

Macquarie University
Incubator



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“The Incubator is one of the best examples of innovative collaboration between client, designer, contractor and subcontractors that I’ve ever seen. Together we delivered a visionary project within budget, on-time and to a quality that exceeded everyone’s expectations.”

Mark Broomfield, Director of Property,
Macquarie University.





1. Executive Summary

The Macquarie University Incubator is purposefully designed and realised to function in the critical zone where education and industry coincide. It is a dramatic demonstration that Macquarie University is facilitating societal advancement through industry partnerships, through research and education, through invention and creation.

Collaboration, communication and the transfer of knowledge and ideas are key to achieving the entrepreneurial intent of the Incubator and so constant exposure to other people is imperative here.

Designed with a highly transparent interior – even the private meeting rooms are glass enclosed – and with a diversity of learning settings – internal and external – means that there's no avoiding anyone and there is plenty of opportunity to utilise the settings to positively effect interactive behaviour and to support educational objectives.

The guiding principles for the architectural design were inclusive of transparency, flexibility, an authentic approach to the use of sustainable materials, passive environmental design, the sensitive integration with surrounding landscape and the innovative use of prefabricated modular systems combined with emerging technological advances associated with the digital fabrication of engineered timber products.

With its structure arranged on the perimeter the Incubator is flexible and adaptable to changing needs. Supporting this approach the flexible furniture is also easily moved – being light weight and relocatable.

Visibility amongst the start-ups breeds friendly competition and pushes each team within the Incubator to be better and more successful in the development of their ideas. The public spaces of the Incubator facilitate the transmission of knowledge – from start-ups to potential financial supporters and from industry experts to students and other entities keen to develop their abilities and rapidly take the next generation of ideas to market.

Key to the originality of the Incubator is its accelerated process of design, modular pre-fabrication and rapid installation. In an era when the provision of high-quality built environments are needed with increasing urgency to address elevated levels of educational demand the Macquarie University Incubator has clearly demonstrated that speed and excellence can be realised with intelligence and architectural elegance.



2. Scope of Work and Budget

In mid 2016, Macquarie University conducted a design competition, with 10 Architectural practices; Architectus won, the project had to be designed and delivered in one year.

Early in the consultation phase, user groups were established an extensive face to face consultation was conducted over a period of 9 months. This can be summarised in a series of principles as follows:

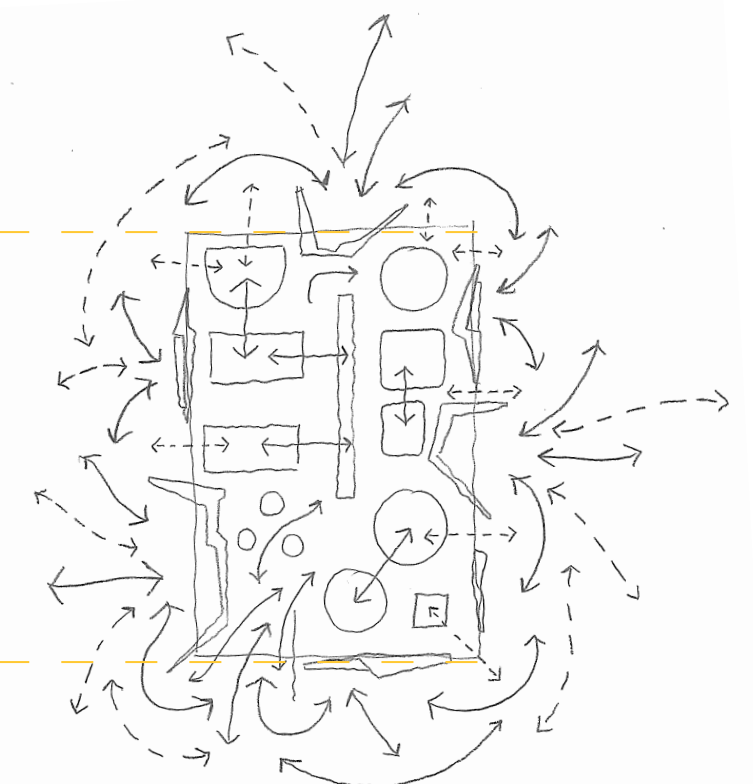
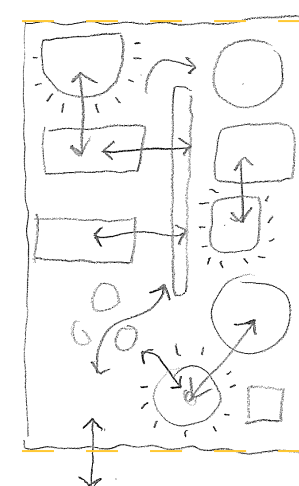
- The space will be a signature space for the Macquarie University for Incubation, innovation and education knowledge transfer;
- The space will offer engaging and supportive experiences for our diverse student and industry cohort;
- The space will support a cooperative academic and professional work environment;
- The space will encourage the use of contemporary teaching and learning modes;
- The spaces will be connected
- The space will be flexible and able to respond to future need.

An Educational Specification was created to summarise the Incubators consultation process to date and explored the broad educational and research objectives of the Incubator project. The Specification was used by the design team to ensure that the educational objectives of the project were clearly addressed.

The Specification identifies an emphasis on collaborative and flexible based learning. The building itself represents this embodied idea and permits a form of design which moves back and forth from different modes of spaces.

As the design progressed the Specification continued to evolve. The design was tested using timetable analysis, a series of space management guidelines simulations and prototypes.

To meet 12-month construction program and budget of \$9.6 million, a modular prefabricated construction methodology was selected.





3. School & Community Engagement

In late 2013 the consultant team and the Faculty commenced the first iteration of stakeholder engagement with the establishment of a range of user groups designed to obtain feedback from key academic and professional staff on aspects of the design assumptions.

Workshops were facilitated by the design team and the Educational Space Planner. Participants represented the university sector of corporate engagement and advancement and its associated schools, and business partners.

A survey was conducted using the internal Macquarie University portal. The aim was to offer staff an opportunity to comment on matters affecting the physical environment and via these answers, identify any areas that are not aligned with the Incubator vision.

The usergroup consultation was highly iterative process including site visits of relevant facilities, design presentations, spatial mock ups, 3D physical models, digital walk throughs and physical prototypes. Each session provided an opportunity to test the users vision for the space against the design and continually adjust and refine. It was a two-way exchange, the vision for knowledge exchange and learning was informed by questions and ideas that grew from the consultant process and the architecture is a manifestation of this vision.

In addition to the spatial planning and interiors concept a comprehensive process explored how the incubators philosophy of innovation through education and knowledge transfer could be reflected in the architecture

Community Activity

- User group sessions weekly commencing in August 2017 until June 2018.
- Visitation of similar style educational and incubator type spaces.
- International research of similar facilities undertaken by Architectus in the concept research phase. Research finding presented to the users on a weekly basis.
- Differing types of surveys conducted, through the University's survey portal.
- Weekly 2-3-hour sessions between August 2016 to July 2017

Outcome: Broad consultation process informed both the development of the building, learning spaces and provided the faculty with a professional learning tool.

Learning Environment Activity

- Educational Space Planning Principles & Educational Specification
- Multiple activities during 2014

Outcome: The Incubator was a prototype to explore ways for industry and education to co-exist. Design was used to best facilitate flexibility and churn. The simulations through VR AR were critical to a successful alignment of pedagogy and space.

Physical Environment Activity

- The Macquarie University Campus Master planning
- Space Management Guidelines (recommendations relating to the allocation, ownership and use of specific spaces)
- Timetabling Analysis to determine design responsiveness (allocation & space type)

Outcome: a world class space to facilitate and generate the creation of ideas.



3. School & Community Engagement _ Sketch





4. Educational Environment

The Incubator is designed to guide and encourage students and users to explore new working methods. The spaces are designed to support both limited transmissive learning teaching and active collaborative learning. The spaces can be easily reconfigured from centric modules to dicentric collaborative spaces.

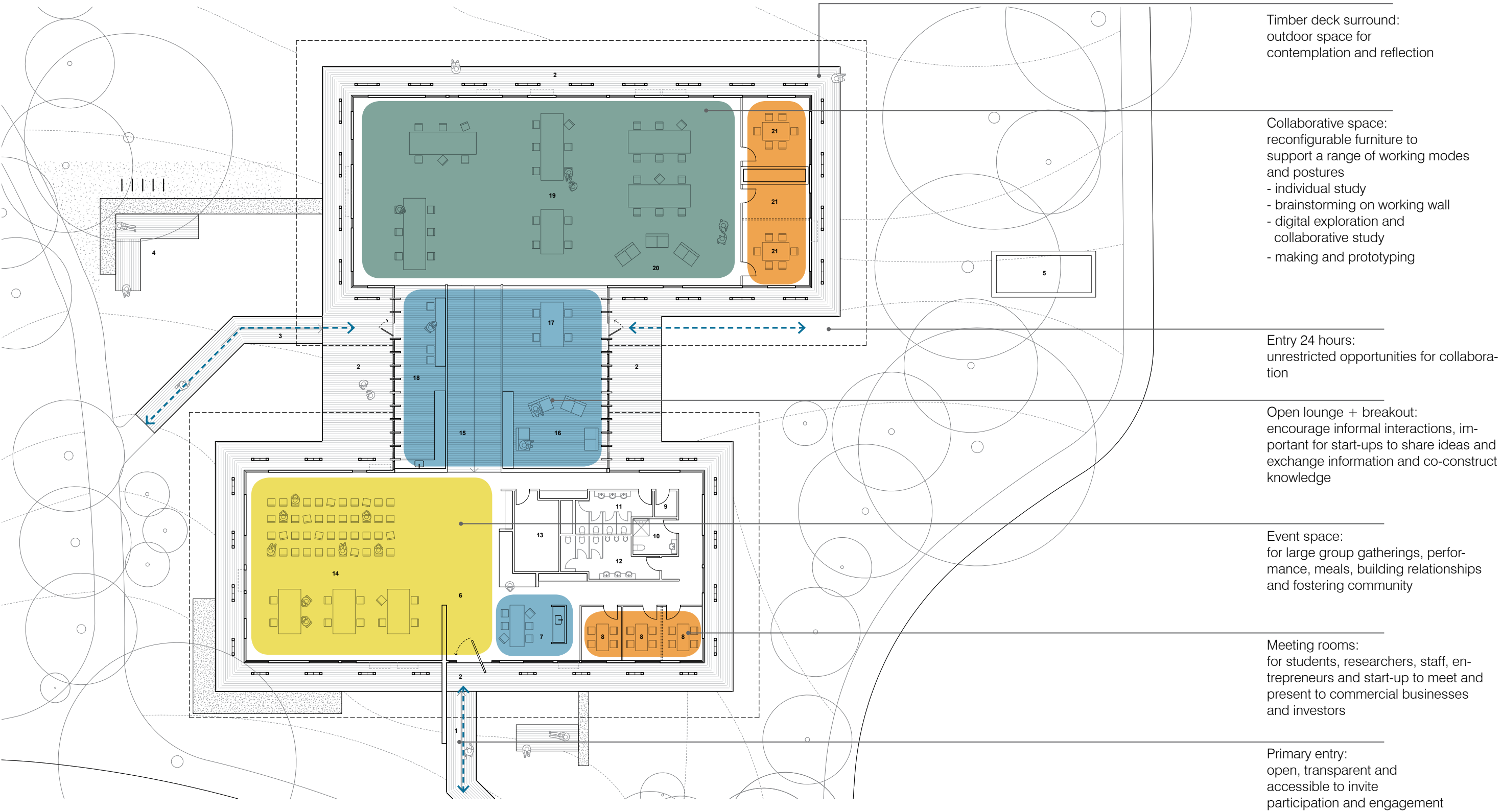
In addition to this the building is future proofed – the long span structural grid is designed to enable easy change from small to large spaces, or vice versa as the needs of the Incubator changes. The generous floor to floors provides for new space types and incorporation of new technology.

The architecture both facilitates and represents the concept of an innovative collaborative education industry space. Yet beyond the immediate use, the building is a subtle reflection of the magnificent grounds

of Macquarie University, where academia meets the Australian bush. The building floats above this, extending its large eaves to meet and greet the mature trees. The abstracted façade distills the irregular and tough geometry of the eucalyptus trees, where glimpses and framed views distill the idea of thinking and working under the dappled light of a eucalyptus.

In this context the palette is implied, natural and relaxed. Timber, sky, and earth, the incubator is worldly but also a story about place.

4. Educational Environment_ Project Space Planning





5. Physical Environment

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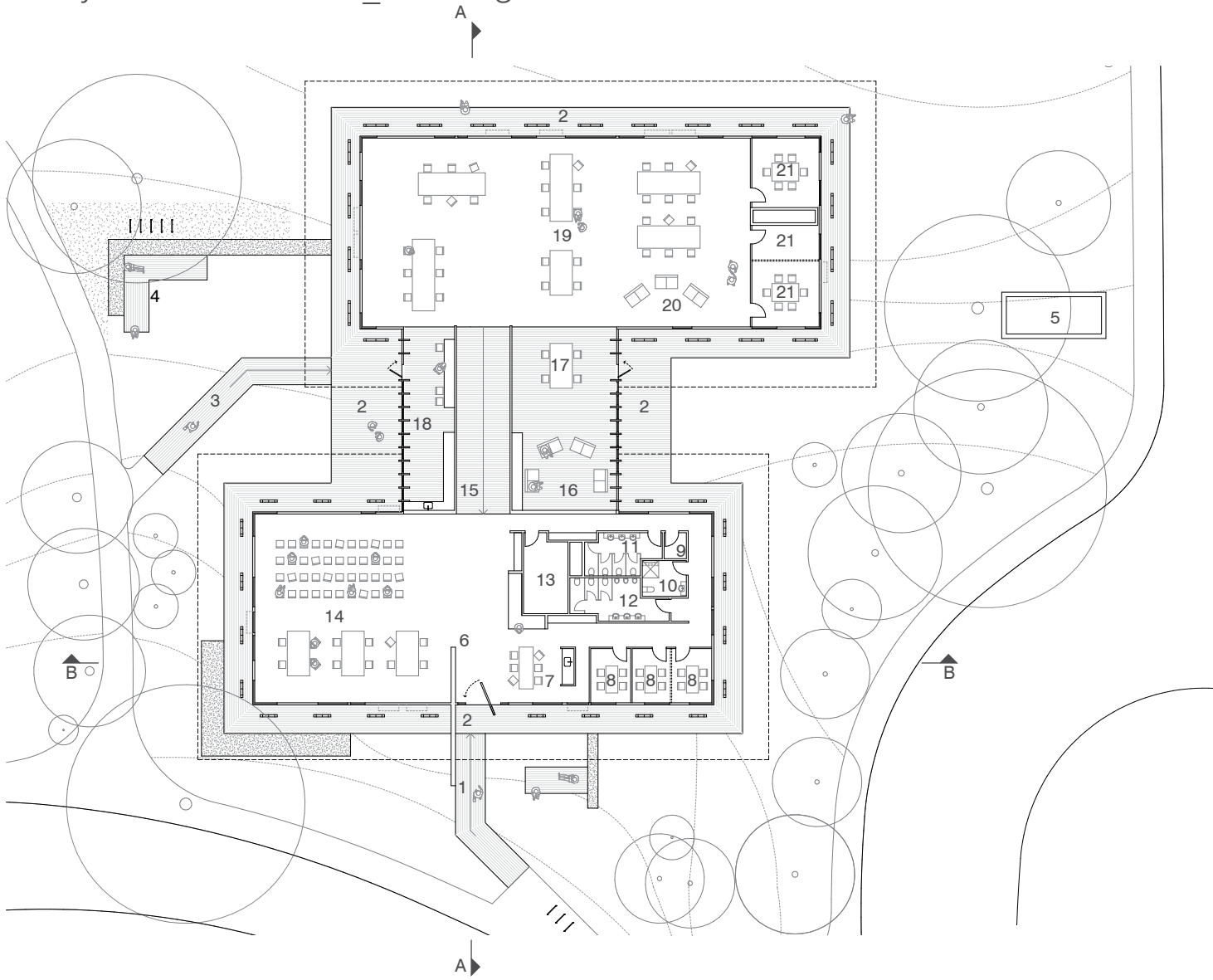
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Key to the originality of the Incubator is its accelerated process of design, modular pre-fabrication and rapid installation. The resulting building was completed within five months of construction commencing, and despite flexibility and relocation being a strong factor of the original design brief, the Incubator will remain permanently in its current location. In an era when the provision of high-quality built environments are needed with increasing urgency to address elevated levels of educational demand the Macquarie University Incubator has clearly demonstrated that speed and excellence can be realised with intelligence and architectural elegance.

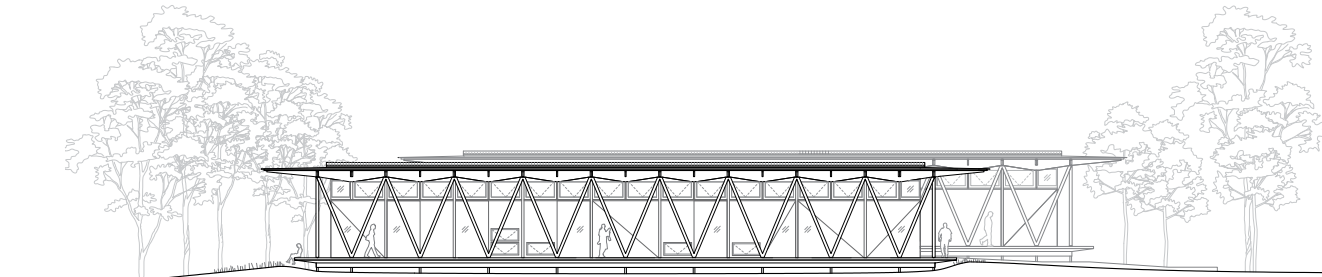
5. Physical Environment_ Drawings



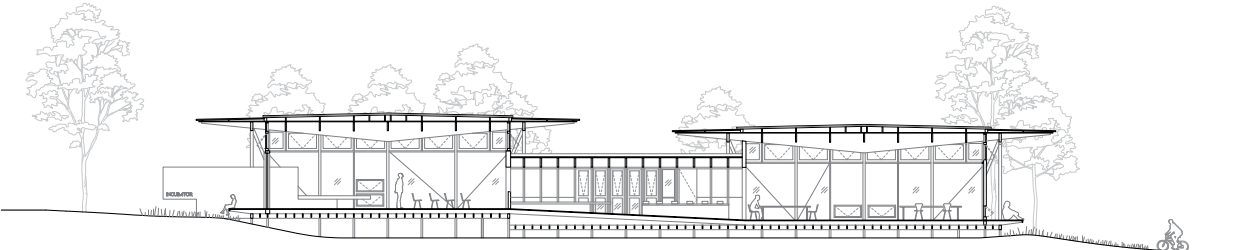
Ground Floor Plan

N 1 1:400 0 2 5 10 20M

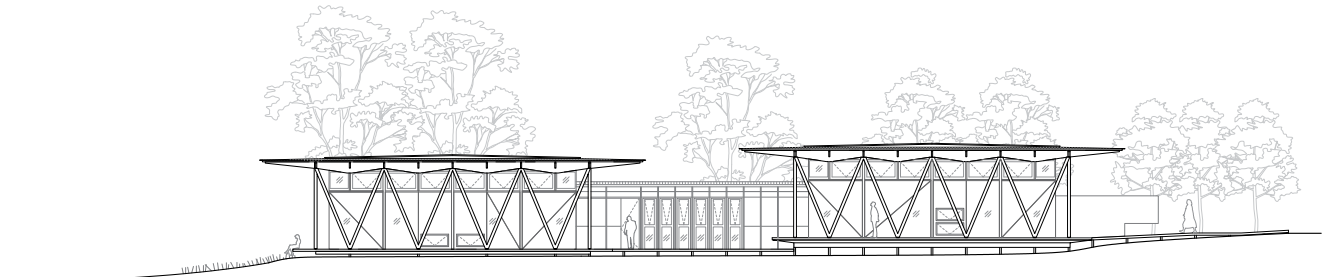
- 1 Entry Ramp
- 2 External Deck
- 3 Side Entry Ramp
- 4 BBQ Area
- 5 External Enclosed Plant
- 6 Entry Point
- 7 Tea and Coffee Point
- 8 Meeting Pods
- 9 Cleaners Closet
- 10 Accessible Amenities
- 11 Female Amenities
- 12 Male Amenities
- 13 Service Room
- 14 Event Space
- 15 Walkway
- 16 Presentation Space
- 17 Makers Space
- 18 Kitchenette
- 19 Open Collaborative Space
- 20 Active Wall Space
- 21 Meeting Room



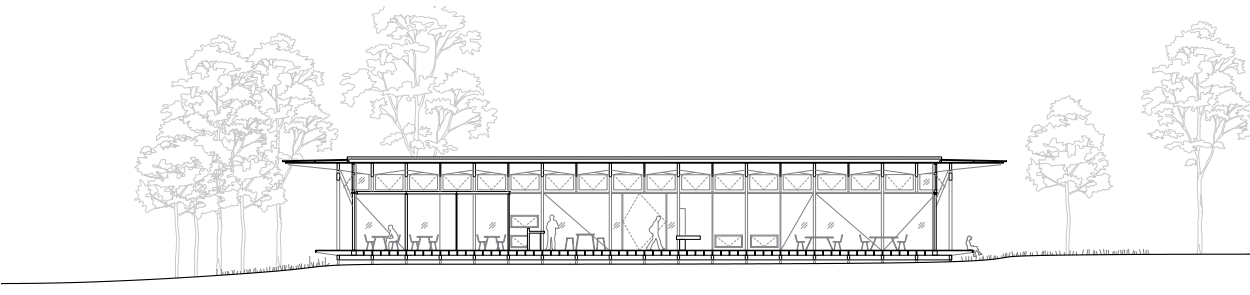
North Elevation



AA Section



West Elevation

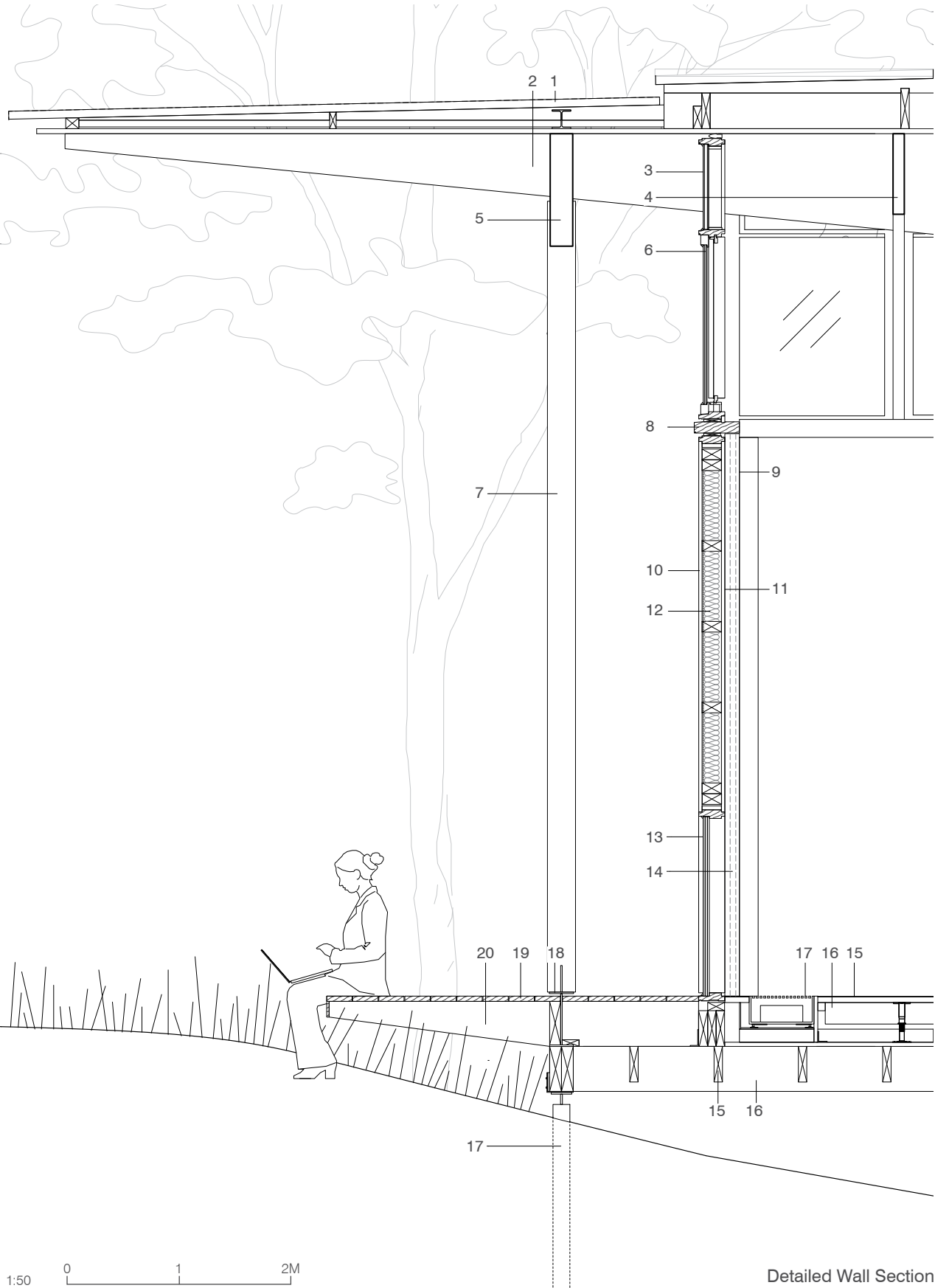


BB Section



5. Physical Environment_ Detail

- 1 Metal Roof Deck
- 2 Glulam Double Primary Beam
- 3 Accoya Timber Frame Fixed Window
- 4 Reverse Taper Timber Noggin
- 5 Structural Timber Spruce Glulam
- 6 Double Glazed Awning Window
- 7 Victoria Ash Glulam V Columns
- 8 Structural Timber Spruce Transom
- 9 Structural Timber Spruce Mullion
- 10 Birch Plywood External Lining
- 11 Birch Plywood Internal Lining
- 12 Insulation
- 13 Double Glazed Panel
- 14 Rebate For Services Reticulation
- 15 Cork Tile
- 16 Raised Access Floor
- 17 Trench Convector
- 18 Column Fixing Plate
- 19 Victoria Ash Decking Board
- 20 Tapered Cantilever Cassette
- 21 Timber Joist
- 22 LVL Bearer
- 23 Screw Pile





The external walls of the pavilions are protected by large eaves that cantilever 2.95 meters beyond the façade. The external decks and landscape created meaningful social spaces which respond to building uses, whilst integrating natural material palette throughout.

Throughout the interiors the LED strip lighting were concealed via rebates, which was processed into the tapered secondary roof beams before they were installed into the roof cassettes. The diffuser profile for the LED strip lights were selected to ensure warm white light would be distributed and reflected from the timber soffit of the CLT ceiling diaphragm to emphasis its natural beauty.





Door Detail

The resulting building was completed within five months of construction commencing. Despite flexibility and relocation being a strong factor of the original design brief, the incubator has become so well loved that it's likely it will now remain in its current location.

A consistent clear ceiling height of 4.5 meters allows for greater flexibility as well as to complement the dimensional attributes of the space. The Incubator is naturally ventilated. The Building Management System monitors heat loads and carbon dioxide levels. High level windows operate automatically to ensure that thermal comfort and fresh air supply are maintained.



Internal Walkway



6. Results of the Process & Project

The architectural principles of the Incubator, that being the expression of structure, a harmonious palette of natural materials and a form that acknowledges the gridded character of the Wally Abrahams masterplan, also reflects the best and defining features of the architectural context of the Macquarie University campus. Beyond the form, the feel and scent of the timber is a fundamental characteristic of the Incubator.

A swift and ambitious program of 12 months from concept design to delivery was a fundamental driver of the project. The project was delivered within the targeted timeframe and on budget. It is noteworthy to add that a modular prefabricated approach requires comprehensive design and coordination earlier in the delivery process with the attendant opportunities to control risk, reduce cost and add value.

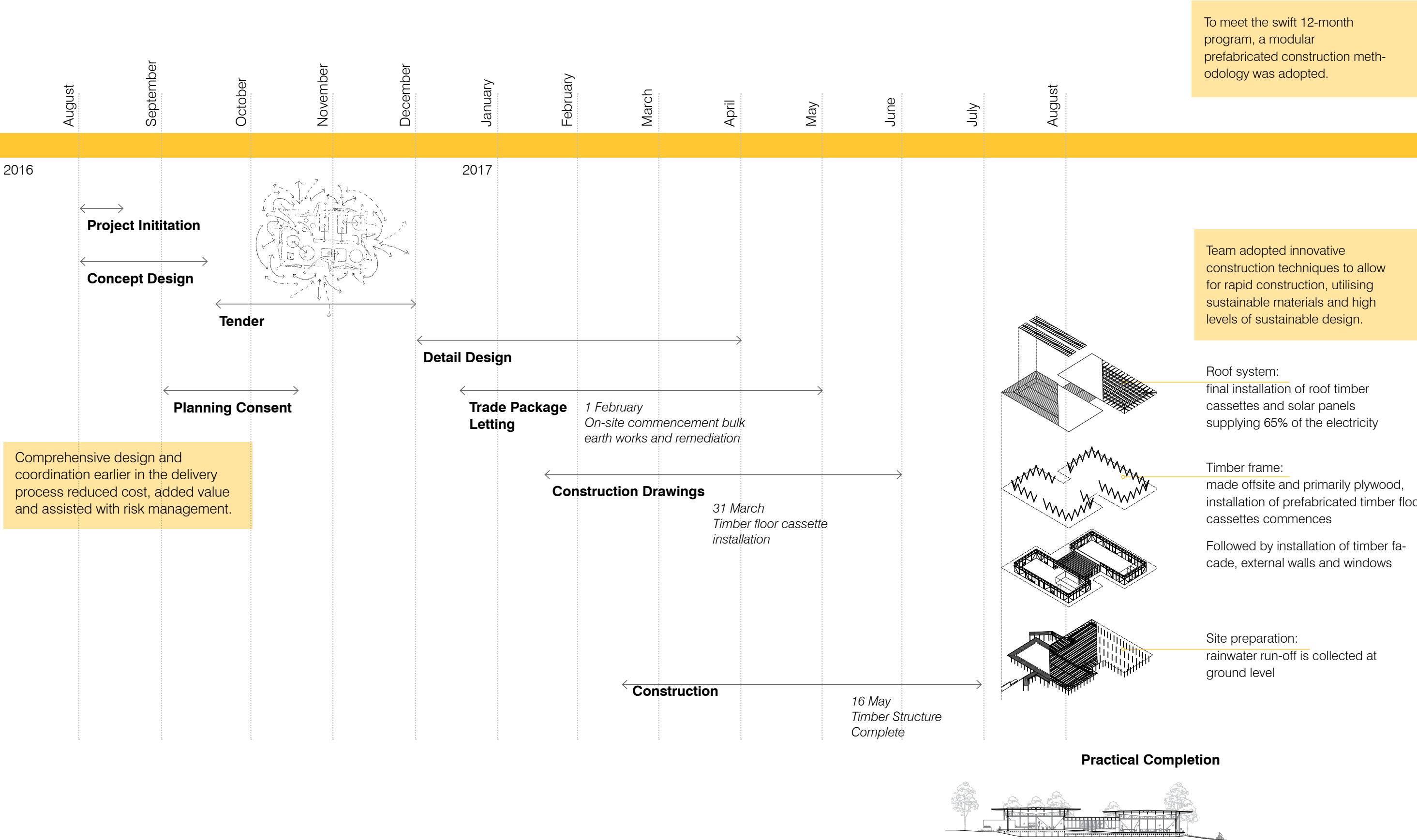
The Incubator is naturally ventilated, The Building Management System monitors heat loads and carbon dioxide levels. High level windows operate automatically to ensure that thermal comfort and fresh air supply are maintained. Supplementary heating and cooling is delivered via trench convectors which mitigate heat loads through the facade glazing and ensure that a temperature range of 19-26 degrees is maintained all year. The adopted natural ventilation strategy in conjunction with conventional measures, including a well-insulated building envelope, performance glazing and LED lighting switched with motion sensors. ensures low running costs. The required size of the mechanical plant was significantly reduced by adopting natural ventilation. The photovoltaic system supplies approximately 65% of the electricity required for the operation of the Incubator. The building management system monitors the performance of the building and ensures that the operable areas of the facade are configured optimally, ensuring occupant comfort

and minimised operational costs. There is a well-documented correlation between direct user control of buildings and their perceived thermal comfort. Ventilation hatches in the facade provide a measure of direct control to the building occupants.

The Incubator is designed to be 100% reusable therefore, sustainability was key to the design approach; selection of materials; fabrication of timber cassettes; and installation of the structural system.

A building like the Incubator sends a clear signal about the importance of innovation within the culture of Macquarie University. It is a place for the gestation of ideas with potentially profound economic benefits. The Incubator is a dramatic demonstration that Macquarie University is facilitating societal advancement through partnerships, through research, through invention and creation.

6. Results of the Process & Project _ Program



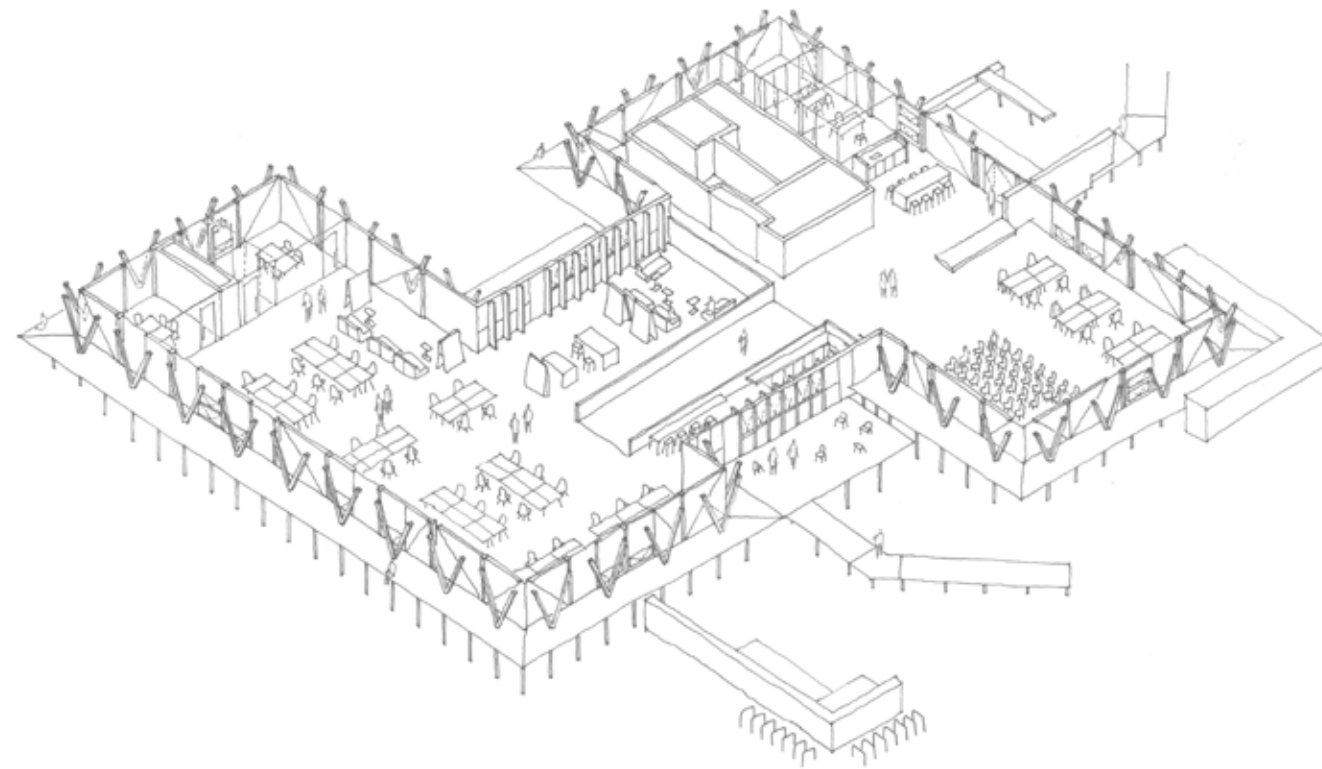
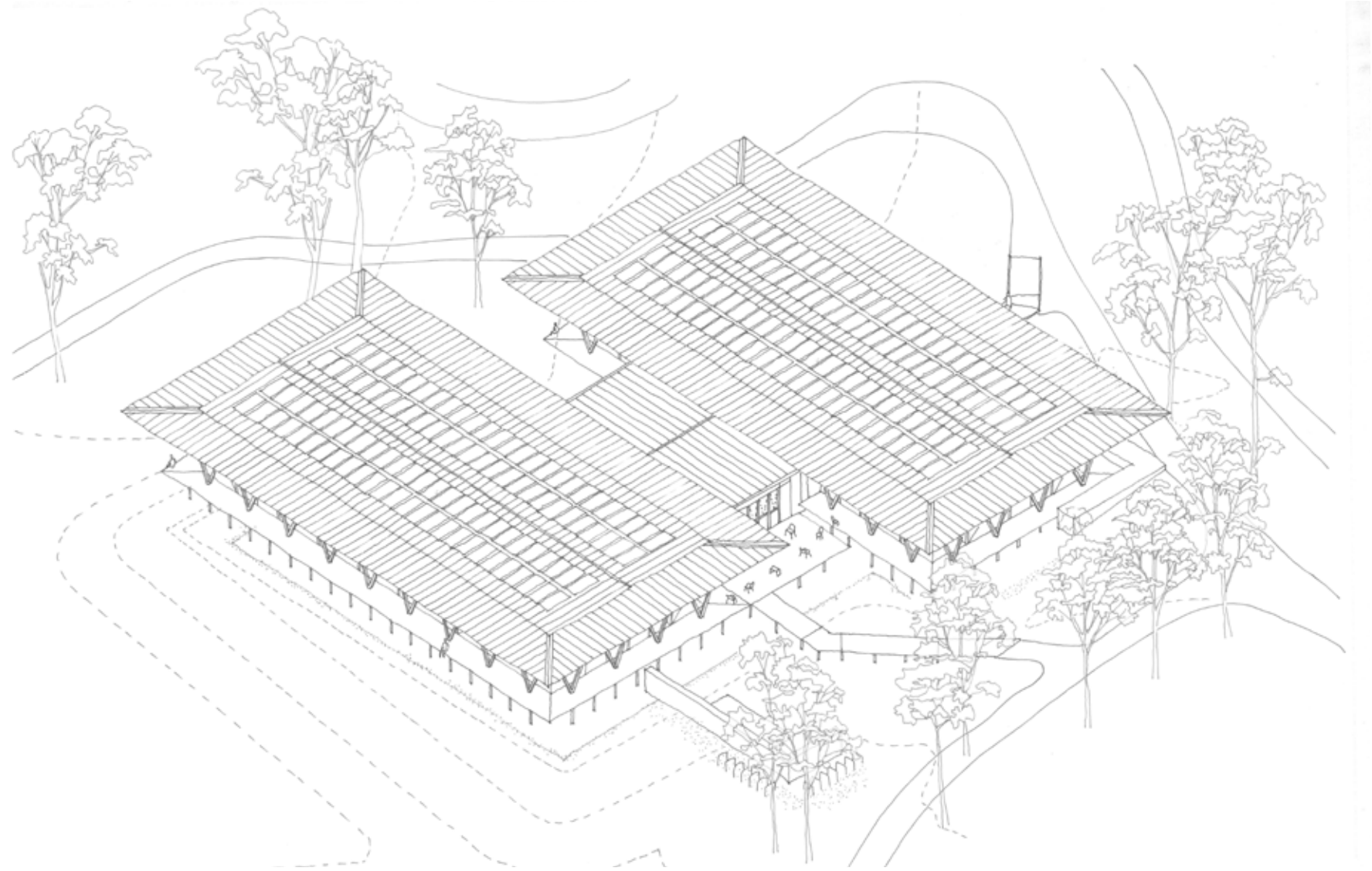
6. Results of the Process & Project

To meet the swift 12-month program, a modular prefabricated construction methodology was employed. The architects worked closely with the consultants and contractor to a high degree of design resolution, through the traditional means of meetings and hand sketching but also crucially through the sharing and utilisation of 3D BIM models. This was necessary as accuracy was fundamental to ensure the building components were fully coordinated before they were delivered and installed on site.

The Incubator was conceived as a pair of pavilions, each with flexible layouts that lend themselves to future adaptations and functions with the facilitation of collaboration being the underlying principle.

The Macquarie University Incubator is:

1. Readily adaptable to the regular churn of diverse learning settings from large groups to small;
2. Able to support a variety of flexible spaces for a wide variety of workspace environments;
3. A striking visual statement and place of identification;
4. Highly visible and engaging;
5. Serves as a connection between local business, the University and the occupants;
6. Accommodates a flexible layout for its transient population;
7. An area to support needs and promote engagement;





“The reality is that everyone loves the building and it has a visceral impact. The demand for start-ups to come into the space is overwhelming”

Professor David Wilkinson, Deputy Vice Chancellor,
Corporate Engagement and Advancement
Macquarie University.