Architectural Engineering Portfolio

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The Crank Community Complex
Academic Work, Spring 2023

Integrated Systems Design
Instructors: John Straube, Chris Schumacher, and Harry Wei

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New Housing Proposal for the KWUNWP
Extracurricular Work, Winter 2023

Warrior Home Student Design Team
As the Architecture Lead

2

Universal Library
Academic Work, Fall 2022

Environmental Building Studio
Instructors: John Straube and Elizabeth English

3

Ron Eydt Village Exterior Renovation
Academic Work, Winter 2022

Building Envelope Studio
Instructors: Terri Boake, Scott Walbridge, and Andrea Atkins

4

Bluebell Pavilion
Academic Work, Spring 2021

Structural Design Studio
Instructors: Cory Zurell, Fiona Lim Tung, and Elizabeth English

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Modular Design Workstation
Academic Work, Fall 2020

Concepts Design Studio
Instructors: Andrea Atkins, Jonathan Enns, and John Straube

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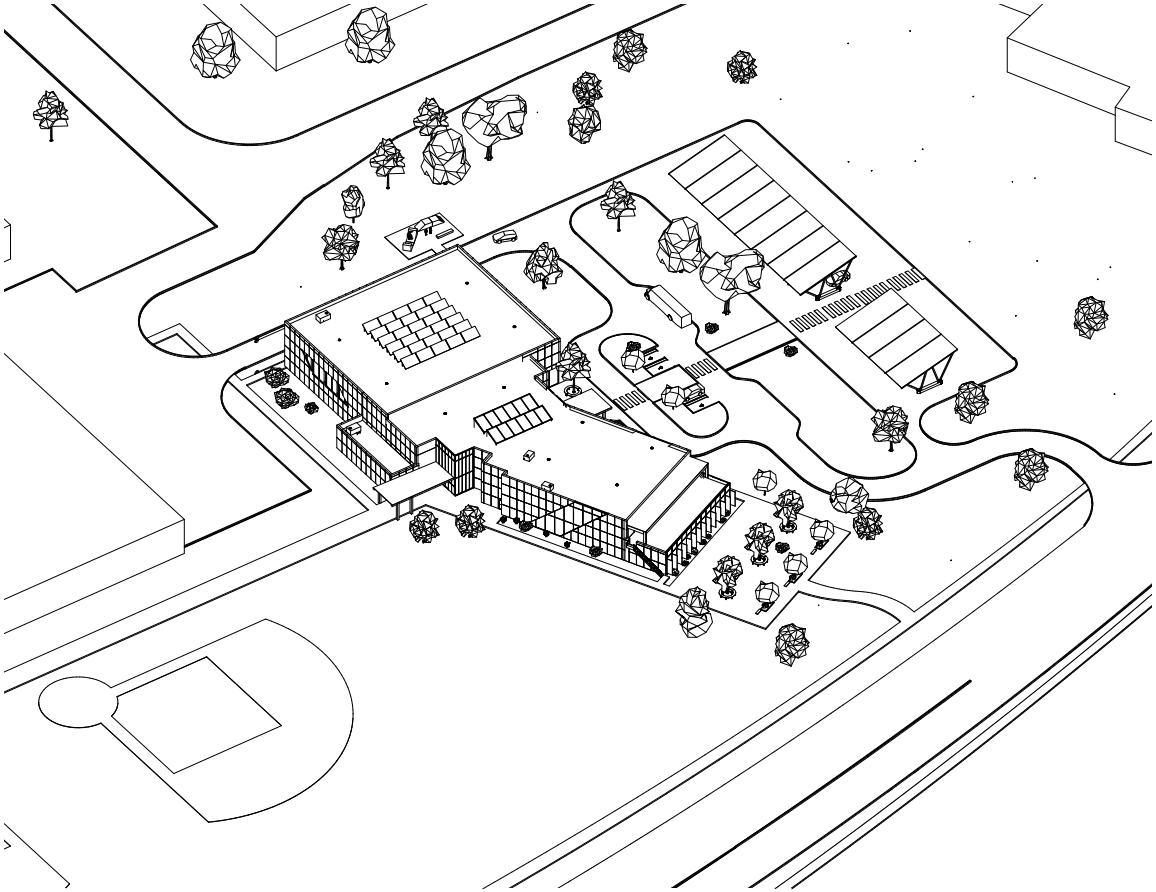
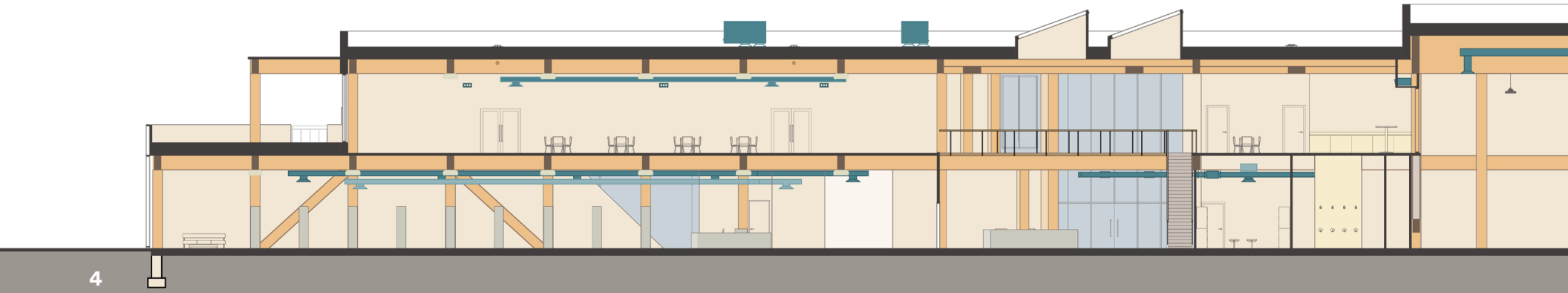
1. The Crank Community Complex

Situated between industrial and residential neighbourhoods, the Cambridge Sports Park, located in Cambridge, Ontario, is a popular public amenity, but is outdated and lacks versatility. In response, a theoretical tender requests an expansion to add a 765 m^2 library, 1180 m^2 gymnasium, and various multipurpose and staff rooms to the space.

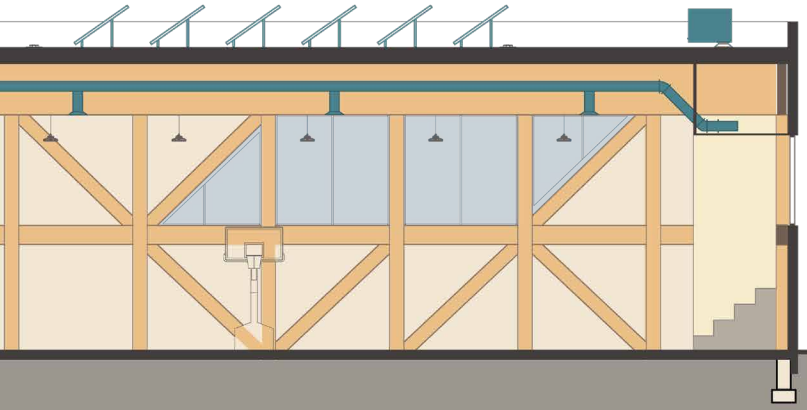
In meeting these requirements, the Crank Community Complex is designed to keep the various programs distinct, while intersecting them with the existing site and each other. The gym is aligned with the existing building, while the quieter library and rooms align with the residential neighbourhood to the south. The atrium where the programs meet provides a unique entrance for both, and acts as a common gathering ground of all users of the building.

Designed with Rebecca Damsteegt and David Burtenshaw.

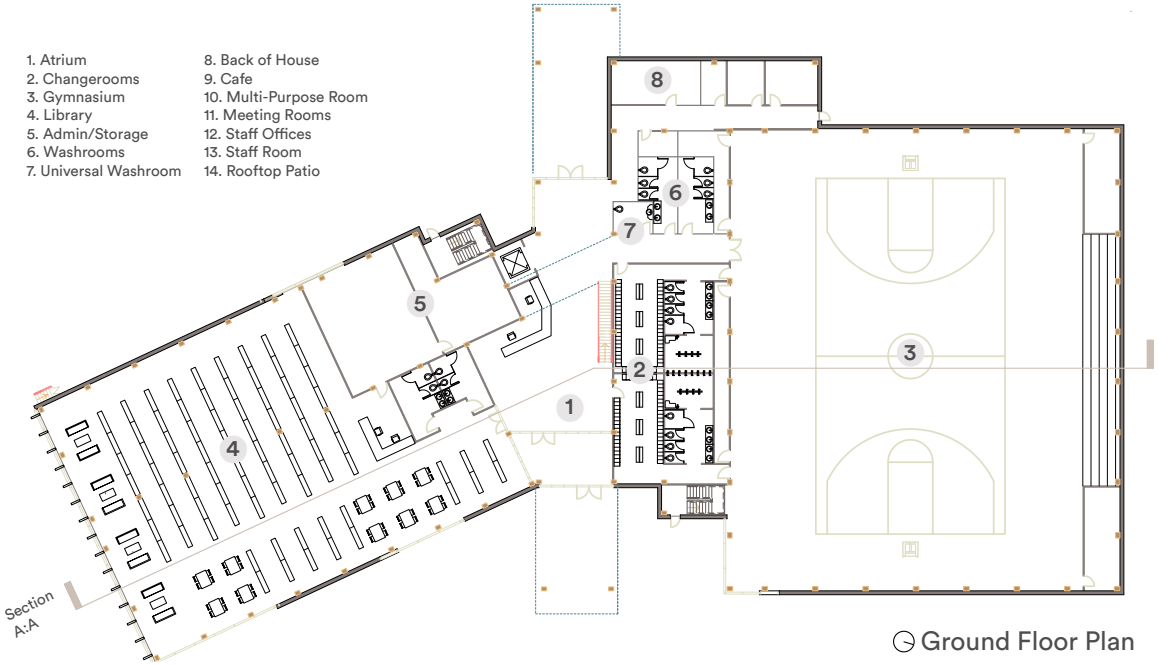




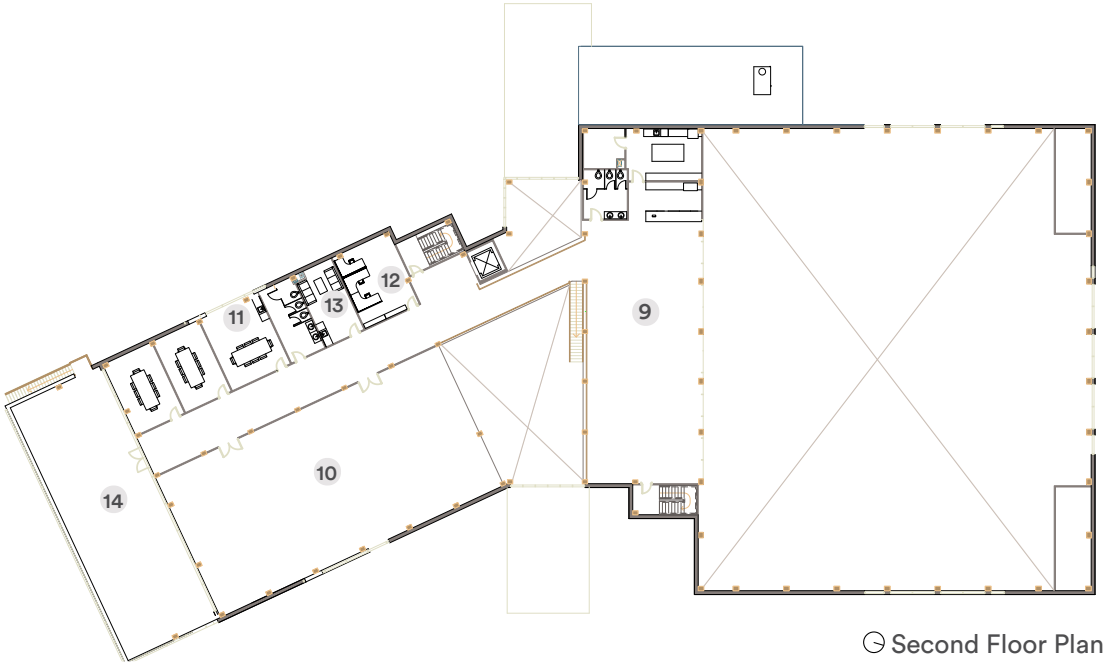
Renders by Rebecca Damsteegt.



1. Atrium
2. Changerooms
3. Gymnasium
4. Library
5. Admin/Storage
6. Washrooms
7. Universal Washroom
8. Back of House
9. Cafe
10. Multi-Purpose Room
11. Meeting Rooms
12. Staff Offices
13. Staff Room
14. Rooftop Patio



Ground Floor Plan



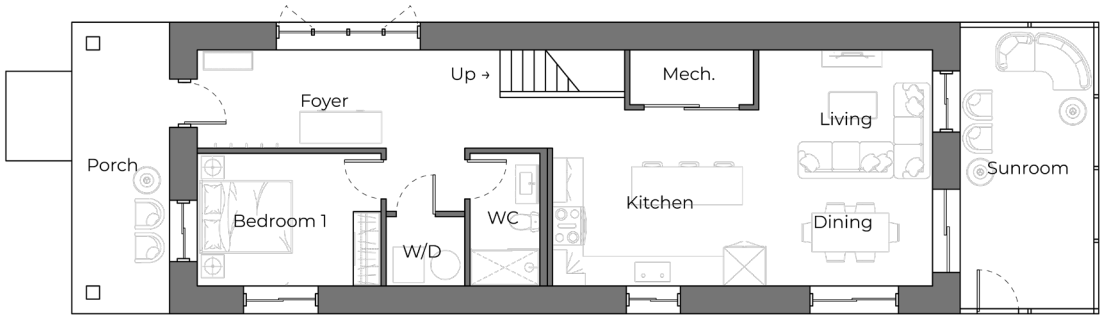
Second Floor Plan

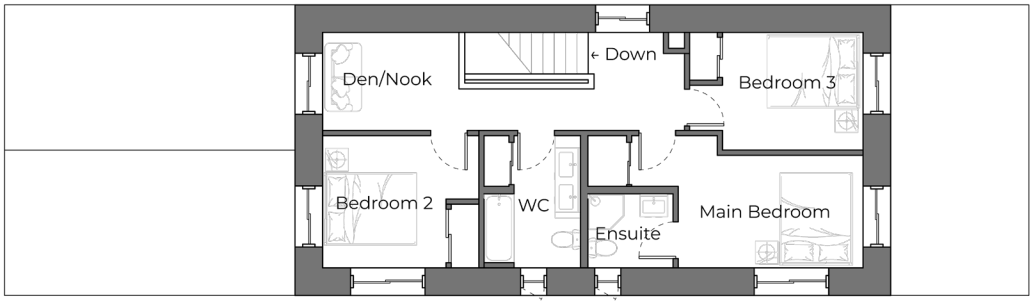
2. New Housing Proposal

The Kitchener-Waterloo Urban Native Wigwam Project (KWUNWP) is a non-profit organization dedicated to providing affordable housing to the Indigenous community in the region. Many of their properties are very old single-family homes or complexes geared towards transitional occupancy, with a growing need for multi-generational units.

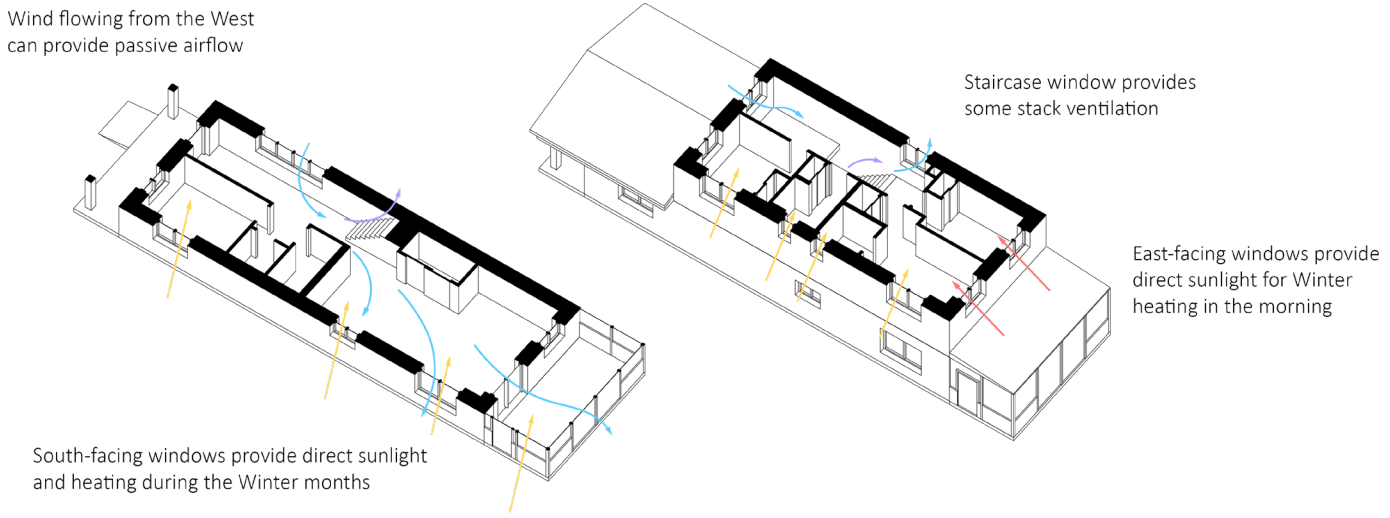
To tackle this need, the Warrior Home Student Design Team (named after the University of Waterloo mascot), a long-time partner of the KWUNWP, prepared a proposal to demolish a property in particularly poor condition and construct a new building, greatly expanding the functionality of the lot while visually integrating the home seamlessly into the local community.

Designed as the Architecture Lead of Warrior Home Student Design Team.





Throughout the project, prefabrication strategies were also combined with high-efficiency building envelope design to drastically lower both construction and operational cost estimates throughout the building's lifetime, providing a sustainable blueprint for future projects of similar nature.

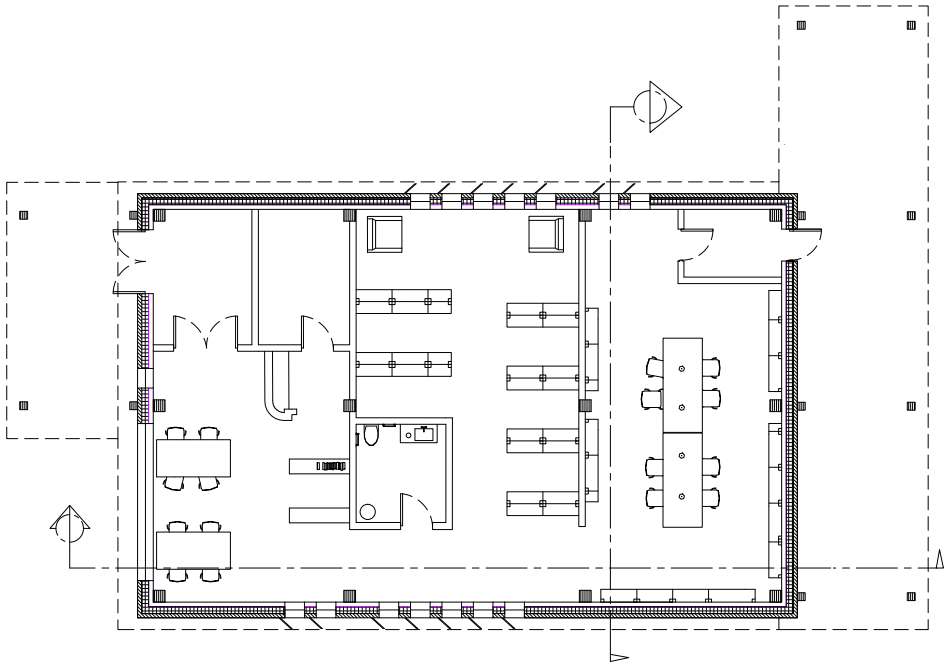


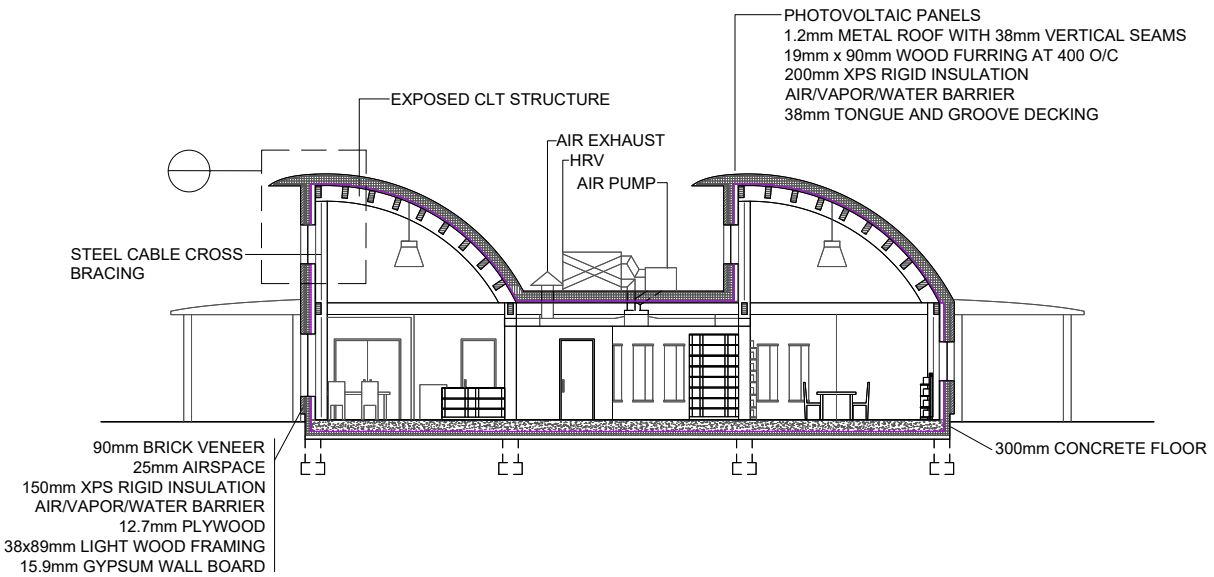
3. Universal Library

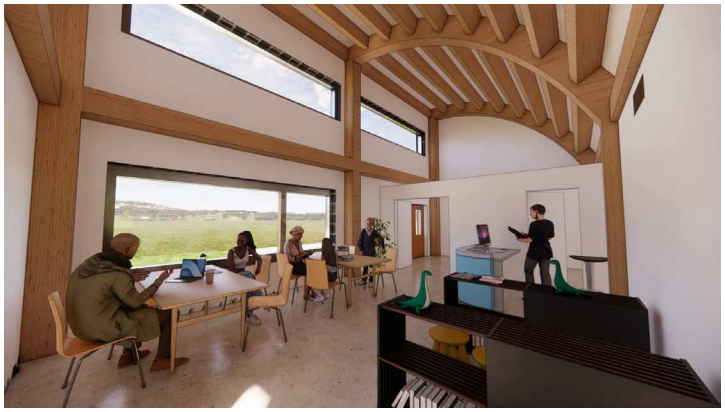
Libraries provide a vital service to local communities, but are challenging to design, especially on a smaller scale. This project, specifying only 160 m^2 of space for a public library in the Waterloo, Ontario climate, is thus designed to be primarily efficient, and replicable.

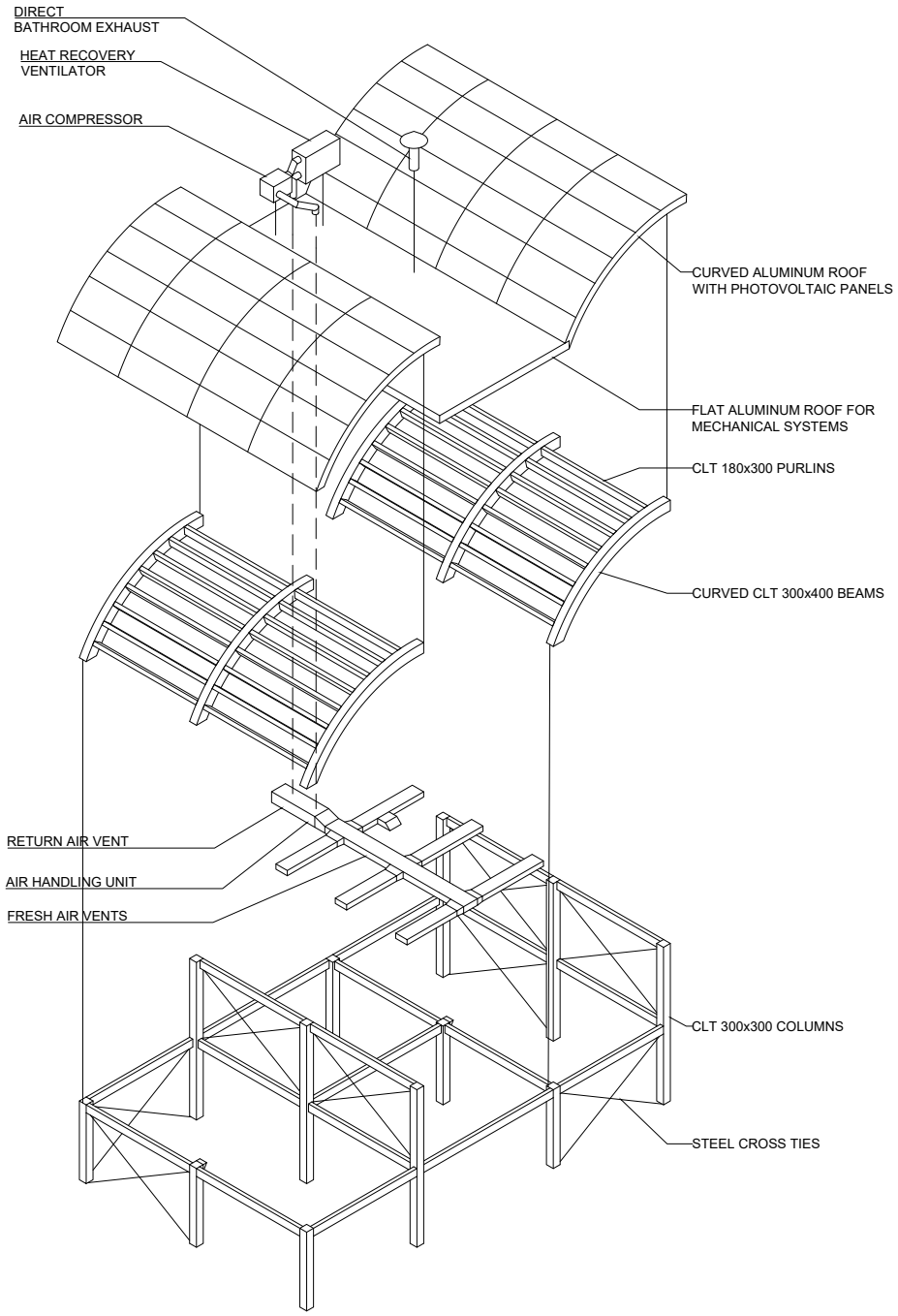
The plan features distinct spaces for quiet studying, reading, and social gathering, with vestibules for both the main and rear entrances. Curved roofs allow for diffused lighting and add volume to the smaller floor area, with a flat portion over the stacks to allow for ease of HVAC access.

Designed with Emma White, Urooj Khan, and David Jung.







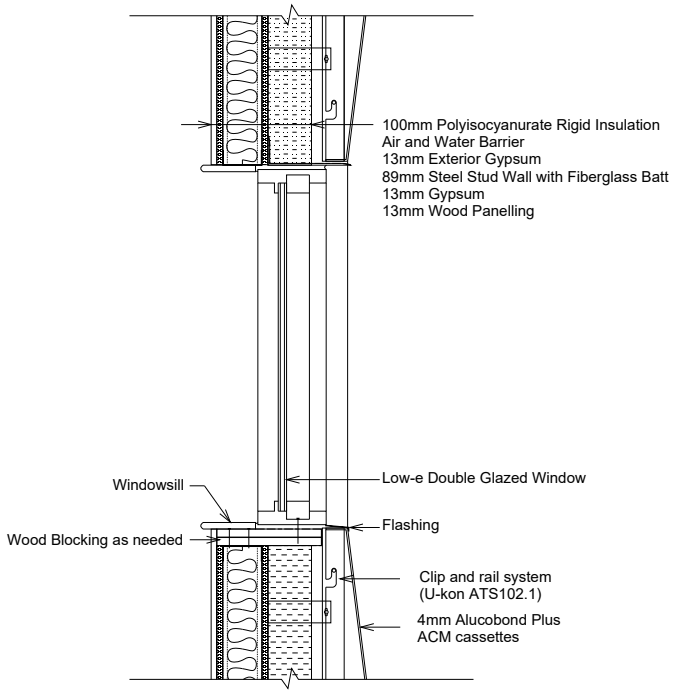

DIRECT
BATHROOM EXHAUST
HEAT RECOVERY
VENTILATOR
AIR COMPRESSOR
CURVED ALUMINUM ROOF
WITH PHOTOVOLTAIC PANELS
FLAT ALUMINUM ROOF FOR
MECHANICAL SYSTEMS
CLT 180x300 PURLINS
CURVED CLT 300x400 BEAMS
RETURN AIR VENT
AIR HANDLING UNIT
FRESH AIR VENTS
CLT 300x300 COLUMNS
STEEL CROSS TIES

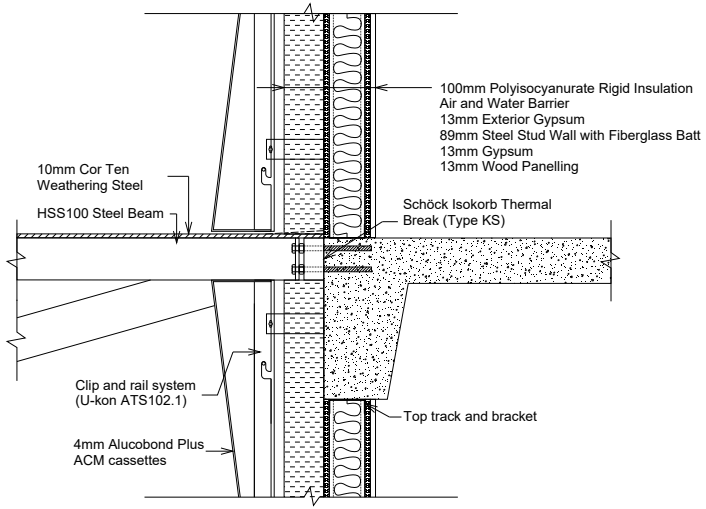
4. Ron Eydt Village Exterior Renovation

Built in the 1970s, the Ron Eydt Village student residence is one of the least energy efficient buildings at the University of Waterloo. However, demolition and new construction would be costly and would greatly reduce the already low student housing stock in the region for an extended time.

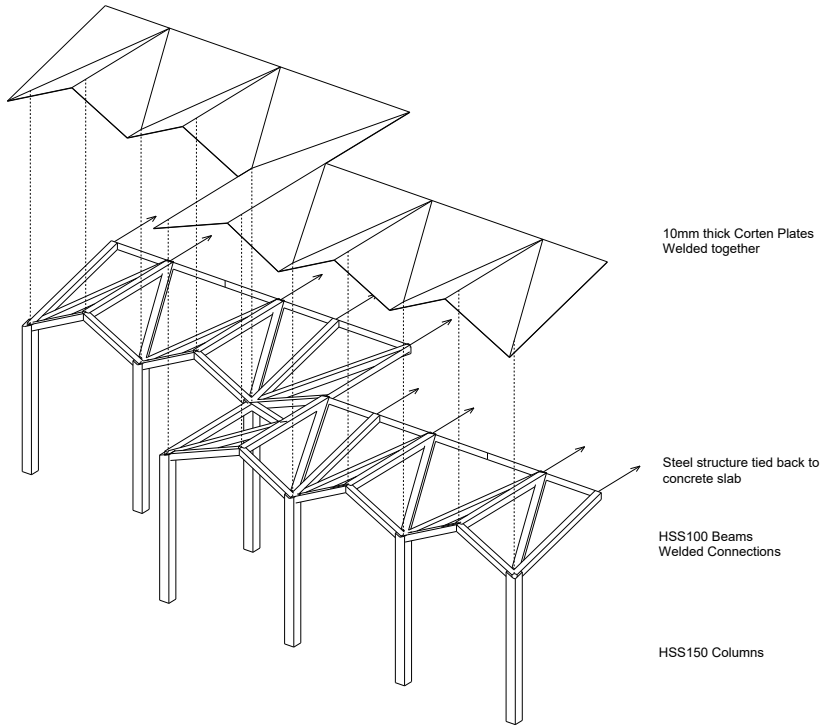
A specialized renovation, targeted primarily around updating the performance of the enclosure, in addition to modernizing the entrance and exterior visuals of the residence, may prove to be the most pragmatic solution.

Designed with Ambrose Chin, David Guo and Carol Hu.





Informed by a thorough building envelope performance analysis, a new enclosure was designed to incorporate greater insulation continuity and quality, while adding moisture and air control layers. A new entrance canopy was also designed to add visual interest to the building, inspired by similar patterns throughout campus.

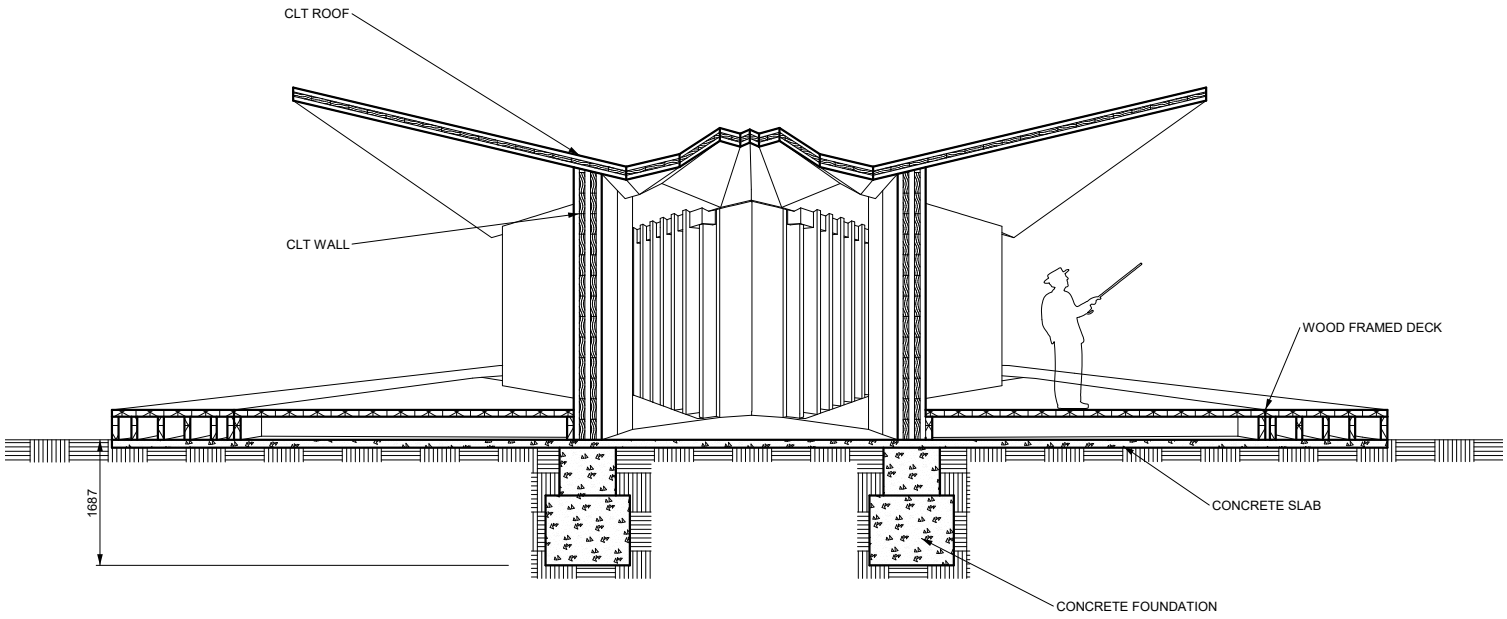


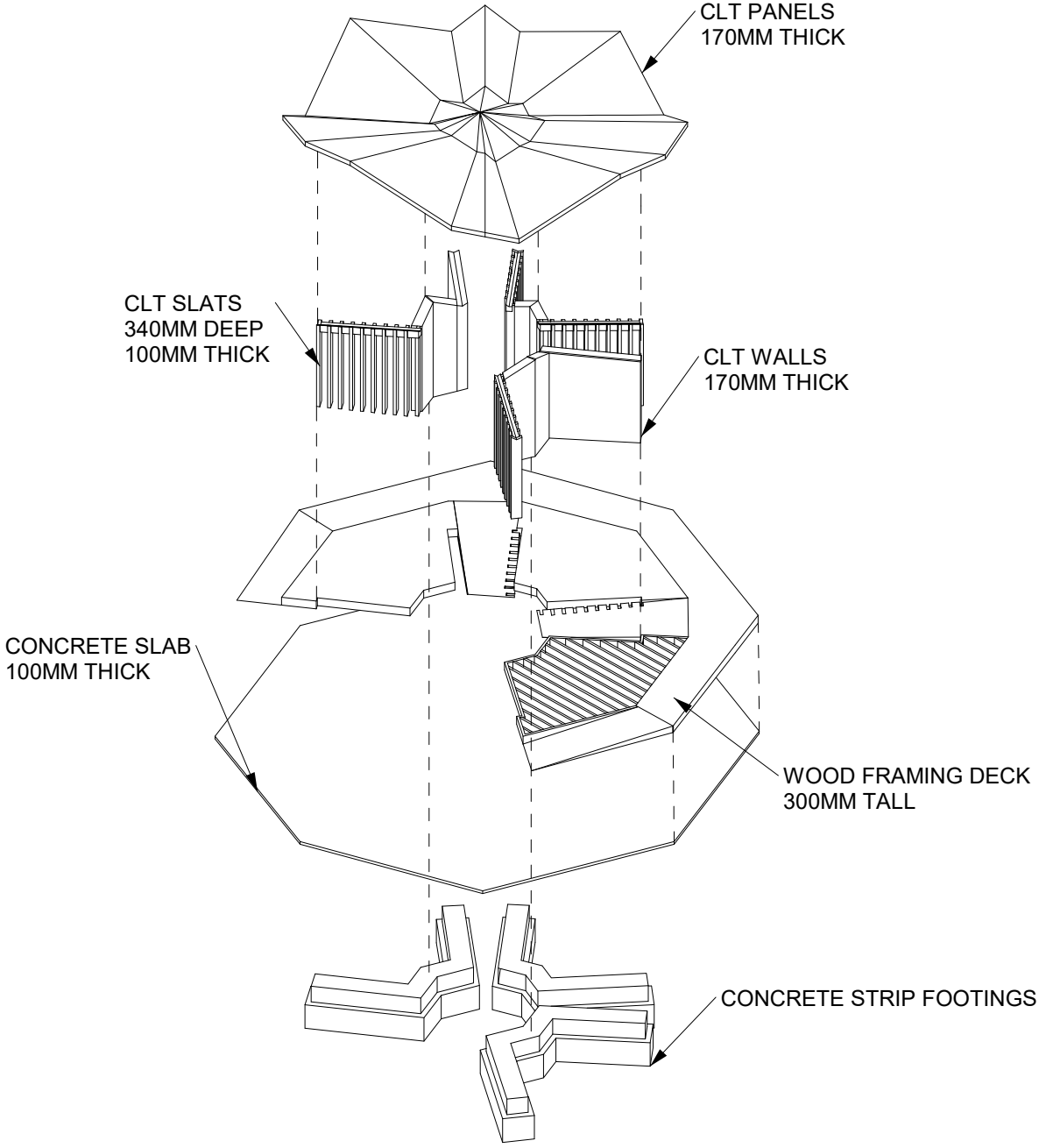
5. Bluebell Pavilion

Designed as a study of structure, the Bluebell Pavilion serves as a peaceful refuge within Waterloo Park, in Waterloo, Ontario. Parts of the pavilion closest to the wooded area between the labyrinth and the meadow are bounded by walls, creating a quieter, more enclosed space for studying or meditation. The front and sides of the pavilion are more open, and serves as an extension of the path, inviting park-goers for a brief respite from the sun.

Connections of the unique folded-plate mass timber structure were conceptualized to use TS3, a novel end-to-end joining technology first developed in Switzerland.

Designed with Dagmawit Worku, Pouya Pourrezaei, and Alexandra Keber.



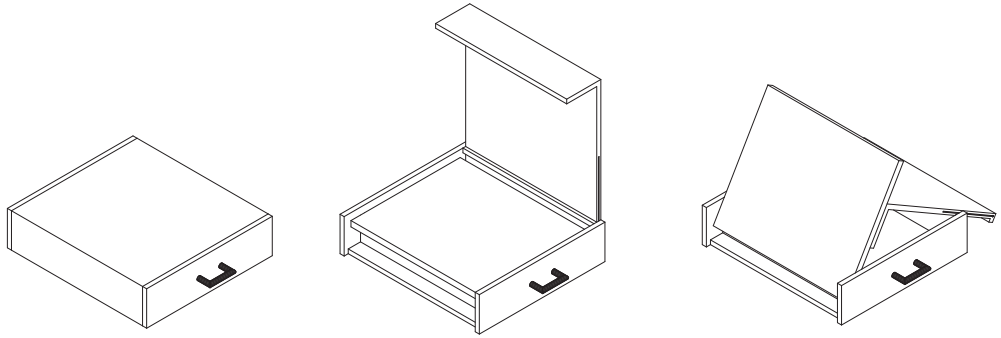

CLT PANELS
170MM THICK
CLT SLATS
340MM DEEP
100MM THICK
CLT WALLS
170MM THICK
CONCRETE SLAB
100MM THICK
WOOD FRAMING DECK
300MM TALL
CONCRETE STRIP FOOTINGS

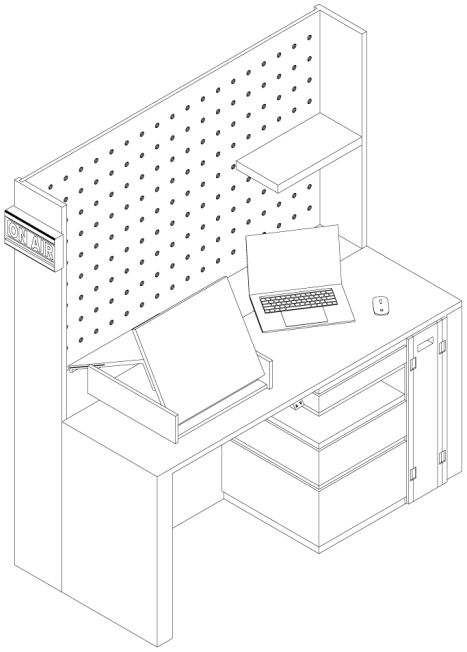
6. Modular Design Workstation

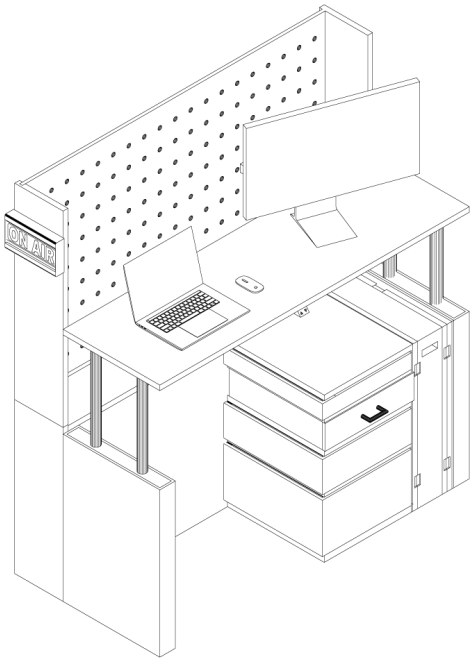
At the height of the COVID-19 pandemic, the need for dedicated workspaces within the home became apparent to students and professionals around the world.

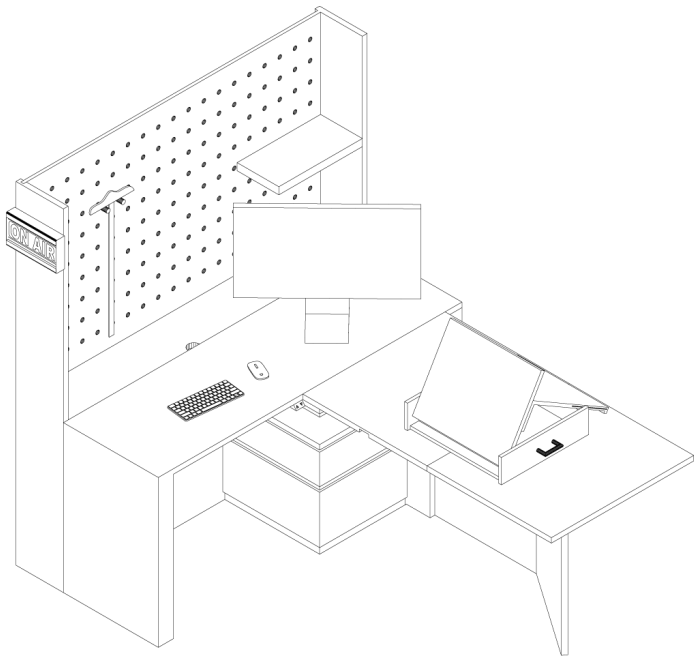
Proposed as an affordable and multi-functional system for design students, this workstation features a rising desk, an expandable tabletop, and removable elements for customization, including a portable drafting box, customizable pegboard shelves and a two-way drawer.

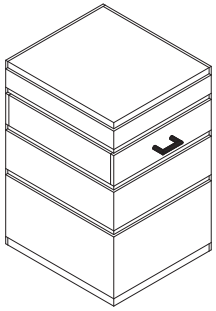
Designed with Emily Wong, Athena So and Ashten Fairhall.

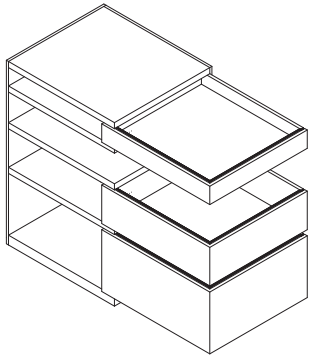


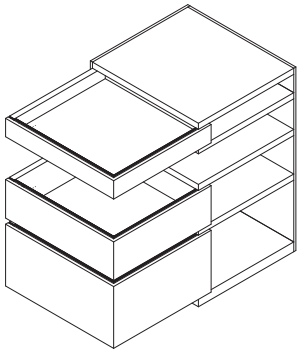


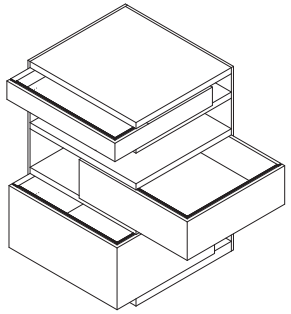


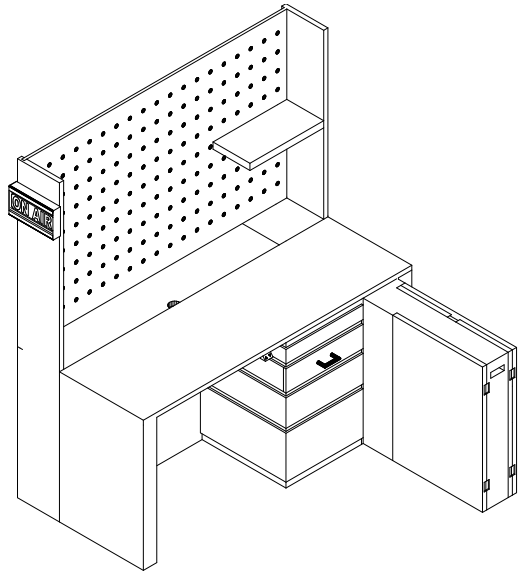


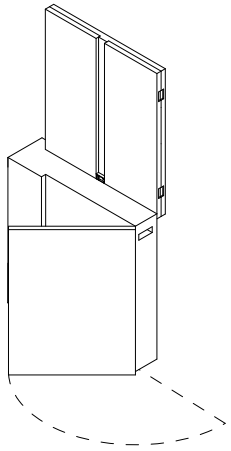


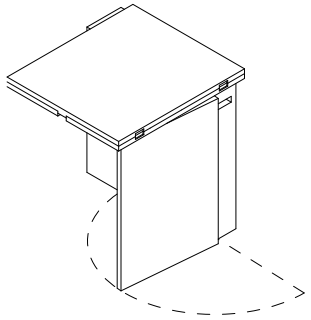


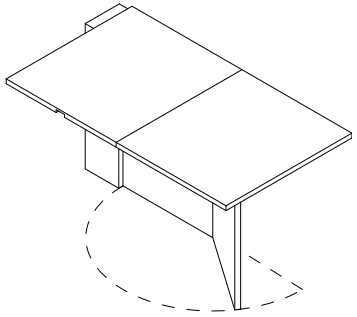












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