



allanblock.com

# Rooftop Landscaping and Gardens

Rooftop landscaping is not a new concept but today with the continued expansion of green spaces they are becoming even more popular in urban environments for both new and existing sites. For what once was an unattractive building rooftop can now be transformed into usable space for public recreation, entertainment or outdoor living spaces. Allan Block products continue to be a popular choice of architects and engineers for their innovated design and flexibility. Allan Block's retaining walls, seating walls and fence products all provide a hollow core that provide a lighter material weight and can be used with a variety of fill material to satisfy the project requirements. To properly design a rooftop landscape certain factors need to be known.

## Purpose of the roof

- o Entertainment
- o Relaxation
- o Living Space
- o Public or Private Use

## What are the desired elements

- o Raised Garden Beds
- o Stairs
- o Seating Walls
- o Fountains
- o Walking Paths
- o Pools

## Roof Parameters

- o Designed Weight Limit of the Roof
- o Water Management
- o Access to the Roof

Determining these factors will allow the engineer to accurately design the rooftop garden/living space to the client's specification.

## Purpose of the Roof

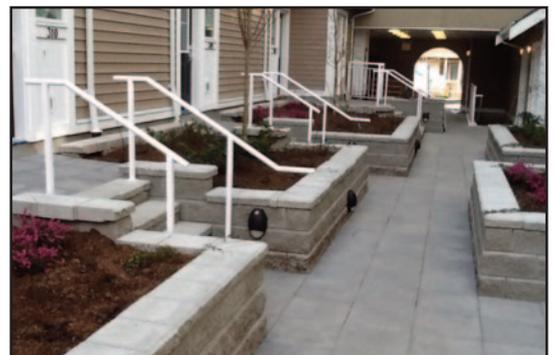
Depending on the intended use of the roof, the overall scope and design will be differ from site to site. If the roof is to be for public entertainment it may entail large open spaces to accommodate the maximum amount of people. As a relaxation space this may be a large or medium sized space that has planters and defined, enclosed areas for the average to low amount of people. If this roof is intended for an outdoor living space it will most likely be smaller and more personal.

With each different type of use the loading will change based on the capacity of people and the elements that are used in the design. A good reference for design loading comes from Table 4-1 in ASCE 7. ASCE 7 suggests a Live Load of 100psf (4.79kN/m<sup>2</sup>) be used for rooftop gardens. They also suggest a load factor combination of 1.2 Dead Load and 1.6 Live Load. Therefore, if designing new or evaluating existing structures it is important to understand and to minimize the weight of all material used.

## Elements

The elements that are utilized in the design may come straight from the owner or from a landscape architect on behalf of the owner. Every element will be different and have its own dead load associated with it. For example if there is a water feature or a pool the associated loading will come from the materials and the water weight. If the element is to support plant growth, such as a planter, the loading will result from the plants, the growing medium, the Allan Block planter box material and the water that is absorbed into the growing medium. For stairs and walking paths the loading will come from the pavement material along with the base material.

It is very common to utilize lightweight fill material or even styrofoam blocks as backfill. Allan Block's flexibility allows the designer to take advantage of these material to provide a strong but light alternative to other products and material.



# Rooftop Landscaping and Gardens

The arrangement of the elements will affect the design and selection of the roof supports and in turn the roof itself. The designer must consider the fact that rooftop gardens do not provide a uniform loading therefore analysis of new or existing roof structures needs to be carefully reviewed for loading capacity.

## Water Management

It may sound obvious to say that water management is critical for rooftop gardens and public spaces but it is. The simple definition implies that there is a building below and water cannot be allowed to leak into that space. Water is needed to support the plant life and this water not only adds weight to the structure, it must be managed to prevent leaking into the building. Therefore every design must have a water management plan that includes an understanding of irrigation requirements and drainage and/or water storage requirements. The designer must call for the proper waterproofing membrane system to ensure no leakage. It goes without saying that finding and repairing a leak is most difficult and expensive after the completion of the garden space.

## Design and Construction Considerations

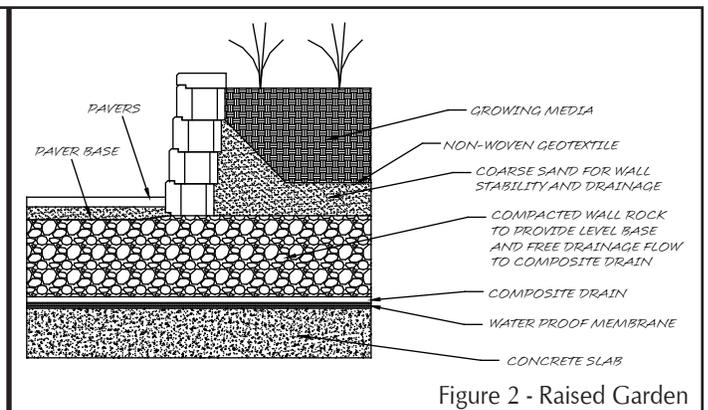
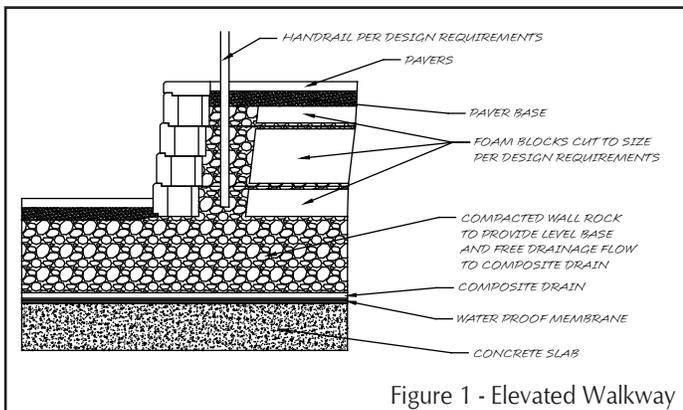
No roof top garden will be identical to the last one or even the next one but there are similarities to design and construction detailing one should consider. This section will discuss design and construction practices for the three main Allan Block product lines: AB Retaining Wall products, AB Courtyard and AB Fence.

## AB Retaining Walls

As mentioned above, weight is a major consideration for the rooftop gardens and any of the AB Collections will work great for this application.

The design process is the same as any typical wall in that the designer must consider external overturning and sliding calculations and all internal calculations. These walls however will commonly use lightweight aggregate fills or even foam blocks to lessen the overall structure weight. AB Retaining Walls can be designed in Allan Block's AB Walls Design Software. The designer can easily modify the unit weights of infill and retained soils to match the lighter weight material typically used.

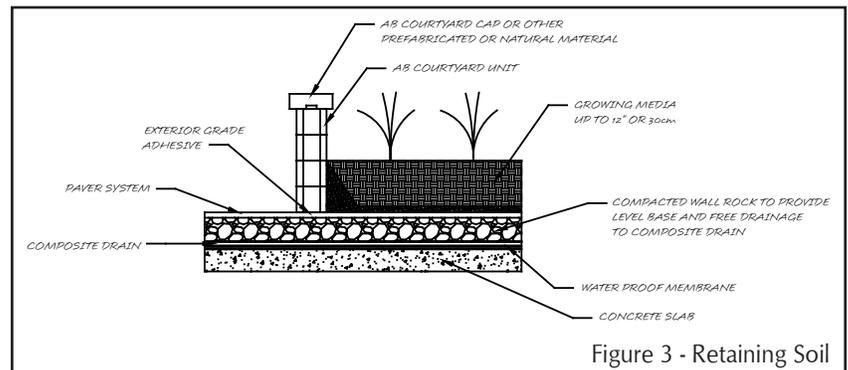
Any typical retaining wall application can be utilized on a rooftop such as a simple wall, raised walkway, raised flower bed, stairs, parapets, etc. Figures 1 and 2 show two typical rooftop applications. Figure 1 shows a wall supporting a raised walk-



way and Figure 2 is configured as a typical planter bed. Both utilize the same block and the same substructure designed to handle the migrating water runoff but have very different internal structures due to loading and intended use. One has geogrid and foam block to support the surcharge loading from the walkway and the other is a gravity wall with plantable area directly behind the cap unit. The drainage concerns for either section are minimal as we simply let gravity do the work down to the composite drain system above the roofing material. This fact can also result in the elimination of the traditionally used toe and heel drain if the design engineer agrees. Please note that with a slight change to Figure 1, the designer could create a shallow pond or fountain for added beauty and character to the rooftop. By simply replacing the non-woven geotextile with a manufactured rubber membrane, the growing media can be replaced with water. For more detailed discussion on building with Allan Block Retaining wall units see either the Retaining Walls by Allan Block Guide or the Commercial Installation Manual at [www.allanblock.com](http://www.allanblock.com).

## Allan Block AB Courtyard

AB Courtyard is very popular for rooftop gardens because it is so versatile and has an exceptionally attractive appearance. It can be used for small retaining walls up to 12 in. (30cm) in height, seating walls, screening and security fencing, decorative accent posts, benches, outdoor kitchens and much more. Just like the retaining walls, AB Courtyard has a hollow core that provides for a lighter installed weight and can be built directly on the roofing material or on a compacted level base. If the engineer allows, many Courtyard applications can be built on top of the finished roof paver system. AB Courtyard is finished on both sides and typically capped with the AB Courtyard Cap unit or other natural stone material. Figure 3 shows a common seating wall section supporting a raised planter bed. Any AB Courtyard application that can be built in your backyard can be built on your rooftop. Allan Block's website has AB Courtyard literature, design idea books, how-to tech sheets and videos to describe every aspect of how to design and build with AB Courtyard. The AB Courtyard Reference Guide will provide the installer with all the tools they need to modify and install the units. The AB Weekend Projects and Patio Packages will provide numerous ideas for your rooftop. From simple seating walls to ponds and fountain to firepits and outdoor kitchens, the AB Courtyard will be the product that completes your rooftop living space.



## AB Fence

AB Fence is typically used for screening and security fencing or in larger projects, sound walls. All these applications may be required for a rooftop setting. In standard applications, AB Fence is designed to be attached to a structural base or footing using reinforcing steel and concrete grout in the posts for added strength. For rooftop applications where the height of fence walls will be much shorter, dry stacking the post and panel units is most common. Using an exterior grade masonry adhesive to glue the courses of post and panel block together will provide adequate wind resistance for most applications. AB Fence is easy to install for all applications and if the engineer requires, the structural post can be physically connected to the roof top similar to the typical in-ground construction. Figure 4 shows a common structural connection to the roof deck for a screening application. For a complete discussion on AB Fence and its design and installation along with photo ideas and how to sheets, see [allanblock.com](http://allanblock.com).

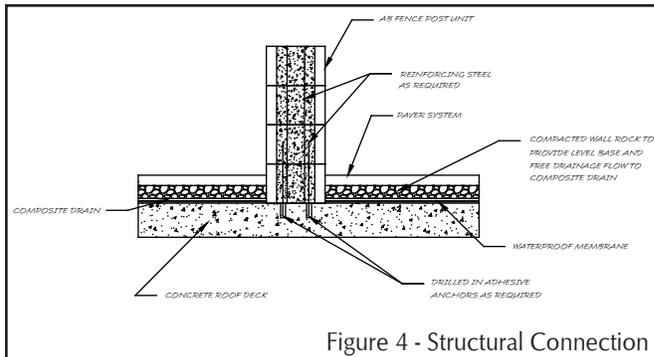


Figure 4 - Structural Connection

The information shown here is for use with Allan Block products only.