OLD BUILDINGS SHOULD BE POSITIVE, TOO.

12 October 2023

emersion DESIGN

OHIO HISTORY CONNECTION

Pepper Construction
Tomorrow Transformed

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Preservation Services Manager
SHPO

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Sr. VP & Regional Director
Pepper Construction

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principal
emersion DESIGN

learning objectives:

1. Understand the embodied carbon impact of existing, historic buildings.

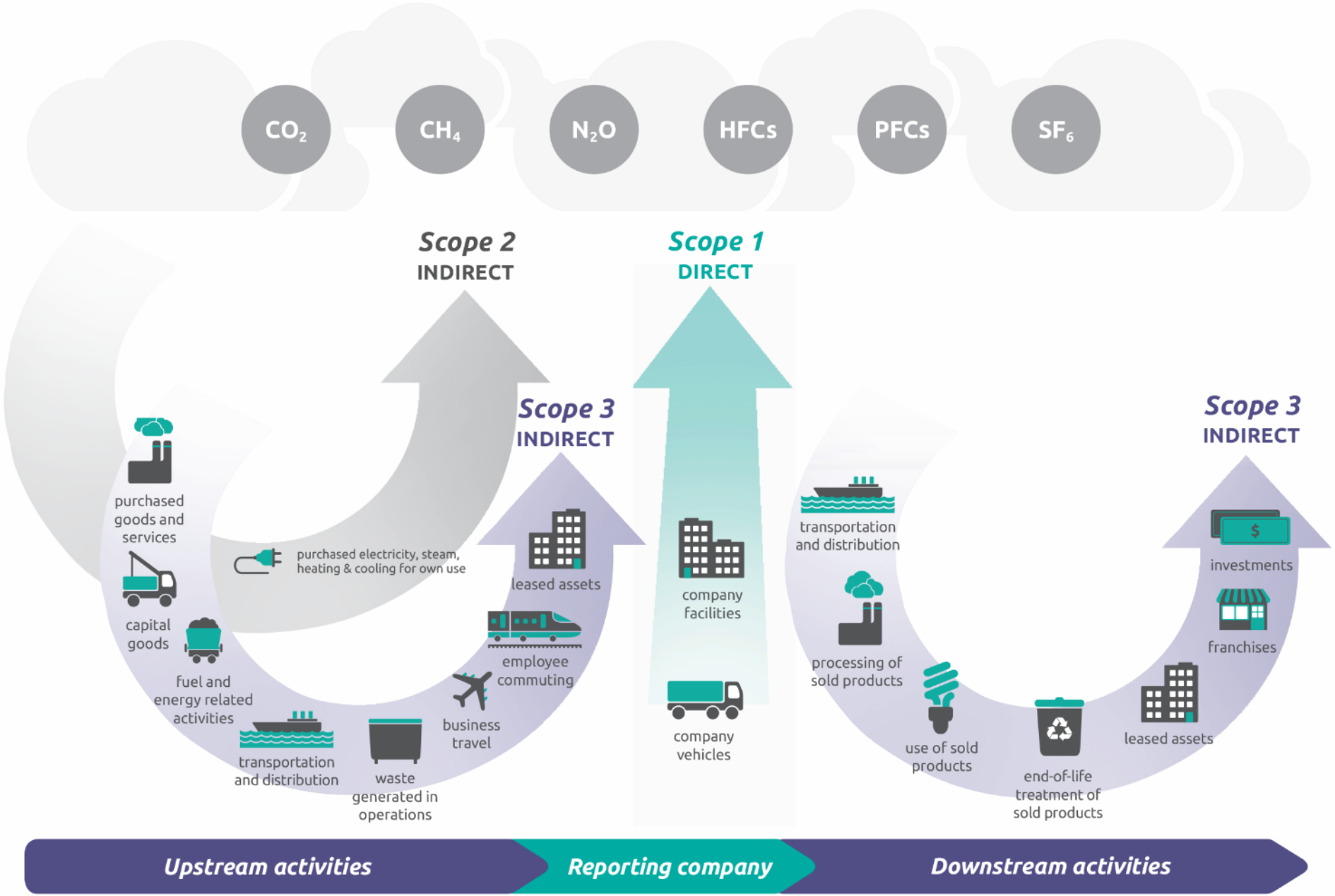
2. Gain resources on sustainable tactics for renovating historic buildings.

3. Learn how to work with the State Historic Preservation Office for a smoother process and successful outcome.

4. Learn how to create a Net Positive renovation while keeping the historic integrity.

SET THE STAGE

Figure [1.1] Overview of GHG Protocol scopes and emissions across the value chain



Targeting Net-Zero Embodied Carbon

This document provides an overview of three types of embodied carbon reduction targets, and also examples of corporate and other voluntary commitments to reduce embodied carbon. More information about opportunities for addressing embodied carbon with policy can be found in the Carbon Leadership Forum's Owner Toolkit.

Target-setting is key to success and momentum

Investor, developer, building owner, and tenant policies are essential to reducing embodied carbon by spurring action before a project begins when the largest range of solutions are available. As a project progresses, the range of options is reduced. Setting net-zero embodied carbon targets early in a project (preferably before it begins) is therefore key to maximizing reductions and minimizing costs.

When it comes to targeting net-zero embodied carbon, there are three relevant types of targets:

1. Company or organization-wide targets;
2. Project-level targets; and
3. Material-level (procurement) targets.

Organization-wide targets are most effective at accelerating action through aligning teams across an organization that may otherwise be siloed, such as sustainability, real estate, and procurement. Project and procurement targets support broader goals and ensure that reductions opportunities are followed through the value chain and communicated as a priority across the large number of stakeholders across a typical project.

Public sustainability commitments can also help maintain momentum on climate action within a company while signaling demand for low carbon solutions, inspiring a "race to the top" among organizations competing to be the first to net-zero.

Embodied carbon and scope 3 emissions

Embodied carbon refers to the greenhouse gas emissions associated with the manufacturing, transportation, use, and disposal of building materials used in construction.

The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard splits GHG emissions into three scopes:

- **Scope 1** emissions are from a company's operations that are under a facility's direct control, e.g., on-site fuel combustion;
- **Scope 2** emissions are from usage of electricity, steam, heat and/or cooling purchased from third parties; and
- **Scope 3** emissions are upstream and downstream value chain emissions, including upstream supply chain emissions from purchased products, transport emissions, and business travel and downstream emissions from transport of products, usage of sold products and product disposal.

Upfront or "cradle-to-gate" embodied carbon refers to embodied carbon impacts up to the point of purchasing, and are therefore accounted as scope 3 emissions (see Figure 1). The primary categories of scope 3 emissions associated with embodied carbon are (1) purchased goods and services and (2) capital goods, or assets that are used to produce goods or services.

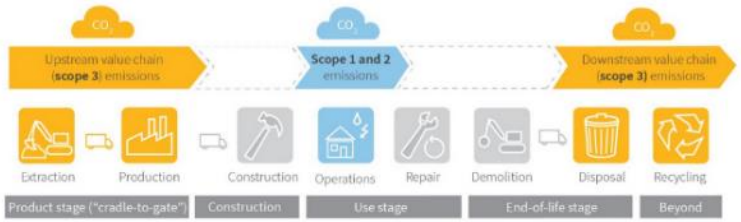


Figure 1. Building product life cycle stages included in scope 1, 2, and 3 greenhouse gas accounting, as described by the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Reporting Standard. Cradle-to-gate emissions (including extraction, transportation, and production) as well as end-of-life waste disposal and recycling emissions are included in scope 3 emissions. Other life cycle stages, such as construction and demolition, are not clearly attributable to a category.

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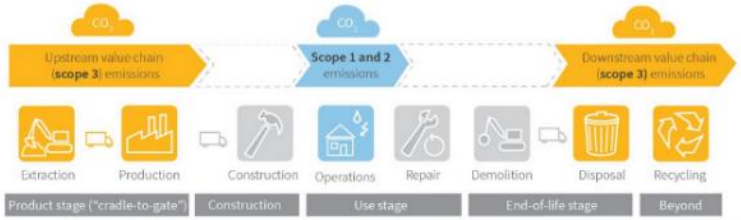

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The following sections provide an outline of the tools and accounting methodologies that are helpful for setting company, project, and material-level targets.

Company/organization-wide targets

GHG accounting and target-setting is an integral part of corporate sustainability and reporting. The GHG Protocol Corporate Accounting and Reporting Standard is used by companies, cities, universities, and other entities to report GHG emissions. Standards like the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) help define what companies must report in their annual sustainability report and how GHG emissions are accounted. Corporate accountability initiatives encourage companies to take additional actions such as setting meaningful targets (see the Science Based Targets Initiative (SBTi)) or procuring 100% renewable energy (see RE100).

Until recently, GHG accountability initiatives have focused on emissions from direct or indirect energy use, also known as scope 1 and 2 emissions. However, increasing public pressure to do more holistic GHG accounting has resulted in a growing number of companies expanding their scope of GHG accounting and public sustainability commitments to include value chain (scope 3) emissions. According to SBTi, "Setting value chain targets (scope 3 targets) is now standard practice; 94% of companies with science-based targets include scope 3 emissions" (source).

While scope 3 emissions targets are becoming increasingly popular, setting targets explicitly focused on embodied carbon or through green building certifications that require embodied carbon reductions, such as the Zero Carbon Certification, provide additional pathways for targeting net-zero. Table 1 highlights examples of building owner commitments that address embodied carbon.

Project-level targets

Project-level embodied carbon targets should be set before a project begins and communicated in owner's project requirements. There are two primary approaches to setting project-level targets:

1. A **carbon intensity limit** sets a maximum carbon footprint per area value for a building. For example, the Zero Carbon Certification requires that "[t]he total embodied carbon emissions of the project must not exceed 500 kg-CO_2e/m^2."
2. **Percent reduction goals** from a baseline value can be set for the entire project or on a per area basis. For example, the LEED v4 credit "Building life-cycle impact reduction" awards points to teams that "conduct a life-cycle assessment of the project's structure and enclosure that demonstrates a minimum of 10% reduction, compared with a baseline building."

Table 1. Examples of building owner commitments that include embodied carbon reductions. Many companies have chosen to develop Science Based Targets related to scope 3 emissions that cover building materials, while others have made commitments specifically related to embodied carbon in the context of green building policies.

Owner	Goal
Amazon	Amazon co-founded The Climate Pledge, which is a commitment to net-zero carbon across their business by 2040 (including scopes 1, 2, and 3).
Autodesk	Autodesk aims to achieve climate-neutral GHG emissions for scopes 1, 2, and 3 beginning in FY21 using an internal price on carbon. Their target is to achieve an 85% reduction by 2050.
Facebook	Facebook is committed to reaching net-zero GHG emissions for their value chain (scope 3) by 2030.
Hewlett Packard	Hewlett Packard is committed to becoming carbon-neutral by 2050, covering scope 1, 2, and 3 emissions. Their 2025 climate targets include a 15% reduction in manufacturing-related GHG emissions in their supply chain from 2016 levels.
Kilroy Realty	Kilroy aims to reduce the embodied carbon of construction materials in development projects 30% like-for-like by year-end 2040 and 50% by year-end 2050 from a 2019 baseline. They are also aiming to reduce their scope 3 emissions by 72% by 2050.
Lendlease	Lendlease aims to achieve net zero carbon by 2025 for scope 1 and 2 and absolute zero carbon by 2040 from all scopes and activities without the use of offsets.
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The embodied carbon of a project can be calculated by using whole building life cycle assessment (WBLCA) tools, such as Tally, OneClickLCA, and others. WBLCA analysis should be included in the scope of work for the project, to be led by the architect, engineer, and/or sustainability consultant. *Learn more about WBLCA in the Carbon Leadership Forum's Practice Guide.*

Analyzing data from past projects is ideal for providing meaningful carbon intensity limits or reduction goals. As of April 2021, there is no publicly available database of building life cycle assessments to provide embodied carbon benchmarks at the building scale. The Embodied Carbon Benchmark Study compiled over 1000 buildings to establish consensus on the order of magnitude of typical building embodied carbon. Additional research is needed to provide benchmark numbers similar those available for operational energy.

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While many building owners may choose to develop embodied carbon targets as part of broader initiatives like Science Based Targets or their corporate green building policies, the 2030 Challenge for Embodied Carbon and the Clean Construction Declaration are two examples of commitments that include targets specific to embodied carbon in construction.

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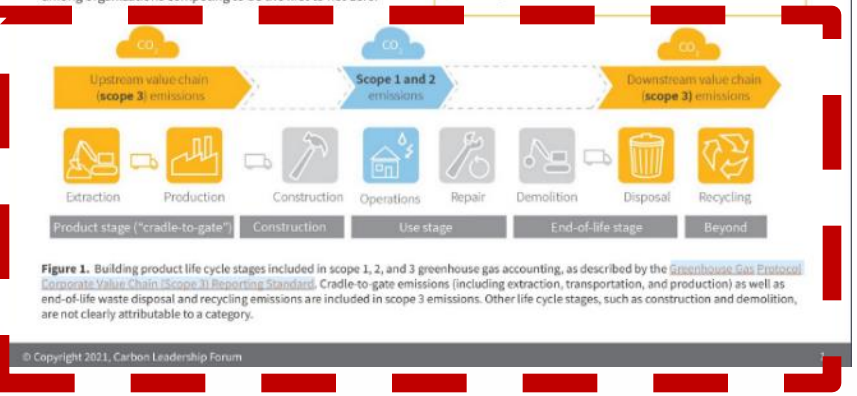

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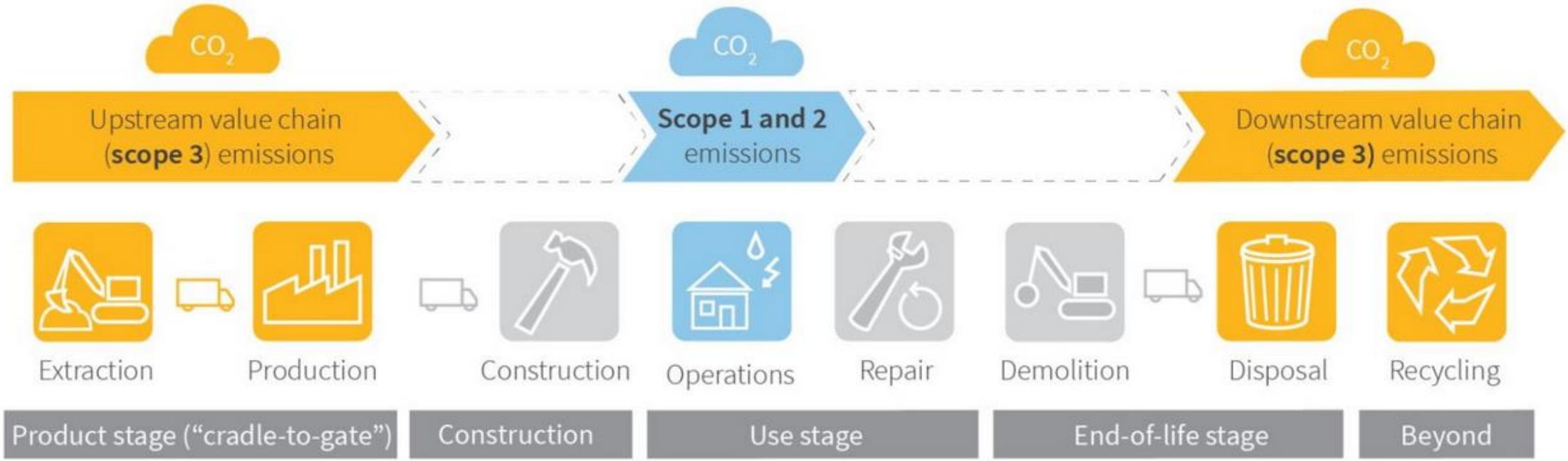

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CRADLE TO GRAVE

The 2030 Challenge for Embodied Carbon

Buildings, Infrastructure, and Materials

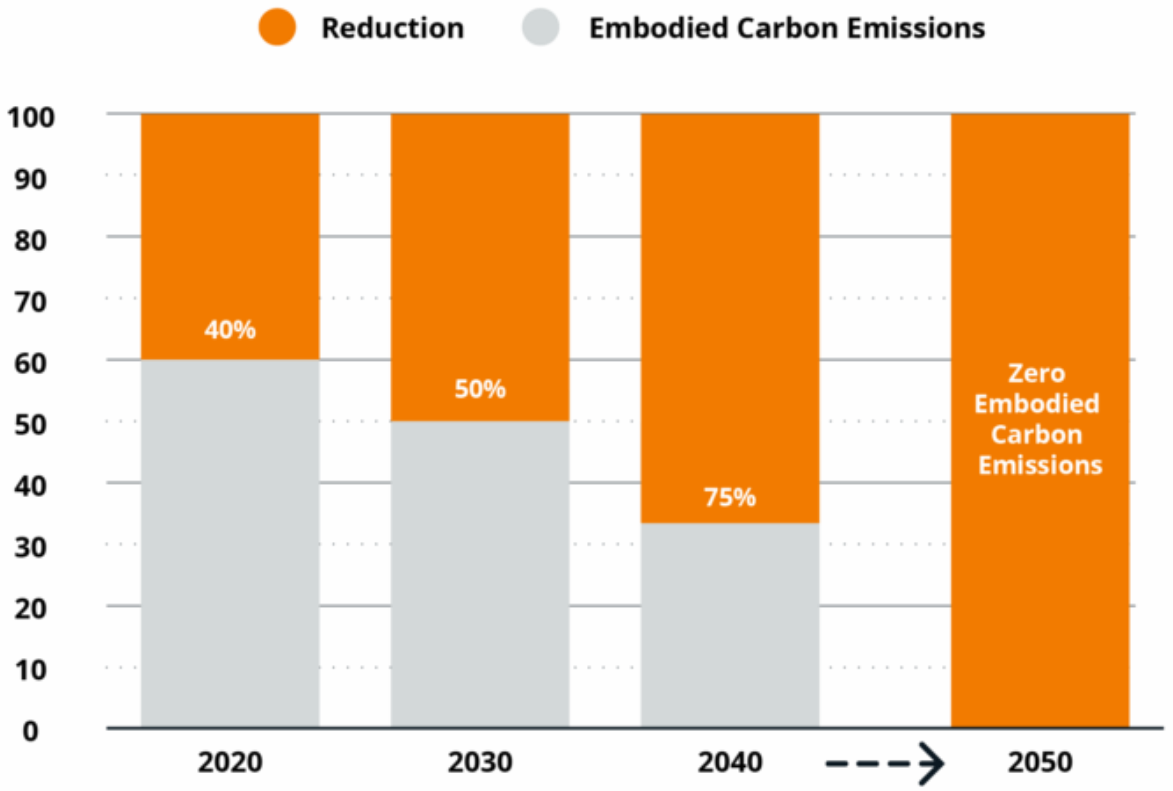
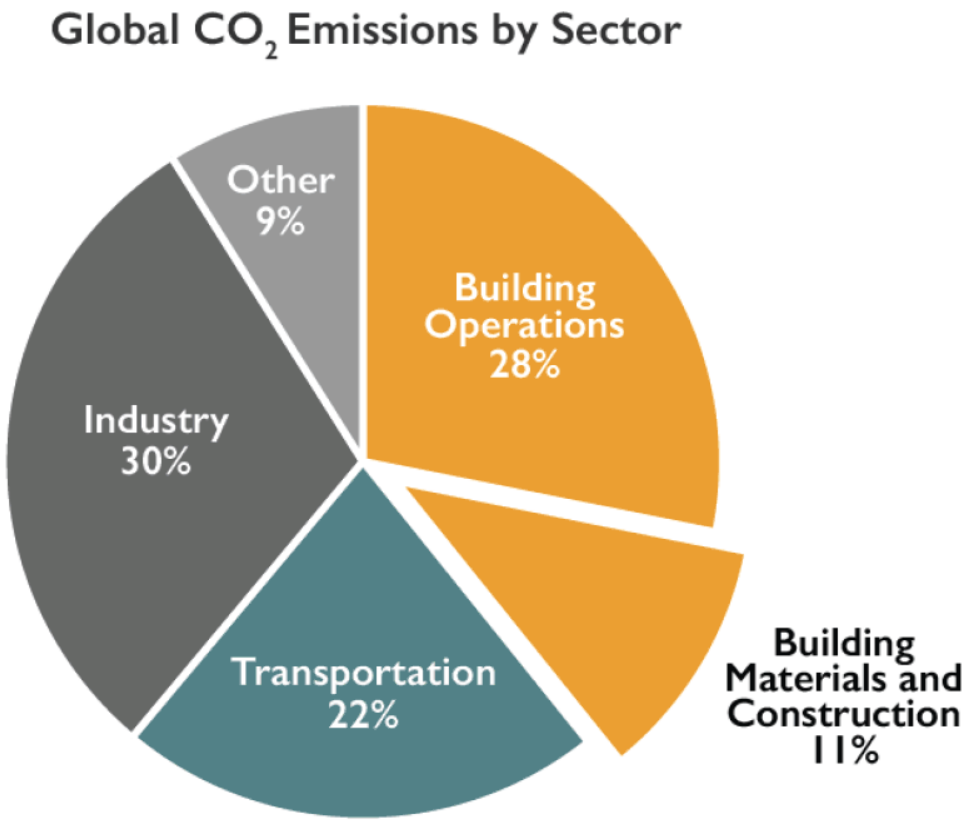


Figure 2 | Embodied Carbon vs Operational Carbon



Source: © 2018 2030, INC \ Architecture 2030. All Rights Reserved. Data Sources: UN Environmental Global Status Report 2017: EIA International Energy Outlook 2017

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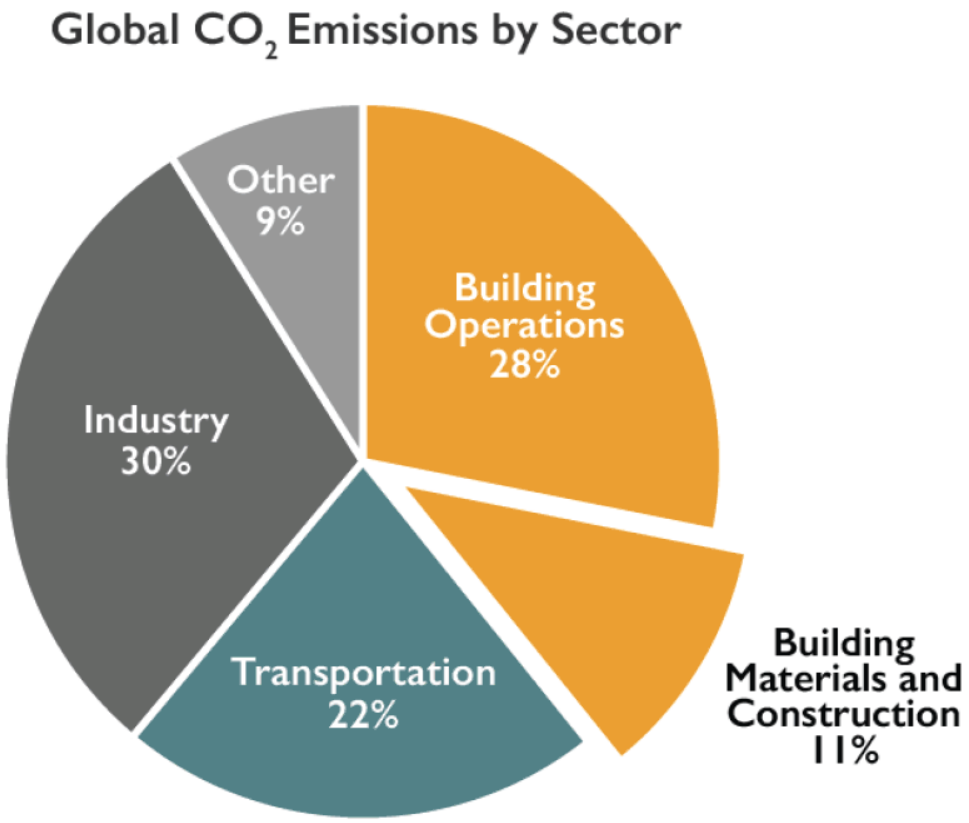

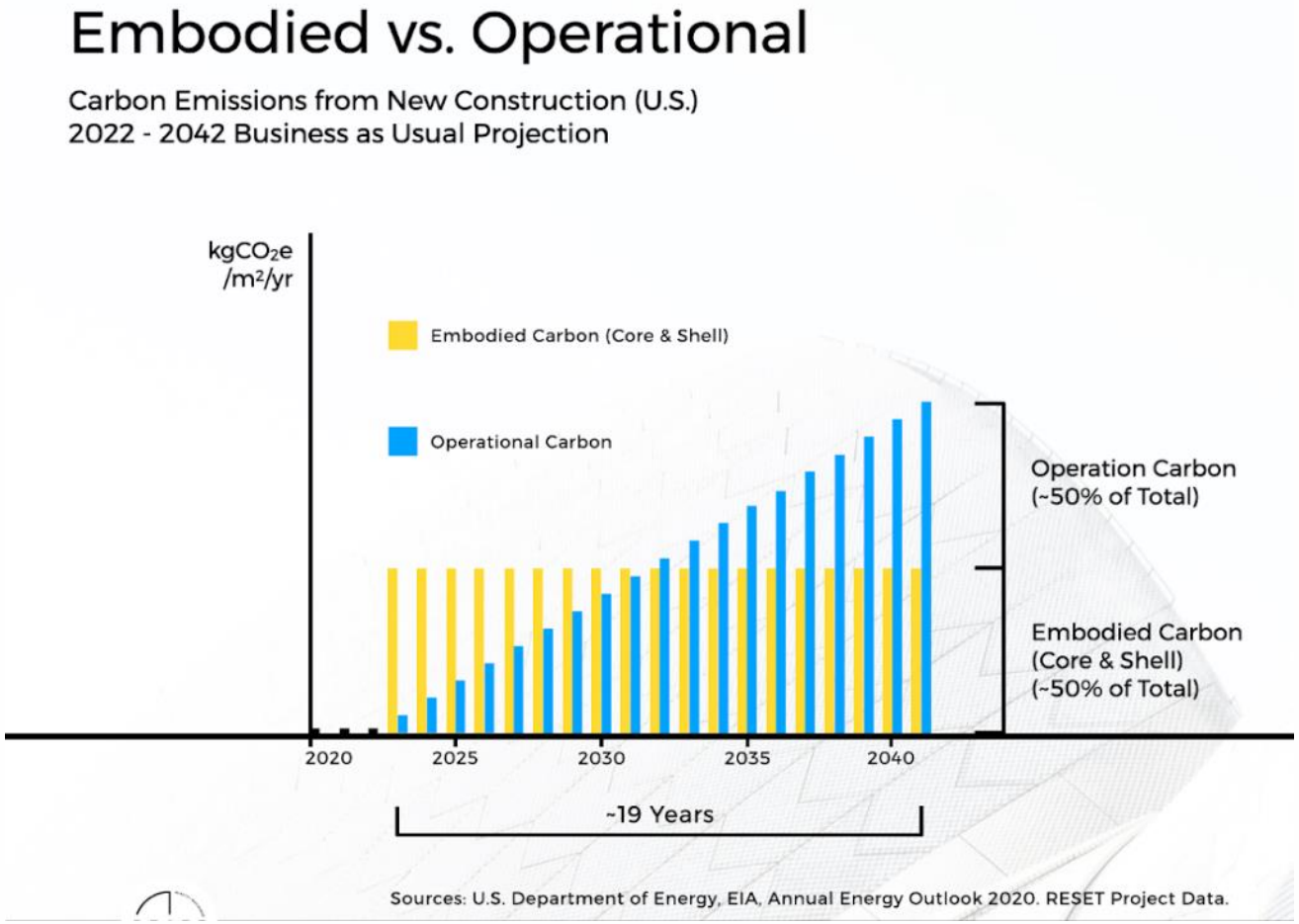

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OLD BUILDINGS CAN BE POSITIVE, TOO. NAT'L CULTRUAL ICONS/ NEIGHBORHOOD, LOCALIZED, COMMUNITY BASED CULTURE

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HOW HISTORIC TAX CREDITS FUNDING WORKS

Why the Historic Tax Credit?

Adaptive reuse repurposes dormant community assets, leveraging cultural heritage and attracting private capital

75% of the economic benefits of HTC projects generate local benefits: materials and wages

Historic building rehabilitations are more labor intensive than new construction: higher skilled workers + higher wages

Restoring underutilized buildings sets the stage for additional community investment and catalyzes more revitalization projects

Historic Preservation Tax Incentives

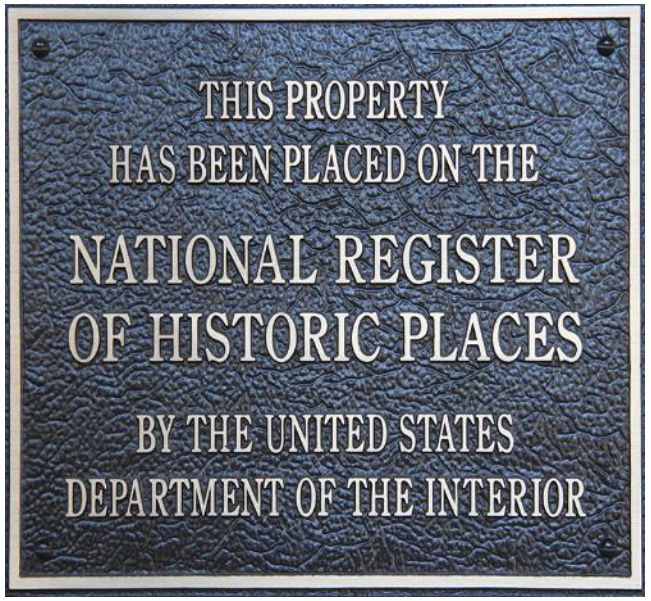
Tax Incentives for Preserving Historic Properties

The Federal Historic Preservation Tax Incentives program encourages private sector investment in the rehabilitation and re-use of historic buildings. It creates jobs and is one of the nation's most successful and cost-effective community revitalization programs. It has leveraged $116.34 billion in private investment to preserve more than 47,000 historic properties since 1976. The National Park Service, through its **Technical Preservation Services** division, and the **Internal Revenue Service** administer the program in partnership with **State Historic Preservation Offices**.

Historic Preservation Certification Application submission and review are now fully electronic. Hard copy applications are no longer accepted.

As of August 15, 2023, all applications submitted to SHPOs and materials submitted to the NPS in response to requests for additional information must be submitted electronically. All applications must use the current application forms and instructions dated "(Rev. 6/2023)."

FEDERAL Historic Preservation Tax Credit



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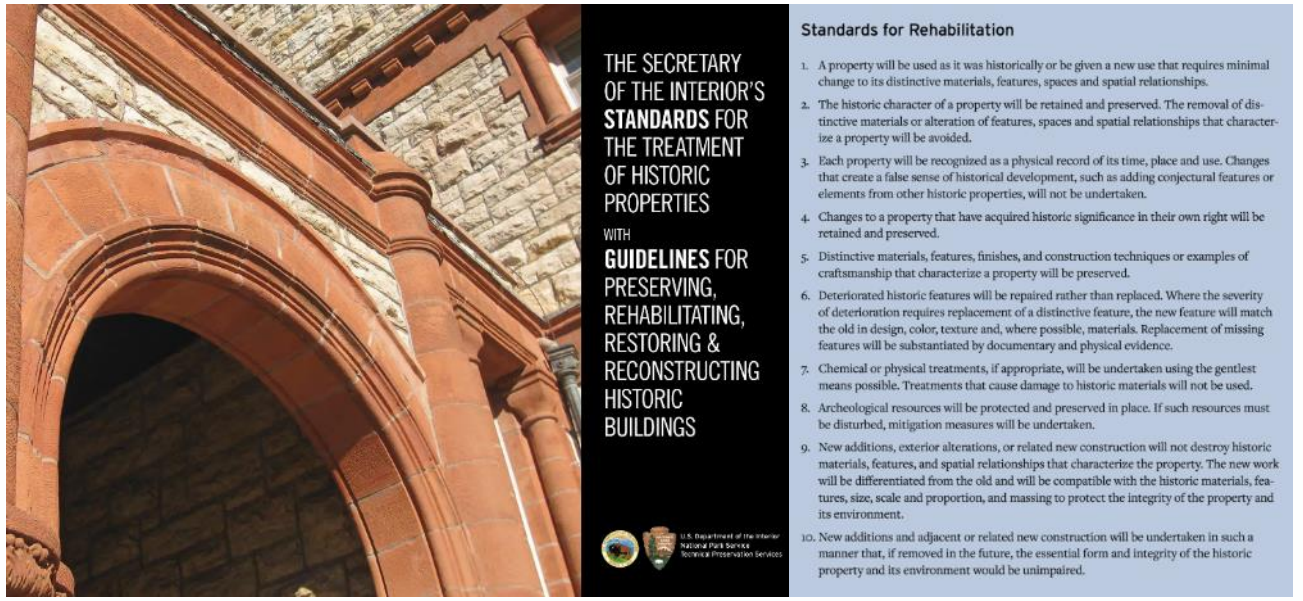

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20%

Ohio Historic Preservation Tax Credit Program

Community

WELCOME

HOUSING & HOMELESSNESS

ECONOMIC DEVELOPMENT

REDEVELOPMENT

GOVERNOR'S OFFICE OF APPALACHIA

The Ohio Historic Preservation Tax Credit Program provides a tax credit to leverage the private redevelopment of historic buildings. The program is highly competitive and receives applications bi-annually in March and September.

With 30 rounds of funding complete, tax credits have been approved for 627 projects to rehabilitate more than 863 historic buildings in 86 different Ohio communities. The program is projected to leverage more than $9.09 billion in private development funding and federal tax credits directly through the rehabilitation projects

Share this

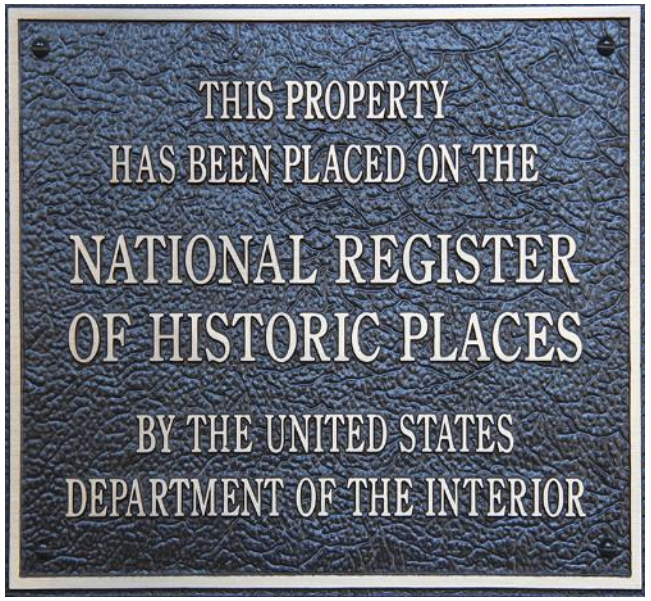
For more information

Lisa Brownell
Program Manager
Office of Strategic Business Investments
Business Services Division
(614) 752-2345
Lisa.Brownell@development.ohio.gov

View more tax credit programs

Sign up for email updates

OHIO Historic Preservation Tax Credit



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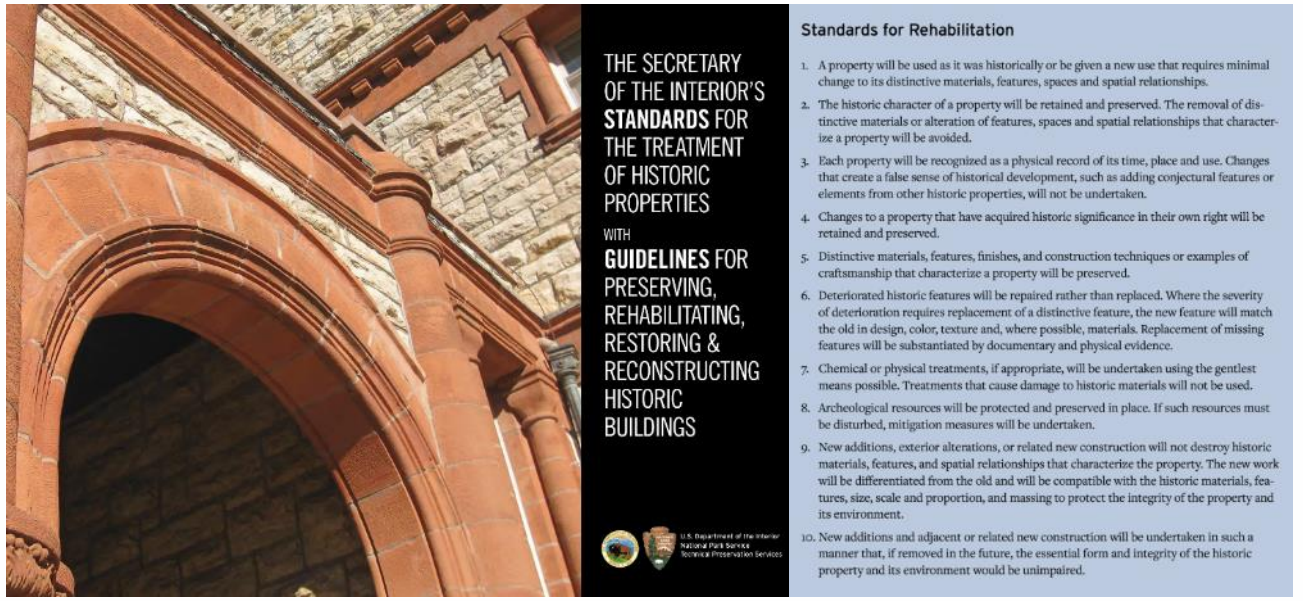

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25%/35%

Ohio Historic Preservation Tax Credit

- Annual allocation of $120 million awarded in two competitive rounds

- Applications divided into three project sizes
  - Small Projects – Roughly $1 million or less in Qualified Rehabilitation Expenditures
  - Intermediate Projects – Roughly $1 million to $10 million in Qualified Rehabilitation Expenditures
  - Large Projects – Over $10 million in Qualified Rehabilitation Expenditures

- Percentage of allocated funds awarded to each pool, per round
  - Small Projects = 8%
  - Intermediate Projects = 25%
  - Large Projects = 67%

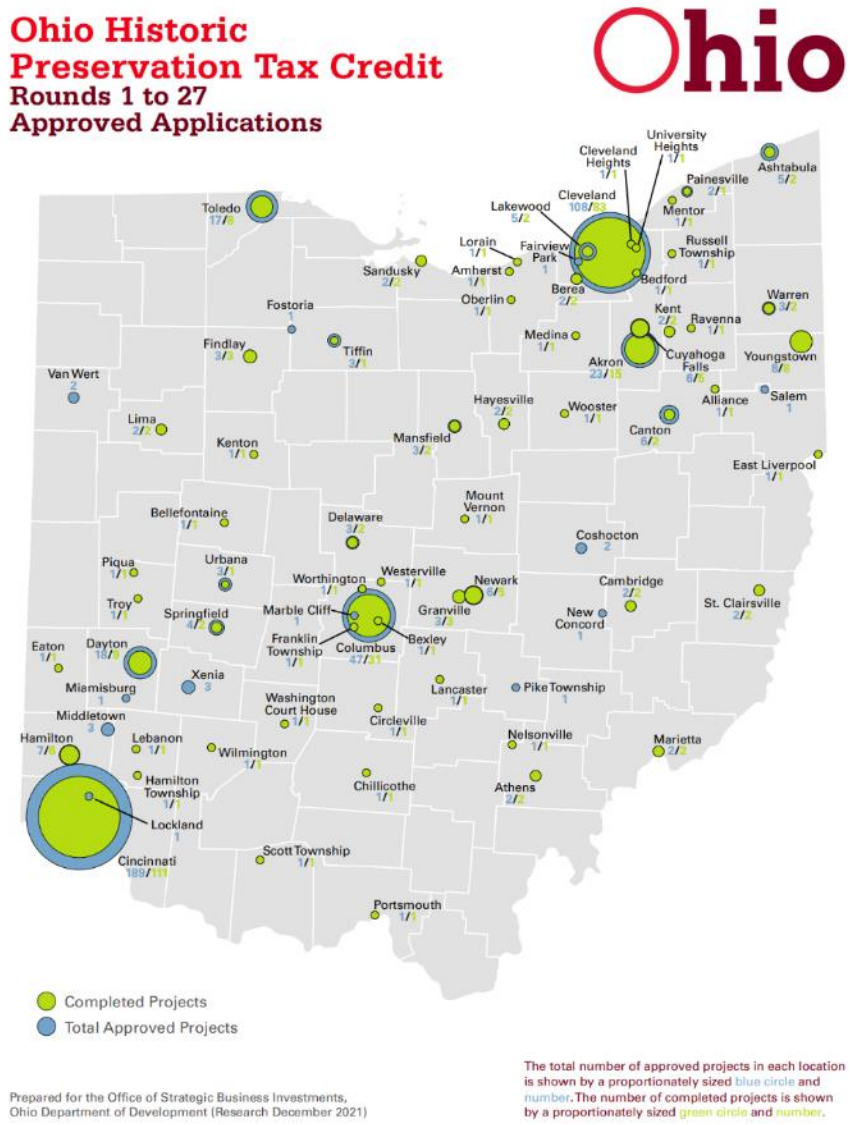
Ohio Historic Preservation Tax Credit

- Program is HIGHLY competitive, with resulting economic impact being used to score applications and determine which projects are awarded
  - Over the last three rounds, awards have totaled 39% of the credits requested

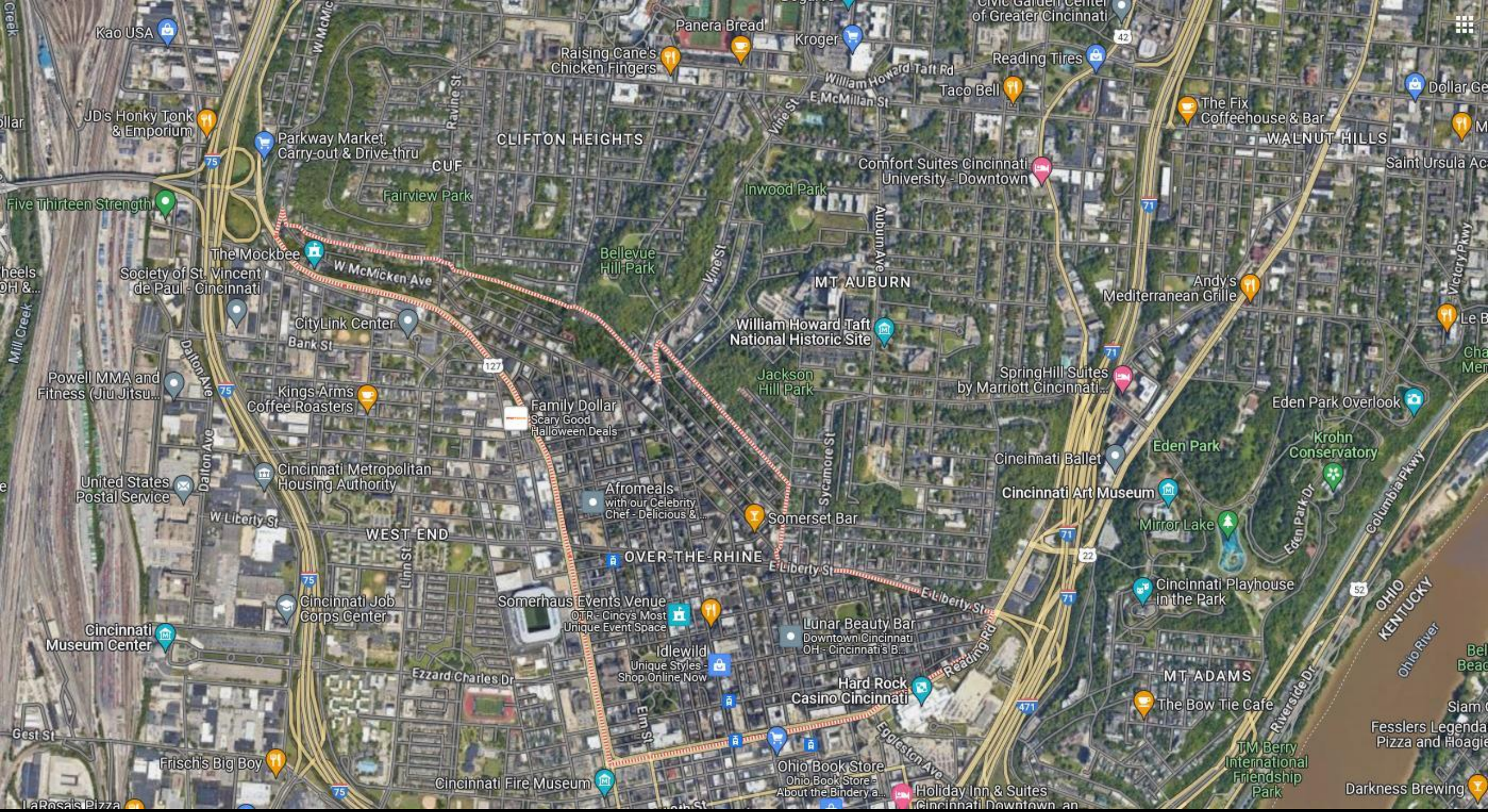
- Maximum credit request is 35% (25% in Cincinnati, Cleveland, and Columbus) and total credit per project may not exceed $10 million

- $120 million annual allocation (previously $60 million), 35% maximum credit request (previously 25%), and $10 million per project maximum credit (previously $5 million) are tied to S.B. 225, which is effective for only state fiscal years 2023 & 2024.

- Program has had a statewide impact, with geographic distribution considered as part of scoring



HTC
and
LEED TAX ABATEMENT



OVER THE RHINE

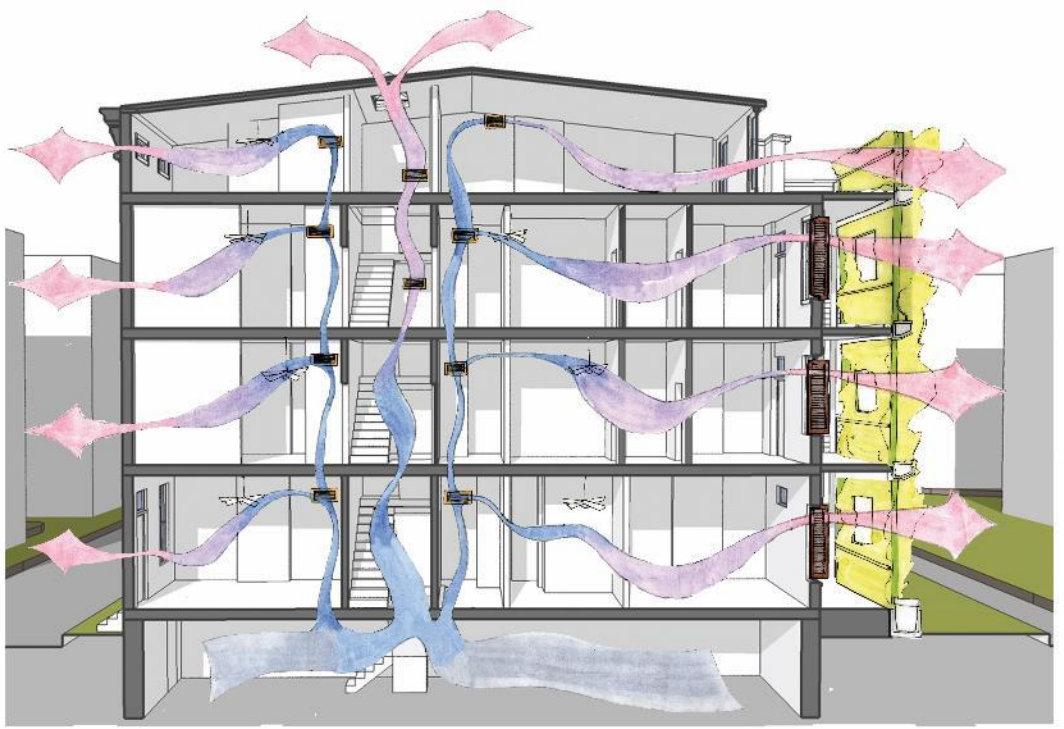
OTR Green Historic Study: AIA Cincinnati Merit Award for Architectural Advancement

GREENING OVER-THE-RHINE

This study, intended to serve as a national example, identifies the conflicts and compatibilities between green and historic, and challenges the infeasibility assumption through the integration of multi-disciplinary expertise.

OTR Green historic Study: 20 person Integrative Design Team


74
50
27.5
winter
morning &
evening
15



GREENING OVER-THE-RHINE

STUDY PARAMETERS

CLAY STREET – ENERGY MODELING PARAMETERS

	Historic Baseline	Model #1 Balanced	Model #2 Efficient
HERS Score	159	85 Maximum	85 Maximum
LEED Certification	NO	YES	YES
Perimeter walls	exposed brick	exposed brick	3.5 inches open cell foam R-15 behind drywall and on interior of brick
Windows	Double hung wood single paneU.9; SHGC.65	Very high end windows replacements U.19; SHGC .27	Very high end windows replacements U.19; SHGC .27
Floor above garage	Un-insulated slab	R25 continuous spray foam to basement ceiling	R13 open cell foam applied beneath slab
Air Leakage	.35 air changes per hour	20% improvement due to tighter windows	20% improvement due to tighter windows
HVAC	14 SEER heat pumps with electric resistance back up and 88% efficient distribution losses (ducts) associated with forced air system entirely in conditioned space	Dual fuel heat pumps, 16 SEER, 9.5HSPF, 92% efficient backup furnace with variable speed	Same as historic
Lighting and Appliances	Energy Star Appliances and 20% of lighting is CFL; electric range/oven and electric dryer; default U.S. statistics plug loads	Same	Same
Ceiling	R30	R49	Same as historic
Slab	Un-insulated	Same	Same
Rim/Band Joists	Un-insulated	Same	Same
Doors	All doors between conditioned and unconditioned space are Steel + Urethane with a thermal break (R4.4) except for the third floor pulley door for decoration (wood)	Same	Same
Skylights	Areas as proposed U.6 SHGC .5	Same	Same
Water heaters	40 gal electric units	Tankless natural gas	Same as historic
Orientation	As is	Same	Same
Neighbors	Building does NOT abut any other buildings	Same	Same

STUDY RESULTS

BELMAIN – ENERGY PERFORMANCE AND COST COMPARISON

	Historic Baseline	Model #1 Balanced	Model #2 Efficient
Energy Performance – HERS Score*	**102**	**85**	**79**
End-Use Annual Costs			
Heating	$ 5,866	$ 3,046	$ 2,553
Cooling	$ 1,375	$ 1,335	$ 1,249
Hot Water	$ 3,264	$ 3,264	$ 3,264
Lights & Appliances	$ 7,460	$ 7,460	$ 7,460
Total	**$ 17,965**	**$ 15,105**	**$14,526**
End-Use Energy Savings Annual	-	**$ 2,860**	**$ 3,439**
Return on Investment			
Installed Cost of Improvements	-	$ 41,265	$ 102,375
Increased Annual Mortgage Cost 30-yrs Fixed @ 6.5%APR	-	$ 3,158	$ 7,840
Expected Annual Cash Flow	-	$ -299	$ -4,400

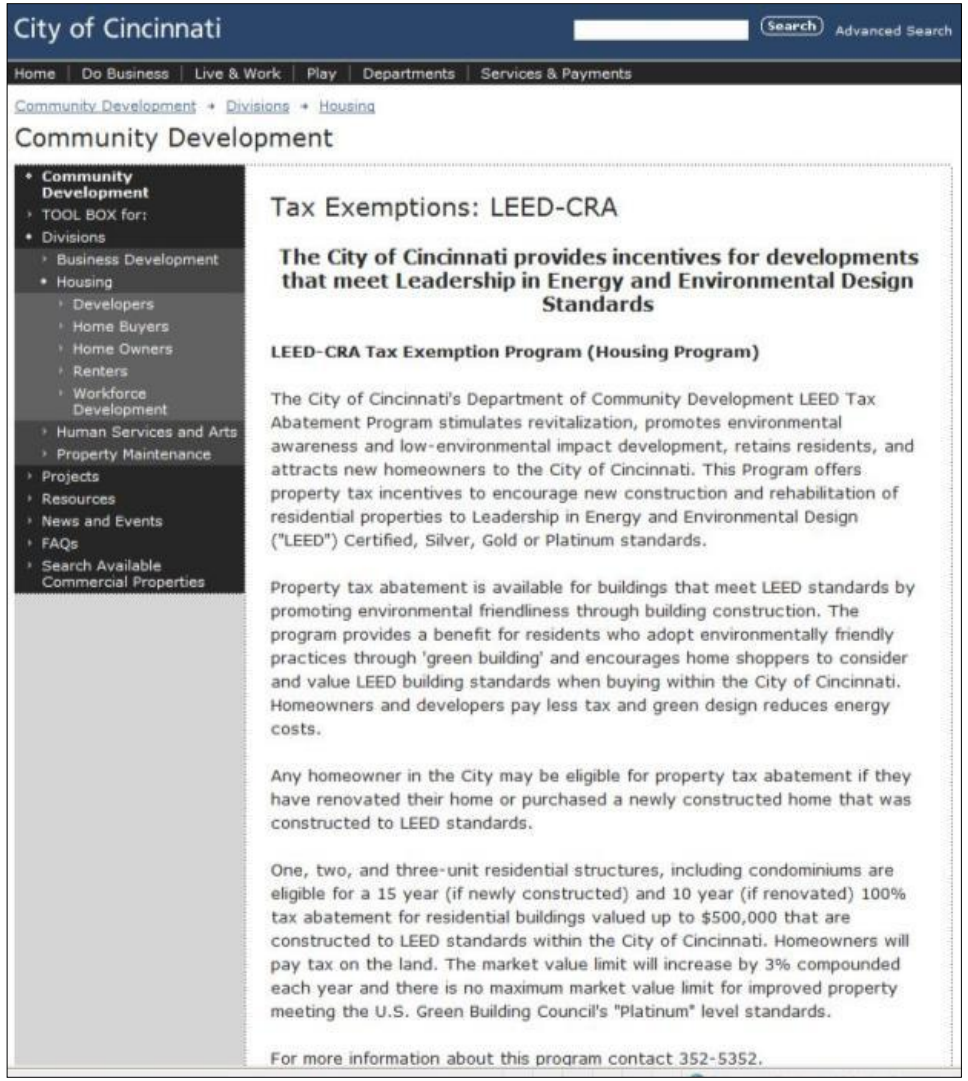
CLAY STREET – ENERGY PERFORMANCE AND COST COMPARISON

	Historic Baseline	Model #1 Balanced	Model #2 Efficient
Energy Performance – HERS Score*	**159**	**85**	**75**
End-Use Annual Costs			
Heating	$ 8,697	$ 1,991	$ 2,402
Cooling	$ 801	$ 567	$ 604
Hot Water	$ 678	$ 445	$ 678
Lights & Appliances	$ 2,726	$ 2,726	$ 2,726
Total	**$ 12,899**	**$ 5,729**	**$ 6,409**
End-Use Annual Energy Savings	-	**$ 7,173**	**$ 6,295**
Return on Investment			
Installed Cost of Improvements	-	$ 80,344	$ 90,117
Increased Annual Mortgage Cost 30-yrs Fixed @ 6.5%APR	-	$ 6,153	$ 6,901
Expected Annual Cash Flow	-	$ 1,021	$ -410

** HERS Index is a nationally accepted guideline developed by (Residential Energy Services Network (RESNET) for assessing the relative energy performance of a home.*

OTR Green historic Study: all 4 buildings were examples of achieving the stated goals: LEED BD+C, CI, H, Mid Rise, ND

GREENING OVER-THE-RHINE



City of Cincinnati

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Community Development → Divisions → Housing

Community Development

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    - Home Owners
    - Renters
    - Workforce Development
  - Human Services and Arts
  - Property Maintenance
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- FAQs
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Tax Exemptions: LEED-CRA

The City of Cincinnati provides incentives for developments that meet Leadership in Energy and Environmental Design Standards

LEED-CRA Tax Exemption Program (Housing Program)

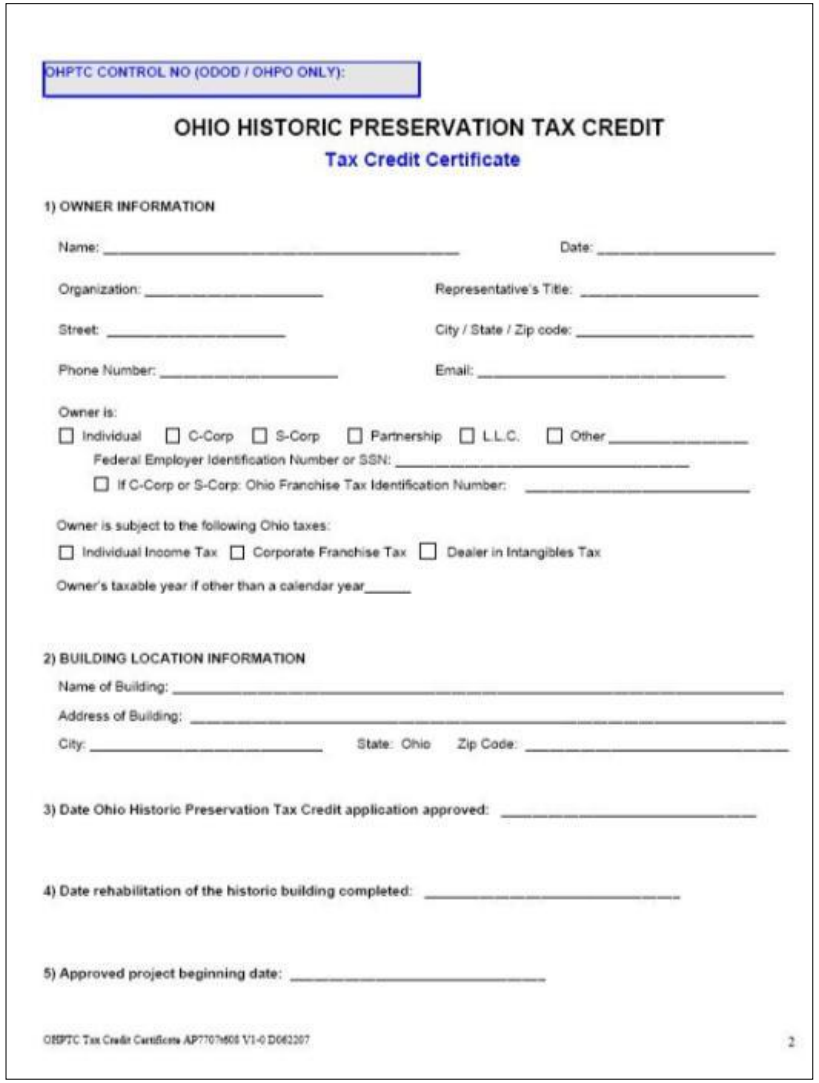
The City of Cincinnati's Department of Community Development LEED Tax Abatement Program stimulates revitalization, promotes environmental awareness and low-environmental impact development, retains residents, and attracts new homeowners to the City of Cincinnati. This Program offers property tax incentives to encourage new construction and rehabilitation of residential properties to Leadership in Energy and Environmental Design ("LEED") Certified, Silver, Gold or Platinum standards.

Property tax abatement is available for buildings that meet LEED standards by promoting environmental friendliness through building construction. The program provides a benefit for residents who adopt environmentally friendly practices through 'green building' and encourages home shoppers to consider and value LEED building standards when buying within the City of Cincinnati. Homeowners and developers pay less tax and green design reduces energy costs.

Any homeowner in the City may be eligible for property tax abatement if they have renovated their home or purchased a newly constructed home that was constructed to LEED standards.

One, two, and three-unit residential structures, including condominiums are eligible for a 15 year (if newly constructed) and 10 year (if renovated) 100% tax abatement for residential buildings valued up to $500,000 that are constructed to LEED standards within the City of Cincinnati. Homeowners will pay tax on the land. The market value limit will increase by 3% compounded each year and there is no maximum market value limit for improved property meeting the U.S. Green Building Council's "Platinum" level standards.

For more information about this program contact 352-5352.



OHPTC CONTROL NO (ODOD / OHPO ONLY):

OHIO HISTORIC PRESERVATION TAX CREDIT

Tax Credit Certificate

1) OWNER INFORMATION

Name: _____ Date: _____

Organization: _____ Representative's Title: _____

Street: _____ City / State / Zip code: _____

Phone Number: _____ Email: _____

Owner is:

☐ Individual ☐ C-Corp ☐ S-Corp ☐ Partnership ☐ L.L.C. ☐ Other _____

Federal Employer Identification Number or SSN: _____

☐ If C-Corp or S-Corp: Ohio Franchise Tax Identification Number: _____

Owner is subject to the following Ohio taxes:

☐ Individual Income Tax ☐ Corporate Franchise Tax ☐ Dealer in Intangibles Tax

Owner's taxable year if other than a calendar year_____

2) BUILDING LOCATION INFORMATION

Name of Building: _____

Address of Building: _____

City: _____ State: Ohio Zip Code: _____

3) Date Ohio Historic Preservation Tax Credit application approved: _____

4) Date rehabilitation of the historic building completed: _____

5) Approved project beginning date: _____

OHPTC Tax Credit Certificate AP7707h608 V1-0 D062207 2

OVER-THE-RHINE GREEN-HISTORIC STUDY

EXPLORING THE INTERSECTION BETWEEN
ENVIRONMENTAL SUSTAINABLITY AND
HISTORIC PRESERVATION

OVER-THE-RHINE
GREEN-HISTORIC STUDY

EXPLORING THE INTERSECTION BETWEEN
ENVIRONMENTAL SUSTAINABILITY AND
HISTORIC PRESERVATION

Historic Preservation Standards and Guidelines

To encourage consistent practices, the National Park Service has developed standards and guidelines that guide preservation work at the national, tribal, state, and local levels. In some cases, these standards can be regulatory. The guidelines explain the standards. The flagship of these preservation guideposts is *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*. These standards and guidelines complement **federal historic preservation laws**.

Archeology and Historic Preservation

The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation

Architectural and Engineering Documentation

The Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation

Federal Agency Historic Preservation Programs

The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act

Historic Vessel Preservation

The Secretary of the Interior's Standards for Historic Vessel Preservation Projects, with Guidelines for Applying the Standards (pdf, 12 MB)

Rehabilitation

The Secretary of the Interior's Standards for Rehabilitation (**36 CFR 67**) regulatory for the Historic Preservation Tax Incentives Program

- **Guidelines for Rehabilitating Historic Buildings**
- **Guidelines on Flood Adaptation for Rehabilitating Historic Buildings**
- **Guidelines on Sustainability for Rehabilitating Historic Buildings**

NPS SUSTAINABILITY GUIDELINES: https://www.nps.gov/subjects/historicpreservation/standards.htm

https://www.nps.gov/subjects/historicpreservation/standards.htm

National Park Service

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Historic Preservation Standards and Guidelines

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- **lines o Adapta Rehabi istoric**
- **Guidelines on Sustainability for Rehabilitating Historic Buildings**

NPS SUSTAINABILITY GUIDELINES: https://www.nps.gov/subjects/historicpreservation/standards.htm

THE SECRETARY OF THE INTERIOR'S STANDARDS FOR REHABILITATION &

ILLUSTRATED GUIDELINES ON **SUSTAINABILITY** FOR REHABILITATING HISTORIC BUILDINGS

U.S. Department of the Interior
National Park Service
Technical Preservation Services

NPS SUSTAINABILITY GUIDELINES: https://www.nps.gov/orgs/1739/upload/sustainability-guidelines.pdf

33

34

35

Recommended: [33-35] Original metal windows were appropriately repaired as part of the rehabilitation of this historic industrial building.

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Retrofitting historic steel windows and curtain-wall systems to improve thermal performance without compromising their character.	
Installing clear, low-emissivity (low-e) glass or film without noticeable color in historically-clear windows to reduce solar heat gain.	Retrofitting historically-clear windows with tinted glass or reflective coatings that will negatively impact the historic character of the building.
Installing film in a slightly lighter shade of the same color tint when replacing glazing panels on historically-dark-tinted windows to improve daylighting.	Introducing clear glazing or a significantly lighter colored film or tint than the original to improve daylighting when replacing historically dark-tinted windows.

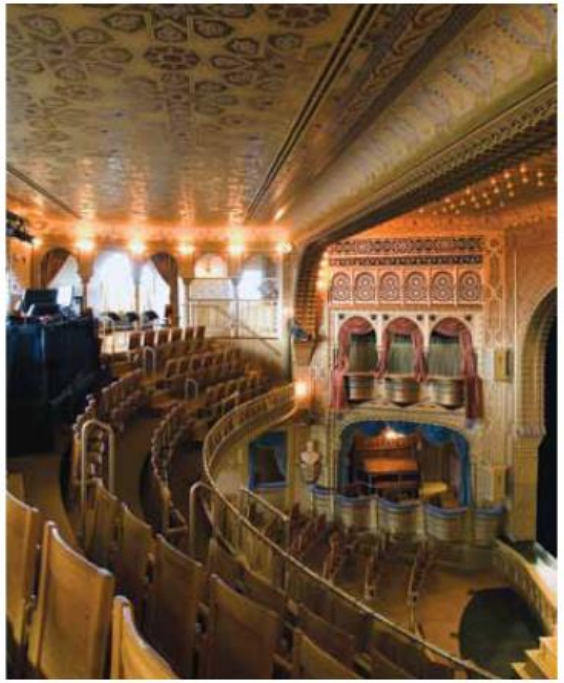
36

37

38

Recommended: [36-38] Original metal windows were retained and made operable during the rehabilitation of this historic mill complex. Installing patio slider doors as interior storm windows was a creative and successful solution to improve the energy efficiency of the existing windows.

62



HEATING, VENTILATING AND AIR CONDITIONING (HVAC) AND AIR CIRCULATION

RECOMMENDED	NOT RECOMMENDED
Installing new mechanical ductwork sensitively or using a mini-duct system, so that ducts are not visible from the exterior and do not adversely impact the historic character of the interior space.	Installing new mechanical ductwork that is visible from the exterior or adversely impacts the historic character of the interior space.
Leaving interior ductwork exposed where appropriate, such as in industrial spaces, or when concealing the ductwork would destroy historic fabric.	Leaving interior ductwork exposed in highly-finished spaces where it would negatively impact the historic character of the space.
Leaving interior ductwork exposed and painting it, when concealing it would negatively impact historic fabric, such as a historic pressed metal ceiling.	Leaving exposed ductwork unpainted in finished interior spaces, such as those with a pressed metal ceiling.
Placing HVAC equipment where it will operate effectively and efficiently and be minimally visible and will not negatively impact the historic character of the building or its site.	Placing HVAC equipment in highly-visible locations on the roof or on the site where it will negatively impact the historic character of the building or its site.

63

64

65

66

Recommended: [62-63] Carefully installed new mechanical ductwork is barely visible in the elaborately decorated ceiling of this historic theater.
[64] The ductwork has been left unpainted which is compatible with this historic industrial interior.
[65] To avoid damaging the metal ceiling, the ductwork was left exposed and it was painted to minimize its impact, thus preserving the historic character of this former bank.

Not Recommended: [66] Interior ductwork has been inappropriately left exposed and unpainted here in this traditionally-finished school entrance hall.

NPS SUSTAINABILITY GUIDELINES: https://www.nps.gov/orgs/1739/upload/sustainability-guidelines.pdf

SOLAR TECHNOLOGY

RECOMMENDED	NOT RECOMMENDED
Installing a low-profile solar device on the historic building so that it is not visible or only minimally visible from the public right of way: for example, on a flat roof and set back to take advantage of a parapet or other roof feature to screen solar panels from view; or on a secondary slope of a roof, out of view from the public right of way.	Installing a solar device in a prominent location on the building where it will negatively impact its historic character.
Installing a solar device on the historic building in a manner that does not damage historic roofing material or negatively impact the building's historic character and is reversible.	Installing a solar device on the historic building in a manner that damages historic roofing material or replaces it with an incompatible material and is not reversible.
	Removing historic roof features to install solar panels.
	Altering a historic, character-defining roof slope to install solar panels.
	Installing solar devices that are not reversible.
Installing solar roof panels horizontally -- flat or parallel to the roof—to reduce visibility.	Placing solar roof panels vertically where they are highly visible and will negatively impact the historic character of the building.

76

77

79

Not Recommended: [79] Although installing solar panels behind a rear parking lot might be a suitable location in many cases, here the panels negatively impact the historic property on which they are located.

Recommended: [76-77] Solar panels, which also serve as awnings, were installed in secondary locations on the side and rear of this historic post office and cannot be seen from the front of the building. [78] Solar panels placed horizontally on the roof of this historic building are not visible from below.

78

NPS SUSTAINABILITY GUIDELINES: https://www.nps.gov/orgs/1739/upload/sustainability-guidelines.pdf

WORKING WITH OHPO

Working With the Ohio State Historic Preservation Office (Ohio SHPO)

Technical Preservation Services

Works with owners of eligible historic properties in Ohio, helping them qualify for federal and state rehabilitation tax credits. Advises on the physical conservation of historic properties and conducts Building Doctor clinics for the general public. Administers the Certified Local Governments program. Serves as liaison to national and statewide historic preservation organizations. Oversees preparation of the state historic preservation plan.

Mariangela Pfister, Department Head
Nathan Bevil, Community Planning and Preservation Manager
Jessica Chunat, Technical Preservation Services Manager
Justin Cook, Technical Preservation Services Manager
Sam Decillis, Project Navigator
Vanessa Gabriele, Technical Preservation Services Manager
Rachel Krause, Technical Preservation Services Manager

Historic Tax Credit DOCUMENTATION

Rec'd by SHPO Aug 31 2023

NPS Form 10-168e (Rev. 6/2020)
National Park Service
OMB Control No. 1024-0009

HISTORIC PRESERVATION CERTIFICATION APPLICATION
PART 2 – DESCRIPTION OF REHABILITATION

Instructions: This page must bear the applicant's original signature and must be dated. The National Park Service certification decision is based on the description in this application form. In the event of any discrepancy between the application form and other supplementary material submitted with it (such as architectural plans, drawings and specifications), the application form takes precedence. A copy of this form will be provided to the Internal Revenue Service.

NPS Project Number

1. **Historic Property Name** baker brothers wholesale grocery
   Street 8-12 East Main Street
   City Zanesville County Muskingum State OH Zip 43701
   Name of Historic District or National Register property Baker Brothers Wholesale Grocery
   ☒ Listed individually in the National Register of Historic Places; date of listing 06/01/2023
   ☐ Located in a Registered Historic District; name of district
   ☐ Part 1 – Evaluation of Significance submitted? Date submitted Date of certification

2. **Project Data** (For phased projects, data entered in this section must be the totals for entire project)
   Date of building [redacted] Estimated total rehabilitation costs (QREs) [redacted]
   Number of buildings in project 1 Floor area before / after rehabilitation [redacted] / [redacted] sq ft
   Start date (estimated) [redacted] Use(s) before / after rehabilitation [redacted] / [redacted]
   Completion date (estimated) [redacted] Number of housing units before / after rehabilitation [redacted] / [redacted]
   Application includes phase(s) [redacted] of [redacted] phases Number of low-moderate income housing units before / after rehabilitation [redacted] / [redacted]
   ☐ Intend to apply the IRS 60-month measuring period for the purposes of certain tax rehabilitations

3. **Project Contact** (if different from applicant)
   Name [redacted] Company
   Street [redacted] City [redacted] State [redacted]
   Zip [redacted] Telephone [redacted] Email Address [redacted]

4. **Applicant**
   I hereby attest that the information I have provided is, to the best of my knowledge, correct. I further attest that (check one or both boxes, as applicable):
   ☒ I am the owner of the above-described property within the meaning of "owner" set forth in 36 CFR § 67.2 (2011), and/or
   ☐ If I am not the fee simple owner of the above described property, no fee simple owner is aware of the action I am taking relative to this application and has no objection, as noted in a written statement from the owner, a copy of which (i) is/ is not is attached to this application form and incorporated herein, or has been previously submitted, and (ii) meets the requirements of 36 CFR § 67.3(a)(1) (2011).
   For purposes of this attestation, the singular shall include the plural wherever appropriate. I understand that knowing and willful falsifications or factual representations in this application may subject me to fines and imprisonment under 18 U.S.C. § 1001, which, under certain circumstances, provides for im
   Name [redacted] Signature [redacted]
   Applicant Entity [redacted] SSN
   Street [redacted] City [redacted]
   Zip [redacted] Telephone [redacted] Email Address [redacted]
   ☐ Applicant, SSN, or TIN has changed since previously submitted application

NPS Official Use Only

The National Park Service has reviewed the Historic Preservation Certification Application – Part 2 for the above named property and has de
☐ the rehabilitation described herein is consistent with the historic character of the property and, where applicable, with the district in whic
meets the Secretary of the Interior's Standards for Rehabilitation. This letter is a preliminary determination only, since a formal certificat
only to the owner of a "certified historic structure" after rehabilitation work is complete.
☐ the rehabilitation or proposed rehabilitation will meet the Secretary of the Interior's Standards for Rehabilitation if the attached condition
☐ the rehabilitation described herein is not consistent with the historic character of the property or the district in which it is located and that
Secretary of the Interior's Standards for Rehabilitation.

Date: National Park Service Authorized Signature:

☐ NPS conditions or comments attached

Rec'd by SHPO Aug 31 2023

HISTORIC PRESERVATION CERTIFICATION APPLICATION
PART 2 – DESCRIPTION OF REHABILITATION

Historic Property Name Baker Brothers Wholesale Grocery NPS Project Number
Property Address 8-12 East Main Street, Zanesville, OH

metal deterioration.

Aside from the masonry cleaning described above, no other work is proposed.

Number 7 Feature Storefront Date of Feature 1894, 1978

Describe existing feature and its condition

The 1894 building has a traditional three-bay storefront, with a flush center entrance flanked by cast iron columns and large display windows. The storefront sits on a metal sill plate supported by sandstone blocks. The aluminum door assembly – with vertical sidelight and transom – is not historic (date unknown). Above the door and windows are single glazed transoms. Storefront framing, window trim, and bulkheads are wood. One of the plate glass windows has been plywood/cracked and temporarily secured with plywood; both appear to be historic, if not original. At the northeast corner of the building is a single storefront bay, with the same configuration and materials as described above.

The 1913 building was built to complement the design of the original building, but the storefront was replaced in 1978 when the building was renovated for a furniture store showroom. The historic storefront originally aligned with the dimensions of the 1894 building. In terms of its proportions and scale. While photos of the original storefront could not be located for this project, it appears from physical evidence that two display windows were removed from the historic storefront, the transom and bulkhead areas were infilled with brick, and the current insulated, aluminum-framed display windows were installed in the new openings. A diamond-shaped window – also insulated with aluminum framing – was added at the front end of the west wall of the 1913 building, providing additional illumination to the showroom space at street level.

Photo Numbers Drawing Numbers A1.3, A2.3

Describe work to feature

Historic interior trim will be carefully removed, existing single-pane glazing will be removed, and new aluminum-clad, single-lite wood display windows will be installed in the 1894 storefront. Original wood trim will be reinstalled, with adjustments for the new glazing as needed. Window samples will be submitted to the SHPO for review and approval before work begins, as stipulated in Item 10 below.

No changes are proposed for the 1913 storefront.

Number 8 Feature Loading dock (east) Date of Feature 1894, unknown

Describe existing feature and its condition

There are 2 freight doors and 1 pedestrian door on the east wall of the 1894 building. Directly in front of the doors is a 5-bay loading dock, where deliveries were initially made to/from the grocery warehouse. The loading dock is wood framed, with plywood decking and skirting. Access to the platform is provided by a precast concrete stair at the north end of the loading dock. While it does not appear to be historic, the age of the platform cannot be determined. It is in poor condition.

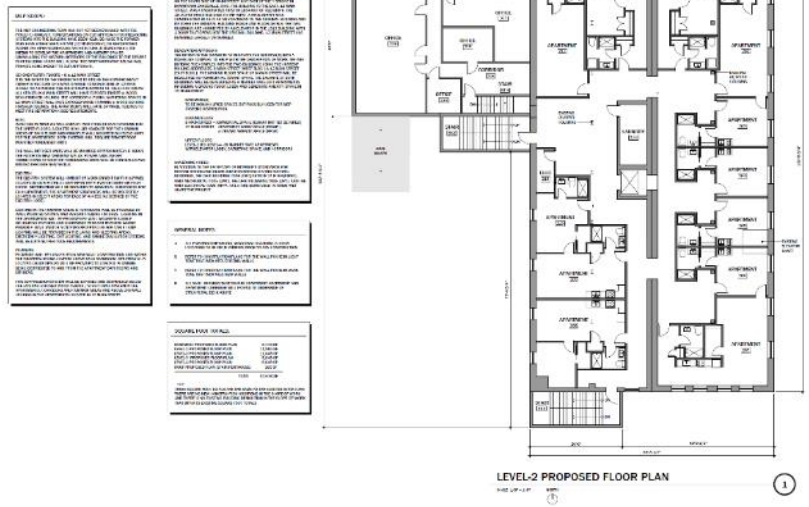
Above the platform are 5 wood knee braces that are cantilevered out of pockets in the

Page 6 of 13

Photo Sheets:
Baker Brothers Wholesale Grocery, 8-12 E. Main Street, Zanesville
Part 2 / 6/29/2023

112: First-floor warehouse of 12 E. Main Street, looking south.

113: First-floor warehouse of 12 E. Main Street, looking southwest.



LEVEL-2 PROPOSED FLOOR PLAN

Gossman group

Baker Bros Building

30 August 2023

Historic Review

Level-2 Proposed Floor Plan

A2.3

nps.gov/subjects/taxincentives/index.htm

As of August 15, 2023, Historic Preservation Certification Application submission and review are fully electronic. Hard copy applications are no longer accepted.
All applications submitted to SHPOs and materials submitted to the NPS in response to requests for additional information must be submitted electronically. All applications must use the current application forms and instructions dated "(Rev. 6/2023)."

Banner photo: Cook County Hospital Administration Building, Chicago, Illinois, Dave Burk, SOM; Courtesy Murphy Real Estate Services

About the Tax Incentives ›

Overview of the tax incentives

Before You Apply ›

Information to review before preparing an application

Application Process ›

Application forms, documentation requirements, and fees

All application materials are now submitted

ELECTRONICALLY

ohiohistory.org/preserving-ohio/historic-tax-incentive/federal-historic-rehabilitation-tax-credit/

Submitting Your Federal Tax Credit Application

Part 1 | Part 2 | Part 3 | Amendments / Advisory Determinations | E-Submission Requirements | Application Submission Form

1. Ensure all application components are complete according to the e-submission requirements.
2. Place the application and supporting materials in a file transfer program. Dropbox is preferred.
3. Click to submit your application.

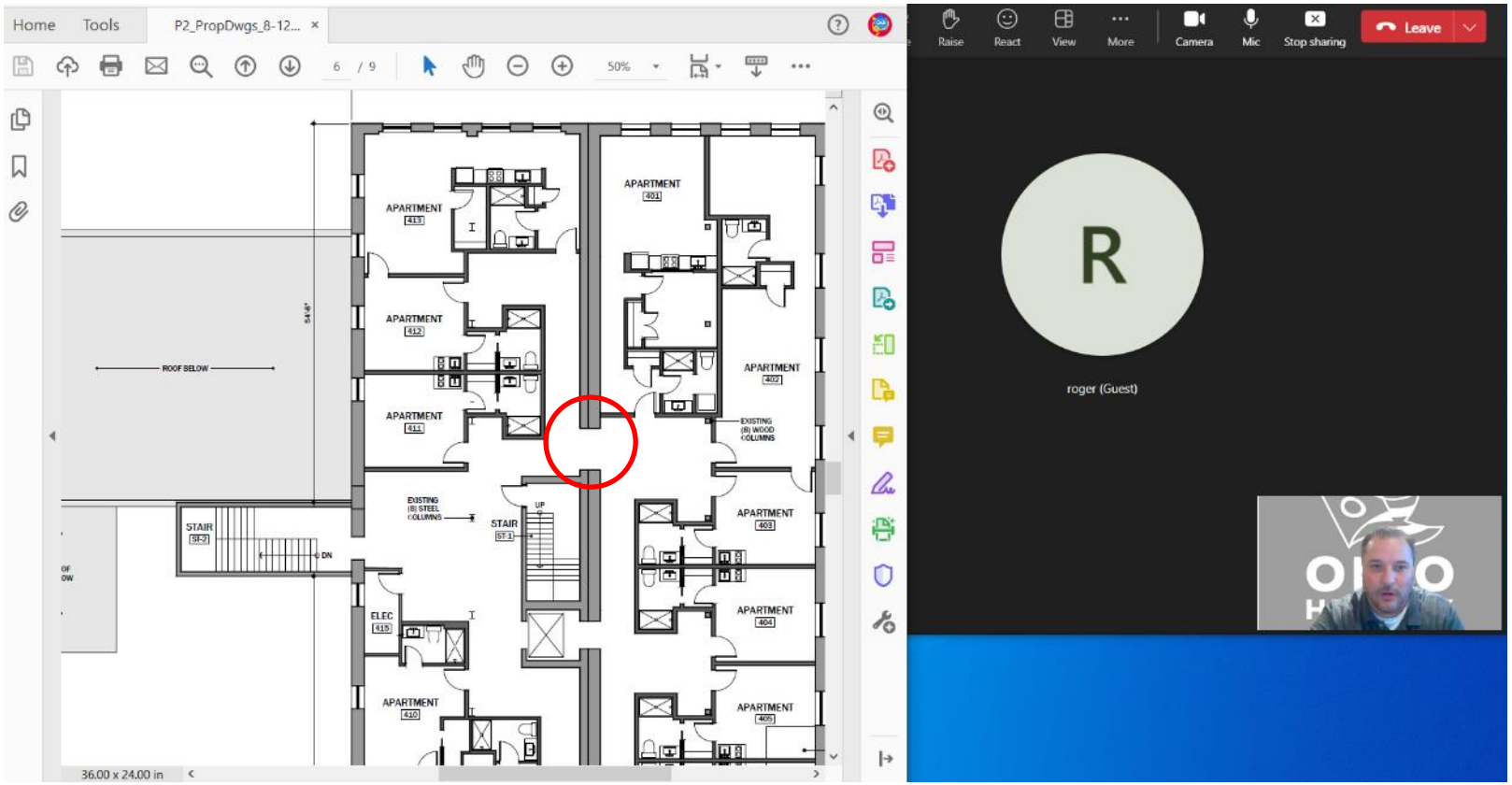
Common Definitions

- Qualified Rehabilitation Expenditures
- Certified Rehabilitation
- Certified Historic Structure
- Depreciable
- Substantial
- Phased Project
- Placed in Service Date

These expenditures include costs associated with the work undertaken on the historic building, as well as architectural and engineering fees, site survey fees, legal expenses, development fees, and other construction-related costs if such costs are added to the basis of the property and are determined to be reasonable and related to the services performed. They do not include costs of acquiring or furnishing the building, new additions that expand the existing building, new building construction, or parking lots, sidewalks, landscaping, or other facilities related to the building.

Open Lines of COMMUNICATION

- Always accessible via phone/email
- Regularly participate in videoconferences with architects, consultants, and applicants to discuss challenging issues
- Able to conduct site visits to gain a better understanding of the building

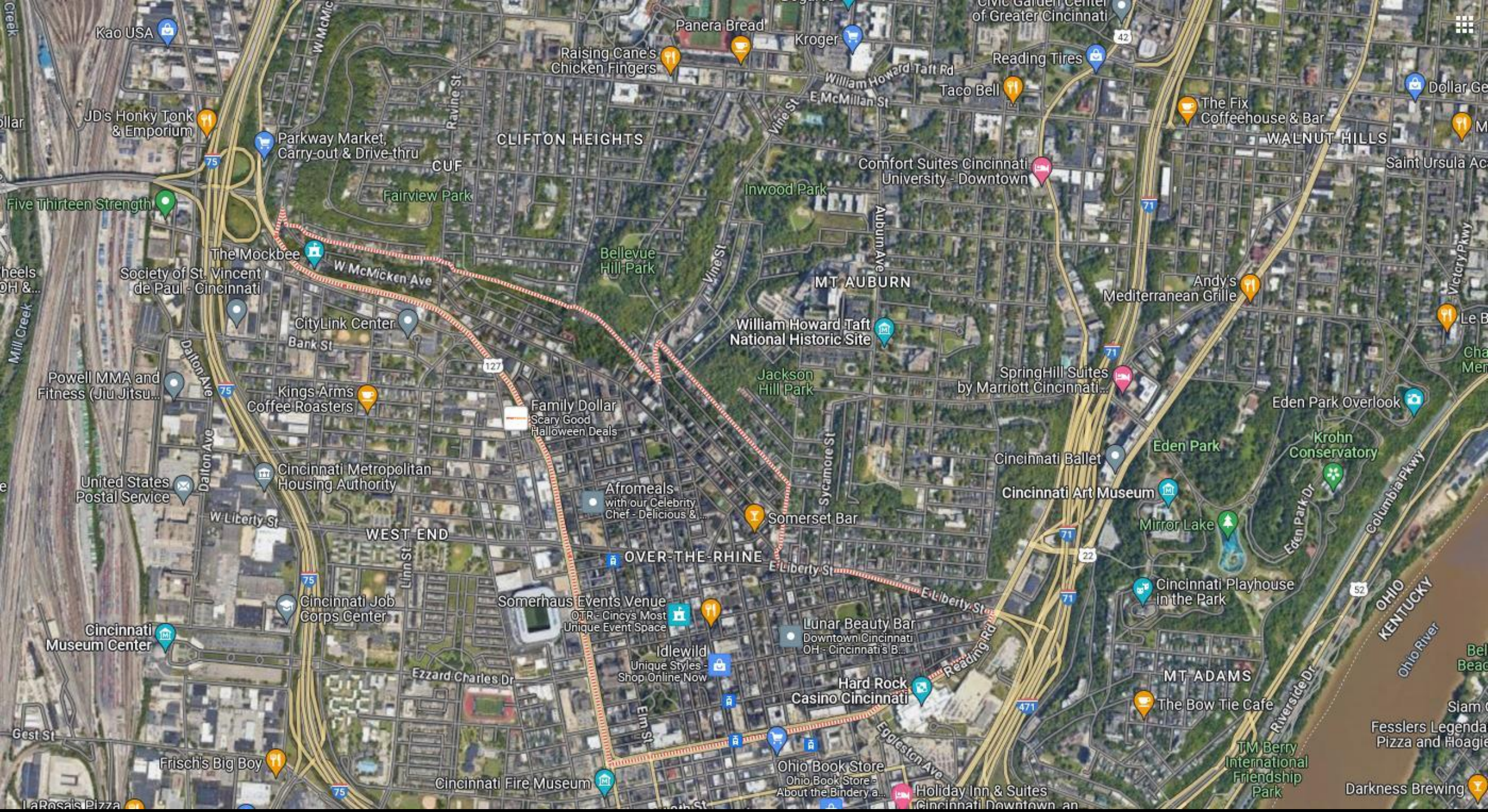


SHPO is part of the project TEAM

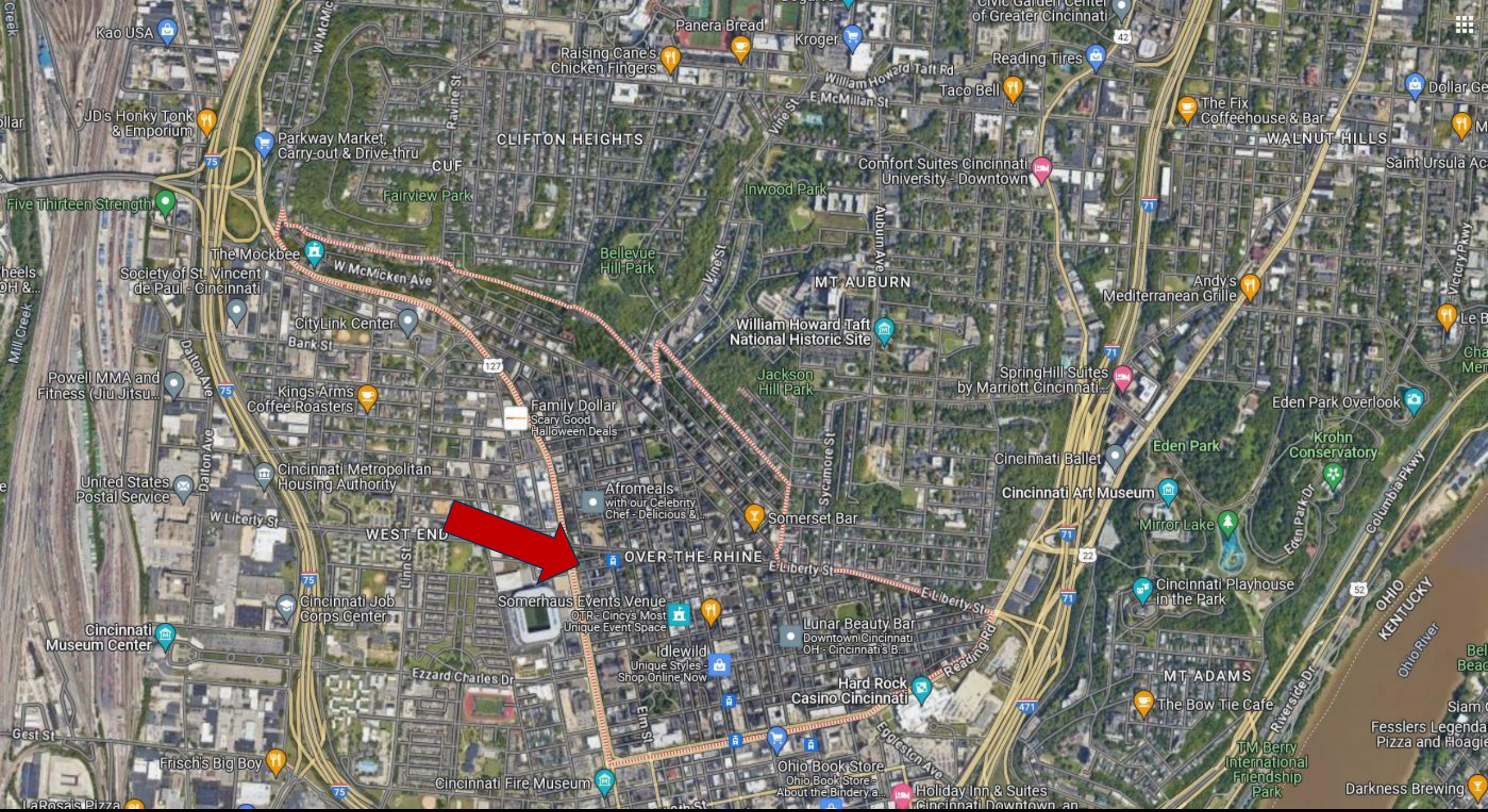
We want your project to SUCCEED

- Helps return a historic building to productive use
- Promotes further investment in the surrounding neighborhood.

CHATFIELD COLLEGE



OVER THE RHINE



OVER THE RHINE


CINCINNATI ASSOCIATION FOR THE BLIND

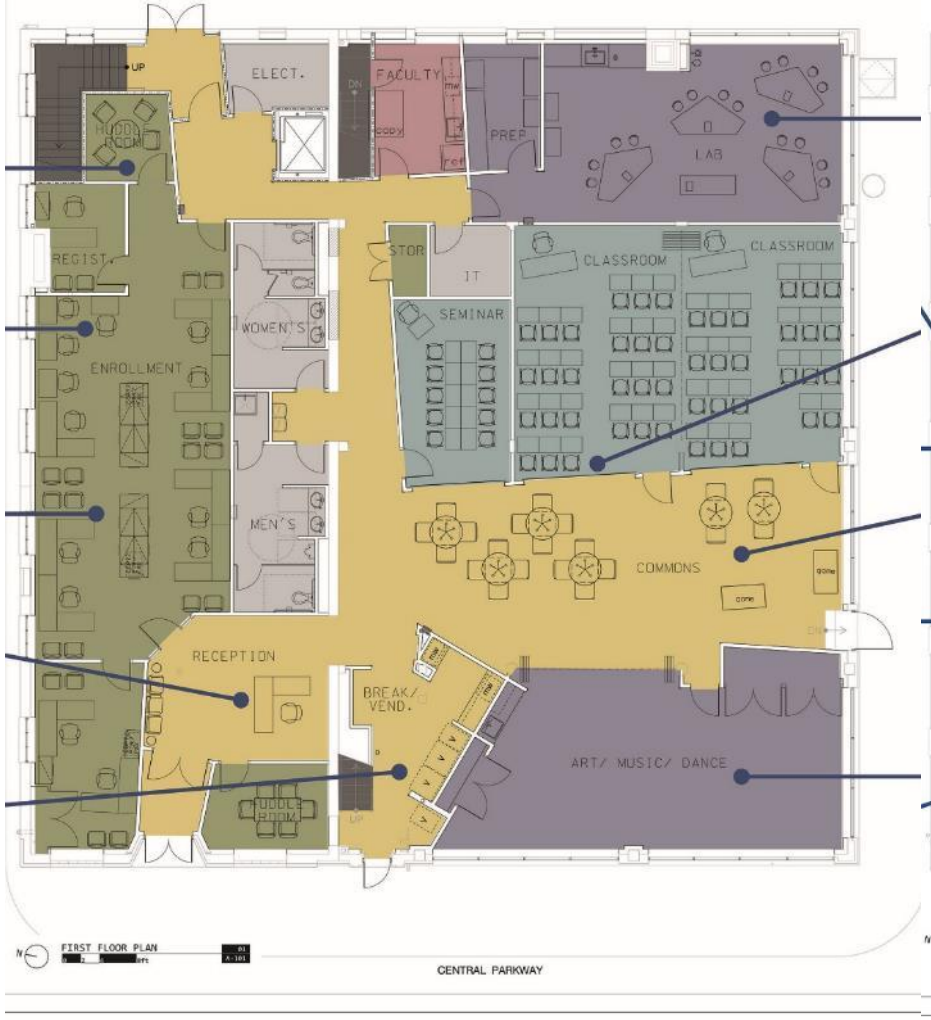

DX
DIGITALXPRESS

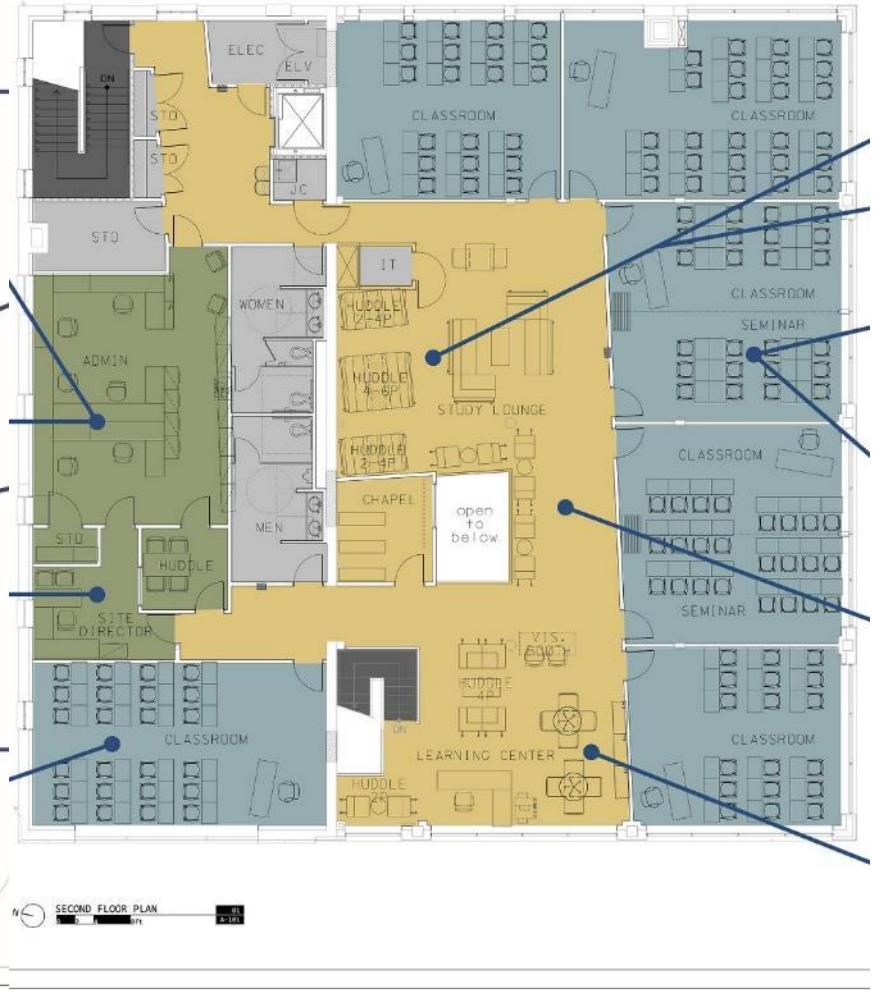

DX
DIGITALXPRESS

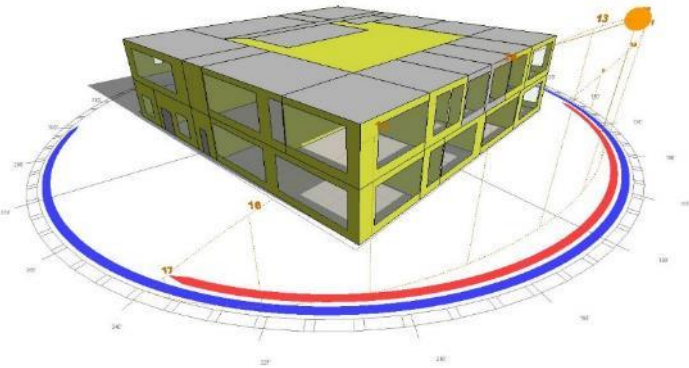

CHATFIELD COLLEGE


CHATFIELD COLLEGE
CENTRAL

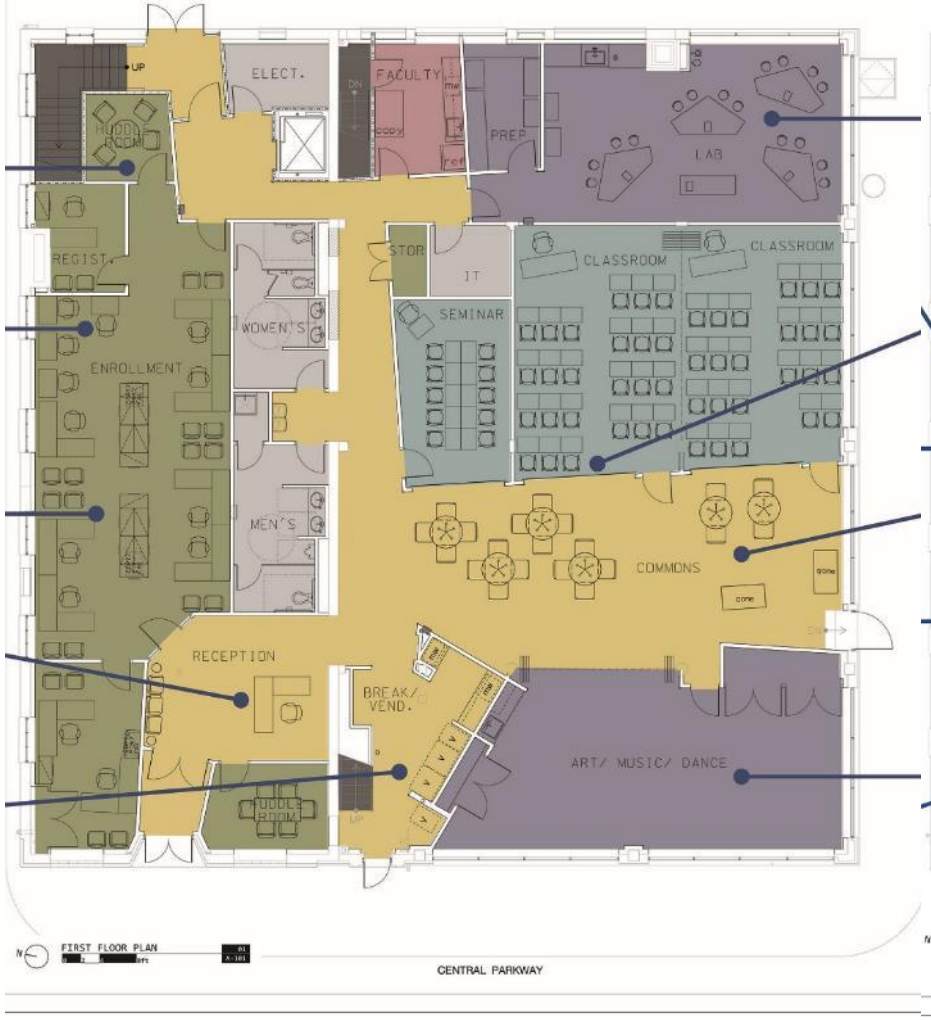
Understanding inherent problems and working around them/ daylighting in core/ scheduling, modeling and energy/ geo test/

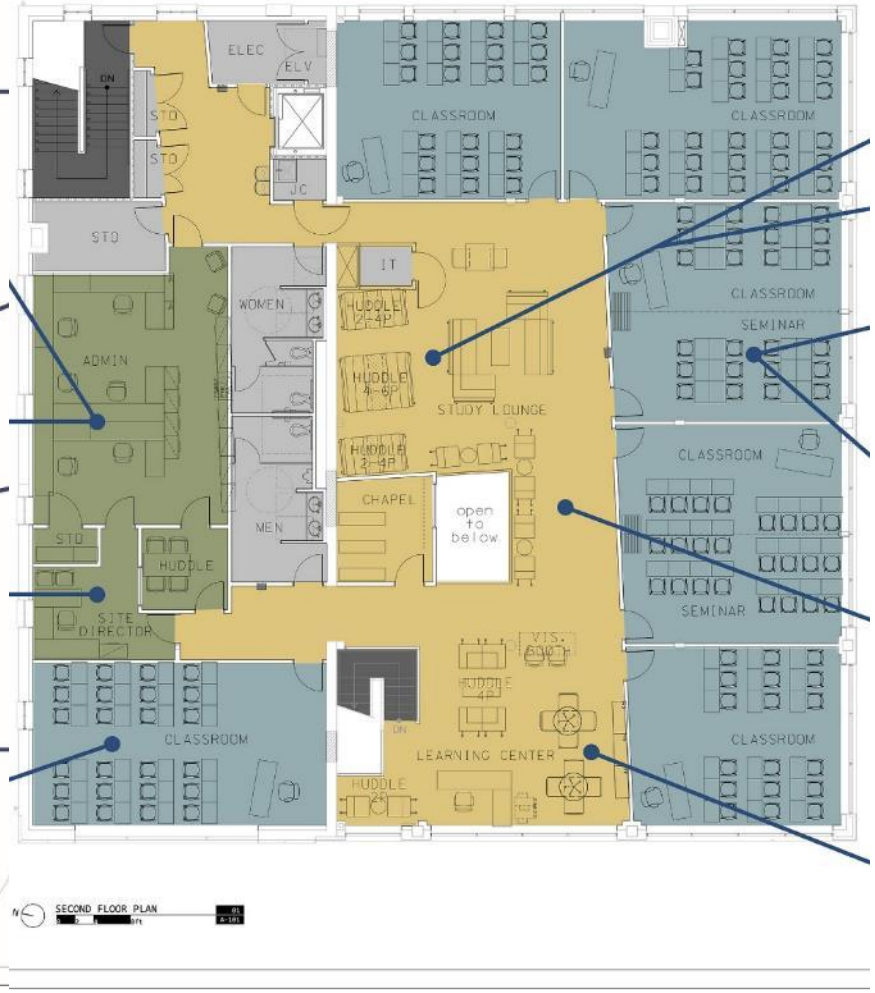


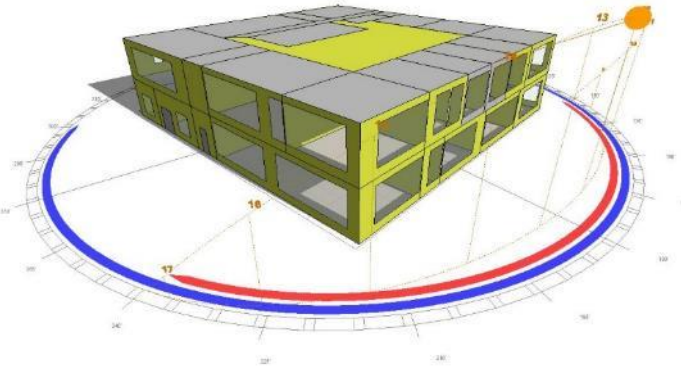


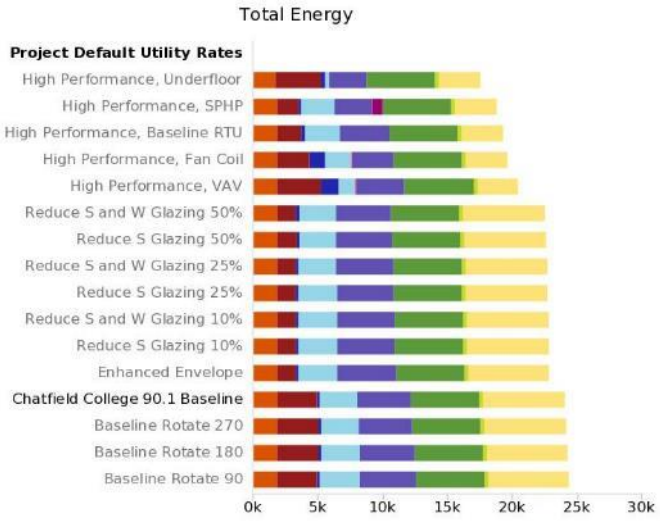


Understanding inherent problems and working around them/ daylighting in core/ scheduling, modeling and energy/ geo test/

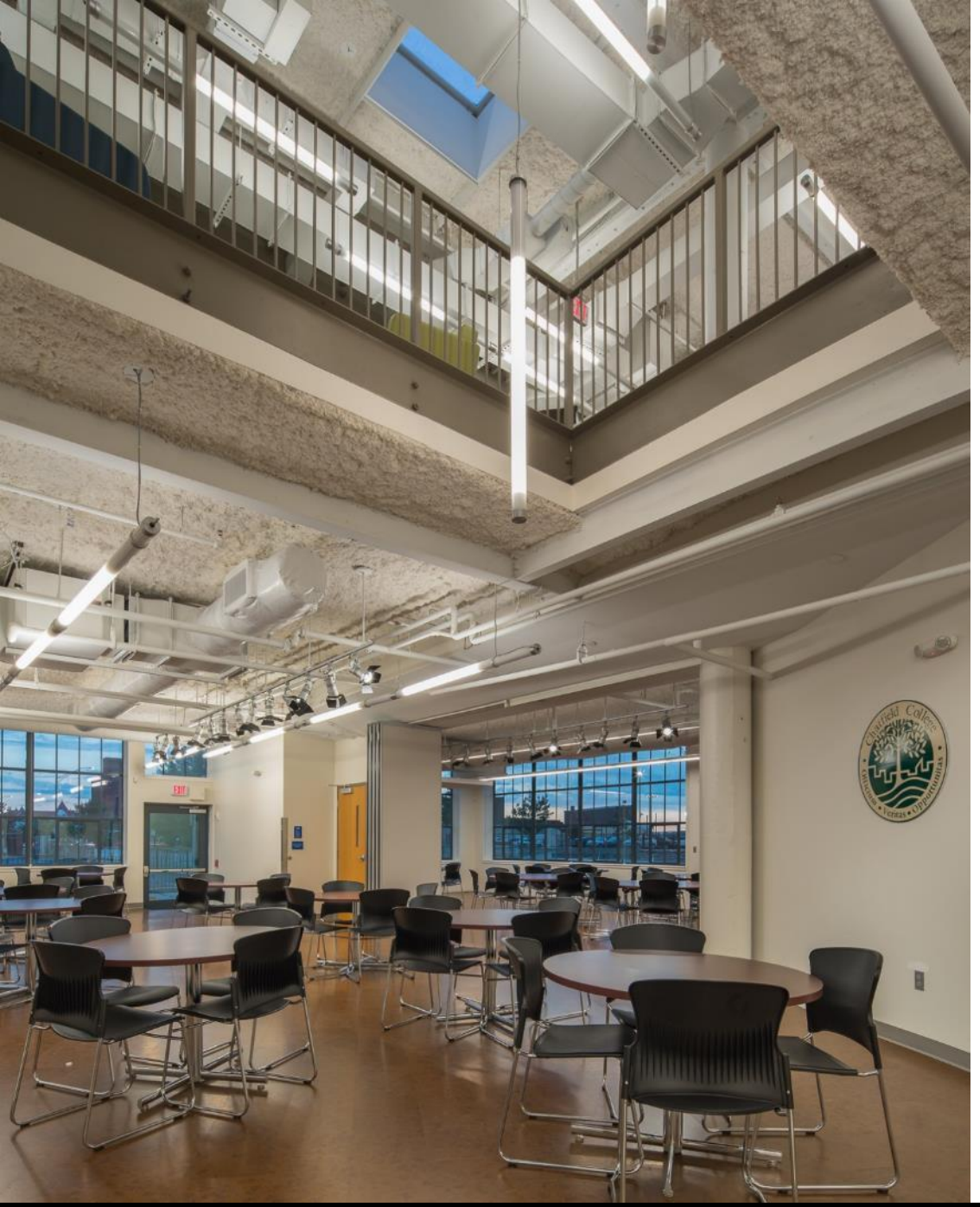






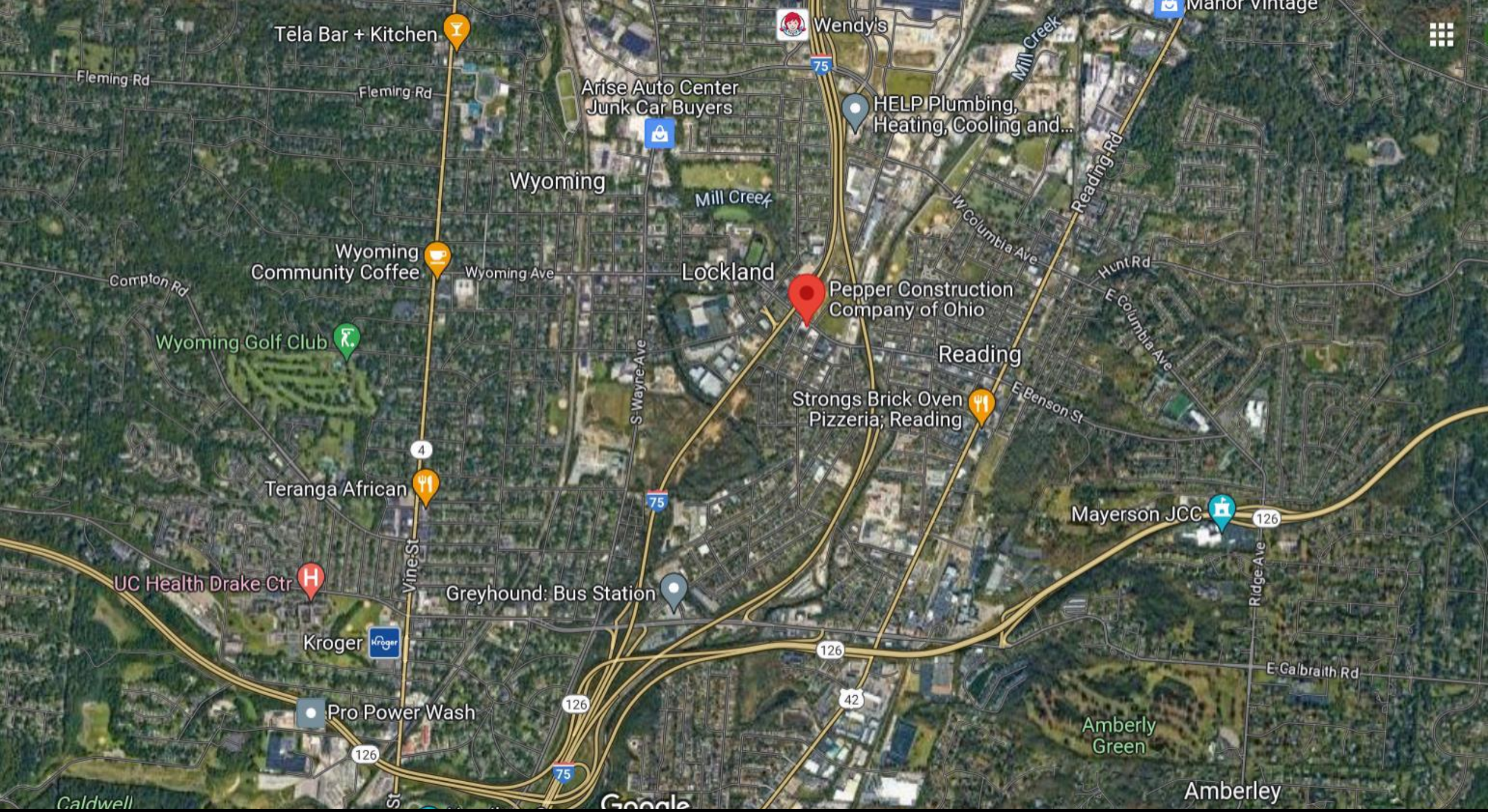


Understanding inherent problems and working around them/ daylighting in core/ scheduling, modeling and energy/ geo test/



INTERIOR RENOVATION

PEPPER OFFICE EXISTING CONDITIONS


Tēla Bar + Kitchen
Wendy's
Manor Vintage
Fleming Rd
Fleming Rd
Arise Auto Center
Junk Car Buyers
HELP Plumbing,
Heating, Cooling and...
Mill Creek
Reading Rd
Wyoming
Mill Creek
W Columbia Ave
Wyoming
Community Coffee
Wyoming Ave
Lockland
Hunt Rd
Compton Rd
Pepper Construction
Company of Ohio
E Columbia Ave
Wyoming Golf Club
Reading
S Wayne Ave
Strongs Brick Oven
Pizzeria; Reading
E Benson St
4
Teranga African
75
Mayerson JCC
126
Vine St
UC Health Drake Ctr
Greyhound: Bus Station
Ridge Ave
Kroger
126
E Galbraith Rd
42
Pro Power Wash
126
Amberly
Green
75
Amberley
Caldwell
Google

LOCKLAND


N Wyoming
Dunn St
Mill St
75

CAGIS Map

4/7/2021, 4:20:24 PM

- Hamilton County Political Jurisdictions
- Subdivision Boundaries
- Property Boundaries
- Countywide Zoning

1:600

0 37.5 75 150 ft

0 10 20 40 m

CAGIS

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

ESTABLISHING THE HISTORIC GAME PLAN

SULLEBARGER ASSOCIATES
HISTORIC PRESERVATION CONSULTANTS

Stearns & Foster Company Office Building
100 Williams Street, Lockland, Ohio
Items for consideration to qualify for Historic Tax Credits

Introduction

This report is based on a site visit to the Stearns & Foster Company Office Building on Monday, January 11, 2021, with Jerry Noble of Pepper Construction and others. The purpose of the report is to advise on design and construction issues that may arise in meeting the Secretary of the Interior's Standards for Rehabilitation, which must be followed to qualify for state and federal tax credits for Historic Rehabilitation. (The Standards for Rehabilitation are provided on page 7 of this report.) While the Standards can be challenging to interpret when applied in specific situations, they can be distilled down to a single principle, which is that historically significant building fabric and spaces must be retained, if feasible, and if replaced, they must be duplicated to preserve the historic appearance of the building.

Brief History of the Building

The Stearns & Foster Company Office Building is associated with what was a major industry in Lockland, Ohio for almost a century. Founded in 1846, the company was initially based in Cincinnati and built its first factory in Lockland in 1882. By 1898, the company moved its entire operation to Lockland and remained in business there until 1993. Its factory buildings occupied several blocks north of Wyoming Avenue, but today only the office building remains.

The office building was built in at least three stages, beginning with the "C"-shaped section facing Williams Street in 1912. Sometime later an "L" shaped addition was added on the rear, and a third addition was made at the northeast corner. The phases of construction are very evident in the aerial photo below based on the parapet outlines. Because the building was built at different times, there are differences in structure, materials, finishes, and window configuration throughout.

Aerial view looking northwest

1080 Morse Avenue, Glendale OH 45246, sullebarger@fuse.net, (513) 703-0877

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RIC PRESERVATION CONSULTANTS

Advice on Meeting the Standards

onry - The exterior masonry is consistently variegated red-purple brick in Flemish slight variations are visible in the joints and brick color. Repointing must be carried lly so as to match existing in appearance, color, texture, tooling, profile and

a – There is a terra cotta cornice as well as a plaque above the door announcing of the company. Both must be retained and repaired and/or repointed, similar to asonry.

View of Office Building on Williams Avenue, looking northeast

is a small bronze plaque to the right of the main entrance, which should be

the exterior doors are replacements, such as the main entrance double etal fire doors on the south and east. However, there is one original wood East Wyoming Avenue with 8 lights in the top. This should be retained. is an assortment of windows, most are original with wood double-hung 12 wing, the second floor features paired windows with 4-over 4 wood ird floor has 6-over-6 wood sashes. These have been protected by storm windows and appear to be in sufficiently good condition. There are od windows on the third floor of the second addition. Unless it can be t the windows are beyond repair, it will be expected that they will be red. Energy efficiency can be provided by weatherstripping, storm mplete window survey is required to identify all the conditions and

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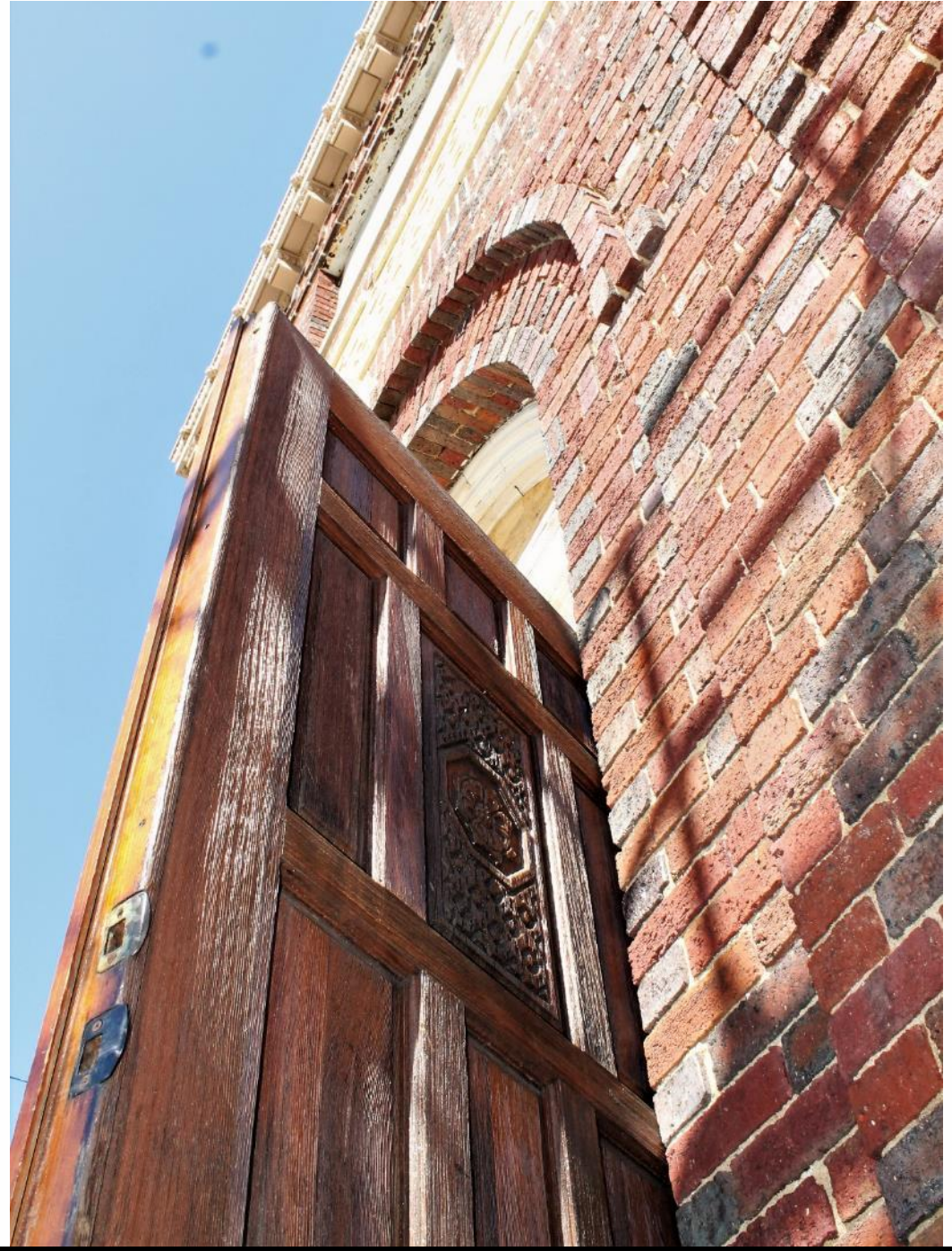
e – Located to the east of the Office Building, the brick garage dates from 1912 and its is similar, with corner quoins and dentil molding at the cornice. The garage is in good on, with a new roof. The garage bays retain multi-light wood transoms, but the doors are missing. A door stored in the garage appears to be a later retrofit. Install ible new doors.

Brick Garage and ornamental wrought-iron gate

south wall of garage from within Shed 1!



DURING CONSTRUCTION – BRICK RESTORATION

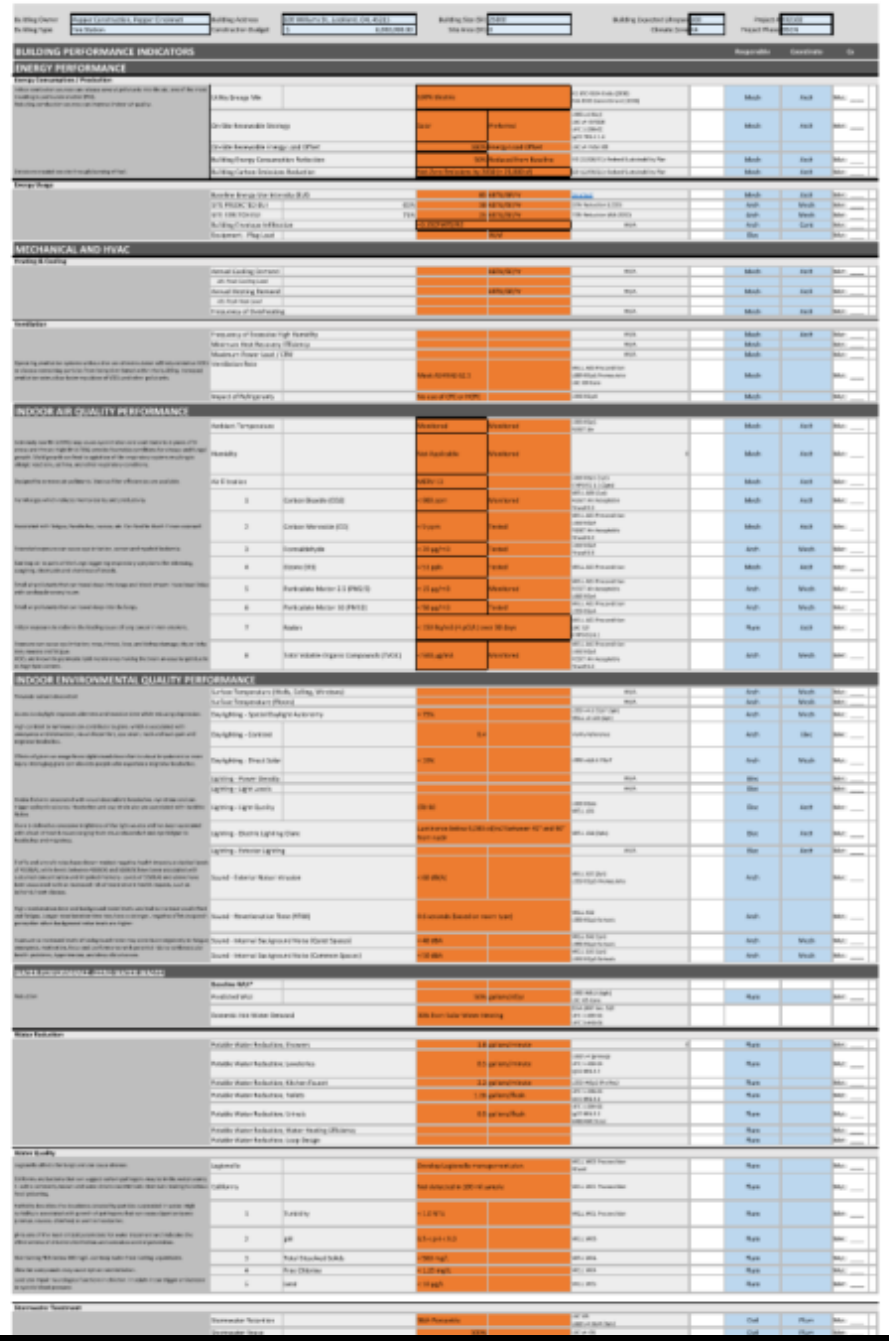
DURING CONSTRUCTION

RESTORED EXTERIOR WITH MODERN ADDITION

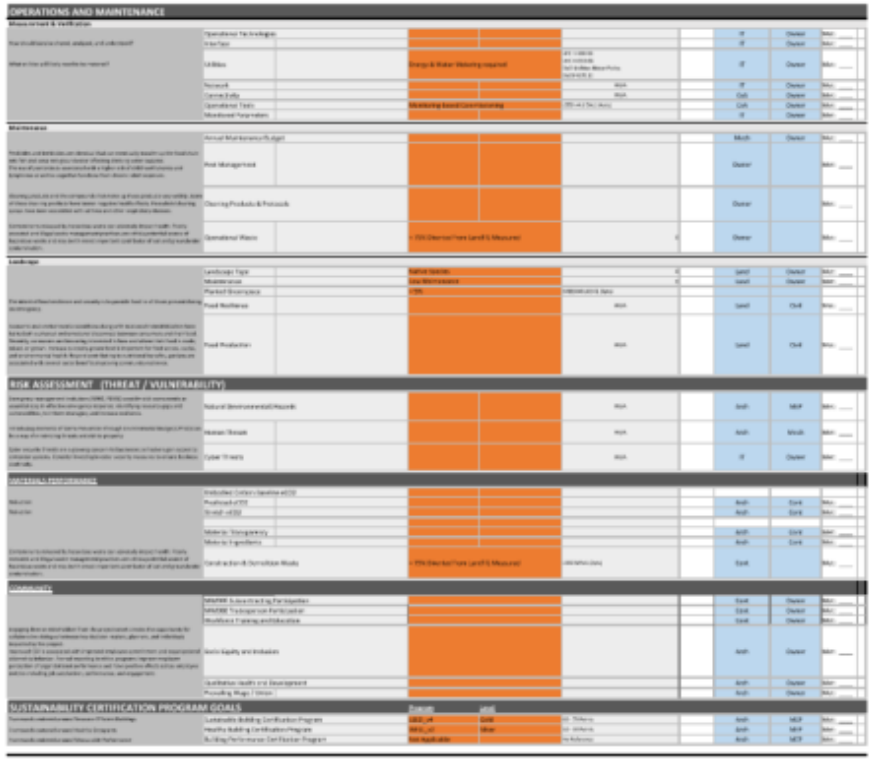
RESTORED EXTERIOR WITH MODERN ADDITION

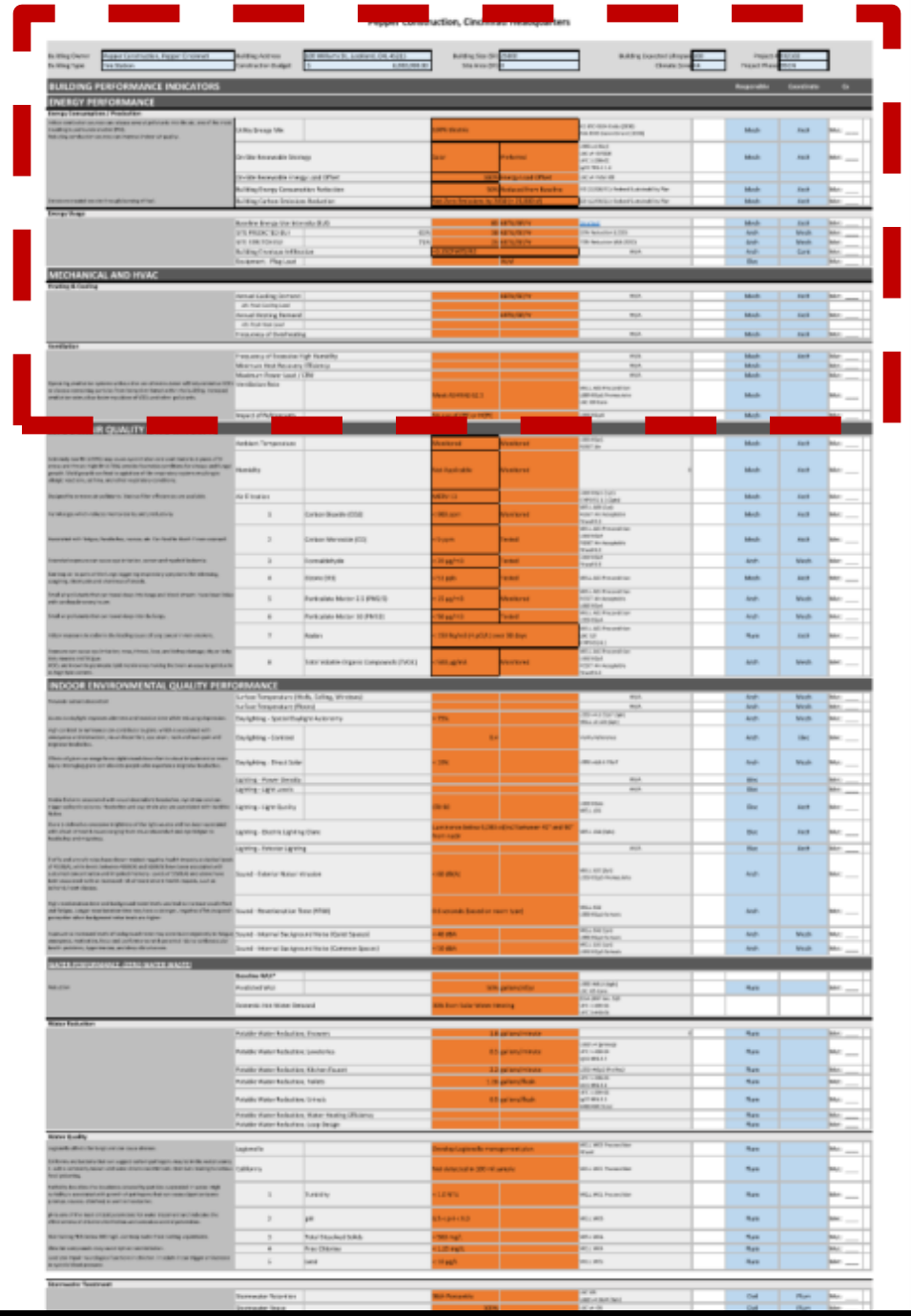
EARLY SUSTAINABILTY GOAL SETTING

Pepper Construction, Cincinnati Headquarters



Pepper Construction, Cincinnati Headquarters





Pepper Construction, Cincinnati Headquarters

Pepper Construction, Cincinnati Headquarters

METRICS BASED GOAL SETTING

Pepper Construction, Cincinnati Headquarters

Building Owner	Pepper Construction, Pepper Cincinnati	Building Address	100 Williams St., Lockland, OH, 45215	Building Size (SF)	25000	Building Expected Lifespan	100	Project #	032102
Building Type	Fire Station	Construction Budget	$ 6,000,000.00	Site Area (SF)	0	Climate Zone	4A	Project Phase	DSGN

BUILDING PERFORMANCE INDICATORS

							Responsible	Coordinate	Cx
ENERGY PERFORMANCE									
Energy Consumption / Production									
Indoor combustion sources can release several pollutants into the air, one of the most troubling is particulate matter (PM). Reducing combustion sources can improve indoor air quality.	Utility Energy Mix		100% Electric		42 USC 6834 Code (2030) AIA 2030 Commitment (2030)		Mech	Arch	Met: ____
	On-Site Renewable Strategy		Solar	Preferred	LEED v4 EAc5 LBC v4 I07/I08 UFC 1-200-02 IgCC 701.4.1.3		Mech	Arch	Met: ____
	On-Site Renewable Energy Load Offset		100%	Energy Load Offset	LBC v4 Petal I08				
	Building Energy Consumption Reduction		50%	Reduced from Baseline	EO (12/08/21): Federal Sustainability Plan		Mech	Arch	Met: ____
Emissions created on-site through burning of fuel.	Building Carbon Emissions Reduction		Net-Zero Emissions by 2030 (> 25,000 sf)		EO (12/08/21): Federal Sustainability Plan		Mech	Arch	Met: ____
Energy Usage									
	Baseline Energy Use Intensity (EUI)		85	kBTU/SF/Yr	ZeroTool		Mech	Arch	Met: ____
	SITE PREDICTED EUI	65%	30	kBTU/SF/Yr	55% Reduction (LEED)		Arch	Mech	Met: ____
	SITE STRETCH EUI	71%	25	kBTU/SF/Yr	70% Reduction (AIA 2030)		Arch	Mech	Met: ____
	Building Envelope Infiltration		<0.15CFM75/ft2		#N/A		Arch	Cont	Met: ____
	Equipment - Plug Load			W/sf			Elec		Met: ____
MECHANICAL AND HVAC									
Heating & Cooling									
	Annual Cooling Demand			kBTU/SF/Yr	#N/A		Mech	Arch	Met: ____
	Alt. Peak Cooling Load								
	Annual Heating Demand			kBTU/SF/Yr	#N/A		Mech	Arch	Met: ____
	Alt. Peak Heat Load								
	Frequency of Overheating				#N/A		Mech	Arch	Met: ____
Ventilation									
	Frequency of Excessive High Humidity				#N/A		Mech	Arch	Met: ____
	Minimum Heat Recovery Efficiency				#N/A		Mech		Met: ____
	Maximum Power Load / CFM				#N/A		Mech		Met: ____
Operating ventilation systems without the use of recirculation will help minimize VOCs or disease-containing particles from being distributed within the building. Increased ventilation rates allow faster expulsion of VOCs and other pollutants.	Ventilation Rate		Meet ASHRAE 62.1		WELL A03 Precondition LEED EQp1 Prerequisite LBC I09 Core		Mech		Met: ____
	Impact of Refrigerants		No use of CFC or HCFC		LEED EQp4		Mech		Met: ____

Pepper Construction, Cincinnati Headquarters

Building Owner	Pepper Construction, Pepper Cincinnati	Building Address	100 Williams St., Lockland, OH, 45215	Building Size (SF)	25000	Building Expected Lifespan	100	Project #	032102
Building Type	Fire Station	Construction Budget	$ 6,000,000.00	Site Area (SF)	0	Climate Zone	4A	Project Phase	DSGN

BUILDING PERFORMANCE INDICATORS

							Responsible	Coordinate	Cx
ENERGY PERFORMANCE									
Energy Consumption / Production									
Indoor combustion sources can release several pollutants into the air, one of the most troubling is particulate matter (PM). Reducing combustion sources can improve indoor air quality.	Utility Energy Mix		100% Electric		42 USC 6834 Code (2030) AIA 2030 Commitment (2030)		Mech	Arch	Met: ____
	On-Site Renewable Strategy		Solar	Preferred	LE v4 EAc5 LB 4 I07/I08 U -200-02 IgCC 701.4.1.3		Mech	Arch	Met: ____
	On-Site Renewable Energy Load Offset		100%	Energy Load Offset	LBC v4 Petal I08				
	Building Energy Consumption Reduction		50%	Reduced from Baseline	EO 2/08/21): Federal Sustainability Plan		Mech	Arch	Met: ____
Emissions created on-site through burning of fuel.	Building Carbon Emissions Reduction		Net-Zero Emissions by 2030 (> 25,000 sf)		EO 2/08/21): Federal Sustainability Plan		Mech	Arch	Met: ____
Energy Usage									
	Baseline Energy Use Intensity (EUI)		85	kBTU/SF/Yr	ZeroTool		Mech	Arch	Met: ____
	SITE PREDICTED EUI	65%	30	kBTU/SF/Yr	55% Reduction (LEED)		Arch	Mech	Met: ____
	SITE STRETCH EUI	71%	25	kBTU/SF/Yr	70 Reduction (AIA 2030)		Arch	Mech	Met: ____
	Building Envelope Infiltration		<0.15CFM75/ft2		#N/A		Arch	Cont	Met: ____
	Equipment - Plug Load			W/sf			Elec		Met: ____
MECHANICAL AND HVAC									
Heating & Cooling									
	Annual Cooling Demand			kBTU/SF/Yr	#N/A		Mech	Arch	Met: ____
	Alt. Peak Cooling Load								
	Annual Heating Demand			kBTU/SF/Yr	#N/A		Mech	Arch	Met: ____
	Alt. Peak Heat Load								
	Frequency of Overheating				#N/A		Mech	Arch	Met: ____
Ventilation									
	Frequency of Excessive High Humidity				#N/A		Mech	Arch	Met: ____
	Minimum Heat Recovery Efficiency				#N/A		Mech		Met: ____
	Maximum Power Load / CFM				#N/A		Mech		Met: ____
Operating ventilation systems without the use of recirculation will help minimize VOCs or disease-containing particles from being distributed within the building. Increased ventilation rates allow faster expulsion of VOCs and other pollutants.	Ventilation Rate		Meet ASHRAE 62.1		WELL A03 Precondition LEED EQp1 Prerequisite LBC I09 Core		Mech		Met: ____
	Impact of Refrigerants		No use of CFC or HCFC		LEED EQp4		Mech		Met: ____

Building Owner	Pepper Construction Cincinnati HQ	**Project #:**	032102
Building Address	100 Williams St, Lockland OH, 45215		
Building Type	Office	**Climate Zone**	4A
Building Size	25000 SF		
Construction Budget	$6,000,000.00	**Occupant Load**	80

OWNER PERFORMANCE REQUIREMENTS			Responsibility	Coordinate	Cx	Comments	
ENVELOPE PERFORMANCE						08/19/2021 Comments	2/7/2022 Comments
Roof	R-35 / U-0.0286		emersion	CMTA	Met: ____	Confirmed height with Parapets	
Wall	Tuckpoint Existing		CMTA	emersion	Met: ____	Enevelope wall options being evaluated. Still need hygrothermal analysis of final options to be completed.	A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as primary air barrier.
Window	U-0.35 / SHGC-0.37		emersion	CMTA	Met: ____	Interior High performance storms (emersion to provide) (CMTA to analyze energy modeling) Assumes fur-out of exterior walls. If no furring, need to explore slim profile storm windows. Decision of furring comes down to budget, thermal & energy benefit. What is the energy impact of each wall, what is the cost shifting potential with each option?	30 EUI is dependent on the Alpen Winsert Plus as interior storm window option for better thermal leakage reduction. Locate interior storm to be sealed to the plaster because the plaster is the primary air barrier. 30 EUI is dependent on using the plaster as the air barrier throughout the entire building
Building Envelope Infiltration	< 0.15 CFM_{75}/ft^2		emersion	CMTA	Met: ____	Targeting 0.15 but might change to 0.4. Both infiltration rates are being assessed in Wall evaluations.	A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as primary air barrier.
Air Barrier Permeance	> 30 perm vapor diffusion		emersion	CMTA	Met: ____		
ENERGY PERFORMANCE							
Baseline EUI	85	kBTU/sf/yr					
SITE PREDICTED EUI 65% Reduction	30	kBTU/sf/yr	CMTA	emersion	Met: ____	Maximum Bldg EUI to achieve Net Zero Goal with on-site PV Array offset	Building EUI will be more around 30.
Gas Usage vs. Electrification Balance	All Electric, No Gas		CMTA		Met: ____		
Renewables	PV Array		CMTA	emersion	Met: ____	Produces ~24 EUI. Anticipate 20% over production from building need to account for panel degredation.	**220,000 kWh / year required, plus a little bit more to offset degredation of panels** 93-94 kW of Solar Canopy w/ 103 kW of Rooftop Solar. Roof edge 4' offset, roof hatch 4' offset around. 240 panels, but need to finalize vendor. Around 5,000 SF of solar canopy. Pricing based on Option 1 # of panels. What is needed from a production for solar. Assumption 430 Watt panel assumed in calcs. Confident to be around 30 EUI.
INDOOR AIR QUALITY PERFORMANCE							
Temperature	Monitored		CMTA		Met: ____		
Humidity	*Not Applicable / Not Pursued*		CMTA		Met: ____		
Carbon Dioxide (CO2)	< 900 ppm		CMTA		Met: ____	CO2 monitors in conference rooms. Monitoring yes. Monitoring return CO2 systems. Enverid system. Monitoring at Building Level. Enverid input level. Not used for demand control ventilation. Mostly a monitoring point. CO2 monitoring needs recallibration every couple years. Each monitor is ~$300/monitor last 3-5 yrs (CMTA). What is integration into controls system?	LEED increases the ventilation load requirements beyond ASHRAE.
Carbon Monoxide (CO)	< 9 ppm		CMTA		Met: ____	Explore for optimization (< 6 ppm)	
Formaldehyde	< 50 µg/m3		CMTA		Met: ____	Explore for optimization (< 25 µg/m3), Drives lifecycle for Enverid	
Ozone (O3)	< 51 ppb		CMTA		Met: ____	Explore for optimization (< 25 ppb); Reason to replace Enverid filters	
Particulate Matter 2.5 (PM2.5)	< 15 µg/m3		CMTA		Met: ____		
Particulate Matter 10 (PM10)	< 50 µg/m3		CMTA		Met: ____		
Radon	< 0.15 Bq/L (4 pCi/L)		CMTA		Met: ____	Typically not an issue because outside air is brought in and exhausted. Still need to test for to understand where we are at baseline. Specific for ground floor. Zip code indicates low risk from Hamilton County Radon maps. Enverid does not treat this.	
Total Volatile Organic Compounds (TVOC)	< 500 µg/m3		CMTA		Met: ____		
INDOOR ENVIRONMENTAL QUALITY PERFORMANCE							
Private Offices, Conference Rooms, Classrooms	< 40 dBA		emersion		Met: ____	SHPO conversation done. Need conversations around acoustic control.	
Open Office, Common Areas	< 50 dBA		emersion		Met: ____	Explore pink noise as potential noise mitigation strategy	
Exterior Noise Intrusion	< 60 dBA		emersion		Met: ____		
Reverberation Time (RT60)	0.6 seconds (based on room type)		emersion		Met: ____		Need to run acoustics strategies and credits to ground
Lighting Requirements	Consider BIOS where applicable		emersion	CMTA	Met: ____		
Daylighting - Spatial Daylight Autonomy	$sDA_{300/50\%}$ @75%	Annual Hours	emersion	CMTA	Met: ____	Average sDA 300,50% is achieved for 75% of regularly occupied floor area	
Daylighting - Direct Solar	$ASE_{1000,250}$	Annual Sunlight Exposure	emersion	CMTA	Met: ____	Annual sunlight exposure is no more than 10%	
Lighting - Light Levels	150	EML	CMTA	emersion	Met: ____		
Lighting - Light Quality	CRI 90 + R9 > 50		emersion	CMTA	Met: ____		
MATERIALS PERFORMANCE							
Embodied Carbon Baseline CO2e	97	lb $CO2e/ft^2$					

Building Owner	Pepper Construction Cincinnati HQ	**Project #:**	032102
Building Address	100 Williams St, Lockland OH, 45215		
Building Type	Office	**Climate Zone**	4A
Building Size	25000 SF		
Construction Budget	$6,000,000.00	**Occupant Load**	80

OWNER PERFORMANCE REQUIREMENTS			Responsibility	Coordinate	Cx	Comments	
						7/19/2021 Comments	2/7/2022 Comments
ENVELOPE PERFORMANCE							
Roof	R-35 / U-0.0286		emersion	CMTA	Met: ____	nfirmed height with Parapets	
Wall	Tuckpoint Existing		CMTA	emersion	Met: ____	evelope wall options being evaluated. Still need hygrothermal analysis of final options to be completed.	A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as primary air barrier.
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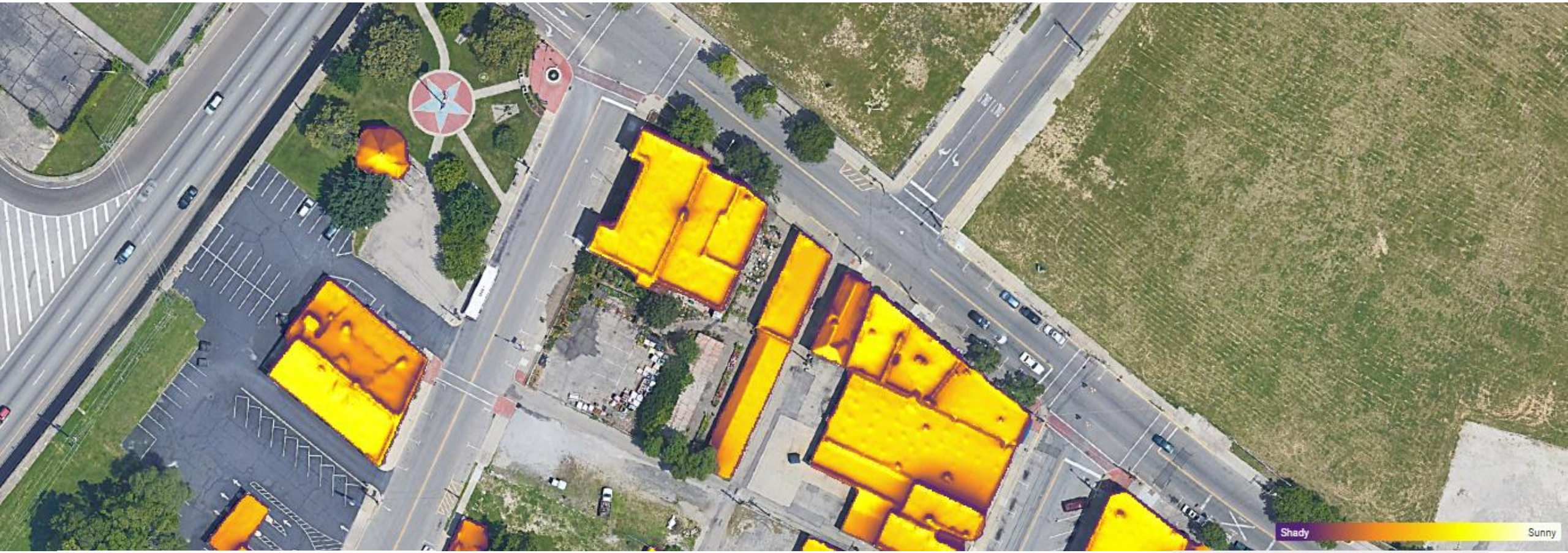
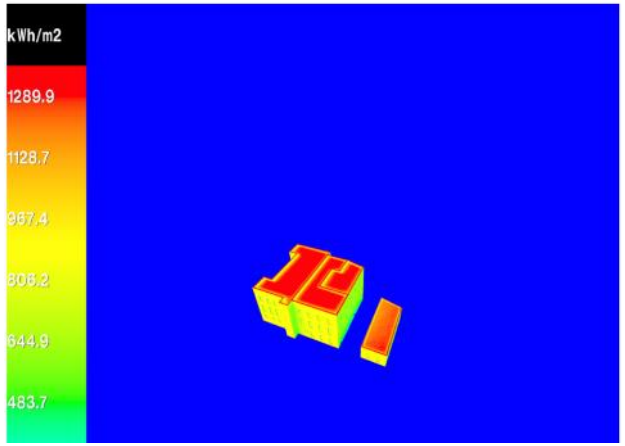
Air Barrier Permeance	> 30 perm vapor diffusion		emersion	CMTA	Met: ____		
ENERGY PERFORMANCE							
Baseline EUI	85	kBTU/sf/yr					
SITE PREDICTED EUI 65% Reduction	30	kBTU/sf/yr	CMTA	emersion	Met: ____	aximum Bldg EUI to achieve Net Zero Goal with on-site PV Array offset	Building EUI will be more around 30.
Gas Usage vs. Electrification Balance	All Electric, No Gas		CMTA		Met: ____		
Renewables	PV Array		CMTA	emersion	Met: ____	oduces ~24 EUI. Anticipate 20% over production from building need to account panel degredation.	220,000 kWh / year required, plus a little bit more to offset degredation of panels 93-94 kW of Solar Canopy w/ 103 kW of Rooftop Solar. Roof edge 4' offset, roof hatch 4' offset around. 240 panels, but need to finalize vendor. Around 5,000 SF of solar canopy. Pricing based on Option 1 # of panels. What is needed from a production for solar. Assumption 430 Watt panel assumed in calcs. Confident to be around 30 EUI.
INDOOR AIR QUALITY PERFORMANCE							
Temperature	Monitored		CMTA		Met: ____		
Humidity	*Not Applicable / Not Pursued*		CMTA		Met: ____		
Carbon Dioxide (CO2)	< 900 ppm		CMTA		Met: ____	CO2 monitors in conference rooms. Monitoring yes. Monitoring return CO2 systems. Enverid system. Monitoring at Building Level. Enverid input level. Not used for demand control ventilation. Mostly a monitoring point. CO2 monitoring needs recallibration every couple years. Each monitor is ~$300/monitor last 3-5 yrs (CMTA). What is integration into controls system?	LEED increases the ventilation load requirements beyond ASHRAE.
Carbon Monoxide (CO)	< 9 ppm		CMTA		Met: ____	Explore for optimization (< 6 ppm)	
Formaldehyde	< 50 µg/m3		CMTA		Met: ____	Explore for optimization (< 25 µg/m3), Drives lifecycle for Enverid	
Ozone (O3)	< 51 ppb		CMTA		Met: ____	Explore for optimization (< 25 ppb); Reason to replace Enverid filters	
Particulate Matter 2.5 (PM2.5)	< 15 µg/m3		CMTA		Met: ____		
Particulate Matter 10 (PM10)	< 50 µg/m3		CMTA		Met: ____		
Radon	< 0.15 Bq/L (4 pCi/L)		CMTA		Met: ____	Typically not an issue because outside air is brought in and exhausted. Still need to test for to understand where we are at baseline. Specific for ground floor. Zip code indicates low risk from Hamilton County Radon maps. Enverid does not treat this.	
Total Volatile Organic Compounds (TVOC)	< 500 µg/m3		CMTA		Met: ____		
INDOOR ENVIRONMENTAL QUALITY PERFORMANCE							
Private Offices, Conference Rooms, Classrooms	< 40 dBA		emersion		Met: ____	SHPO conversation done. Need conversations around acoustic control.	
Open Office, Common Areas	< 50 dBA		emersion		Met: ____	Explore pink noise as potential noise mitigation strategy	
Exterior Noise Intrusion	< 60 dBA		emersion		Met: ____		
Reverberation Time (RT60)	0.6 seconds (based on room type)		emersion		Met: ____		Need to run acoustics strategies and credits to ground
Lighting Requirements	Consider BIOS where applicable		emersion	CMTA	Met: ____		
Daylighting - Spatial Daylight Autonomy	$sDA_{300/50\%}$ @75%	Annual Hours	emersion	CMTA	Met: ____	Average sDA 300,50% is achieved for 75% of regularly occupied floor area	
Daylighting - Direct Solar	$ASE_{1000,250}$	Annual Sunlight Exposure	emersion	CMTA	Met: ____	Annual sunlight exposure is no more than 10%	
Lighting - Light Levels	150	EML	CMTA	emersion	Met: ____		
Lighting - Light Quality	CRI 90 + R9 > 50		emersion	CMTA	Met: ____		
MATERIALS PERFORMANCE							
Embodied Carbon Baseline CO2e	97	lb $CO2e/ft^2$					

EARLY SUSTAINABILTY BENCHMARKING



Total Energy Map



68

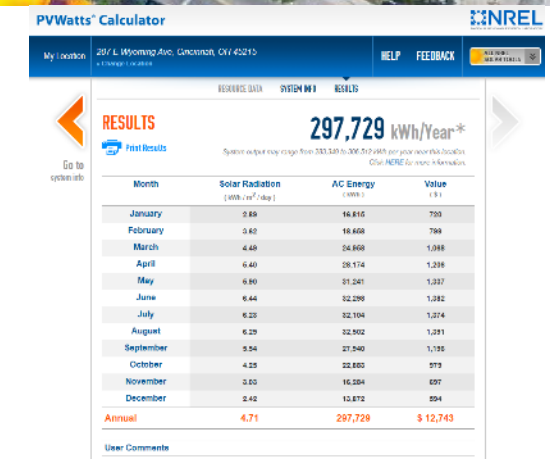
Walk Score®

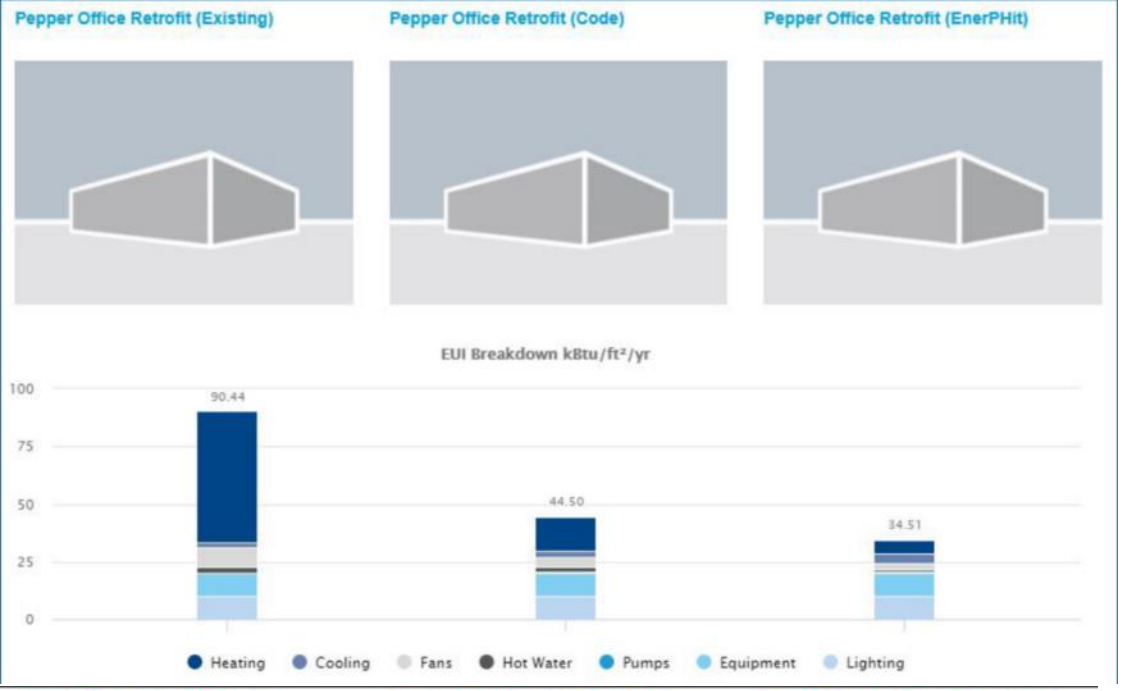
Somewhat Walkable

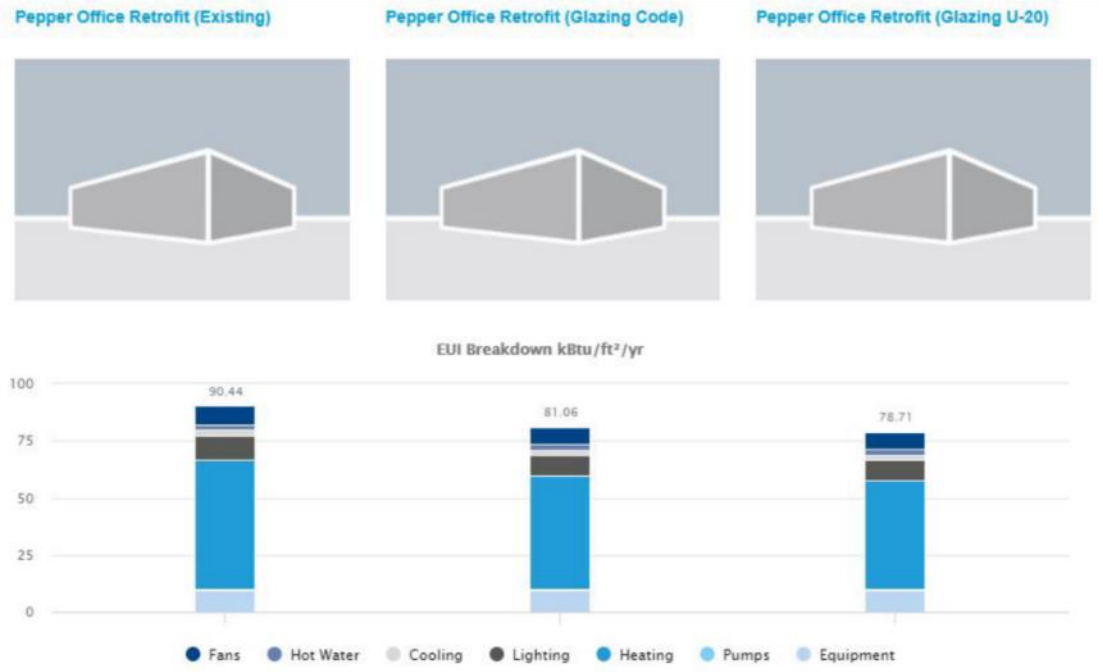
57

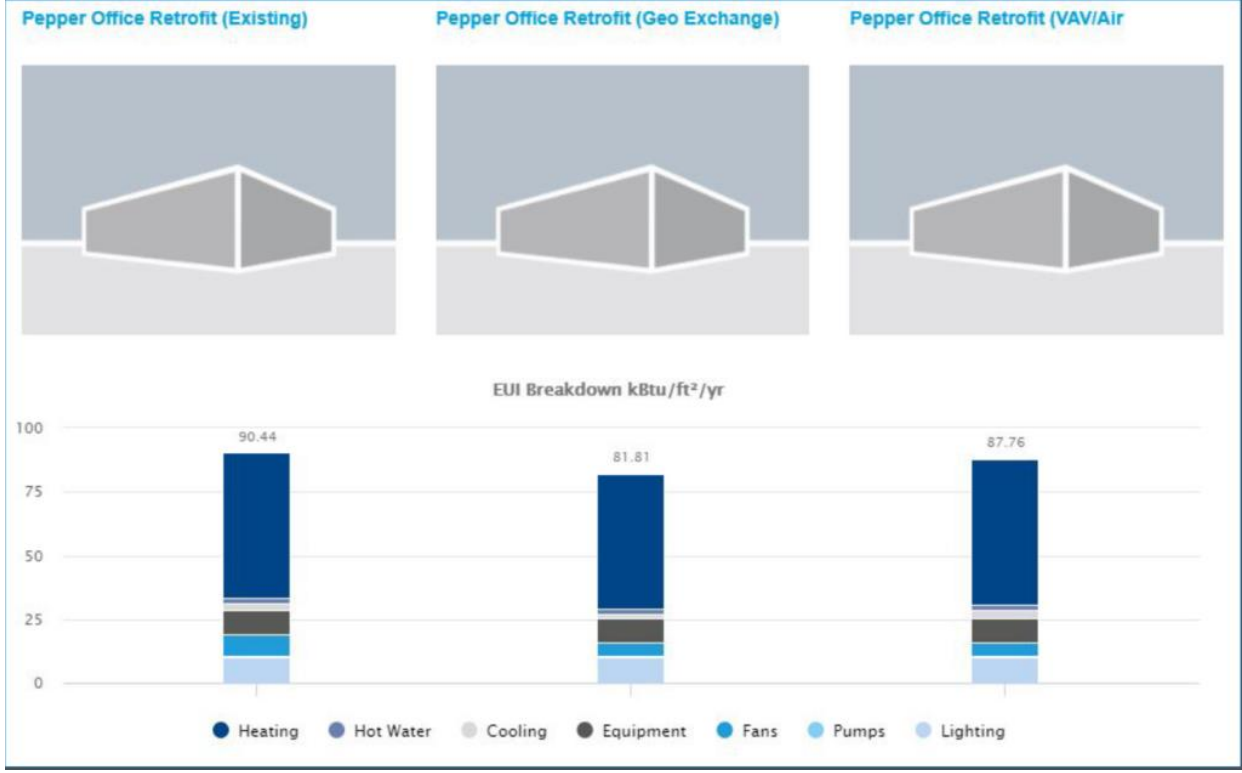
Bike Score®

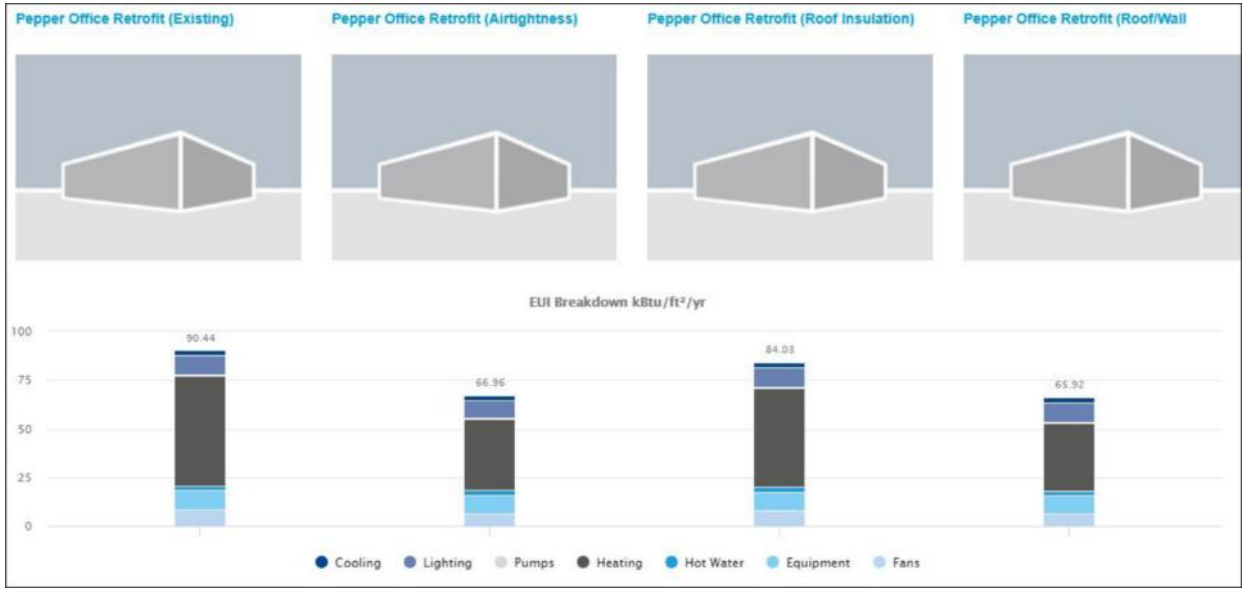
Bikeable




Pepper Office Retrofit (Existing)
Pepper Office Retrofit (Code)
Pepper Office Retrofit (EnerPHit)
EUI Breakdown kBtu/ft²/yr
100
75
50
25
0
90.44
44.50
34.51
Heating
Cooling
Fans
Hot Water
Pumps
Equipment
Lighting


Pepper Office Retrofit (Existing)
Pepper Office Retrofit (Glazing Code)
Pepper Office Retrofit (Glazing U-20)
EUI Breakdown kBtu/ft²/yr
100
75
50
25
0
90.44
81.06
78.71
Fans
Hot Water
Cooling
Lighting
Heating
Pumps
Equipment


Pepper Office Retrofit (Existing)
Pepper Office Retrofit (Geo Exchange)
Pepper Office Retrofit (VAV/Air
EUI Breakdown kBtu/ft²/yr
100
75
50
25
0
90.44
81.81
87.76
Heating
Hot Water
Cooling
Equipment
Fans
Pumps
Lighting

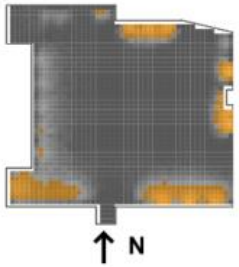
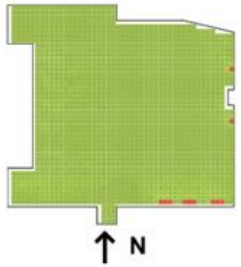
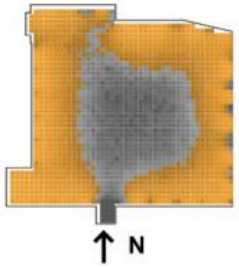
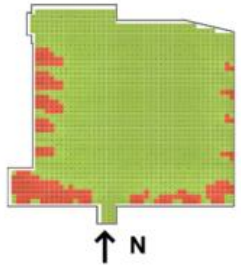
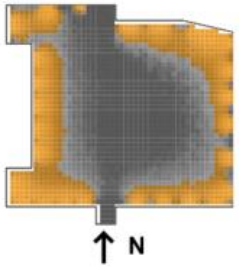
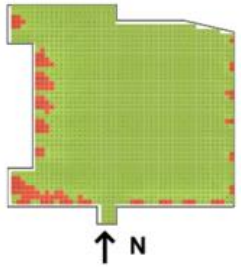

Pepper Office Retrofit (Existing)
Pepper Office Retrofit (Airtightness)
Pepper Office Retrofit (Roof Insulation)
Pepper Office Retrofit (Roof/Wall
EUI Breakdown kBtu/ft²/yr
100
75
50
25
0
90.44
66.96
84.03
65.92
Cooling
Lighting
Pumps
Heating
Hot Water
Equipment
Fans

LEED v4.1 Daylight Credit

Option 1 Total: *0 points*

LEED v4.1 Option 1 *sDA = 37.73% ASE = 6.71%*

ALL FLOOR 1 FLOOR 2 FLOOR 3

Name	Area (ft^2)	sDA Results	sDA Score	ASE Results	ASE Score	ASE Met?
		0% 50%		0 hr 250 hr		
Default Floor	7,245.5		11.57%		0.69%	Yes
Default Floor	7,114.5		63.76%		12.75%	Explanation:
Default Floor	7,263.0		38.51%		6.84%	Yes

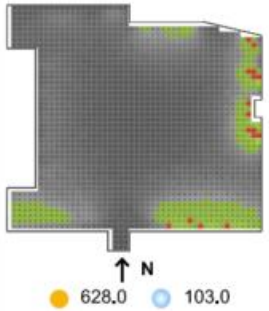
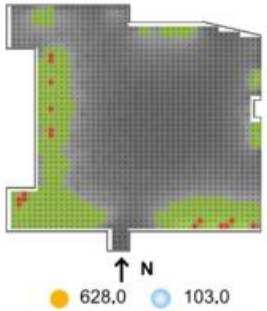
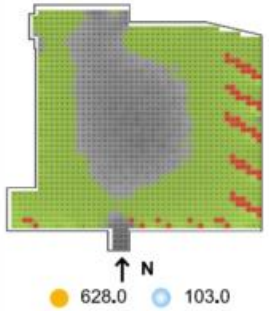
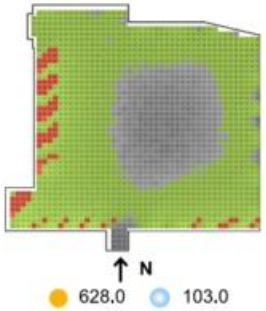
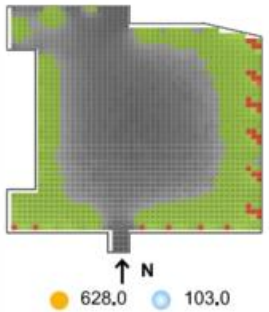
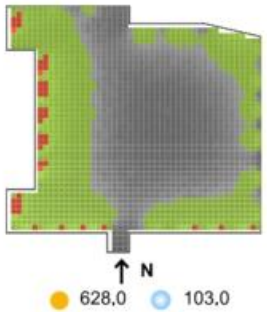
LIGHTSTANZA – SPATIAL DAYLIGHT AUTONOMY OVER 40%/ ANNUAL SUNLIGHT EXPOSURE BELOW 10%

LEED v4.1 Daylight Credit

Option 2 Total: *0 points*

LEED v4.1 Option 2 *40.26% compliant*

ALL FLOOR 1 FLOOR 2 FLOOR 3

Name	Area (ft^2)	Results (9AM)	Results (3PM)	Area (ft^2) With Daylight Illuminance Levels Between 300 and 3000 Lux
		0 300 3,000 lux	0 300 3,000 lux	
Default Floor	7,245.5			1,225.74 (16.92% compliant)
Default Floor	7,114.5			4,557.34 (64.06% compliant)
Default Floor	7,263.0			2,934.41 (40.40% compliant)

BENCHMARKS

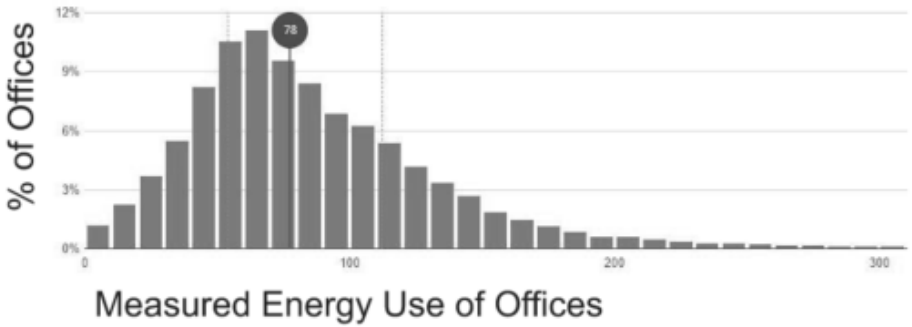
WHERE DO WE NEED TO BE?

Energy

76
National Average

15
2030 Target

EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in kBtu) by the total floor area of the building. The most common unit for EUI is kBtu/ft²/year.



55%
Daylight

Spatial Daylight Autonomy (sDA) describes the percentage of floor area that receives at least 300 lux for at least 50% of the annual occupied hours.

10%
Glare

Annual Solar Exposure (ASE) refers to the percentage of space that receives too much direct sunlight (1000 Lux or more for at least 250 occupied hours per year), which can cause glare or increased cooling loads.

ENERGY ANALYSIS

Baseline Energy

OpenStudio Export

Whole Building EUI

90.44

Office 90.44 kBtu/ft²/yr

LEED Points - EAc2 Credit

0

Electricity $19113.49 /yr

Natural Gas $7866.84 /yr

CO2 Reduction %

0

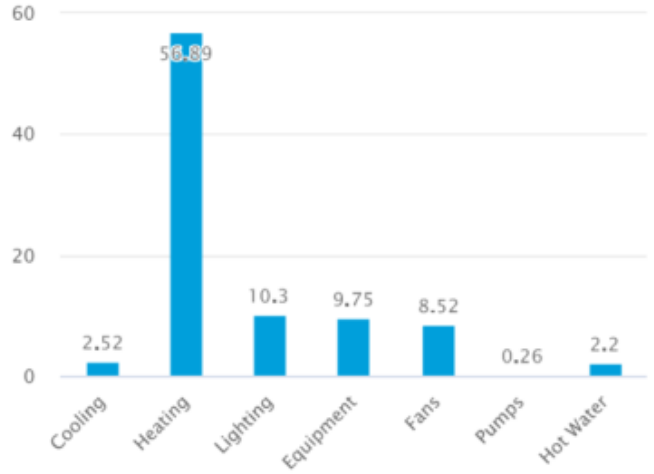
2030 Baseline Emissions 166.7 Tonne/CO2e/yr

198.9 Tonne/CO2e/yr

You Saved 0 Trucks of Ice/yr

Benchmarking Energy

Whole Building EUI Breakdown



Cooling

Your cooling load is not dominating your energy use. This is because your HDD are higher than your CDD days.

Heating

Your heating load is dominating your energy use. This is because your HDD are higher than your CDD days. You can reduce your heating load by facade, HVAC system or reducing infiltration.

Lighting

Your lighting load contributes to 11.39% of the total EUI. You can reduce your lighting load by reducing your lighting power density and having daylight and occupancy sensors in the Engineering Inputs.

Equipment

Your equipment load contributes to 10.78% of the total EUI. You can reduce your equipment load by reducing your appliance power density in the Engineering Inputs.

Hot Water

Your hot water load contributes to 2.43% of the total EUI. You can reduce your hot water load by reducing your domestic hot water demand and using a more efficient hot water generation system in Engineering Inputs.

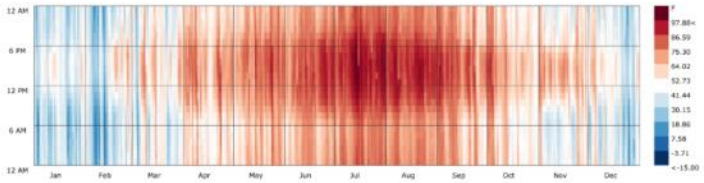
Fans

Your fan load contributes to 9.42% of the total EUI. You can reduce your fan energy by switching your fan flow control accordingly in the Engineering Inputs.

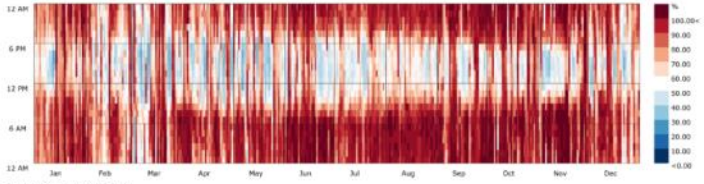
Pumps

Your pump load contributes to 0.29% of the total EUI. You can reduce your pump energy by adjusting pump control for cooling/heating in the Engineering Inputs.

CLIMATE ANALYSIS
RELATIVE TEMPERATURE & HUMIDITY

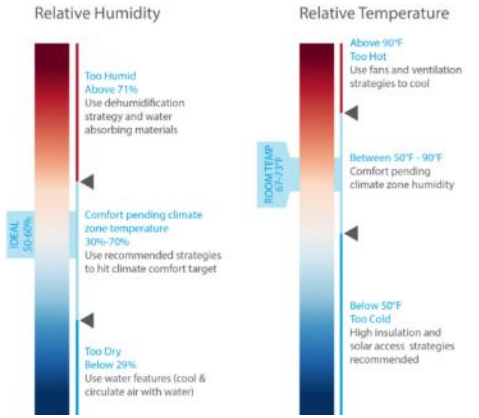


Dry Bulb Temperature (F) - Hourly
Cincinnati Municipal Ap Lunki_OH_USA
1 JAN 1:00 - 31 DEC 24:00

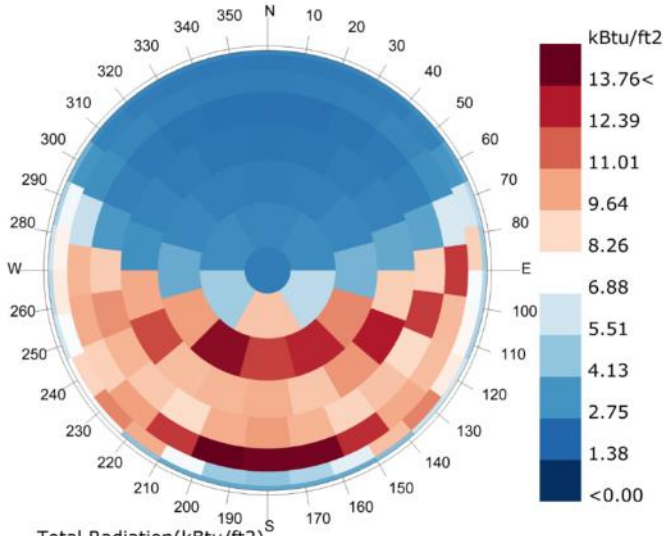


Relative Humidity (%) - Hourly
Cincinnati Municipal Ap Lunki_OH_USA
1 JAN 1:00 - 31 DEC 24:00

This graph shows the outdoor comfort in Lockland using the yearly range of temperatures and humidities.

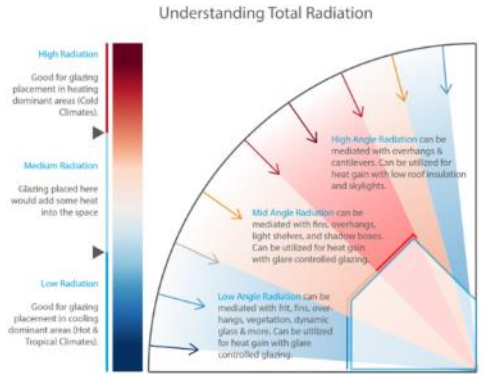


CLIMATE ANALYSIS
RADIATION BY SKY SEGMENT



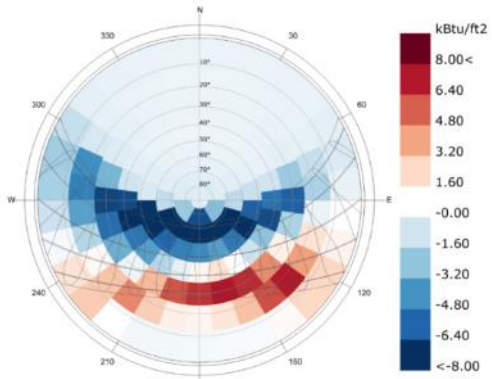
Total Radiation(kBtu/ft2)
Cincinnati_Municipal_Ap_Lunki_OH_USA_1999
1 JAN 1:00 - 31 DEC 24:00

This graph maps the radiation onto a sky dome to show the intensity of the direction and intensity of solar radiation on a yearly basis around the cardinal points for Lockland.

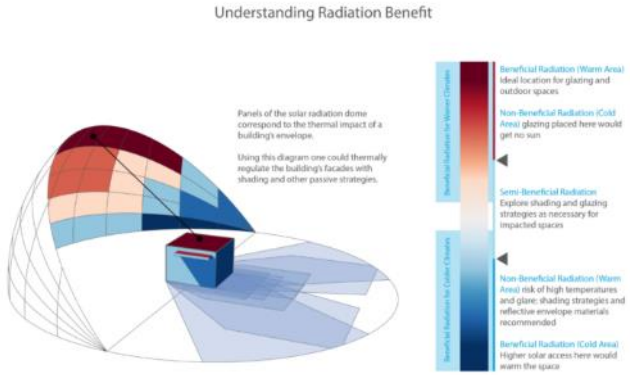


This diagram shows a radiation map projected onto a dome which is used to determine the best placement for glazing and possible radiation mediation strategies. Use the color, angle, and direction of radiation to identify what strategy you can use to optimize thermal comfort and ideal placement.

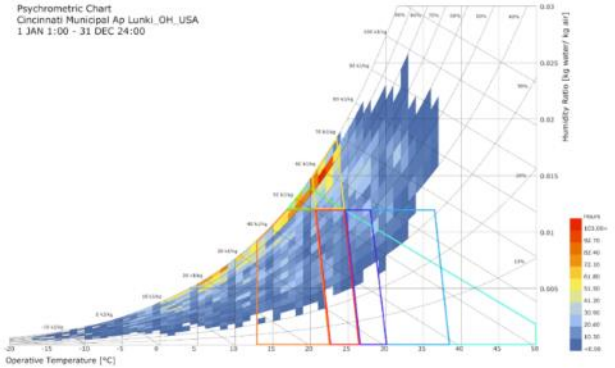
CLIMATE ANALYSIS
RADIATION BENEFIT



Total Radiation(kBtu/ft2)
Cincinnati_Municipal_Ap_Lunki_OH_USA_1999



CLIMATE ANALYSIS
PSYCHROMETRIC CHART



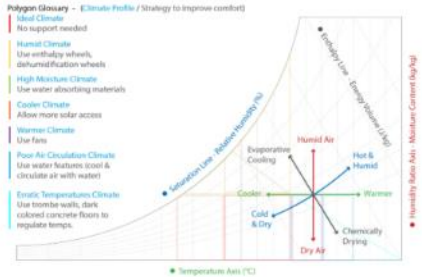
3.89 %	COMFORT - NO PASSIVE STRATEGIES

Impact of Passive Strategies
% of additional comfort – higher is better

1.93 %	EVAPORATIVE COOLING
2.18 %	THERMAL MASS + NIGHT VENTILATION
2.05 %	OCCUPANT USE OF FANS
21.53 %	INTERNAL HEAT GAIN
5.02 %	DESICCANT DEHUMIDIFICATION
8.81 %	DEHUMIDIFICATION

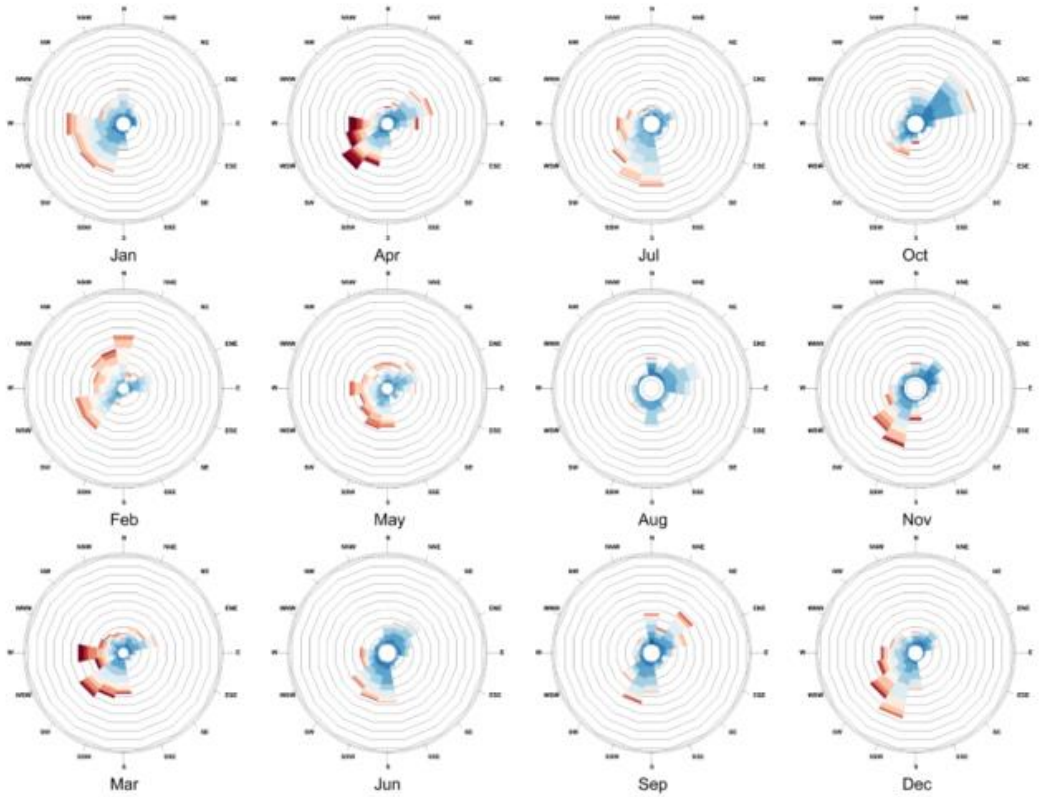
This chart shows the relationship between dry bulb, humidity ratio, and enthalpy. The polygons overlaid on the chart represent different strategies to increase comfort. Based on ASHRAE 55-2013 under standard conditions.

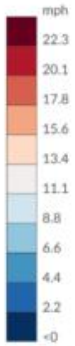
Psychrometric Chart



CLIMATE ANALYSIS

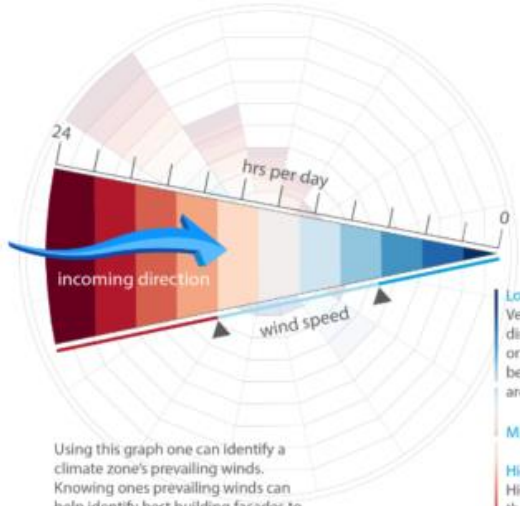
WIND





The diagrams show the wind direction and intensity coming to the site. The number of hours are reflected by the size of the rose, and the intensity is expressed in colors as shown in the legend.

Understanding the Wind Diagram



Using this graph one can identify a climate zone's prevailing winds. Knowing ones prevailing winds can help identify best building facades to use for passive ventilation strategies such as operable window placement.

Low Wind Speeds
Ventilation placed along the directions of 'low wind speeds' or 'winds of minor reach' will not be effective in cooling dominant areas (Hot/ Tropical Climates)

Mild Wind Speeds

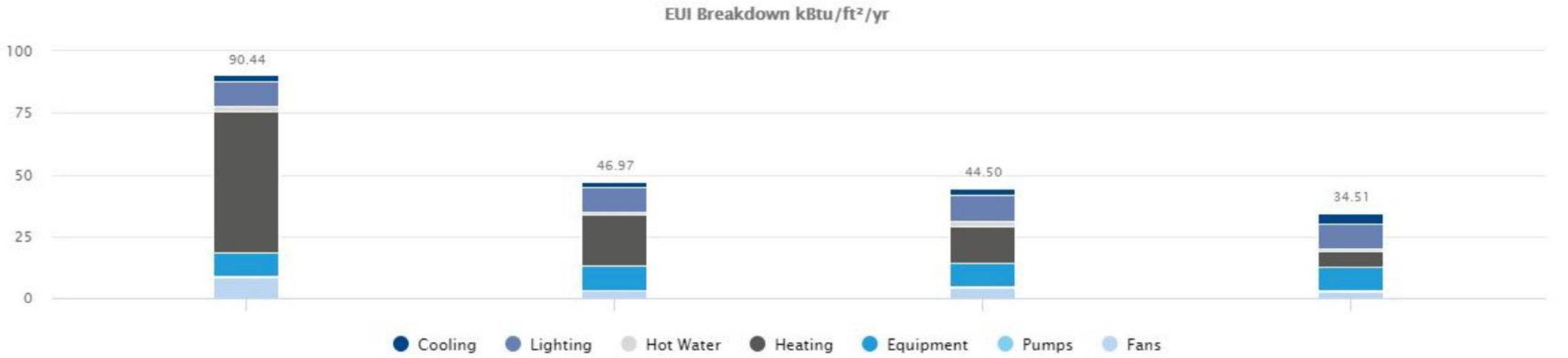
High Wind Speeds
High wind with the furthest reach is the prevailing wind for that climate area. This is the best area/ direction for ventilation strategy.

Pepper Office Retrofit (Existing)

Pepper Office Retrofit (Low Energy)

Pepper Office Retrofit (Code)

Pepper Office Retrofit (EnerPHit)



EARLY DESIGN-BASED MODELING

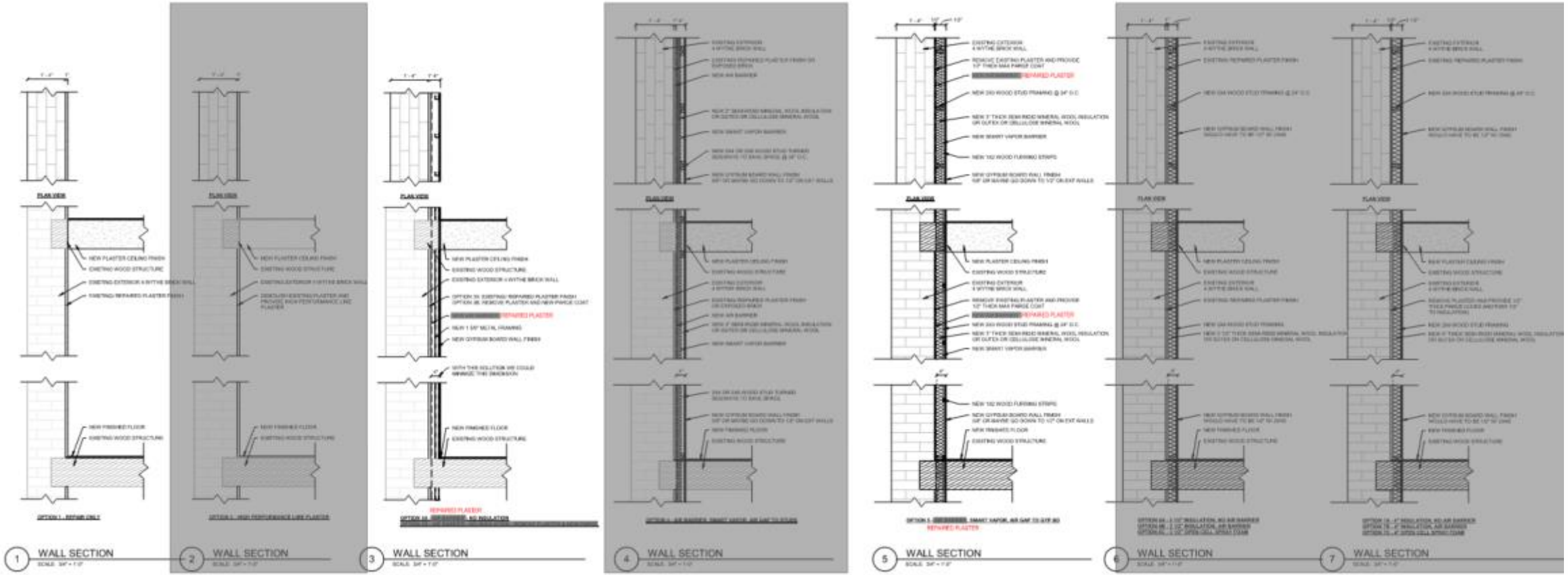
REVISED 09/15/2021
REVISED 10/27/2021

INSULATION OPTIONS

- SEMI-RIGID MINERAL WOOL: ROCKWOOL ROCKBOARD 60
  1. R-4.2 PER INCH — R4.2 (3") R12.6 (3") R14.7 (3 1/2")
  2. PERM RATING NOT LISTED, REACHED OUT TO REP
- GUTEX THERMOSAFE
  1. VARIES — R5.5 (3 3/8") R11.3 (3 1/8") R14.5 (3 15/16 WORST CT)
  2. 44 PERMS PER INCH
- GUTEX THERMOFLEX
  1. NOT SURE IF WE CAN SPF IT IN (MAKE PR NOTES AS IT IS (STITI) AS 5 1/2" THICK BATTS, BUT 5" WE CAN...
  2. R4 PER INCH — R4 (3") R12 (3") R14 (3 1/2")
  3. 66 PERMS PER INCH
- RAVELOCK WOOL (DENSE PACK)
  1. R4.1 PER INCH — R12.3 (3") R12.3 (3") R15.4 (3 1/2")
  2. VAPOR OPEN (NO PERM RATING LISTED)
- OPEN CELL SPRAY FOAM: HUNTER CLASSIC PLUS
  1. R4 PER INCH — R4 (1") R12 (3") R14 (3 1/2")
  2. 22.7 PERMS AT 2" THICK

AIR BARRIER
- 475 VISCOWN

SMART VAPOR BARRIER
- 475 INTELLO PLUS



REVISED 09/15/2021

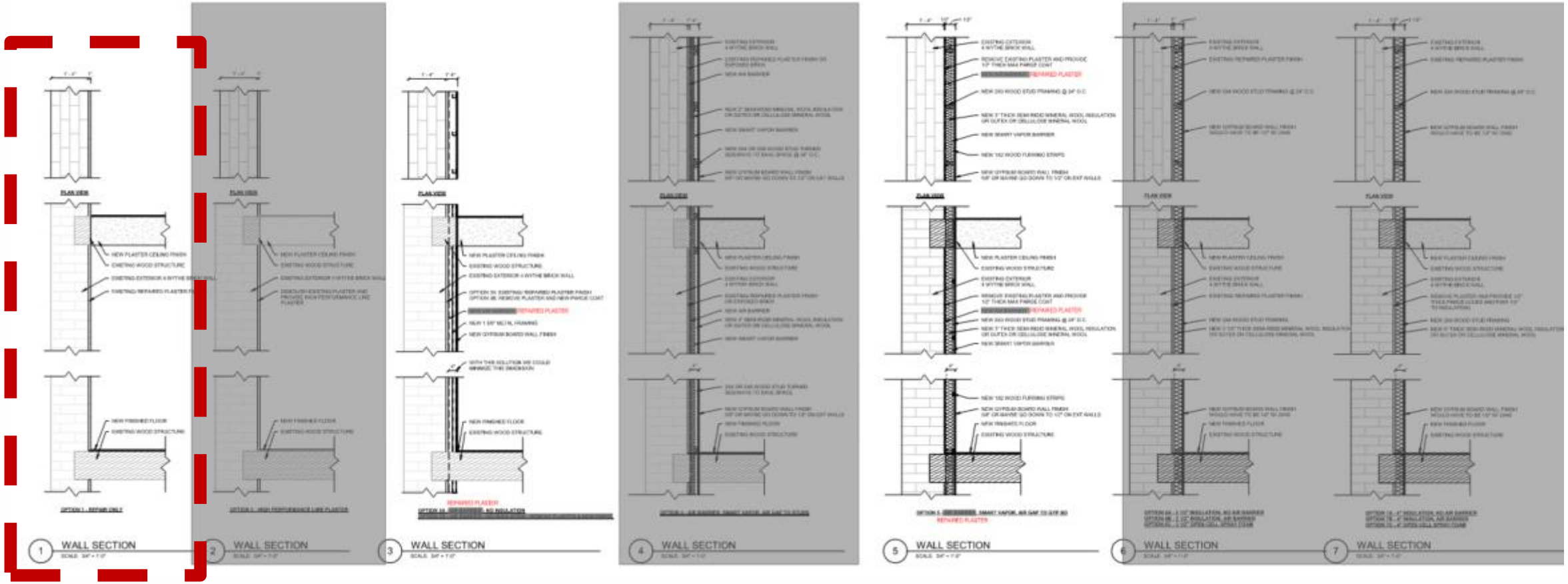
REVISED 10/27/2021

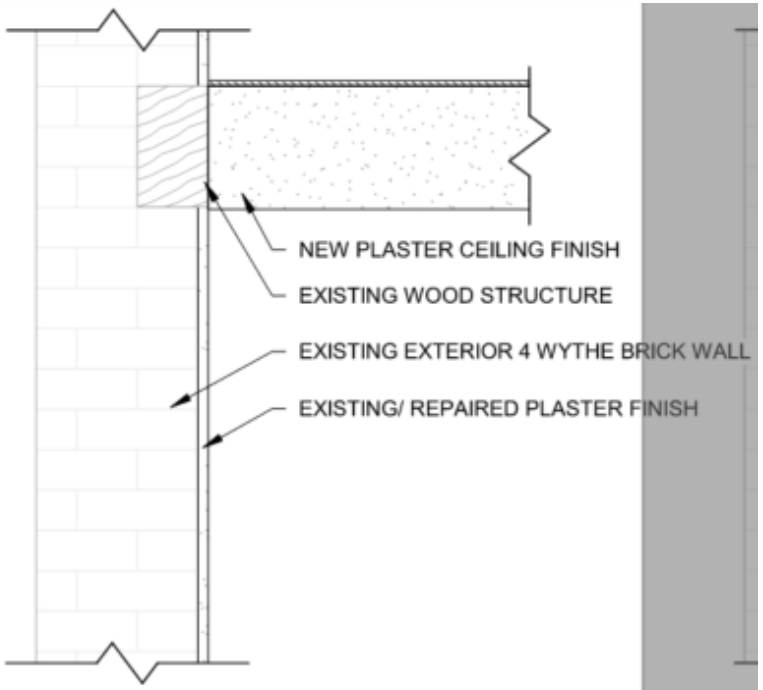
INSULATION OPTIONS

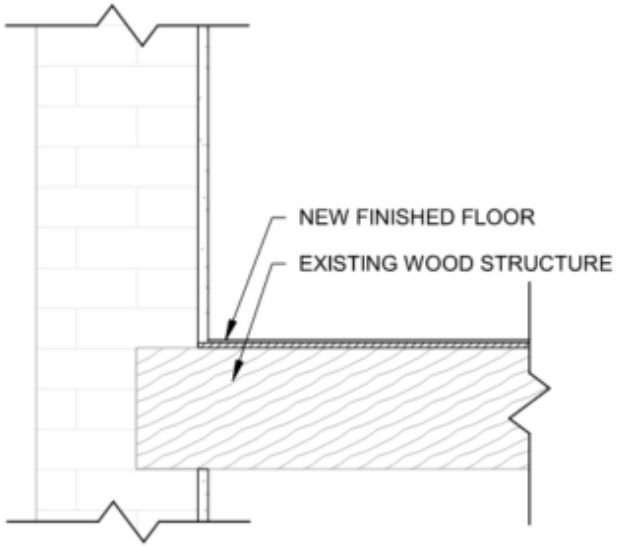
- SEMI-RIGID MINERAL WOOL: ROCKWOOL ROCKBOARD 60
  1. R-4.2 PER INCH — R4.2 (3") R12.6 (3") R14.7 (3 1/2")
  2. PERM RATING NOT LISTED, REACHED OUT TO REP
- GUTEX THERMOSAFE
  1. VARIES — R5.5 (3 3/8") R11.3 (3 1/8") R14.5 (3 15/16 WORST CT)
  2. 44 PERMS PER INCH
- GUTEX THERMOFLEX
  1. NOT SURE IF WE CAN SPF IT IN (SEE EMAIL FROM NOTES AS IT IS LISTED AS 5 1/2" THICK BATTS, BUT 5" WE CAN...
  2. R4 PER INCH — R4 (3") R12 (3") R14 (3 1/2")
  3. 60 PERMS PER INCH
- RAINLOCK WOOL (DENSE PACK)
  1. R4.4 PER INCH — R22.0 (5") R13.2 (3") R15.4 (3 1/2")
  2. VAPOR OPEN (NO PERM RATING LISTED)
- OPEN CELL SPRAY FOAM: HUNTER CLASSIC PLUS
  1. R4 PER INCH — R4 (1") R12 (3") R14 (3 1/2")
  2. 22.7 PERMS AT 2" THICK

AIR BARRIER
- 475 VISCOHM

SMART VAPOR BARRIER
- 475 INTELLO PLUS







OPTION 1 - REPAIR ONLY

WALL SECTION SELECTED

Exterior Wall Improvement Options

Date:	10/27/2021	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
	Description	Repair Only	High Performance Lime Plaster	Air Barrier, No Insulation	Air Barrier, Insulation, Smart Vapor Barrier	Air Barrier, Insulation, Smart Vapor Barrier	No Air Barrier, Insulation	Air Barrier, Insulation
Immediate "No-Go" Factors					Too complicated with SHPO max wall thickness limitations.		Concerned about Moisture getting trapped in the insulation cavity.	Concerned about Moisture getting trapped in the insulation cavity.
Factor:	**Air Barrier**	Medium Performance	Medium performance	High Performance	Highest Performance	Highest Performance	Low Performance	High Performance
Criteria:	Increased Air Tightness reduces overall mechanical tonnage to maintain temperature control of the interior.							
Attribute:		Need treatment above ceilign of 1912 ceiling plenum where there is exposed interior brick.				Use repaired plaster finish as the primary air barrier on the brick. And the smart vapor barrier is the main moisture management system.		
Advantage:		No change to the way the brick has experienced temperature.	- No change to the way the brick has experienced temperature. - Reduced Air Leakage from Baseline	- Reduces overall energy consumption from air leakage & tying Storm Windows into Air Barrier		- Substantially reduces overall energy consumption from air leakage. - Incorporates Storms into Air Barrier		
	Insulation	None	None	None	Yes	Yes	Yes	Yes
Criteria:								
Attribute:								
Advantage:		No change to brick temperature.	No change to brick temperature.	No change to brick temperature.		- Reduces energy consumption		
	Smart Vapor Barrier	None	None	None	Yes	Yes	None	None
Criteria:								
Attribute:								
Advantage:						- Controls moisture - Prevents moisture trapped in insulation layer - Maintains Drying Effect of Brick depending on exterior temperatures		
	Effective R-Value	R-5.1	R-5.1	R-6.2	R-13.8	R-12.8	R-15.4	R-16.9

Exterior Wall Improvement Options

Date:	10/27/2021	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
	Description	Repair Only	High Performance Lime Plaster	Air Barrier, No Insulation	Air Barrier, Insulation, Smart Vapor Barrier	Air Barrier, Insulation, Smart Vapor Barrier	No Air Barrier, Insulation	Air Barrier, Insulation
Criteria:						- Mineral wool - Gutex packed fill - Inorganic to prevent mold issues - Could use spray foam to increase R-Value but that reduces vapor permeance		
Attribute:								
Advantage:		No change to existing wall.						
	Risk							
Pros		- Lowest Risk / least intrusive - Leaks or Brick Damage will be visible.	- Better than baseline Air Infiltration performance. - Leaks or Brick Damage will be visible.	- Keeps temperature of inside face of brick high while improving air infiltration. - Allows integreation of high performane interior storms into air barrier.	- Increased moisture control - Lowest energy usage	- Increased moisture control - Lowest energy usage - Maintains Brick Drying Effect	- Vapor permeability	
Cons		Uses the most energy to condition the building.	- Increased Lime could cause brick to effloresce worse than it has experienced in the past. - Uses the second most energy to condition the building.	If there is a leak or interior Brick issue, it is hidden.	- If there is a leak or interior Brick issue, it is hidden. - Most complicated construction.	- If there is a leak or interior Brick issue, it is hidden. - More intrusive construction	- High Risk of trapping moisture and condensation within the insulation area. - If there is a leak or interior Brick issue, it is hidden.	- If there is a leak or interior Brick issue, it is hidden.
Advantage:								

Exterior Wall Improvement Options

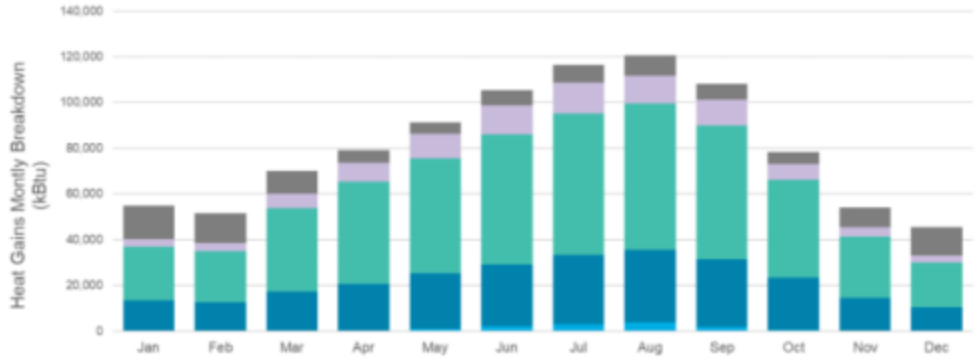
Date:	10/27/2021	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
	Description	Repair Only	High Performance Lime Plaster	Air Barrier, No Insulation	Air Barrier, Insulation, Smart Vapor Barrier	Air Barrier, Insulation, Smart Vapor Barrier	No Air Barrier, Insulation	Air Barrier, Insulation
	EUI	27	25	23		22		
	Thermal Comfort	Moderately Uncomfortable	Moderately Uncomfortable	Moderately Comfortable		Mostly Comfortable		
		Due to a lack of insulation, radiant cooling effects make perimeter spaces uncomfortable for large portions of regularly occupied space. This discomfort could be addressed through adaptive comfort strategies or improved insulation within the wall assembly.	Due to a lack of insulation, radiant cooling effects make perimeter spaces uncomfortable for large portions of regularly occupied space. This discomfort could be addressed through adaptive comfort strategies or improved insulation within the wall assembly.	Due to a lack of insulation, radiant cooling effects make perimeter spaces uncomfortable for large portions of regularly occupied space. This assembly option slightly improves thermal comfort through the reduction of infiltration, which improves consistency in air temperatures. Remaining discomfort could be addressed through adaptive comfort strategies or improved insulation within the wall assembly.		Increased insulation improves the percentage of occupants comfortable to within an acceptable range. Peak discomfort is likely to occur in winter months, and adaptive comfort strategies will likely still be necessary in more extreme weather conditions.		
	Geo Well Quantity	20	20	19		19		

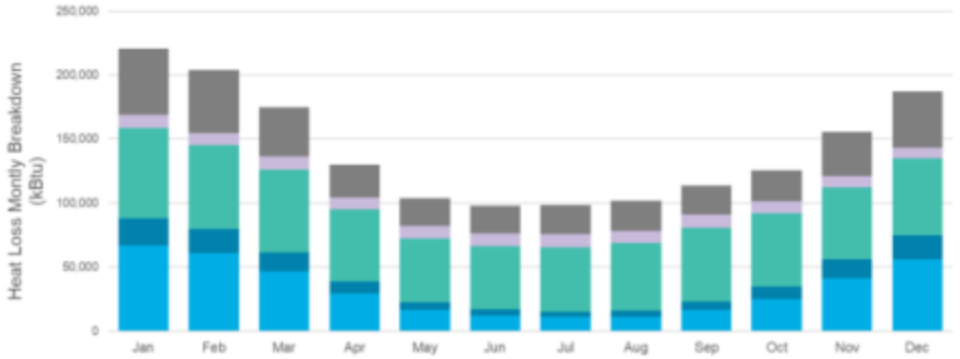
Exterior Wall Improvement Options

Date:	10/27/2021	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
	Description	Repair Only	High Performance Lime	Air Barrier, No	Air Barrier, Insulation,	Air Barrier, Insulation,	No Air Barrier, Insulation	Air Barrier, Insulation
	EUI	27	25	23		22		
	Thermal Comfort	Moderately Uncomfortable	Moderately Uncomfortable	Moderately Comfortable		Mostly Comfortable		
		Due to a lack of insulation, radiant cooling effects make perimeter spaces uncomfortable for large portions of regularly occupied space. This discomfort could be addressed through adaptive comfort strategies or improved insulation within the wall assembly.	Due to a lack of insulation, radiant cooling effects make perimeter spaces uncomfortable for large portions of regularly occupied space. This discomfort could be addressed through adaptive comfort strategies or improved insulation within the wall assembly.	Due to a lack of insulation, radiant cooling effects make perimeter spaces uncomfortable for large portions of regularly occupied space. This assembly option slightly improves thermal comfort through the reduction of infiltration, which improves consistency in air temperatures. Remaining discomfort could be addressed through adaptive comfort strategies or improved insulation within the wall assembly.		Increased insulation improves the percentage of occupants comfortable to within an acceptable range. Peak discomfort is likely to occur in winter months, and adaptive comfort strategies will likely still be necessary in more extreme weather conditions.		
	Geo Well Quantity	20	20	19		19		

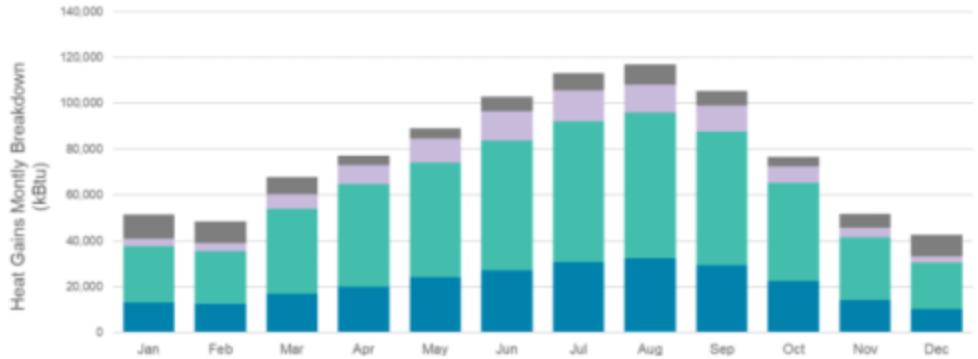
Appendix C – Building Envelope Load Assessment

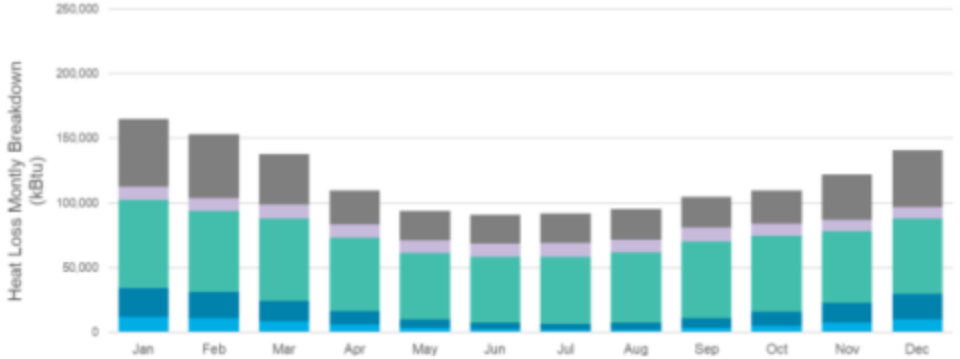
OPTION 1



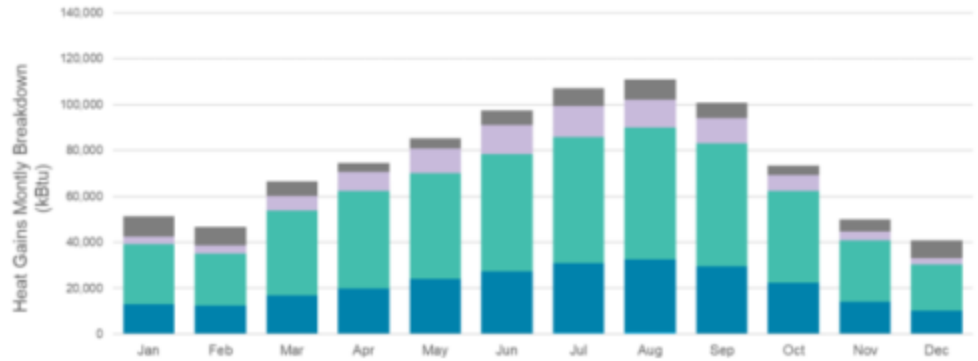


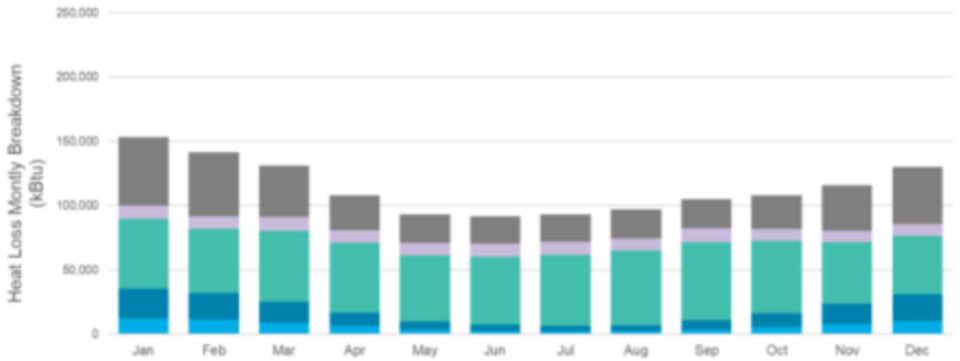
OPTION 3





OPTION 5



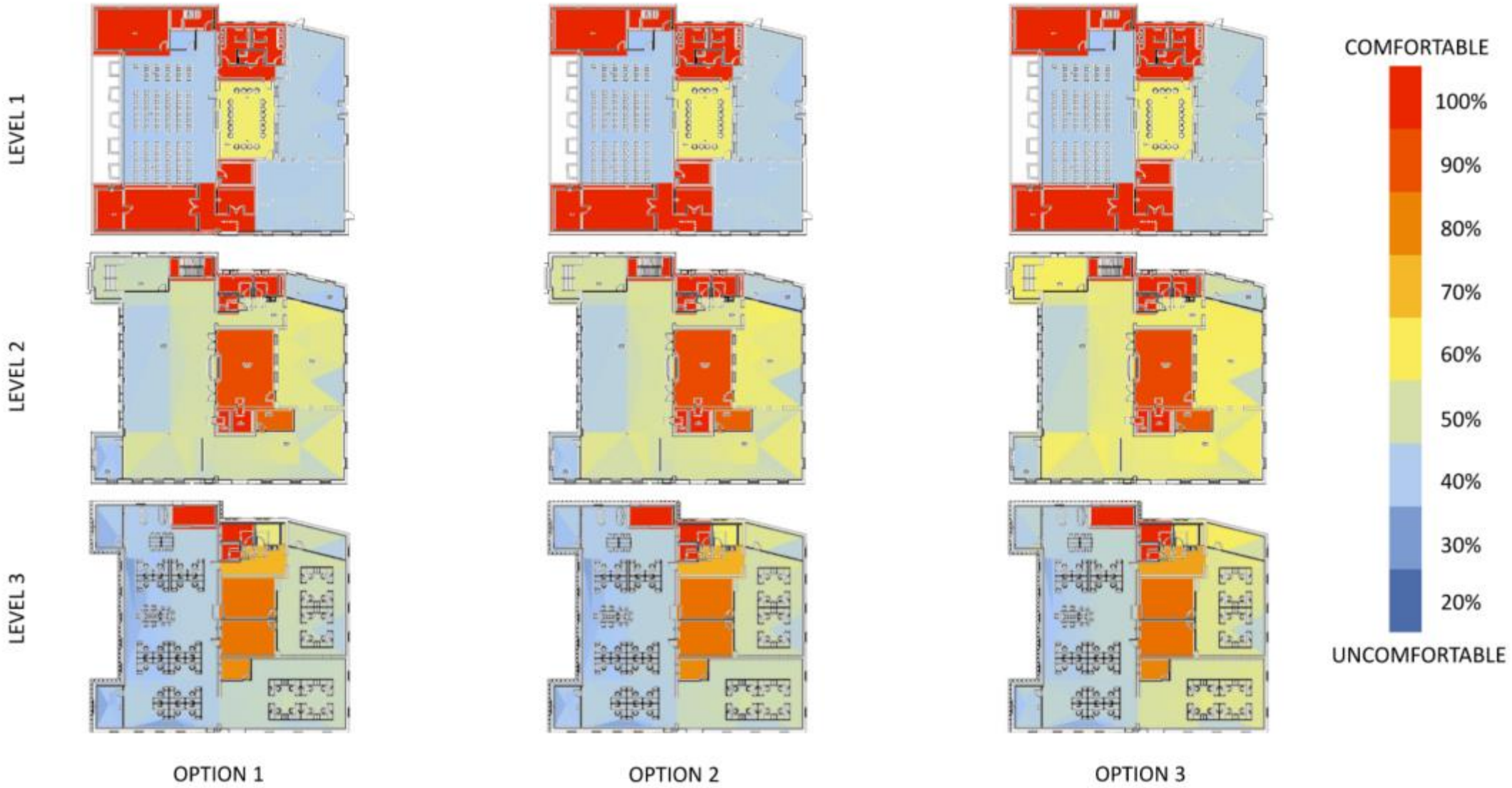


Zone Infiltration Sensible Heat Gain Energy
Surface Window Heat Gain Energy
Exterior Wall Surfaces Heat Gain
Roof Surfaces Heat Gain
Ground Exposed Surfaces Heat Gain

Zone Infiltration Sensible Heat Loss Energy
Surface Window Heat Loss Energy
Exterior Wall Surfaces Heat Loss
Roof Surfaces Heat Loss
Ground Exposed Surfaces Heat Loss

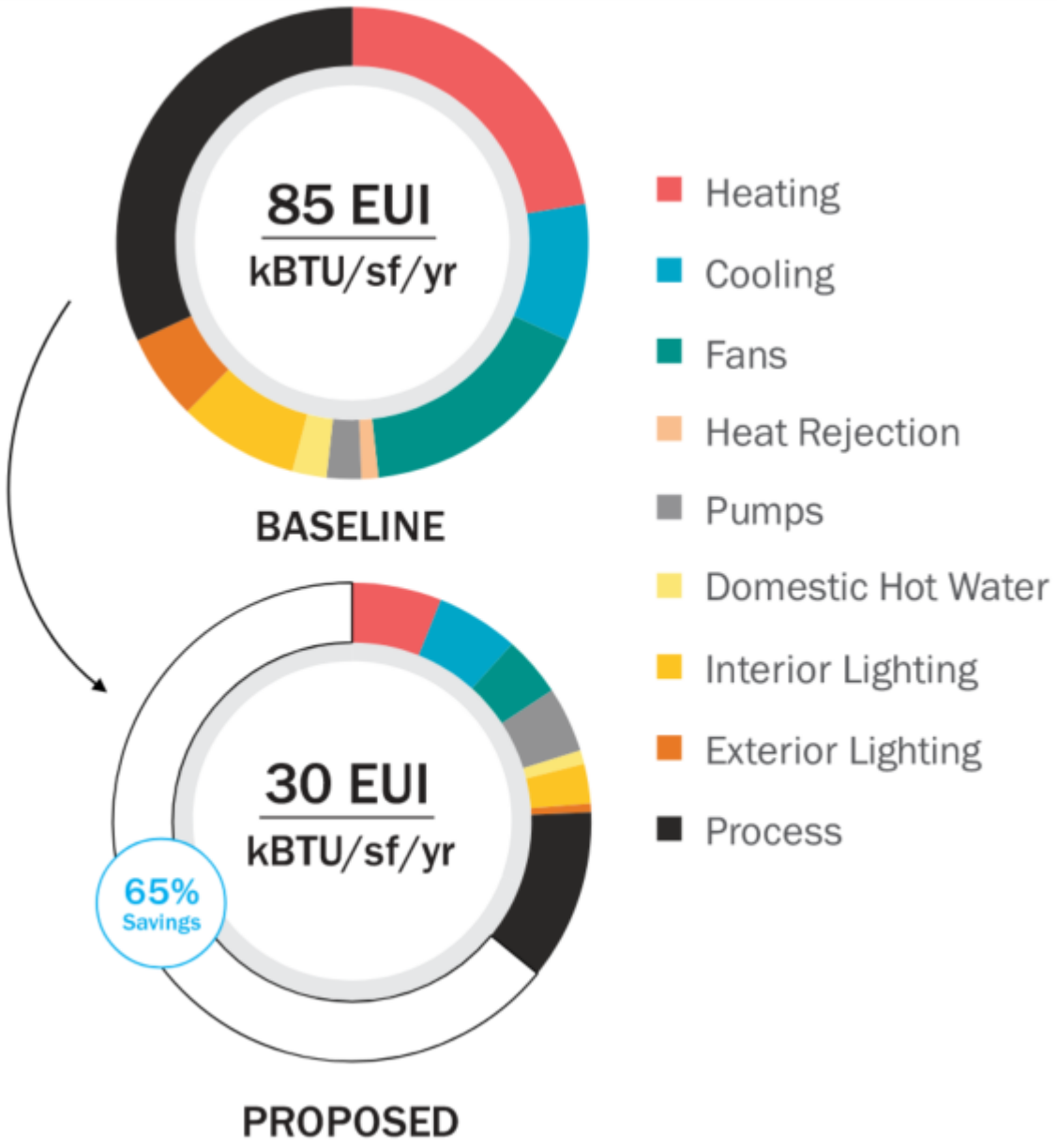
Appendix E – Thermal Comfort

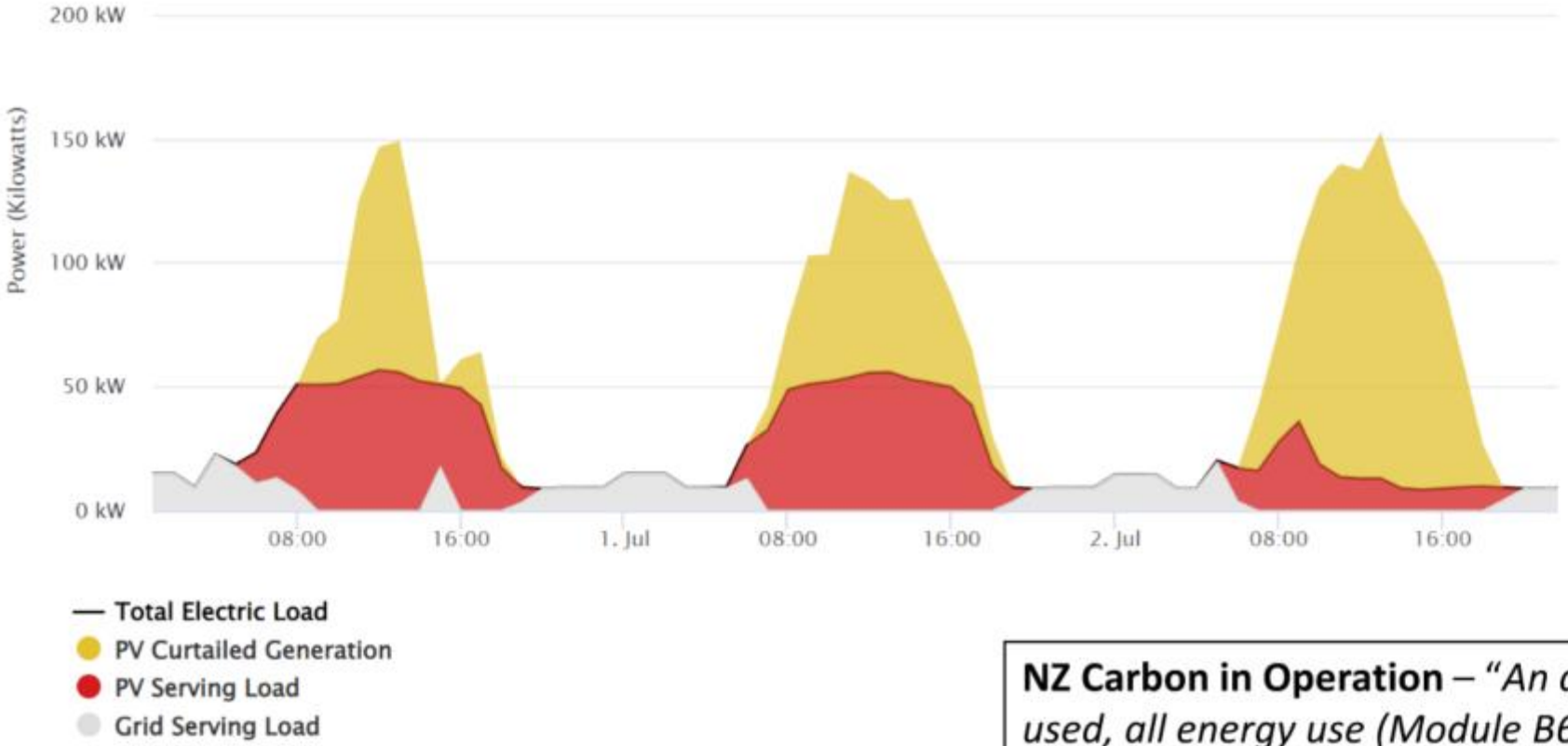
PERCENT OF OCCUPANTS SATISFIED/COMFORTABLE BY ASSEMBLY TYPE

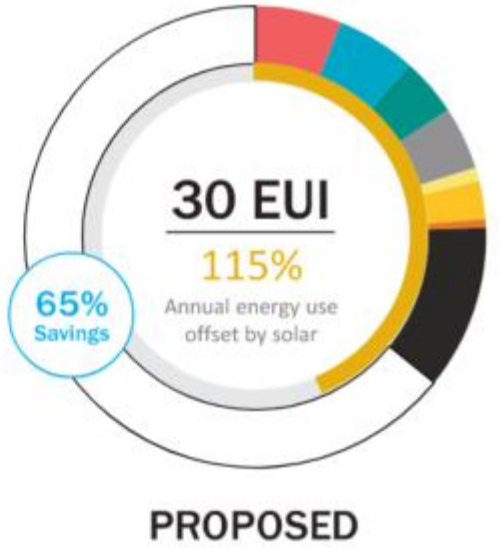


Additional Efficiency Measures

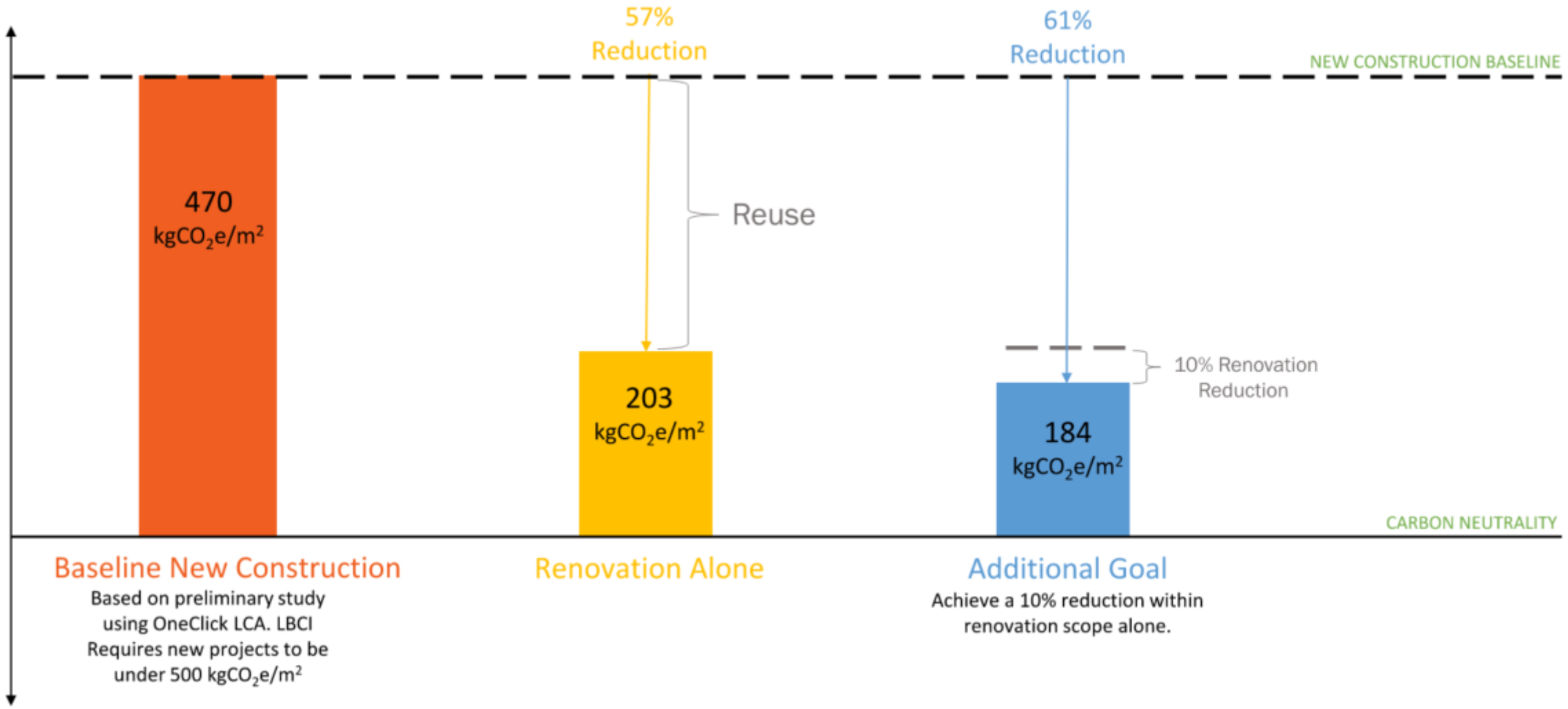
- **Lighting:**
  - 0.35 W/sf
  - Interior and Exterior Lighting Controls
- **Plug Loads:**
  - Laptop Docking Stations
  - Energy Star Appliances
  - No bevi Machines
- **DHW**
  - Low Flow Fixtures
  - Heat Pump DWH Heaters







NZ Carbon in Operation – *"An asset where no fossil fuels are used, all energy use (Module B6) has been minimized and meets the local energy use target, and all energy use is generated on- or off-site using renewables that represent additionality"*
- WLCN, LETI, RIBA


57%
Reduction
61%
Reduction
NEW CONSTRUCTION BASELINE
470
kgCO2e/m2
Reuse
203
kgCO2e/m2
10% Renovation
Reduction
184
kgCO2e/m2
CARBON NEUTRALITY
Baseline New Construction
Based on preliminary study
using OneClick LCA. LBCI
Requires new projects to be
under 500 kgCO2e/m2
Renovation Alone
Additional Goal
Achieve a 10% reduction within
renovation scope alone.

FINISHED HISTORIC RENOVATION

INTERIOR

Image: Pepper Construction

Image: Pepper Construction

INTERIOR

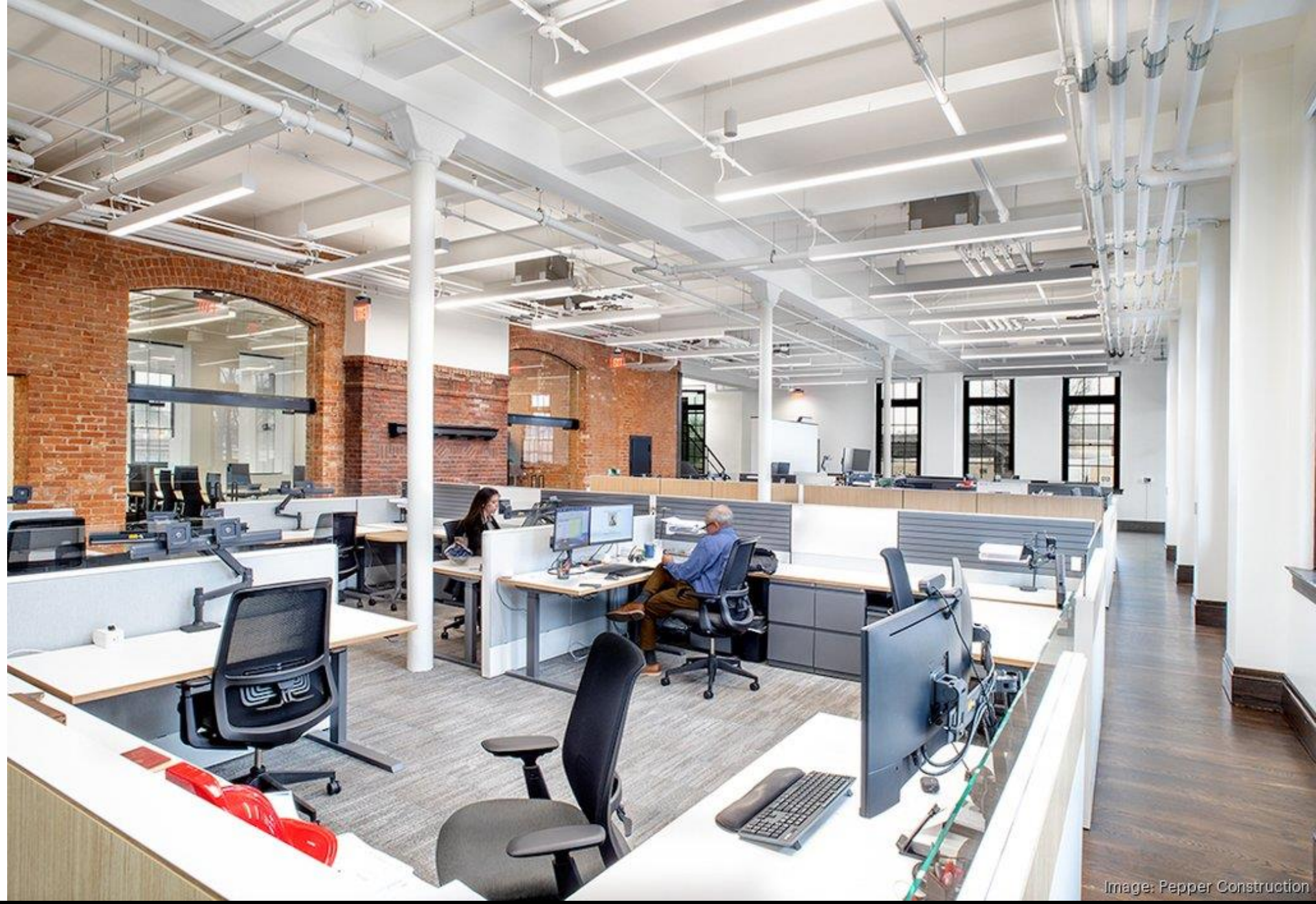


Image: Pepper Construction

INTERIOR

Image: Pepper Construction

INTERIOR

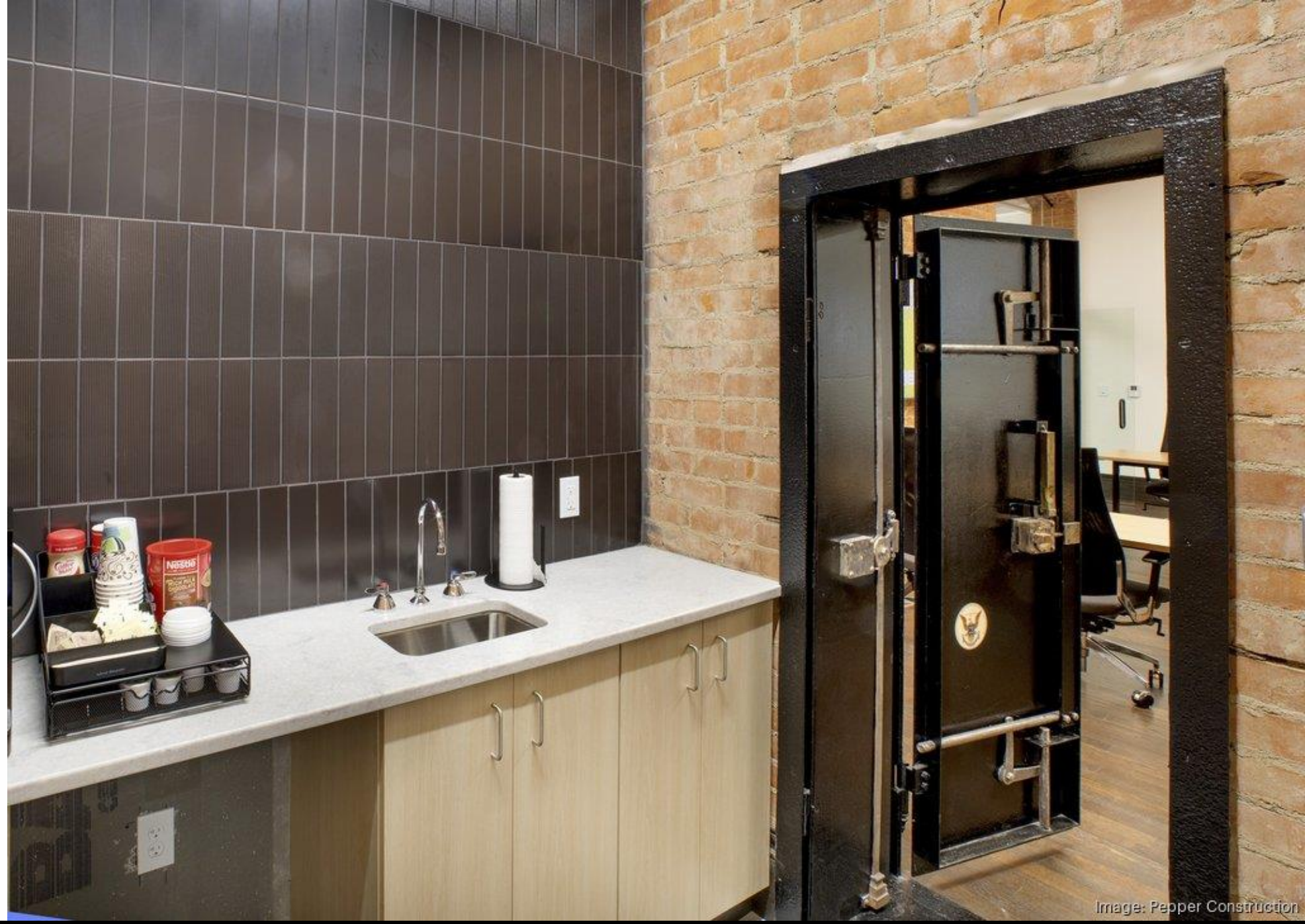


Image: Pepper Construction

INTERIOR

HISTORIC TAX CREDIT COALITION

INTERNATIONAL WELL BUILDING INSTITUTE™

U.S. GREEN BUILDING COUNCIL USGBC

ZERO ENERGY CERTIFICATION

STATE & FEDERAL HISTORIC TAX CREDITS + PENDING: WELL SILVER, LEED GOLD, NET ZERO ENERGY

members of the ohpo | pepper | emersion team

Chad Edwards
principal
emersion DESIGN

Justin Cook
Preservation Services Manager
SHPO

Jerry Noble
Sr. VP & Regional Director
Pepper Construction

Brett Macht
principal
emersion DESIGN

Historic Preservation Certification Application submission and review are now fully electronic. Hard copy applications are no longer accepted.

As of August 15, 2023, all applications submitted to SHPOs and materials submitted to the NPS in response to requests for additional information must be submitted electronically. All applications must use the current application forms and instructions dated "(Rev. 6/2023)."

Banner photo: Cook County Hospital Administration Building, Chicago, Illinois, Dave Burk, SOM; Courtesy Murphy Real Estate Services

About the Tax Incentives ›

Overview of the tax incentives

Before You Apply ›

Information to review before preparing an application

Application Process ›

Application forms, documentation requirements, and fees

Standards for Rehabilitation ›

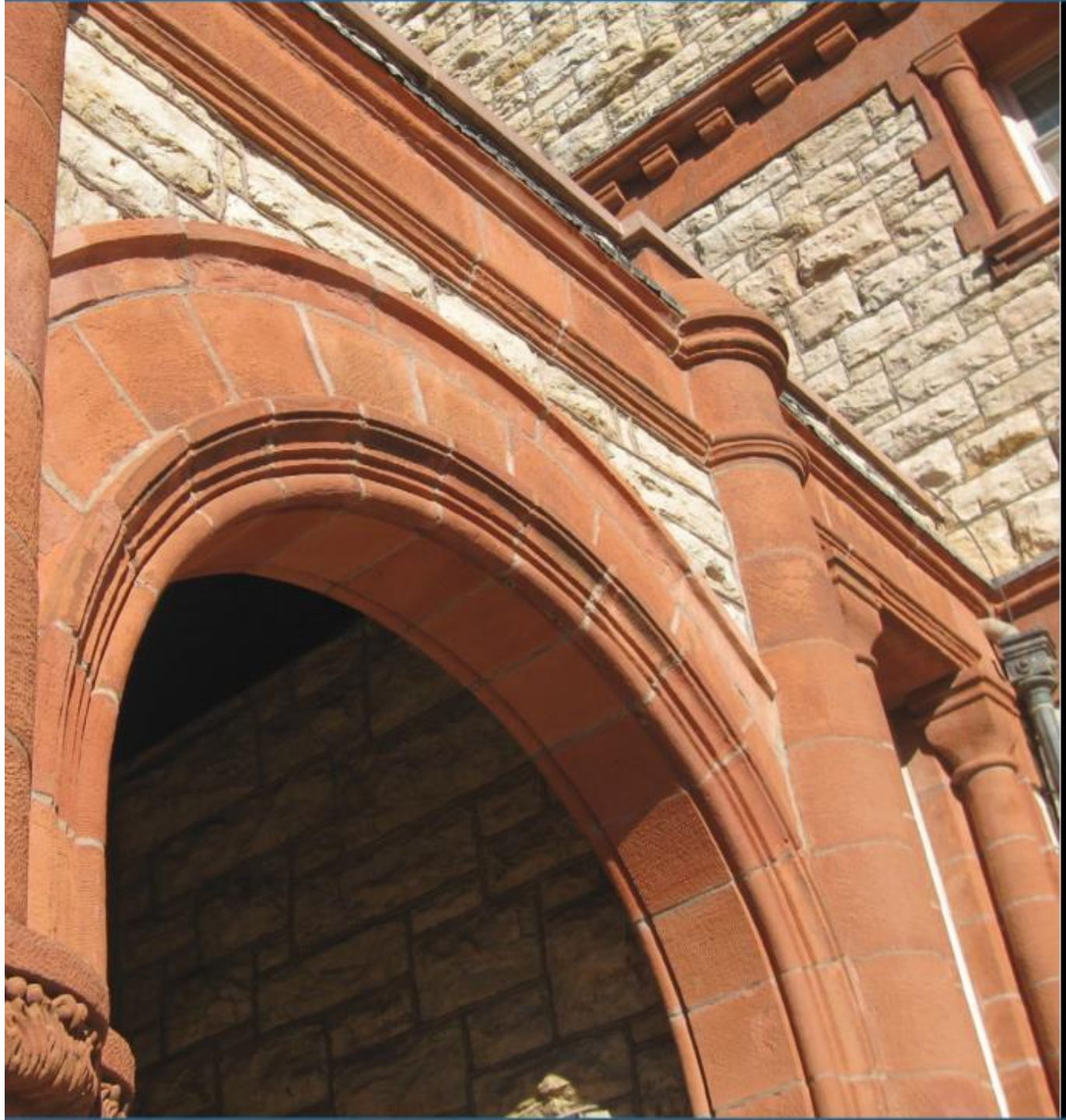
Regulatory for the Tax Incentives Program

Planning Successful Rehabilitations ›

Guidance on common rehabilitation treatments

IRS Information ›

Links to program information provided by the IRS



THE SECRETARY OF THE INTERIOR'S **STANDARDS** FOR THE TREATMENT OF HISTORIC PROPERTIES

WITH

GUIDELINES FOR PRESERVING, REHABILITATING, RESTORING & RECONSTRUCTING HISTORIC BUILDINGS

U.S. Department of the Interior
National Park Service
Technical Preservation Services

The State Historic Preservation Office (SHPO) recommends that agencies use the Section 106 Review Project Summary Form and its supporting documents to submit most routine projects for review.

About the Section 106 Review Process in Ohio

Submitting Projects for Section 106 Review

Check the Status of a Project review

Advisory Council on Historic Preservation

Section 106 Online Training

Connect with the Resource, Protection & Review Staff

Archaeology Guidelines

Federal Resources

Advisory Council on Historic Preservation

36 CFR 800
Regulations governing the Section 106 process.

Protecting Historic Properties
A Series of online articles intended to aid Section 106 participants as they apply 36 CFR Part 800.

Citizen's Guide
Information for the general public about how to participate in the Section 106 process.

National Park Service
Procedural Guidance

Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines

Using the Secretary of the Interior's Standards for Rehabilitation

Laws, Executive Orders & Regulations

Conservation Practice

Preservation Briefs
Advice about preserving, rehabilitating and restoring historic buildings. Includes detailed guidance for specific treatment measures and building materials.

Preservation Tech Notes
Case Studies in Historic Preservation.

Secretary of the Interior's Standards for the Treatment of Historic Properties
Basic principles for the preservation, rehabilitation, restoration, and reconstruction of historic buildings with examples of "recommended" and "not recommended" treatments for various building components.

SHPO Resources

Legislation

Ohio Revised Code §149.52 - §149.54

Historic Property Data

Inventory - Learn about recording buildings and sites

National Register of Historic Places
Search a database for National Register listings in Ohio.

Record Search Service
Learn early in project planning how likely it is that preferred project sites are near properties that are listed in the National Register of Historic Places and/or included in state inventories. Fee required.

Online Mapping System
This site allows users to search inventory data and produce maps. Limited to approved, paid subscribers

Cultural Resource Survey Reports

Survey Reports Submission Requirements
Archaeology Guidelines
Guidelines for Conducting Historic/Architecture Surveys in Ohio

Other Resources

Amendments to Programmatic Agreements for Communities Administering HUD Funds
Section 106 Preservation Organizations

Consultant Lists

History/Architecture Consultants List
Archaeology Consultants List