# OLD BUILDINGS SHOULD BE POSITIVE, TOO.

12 October 2023









Chad Edwards

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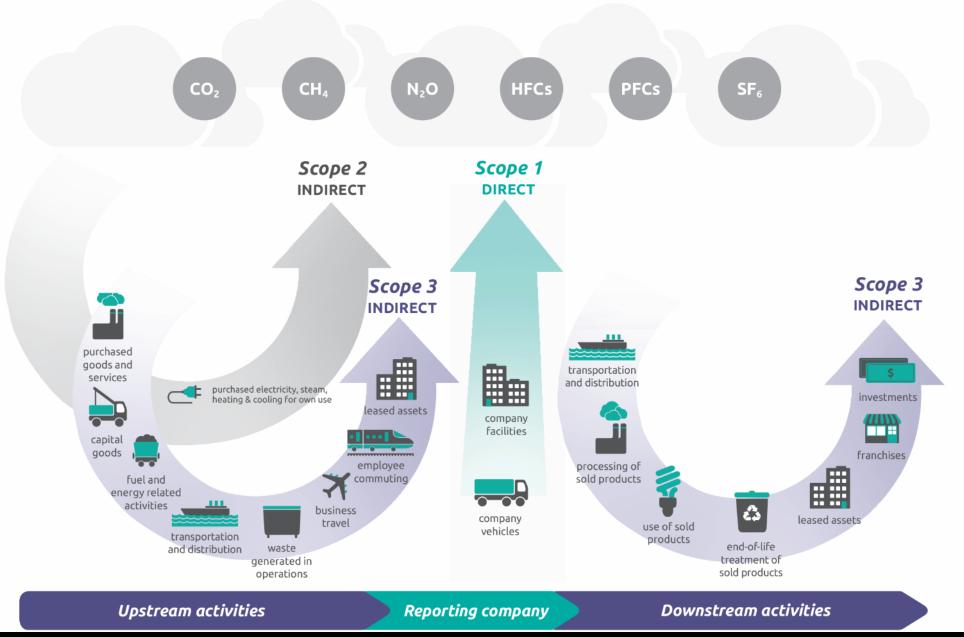
Brett Macht principal emersion DESIGN

## learning objectives:

- Understand the embodied carbon impact of existing, historic buildings.
- 2. Gain resources on sustainable tactics for renovating historic buildings.
- 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.

## SETTHE 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 <u>Carbon teadership Forum's Owner Toolkit</u>.

## 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 siliced, 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 "cradie-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 31 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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Owner

Goal

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 Sustainability 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 #E100).

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:

- A carbon intensity limit sets a maximum carbon footprint per area value for a building. For example, the Zero Carbon Cartification requires that "[t]he total embodied carbon emissions of the project must not exceed 500 kg-CO<sub>2</sub>e/m<sup>2</sup>."
- Percent reduction goals from a baseline value can be set
  for the entire project or on a per area basis. For example,
  the LEEO 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.

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).	
<u>Autodesk</u>	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 17% 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.	
Linkedin	LinkedIn aims to reduce their scope 3 emissions by more than half and remove more carbon than they emit by 2030.	
Mastercard	Mastercard is working to reduce total scope 1 and 2 emissions by 38% and scope 3 emissions by 20% by 2025 from a 2016 baseline.	
Microsoft	Microsoft aims to drive its operations and supply chain to be carbon-negative by 2030.	
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Project Gigaton to avoid a gigaton of GHG emissions

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### Carbon Leadership Forum

The embodied carbon of a project can be calculated by using whole building life cycle assessment (WBLCA) tools, such as Tally, One-Licki C.A. 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 Proctice 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 <a href="Embodied Carbon Benchmark Study">Embodied Carbon Benchmark Study</a> 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.

### Material-level targets

Procurement targets should be set during the design process and included in specifications. Similar to project-level targets, two approaches can be used:

- A material carbon intensity limit sets a maximum carbon footprint per unit of material, such as a cubic yard of concrete. For example, the <u>State of California</u> requires that rebar purchased for State projects must be below the global warming potential limit of 1.06 metric tons CO<sub>2</sub>e per metric ton of rebar.
- Percent reduction goals from a baseline value can be set in total or per functional unit of material. For example, the LEED B0+C New Construction pilot credit "Procument of Low Carbon Construction Materials" awards teams 1 point for reductions of 0-30% and 2 points for reductions above 30% from the Carbon Leadership Forum's Material Baselines values.

Product embodied carbon should be tracked via product-specific environmental product declarations, rather than whole building life cycle assessment tools. Learn more in Procurement Policies to Reduce Embodied Carbon.

## **Voluntary Embodied Carbon Commitments**

Targeting Net-Zero Embodied Carbon

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.



The 2030 Challenge for Embodied Carbon from Architecture 2030 asks the global architecture and building community to adopt the following commitment:

The embodied carbon emissions from all buildings, infrastructure, and associated materials shall immediately meet a maximum global warming potential (GWP) of 40% below the industry average today. The GWP reduction shall be increased to:

- 45% or better in 2025
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Signatories to the <u>Clean Construction Declaration</u> from C40 Cities pledge to "bring together and inspire stakeholders to take action, and enact policies and regulations where we have the powers to:

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Join the movement: carbonleadershipforum.org



Research





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Research



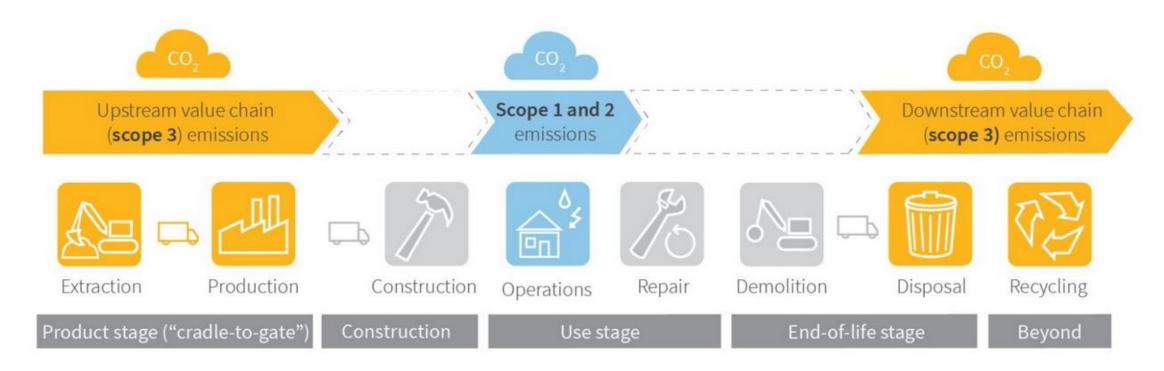






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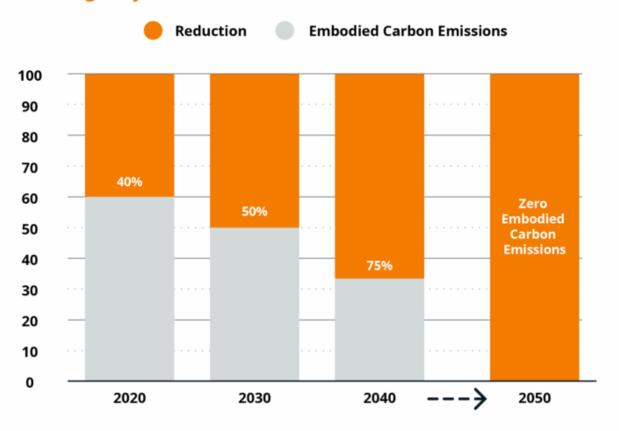


**Figure 1.** Building product life cycle stages included in scope 1, 2, and 3 greenhouse gas accounting, as described by the <u>Greenhouse Gas Protocol</u> <u>Corporate Value Chain (Scope 3) Reporting Standard</u>. Cradle-to-gate emissions (including extraction, transportation, and production) as well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



## **The 2030 Challenge for Embodied Carbon**

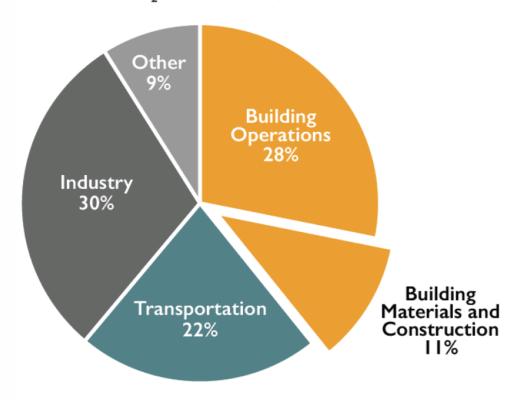
Buildings, Infrastructure, and Materials



Source: 2030, Inc. / Architecture 2030. All Rights Reserved.

## Figure 2 | Embodied Carbon vs Operational Carbon

## Global CO, Emissions by Sector

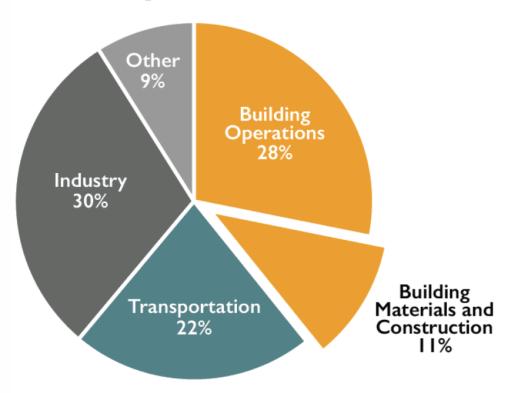


Source: © 2018 2030, INC \ Architecture 2030. All Rights Reserved. Data Sources: UN Environmental Global Status Report 2017: EIA International Energy Outlook 2017

Source: Architecture 2030 Challenge New Buildings: Embodied Carbon – Architecture 2030

## Figure 2 | Embodied Carbon vs Operational Carbon

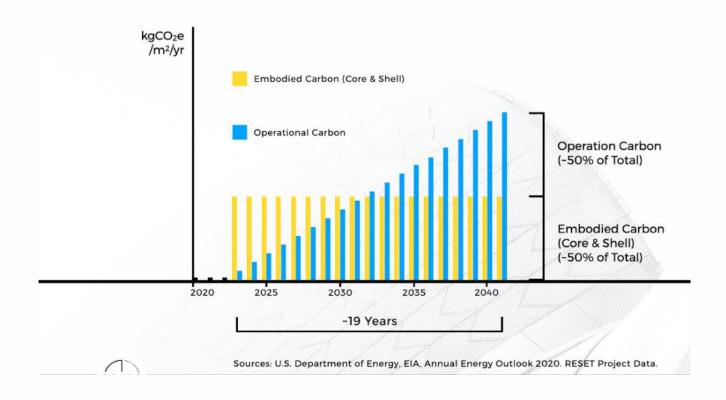




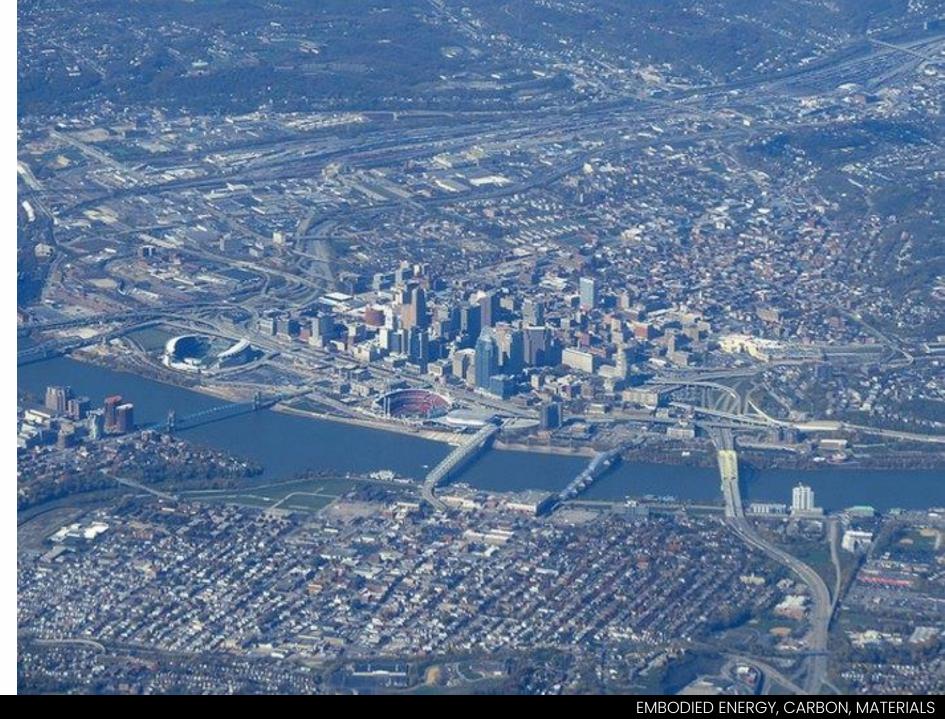
Source: © 2018 2030, INC \ Architecture 2030. All Rights Reserved. Data Sources: UN Environmental Global Status Report 2017: EIA International Energy Outlook 2017

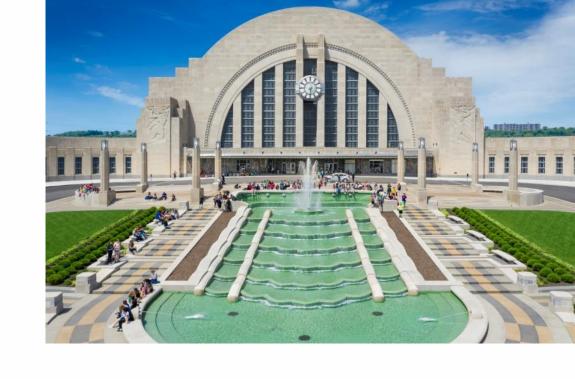
## Embodied vs. Operational

Carbon Emissions from New Construction (U.S.) 2022 - 2042 Business as Usual Projection

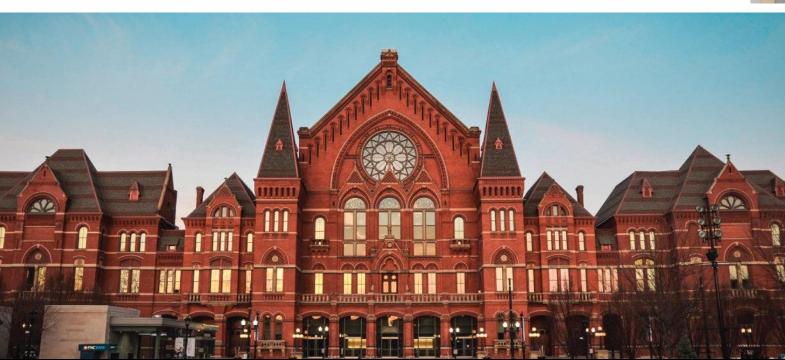


Source: Architecture 2030 Challenge New Buildings: Embodied Carbon – Architecture 2030



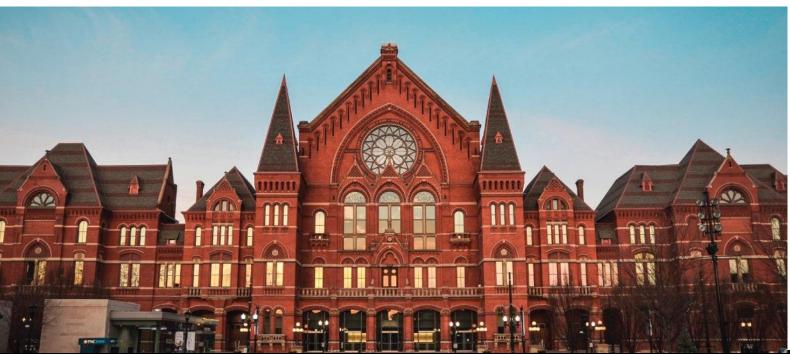








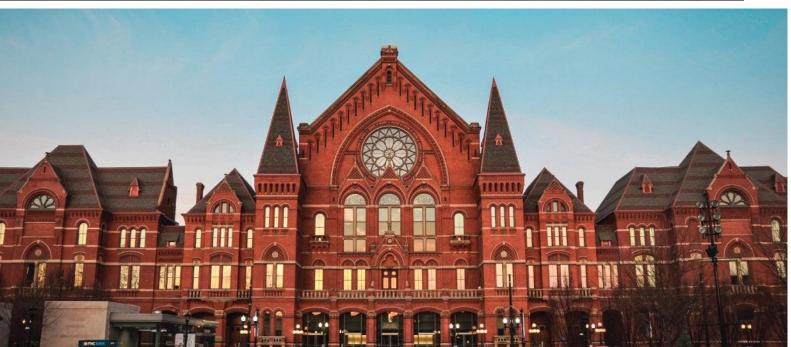




OLD BUILDINGS CAN BE POSITIVE, TOO. NAT'L CULTRUAL ICONS/ NEIGHBORHOOD, LOCALIZED, COMMUNITY BASED CULTURE





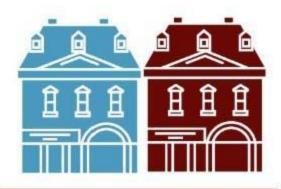


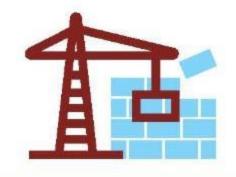


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## HOW HISTORIC TAX CREDITS FUNDING WORKS

## Why the Historic Tax Credit?







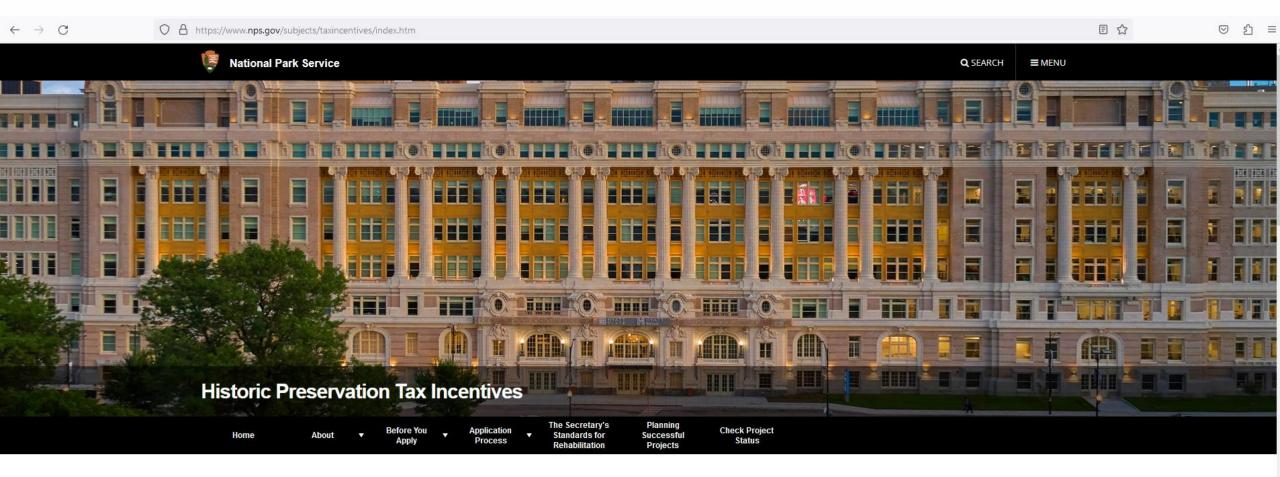


Adaptive reuse repurposes dormant community assets, leveraging cultural heritage and attracting private capital

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



NPS.gov / Home

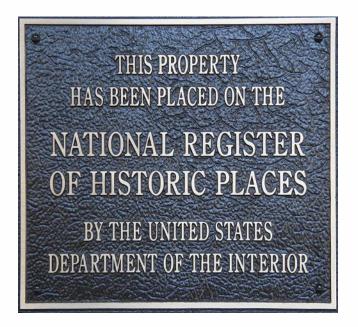
## Tax Incentives for Preserving Historic Properties

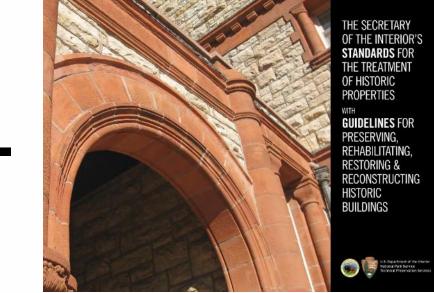
The Federal Historic Preservation Tax Incentives program encourages private sector investment in the rehabilitation and re-use of historic buildings. It creates jobs and is one of the nation's most successful and cost-effective community revitalization programs. It has leveraged \$116.34 billion in private 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





## Standards for Rehabilitation

- A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
- The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
- 3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
- Changes to a property that have acquired historic significance in their own right will be retained and preserved.
- Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
- 6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
- Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
- Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
- 9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
- 10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

20%





♠ Language Translation







An official State of Ohio site. Here's how you know V

Department of Development

FOR FOR FOR **ABOUT** BUSINESS INDIVIDUAL COMMUNITY US

(?) Contact



Development / Community / Redevelopment / Ohio Historic Preservation Tax Credit Program

## 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 tay 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

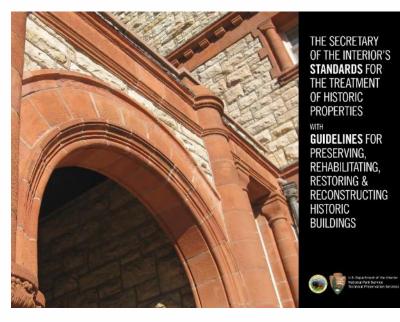
View more tax credit programs

Sign up for email updates

## OHIO Historic Preservation Tax Credit







## Standards for Rehabilitation

- A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
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- 10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

# 25%/35%

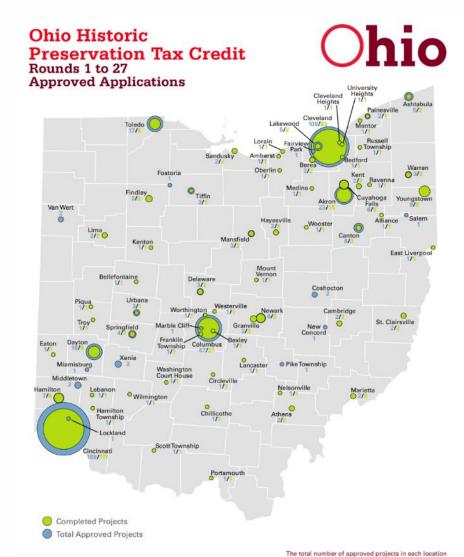
## Ohio Historic Preservation Tax Credit

- 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

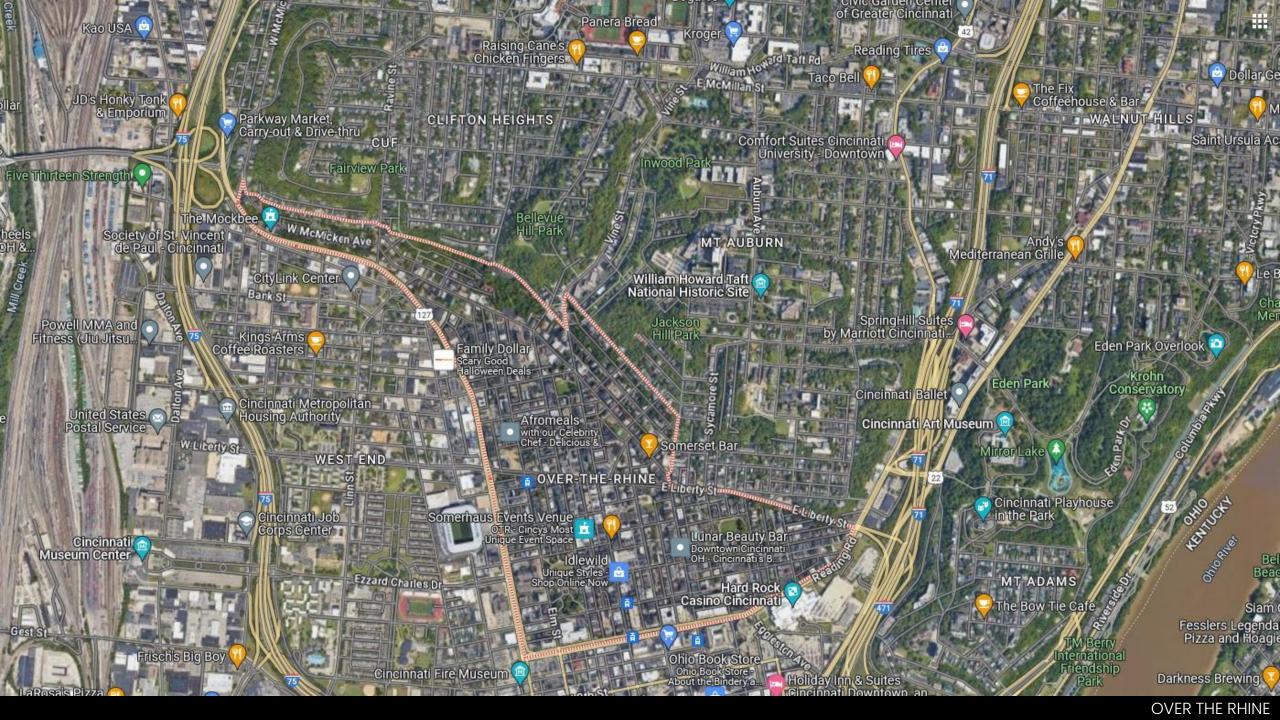


repared for the Office of Strategic Business Investments

is shown by a proportionately sized blue circle and

r. The number of completed projects is shown

## HTC and LEED TAX ABATEMENT



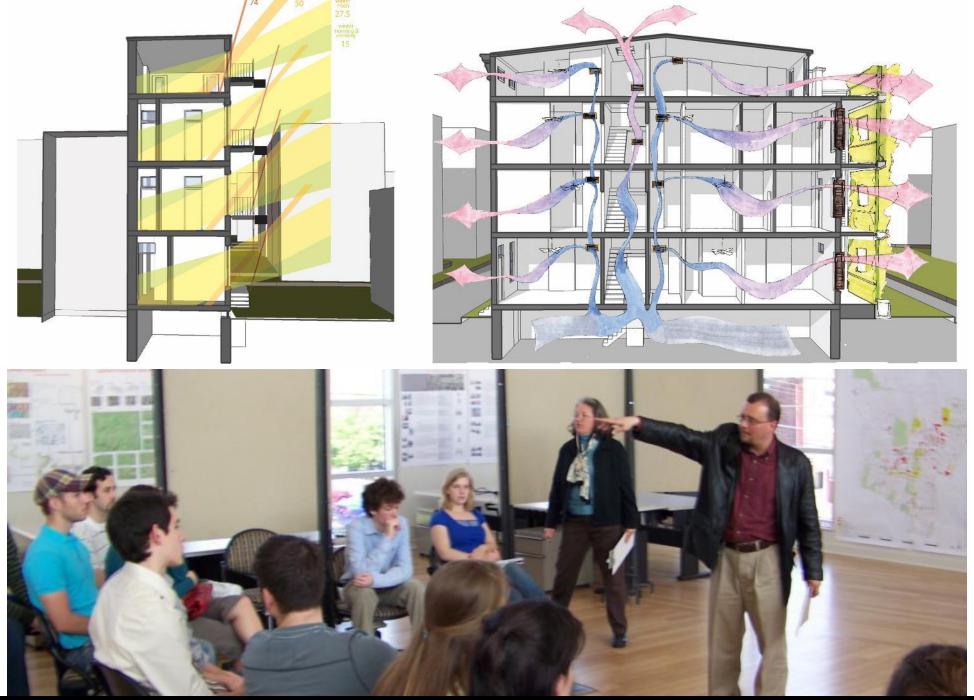


OTR Green Historic Study: AIA Cincinnati Merit Award for Architectural Advancement



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. 2 Design Studios and Seminars

## **GREENING OVER-THE-RHINE**

Over-the-Rhine Foundation

September 26, 2008

## 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	Very high end windows	Very high end windows
	paneU.9; SHGC.65	replacements U.19; SHGC .27	replacements U.19; SHGC .27
Floor above garage	Un-insulated slab	R25 continuous spray	R13 open cell foam applied
		foam to basement ceiling	beneath slab
Air Leakage	.35 air changes per hour	20% improvement due to	20% improvement due to
		tighter windows	tighter windows
HVAC	14 SEER heat pumps with	Dual fuel heat pumps, 16	Same as historic
	electric resistance back up and	SEER, 9.5HSPF, 92%	
	88% efficient distribution	efficient backup furnace	
	losses (ducts) associated with	with variable speed	
	forced air system entirely in		
Lighting and	conditioned space		
Appliances	Energy Star Appliances and 20% of lighting is CFL; electric	Same	Same
	range/oven and electric	I	I
	dryer; default U.S. statistics		I
	plug loads	1	I
Ceiling	R30	R49	Same as historic
Slab	Un-insulated	Same	Same
Rim/Band Joists	Un-insulated	Same	Same
Doors	All doors between	Same	Same
	conditioned and		
	unconditioned space are Steel		
	+ Urethane with a thermal		
	break (R4.4) except for the		
	third floor pulley door for		
	decoration (wood)		
Skylights	Areas as proposed U.6 SHGC	Same	Same
TATeter bestern	.5	T-mld	Same as bistania
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

Over-the-Rhine Foundation

September 26, 2008

## 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	1	1	
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	l -	\$ -299	\$ -4,400

## CLAY STREET - ENERGY PERFORMANCE AND COST COMPARISON

	Historic Baseline	Model #1 Balanced	Model #2 Efficient
	î .	1	
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

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

Sol Developments 08005

Sol Developments 08005

7

## **GREENING OVER-THE-RHINE**

City of Cincinnati	(Search) Advanced Search
Home   Do Business   Live & \	Work   Play   Departments   Services & Payments
Community Development + Div	isions + Housing
Community Develo	ppment
Community     Development     TOOL BOX for:     Divisions	Tax Exemptions: LEED-CRA
Business Development     Housing     Developers     Home Buyers	The City of Cincinnati provides incentives for developments that meet Leadership in Energy and Environmental Design Standards
Home Owners Renters	LEED-CRA Tax Exemption Program (Housing Program)
Workforce Development Human Services and Arts Property Maintenance Projects Resources News and Events FAQs	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.
Search Available     Commercial Properties	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.

	Credit Certificate	
I) OWNER INFORMATION		
Name:	Date:	_
Organization:	Representative's Title:	_
Street:	City / State / Zip code:	_
Phone Number:	Email:	
Federal Employer Identification Number or 3	Partnership	_
Owner is subject to the following Ohio taxes:  Individual Income Tax		
BUILDING LOCATION INFORMATION  Name of Building:		
Address of Building:		
City: S	State: Ohio Zip Code:	
3) Date Ohio Historic Preservation Tax Credit ap	oplication approved:	-
4) Date rehabilitation of the historic building com	mpleted:	

## 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 SUSTAINABLITY AND HISTORIC PRESERVATION





NPS.gov / Home / Federal Preservation Laws / Standards & Guidelines

#### 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

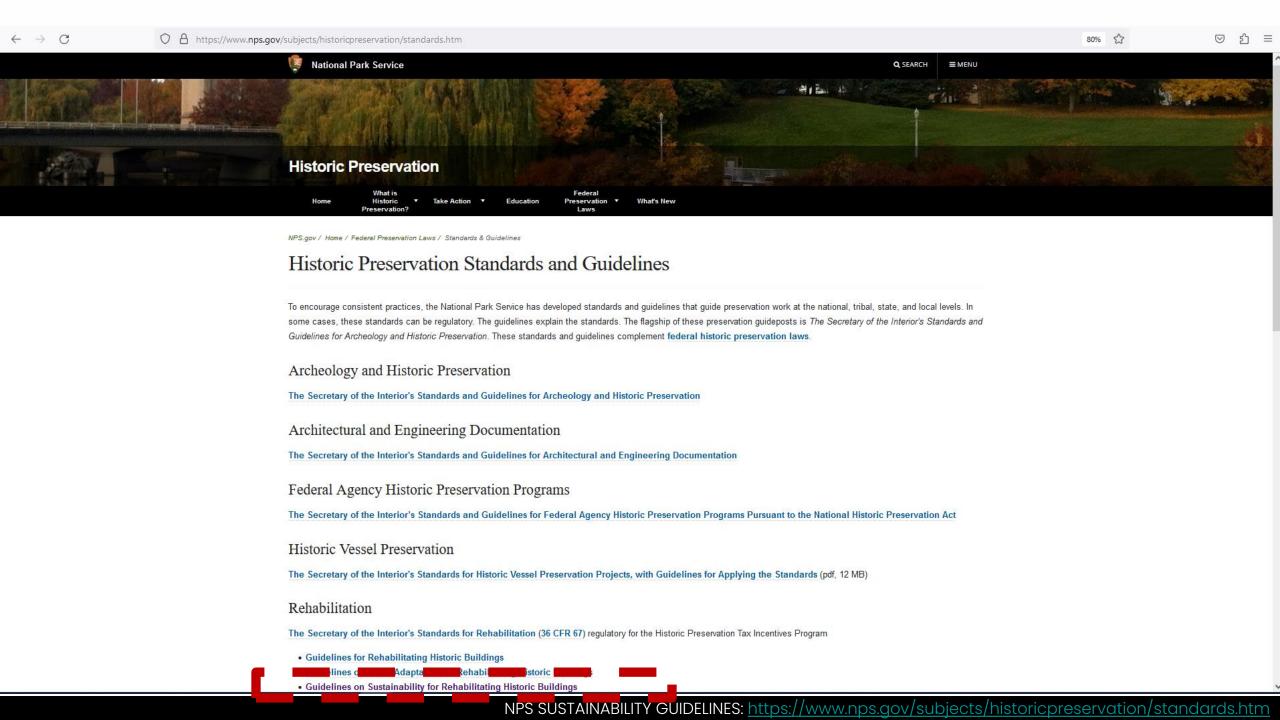
#### Historic Vessel Preservation

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





THE SECRETARY OF THE INTERIOR'S STANDARDS FOR **REHABILITATION &** 

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



#### 33





**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 Retrofitting historically-clear windows with film without noticeable color in historicallytinted glass or reflective coatings that will clear windows to reduce solar heat gain. negatively impact the historic character of the building. Installing film in a slightly lighter shade of Introducing clear glazing or a significantly the same color tint when replacing glazing lighter colored film or tint than the original



panels on historically-dark-tinted windows to

improve daylighting.

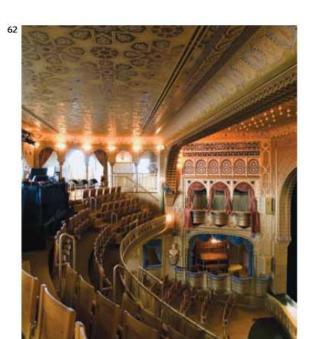


to improve daylighting when replacing

historically dark-tinted windows.



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.



### 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 paint- ing 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.







**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.

#### SOLAR TECHNOLOGY

#### RECOMMENDED

#### NOT RECOMMENDED

Installing a low-profile solar device on the Installing a solar device in a prominent historic building so that it is not visible or location on the building where it will negaonly minimally visible from the public right of tively impact its historic character. 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 on the historic build-Installing a solar device on the historic ing in a manner that does not damage historic building in a manner that damages historic roofing material or negatively impact the roofing material or replaces it with an inbuilding's historic character and is reversible. compatible 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 Placing solar roof panels vertically where or parallel to the roof—to reduce visibility. they are highly visible and will negatively impact the historic character of the

building.



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.







## 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 NPS Form 10-166a (Rev. 6/2025) Personal Park Service OMB-Cuntral No. 1034-0009

Rec'd by SHPO Aug	31 2023
ISTORIC PRESERVATION CERTIFICATION APPLICATION PART 2 – DESCRIPTION OF REHABILITATION	•

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	☐ United individually in the National Register of Historic Places; date of lieting 06/01/2023			
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The initialization of proposed initialization will meet the Secretary of the Interior's Standards for Rendefitation if the Standards for Rendefitation if the Standards for the property or the distinct in which it is Eccined and that
the Devalutation described herein is not considered with the historic chostable or the property or the distinct in which it is Eccined and that

Date National Park Server Authorized Sarukan

□ NPS conditions or comments attached

Rec'd by SHPO Ang 31 2023
HISTORIC PRESERVATION CERTIFICATION APPLICATION
PART 2 - DESCRIPTION OF REHABILITATION

ORDER DEPOS DE LE CONTROL DE L'ANDRE DE L'AN

side from the mesonry cleaning described above, no other work is proposed

Number 7 Feature Store front Date of Feature 1894, 1978

Peature StoreTrent Date of Feature 1894, 1978
Describe existing feature and its condition

the 1694 building has a traditional three-bay storefront, with a flush center entrance flanked by cast two columns and large display windows. The storefront size on a metal sill plate supported by sandstone blocks. The aluminum door assembly - with vertical sidelight and transen - Is not historic fidate unknown, above the door and windows are single glazed transmoss. Storefront framing, window trim, and buildheads are wood. One of the plate glazes windows have been pierworld-reacked and temporarily recurved with plymousd 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 a described show.

The 1913 beliding was built to complement the design of the original building, but the atorefront was replaced in 1970 when the building was renowated for a furniture store shownown. The historic storefront originally sligned with the diseasions of the 1994 building, in terms of its propertions and souls. Mills 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 transon and builkined arraw were infilled with briefly, and the current insulated, aluminum-framed display windows were installed in the new openings. A dismont-imaged 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 absorption against a section.

Photo Numbers Drawing Numbers A3.7, A3.7

Describe work to feature

Historic interior trim will be carefully removed, existing single-pane glating will be removed, and now aluminum-clas, single-lite wood display windows will be installed in the 189% storetront, Original wood trim will be reinstalled, with adjustments for the new glasing as needed. Window samples will be submitted to the SEFO for review and approval before work begins, as stipplated in Item 10 below.

No changes are proposed for the 1913 storefront,

Number 8 Feeture Loading dock (aast) Date of Feeture 1899, unknown

Describe existing feature and its condition

There are I freight doors and I pedestrian door on the east wall of the 1994 building. Directly in front of the doors is a b-bay loading dock, where deliveries were initially made to/frox the grecery warehouse. The loading dock is wood framed, with plywood decting and skirtnin, Access to the platform is provided by a precast connects star at the north end of the loading dock, while it does not appear to be historic, the age of the platform cannot be detarmined. It is in poor condition.

Above the platform are 5 wood know 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.

# Historic Tax Credit DOCUMENTATION





#### 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



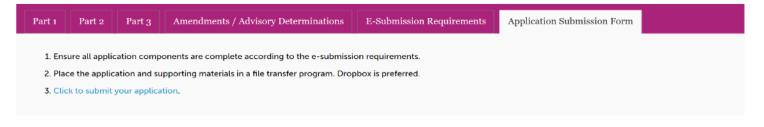
← → C ☆ • ohiohistory.org/preserving-ohio/historic-tax-incentive/federal-historic-rehabilitation-tax-credit/



#### Submitting Your Federal Tax Credit Application

## All application materials are now submitted

### ELECTRONICALLY



#### Common Definitions

Qualified Rehabilitation Expenditures

Certified Rehabilitation

Certified Historic Structure

Depreciable

Substantial

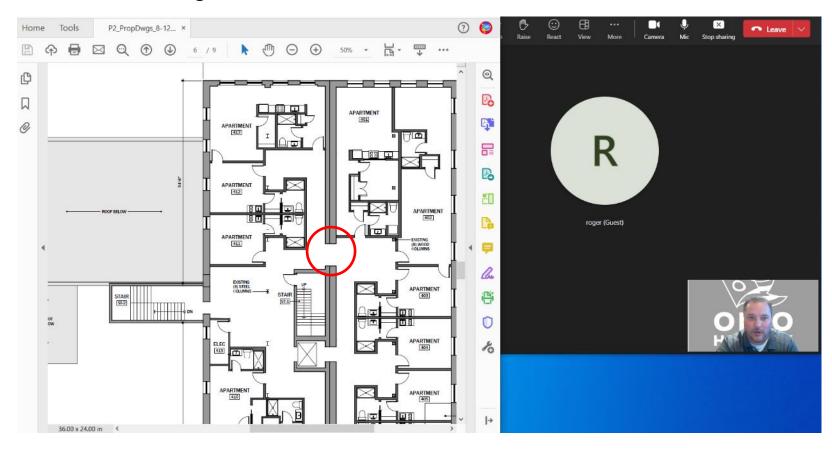
Phased Project

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





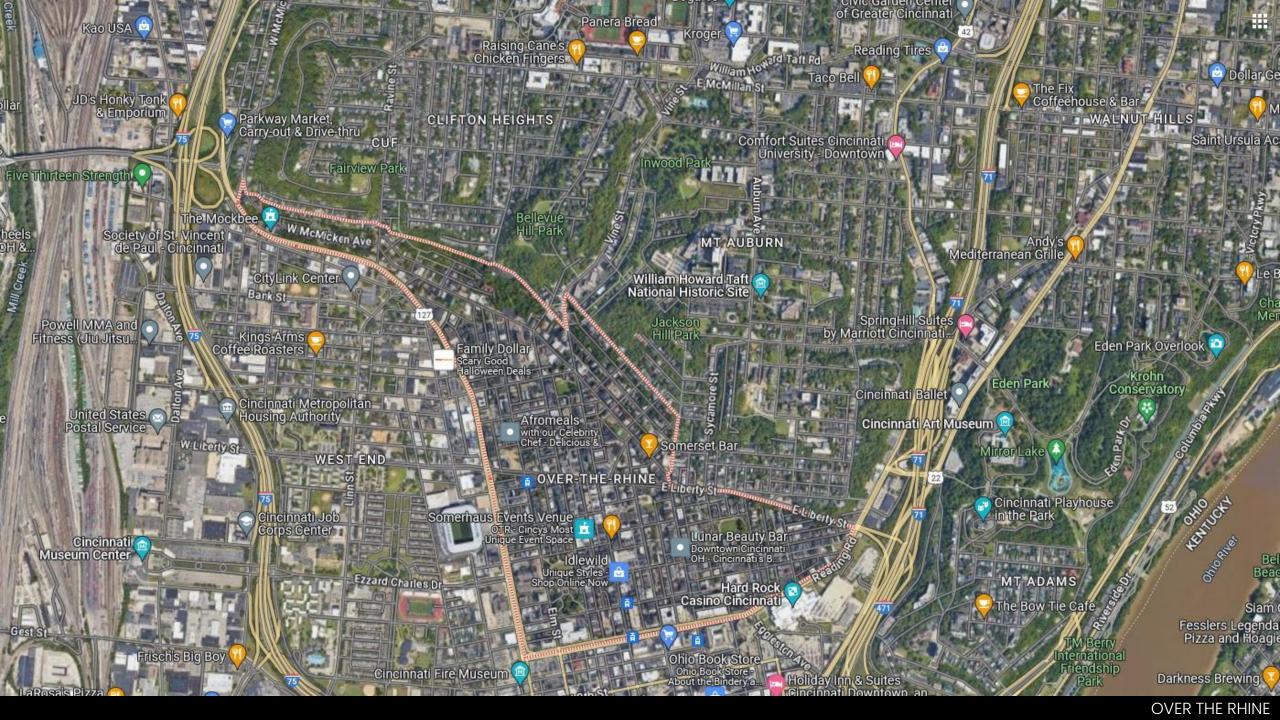
## SHPO is part of the project TEAM

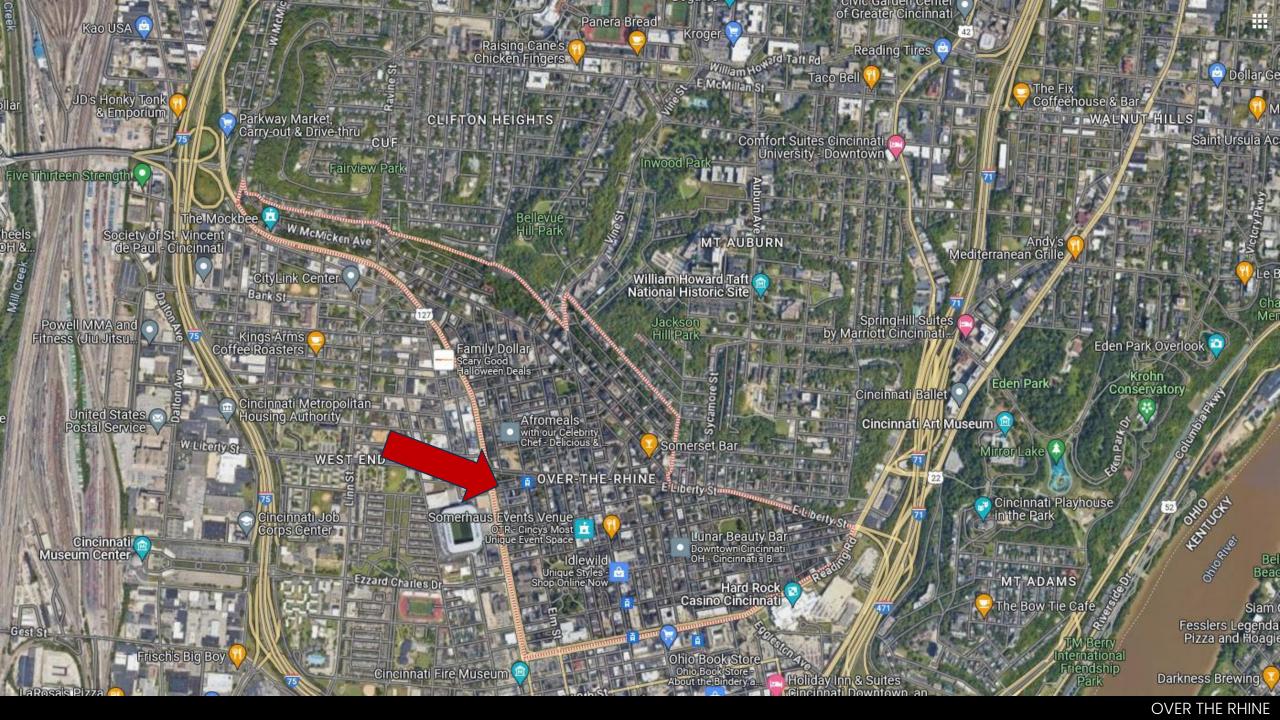
## We want your project to SUCCEED

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



## CHATFIELD COLLEGE















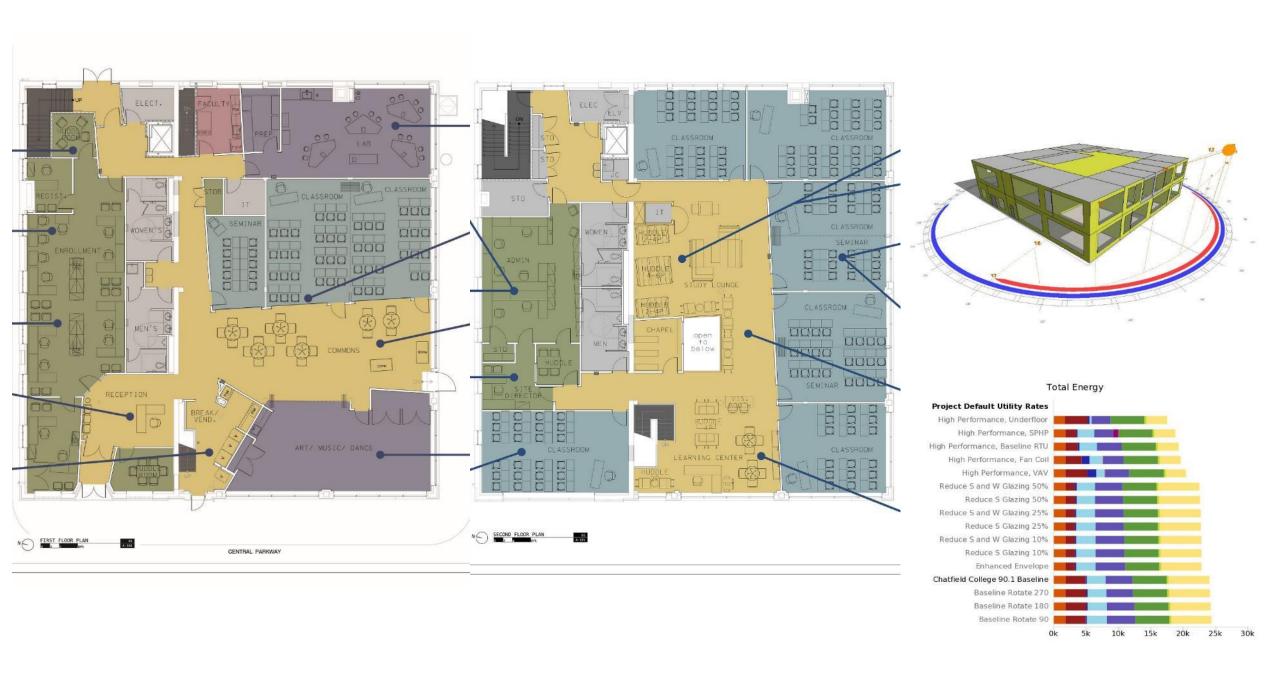












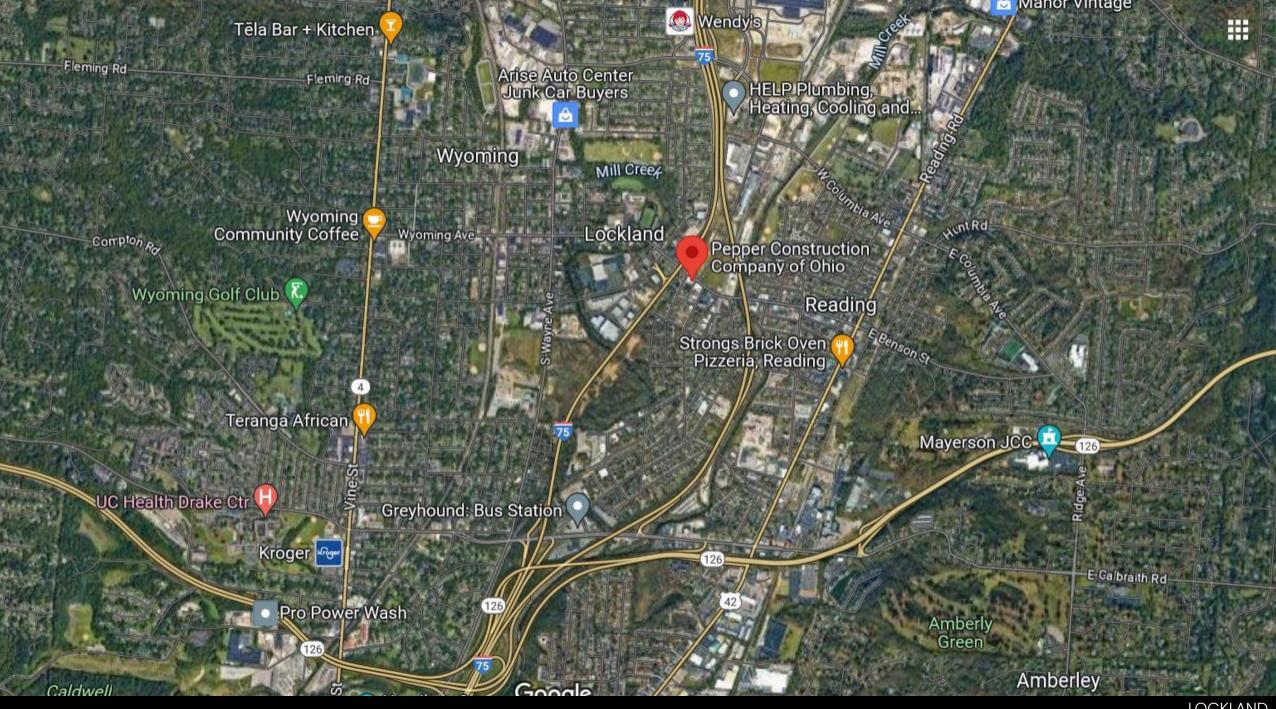


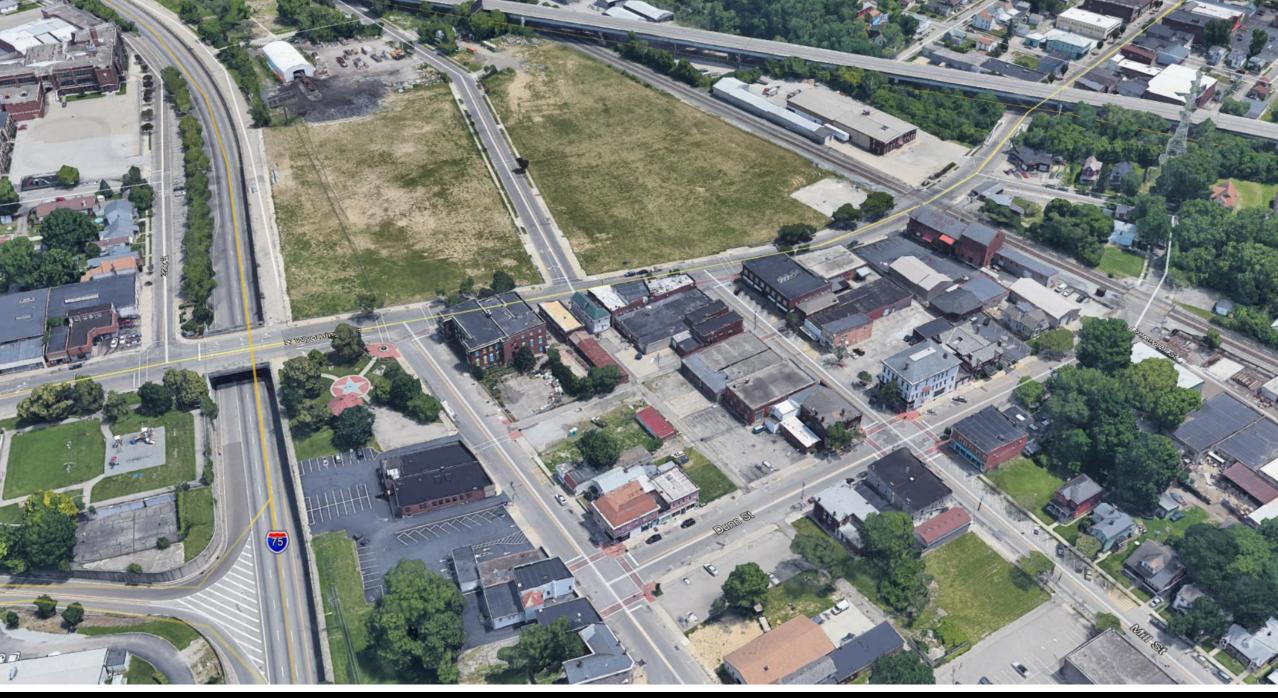




INTERIOR RENOVATION

## PEPPER OFFICE **EXISTING** CONDITIONS





**CAGIS Map** 









## ESTABLISHINGTHE 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

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.

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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#### 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 illy so as to match existing in appearance, color, texture, tooling, profile and

- 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



View of Office Building on Williams Avenue, looking northeast

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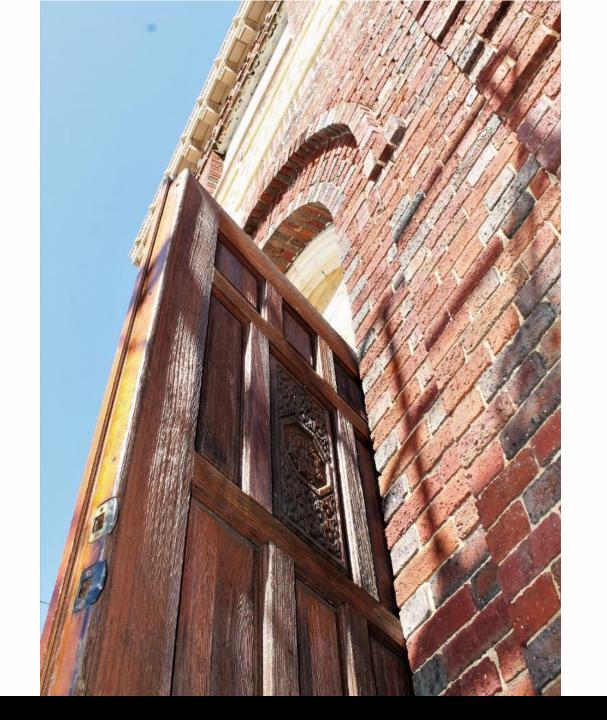
e – Located to the east of the Office Building, the brick garage dates from 1912 and its is similar, with corner quoins and dentil molding at the cornice. The garage is in good on, with a new roof. The garage bays retain multi-light wood transoms, but the doors are missing. A door stored in the garage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



Brick Garage and ornamental wrought-iron gate



south wall of garage from within Shed 1!











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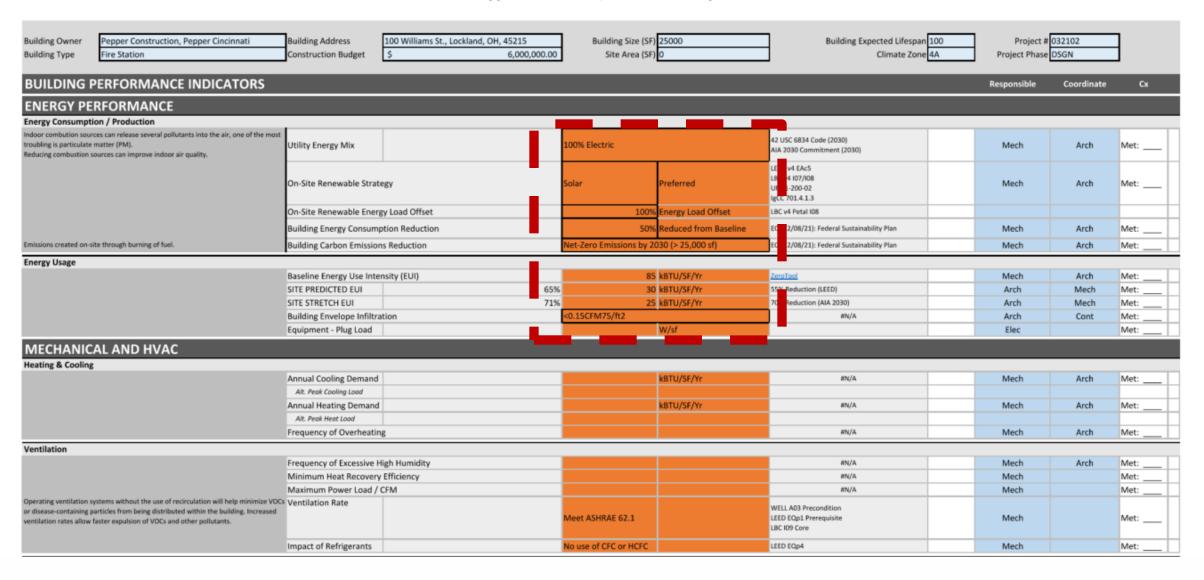
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# Pepper Construction, Cincinnati Headquarters

Building Owner	Pepper Construction, Pepper Cincinnati	Building Address	100 Williams St., Lockland, OH, 45215	Building Size (SF)	25000	Building Expected Lifespan	100	Project #	032102	1
Building Type	Fire Station	Construction Budget	\$ 6,000,000.00	Site Area (SF)		Climate Zone	=	Project Phase		1
BUILDING P	ERFORMANCE INDICATORS							Responsible	Coordinate	Cx
ENERGY PER	RFORMANCE									
Energy Consumptio										
troubling is particulate m		Utility Energy Mix		100% Electric		42 USC 6834 Code (2030) AIA 2030 Commitment (2030)		Mech	Arch	Met:
Reducing combustion sources can improve indoor air quality.		On-Site Renewable Strat	egy	Solar	Preferred	LEED v4 EAc5 LBC v4 107/108 UFC 1-200-02 IgCC 701.4.1.3		Mech	Arch	Met:
		On-Site Renewable Energ	gy Load Offset	100%	Energy Load Offset	LBC v4 Petal I08				
		Building Energy Consum	otion Reduction	50%	Reduced from Baseline	EO (12/08/21): Federal Sustainability Plan		Mech	Arch	Met:
Emissions created on-sitr	te through burning of fuel.	Building Carbon Emission	ns Reduction	Net-Zero Emissions by 20	030 (> 25,000 sf)	EO (12/08/21): Federal Sustainability Plan		Mech	Arch	Met:
Energy Usage		-								
		Baseline Energy Use Inte	nsity (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 Infiltra	ition	<0.15CFM75/ft2		#N/A		Arch	Cont	Met:
		Equipment - Plug Load			W/sf			Elec		Met:
MECHANICA	AL 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 Overheatin	g			#N/A		Mech	Arch	Met:
Ventilation										
		Frequency of Excessive H	ligh Humidity			#N/A		Mech	Arch	Met:
		Minimum Heat Recovery				#N/A		Mech		Met:
		Maximum Power Load /	·			#N/A		Mech		Met:
or disease-containing par	rstems without the use of recirculation will help minimize VOCs articles from being distributed within the building. Increased aster expulsion of VOCs and other pollutants.	Ventilation Rate		Meet ASHRAE 62.1		WELL A03 Precondition LEED EQp1 Prerequisite LBC 109 Core		Mech		Met:
						LDC 103 COVE				

# **Pepper Construction, Cincinnati Headquarters**



Building Owner Pepper Construction Cincinnati HQ

Building Address 100 Williams St, Lockland OH, 45215

Building Type Office Climate Zone 4A

Building Size 25000 SF

Project #: 032102

Construction Budget \$6,000,000.00	Occupant Load 80					
OWNER PERFORMANCE REQUIREME	NTS	Responsibility	Coordinate	Cx	Comments	
OWNER PERFORMANCE REQUIREME	NIS	Responsibility	Coordinate	C.X	Constrains	
ENVELOPE PERFORMANCE					08/19/2021 Comments	2/7/2022 Comments
Roof	R-35 / U-0.0286	emersion	CMTA	Met:	Confirmed height with Parapets	ETTERS COMMEND
					Enevelope wall options being evaluated. Still need hygrothermal analysis of final	A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as
Wall	Tuckpoint Existing	CMTA	emersion	Met:	options to be completed.	primary air barrier.
					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	30 EUI is dependent on the Alpen Winsert Plus as interior storm window option for better thermal leakage reduction.
Window	U-0.35 / SHGC-0.37	emersion	CMTA	Met:	profile storm windows. Decision of furring comes down to budget, thermal &	Locate interior storm to be sealed to the plaster because the plaster is the
					energy benefit. What is the energy impact of each wall, what is the cost shifting potential with each option?	primary air barrier. 30 EUI is dependent on using the plaster as the air barrier
Building Envelope Infiltration	< 0.15 CFM <sub>29</sub> /ft <sup>2</sup>	emersion	CMTA	Met:	Targeting 0.15 but might change to 0.4. Both infiltration rates are being assessed	A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as
				Met:	in Wall evaluations.	primary air barrier.
Air Barrier Permeance ENERGY PERFORMANCE	> 30 perm vapor diffusion	emersion	CMTA	Met:		
Baseline EUI	85 kBTU/sf/yr					
SITE PREDICTED EUI 65% Reduction	30 kBTU/sf/vr	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	CC.	Met:		
						220,000 kWh / year required, plus a little bit more to offset degredation of
						panels  O3 O4 MM of Solve Source w/ 200 MM of Booker Solve Boof also diselfest and
					Broduces ~24 EUL Anticipate 20% over production from building pand to account	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
Renewables	PV Array	CMTA	emersion	Met:	for panel degredation.	of solar canopy. Pricing based on Option 1 # of panels. What is needed from a
					To pane degreeators	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:	1	
					CO2 monitors in conference rooms. Monitoring yes. Monitoring return CO2	LEED increases the ventilation load requirements beyond ASHRAE.
					systems. Enverid system. Monitoring at Building Level. Enverid input level. Not	
Carbon Dioxide (CD2)	< 900 ppm	CMTA		Met:	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?	
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:	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	
Radon	< 0.15 Bq/L (4 pCi/L)	CMTA		Met:	code indicates low risk from Hamilton County Radon maps. Enverid does not treat	t
					this.	
Total Volatile Organic Compounds (TVOC)	< 500 μg/m3	CMTA		Met:		
INDOOR ENVIRONMENTAL QUALITY PERFORMANCE	< 40 dBA	ion		14-1-	SURG comparation days. Wood comparations around acquiring control	
Private Offices, Conference Rooms, Classrooms Open Office, Common Areas	< 50 dBA	emersion emersion		Met:	SHPO conversation done. Need conversations around acoustic control.  Evaluate pink points as potential points mitiration strategy.	
Exterior Noise Intrusion	< 60 dBA	emersion	_	Met:	Explore pink noise as potential noise mitigation strategy	
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:		The second statement and state
Daylighting - Spatial Daylight Autonomy	sDA <sub>soutson</sub> @75% Annual Hours	emersion	CMTA	Met:	Average sDA 300,50% is achieved for 75% of regularly occupied floor area	
Daylighting - Direct Solar	ASE <sub>1000,250</sub> 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 <sup>2</sup>					

**Building Address** 100 Williams St, Lockland OH, 45215 **Building Type** Office Climate Zone 4A **Building Size** 25000 **Construction Budget** \$6,000,000.00 Occupant Load 80 OWNER PERFORMANCE REQUIREMENTS ENVELOPE PERFORMANCE /19/2021 Comments R-35 / U-0.0286 CMTA emersion Meti firmed height with Parapets elope wall options being evaluated. Still need hygrothermal analysis of final A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as Tuckpoint Existing CMTA Wall emersion Met: tions to be completed. erior High performance storms (emersion to provide) (CMTA to analyze energy 30 EUI is dependent on the Alpen Winsert Plus as interior storm window option feling) Assumes fur-out of exterior walls. If no furring, need to explore slim for better thermal leakage reduction. Window U-0.35 / SHGC-0.37 CMTA Met: ofile storm windows. Decision of furring comes down to budget, thermal & emersion Locate interior storm to be sealed to the plaster because the plaster is the ergy benefit. What is the energy impact of each wall, what is the cost shifting primary air barrier. 30 EUI is dependent on using the plaster as the air barrier carbout the entire building rgeting 0.15 but might change to 0.4. Both infiltration rates are being assessed A3 Analysis, Option 1 accepted. Repair plaster and utilize plaster finish as **Building Envelope Infiltration** < 0.15 CFM<sub>79</sub>/ft<sup>2</sup> emersion CMTA Met: Wall evaluations. primary air barrier. CMTA Air Barrier Permeance > 30 perm vapor diffusion emersion Met: ENERGY PERFORMANCE **Baseline FUI** kBTU/sf/yr 85 SITE PREDICTED EUI 65% Reduction 30 kBTU/sf/yr CMTA emersion Met: imum 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: 220,000 kWh / year required, plus a little bit more to offset degredation of 93-94 kW of Solar Canopy w/ 103 kW of Rooftop Solar. Roof edge 4' offset, roof duces "24 EUI. Anticipate 20% over production from building need to account | hatch 4' offset around. 240 panels, but need to finalize vendor. Around 5,000 SF Renewables PV Array CMTA emersion Met: panel degredation. 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 LEED increases the ventilation load requirements beyond ASHRAE. CO2 monitors in conference rooms. Monitoring yes. Monitoring return CO2 ystems, Enverid system, Monitoring at Building Level. Enverid input level, Not Carbon Dioxide (CO2) < 900 ppm CMTA. used for demand control ventilation. Mostly a monitoring point, CO2 monitoring eeds recallibration every couple years. Each monitor is "\$300/monitor last 3-5 yrs (CMTA). What is integration into controls system? CMTA Carbon Monoxide (CO) < 9 ppm Explore for optimization (< 6 ppm) < 50 µg/m3 CMTA Formaldehyde 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 < 15 µg/m3 CMTA Particulate Matter 2.5 (PM2.5) Met: CMTA Met: Particulate Matter 10 (PM10) < 50 µg/m3 ypically not an issue because outside air is brought in and exhausted. Still need o test for to understand where we are at baseline. Specific for ground floor. Zip < 0.15 Bq/L (4 pCi/L) CMTA Radon Met: \_ code indicates low risk from Hamilton County Radon maps. Enverid does not treat Total Volatile Organic Compounds (TVOC) < 500 µg/m3 CMTA Met: INDOOR ENVIRONMENTAL QUALITY PERFORMANCE Private Offices, Conference Rooms, Classrooms < 40 dBA emersion SHPO conversation done. Need conversations around acoustic control. Open Office, Common Areas < 50 dBA Met: Explore pink noise as potential noise mitigation strategy emersion Exterior Noise Intrusion < 60 dBA emersion Met: Reverberation Time (RT60) 0.6 seconds (based on room type) emersion Mot: Need to run acoustics strategies and credits to ground Lighting Requirements Consider BIOS where applicable CMTA Met: emersion Average sDA 300,50% is achieved for 75% of regularly occupied floor area Daylighting - Spatial Daylight Autonomy sDA<sub>300/S0%</sub> @75% Annual Hours emersion CMTA Met: Daylighting - Direct Solar ASE3000,250 Annual Sunlight Exposure emersion CMTA Met: Annual sunlight exposure is no more than 10% Lighting - Light Levels CMTA. emersion 150 EML CRI 90 + R9 > 50 Lighting - Light Quality CMTA Met: emersion MATERIALS PERFORMANCE Embodied Carbon Baseline CO2e Ib CO2e/ft2

Project #:

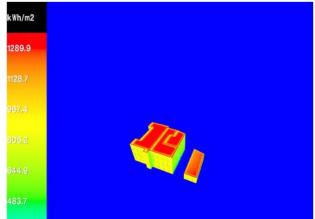
032102

**Building Owner** 

Pepper Construction Cincinnati HQ

# EARLY SUSTAINABILTY BENCHMARKING



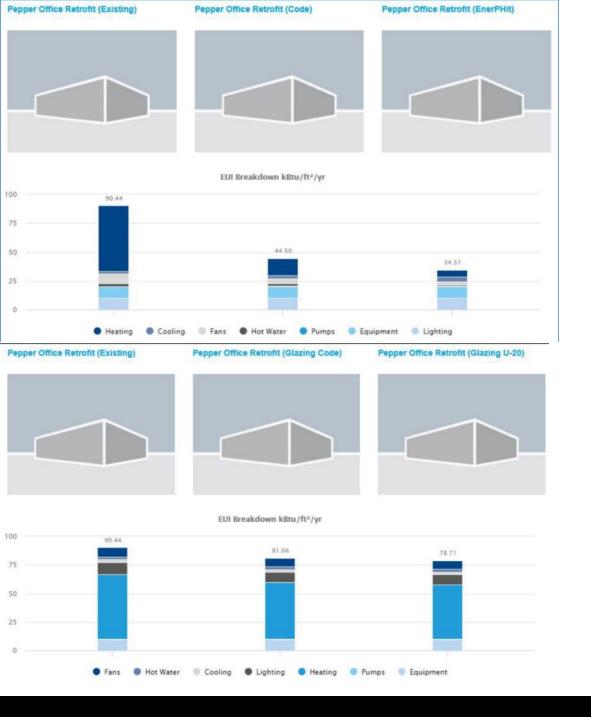


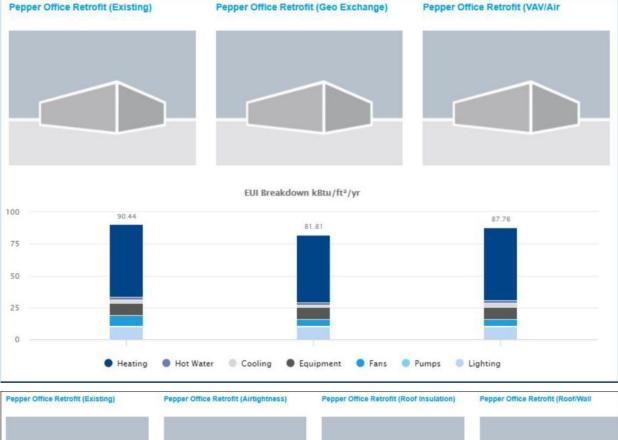
68

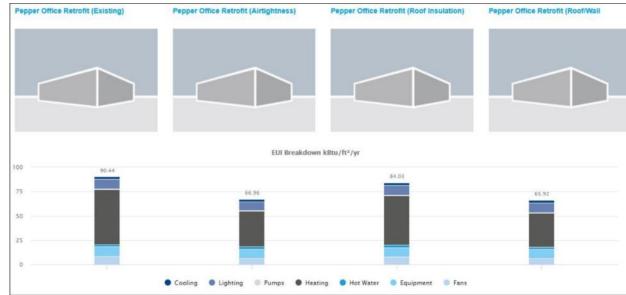
Walk Score® Somewhat Walkable 57

Bike Score®
Bikeable









# 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 (ft²)	sDA Results	sDA Score	ASE Results	ASE Score	ASE Met?
Default Floor	7,245.5	0% 50%	11.57%	0 hr 250 hr	0.69%	Yes
Default Floor	7,114.5	↑ N	63.76%	↑ N	12.75%	Explanation:
Default Floor	7,263.0	↑ N	38.51%	↑ N	6.84%	Yes

Option 2 Total: 0 points

LEED v4.1 Option 2 40.26% compliant

ALL

FLOOR 1

FLOOR 2

FLOOR 3

Name	Area (ft²)	Results (9AM)	Results (3PM)	Area (ft²) With Daylight Illuminance Levels Between 300 and 3000 Lux
Default Floor	7,245.5	0 300 3,000 lux  N 628.0 103.0	0 300 3,000 lux	1,225.74 (16.92% compliant)
Default Floor	7,114.5	↑ N 628.0 103.0	↑ N 628.0 103.0	4,557.34 (64.06% compliant)
Default Floor	7,263.0	↑ N 628,0 103,0	↑ N 628,0 0 103,0	2,934.41 (40.40% compliant)

# **BENCHMARKS**

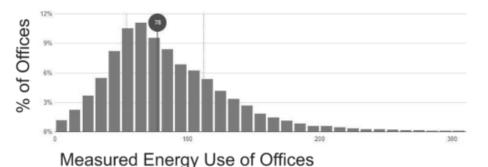
# WHERE DO WE NEED TO BE?

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.

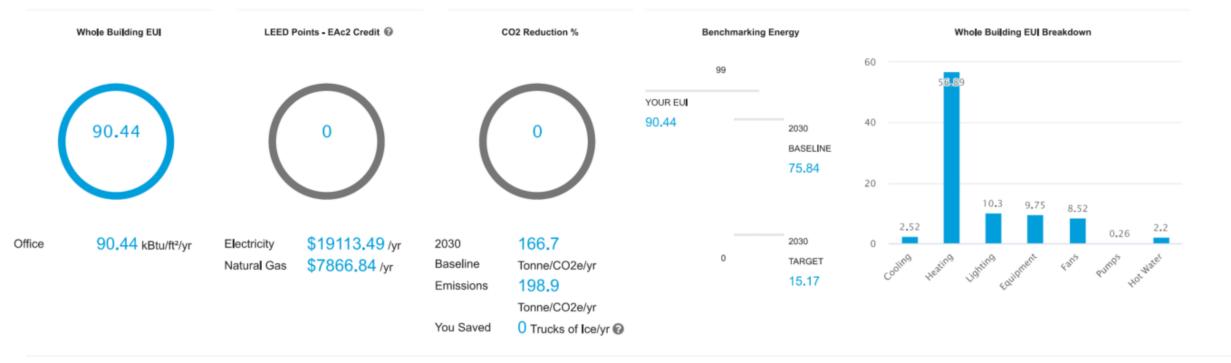
10 % Glare

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



# 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 EUL You can reduce your lighting load by reducing your lighting power density reducing your appliance power and having daylight and occupancy density in the Engineering Inputs. sensors in the Engineering Inputs.

#### Equipment

Your equipment load contributes to 10.78% of the total EUI. You can reduce your equipment load by

#### Hot Water

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

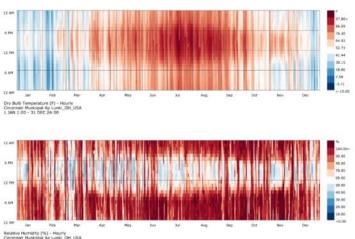
#### Pumps

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.

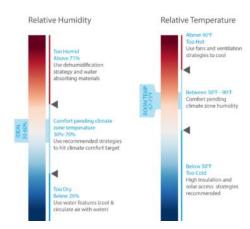
### CLIMATE ANALYSIS

CLIMATE ANALYSIS RADIATION BY SKY SEGMENT

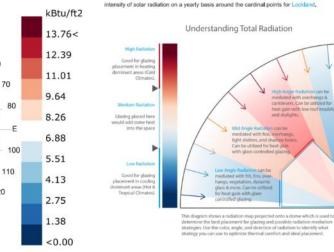
#### RELATIVE TEMPERATURE & HUMIDITY



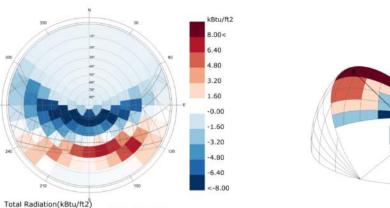
#### This graph shows the outdoor comfort in Lockland using the yearly range of temperatures and humidities.

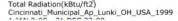


# This graph maps the radiation onto a sky dome to show the intensity of the direction and

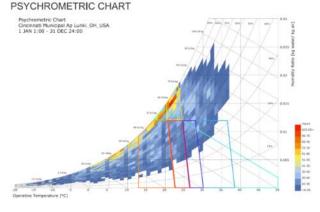


# **CLIMATE ANALYSIS** RADIATION BENEFIT

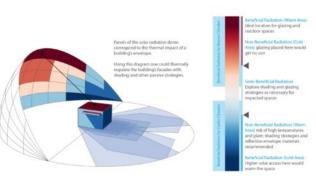




# **CLIMATE ANALYSIS**



#### **Understanding Radiation Benefit**





EVAPORATIVE COOLING

2.18%	THERMAL MASS + NIGHT VENTILATION
2.05%	OCCUPANT USE OF FANS

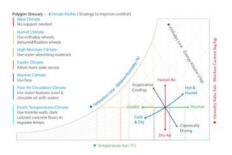
1.93%

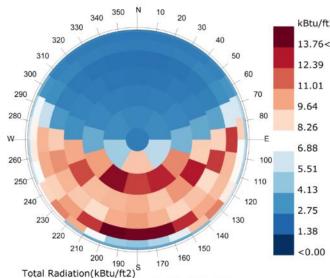
21.55%	INTERNAL HEAT GAIN
5.02 ··	

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

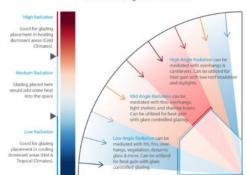




Cincinnati\_Municipal\_Ap\_Lunki\_OH\_USA\_1999

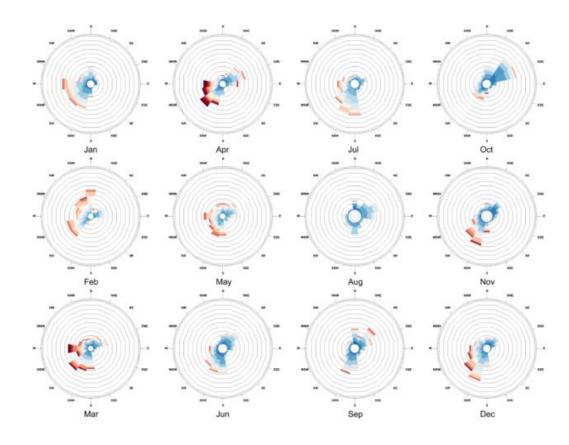
1 JAN 1:00 - 31 DEC 24:00

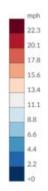




# **CLIMATE ANALYSIS**

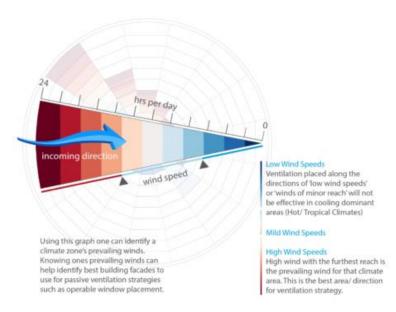
# WIND



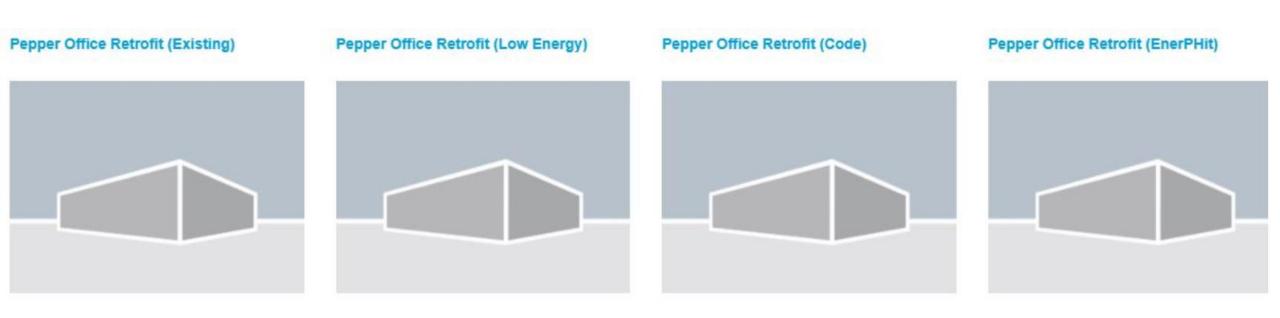


The diagrams show the wind direction and intensity coming to the site. The number of hours are reflected by the size of the rose, and the intensity is expressed in colors as shown in the legend.

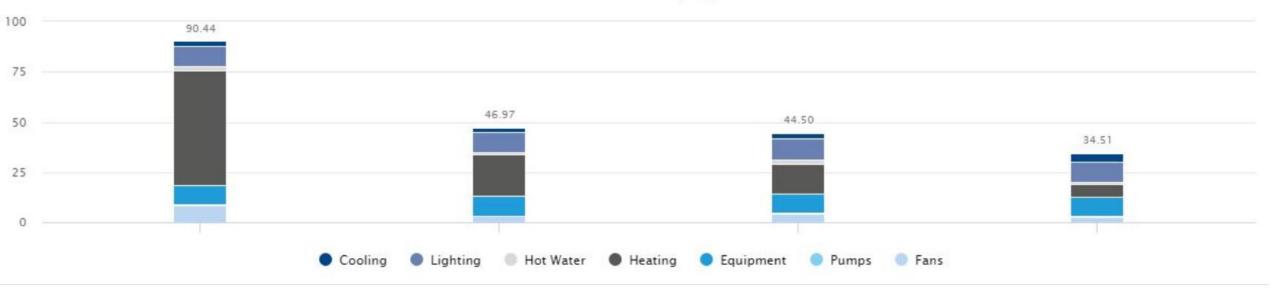
# Understanding the Wind Diagram



© 2021 Cove Tool, Inc. Patent Pending.







# EARLY DESIGN-BASED MODELING

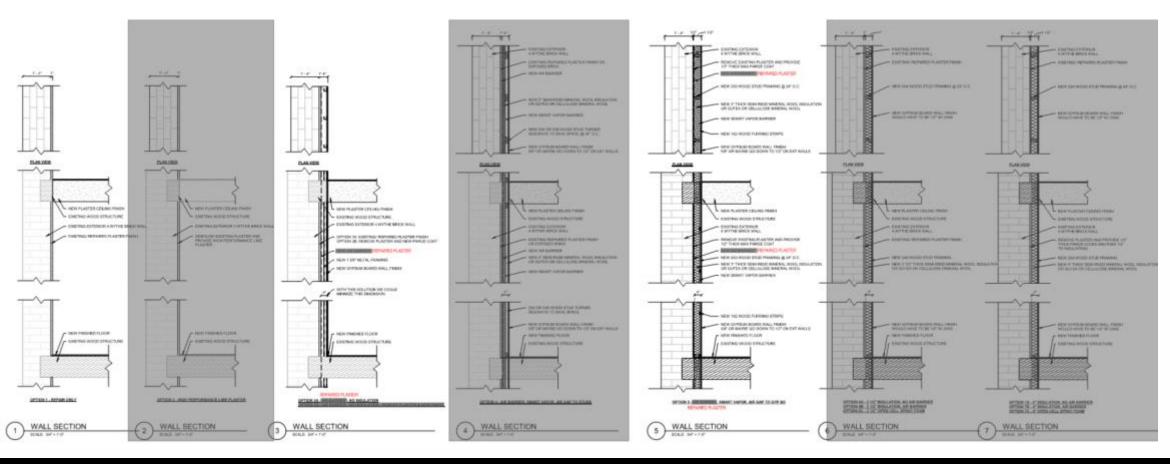
#### INSULATION OPTIONS

- TEMPOR MARINA, MOST, ROCKMOST, ROCKESHIR-48
   TEMPOR MARINAT LICISEL MERCHES CUT TO MER
- + SUPER PROMODURE + SARES RELIGION ENGIGINE PRINTER PRINTER PER SUPER PRINTER PRINTER
- TOUTION THERMOSILES
   MOST BLOOD FOR SAME OFFI THE INSECTION SAME AND THE LISTERLAS SHOP THEORY
   MOST BLOOD FOR SAME OFFI THE INSECTION SAME OFFI THEORY
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WART VAPOR BARRIER
4/5 MTELO PLOS

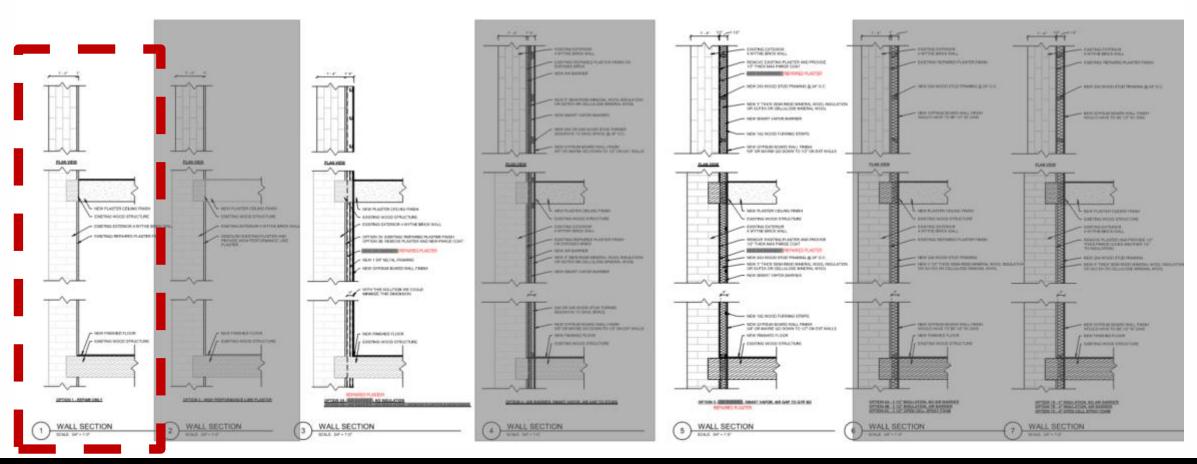


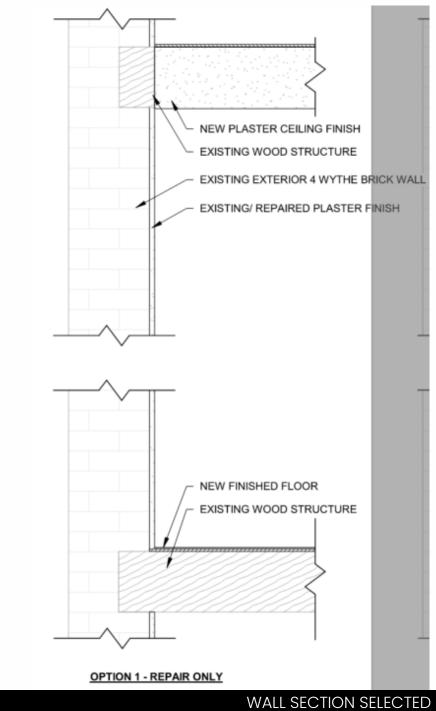
#### INSULATION OPTIONS

- TEMPOR MARINA, MOST, ROCKMOST, ROCKESHIR-48
   TEMPOR MARINAT LICISEL MERCHES CUT TO MER
- + SUPER PROMODURE + SARES RELIGION ENGIGINE PRINTER PRINTER PER SUPER PRINTER PRINTER
- TOUTION THERMOSILES
   MOST BLOOD FOR SAME OFFI THE INSECTION SAME AND THE LISTERLAS SHOP THEORY
   MOST BLOOD FOR SAME OFFI THE INSECTION SAME OFFI THEORY
   MOST MOST THE CONTRACTOR OFFI THEORY
   MOST MOST THEORY OFFI THEORY
- RAVISCOC HOOS (DOMES PACK)
   NA APRIL SICK. RESID'S PROSED'S PRINA (C.102)
   NAPOR OPCH (NO PERM TAXABLE (CETES))
- OPENICELL SPEAK FOAKE HEAPTH (LASSE PLAS 1. MERITS AND MELT) AND (1) POLITICAL 2. DEF PRINCE OF THESE

ART SAMPLE IN 475 YESTONIA

WART VAPOR BARRIER
4/5 MTELO PLOS





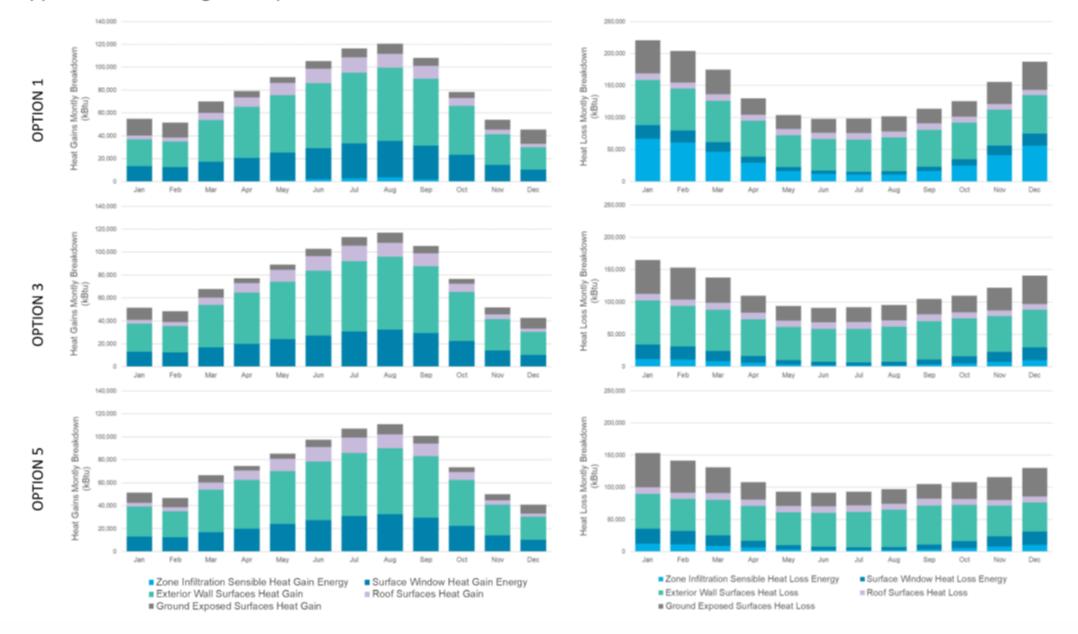
			Exterior \	Wall Improven	nent Options			
Date:	10/27/2021	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
	Description	Repair Only	High Performance Lime Plaster	Air Barrier, No Insulation	Air Barrier, Insulation, Smart Vapor Barrier	Air Barrier, Insulation, Smart Vapor Barrier	No Air Barrier, Insulation	Air Barrier, Insulation
mmediate "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						
	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 nside face of brick high while improving air infiltration.  - Allows integreation of high performane nterior storms into air arrier.	- 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	<ul> <li>High Risk of trapping moisture and condensation within the insulation area.</li> <li>If there is a leak or interior Brick issue, it is hidden.</li> </ul>	- 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			

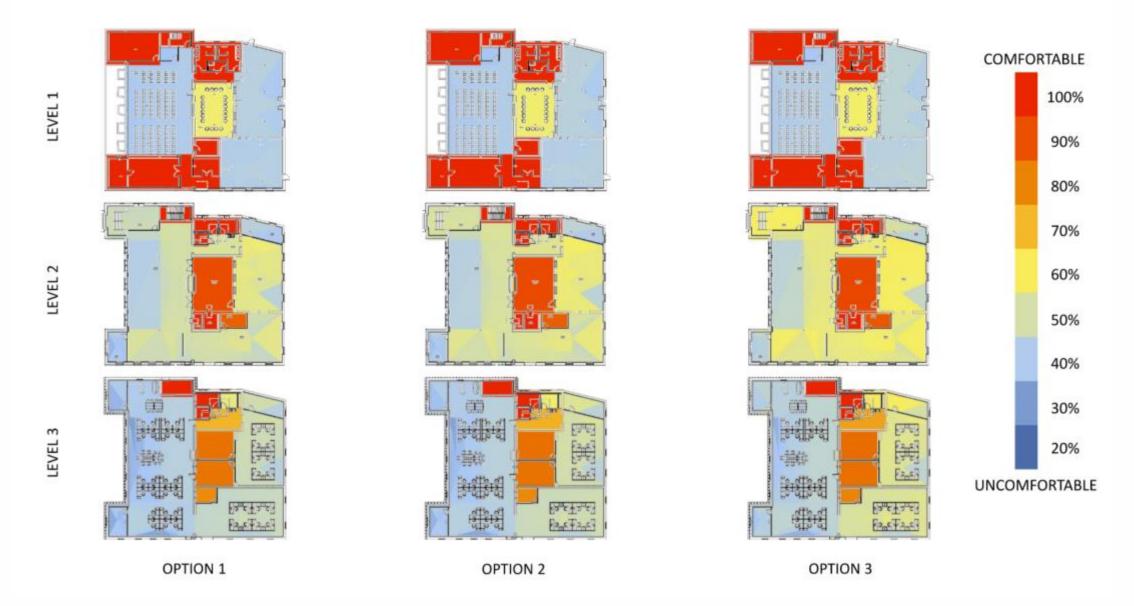
	Exterior Wall Improvement Options									
ate:	10/27/2021	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7		
	Description	Repair Only	High Performance Lime er	Air Barrier, No In	Air Barrier, Insulation, mart Valer	Air Barrier, Insulation, apor Ba	No Air Barrier, Insulation	Air Barrier, 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



# Appendix E – Thermal Comfort

PERCENT OF OCCUPANTS SATISFIED/COMFORTABLE BY ASSEMBLY TYPE



# Additional Efficiency Measures

# Lighting:

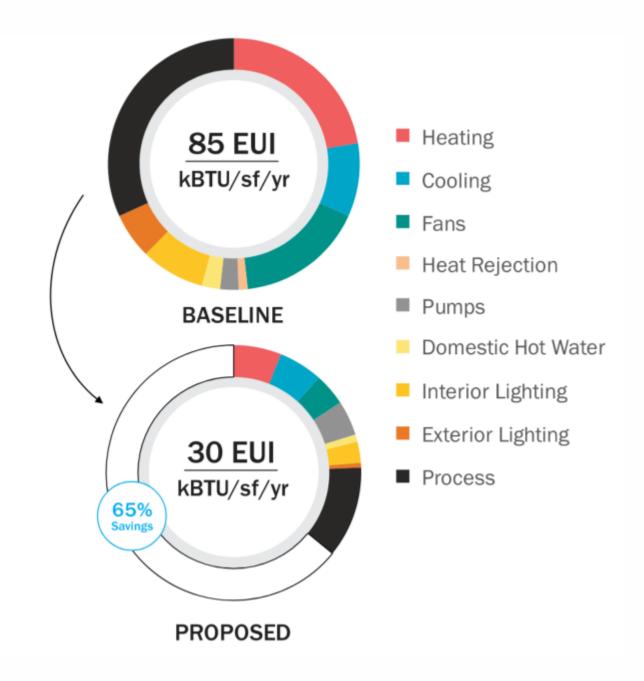
- 0.35 W/sf
- Interior and Exterior Lighting Controls

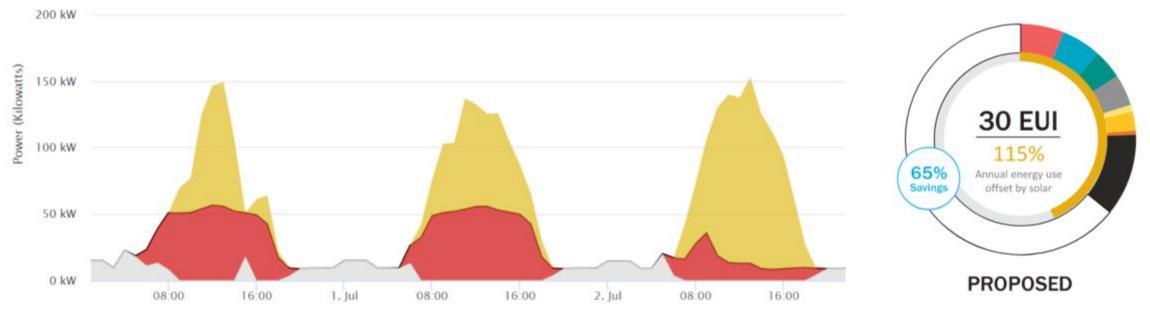
# Plug Loads:

- Laptop Docking Stations
- Energy Star Appliances
- No bevi Machines

# DHW

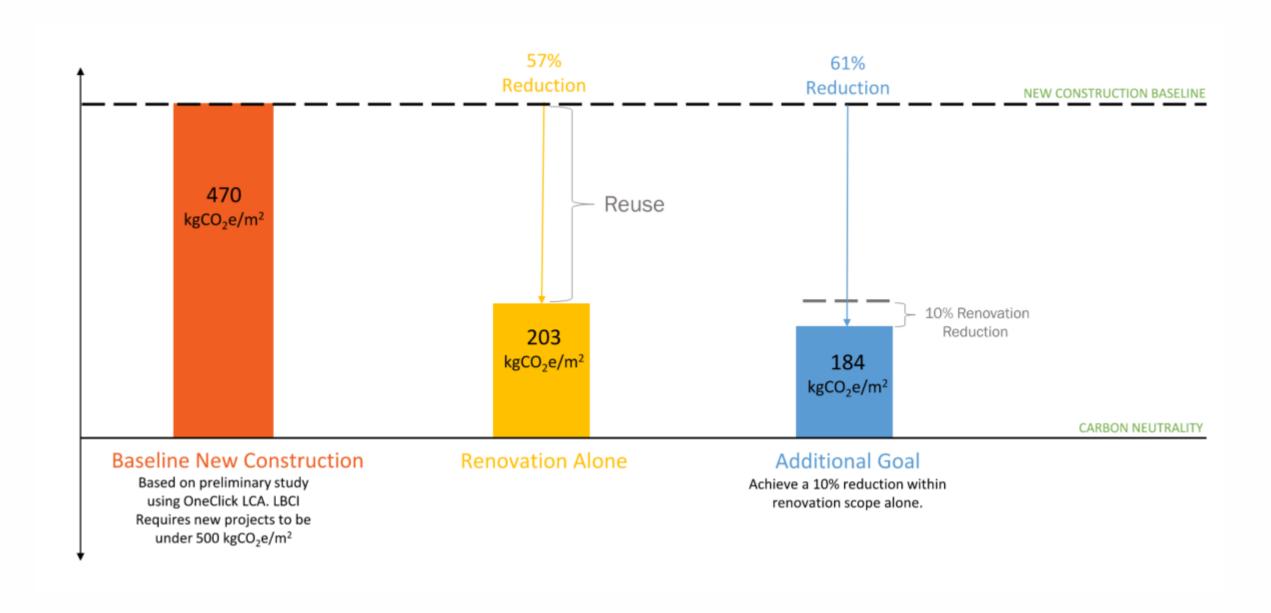
- Low Flow Fixtures
- Heat Pump DWH Heaters



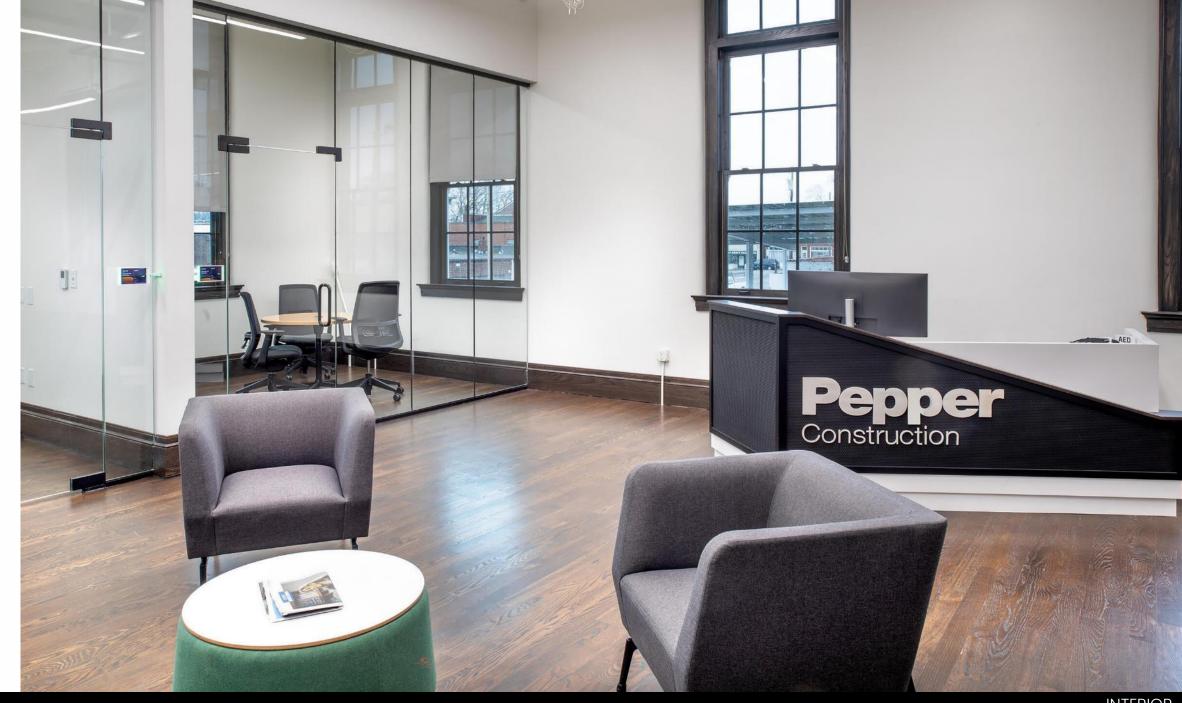


Total Electric Load
 PV Curtailed Generation
 PV Serving Load
 Grid Serving Load

**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 onor off-site using renewables that represent additionality" - WLCN, LETI, RIBA

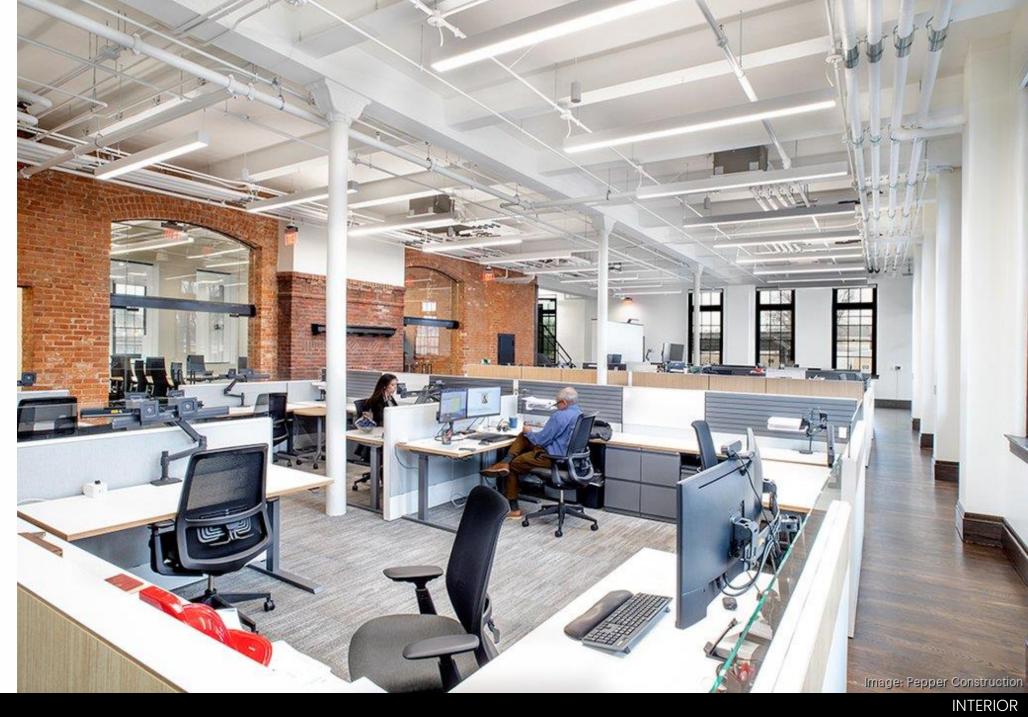


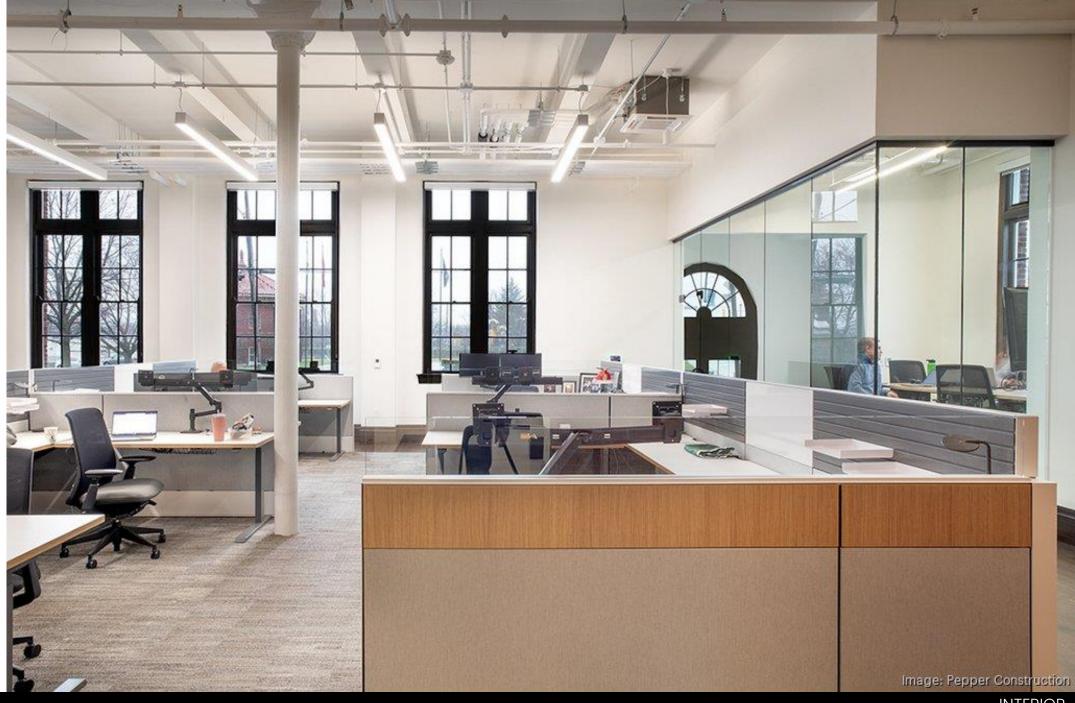
# FINISHED HISTORIC RENOVATION

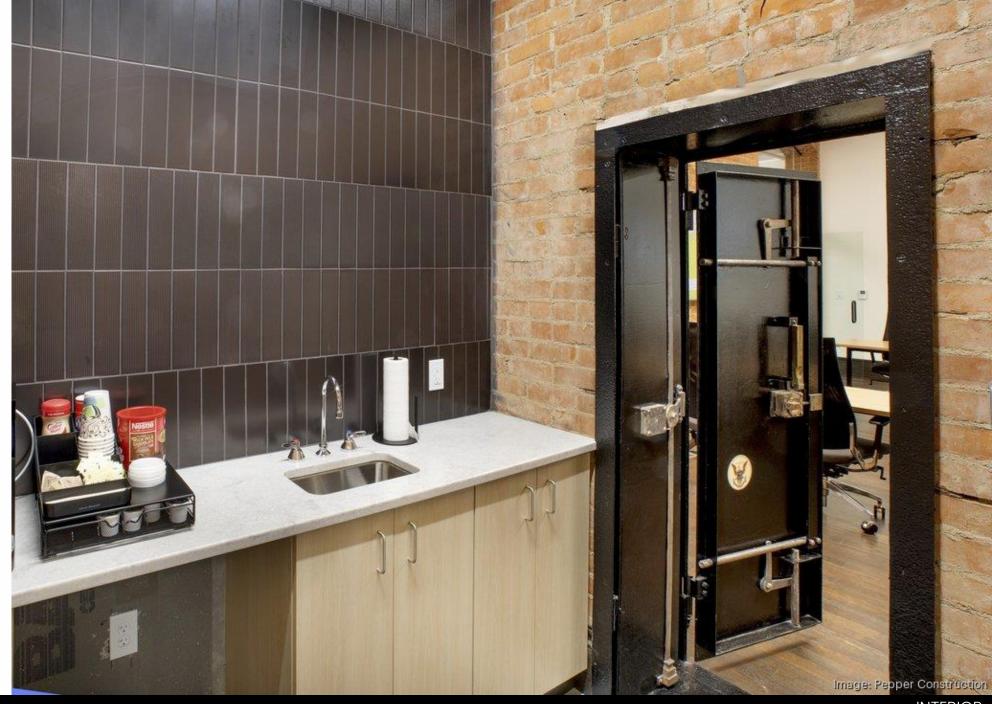












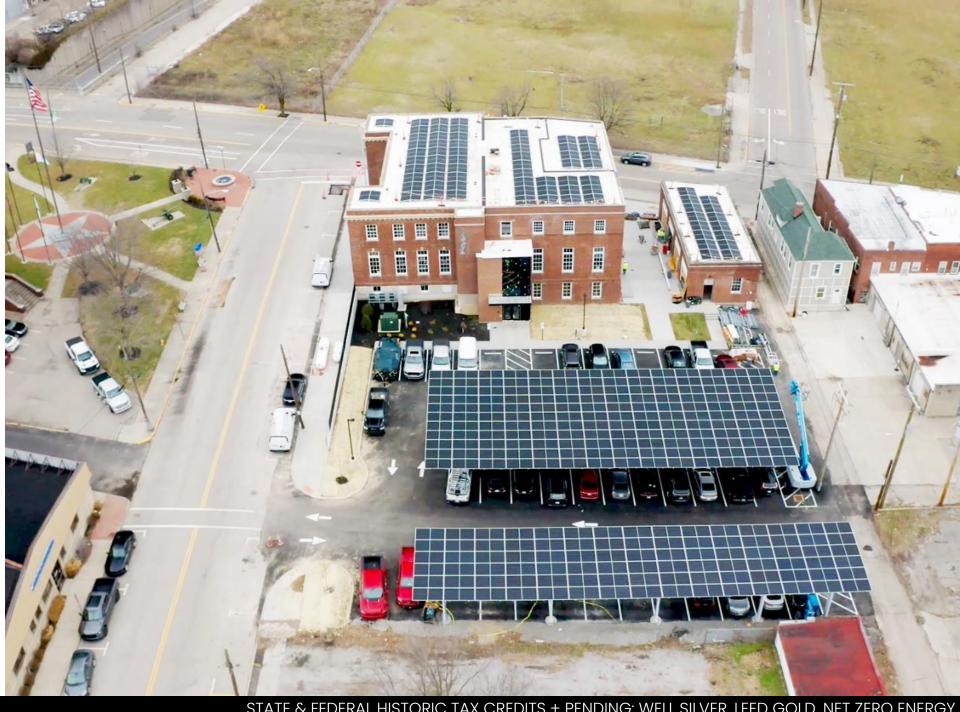
INTERIOR













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



Standards for Rehabilitation >

Regulatory for the Tax Incentives Program



# Before You Apply>

Information to review before preparing an application



Planning Successful Rehabilitations>

Guidance on common rehabilitation treatments



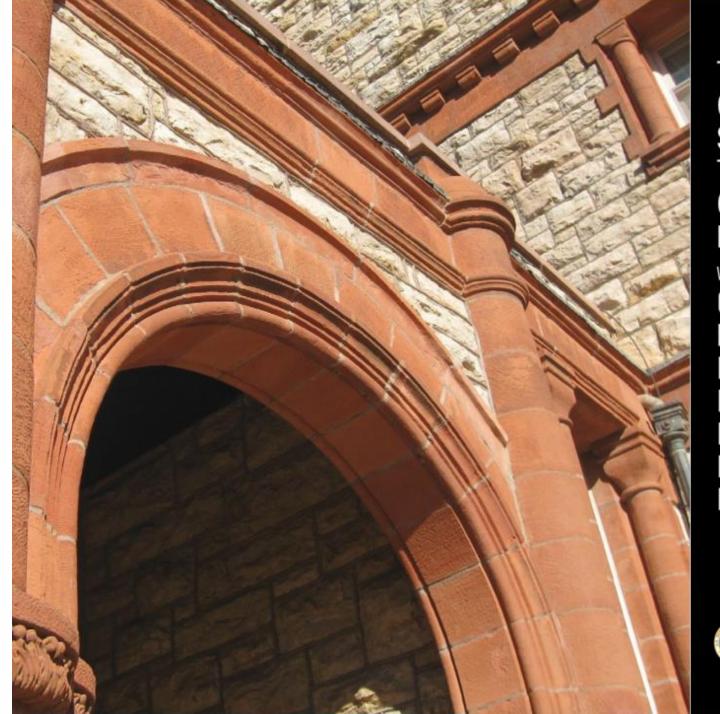
# Application Process>

Application forms, documentation requirements, and fees



#### IRS Information >

Links to program information provided by the IRS



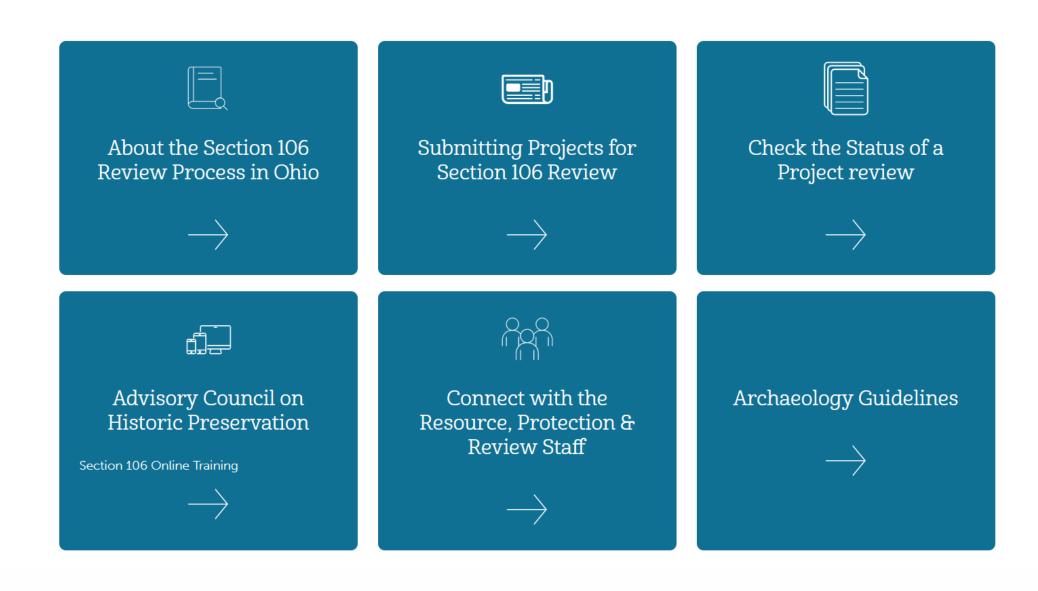
THE SECRETARY
OF THE INTERIOR'S
STANDARDS FOR
THE TREATMENT
OF HISTORIC
PROPERTIES

WITH

GUIDELINES FOR PRESERVING, REHABILITATING, RESTORING & RECONSTRUCTING HISTORIC BUILDINGS



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.



# **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