WMU'S MASS TIMBER ADVENTURE

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CHRISTMAN
BUILDING SINCE 1894

BRITT, PETERS AND ASSOCIATES INC.
consulting engineers

MILLIES
ENGINEERING GROUP

fishbeck
Engineers | Architects | Scientists | Constructors

VIRIDIS
Design Group

WMU'S MASS TIMBER ADVENTURE

1. SPEED
2. AFFORDABILITY
3. AN EXCEPTIONAL STUDENT EXPERIENCE
4. ENVIRONMENTAL SUSTAINABILITY

Mass Timber Primer

1. What is the **definition** of mass timber?
2. What are the **speed** advantages of prefabrication (including mass timber)?
3. What are some **affordability** techniques associated with mass timber?
4. What aspects of mass timber help create an **exceptional student experience**?
5. What are the **environmental sustainability** advantages of mass timber?

WESTERN MICHIGAN UNIVERSITY REQUIREMENTS

First occupancy Fall 2026

Support WMU Strategic Plan

"We integrate sustainability into all aspects of university functions and invest in this commitment at the highest level of institutional decision-making."

Rate structure in-line with lower-cost higher ed housing

Support recruitment and retention of first-year students

Use nearby amenities to inspire building architecture

Ensure a diverse housing mix

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WESTERN MICHIGAN UNIVERSITY PROJECT AND PROGRAM GOALS

CREATE A SENSE OF COMMUNITY WHERE STUDENTS ARE COMPELLED TO GATHER, PLAY AND LEARN

MAKE USE OF BEAUTIFUL OUTDOORS SPACES AND WONDERFUL VIEWS

1,000 DOUBLE AND SINGLE OCCUPANCY BEDS

SAME FOOTPRINT OF CURRENT BUILDING AND PARKING LOTS

INCLUSIVE, SECURE AND ACCESSIBLE

"LIVING ON CAMPUS IS THE BEST WAY FOR FIRST YEAR STUDENTS TO BECOME ENGAGED IN COLLEGE LIFE, FORM DIVERSE SOCIAL NETWORKS AND EASILY PARTICIPATE IN ACADEMIC ACTIVITIES AND LEARNING OPPORTUNITIES.

BY ESTABLISHING STRONG SOCIAL AND ACADEMIC CONNECTIONS, CAMPUS RESIDENTS ARE MORE LIKELY TO DEVELOP A SENSE OF BELONGING AND ACHIEVE THEIR EDUCATIONAL GOALS."

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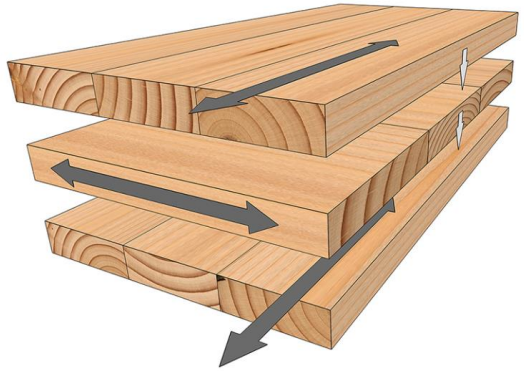
What is Mass Timber?

Mass timber buildings are constructed with large, prefabricated, multi-layered wood structural components. This includes solid timber floor and roof panels, as well as timber post and beam framing, or even solid timber walls. Solid panels can range between 4 inches and 12 inches in thickness. Typical mass timber products include cross-laminated timber (CLT), nail-laminated timber (NLT), glue-laminated timber (Glulam or GLT), dowel-laminated lumber (DLT), mass plywood panels, and structural composite lumber (SCL)—all renewable and sustainable engineered wood products. Because of its strength and inherent fire resistance, mass timber offers an alternative to fossil fuel-intensive materials for many applications.

Wood Innovation Design Center, Michael Green Architects

Cross-laminated timber (CLT)



Floors, ceilings, walls

Nail-laminated timber (NLT)

Floors, ceilings, walls

Glue-laminated timber (Glulam)

Columns & beams

Structural composite lumber (SCL)

Laminated veneer lumber (LVL)

Parallel strand lumber (PSL)

Laminated strand lumber (LSL)

Columns & beams

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1. SPEED

- Procurement Process: 6 weeks including GMP
- Prefabrication: Interior walls, exterior walls, and floors/ceilings
- Design / Build Process: 2 years start to finish, Design and Construction, 1,019 BEDS / 274,400 GSF

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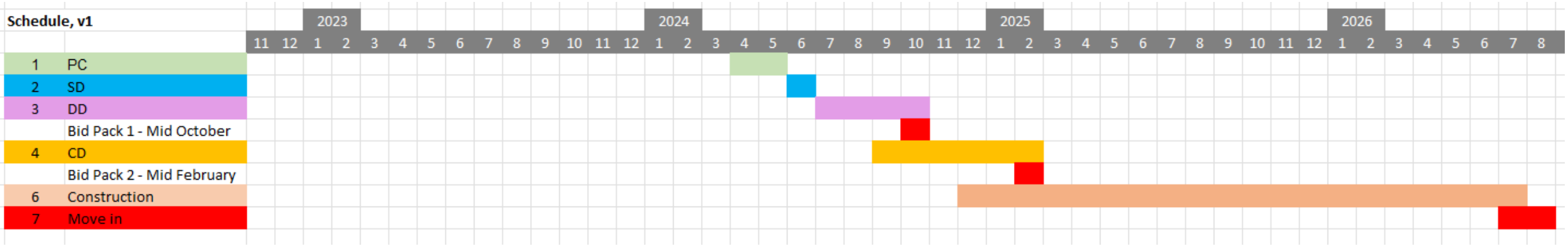
Procurement & DB Process

Design: 1.5 + 7.5 months



Construction: 21 months

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Procurement Process

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Procurement Process

Space Legend
- Single Unit
- Super Single Unit
- Double Unit
- Gathering
- Community
- Support
- Staff
- Staff Apartments
- Student Communities

1. Entry Lobby
2. Central Lounge
3. Community RR
4. Vending
5. Community Laundry
6. Community Kitchen
7. Community Stair
8. Study Pod
9. Multi-Purpose Room
10. Multi-Purpose Storage
11. Common Storage
12. Kitchen
13. Central Admin.
14. Mail Room
15. Package Pick-Up
16. Fitness/Wellness Studios
17. Trash/Recycling
18. Electrical Room
19. Bottle Filler Station
20. Bathroom Pods
21. Mechanical Support
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23. IT Room
24. Study Lounge
25. Mechanical Room
26. Fire Pump Room
27. Pod Lounge
28. Single Unit
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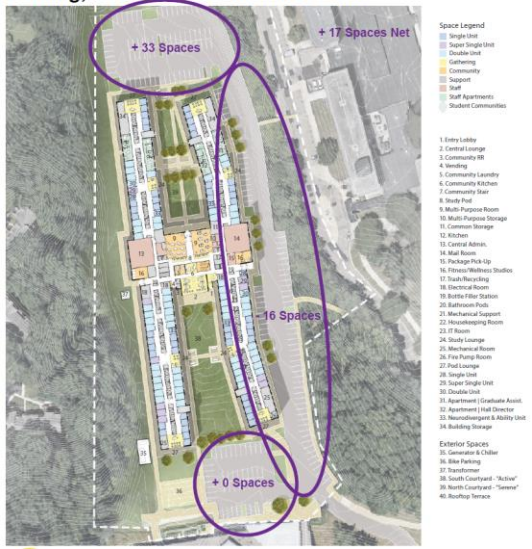
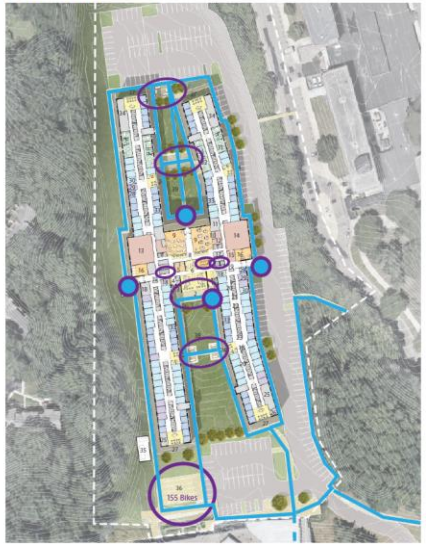
30. Double Unit
31. Apartment | Graduate Assist.
32. Apartment | Hall Director
33. Neurodivergent & Ability Unit
34. Building Storage

Exterior Spaces
35. Generator & Chiller
36. Bike Parking
37. Transformer
38. South Courtyard - "Active"
39. North Courtyard - "Serene"
40. Rooftop Terrace

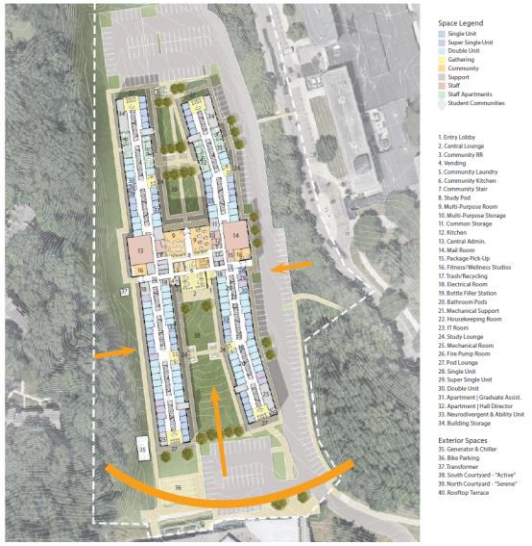
Parking, Service, Move-In / Move Out



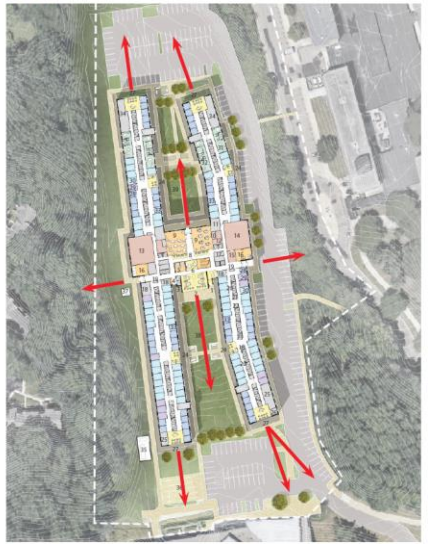
Pedestrian & Bike



Solar



Views



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Procurement Process

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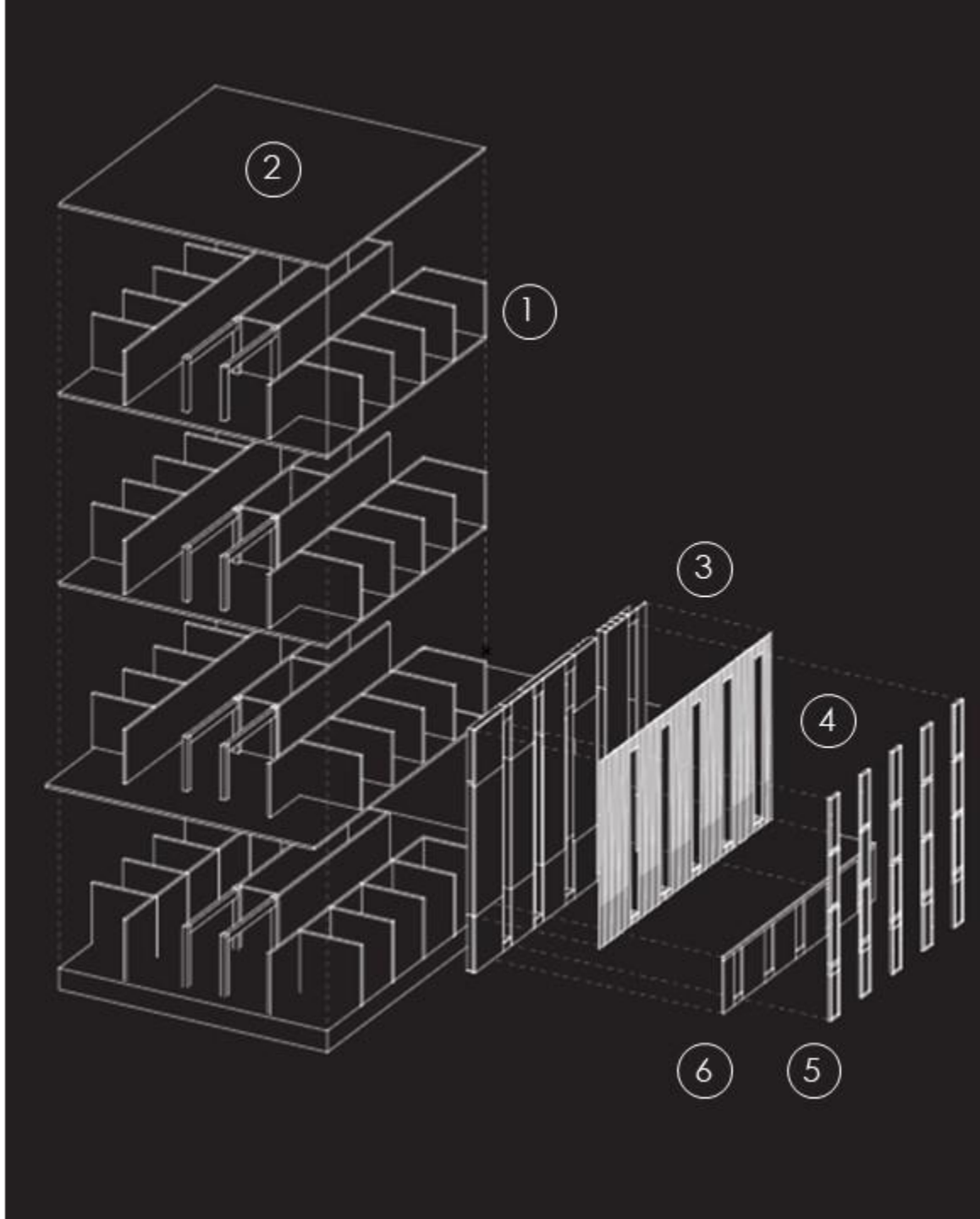
Prefabrication

- **Interior CFMS Wall Panels:** Fabricated off-site and swung into place.
- **CLT Floor / Ceiling Slabs:** 3-ply cross-laminated timber (CLT) slabs installed rapidly to create each floor.
- **Exterior Wall Panels:** Large 11-foot-wide, 4-story-tall panels consisting of 6-inch metal studs and 3-inch insulated metal panels (IMPs)

Construction Sequencing

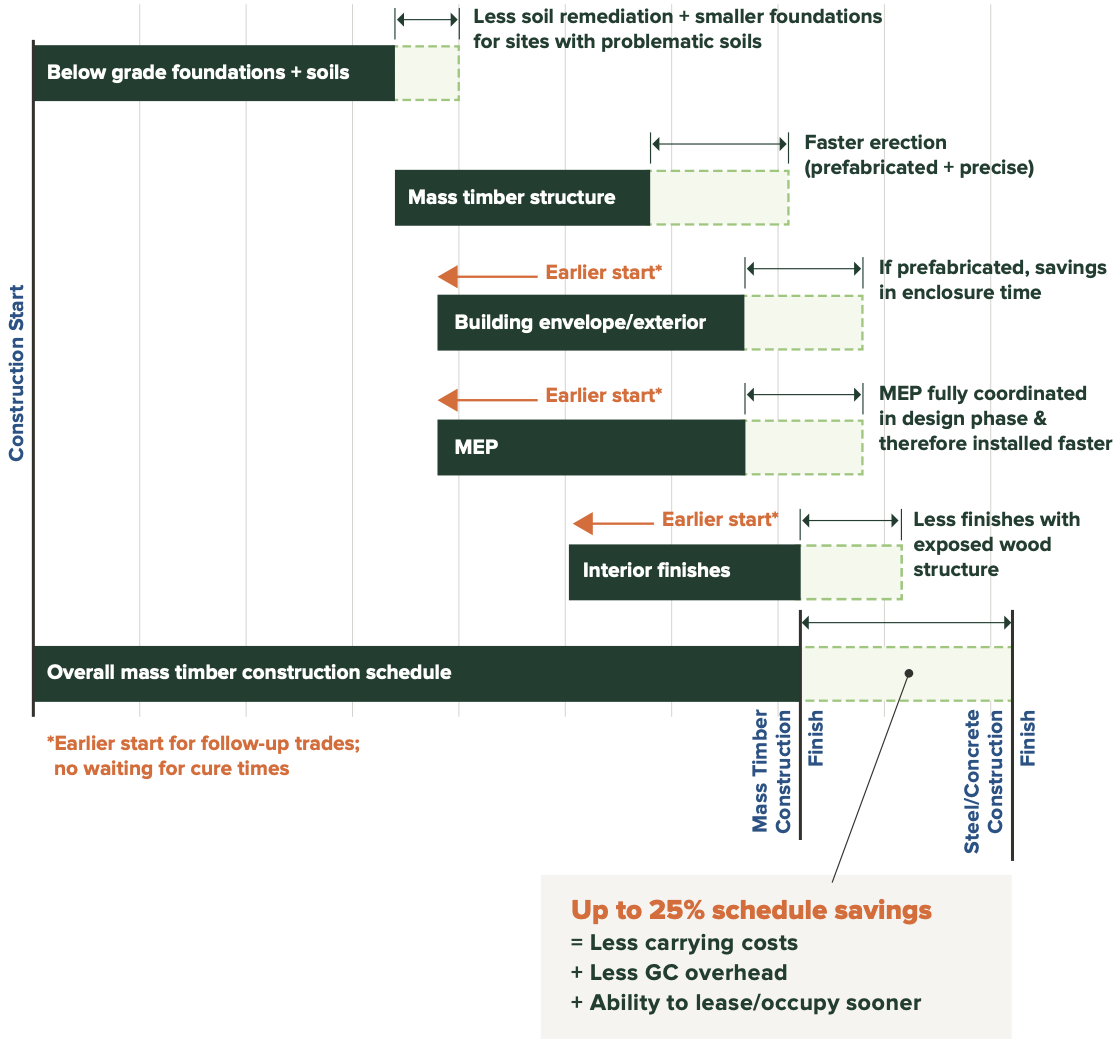


1.prefab metal interior walls
2. 3 ply CLT floor slabs
3. prefab exterior metal wall panels with 3" IMP (4 story tall)
4. full height metal panel skin
5. Vertical punched storefront windows full height flr to ceiling
6. Face brick

Construction Schedule Savings

Compressing the Typical Construction Schedule with Mass Timber [13, 15, 16]

Look for these potential schedule savings in comparison to steel and concrete



Up to 25% schedule savings
= Less carrying costs
+ Less GC overhead
+ Ability to lease/occupy sooner

Credit: WoodWorks

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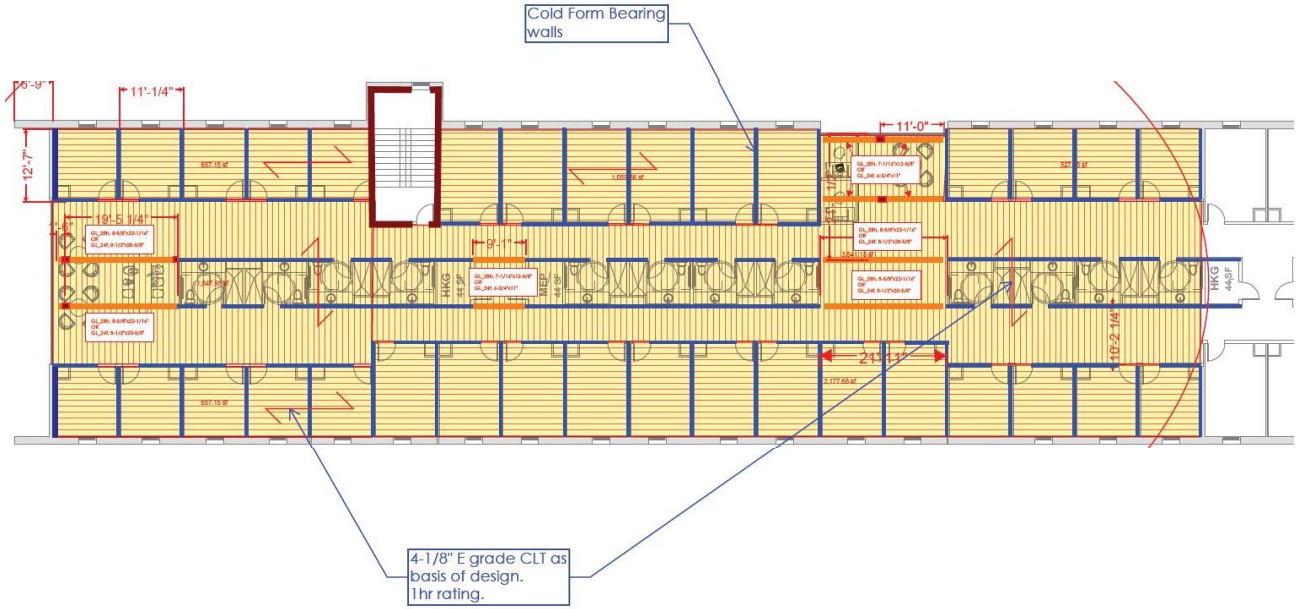
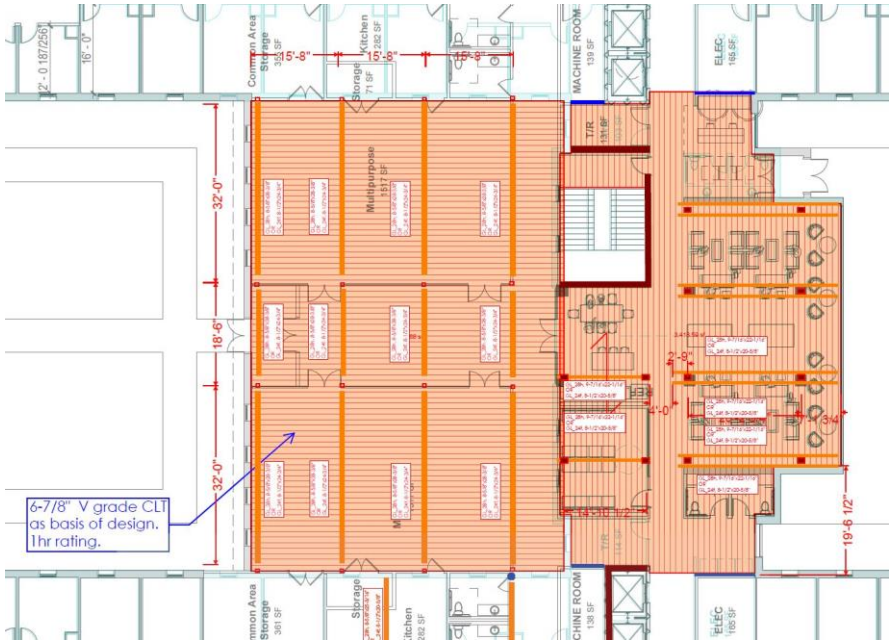
2. AFFORDABILITY

- $330 / SQFT, construction cost
- Understanding maximum spans in relation to plies
- Designing toward mass timber early in the process
- Optimizing the number of columns, beams, and connections
- Utilizing design / build / manufacturing team members familiar with mass timber

Understanding Maximum Spans in relation to Plies

- RESIDENTIAL WINGS
  - 3 PLY CLT FLOOR SLABS OVER CFMS
  - 7 PLY CLT EXIT STAIR WALLS
- CENTRAL CORE
  - 5 PLY CLT





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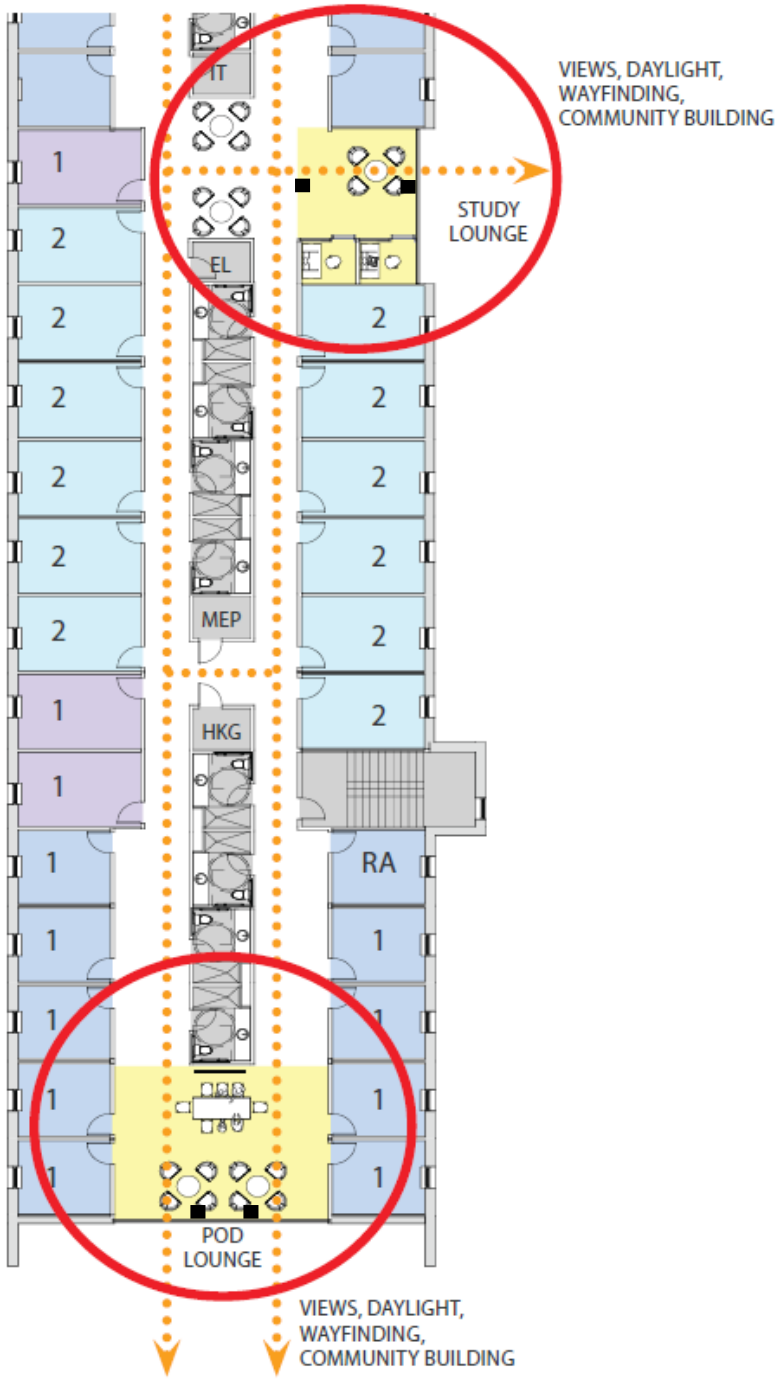
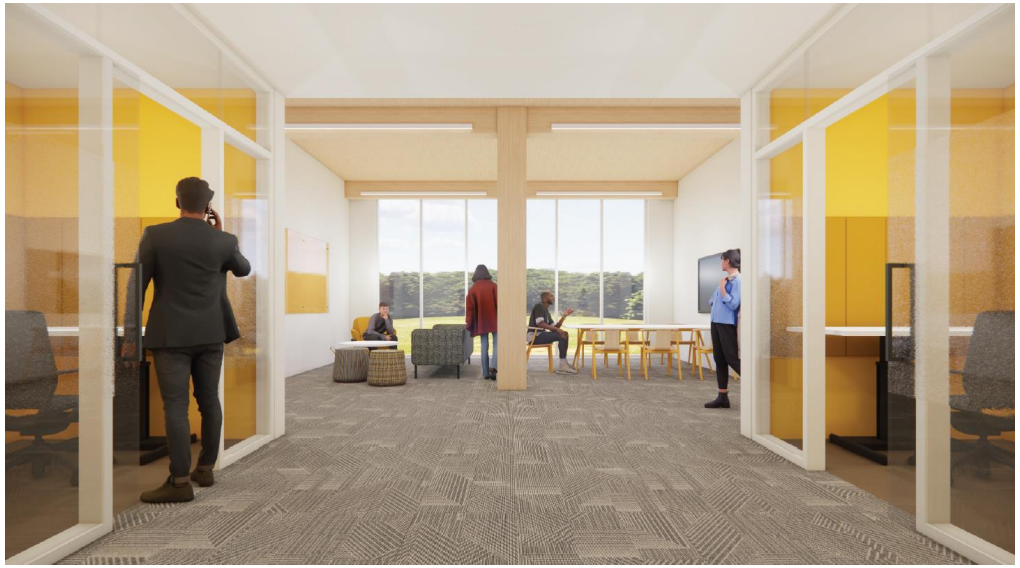
Designing Toward Mass Timber Early





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Optimizing the number of columns, beams, and connections

A walkable roof, roof pavers and handrail over the MP rooms would add approximately $250,000 to the project.

Space Legend
- Single Unit
- Super Single Unit
- Double Unit
- Gathering
- Community
- Support
- Staff
- Staff Apartments
- Student Communities

Interior Spaces
1. Entry Lobby
2. Central Lounge
3. Community RR
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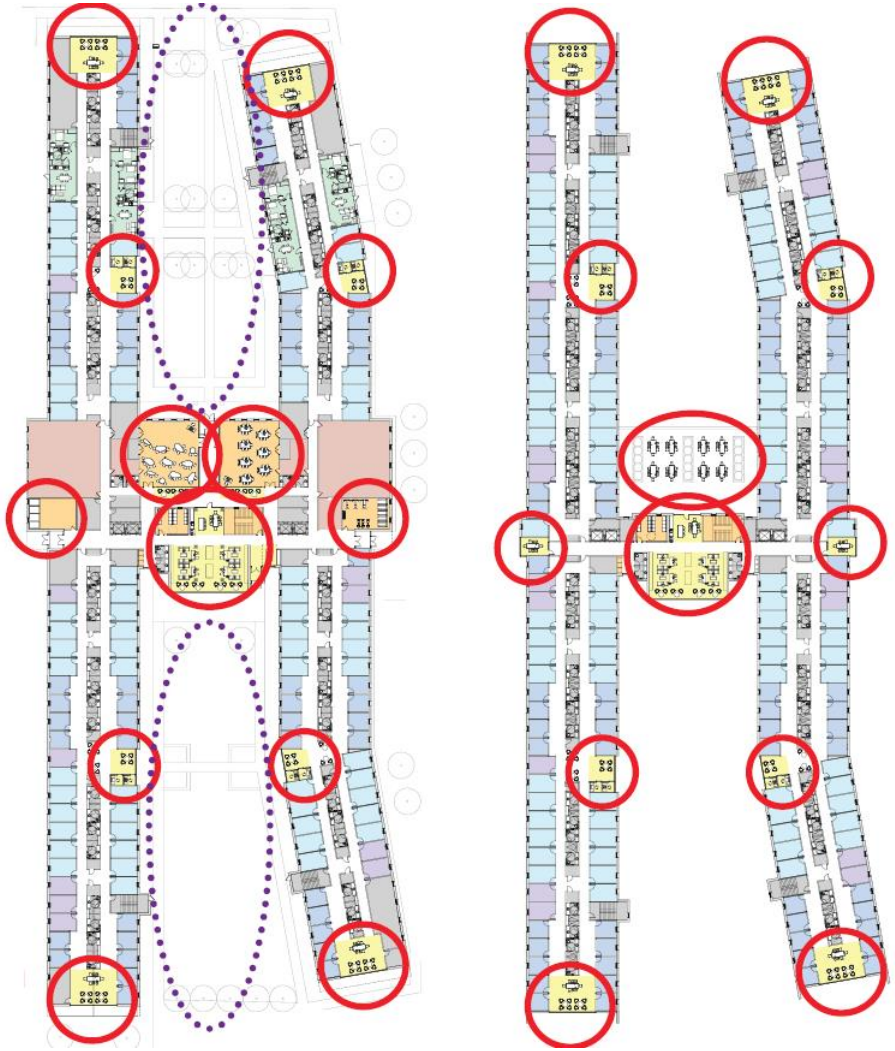

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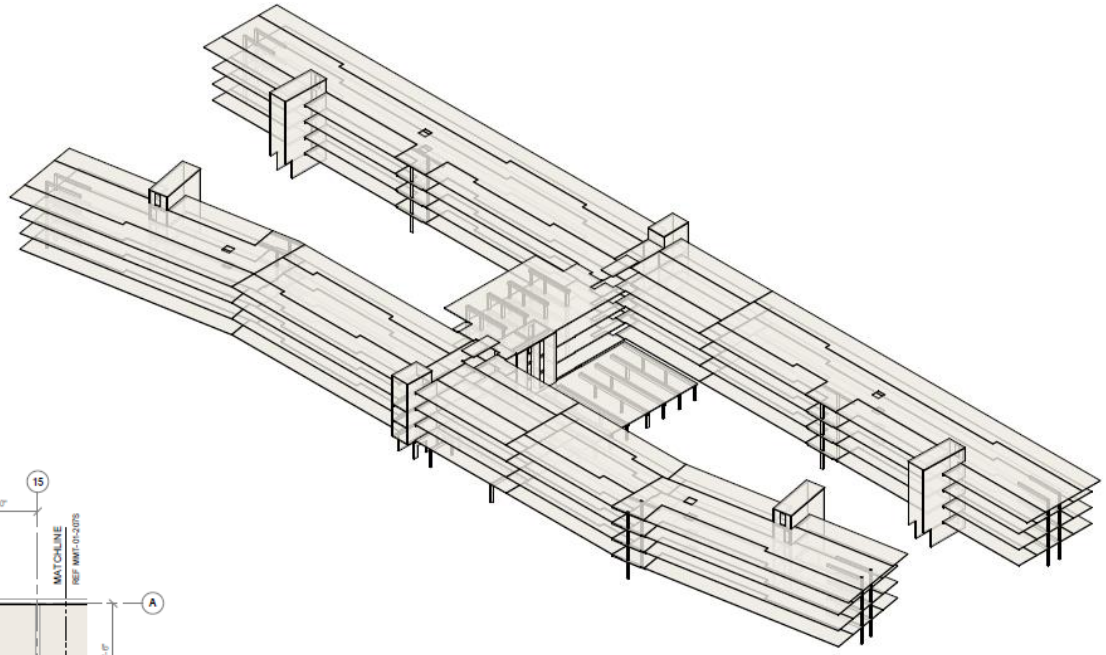
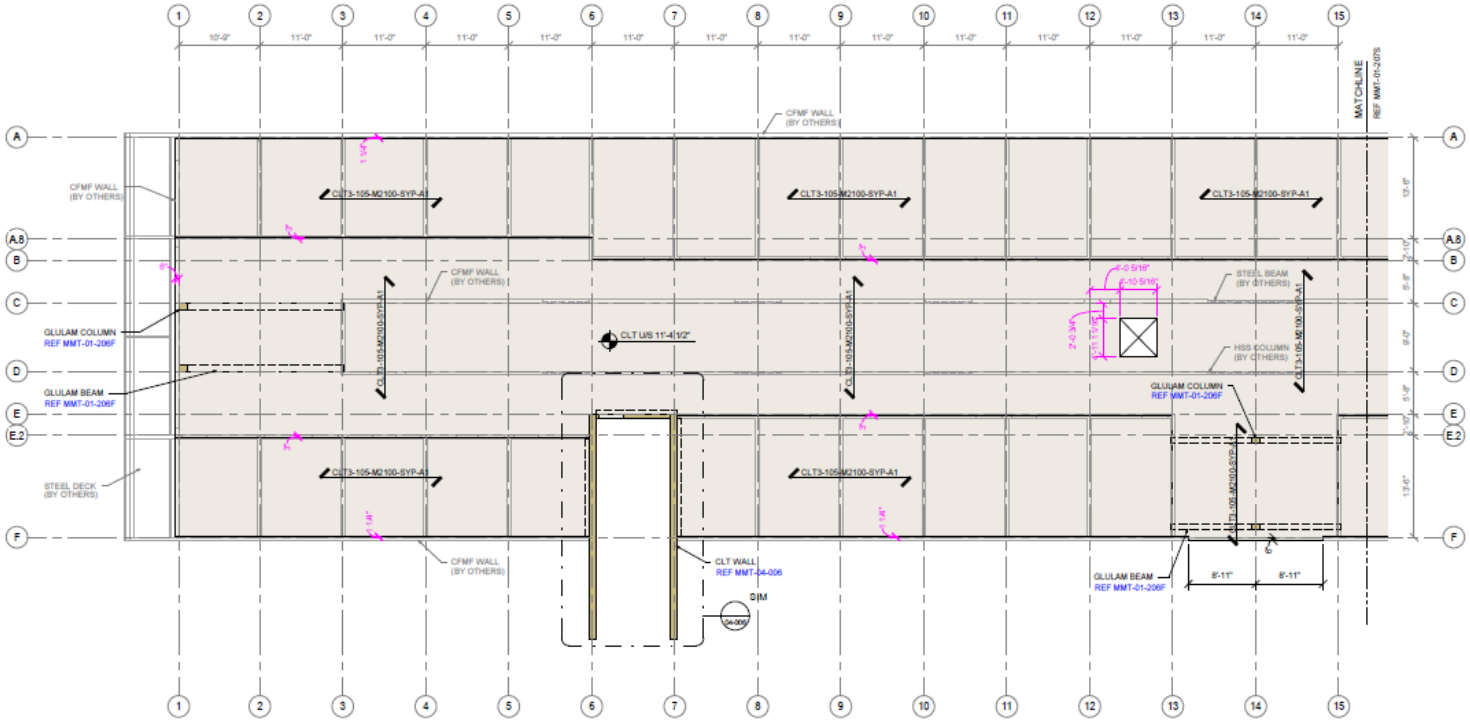
Design / Build / Manufacturing

1. Early Design, Cost Estimating, and Bidding
2. Coordination after BP1 / during BP2
   a. Revit model sharing
   b. CLT / CFMF Wall panels
   c. CLT floor / ceiling panels
   d. Glulam Sizing and Connections
   e. CLT Penetrations
3. Submittal Process: LOD Model Reviews



3D VIEW



Western Michigan University

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Design / Build / Manufacturing

1. Early Design, Cost Estimating, and Bidding
2. Coordination after BP1 / during BP2
   a. Revit model sharing
   b. CLT / CFMF Wall panels
   c. CLT floor / ceiling panels
   d. Glulam Sizing and Connections
   e. CLT Penetrations
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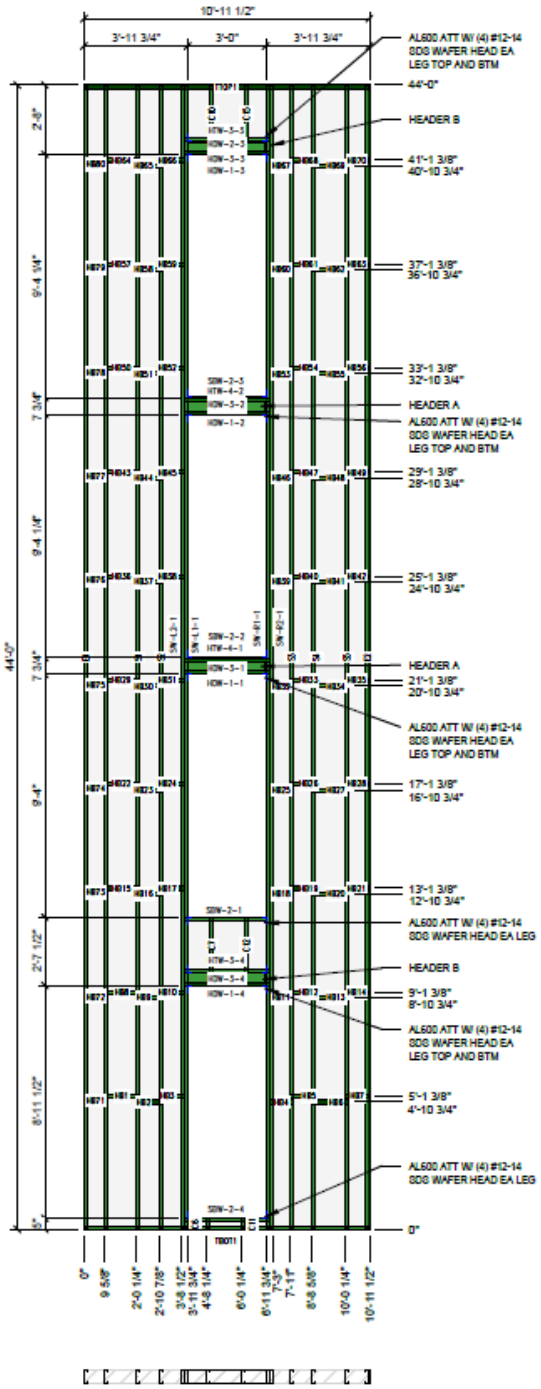

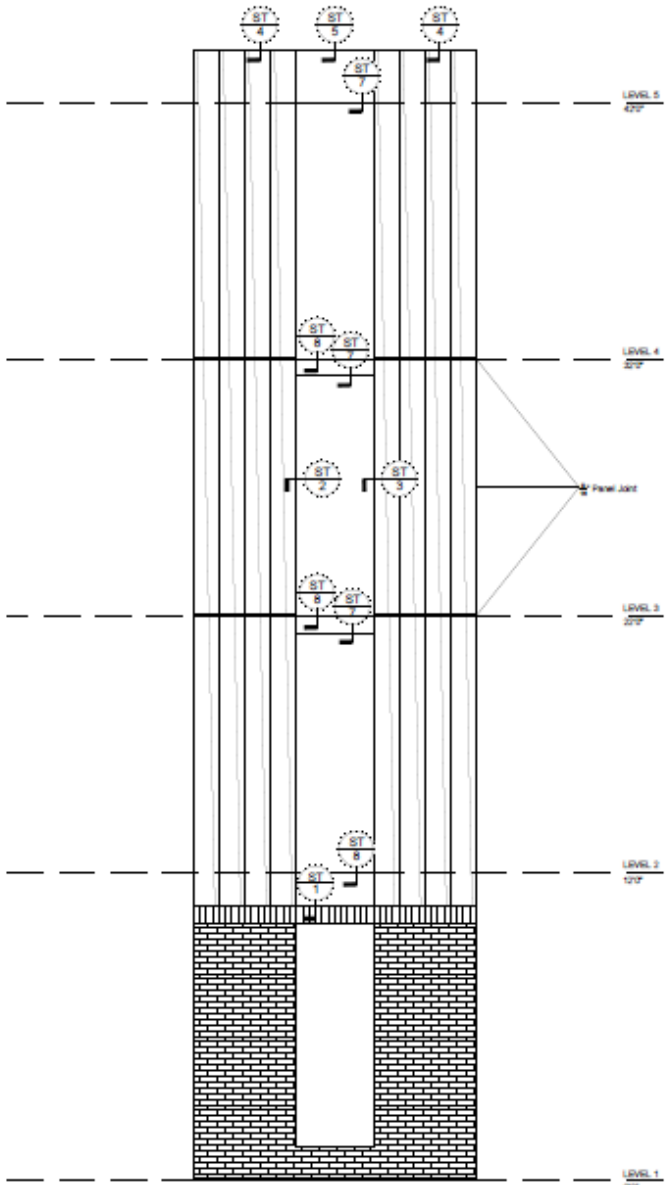

1 ELEVATION
A1 3/8"=1'0"

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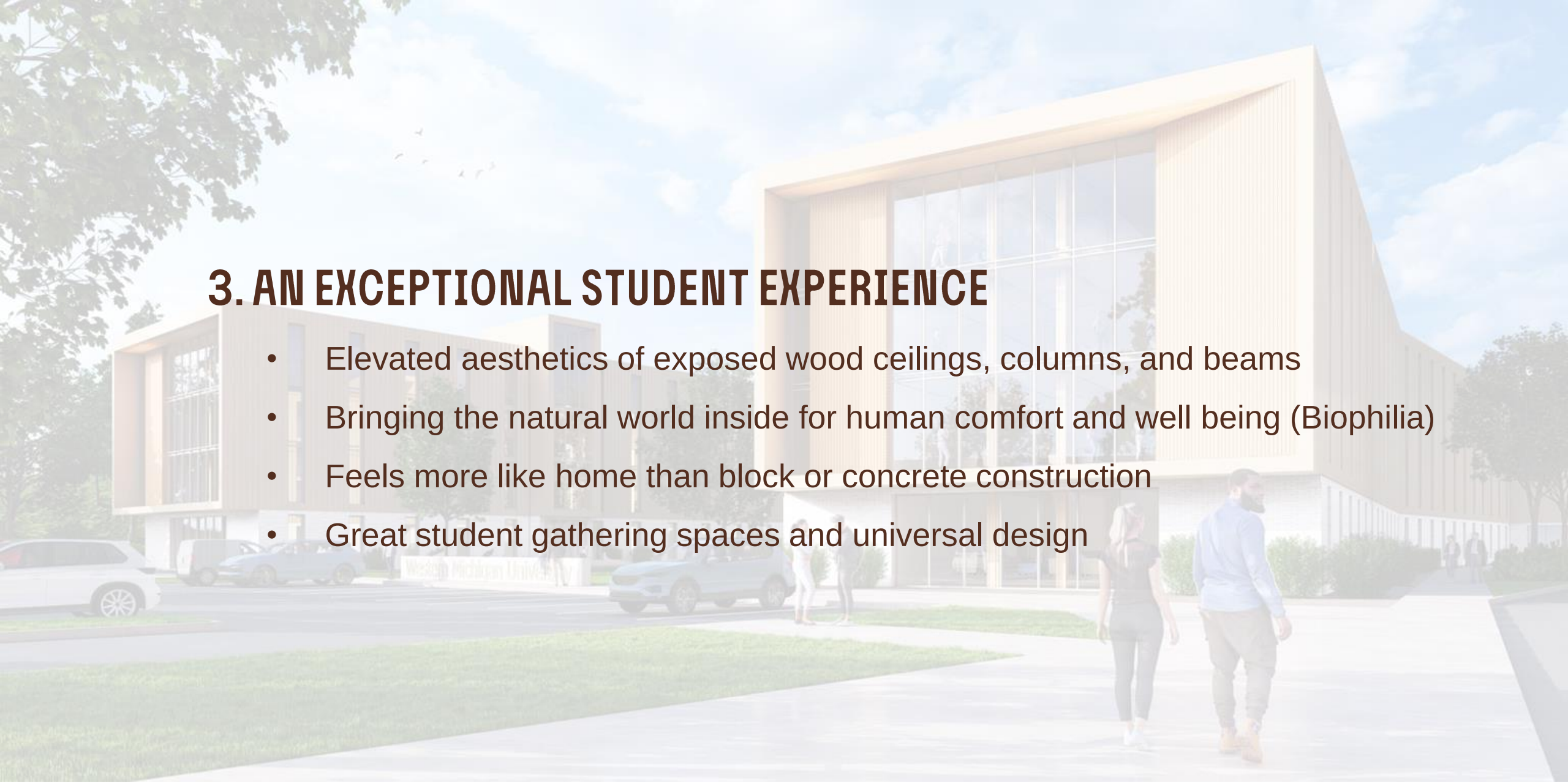


3. AN EXCEPTIONAL STUDENT EXPERIENCE

- Elevated aesthetics of exposed wood ceilings, columns, and beams
- Bringing the natural world inside for human comfort and well being (Biophilia)
- Feels more like home than block or concrete construction
- Great student gathering spaces and universal design

SOUTH COURTYARD & CENTRAL LOUNGE EXTERIOR

CENTRAL LOUNGE

NORTH COURTYARD NIGHT VIEW

POD LOUNGE

SOUTH ENTRY

STUDY LOUNGE

MULTIPURPOSE

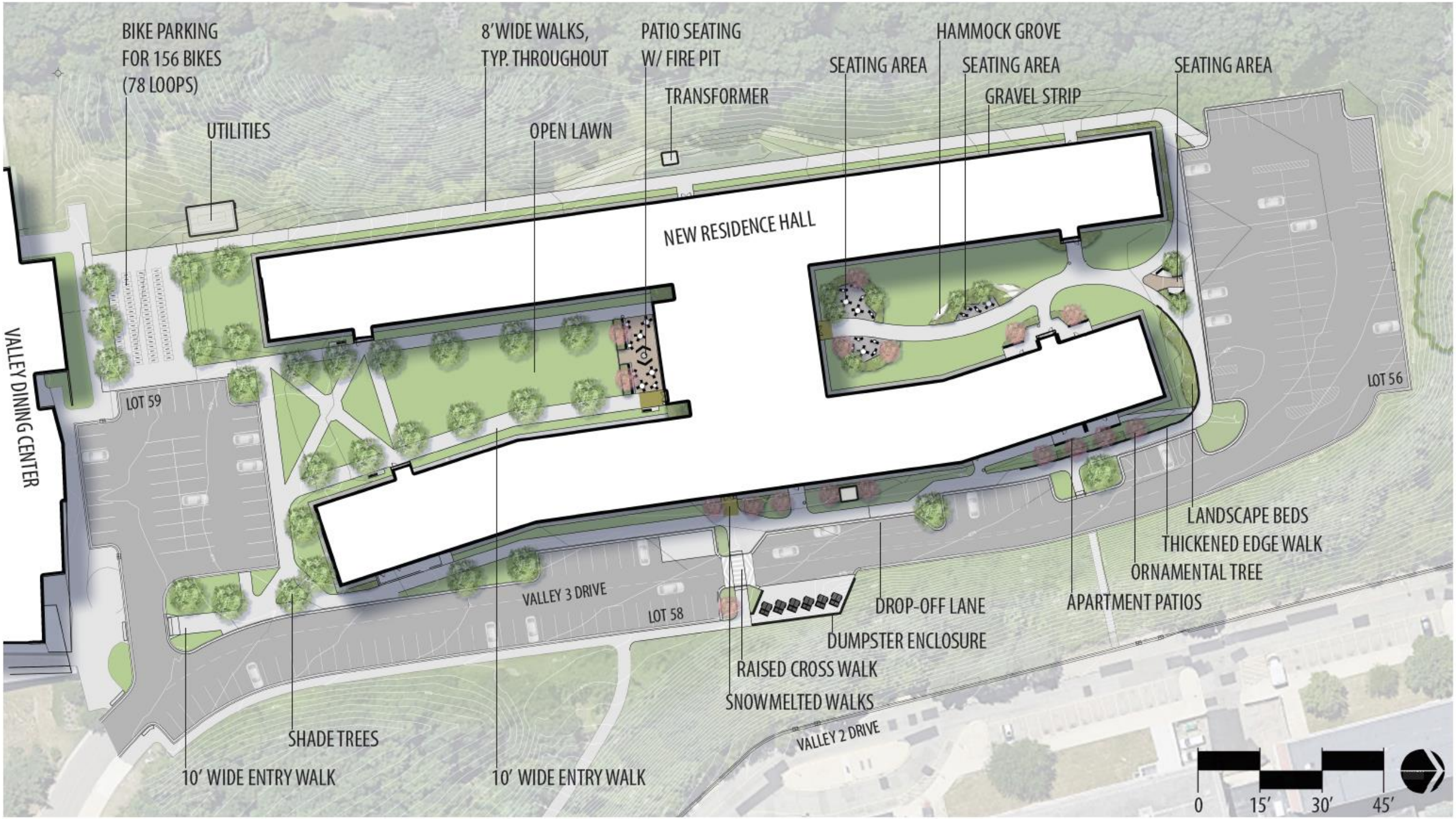
MULTICULTURAL CORRIDOR

COMMUNITY KITCHENETTE 1ST

COMMUNITY KITCHENETTE 2ND

RESIDENTIAL CORRIDORS

RESIDENTIAL RESTROOMS


BIKE PARKING
FOR 156 BIKES
(78 LOOPS)
UTILITIES
8'WIDE WALKS,
TYP. THROUGHOUT
OPEN LAWN
PATIO SEATING
W/ FIRE PIT
TRANSFORMER
SEATING AREA
HAMMOCK GROVE
SEATING AREA
GRAVEL STRIP
SEATING AREA
NEW RESIDENCE HALL
VALLEY DINING CENTER
LOT 59
LOT 56
LANDSCAPE BEDS
THICKENED EDGE WALK
ORNAMENTAL TREE
APARTMENT PATIOS
DROP-OFF LANE
DUMPSTER ENCLOSURE
VALLEY 3 DRIVE
LOT 58
RAISED CROSS WALK
SNOWMELTED WALKS
VALLEY 2 DRIVE
SHADE TREES
10' WIDE ENTRY WALK
10' WIDE ENTRY WALK
0
15'
30'
45'

4. ENVIRONMENTAL SUSTAINABILITY

- Rapidly renewable and abundant resource
- Dramatically lower embodied carbon (energy / CO2 used to produce, transport, and install the material) than similar construction methods
- Captures carbon that might otherwise be lost to the atmosphere
- Promotes sustainably managed forests

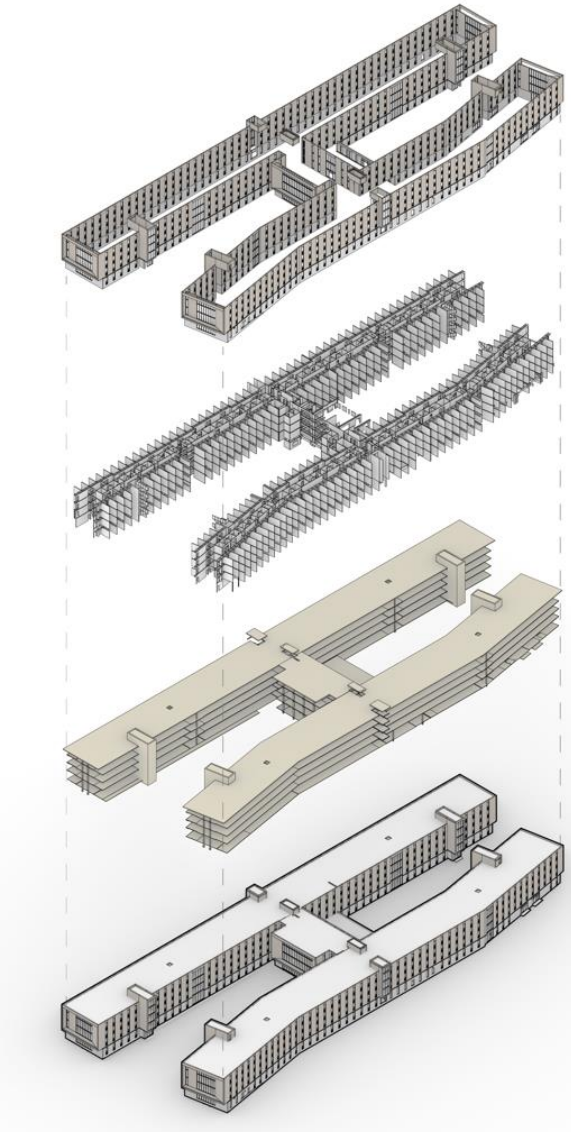
Embodied Carbon

Comparative			
Cross Laminated Timber	*floor and roof assembly*	410	Tonnes CO_2e
Long Span Metal Decking	*includes concrete topper*	1463	Tonnes CO_2e
		1053	*difference*
		356.83%	increase

THESE NUMBERS ARE BASED OFF OF GENERIC LONG SPAN METAL DECKING

NUMBERS ARE VIA ONE CLICK LCA

3.5 X



MOST CONTRIBUTING MATERIALS (global warming)

38.19% EXTERIOR WALL ASSEMBLY

Floor _ 01

-20.2% Brick, Cold Form metal Stud, Insulated Metal Panel

Floor _ 02-4

-17.95% Folded Metal Panel, Cold Form metal Stud, Insulated Metal Panel

31.17% INTERIOR WALL ASSEMBLY

Gypsum wallboard, Cold Formed Metal Stud, Gysum Wallboard

21.65% TIMBER FRAMING + FLOORS

GLULAM (Southern yellow Pine)

-1% Columns, Beams

CROSS LAMINATED TIMBER

-20.6% 3-ply Floor and Roof Deck Assembly, 5-ply Floor and Roof Deck Assembly

8.99% FOUNDATION

100% WHOLE BUILDING

-774,529.87 kg Carbon Stored

21.65% of building volume is mass timber

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Carbon Savings

Carbon Sequestration		
Volume of Timber	All Southern Yellow Pine	25083 ft^3
Carbon Captured	via Wood Works Carbon Calculator, includes CLT and Glulam	**717 Metric Tons of CO_2**

NUMBERS ARE VIA WOOD WORKS CARBON CACULATOR

Carbon Capture

Rapidly Renewable & Abundant

Carbon Stored

+

Avoided Greenhouse Gas (burning)

Total Potential Carbon Benefit

Equivalent Carbon Savings

Carbon Summary

WoodWorks™
WOOD PRODUCTS COUNCIL

Results

Volume of wood products used (m^3):
710 m^3 (25083 ft^3) of lumber and sheathing

U.S. and Canadians forests grow this much wood in:
2 minutes

Carbon stored in the wood:
717 metric tons of CO_2

Avoided greenhouse gas emissions:
277 metric tons of CO_2

Total potential carbon benefit:
994 metric tons of CO_2

Project: WMU New Student Housing

Date: December 19, 2024

Results from this tool are based on wood volumes only and are estimates of carbon stored within wood products and avoided emissions resulting from the substitution of wood products for non-wood products. The results do not indicate a carbon footprint or global warming potential and are not intended to replace a detailed life cycle assessment (LCA) study. Please refer to the References & Notes (PDF) for assumptions and other information related to the calculations.

Equivalent to:

210 cars off the road for a year

Energy to operate **105** homes for a year

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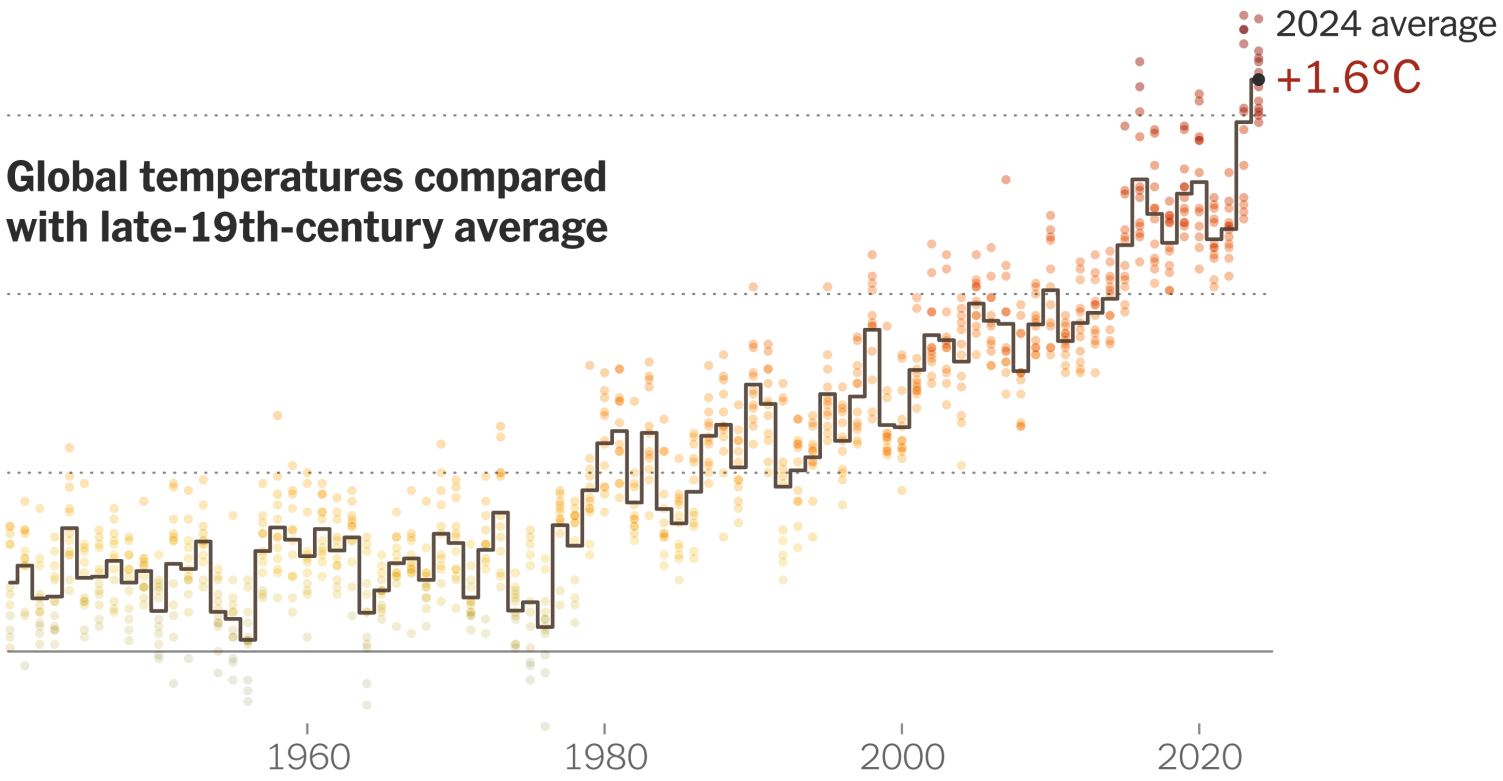
Decarbonization & Global Warming

1.5°C

About 14 %
of world population

2°C

About 37 %
of world population



2015: Paris Agreement: 10 years ago, 2 goals / 2 temps, severe heat waves once every 5 years
2024: Warmest global temperatures on record, 1.6 C / 2.7 F above late-20th century average
Today: Decarbonization, every tenth of a degree counts

We've Breached a Key Limit for Global Warming. Now What? - The New York Times

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Rapidly Renewable & Abundant

MERCER

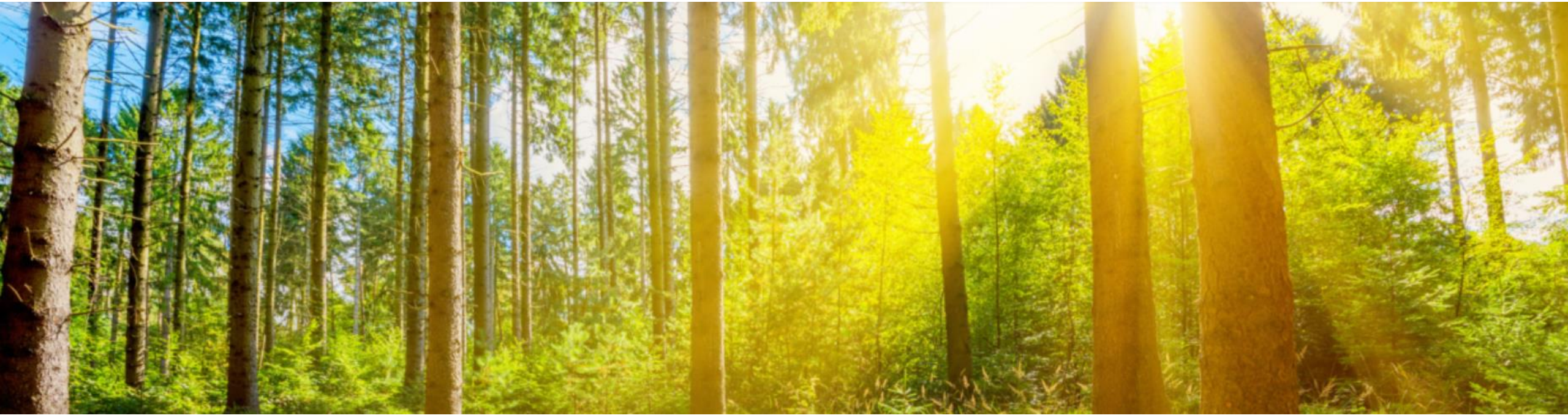
Renewable, Bio-based Forest Products

At Mercer, we aim to be a preferred provider of renewable bio-based products, produced sustainably by our teams in a safe, efficient environment. We optimize stakeholder value and respond to market needs through integrated strategies, modern technology, and proficient use of our resources. We are committed to supporting a healthy environment and preserving our natural resources by sourcing wood from sustainably managed forests. We do this through the dedication of our team members, as we continue to grow and remain proud of our accomplishments and the legacy of excellence that we uphold.

A revolution is happening.

And Mercer Mass Timber is leading the way.

Mercer Mass Timber is at the forefront of innovation, paving the way for mass timber to become the foundation for future generations of high-performance, low-carbon buildings.



Promotes Sustainably Managed Forests

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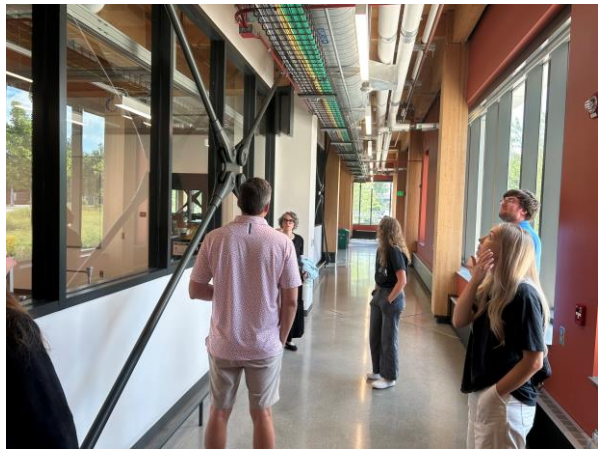
Shout Out & Resources

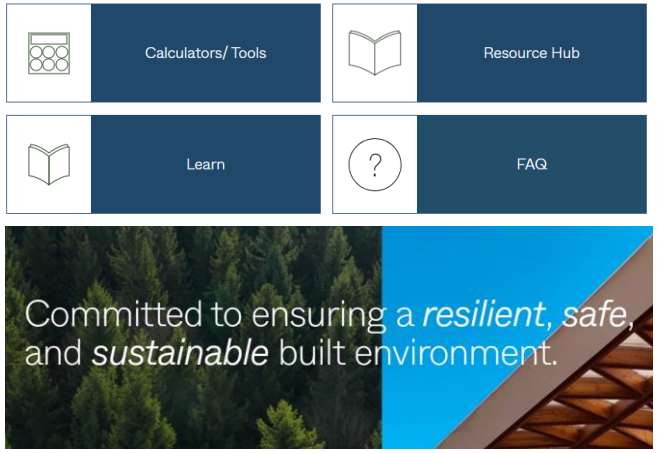
MASS TIMBER @MSU

MICHIGAN MASS TIMBER UPDATE

AMERICAN WOOD COUNCIL

WOODWORKS
WOOD PRODUCTS COUNCIL





WoodWorks is your go-to resource for commercial and multi-family wood building design, engineering, and construction. We're here to support you with free one-on-one project assistance, continuing education, design tools, and on-demand resources.

Get to Know Us

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Mass Timber Quiz

1. What is the **definition** of mass timber?
2. What are the **speed** advantages of prefabrication (including mass timber)?
3. What are some **affordability** techniques associated with mass timber?
4. What aspects of mass timber help create an **exceptional student experience**?
5. What are the **environmental sustainability** advantages of mass timber?
6. What are some **other benefits and challenges** of mass timber?

CONTACT INFO

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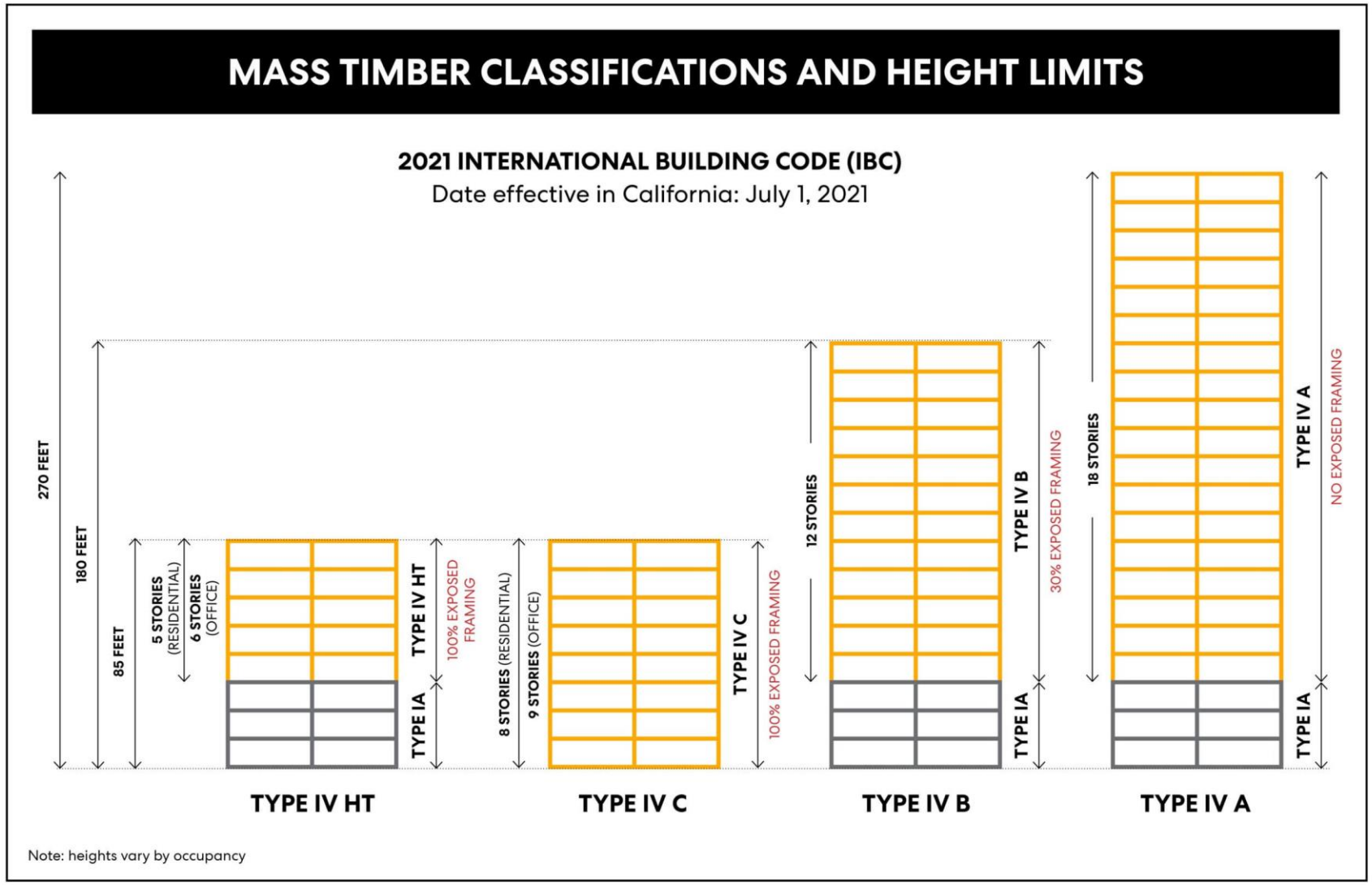
2021 IBC, Mass Timber Height Limits



California Catches up on Mass Timber – Perkins&Will

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WMU'S MASS TIMBER ADVENTURE

2025 MIAPPA Annual Conference at Michigan State University

Kellogg Hotel and Conference Center

Thursday, February 13, 2:45pm-3:45pm

- Barry Olson, WMU
- Janice Quakenbush, WMU
- Zac Bosma, The Christman Company:
- Doug Campbell, Hanbury

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