Modular building

Modular construction is rapidly gaining acceptance as a successful solution for multi story buildings.

Significant savings in time and cost with no compromise on quality are being realized globally for such projects.

Conventional construction can at times prove costly in terms of financial, human resources and environmental impact, hence the general interest in modular construction

Whilst the conventional volumetric delivery for modular buildings is certainly attractive from a resource perspective, there are occasions where the shipping and road transportation costs can detract from the benefits.

We believe the following slides will help to portray a further modular building solution, falling somewhere between conventional and volumetric construction.

Components

Essentially utilizing the same structural, architectural, fire rated properties used in a multi story volumetric construction volumetric modules are broken down into components and shipped by container.

This differs from a flatpack supply as wall,floor and ceiling panels are complete with linings,ready to connect.

An example is shown in ***fig 1.a*** where we have 2 x complete accommodation modules including bathrooms and kitchens packed into a single 40ftHQ container.

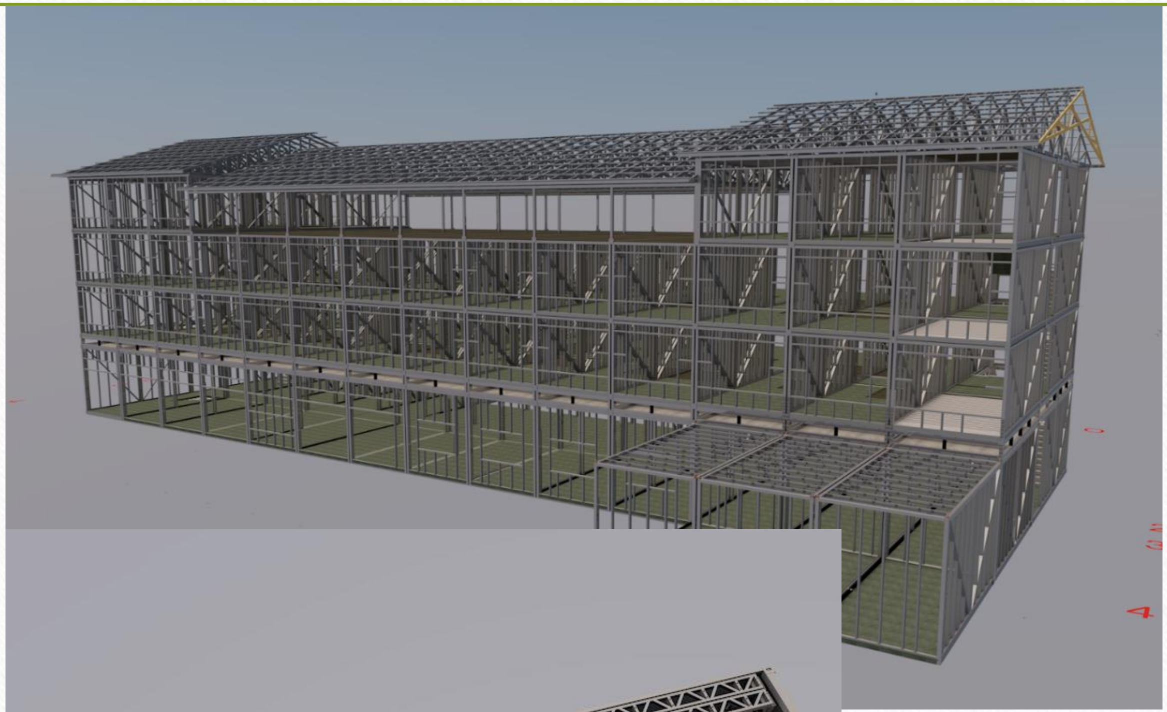
Shipping costs for modules delivered in this fashion are approximately 15% that of break bulk costs.

Onsite erection of modules with a 4 man team and a 5 ton crane are approximately 8hrs per module.

Walls, floors and ceilings are all pre finished and fitted with doors and windows, where applicable.

Bathrooms, as below are fully complete and delivered as pods ready for a fast and accurate install to the prepared floor panels.

Electrical wirung is complete to each panel.



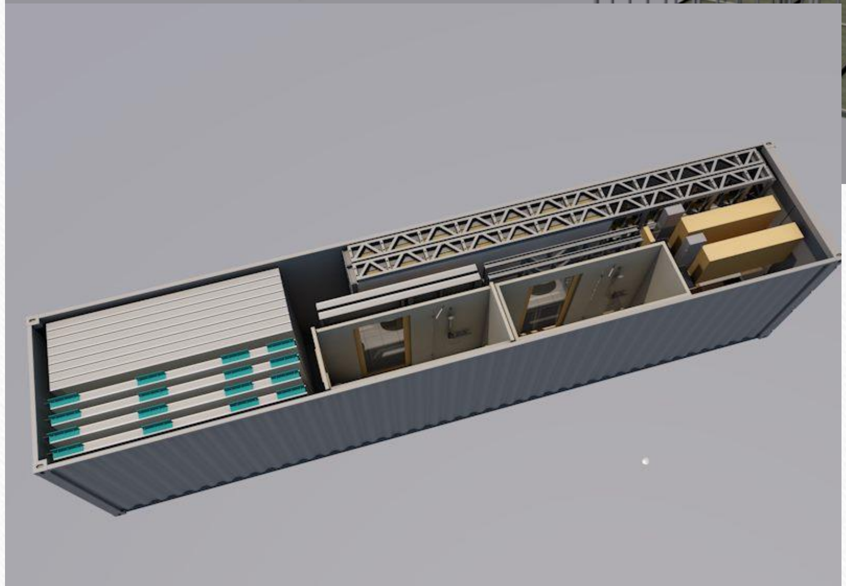


Fig 1.a

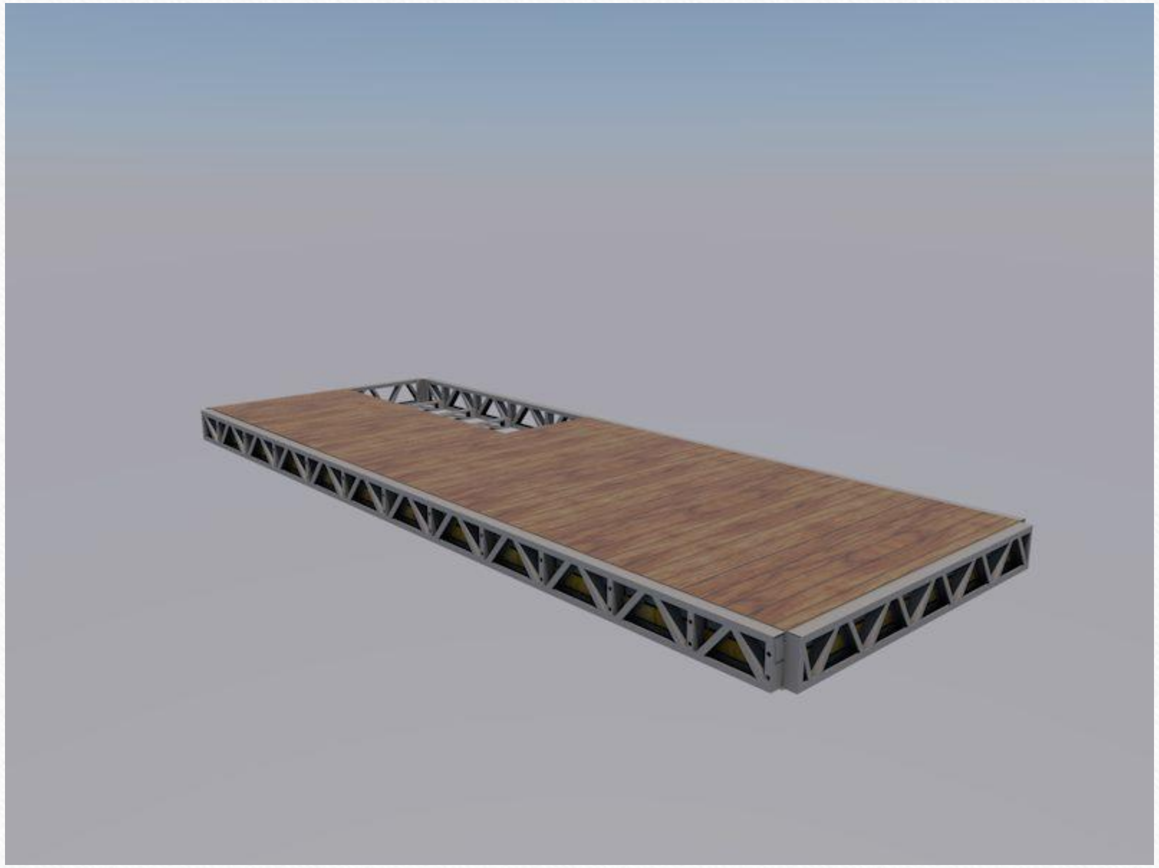
Installation sequence for modules.

Modules may be shipped assembled or in knockdown form as follows

1.Floors

Composite floor panels are used comprising.

- 300 x 89mm g550 steel truss frame cassette
- 2 x layers 18mm cfc or Vivfa board top layer
- 5mm Thermacon or similar acoustic barrier
- 100mm Rockwool insulation.
- 12mm base sheet.
- Steel locating channels installed to accommodate wall panels
- Conversely a concrete slab base may be utilized to replace the framed floor system



2.Bathroom pods

Bathrooms are completed to the clients design and complete with all fittings, floor and wall linings and accessories.

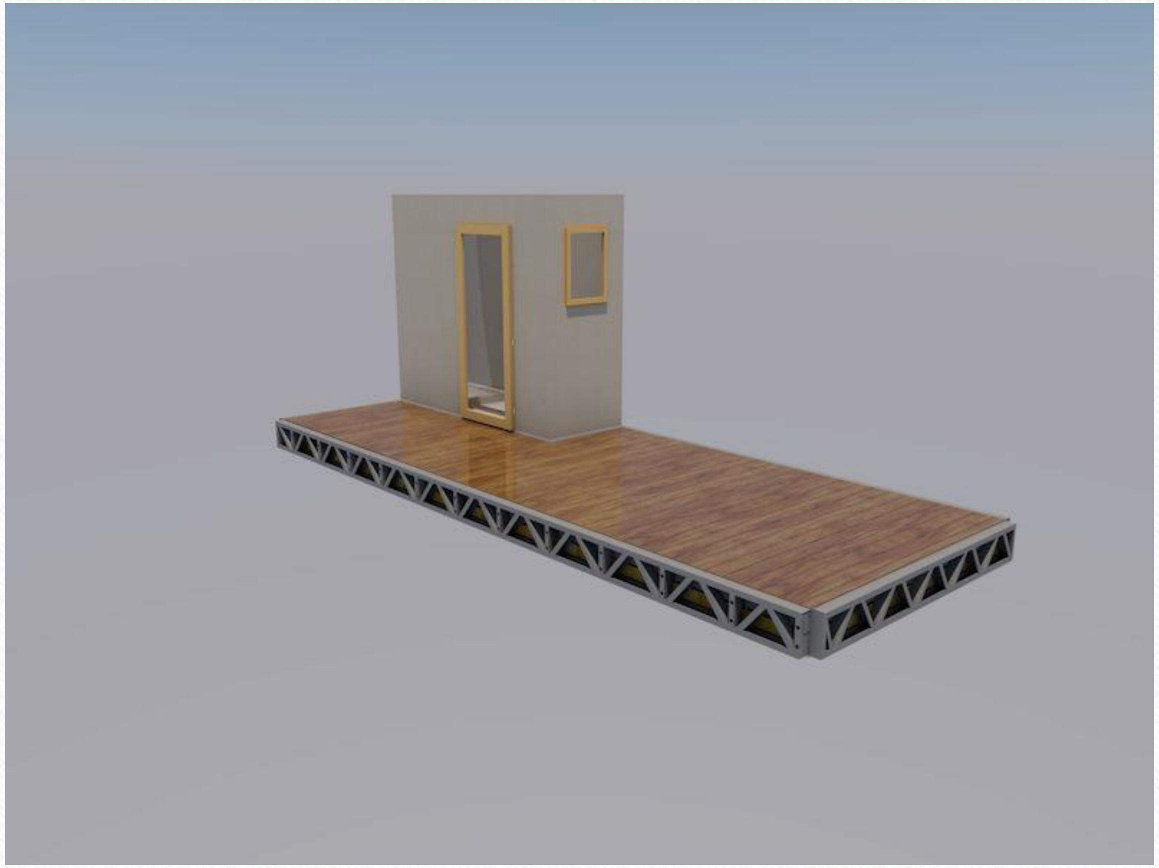
Pods are manufactured to and exact tolerance allowing a seamless fit to walls,ceilings and floors.

External walls are constructed to meet the required frl,s and structural requirements,eliminating the need for a double wall system

All plumbing work is AS 3500 standard, tested and signed off by a licensed plumber

2.Bathrooms cont.

Bathroom pods are lifted into place to prepared floors.Any external walls are constructed to the general wall specification, taking the place of these walls where applicable

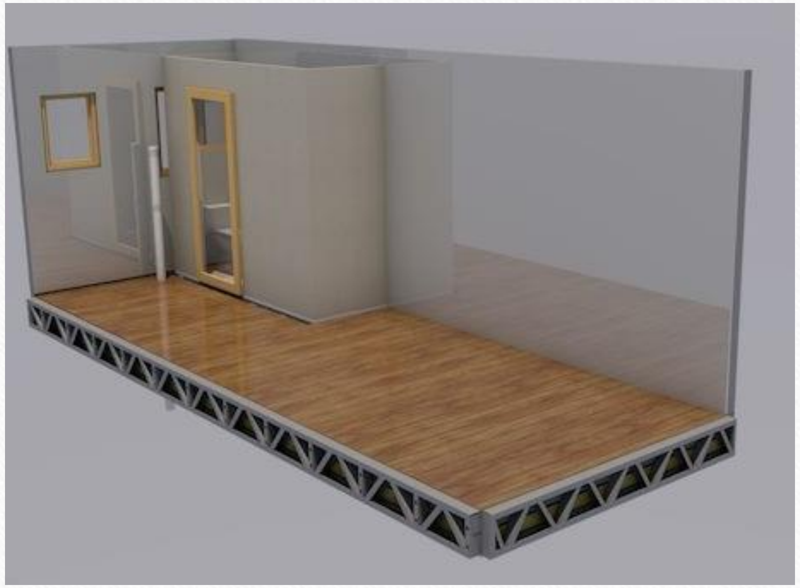


3.Walls

Walls are manufactured to an exact tolerance inserted in to base channels and bolted to floors and adjoining walls.

Bolt locations are pre determined,cleats and bolt holes are installed in the factory prior to shipping.

Wall frames have a dimensional tolerance of +- 2mm over 7000mm

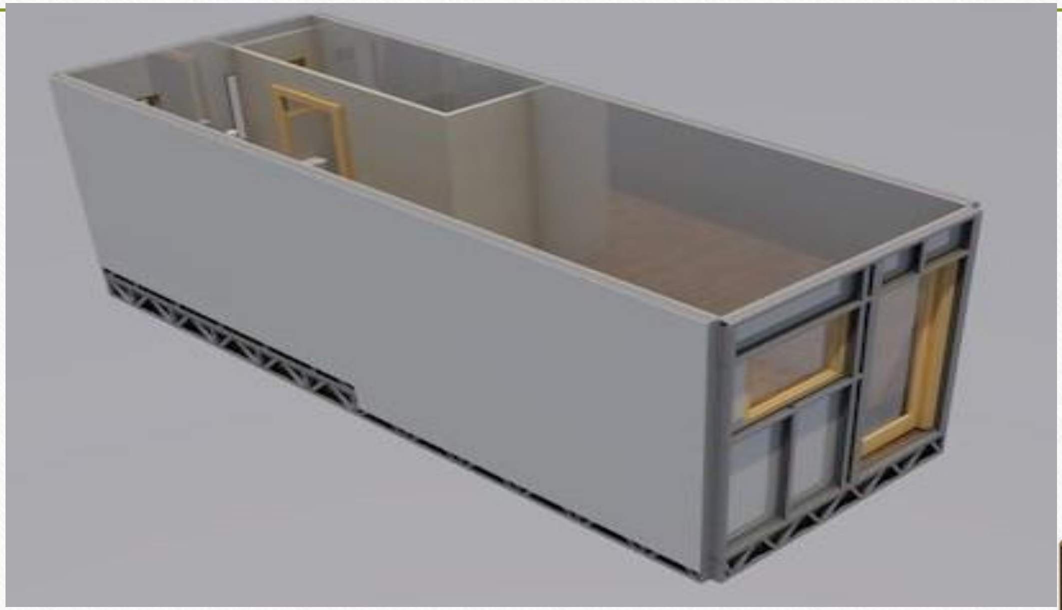


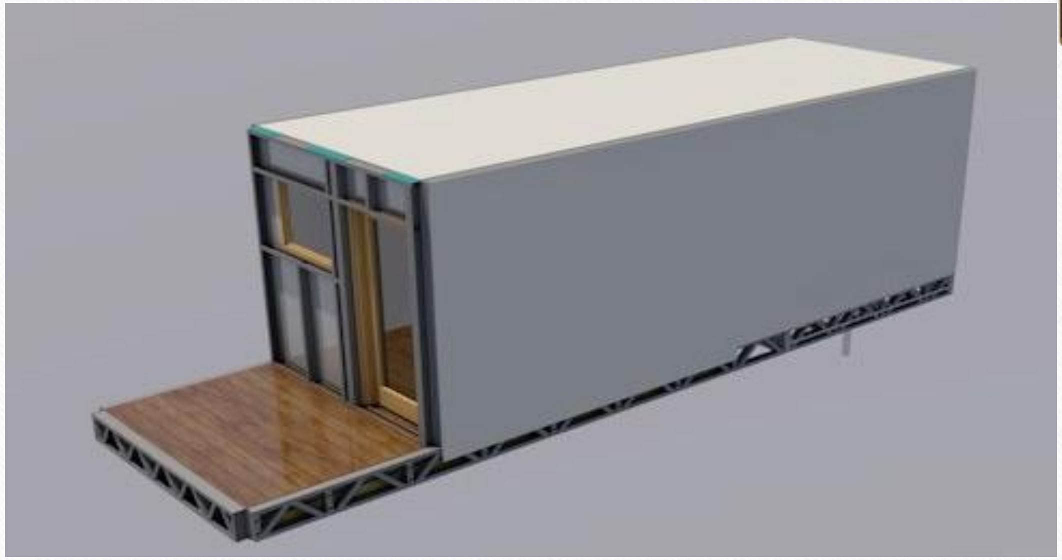
Wall panels- up to 7000mm long

3.Walls cont.

Typical wall composition includes the following.

- 89mm g550 c section stud framing produced with the Howick cnc machine.
- Fire rated internal linings /90/90 min
- 75 mm Rockwool insulation
- 5mm thermal break to external walls
- 12mm cfc or Viva board external ining.
- Finishes of either laminate, paint or fire retardant composite aluminium panel are available





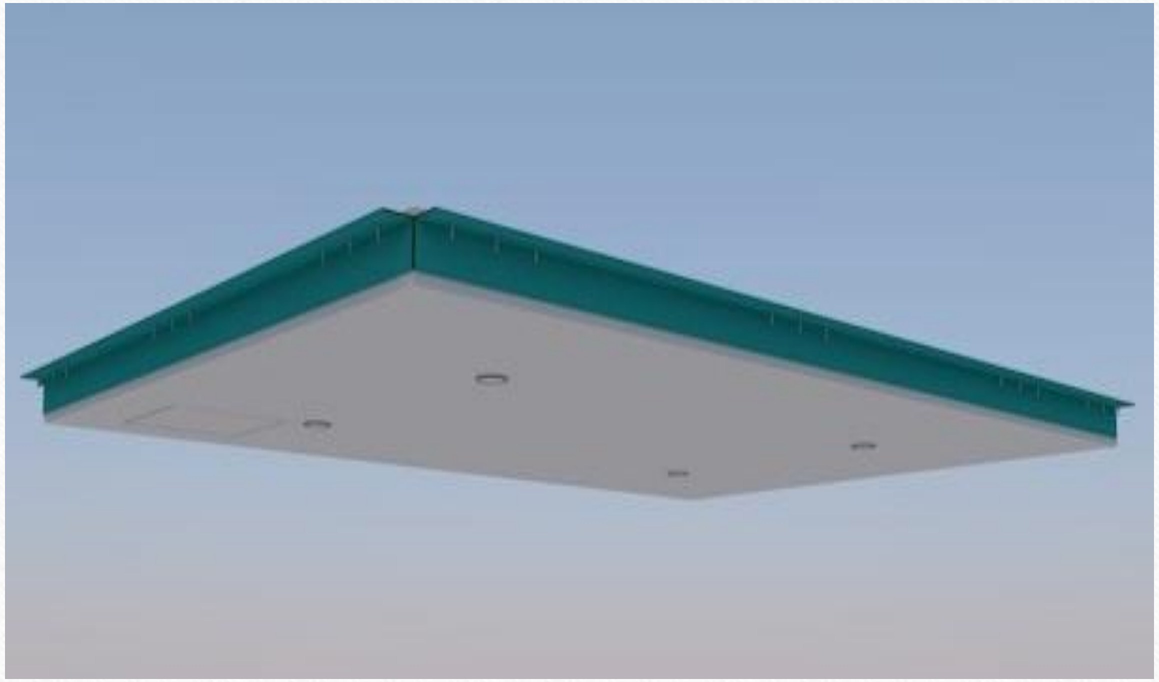
4.Ceiling panels

Ceiling panels are pre-assembled with mounting cleats in a panel configuration

Ceiling panels are manufactured to an exact tolerance and dropped inside the module walls and secured, acting as a diaphragm and ensuring a square room.

Typical composition:

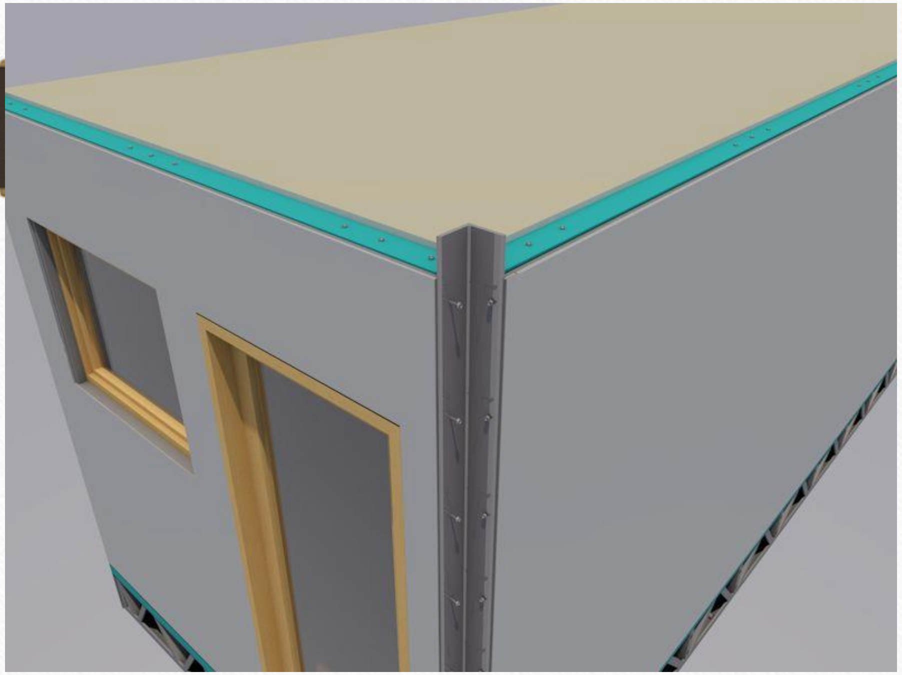
- 89mm g550 c section stud framing produced with the Howick cnc machine.
- Fire rated internal linings /60/60 min
- 75 mm Rockwool insulation
- 12mm cfc or Viva board external ining.
- Finishes of either laminate or paint are available
- Ceiling panels are pre wired read for connection to walls via an access hatch

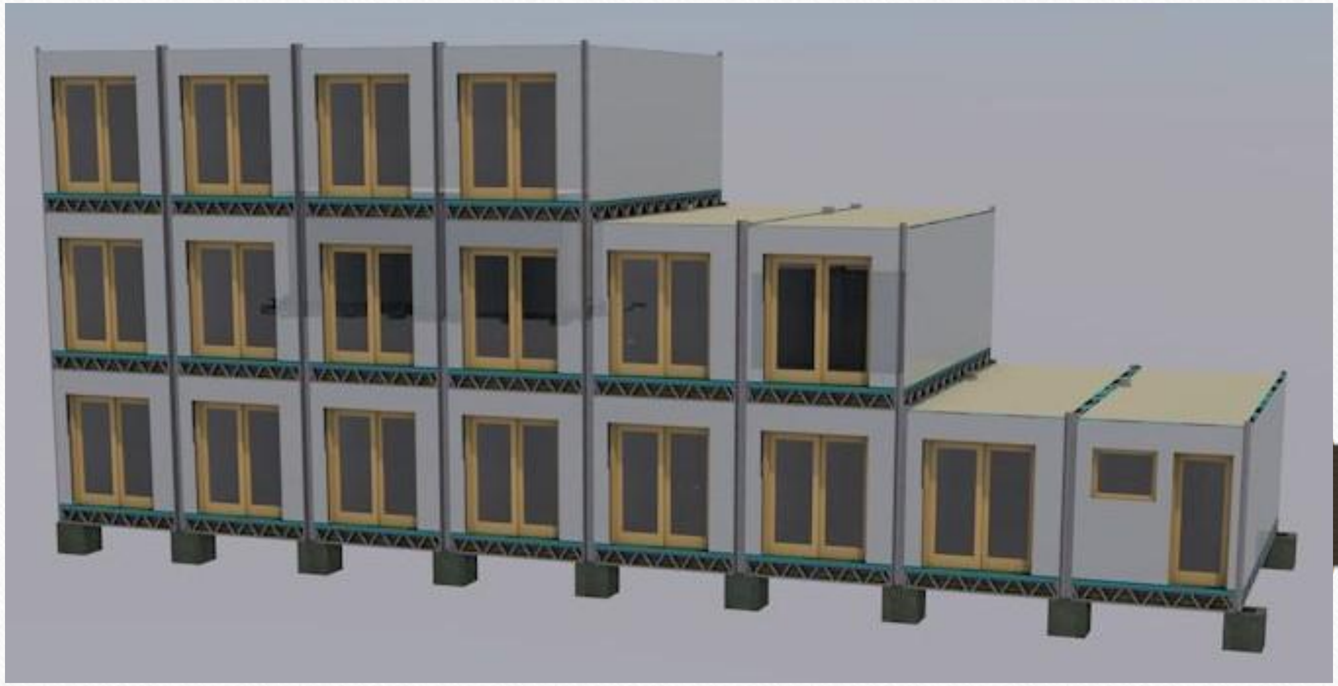


Completed modules

If required, modules can be fully assembled in a laydown area then lifted into place for multi story applications.

Corner angles can be utilized for hoisting with lifting lugs





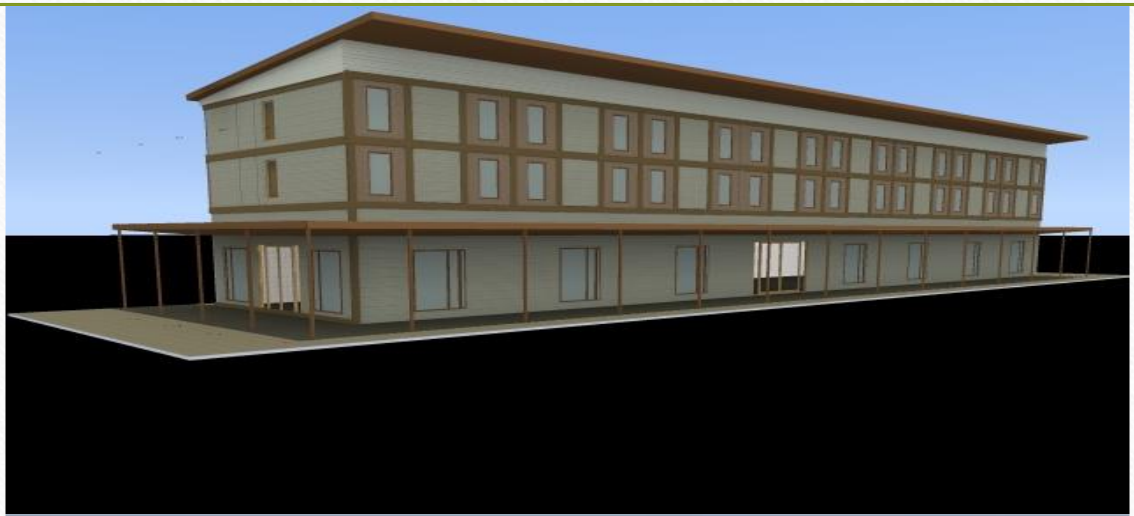
Irregular floorplans, housing

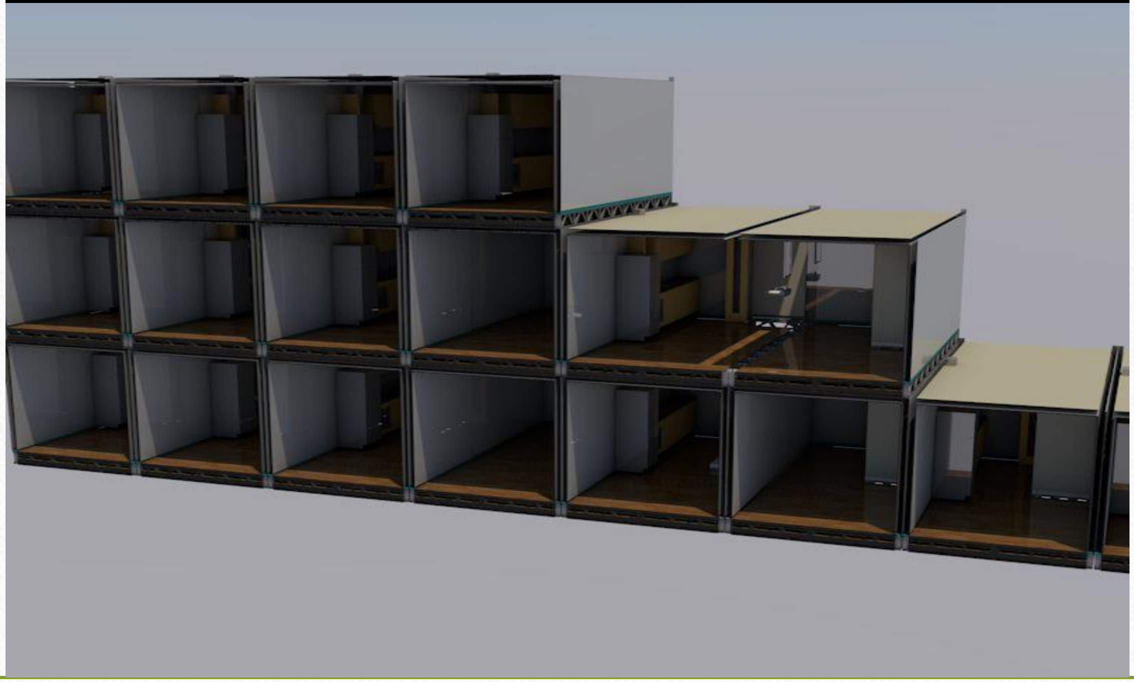
The knockdown modular system allows for design to be free of the usual modular constraints imposed by shipping and logistical issues.

Open plan layouts are possible with bespoke design enabling our system to meet almost any floor plan configuration.

The addition of structural beams and columns enables to open span and multi story capability of this system to match conventional construction.

Prior to any manufacture all designs are certified by the relevant regulatory bodies including, structural, fire ,acoustic engineers and building surveyors as reqd.





Knockdown kit house

The knockdown format is ideal for housing where irregular shapes and sizes may be utilised for aesthetics and function.

The house shown in fig 2.a has raked ceilings

Wing type roof panels and irregular shaped wall panels.

All fit comfortably into 2 x containers including the 2 x bathroom pods and kitchens.

Installation time to prepared footings is estimated at 2 x days using a 4 person crew and either a HIAB or small 5 ton mobile crane.

Prior to any manufacture all designs are certified by the relevant regulatory bodies including, structural, fire ,acoustic engineers and building surveyors as reqd.

Fig 2.a

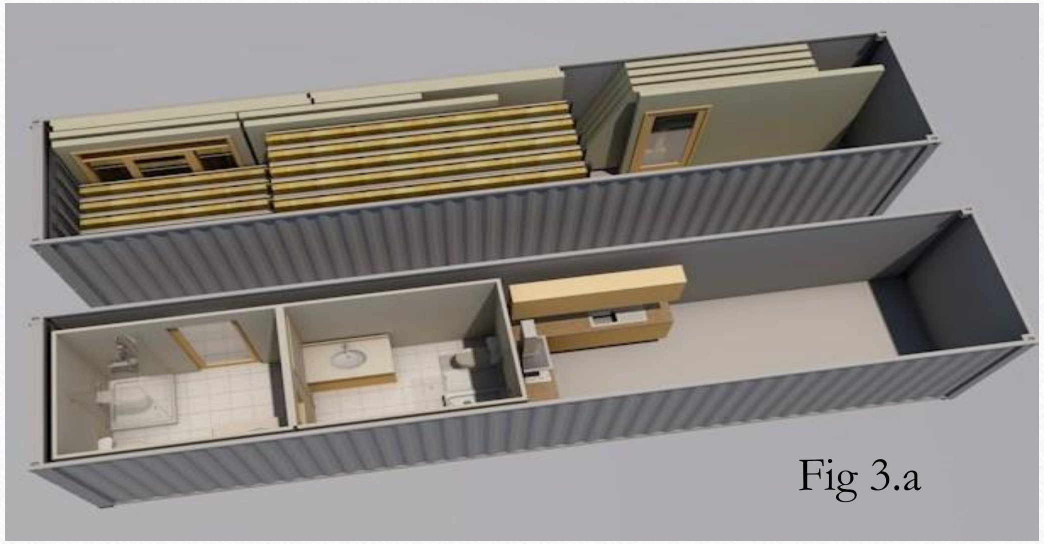
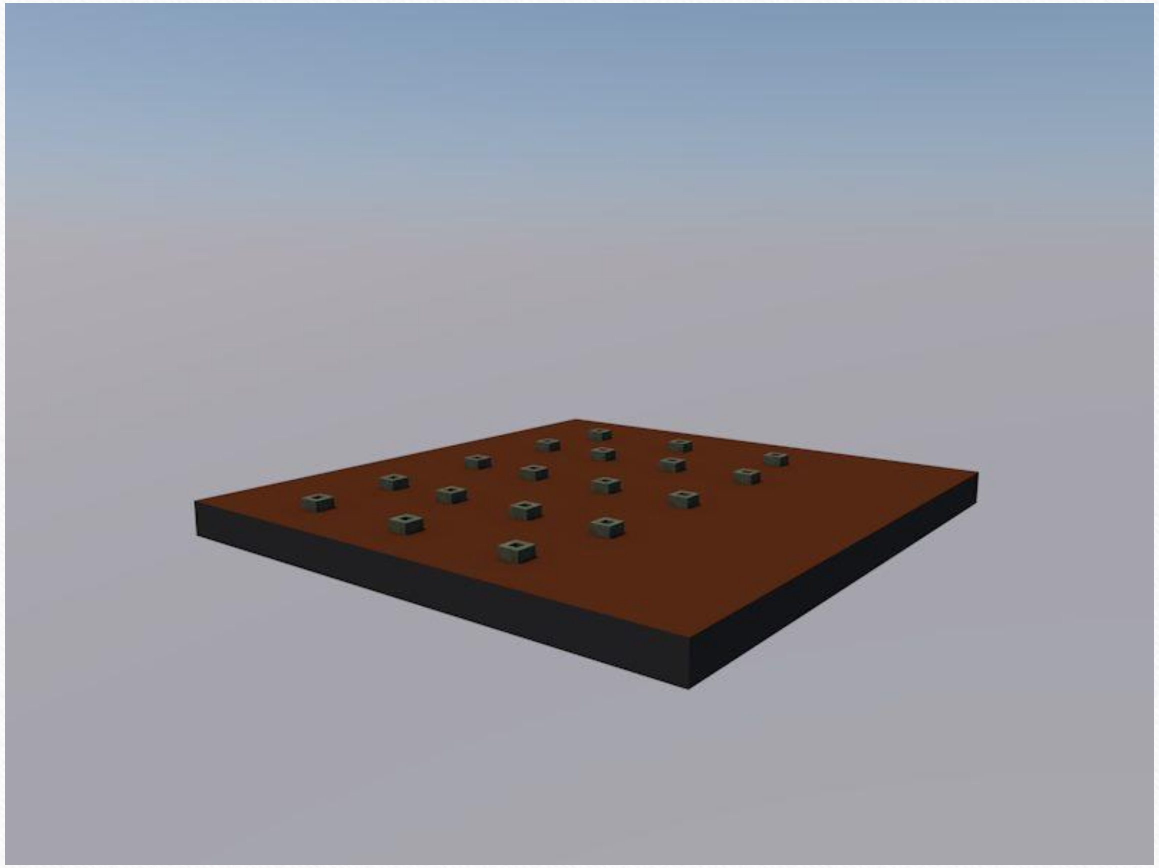


Fig 3.a

Installation sequence

1.Footings- Typically installed by the builder prior to delivery of modules.

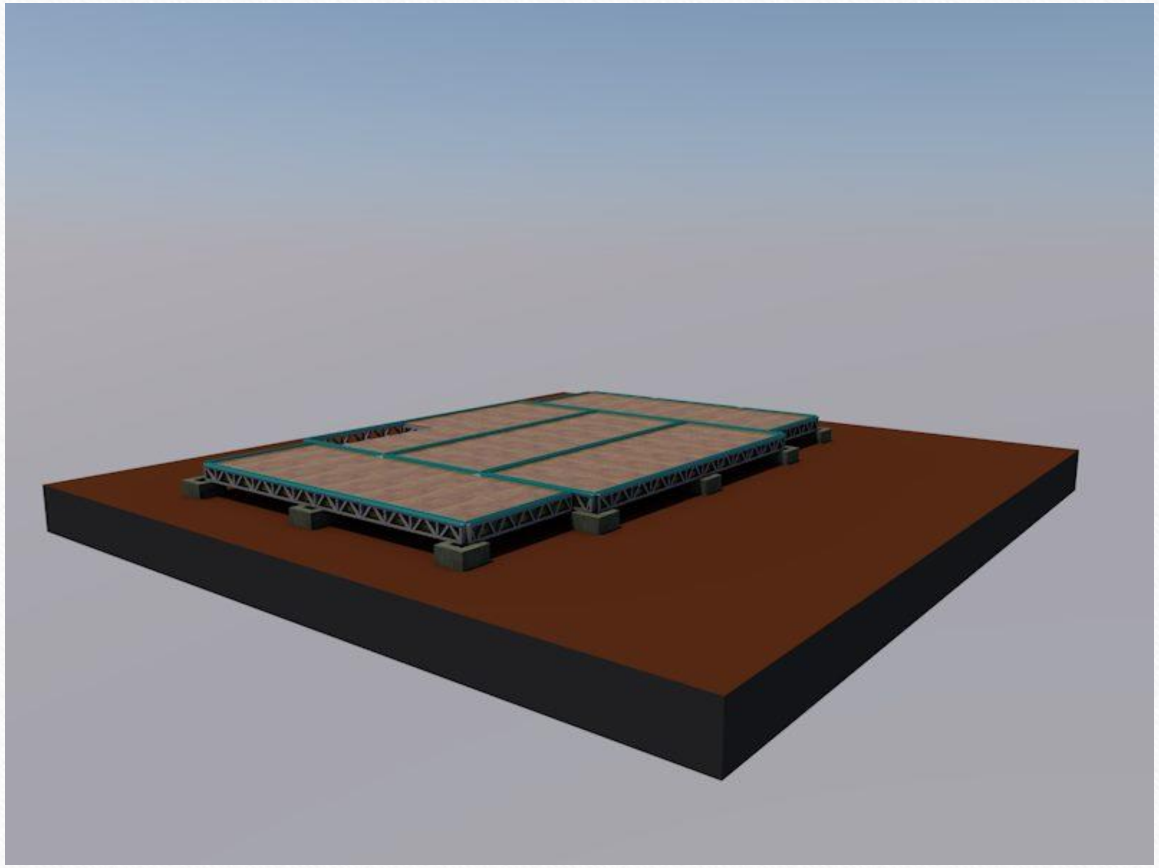
Conversely a concrete slab base may be utilized to replace the framed floor system.



2.Floor panels

Prefabricated composite floor panels to the required size are fixed to prepared footings, floors are comprised of the following:

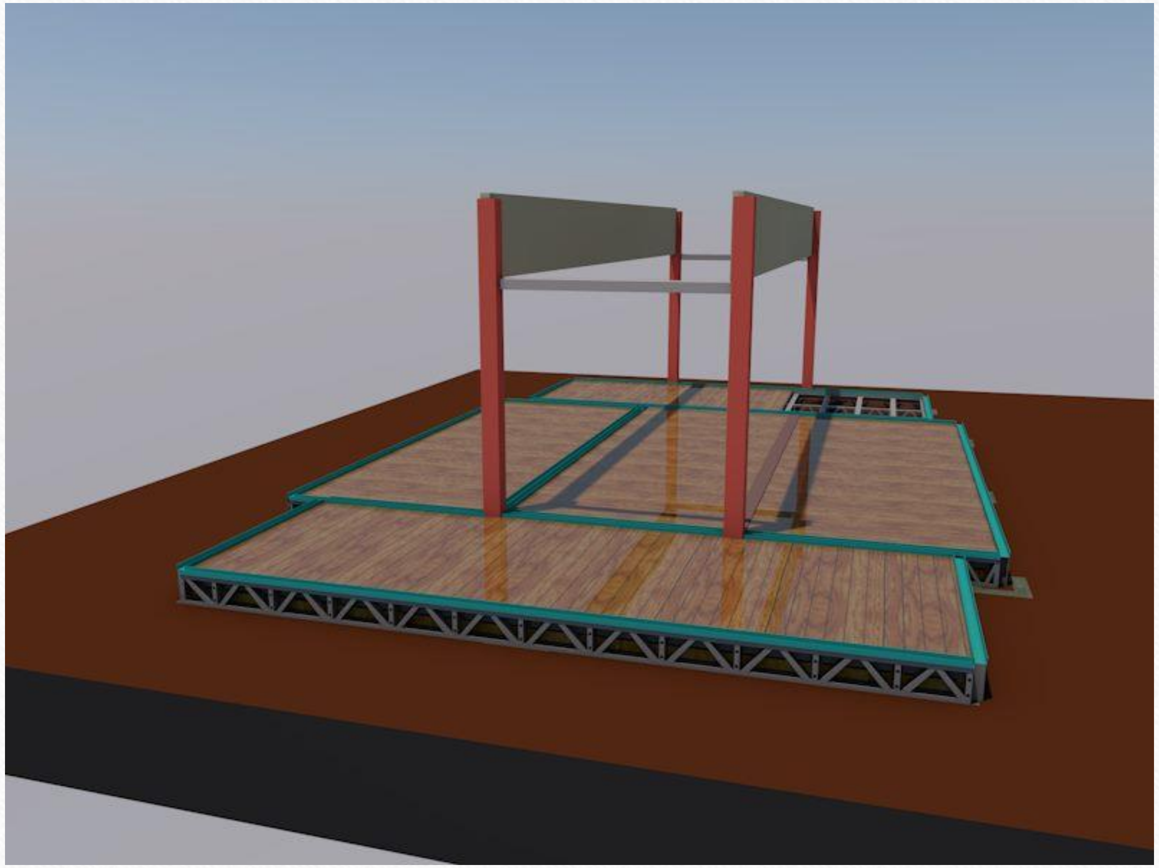
- 300mm g550 truss framing cassette
- 2 x 20mm layers of cfc to top
- 1 x 16mm layer of cfc to base
- 100mm rockwool insulation
- 6.3mm Thermacon between floor panels and frame.
- 16mm timber flooring



3.Structural core

A structural core composed of shs steel columns and beams along with a lined truss to form the required roof pitch.

All items are bolted into place following pre assembly in the factory.



3.Walls

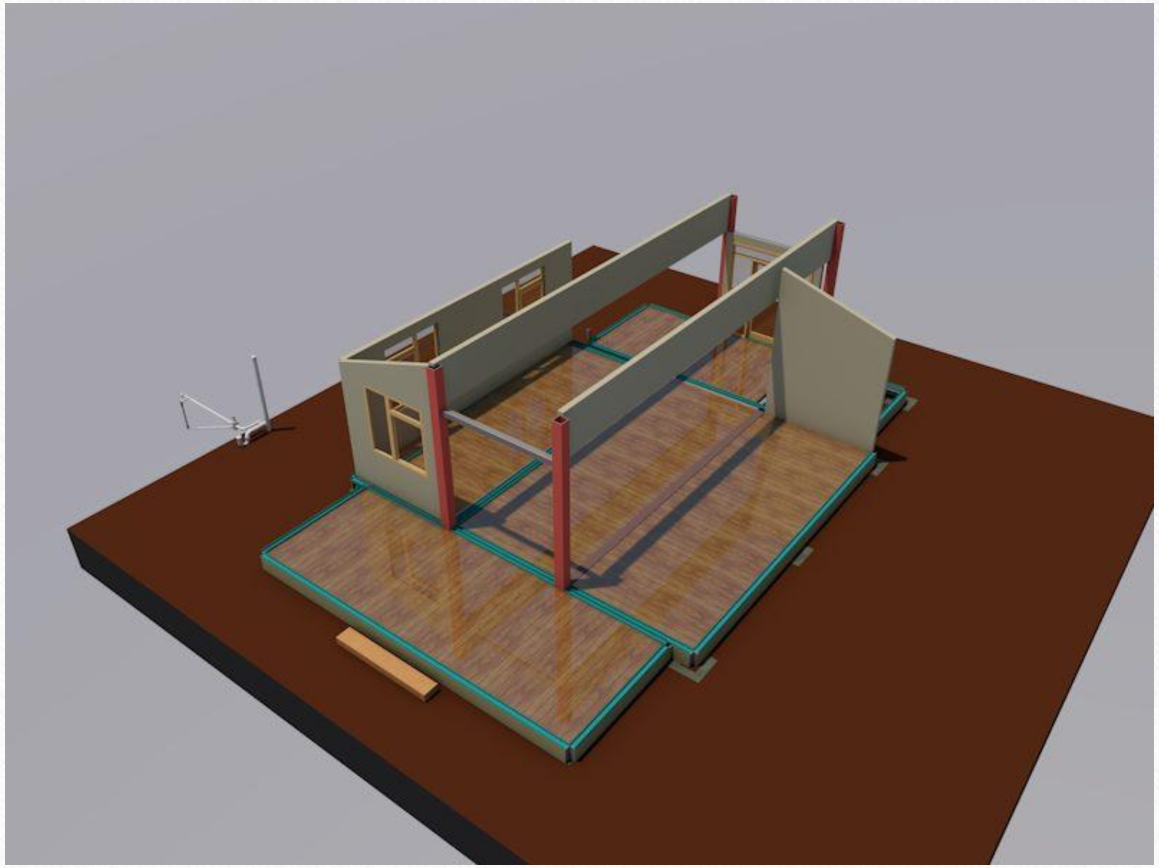
Walls are available in a variety of finishes and fire ratings.

Panels are installed into pre installed base channels in the floor system.

The average wall panel length is from 2000mm to 3600mm long.

All items are bolted into place following pre assembly in the factory.

Bolt and screw locations are clearly marked on the panels to allow for a precise installation.



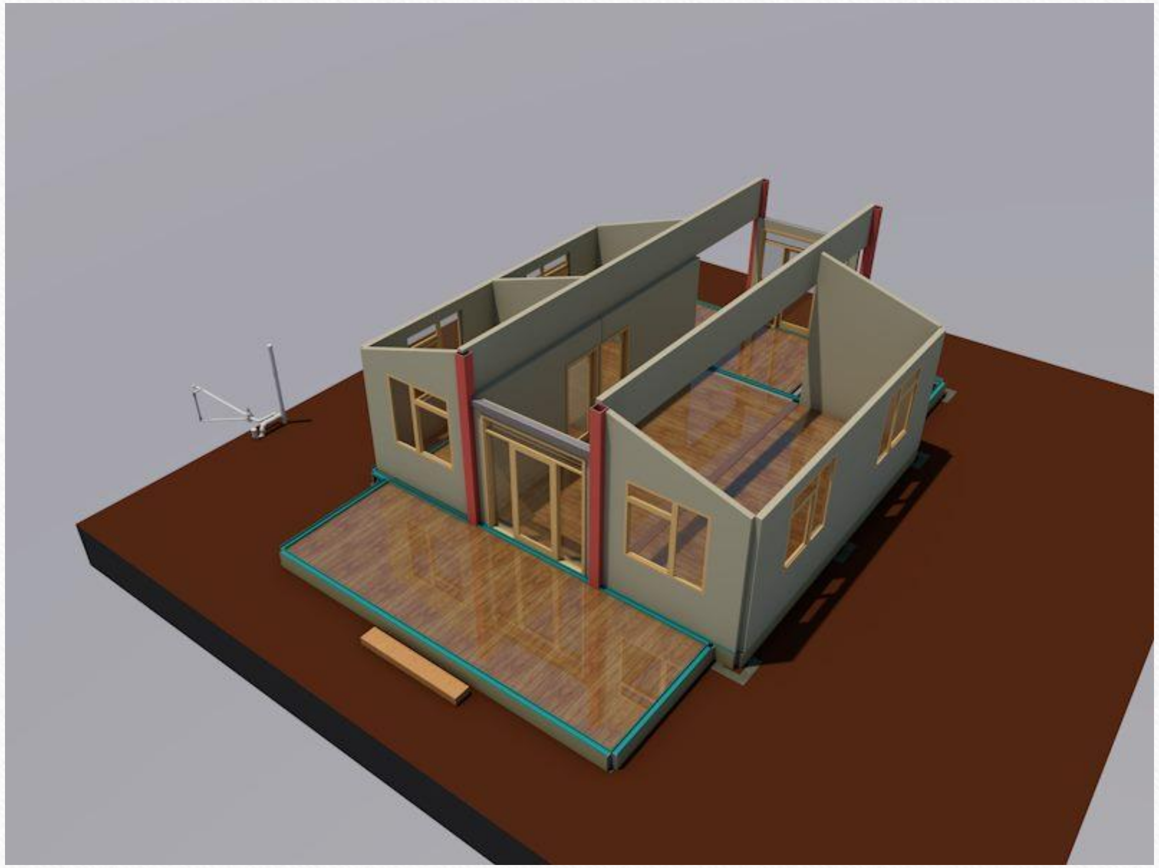
3.Walls cont.

Walls are fabricated in sections up to 3600mm x 2700mm. Linings, windows and doors are pre installed.

After a dry install walls are packaged using a protective sheet and plastic wrapped for transport.

Wall configuration(Typical)

- 89mm g550 c section stud framing
- 16mm Viva board fire rated to AS lining to internal walls c/w fire rated backing strip.12mm cfc or Viva board to external skin c/w Thermacon or similar thermal break.
- 75mm Rockwool insulation
- Finishes' Option for composite aluminium panel, laminate, cfc plank or paint finish

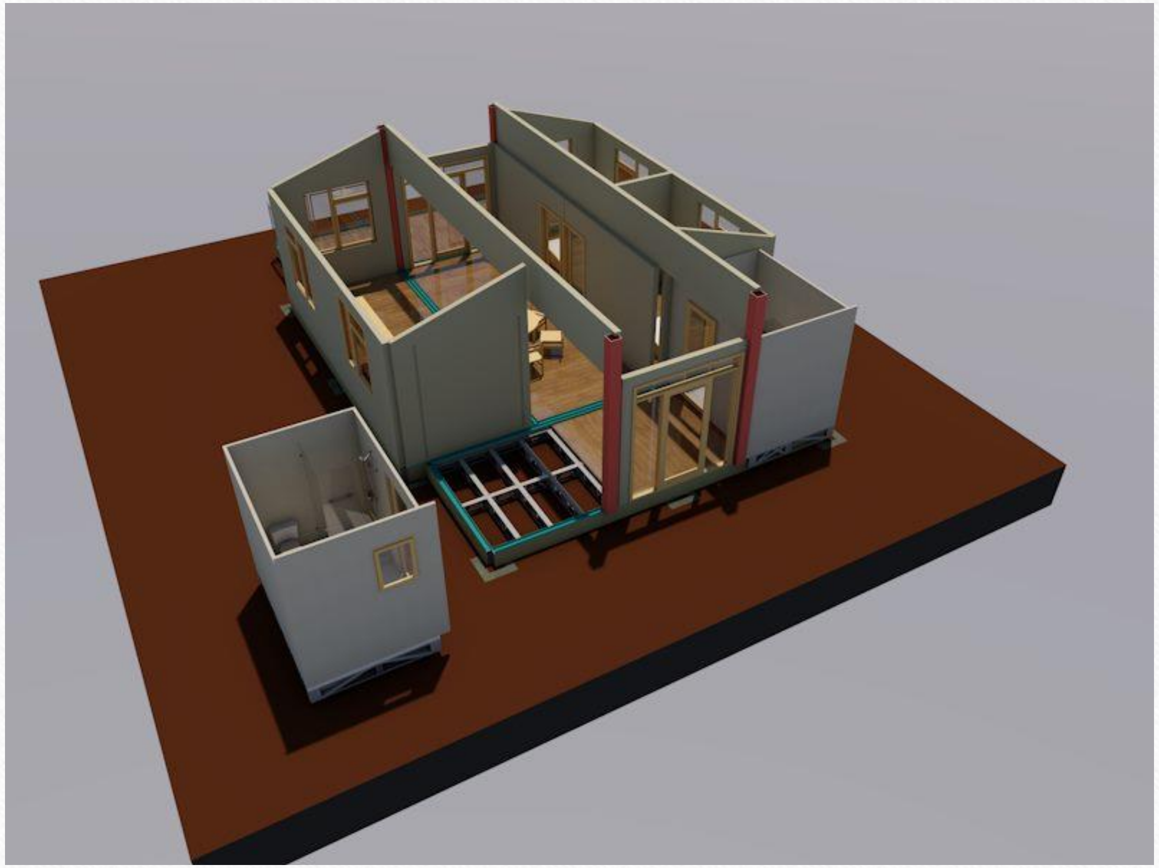


4.Bathrooms

Bathrooms are completely finished and ready for connection to mains once installed.

A variety of finishes is available to suit almost any design.

All plumbing work is AS 3500 standard,tested and signed off by a licensed plumber.



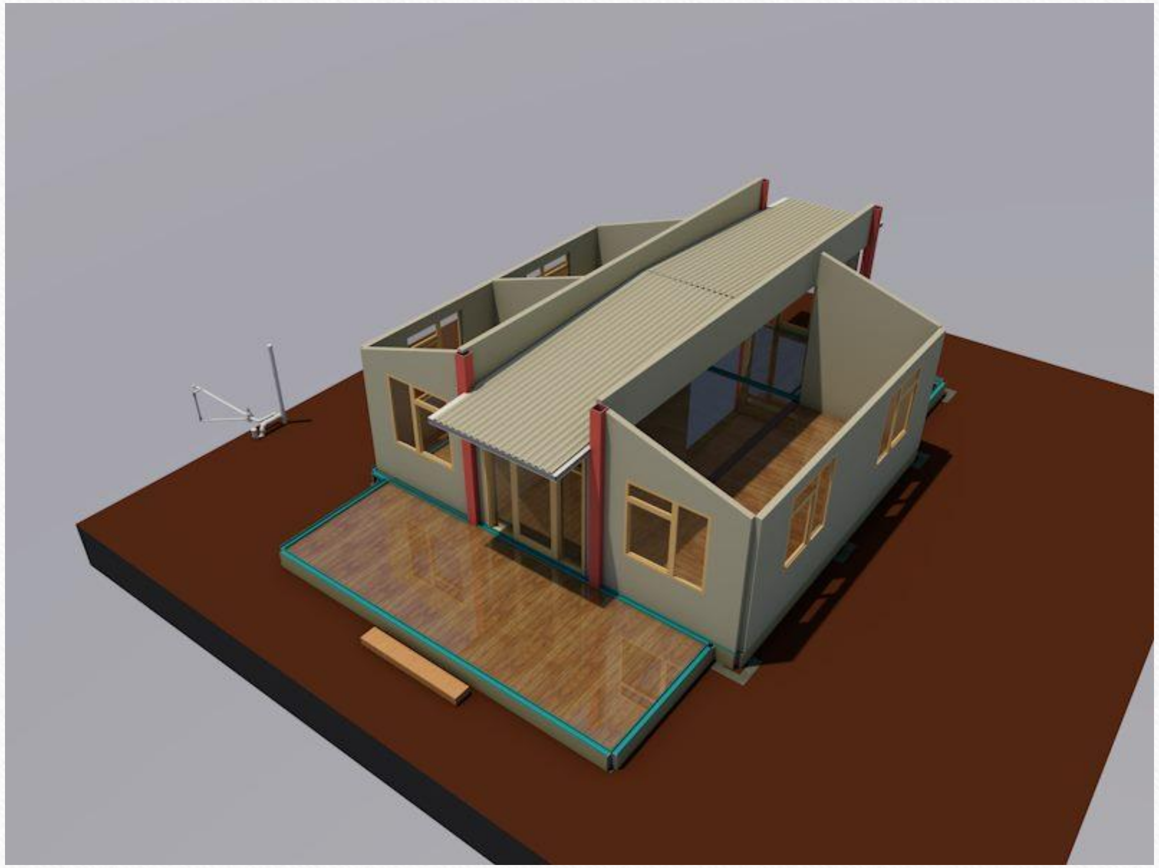
5.Roof

Roofs are delivered as panels with top and bottom linings in place.

Roof panels lock on to the wall panels with pre installed cleats providing absolute accuracy.

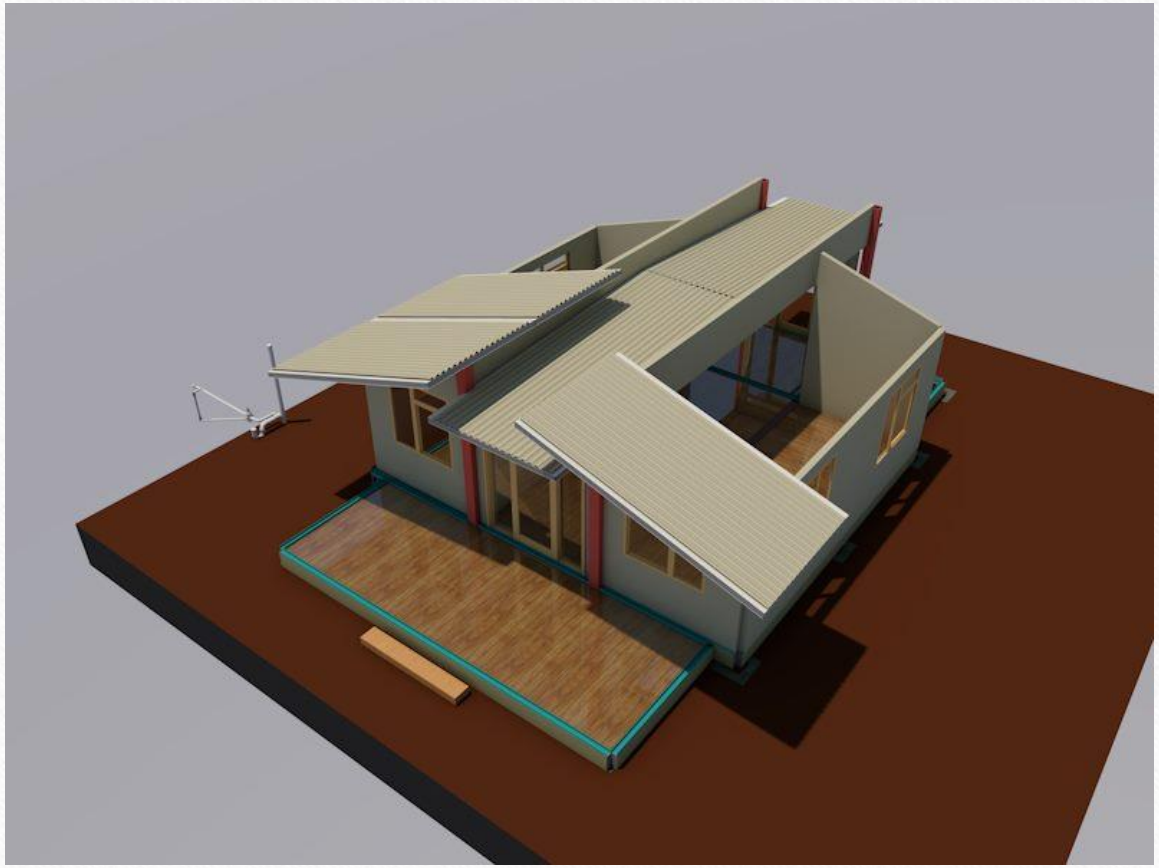
Generally the roof panels come in a 2450 width and length to suit. A split sheet is then applied to junctions in the case of rolled profile steel roofs.

Wiring is complete to roof panels, installed by a registered electrician and terminating with AS3000 approved plugs for connection to the main electrical system.



5.Roof cont

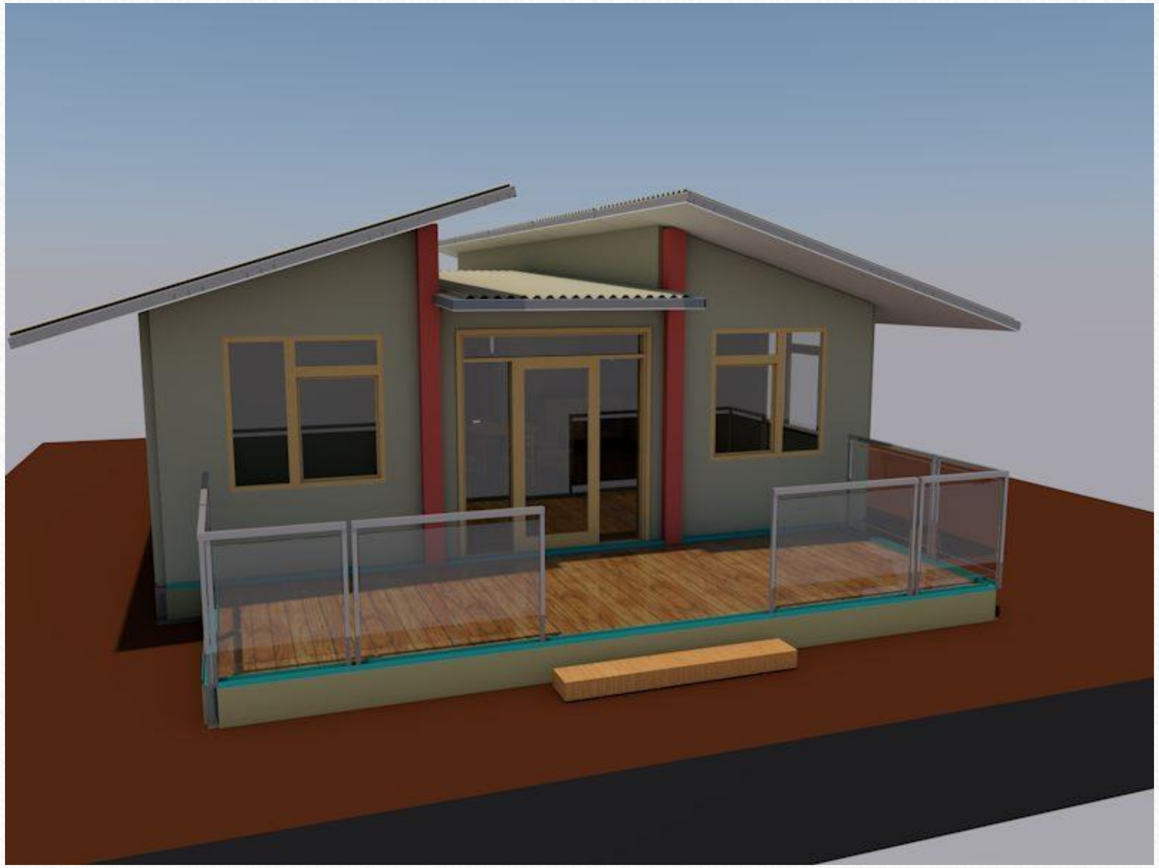
Roof panels are progressively installed



Complete

Finishing work required once installed:

1. Flashings and trims are installed following installation of main components.
2. Installation and connection of modular kitchen to services
3. Installation of internal trims
4. Connection of plumbing to mains
5. Skirt to base perimeter if required



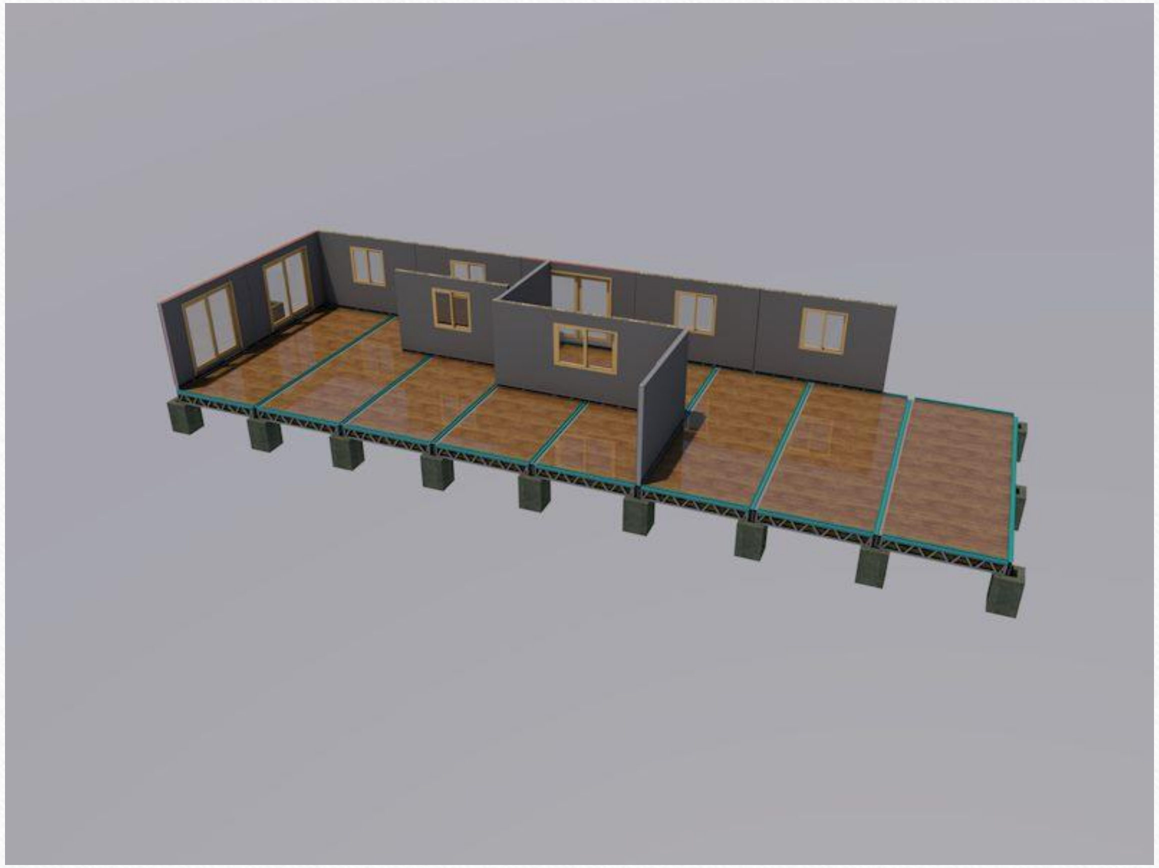
Commercial applications

The knockdown system enables an efficient way to construct single or multi story commercial buildings.

Using the system as per the previous examples, floor panels are installed followed by wall panels fitting into pre installed base channels.

Whilst all conventional engineering principles still apply the buildings are free from the box like construction of a volumetric structure.

Wide spans can be achieved with the addition of supplied trusses and columns.



Commercial cont.

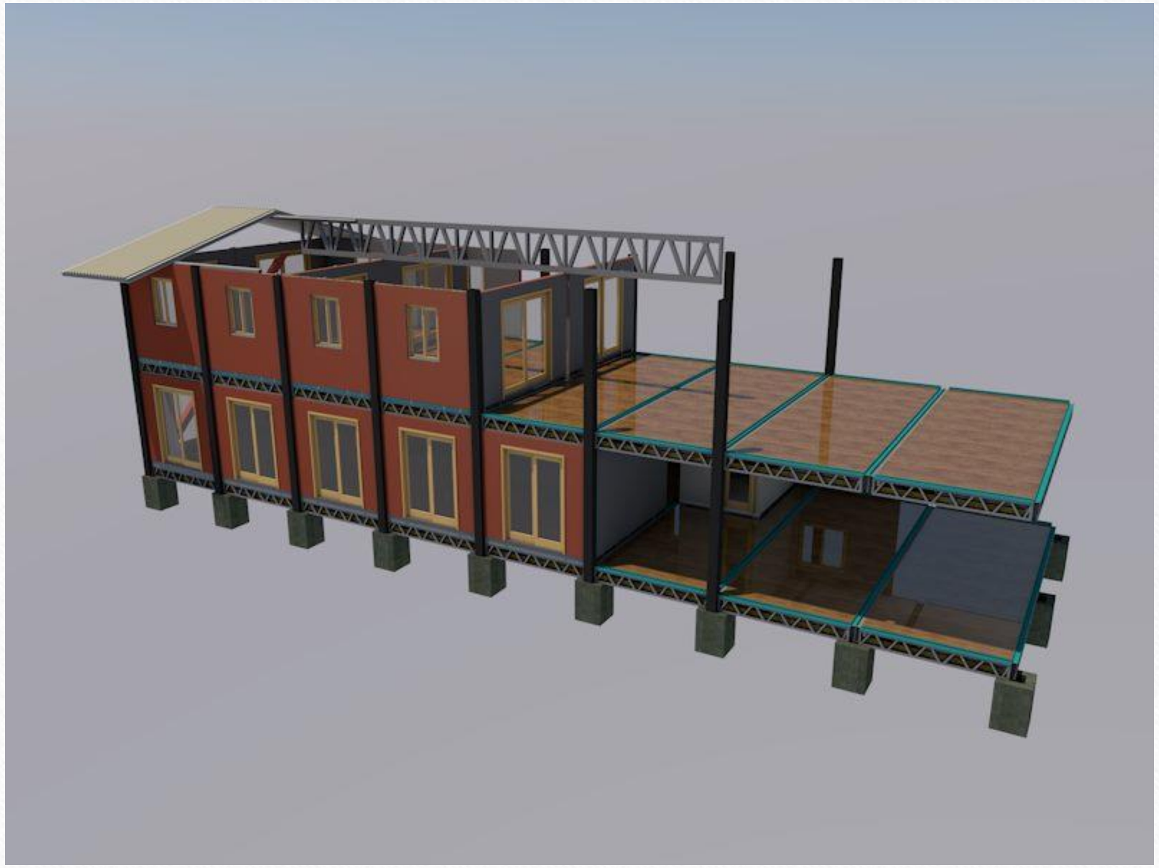
#The average time for installation of a wall, floor or roof panel is approx. 1 hr, allowing buildings to be assembled in rapid time.

All designs and completed works are certified by a registered structural engineer.

As per the previous examples, floors, walls and ceilings may be pre wired for electrical connections.

Drop in bathrooms and or kitchens are utilized as required.

Fire ratings of 120/120/120 are achievable

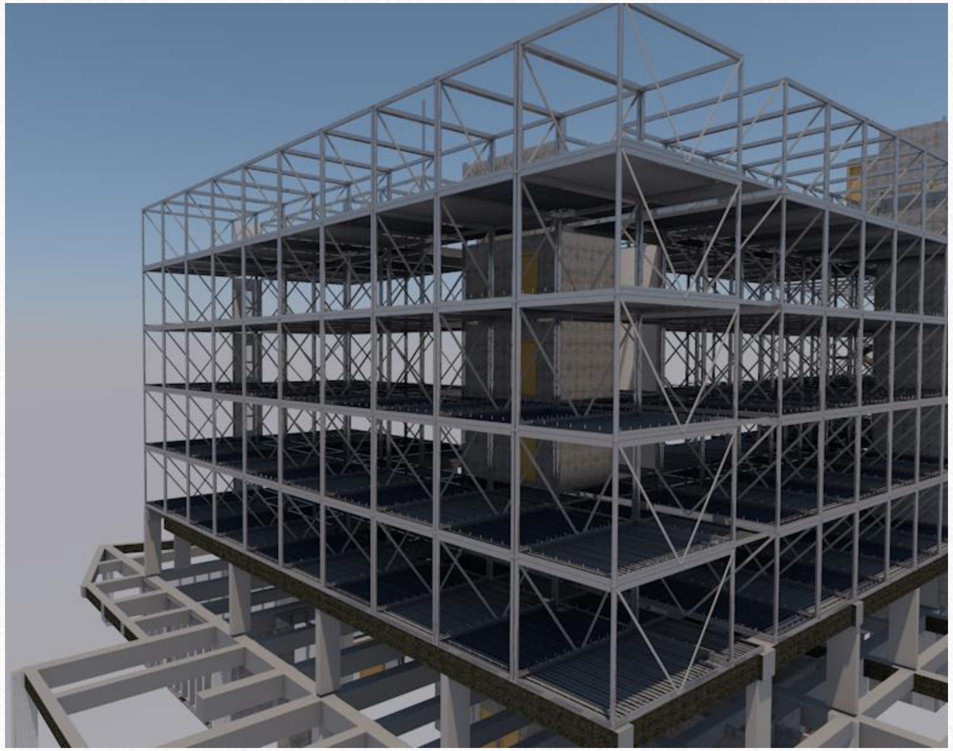


Summary

This form of knockdown construction allows a level of flexibility and reduction of transport costs and may be advantageous in situations where the cost of shipping volumetric modules outweighs the cost of knockdown construction.

Although more labour intensive at site, many of the required tasks of the knockdown system are in fact still required by volumetric or prefabricated structures, such as connection of modules. Clashing of junctions etc.

It would seem prudent to explore both options for your forthcoming projects as there may be significant cost savings to be had, without compromise. Other benefits of the system are the possibilities of employment for semi skilled workers and the advantage of regulatory bodies being able to witness and inspect the construction in progress, as opposed to prefabricated modules.



Comparative summary

This brief comparative chart attempts to delineate key cost implications of the two systems,i.e knockdown vs volumetric.