

Mass Timber in K-12 Educational Facilities: Sustainable Design Solutions & Community Learning Outcomes

Credits: 1.0 AIA/CES HSW LUs, 1.0 PHD credit, 0.10 ICC credit

MASS TIMBER+SM
OFFSITE CONSTRUCTION CONFERENCE

PRODUCED BY



Forest Economic Advisors

**Paul
Lund**

Hord Coplan
Macht



**Jason
Bing**

Ann Arbor
Public Schools



**Alyssa
Leeviraphan**

Mahlum



Riki Fujitani

Hawaii School
Facilities Authority



Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.

WoodWorks | The Wood Products Council

is a registered provider of AIA-approved continuing education under Provider Number G516. All registered **AIA CES** Providers must comply with the AIA Standards for Continuing Education Programs. Any questions or concerns about this provider or this learning program may be sent to AIA CES (cessupport@aia.org or (800) AIA 3837, Option 3).

This learning program is registered with **AIA CES** for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

AIA continuing education credit has been reviewed and approved by **AIA CES**. Learners must complete the entire learning program to receive continuing education credit. AIA continuing education Learning Units earned upon completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



Course Description

This session examines the use of mass timber systems in K-12 school design, featuring winners from the 2025 Mass Timber Competition: Building Sustainable Schools. Winning project teams will share real-world insights on code compliance, cost considerations, biophilic design, and construction challenges unique to educational environments.

Attendees will learn about mass timber system selection, fire safety strategies, structural performance in hybrid construction, quantifying carbon impact, and post-occupancy wellness outcomes. The session will also address current market barriers, regulatory and insurance pathways, and how to make the business case for mass timber construction in the educational sector.

Learning Objectives

1. Identify appropriate mass timber structural systems for various K-12 educational building types and explain how they meet current International Building Code (IBC) requirements for fire resistance, egress, and allowable heights, areas, and number of stories.
2. Quantify the carbon impact and wellness benefits of mass timber in school design and apply this knowledge to support informed material selection and development of sustainable, occupant-centered educational facilities.
3. Develop implementation strategies for overcoming common barriers to mass timber adoption in school districts, including insurance considerations, supply chain coordination, and community engagement processes.
4. Evaluate structural and fire safety strategies used in hybrid mass timber systems for educational facilities, including detailing, material interfaces, and compliance with life safety requirements.



Moderators

Simon Hyoun

VP, Marketing & Communications
Softwood Lumber Board

Mass Timber Competition: Building Sustainable Schools

2025-2026 AWARD YEAR

Educating Beyond the Curriculum

When students walk into a mass timber school, they're **surrounded by carbon storage, daylight, and natural materials.**

UNIVERSITY OF NEBRASKA LINCOLN COLLEGE OF ARCHITECTURE





MARTHA C. CUTTS GYMNASIUM





HOME	11:39	VISITOR
10	HALF 2	3
SHOTS C/K		SHOTS C/K
15 6		6 5





Mass Timber Competition: Building Sustainable Schools

\$1.8 million awarded to support four projects—
and adding to the knowledge base for the entire
design and education community.

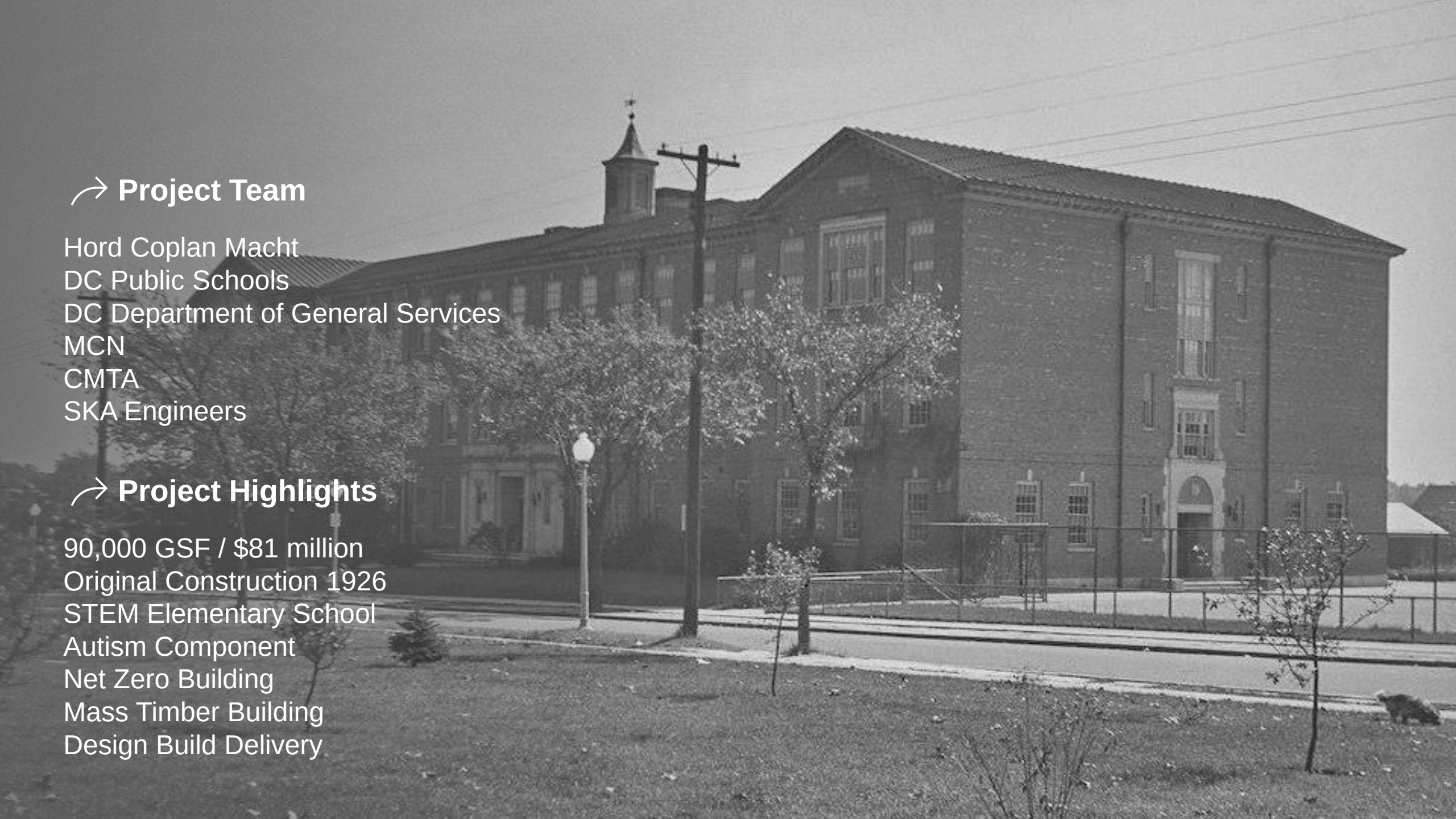


Winners

1. Whittier Elementary (D.C.)
2. New Lawton Elementary (Ann Arbor)
3. Cleveland High School (Portland)
4. New Central Maui School



D.C. Public Schools Whittier Elementary

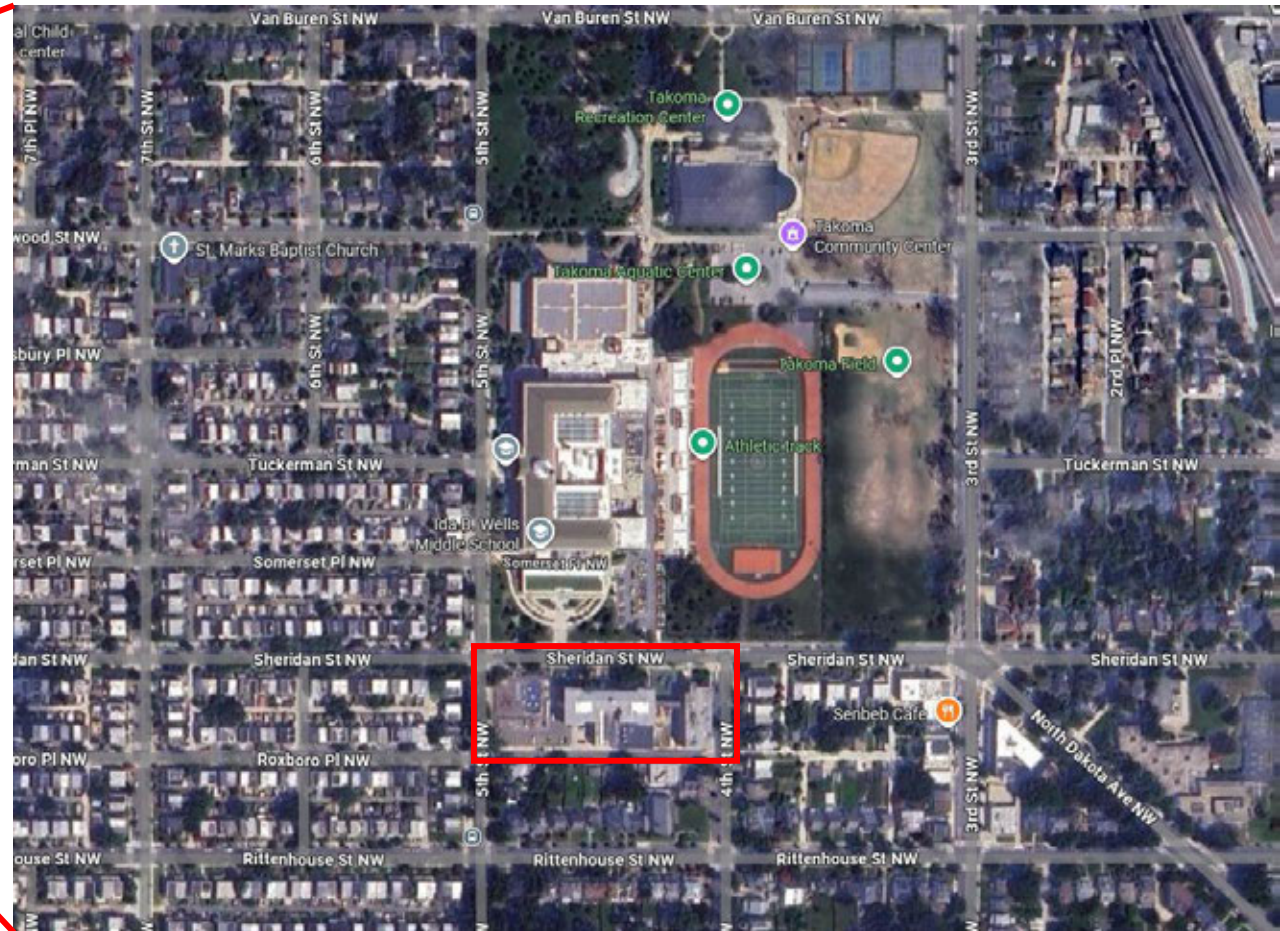
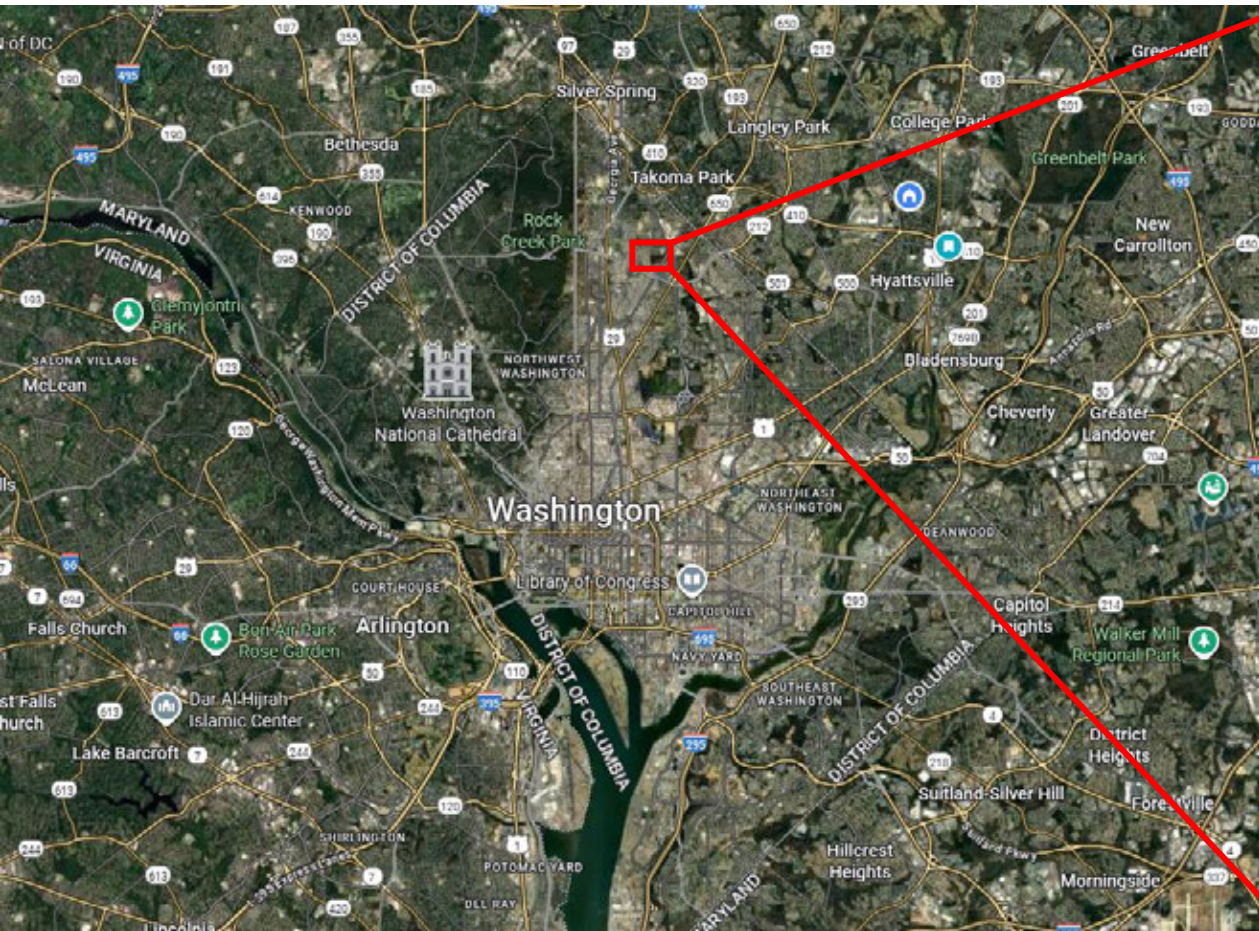


→ Project Team

Hord Coplan Macht
DC Public Schools
DC Department of General Services
MCN
CMTA
SKA Engineers

→ Project Highlights

90,000 GSF / \$81 million
Original Construction 1926
STEM Elementary School
Autism Component
Net Zero Building
Mass Timber Building
Design Build Delivery



WHITTIER ELEMENTARY



WHITTIER ELEMENTARY

hard / coplan / media

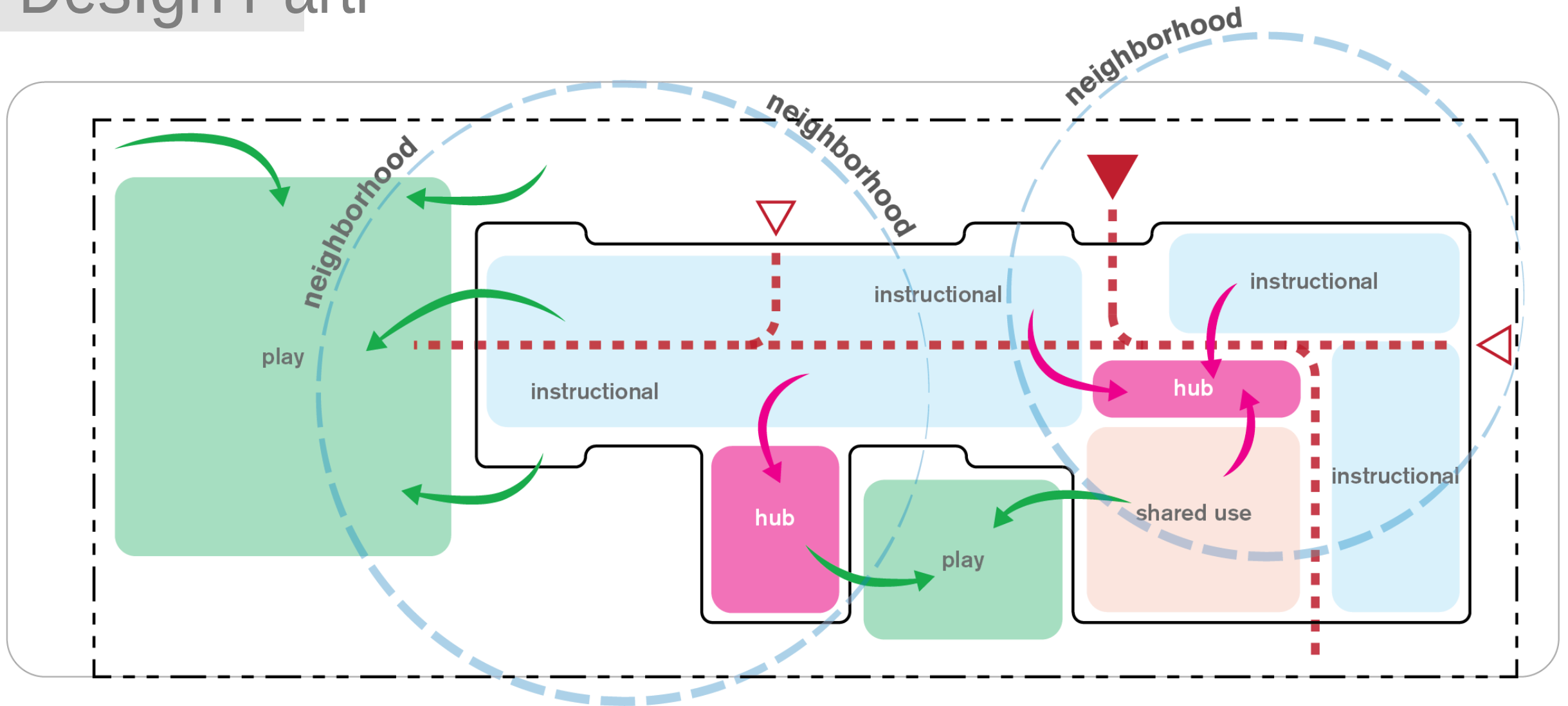


WHITTIER ELEMENTARY

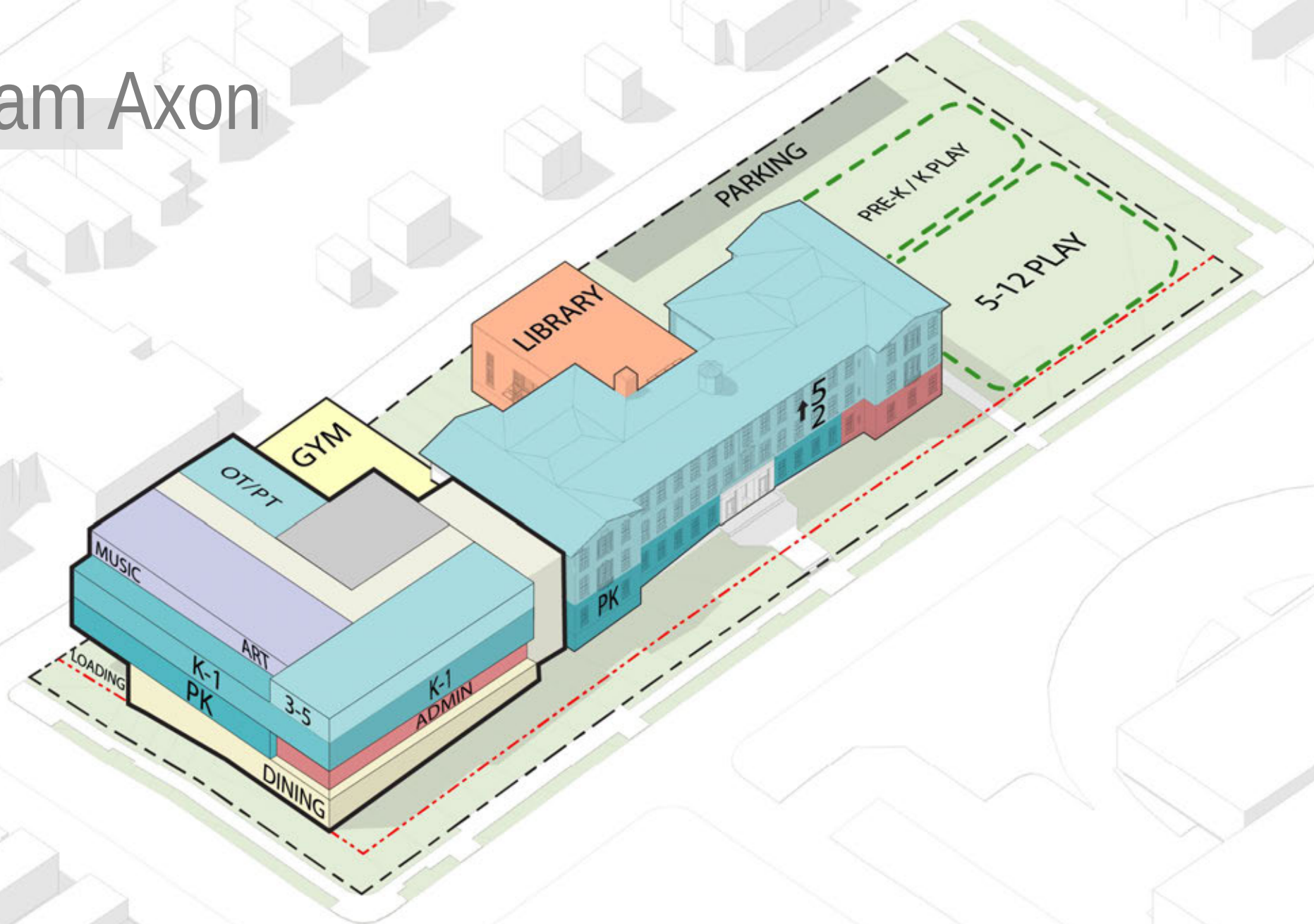


David Kaplan/Whittier

Design Parti



Program Axon

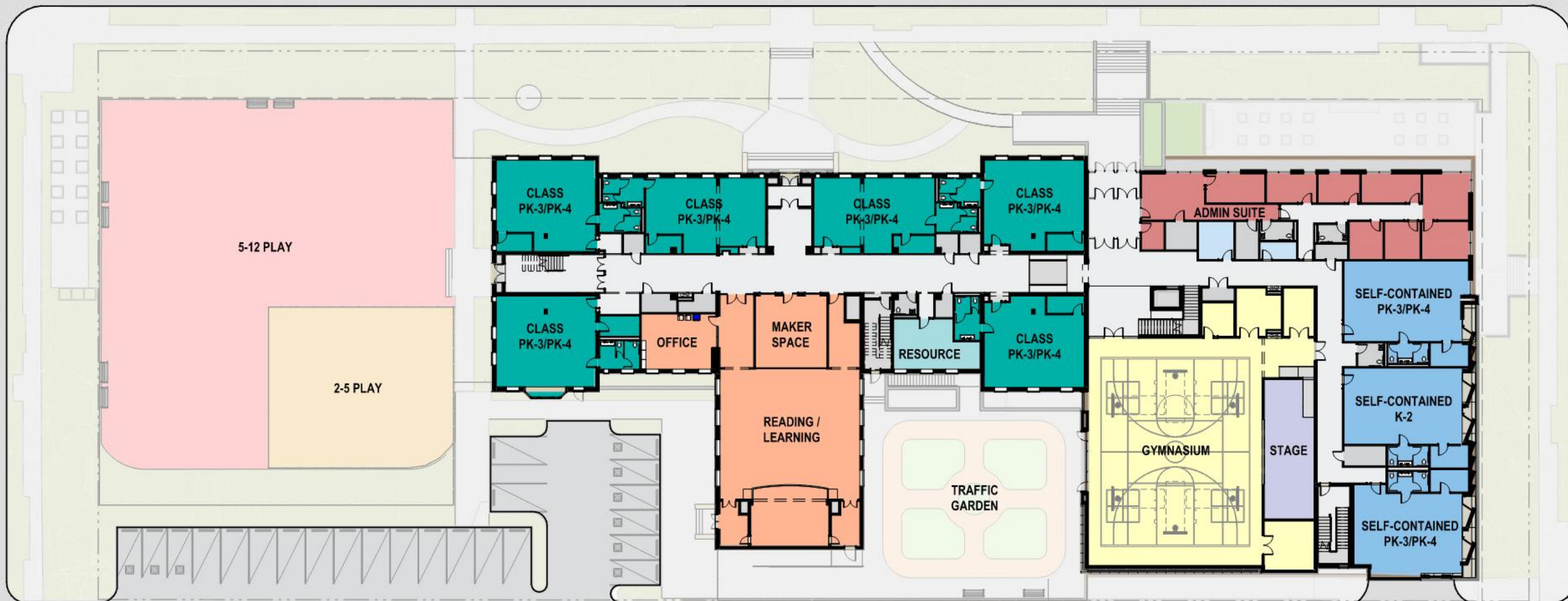


WHITTIER ELEMENTARY

SHERIDAN ST. NW

5TH ST. NW

4TH ST. NW

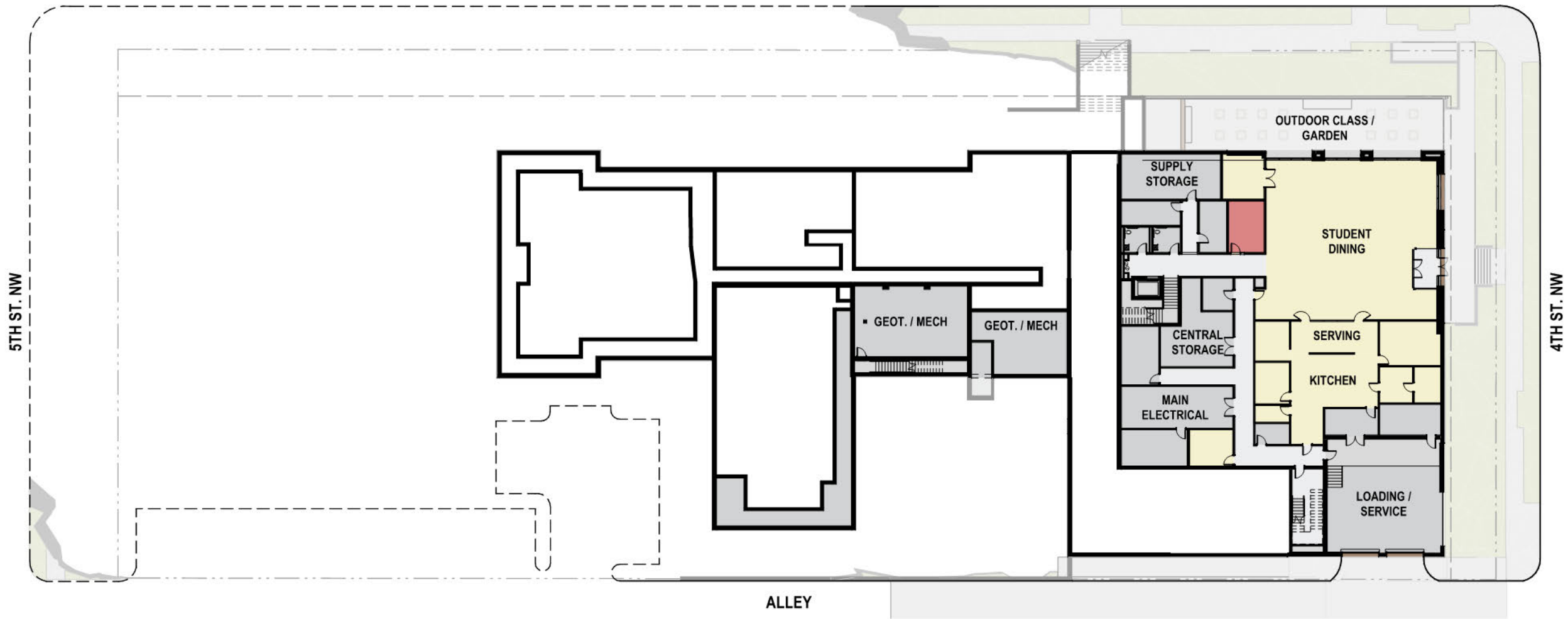


ALLEY



WHITTIER ELEMENTARY
FIRST FLOOR

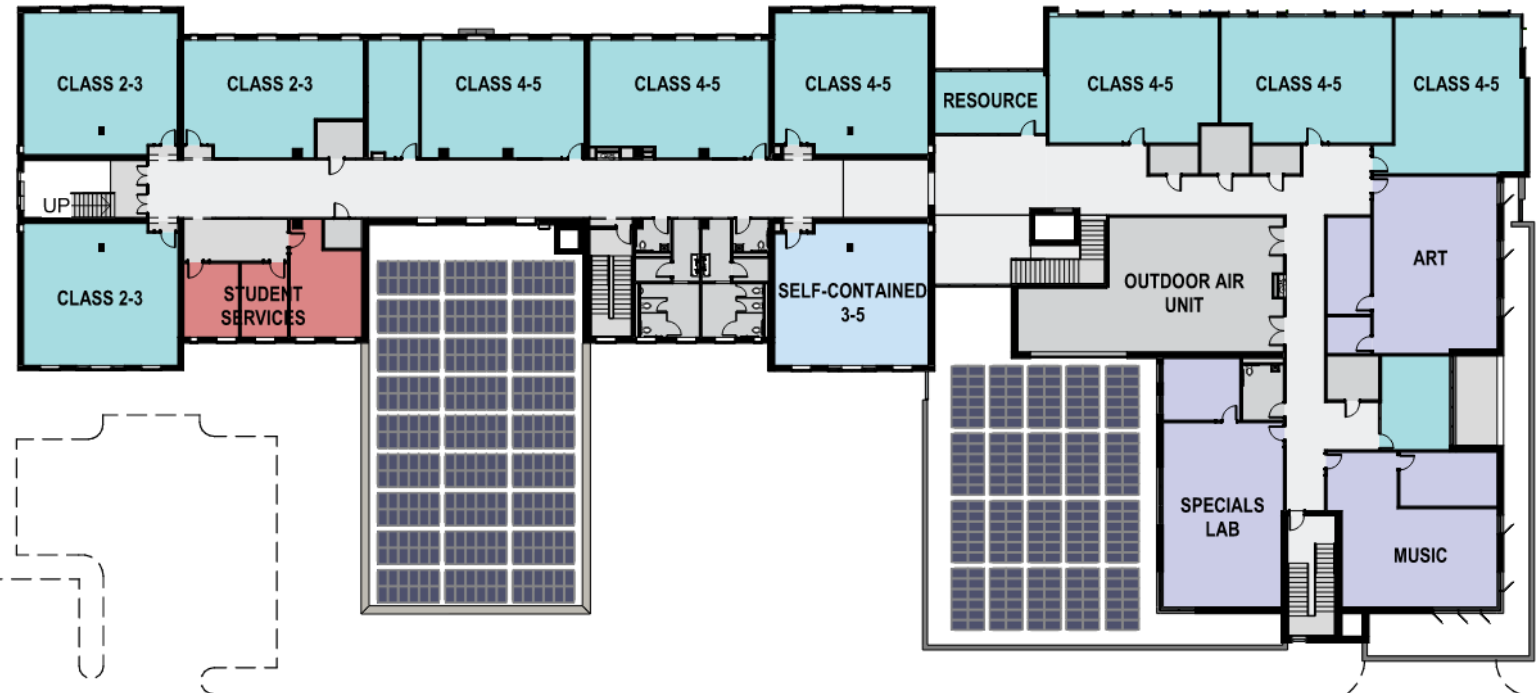
board | system | model



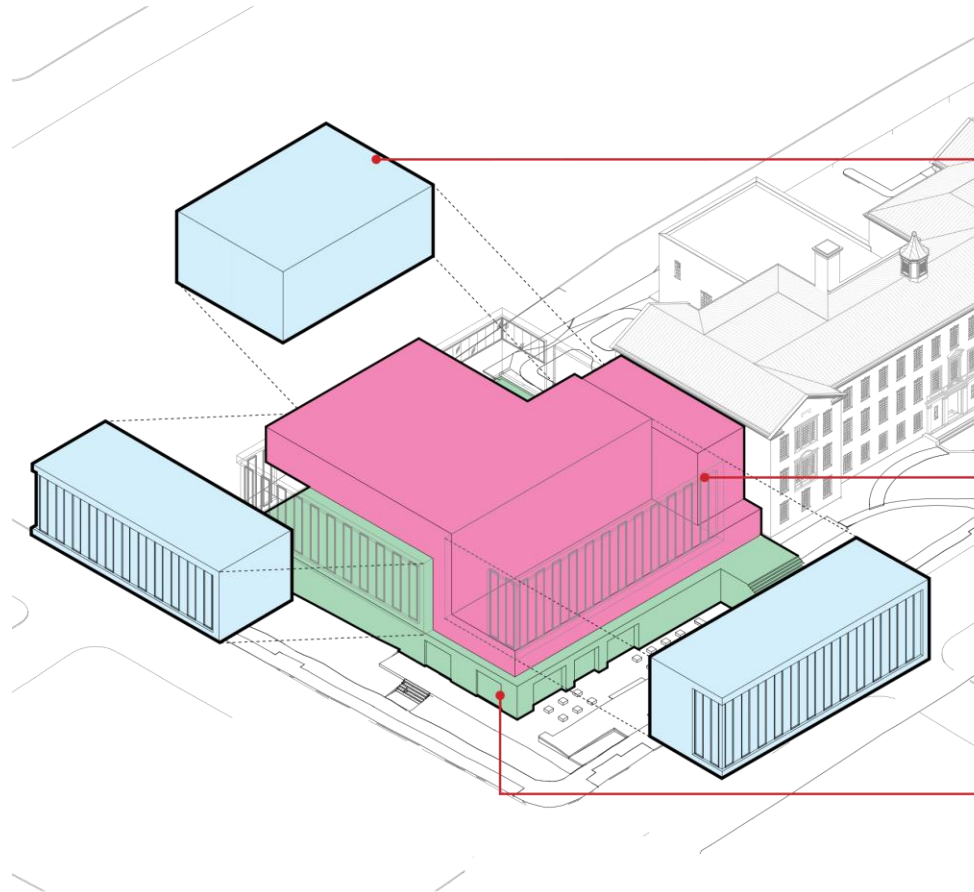
WHITTIER ELEMENTARY
LOWER LEVEL



WHITTIER ELEMENTARY
SECOND FLOOR



WHITTIER ELEMENTARY
THIRD FLOOR

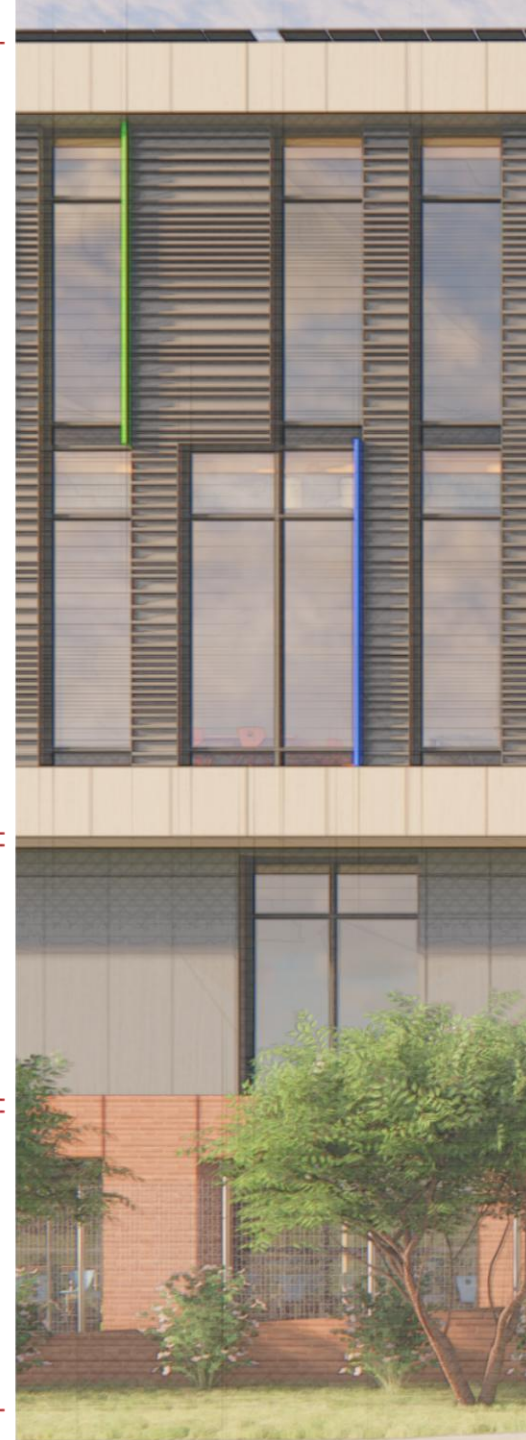


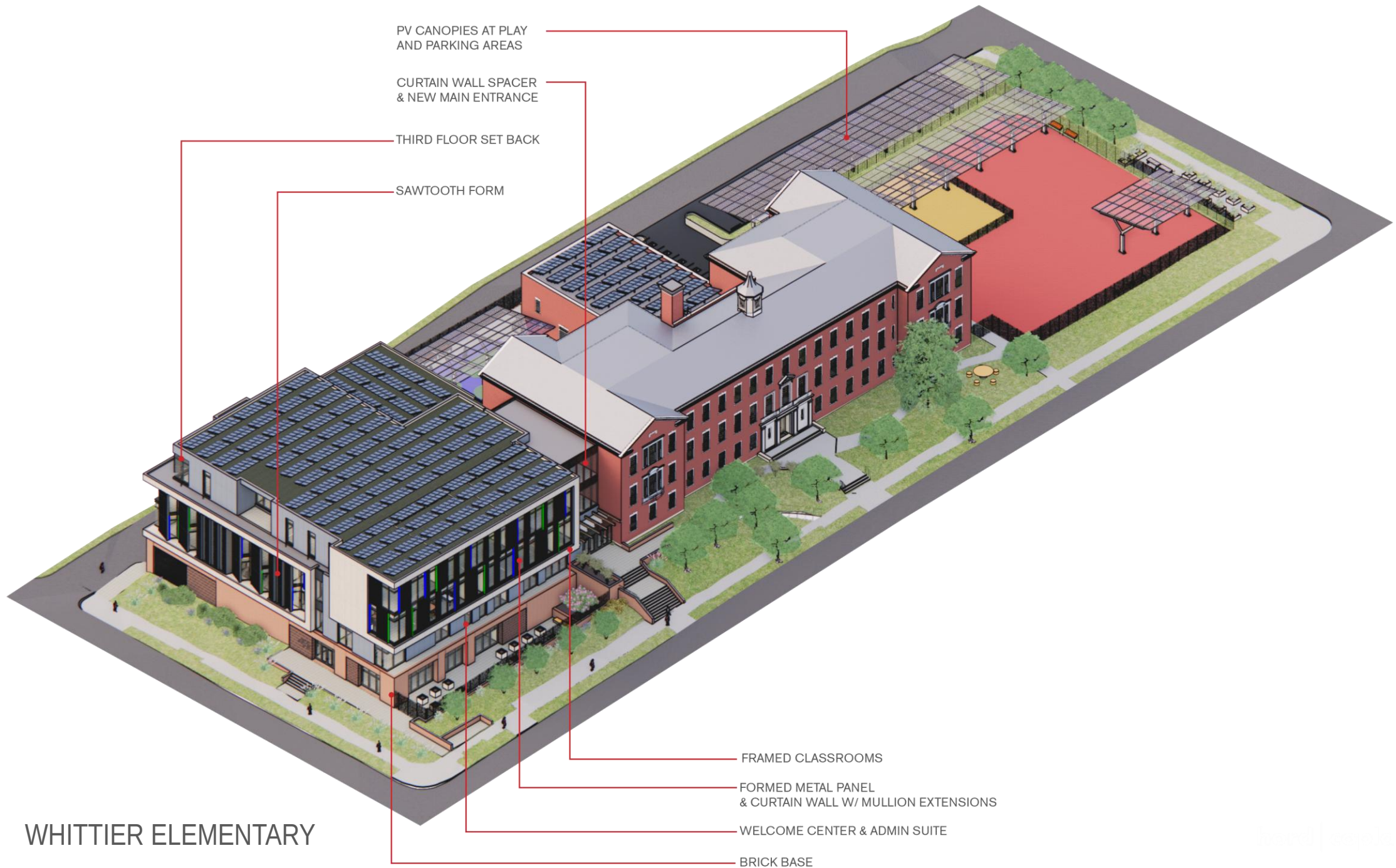
FOCAL POINTS

CONNECTIVE ELEMENT

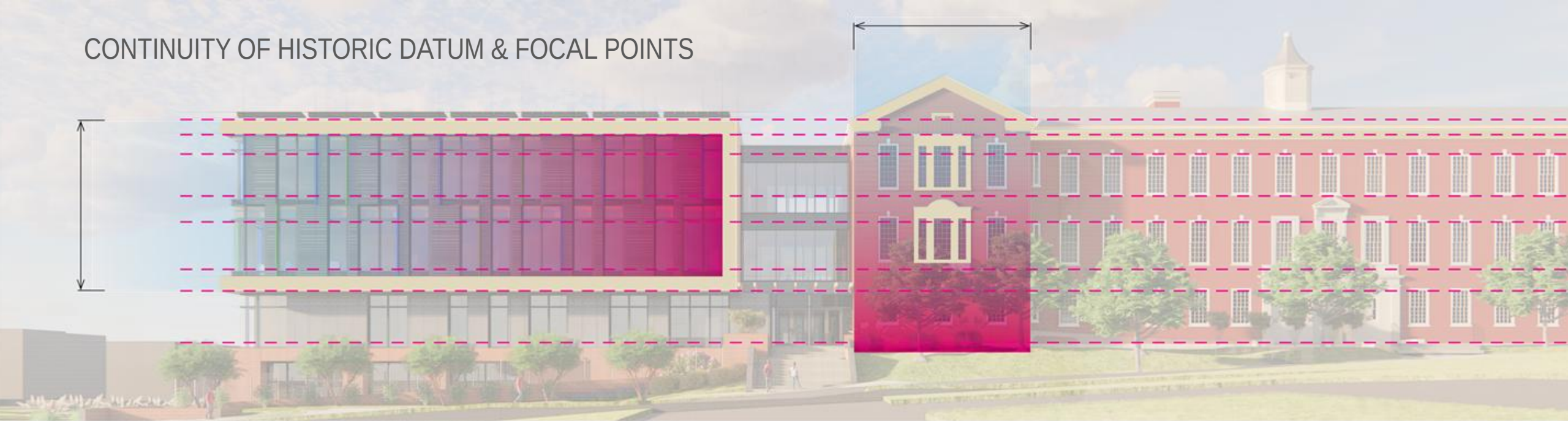
GROUNDING BASE

WHITTIER ELEMENTARY

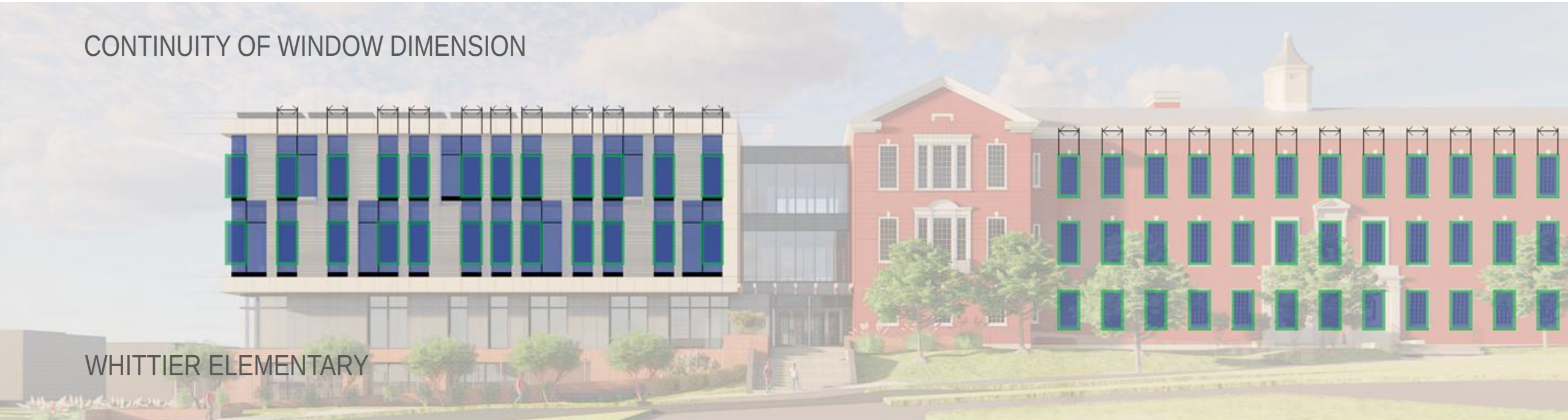




CONTINUITY OF HISTORIC DATUM & FOCAL POINTS



CONTINUITY OF WINDOW DIMENSION



WHITTIER ELEMENTARY



WHITTIER ELEMENTARY



WHITTIER ELEMENTARY



WHITTIER ELEMENTARY



WHITTIER
ELEMENTARY
SCHOOL

WHITTIER ELEMENTARY



WHITTIER ELEMENTARY



ANN ARBOR PUBLIC SCHOOLS

Capital Program Investments and the New Lawton Elementary School

October 28, 2025

Jason Bing, Director
Capital Programs

District Overview



3.4 MILLION SQ. FT

The first buildings in our district were built in 1922, and the most recent in 2008. With an average age of 64 years, it's time to bring our districts' infrastructure into the 21st century.

[VIEW BOND PROGRAM TIMELINE >>](#)

32 SCHOOLS

Learning environment directly impacts student achievement and wellbeing. The updates will empower us to be better stewards of our students, and the trust of our community.

[SEE PROJECTS BY SCHOOL >>](#)

723 ACRES

Ann Arbor Public Schools serves nearly 17,000 students, in an area spanning 125 square miles. The bond will allow us to engage with communities in new and impactful ways.

[LEARN MORE ABOUT THE BOND >>](#)

AAPS Capital Program – Objective

To transform the student learning experience with the goal of providing for the health, safety, and well-being **of all students** in high-quality, equitable, and environmentally sustainable schools

AAPS Community – environmental sustainability

ANN ARBOR

Ann Arbor declares climate emergency, sets 2030 carbon-neutral goal

Updated: Feb. 14, 2020, 10:44 p.m. | Published: Nov. 04, 2019, 9:57 p.m.

ANN ARBOR

Washtenaw County leaders OK plan to reach carbon neutrality by 2035. What's next?



VICE PRESIDENT FOR COMMUNICATIONS
MICHIGAN NEWS
UNIVERSITY OF MICHIGAN

Search the site



Arts & Culture · Business & Economy · Education & Society · Environment · Health · Law & Politics · Science & Technology · International

TRENDING: Artificial Intelligence · Firearms · Abortion Access · Food Addiction · Food Security · Ukraine · Coronavirus · Detroit · Aging · Mental Health · Space · Smoking & Vaping · This is Michigan · Pride, LGBTQ · Transportation Technology · Opioids

U-M commits to universitywide carbon neutrality

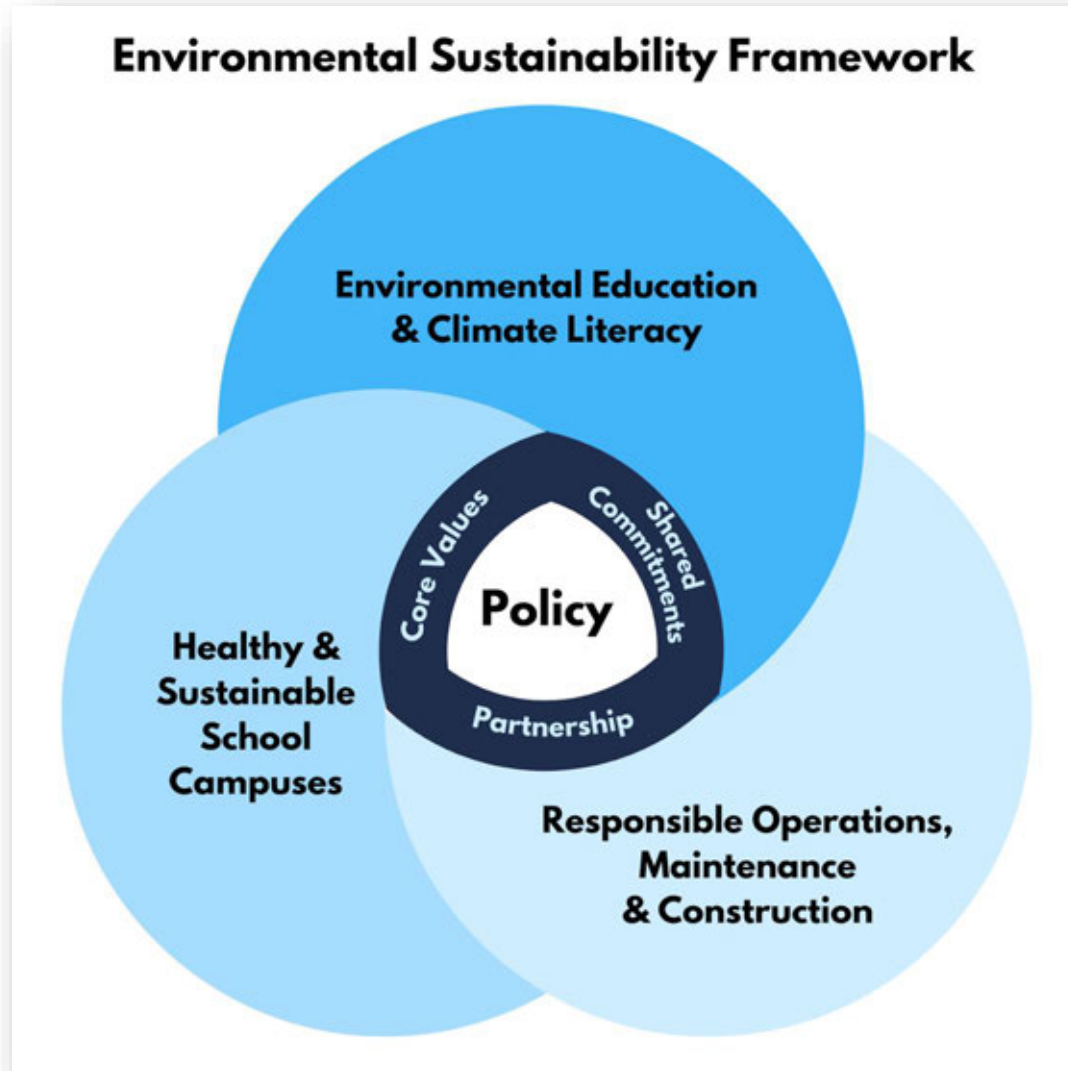


May 20, 2021

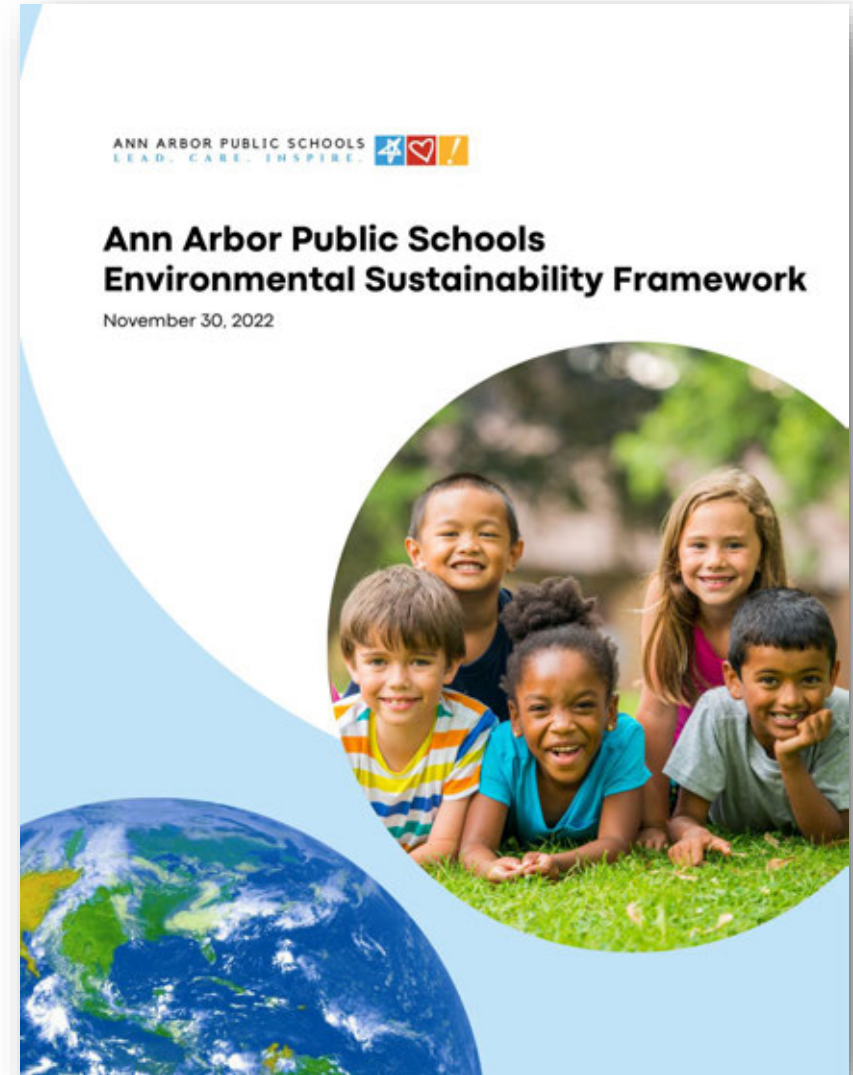
Written By:
Adam Fisher



AAPS Environmental Sustainability Framework



**Approved
by the
Board in
November
2022**



AAPS Sustainability Targets + Metrics Tracking

US – CHPS Certification

- Meet Collaborative for High Performance Schools - Verified Leader certification

EUI of 25 or lower

- NBI Decarbonization Roadmap and ZeroTool

10% or better embodied carbon reduction

Project Overview:

New Lawton Elementary School

AAPS Partners

Architect: Quinn Evans

Learner's Rep: Fielding International

Landscape and Civil: Beckett & Raeder

Acoustics: Soundscape Engineering

Technology and Security: JDRM Engineering

Owner's Rep: Gilbane

Construction Manager: Brix Corporation

Food Service: Bakergroup

MEP: Strategic Energy Solutions

Traffic: Fleis & VandenBrink

Structural: TYLin Group

Project Overview

Lawton Elementary

Big Idea

Lawton Elementary's vision is to create an inclusive environment that fosters belonging, connectedness, safety, and well-being.

The school's design reflects a connection to the environment, emphasizing daylighting, indoor-outdoor connection, and spaces for exploration while creating equitable spaces for individualized learning and proactive self care.



Project Overview

New Lawton Elementary

2250 S. 7th Street, Ann Arbor, MI

Scope: Create a new multi-story, pK-5 Elementary School on existing site

Design enrollment: 552 K-5 students plus up to 18 Preschool students
(Four-Section PK-5)

Max capacity: designed to accommodate 648 students

SF: approximately 93,500 SF

Sustainable certifications: Pursuing Passive House Institute U.S. (PHIUS) feasibility study to determine if the project will continue to pursue PHIUS certification; exploring LEED

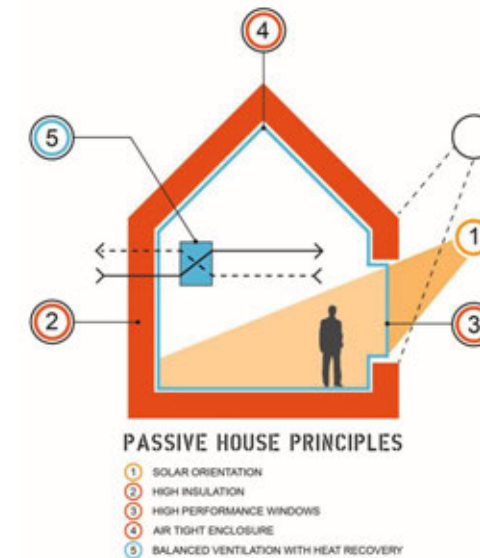


Integrating Sustainability

Initial New Lawton ES Sustainability Goals

Category	Goal
CHPS Certification	CHPS Verified Leader
Energy Use Intensity (EUI) without photovoltaics	25
Embodied carbon reduction	10% over EPIC baseline
Photovoltaic (PV) output	100% or max roof capacity
Ventilation	130% of ASHRAE Standard 62.1-2019

Design to PHIUS Passive House Standards

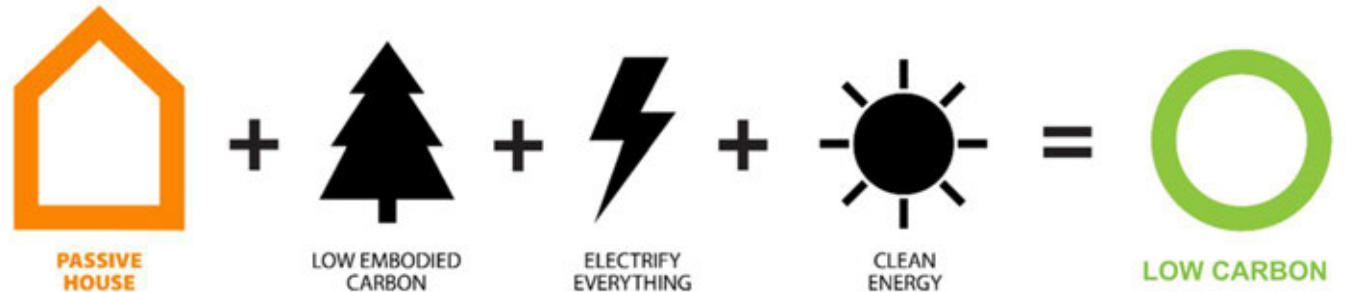


Integrating Sustainability

Reducing a K-12 School Building's Carbon Footprint

Reducing New Lawton Elementary's carbon footprint has four major components:

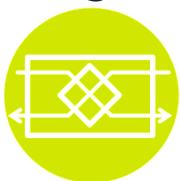
1. Create a **high-performance envelope** through Passive House Principles.
2. Use **low embodied carbon building materials** such as mass timber.
3. **All-electric** systems (except for back-up generator).
4. **Clean energy** through geothermal systems, PV, and AAPS's agreement with DTE to provide renewable energy.



Carbon Strategies

Systems

High Performance Heating and Cooling



Geothermal Energy

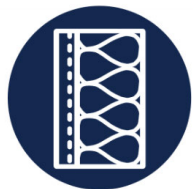


Photovoltaics



Envelope

Enhanced Insulation



Airtight Enclosure



Reducing Thermal Bridging



High Performance Windows



Embodied Carbon

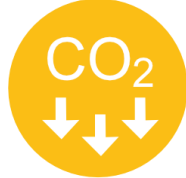
Historic Building Re-use



Mass Timber



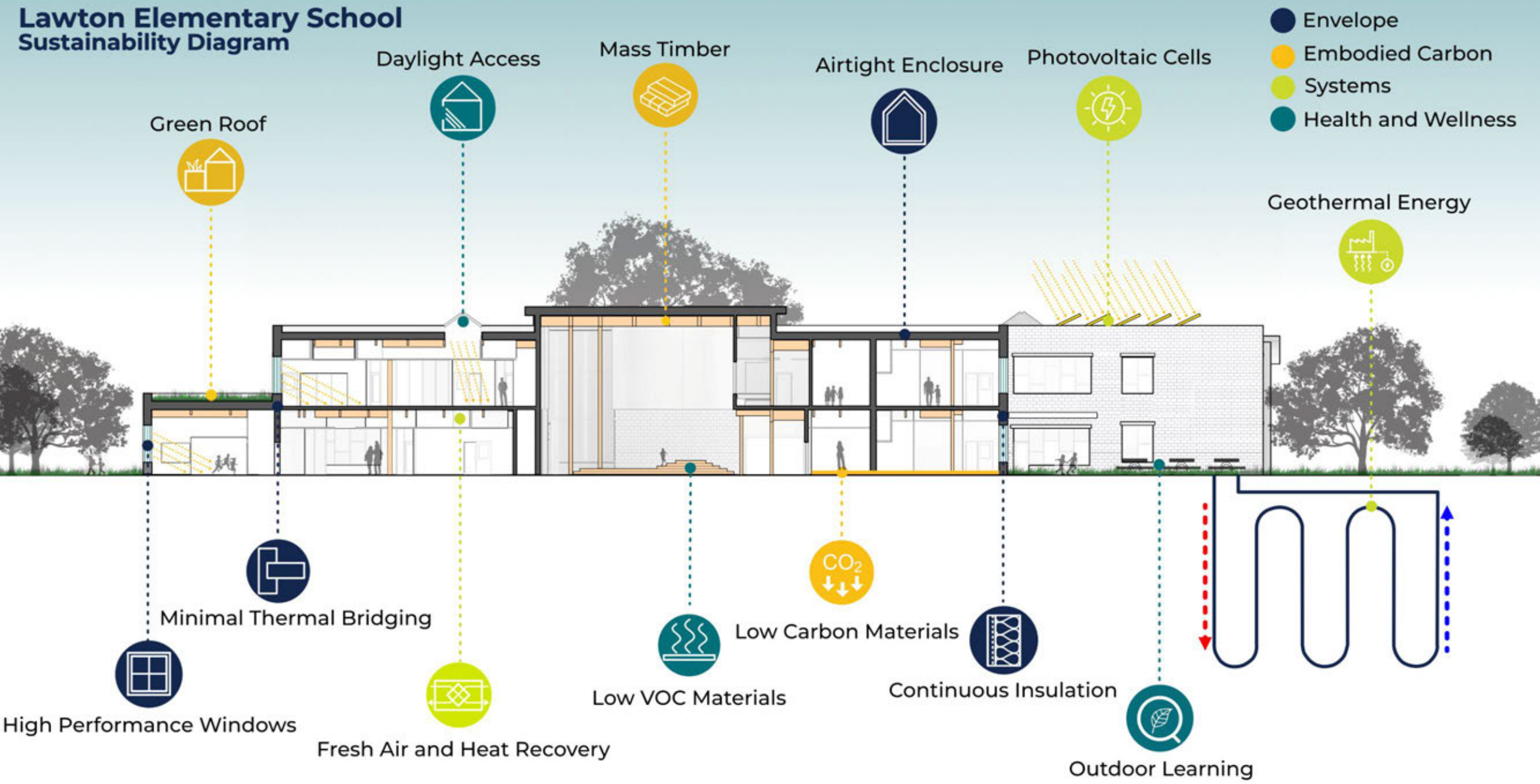
Low Carbon Materials



Green Roof



Lawton Elementary School Sustainability Diagram



Lawton Elementary Preliminary Projected Energy Performance

AAPS LAWTON DESIGN:

ENERGY USE INTENSITY (EUI)

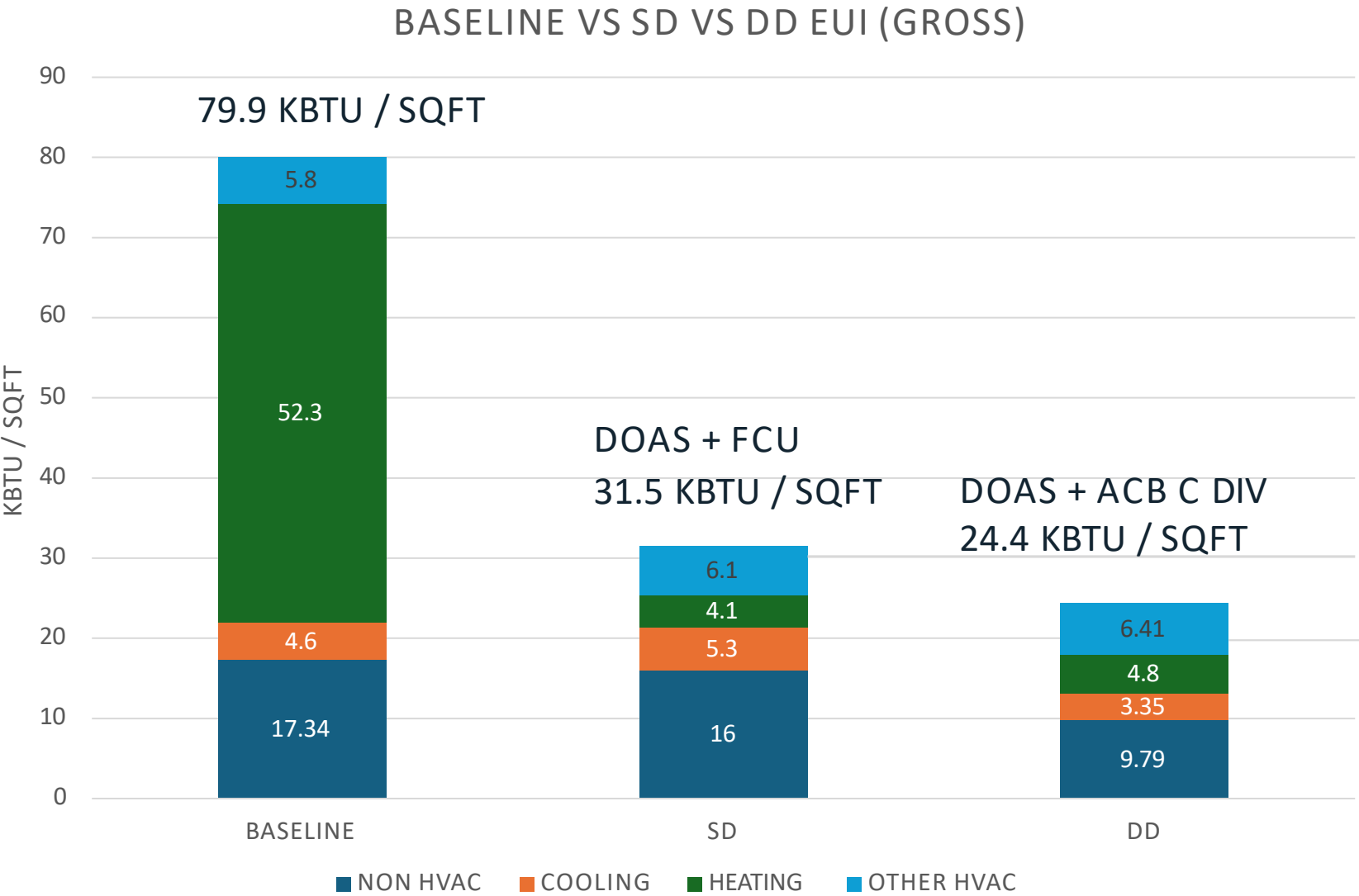
- BASELINE EUI: 79.9 kBTU / Sqft.
- SD EUI: 31.5 kBTU / Sqft.
- DD EUI: 24.4 kBTU / Sqft.

ANNUAL EMISSIONS

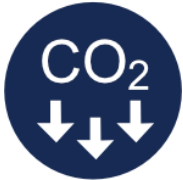
- SD: 1,077,084 lbs CO2 (Equivalent)
- DD: 805,922 lbs CO2 (Equivalent)

IMPROVEMENT FROM ASHRAE 90.1 BASELINE

- 69% Reduction in EUI from baseline energy model.
- Includes additional load for CHPS required 130% ventilation.
- Includes PHIUS-level envelope and fenestration



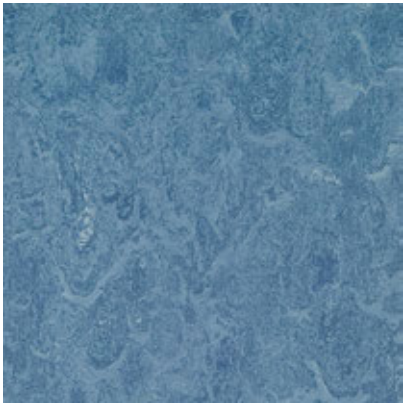
Selecting Low-Carbon Materials



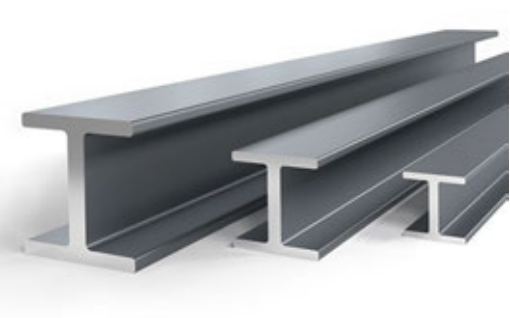
Mass Timber



Concrete



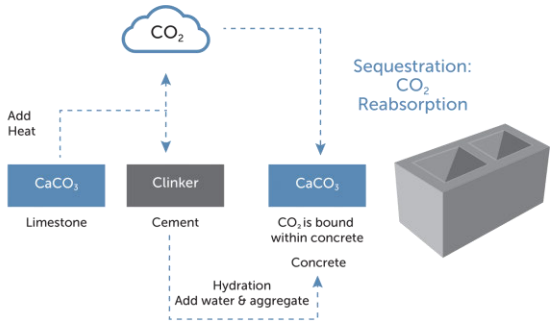
Interior Finishes



Steel Structure



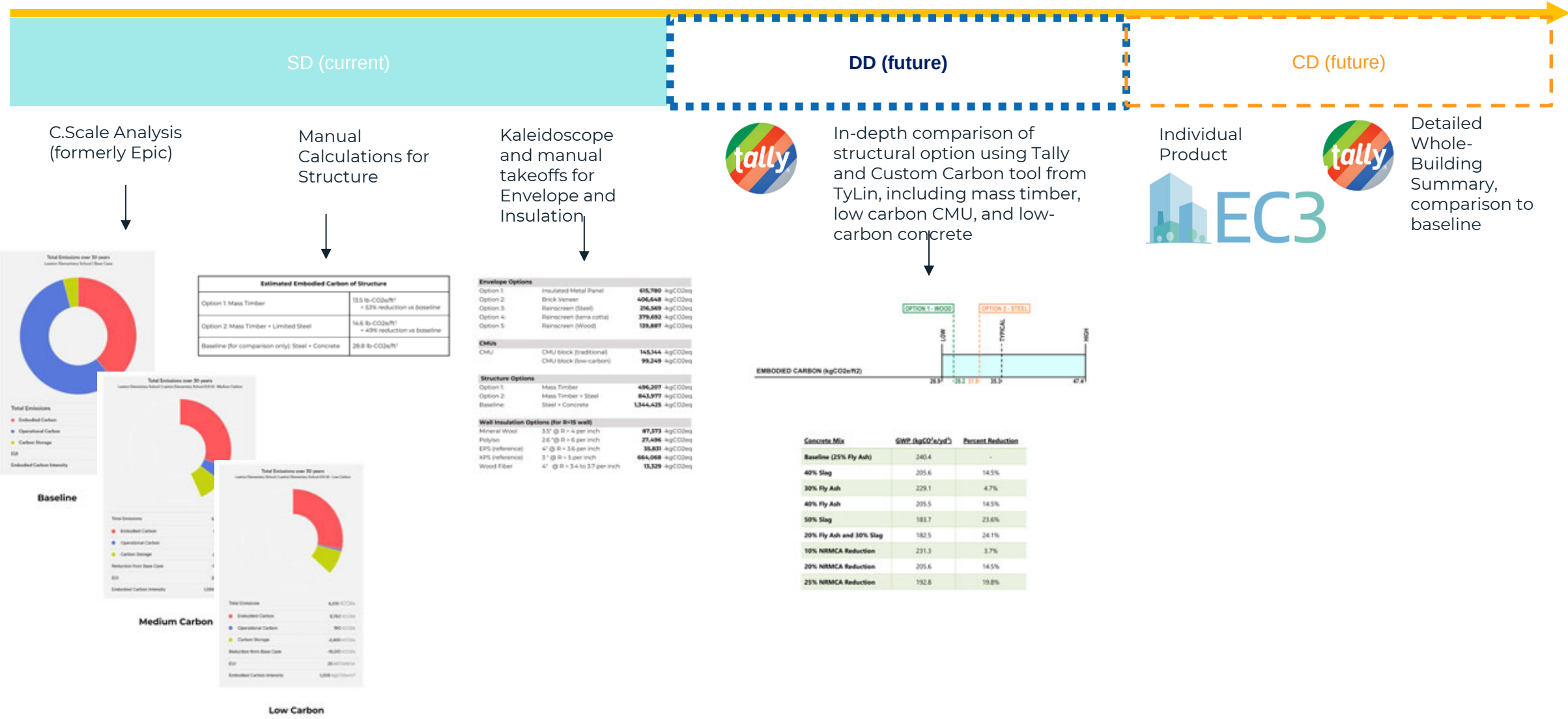
Insulation



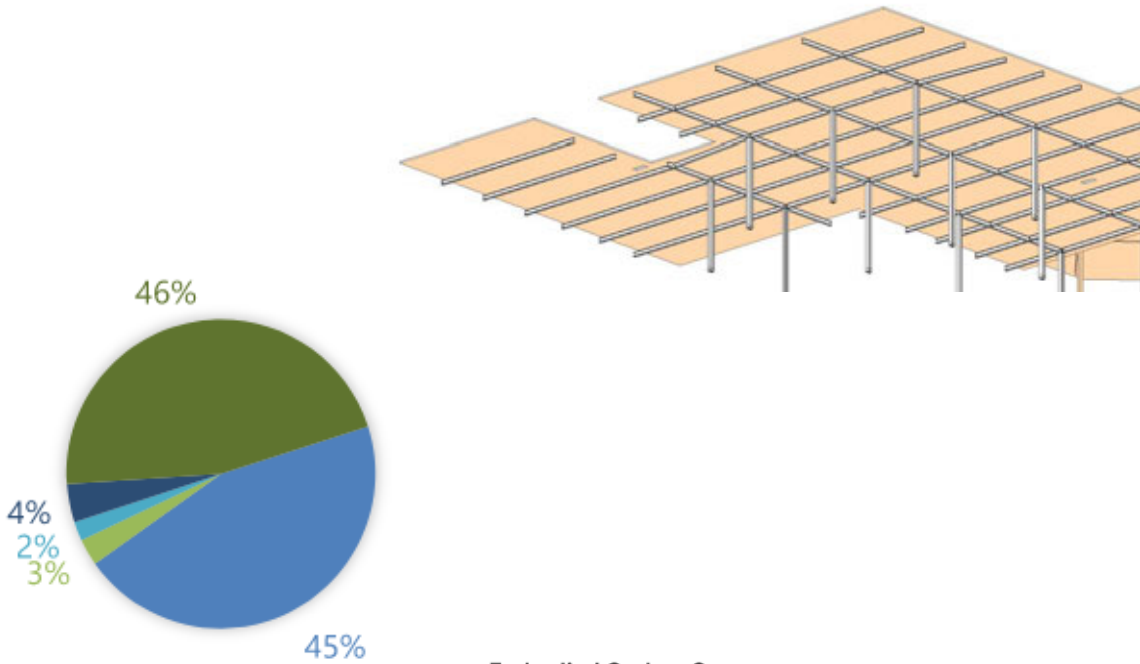
The implications of using CarbonX technology include: more efficient use of raw materials, improved quality, and the significant reduction of the global warming potential of our products.

Concrete Masonry Units

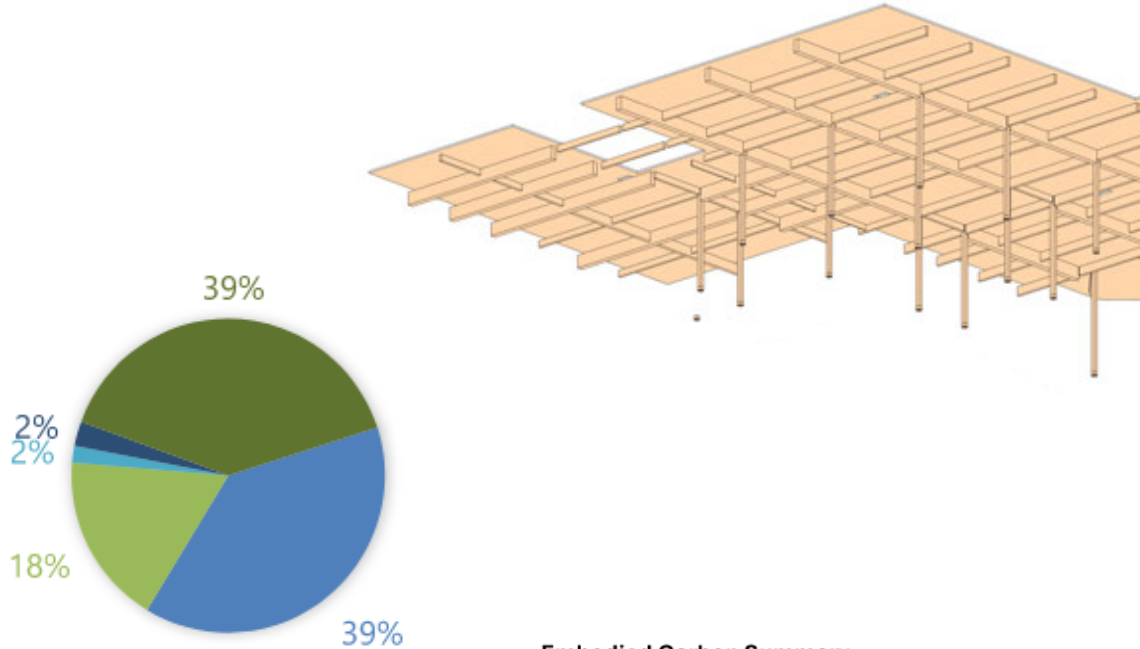
Lawton Elementary School Analysis Timeline



Example: Lawton Structural Analysis



Embodied Carbon Summary			
Concrete Foundations	9.35E+05	kg-CO2e	45%
Superstructure	1.13E+06	kg-CO2e	55%
Steel Superstructure	5.78E+04	kg-CO2e	3%
Concrete Superstructure	4.09E+04	kg-CO2e	2%
Wood Superstructure	8.27E+04	kg-CO2e	4%
CMU Superstructure	9.53E+05	kg-CO2e	46%
Project Total:		2.07E+06	kg-CO2e 100%



Embodied Carbon Summary			
Concrete Foundations	9.35E+05	kg-CO2e	39%
Superstructure	1.48E+06	kg-CO2e	61%
Steel Superstructure	4.27E+05	kg-CO2e	18%
Concrete Superstructure	4.09E+04	kg-CO2e	2%
Wood Superstructure	6.16E+04	kg-CO2e	3%
CMU Superstructure	9.53E+05	kg-CO2e	39%
Project Total:		2.42E+06	kg-CO2e 100%

Full mass timber saves the equivalent of emissions produced by 75 cars in one year compared to a hybrid system

AAPS Capital Program – New Lawton ES



Find the informational video here: <https://www.youtube.com/watch?v=amaYJuJsAW0>

Thank You!

Questions: Jason Bing – bingj@aaps.k12.mi.us

For more information, please visit:

A2schoolsbond.org



MASS TIMBER PLUS CONFERENCE | 29 OCTOBER 2025

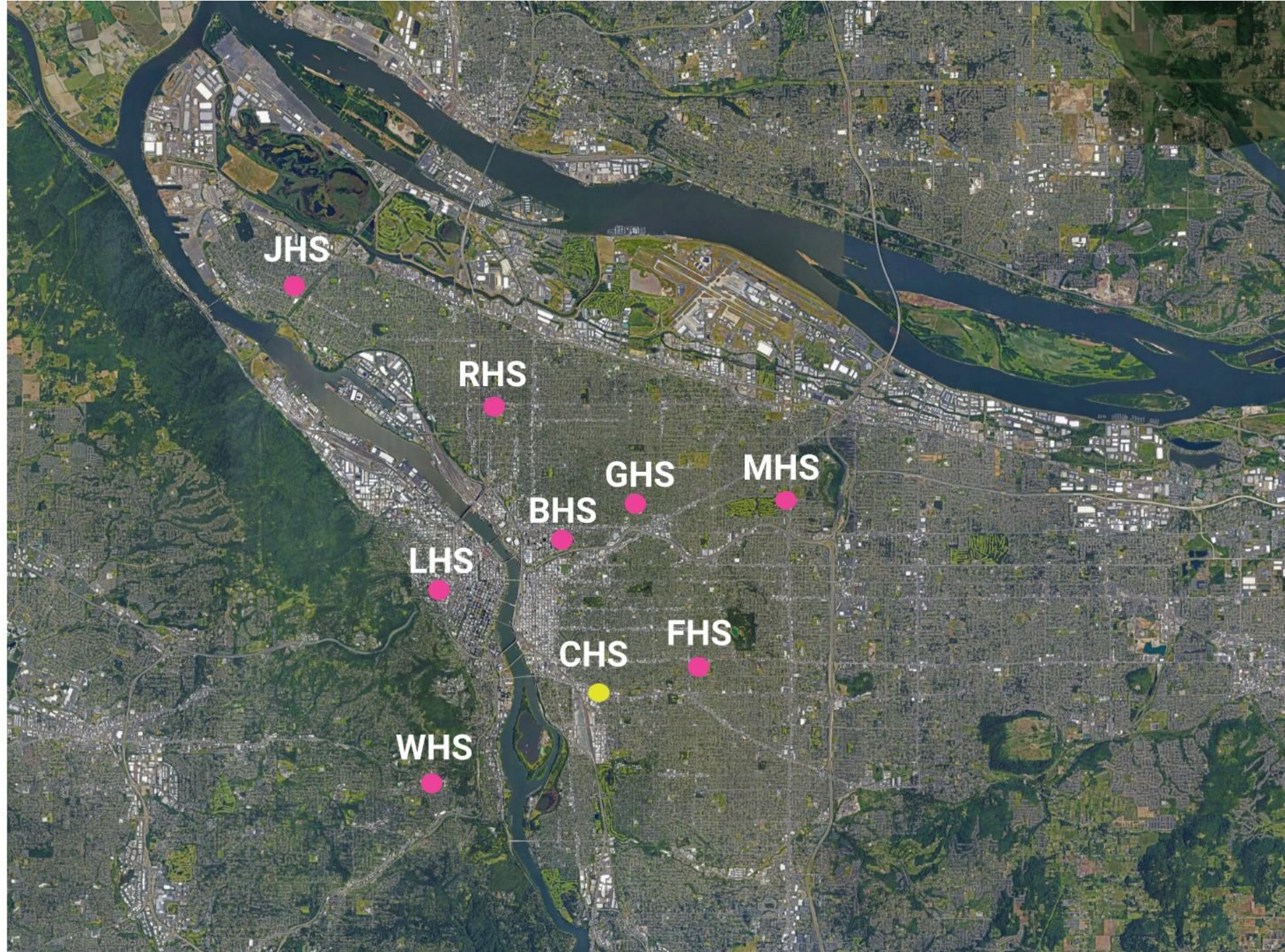
Building Sustainable Schools

Cleveland High School, Portland OR



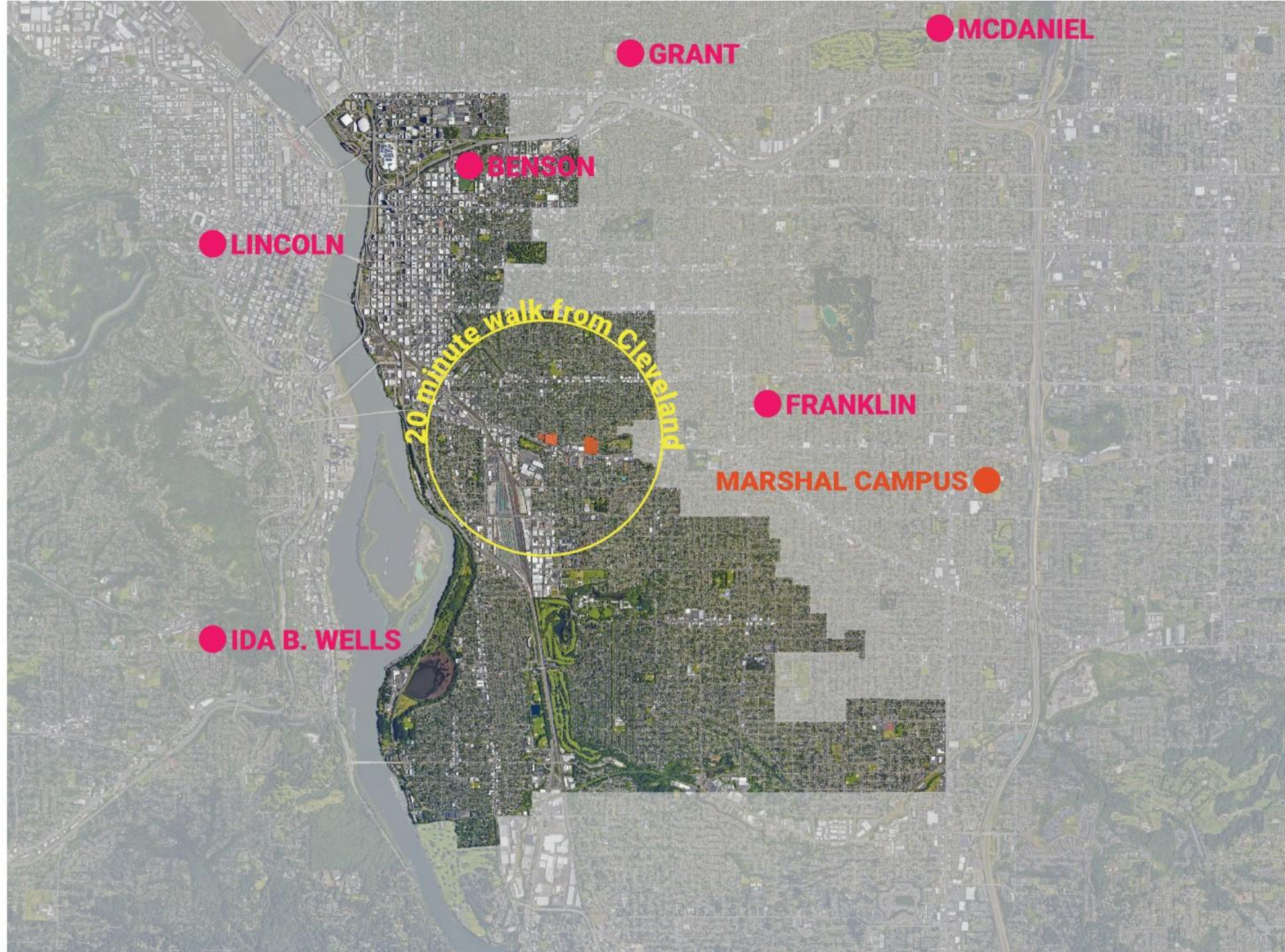
Portland Public Schools

- > 44,000 students
- > 81 schools/
- > 9 high schools
- > bonds: 2012, 2017, 2025



Cleveland High School

- > 1,500 students
- > socio-economic mixed neighborhood
- > 12% under-served student population



Cleveland Historical Timeline



PAST

Portland Metro area is home to the Multnomah, Wasco, Cowlitz, Kathlamet, Clackamas, Bands of Chinook, Tualatin, Kalapuya, Molalla, and many other tribes.

1860

Clinton Kelly donates land that he received through the US 1850 Donations Claims Act, with the stipulation that it be used as an educational site

1890's

Clinton Kelly School erected in series of expansions on Kelly land site

1929

School constructed on current site and renamed Clinton Kelly HS of Commerce

1948

Commerce High School name changed to Grover Cleveland by school board decision

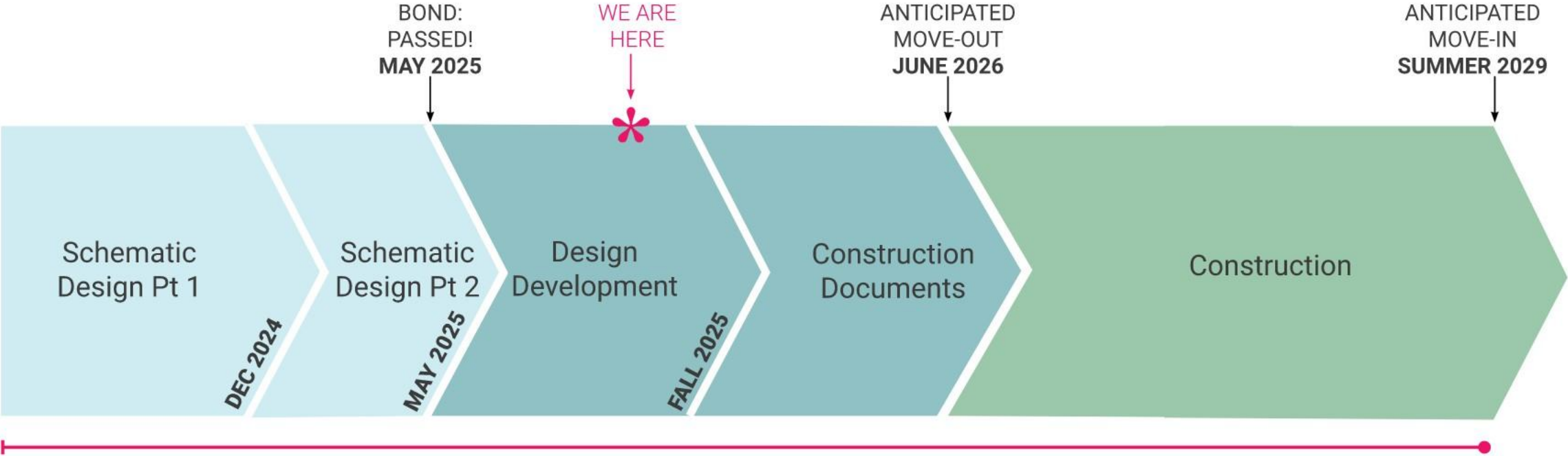
2029

Proposed construction completion for new Cleveland High School

FUTURE

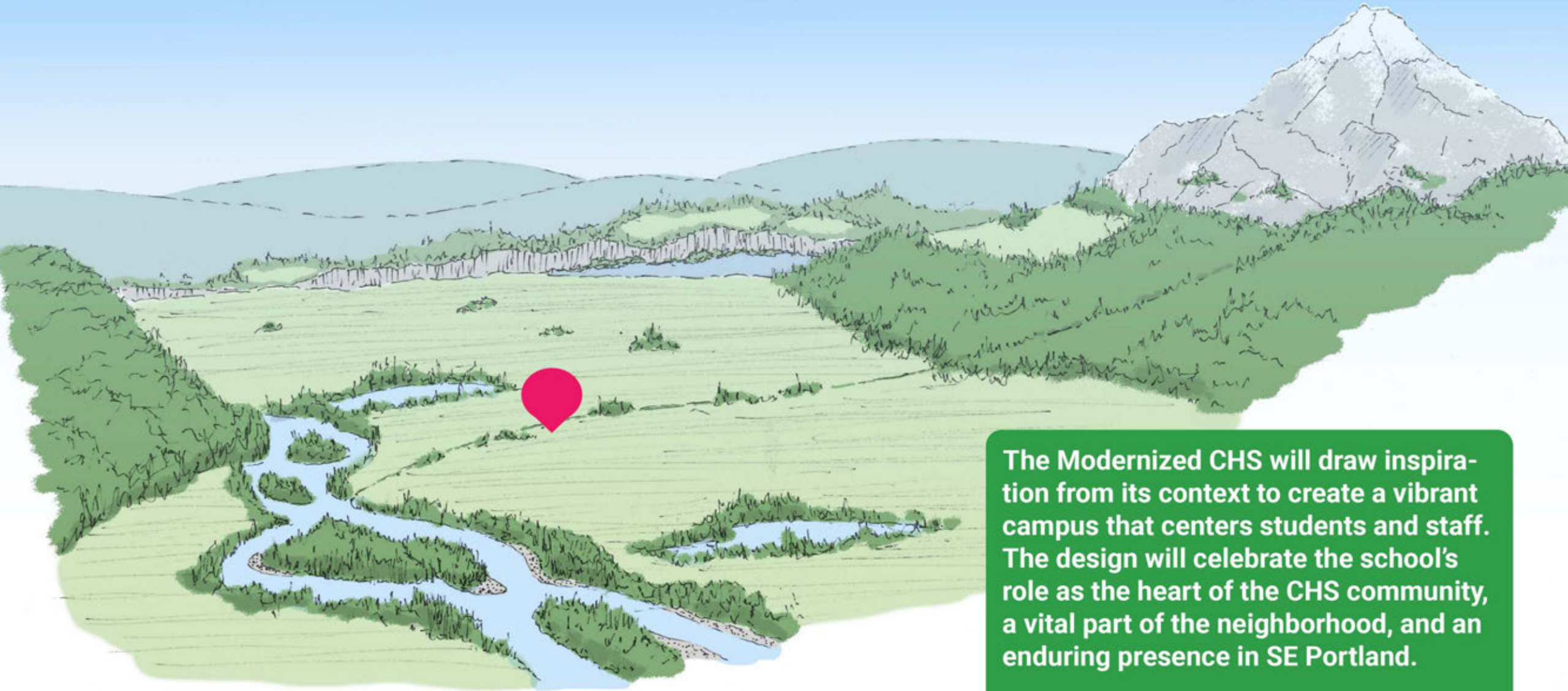
Possible name change and a new legacy for CHS students

Project Schedule



TIMELINE IS DEPENDENT ON CONSTRUCTION SCHEDULE AND SCHOOL BOARD DIRECTIVES

Design Framework



The Modernized CHS will draw inspiration from its context to create a vibrant campus that centers students and staff. The design will celebrate the school's role as the heart of the CHS community, a vital part of the neighborhood, and an enduring presence in SE Portland.

Vision & Goals

The Modernized CHS will draw inspiration from its context to create a vibrant campus that centers students and staff. The design will celebrate the school's role as the heart of the CHS community, a vital part of the neighborhood, and an enduring presence in SE Portland.

Develop academic and extracurricular excellence with intercultural understanding

Promote health, wellness, and climate resiliency

Improve student safety in and around the sites

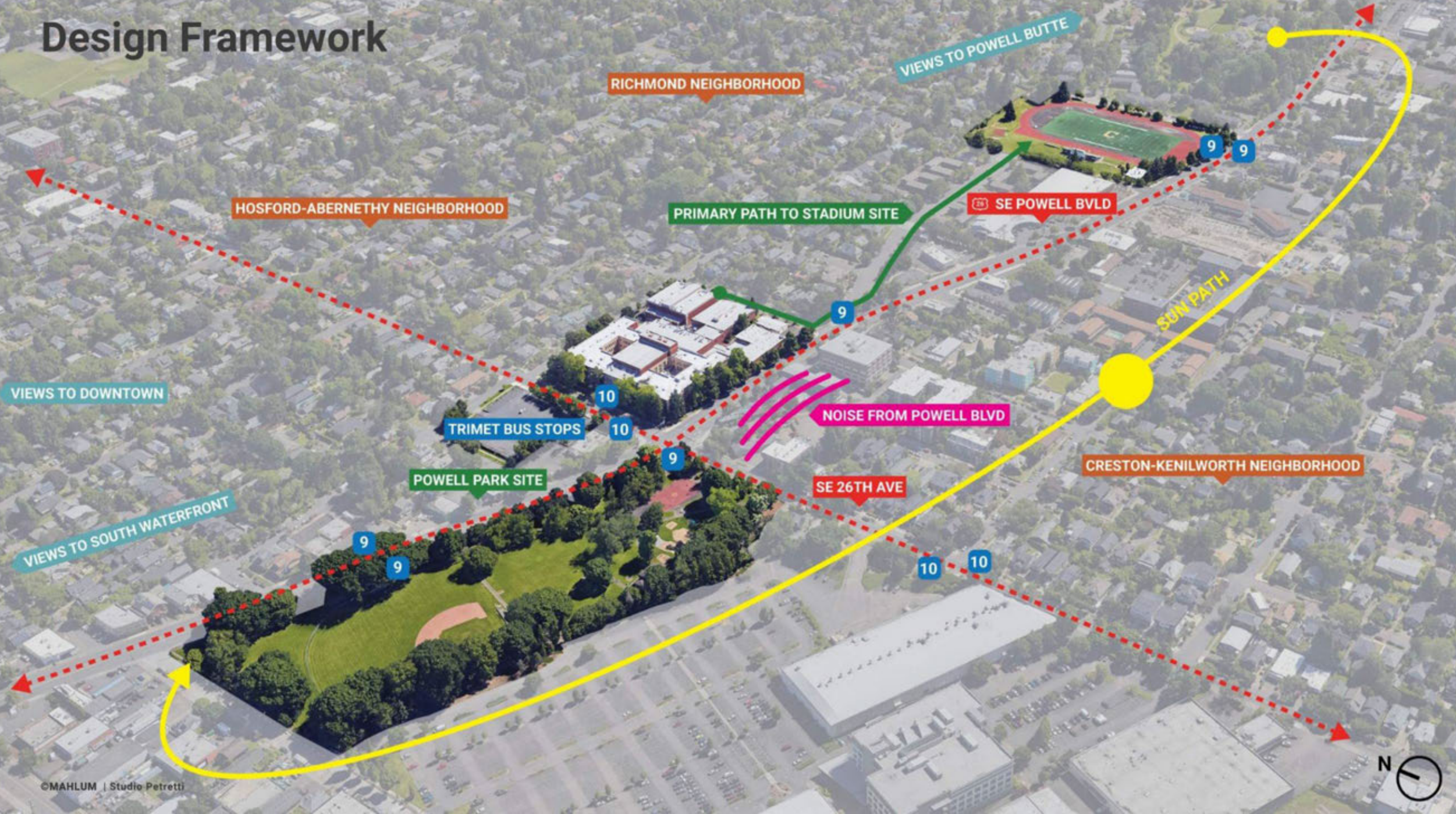
Create a welcoming, inclusive environment that supports students and staff

Acknowledge the Indigenous presence at this site

Enhance CHS's role as a civic and community resource

Be good stewards of local taxpayer dollars and balance district-wide facility needs

Design Framework

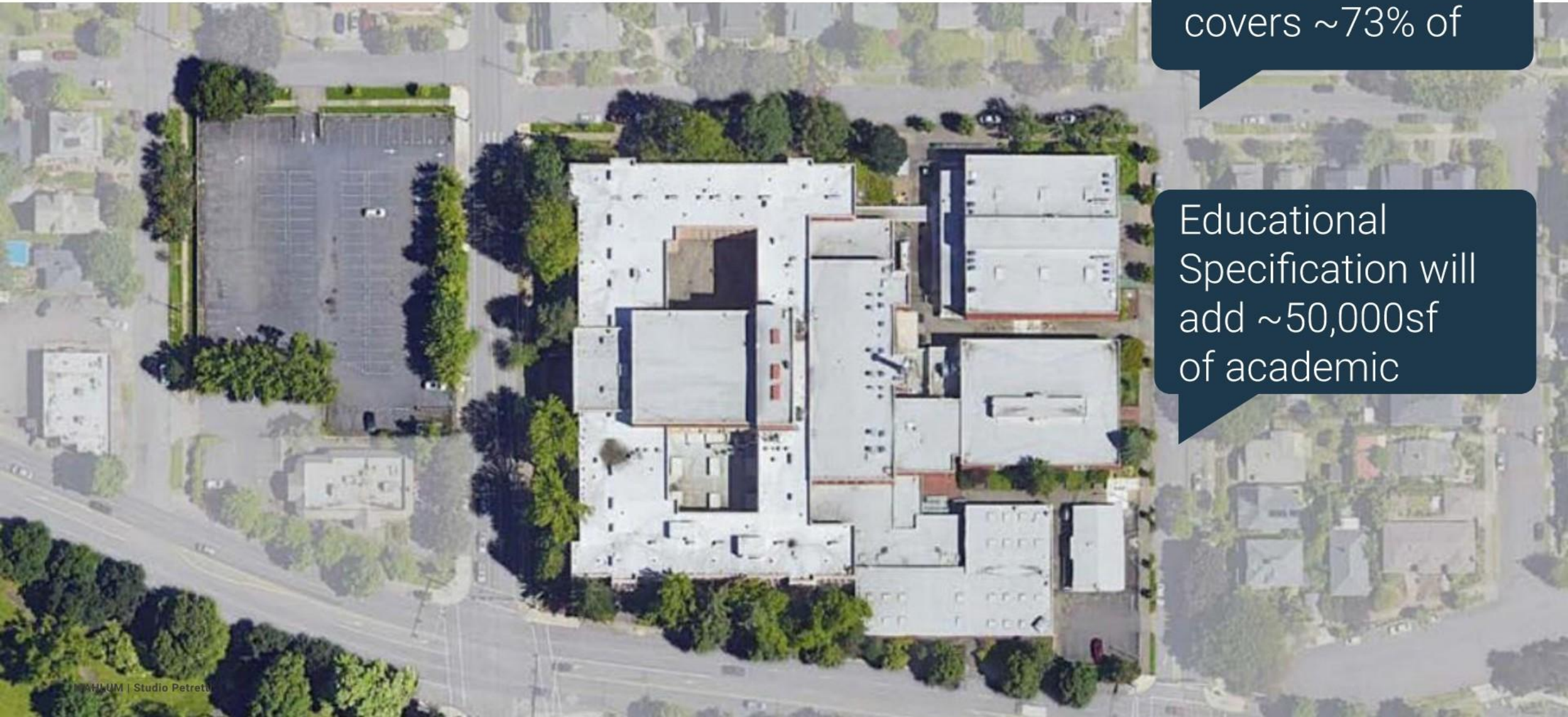


Context

Existing Constraints: Site Size

Existing building covers ~73% of

Educational Specification will add ~50,000sf of academic



The Opportunity

CURRENT CHS SITE

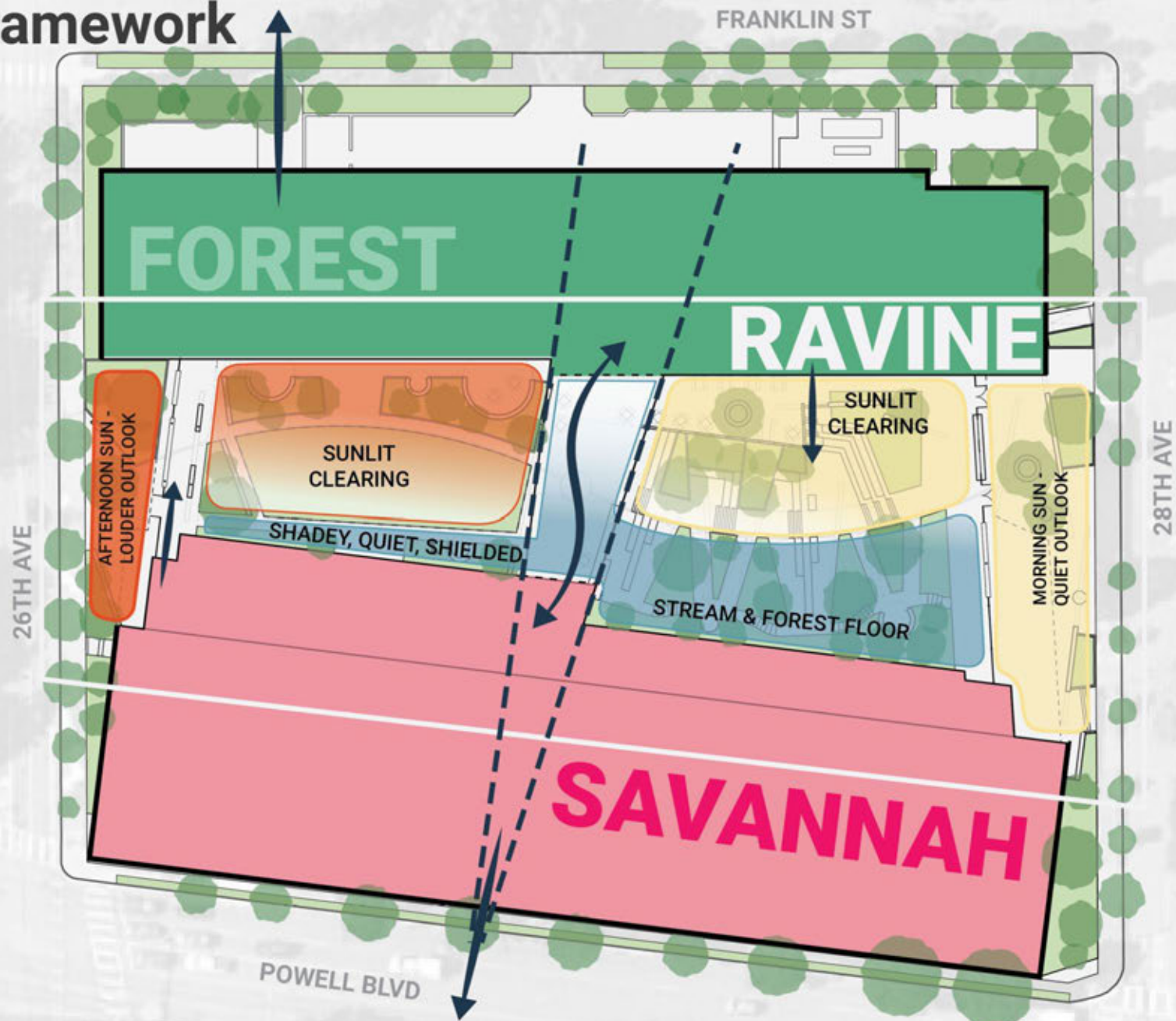


PROPOSED DESIGN ON SITE



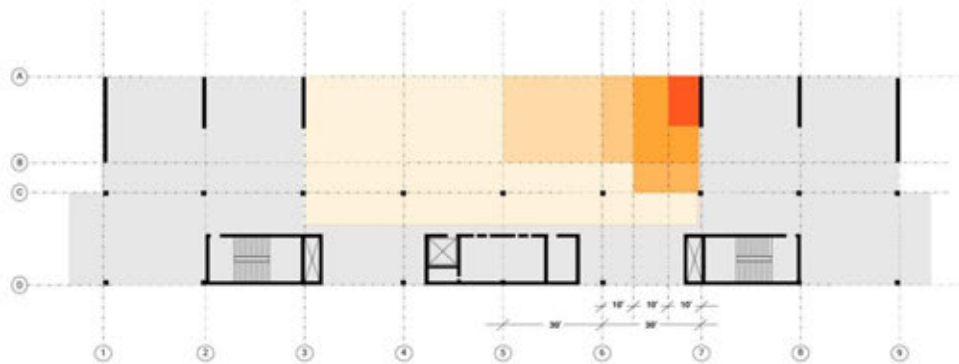
Views from NE corner (SE Franklin and 28th Ave)

Design Framework



Prototype School: 2022

Multi-Story Mass Timber



UNITED STATES FOREST SERVICE WOOD INNOVATION REPORT

MULTI-STORY MASS TIMBER K-12 SCHOOLS

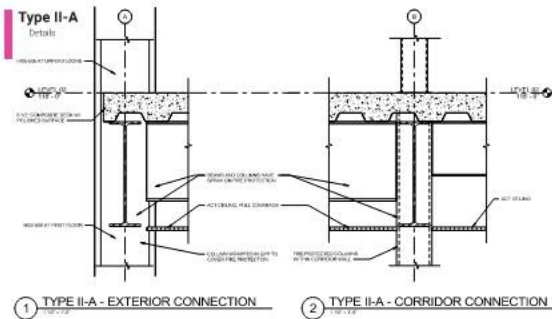
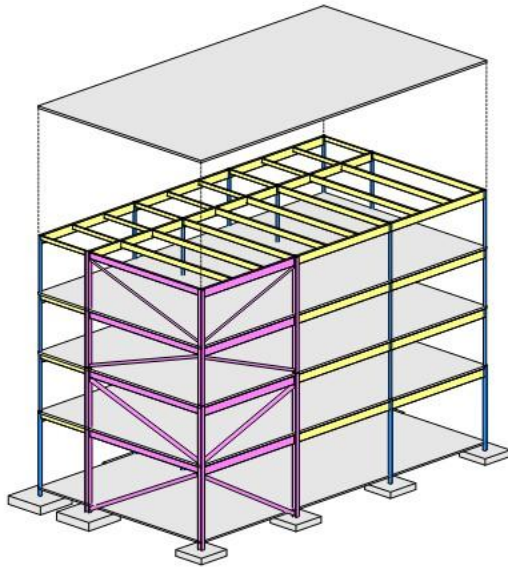
PREPARED BY MAHLUM ARCHITECTS
31 JANUARY 2022
19-DG-11062765-734



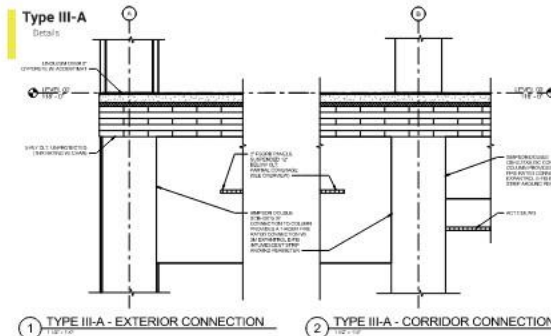
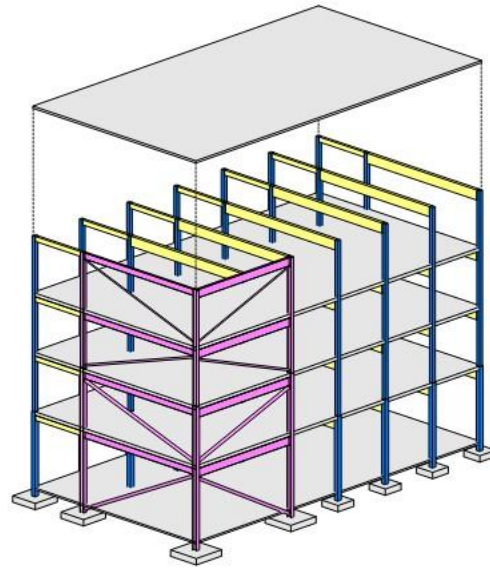
PPS Cleveland High School

Construction Type Analysis

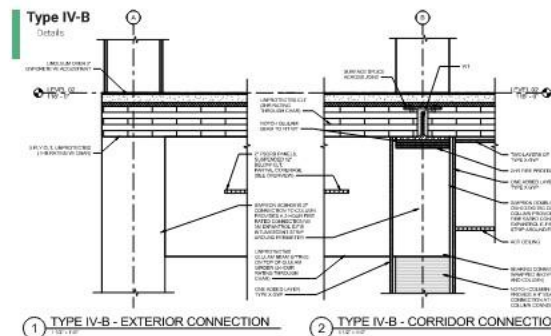
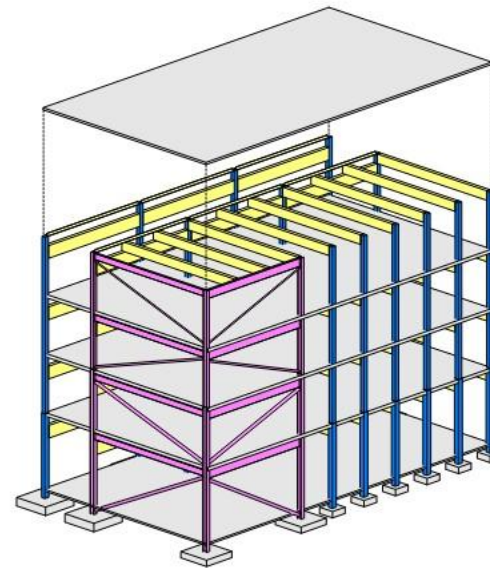
Type II-A



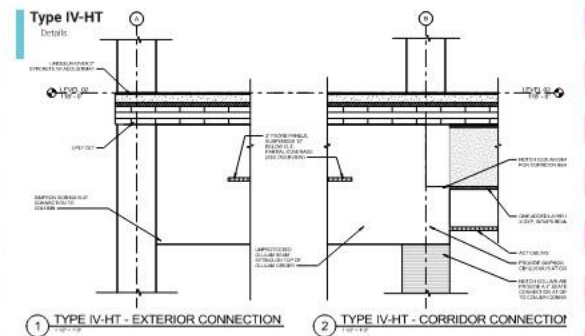
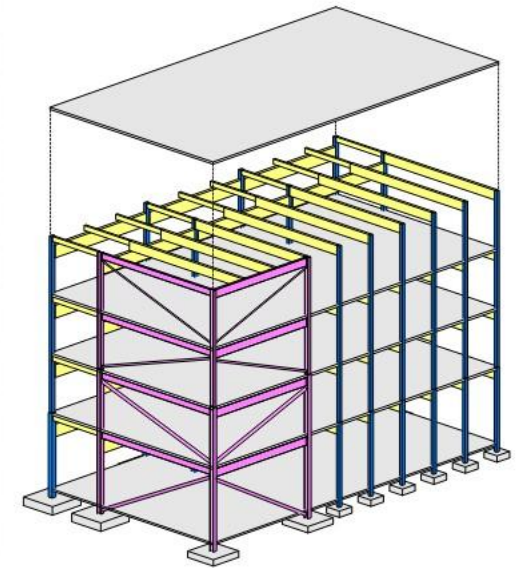
Type III-A



Type IV-B

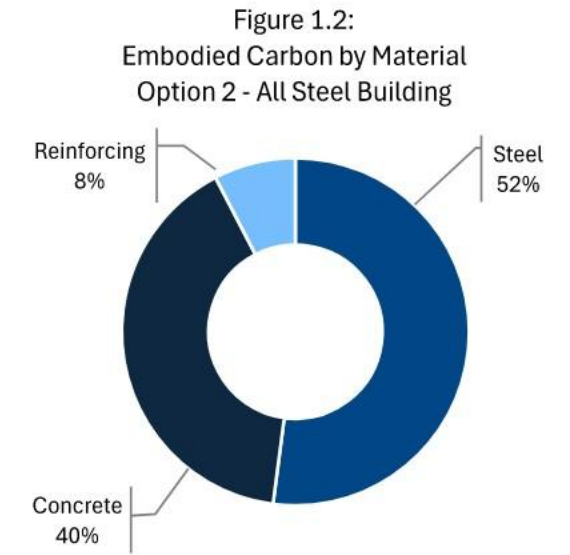
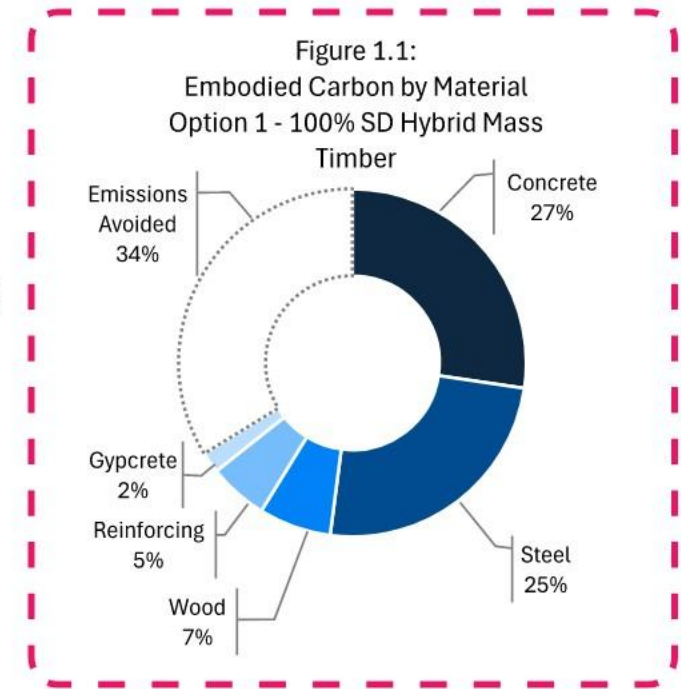
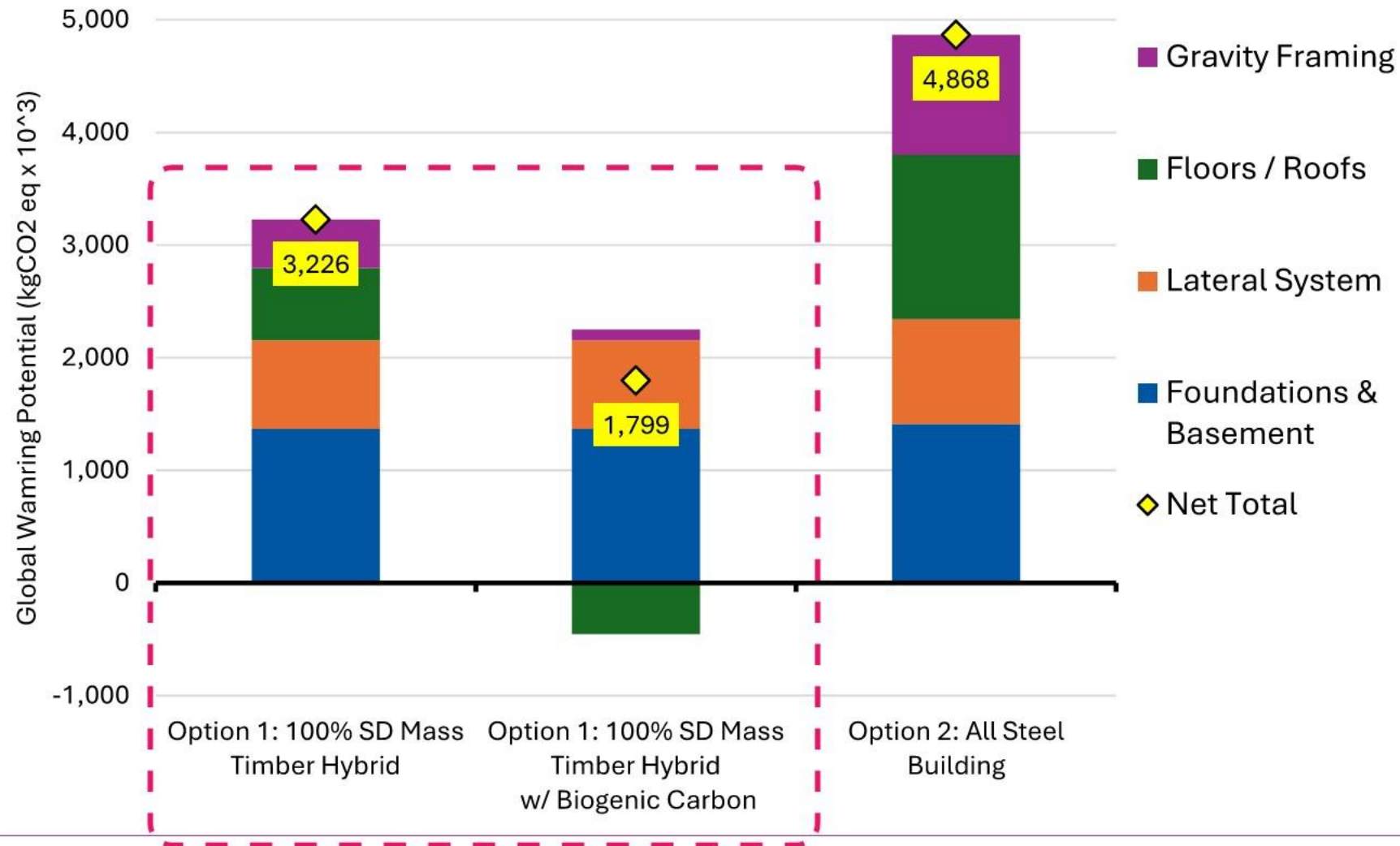


Type IV-HT



PPS Cleveland High School

Embodied Carbon LCA



PPS Cleveland High School

4-Story Type-IV Heavy Timber



mahlum

STUDIO PETRETTI
ARCHITECTURE



Exterior View

East Courtyard



Interior View Commons



Interior View

2nd Floor Connector



Interior View

South Corridor



Interior View

Classroom Corridor



Interior View

Classroom



An architectural rendering of a modern interior space, likely a library or community center. The ceiling is a prominent feature, composed of numerous horizontal wooden slats in various colors (red, orange, yellow, green, blue, and grey) arranged in a stepped, staggered pattern. The space is filled with people sitting at long wooden tables, engaged in conversation or study. The room has large windows on the left side, providing natural light and a view of the outdoors. The overall atmosphere is bright and collaborative.

Thank you!

Alyssa Leeviraphan <alyssal@mahlum.com>

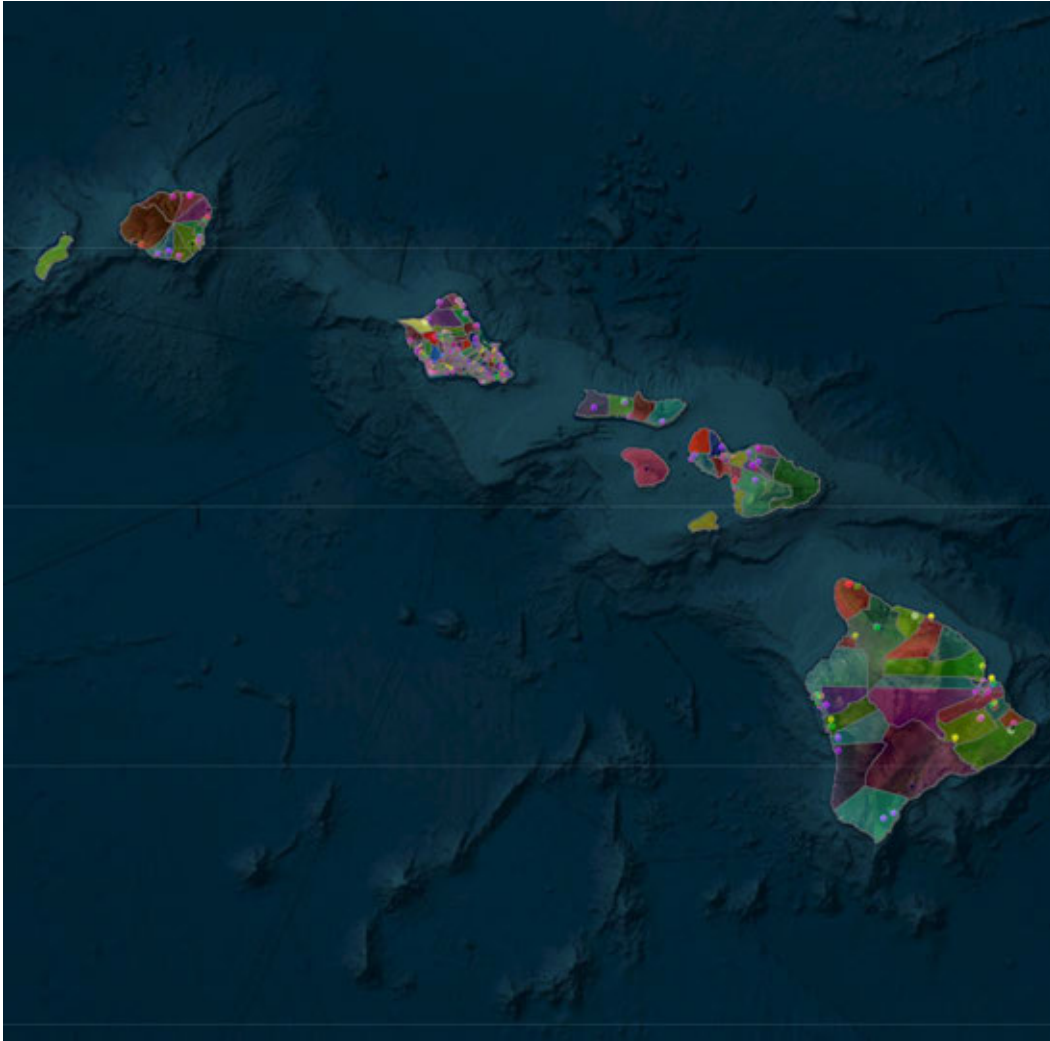


**Hawai'i School
Facilities Authority**

New Central Maui School Project

October 29, 2025

Hawaii's Public Education



A single, statewide public school system

- Total Students: 177,000
- Teachers: 12,610
- Total Staff: 42,100
- Number of Schools: 258 traditional public schools and 37 charter schools
- DOE FY24-25 Operation Budget: \$2.18 billion

Hawai'i School Facilities Authority (SFA)

Established in 2020, the SFA is a specialized agency tasked with expediting the development and construction of public school facilities.

Key Initiatives:

- Educator Workforce Housing
- Preschool Expansion
- New Central Maui School

Hawaii's Unique Struggle – Recent Wildfires



Google Maps



King Kamehameha III Elementary School was destroyed, and over 12,000 people were displaced from the August 8th, 2023, Lahaina Wildfires.

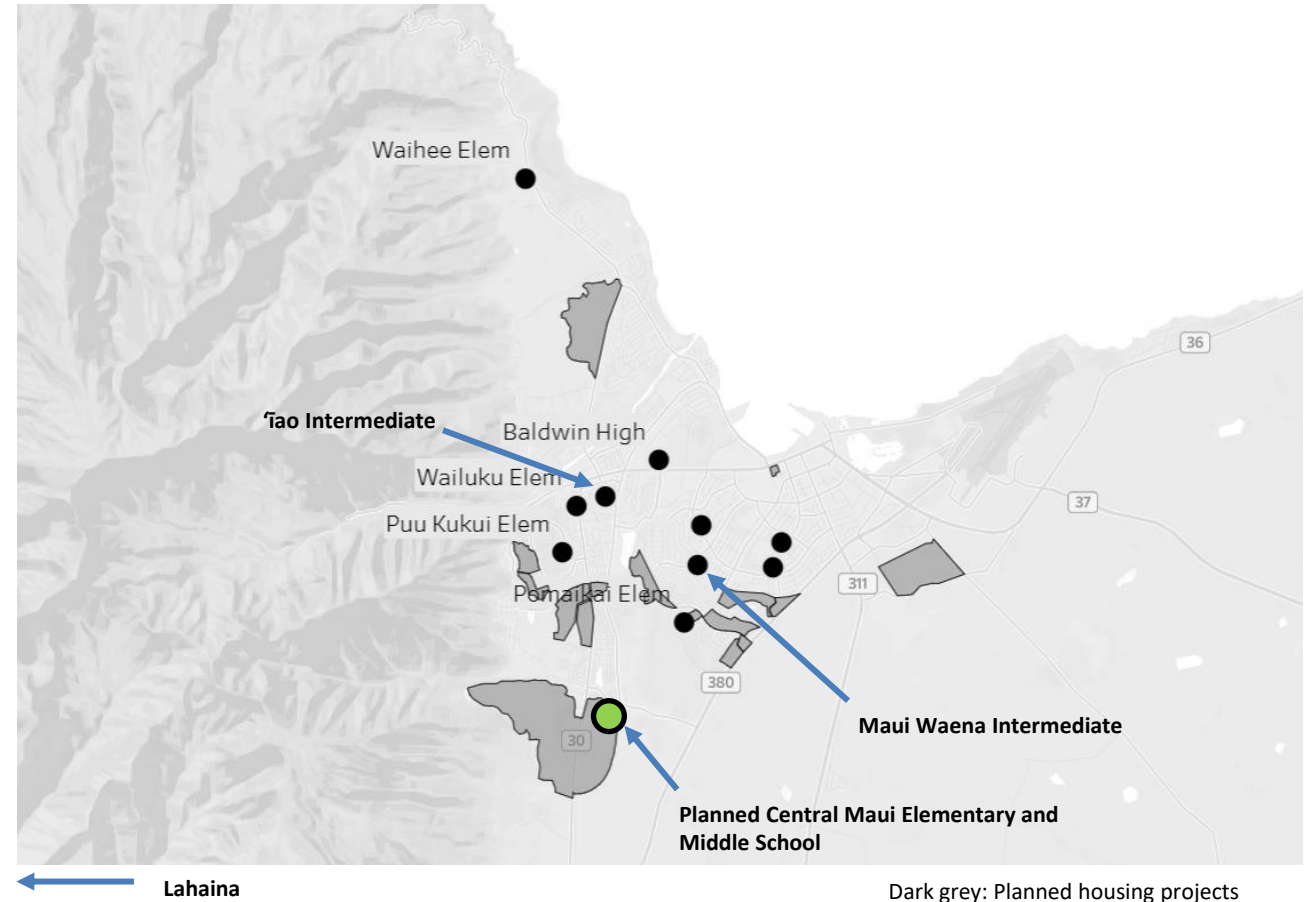
From Capacity to Crisis

Current Schools Overcrowding

- Before the wildfire, 'Īao and Maui Waena Intermediate were already at 100% capacity.
- After the wildfire, these schools absorbed an additional 252 displaced students.
- This surge has pushed classrooms, staff, and student resources far beyond their limits.

Significant Housing Growth Planned

- Over 5,600 new housing units are planned in Central Maui within the next 10 years.
- This growth will increase demand for school facilities and services.



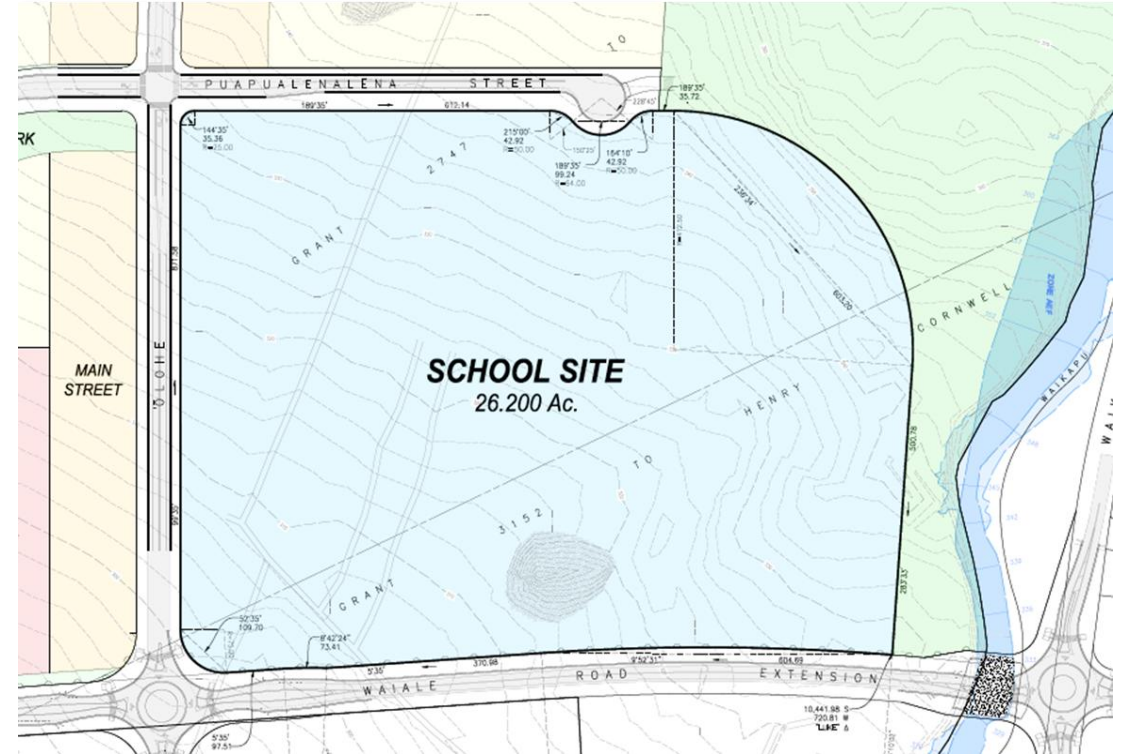
Project Summary

Separate Elementary (K-5) and Middle (G6-8) schools co-located on a single campus

- First mass timber public school in Hawaii
- First net-zero public school in Hawaii
- Land: 26.2 acres
- Max site capacity: ~1,650 students
 - 900 Middle
 - 750 Elementary

Proposed phased construction:

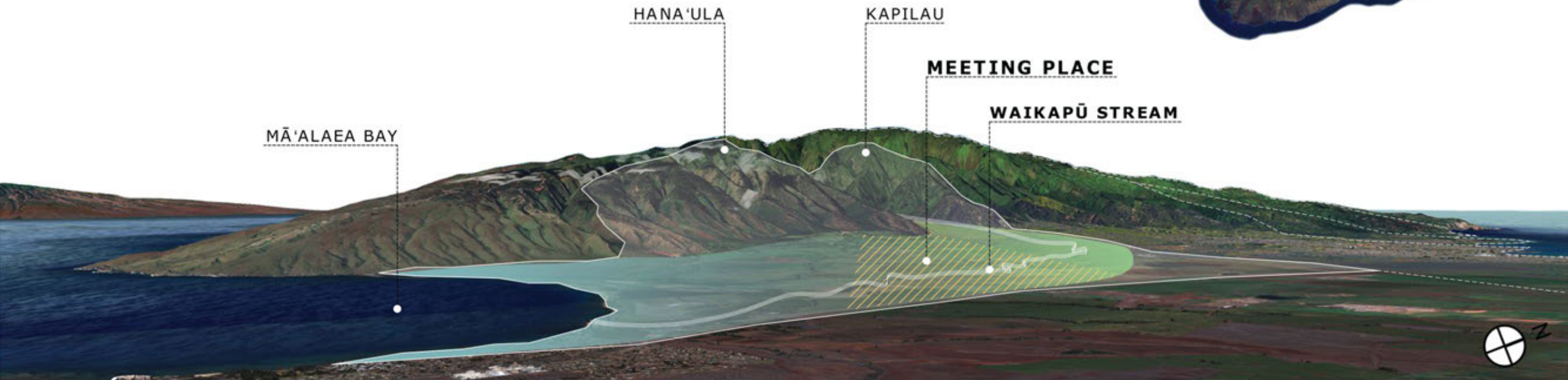
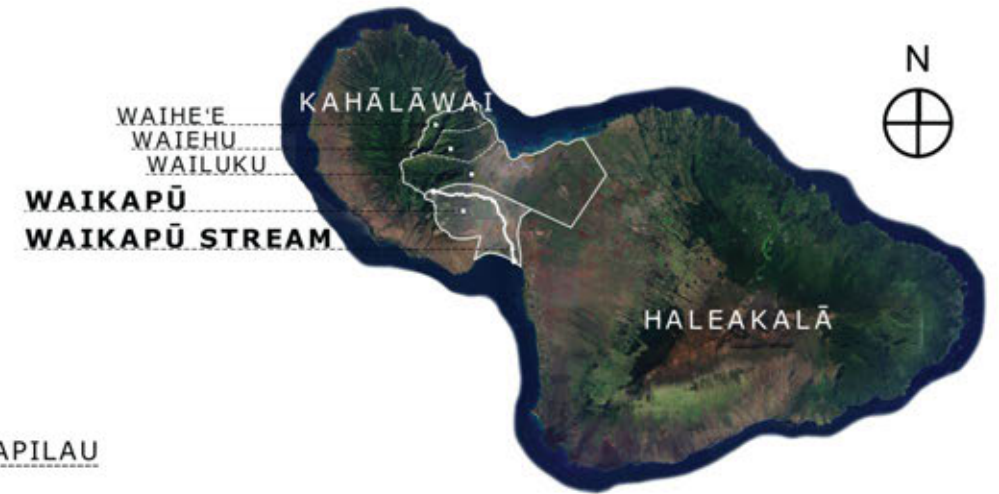
Phase 1	• Middle School (300 students) • Target Opening: Fall 2030
Phase 2 (TBD)	• Additional buildings (+300 Middle School students)
Phase 3 (TBD)	• Additional buildings (+500 Elementary School students)



Ahupua'a: Waikapū

Waikapū is the most southern Ahupua'a of Na Wai 'Ehā. Waikapū means "waters of the conch", which was named after a sacred conch that was blown in the upland reaches of the valley by Hawaiians of that district.

Waikapū was said to be a meeting place between fishers and farmers, connecting Mā'alaea Bay to the farming uplands of Kahālāwai.



Ahupua'a: Waikapū



Guiding Philosophy



INTACT
Life and Culture prior to
Western Contact

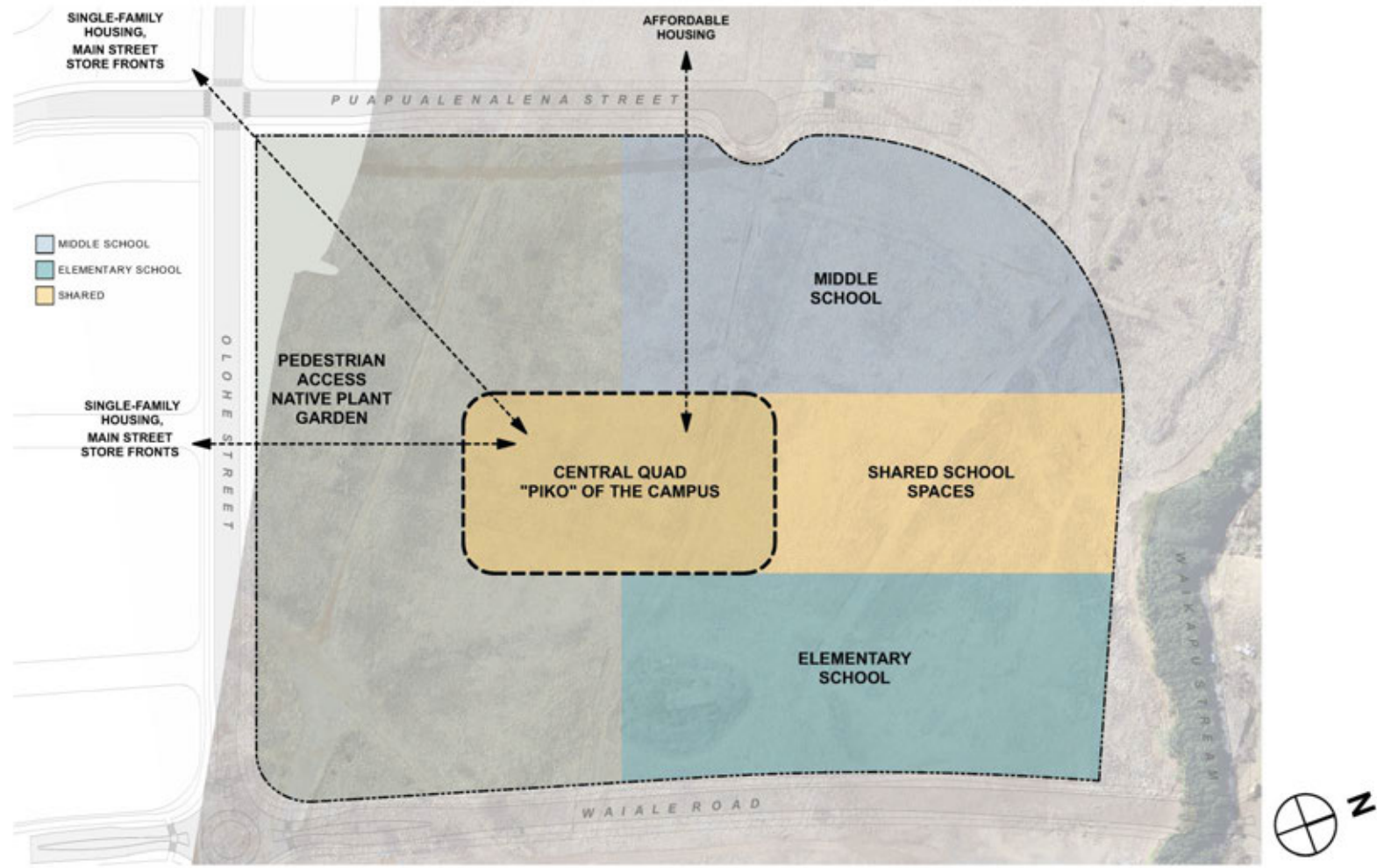
CONTACT
The shift and loss of land and
Traditional Practices

RESTORE
The Hawaiian Renaissance
and sharing of knowledge for
generations to come



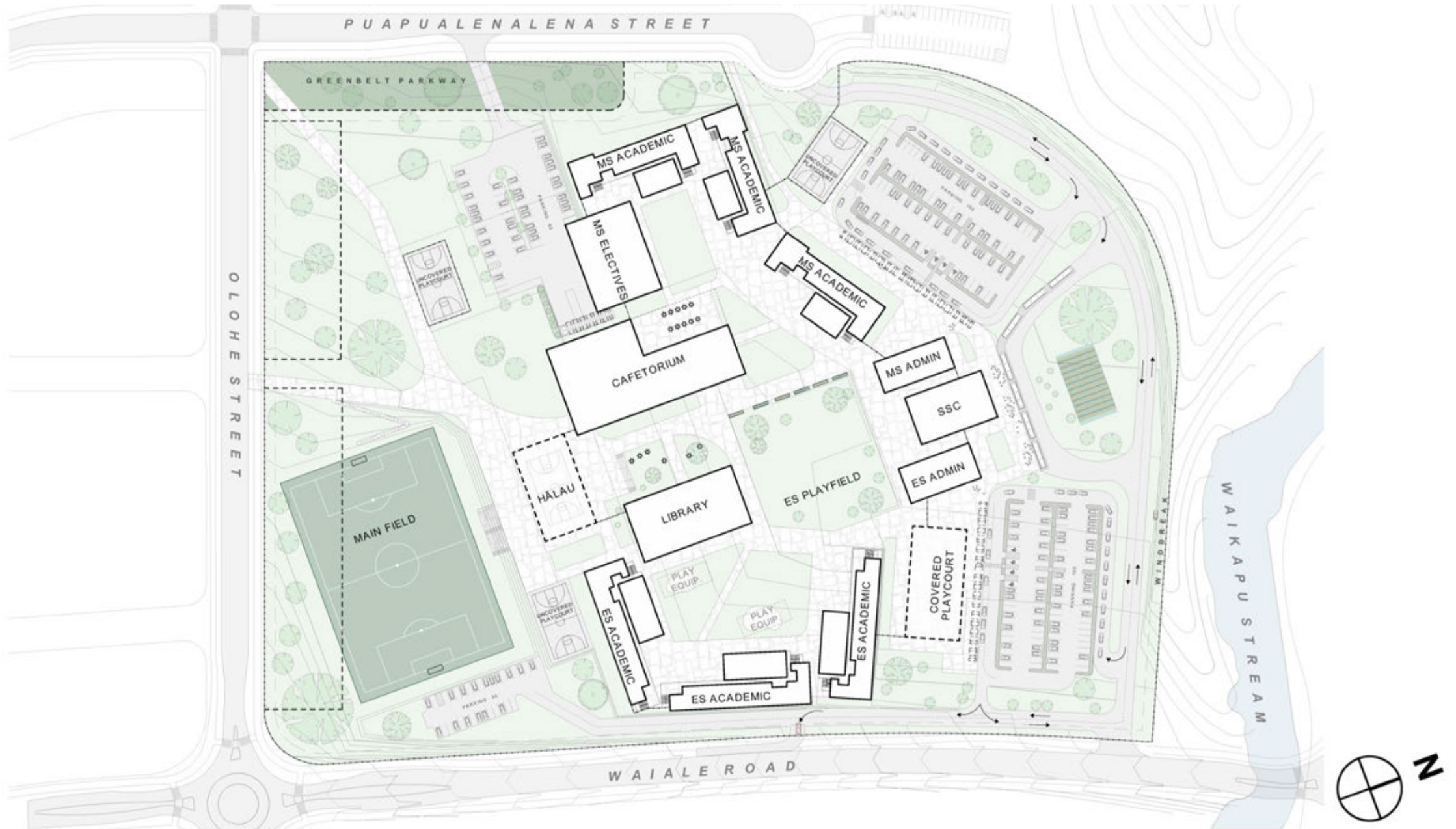
Conceptual Diagram

Initial Area Zoning



Proposed Concept Master Site Plan

900 MS + 750 ES



Aerial View from Puapualenalena Street



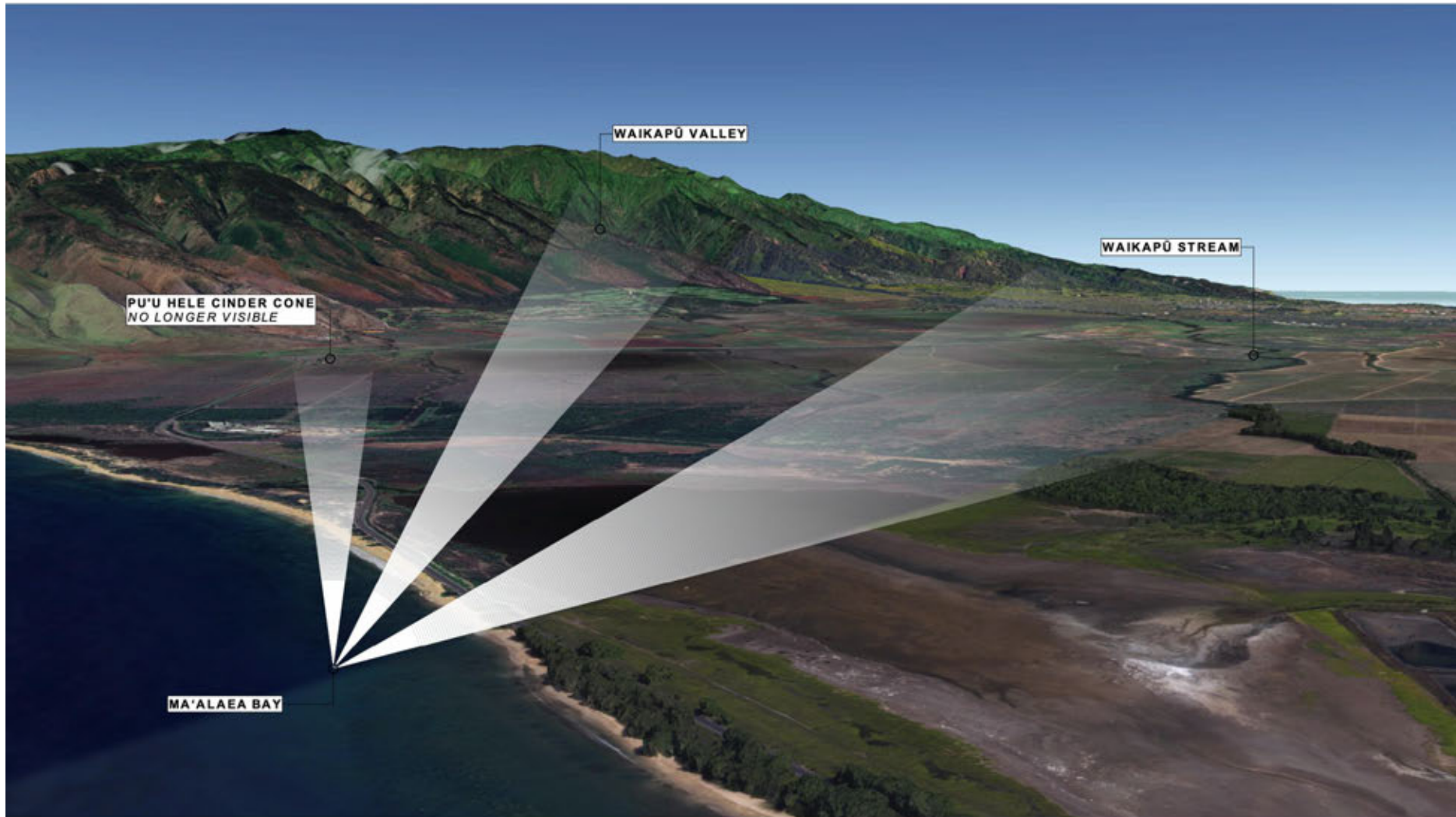
Piko View from Main Street Entrance



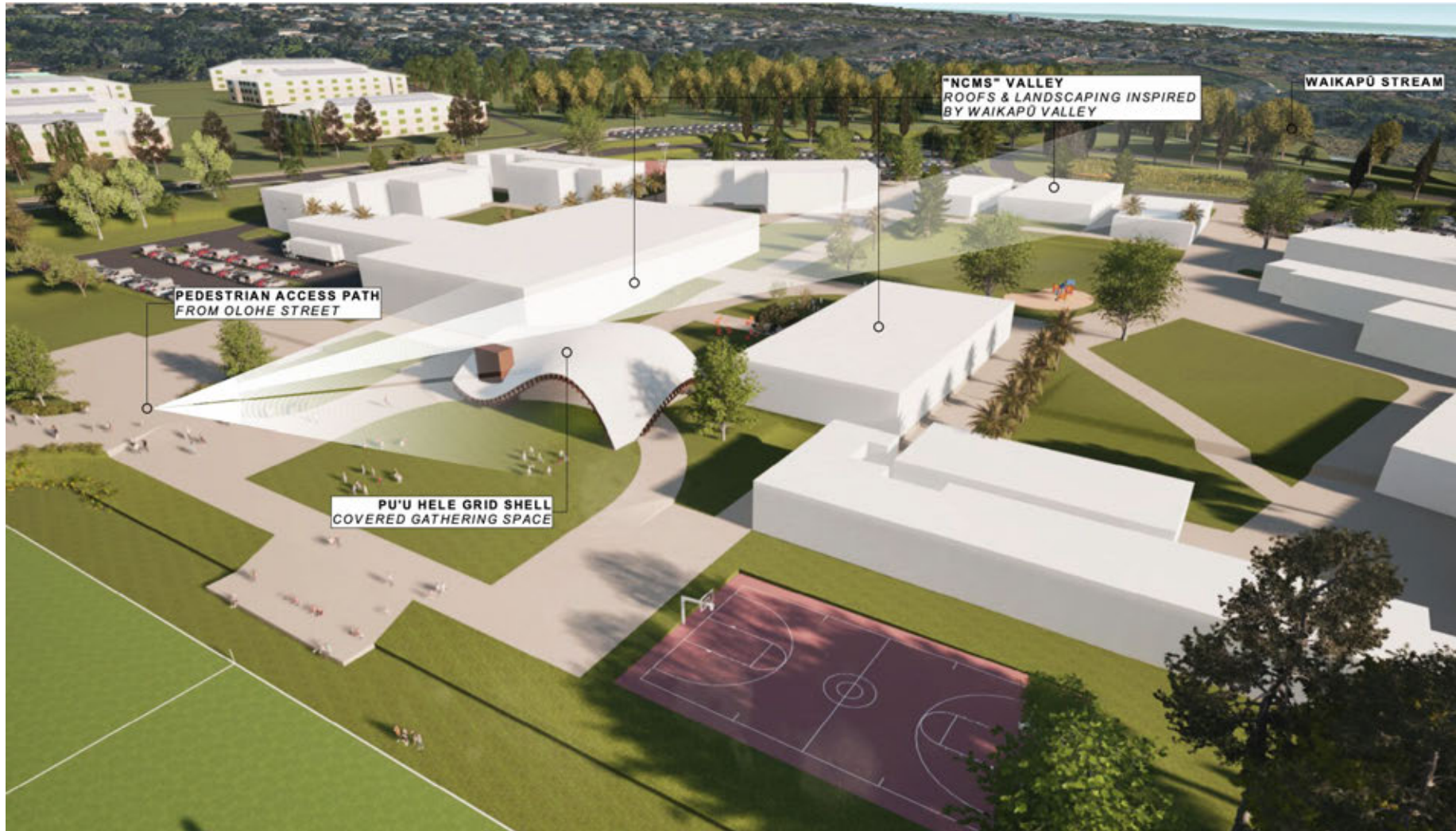
Piko View from Playfield



Pu'u Hele - "Piko" Inspiration



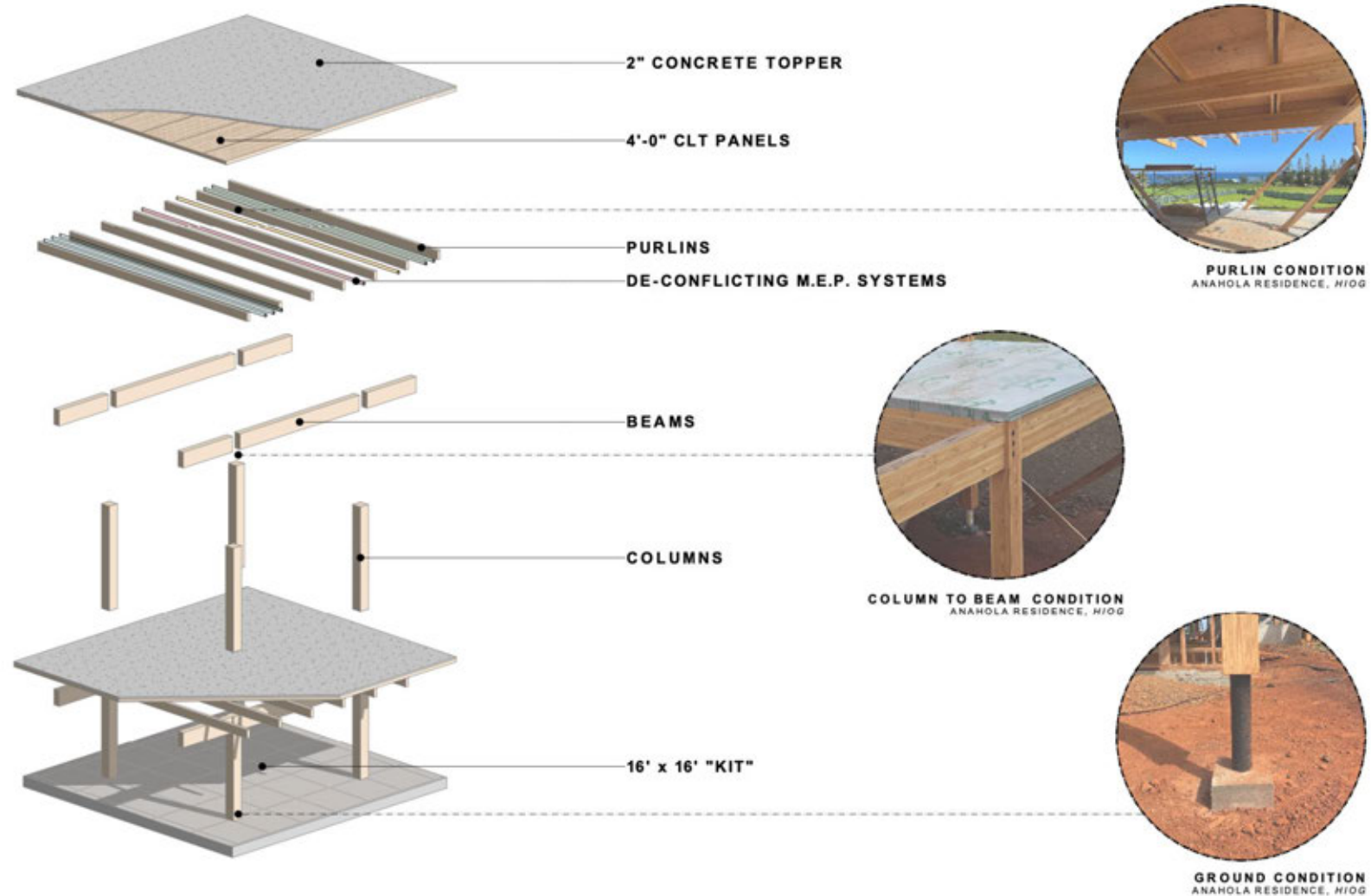
Pu'u Hele - "Piko" Inspiration



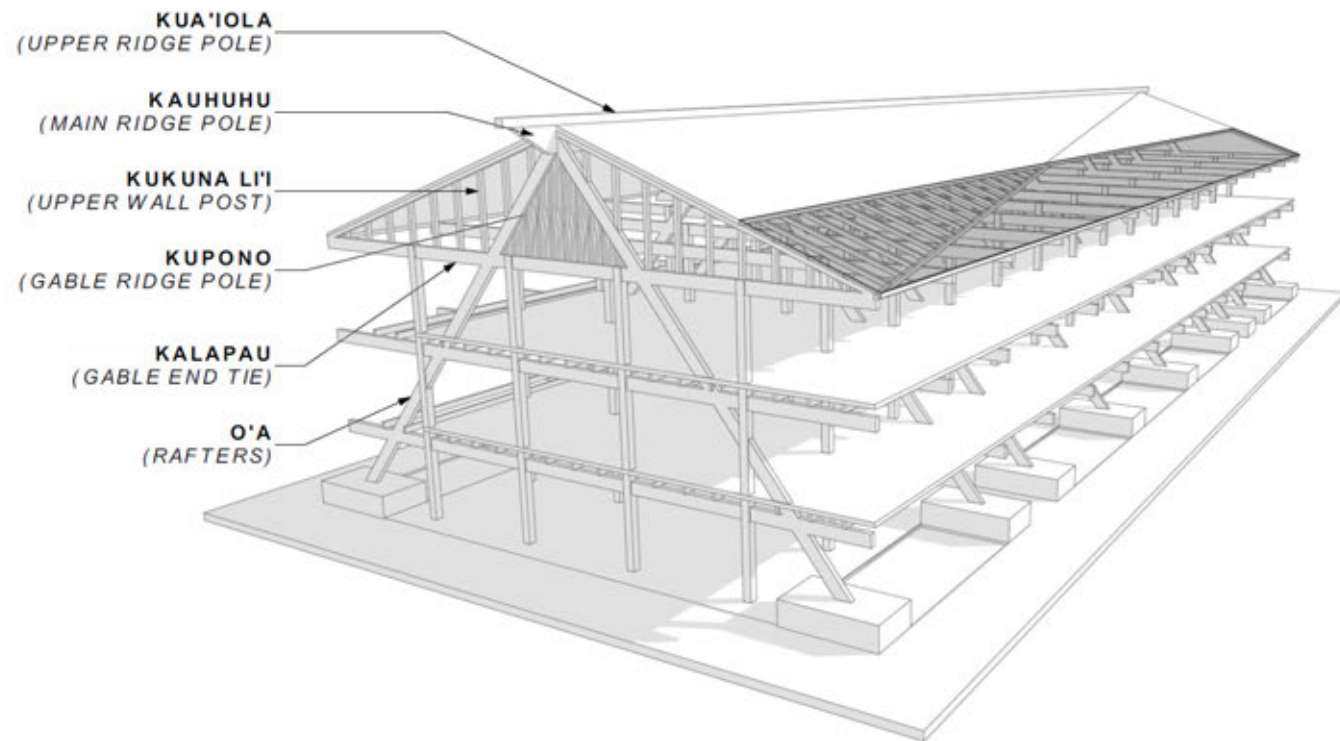
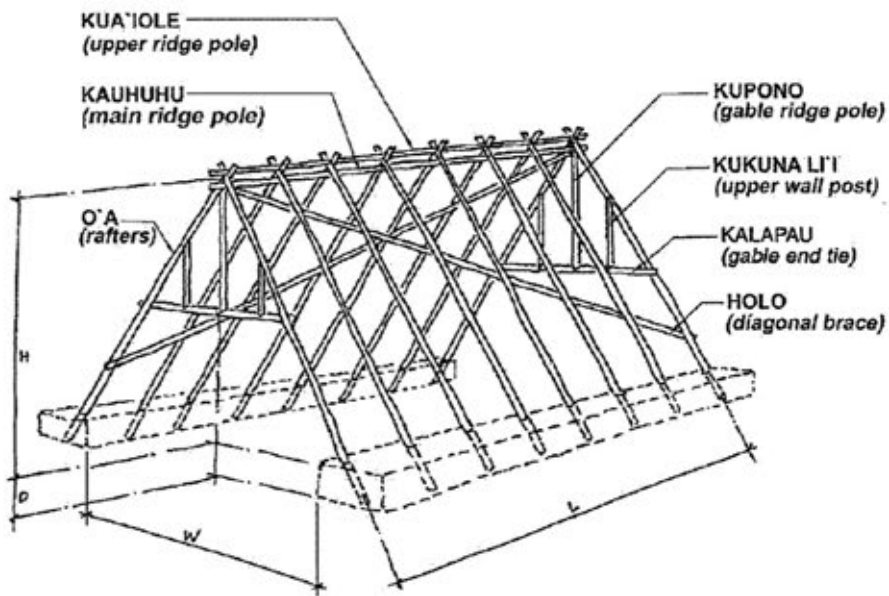
Piko Interior View



Kit-of-Modules Standard Classroom Design



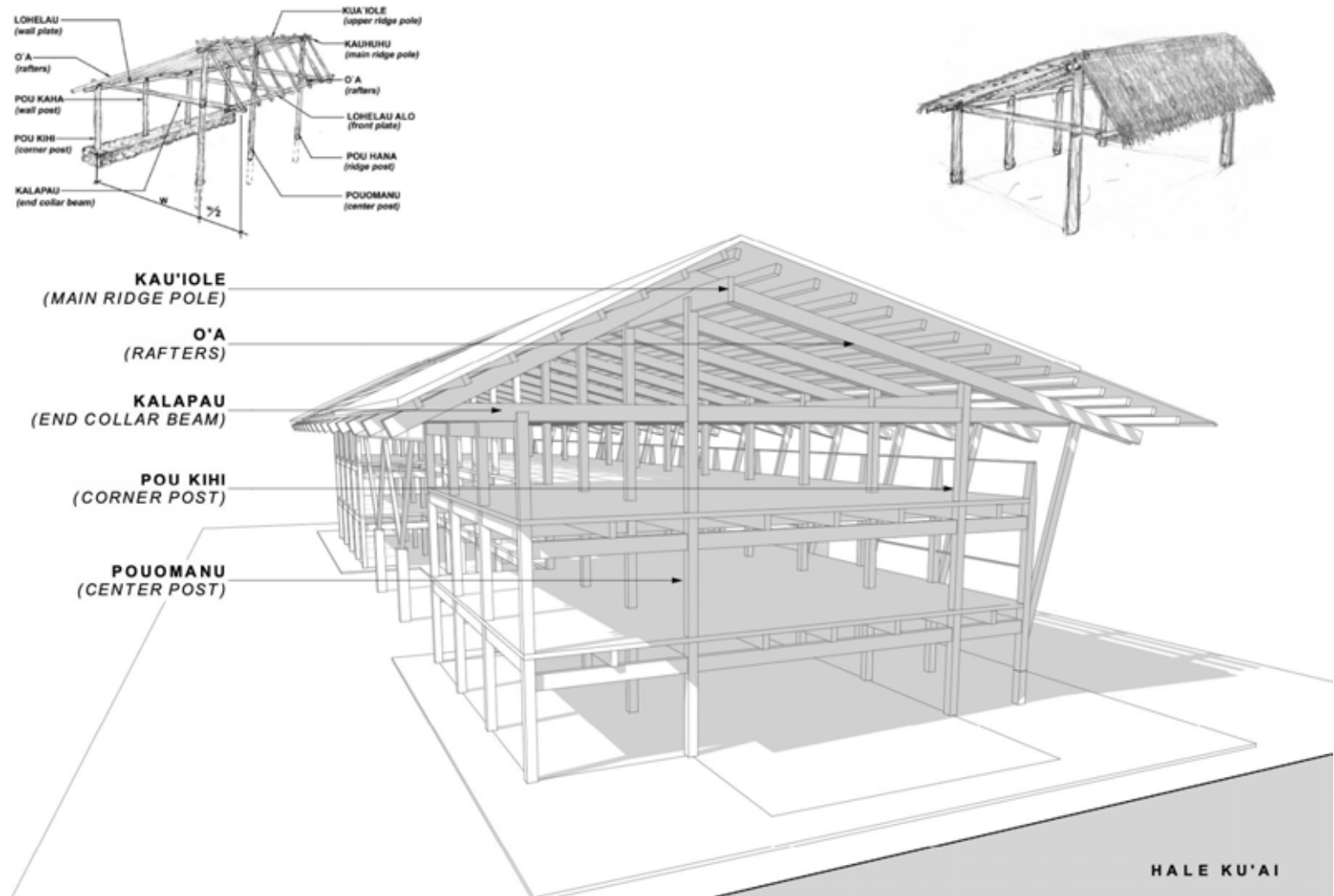
Inspiration from Hawaiian Traditional Structure



Form Study



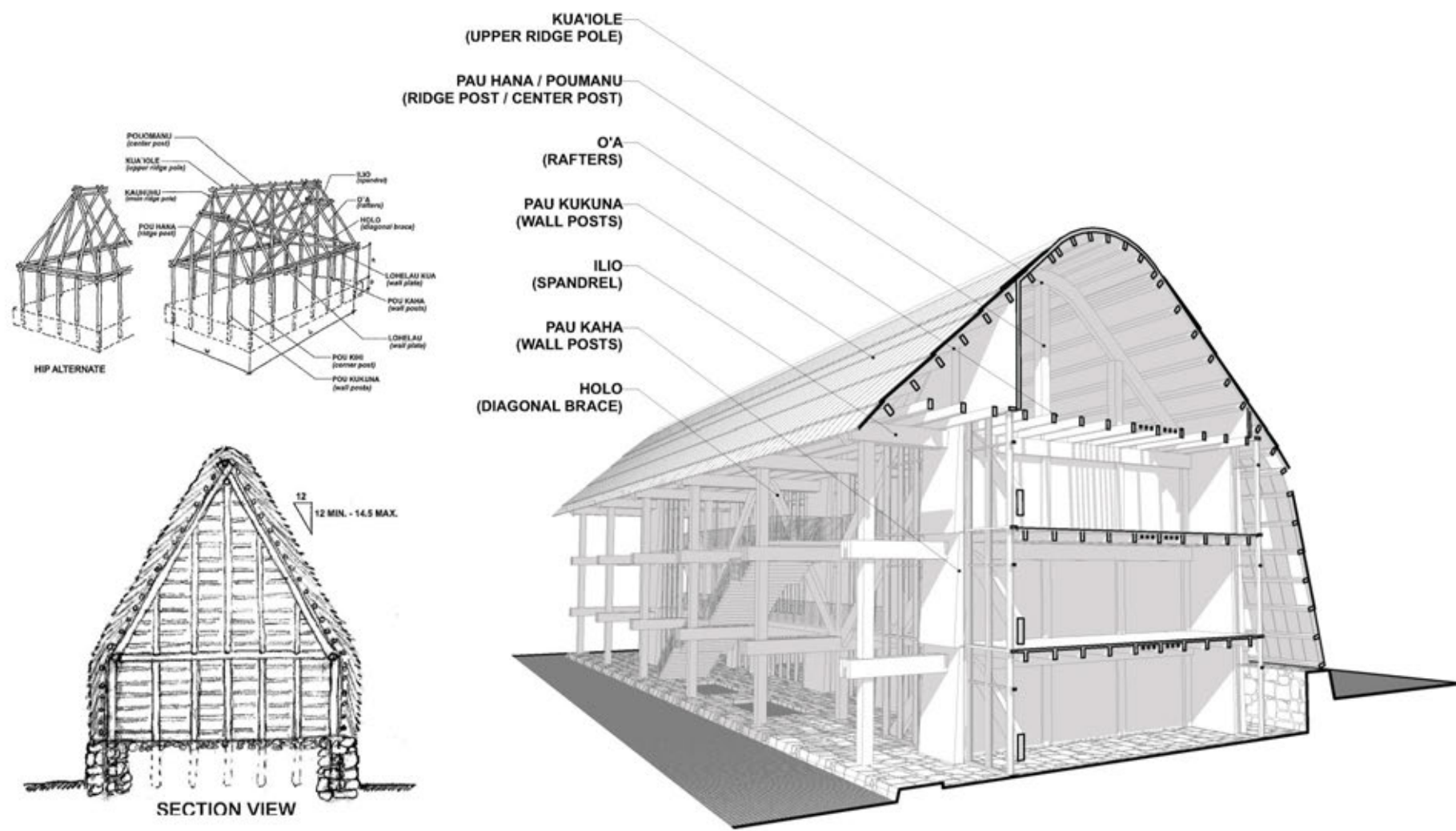
Inspiration from Hawaiian Traditional Structure



Form Study



Inspiration from Hawaiian Traditional Structure

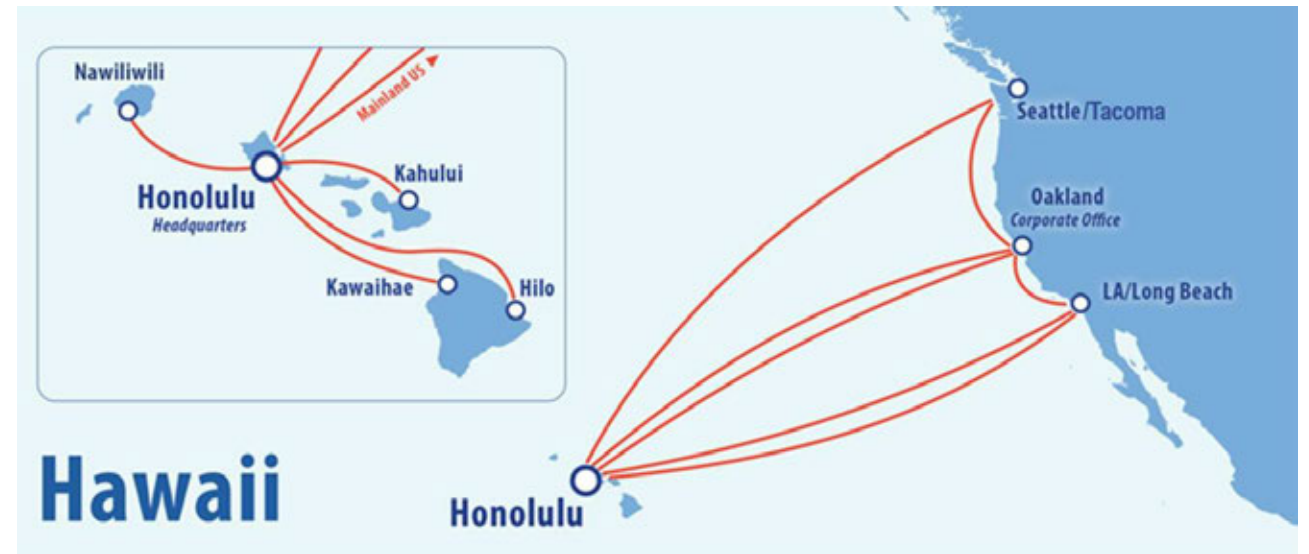


Form Study

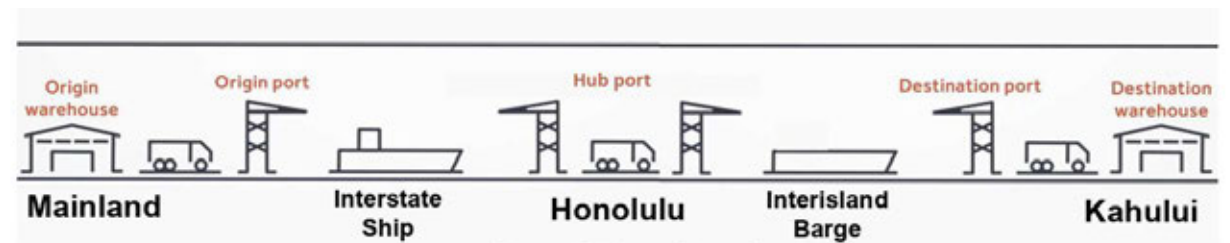


Hawaii's Unique Struggle - Shipping

Hawaii imports roughly 80 % of essential goods.



From Matson

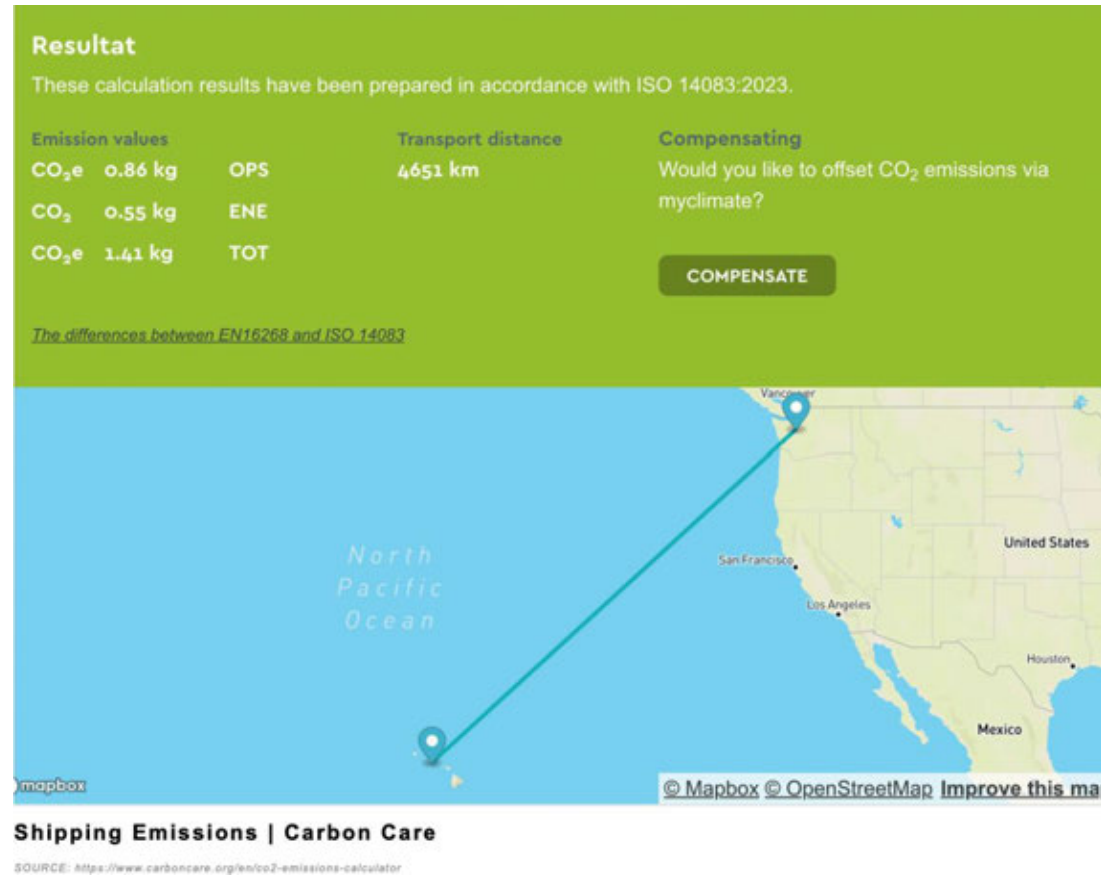


Cargo is transferred from ship to barge. It does not leave the terminal.

Hawaii's Unique Struggle - Shipping

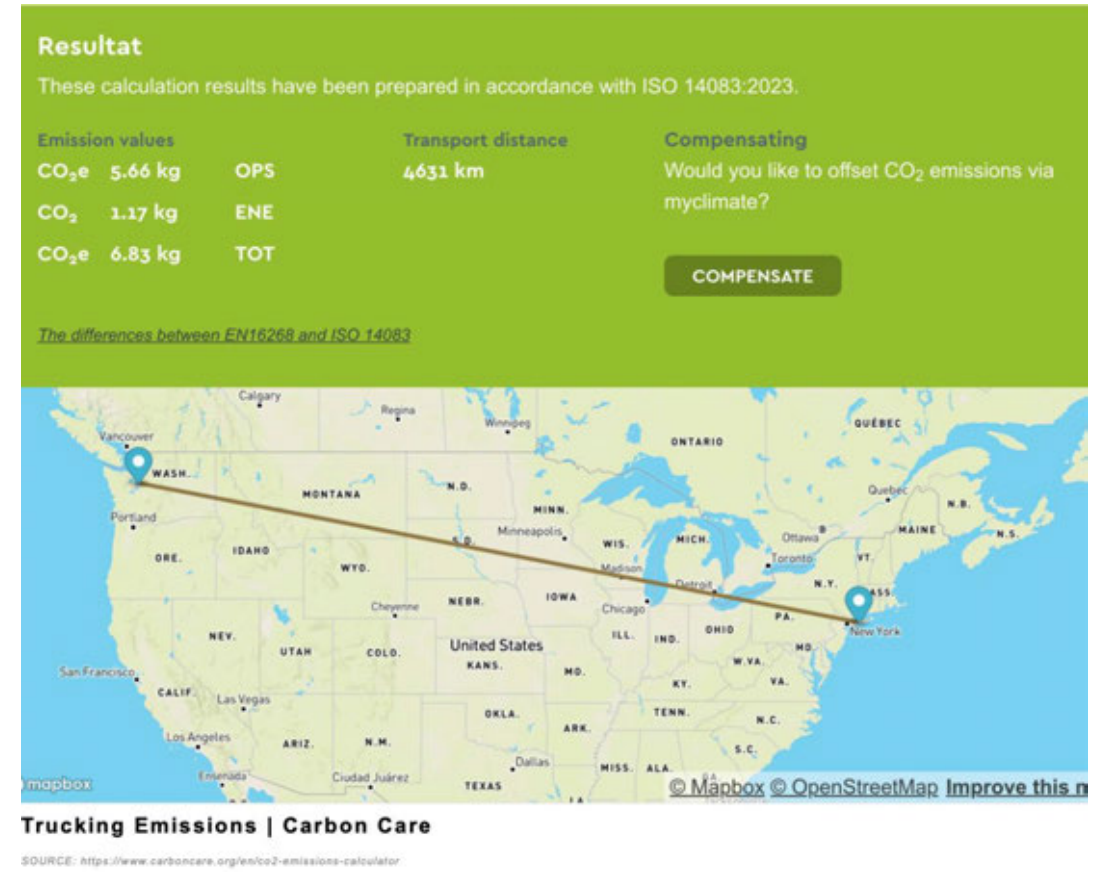
Shipping cross-ocean:

- Seattle to Hawaii = 1.41 kg CO₂e



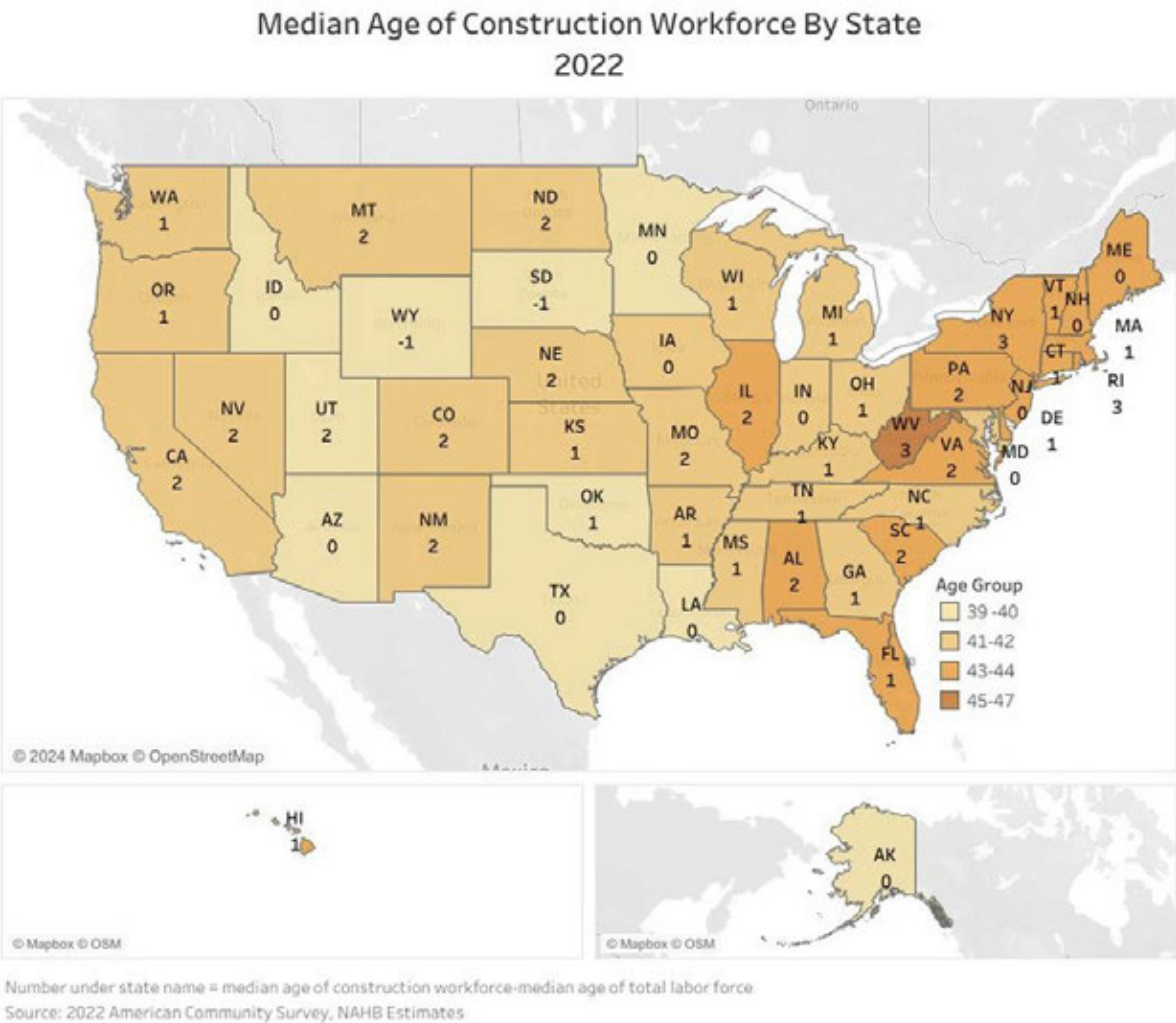
Shipping cross-country:

- Seattle to Long Island = 6.83 kg CO₂e



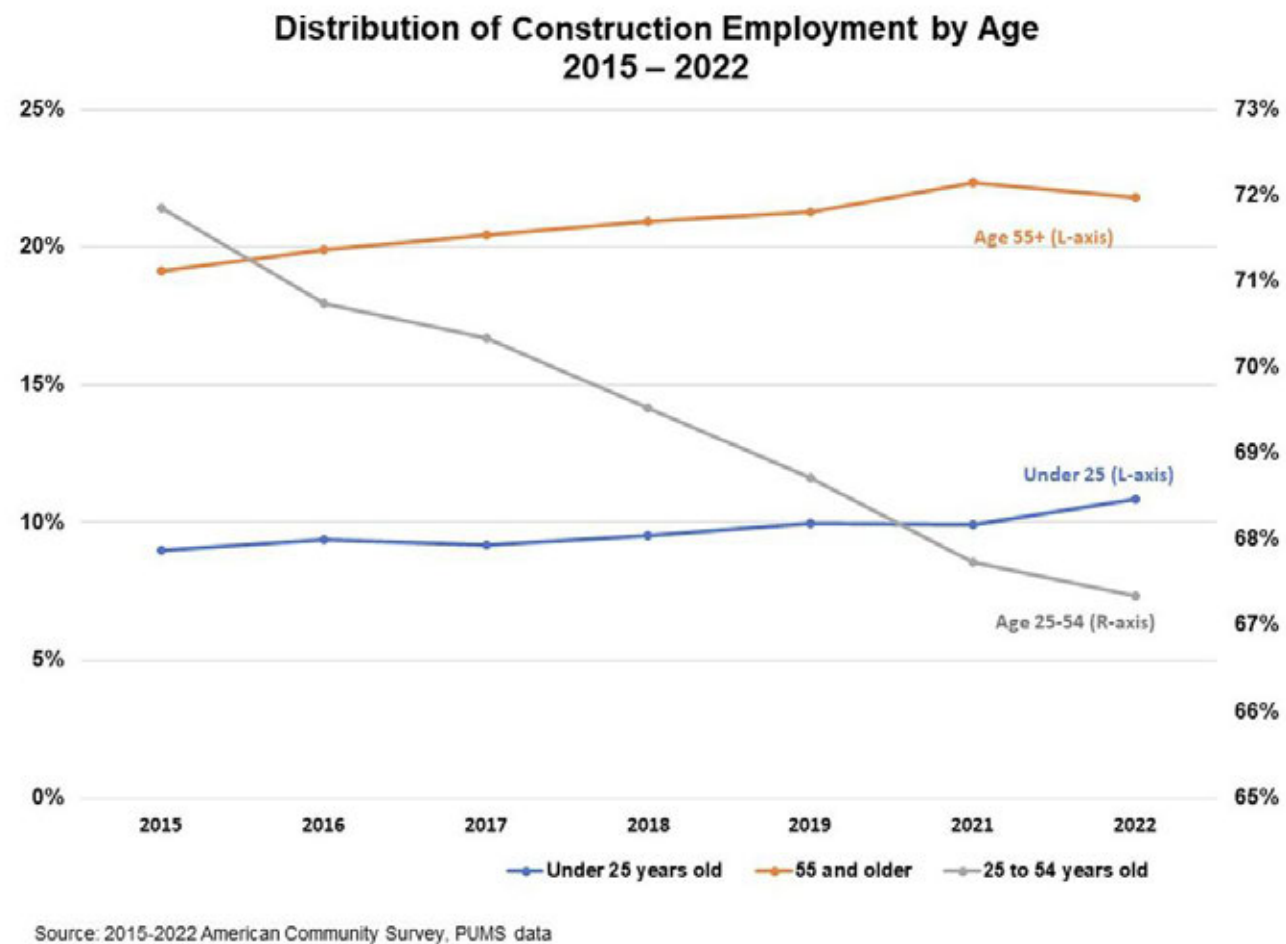
Hawaii's Unique Struggle - Labor & Workforce

Hawaii has one of the oldest Median Age of Construction Workforce in the country.



Hawaii's Unique Struggle - Labor & Workforce

For every 7 workers retiring, 1 worker is entering the workforce.



Mahalo!



NewCentralMauiSchool.org



SPEAKERS

Simon Hyoun

Softwood Lumber Board

hyoun@softwoodlumberboard.org

Collin Buntrock

USDA Forest Service

collin.buntrock@usda.gov

Paul Lund

Hord Coplan Macht

plund@hcm2.com

Jason Bing

Ann Arbor Public Schools

bingj@aaps.k12.mi.us

Alyssa Leeviraphan

Mahlum

alyssal@mahlum.com

Riki Fujitani

Hawaii School Facilities Authority

riki.fujitani@hisfa.org

➤ QUESTIONS?

This concludes The American
Institute of Architects Continuing
Education Systems Course

Simon Hyoun

Softwood Lumber Board

hyoun@softwoodlumberboard.org