

Abstract 200 words

In response to the growing global population and pandemic issues. The project has proposed vertical farm in each unit balcony, the user can produce fruit and vegetable with a great nutritional value. The commercial building also has vertical farm which could produce fresh fruit, vegetable to small grocery store and neighbor's stores. To reconnect the relationship with local community and creates an ecosystem within an innovative and healthy urban agriculture spaces.

Using Glue Laminated Timber (GLT) as main structural materials which has superior fire-resistant, great acoustic, and easy to erect and install. The wall has chosen eco-friendly cardboard panel. It is 100% recyclable material and could be disassembled and assembled. With waterproof timber claddings façade creates durability, optimal insulation, and aesthetic appearance. The floor and internal panel used cross-laminated timber (CLT) which is a prefabricated wood panel and provides dimensional stability.

Utilizing acoustic ceiling for each module which provides an acoustic comfort living area. Installing retractable roof to maximize natural light coming into balcony and indoor living area and minimize the energy cost. Installing renewable sources solar tracking system on the top which gives sustainable power generating solution and minimize the consumption. Finally, to maintain vertical farm value and reduce water cost, the building installed rainwater tanks on site which to collect rain and supply stable water resource for each unit vertical farm. Creating sustainability environment to the users.

Executive summary 500 words

The project site is in Lot 1359 (12) Stack Street, Fremantle WA. To maintain heritage characteristic, the project has adapted existing façade and steel structure. It also proposed new light weight steel column to enhance the existing structure. Using existing roof triangular shaped as V-column as new construction system inspiration idea and module form appearance.

Project program has adapted existing building as restaurant, workshop, grocery, and proposed four levels contemporary prefabricated modular building as mixed-use development. In response to the growing global population and pandemic issues. The project has proposed vertical farm in each unit balcony, the user can produce fruit and vegetable with a great nutritional value that could be utilized in supplement to a healthy diet. The commercial building also has vertical farm which could produce fresh fruit, vegetable to small grocery store and neighbor's stores. To reconnect the relationship with local community and enhance the community and client value. It also creates a collective awareness of the inhabitants, biodiversity, an ecosystem within an innovative and healthy urban agriculture spaces.

Furthermore, to achieve affordable and higher sustainable environment goals, this project also re-use existing timber frames for the balcony of module apartment. Adapted existing brick as recycled material in apartment building service area which could provide a great acoustic performance and stronger structure. It also provides job opportunity for local re-use shops and enhance the connection with surrounding.

Regarding the materials selection, the modular building has adopted Glue Laminated Timber (GLT) as main structural materials. GLT is strong structure with superior fire-resistant, great acoustic, thermal and easy to erect and install. Allowing a high degree of dimensional stability and structural capabilities. It also reduces carbon footprint and provide a sustainable living environment. The wall has chosen eco-friendly cardboard panel and waterproof timber claddings as façade materials which create durability, optimal insulation, and aesthetic appearance. Cardboard is a lightweight material and 100% recyclable. It is disassembled and assembled. It also can be transported and connected on site in a day. The floor and internal panel used cross-laminated timber (CLT) which is a prefabricated wood panel and provides dimensional stability. Giving high strength and stiffness properties with lighter weight structures. It is safer and fast to install in shorter construction times.

To prevent noisy transfer from near unit, the project utilized acoustic ceiling for each module which provides an acoustic comfort living area. Using retractable roof to maximize natural light coming into balcony and indoor living area which could be beneficial for vertical garden and enhance indoor and minimize the energy cost. The roof also can be entirely closed to prevent the rain and retracted entirely for star-gaze at night, which gives amazing experience.

Installing renewable sources solar tracking system on the top. It is a device for positioning a solar panel or focusing a solar reflector which gives sustainable power

generating solution and minimize the consumption. Finally, to maintain vertical farm value and reduce water cost, the building installed rainwater tanks on site which to collect rain and supply stable water resource for each unit vertical farm. It also provides nature water resource for each unit toilet, and common laundry. Creating sustainability environment to the users.

V-FARM MODULAR APARTMENT

The project site is in Lot 1359 (12) Stack Street, Fremantle WA. To maintain heritage characteristic, the project has adapted existing facade and steel structure. It also proposed new light weight steel column to enhance the existing structure. Using existing roof triangular shaped as V-column as new construction system inspiration idea and module form appearance. Project program has adapted existing building as restaurant, workshop, grocery, and proposed four levels contemporary prefabricated modular building as mixed-use development. In response to the growing global population and pandemic issues. The project has proposed vertical farm in each unit balcony, the user can produce fruit and vegetable with a great nutritional value. The commercial building also has vertical farm which could produce fresh fruit, vegetable to small grocery store and neighbor's stores. To reconnect the relationship with local community and creates an ecosystem within an innovative and healthy urban agriculture spaces. Using Glue Laminated Timber (GLT) as main structural materials which has superior fire-resistant, great acoustic, and easy to erect and install. The wall has chosen eco-friendly cardboard panel. It is 100% recyclable material and could be disassembled and assembled. With waterproof timber claddings facade creates durability, optimal insulation, and aesthetic appearance. The floor and internal panel used cross-laminated timber (CLT) which is a prefabricated wood panel and provides dimensional stability. Utilizing acoustic ceiling for each module which provides an acoustic comfort living area. Installing retractable roof to maximize natural light coming into balcony and indoor living area and minimize the energy cost. Installing renewable sources solar tracking system on the top which gives sustainable power generating solution and minimize the consumption. Finally, to maintain vertical farm value and reduce water cost, the building installed rainwater tanks on site which to collect rain and supply stable water resource for each unit vertical farm. Creating sustainability environment to the users.



MACRO MAP



MICRO MAP



The project site is located in Lot 1359 (12) Stack Street, Fremantle WA. There is an existing industrial single story building which was constructed in 1955 by built-in DM Bridges of Tubular Steel Structures. Currently this building provides car, mechanical, and engine repairs service for local community.

SITE PLAN



EXISTING MATERIAL

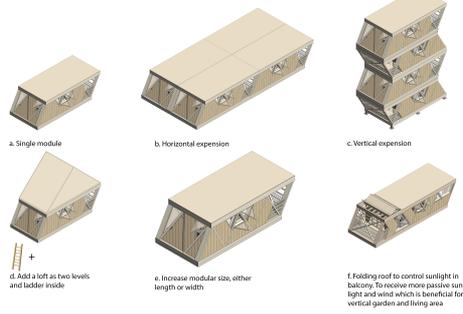


Remain existing facade & steel frame
To maintain heritage characteristic of existing building. Will adapt the existing facade appearance and existing structure. Propose new light weight steel column to enhance the existing structure and using roof triangular shape for the proposed structure.

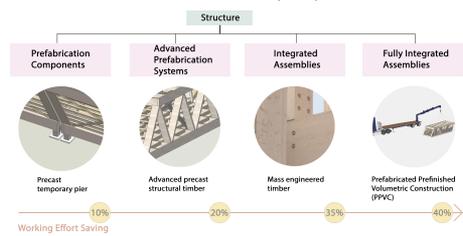
Adaptive reuse timber frame
Using existing brick of the site as recycled material in apartment building service area. The brick could provide a great acoustic performance and stronger structure. It also created a sustainable environment and reconnect the neighborhood. It also reduces construction cost and waste.

Recycled brick
Using existing brick of the site as recycled material in apartment building service area. The brick could provide a great acoustic performance and stronger structure. It also created a sustainable environment and reconnect the neighborhood. It also reduces construction cost and waste.

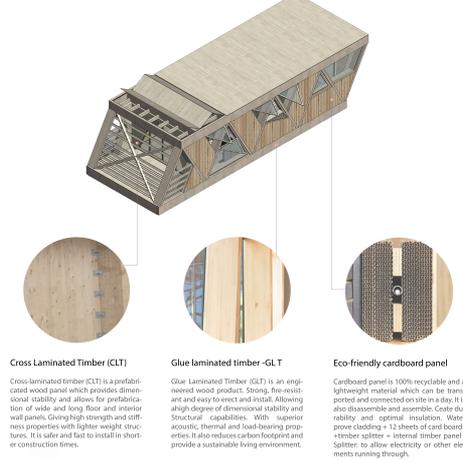
DESIGN APPROACH



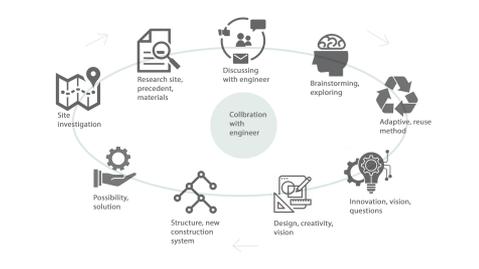
DESIGN FOR MANUFACTURE AND ASSEMBLY (DFMA)



INNOVATION IN MATERIALS

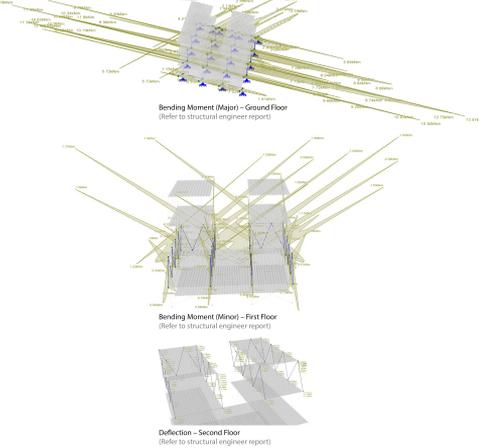


COLLABRATION WITH ENGINEER

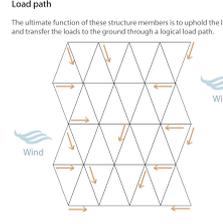


INNOVATION IN ENGINEER

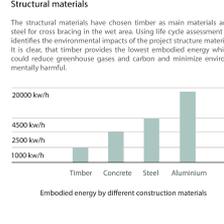
Module form
Each level of module structures will be in opposite direction when stacking up, to allow to withstand the loads in all directions including gravity loads, government and imposed, upward load (wind) and lateral loads (wind). This is because all the structure members will be undertaking bending moment, axial and shear force therefore make sure the members pass all the design criteria.



BUILDING LOAD - V SHAPE COLUMN



LIFT CYCLE ASSESSMENT



EAST ELEVATION



North ELEVATION





V-farm module apartment with adaptive existing warehouse entrance



SUSTAINABILITY



VERTICAL FARM
In response to the growing global population and pandemic issues, the provide has adopted vertical farm concept as an alternative to traditional farming methods. It focuses on focuses on the production of foods with a great nutritional value that could be utilized in supplement to a healthy diet. This vertical farm also attempts to reestablish an ecosystem within Fremont's urban environment.

RETRACTABLE ROOF
Retractable roof can be opened to allow more natural light coming into balcony and indoor living area which could be beneficial for vertical garden and indoor comfort. Increasing attractiveness to the building and minimize the energy cost. The roof also can be entirely closed to prevent the rain and retracted entirely for star-gaze at night, which gives amazing experience.

RAINWATER TANK
To maintain vertical farm value and reduce water cost, the building installed rainwater tanks on site which to collect rain and supply stable water resource for each unit vertical farm. It also provides nature water resource for each unit toilet, and common laundry. Creating sustainability environment to the users.

North winter sunlight



SOLAR AXIS TRACING SYSTEMS

Global warming has rise the need and request for green energy provided by renewable sources such as solar system. Thus, solar tracking is growing being adopted as a sustainable power generating solution. It is a device for positioning a solar panel or focusing solar reflector. Received 90% of the solar energy to minimize the consumption.

Low E-glazing window
High performance hopper to allow more natural ventilation into indoor space

Natural convection exhaust
Unwant heat out



Cross ventilation



Cross ventilation



Atrium sunlight

Skylight window
To receive more natural light into indoor space



Rainwater supply to each unit



V farm module apartment roof top



Existing warehouse with new building entrance

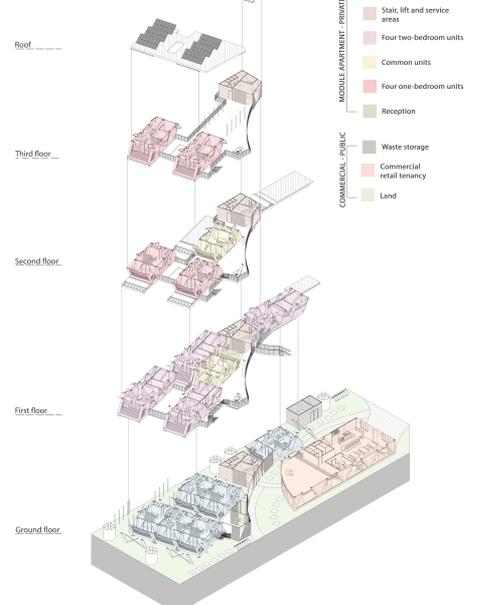


Adapt existing warehouse to be a restaurant to reconnect local community relationship

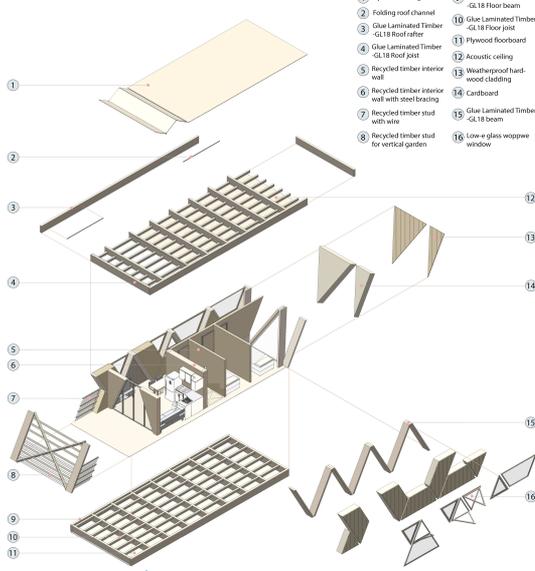


V farm module apartment void

PROGRAMME



EXPLORED TWO-BEDROOM UNIT MODULAR

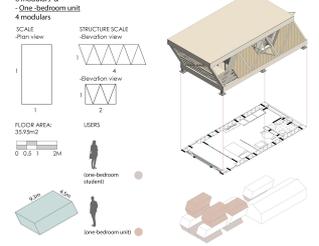


V farm module apartment - unit 2 internal

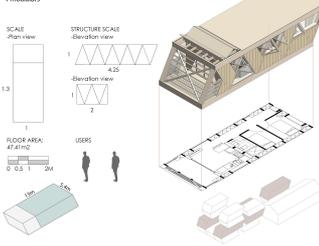


V farm module apartment - unit 3 vertical farm balcony

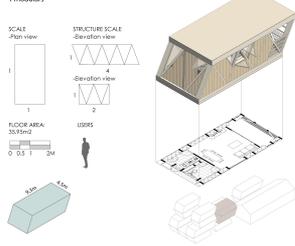
TYPICAL FLOOR PLAN - a.



TYPICAL FLOOR PLAN - b.

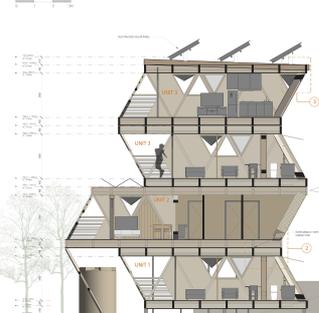


TYPICAL FLOOR PLAN - b.

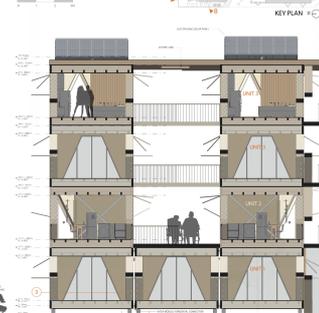


V farm module apartment - ground floor study and outdoor areas

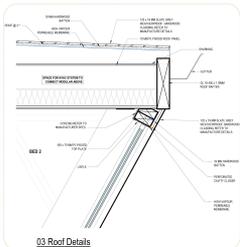
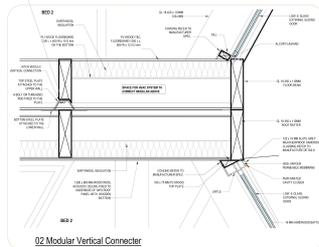
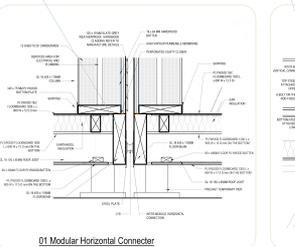
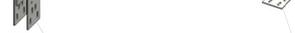
Modular Apartment Section A



Modular Apartment Section B



KEY PLAN



0 0.5 1M