



# STANDARD PANEL ASSEMBLY MANUAL

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# 1.0 INTRODUCTION

## 1.1 Greenstone Structural Engineered Panels

The GREENSTONE panel is a combination of expanded polystyrene and galvanized steel studs. The panel has load bearing, sound transmission, thermal insulation, and vapor barrier characteristics. This manual outlines the proper methods for constructing buildings using the panel. The directions found in this manual must be observed in order to achieve the full effectiveness of the characteristics of the system.

**IMPORTANT NOTE:** Impact drills are NOT permitted for installation of GREENSTONE panels. Impacts damage the structural integrity of fasteners and are not designed for use in structural members. Evidence of impacts being used during installation will render GREENSTONE's warranty VOID and the Authority Having Jurisdiction will be notified.

## 1.2 Drawing and Element Numbers

Builders should study the appropriate drawings before beginning construction and assembly. Installation Drawings are provided by GREENSTONE and show an element number for each panel in the floor plan. This element number appears on the top end of each panel. Panel drawings are viewed from the exterior. The exterior face of each panel has the logo (when provided) and leading edge overlap metal.

## 2.0 ASSEMBLY

### 2.1 Sequence of Assembly

Sequence of assembly should be determined onsite and can initiate at any building corner, with the preferred direction of assembly being right to left.

Unload the container at the job site. Stack the panels for each floor in the erection sequence shown on the Installation Drawings. Protect panels from high winds and sharp impact. Panels are usually set starting at one corner of the building and proceeding in a counter-clockwise fashion.

### 2.2 Preparation of Foundation

First verify that dimensions of the slab or subfloor are in accordance with contract documents and coordinate with Installation Drawings. These dimensions should be within the tolerances stipulated by the design professional and/or by good construction practices. Locate conduit stub-ups (if any) and drill holes in base plate.

The panels are attached to the foundation using specified steel base track with wedge anchors (concrete) or specified screw fasteners (wood sub base). Size and spacing of anchors shall be determined by a design professional based on building code requirements (ie. GRK screws).

Caulk and set baseplates or track to building dimensions and secure to the slab or subfloor using anchors as per the Installation Drawings. Be sure the plates are level and the corners are square. If the foundation is not level, shim, grout and caulk to obtain a level baseplate (track). Do NOT try to obtain a level wall by shimming the panels.

### 2.3 Wall Assembly

Using the element numbers as reference and starting at a corner, obtain the necessary panels and lay them out with the interior face down. Identify opening milestones in the wall and adjust to those during panel installation by leaving slight gaps between panels on the interior wall. GREENSTONE panels are manufactured with a  $\frac{1}{4}$ " gap on ship-lap joints to allow for adjustability. Do not winch the panels tight, any gaps will be foamed shut later. Always use AAMA 812-04 approved foam.

Reference Installation Drawings to determine which panel is fully installed in the corner and in what order the sequence is followed (R-L). Foam bottom track the length of the panel. Place first corner panel into corner, plumb both ways and screw it to the bottom track on every stud on the exterior only. Foam adjacent bottom track and place other corner panel 1" from first panel. Foam between the panels full height and push them together. Plumb both ways and screw to the bottom track on every stud on the exterior only. Install exterior and interior corner plates to secure the corner. You should have a straight and plumb starting point.

Foam between split track for the length of the next panel to be installed. Place panel into track and tilt up against the previous panel. Plumb panel and install 1 screw into leading edge or install connection plate when there is no leading edge, 2/3 of wall height from the bottom. When there is no leading edge, foam between the panels. Install 2 screws on either corner of the panel on the exterior base track only. Do NOT install fasteners on the inside of the panels other than the building corners at this time.

Install temporary wall bracing (interior or exterior) at MAX 10FT intervals.

Opening size and placement must be as per drawings with the bottom adjusted accordingly but the headers left out at this time. Headers are built ½" shorter than the opening to allow for placement and foaming later.

Top plate LBC's (load bearing channel) are longer sections which tie the building together. They should never end on a joint or in a header (min 6" past). Gap between adjacent LBC's (cutting error) shall not exceed ½". Ensure the exterior LBC's meet in the corner to tie them together. Onsite modification of the LBC will be required to accomplish this.

After building envelope is complete or a substantial amount of wall has been installed (larger builds), Install headers and install LBC's. This will further straighten and stiffen the wall. Be sure to also Install LBC's on bottom of window openings.

Once the panels are in place for one floor, the overall dimensions and squareness of the building should be checked before proceeding with the assembly of any upper floor deck or roof system. String line the wall before final foaming of all joints. Install all connection plates as per connection details, then caulk or tape all connection joints with approved products to ensure an air tight building envelope. See item 2.5 below.

## 2.4 Wall Assembly Below Grade

Reference GSS Typ. Foundation Detail for either deep burial or shallow burial below grade installation. GREENSTONE continuous below grade galvanized track must be used as shown. Follow wall assembly instructions above. Add PWF Plywood or equal and waterproofing membrane as shown.

## 2.5 Vapour and Air Barrier

GREENSTONE requires all panel joints to be sealed for air and vapour tightness. Complete a visual inspection of all joints after panel installation is complete and spray foam any visible gaps on the inside and outside of the assembly.

Joints must be sealed with spray foam and, caulking or vapour tape. Sealants must be approved for EPS and galvanized steel.

Butt joints and any non-ship-lap joints require spray foam and joint sealant on both sides of the assembly. Ship-lap joints, floor to wall, and roof to wall joints require spray foam and joint sealant on the inside of the assembly.

The base angle to floor connection (exterior split track) should NOT be sealed. This will allow any entrapped water to escape out. Ensure the top of the base angle to floor connection is fully sealed against the wall panel.

A high-vapour-permeance weather barrier membrane must be installed on the exterior to act as a drainage plane to drain water away from the panel joints under any finishes.

#### Wall Connections

- Split Track to Floor Connection – Do not apply caulking or sealant to the outside base of split track. Do apply caulking prior to installing inside base of split track.
- Panel to Split Track Connection – Apply continuous bead of foam between split tracks on floor or base material. It will be compressed when the panel is inserted into the split track.
- Ship-Lap Connection – Do not apply foam during installation. Fill any visible gaps bigger than ¼ inch post installation then vapor tape or caulk interior connection.
- Butt Joint Connection – Apply continuous bead of foam between panel to panel vertical connection before installation. Apply vapor tape to both interior and exterior face of connection.

#### Roof & Floor Connections

- Ship Lap Connection – Apply a 3/8 bead of caulking on male flange once panel is secured with roof clips. Apply continuous bead of foam to shiplap joint before installing next roof panel. Foam any remaining gap with foam after installation. Seal top of joint with vapor tape after completion.
- Butt Joint Connection – Space panel approximately 1" apart from installed panel. Apply continuous bead of foam to fill void between panels. Press panels together and tape top of butt joint after installation is complete.

## 3. QUALITY CONTROL

### 3.1 Inspection of Panels

Panels have been checked for density and fusion quality and for dimensions before shipment, but should be checked for damage and spot-checked for dimensions as they are unloaded and stacked. For dimensional tolerances refer to 3.3 below.

As a general rule, any defect in the polystyrene core of the panel such as small cuts or nicks will not affect the integrity of the panel. Damage to the metal will affect the panel's strength and integrity and can result in a rejected panel; refer to 3.2 below.

### 3.2 On-Site Changes

In general, any changes deemed necessary on-site must be cleared with the manufacturer before the changes are made. The following site changes may be made:

- Reject any panel with vertical steel members that are buckled.
- Straighten any bends or dents in the leading edge overlap metal.
- Electrical Boxes. Use a hot knife or other acceptable cutting tool. Do not exceed the box dimensions and, where possible, locate the box beside a vertical steel channel for screw attachment. Boxes should have recessed "ears" or brackets behind the wall cladding.
- Wiring or Conduit Chases. Vertical chases may be cut in to the polystyrene with a hot knife or other acceptable cutting tool. Vertical chases shall be cut a minimum of 2" from any vertical steel channel. Do not exceed half the panel thickness in depth or 1" in width when making these cuts. Do not cut or drill any steel without approval from an engineer.

### 3.3 Installation Compliance Report

In order to certify the GREENSTONE installation, an Installation Compliance Report must be completed by an authorized GREENSTONE Installer or Inspector. The provided Compliance Report must be used to complete the inspection.

The completed form will be reviewed by GREENSTONE and provided to the Structural Engineer of Record for the project.

### 3.4 Dimensional Tolerances

#### Panels:

- Thickness  $\pm 1/8''$
- Panel Bow  $\pm 1/8''$
- Width  $+0''$ ,  $-1/4''$
- Additional Width Deviation @ mid height  $+0''$ ,  $-1/4''$
- Length  $\pm 1/4''$
- Length difference between panels of same nominal length  $\pm 1/8''$
- Diagonal out of square  $\pm 1/4''$

#### Door, Window, and other Rough Openings:

- Width  $\pm 1/4''$
- Length  $\pm 1/4''$
- Diagonal out of square  $\pm 3/8''$



## 4. SAFETY

The panels may be handled by one or two people. The following rules should be followed:

- Gloves should be worn at all times when moving panels. The metal edges can cut and must be handled carefully.
- Do not remove panels in high wind conditions. The surface of the panel will catch the wind and can create a potentially hazardous condition.
- If high winds are possible, panels must be sheltered, weighted, or otherwise protected from moving.

## 5. DRAWINGS & REFERENCE DOCUMENTS

The following documents are required for installation and will be provided as part of the GREENSTONE Installation Package sent by your GREENSTONE Supplier:

- GREENSTONE Standard Panel Assembly Manual
- GREENSTONE Project Specific Installation Drawing Package
- GREENSTONE Standard Details
- GREENSTONE Installation Compliance Report