

GREENING *the* WALLS

BY VICKI LEE

Parking structures haven't traditionally been viewed as things of beauty; historically, they've been thought of as dull, gray, and packed with vehicles that emit pollutants. An increasingly popular solution to this challenge has been to cover parking garages' façades with living green walls.

Green walls, also known as living walls, vertical gardens, or plant walls, are a rising trend in green design. These living works of art are a cost-efficient way to beautify a building, creating a whole new aesthetic while adding positive environment benefits, such as better air quality, urban beautification, general well being, temperature regulation, and building protection. In many ways, green walls are perfectly suited for cold, hard structures that need a touch of nature, but they're also a way of doing good for the community and planet Earth.

There are two different types of green wall systems that work for parking garages; each one has its own advantages and varies in cost:

- **Traditional Vine Trellis.** This is planted in the ground or in a planter. It can grow along the face of the wall, whether on its own, on a cable system, or on an installed screen. Keep in mind that with this option only one row of plants is planted at the bottom and grows up the entire surface. The drawback to this system is that you won't know at the start if your façade will ever be fully covered, and reaching full coverage could take years. The advantage is low cost.
- **Vine Containers/Screens.** These are rows of vine containers that are typically placed at 5-foot intervals up across the surface of the wall. While this system does cost a little more than a traditional vine trellis, the advantage is that you get much more consistent coverage, the plants can reach higher levels, and the wall is assured of consistent coverage. You also have the option of adding pre-grown plants at an additional cost.

Whether you opt for a traditional vine trellis or vine containers/screens, here are the top 10 things you'll want to consider before installing a green wall on your parking garage:

1. AESTHETICS

Living walls give buildings an immediate wow factor—the idea of seeing plants grow vertically on walls is both innovative and fascinating. Today, they are wonderful pieces of art that make a green statement about environmental commitments for any building owner or business. Living walls have the potential to transform any space by turning a concrete surface into an aesthetically pleasing artwork while improving people's experience. Furthermore, they are green infrastructures that help contribute to urban green space.

Many cities have started to implement a green space requirement for new developments, and a green wall can be counted toward this. In some cases, parking developers may even be allowed to increase parking density as a result of including more greenery.



From plant selection to maintenance, the top 10 essentials when considering a living green wall.

A newly installed green wall. The vines will fully cover the walls in 1–2 years, as shown in artist rendering at left.

In instances where there have been pushbacks against new parking structure developments, green walls have been a successful concession to put forward in the negotiations to get a project approved.

2. FUNCTIONALITY

There is more to living walls than meets the eye! A perfect blend of nature and art, there are many proven environmental benefits that come from these eco-friendly green walls, including:

- **Screening.** Living wall systems designed for parking garages provide an instant greening effect that is aesthetically pleasing and very cost effective.
- **Temperature Regulation.** Green walls reduce wall temperature by as much as 15 degrees Fahrenheit. They also help mitigate the urban heat island effect that is a result of concentrated heat from air conditioners, asphalt roads, vehicles, and the general population. Green walls lessen the heat through the evaporation process and shading surfaces that are conducive to heat absorption.
- **Air Quality Benefits.** You can breathe easy knowing that plants on the green walls act as a natural breathing air filter by removing dust and toxins. They help increase energy-rich O₂ and reduce CO₂ through the

process of photosynthesis. Just 50 square feet of green wall can consume as much CO₂ and produce as much O₂ as a 15-foot-high tree in one year!

- **Sound Absorption:** We are constantly surrounded by noise in the city; fortunately, plants on the green wall can absorb acoustic sounds and minimize noise pollution. Built on the exteriors of a building, green walls serve as noise buffers that can significantly reduce sound reflection and vibrations.
- **General Well-Being.** Plants help ease physiological and psychological pressures of city life by providing a spiritual and physical connection to nature.

3. HEIGHT

The height or the number of building stories will influence the coverage of the green wall and how high it can be installed. Traditional vine trellis systems are great for one to two stories of green wall coverage, whereas container systems are recommended for coverage higher than two stories, although they can be used for one to two stories of coverage, as well.

4. STRUCTURAL

Depending on your location, wind and earthquakes may play a significant role in your ability to install a green wall. Traditional vine systems are not an issue, but vine containers/screens require planning for additional weight and fasteners to the building. Also, depending on the location of specific structural elements within the building, a green wall may or may not be able to be installed on a certain area of the surface. Consulting with a structural engineer on the job is required to ensure anchors are placed far enough from post-tension cables so they will not compromise the structural integrity of the building.

5. IRRIGATION

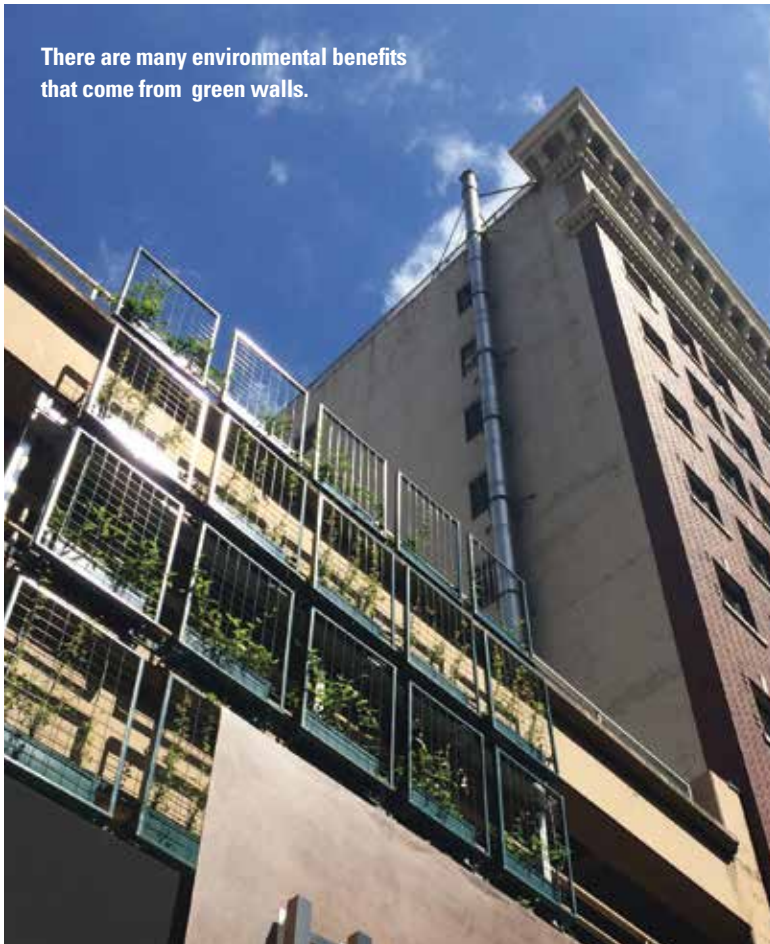
There are two options to get water to the green wall:

- Install all of your valves in a single location and run individual lines to each point you want that water to reach.
- Install a single water line and stub out to each water location and put a valve at each of the stub outs. This requires an electrical conduit to be placed alongside the water line to run valve control wires to reach the valve. The number of valves that are required on a wall will be determined by several factors:
 - Solar exposure of the plants.
 - The height of the plants on the wall.
 - The number of plants on the wall.
 - Any shading conditions that might be affecting any specific areas of the wall.

6. DRAINAGE

Drainage is typically not as big of an issue for parking structures because there are drainage points available

There are many environmental benefits that come from green walls.



throughout the structure. It is often possible to drain water onto the parking surface early in the morning when irrigation runs, or it can be tapped directly into the sanitary system—either way is perfectly acceptable.

7. ENVIRONMENTAL

Another important factor to consider for outdoor green walls is climate and the direction a wall faces and exposure. Temperature and exposure can affect the way the plants grow.

When using a vine container/screen system in a warm climate, it is important to keep the roots of the plants from overheating in the containers. To do this, the containers must be shaded from direct solar radiation. If this doesn't happen, the plants' roots will heat up and require more frequent watering to keep cool, increasing your water bill. That being said, if you don't irrigate frequently, the plants could die.

In cold climates, various plants survive freezing by injecting a natural anti-freeze into their branches and roots. However, if the roots of the plants get too cold, the temperatures can exceed the capabilities of the plant roots to protect themselves. To protect the plants' roots, there should be a heating wire system installed in the planters that will protect them from damaging temperatures. This heating wire does not bring the roots above freezing but keeps temperatures within the container at a point that protects roots so the plants can recover and thrive in the spring.

8. PLANTS

The U.S. Department of Agriculture Plant Zone Map will help you determine the best-suited plants in your area. The USDA map has 11 plant zones, ranging from very cold (e.g., Zone 1, which includes Alaska), to very hot and/or humid (e.g., Zone 11 includes Puerto Rico, and Zone 9 includes Arizona).

Popular plant choices include vines, evergreens, and deciduous. You can even mix evergreens with flowering or deciduous vines to create seasonal flower and color change.

9. ACCESSIBILITY

Before installing a green wall, you need to consider how it will be accessed. If you can't access it, you can't put a green wall there! There are a variety of ways to access the plants, such as ladders, scissors lift, boom lift, scaffolding, elevated platform, and more. At the end of the day, you need a way to access your living wall.

10. MAINTENANCE

Maintenance is required on all plants. The type of system and the site conditions will determine the degree to which maintenance is required. Frequency of visits also depends on location and cost.

Green Walls At a Glance

Technical Details	Traditional Vine Trellis	Vine Container/ Screening System
Maintenance	Low	Medium
Cost	Low	Medium
Coverage at install	Virtually none	Low
Years to fully cover	15+	1 to 3 years

Environmental Benefits	Traditional Vine Trellis	Vine Container/ Screening System
Air Quality Improvement	Low	Medium
Heat Absorption	Low	Medium
Noise Abatement	Low	Low-Medium

Here is what you can expect by season:

- **Spring.** This is the time of year when longer days and warmer temperatures initiate new leaf growth on the plants. The beginning of spring will quickly fill the walls back in with new leaves until they are fully covered again. Maintenance on vines should be done to train new shoots to cover bare locations on the wall and to cut back any nonperforming or overgrowth areas of the wall. This is also the time when the plants need nutrients (fertilizer) to support new growth and develop good vigor.
- **Summer.** Most plants go dormant over the summer to deal with the longer days and heat. Irrigation is still required, but it must be carefully managed to not damage the plants by over- or under-watering.
- **Fall.** Fall will see a last spurt of growth due to shorter days and cooler temperatures. It is at this time that the plants will benefit greatly from pruning in order to prepare for the winter by hardening off, and to promote thick, tight growth in the following year. Leaf cleanup and cutting back dead stems is the biggest maintenance task at this time of the year for all walls.
- **Winter.** Evergreen and semi-evergreen plants will hold their leaves over the winter, however, they will appear depressed, especially in areas with a lot of snow. Deciduous vines will lose their leaves over the winter and your screens will be bare, displaying only the stems/branches of the plants. There are some vines that flower from these bare branches in the winter, but they aren't available in all locales. Maintenance is minimal, and irrigation systems in cold climates are shut down and blown out on vine container systems.

In conclusion, there are several things to consider before installing any type of green wall. Green walls are alive—they are a living system comprised of various technologies that are designed to keep the plants alive and thriving. As such, green walls need routine care to ensure all components are performing at their best. Plants, just like all living things, require food, regular cleaning, grooming, and pruning. That being said, only proper maintenance can guarantee a beautiful and long-lasting green wall.



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