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Stage 1 - **Develop a series of plan templates to assist councils to more easily design and build small scale public libraries.** The project would likely include 'modules' to be designed that can be put together to create a usable library space. These modules could also be used to extend existing library spaces, for example, to include additional seating or a meeting room (Brief) 1

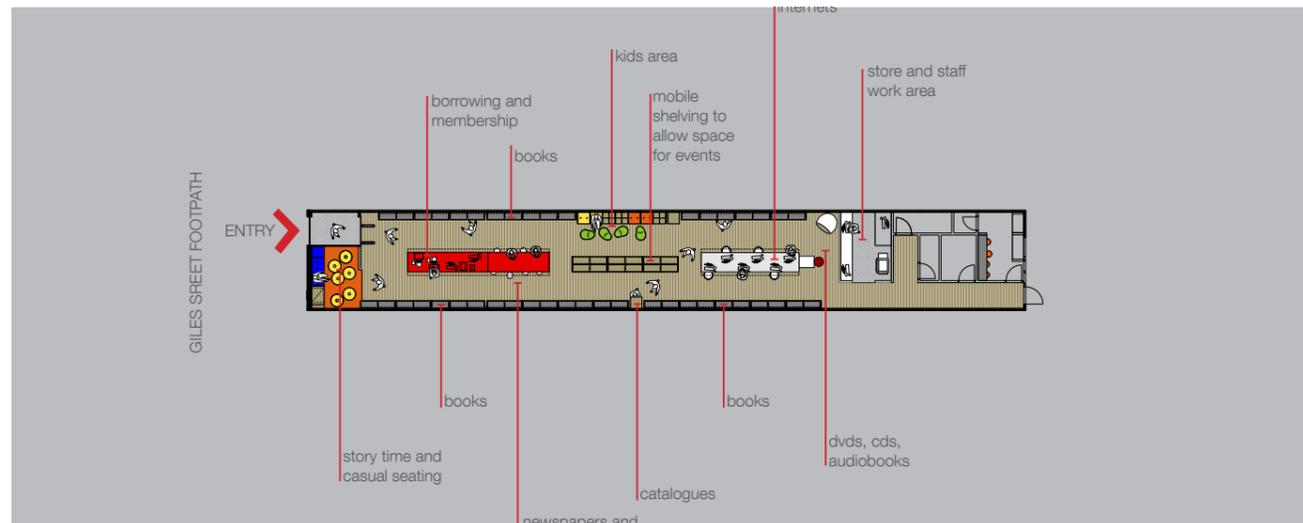
Stage 2 - **Design and scope the fitout of a 'shipping container' style library** that could be temporarily located in a small community to provide longer term services than the traditional mobile library visit.

Stage 3 - **Investigate and cost the development of suitable prefabricated options** that could be purchased by councils to contain the modules.

1.0 Benchmarks

A series of benchmarks has been investigated of libraries which relate to the briefed 'small library' areas. The State Library NSW Small Library Brief has been used as a reference for the 500sqm library and the Area Calculation Spreadsheets have been used to approximate the size of various functions for each library size.

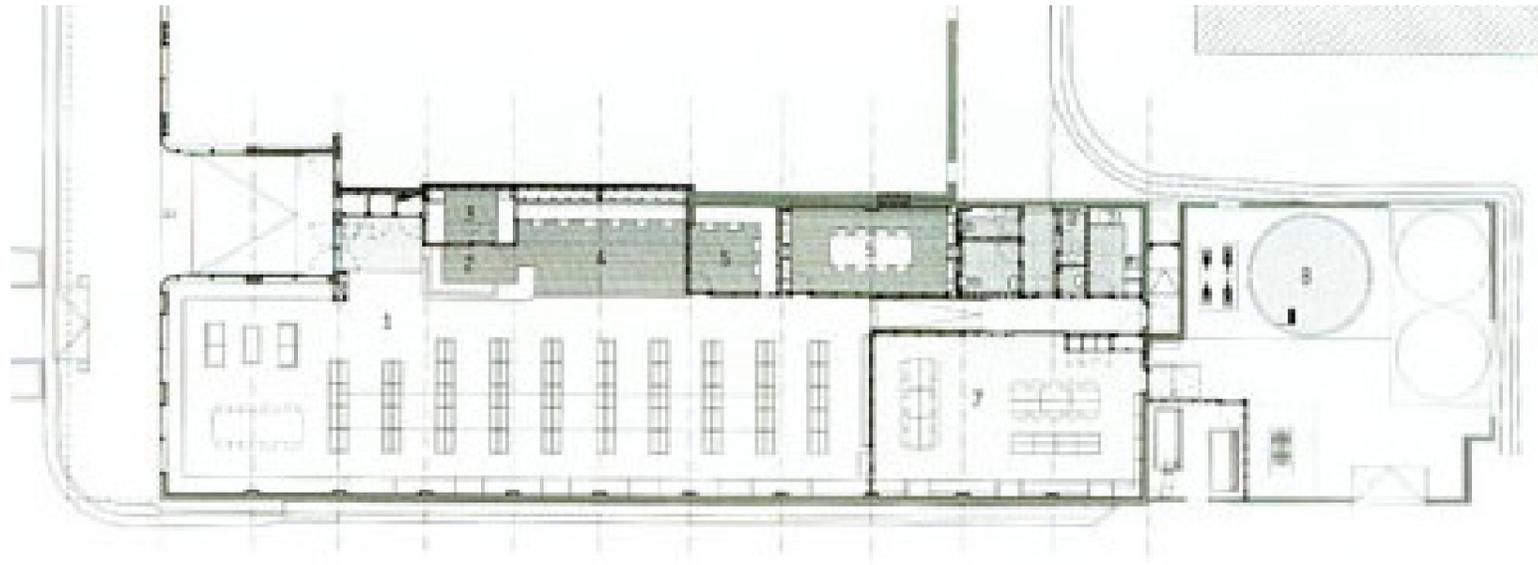
< 200 sqm libraries



Kingston Library ACT (BVN Architects)



Watsons Bay Library Kiosk (CK International)



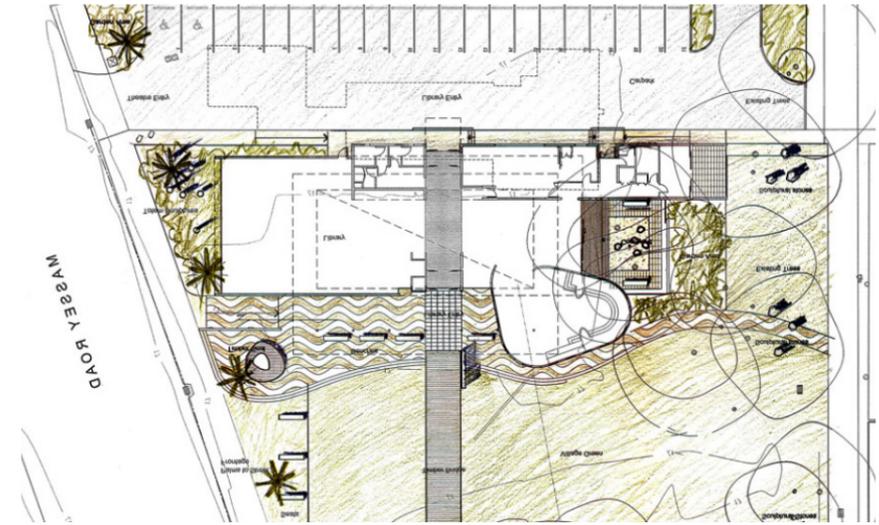
500 sqm library



Junee Library (Lee Hillam)



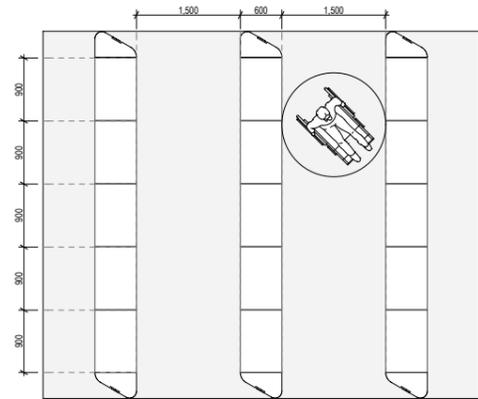
1000 sqm library



Magere East Public Library (Jasmax)

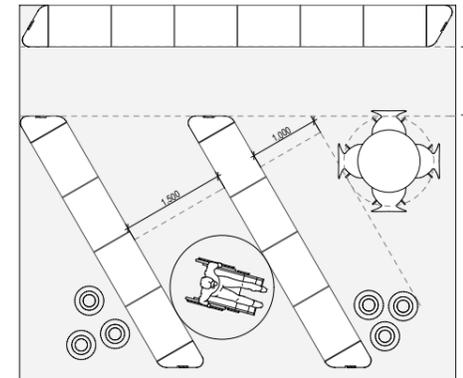
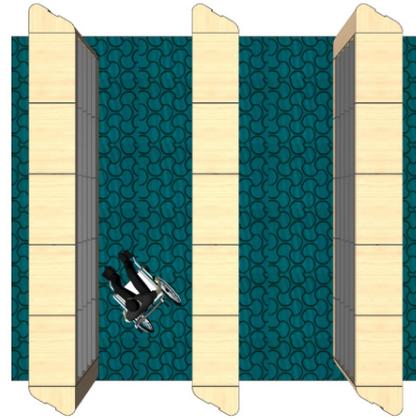
2.0 Library Planning Modules

The generic library plans provided as part of the prefabrication study can be used to assist librarians in the preliminary planning of small libraries and library extensions. A kit of parts is also provided below which when printed to scale can offer further 'Lego' elements which when combined can offer a preliminary understanding of space requirements.



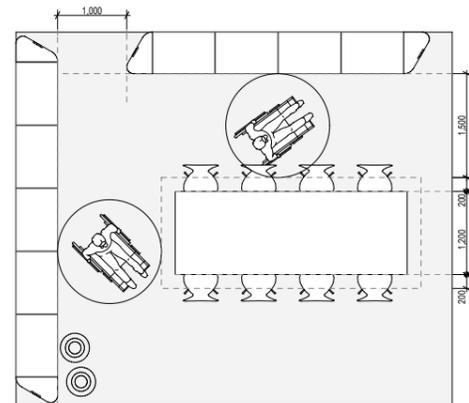
30 BAYS
6.3 x 5.4m 34m²

TYPE 1
1:50



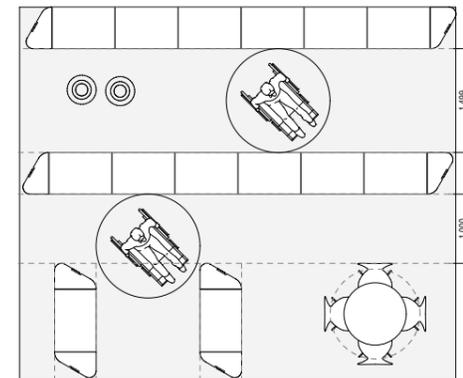
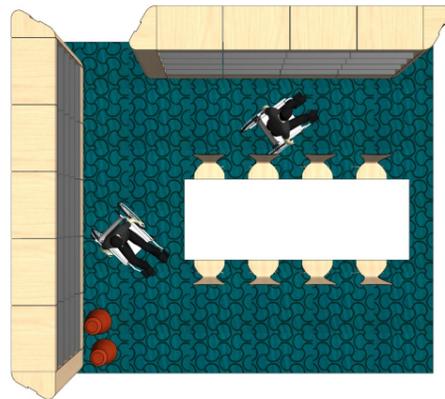
28 BAYS + 4 SEATS

TYPE 4
1:50



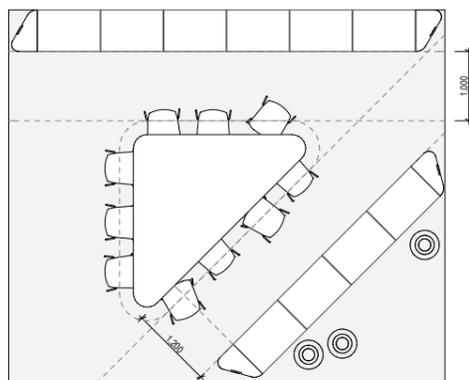
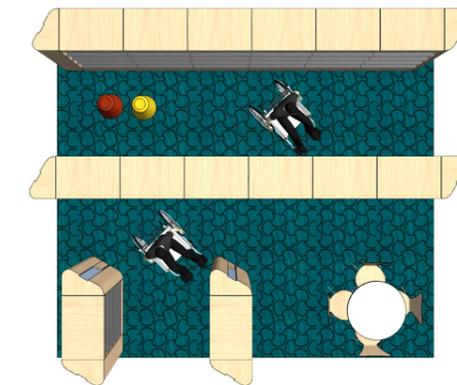
18 BAYS + 8 SEATS
6.3 x 5.4m 34m²

TYPE 2
1:50

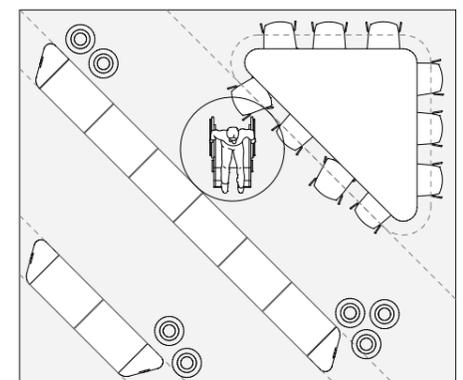
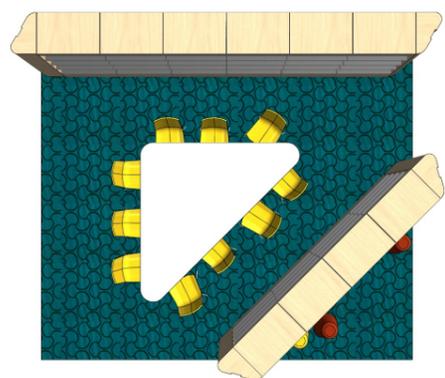


28 BAYS + 4 SEATS

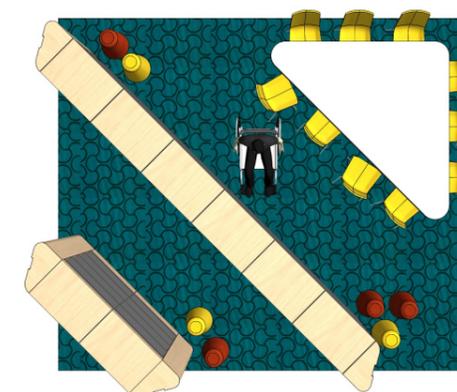
TYPE 5
1:50



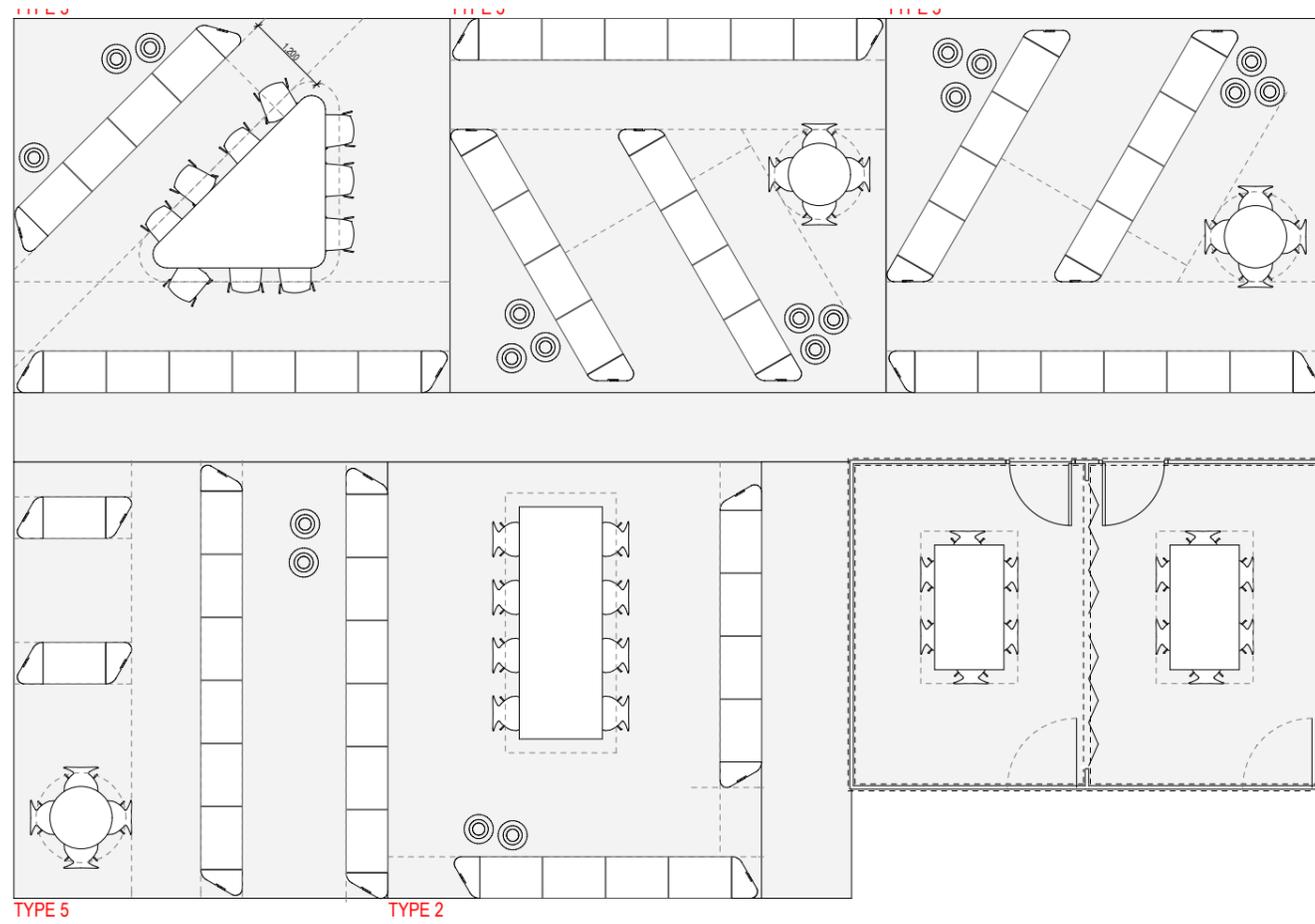
20 BAYS + 10 SEATS



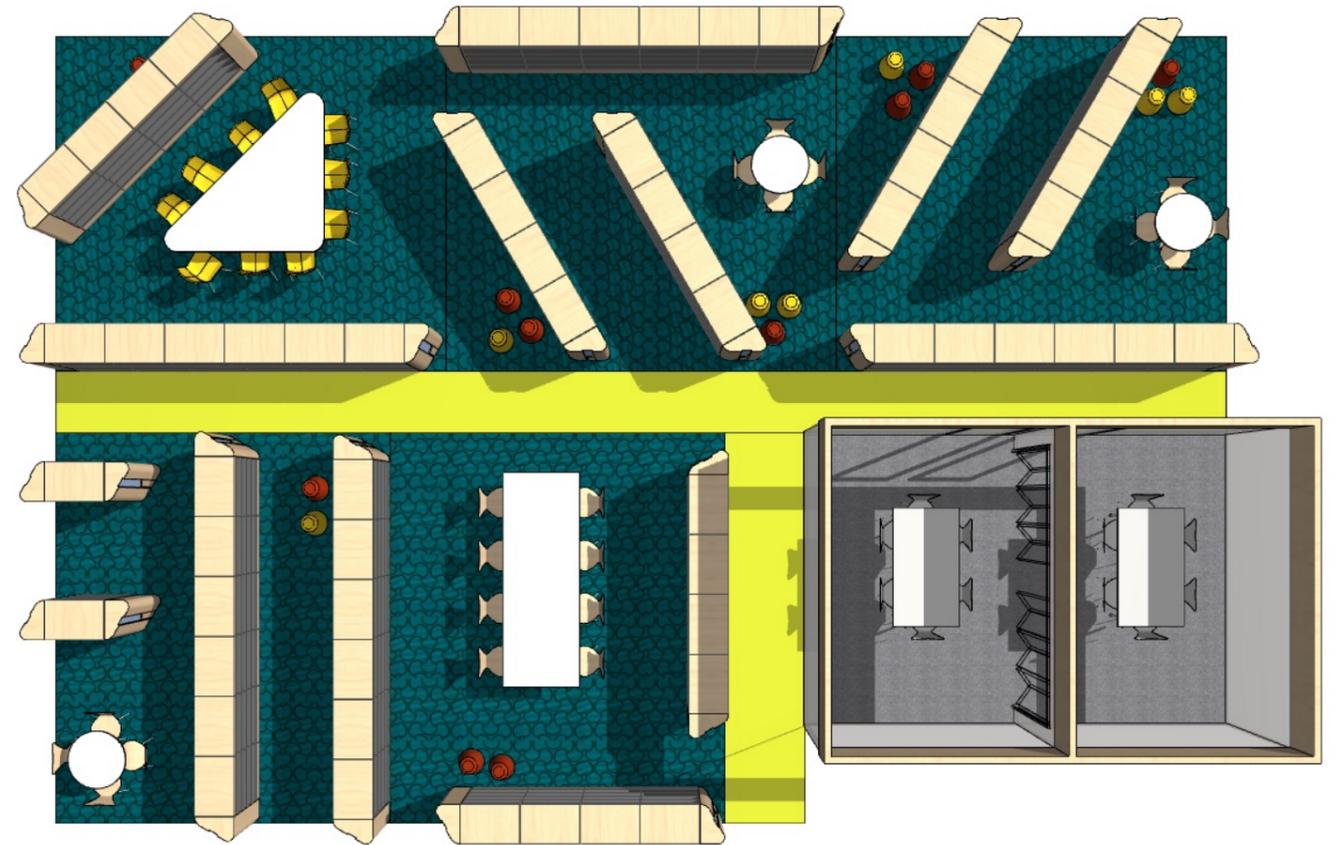
16 BAYS + 10 SEATS



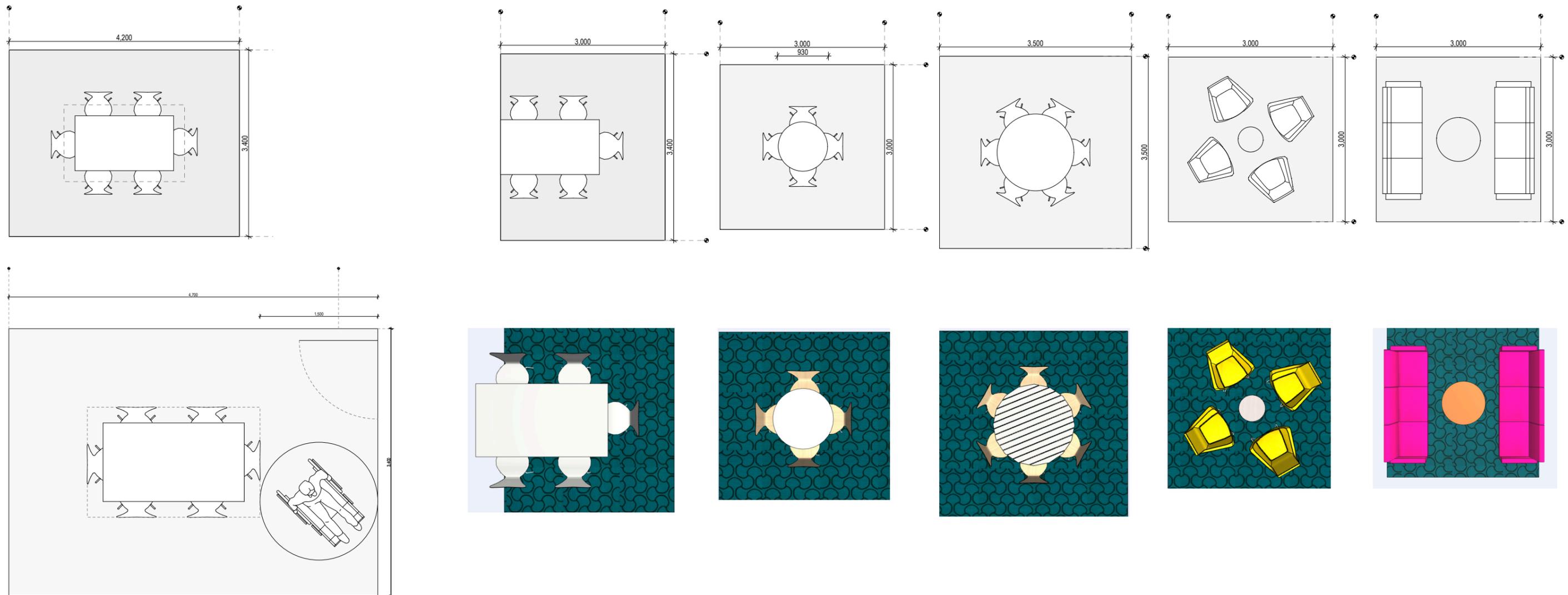
Modules can be combined with circulation space to understand overall space requirements.



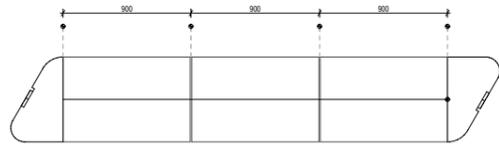
Combined Elements
1:50



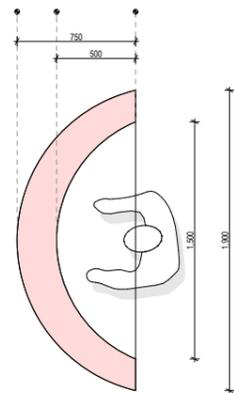
Typical seating arrangements for small 'shelving rooms' or in open plan arrangements are detailed below. Allowance for wheelchair circulation should be taken into consideration if the space is enclosed or constrained by surrounding furniture.



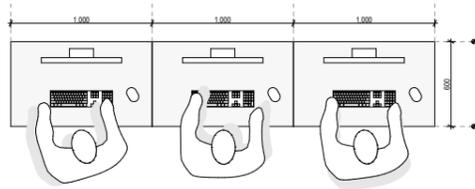
Typical shelf and workpoint dimensions are detailed below. These are for average adult physiques and not for children or people with larger or smaller frames



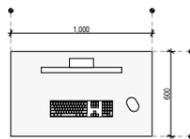
TYPICAL SHELVING MODULES



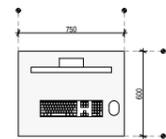
AVERAGE REACH



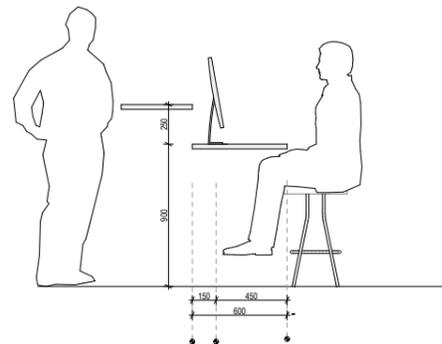
TYPICAL WORKPOINT SPACING



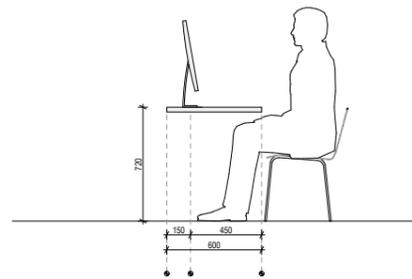
WORKPOINT SPACING



MINIMUM WORKPOINT SPACING



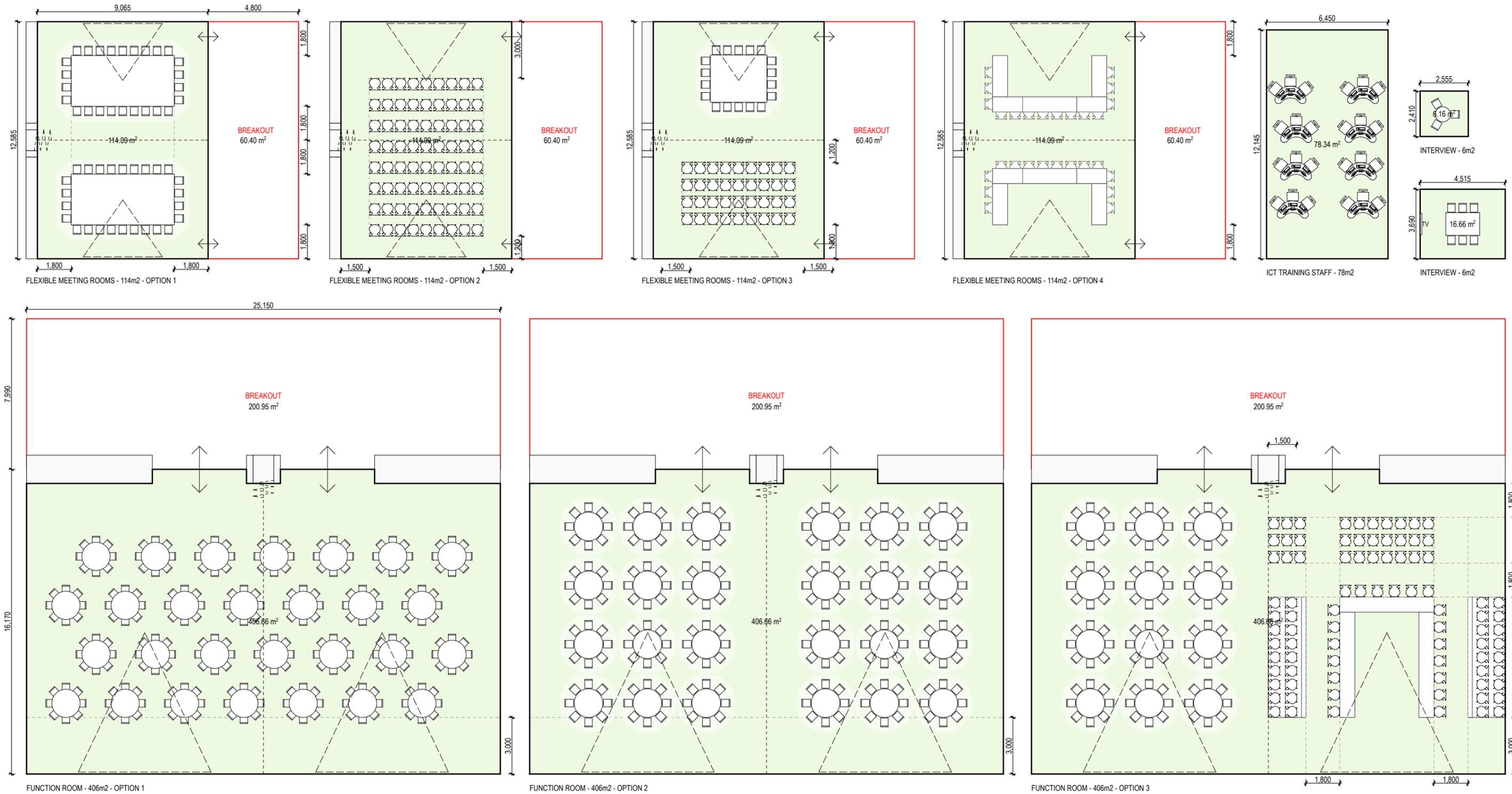
WORKING AND STANDING BENCH HEIGHTS

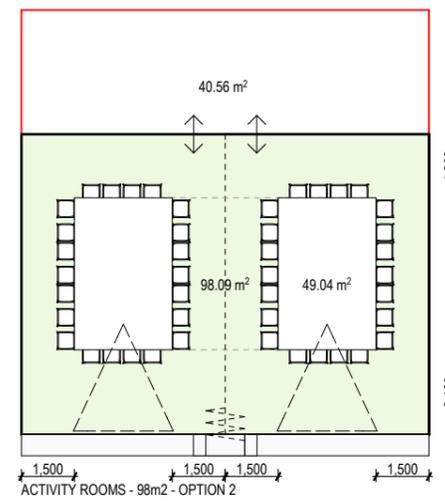
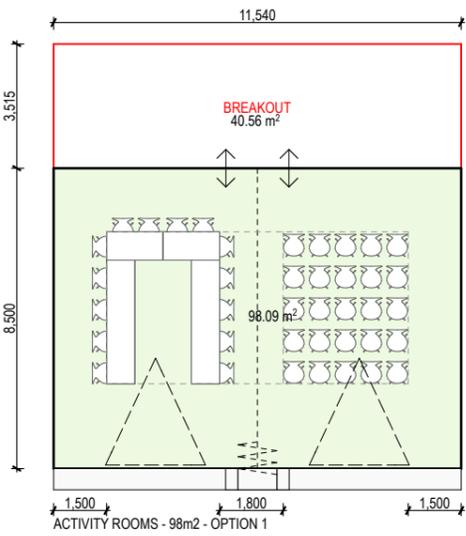
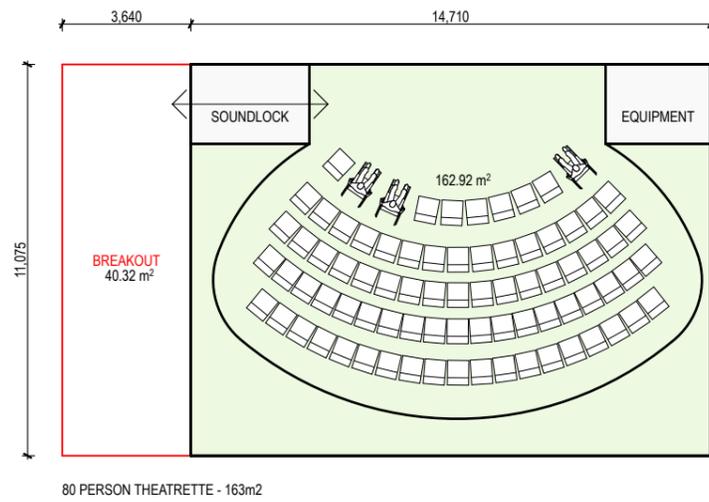
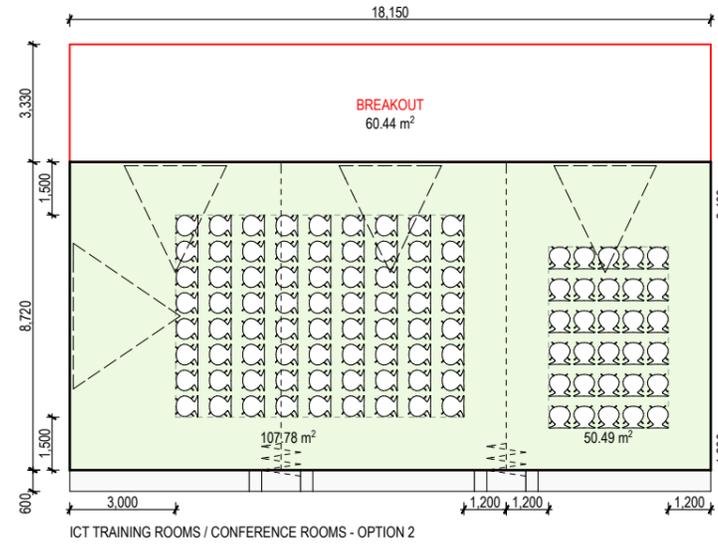
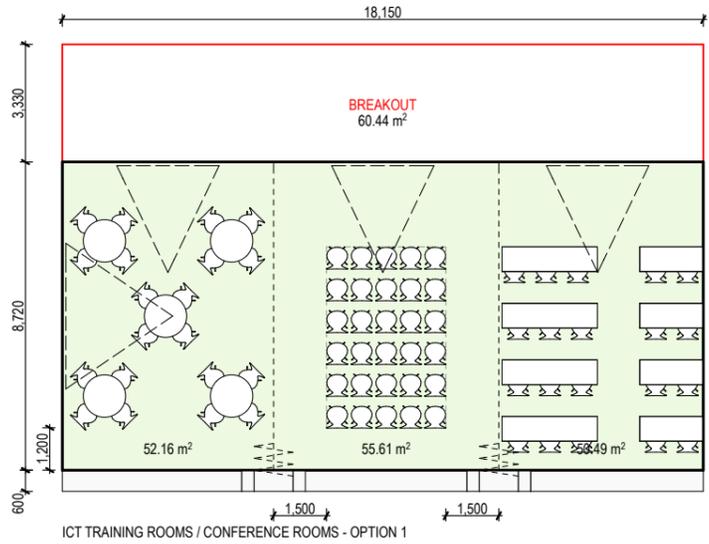
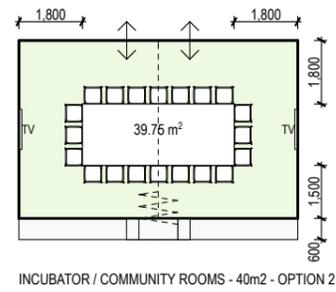
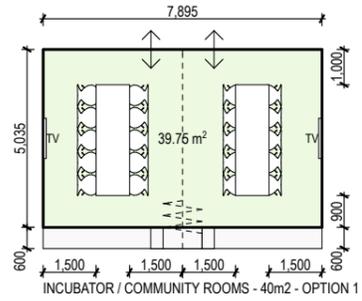
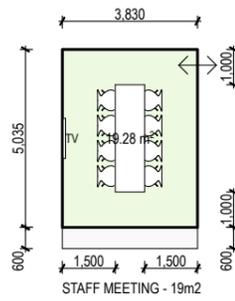


AVERAGE SEATING DESK HEIGHT (varies for tall and short physiques)

3.0 Meeting Room Modules

A range of meeting room modules copied directly from recently completed fjmt libraries is provided for information below. This should allow librarians and planners a greater understanding of the area and capacity of meeting spaces and their ability to work as flexible multi-use space.



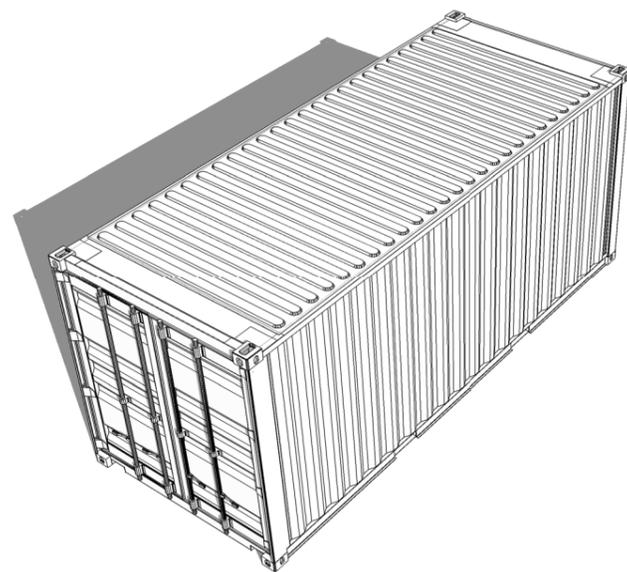
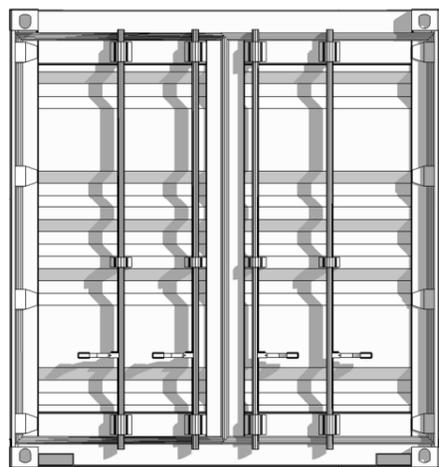
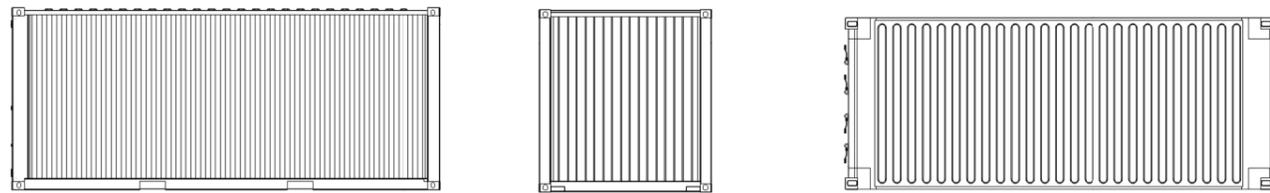


4.0 Transportable Modules for Prefabrication

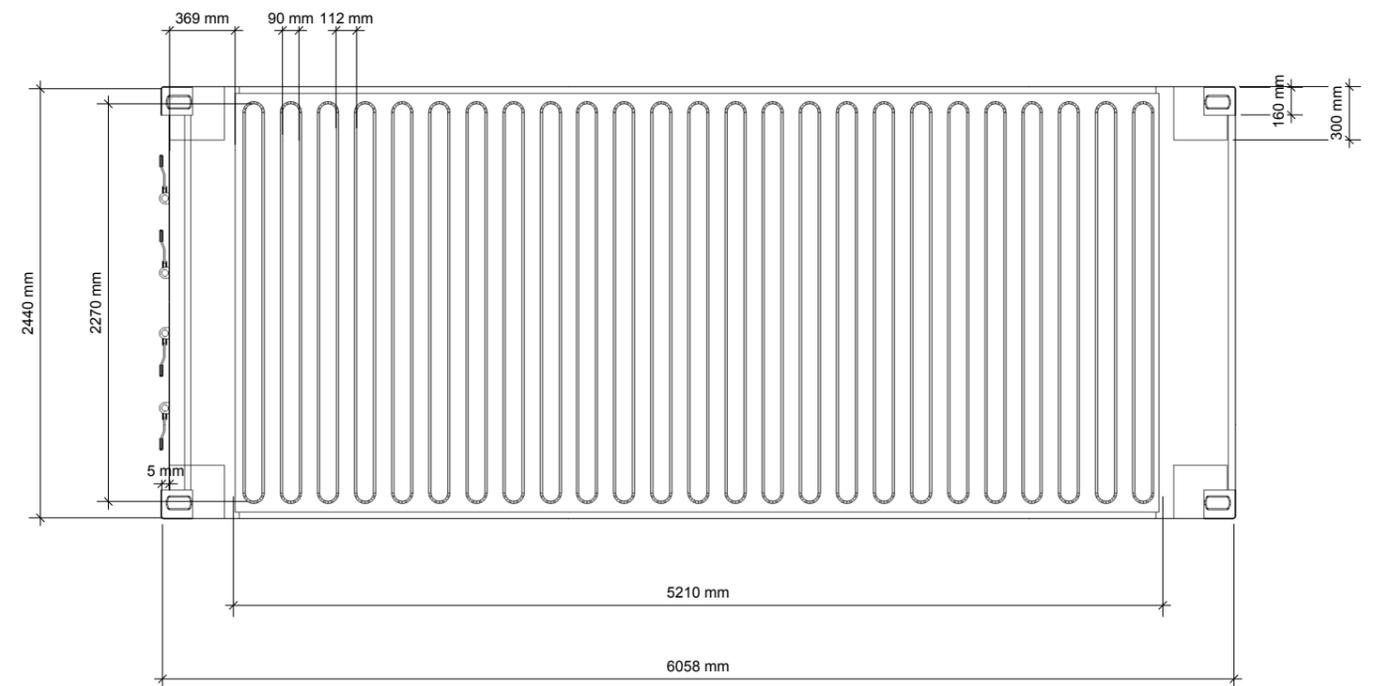
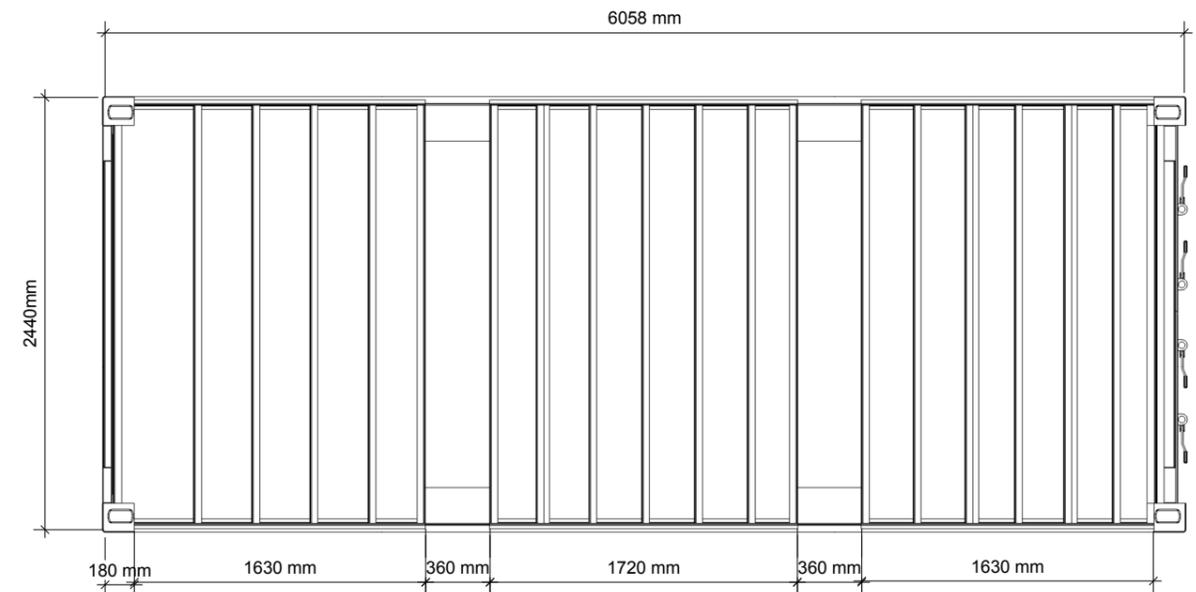
To review prefabrication of library buildings, a transport 'module' overlay was applied to the typical plans evolving from the benchmark studies. The size of transportable modules varies and would require further input from both the prefabricator but modules are limited to avoid 'oversize' truck transport which significantly increases cost. A transport module similar to the footprint of a container can be applied (2.4 x6 or 2.4x12).

Although shipping containers are widely repurposed for pop-up buildings such as cafes, they are not easily repurposed. Small prefabricated buildings of a dimension similar to a container, and easily craned from a truck, can provide the basis of a prefabricated library module.

A volume of approximately 2.4-2.5m wide (at various lengths) can be used as an extruded module for longer elements.



TYPICAL SHIPPING CONTAINER MODULES



Prefabricated buildings which arrive as a 'volume' rather than 'flat pack' offer the additional benefit of interior fitout prefabrication. This means that the interior lining, wiring, plumbing and joinery can be completed in part or in full prior to arrival on site



FITOUT ELEMENTS AND SMALL RURAL HOUSE BY ARCHIBLOX (LOCAL SUPPLIER)



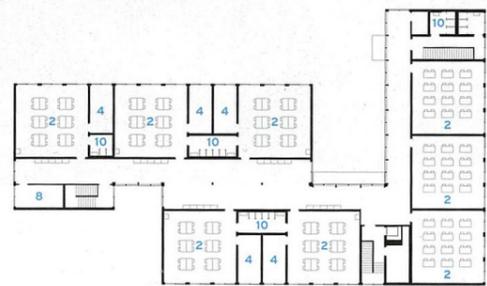
PREFABRICATED HOUSE DELIVERED AS ONE VOLUME FROM CRANE ON TRUCK (MAPA Architects BRAZIL)

5.0 Extruded volumetric buildings

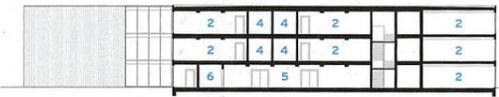
Fixed Module Buildings, such as the European School Frankfurt, can be created with a range of modules of equal dimensions. Some offer an end or termination to a space, with enclosing wall, while centre modules remain open to allow the flow of space.

The repetitive nature of these buildings, when designed well can celebrate the modular construction method but can also look rigid.

An alternative prefabrication option is to accept a 'wide load' approach which allows greater variety in form and larger dimensions. There is still the option to fit out much of the interior prior to transport but transportation costs will be greater.

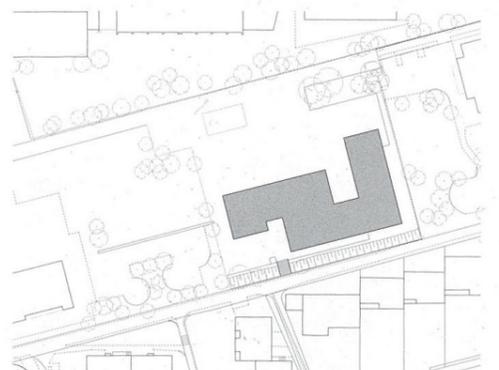


THIRD-FLOOR PLAN



SECTION A - A

- | | |
|---------------------|---------------|
| 1 ENTRY | 6 KITCHEN |
| 2 CLASSROOM | 7 GYM |
| 3 KITCHENETTE | 8 STORAGE |
| 4 MULTIPURPOSE ROOM | 9 LOCKER ROOM |
| 5 CAFETERIA | 10 TOILETS |



PREFABRICATED MODULES ARRIVE ON SITE



Prefabrication design is informed by the limitations of transportation. In this case, a hiking lodge in the European Alps is installed by helicopter.



SLOVENIAN MOUNTAIN LODGE by OFIS

The form and the dimension of modules can exceed typical shipping container modules but will rely on wide load transportation which may be prohibitive in terms of cost.

The cladding of the buildings can contribute significantly to their contextual fit, shading and integration into landscape.



PREFABRICATED BUILDINGS BY MODSCAPE (LOCAL SUPPLIER)

6.0 Larger scale prefabricated buildings

The Caulfield Grammar Learning Centre Installation illustrated below was one of three prefabricated buildings designed by Hayball and fabricated by Prebuilt.

Lightweight footings reduced in-ground scope and cost

Modules arrived in larger 'wide load' elements which required a separate crane for installation. The larger dimensions offered more flexibility in ceiling height and provision of skylights.



EXTERNAL SCREENING OFFERS SHADING AS WELL AS VIEWS FROM INTERIORS



Construction time is greatly reduced by prefabrication.
Lightweight footings reduced in-ground scope and cost.

Modules arrived in larger 'wide load' elements which required
a separate crane for installation. The larger dimensions offered
more flexibility in ceiling height and provision of skylights.

Manufactured in factory >>>



Simple Footings >>>



Truck Transport >>>



Crane Installation >>>



Install on Footings >>>



Modules come together >>>



Cladding and Shading >>>



Complete fitout >>>

7.0 Prefabrication Option 1

The initial option developed for the prefabricated library study involves a rigid steel frame module. These elements would arrive by oversize vehicle transport and would require a separate crane. This option integrates both smaller enclosed areas and the open space front of house zone into one element. Fitout of fixed joinery, internal linings, wet areas and plumbing could primarily be undertaken prior to transport.

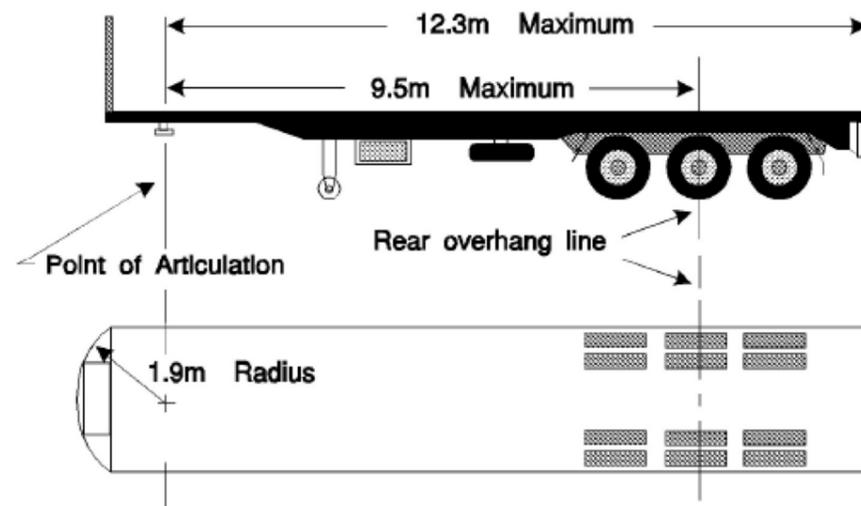
Typical Module

2,400 or 4,800 x 12,000

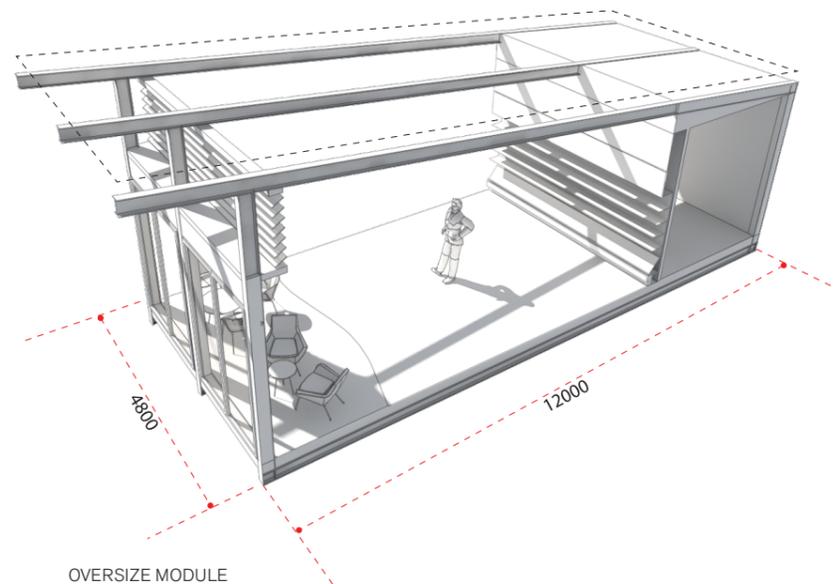
Over 2500mm is considered an oversize load by RMS
up to 5000mm is allowable with oversize vehicle provisions

Galvanised steel rigid portal frame with 1200mm colourbond sandwich panels walls and Stratco cooldek roofing panels. High-ventilated louvres with aluminium operable sliding doors.

Grid Setout 2.4 x 3.0m (7.2m²/grid)



TRUCK BED RESTRICTIONS



OVERSIZE MODULE

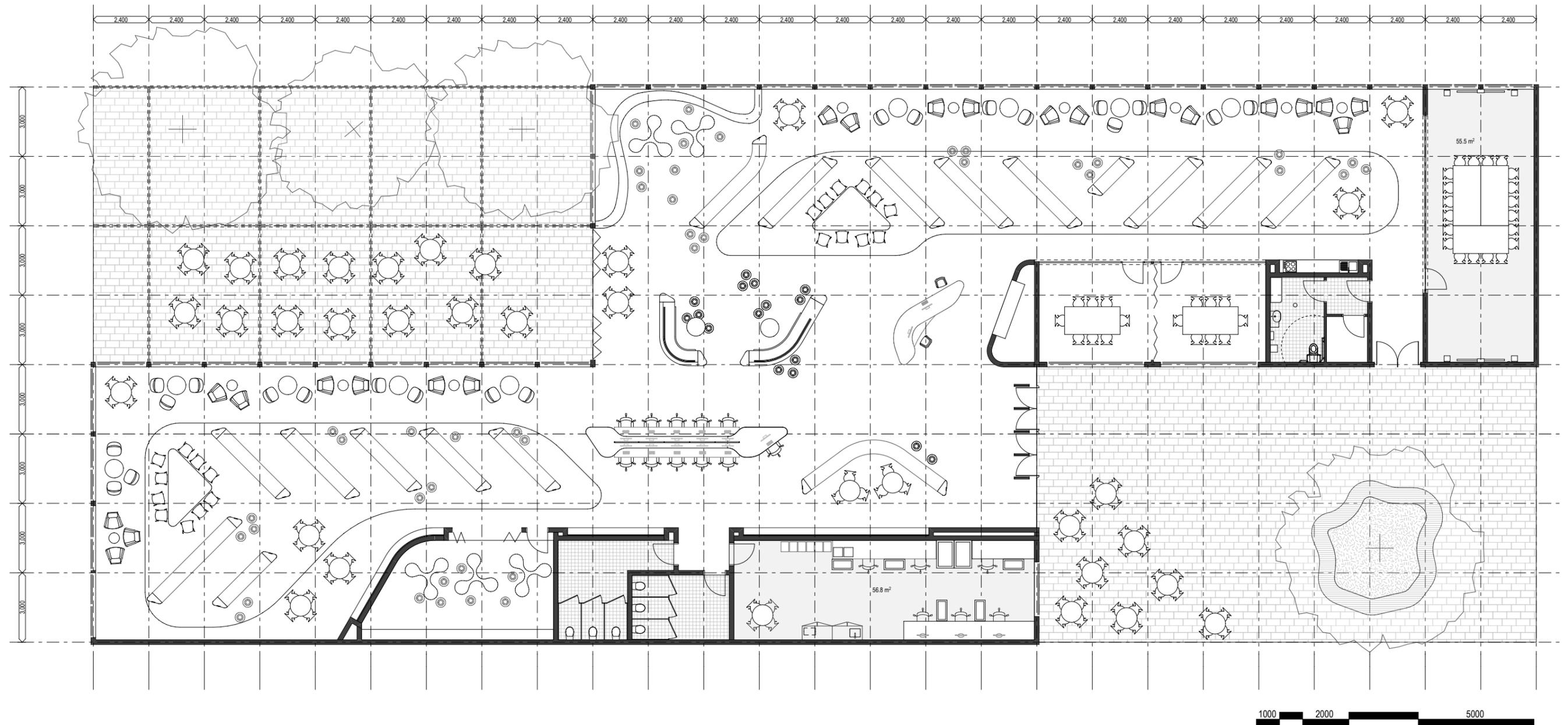


LARGER SPACES CREATED BY MULTIPLE MODULES



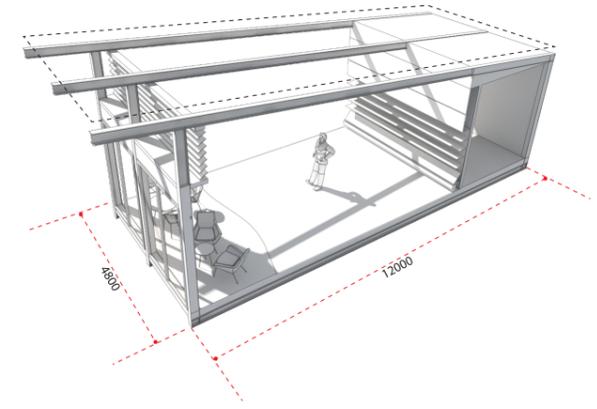
Option 1 _ 1000sqm library

4.8x12m module



GENERIC PLAN FOR A PREFABRICATED LIBRARY AT 1000SQM

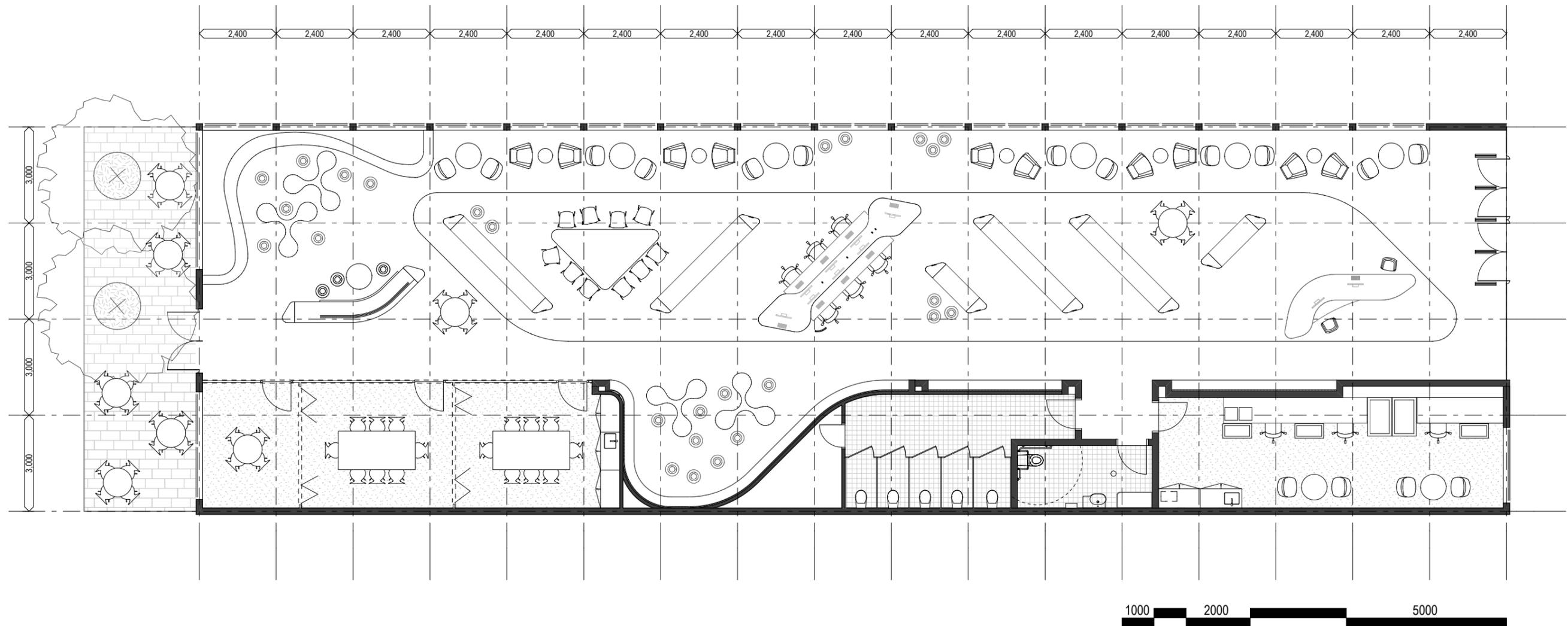
4.8x12m module



AERIAL VIEW OF OPTION 1 1000SQM LIBRARY

Option 1 _500sqm library

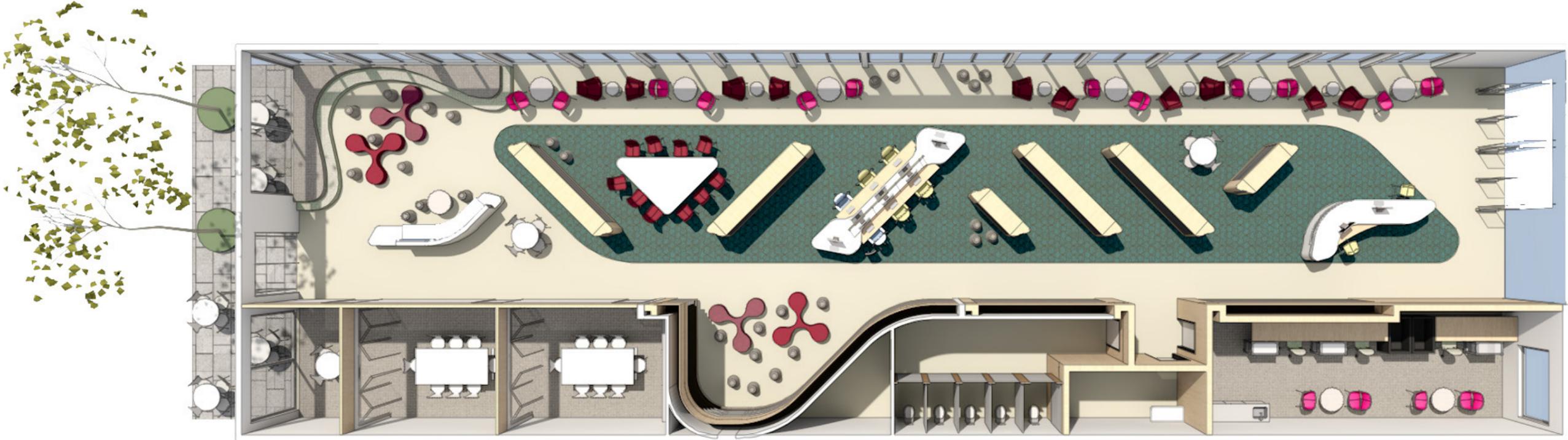
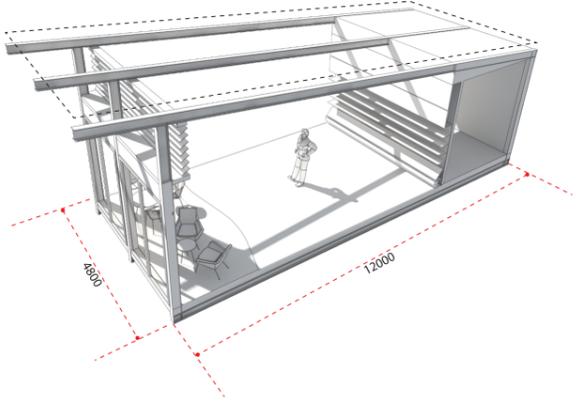
4.8x12m module



GENERIC PLAN FOR A PREFABRICATED LIBRARY AT 500SQM

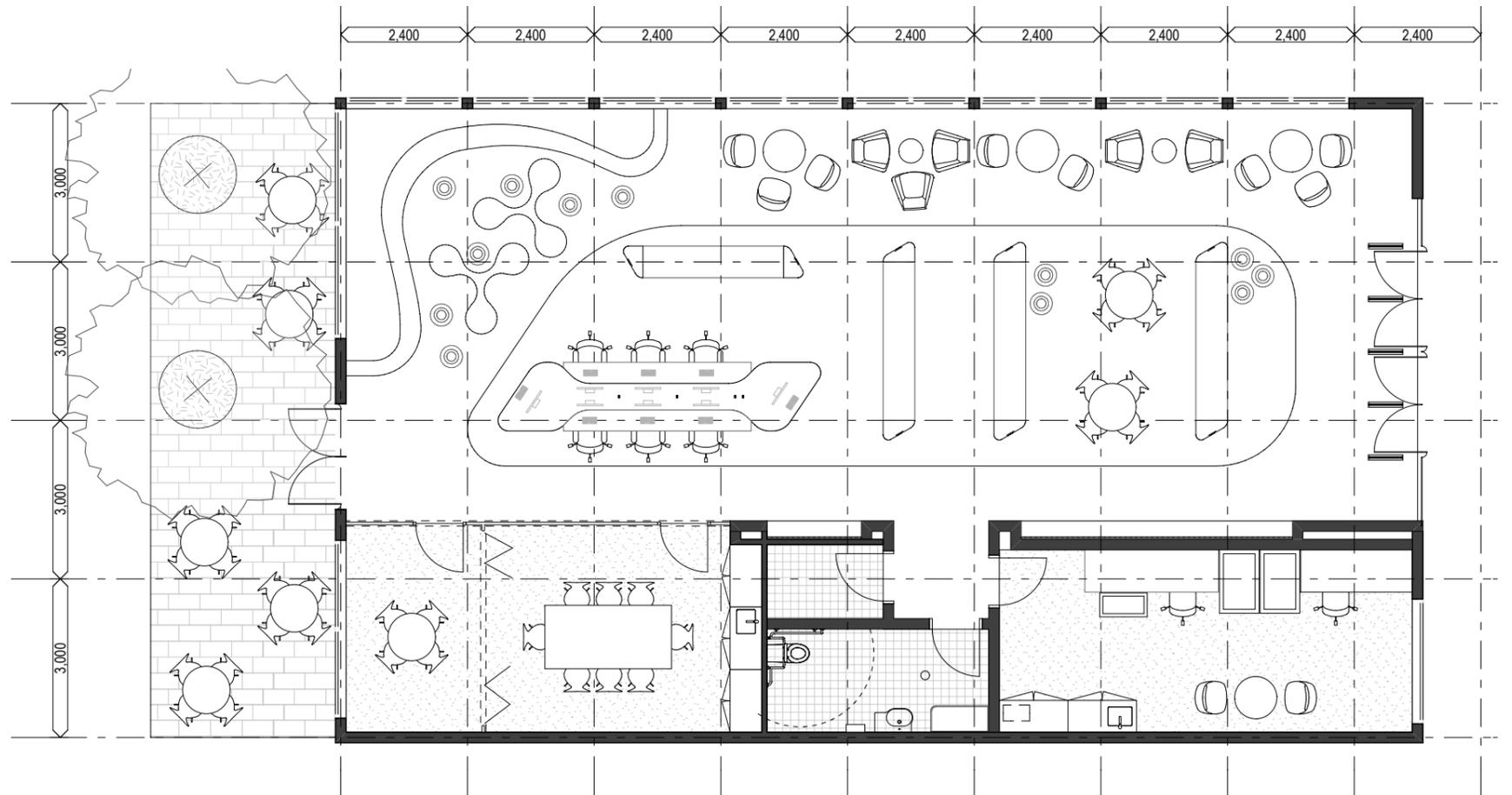
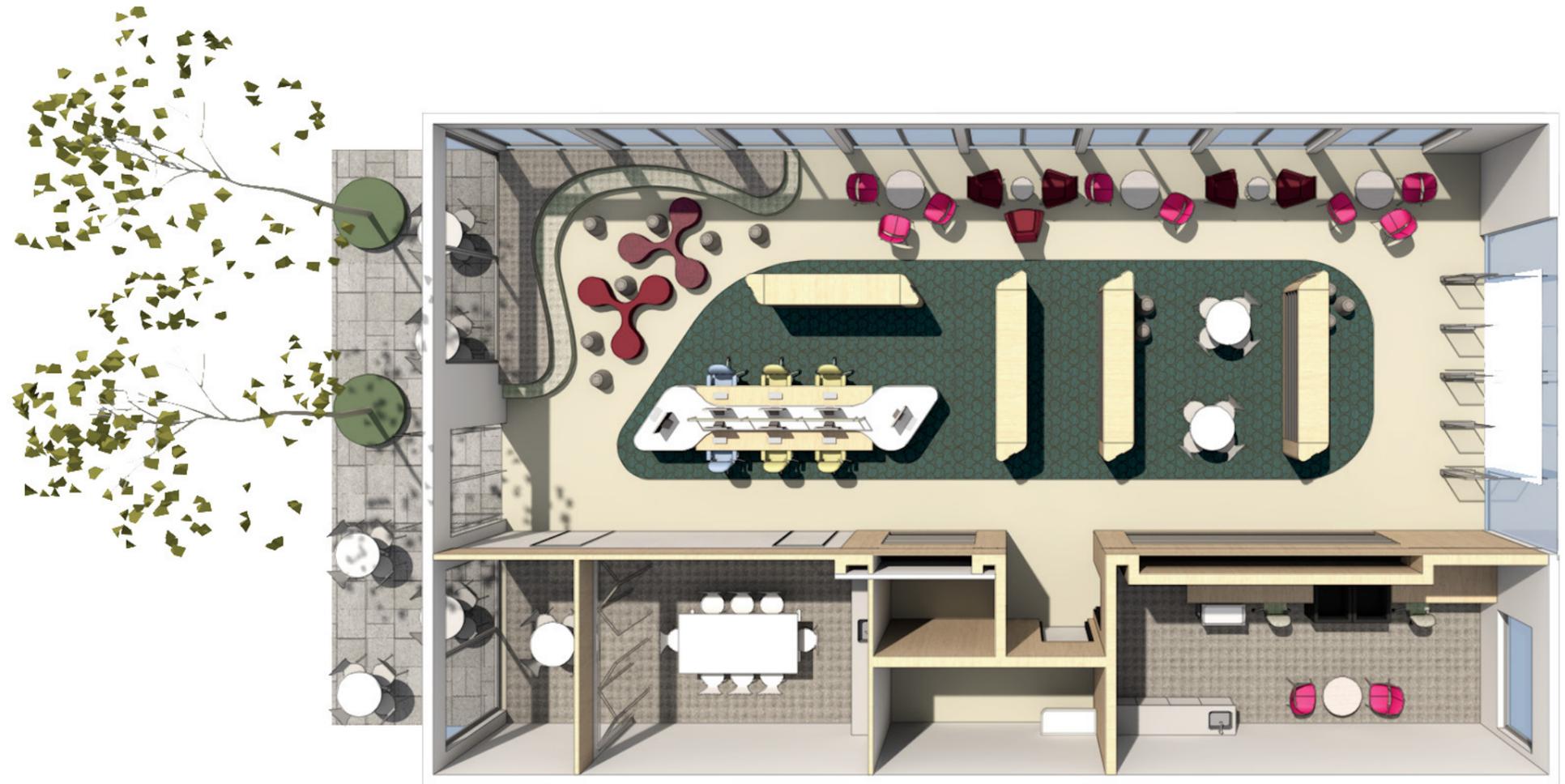
500sqm library

4.8x12m module



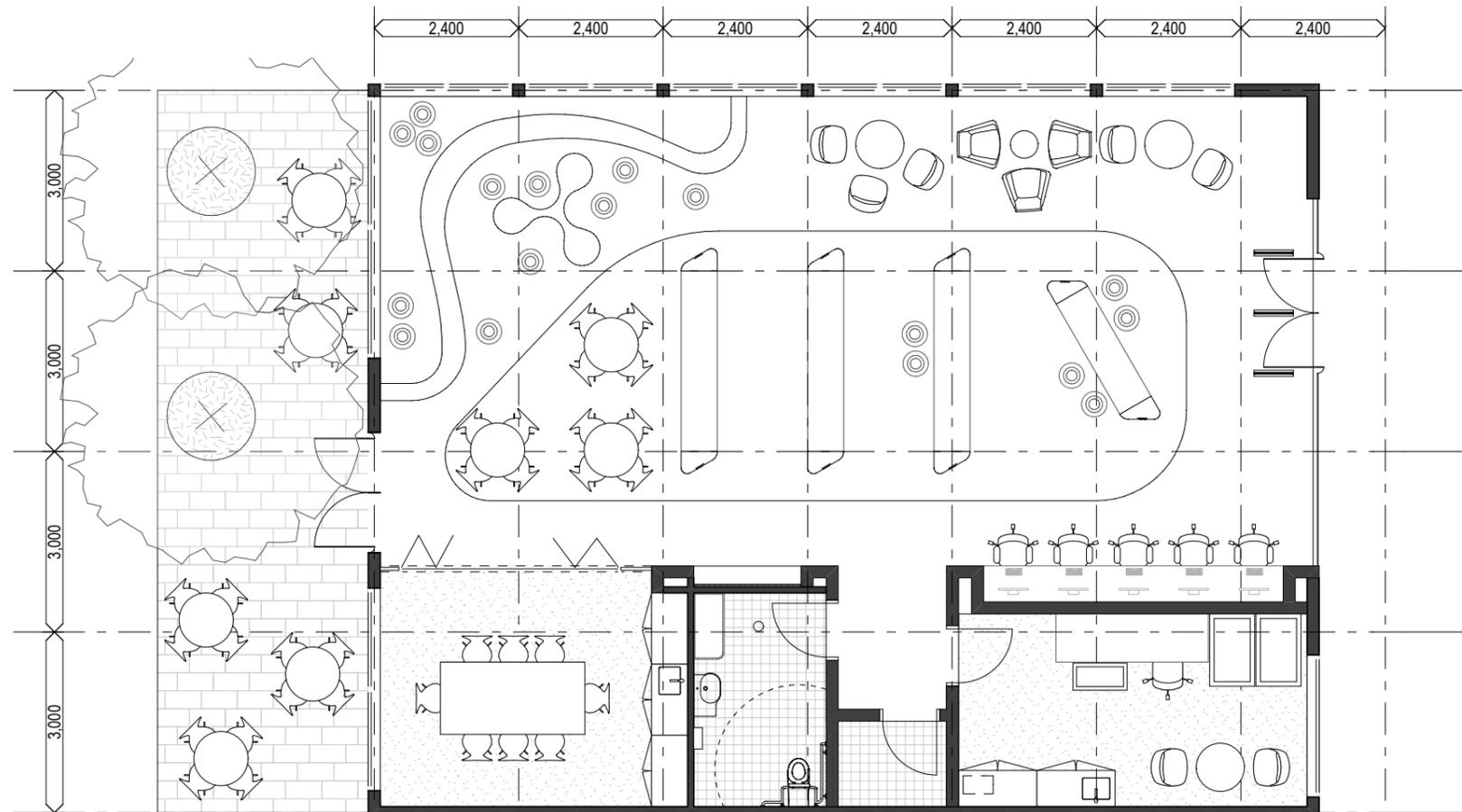
Option 1 _ 250sqm library

4.8x12m module



Option 1 _ 190sqm library

4.8x12m module

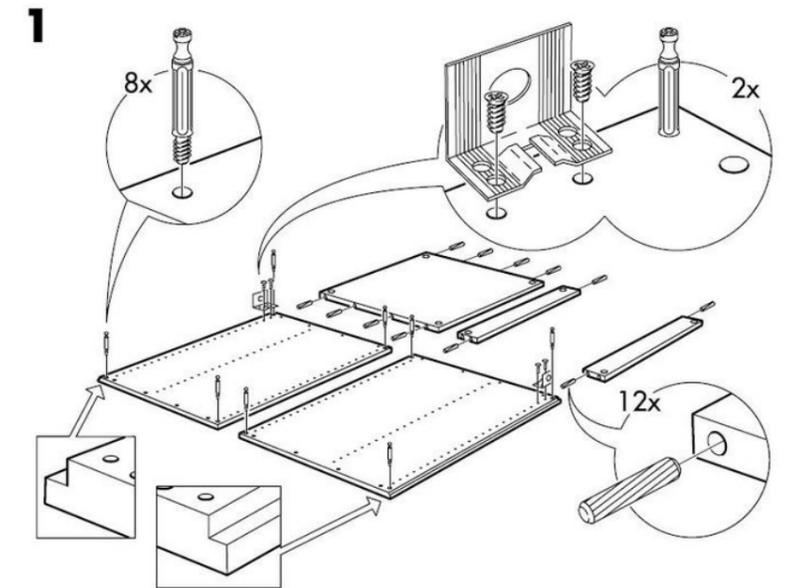


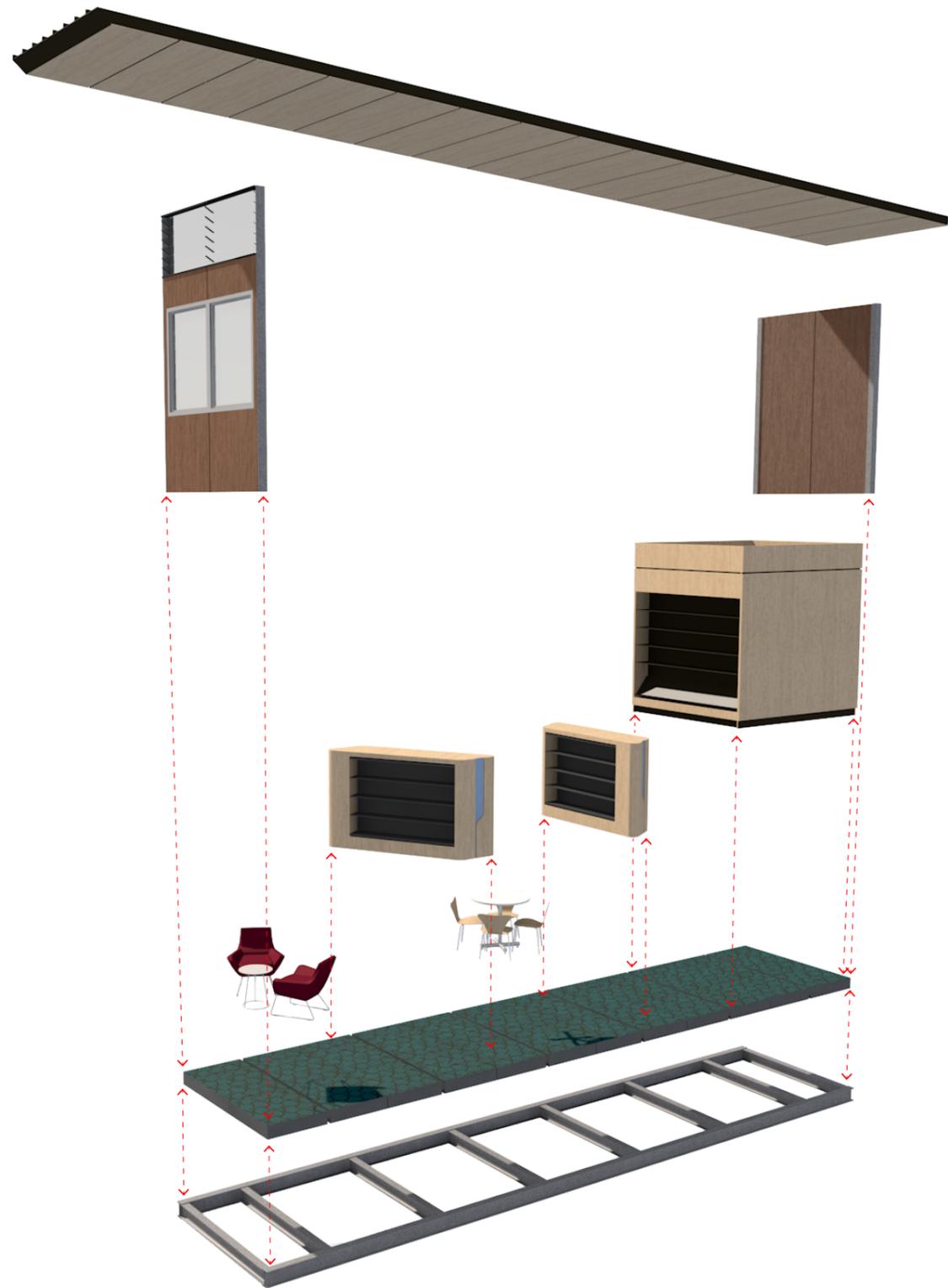
8.0 Prefabrication Option 2

Demountable Module

A flatpack, demountable option was investigated to improve transportation by truck. This option investigated creating modules using a kit of 'flat' parts which can be easily stacked on a truck. Roof, floor and wall modules could be prefabricated off site and brought together on site.

The negative aspect of this option is greater construction time on site





Technology

Versiclad Spacemaker roof

- Extremely economical high spans and unit length
- Light weight
- Rapid Installation
- Prefabricated offsite
- No Internal linings required



Versiclad SIP Wall System

- Lightweight and low embodied energy
- Rapid installation
- Prefabricated offsite



Surefoot Footings

- No concrete
- No wait time
- Adjustable after installation
- Single Trade

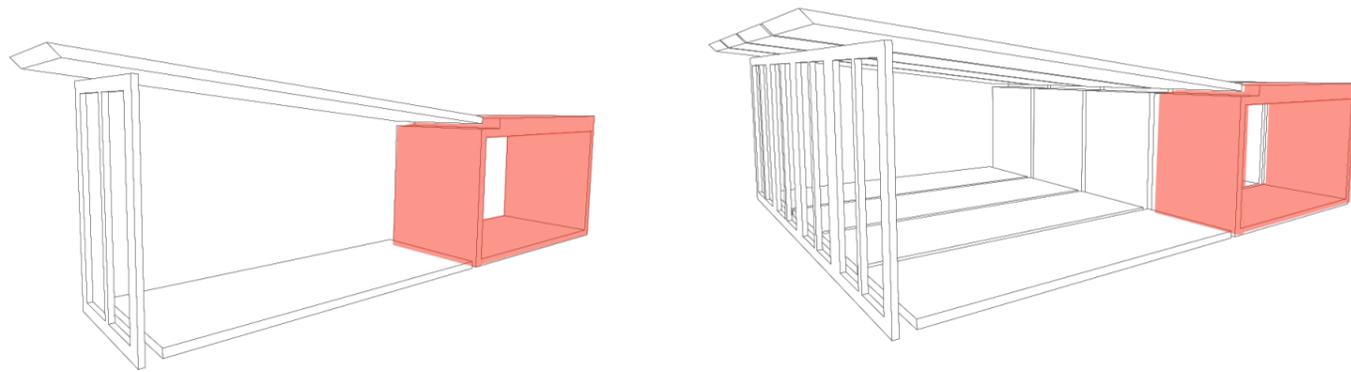


9.0 Prefabrication Option 3

Combination 'flatpack' and volumetric prefabrication

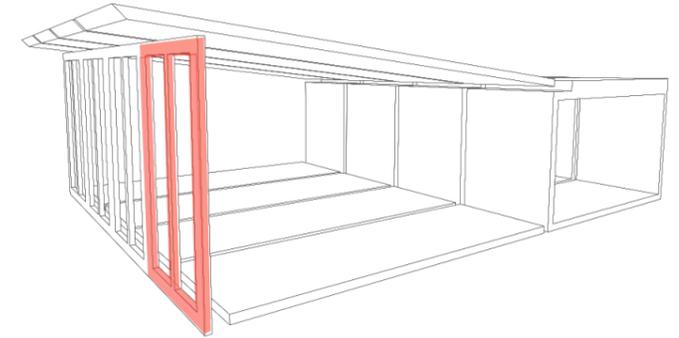
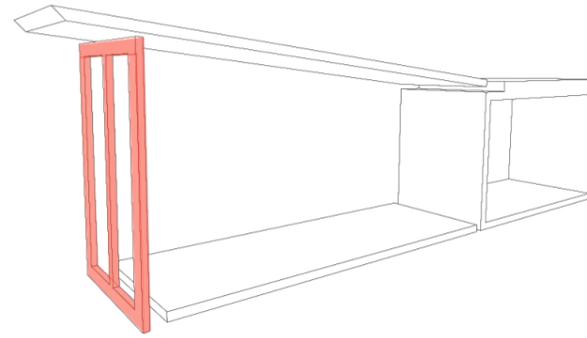
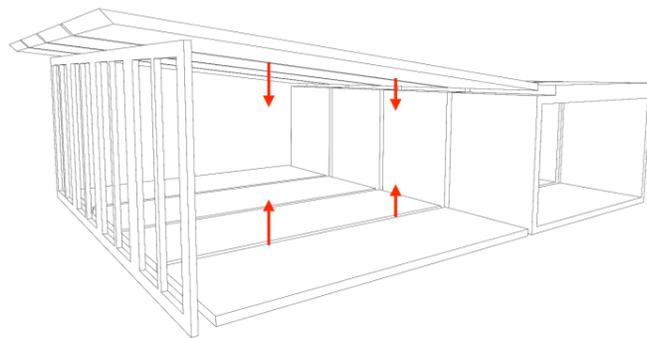
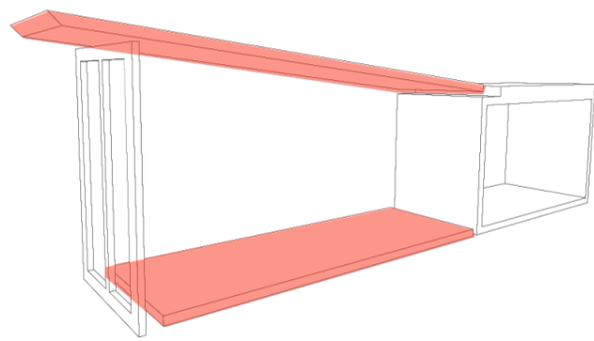
The majority of libraries require a portion of enclosed space for meeting, staff areas, wet areas and storage. The remainder of the space is primarily open plan and subdivided into zones by joinery and loose furniture.

The enclosed volume spaces can be prefabricated as rigid 3D modules with the open plan areas created by flat pack modules stabilised by the 3D volume.



The extruded 3D volume can be easily loaded on a truck and fully fitted within. Detailing the volume to read like a crafted 'machine' as below can add to the technology aesthetic





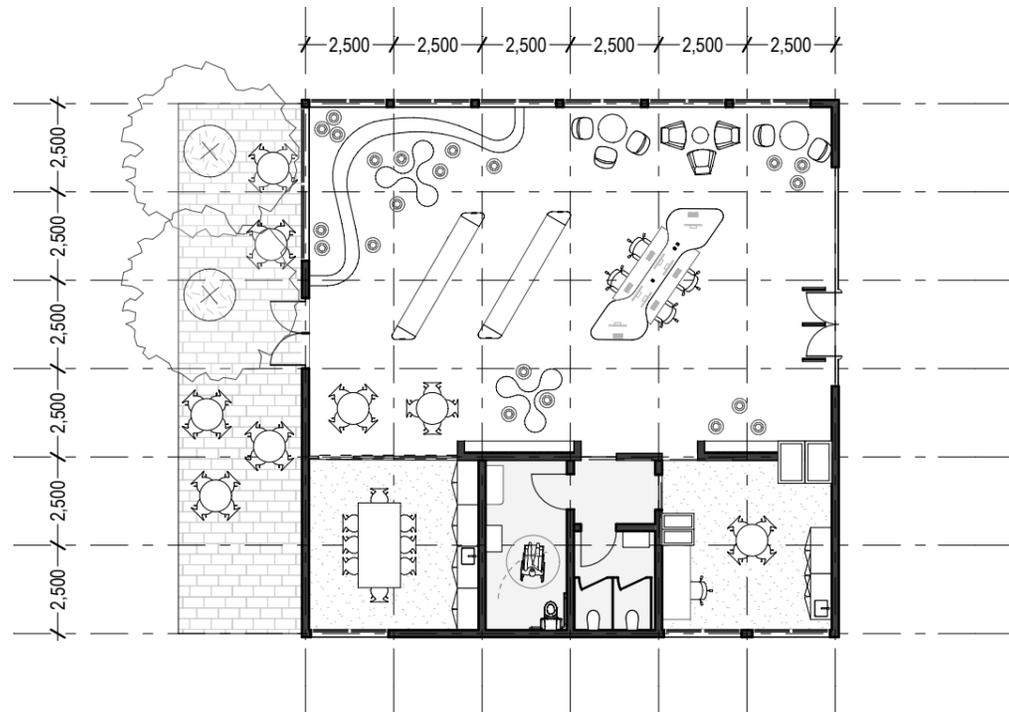
Floor and roof can be transported as flat pack planks with reticulation within ducts in the floor and ceiling joints for power, lighting and other services.

The glazing system can reflect the module and can integrate both fixed and operable elements, doors and shading if required.

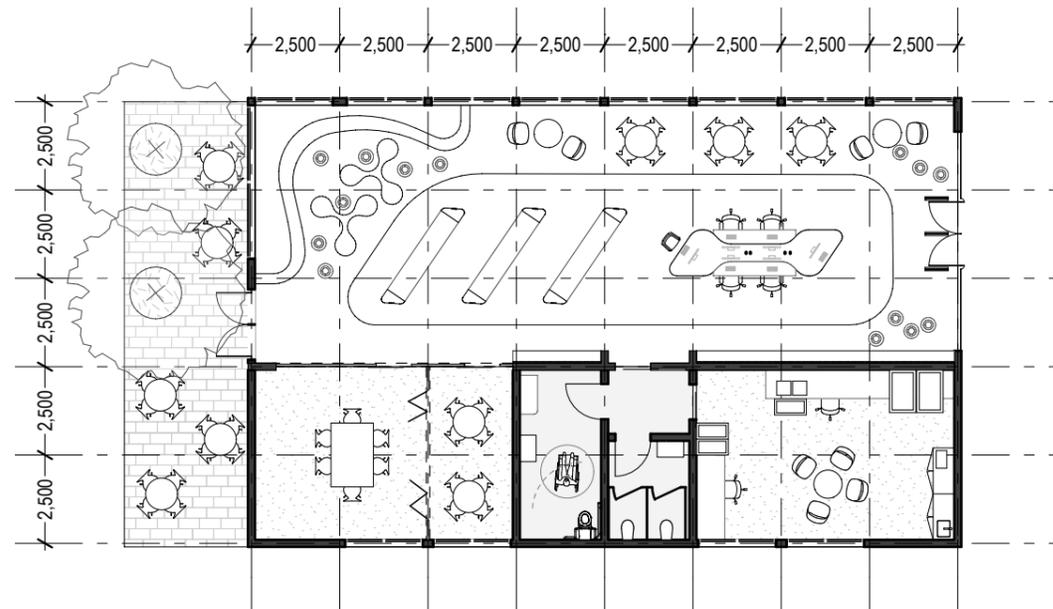


Option 3 _ 2.5 x 2.5m module

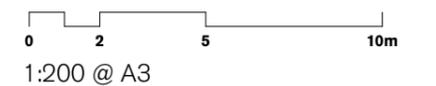
A module which allows for a 2.4m element plus space for jointing and ducting was explored. The 2.5m module provided a square grid for simple arrangements in both axes. The plans assume a 3D volume arrangement for enclosed meeting rooms, bathrooms and staff areas with open space constructed from flat back elements. These plans can also be used for spatial planning (scale 1:200)

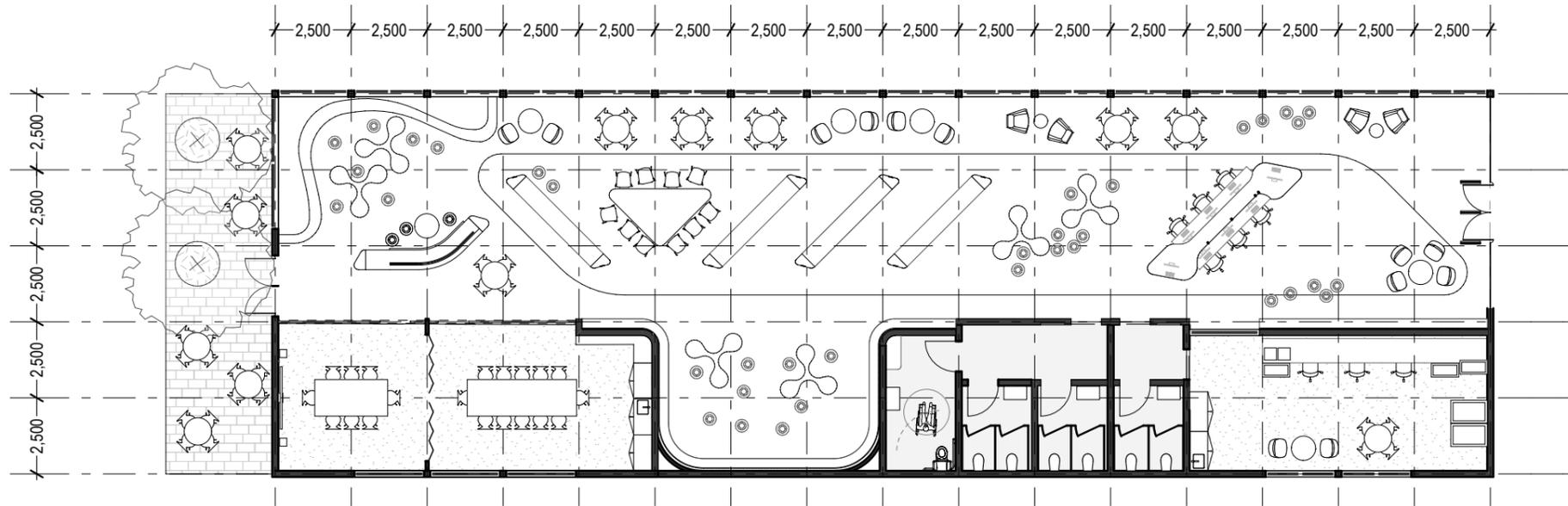


190sqm library

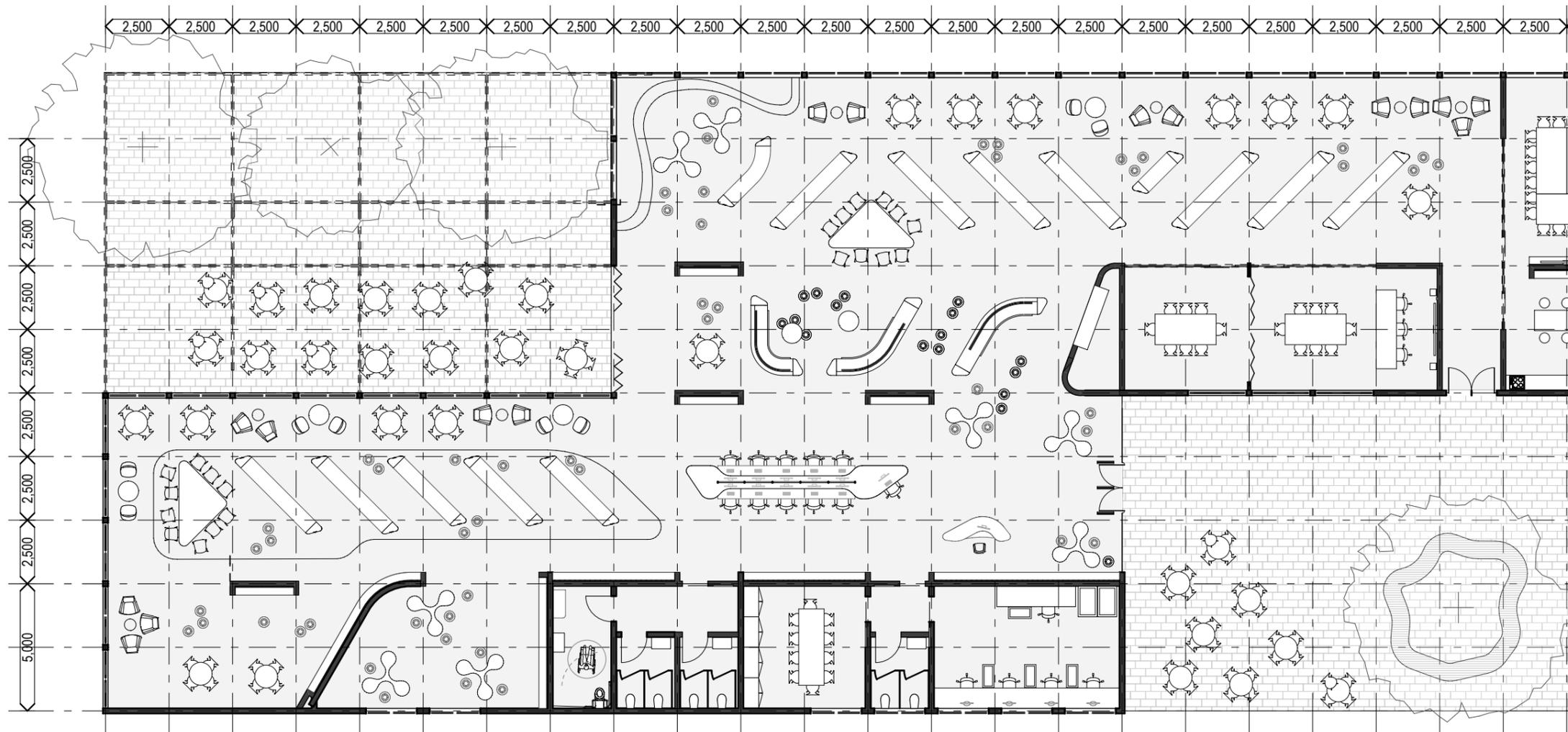


250 sqm library





500 sqm library

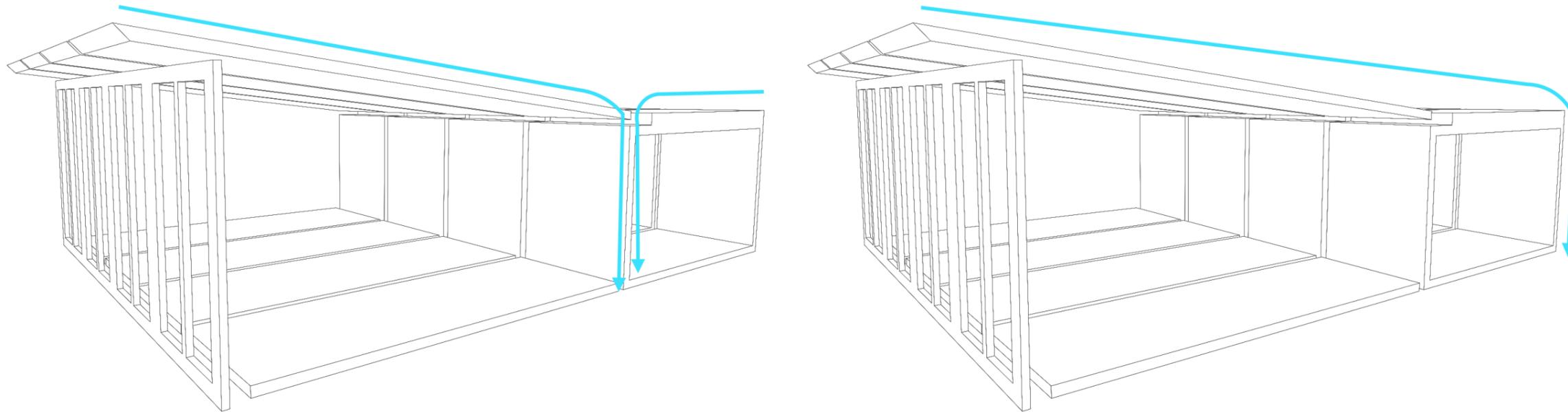


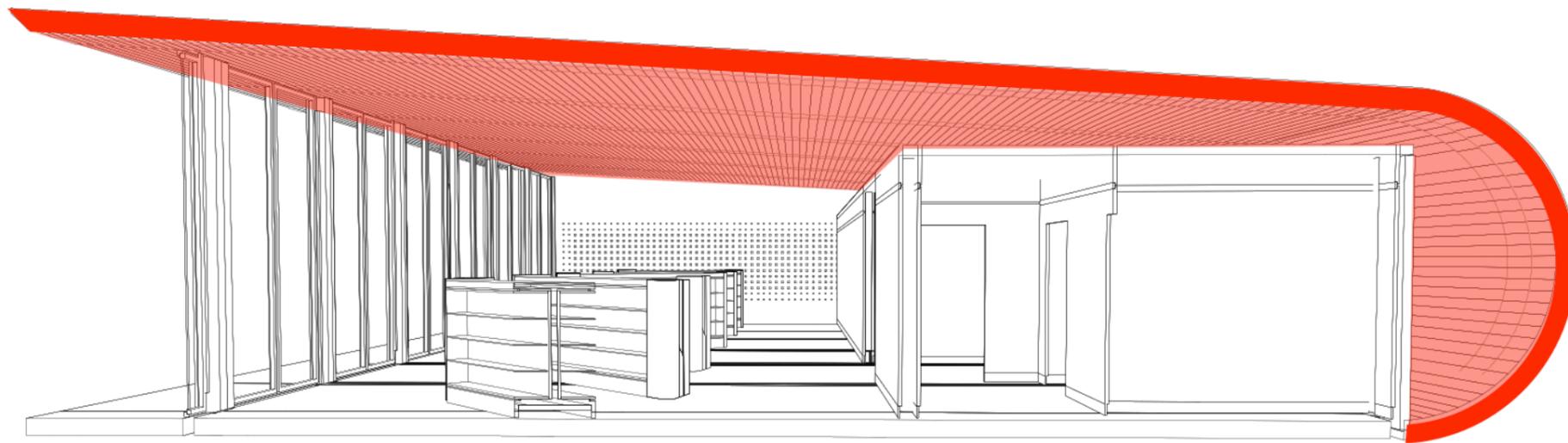
1000 sqm library

0 2 5 10m
1:200 @ A3

Option 3 _ further development

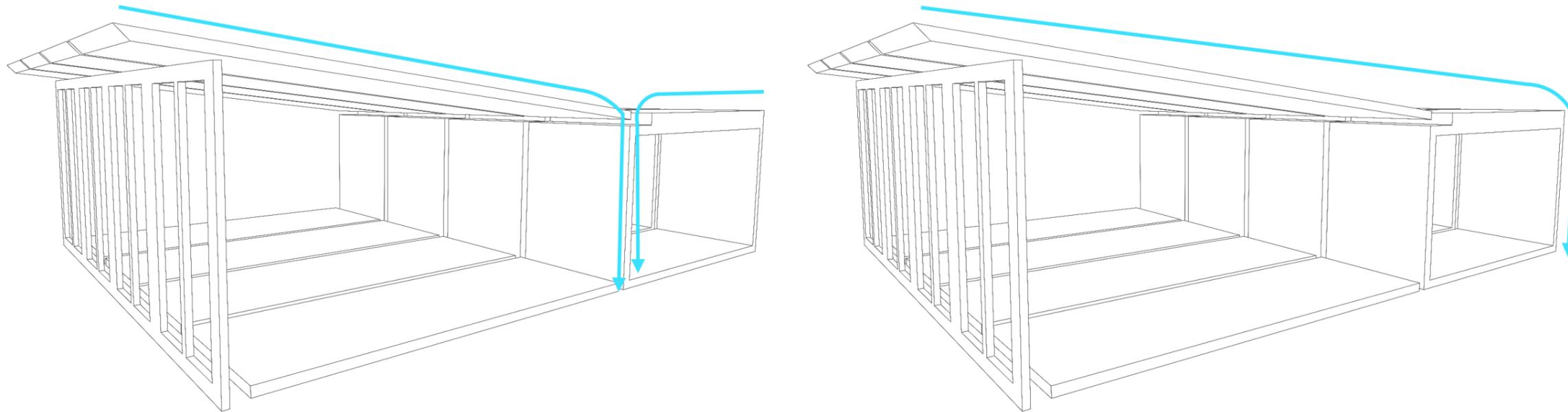
Further refinement of Option 3 explored an all encompassing modular roof which avoids issues of internal drainage lines (box gutters) and can potentially curve to form the enclosing wall of the 3D volumetric element. This allows the 3D volume to be an internal form without the need for waterproofing. The modular, smooth lines can reflect a contemporary approach to regional libraries.



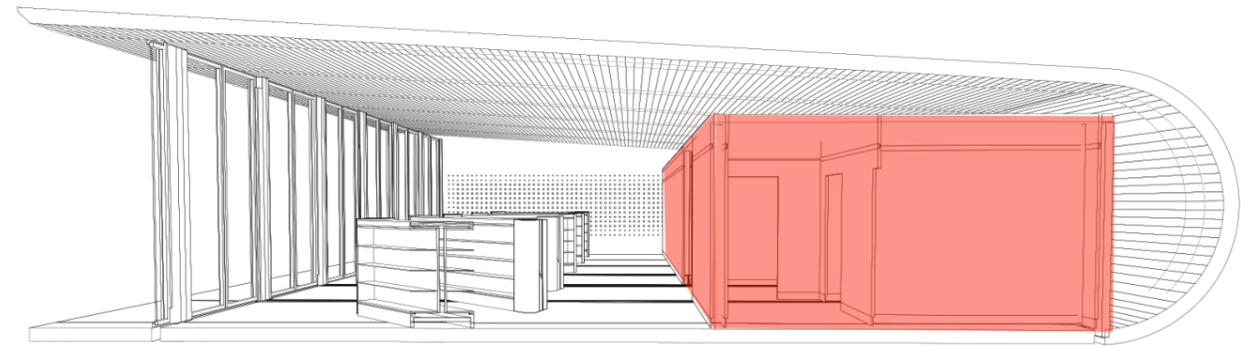
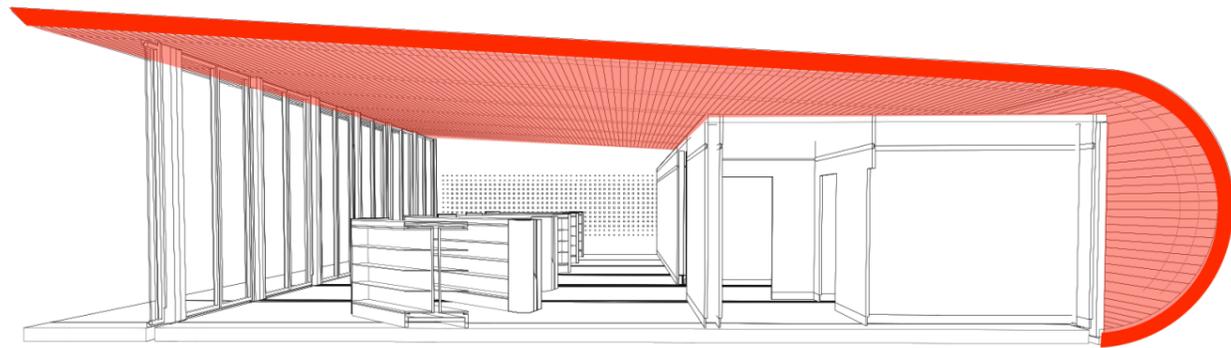


Option 3 _ further development

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A fully enclosing roof / wall allows the volumetric box to be constructed without waterproofing.



Option 3 _ further development

The 500sqm library is depicted in these renderings and sketches. The intent is the creation of a carefully crafted object which sits in a variety of landscaped and urban settings, acting as an identifiable 'off the shelf' product of design which offers internal flexibility and adaptability.

