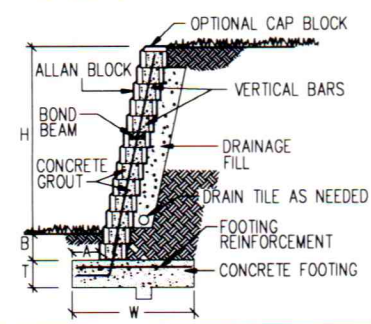
ALLAN BLOCK WALL - GRAVITY SYSTEM
TYPICAL SECTION




ALLAN BLOCK - GEOGRID SYSTEM
TYPICAL SECTION




ALLAN BLOCK - MASONRY SYSTEM
TYPICAL SECTION



## SITE ANALYSIS

*Your retaining wall design must begin with a proper site analysis. The conditions at the job site will determine wall heights and locations, as well as reinforcement requirements. Use the guidelines below to assist in your wall design.*

### SOILS

Soil conditions behind and below each retaining wall have a direct effect on the strength needed in that retaining wall. For proper wall design it is critical to make an accurate soil analysis at the site.

| SOIL TYPE | FRICTION ANGLE Ø | SLIDING COEFFICIENT | BEARING CAPACITY | EQUIVALENT FLUID PRESSURE |
|---|---|---|---|---|
| FIRM CLAY | 26° | .40 | 2,000 lb/sq.ft. | 60 lb/cu.ft. |
| SILTY CLAY | 28° | .45 | 2,500 lb/sq.ft. | 50 lb/cu.ft. |
| MIXED SILTS | 30° | .50 | 3,000 lb/sq.ft. | 40 lb/cu.ft. |
| SANDY SILTS | 32° | .55 | 3,500 lb/sq.ft. | 35 lb/cu.ft. |
| CLEAN SANDS | 34° | .60 | 4,000 lb/sq.ft. | 30 lb/cu.ft. |

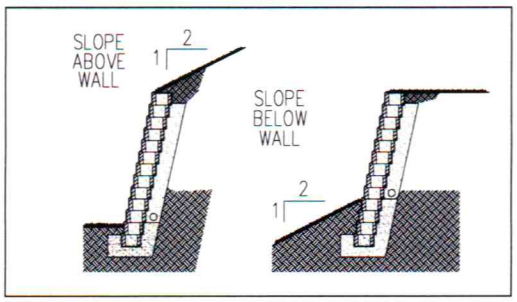
The pressure from the soil behind the wall will vary a great deal depending on the soil type. In general, a wall built in clay soils will require more strength and reinforcement than a wall of the same height built in sandy soils because the clay exerts more pressure on the wall.

Check the soil type and conditions at the base of each wall for adequate "bearing pressure." The soil below a wall needs to be strong enough to support the weight of the wall resting on it. If the soil is in a moist or wet condition, extra precautions may be required to provide a stable base.

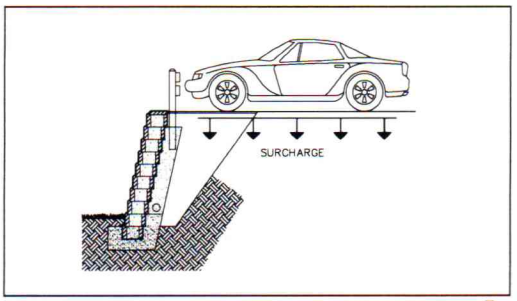
*Use the soil classification chart above to identify the basic properties of the soil at your site, and refer to the pre-engineered charts in this manual for construction guidelines.*

**SLOPES** When the grade above a retaining wall is sloped, the extra soil being retained will add pressure to the wall. Extra reinforcement will be required to compensate. Slopes are often identified by the horizontal run to vertical rise, and typically vary from five to one to two to one.

When the grade below the retaining wall slopes down and away from the wall, care should be taken to properly lock the base of the wall in place. For slopes up to 3 to 1, bury 2 inches of block for every foot of wall height. For slopes steeper than 3 to 1, bury three inches of base block for every foot of wall height.

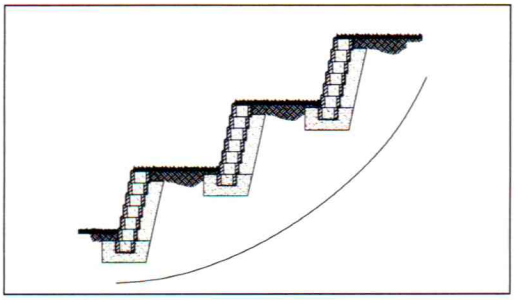



**SURCHARGES** Any added pressure applied above a retaining wall is called a "surcharge." Parking lots, streets, swimming pools, and building foundations are common examples. This added pressure needs to be considered when engineering the retaining wall. Surcharges are calculated in pounds per square foot (psf). A typical design value for parking lots is 250 psf.




**TERRACES** Terracing a hillside often provides for improved aesthetics and easier installation than a single tall wall. If the distance between terraces is too small, however, the upper walls will exert added pressure on the lower walls and create an unstable condition.

**When the distance between two terraces is less than two times the height of the lower wall, the design should be evaluated for overall stability.**

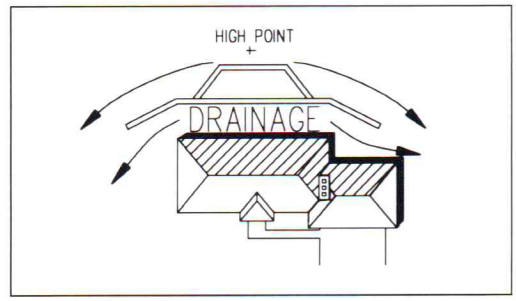


## WATER MANAGEMENT

*Retaining walls should always be designed with consideration given to the management of water at the retaining wall site. Proper grading and drainage planning will ensure a quality wall solution.*

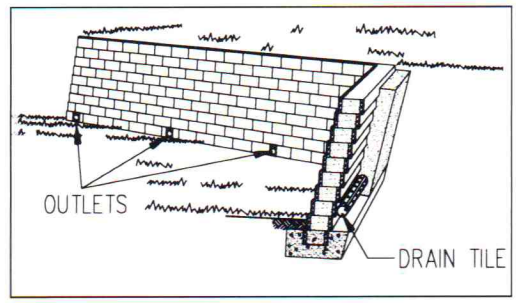
### GRADING

Develop a grading plan that routes water around the walls as much as the site will allow. Provide swales above and below the wall as permissible to accommodate. Avoid retaining wall designs which permit pooling and collection of surface runoff above the wall. Contain sources of concentrated water flow such as roof scuppers, downspouts, roof drains and valleys, and route them around the wall ends accordingly.




### DRAINAGE

Water that can not be directed around the retaining wall must flow over or through the wall. A good drainage system can be integrated into the ALLAN BLOCK wall to manage that flow of water. ALLAN BLOCK walls are actually vertical "french drains". The granular material used in the block cores and immediately behind the wall creates a drainage zone which allows water to flow down through the wall and out at the base. Drain tile and outlets should be added on taller, reinforced walls to handle the larger volume of water moving through the wall.




**WATER SITES** ALLAN BLOCK walls can be built on sites where water is present at the base of the wall. Lakeshores, holding ponds, stream beds and even sea wall applications are all easily handled with a few modifications to standard construction. These sites typically require a closer inspection of the soil conditions and engineering requirements.

### DESIGN CRITERIA FOR WATER APPLICATIONS

#### Foundation Strength

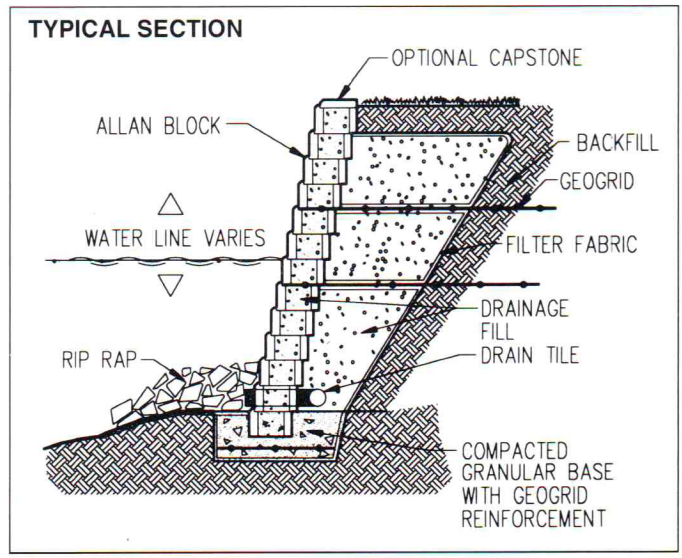
Walls built in sites with moist or saturated soils often have poor soil conditions at the wall base, and will often require additional stabilization to provide a proper foundation.

#### Wall Reinforcement

When water penetrates the backfill soils behind a wall, the soil becomes saturated and heavy. This increase in "hydrostatic pressure" will require added reinforcement in the wall to compensate.

#### Water Movement

Walls built in water applications often have some movement in the adjacent water. Stream beds flow along the wall base. Wave action at lakeshores and sea walls moves water up to and away from the wall face. This water movement causes a suction-like force which can scour the soils away from the wall foundation. Retention ponds rise and fall with each rainfall. Added drainage may be required to aid in the removal of water from behind the wall as the pond level recedes.




ALLAN BLOCK walls built in water applications should be carefully designed with these conditions in mind. Turn to page 11 for recommended construction techniques. Be sure to contact an ALLAN BLOCK representative or qualified engineer for your specific design.

# INSTALLATION GUIDELINES

## GETTING STARTED

*By using the proper tools and materials and by following the Basic Installation Guidelines, construction of Allan Block walls can be simple and cost effective.*

**BASIC TOOLS**
- Wheel barrow
- Shovels
- String line
- Level
- Hand compactor
- Maul
- Brick hammer

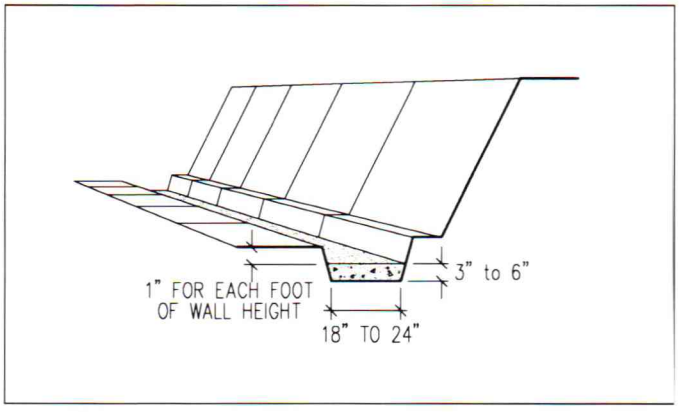
**OPTIONAL TOOLS**
- Mechanical compactor
- Skidsteer loader
- Power cutoff saw
- Transit

**MATERIALS**
- **Base** ..... Compactible granular material (eg: 3/4" minus\road base)
- **Drainage Fill**..... Free draining granular material (eg: 3/8" - 3/4" crushed stone)
- **Geogrid**
- **Capstone adhesive**
- **Drain tile**
- **Sand**

## CONSTRUCTION

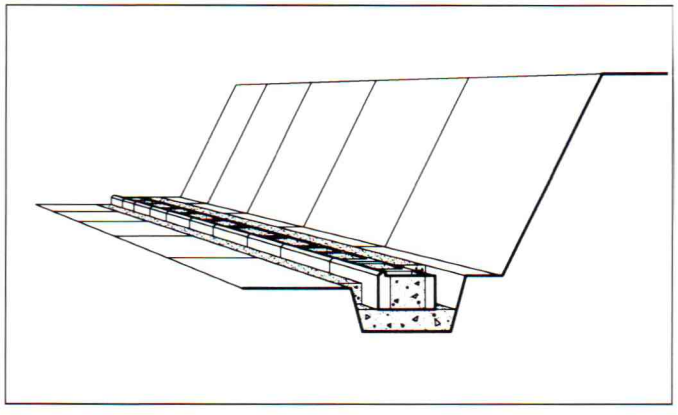
### BASE PREPARATION

Begin by excavating a shallow trench along the planned location of each new wall, being careful not to over excavate. The trench must be deep enough to accommodate a layer of compacted granular base material and the amount of base block required below grade to lock the wall in place. Base material should consist of compactible granular material, (e.g. 3/4" minus road base). For walls up to four feet high a 3-inch deep by 18-inch wide layer of compacted base will be sufficient. For taller walls, a 6-inch by 24-inch base is recommended. **Plan to bury one inch of base block for each foot of wall height.**



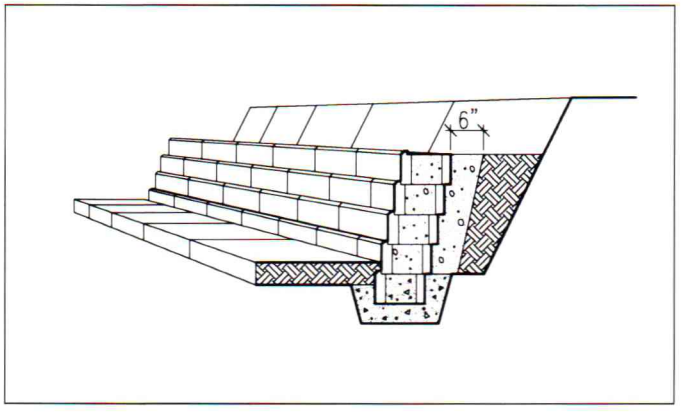

### BASE INSTALLATION

Place the proper amount of base material in the trench. Rake it smooth and level, and compact by hand or by mechanical tamper to 95% Standard Proctor. All walls should be constructed on stable, well compacted ground to prevent major settling. Place the first row of Allan Block on the compacted base with the raised lip facing out and the front edges tight together. Level each block from side to side and front to back. Carefully back fill around the base block and in the block pockets with base material and pack to lock in place. **Check the level often and sight down the base course for straight lines and smooth curves.**



### ADDITIONAL COURSES

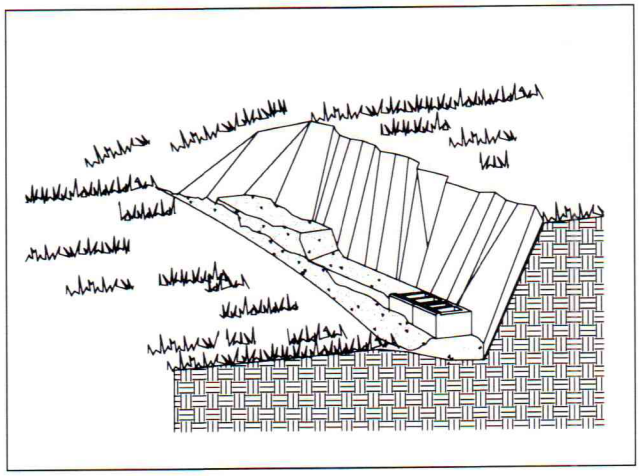
Sweep the excess material from the tops of the first row of the blocks. Position the new row of block on top of the first row so the seams are offset from the blocks below. Perfect "running bond" is not essential, but a three inch minimum off set is recommended. Check each block for proper alignment and level. Sand can be used to "shim up" the low spots and smooth out straight lines and curves. Fill the block cavities and immediately behind the block 6 to 8 inches with free draining granular material (3/8" - 3/4" crushed stone). Back fill the remaining space behind the second course with on site soils and compact. Lay up each subsequent course in the like manner until the wall is complete.

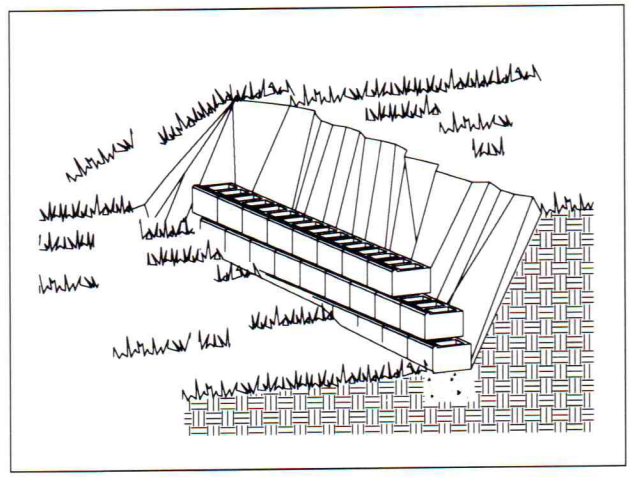


# INSTALLATION GUIDELINES

## STEPPING UP

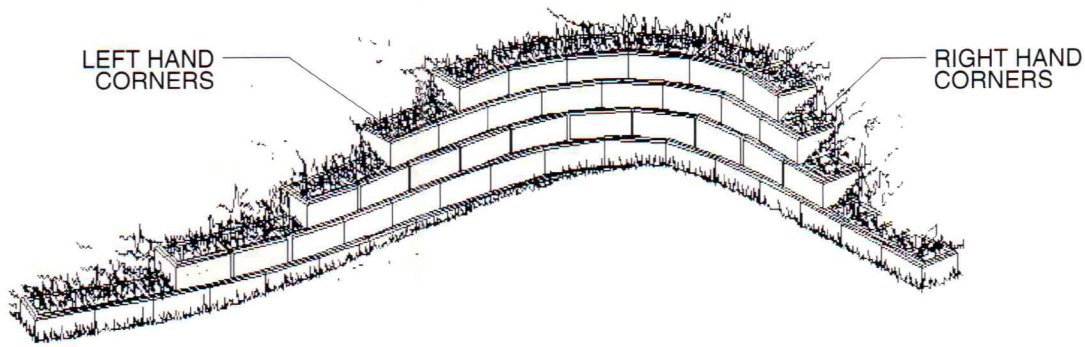
Always begin your wall construction at the lowest possible point and "step-up" with the base. A string line and line level will keep each new row of blocks on track.





## STEPPING DOWN

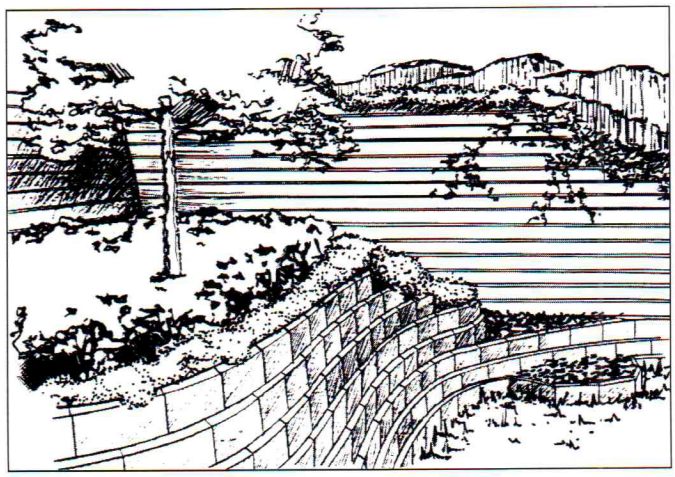
When the top of your wall needs to "step-down" use corner blocks at the end of each row to provide a perfect finish.

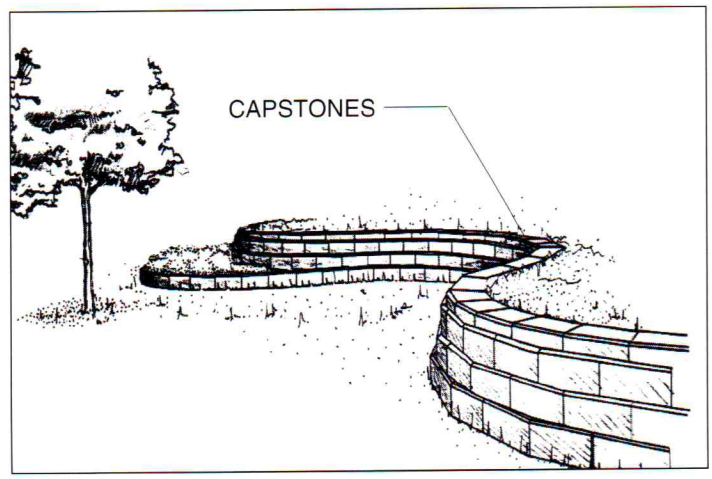



## TOPPING OFF

The ALLAN BLOCK SYSTEM provides a wide variety of options for finishing off the top of each wall. The raised lip on the row makes an excellent edge to finish to, **and makes cap blocks unnecessary!** By leaving the top blocks partially unfilled, decorative rock or wood mulch can be placed right up to the edge. By filling the top row of blocks with planting soil, flowers shrubs or ground cover can be planted right up to the front to give the wall a soft green look.

If a capped appearance is preferred, matching capstones can be placed on the top row and attached with a construction adhesive.

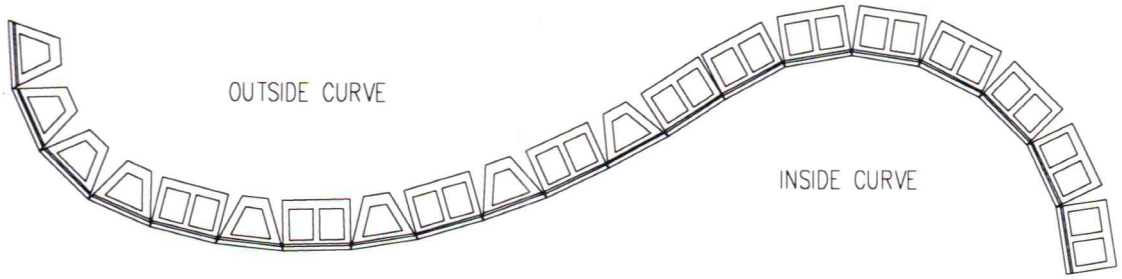




# INSTALLATION GUIDELINES

## CURVES

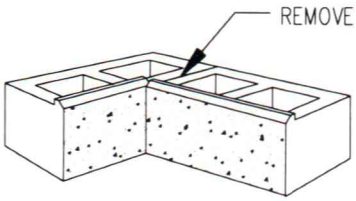
Serpentine and curved walls are built by combining Allan Block's special angle block with the standard block. Inside curves are simply built by placing the front face of the standard block edge to edge and fanning the block to form the required curve. Outside curves with a soft flow (radius > 6 ft.) will give the best fit and smoothest appearance. Soft outside curves are formed by alternating angle blocks and standard blocks. For tighter outside curves(radius < 4 ft.) all angle blocks are required. To calculate the number of angle blocks needed in a curved wall see the order sheet on page 22.



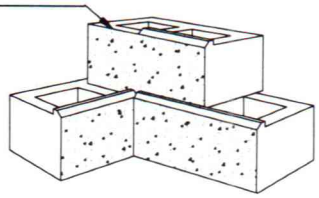

## CORNERS

• **Inside Corners** are constructed by modifying standard blocks. Remove half of the raised lip from a standard block (they can be chiseled off but a masonry saw cut works best). Lay the modified block perpendicular to another standard block with the lips lined up and complete the base row. On each successive row, simply reverse the position of the modified block to obtain an interlocked corner.

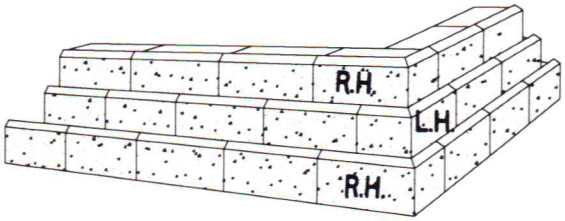
• **Outside Corners** are constructed using the special "corner blocks." Alternate right and left handed blocks on each course to obtain a perfect corner.




STEP 1



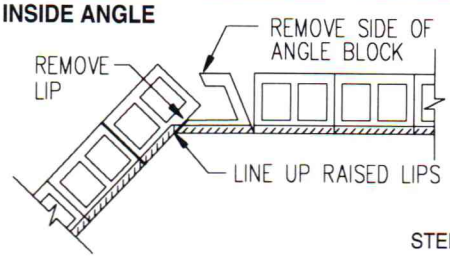
STEP 2




## ANGLES

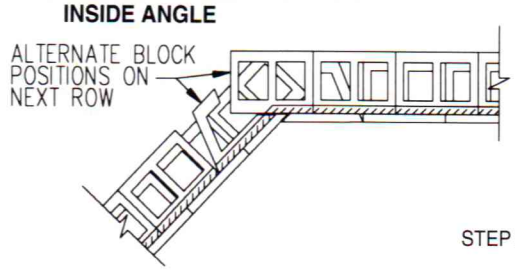
With some simple modifications to standard and angle blocks, inside and outside angles can be built. Some cutting and fitting will be required to make tight fitting seems. Properly built, the blocks will overlap and interlock at the angle.

**INSIDE ANGLE**



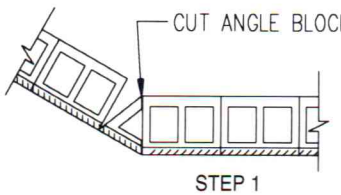

STEP 1

**INSIDE ANGLE**



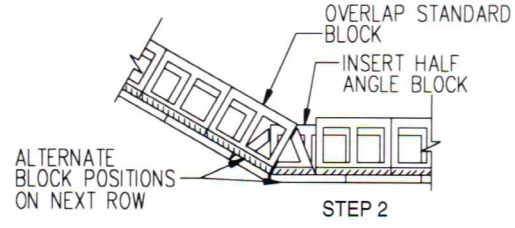

STEP 2

**OUTSIDE ANGLE**




STEP 1

**OUTSIDE ANGLE**

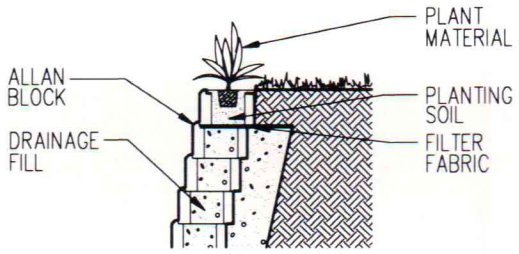



STEP 2

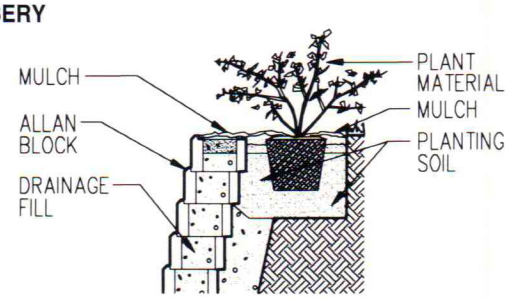
## PLANTING

Installing plant material above an Allan Block wall is effective and easy. Uncapped walls can accommodate smaller plantings right up to the front lip.

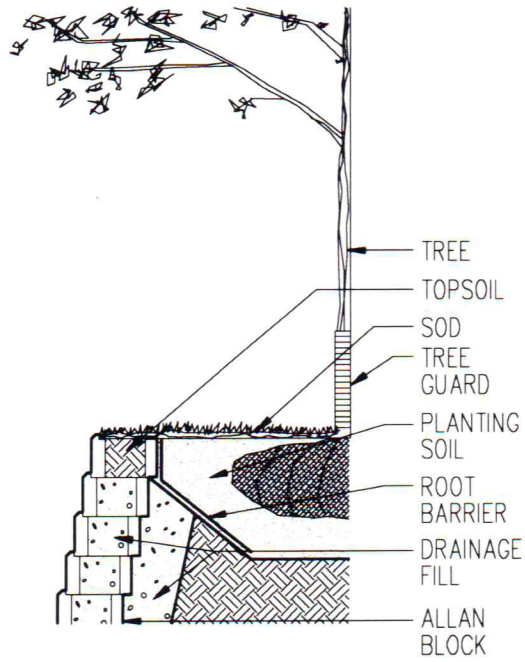
### GROUND COVER




### SHRUBBERY



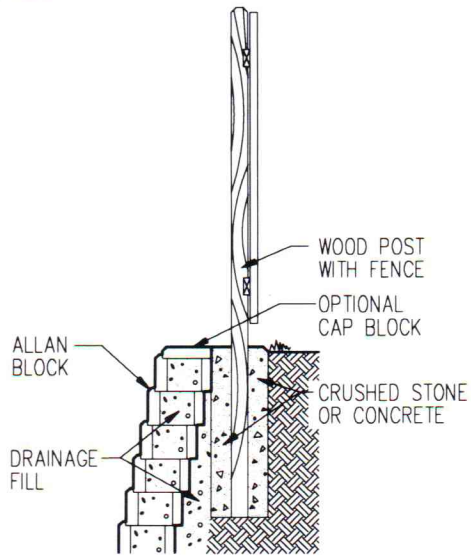

### TREE PLANTING



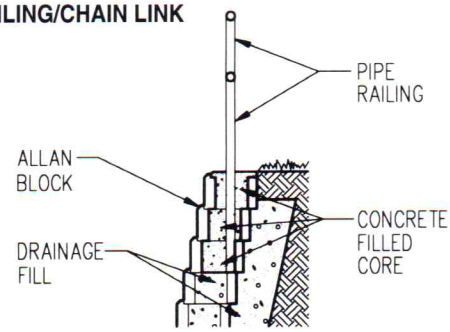

## FENCING & RAILINGS

Several options are available for design and installation of fencing and railings above an Allan Block wall. In areas of heavy traffic above taller walls, railings may be required for safety.

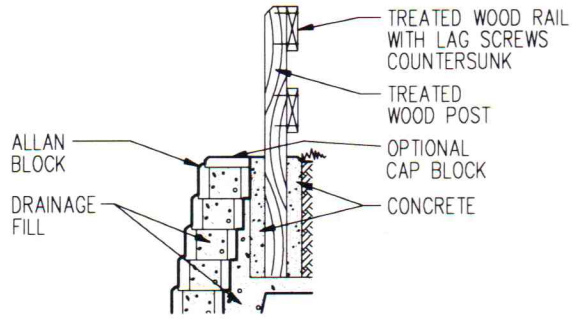
### WOOD FENCE




### PIPE RAILING/CHAIN LINK




### GUARD RAIL



## STAIRS

*Building stairs with Allan Block is simple and effective. By following some basic construction techniques a variety of configurations can be built to best match your site.*

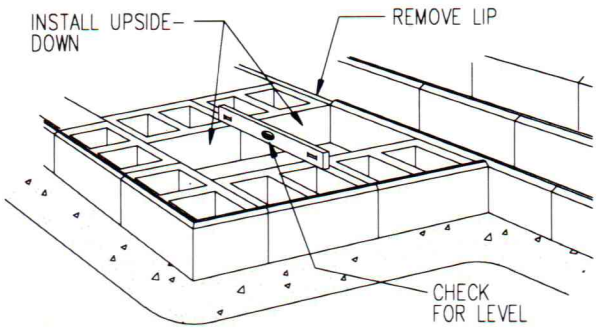
### BASIC INSTALLATION

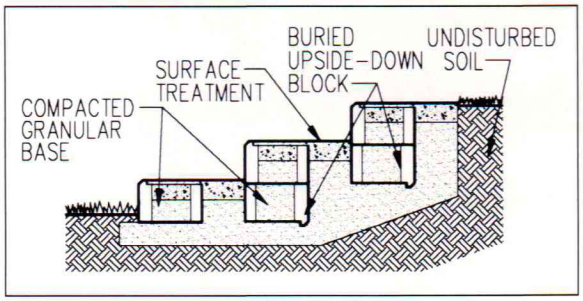
**Step One** — Prepare granular base and install first course of Allan Block at location of first riser. Be sure to bury enough block to lock in place

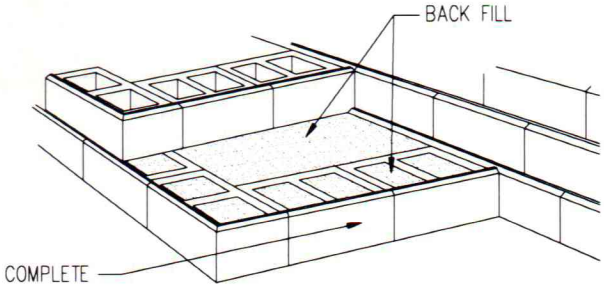
**Step Two** — Place Allan Blocks upside down at location of second riser and level with top of first riser. Backfill in and around the first riser and buried block and compact thoroughly.

**Step Three** — Install the second riser on top of the buried block. Some cutting may be required to fit the block to the adjacent walls.

**Step Four** — Install the next row of buried block. Backfill and continue.



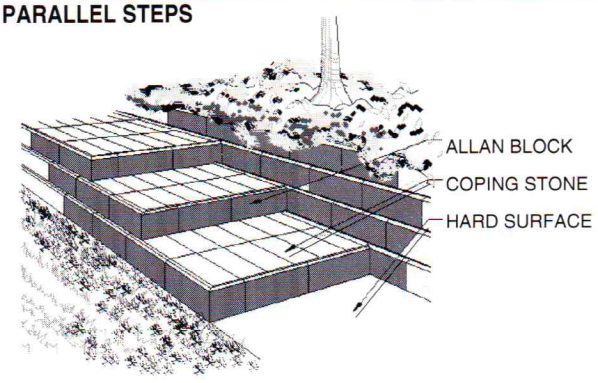

### DESIGN OPTIONS

**Parallel Steps** will follow the natural set back of an Allan Block wall. To maintain a constant stair width, remove lip off of the block where each riser intersects with the wall.

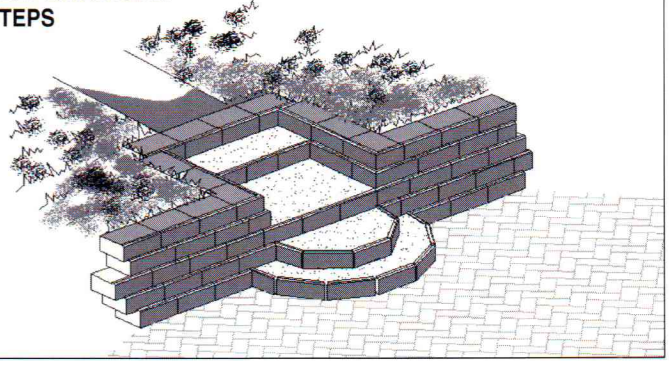
**Perpendicular Steps** will increase in width by 3 inches on each riser due to the set back on each side. Some cutting and fitting will be required. Intermediate landings will help control and balance stair width.

**Free Flowing Steps** are built independent of a wall system and follow the natural contour of the grade. Use corner block. Use corner blocks to finish off the ends of each step.

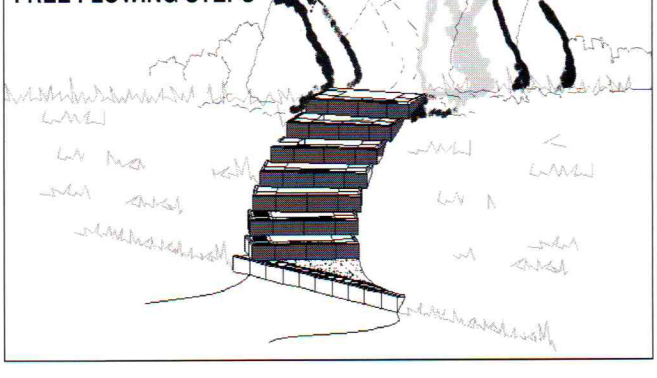
PARALLEL STEPS




PERPENDICULAR STEPS



FREE FLOWING STEPS



# INSTALLATION GUIDELINES

## WATER APPLICATIONS

*To build ALLAN BLOCK walls in water sites, use the basic construction techniques outlined below. Every retaining wall built in a water site will have its own unique set of site and soil conditions. These walls should be carefully designed for proper performance. Check with Allan Block Corporation or a qualified engineer.*

### FOOTING DESIGN

A footing analysis may be required to insure proper stability. If soil conditions at the wall base are poor, unstable, or frequently saturated, the footing will need added strength to prevent settlement or movement of the wall.

**OPTION ONE -** Drape a sheet or filter fabric in the trench and up the slope behind.Install a granular base using clean material (no fines) graded from 3/8" - 3/4". Place the granular base material in the trench a minimum of 12" deep x 24" wide and compact. Install a strip of geogrid as needed to provide added reinforcement.

**OPTION TWO -** Install a lean concrete spread footing with wire mesh or steel reinforcement. Wet set the base course of Allan Block to provide a positive interlock.

**OPTION THREE** On water sites with significant water movement, the footing should be designed for scour protection. Consider a vertical footing design with steel reinforcement and a shear key. Construct the footing to a significant depth below the water table to prevent scour.

### BLOCK PLACEMENT

Install the base course and additional courses of Allan Block in the same manner used for standard construction.

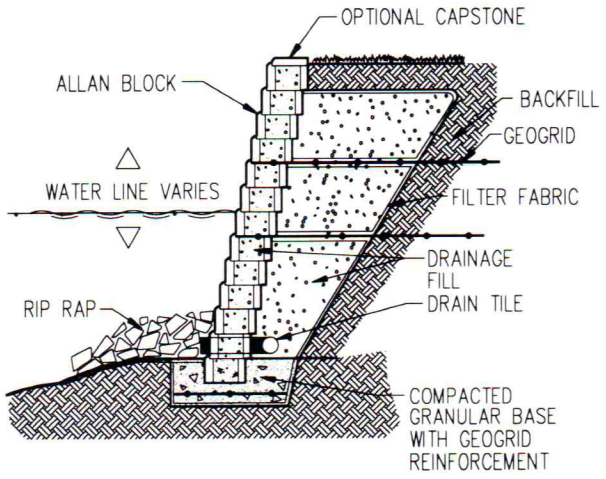
### DRAINAGE FILL

Use a clean granular material with no fines for the drainage fill.On sites where all or parts of the wall will be submerged, the depth of the drainage fill should be increased.

### DRAIN TILE

On wall sites with vertical water movement, such as retention ponds, install drain tile and outlets just above the low water line. Always provide adequate drainage from behind walls built in water applications.

SHORE LINE PROTECTION



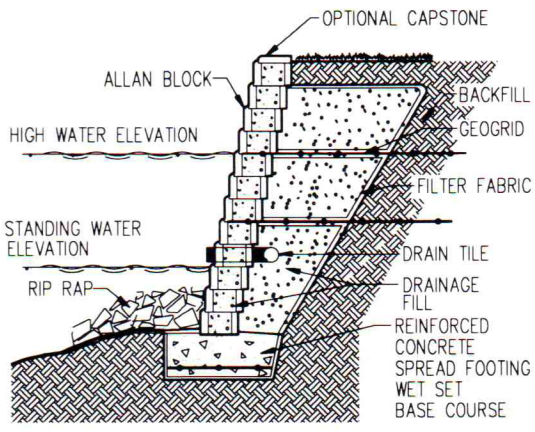

### FILTER FABRIC

By installing a filter fabric in the base trench and up the slope, you can prevent the on site soils from migrating into the granular base and drainage fill.

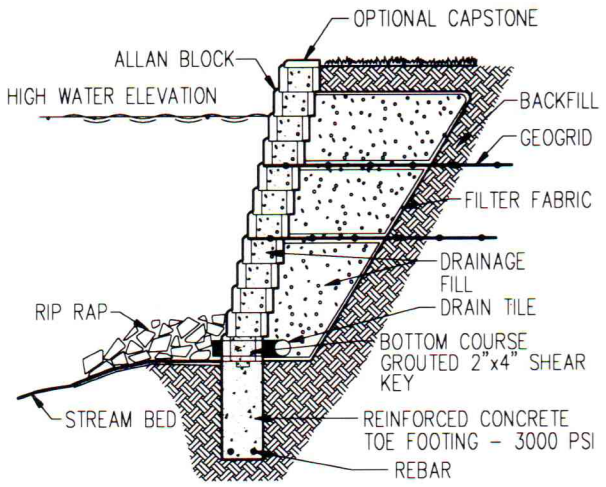
### RIP RAP

Install a layer of rip rap (large granular stone material 6" – 8" in size) at the wall base. Walls built in sites with significant water movement should have a minimum layer of 18".

RETENTION POND




STREAM BED WITH SCOUR PROTECTION



# SYSTEM OPTIONS

*ALLAN BLOCK WALLS can be adapted to meet the structural requirements of any retaining wall site. Choose the system that best meets the requirements of your retaining wall site from the three options below.*

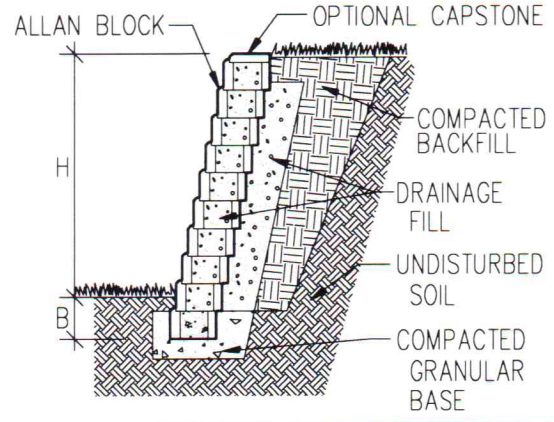
## GRAVITY WALL SYSTEM

A wall that relies solely on its own weight to stand up is called a "Gravity Wall." Allan Block combines basic engineering principles and simple mechanics to make a great gravity wall.

Each Allan Block weighs just 55 pounds when set in place, but over 90 pounds when the cores are filled - the same as heavier, bulkier products. The 1.5 inch set back on each row of blocks creates maximum leverage for the ninety pounds — more leverage than vertical walls. And the same set back provides an added benefit by significantly reducing the amount of soil that needs to be retained. Lower soil pressures, greater leverage, and equal weight at the site - these simple principles let Allan Block outmuscle heavier, costlier, and bulkier products.

Check the **GRAVITY WALL CHART** on page 13 to find the maximum recommended heights for Allan Block walls for various site and soil conditions.

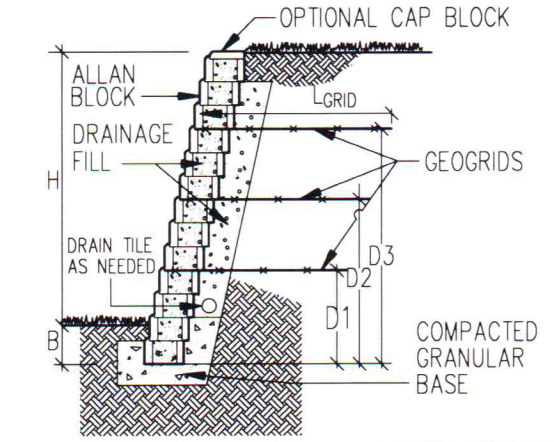
ALLAN BLOCK GRAVITY SYSTEM
TYPICAL SECTION




## GEOGRID SYSTEMS

When wall heights and soil conditions exceed the gravity potential of an Allan Block wall, geogrid fabrics can be integrated to provide the required additional strength. Geogrids are synthetic meshes that are manufactured with high tensile strength and designed specifically for slope stabilization and earth retention. By placing layers of geogrid at specific lengths of embedment behind the wall, frictional forces develop between the soil and the grid to create a unified soil mass. This soil mass provides the additional resistance needed to offset the pressures from the slope being retained. Geogrids are available in a variety of types and sizes. The amount of grid required on any specific project will depend on the site conditions, wall heights, and strength of the grid being used. Check the **GEOGRID CHARTS** on pages 15-17 for more information and pre-engineered solutions.

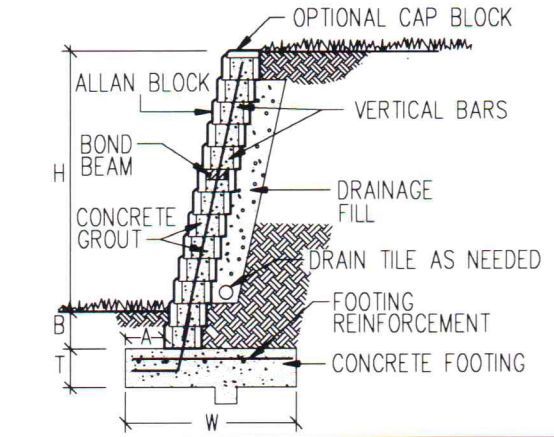
ALLAN BLOCK GEOGRID SYSTEM
TYPICAL SECTION




## MASONRY SYSTEM

When wall heights and soil conditions exceed the gravity potential of an Allan Block wall, traditional masonry reinforcement techniques can be employed to provide the required additional strength. Calculations and design techniques for this method follow accepted ACI masonry standards and existing UBC design criteria, while including the benefit of an inclined Allan Block wall. A footing is designed to an appropriate size. Vertical steel rod reinforcement is placed through the cores of the blocks and grouted. The rod reinforcement is located as the site conditions and wall heights require. Unreinforced unit cores are filled with free-draining granular fill as each course is installed. This reinforcement technique is particularly useful on job sites where geogrids are not feasible or cost effective. Check the **MASONRY CHART** on page 19 for more information and pre-engineered solutions.

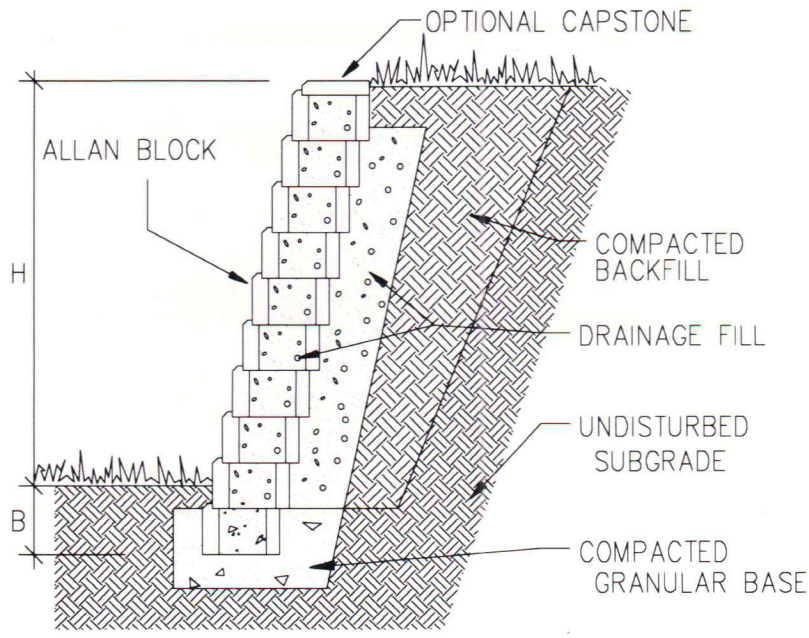
ALLAN BLOCK MASONRY SYSTEM
TYPICAL SECTION



## GRAVITY WALLS

*A wall that relies solely on its own weight to stand up is called a **"gravity wall."** Allan Block functions as a gravity wall to heights as high as six feet, depending on the site and soil conditions. To find the maximum height of an unreinforced Allan Block wall (a gravity wall) for any specific project, match the conditions at the site to those in the table below.*

**ALLAN BLOCK GRAVITY SYSTEM**
**TYPICAL SECTION**




Allan Block combines basic engineering principles and simple mechanics to make a great gravity wall. Each Allan Block weight just 55 pounds when set in place but over 90 pounds when the cores are filled. The 1.5 inch set back on each row of blocks creates maximum leverage for that 90-plus pounds to offset the soil pressure. That same set back provides an added benefit by significantly reducing the amount of soil being retained.

Allan Block functions as a gravity wall up to specific heights. These heights are determined by site and soil conditions. By comparing the resistive force from the leveraged 90-pound Allan Blocks with the soil pressure exerted by various soil types and site conditions, maximum unreinforced wall heights can be calculated. Check the Gravity Chart below for those heights.

### ALLAN BLOCK GRAVITY WALL HEIGHTS

**Recommended Maximum Wall Heights — In Feet**
Unreinforced ALLAN BLOCK Walls

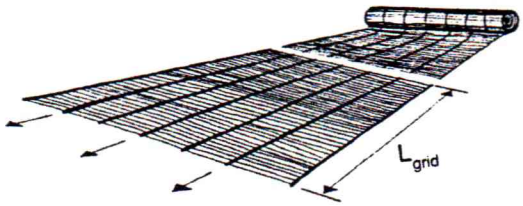
| | | CONDITIONS ABOVE RETAINING WALL | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **SOIL TYPE** | **ø** | **LEVEL SLOPE** | **5 TO 1 SLOPE** | **4 TO 1 SLOPE** | **3 TO 1 SLOPE** | **2 TO 1 SLOPE** | **150 psf SURCHARGE** | **250 psf SURCHARGE** |
| FIRM CLAY | 26° | 3.5 | 3.0 | 2.5 | 2.0 | 1.5 | 2.5 | 2.0 |
| SILTY CLAY | 28° | 4.0 | 3.5 | 3.0 | 2.5 | 2.0 | 3.0 | 2.3 |
| MIXED SILTS | 30° | 4.5 | 4.0 | 3.5 | 3.0 | 2.5 | 3.5 | 2.5 |
| SILTY SAND | 32° | 5.0 | 4.5 | 4.0 | 3.5 | 3.0 | 4.0 | 3.0 |
| CLEAN SAND | 34° | 5.5 | 5.0 | 4.5 | 4.0 | 3.5 | 4.5 | 3.5 |

***If the wall heights at your project exceed those recommended in the table above, reinforcement will be needed. Select from the Geogrid or Masonry system options in the following section of the manual.***

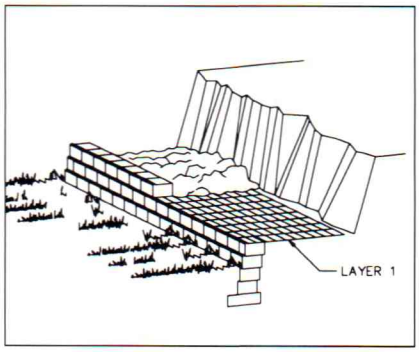
# SYSTEM OPTIONS

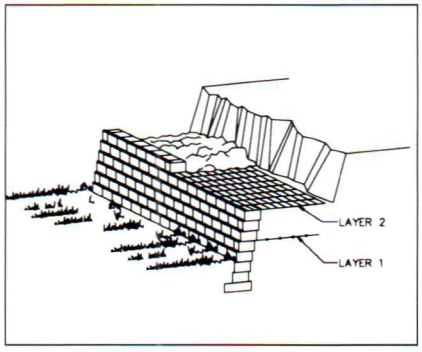
## GEOGRID REINFORCEMENT

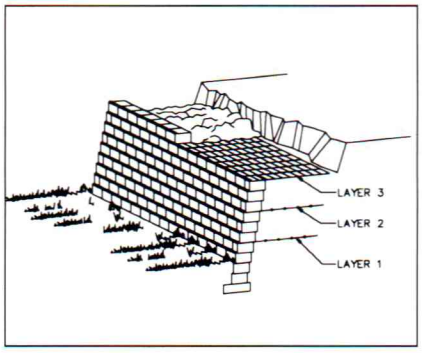
Geogrids are flexible, synthetic meshes which are manufactured specifically for slope stabilization and earth retention. These "grids" are available in a variety of materials, sizes, and strengths. They can be made of high tensile strength plastics or woven polyester yarns. They are typically packaged at the factory in rolls. The grids are rated by Long-Term Design Strength with values ranging from 500 pounds to 3,000 pounds per linear foot.




When wall heights exceed those listed in the Maximum Wall Height Chart for Unreinforced Allan Block Walls, on page 13, geogrid can be added to provide a stable wall condition. Layers of geogrid inserted between the blocks and extending behind the wall interlock with the soil mass. This mass uses its own weight and cohesion to resist both the sliding and overturning pressures from the slope being retained. The granular material in the block pockets provides a positive connection between the layers of geogrid and the Allan Block wall and locks the two systems together. In effect, the grid becomes the structure for the slope and the Allan Block Wall a structural facing. The specific location of grid layers and the actual length of embedment of the grid will depend on the site conditions, wall heights, and Long-Term Design Strength of the grid being used. Check the pre-engineered Geogrid Charts on pages 15-17 for general design solutions.




### INSTALLATION

**Site Preparation** - Excavate behind wall location for a distance equal to the designed embedment length of the grid. Store soil for placement on grid.

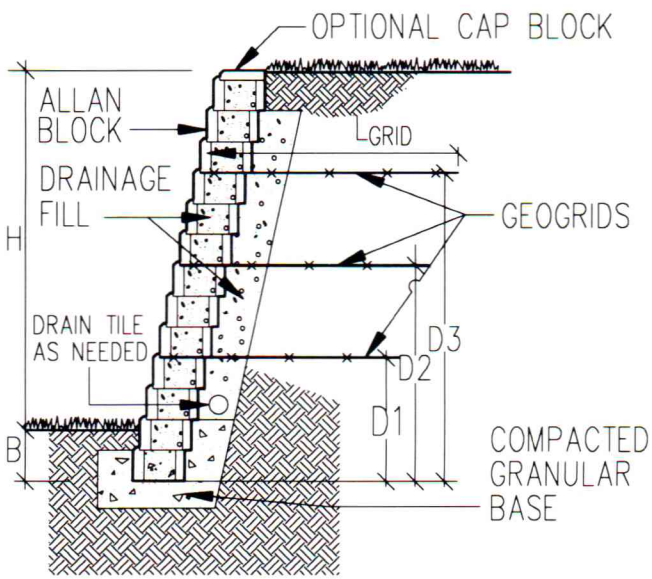
**Base Wall** - Construct Allan Block wall following standard guidelines up to designated height of first grid layer. Backfill and compact.

**Grid Placement** - Cut section of grid to designated embedment length. Lay cut edge of grid on top of Allan Block to back edge of lip and extend to back of slope. Place next course of Allan Block on top of Grid and fill block cores to lock in place. Pull grid taut to back of slope and stake to hold in place.

**Backfill** - Place layer of drainage fill to 8-inch depth behind Allan Block. Place on-site soils on remainder of geogrid working from wall towards slope. Compact to 95% of Standard Proctor.

**Completion** - Install additional courses of Allan Block. Backfill and compact in seven-inch lifts up to designated height of next layer of grid. Install second layer of grid and backfill. Install additional layers of grid and Allan Block in like manner to top of wall.

ALLAN BLOCK GEOGRID SYSTEM
TYPICAL SECTION



# ALLAN BLOCK GEOGRID SYSTEM

The pre-engineered table below provides an accurate **estimate** for geogrid reinforcement.
To use the table follow these simple steps;

1. Make sure the soil conditions at your site match the description in the top of the table
2. Select the site condition (Case A, B, or C) that most closely resembles your project site.
3. Choose the wall height needed for your site and read across to find the number of grid layers, embedment length and grid locations.

**DESIGN PARAMETERS**

FACTORS OF SAFETY
- Sliding = 1.5
- Overturning = 2.0
- Grid Pullout = 1.5
- Grid Rupture = 1.5

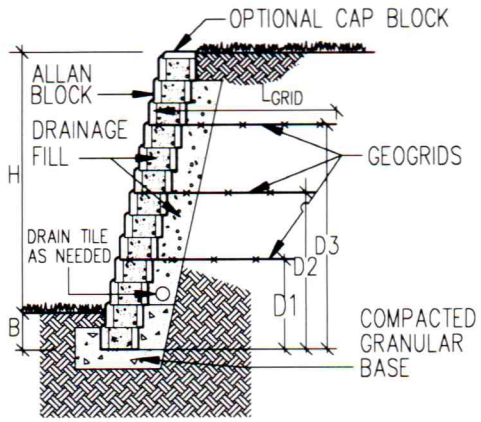
ASSUMED WEIGHTS
- Earth Backfill = 120 lbs/cu.ft.
- Filled weight of ALLAN BLOCK= 120 lbs/cu.ft.
- Onsite soils = 120 lbs/cu.ft.

GENERAL
- Proper drainage provided.
- Grid meets ASTM D-4595

SOILS
- Cohesion = 0
- Bearing Capacity $\geq$ 3,500 psf

GRID
Design Strength $\geq$ 1,000 lbs/ft (LTADS) ie - Tensar UX1400, Miragrid 5T, Stratagrid 300, Fortrac 35/20 - 20

**ALLAN BLOCK GEOGRID SYSTEM TYPICAL SECTION**




This table should be used for **estimating** grid quantities for projects which match the site and soil descriptions provided, and only for projects which use grid strengths of 1000 lbs/ft or higher.

| SOIL CONDITIONS | SOIL FRICTION ANGLE Ø = 36 ° | | | | Soil Types: Coarse to medium sands, clean sand and gravel | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SITE CONDITIONS | H ft | B ft | TOTAL No. OF GRID LAYERS | $L_{grid}$ ft | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
| | | | | | NUMBER OF BLOCK COURSES ABOVE BASE | | | | | | |
| CASE A<br>Level slope above wall | 6 | .7 | - | | | | | | | | |
| | 7 | .8 | 1 | 3.5 | 6 | | | | | | |
| | 8 | .9 | 2 | 4.0 | 4 | 8 | | | | | |
| | 9 | 1.0 | 2 | 4.5 | 4 | 8 | | | | | |
| | 10 | 1.0 | 3 | 5.0 | 4 | 8 | 12 | | | | |
| | 12 | 1.0 | 4 | 6.0 | 3 | 7 | 11 | 15 | | | |
| | 14 | 1.0 | 5 | 7.0 | 3 | 7 | 11 | 15 | 19 | | |
| | 16 | 1.5 | 6 | 8.0 | 1 | 5 | 9 | 13 | 17 | 21 | |
| CASE B<br>Surcharge above wall | 5 | .6 | 1 | 4.0 | 5 | | | | | | |
| | 6 | .7 | 2 | 4.0 | 4 | 7 | | | | | |
| | 7 | .8 | 2 | 4.0 | 4 | 8 | | | | | |
| | 8 | .9 | 3 | 4.5 | 4 | 7 | 11 | | | | |
| | 9 | 1.0 | 3 | 5.0 | 4 | 8 | 12 | | | | |
| | 10 | 1.0 | 3 | 6.5 | 3 | 7 | 11 | | | | |
| | 12 | 1.0 | 5 | 7.0 | 2 | 6 | 10 | 14 | 18 | | |
| | 14 | 1.5 | 6 | 8.0 | 1 | 4 | 8 | 12 | 16 | 20 | |
| CASE C<br>2 to 1 slope above wall | 5 | .6 | 1 | 4.0 | 4 | | | | | | |
| | 6 | .8 | 2 | 4.5 | 4 | 7 | | | | | |
| | 7 | .9 | 2 | 5.5 | 4 | 8 | | | | | |
| | 8 | 1.0 | 3 | 7.0 | 4 | 7 | 11 | | | | |
| | 9 | 1.0 | 3 | 7.5 | 3 | 7 | 11 | | | | |
| | 10 | 1.0 | 4 | 8.0 | 2 | 6 | 10 | 14 | | | |
| | 12 | 1.0 | 6 | 9.5 | 1 | 4 | 8 | 12 | 16 | 20 | |
| | 14 | 1.5 | 7 | 10.5 | 1 | 4 | 7 | 11 | 15 | 18 | 21 |

The above information provides general guidelines for the use of the Allan Block Wall system. The suitability of this information and its use for any specific job shall be determined by the user. Actual project details, designs and specifications should be obtained from a qualified professional engineer for each specific project. **No provision or analysis for global stability.**

# ALLAN BLOCK GEOGRID SYSTEM

The pre-engineered table below provides an accurate **estimate** for geogrid reinforcement.
To use the table follow these simple steps;

1. Make sure the soil conditions at your site match the description in the top of the table
2. Select the site condition (Case A, B, or C) that most closely resembles your project site.
3. Choose the wall height needed for your site and read across to find the number of grid layers, embedment length and grid locations.

**DESIGN PARAMETERS**

FACTORS OF SAFETY
- Sliding = 1.5
- Overturning = 2.0
- Grid Pullout = 1.5
- Grid Rupture = 1.5

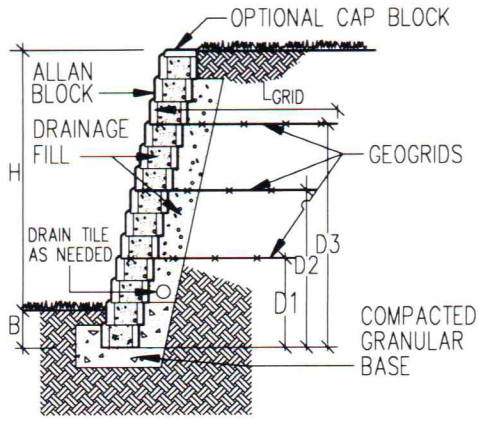
ASSUMED WEIGHTS
- Earth Backfill = 120 lbs/cu.ft.
- Filled weight of ALLAN BLOCK= 120 lbs/cu.ft.
- Onsite soils = 120 lbs/cu.ft

GENERAL
- Proper drainage provided.
- Grid meets ASTM D-4595

SOILS
- Cohesion = 0
- Bearing Capacity ≥ 3,000 psf

GRID
Design Strength ≥ 1,000 lbs/ft (LTADS) ie - Tensar UX1400, Miragrid 5T, Stratagrid 300, Fortrac 35/20 - 20

**ALLAN BLOCK GEOGRID SYSTEM TYPICAL SECTION**




This table should be used for **estimating** grid quantities for projects which match the site and soil descriptions provided, and only for projects which use grid strengths of 1000 lbs/ft or higher.

| SOIL CONDITIONS | SOIL FRICTION ANGLE ø = 32 ° | | | | Soil Types: Uniform to well-graded sands, sandy silts | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SITE CONDITIONS** | H ft | B ft | TOTAL No. OF GRID LAYERS | $L_{grid}$ ft | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
| | | | | | NUMBER OF BLOCK COURSES ABOVE BASE | | | | | | |
| CASE A<br>Level slope above wall | 6 | .7 | 1 | 3.0 | 5 | | | | | | |
| | 7 | .8 | 2 | 3.5 | 3 | 7 | | | | | |
| | 8 | .9 | 2 | 4.0 | 4 | 8 | | | | | |
| | 9 | 1.0 | 3 | 4.5 | 4 | 8 | 12 | | | | |
| | 10 | 1.0 | 3 | 5.0 | 4 | 8 | 12 | | | | |
| | 12 | 1.0 | 5 | 6.0 | 2 | 6 | 9 | 13 | 17 | | |
| | 14 | 1.0 | 6 | 7.0 | 1 | 4 | 8 | 12 | 16 | 20 | |
| | 16 | 1.5 | 7 | 8.5 | 1 | 4 | 8 | 12 | 16 | 20 | 24 |
| CASE B<br>Surcharge above wall | 5 | .6 | 2 | 3.5 | 2 | 6 | | | | | |
| | 6 | .7 | 2 | 4.0 | 3 | 7 | | | | | |
| | 7 | .8 | 3 | 4.5 | 3 | 7 | 11 | | | | |
| | 8 | .9 | 3 | 5.0 | 3 | 7 | 11 | | | | |
| | 9 | 1.0 | 3 | 5.5 | 3 | 7 | 11 | | | | |
| | 10 | 1.0 | 4 | 6.5 | 3 | 6 | 10 | 14 | | | |
| | 12 | 1.0 | 5 | 7.0 | 1 | 5 | 9 | 13 | 17 | | |
| | 14 | 1.5 | 7 | 8.5 | 1 | 4 | 8 | 11 | 15 | 18 | 21 |
| CASE C<br>2 to 1 slope above wall | 5 | .6 | 2 | 4.0 | 2 | 5 | | | | | |
| | 6 | .7 | 2 | 6.0 | 3 | 7 | | | | | |
| | 7 | .8 | 2 | 6.5 | 3 | 7 | | | | | |
| | 8 | .9 | 3 | 7.5 | 3 | 6 | 10 | | | | |
| | 9 | 1.0 | 3 | 8.5 | 3 | 7 | 11 | | | | |
| | 10 | 1.0 | 4 | 11.5 | 2 | 6 | 10 | 14 | | | |
| | 12 | 1.0 | 6 | 14.0 | 1 | 4 | 7 | 10 | 13 | 17 | |

The above information provides general guidelines for the use of the Allan Block Wall system. The suitability of this information and its use for any specific job shall be determined by the user. Actual project details, designs and specifications should be obtained from a qualified professional engineer for each specific project. **No provision or analysis for global stability**.

# ALLAN BLOCK GEOGRID SYSTEM

The pre-engineered table below provides an accurate **estimate** for geogrid reinforcement.
To use the table follow these simple steps;

1. Make sure the soil conditions at your site match the description in the top of the table
2. Select the site condition (Case A, B, or C) that most closely resembles your project site.
3. Choose the wall height needed for your site and read across to find the number of grid layers, embedment length and grid locations.

**DESIGN PARAMETERS**

FACTORS OF SAFETY
- Sliding = 1.5
- Overturning = 2.0
- Grid Pullout = 1.5
- Grid Rupture = 1.5

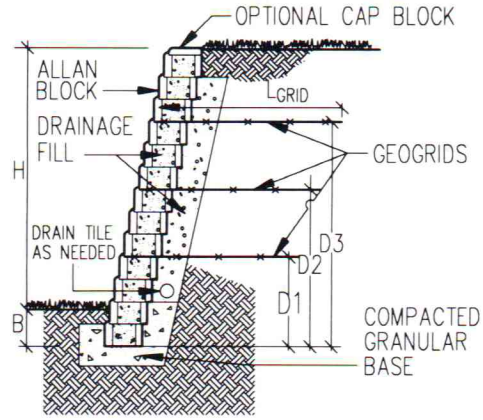
ASSUMED WEIGHTS
- Earth Backfill = 120 lbs/cu.ft.
- Filled weight of ALLAN BLOCK= 120 lbs/cu.ft.
- Onsite soils 120 lbs/cu.ft.

GENERAL
- Proper drainage provided.
- Grid meets ASTM D-4595

SOILS
- Cohesion = 0
- Bearing Capacity ≥ 2,500 psf

GRID
Design Strength ≥ 1,000 lbs/ft (LTADS) ie - Tensar UX1400, Miragrid 5T, Stratagrid 300, Fortrac 35/20 - 20

**ALLAN BLOCK GEOGRID SYSTEM TYPICAL SECTION**




This table should be used for **estimating** grid quantities for projects which match the site and soil descriptions provided, and only for projects which use grid strengths of 1000 lbs/ft or higher.

**SOIL CONDITIONS** | **SOIL FRICTION ANGLE Ø = 27 °** | **Soil Types:** Uniform to well-graded silts, sandy and silty clays

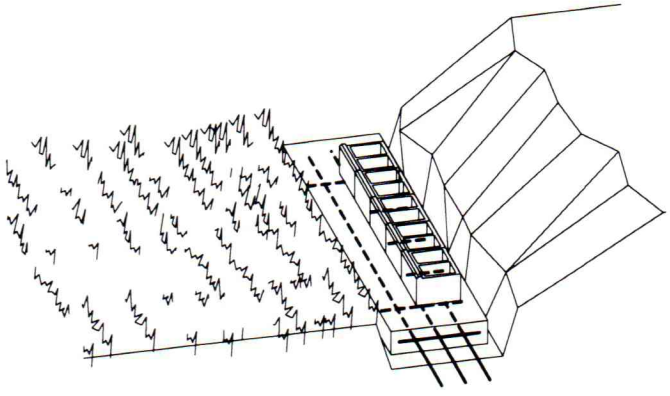
| SITE CONDITIONS | H ft | B ft | TOTAL No. OF GRID LAYERS | $L_{grid}$ ft | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | NUMBER OF BLOCK COURSES ABOVE BASE | | | | | | |
| CASE A<br>Level slope above wall | 5 | .6 | 2 | 4.0 | 2 | 5 | | | | | |
| | 6 | .7 | 2 | 4.0 | 3 | 7 | | | | | |
| | 7 | .8 | 2 | 4.0 | 3 | 7 | | | | | |
| | 8 | .9 | 3 | 4.5 | 3 | 7 | 11 | | | | |
| | 9 | 1.0 | 3 | 5.0 | 3 | 7 | 11 | | | | |
| | 10 | 1.0 | 4 | 6.0 | 3 | 6 | 10 | 14 | | | |
| | 12 | 1.0 | 5 | 7.0 | 1 | 3 | 7 | 11 | 15 | | |
| | 14 | 1.5 | 6 | 8.0 | 1 | 3 | 7 | 11 | 15 | 19 | |
| CASE B<br>Surcharge above wall<br>250 psf | 5 | .6 | 2 | 4.5 | 2 | 5 | | | | | |
| | 6 | .7 | 2 | 5.0 | 3 | 7 | | | | | |
| | 7 | .8 | 3 | 5.5 | 3 | 6 | 9 | | | | |
| | 8 | .9 | 3 | 6.5 | 2 | 5 | 9 | | | | |
| | 9 | 1.0 | 4 | 7.0 | 2 | 5 | 9 | 12 | | | |
| | 10 | 1.0 | 5 | 7.5 | 2 | 5 | 8 | 11 | 14 | | |
| | 12 | 1.0 | 6 | 8.5 | 1 | 4 | 8 | 11 | 14 | 17 | |
| | 14 | 1.5 | 7 | 10.0 | 1 | 4 | 8 | 11 | 14 | 18 | 21 |
| CASE C<br>3 to 1 slope above wall<br>3 / 1 | 5 | .6 | 2 | 4.0 | 2 | 5 | | | | | |
| | 6 | .8 | 2 | 4.5 | 3 | 7 | | | | | |
| | 7 | .9 | 3 | 5.5 | 3 | 6 | 9 | | | | |
| | 8 | 1.0 | 3 | 6.0 | 3 | 7 | 10 | | | | |
| | 9 | 1.0 | 3 | 7.0 | 3 | 7 | 11 | | | | |
| | 10 | 1.0 | 4 | 7.5 | 2 | 6 | 10 | 14 | | | |
| | 12 | 1.0 | 5 | 10.0 | 1 | 5 | 9 | 13 | 17 | | |
| | 14 | 1.5 | 7 | 12.0 | 1 | 4 | 8 | 11 | 14 | 18 | 21 |

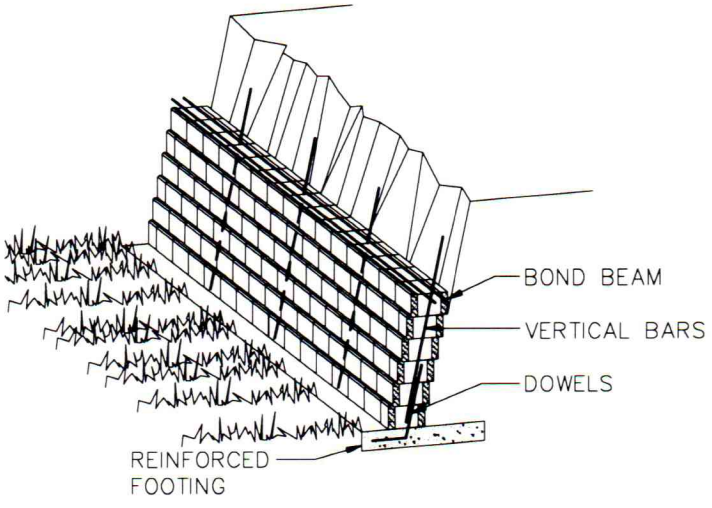
The above information provides general guidelines for the use of the Allan Block Wall system. The suitability of this information and its use for any specific job shall be determined by the user. Actual project details, designs and specifications should be obtained from a qualified professional engineer for each specific project. **No provision or analysis for global stability**.

## MASONRY REINFORCEMENT

Allan Block Retaining Walls can be reinforced with the same proven techniques used for conventional masonry walls. This method, often referred to as a "cantilevered wall", relies on a reinforced footing and vertical pilasters to counteract lateral earth pressures. These walls combine the natural stability of an Allan Block Wall with the tensile strength of the steel rods in pilasters, and the mass of soil resting on the heel of the footing to resist overturning. The design and construction of these walls follow the guidelines outlined in current ACI Standard and existing UBC design criteria (ACI 318-89), while factoring in the benefit of an inclined Allan Block wall.

This reinforcement technique is particularly useful on sites where geogrids are not feasible or cost-effective. Physical site limitations such as lot lines, adjacent buildings, or mature trees may prevent the excavation required for grid reinforcement. Or the cost of additional excavation and backfill, (plus the cost of the grid) may prove too high. Masonry reinforcement provides an excellent alternative for those occasions. The specific footing size and steel location depends on site and soil conditions, and wall heights. Check the pre-engineered Masonry Chart on page 19 for design sample solutions.






### INSTALLATION

**Site Preparation** — Excavate area at base of wall to accommodate footing width (W), and to depth below final grade equal to footing thickness (T) and buried block (B). In heavy clay add a 6-inch layer of granular base below footing.

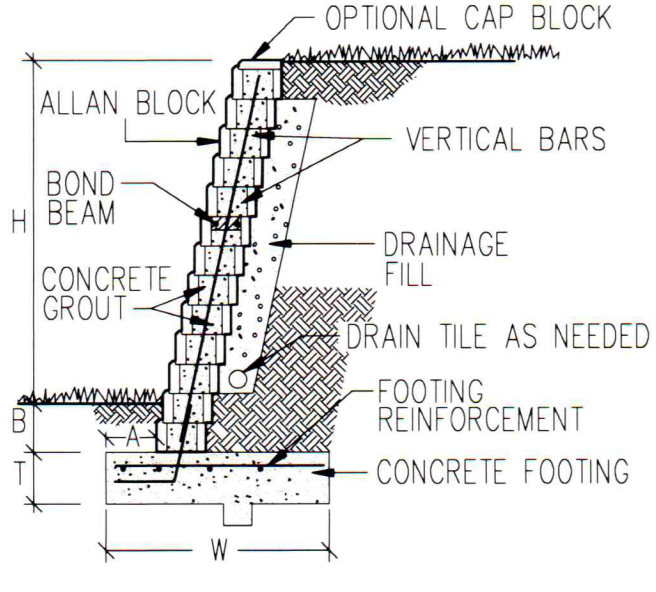
**Footing** — Form and pour concrete footing according to size and specifications. Include steel reinforcement as required. Follow NCMA TR-49 for details.

**Wall base** — Install first course of Allan Block on top of footing per wall layout. Set blocks so that the dowels are located at the backs of the block pockets. Fill all block cores not containing vertical bars with granular fill, taking care to keep the "pilaster" cores clean. Backfill to lock in place and compact. **Set next course of Allan Block with seams in running bond, and backfill in like manner.**

**Grout** — Set additional courses to height of first bond beam. Install bond beam blocks for full length of wall. Place vertical bars (sized and spaced according to specs) in hollow cores to top of footing and extend above top block at least 30 bar diameters. Place bond beam bars per specs. Fill all hollow cores and entire bond beam course with concrete grout.

**Completion** — Continue wall construction in similar lifts to top of wall.

ALLAN BLOCK MASONRY SYSTEM
TYPICAL SECTION



# ALLAN BLOCK MASONRY SYSTEM

The following information has been prepared according to current ACI Standards and Chapters 24 (Masonry) and 26 (Reinforced Concrete) of the 1991 Uniform Building Code (ICBO). The table below provides an accurate **estimate** for masonry reinforcement. To use the table follow these simple steps.

1. Make sure the soil conditions at your site match the description in the top of the table
2. Select the site condition (Case A, B, or C) that most closely resembles your project site.
3. Choose the wall height needed for your site and read across to find the footing dimensions, vertical bar sizes and bond beam requirements and locations.

NOTE: Footing reinforcement design per local engineering requirements

**DESIGN PARAMETERS**

FACTORS OF SAFETY
- Sliding = 1.5
- Overturning = 2.0

ALLOWABLE STRESSES
- Masonry: f'm = 3000 psi Allan Block
- Concrete: f'c = 3000 psi per ACI - 301
- Reinforcement: f'y = 40,000 psi #4 bars, 60,000 psi #5 & #6 bars

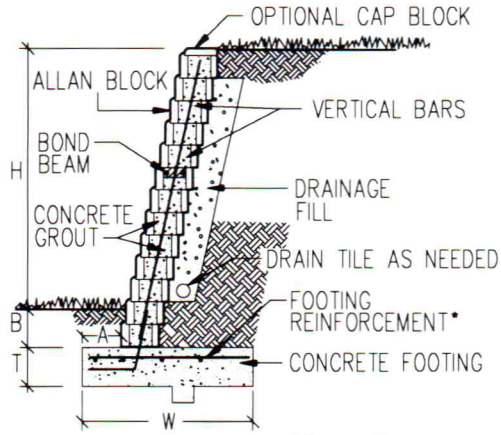
ASSUMED WEIGHTS
- Earth Backfill = 120lbs/cu.ft.
- Filled Allan Block = 120lbs/cu.ft.
- Reinforced Allan Blk. = 135lbs/cu.ft.
- Reinforced Concrete = 150lbs/cu.ft.

SOILS: Allowable soil bearing = 2000 psf
Soil to footing friction = .55
Passive soil equivalent fluid pressure = 300 pcf at toe and buried depth.

GROUT: Per ASTM C-476 f'c = 2500 psi
Maximum aggregate size 3/8"

STEEL BAR PLACEMENT: 3" from back of block
solid grout all cells with reinforcement.

**ALLAN BLOCK MASONRY SYSTEM TYPICAL SECTION**




* DESIGN PER LOCAL ENGINEER

**SOIL CONDITIONS** | **SOIL FRICTION ANGLE ø = 32 °** | **Soil Types:** Uniform to well-graded fine sands, sandy silts

| SITE CONDITIONS | H ft | # OF BLOCK COURSES | B ft | T ft | W ft | A ft | VERTICAL BARS SIZE | VERTICAL BARS CELL SPACING | BOND BEAM BARS SIZE | BOND BEAM BARS COURSE SPACING |
|---|---|---|---|---|---|---|---|---|---|---|
| CASE A<br>Level slope above wall | 3'-11" | 8 | 8" | 10" | 2'-8" | 8" | #4 | EVERY 7 CELLS | (2) # 5 | EVERY 4 COURSES |
| | 5'-1" | 10 | 8" | 10" | 3'-2" | 8" | #5 | EVERY 7 CELLS | (2) # 5 | EVERY 5 COURSES |
| | 6'-3" | 12 | 8" | 10" | 3'-9" | 8" | #5 | EVERY 4 CELLS | (2) # 5 | EVERY 6 COURSES |
| | 7'-4" | 14 | 8" | 10" | 4'-4" | 8" | #5 | EVERY 3 CELLS | (2) # 4 | EVERY 5 COURSES |
| | 8'-6" | 16 | 8" | 10" | 5'-0" | 8" | #5 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| | 9'-6" | 18** | 10" | 12" | 5'-6" | 8" | #5 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| CASE B<br>Surcharge above wall (250 psf) | 3'-11" | 8 | 8" | 10" | 3'-2" | 6" | #5 | EVERY 4 CELLS | (2) # 5 | EVERY 6 COURSES |
| | 5'-1" | 10 | 8" | 10" | 4'-0" | 6" | #5 | EVERY 2 CELLS | (2) # 4 | EVERY 7 COURSES |
| | 6'-3" | 12 | 8" | 10" | 4'-9" | 6" | #5 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| | 7'-4" | 14 | 8" | 10" | 5'-4" | 6" | #5 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| | 8'-4" | 16** | 10" | 12" | 5'-10" | 6" | #6 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| | 9'-6" | 18** | 10" | 12" | 6'-8" | 6" | #6* | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| CASE C<br>2 to 1 slope above wall | 3'-11" | 8 | 8" | 10" | 3'-2" | 6" | #4 | EVERY 4 CELLS | (2) # 5 | EVERY 5 COURSES |
| | 5'-1" | 10 | 8" | 10" | 4'-0" | 6" | #5 | EVERY 4 CELLS | (2) # 5 | EVERY 8 COURSES |
| | 6'-3" | 12 | 8" | 12" | 4'-10" | 6" | #5 | EVERY 2 CELLS | (2) # 4 | EVERY 7 COURSES |
| | 7'-4" | 14 | 8" | 12" | 5'-10" | 6" | #5 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| | 8'-2" | 16 | 12" | 12" | 6'-6" | 6" | #5 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |
| | 9'-0" | 18** | 16" | 12" | 7'-2" | 6" | #6 | EVERY CELL | (2) # 4 | EVERY 7 COURSES |

** Soil Bearing Exceeds 2,000 PSF  * Requires Special Inspection Per UBC

The above information provides general guidelines for the use of the Allan Block Wall system. The suitability of this information and its use for any specific job shall be determined by the user. Actual project details, designs and specifications should be obtained from a qualified professional engineer for each specific project. **No provision or analysis for global stability**.

# SPECIFICATIONS

## *ALLAN BLOCK*

### PART 1 GENERAL

**1.1 Scope**

Work includes furnishing and installing modular concrete block retaining wall units to the lines and grades designated on the construction drawings and as specified herein.

**1.2 Applicable Sections of Related Work**

A. Geogrid Wall Reinforcement
B. Masonry Wall Reinforcement

**1.3 Reference Standards**

A. ASTM C90-75 (1981 rev) Hollow Load Bearing Masonry Units
B. ASTM C140-75 (1981 rev) Sampling and Testing Concrete Masonry Units
C. ASTM C145-75 (1981 rev) Solid Load Bearing Concrete Masonry Units

**1.4 Delivery, Storage, and Handling**

A. Contractor shall check the materials upon delivery to assure proper material has been received.
B. Contractor shall prevent excessive mud, wet cement, and like material which may affix themselves, from coming in contact with the materials.
C. Contractor shall protect the materials from damage. Damaged material shall not be incorporated into the project.

### PART 2 RETAINING WALL

**2.1 Materials**

A. Concrete Units
1. Masonry units shall be Allan Block Retaining Wall units as produced by Licensed Manufacturer.
2. Concrete wall units shall have minimum 28 day compressive strength of 3,000 psi in accordance with ASTM C-90. The concrete shall have adequate freeze-thaw protection with an average absorption rate of five percent.
3. Exterior dimensions shall be uniform and consistent. Maximum dimensional deviations shall be one-half inch (not including textured face). Units are required to have an average facial area of .75 sq.. ft.
4. Retaining wall units shall provide a minimum of 100 pounds total weight per square foot of wall face area. Fill contained within the units may be considered 80% effective weight.
5. Exterior face shall be textured. Color as specified by owner.

B. Base Material
1. Base material shall consist of compacted sands, gravel, or concrete as shown in the construction drawings. A minimum of six inches of compacted base is required.

C. Drainage Fill
1. Fill material for unit cores and for drainage behind wall shall consist of free-draining, granular material. Gradation shall include material to 3/8 inch minus with fines limited to 5% passing #200 sieve and less than 50% passing #40 sieve.
2. A minimum of 8 inches of drainage fill must extend behind the wall to within one foot of the final grade. Cap backfill with impervious material.

E. Backfill
1. Material shall be native material unless otherwise specified in the drawings. When using geogrid for slope reinforcement, soils used to backfill geogrid must comply with standards set by grid manufacturer's guidelines.
2. Where additional fill is required, contractor shall submit sample and specifications to the Engineer for approval.

**2.2 Retaining Wall Installation**

A. Excavation
1. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall use caution not to over excavate beyond the lines shown, or to disturb the base elevations beyond those shown.

B. Foundation Soil Preparation
1. Foundation soil shall be excavated as required for base and footing dimensions shown on construction drawings, or as directed by the site Engineer.
2. Foundation soil shall be examined by the Engineer to insure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with acceptable material.

C. Base
1. Base material shall be placed as shown on construction drawing with a minimum thickness of six inches. Top of base shall be located to allow bottom wall units to be buried to proper depths as per wall heights and specifications.
2. Base materials shall be installed on undisturbed native soils or suitable replacement fills compacted to 95% of standard proctor.
3. Base materials shall be compacted to provide a level hard surface on which to place first course of units. Compaction shall be with a mechanical plate compactor to 95% of standard proctor.
4. Base materials shall be to the depth and width shown. Contractor may opt for replacing top three inches of base with an unreinforced concrete topping. When masonry reinforcement technique is used, check footing design in that section for further details.

D. Unit Installation
1. First course of concrete wall units shall be placed on the prepared base with the raised lip facing out and the front edges tight together. The units shall be checked for level and alignment as they are placed.
2. Insure that units are in full contact with base. Proper care shall be taken to develop straight lines and smooth curves on base course as per wall layout.
3. All cavities in and around the base row shall be filled with "base material" and compacted. Backfill front and back of entire base row to firmly lock in place. Check again for level and alignment. All excess material shall be swept from tops of units.
4. Install next course of wall units on top of base row. Position blocks to be offset from seams of blocks below. Perfect "running bond" is not essential, but a three-inch average minimum offset is recommended. Check each block for proper alignment and level. Fill all cavities in and to an 8" depth behind block with "drainage. fill" Backfill remaining space behind second course with onsite soils and compact to 95% of standard proctor.
5. Lay up each subsequent course in like manner. Repeat procedure to the extent of wall height.

**2.3 Water Management**

A. Avoid retaining wall design and installation which would permit pooling and collection of surface runoff above wall.
B. Adequate provisions to be made to control surface runoff and direct around wall ends. Provide swales above and below wall as permissible to accommodate.
C. Retaining Wall design and installation to provide maximum lateral drainage at site as allowed by existing site conditions.
D. Provide for additional drainage relief behind retaining walls above 5 feet in height. Install 4-inch diameter perforated drain tile at wall base and above grade at base of wall. Install tee-fittings and outlets through wall surface at no greater than 20 feet on center.
E. Provide for adequate mulch or vegetative ground cover above and surrounding retaining wall to prevent excessive soil erosion.
F. Contain sources of concentrated water flow such as roof scuppers, drains and valleys, parking lots, etc...and route around wall accordingly.

## REINFORCEMENT
### GEOGRIID

**PART 1 GENERAL**

**1.1 Scope**

Work includes furnishing and installing geogrid reinforcement, wall fill, and backfill to the lines and grades designated on the construction drawings and as specified herein. Also included is the furnishing and installing all appurtenant materials re-required for construction of the geogrid reinforced soil retaining wall as shown on the construction drawings.

**1.2 Applicable Sections of Related Work**

A. Section I: Allan Block Modular Retaining Wall Units.

**1.3 Reference Standards**

A. See specific geogrid manufacturers reference standards.

**1.4 Delivery, Storage, and Handling**

A. Geogrid
   1. Contractor shall check the geogrid upon delivery to assure that the proper material has been received.
   2. Geogrid shall be stored above -20 degrees F.
   3. Contractor shall prevent excessive mud, wet cement, epoxy and like materials which may affix themselves to the gridwork, from coming in contact with the geogrid material.
   4. Rolled geogrid material may be laid flat or stood on end for storage.

**PART 1 GRID MATERIALS**

**2.1 Definitions**

A. Geogrid products shall be of high density polyethylene or Polyester yarns encapsulated in protective coating specifically fabricated for use as a soil reinforcement material.
B. Concrete retaining wall units are as detailed on the drawings and are specified under section: Retaining Wall Units.
C. Wall fill is a free draining granular material as defined in section: Modular Concrete Retaining Wall systems as "Drainage Fill" behind the wall.
D. Backfill is the soil which is used as fill for the reinforced soil mass.
E. Foundation soil is the insititu soil.

**2.2 Products**

A. Geogrid shall be the type as shown on the drawings having the property requirements as described within the manufacturers specifications.

**2.3 Acceptable Manufacturers**

A. A manufacturers product shall be approved by the engineer prior to bid opening.

**PART 3 EXECUTION**

**3.1 Foundation Soil Preparation**

A. Foundation soil shall be excavated to the lines and grades as shown on the construction drawings or as directed by the Engineer.
B. Foundation soil shall be examined by the Engineer to assure that the actual foundation soil strength meets or exceeds assumed design strength.
C. Over-excavated areas shall be filled with approved compacted backfill material.
D. Foundation soil shall be proof rolled prior to fill and geogrid placement.

**3.2 Wall Erection**

A. Wall erection shall be as specified under Section I: Retaining Walls.

**3.3 Geogrid Installation**

A. Install ALLAN BLOCK wall to designated height of first grid layer, backfill and compact behind wall to depth equal to designed grid length.
B. Cut geogrid to designed embedment length (Lgrid) and lay behind wall with cut edge of grid on top of ALLAN BLOCK to back edge of lip. Extend to back of slope.
C. Place next course of ALLAN BLOCK on top of grid and fill block cores with drainage fill to lock in place. Remove slack in grid and stake to maintain tension.
D. Geogrid shall be laid at the proper elevation and orientation as shown on the construction drawings or as directed by the Engineer.
E. Correct orientation (roll direction) of the geogrid shall be verified by the contractor.
F. Follow manufacturers guidelines relative to overlap requirements of uniaxial and biaxial grids.
G. Location and placement of the geogrid is as shown on the drawings. The relative position of the geogrid layers to the height above finished grade must be maintained regardless of the number of units which are placed below finished grade.

**3.4 Fill Placement and Backfill Placement**

A. Wall fill material shall be placed in lifts and compacted as specified under Section: Modular Concrete Retaining Wall Systems.
B. Backfill shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in and/or movement of the geogrid.
C. Only hand-operated compaction equipment shall be allowed within 3 feet of the wall face.
D. Backfill shall be placed from the wall rearward to insure that the geogrid remains taut.
E. Tracked construction equipment shall not be operated directly on the geogrid. Minimum backfill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks form displacing the fill and damaging the geogrid.
F. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.
G. The backfill shall be compacted to achieve 95% standard proctor. Soil tests of the backfill material shall be submitted to the on-site engineer for review and approval prior to placement of any backfill These soil tests shall be performed by an independent testing agency, or approved on-site lab. The test results shall be given to the on-site engineer as soon as possible after testing. The contractor is fully responsible for achieving the specified compaction requirements. The on-site engineer may direct the contractor to remove and correctly replace any soil found to be not in compliance with these specifications.

## MASONRY

The design and construction of a Reinforced Masonry Wall System shall comply with Sections B through D and the provisions of chapters 23 and 24 of the 1991 UBC.

## TECHNICAL SUPPORT

Engineering support for projects that fall beyond the scope of these guidelines, contact **ALLAN BLOCK CORPORATION** at **1-800/899-5309** for assistance.

# ALLAN BLOCK - ORDER SHEET

| | | | |
|---|---|---|---|
| Project Name | _____ | Standards | _____ |
| Company | _____ | Angles | _____ |
| Contact | _____ | Corners LH | _____ |
| Address | _____ | Corners RH | _____ |
| City | _____ | Capstones | _____ |
| Phone | _____ | Color | _____ |

**TOTAL BLOCKS** - Calculate the total square feet of each wall in the project - Wall length x Avg. wall Hgt. Remember to include burying 1 inch of block for every Ft. of wall Hgt. Add all of these wall footages together to get the total Sq. Ft. Multiply the total Sq. Ft. x 1.3 to find the total number of BLOCKS.

Total Sq. Ft. _____ x 1.3 = _____ TOTAL BLOCKS

**ANGLE BLOCKS** - When constructing an outside curve every other block will be an Angle Block. To find required Angle Blocks measure the total Sq. Ft. of outside curved walls and multiply by .65. Add additional Angle blocks as needed for angled corners, steps etc.

Outside Curves _____ Sq. Ft. x .65 = _____ + Misc. Angles = _____ TOTAL ANGLES

**CORNERS** - Corner Blocks come in left and right hand units. For outside 90 degree corners measure the total corner heights and multiply by 2. Divide this number equally between left and right hand units. For step downs take total step down height and multiply by 2. Use right corners for right step downs and left corners for left step downs. See page 7 for construction details.

_____ Ft. of Height x 2 = _____ (Outside Corners / Total)

_____ TOTAL LH CORNERS

_____ Ft. of Height x 2 = _____ (Steps Down / Total)

_____ TOTAL RH CORNERS

**STANDARD BLOCKS** - Subtract total number of Angle Blocks and Corner Blocks from total Blocks.

_____ (Total Blocks) - _____ (Angles) - _____ (Corners) = _____ TOTAL STANDARDS

**CAPSTONES** - Each Capstone is 15 5/8 inches long. Divide total linear feet of capped wall by 1.3.

_____ (Total Capped Wall) Linear Ft. / 1.3 = _____ TOTAL CAPSTONES

**DRAINAGE FILL** - Install free draining crushed stone in the cores of the blocks and 6"-8" directly behind the wall. To find **Cubic Yards** needed divide the total wall square footage by 27.

_____ (Total Sq. Ft.) / 27 = _____ TOTAL CUBIC YARDS DRAINAGE FILL

**BASE MATERIAL** - Install a compactible granular material (3/4 minus/road base) 6 inches deep by 24 inches wide for a base. Find the total wall length and divide by 27 to get total cubic yards for base.

_____ (Total Wall Length) / 27 = _____ TOTAL CUBIC YARDS BASE MATERIAL

**Note:** We recommend that you add 5% to the block order to account for contingencies.

# ALLAN BLOCK - DESIGN PAD

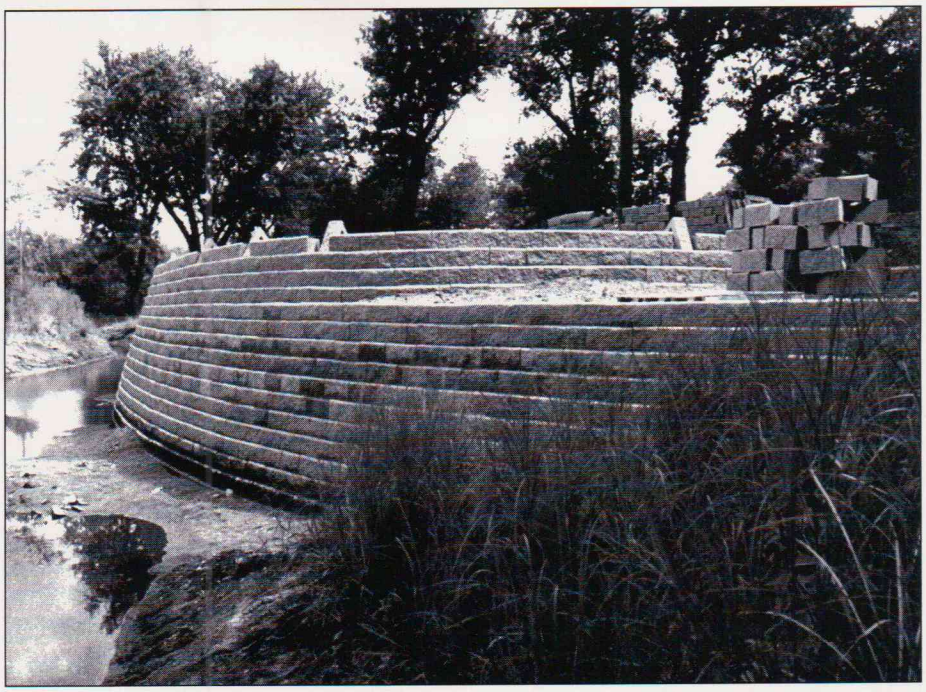
Project Name:_____ Date:_____
Designer: _____ Scale:_____

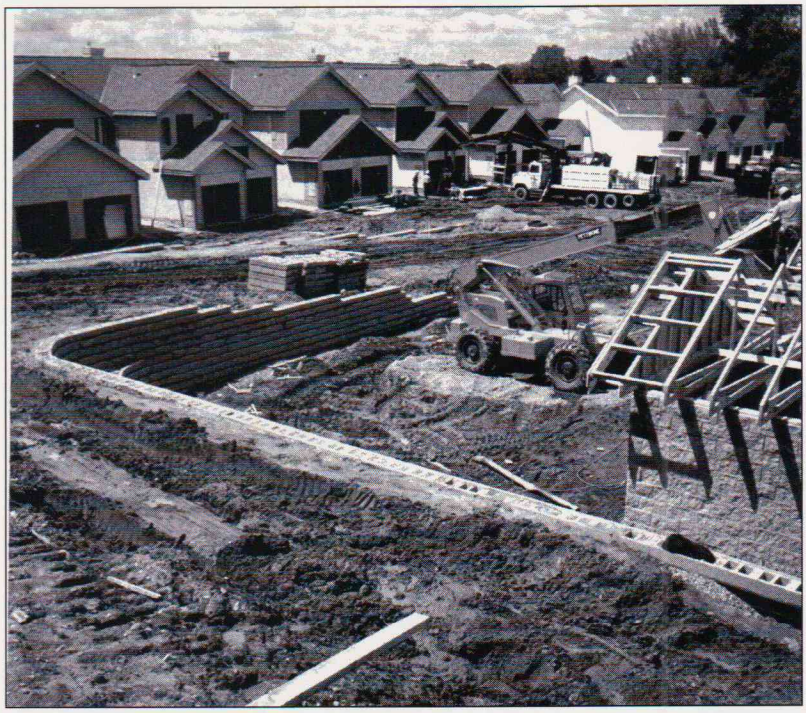
Indicate general wall layout, wall heights, topography above and below walls, soil conditions, lot lines, buildings etc.

| SITE CONDITIONS | SOIL TYPE | NOTES: |
|---|---|---|
| Above Wall _____ | Clean Sand _____ | |
| Below Wall _____ | Mixed Silts _____ | |
| Surcharge _____ | Firm Clay _____ | |
| Other _____ | Other _____ | |

**FOR DESIGN/ENGINEERING HELP CALL THE ALLAN BLOCK CORP: 800-899-5309 FAX 612-835-0013**

The information in this manual has been carefully compiled by the ALLAN BLOCK CORPORATION and to the best of our knowledge accurately represents ALLAN BLOCK product use in the applications which are illustrated. Final determination of the suitability of any information or material for the use contemplated and its manner of use is the sole responsibility of the user.





# THE ALLAN BLOCK WARRANTY

**ALLAN BLOCK INC.**, warrants to its customers that each **ALLAN BLOCK** will meet or exceed current ASTM standards on compression, strength,and absorption for a period of up to **20 YEARS** from the date of shipment.

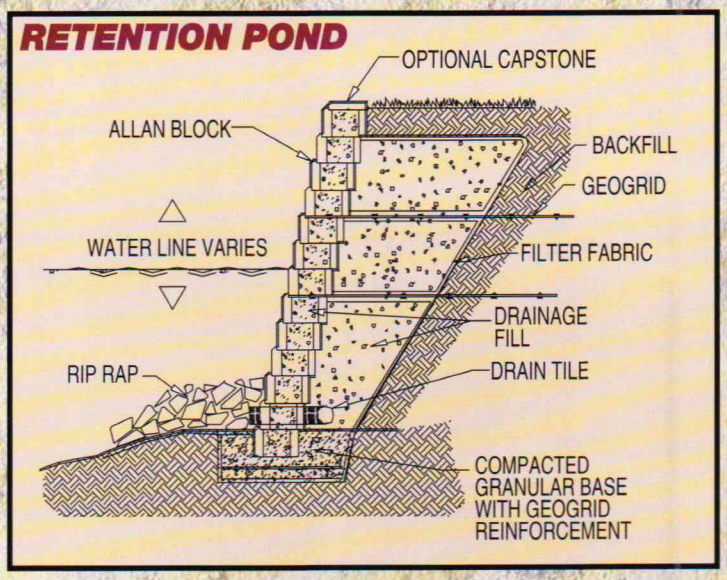
If an **ALLAN BLOCK** does not meet these standards, and as a result causes a retaining wall to fail.**ALLAN BLOCK INC.** will, upon notification in writing from from the customer, and verification of such cause, ship the appropriate number of replacement units to the customer's address, free of charge. Neither **ALLAN BLOCK INC.** nor the manufacturer shall have any further obligations under this warranty, either for replacement costs or any other costs associated with the reconstruction of the customer's wall.

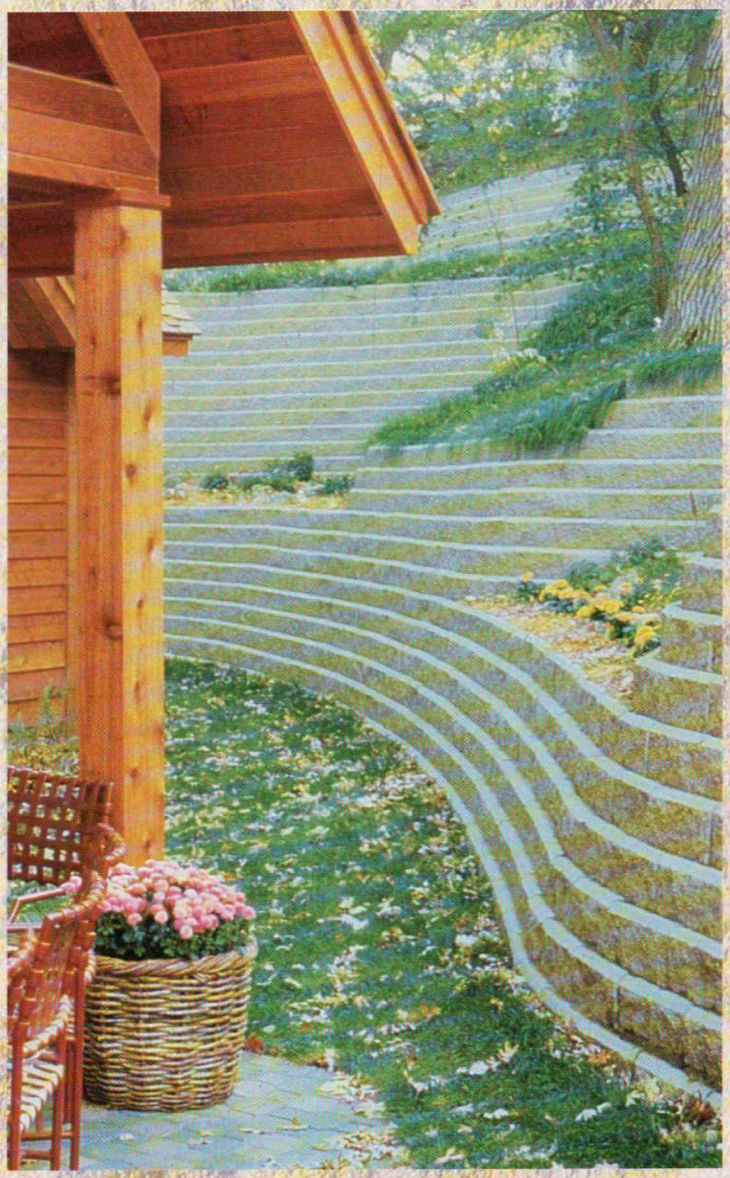
This warranty does not apply to blocks which are damaged upon delivery, blocks which are affected by unusual sight or soil conditions, blocks not manufactured in accordance with manufacturer's Product Control; Standards, the design or structure of any **ALLAN BLOCK** walls, or any blocks not installed in strict accordance with **ALLAN BLOCK INSTALLATION GUIDELINES.**

Warranty information shall be sent to Allan Block, Inc.,
7400 Metro Blvd., Suite #185, Edina, MN 55439. Phone 612/835-5309.

# From CONCEPT to CONSTRUCTION to COMPLETION

No other company stays with you like **ALLAN BLOCK**. Use our ON•LINE•ENGINEERING to find the most efficient, cost-effective solution for your retaining wall project.



## TURN KEY

1. Phone our staff of wall technicians for preliminary engineering and project evaluation.
2. Link up with our network of regional engineering and geo-technical experts for local field support.
3. Access our team of trained installers to take your wall project to completion- on time and on budget.

**ON LINE ENGINEERING AND DESIGN SUPPORT**

**1-800-899-5309**

# THE ALLAN BLOCK ADVANTAGE...

***ATTRACTIVE***

***DURABLE***

***VERSATILE***

***EASY to INSTALL***

***FULLY ENGINEERED***

The ***ALLAN BLOCK Retaining Wall System*** was designed and developed in 1985 to answer the need for a durable, attractive and affordable retaining wall product. Over five million square feet of ***ALLAN BLOCK*** has since been installed on commercial and residential projects and met the needs of every architect, engineer and owner. Available all across North America.

DISTRIBUTED BY:


**ALLAN BLOCK CORPORATION**

7400 Metro Boulevard
Suite 185
Edina, MN 55439

612-835-5309
1-800-899-5309
FAX 612-835-0013



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