

ACSA Design-Build Award

2015-2016 Winner Submission Materials

Colorado Outward Bound Micro Cabins

RICK SOMMERFELD

University of Colorado Denver

Name of project	Colorado Outward Bound Cabins
Type of project	Micro Dormitories
Design-Build Timeline	<i>(started)</i> January 2015 <i>(finished)</i> June 2015
Location	Leadville, CO
Primary materials used	Steel, dimensional lumber and birch plywood
Size of building	Each cabin is less than 200 sq. ft. 14 cabins total
Size of site	3.3 acres
Cost of construction	\$9,500 per cabin, \$133,000 total (material cost) The design build program donated all the labor
Scope of work	Prefabricated flat pack cabins Designed and built in 19 weeks Constructed at 10,000 ft. in a lodgepole pine forest
Additional information	The cabins replaced tuff sheds and quonset huts that were being used as staff housing.

Project Narrative

Located on a steep hillside in a lodgepole pine forest, these cabins were designed as micro dormitories for a community of outdoor educators. The cabins sit lightly on the landscape, directing views from private spaces towards trees, rock outcroppings and distant mountain views of the Mosquito Range. More public “community” views are directed into social spaces that develop from the organization of the cabins in relationship to one another. These community spaces are made up of front porches and the negative spaces between cabins.

To satisfy clients’ lodging and storage requirements, and to facilitate completion in three weeks of on-site construction, the cabins were conceived as two separate elements, a “box” and a “frame”. The “frame” acts as a storage device for the educators’ large gear (bikes, skis, kayaks, etc.) while simultaneously housing the cabin “box” and covered porches. The prefabricated cabin “box” rests in the frame under the protection of a “snow roof” designed to keep the winter snow load off the waterproofed roof below. Hot rolled steel provides a low maintenance rain screen for the box. This steel cladding and the vertical columns blend with the lodgepole forest minimizing the visual impact of the cabins. Structural taped glazing on the windows eliminates mullions and connects the occupants directly with natural views.

The interior of the cabin is skinned in CNC’d birch plywood bringing warmth to the interior and evoking a connection with the trees surrounding the site. The plywood is specifically milled to accommodate desks, beds and storage for each user. The walls and CNC’d plywood were prefabricated in Denver, flat packed onto trucks and shipped to Leadville to shorten the on-site construction timeline.

This project was designed and built by 28 graduate students in 19 weeks. A team of interdisciplinary faculty and professionals helped guide the process. The project showcases architect lead design build and the ingenuity of an integrated project delivery design team.



Checking out existing living conditions



Site analysis

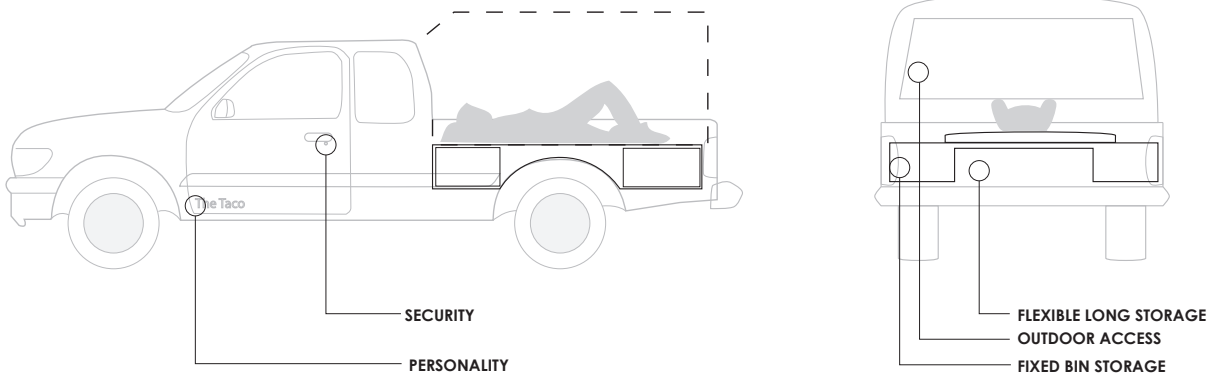
Pre-Design and Programming

The semester began with an intensive three-day integrated project delivery design session. The clients, structural engineer, students and architecture faculty worked as a team to understand the history of the Colorado Outward Bound School, diagram existing housing precedents, analyze environmental data and better comprehend the social nature of the school. The outcome of the visit was to establish “core issues” and “joint positions” with the Integrated Project Delivery team.

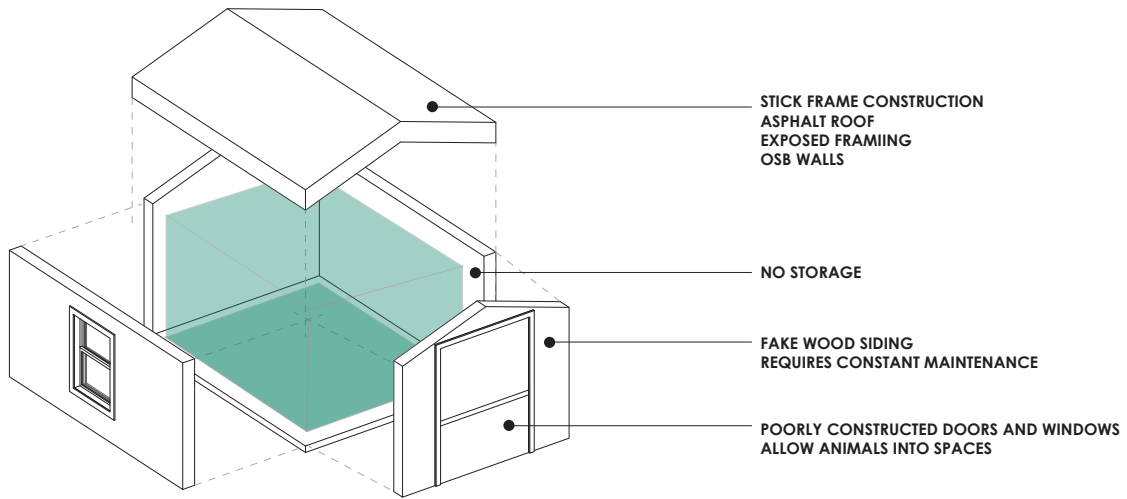


Students work in teams with COBS staff to identify core issues and joint positions. Students design, build and test their toboggans, a team-building event run by Colorado Outward Bound.

Core Issues: Existing Housing Stock



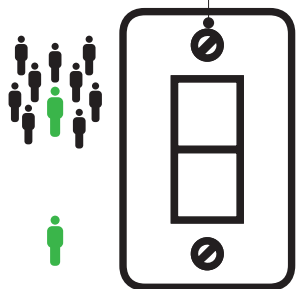
EXISTING HOUSING CONDITIONS: TOYOTA TACOMA



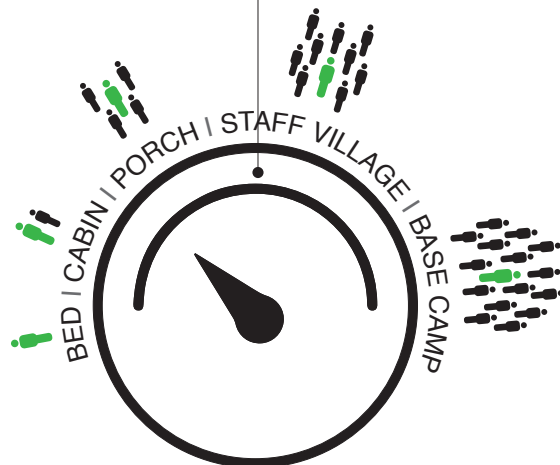
EXISTING HOUSING CONDITIONS: TUFF SHED

Joint Position: Increase Social Gradient

EXISTING HOUSING:
DOES NOT SUPPORT A
RANGE OF SOCIAL ENGAGEMENT



JOINT POSITION:
CREATE A VARIETY OF SPACES TO
ADAPT TO SOCIAL CHANGE



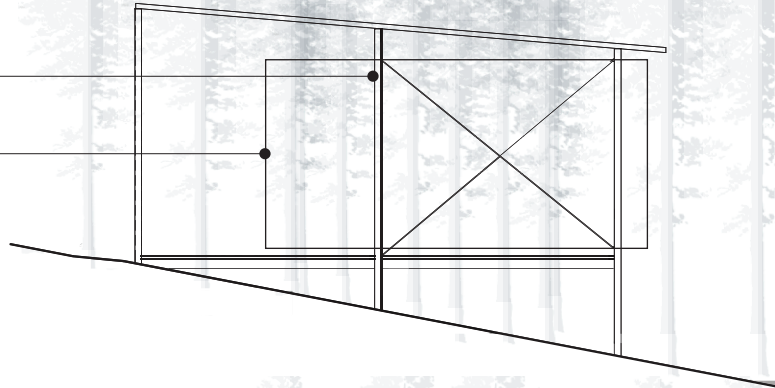
Core Issues: Gear



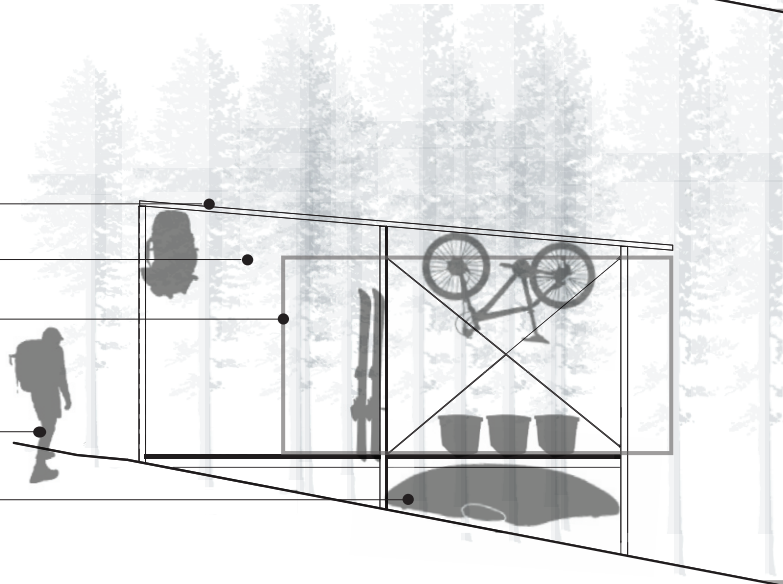
EXISTING STORAGE NEEDS: TYPICAL OUTWARD BOUND GUIDE

Joint Positions and Diagrammatic Architectural Morphology: "Box" and "Frame"

DESIGN SOLUTION
 CONSTRUCT A FRAME TO NEGOTIATE THE LANDSCAPE AND HOLD THE SNOW
 INSERT A PREFABRICATED CABIN AND ALL REQUIRED STAFF GEAR



D-DECK "SNOW ROOF"
 COVERED PORCH WITH DRY STORAGE AREA
 PREFABRICATED CABIN WITH CUSTOM CNC'D BIRCH PLYWOOD INTERIOR, DURABLE STEEL CLAD EXTERIOR, EPDM ROOF AND TAPE GLAZED WINDOWS
 HAPPY OUTWARD BOUND GUIDE
 UNDER CABIN DRY STORAGE



Design and Mock-up

As the semester evolved the students presented concepts to the IPD team and clients. The feedback they received was incorporated into new design proposals and a full-scale mock-up. The students tested their prefabricated assemblies and CNC'd furniture using the mock-up, which was constructed inside the architecture building. The second floor studio, where the project was constructed, proved to be a good test for how building assemblies could negotiate tight spaces.

The outcome of the mock-up was to better understand the timeframe and budget of the project when tested against a real build. The process proved invaluable. At the conclusion of the mock-up build the students changed design details, materials assemblies and products to better fit the remote site and condensed timeline. Without this stage of the design process the project would never have been completed on time.



Client and engineering review, CNC fabrication and Mock-up

Engaging the consultants

The mock-up became a tool for learning about new methods of construction. The prefabricated projected windows, glazed with 3M VHB tape, evolved into an area where collaboration between instructors, students and material representatives was required to create a new waterproofing detail.

Students also tested their prefabricated Structurally Non-Insulated Panels or SNIPs. The CNC'd interior and flat stud wall framed SNIPs were designed with the structural engineer and conceived to be a lighter, more integrated way to assemble the cabins and interior furniture. It proved to create unforeseen issues with tolerance that slowed the process and compromised the craft of the cabins. The idea was abandoned for flat packed, advanced frame, prefabricated wall assemblies.

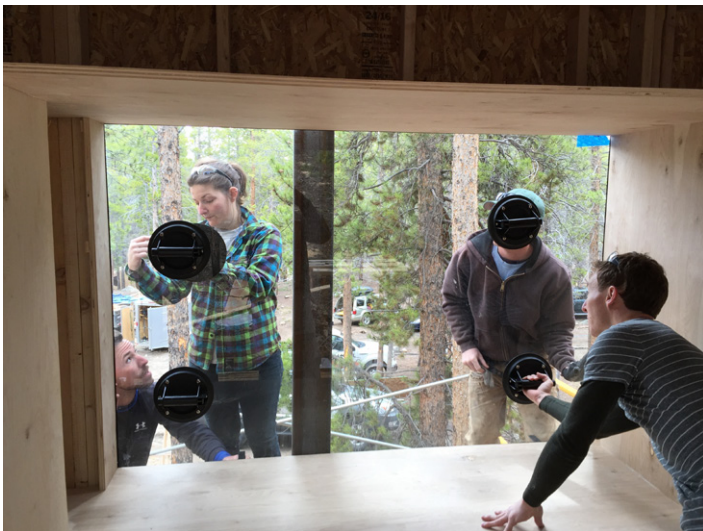
Finally the mock-up proved useful for determining the steel frame details. Various column to girder connections were explored along with tension connections for the cross bracing. Students were able to evaluate the cost of each assembly and weight it against the ease of construction and aesthetic value.



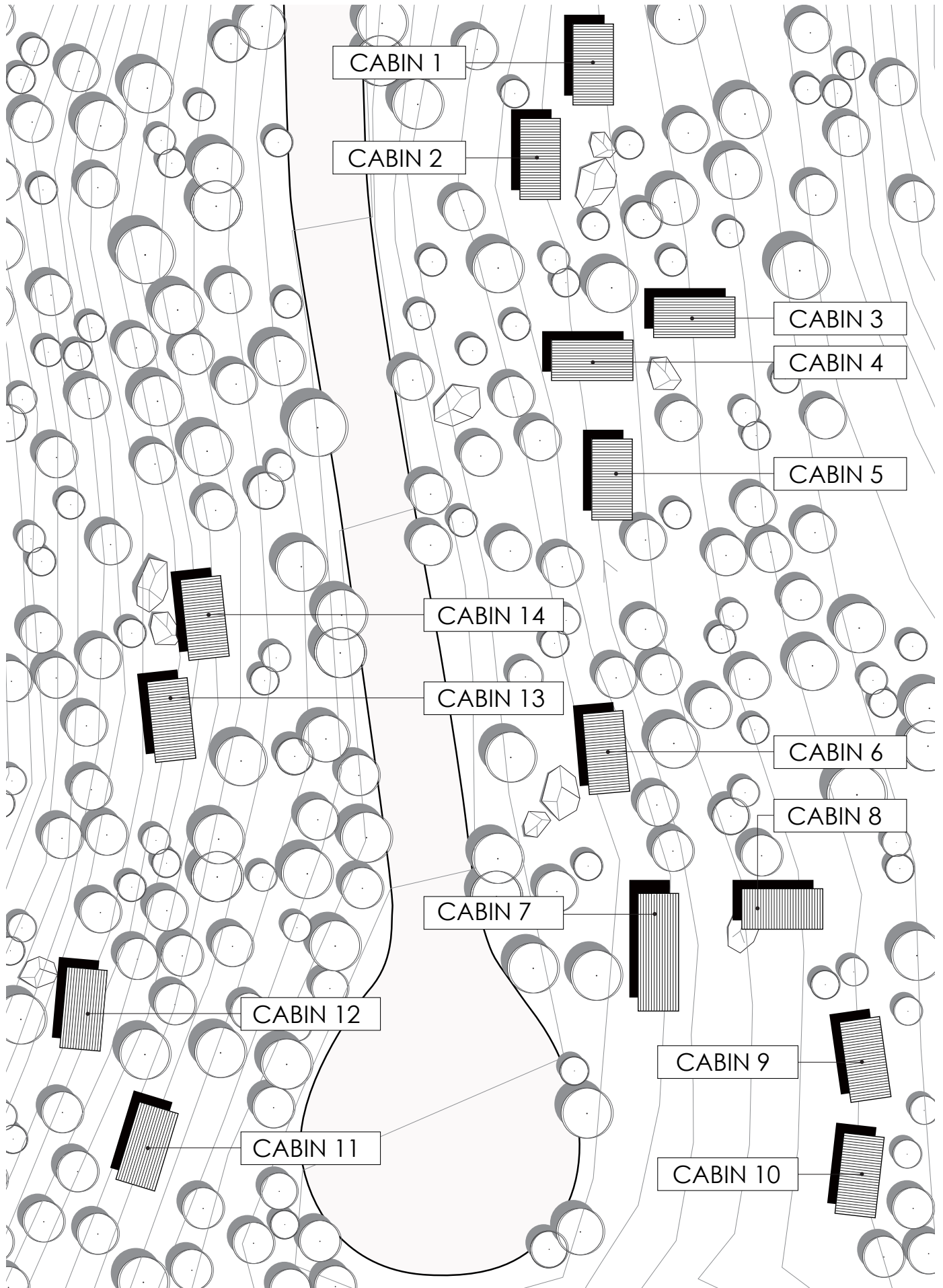
Waterproofing the prefabricated window bucks, The SNIP failure and students hanging out in the finished mock-up inside the architecture school.

The Build

In a mere 29 days on-site the students built 14 cabins constructing everything from the steel frames to the CNC'd interior furniture and storage.



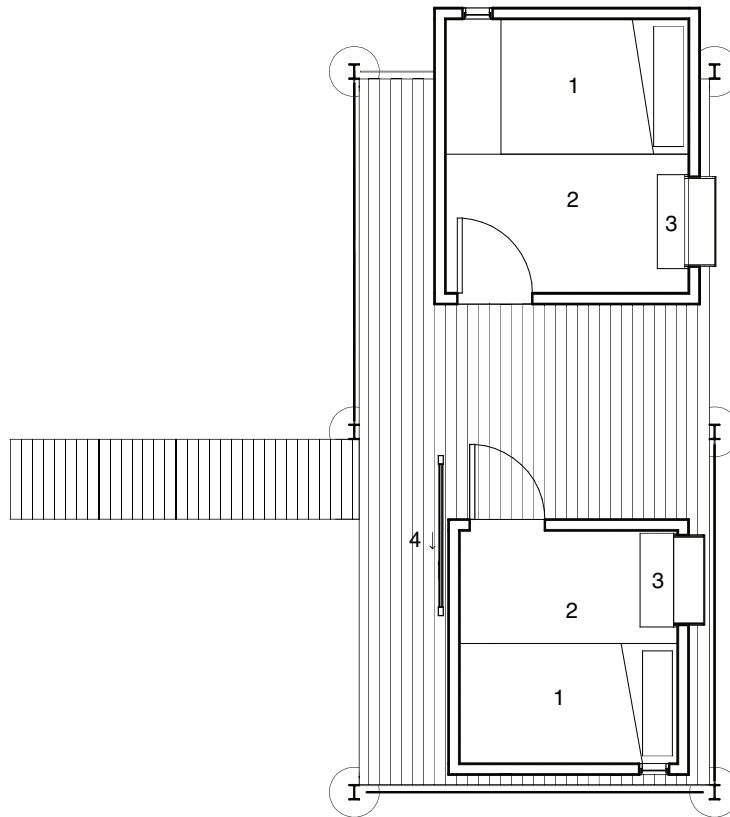
Construction



SITE PLAN

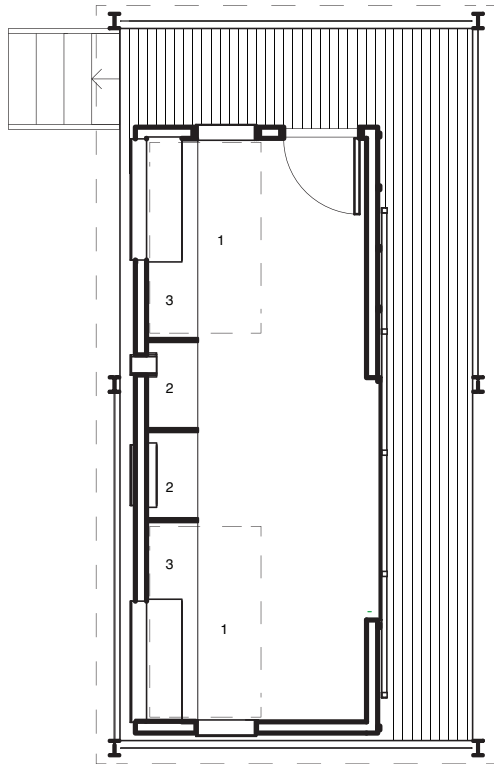






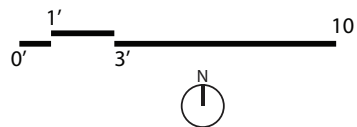
CABIN 1
FLOOR PLAN

- 1 QUEEN BED
- 2 STORAGE
- 3 DESK
- 4 SLIDING BARN DOOR



CABIN 2
FLOOR PLAN

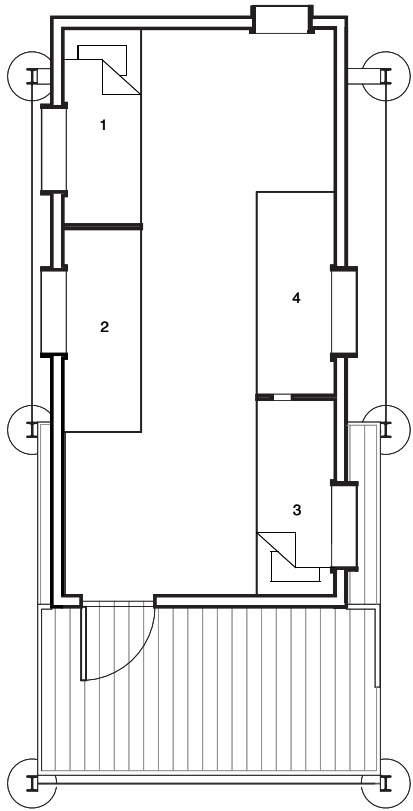
- 1 BED (TWIN)
- 2 BENCH / DESK / UTILITY
- 3 STORAGE (ABOVE BEDS)





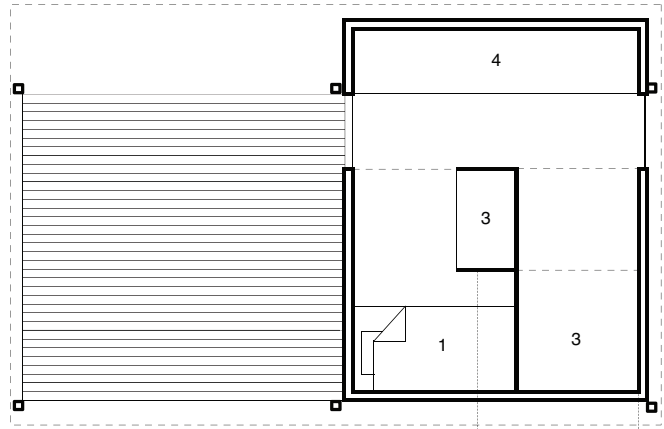
CABIN 1 and 2





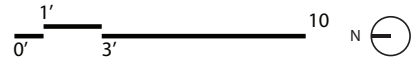
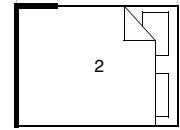
CABIN 4
FLOOR PLAN

- 1 EAST BED / STORAGE UNDER
- 2 DESK / STORAGE / OVERFLOW BED
- 3 WEST BED / STORAGE UNDER
- 4 DESK / STORAGE / OVERFLOW BED



CABIN 5
FLOOR PLAN

- 1 LOWER BED - TWIN
- 2 UPPER BED - DOUBLE
- 3 STORAGE
- 4 BENCH / DESK / TWIN BED



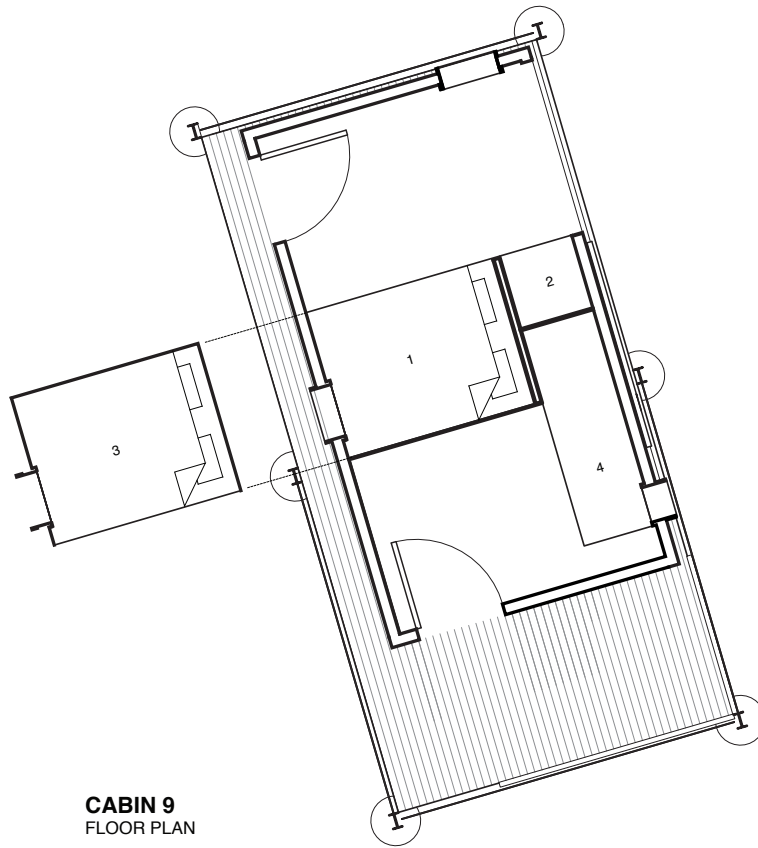
CABIN 5 and 4





CABIN 7, 6 and 8



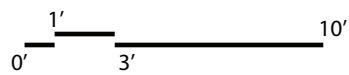
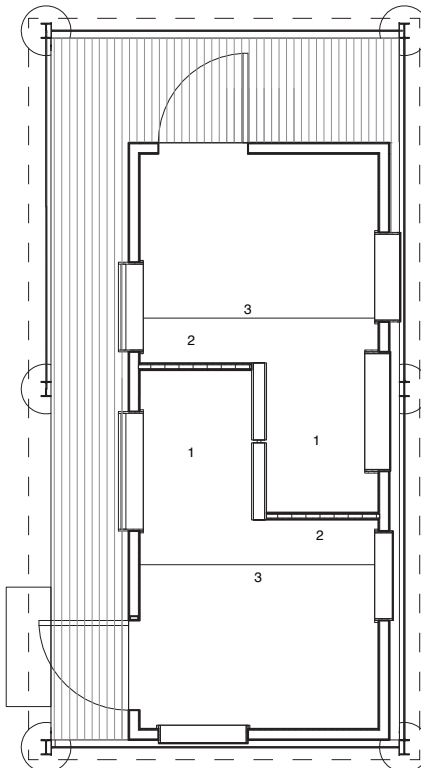


CABIN 9
FLOOR PLAN

- 1 UPPER BED / UNDER STORAGE
- 2 DESK / STORAGE
- 3 LOWER BED
- 4 DESK / STORAGE

CABIN 10
FLOOR PLAN

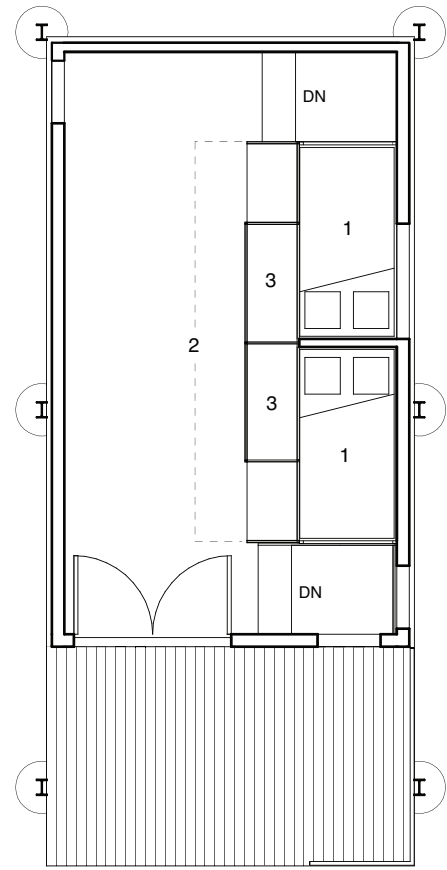
- 1 BED (4' WIDE)
- 2 BENCH / DESK / UTILITY
- 3 STORAGE (ABOVE/BELOW BEDS)





CABIN 9 and 10





CABIN 11
FLOOR PLAN

- 1 TWIN BED
- 2 STORAGE WALL
- 3 DESK (FLIP DOWN DESKS)



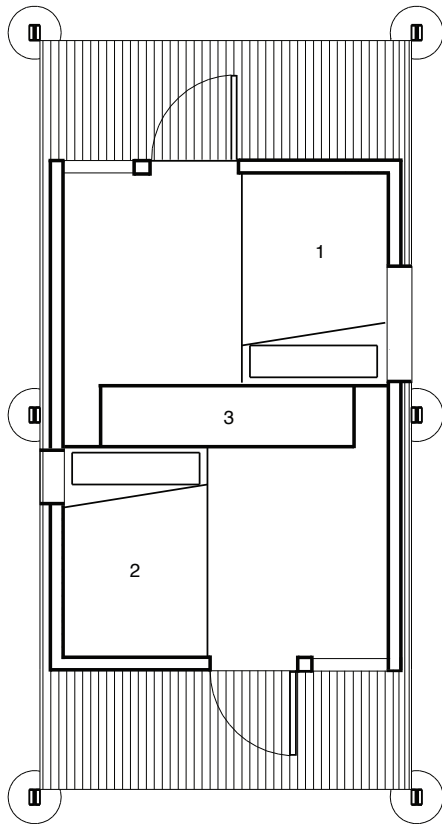
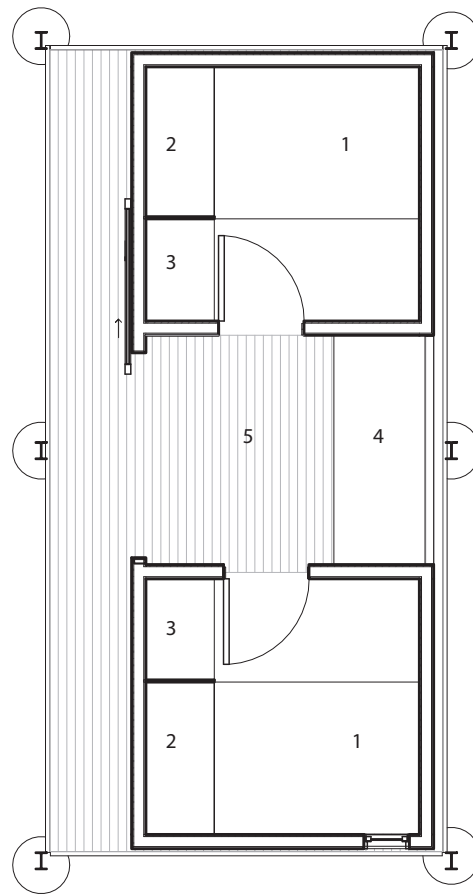


CABIN 12



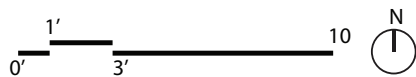
Cabin 14
Floor Plan

- 1 Bed (Full)
- 2 Deep Storage
- 3 Mud Room
- 4 Breakfast Counter/ Sleeping Platform
- 5 Common Area



Cabin 13
Floor Plan

- 1 Bed (Full)
- 2 Bed (Full)
- 3 Ying Yang Storage and Desk





CABIN 13 and 14

