



Note:

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It is presumed that that viewer of this document has already reviewed the TGS Developments and Technology documents.

Thank-you for your consideration and cooperation.
TG Solutions – Global L.L.C.



*Working together to help make things better for humanity
— without harming the environment or the community!*

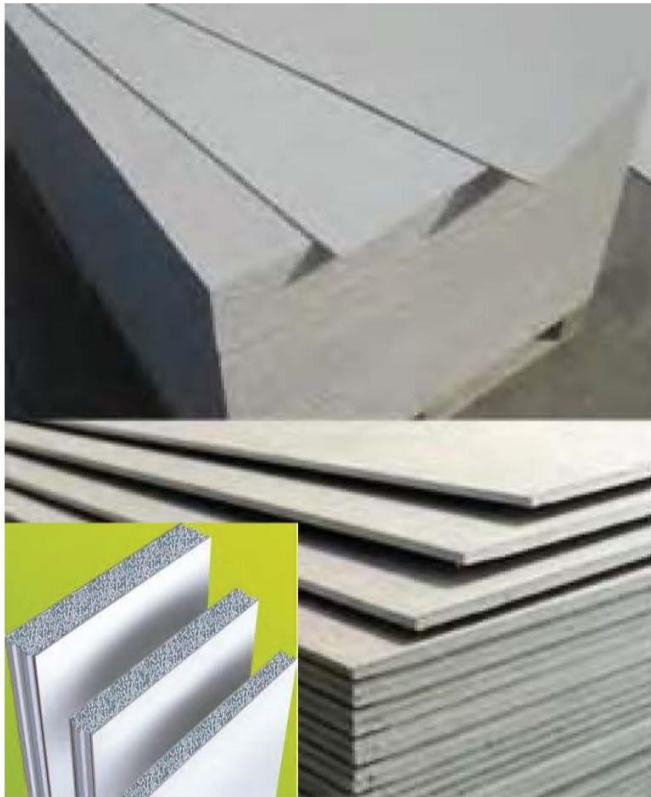


How many times have you heard people, particularly in the building and construction industry, say: “*But we’ve always done it this way*”? Does that answer make it right? **Not hardly and TGS has developed better answers.**

TGS is the developer and provider of ecologically-friendly cost-effective breakthrough products for the Building and Housing Industry. As an industry leader, **TGS** intends to always practice good stewardship to the environment, local communities, and our customers (and surrounding inhabitants).

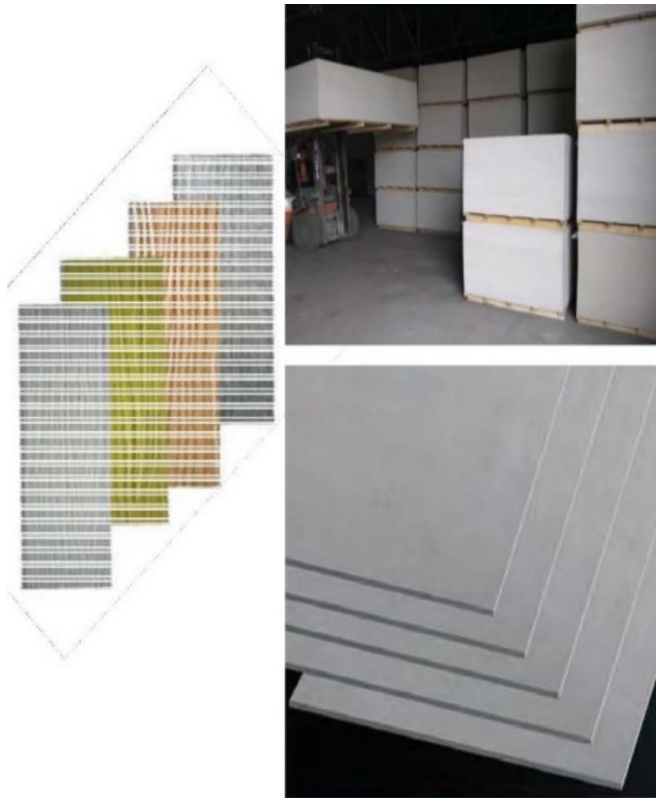
TGS firmly believes that being a good steward for the community go hand-in-hand with being a “Good Neighbor”. As a “Good Neighbor”, **TGS** acknowledges that the creation of positive employment opportunity for the local community is a critical social impact. Therefore, where possible, **TGS** plans upon utilizing local resources (*including labor*) in its manufacturing and building programs.

As a business decision, **TGS** has predetermined to incorporate the use of **TGS Micro-Facilities** in an effort to both reduce transportation costs and to provide sustainable employment opportunities for the various regions in which the **TGS Micro-Facilities** serve.



Description	TGS Light Weight Fiber Reinforced Sheathing
Cl ₂ Content	0%
Abestos Content	0%
Formaldehyde Content	0%
Density	0.8 to 1.4 g/cm ³
Residual Water content	< 12%
Dry Shrinkage Rate	< 0.09%
Sound Insulation	≥ 46 db
Thermal Conductivity	≤ 0.20 W/mk
Thermal Shrinkage	≤ 0.5%
Fire Resistance	Class A1
Fire Resistance Limit	≥ 60-minutes is typical at 9-mm thickness ≥ 240-minutes is typical at 12-mm thickness
Bending Strength	≥ 10 MPa Traverse, ≥ 8 MPa Vertical
Impact Strength	≥ 8.0 KJ/m ²
Screw-withdrawal force	≥ 20 N/mm
Freezing Resistance	No Cracking or Layering after 100 Freeze-Thaw cycles
Heat-Rain Resistance	No degradation in performance after 50 Heat-Rain cycles
Water Swelling	≤ 0.25%
Water Vapor Permeability	No water vapor after a 24-hour test
Surface Treatements	Without Sanded Surfaces
	With Sanded Surfaces
	Square Edge
	Beveled Edge
Standard Color	Gray

Note: These are the general specifications, based upon ASTM testing, for the TGS Phase 1 product. The TGS Phase 2 products are anticipated to be superior.



Description	TGS Medium Weight Fiber Reinforced Sheathing
Cl ₂ Content	0%
Abestos Content	0%
Formaldehyde Content	0%
Density	1.2 to 1.4 g/cm ³
Residual Water content	< 10%
Dry Shrinkage Rate	< 0.15%
Sound Insulation	≥ 30 db
Thermal Conductivity	≤ 0.25 W/mk
Thermal Shrinkage	≤ 1.5%
Fire Resistance	Class A1
Fire Resistance Limit	≥ 60-minutes is typical at 9-mm ≥ 240-minutes is typical at 12-mm
Bending Strength	≥ 16 MPa Traverse, ≥ 12 MPa Vertical
Impact Strength	≥ 10.0 KJ/m ²
Screw-withdrawal force	≥ 50 N/mm
Freezing Resistance	No Cracking or Layering after 100 Freeze-Thaw cycles
Heat-Rain Resistance	No degradation in performance after 50 Heat-Rain cycles
Water Swelling	≤ 0.25%
Water Vapor Permeability	No water vapor after a 24-hour test
Surface Treatements	Without Sanded Surfaces
	With Sanded Surfaces
	Square Edge
	Beveled Edge
Standard Color	Gray

Note: These are the general specifications, based upon ASTM testing, for the TGS Phase 1 product. The TGS Phase 2 products are anticipated to be superior.



TGS Fiber Reinforced Sheathing tests – Part 1

Description	Test Method	Parameters	Continuous Performance (mean)	Results
Test for Non-Combustibility	ISO 1182	$\Delta T \leq 30^{\circ}\text{C}$ $\Delta m \leq 50\%$ $t_f = 0 \text{ s}$	0.3 9.0 0	Pass Pass Pass
Test for Gross Heat of Combustion	ISO 1716	$\text{PCS} \leq 2.0 \text{ MJ/kg}$	0.18	Pass
Fire Resistance Classification	EN 13501-1	A1 = No Smoke and No burning droplets		A1
Rating for Combustibility	Non-Combustible			
Product Density	$1.23 \pm 0.14 \text{ g/cm}^3$			
Product Thickness Limitation	Unlimited			
Product Length & Width Limitation	Unlimited			
CL ₂ Content	0%			
Absetos Content	0%			
Formaldehyde Content	0%			
Residual Water Content	< 10%			
Dry Shrinkage Rate	< 0.15%			
Sound Insulation	$\geq 30 \text{ db}$			
Thermal Conductivity	$\leq 0.25 \text{ W/mk}$			
Thermal Shrinkage	$\leq 1.5\%$			
Fire Resistance Limit	9-mm thickness typically achieves a 1-hour rating 12-mm thickness typically achieves a 4-hour rating			
	Maximum Temperature approximately $1,050^{\circ}\text{C}$ ($1,922^{\circ}\text{F}$)			

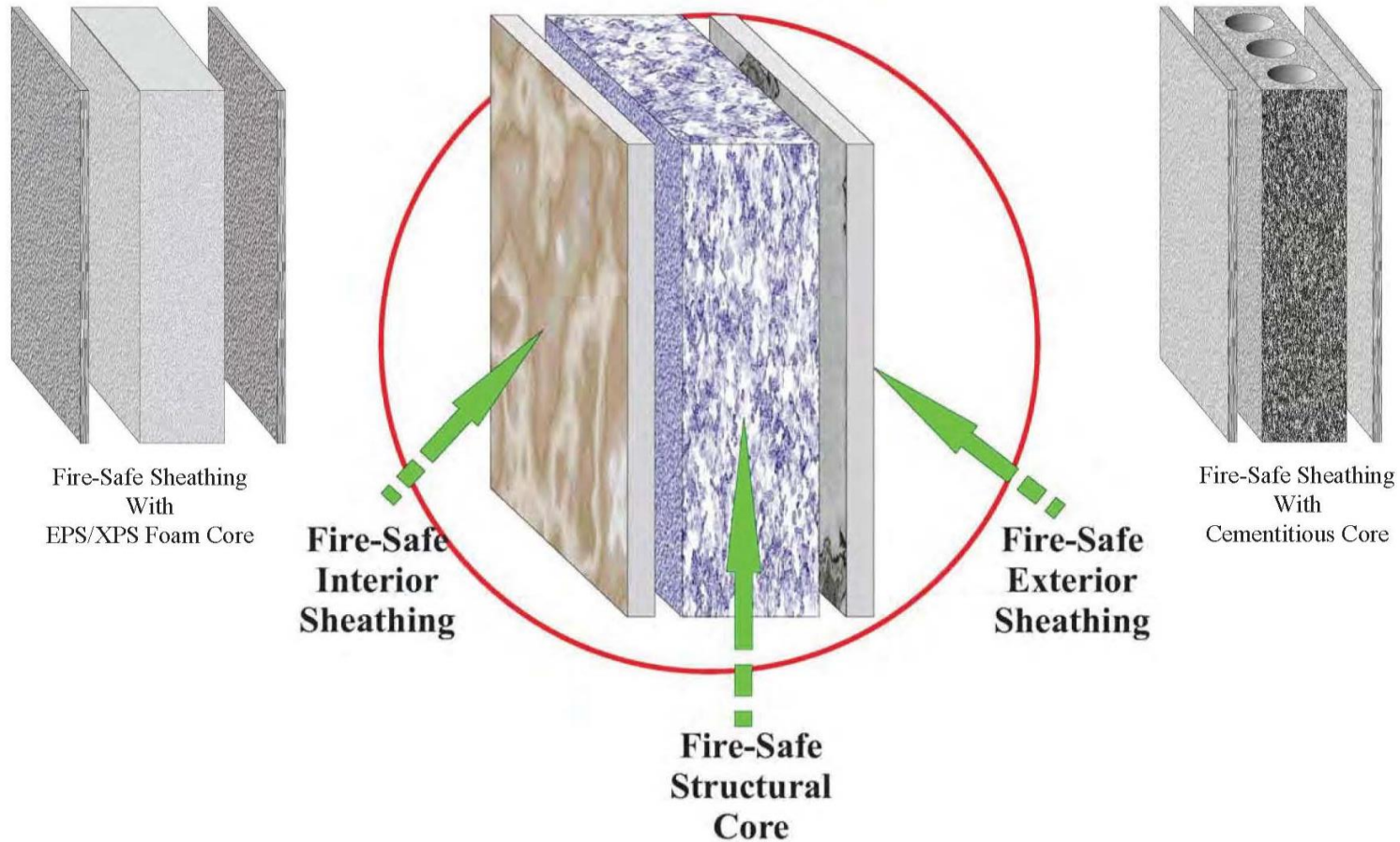


TGS Fiber Reinforced Sheathing tests – Part 2

Description	Test Method	Parameters	Continuous Performance (mean)	Results
Fire Resistance Limit	9-mm thickness typically achieves a 1-hour rating 12-mm thickness typically achieves a 4-hour rating			
	Maximum Temperature approximately 1,050°C (1,922°F)			
Bending Strength	Traverse	≥ 16 MPa	≥ 2,300 psi	
	Vertical	≥ 12 MPa	≥ 1,740 psi	
Impact Strength		≥ 10.0 KJ/m ²	≥ 4.76 ft-lb/in ²	
Screw Withdrawal Force		≥ 50 N/mm	≥ 285 lbs/inch	
Water Swelling		≤ 0.25%		
Heat-Rain Resistance	No Degradation in performance after 50 Heat-Rain cycles			
Water Vapor Permeability	No water vapor after 24-hour test period			
Freezing Resistance	No Cracking or Layering after 100 Freeze-Thaw cycles			
Available Surface Treatments	Native Surface Finish Sanded Surface Finish Square Edge Beveled Edge			
Standard Color	Gray			



“Fire Safe” Energy Saving
Structural Insulation Panels (SIP) and Walls



Fire-Safe Sheathing
With
EPS/XPS Foam Core

**Fire-Safe
Interior
Sheathing**

**Fire-Safe
Structural
Core**

**Fire-Safe
Exterior
Sheathing**

Fire-Safe Sheathing
With
Cementitious Core



Modular and Pre-fabricated Building Systems



Structural Insulation Panels (SIPs) are better than Stick Built Cavity Wall Homes

TGS SIPs are better than CAFB, Particleboard and OSB based SIPs



½ of the building using OSB + Closed Cell Polyurethane + OSB SIP and ½ of the building (plus outer building) using TGS SIP



Fire Test of OSB + Closed Cell Polyurethane + OSB SIP vs TGS SIP
The OSB had a 2.5-hour fire rating, using Fire-Retardants.



Only the TGS SIP buildings survived.

Homes built using **TGS SIPs** are more fire resistant than the SIP alternatives



TGS Structural Insulation Panel (SIP)

Test	General Description	Result
ASTM E136	Combustibility	Non-Combustable
ASTM E-84	Surface Burning Characteristics	Flame: < 10 Smoke < 5
ASTM C1185	Flexural Strength - allowable	> 580 psi wet and dry
ASTM C1185	Moisture Movement	< 0.02%
ASTM C1185	Water Absorption	< 27%
ASTM E96	Water Vapor Transmisssion	< 2.4 perms
ASTM C666	Freeze - Thaw	No disintegration after 25 and 50 cycles
ASTM G-155	Accelerated Weathering	> 2,000 hours no degradation
ASTM G-21	Fungus	None
ASTM D2394	Compression Indentation	Passes: > 1,700 psi
ASTM D1037	Nail Holding Strength	Passes: > 290 lbs
ASTM D1037	Screw Holding Strength	Passes: > 290 lbs
ASTM D1037	Falling Ball Impact	Passes: no damage at 12 inch drop
ASTM E72 ASTM E564	Allowable Shear	453 plf
	Ultimate Shear	> 10,800 lbs
	Allowable Axial Load	5,521 lbs
	Ultimate Axial Load	> 55,700 lbs
	Allowable Tansverse	59.5 psf
	Ultimate Transverse	> 170 psf
	Allowable Transverse 0	44.8 psf
	Ultimate Transverse 0	> 160 psf



Some examples of TGS *Fire-Safe*, **Energy-Efficient** Housing

Notes:

- This portion of the TGS presentation assumes that the viewers have already become aware of the various TGS products and technologies which will be incorporated.
- The following presentation is not meant to put a constraint upon the possibilities. It is provided only as a means to help illustrate some of what can be accomplished and is based upon previous discussions.
- There are **no** Design Limitations by Design.





Modular Apartment Building (example)





Modular Prefabricated Building Systems



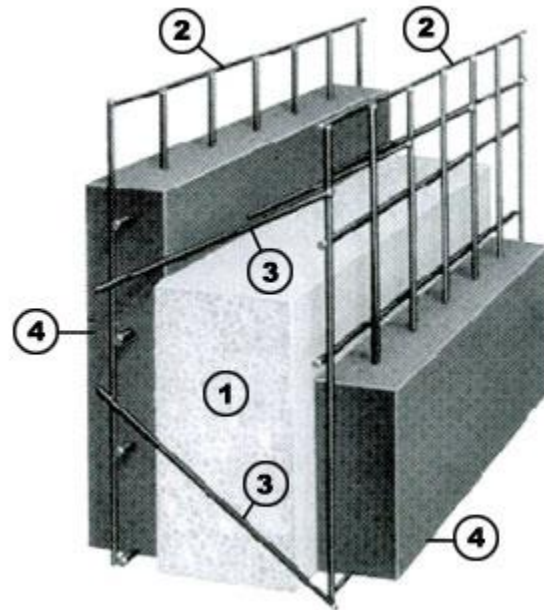
Quick and Easy Installation = Low Labor Costs



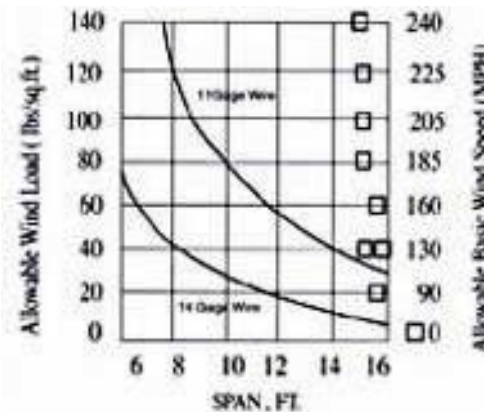


Structural Concrete Insulation Form (SCIF) Building Systems

The critical component



1. TGS Fire Resistant Foam Core or TGS Geo-Core
2. 11- or 14-gauge Galvanized Wire Mesh or TGS Rebar Grid
3. TGS Diagonal Tie Rods
4. TGS Engineered Cementitious Material; field applied



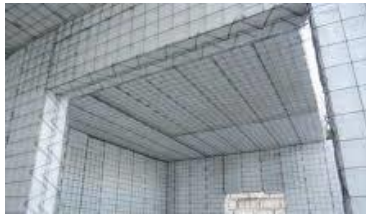
Note: Typical SCIF panels with a 2.5-in thick EPS core and 11-gauge Class III galvanized wire mesh with 2-in concrete (*each side*) has been tested at a structural load of over 70,000 psi without failure. Stronger than wood or metal frames!



TGS Structural Concrete Insulation Form (SCIF) Building Systems

TGS SCIF vs Hollow Block ICF

- ✓ TGS SCIF systems are erected 4 times faster than ICF
- ✓ TGS SCIF systems are 4 times stronger than ICF
- ✓ 1 TGS SCIF panel = 40 ICF blocks
- ✓ TGS SCIF systems cure faster than ICF concrete systems (concrete on the outside vs concrete on the inside)



TGS SCIF

Building the structure with panels



Typical ICF

Building the structure block by block



Structural Concrete Insulation Form (SCIF) Building Systems





Structural Concrete Insulation Form (SCIF) Building Systems





Examples of some Modular and Prefabricated Building Systems





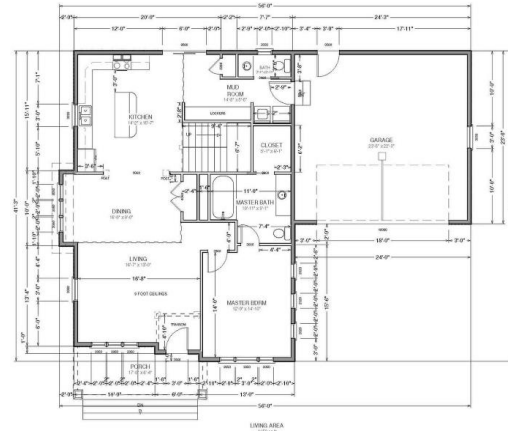
TGS Modular Prefabricated Building Systems – erected on site
Level 1, 2 and 3 *Fundamental* Housing



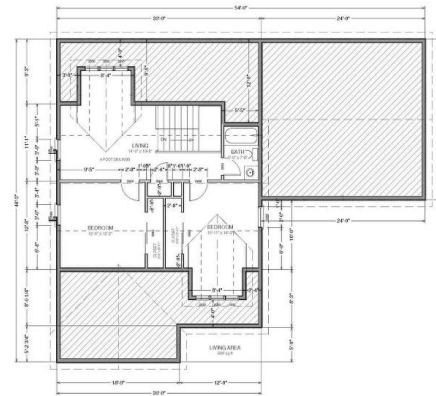
Unlimited Building Designs by Design



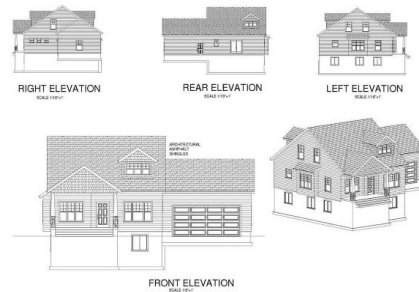
2-story Designs can be accommodated.



MAIN FLOOR PLAN
SCALE 1/8"=1'



SECOND FLOOR PLAN
SCALE 1/8"=1'

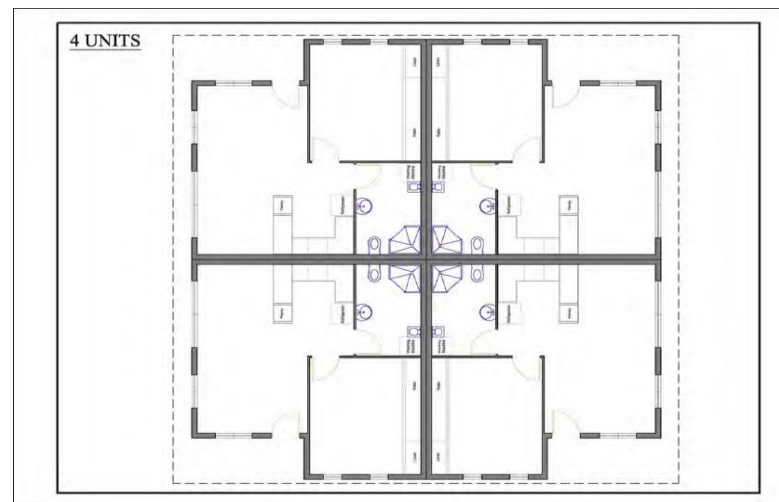


House Plan Examples



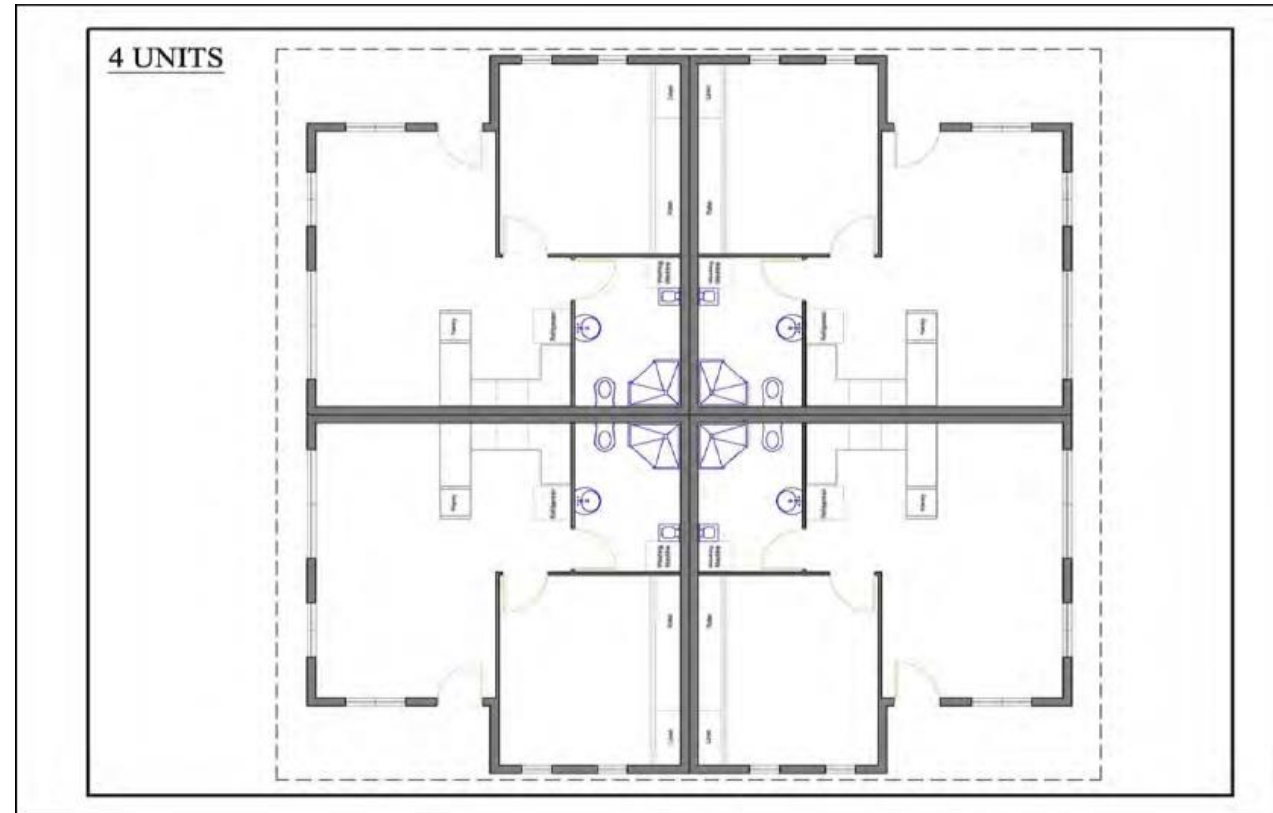


Level 1 Housing – Single to a Quadplex - example



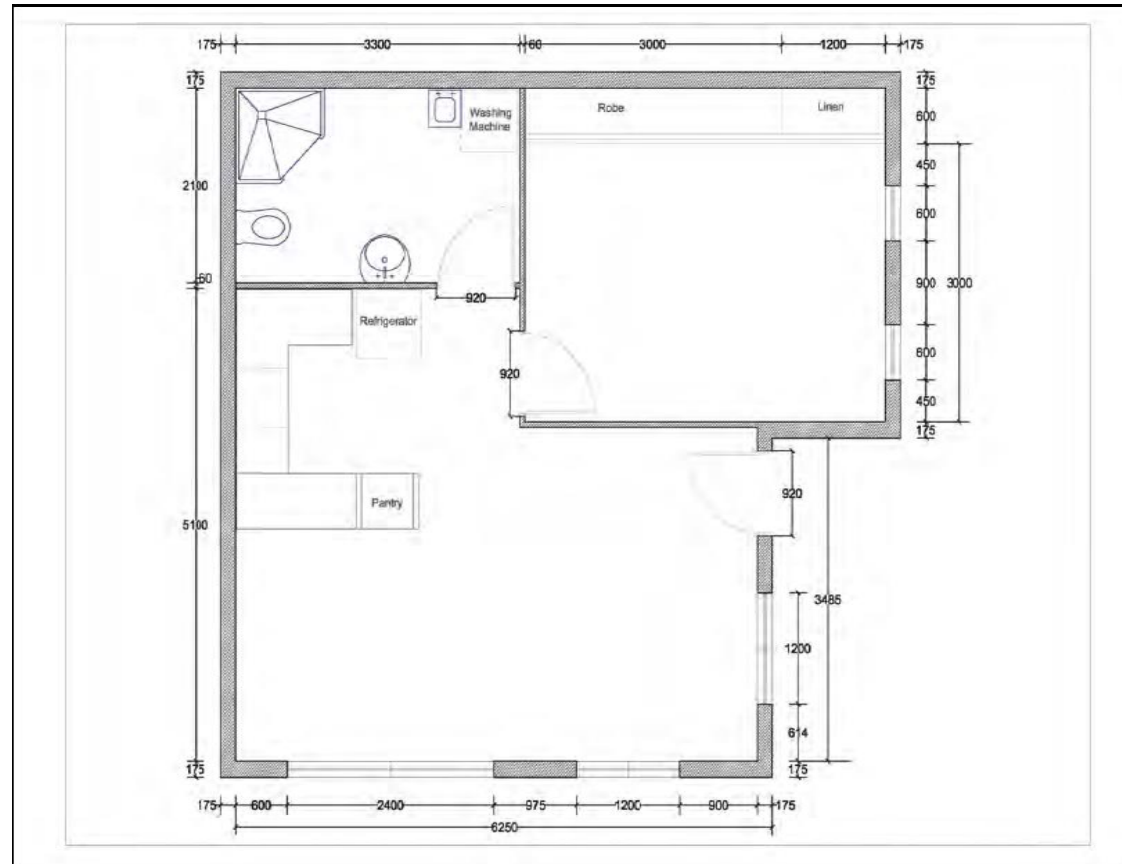


Level 1 Housing – Single to a Quadplex





Level 1 Housing – Single to a Quadplex



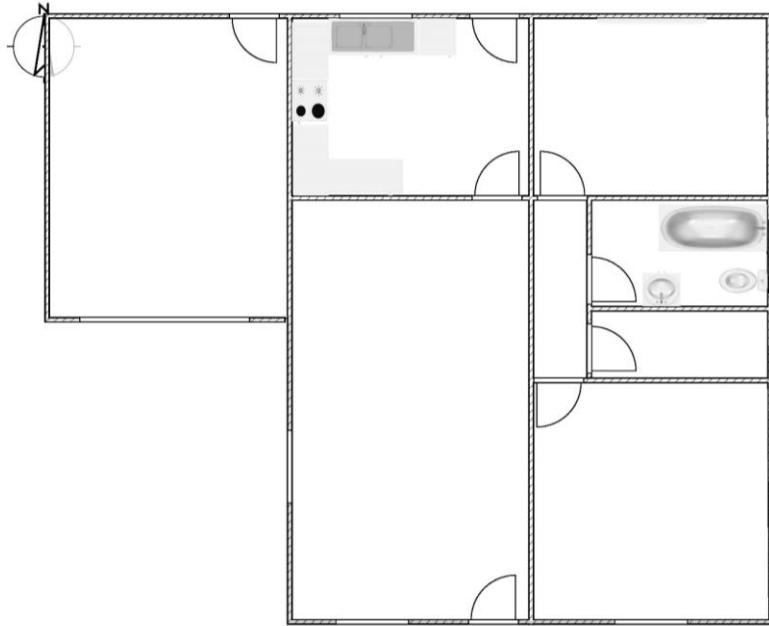


Level 1 Housing – Single to a Quadplex

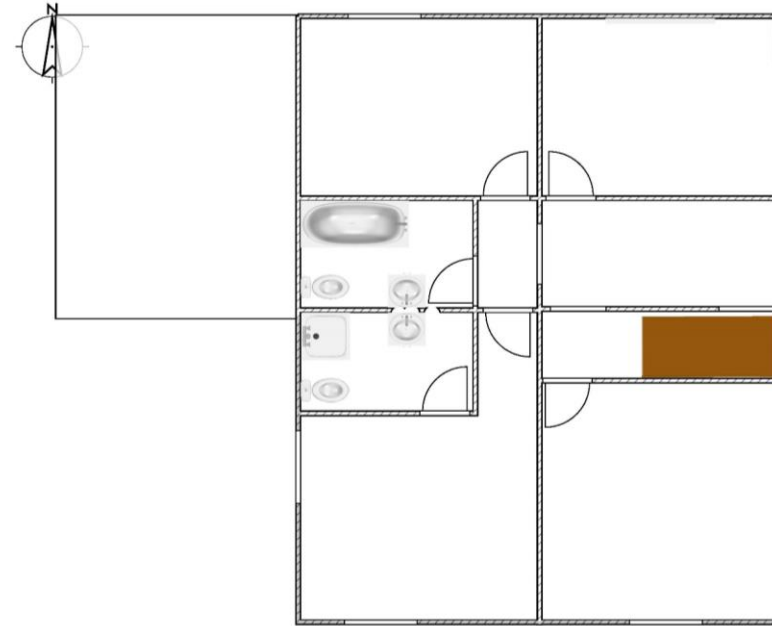




Level 1 Housing – Single to a Quadplex



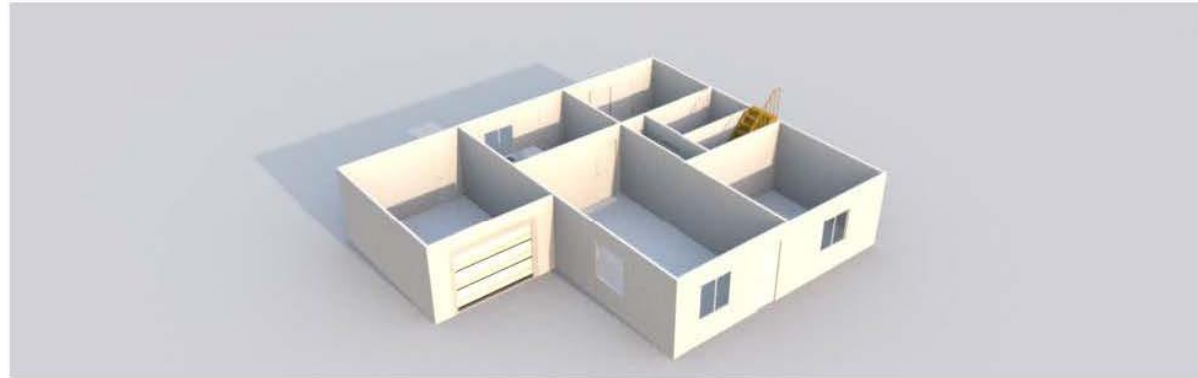
2 story – 1st Floor



2 story – 2nd Floor



Level 1 Housing – Single to a Quadplex



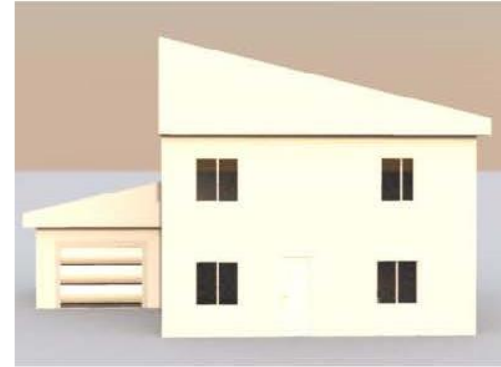
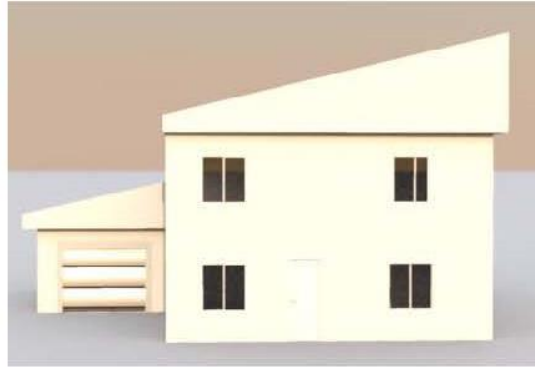
4 Bedder Ground Floor



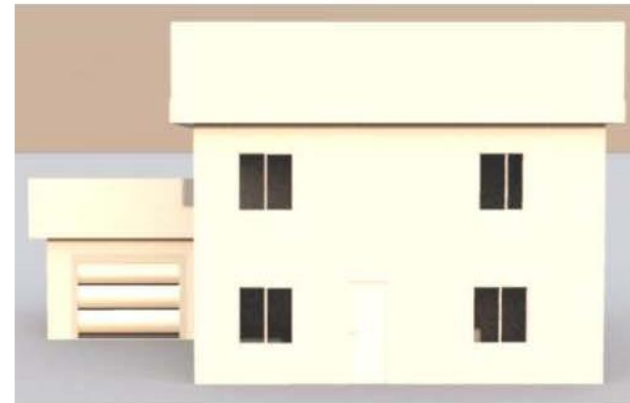
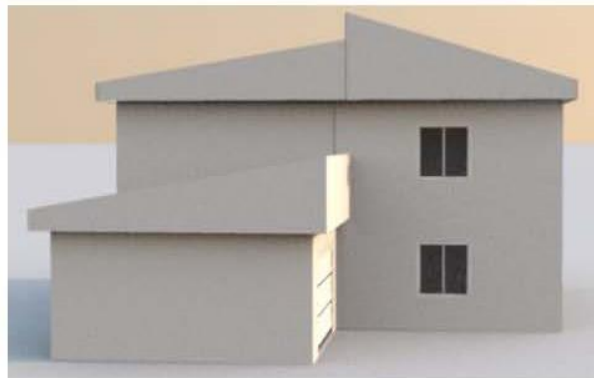
4 Bedder Upper Floor



Level 1 Housing – Single to a Quadplex



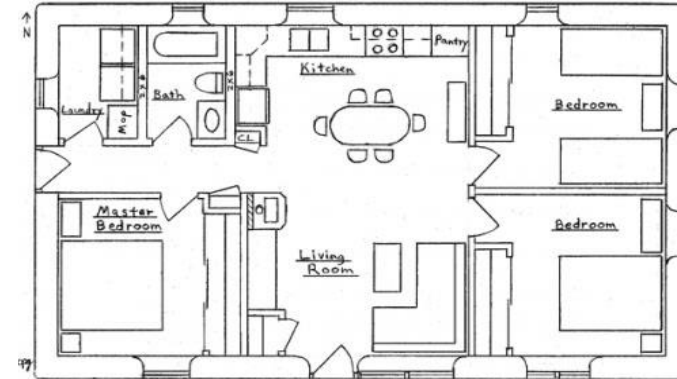
4 Bedder with Skillion Roofs



4 Bedder with Skillions Front to Rear

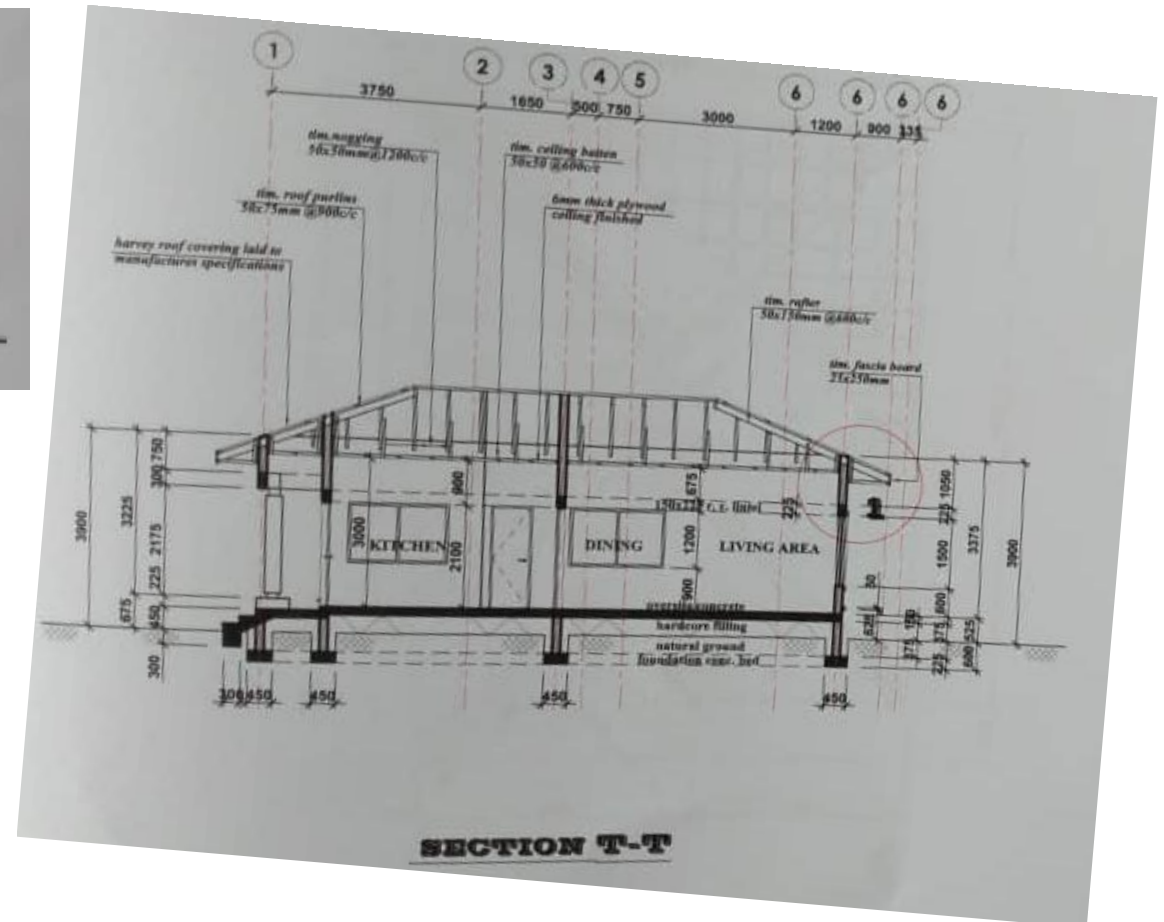
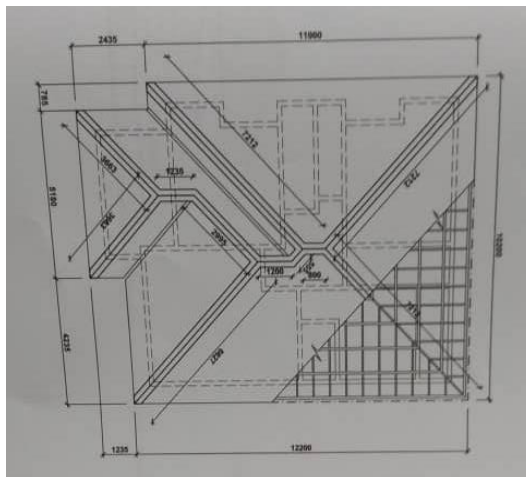
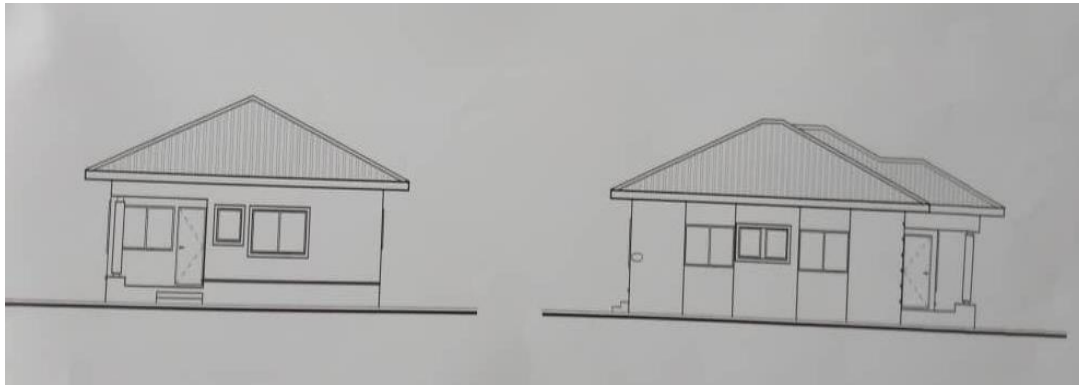


Level 2 Housing – approx. 1,000 to 1,200 square feet



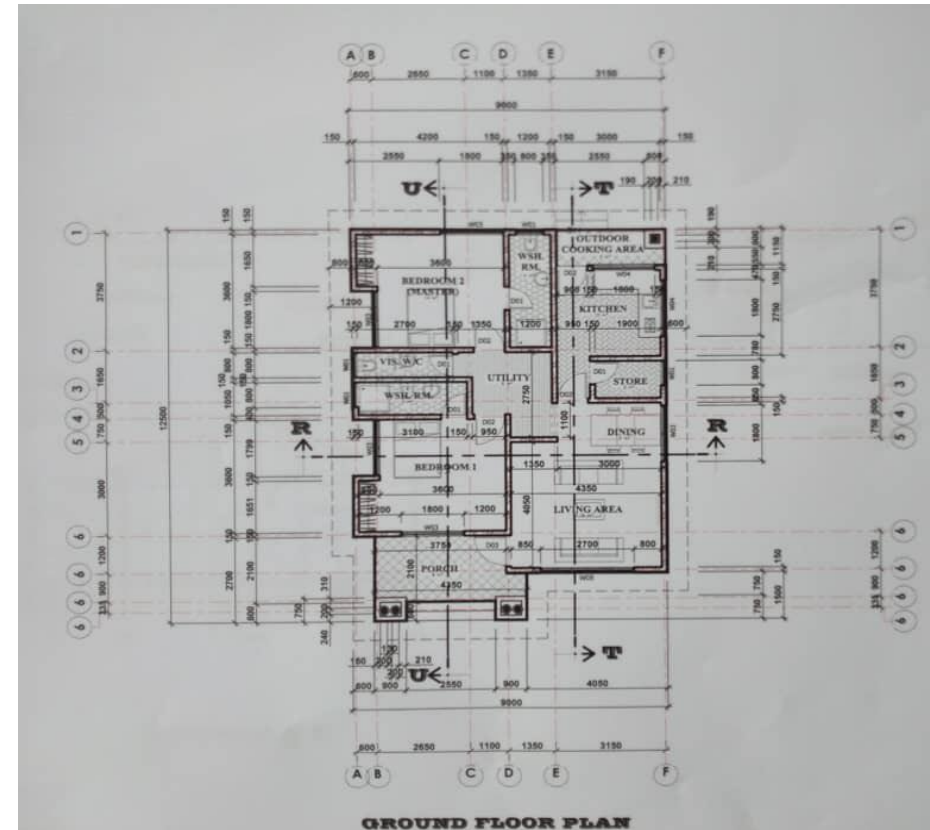
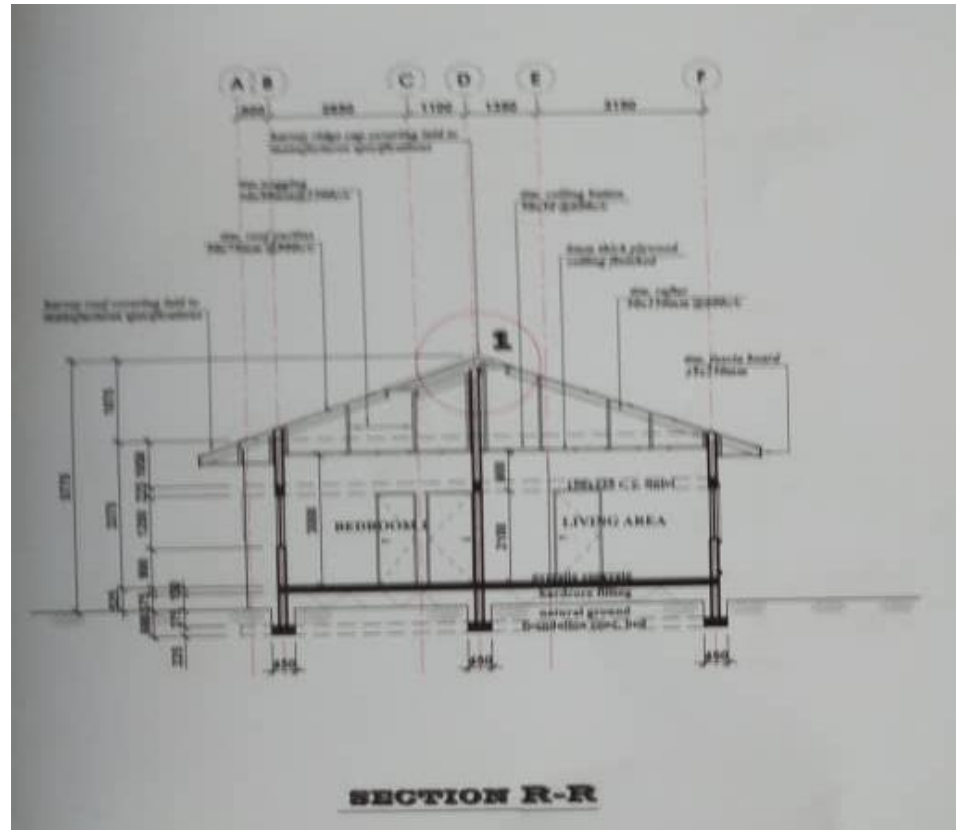


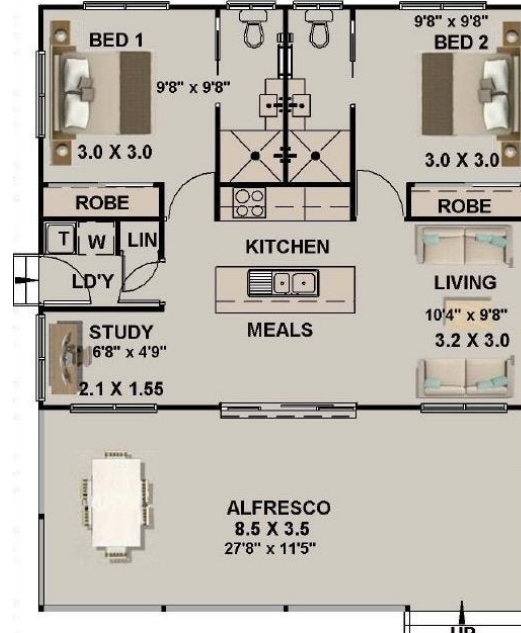
Example 2-bedroom house – approx. 1,000 to 1,200 square feet
Example of a Customer provided design





Example 2-bedroom house – approx. 1,000 to 1,200 square feet
Example of a Customer provided design





Living Area: 648 sq ft
Covered Alfresco: 319 sq ft
Total 967 sq ft

- 2 Bedrooms
- 2 Bathrooms
- Meal Area
- Galley Kitchen
- Living Room
- Separate Laundry
- Alfresco/Porch
- Ramp Roof

Single Windows:	2
Double Windows:	8
Sliding Door:	1
Exterior Door:	1
Interior Doors:	6
Laundry Room:	1

- Options:
- Skillion Window
 - Flat Roof (not shown)
 - Garden Roof (shown above)
 - Terrace Roof (not shown)
 - Solar Panels (Off-grid capable)
 - LED Lighting
 - Exterior Fire Door
 - Interior Wall options
 - Storm Windows
 - More. . . .



Living Area: 878 square feet

Alfresco: 87 square feet

Front Porch: 48 square feet

Total Size: 1,013 square feet

Width: 19 feet and 9 inches

Length: 51 feet and 6 inches

2 bedrooms & 2 baths

Large Great Room and Front Porch

Back Alfresco (outdoor eating area)

Skillion Roof (shown)



Options:

Skillion Window

Flat Roof (not shown)

Garden Roof (shown above)

Terrace Roof (not shown)

Solar Panels

LED Lighting

Exterior Fire Door

Storm Windows

Interior Wall Selections



Confidential Information



Living Area: 1,176 square feet

Covered Patio: 159 square feet

Total Size: 1,335 square feet

Width: 28 feet and 1 inch

Length: 50 feet

Note: Covered Patio is being shown. This could be a 3rd bedroom.



Options:

- Skillion Window
- Flat Roof (not shown)
- Garden Roof (shown above)
- Terrace Roof (not shown)
- Solar Panels
- LED Lighting
- Exterior Fire Door
- Storm Windows
- Interior Wall Selections

Confidential Information



3 Bedroom, 2-bathroom, Family Room, Living Room and Study: 1,384 sq-ft



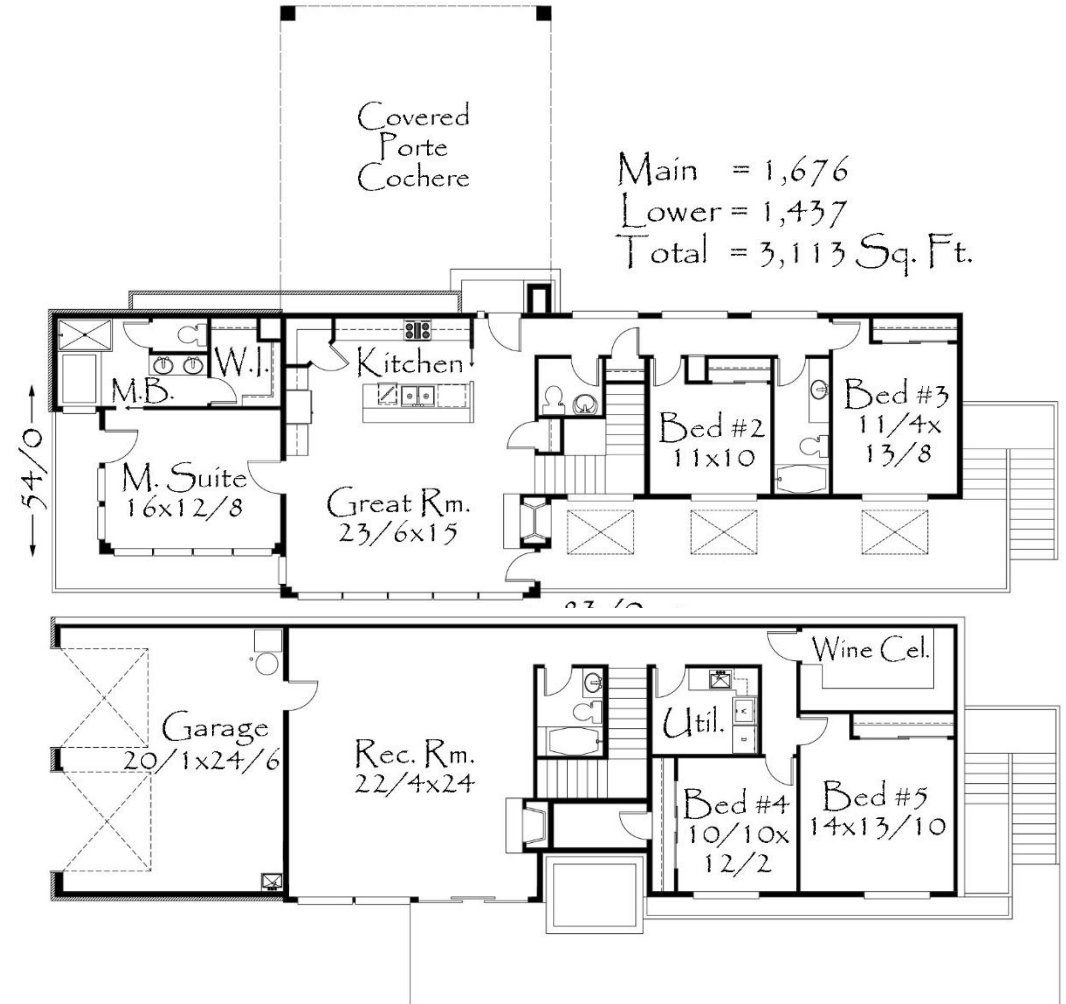
- Bedroom 1: 11'10" by 10'6"
- Bedroom 2: 11'10" by 10"
- Bedroom 3: 9'10" by 9'10"
- Study: 8'4" by 8'10"
- Lounge: 17'5" by 14'4"
- Family Room: 11'10" by 13'1"
- Covered Alfresco/Patio
- Optional Garage (shown)



Options:

- Skillion Window
- Flat Roof (not shown)
- Garden Roof
- Terrace Roof
- Solar Panels
- LED Lighting
- Exterior Fire Door
- Storm Windows
- Interior Wall Selections







Example 2-bedroom house – approx. 1,000 to 1,200 square feet

Roof Deck	(1)	½”	~ 120 sqm Plywood or Ag Fiberboard decking Optional TGS Fire-Safe Decking
Roof Shingles	(1)		~ 120 sqm
Optional Roof Vents			TGS Roof SIP (replaces Deck and Shingles) As required
Electrical Outlets			As required
Doors			As required
Dual Pane Windows	(8)		Dual Pane double window sets
Front Steps			2 to 4-step as required
Planking	(10)	8”	4’ by 36’
Perimeter walls	(32)	6”	4’ by 12’ TGS Fire-rated SIP with PIR core
Keystone Columns	(4)	8”	8” by 10’ Proprietary (steel or concrete)
Interior walls	(24)	4”	4’ by 8.5’ CAFB Fire-Rated Panels Optional TGS Fire-rated SIP with PIR core
Ceiling	(10)	½”	4’ by 10’ TGS LW Fire-rated sheathing



Example 2-bedroom house general specification – approx. 1,000 to 1,200 square feet

Optional

Exterior doors	(2)	36” by 80” Fire-rated
Interior doors	(6)	34” by 80” Fire-rated
LED Lighting Panels	(6)	2’ by 2’ 24VDC
LED Lighting Panels	(6)	1’ by 2’ 24VDC
Bathroom Kit	(1)	Dual sink, Toilet, Shower/Bathtub kit
Kitchen Kit	(1)	10’ by 10’ kit to be assembled on site
Roof Mounted Solar	(1)	Off the Grid
2.52kW solar kit	(1)	Roof Mounted
TGS 25X Exterior Coating	(1)	Estimated 70 to 100 gallons
TGS 25AM Interior Coating		Optional Interior Coating with Antimicrobial Properties
Cassette Heat Pumps	(3)	Cooling only (bedrooms and living area – when using TGS 25I or 25 AM)
Misc.		TGS Floor covering coating Optional TGS Pre-Tiled Systems



The following are examples of some of the identified typical fixtures and options

- This is not meant to place a constraint on the possibilities, nor a fixed price for the depicted possibility,



Shower and Shower/Tub Kit Examples



\$300



\$500



\$800



\$900



Bathroom Vanity Kit Examples



\$300



\$850



\$1,500



Low Volume (1.28 gpf) Single Flush Toilet example



\$200



Kitchen Cabinet Kit (10' by 10') Examples



\$1,650+



\$1,800+



\$2,600+



\$3,200+



Off-Grid roof mounted Solar Kit examples



plus



or



2.52 kW 9-panel system
5.67 to 11.34 kWh

\$7,800

(4) 415Ah 24VDC
LA 9.96kWh Battery Back-up

\$2,200

(2) 220Ah 24VDC
Li 5.6kWh Battery Back-up

\$7,200



Off-Grid roof mounted Solar Kit examples



4.65kW 15-panel system
10.45 to 20.92 kWh

\$10,500



(8) 415Ah 24VDC
LA 19.92kWh Battery Back-up

\$4,500



(2) 260Ah 24VDC
Li 12.48kWh Battery Back-up

\$14,500



Solutions
Off-Grid Back-up Power example

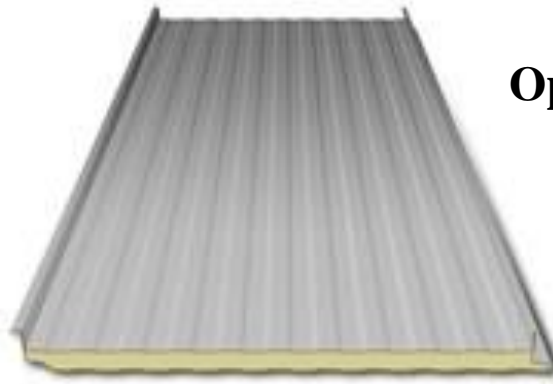


12kW off the grid back-up generator
50A 120/240VAC

\$4,500



Optional SSIP Roof Example



Panel Coverage:

42"

Thickness (A):

2.5"

3"

4"

5"

6"

Exterior Texture:

Smooth

Interior Texture:

Smooth

Embossed

Core:

Continuously poured-in-place, polyisocyanurate, insulating foam

K Factor:

0.138 Btu-in/hr-ft²-F° @ 75° F mean temperature (R-7.25)

0.129 Btu-in/hr-ft²-F° @ 35° F mean temperature (R-7.75)



***“Contemporary modular construction at an affordable price point”* general information notes.**

Feature Notes:

1. Using larger rooms and less interior walls has the benefit of keeping the per sq-ft costs down)
2. Duration required for completion and occupancy can be as quick as 5-day and out to 45-days per unit, depending upon the TGS Building Technology selected. Multiple units can be completed concurrently.
 - Electrical Outlets in the walls
 - Louvered windows
 - Standard doors with lock
 - Basic toilet, single pedestal sink and tub
 - Basic kitchen cabinet and single sink combination.
 - Appliance hook-up
 - Flat Roof

Building Material Notes:

- TGS SIP panel system with noise deadening – made locally; using with CPFIB (*Agricultural Waste Fiberboard panels – with 2.5-hr fire rating*) or optional TGS Fire-Safe Sheathing (*4-hr fire rating*) for interior applications.
- TGS SCIF load-rated perimeter walls and roof – with noise deadening; using local labor and local TGS Structural Rendering (colored).
- Flat roofs are specially designed to accommodate roof-top/terrace gardens, solar panels and other potential items.
- Assumes suitable infrastructure (*foundation/stem wall, electricity, water, sewage, etc.*) is available on-site.
- Optional “off-the-grid” systems, including power grid networks, are available .



How are the costs minimized?

1. To accommodate the anticipated needs (*from Contemporary (low-income) housing through Custom Housing*) at affordable price points, TGS will be establishing strategically located TGS Macro-Factories in combination with strategically located TGS Micro-Factories with a combined ramp-up that can be designed handle up to over 2,500 units per month - with some further expansion being possible.
 - a. TGS proposes to utilize a combination of its Modular and SCIF Building Technology in combination with re-configurable Interior Geo-SIP or Bio-SIP panels, as the needs indicate. Other TGS Building technologies are known and will be as the needs so require.
 - b. The TGS Micro-Facility will be capable of manufacturing a variety of building concepts, so as to allow flexibility and optimization of the systems. This includes the use of 3D Printing for Demonstrations and 3D Construction Printing, for rapid Modeling, Development phases and even custom construction.
 - c. The TGS Factory labor force will be derived from local labor that have undergone specific TGS training (*in a certified TGS Training Center*) and certification. It is anticipated that the typical TGS Micro-Factory will be employing a mixed workforce comprised of *Veterans, DAV, Historically Disadvantaged persons and others within Economic Opportunity zones* – without limitation.
 - d. The TGS Factories will be manufacturing specific structural and non-structural components using local materials and resources (*where possible*).
 - e. Other.



www.tgsolutions.global

QUALITY AROUND THE WORLD

