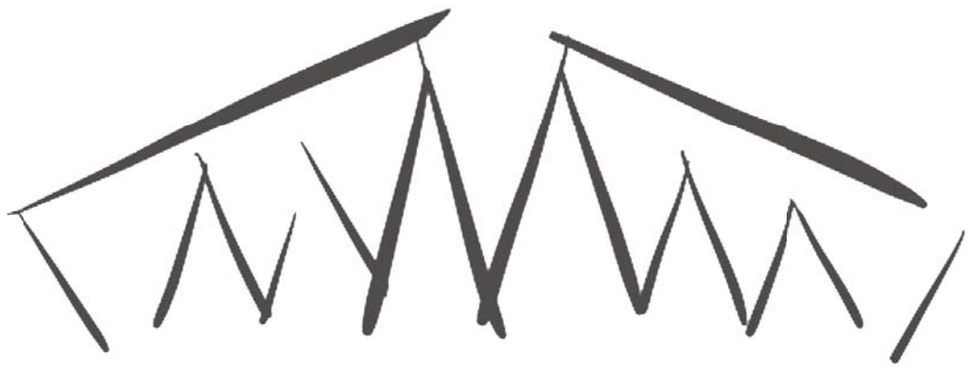


OBJECTIVES

» CONSTRUCTABILITY

To shorten the project schedule, while delivering a high quality classroom. Explore all opportunities to utilize pre-fabrication and/or modularization on the project.

» AFFORDABILITY

Target a $250,000 build cost for the typical 1000sf classroom unit.

» SUSTAINABILITY

Create a healthy, high-performance learning environment employing state-of-the-art green design strategies.

» CONNECT TO HAWAI`I

Embrace Hawaii's natural environment and rich culture. How can this classroom design respond specifiically to Hawaii's needs.

ĒULU

TOP OF A TREE, BRANCHES, CANOPY

HAWAIIAN TRANSLATION

ĒULU

ENERGY NEUTRAL MODULAR CLASSROOM

COMMUNITY DESIGN CHARRETTE

NOVEMBER 11, 2011

The community charrette focused on a cross disciplinary integrated design process included approximately 20 teachers, architects, cultural advisors, engineers, cost estimators, Dept. of Education Facilities representatives, and vendors, along with the professors and students of the School of Architecture.

DESIGN MANTRA

» PUT THE FUN IN FUNDAMENTALS

Injecting a learning space with playfulness creates a warm and welcoming atmosphere.

» SUPPORT GREAT TEACHERS

Free teachers from the traditional desk at the front of the classroom and encourage new settings for teaching and learning.

» FORM FOLLOWS FUNCTION

Teaching and learning should shape the building, not vice versa.

» TRIGGER THE SENSES

Sound, smell, taste, touch, and movement power memory. An environment rich in sensory experiences helps students retain and retrieve what they learn.

» CONNECT TO HAWAI`I

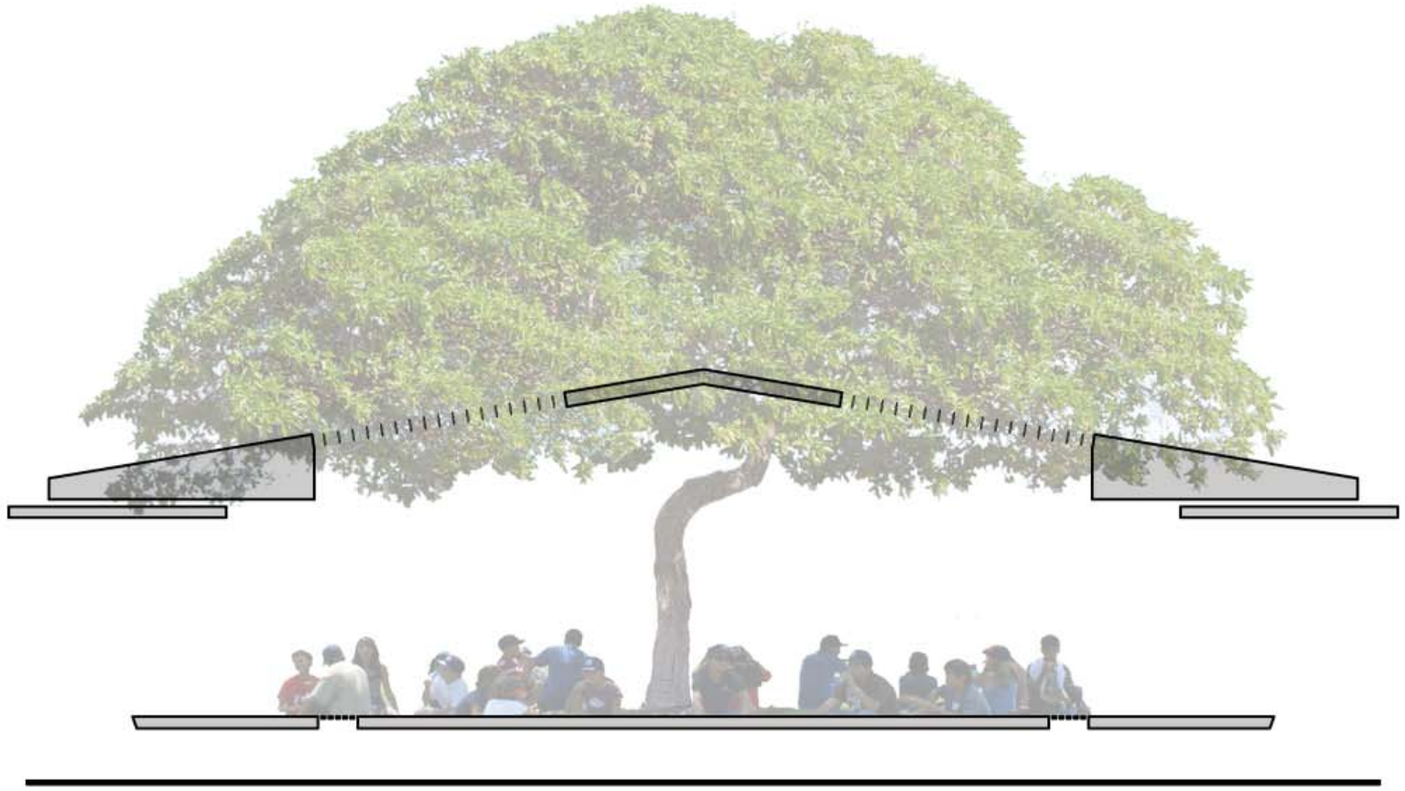
Create a classroom that connects to our natural environment.
Use the classroom as a learning tool, engaging students in what is fundamentally meaningful to Hawai`i culturally and valued spiritually.

» MAKE IT NEW

Design the learning space with 21st-century eyes: Does it work for what we know about learning today, or just for what we knew about learning in the past?


DESIGN
ĒULU

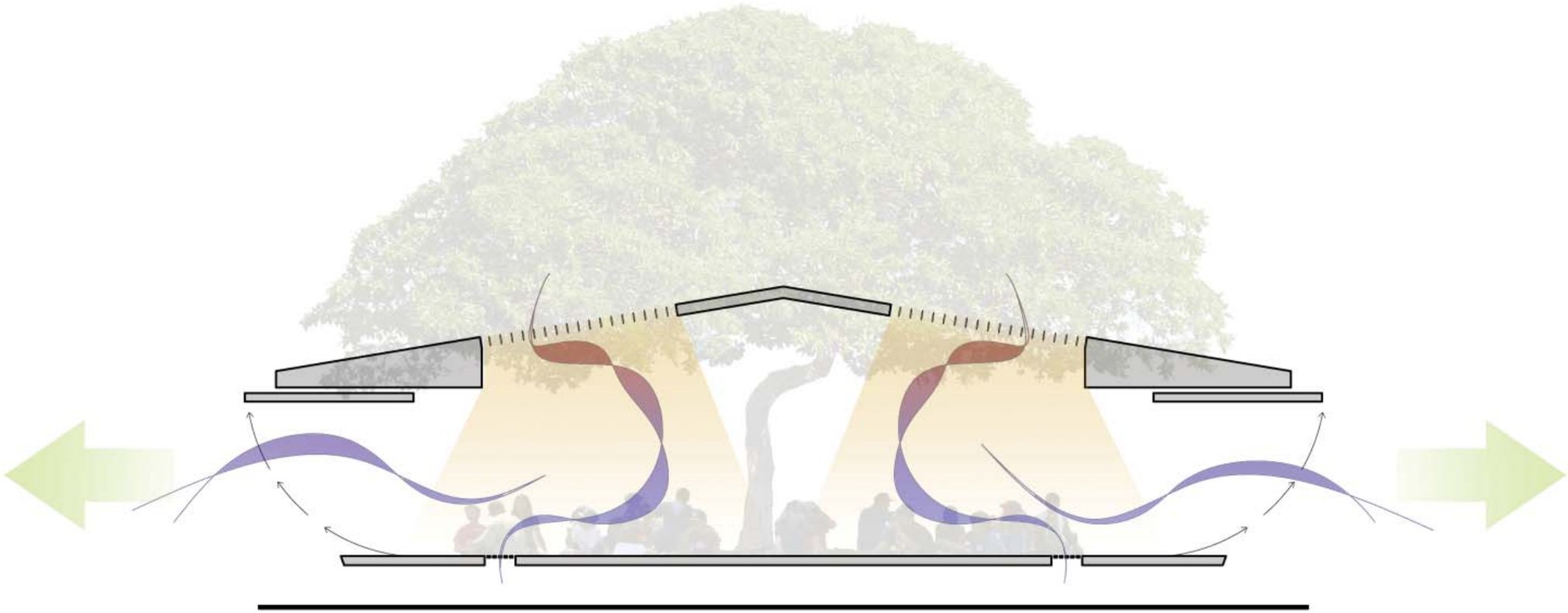
CONCEPT



THE ĒULU ENERGY NEUTRAL CLASSROOM IS DESIGNED TO CONNECT TO NATURE, FUNCTIONING MUCH LIKE THE LEARNING ENVIRONMENT SIMPLY CREATED UNDER THE CANOPY OF A SHADE TREE.

By allowing the classroom to connect and adapt to the sights, sounds and smells of the surrounding environment, an atmosphere rich in sensory experiences, user engagement and versatility is created.

LIGHT & AIR



LIGHT & AIR FLOW DIAGRAM

Large flip up doors at each end allow for cross ventilation and views. Floor vents and ceiling fans allow for cool air to be drawn from beneath the structure, hot air is then released through a louvered roof system and ridge vents above. **Flexible building components create opportunities for users to take an active role in adapting the classroom environment** for many types of weather, wind, and sun conditions.

The classroom can become a light and airy indoor/outdoor experience, a controlled environment for presentations and projection, or any variation in between.

FRAMING DIAGRAM

TRADITIONAL
HAWAIIAN
STRUCTURE

GABION BASKETS

Concept Study: Haus 9x9 - Titus Bernhard Architekten

STONE OR CONCRETE RUBBLE FILLED STEEL BASKETS USED TO ANCHOR FOOTINGS AND CREATE UNIQUE & DURABLE EXTERIOR WALL COMPONENTS.

WALL MODULE OPTIONS

INSULATED FIBER CEMENT PANEL

INSULATED FIBER CEMENT PANEL W/ LOUVERED CLEARSTORY

INSULATED FIBER CEMENT PANEL W/ LOUVERED CLEARSTORY & BASE

WOOD & GLASS W/ LOUVERED CLEARSTORY

GABION BASKET W/ LOUVERED CLEARSTORY

FIXED GLASS W/ LOUVERED CLEARSTORY

DOOR OPTIONS

WOOD VENEER
4′ X 8′ DOOR

STEEL GRAPHIC
4′ X 8′ DOOR

ROLL UP DOOR
WITH PANEL OPTIONS

ENTRY SIDE ELEVATION

DISPLAY SIDE ELEVATION

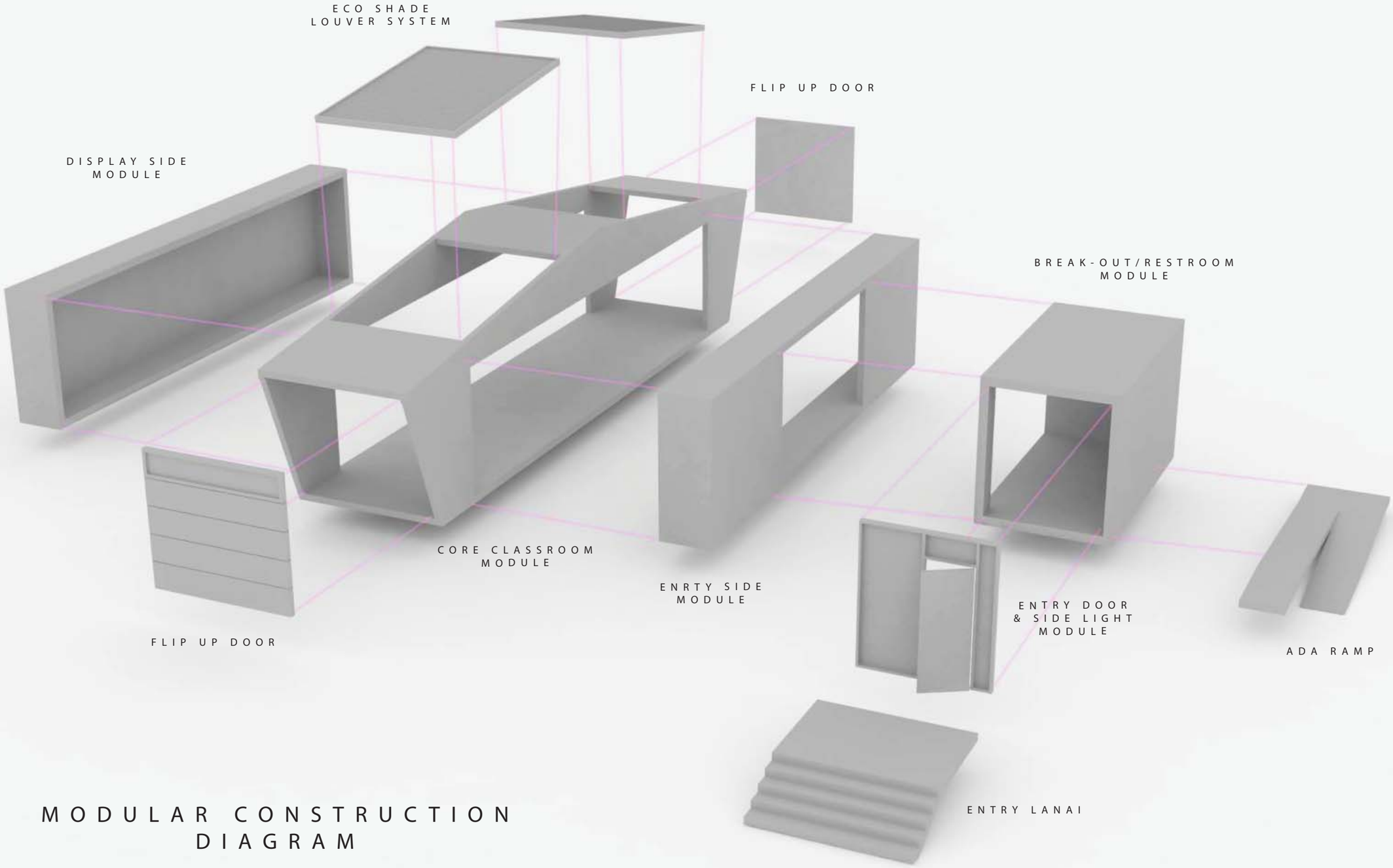
FRONT ELEVATION

REAR ELEVATION

PERSPECTIVE VIEW

ENTRY SIDE SECTION

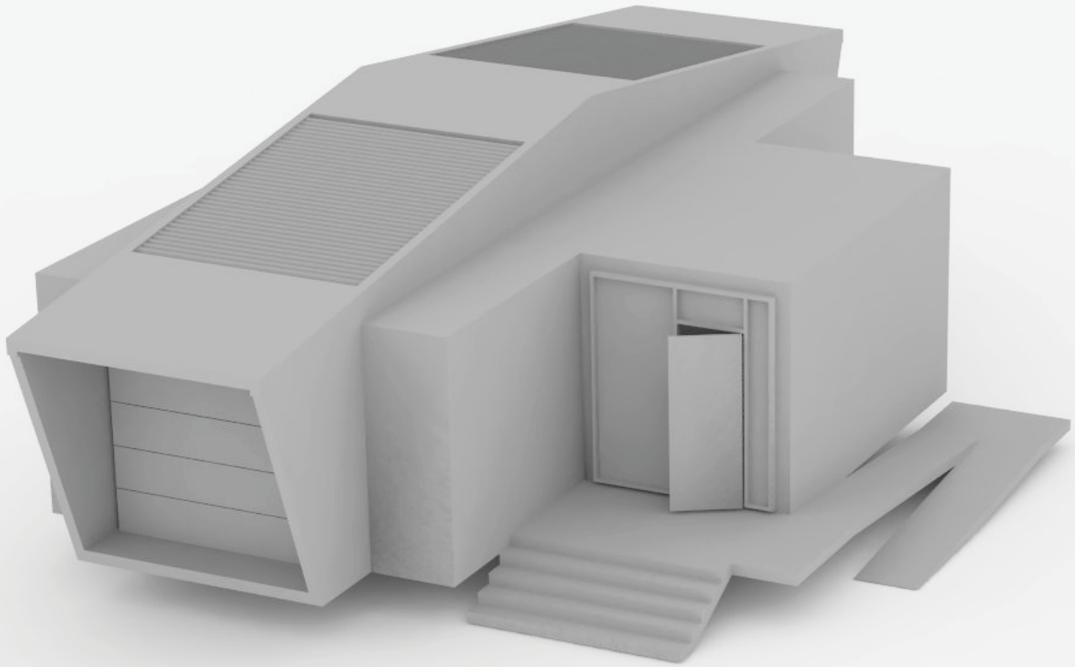
DISPLAY SIDE SECTION



MODULAR CONSTRUCTION DIAGRAM

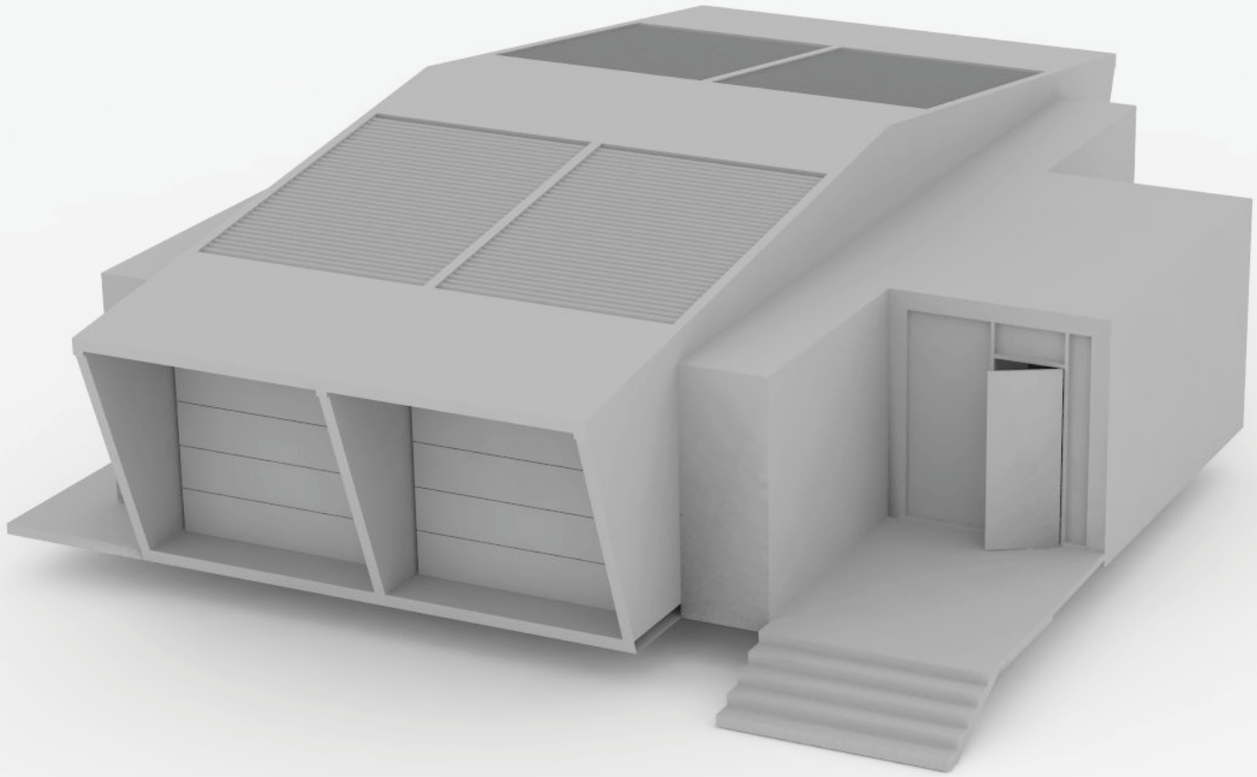
SINGLE CLASSROOM W/ BREAKOUT SPACE

FLOOR AREA: 1100 SF



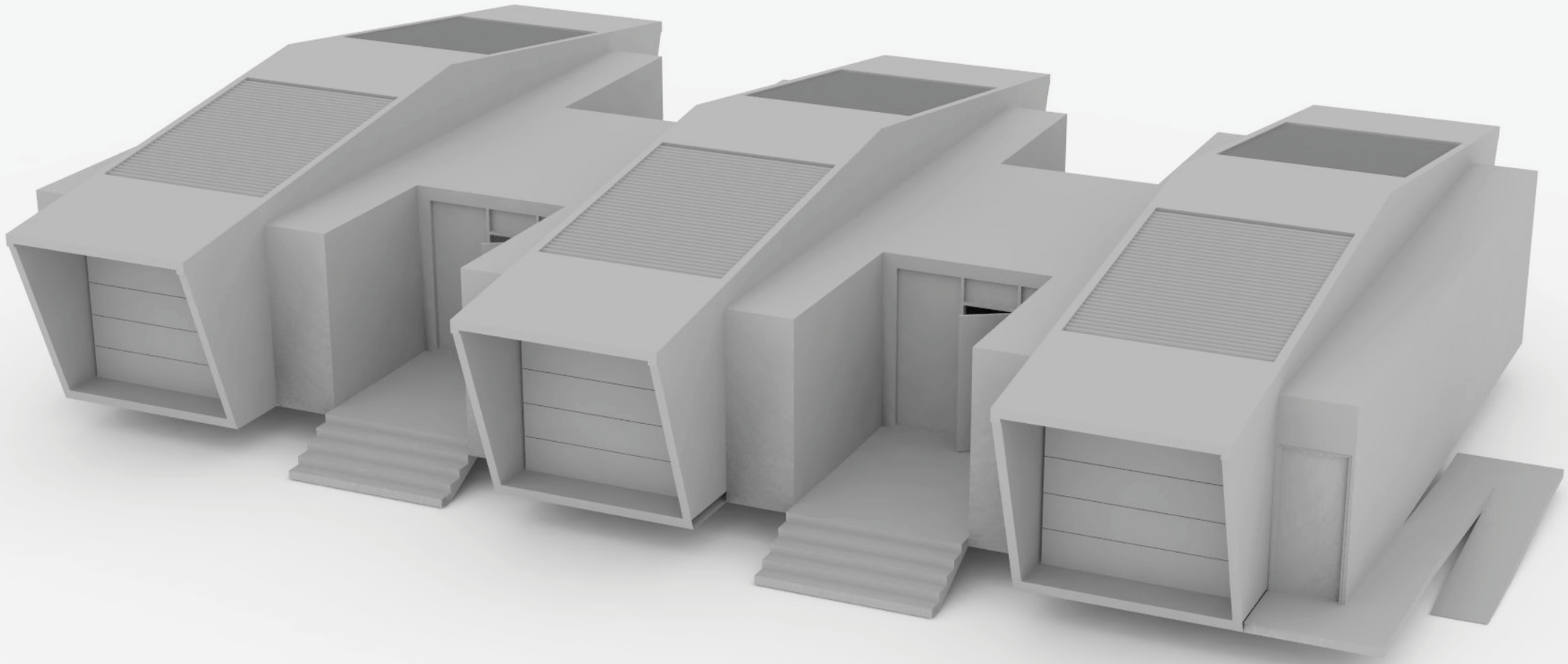
DOUBLE CLASSROOM W/ BREAKOUT SPACE

FLOOR AREA: 2050 SF



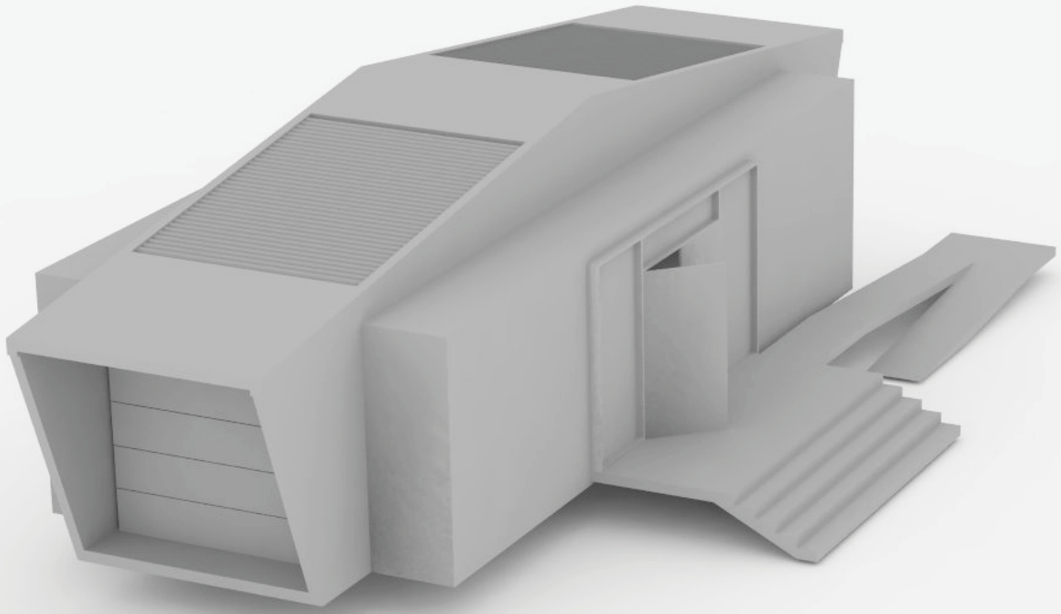
LINKED CLASSROOMS

FLOOR AREA: 3120 SF



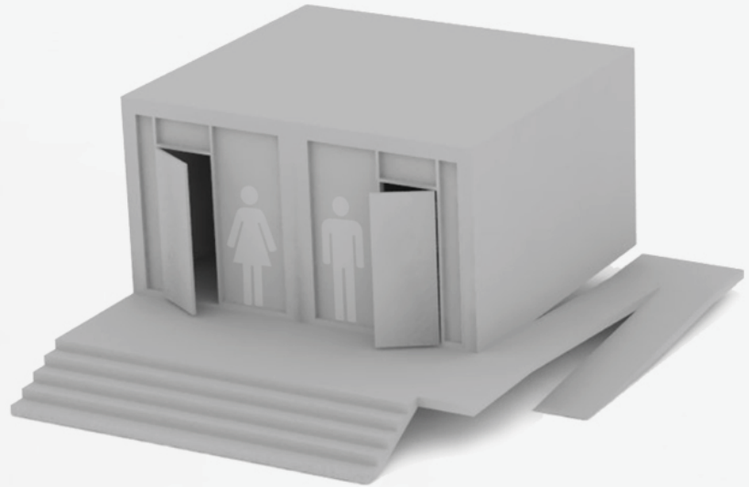
SINGLE CLASSROOM

FLOOR AREA: 950 SF



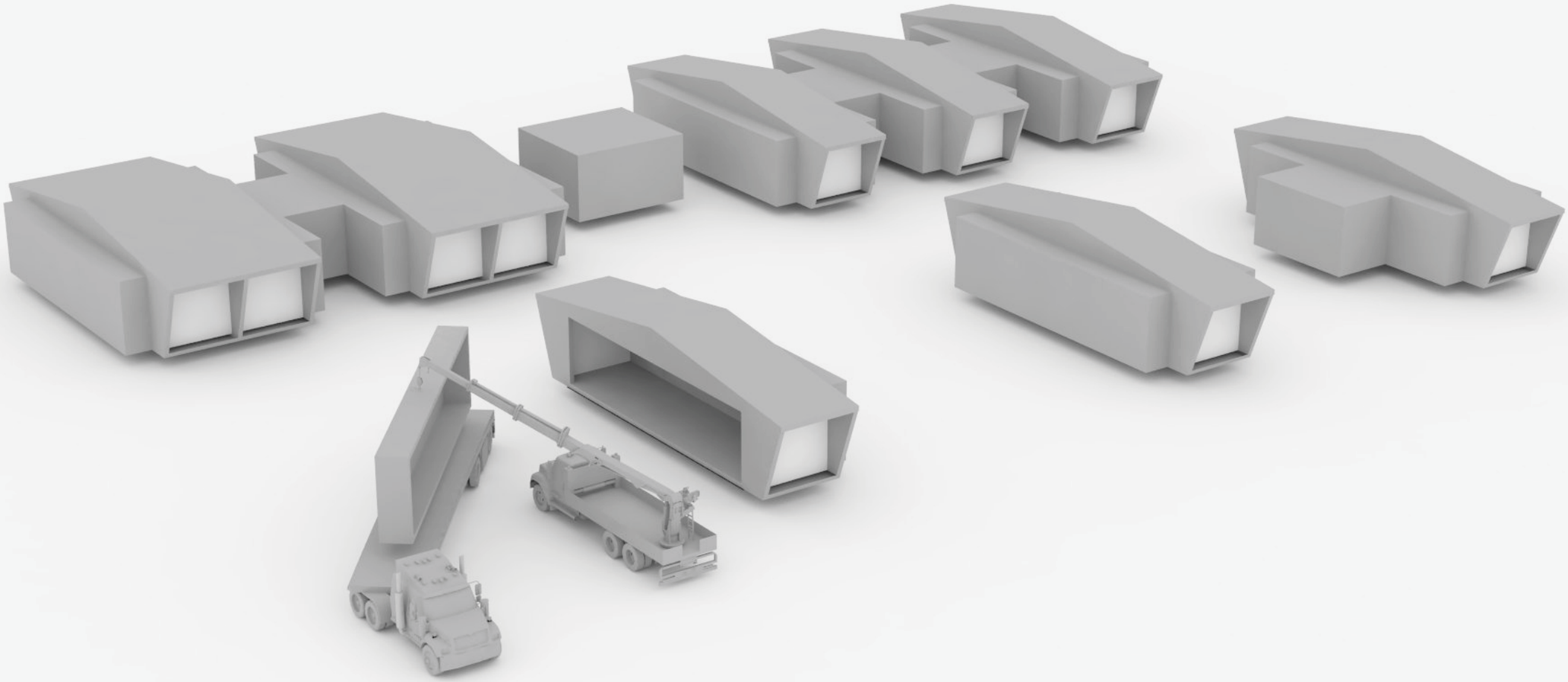
ADA RESTROOM

FLOOR AREA: 390 SF



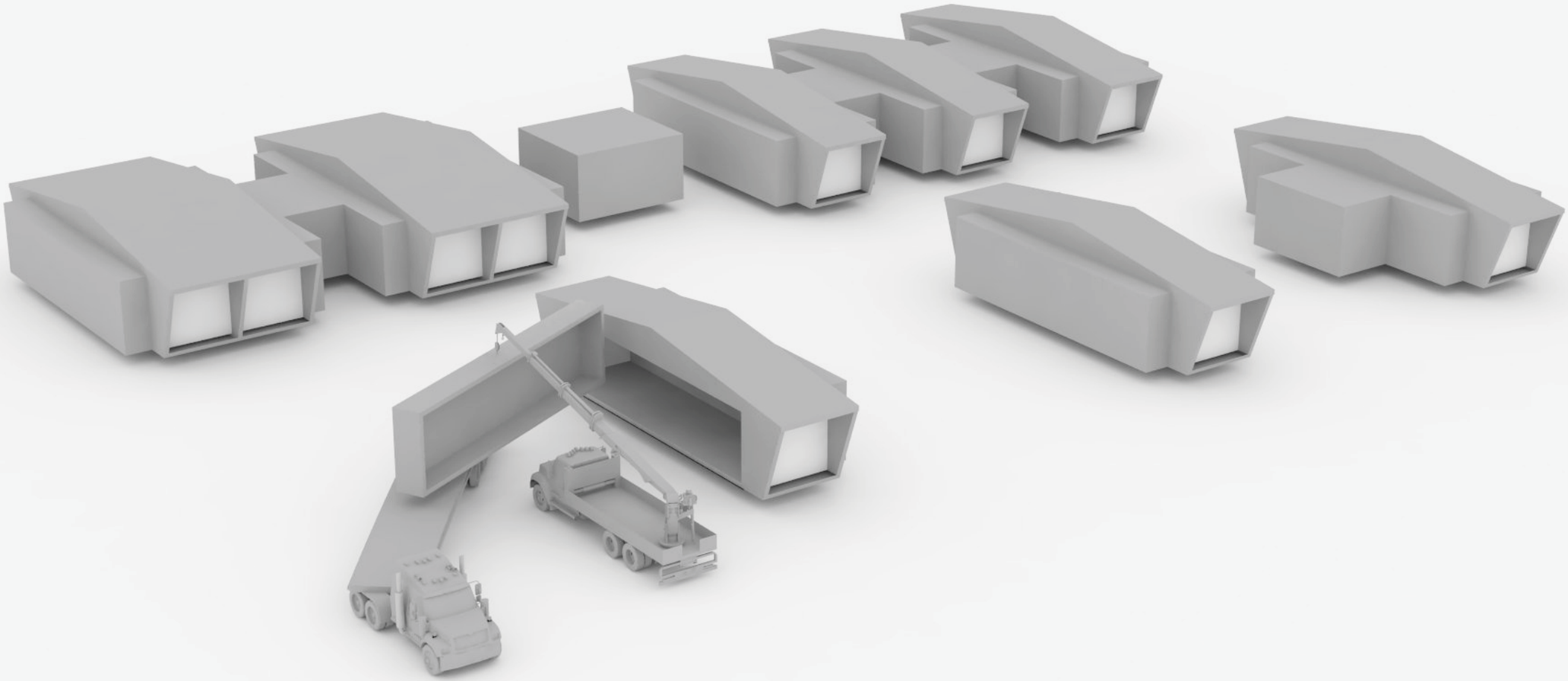
ASSEMBLY

ON SITE MODULE DELIVERY



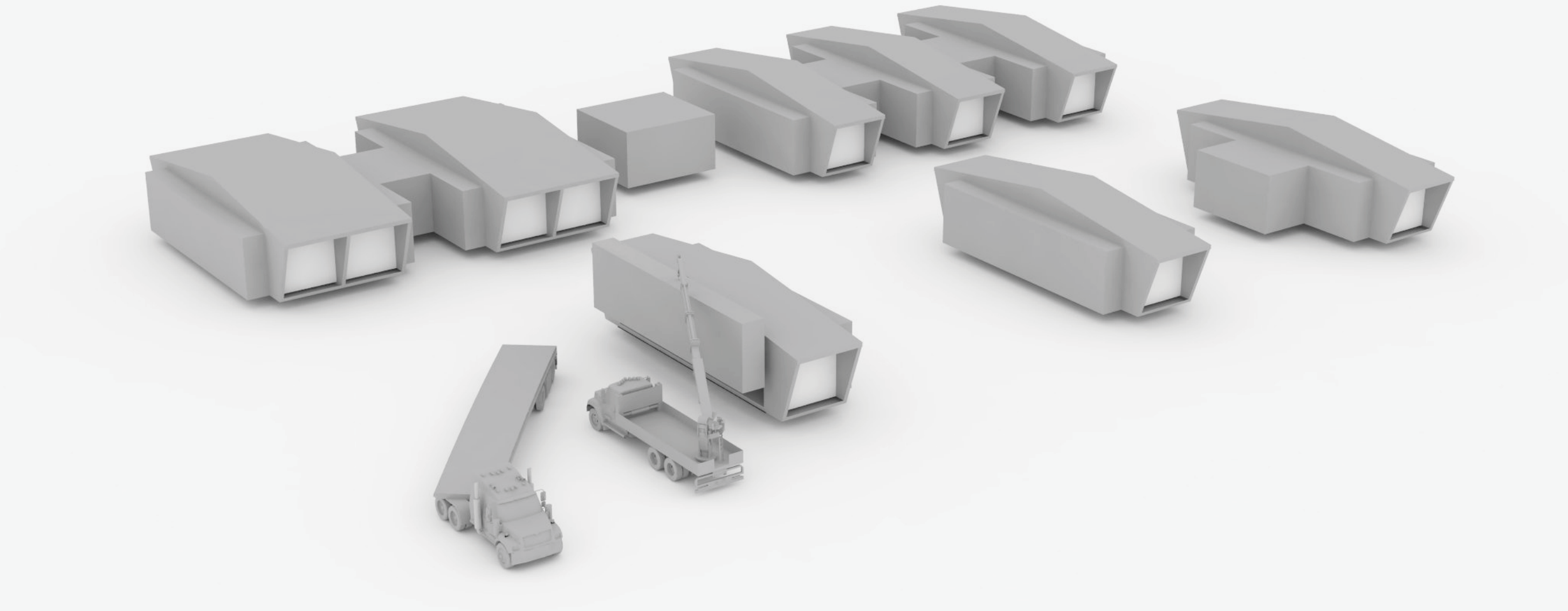
ASSEMBLY

MODULE LIFTED INTO PLACE



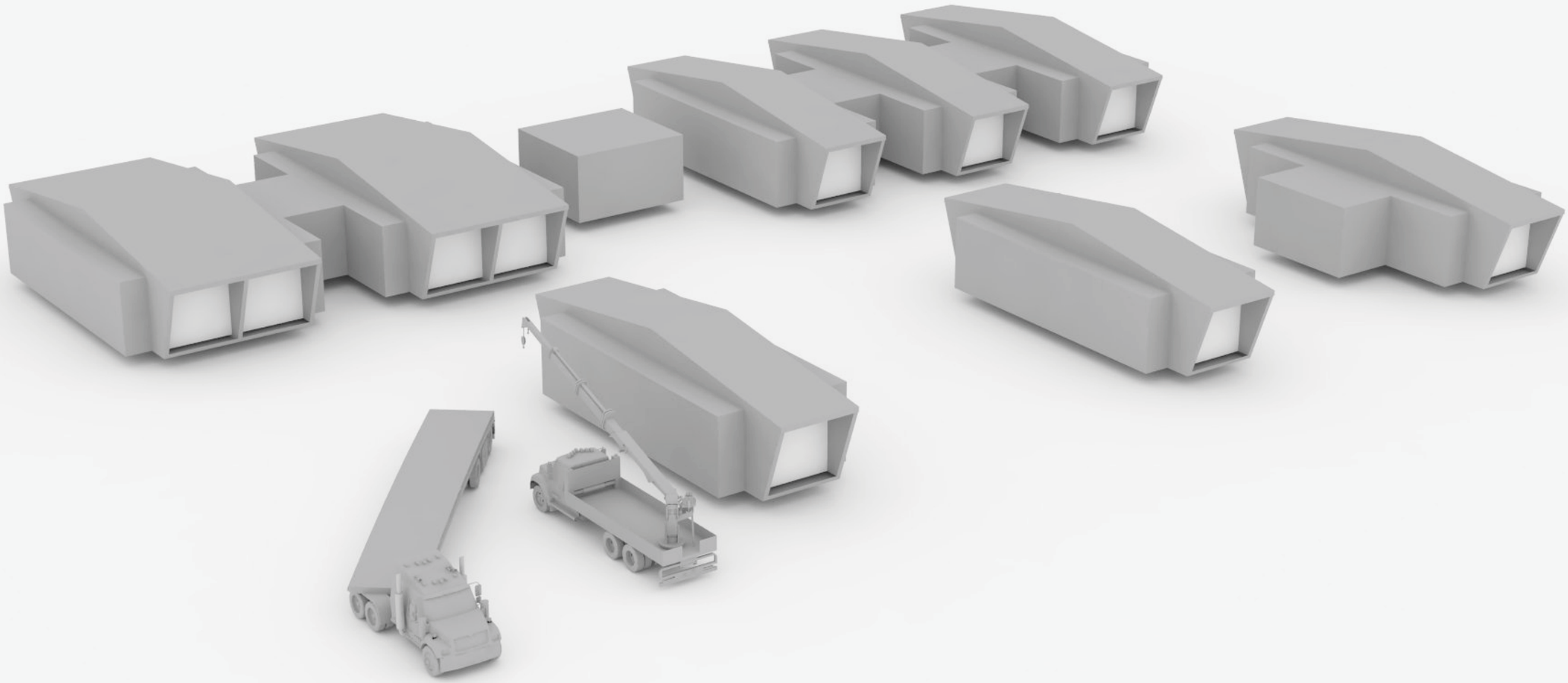
ASSEMBLY

MODULE LIFTED INTO PLACE



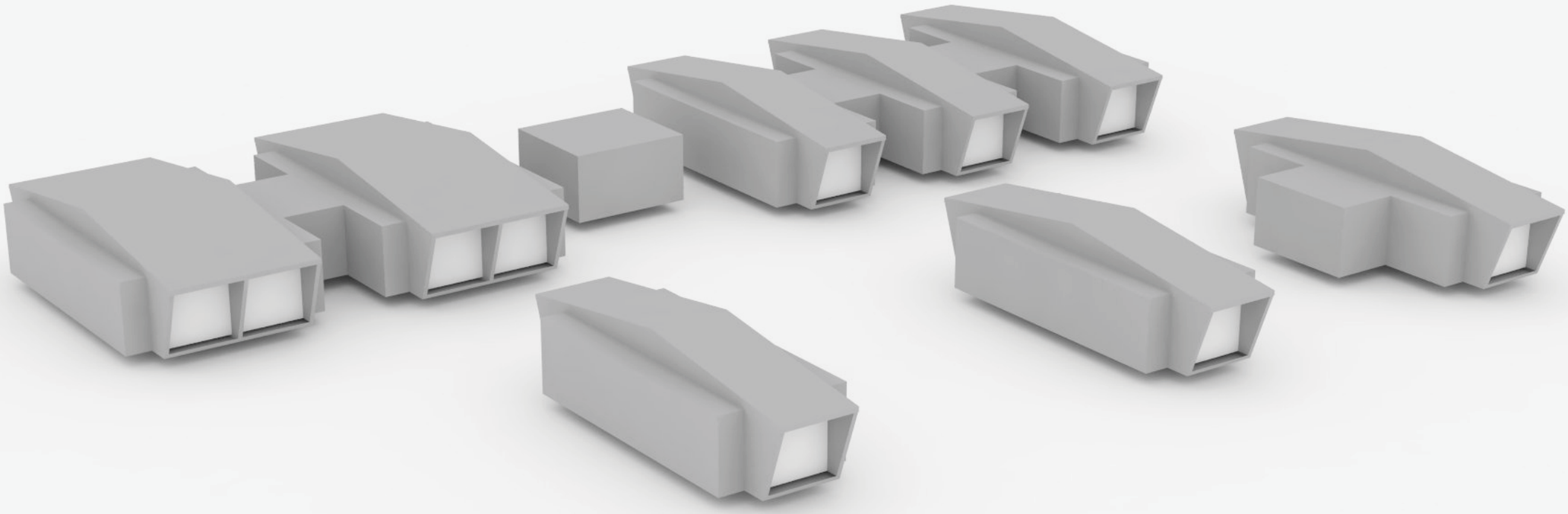
ASSEMBLY

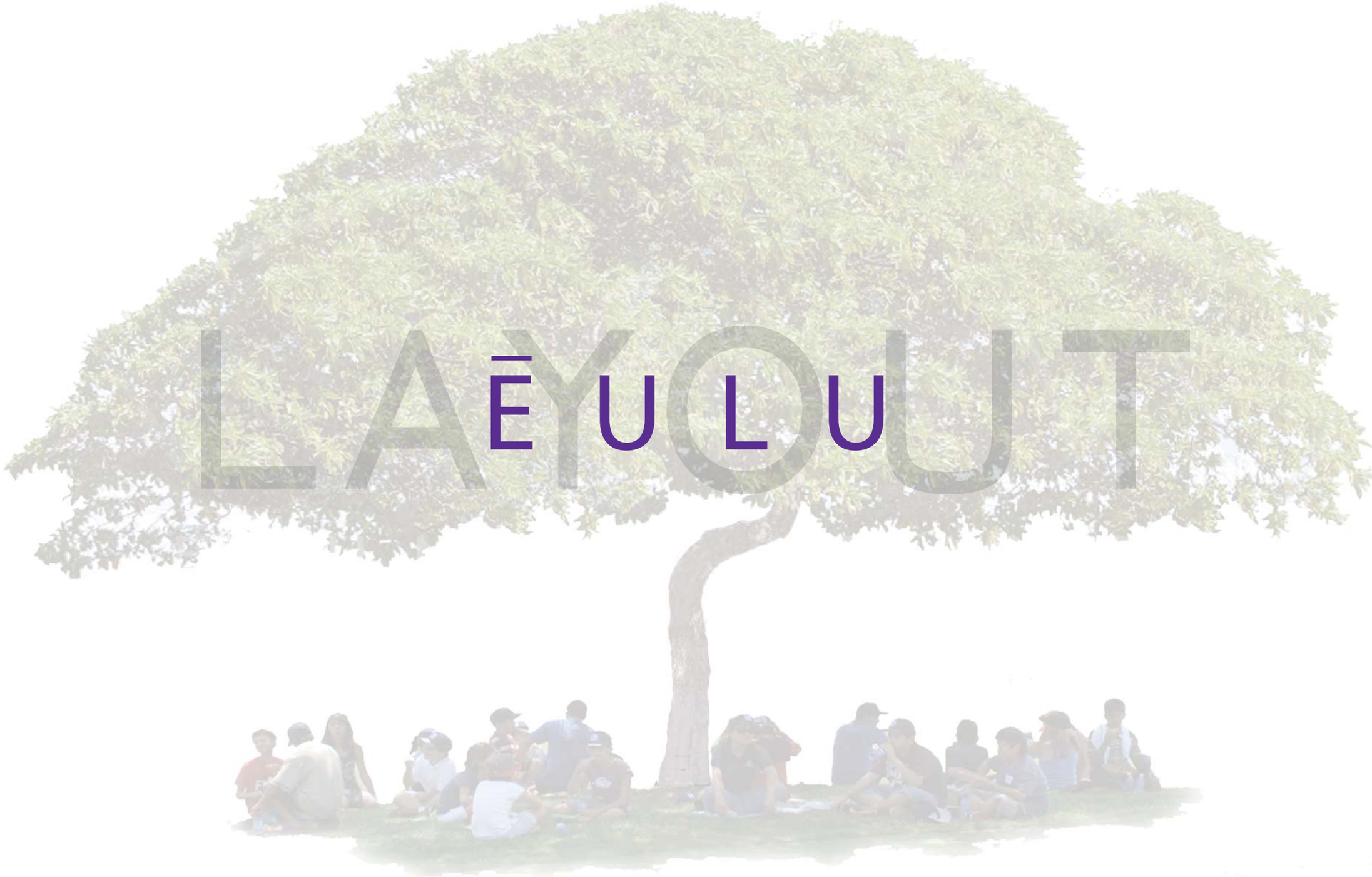
MODULE SECURED TO STRUCTURE



ASSEMBLY

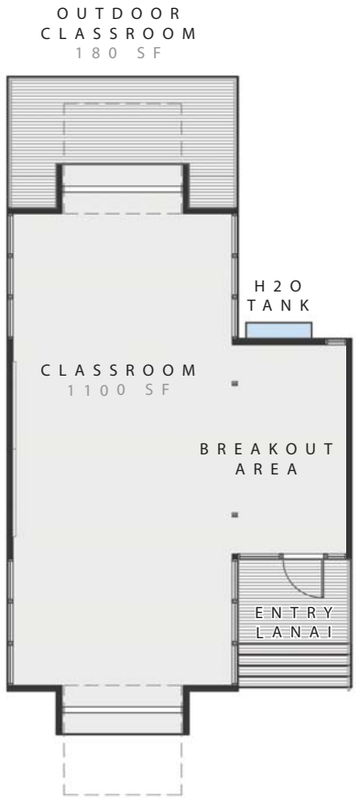
MODULE COMPLETE



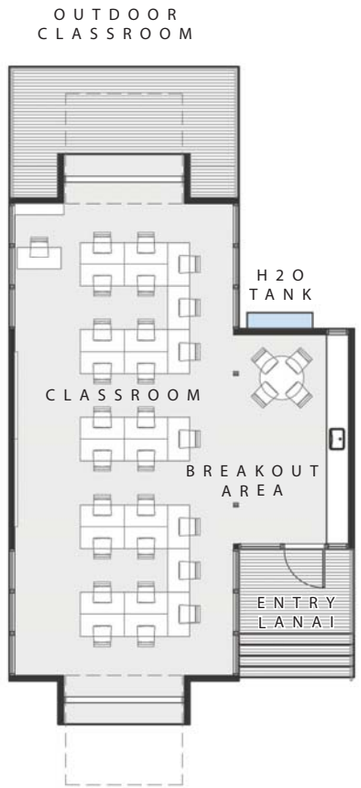


ÈULU

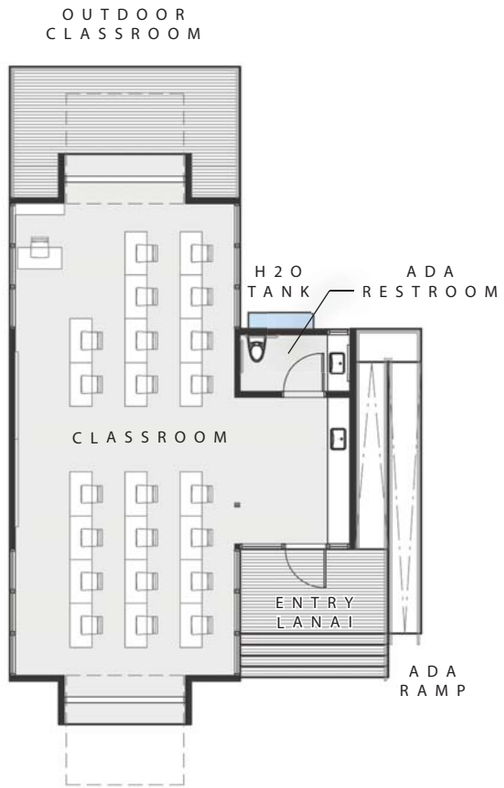
SINGLE CLASSROOM W/ BREAKOUT SPACE



SINGLE W/ BREAKOUT DIAGRAM



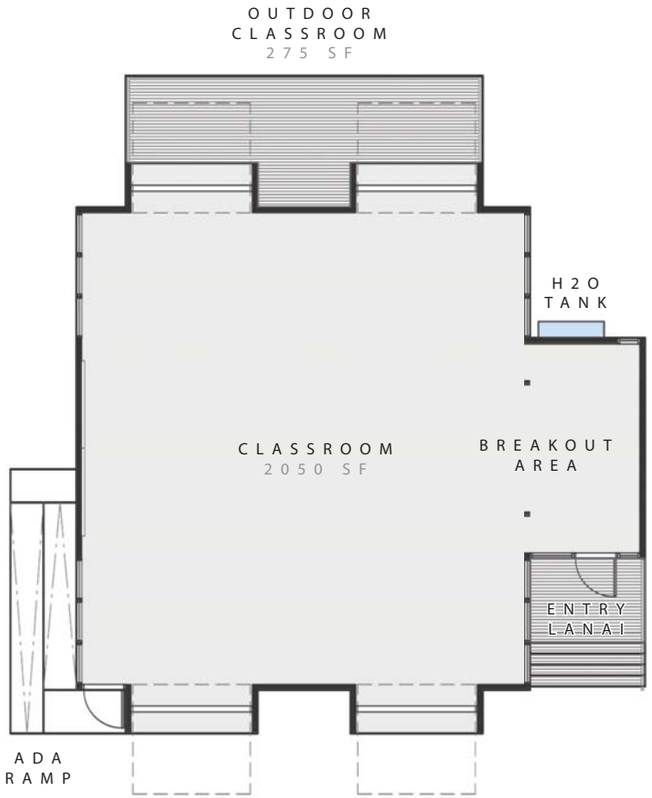
SINGLE W/ BREAKOUT TYPICAL LAYOUT



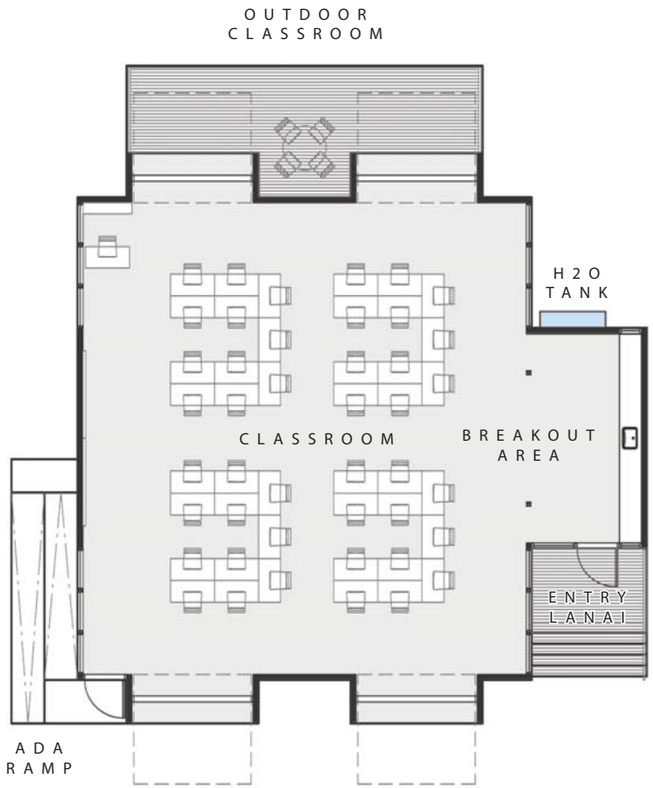
SINGLE W/ BREAKOUT ACCESSABLE LAYOUT

0 4 8 16 FT

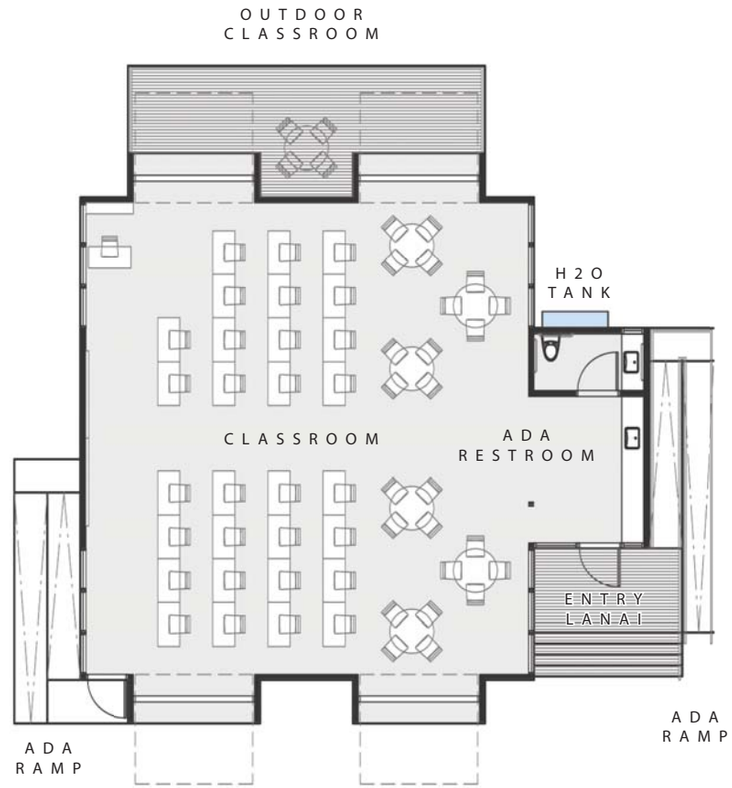
DOUBLE CLASSROOM W/ BREAKOUT SPACE FLOOR PLAN



DOUBLE-WIDE DIAGRAM



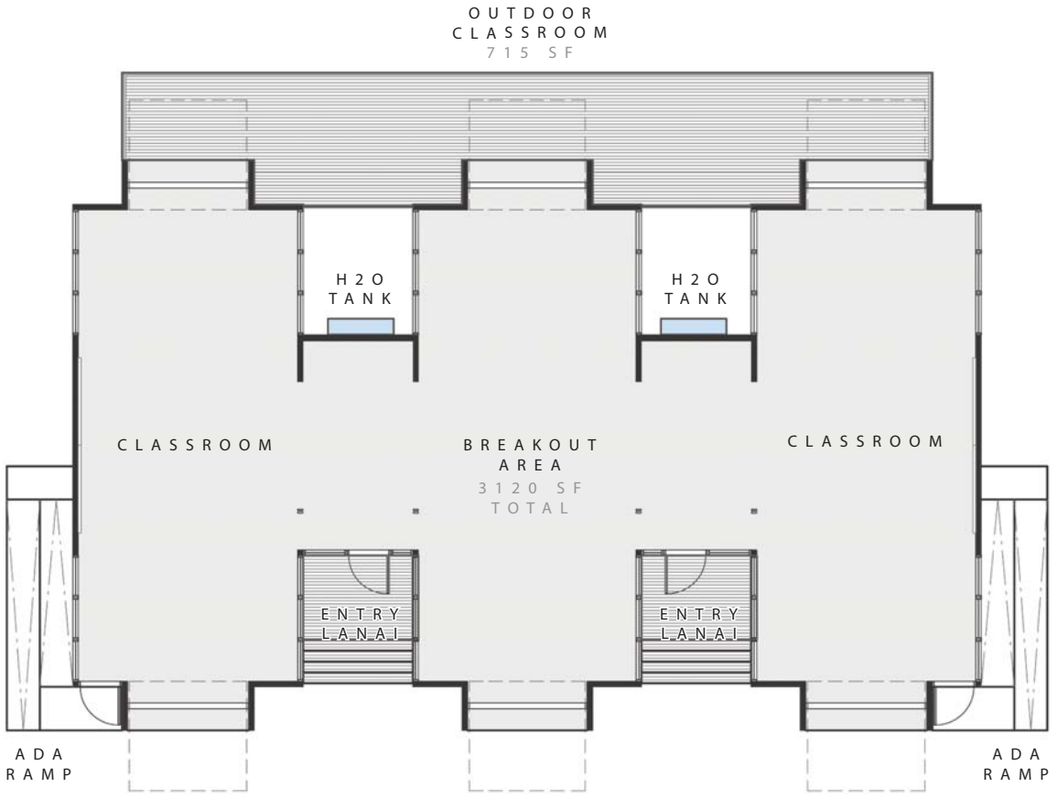
DOUBLE-WIDE TYPICAL LAYOUT



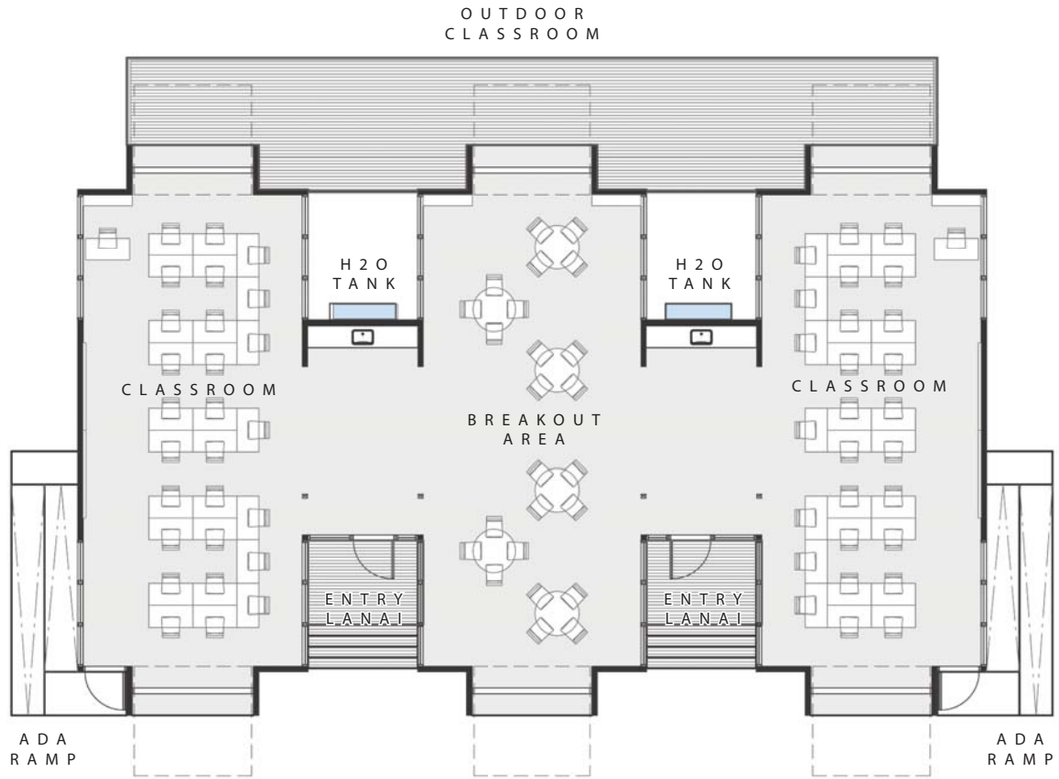
DOUBLE-WIDE ACCESSABLE LAYOUT

0 4 8 16 FT

LINKED CLASSROOM FLOOR PLAN



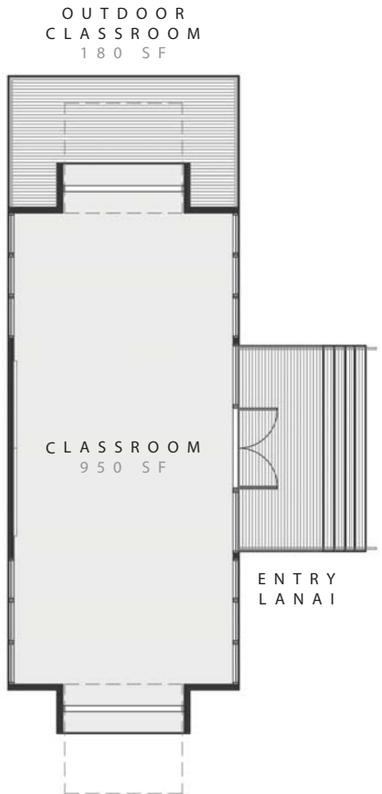
TRIPLE-WIDE
DIAGRAM



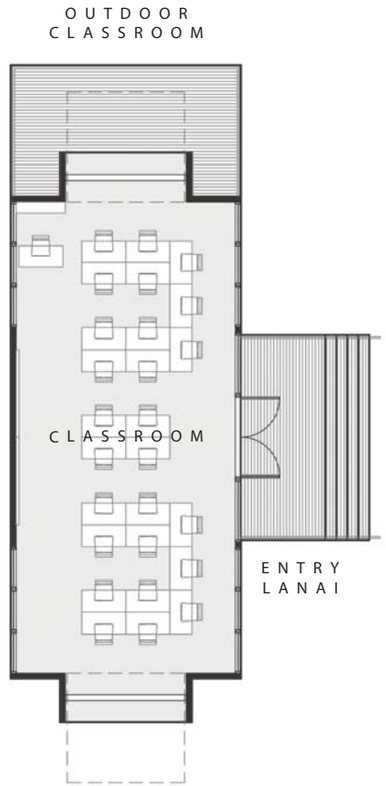
TRIPLE-WIDE
TYPICAL LAYOUT

0 4 8 16 FT

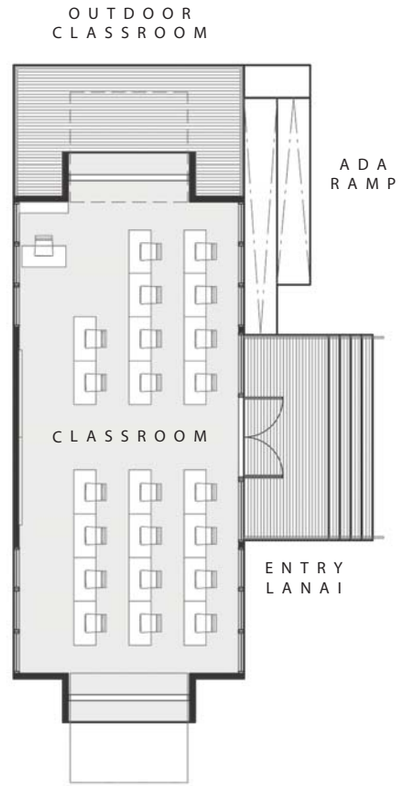
SINGLE CLASSROOM & ADA RESTROOM
FLOOR PLAN



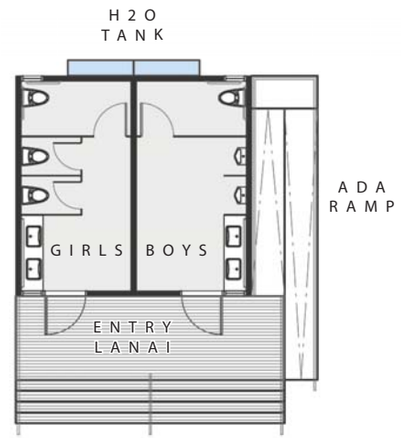
SINGLE
DIAGRAM



SINGLE
TYPICAL LAYOUT



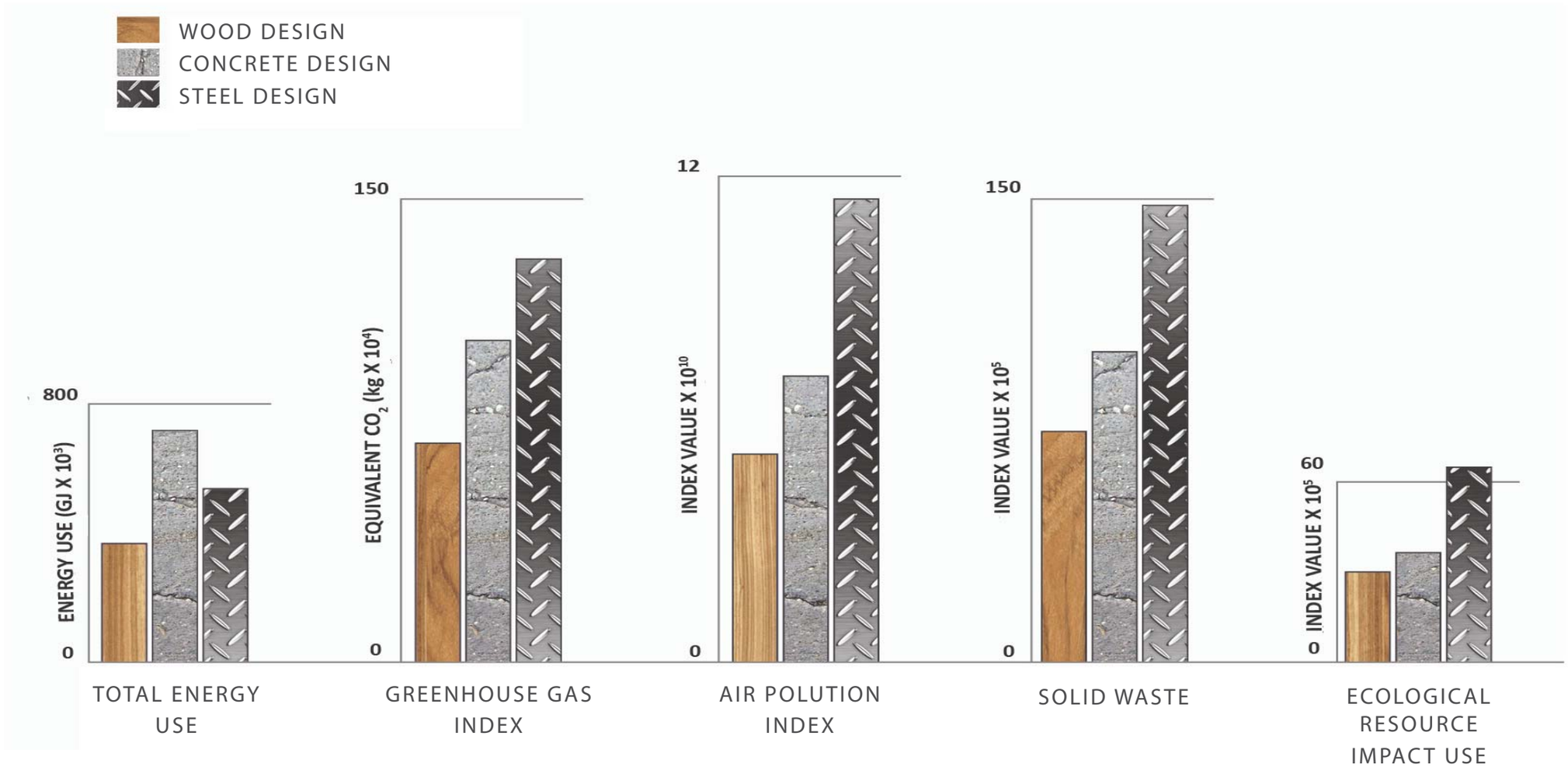
SINGLE
TYPICAL LAYOUT



ADA RESTROOM
LAYOUT

0 4 8 16 FT

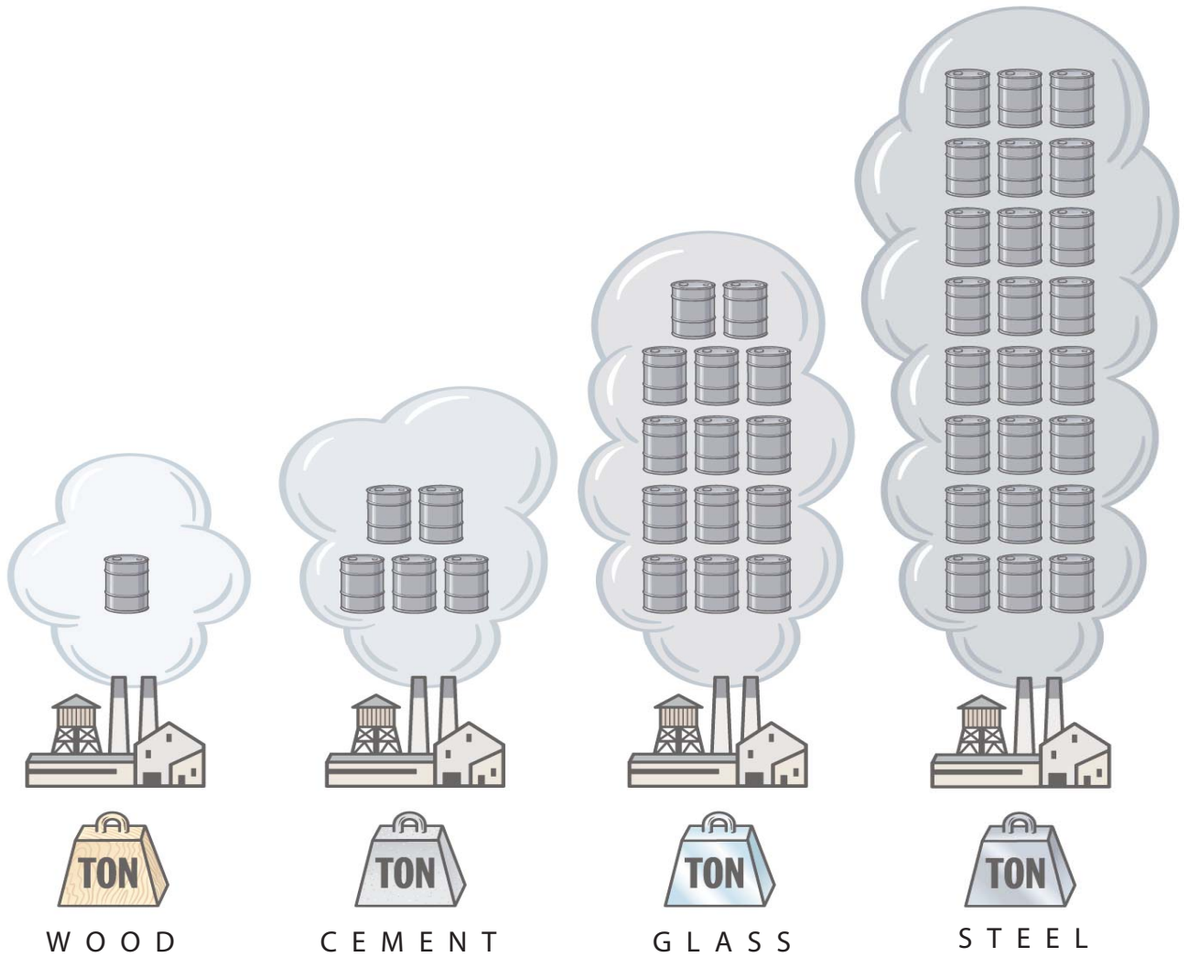

STRATĒGIES
ĒULU



When considered over a building's lifetime – from harvest of raw materials through manufacturing, transportation, installation, use, maintenance and disposal or recycling – wood performs better than concrete and steel in terms of embodied energy, air and water pollution, carbon footprint and global warming potential.

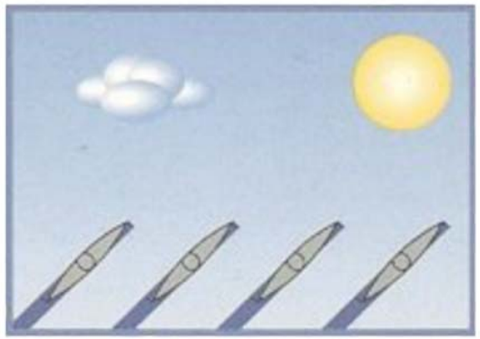
2005 APA - The Engineered Wood Association

EMBODIED ENERGY

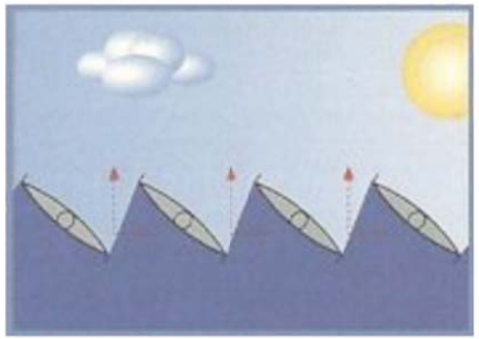


Compare the amount of energy it takes to produce one ton of cement, glass, or steel to one ton of wood. It takes 5 times more energy for cement, 14 times more for glass, and 24 more times for steel.

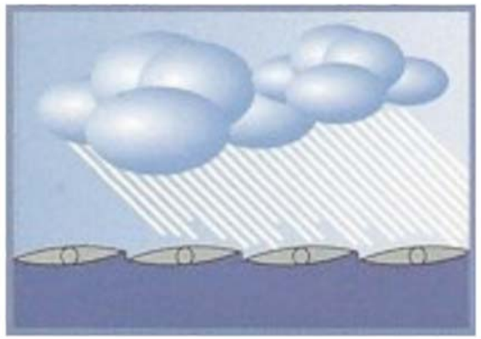
ECO SHADE LOUVERED ROOF



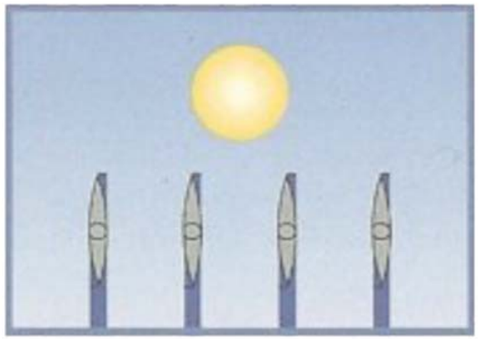
ADJUSTABLE SUNSHADE



SHADE WITH VENTILATION



WATERTIGHT WHEN CLOSED

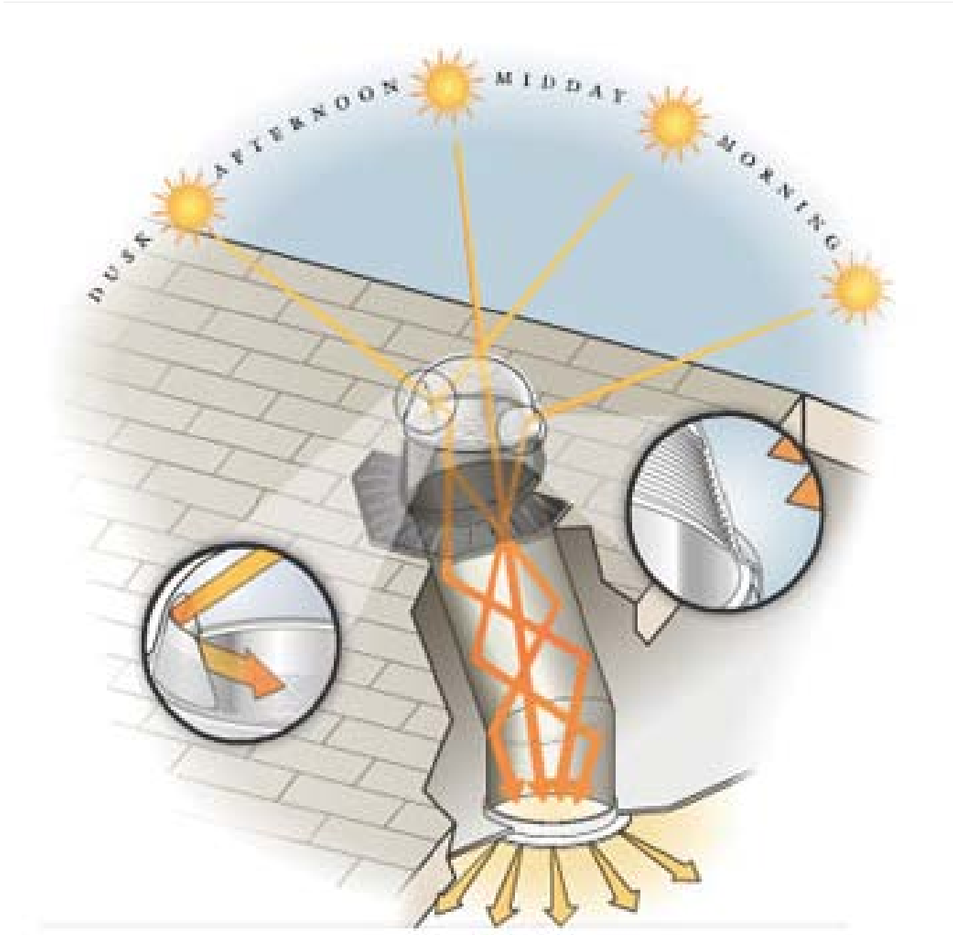


FULL OVERHEAD SUN

HOW IT WORKS

A small motor rotates each louver blade in unison over a 160 degree range of motion with the ability to stop anywhere. This allows an exact regulation of light, shade, shelter and ventilation. When closed, the interlocking louver blades create a waterproof seal, and a slight pitch drains the water away into the internal gutter system. The motor is powered by a small, rechargeable 12-volt battery and controlled by either a switch or remote control. The battery maintains charge by a solar panel incorporated into the system.

SOLAR TUBE SKYLIGHT



SOLAR TUBE DIAGRAM

DIMMER SYSTEM

DAYLIGHT DIFFUSER

HUMIDITY = PURE WATER

AQUAMAKER® AM10

ADVANTAGES

PURE WATER PRODUCTION

REDUCTION OF INDOOR HUMIDITY

FILTERS AIR-BORNE PARTICLES

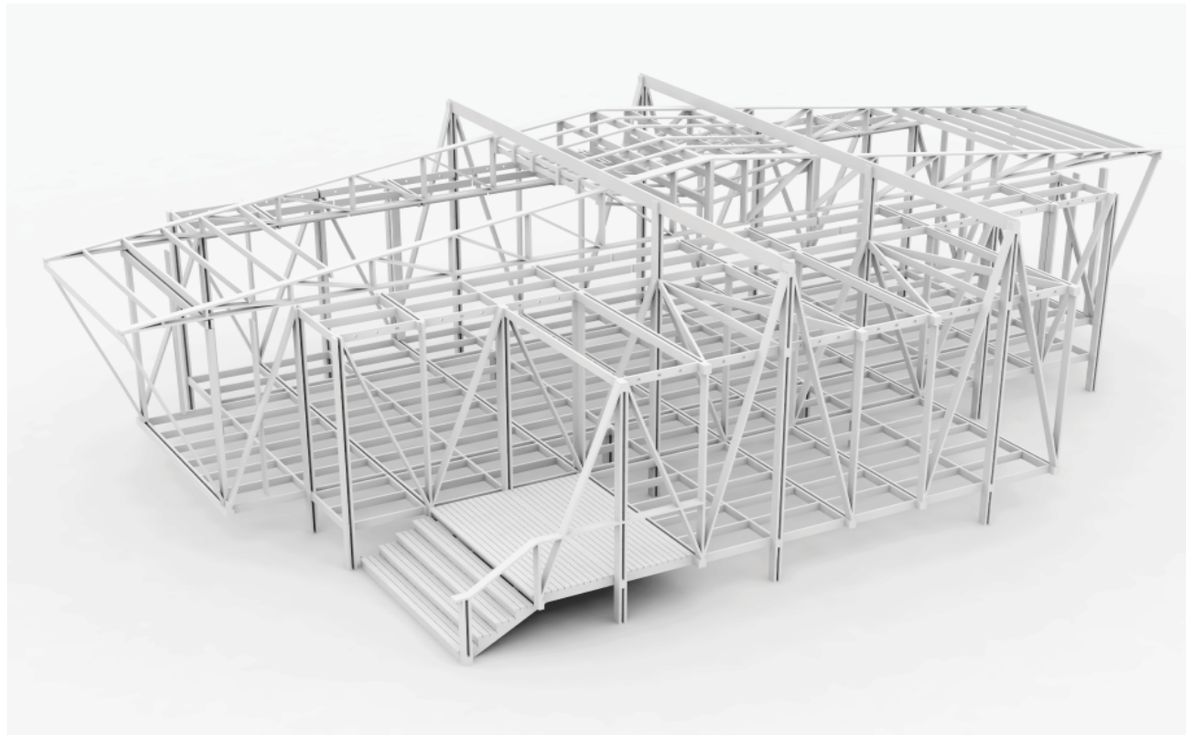
SOLAR POWERED

H2O HOG - WATER STORAGE

To produce fresh water, the AquaMaker® AM10 unit beings with filtration and purification of ambient air. Humid air is drawn in through an air shield (patented antibacterial system), which filters air-borne particles, dust, odor, and various other contaminants. Besides harmful bacteria such as airborne viruses, the AquaMaker® system also removes excess humidity for a safer, more comfortable environment.

CATALOGUE OF PARTS

Wall & door components chosen
based on site orientation, solar exposure,
views, tradewinds & function



Framing concept minimizes
cuts & waste by using typical lumber
lengths & 4’x8’ grid system.

WHY GREEN CLASSROOM DESIGN MATTERS?

Benefits of a High Performance School:

Higher student test scores

Reduced operating costs

Increased daily attendance

Enhanced teacher performance and satisfaction

Reduced environmental impact

Increased building life

Reduced liability

WHY GREEN CLASSROOM DESIGN MATTERS?

In a green school, it is possible to work with natural lighting, which turns out to be better for the students' concentration abilities and overall learning. **Test scores in green schools show a 20 percent improvement over students tested in non-green schools.**
(Study conducted by Heschong Mahone Group)

Students with the **most classroom daylight progressed 20 percent faster in one year on math tests and 26 percent faster on reading tests** than those students who learned in environments that received the least amount of natural light.
Paula Baker-LaPorte and others, Prescriptions for a Healthy House (Gabriola Island, BC, Canada: New Society Publishers, 2001, p. 175)

Good indoor air quality helps people do their jobs more efficiently, the brain works better and there are fewer sick days and fewer allergies' Nancy H Taylor, Go Green. How to Build an Earth-Friendly Community
(Layton, Utah, United States: Gibbs Smith, Publisher, 2008, p.44)

High performance schools provide superior indoor air quality by controlling sources of contaminants and supplying proper ventilation, resulting in **fewer student sick days and increased average daily attendance**.
Since a majority of a schools' operating budget is directly dependent on average daily attendance, **even a small increase can significantly boost the operating budget.**
(The City of Stockton, California, Energy Efficiency Schools, High Performance Schools,http://www.stocktongov.com/daylighting/schools/performanceschools.cfm, n.d.)

High performance school buildings are **consciously designed to have low environmental impact. They are energy and water efficient.**
They use durable, non-toxic materials high in recycled content, and the buildings themselves can be recycled.
They preserve pristine natural areas on their sites and restore damaged ones. And they use non-polluting, renewable energy to the greatest extent possible
(Collaborative for High Performance Schools, Volume 1, 2006, p.7)

LIVING BUILDING CHALLENGE

GREEN BUILDING RATING SYSTEMS

LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN (LEED)

COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS (CHPS)

THE 20 IMPERATIVES OF THE

LIVING BUILDING CHALLENGE

Site

Restoring a healthy coexistence with nature

01 Limits to Growth

02 Urban Agriculture

03 Habitat Exchange

04 Car Free Living

Water

Creating water independent sites, buildings and communities

05 Net Zero Water

06 Ecological Water Flow

Energy

Relying only on current solar income

07 Net Zero Energy

Health

Maximizing physical and psychological health and well being

08 Civilized Environment

09 Healthy Air

10 Biophilia

Materials

Endorsing products and processes that are safe for all species through time

11 Red List

12 Embodied Carbon Footprint

13 Responsible Industry

14 Appropriate Sourcing

15 Conservation + Reuse

Equity

Supporting a just, equitable world

16 Human Scale + Humane Places

17 Democracy + Social Justice

18 Rights to Nature

Beauty

Celebrating design that creates transformative change

19 Beauty and Spirit

20 Inspiration and Education


MAHALO