



phius con
MILWAUKEE 2025





if you make it, you own it.

**DUNNING STREET PASSIVE HOUSE
MADISON WI**

presenters:

Tyler Krupp

Sean Meyers

Sean Size

Kara Haggerty Wilson



DESIGN
ARCHITECT,
ARCHITECT
OF RECORD

OWNER,
DEVELOPER

EQUITY
PLACEMENT



GENERAL
CONTRACTOR,
MAJOR SUBS



PROJECT TEAM

MEP BASIS
OF DESIGN
ENGINEER



CONSULTING
ARCHITECT,
PASSIVE
HOUSE
CONSULTANT



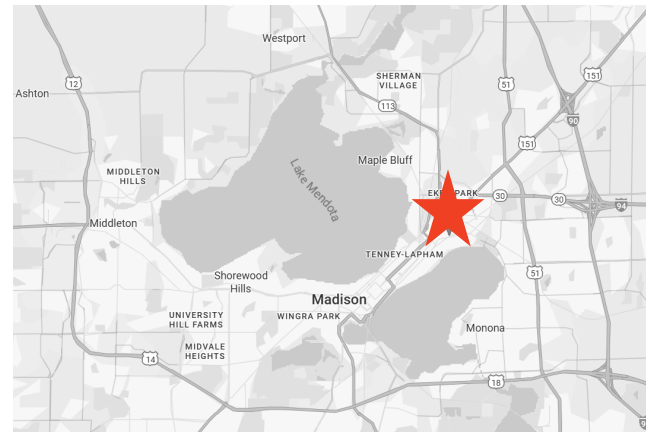
PHIUS
VERIFIER



PASSIVE
BUILDING SUB-
CONTRACTOR

project stats

Location: Madison WI
Dwellings: 32 (qty 22 1-bed, qty 10 2-bed)
Parking: 32 (4 EV chargers, 8 EV ready)
Gross Area (w/ parking): 44,810 sf
Gross Area (w/out parking): 32,088 sf
Envelope Area: 40,518 sf
Blower door: **0.057 cfm/sf @50 pascal!**
Hard cost: \$8.33M / \$8.48M (actual / budget)
Construction schedule: 12 months (appx.)
Leasing: **Stabilized in 3 months!**
Phius: Phius CORE 2021
Notable Building Attributes: Partially below-grade parking garage, partial green roof, ballasted roof mount solar system



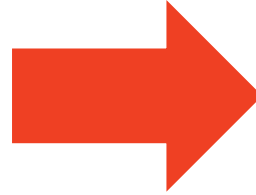
making it happen

Rigorous evaluation of envelope and systems in the face of a pre-determined, already approved design and complex entitlement processes

Creative financing strategies that leveraged equity to add value and align stakeholders

Careful communication with stakeholders and project team – all-in approach

Eliminating ‘fear’ – related pricing escalation by identifying critical team members and shifting passive building-related scope and responsibility to high performance envelope / oversight role



if you make it, you own it.

*RESPONSIBILITY FOR QUALITY AND EXECUTION, ATTENTION TO
DETAIL, EMPOWERMENT THROUGH CONTRIBUTION, ACCOUNTABILITY
THROUGH COLLABORATION ----- EVERY DETAIL COUNTS*

- 1 → **Entitlements Tied to Certification**
- 2 → **MEP Design / Build Approach**
- 3 → **Builder's 1st Passive Building Project**
- 4 → **Market-rate Housing with creative financing**



navigating entitlements

certification as a pre-requisite to building permits

1

PROJECT TIMELINE

2020

Zion Lutheran leaving urban site (combining to form Common Grace).
Initial attempts by affordable housing developer stalls, is not feasible.
Begins relationship with Threshold Development Group – uninspired luxury condominiums, not well-received. Development requires a Planned Development rezoning.

2020 - 2021

Design alternatives – move to rental concept (42 units proposed)

January - April 2022

UDC informational and initial

January - May 2022

Demolition permit, neighborhood plan amendment, rezoning to PD, CSM (plan commission / common council) *Condition of Approval: Phius Design Certified

January 2023

UDC Final approval

January 2023 – July 2023

Design development, construction documents, and bidding = over budget

August 2023 – October 2023

Value management, rebidding, GMP

November 2023 – May 2024

OAC meetings and passive building optimization meetings continue
Early-Start Permit May 15, 2024 – Phius Design Certified Condition*

- Footings and foundation, and pre-cast + topping

May 2024 to August 2024

Phius Design Certified (targeting 8/2/2024 vertical construction to maintain schedule)

- HVAC
- Plumbing
- WUFI – back and forth

Phius Design Certified – 6/28/24

Site Plan Review + PD Recording

August 2024 - May 2025

Construction and QA/QC

May 2025 – August 2025

Leasing and stabilization

July – August 2025

Phius Verifier final submission / documentation

September 2025

Phius Final Certification!



navigating entitlements

certification as a pre-requisite to building permits

1

LESSONS LEARNED

Commit to Phius certification once the building is already designed and has begun design review / public hearings

Phius Design Certified – Condition of Approval (building permit)

- Design-build prime subs – conventional
- Fast-track - typically MEP trails building permit
- Phius Design Certification requires thorough QA/QC process to confirm the as-designed building is certifiable
- Construction start
 - Early-start permit (to precast with topping)
 - Full building permit – received truly JIT
- Plumbing
 - WI Code vs IAMPO – oversized distribution system
 - Complex domestic hot water
- HVAC – straightforward – but still unique – ducting challenges



06/27/2024

To whom it may concern,

Congratulations! We are pleased to inform you that **2210 - 2165 Linden Avenue** is now a Design Certified **Phius CORE 2021** project.

Thank you for choosing Phius and best wishes to your team on achieving Certification. Please contact us when commissioning is complete and you are ready for Certification review, or earlier if you have any other issues to discuss.

Regards,

James Ortega,
Certification Program Director

Phius Certification Team

Isaac Elneccave, Haley Kalvin-Gold, John Loercher, Shannen Martin, Al Mitchell,
Andrés Pinzón [PhD], Zoe Rader, Neil Rosen, Aditya Singh, Mark Smith

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'business as usual' approach with integration of high performance systems

INCORPORATING MEP DESIGN / BUILD WITH PASSIVE BUILDING PROCESSES

MEP design / build is typical for this scale / use / market / location...so why change now?

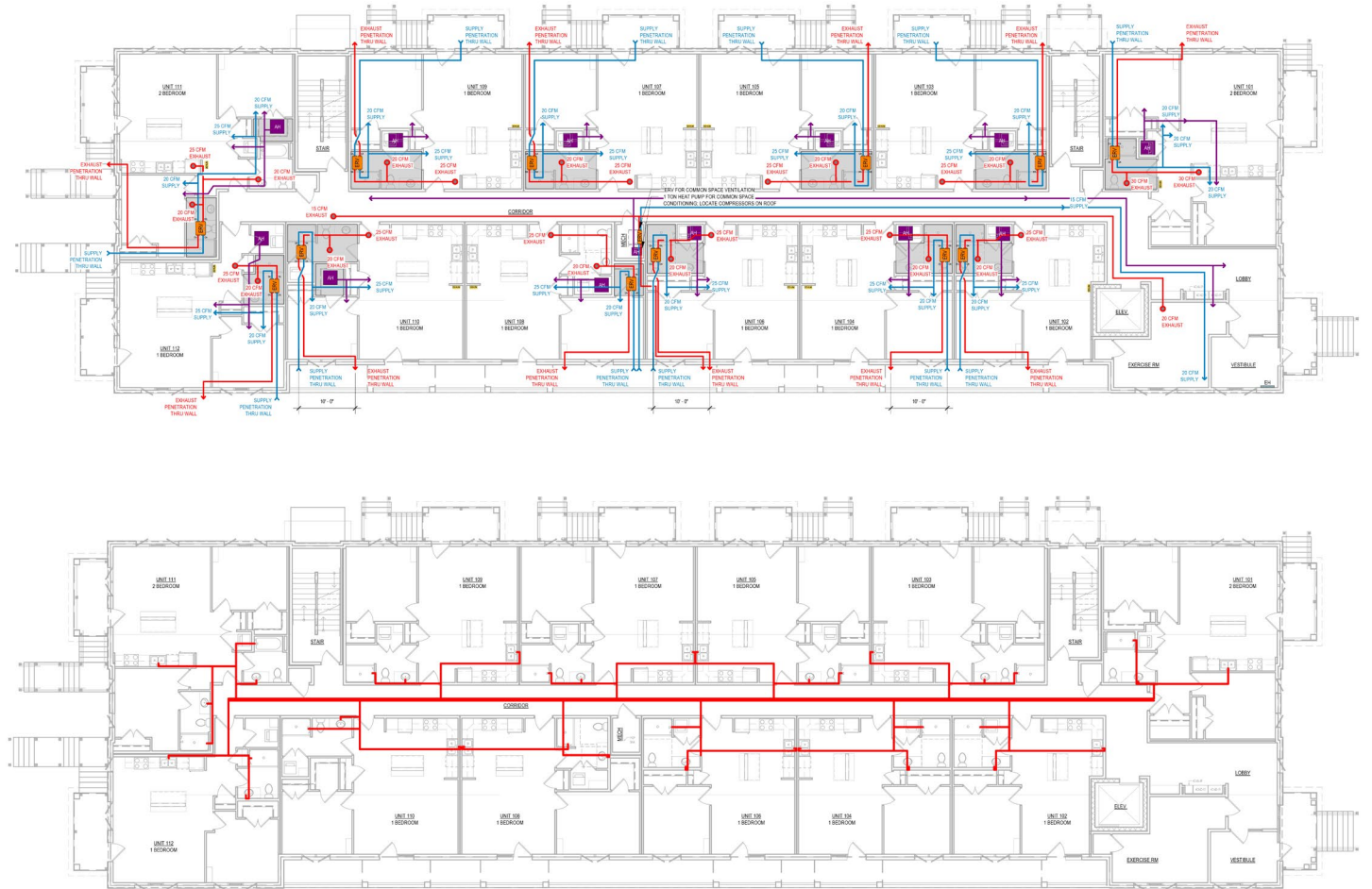
Inherent complexities of pursuing Design Certification when the EOR isn't formally engaged

Passive building holistic overview via energy modeling points towards having systems fully designed / more traditional design / bid / build model

Long lead items in passive building (ie windows) need to be ordered before engineered designs are finalized

EOR in design / build is often yet another sub-consultant of the Primary Subcontractor – one more layer of removal from the passive design team / process

Basis of Design with passive building-focused MEP becomes critical to staying on track



'business as usual' approach with integration of high performance systems

KEEP THE COMPONENTS SIMPLE

System / Components aren't anything too complicated or foreign:

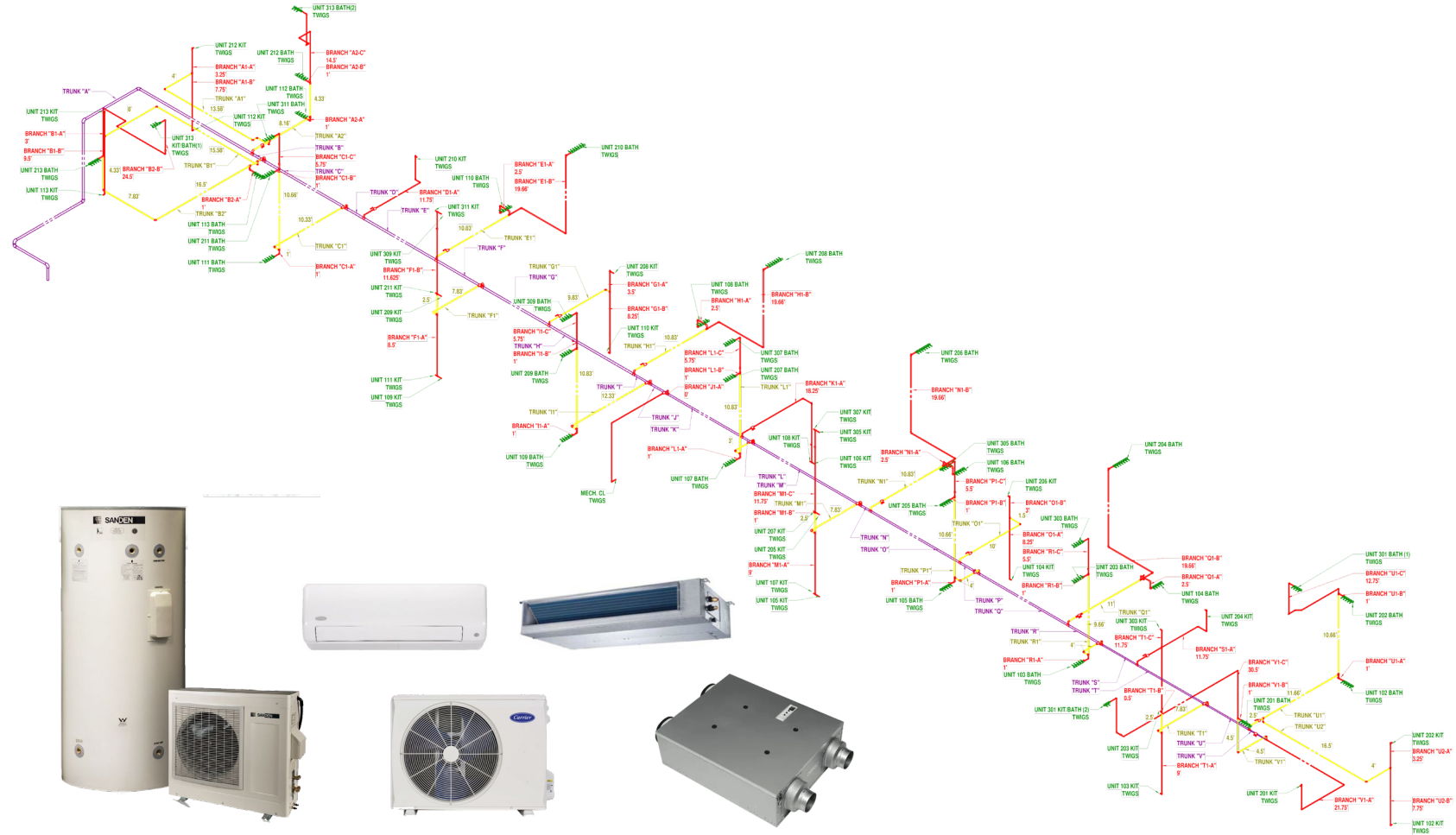
Heating / cooling via decentralized air source heat pumps, mostly ducted with select non-ducted

Domestic hot water via centralized Sanco CO2 refrigerant heat pump system

Individual, in-unit ERVs

Infrastructure for future in-unit dehumidifiers

Critical feedback / input from Basis of Design essential for coordinating with EOR and the subcontractor

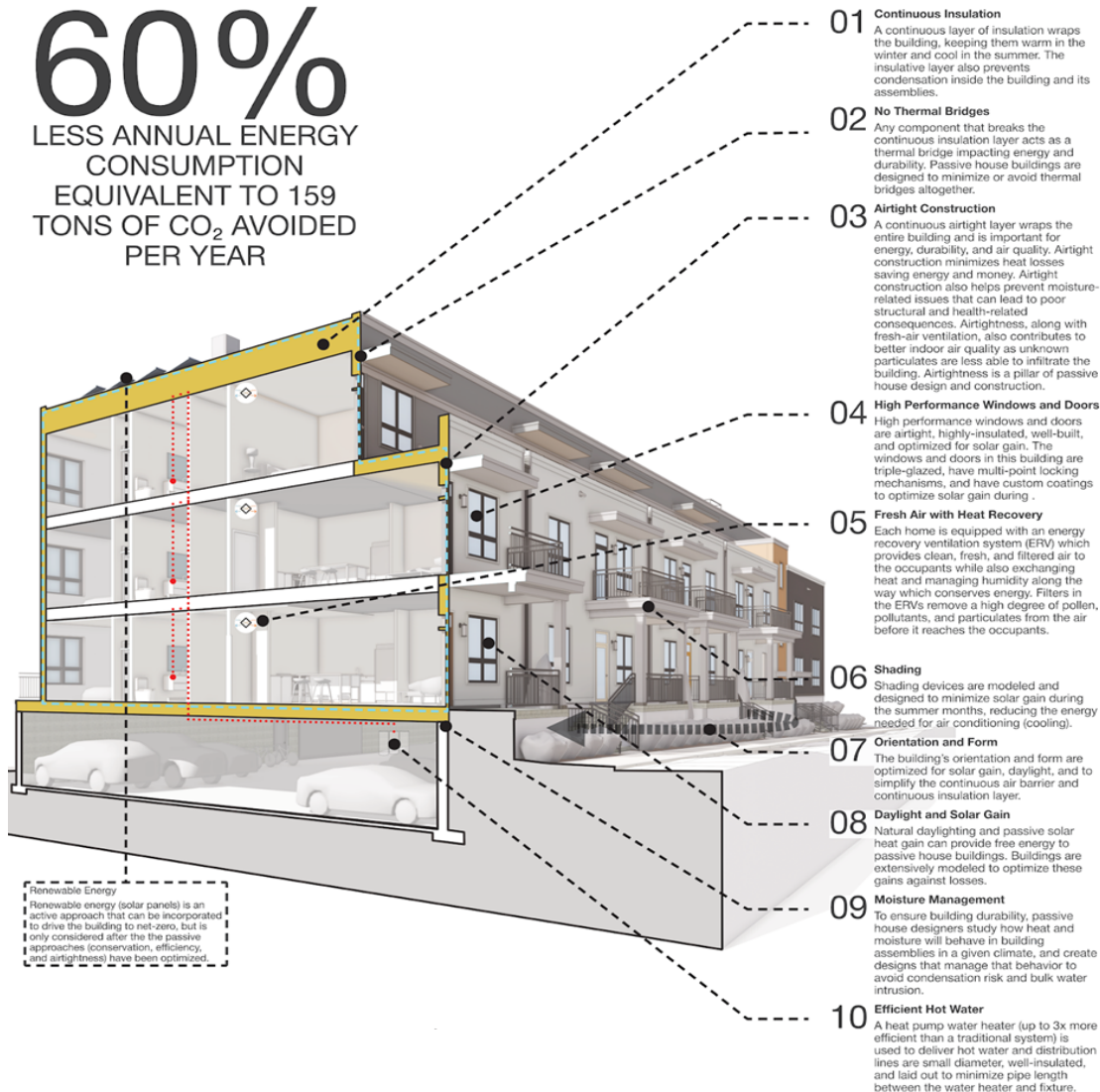


passive building as a new concept

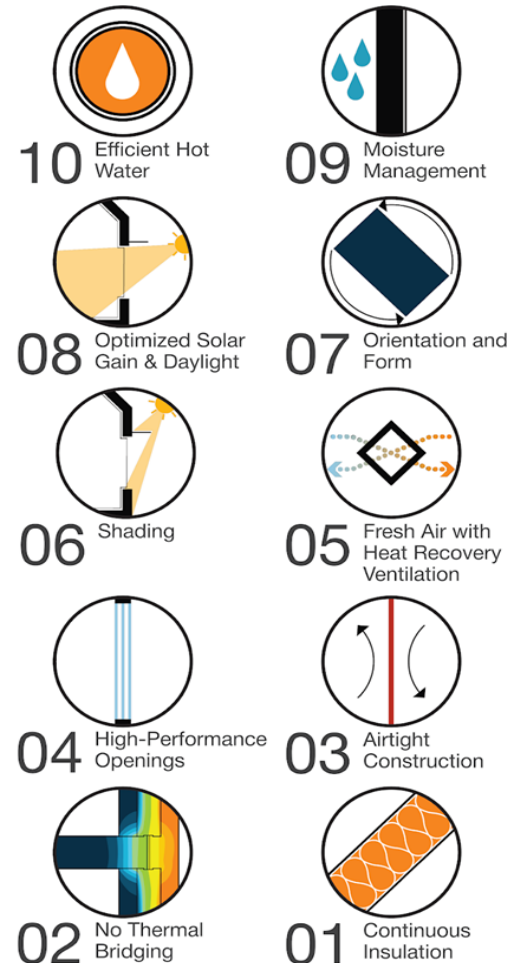
new assemblies, new priorities, and real performance targets

3

60%
LESS ANNUAL ENERGY
CONSUMPTION
EQUIVALENT TO 159
TONS OF CO₂ AVOIDED
PER YEAR



PASSIVE HOUSE PRINCIPLES



Design Principles of Passive House - graphics by Passive House Accelerator <https://passivehouseaccelerator.com/passive-house>

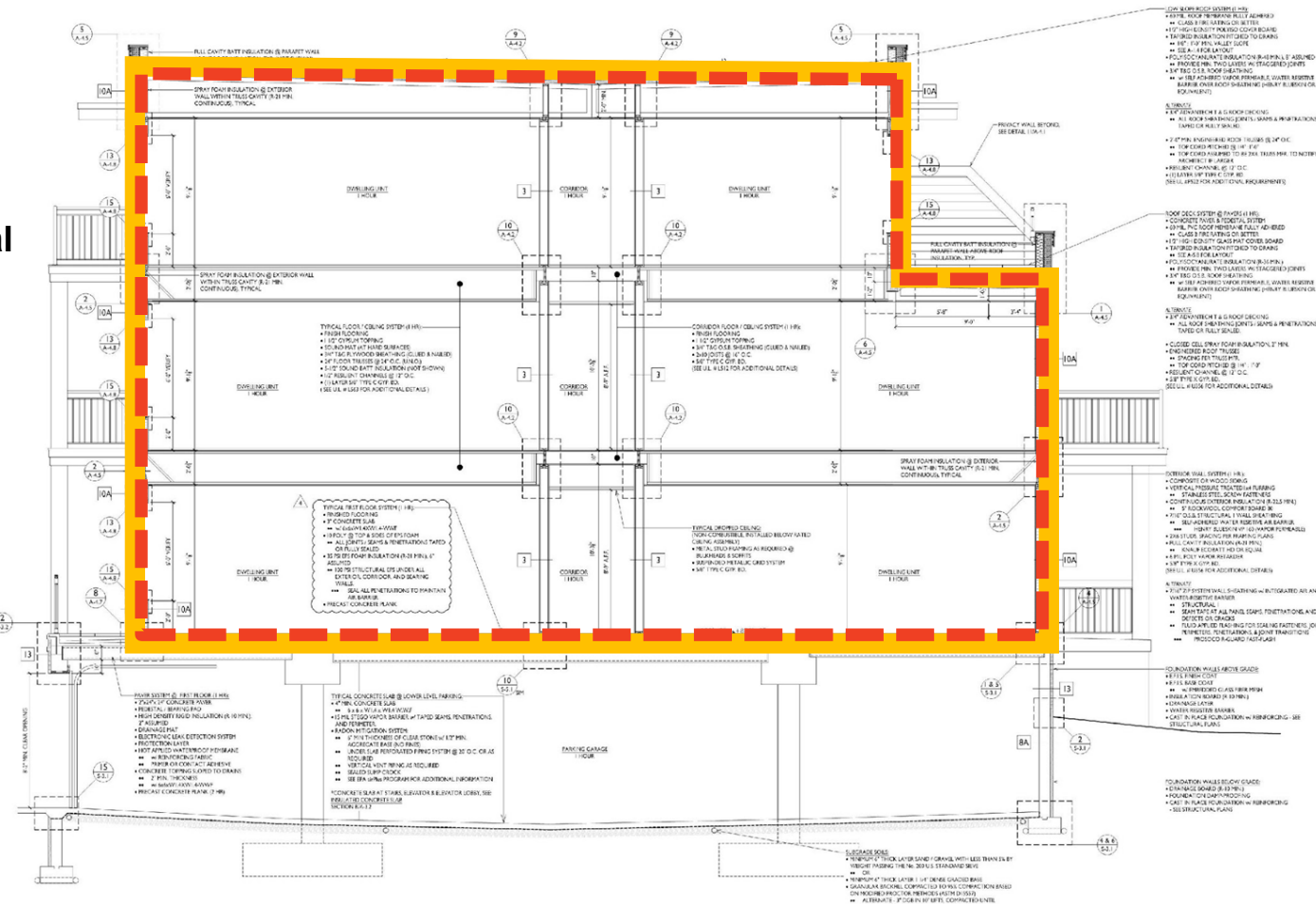
passive building as a new concept

new assemblies, new priorities, and real performance targets

3

LEARNING CURVES / CHALLENGES

- Limited ability to impact physical design, which was previously approved prior to passive building goal adoption
- Passive building over tempered parking garage condition
- Continuous air-control layer: basic for a passive building, but not necessarily top of mind for a conventional build
- Continuous insulation: not yet everyday detailing in this market / location



passive building as a new concept

new assemblies, new priorities, and real performance targets

3

LIMITED ABILITY TO IMPACT PHYSICAL DESIGN

No permitted changes from approved plans;
form, density, unit layout to remain as
originally approved (pre-passive design)

Window to wall ratio to be maintained

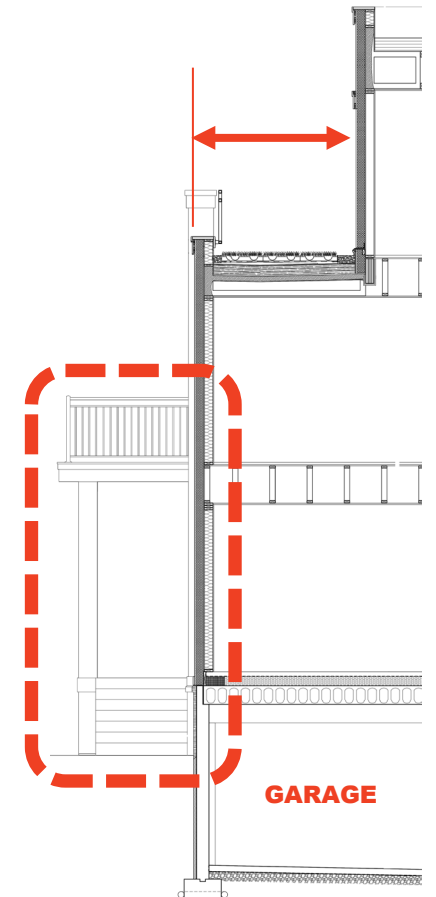
Balconies / roof deck required

Ground floor unit entry doors and concrete
stoops required

3rd floor setback required

On-site parking required

**Beyond optimizing envelope and
systems, not many additional
levers to pull!**



passive building as a new concept

new assemblies, new priorities, and real performance targets

3

PASSIVE BUILDING OVER PARKING

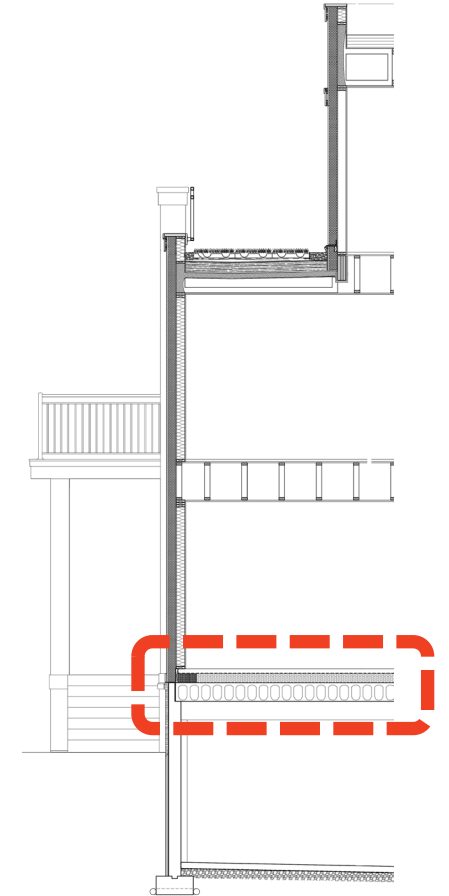
Explored multiple options, including structural frame + dropped ceilings

Final approach included insulating over standard concrete plank floor/ceiling assembly.

Introducing hi-load rigid insulation at critical bearing conditions

Simplified building geometry and double loaded corridor allowed for straightforward structural designs and simple foam pattern

Ultimately a simpler construction detail and execution than approaching thermal boundary at the underside of plank



passive building as a new concept

new assemblies, new priorities, and real performance targets

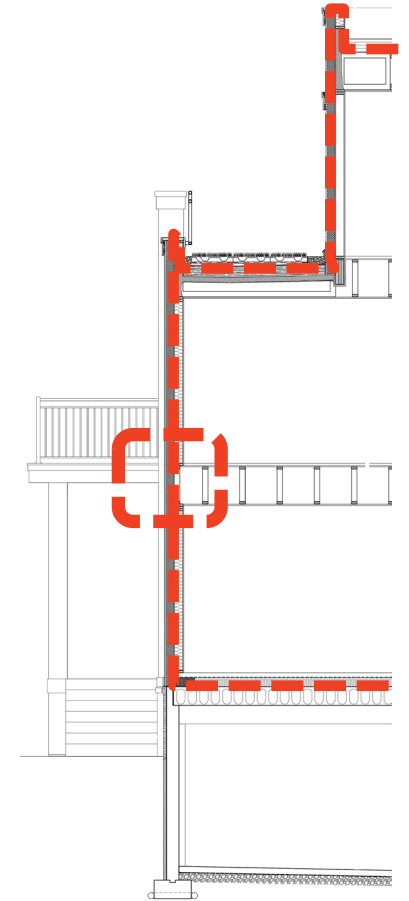
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CONTINUOUS AIR CONTROL LAYER

Self-adhered membrane

Flashing and balcony / roof sequencing
with continuous insulation

Window buck assembly, flashed and fully
air-sealed install



passive building as a new concept

new assemblies, new priorities, and real performance targets

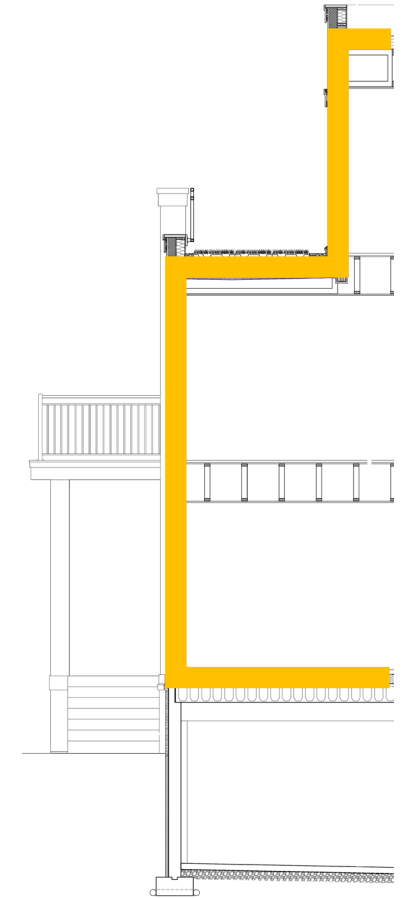
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CONTINUOUS INSULATION

5" mineral wool board, furring / long screws

Roof deck area + balcony sequencing with continuous insulation

Detailing for continuity at transitions



passive building as a new concept

new assemblies, new priorities, and real performance targets

3

SOLAR SYSTEM SPECS

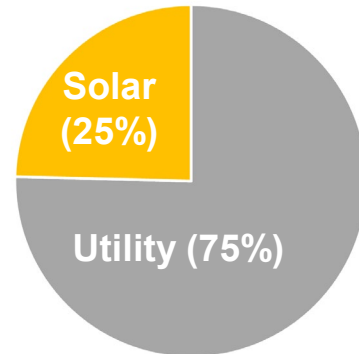
35.2 kW roof mounted ballasted array

44,000 kWh/yr

87 bifacial 405W panels, single slope (5 degree) orientation

Contributes to an equivalent EUI reduction of 4.46 kBtu/sf yr

PROJECTED ENERGY CONSUMPTION MIX



creative financing

4

market rate housing, no subsidies, equity and beyond

BUDGET CONSTRAINTS + TYPICAL VALUE MGMT APPROACH

Original GMP bid too high (appx. 9.0%)

Note: Not exclusively passive building elements

Traditional value management process doesn't quite get us to target (still + 2.7% over budget)

In the meantime, how is sourcing debt in the capital markets...

252 Dunning - Original Budget (Pro Forma)		Cost	Per DU	Per GSF
Land Cost	\$600,000		\$18,750	\$19
Soft Cost	\$1,410,000		\$44,063	\$44
Hard Cost (Budget)		\$8,480,000	\$265,000	\$264
Total Development Cost (Budget)		\$10,490,000	\$327,813	\$327

252 Dunning - Budget / Pricing		Cost	Per DU	Per GSF
Land Cost	\$600,000		\$18,750	\$19
Soft Cost	\$1,410,000		\$44,063	\$44
Hard Cost (GMP - Oct 2022)		\$9,420,000	\$294,375	\$294
Total Development Cost		\$11,430,000	\$357,188	\$356

+9.0%

252 Dunning - Budget / Pricing		Cost	Per DU	Per GSF
Land Cost	\$600,000		\$18,750	\$19
Soft Cost	\$1,410,000		\$44,063	\$44
Value Management Process (Oct 2022 to July 2023)		-\$653,000		
Hard Cost (GMP - July 2023)		\$8,767,000	\$273,969	\$273
Total Development Cost		\$10,777,000	\$336,781	\$336

+2.7%

creative financing

4

market rate housing, no subsidies, equity and beyond

MARKET CONSTRAINTS + TRENDS

- Historically low-interest rate environment
 - Construction prices take time to reset
- US 10Y approaching 5% resulting in construction loans with rates around 6.5% to 7.25% +/-

Multifamily development yields (compressed) in Madison are at 5.5% to 6.25%

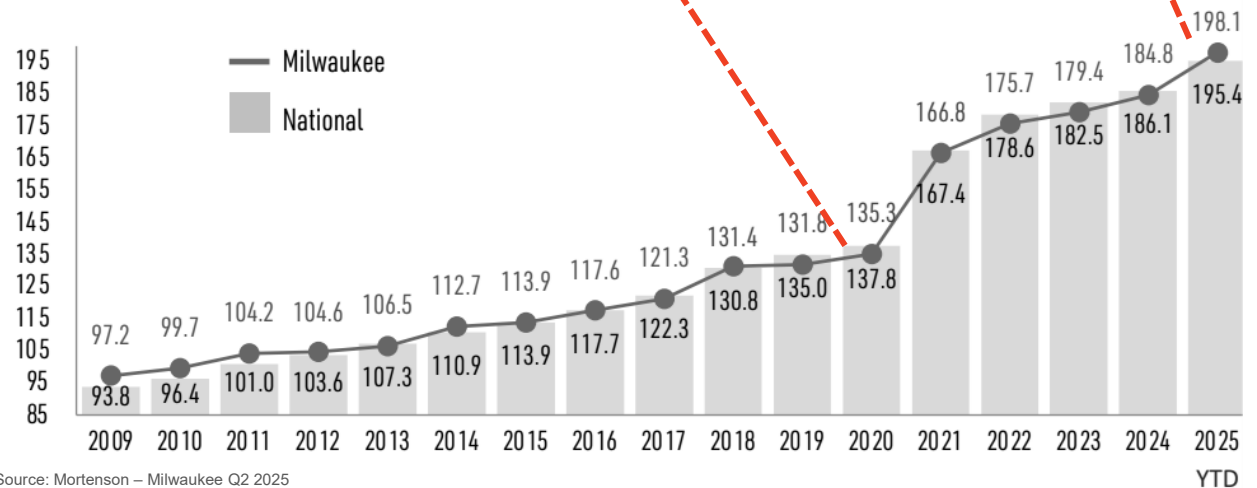
Investors have options

Negative leverage (loan constant > yield)

What do we do? We are over budget and cannot raise capital...



CONSTRUCTION COST INDEX (January 2009 = 100)



creative financing

4

market rate housing, no subsidies, equity and beyond

CREATIVE FINANCING STRATEGIES

Negative leverage = deleverage

Yields grow as leverage decreases

Soft costs (construction interest / financing fees)
decrease as leverage decreases

Equity

1. the quality of being fair and just
2. ownership, value

Raise equity, or exchange equity in lieu of
construction fees = use reduction, source reduction,
stakeholder alignment

All equity – alignment and project savings

252 Dunning - Budget / Pricing		Cost	Per DU	Per GSF
Land Cost	\$600,000		\$18,750	\$19
Soft Cost	\$1,410,000		\$44,063	\$44
Hard Cost (GMP - Adjusted - July 2023)	\$8,767,000		\$273,969	\$273
Total Development Cost		\$10,777,000	\$336,781	\$336

+2.7%

All-Equity Financing Soft Cost Implications		Cost	Per DU	Per GSF
Soft Costs				
No Financing Fees / Construction Interest	-\$360,000		-\$11,250	-\$11
Additional Capital Placement Fees	\$100,000		\$3,125	\$3
Subtotal		-\$260,000	-\$8,125	-\$8
Adjusted Total Development Cost		\$10,517,000	\$328,656	\$328

+0.3%
Close

All-Equity Financing Capital Placement		Cost	Per DU	Per GSF
Subcontractor (Equity In-Lieu of Fee)	-\$300,000		-\$9,375	-\$9
Adjusted Total Development Cost		\$10,217,000	\$319,281	\$318

WITHIN
BUDGET

Total Development Costs (Actual)		Cost	Per DU	Per GSF
Land Cost (Actual)	\$607,500		\$18,984	\$19
Soft Cost (Actual)	\$1,170,219		\$36,569	\$36
Hard Costs (Actual)	\$8,330,849		\$260,339	\$260
Total Development Cost (Actual)		\$10,108,567	\$315,893	\$315

SAVINGS

creative financing

4

market rate housing, no subsidies, equity and beyond

COMPARING STRATEGIES + PATHWAYS

Market rate, side-by-side analysis with conventional approach

~8% premium when modeling Phius vs “Conventional”

Compared to conventional construction = appx. \$600,000 +/- premium or about \$40,000 of additional net operating income required to offset the increased capital expense

Energy savings is valued at appx. \$200,000 to \$250,000 at a 6% cap rate; capture additional value

Does not take into account value of other benefits.

Capital Budget	Phius Dollar	Conventional Dollar	Delta* Dollar	Delta %
Site Acquisition	\$607,500	\$607,500	\$0	0.0%
Soft Costs	\$1,170,219	\$1,020,219	\$150,000	14.7%
Hard Costs	\$8,330,849	\$7,733,208	\$597,641	7.7%
Total Development Costs (TDC)	\$10,108,567	\$9,360,927	\$747,641	8.0%

*Based on similar past projects, not adjusted for inflation or cost escalation

Passive Building Premiums
Division 07 - Thermal and Moisture Protection
Division 08 - Exterior Door and Windows
Division 22 - Plumbing
Division 23 - HVAC

Appx. \$20/sf premium *

IMPORTANT TO NOTE: THE TERM ‘CONVENTIONAL’ IS CONTEXTUAL HERE: ENTITLEMENTS AT THIS SITE WOULD HAVE REQUIRED SOME LEVEL OF ‘GREEN’ CERTIFICATION – THE 8% PREMIUM OVER CONVENTIONAL IS A NUANCED METRIC – FURTHERMORE, THE CONVENTIONAL PROJECTS USED IN THIS COMPARISON WERE NOT ADJUSTED FOR INFLATION OR COST ESCALATION

owning it

WHAT DID WE LEARN?

PROJECT AS BUILT

Design complete, with passive building layered on as a last-minute requirement for approval

Design build MEP approach – other team members pick up the slack without EOR onboard early

Garage, balconies, stoops, exterior doors, setbacks – tricky to detail and ultimately costly

Single source responsibility for high performance / passive building related scope and detailing

All-equity financing

REPLICABLE?

NO



MAYBE



NO



YES



MAYBE



REFINEMENTS FOR SCALABILITY

Performance goals' ability to influence design throughout the process is critical. Passive building focus from day one to allow design decisions to support performance goals

Traditional design/bid/build approach OR must have complete trust in a team to be able to plan for and execute a design/build MEP design. Coordination is key.

Optimize design early on, push back on car-centric or anti-density requirements where appropriate.

Until passive building principles / training is required for code buildings, there is a need to fill those critical roles as they are integral to the success of construction.

If the design is optimized and goals are established early on this could be a feasible solution, but entitlements and zoning requirements play a critical role in shaping a project, from both a design and ultimately cost perspective. Equity as financial approach and value alignment.







questions?

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