

SPECIFICATION

Green Living™ Technologies (GLT) - Green Living™ Wall System

This specification describes the GLT green wall panel system designed to provide a vegetative cover on sloped (>20 degrees) and vertical surfaces. Green Living™ Wall Panels can be delivered as a pre-grown system or non-vegetated / planted in place. Green Living™ Wall Panels are also used as a freestanding (Without being mounted to an existing vertical surface) system. This specification is intended to be included in any **Sections or synonymous descriptions titled – Green Walls or Living Walls.**

1. General

1.1 Related Sections

- Mounting Surfaces
- Hardware
- Panels
- Trim and Catch Basins
- Irrigation
- LEED Qualifications

1.2 Installation Contractor

- .1 The Green Living™ Wall Panels should be installed by an authorized agent of Green Living Technologies (GLT) or certified GLT installer or local labor in addition to GLT supervision. In the event the Green Living™ Wall Panels are not installed by authorized agent or in fact installed by authorized agent GLT shall not be named in any legal actions, disputes or other. Installation contractor will be solely responsible for any legal actions, disputes or other.

1.3 Proof of Structural Load Bearing Capacity

- .1 An engineer's report confirming the load bearing capacity of the existing structure *must be provided by the client*. Green Living Technologies will not be held responsible. This report must be furnished to the named installer. It is assumed that the client has accepted all responsibilities related to the structural integrity of the wall or roof in relation to installing a green wall or sloped green roof and will not name GLT in any legal actions, disputes or other.

1.4 Plans & Shop Drawings

- .1 The client must provide scale drawings to authorized agent for quotation and design purposes.
- .2 If acceptable scale drawings are not available, authorized agent or approved alternate will be required to produce said drawings at the client's expense.
- .3 Authorized agent will provide plan and shop drawings to client showing all material terminations, transitions and penetrations.

1.5 Waterproofing Membrane

- .1 There may be a need for an approved high quality waterproofing membrane in place under the GLT wall system prior to installation of the green wall.
- .2 The waterproofing manufacturer specifications must detail approval for the membrane to be installed in a vertical position.

- .3 A flood test, or other approved leak detection method, is to be performed prior to installation of the GLT green wall system to ensure the membrane is performing as per manufacturer's specifications. GLT will not accept or is responsible for existing leaks or other issues related to the membrane. A leak test report confirming the water tightness is acceptable and *must be provided by the client*. If a report is not provided to GLT or GLT installing agent, GLT or GLT agent will not be named in any legal actions, disputes or other.
- .4 The waterproofing membrane will be covered by a separate warranty issued by the waterproofing provider and will not be covered under the GLT product warranty.
- .5 Green Living Technologies will not be held responsible if this report is not furnished. It is assumed that the client has accepted all responsibilities related to the waterproofing capabilities of the membrane and will not name GLT in any legal actions.

Accessories

- .6 All other components or accessories must be approved or provided by GLT to ensure viability and performance of the system as per the specifications.

1.6 Masonry Mounting Surface

- .1 Include but not limited to: Cinder Block, Stone Wall, Masonry Wall, Brick Walls, Marble and Granite. Generally masonry mounting surfaces must conform to the requirements specified in the 2006 International Building Code (IBC) Section 2103.
- .2 Masonry mounting surfaces must be in a condition to accept suitable hardware to meet a minimum sheer force of 1500 pounds (680 kilograms) as specified by the hardware manufacturer.

1.7 Other Mounting Surfaces

- .1 Other mounting surfaces may include but not limited to sheet rock, ply wood and dens glass. Please refer to the Green Living™ Technologies detailed specification to installing the Green Living™ Wall Panels on these surfaces.

1.8 Lead Time

- .1 It can take as long as 6 months of growing season to produce a pre-grown system depending on plant species and propagation method. The decision to purchase a pre-grown system must be made 6 months prior to the installation date to allow sufficient time for this production by a local approved grower. Growing will commence within 3 weeks from the date set by GLT. A signed contract does not commit GLT to the 6 month growing period (See .3) until all the panels are manufactured.
- .2 Upon contractual obligations and deposit confirmations GLT will issue an anticipated ready date for the delivery of pre-grown green wall panels.
- .3 Production of GLT components can take as long as 2 months to manufacture. A lead time of 2 months should be anticipated when ordering any components. Projects that are fully engineered or custom designed may take up to 3 months depending on the total number of square feet (square meters)
- .4 If the client named requests the system to be delivered sooner than the issued ready date, GLT or the GLT authorized growing agent will not be responsible for immature plants and is assumed the aesthetic appearance is acceptable "as is".
- .5 Some geographic regions provide stock panels already pre-vegetated for a premium fee. Not available in all locations.

1.9 Contract Documents

- .1 In the case where GLT or GLT authorized agent is hired to install the system a signed contract specifying the scope of work, terms and conditions, payment scheduling, warranties, and any other relevant information is required before plant propagation is started.

1.10 Warranty on Workmanship

- .1 A five (5) year standard warranty on workmanship is to be provided by the installer. This does not include a plant warranty.

1.11 Warranty on Components

- .1 GLT warrants all non-living components of the GLT system will perform as specified for 15 years provided the GLT maintenance program is paid and up to date and has been followed and any work performed on the system has been done by GLT or a GLT approved agent.
- .2 The 15 year warranty for the brackets, spacers, green wall panels, catch basins and edging details of the GLT system states that these components will not degrade due to physical, chemical or biological processes that naturally occur in a green wall system. The labor and material cost of any warranty work is covered in this warranty. An extended warranty is available for this portion of the system but must be used in conjunction with the GLT maintenance program performed by a GLT authorized agent.
- .3 All warranties are void if a GLT maintenance agreement is not current.

1.12 Warranty on Vegetation

- .1 A one (1) year warranty and maintenance contract for the approved vegetation shall be provided with the initial quotation for an extra cost as part of the GLT Platinum maintenance agreement. (*All vegetation warranties are voided unless an automatic low volume irrigation system is installed) This will cover all aspects of the vegetation and system performance. An extended warranty (including vegetation) could be available as part of the continued maintenance program and can be extended for as long as a maintenance program is purchased through an authorized representative.

1.13 Extended Warranty and Maintenance Program

- .1 An extended warranty and maintenance program can be purchased for the GLT system.
- .2 The warranty and maintenance program is available in the form of an annually renewable contract between GLT approved agent and the client. The warranty will cover all system components including plant performance provided that all maintenance has been performed by a GLT approved agent since the date of installation.
- .3 Upon completion of the 15 year warranty on the brackets, spacers, green wall panels, catch basins and edging details the system will retain the GLT warranty beyond the 15 years if a maintenance agreement has been in place and continued, GLT will extended the manufactures warranty in conjunction with the maintenance agreement. Once the maintenance agreement is terminated the extended GLT warrantee become void.
- .4 SEE MAINTENACNE AGREEMENT AND PROCEEDURES 3.5

2. Products

2.1 Description

- .1 The GLT green wall system is made up of standard modular sections (See Appendix A) of vegetation area that are delivered as a preassembled product to the site for installation. The plants may be pre-grown into the modules and all components that make up the system are spot welded together to maintain structural integrity. The ability to customize and accessorize the system with various options is possible provided the design has been approved by GLT or Approved Agent.
- .2 The GLT green wall system may also be custom manufactured or custom engineered to accommodate non-standard design and product options.
- .3 The GLT green wall system is also available as a freestanding (Defined as: Not being mounted to a solid vertical surface)
- .4 Required Components for a vertical surface (Exterior or Interior)

Mounting surface (See Section 1.6 & 1.7) suitable for retaining hardware with a minimum 1500 lbs minimum sheer force of 1500 pounds (680 kilograms) as specified by the hardware manufacturer.

- .a GLT 1/2" (minimum) (1.27 cm) to 3/4" (maximum) (1.905 cm) green wall bracket spacers.

Type	Female Unthreaded Round
Female Unthreaded Round Type	Standard
Material Type	Plastic
Finish	Plain
Plastic Type	Recycled Polyethylene
Body Length	1/2"
Body Length Tolerance	±.062"
Screw Size	1/2"
Outside Diameter	1"
Outside Diameter Tolerance	±.02"
Inside Diameter	.51"
Inside Diameter Tolerance	±.02"
Threading	Unthreaded
Color	Black
Rockwell Hardness	Not Rated
Tensile Strength	Not Rated
Operating Temperature	-70°F to +180°F

- .b GLT green wall brackets drilled at a minimum 16" (40.64 cm) on center for hardware.

Material	Multipurpose Aluminum (Alloy 6061)
Finish/Coating	Unpolished (Mill)
Shape	Sheets, Bars, Strips, and Cubes
Sheets, Bars, Strips, and Cubes Type	Plain
Edge Type	Square
Tolerance	Standard
Thickness	.025"
Thickness Tolerance	±.002"
Length	48"
Length Tolerance	±1/8"
Width	2"

Width Tolerance	±1/16"
Temper	T6
Hardness	95 Brinell
Yield Strength	35,000 to 40,000 psi
Flatness Tolerance	Not Rated
Temperature Range	-320° to +300° F
Specifications Met	American Society for Testing and Materials (ASTM)
ASTM Specification	ASTM B209

c. Green Living Wall Panels: (Aluminum or Stainless Steel), see appendix A for standard sizes

Aluminum

Material	Multipurpose Aluminum (Alloy 6061)
Finish/Coating	Unpolished (Mill)
Shape	Sheets, Bars, Strips, and Cubes
Sheets, Bars, Strips, and Cubes Type	Plain
Edge Type	Square
Tolerance	Standard
Thickness	.032"
Thickness Tolerance	±.003"
Length	48"
Length Tolerance	±1/8"
Width	48"
Width Tolerance	±1/16"
Temper	T6
Hardness	95 Brinell
Yield Strength	35,000 to 40,000 psi
Flatness Tolerance	Not Rated
Temperature Range	-320° to +300° F
Specifications Met	American Society for Testing and Materials (ASTM)
ASTM Specification	ASTM B209

Stainless Steel

Material	Stainless Steel
Stainless Steel Type	Modified 440A Stainless Steel
Thickness	.024"
Thickness Tolerance	±.001"
Width x Length	6" x 24"
Length Tolerance	±.25"
Width Tolerance	±.250"

d. For Pre-Grown systems a GLT approved substrate:

Green Wall Panel Depth (inches / cm)	Pounds Per Square Foot Saturated (Kilograms / Square Meter)
3" depth (07.62 cm)	15 lbs per sf saturated (72.93 kg / m ²) *ground covers and sedum
4" depth (10.16 cm)	20 lbs per sf saturated (97.25 kg / m ²) *ground covers and sedum
6" depth (15.24 cm)	30 lbs per sf saturated (145.87 kg / m ²) *ground covers and sedum

e. Established vegetation with root growth. (Pre vegetated only)

.1 Optional Components

- .a GLT edging details and irrigation accessories.
- .b Irrigation catch basins and drainage
- .c Custom Plants

1.2 Substrate

- .1 A locally produced substrate must be applied to the interior cells of the system for the purpose of plant sustainability.
- .2 Any growing medium required must be approved or provided by GLT or GLT authorized agent to ensure viability and performance of the system as per the specifications.

1.3 Vegetation

- .1 The plant list must be approved or provided by GLT or GLT authorized growing agent to ensure viability and performance of the system as per the specifications.
- .2 The vegetation with root establishment into the green wall cells and substrate must be mature enough to provide 90% cover upon installation. (Pre-grown system only)
**GLT will and can deliver a pre-mature product prior to the required 6 month lead time. Less lead time equates to a less mature product and client assumes a product less than 90% mature to be acceptable. (See 1.8)*
- .3 It is possible that climate regions will require growing in a green house. Additional costs may be applied to regulate green house temperatures.
- .4 Some geographic locations provide stock pre-vegetated panels, not available in all locations. Contact GLT or your local GLT agent.

1.4 Irrigation

- .1 Various irrigation solutions are available depending on the situation. All irrigation designs must be approved or designed by GLT or GLT authorized agent.
- .2 An irrigation water source must be provided at the vicinity of the green wall with a shut-off valve installed by certified plumber.
- .3 Grey water or rainwater irrigation water is encouraged for use with the GLT System. Water quality must be approved by GLT or GLT authorized agent prior to installation.

1.5 Edging Details

- .1 Various edging details that fasten to the system are available. This edging detail is designed to be anchored under and over the green wall panel. Edge details also have the option of being powder coated or wrapped with a decorative metal such as copper, contact GLT or approved agent for more information.
- .2 All edging must be approved by GLT for use with the GLT system.

2. Execution

2.1 Delivery

- .1 Co-ordination of delivery time lines is the responsibility of GLT or GLT installer. Two (2) days advance notice of delivery to the producer is necessary to ensure there are no delays.
- .2 The pre-grown modules will be palletized or transported on the GLT panel carrier and delivered to site for installation on the date of installation unless otherwise specified.
- .3 Only pre-grown sedum will be palletized. All other varieties will not be stacked or transported with such the plant material is under weight in any way.

2.2 Storage (This refers to exterior sedum genus)

- .1 If the outside temperature is above 77°F (25°C) the modules must be installed within one (1) day after being palletized to prevent damage to the vegetation. If the outside temperature is between 59°F (15°C) and 77°F (25°C) the modules must be installed three (3) days after being palletized to prevent damage to the vegetation. If the outside temperature is between 41°F (5°C) and 59°F (15°C) the modules must be installed five (5) days after being palletized to prevent damage to vegetation.
- .2 Palletized vegetated material must be stored in a secure, cool shady environment out of direct sunlight prior to installation. Vegetated panels must be protected from rapid temperature changes of more than 30°F (7°C)/hour. All vegetation is to be installed within three (3) days of being delivered. If this is not possible contact GLT for further instructions.
- .3 All other materials (non-living) should be stored in a dry location out of direct sunlight with original packaging and documentation left intact prior to installation.
- .4 All interior plants must be stored in a temperature equal to that of the installation area or as specified by GLT or GLT authorized growing agent.

2.3 Site Protection

- .1 The work area is to be protected from damage by first sweeping off all debris and then laying protective covering in work and traffic areas.
- .2 All areas below the installation area must be sectioned off with caution tape, protective cones and / or other means to prevent persons from walking under the installation work area.

2.4 Installation

- .1 The GLT spacers and green wall brackets must be installed to support the green wall panels.
- .2 The spacers must be filled with marine grade polyurethane or water cut-off (if using a membrane utilize the manufactures brand water cut-off).
- .3 The modular trays can then be picked up by two individuals and placed in the proper area.
- .4 The panels must interlock from the upper and lower sections of the panel with maximum spacing of ¼" (.635 cm) (6.35 mm).

2.5 Maintenance (See Sample Maintenance agreement as Appendix B)

- .1 Maintenance must be provided by a GLT approved agent.
- .2 A maintenance contract beginning from the completion of system installation and is provided with initial quotation by the installer or GLT authorized agent as an additional cost.
- .3 Maintenance work done by an unapproved GLT agent may void any warranties made by GLT.
- .4 Additional maintenance programs and costs are subject to the type of plant species and growing mediums specified for the project.
- .5 All maintenance contracts are subject to annual renewal. Failure to renew the maintenance agreement with GLT approved agent voids all vegetative warranties.
- .6 Every year the client renews the maintenance agreement GLT approved agent will renew the vegetative warranty.
- .7 Upon completing the 15 year non-vegetative warranty every year the client renews the maintenance agreement GLT will continue to warranty the non-vegetative components in addition to the plant material.
- .8 To uphold the non-vegetative 15 year warranty a copy of the maintenance agreement must be left with the contact of the project site and a copy must be electronically submitted to GLT upon every site inspection, maintenance visit or service call.



**LEED™ Fact Sheet
Aluminum Sheet & Plate
for the Building & Construction Market**

(LEED™ is Leadership in Energy & Environmental Design. The LEED Green Building Rating System™, as promulgated by the U.S. Green Building Council, aims to improve occupant well-being, environmental performance and economic returns of buildings using established and innovative practices, standards and technologies.)

RECYCLED CONTENT

A survey of aluminum producers in mid-2008 indicated that the total recycled content of domestically produced, flat rolled products for the Building and Construction market was approximately 85%. The survey of the producers also indicated that on average ~60% of the total product content is from post-consumer sources. While these numbers represent the industry average, higher post-consumer and total recycled content material may be available from individual producers. For information on the LEED™ program and to find out how you can earn credit for the recycled content of your aluminum products go to: http://www.usgbc.org/leed/leed_main.asp.

RECYCLABILITY

Not only does the aluminum used in the building and construction industry contain a high percentage of both post-consumer and post-industrial recycled content, at the end of its long, useful life in your building application it is **100% recyclable**. Aluminum building components can be repeatedly recycled back into similar products with no loss of quality, and aluminum in its various forms provides the most valuable component for most municipal recycling efforts.

To produce **aluminum from recycled material requires only ~5% of the energy** required to produce aluminum from bauxite ore, and every ton of recycled aluminum saves 4 tons of bauxite. Additionally, using recycled aluminum instead of raw materials reduces air pollution generation such as CO₂, SO_x, and NO_x by 95% and water pollution by 97%.

For additional information on aluminum products for the building and construction industry, please contact your local supplier.



www.aluminum.org



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**LEED™ Fact Sheet
Stainless Sheet & Plate for the Building & Construction
Market**

(LEED™ is Leadership in Energy & Environmental Design. The LEED Green Building Rating System™, as promulgated by the U.S. Green Building Council, aims to improve occupant well-being, environmental performance and economic returns of buildings using established and innovative practice, standards and technologies.)

RECYCLED CONTENT

The stainless steel producing members of the Specialty Steel Industry of North America indicated that the average post-consumer recycle content of the 300 series stainless steel grades, generally used in the building and construction market is approximately 75 to 85%.

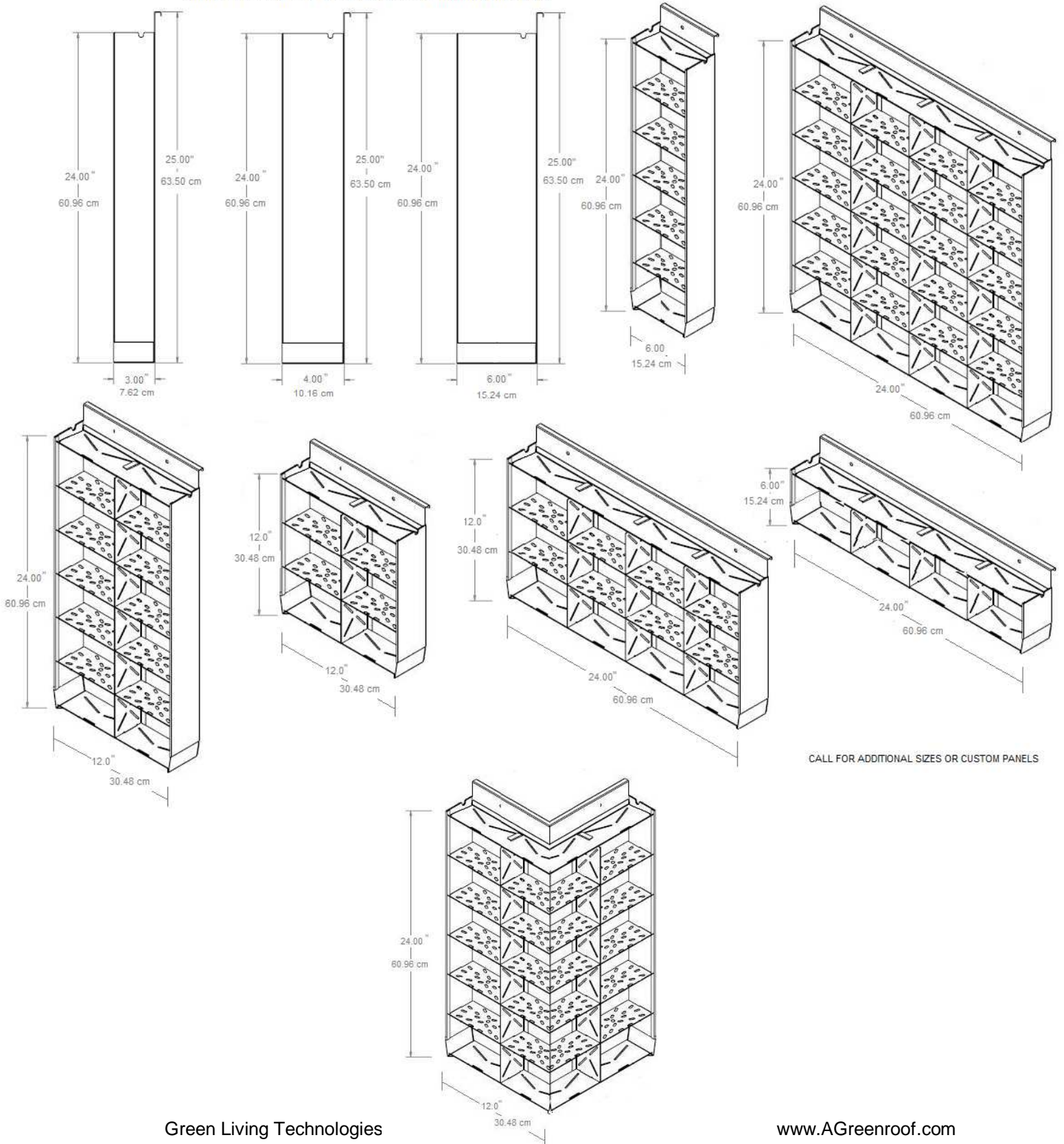
RECYCLABILITY

Not only does the stainless steel used in the building and construction industry contain a high percentage of both post-consumer and post-industrial recycled content, at the end of its long, useful life in your building application it is 100% recyclable. Stainless building components can be repeatedly recycled back into similar products with no loss of quality.

www.ssina.com

Appendix A

SIDE ELEVATIONS & AVAILABLE PLANTING DEPTHS



Appendix B

Name of project:

Date:

Client Name: Full Address of project:

Phone Number:

Fax Number:

E-mail Address:

System Type:

Plant Maintenance:

XYZ a GLT authorized agent will furnish all supervision, labor, material, equipment and transportation for one visit per year, month, week, day (Circle One or bold text) to maintain the NAME Green Roof / Wall (Circle One or bold text) **TO START FROM, November 5, 2008** to uphold the warranty on the vegetation. Name will provide the following services outlined below and will submit to the client a completed Maintenance Task Chart that will also outline any additional recommendations. Any questions can be directed to ENTER CONTACT NAME HERE

Included in the Where Maintenance is:

Tailor description here

- Lift, permits for lift, off hour work
- Servicing done 1 time per week (Until the Green Wall reaches 90% coverage / maturity)
- Upon maturation service will be 1 time every other week and eventually one time per month or as needed / prescribed by Vision Landscaping.
- Replacement plants during service visits when on hand or when immediately available if required.
- Service can be tailored once the green wall is deemed mature.

Maintenance is based on a natural growth pattern of the Green Wall plants.

Additional charges may be a result as the following is not covered as part of the maintenance plant warranty and will require approval between Vision Landscapes and the client named:

- a. Acts of God or terrorism
- b. Water restrictions via local municipalities or government
- c. Winterizing and start-up of irrigation (Pending)
- d. Vermin, birds and animal damage (Plant Replacement per flat of 70 – 1” plugs is \$_____per flat installed)
- e. Name will assess an additional \$_____ per man hour to remove any of the bird screens in the event the green wall cannot be serviced due to the screen inference.

Plant replacement as part of the plant warranty will be replaced with:

- Plant replacement per flat of 70 - 1” plugs of same or similar.

Irrigation

Vision Landscapes will be the authorized Irrigation representative, Contact number for questions/problems/emergencies: ENTER CONTACT NAME HERE. The service is as follows:

_____ **service calls per year** including Start Up and Shutdown:

For each service call our technicians will thoroughly check all zones and water distribution of each zone and ensure proper distribution and timing. _____ hours are allowed for each service call. Filters and drains will be cleaned. Timers will be checked and set. For system start the piping and equipment will be charged and check for leaks and proper distribution and the timers will be set. Shutdown / winterization will consist of draining the system of _____, turning off the main and draining the supply lines and backflow equipment, if applicable. Parts are not included in any of our agreements and will be billed at 15% off of list price.

Not covered under agreement:

Any damage caused by others (i.e—other contractors, landscapers, delivery companies, animals, vandalism, human contact, etc.)

Damage caused by acts of God or Nature (lightning, flood, etc.)

Repair or replacement of Controllers/Clocks

Repair or replacement of Backflow devices

Repair or replacement of Pumps

Rerouting of irrigation system due to construction

Adding or moving heads and/or valves

Adding or moving zones

Any and all additional service and repair work performed will be billed at the following rates:

_____ per hour/Primary Technician

_____ per hour/Each Laborer

Parts will be billed at list price less 15%

A proposal will be provided for any new additions, such as new zones, controllers, backflows, filters, pumps, piping, wiring, etc. for any of the areas which may or may not be a part of the systems listed in this agreement.

Reports: A copy of each site visit and checklist must be retained on the site!

After each site visit, a completed checklist will be submitted to the client by the approved agent along with any recommendations that may be needed to enhance the performance of the Green Wall / Green Roof. The Maintenance Task Chart should be kept accessible on the project premise for the technician at all times. A copy of all service will be electronically submitted to Green Living Technologies by Name Name will also retain their own copies.

Notification/Items that will void this warranty

It is the responsibility of Store Manager or other Representative to notify Name at the first sign or sight of a problem.

Warranty violations are:

1. No notification
2. Client's staff/personnel trying to resolve a problem
3. *Any attempt to service the green wall in anyway.

*If there is an irrigation failure and water is flowing from either the exterior or interior plumbing it is accepted that someone, anyone, has to shut the main water supply located in the rear utility closet where the irrigation controllers are housed. There is a valve that is clearly marked "In case of emergency turn this valve off".

See next page

Name will physically demonstrate and verbally explained what to do in the case of an emergency irrigation shut off.

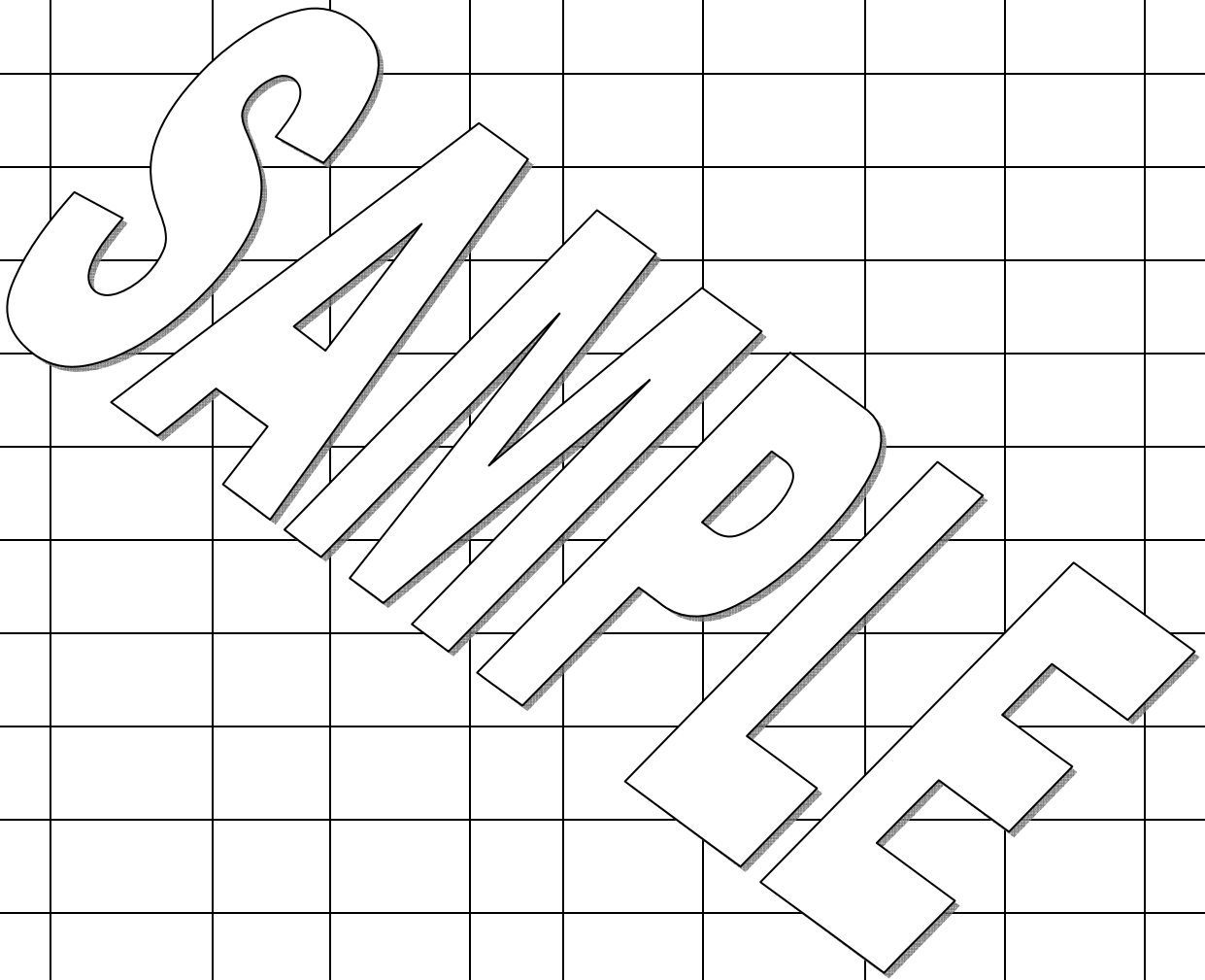
Authorized Signature Name: _____

Store manager / Client named: _____

Date: _____

By signing the above name has physically demonstrated and verbally explained what to do in the case of an emergency irrigation shut off.

Maintenance Task:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Irrigation Startup and Winterization-set irrigation frequency as needed as per season												
Inspect Irrigation System for leaks, loose fittings or malfunctions.												
Clear drip holes of any material and clean lower irrigation catch basin if needed.												
Physically inspect perimeter, visible brackets and trim												
Inspect Plant Health												
Weed Green wall or and Dispose of Weeds (Exterior only)												
Fertilizer 2 times per year												
Remove and dispose of plant material that has died back or yellowed as a result of natural processes.												
Replaced any dead plant material with same or similar.												
Fungicide Treatment / Insecticide Treatment (please specify)												



Payment Terms and Conditions

Description

November 5, 2008 – November 6, 2009 Platinum Maintenance Program (1 year) x

Terms and Conditions: All payments are in US Dollars

Contract must be renewed on a per term basis or at the end of contract agreement to uphold continuing warranty on vegetation.

Contract is to be paid in full prior to service. If the contract is not paid in full and an issue or problem occurs the authorized GLT agent named will not be held responsible. If contract is not paid in full, the contract does not exist and the client named will not name the authorized agent and GLT responsible for any damages that may occur during this period.

Long term maintenance (2,3,5+ terms are available directly with the authorized maintenance agent)

Client

Approved Agent

Name (Print) _____

Authorized Signature _____

Position _____

Witness or Seal _____

Date _____

*THIS MAINTENANCE AND PLANT WARRANTY IS BETWEEN THE CLIENT NAMED AND THE NAMED AUTHORIZED GLT INSTALLATION, MAINTENANCE AND IRRIGATION AGENT. GREEN LIVING TECHNOLOGIES IS NOT THE CONTRACTED MAINTENANCE PERSONAL FOR THIS AGREEMENT. FOR MAINTENANCE ISSUES AND SERVICE CALLS CONTACT THE NAMED AGENT ABOVE.

HOWEVER, GREEN LIVING TECHNOLOGIES WILL MAINTAIN ACCESS TO MAINTENANCE RECORDS IN ORDER TO UPHOLD THE INTEGRITY AND MONITOR THE QUALITY OF MAINTENANCE BY THE AUTHORIZED GLT MAINTENANCE TECHNICIAN. MAINTENANCE TECHNICIAN IS NOT RESPONSIBLE FOR NON-VEGETATED OR NON-ORGANIC WARRANTIES. CONTACT GLT FOR PRODUCT WARRANTY.