

An abstract background featuring warm, textured brushstrokes in shades of yellow, orange, and cream. There are several small, colorful splatters (pink, red, yellow) scattered across the left side of the image.

Historic Barracks to Modern Homes:

10th Cavalry Apartments at Fort Ethan Allen

2026 Downtown & Historic Preservation Conference

HISTORIC BARRACKS TO MODERN HOMES

10th CAVALRY APARTMENTS

Colchester, Vermont

2026 Downtown &
Historic Preservation
Conference



Presenters

Kirsten Merriman Shapiro
Champlain Housing Trust
kirstenmerrimanshapiro@champlainhousingtrust.org

Britta Tonn
VHB
btonn@vhb.com

Shawn Brennan
Freeman French Freeman
sbrennan@fffinc.com

Sandra Silla
Evernorth
ssilla@evernorthus.org



Early 20th century postcard of Fort Ethan Allen.
Courtesy of UVM Special Collections.

Historic Barracks to Modern Homes

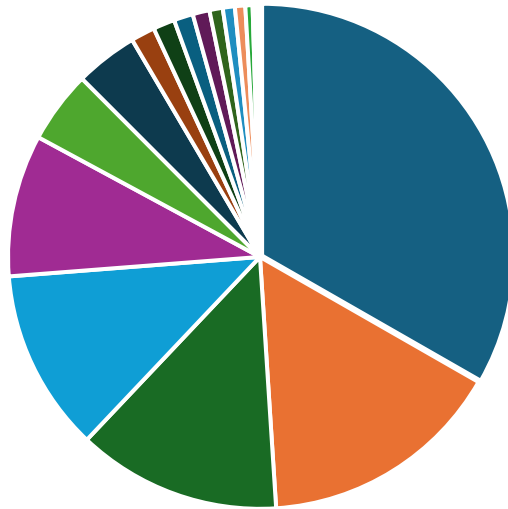
Evernorth and Champlain Housing Trust (CHT) share a commitment to serving low- and moderate-income people through the creation and stewardship of permanently affordable homes and related community assets. Together we embarked on a journey to construct 10th Cavalry Apartments turning the historic barracks into modern homes.

10th Cavalry Apartments are 65 new mixed income affordable homes developed by CHT and Evernorth in the Fort Ethan Allen Historic District. Historic Consultation by Vanasse Hangen Brustlin (VHB), designed by Freeman French Freeman, and built by Engelberth Construction.

- 3 historic buildings on the National Register of Historic Places
- \$2M+ Lead, PCB, PAH and Asbestos remediation in building material and soil
- 18 Sources of funding (Historic and Low-income Housing tax credits, loans, grants, energy incentives)
- 2 Co-Developers
- \$32+M budget - \$5M Historic Tax Credits and \$10.7M Low-Income Housing Tax Credits
- 2 wayside exhibits and interpretation in each building
- 8 years of patience
- 1 visit from the National Park Service

Key Partnerships

\$32,301,096



- LIHTC Equity
- VHCB Loan
- VHFA Loan
- HOME-ARP Loan
- Deferred Developer Fee
- CHT/NeighborWorks Loan
- VEDA-EPA Brownfield Loan
- VT Gas/Efficiency VT
- CCRPC
- HTC Equity
- ARPA Loan
- VT ACCD Brownfield Grant
- VT ACCD CRRP Grant
- VHFA VHIF Loan
- 3E Thermal
- VHCB Lead Loan
- SMC Reimbursement
- GP Capital Contribution

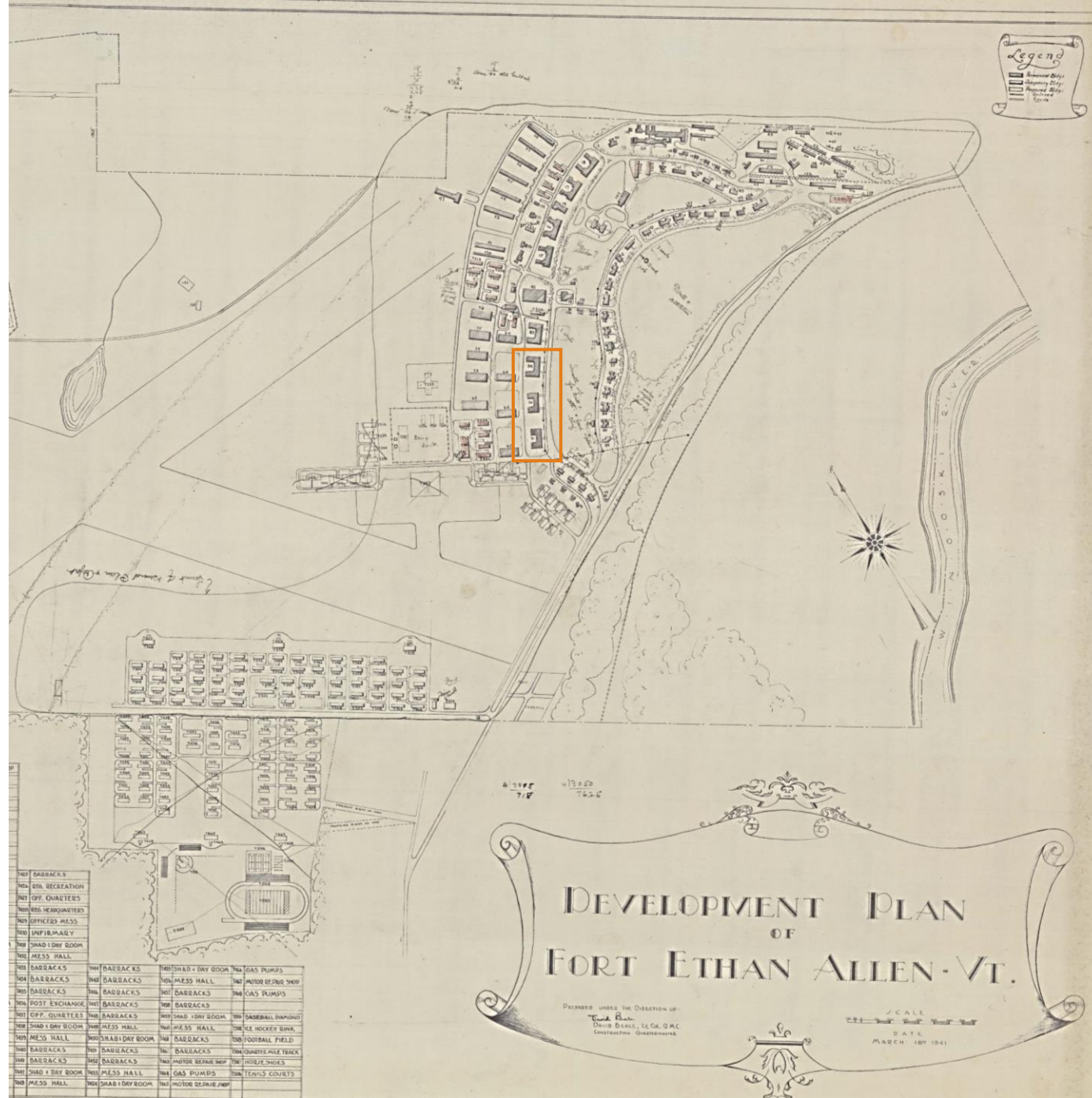
- Co-Developers
 - Evernorth
 - Champlain Housing Trust
- The Team: Architect, Consultants & Construction Manager
- Brownfields
 - Chittenden County Regional Planning Commission
 - Agency of Commerce & Community Development Brownfields
 - Vermont Economic Development Authority
 - Department of Environmental Conservation
- Saint Michaels College
- Town of Colchester
- Division for Historic Preservation
 - Local lovers of Fort Ethan Allen history
- Efficiency Assistance
 - Efficiency Vermont
 - Vermont Gas systems
 - 3E Thermal
- Other Funders: Vermont Housing & Conservation Board, Vermont Housing Finance Agency, Burlington Housing Authority

Adaptive Reuse of Historic SMC Dormitories

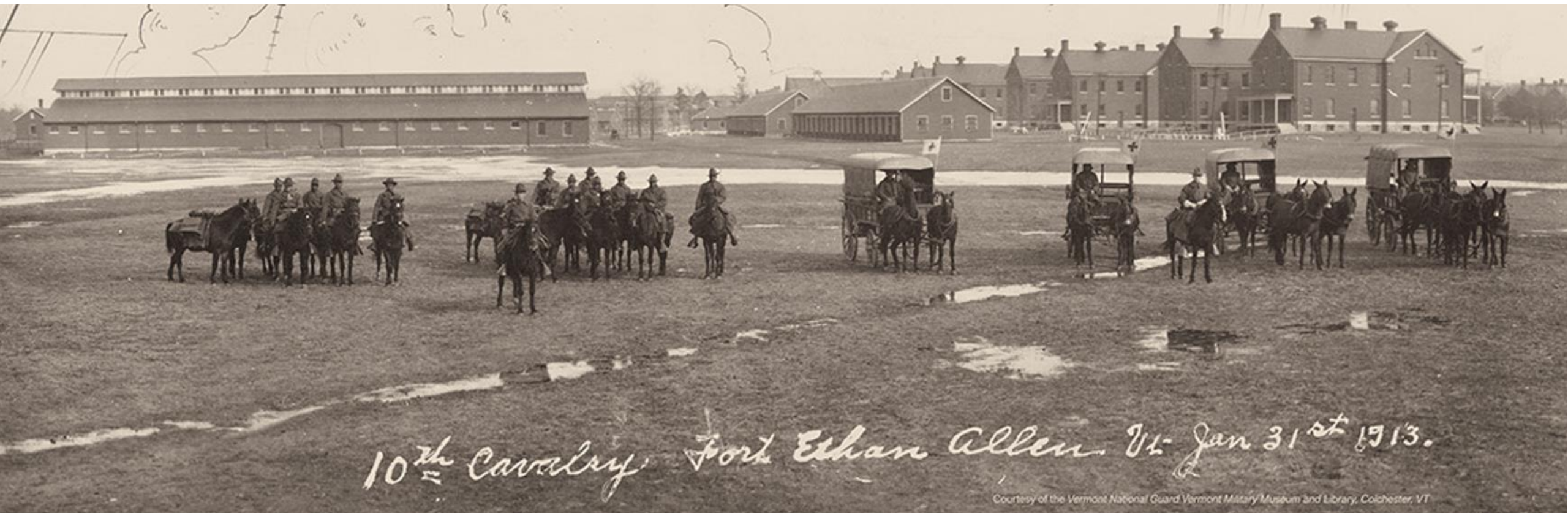
- Conversion to affordable residential housing
- Preservation of historic character
- Modern use integrated into historic building



- 1894 - 1960
- Design & plan dictated by function, military hierarchy, & efficiency
- Standardized design from the Office of the Quartermaster General



10th U.S. Cavalry, 1909-1913



10th U.S. Cavalry

- One of the first peacetime U.S. Army Regiments of all Black soldiers after the Civil War
- Popularly known as the “Buffalo Soldiers”
- Fought in the American Indian Wars, the Spanish-American War, the Boxer Rebellion, and the Philippine-American War
- Highly decorated and nationally famous for their bravery and professionalism
- Fort Ethan Allen was a peacetime assignment – mixed but generally favorable reception in VT

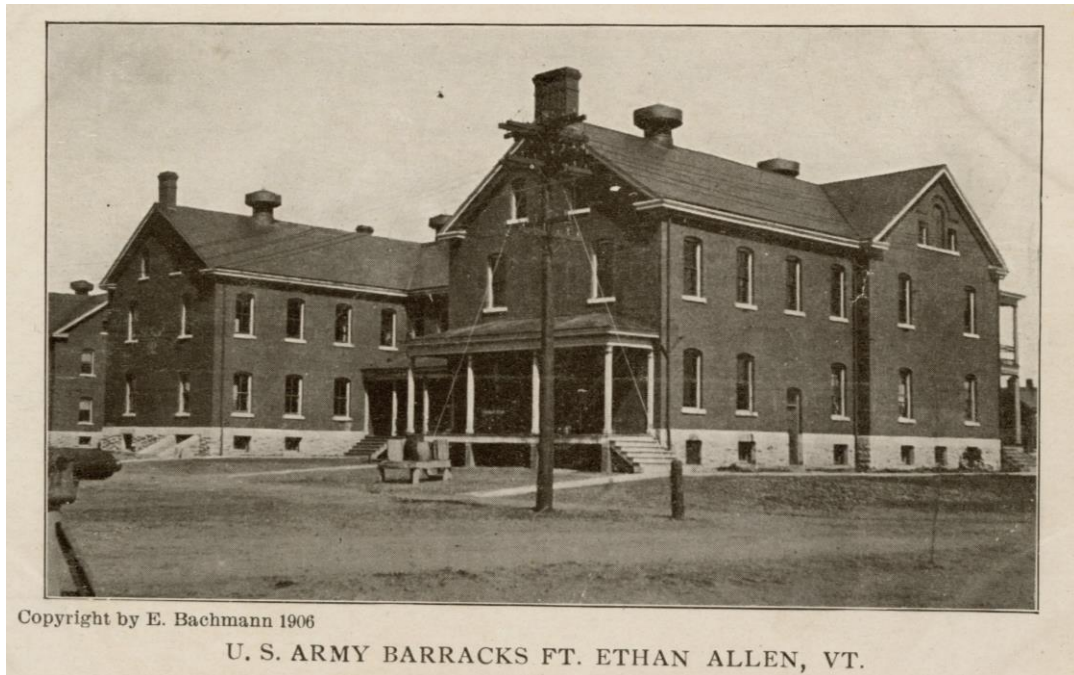
“Vermont was a delightful place to live, and our stay among the abolitionist was a revelation to many in this so called ‘land of the free and home of the brave.’”

– Sgt. Vance Hunter Marchbanks



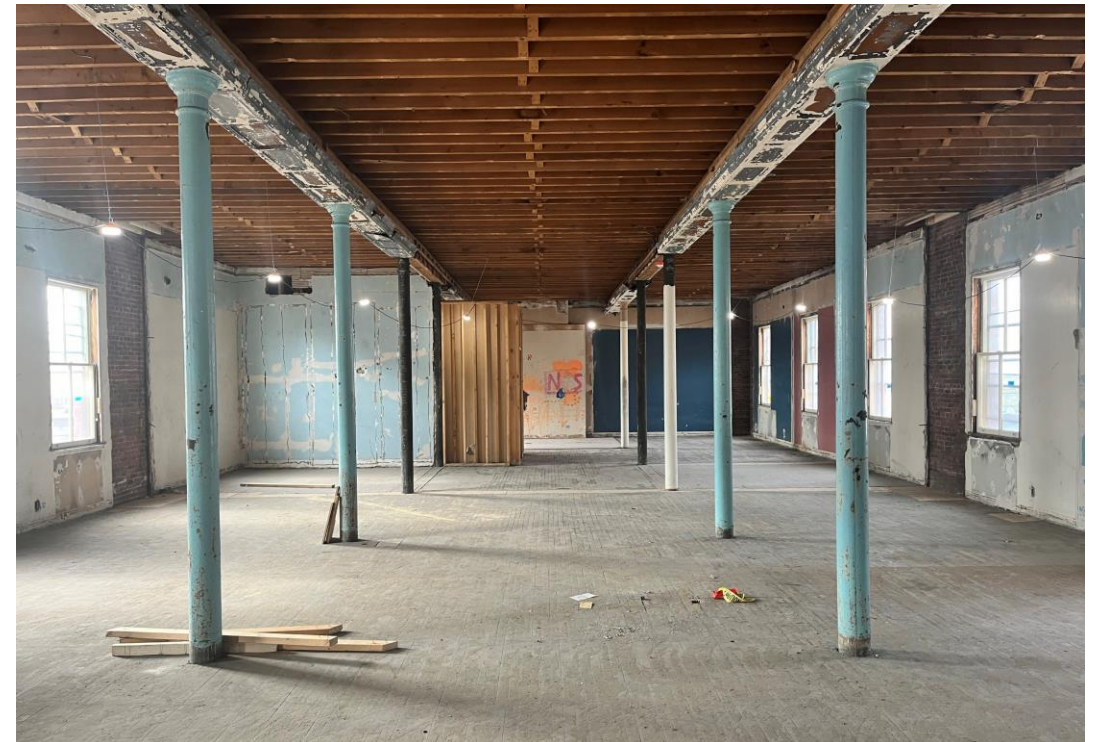
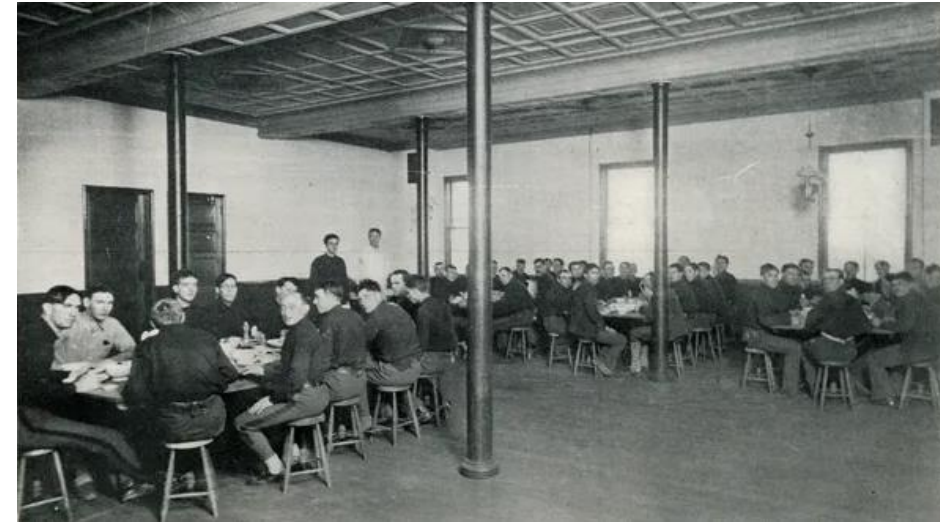
Cavalry and Artillery Barracks

- Standardized Colonial Revival design
- Load-bearing brick on granite foundation
- Local materials and design expertise
- Living & dining quarters for enlisted men
- Project included two identical artillery barracks and one double cavalry barracks



Barracks Interiors

- Bunk rooms, mess halls, & lounges
- Large volumes of open space supported by columns
- Decorative ceilings & ample windows
- Military hierarchy



Character Defining Features

- Two Artillery barracks almost identical
- Double Cavalry barracks similar but slightly higher style
- U-shaped form with rear porches and entrances
- Exterior: slate roof, granite foundation & sills, brick construction, cornice, segmental arch lintels, mushroom vents
- Two-story front porch with Tuscan columns
- Palladian windows in gables
- Pressed metal ceilings on first floor – revealed historic arrangement of spaces
- Grid of structural iron columns
- Wood windows in Double Cavalry barracks
- Chair rails



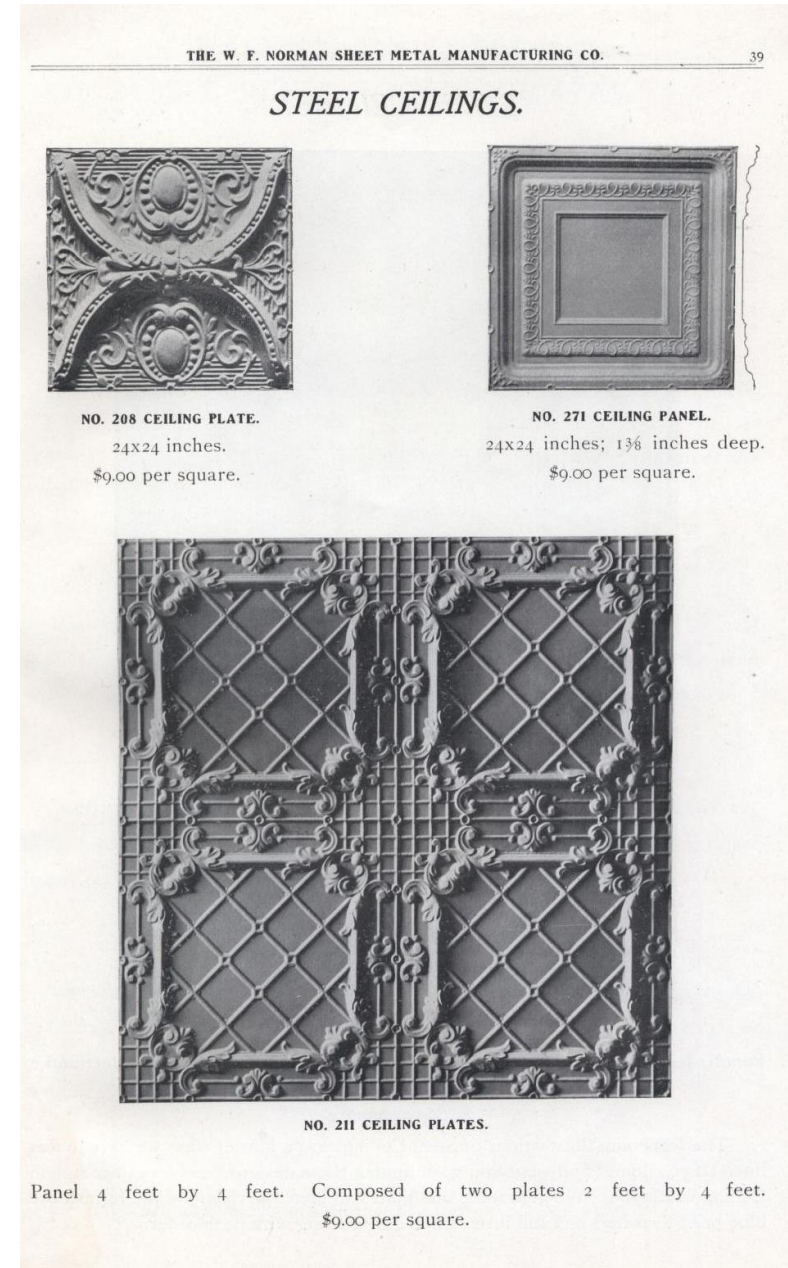
Secretary of the Interior's Standards for Rehabilitation

- Retain / replicate pressed metal ceilings
- Retain historic volume of interior spaces
- Retain grid of iron columns
- Masonry cleaning & repairs
- Roof repairs & mushroom vents
- Porch rehabilitation – repair / rebuild
- ADA accessible entrances & ramps
- Historic wood window restoration & storms
- Energy efficiency
- Code compliance
- Mechanical systems



Pressed Metal Ceilings

- Retain & repair historic decorative beam wrap
- Retain & repair historic ceilings in lobbies & common areas
- Replica / new ceilings in living units – W. F. Norman & Co.



Porch Rehabilitation & ADA Accessibility

- Front porches columns replaced
- Rear porches rebuilt
- Ramps access rear entrances – compatible design



PROJECT DESIGN TENTH CAVALRY APARTMENTS

Building Information Modeling





Freeman French Freeman Inc. | Architecture • Planning • Interiors
81 Maple Street • Burlington Vermont 05401
802-864-6844 • www.fffinc.com

Fort Ethan Allen – Four Buildings Summary

Built in 1904. All are listed as contributing buildings to the Fort Ethan Allen Historic District.

Hamel, Purtill and Dupont were originally Barracks. Linnehan was originally a Post Exchange.

	Hamel Hall	Purtill Hall	Dupont Hall	Linnehan Hall
Construction Type	IIIB	IIIB	IIIB	IIIB
Total SF L1+2	15,924 sf	15,924 sf	20,254 sf	10,328 sf
SF per floor	7,962 sf	7,962 sf	10,127 sf	5,164 sf
Exterior				
Exterior Stairs	Fire escape W+E	Fire escape W+E	Fire escape W+E	Stair tower addition, south side
Exterior Ramps / Primary Means of Egress			Existing Ramp on north side to L1	
Fire Rating – Stairs	Will require 1-hr stairs for egress.			
Porches	L1+2 south	L1+2 south	L1+2 south	
Exterior Brick	Re-pointing required, typical			Some visible Structural damage on front facade
Windows	Alum.-clad wood 2/2 with simulated divided lights	Alum.-clad wood 2/2 with simulated divided lights	Historic wood 2/2. Repair and retain if possible, per historic	Replacements / Multi-pane simulated divided lights.
Roof	Slate Needs replacing at rear porch	Slate Needs replacing at rear porch	Slate	Asphalt Shingles
Interior				
Attic	Timber frame Blown insulation between joists.		Timber frame. Not insulated.	Timber frame. Visible fire damage
Ceilings	Retain/reuse or expose tin ceilings where possible*			Original ceilings no longer remain*
Stairs + Railings	No historical stair railings to retain. Reuse existing stair locations where possible.*			Retain front staircase, railings and newel posts.*

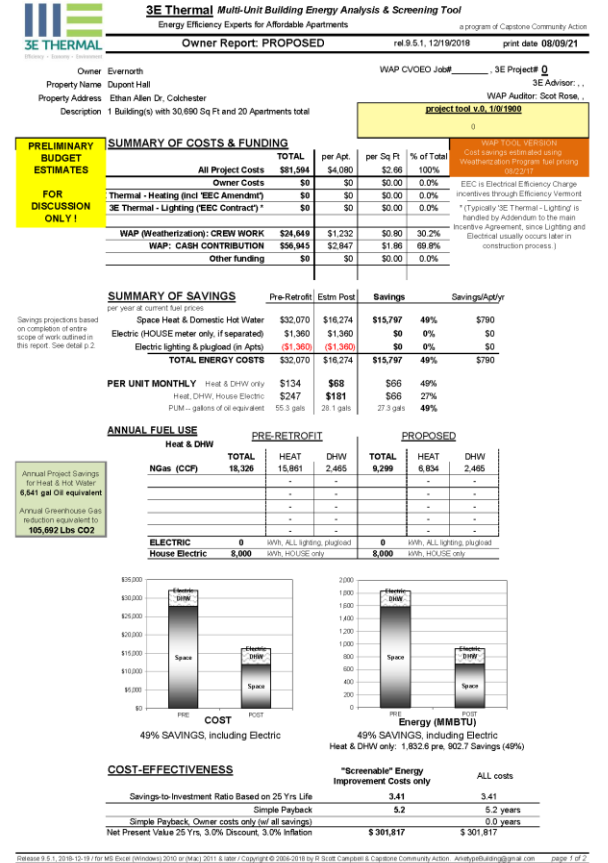
I. HAMEL HALL

• EXISTING SYSTEM DESCRIPTION

- Heating:
 - Heating is provided by a hot water boiler served by natural gas and oil (dual fuel). The existing boiler is a Weil-McLain Model 88 Series 1 Size 788 with an output capacity of 1,419 MBH and gas input of 2,049 MBH (69% efficiency). The unit operates to provide 180°F water and a 20°F temperature differential. The boiler's age is unknown, but it appears to be in need of replacement.
 - The boiler provides hot water to the domestic water heater heat exchanger using a dedicated pump, which operates to maintain 135°F domestic hot water in the storage tanks. The pump and heat exchanger will be removed.
 - A system pump is dedicated to providing hot water to the heating terminal units. A three-way valve is installed prior to the circulating pump to pull water from the return and supply headers to control system supply temperature. The pump and valve along with the associated air separator, expansion tank, etc. will be removed.
 - The heating loop operates on outdoor air control.
 - Terminal units are located around the perimeter of the building and are all piped into the hot water loop. No individual controls or zoning is provided.
 - The hot water piping throughout the building will be replaced due to the new system requirements and the age of piping with concern of potential leaks.
 - The existing boiler flue will need to be inspected by a chimney professional.
 - Combustion air is provided by an open ended duct terminating inside the mechanical room.
- Ventilation:
 - Ventilation is provided via operable windows.
- Exhaust:
 - Exhaust for restrooms and other locations is provided by exhaust fans which are in need of replacement.
- Air Conditioning:
 - Air conditioning is currently not existing.
- Fire Protection:
 - Hamel hall is provided with a 2" fire service in the basement.
 - The Existing Fire Service consists of a double check valve assembly, two (2) shut-off valves with tamper switches, and a flow switch.
- Plumbing:
 - Domestic water service entrance and water meter are located in the basement.
 - Gas is provided to serve the existing boilers.
 - Domestic hot water is generated by an indirect water heater located in the basement.

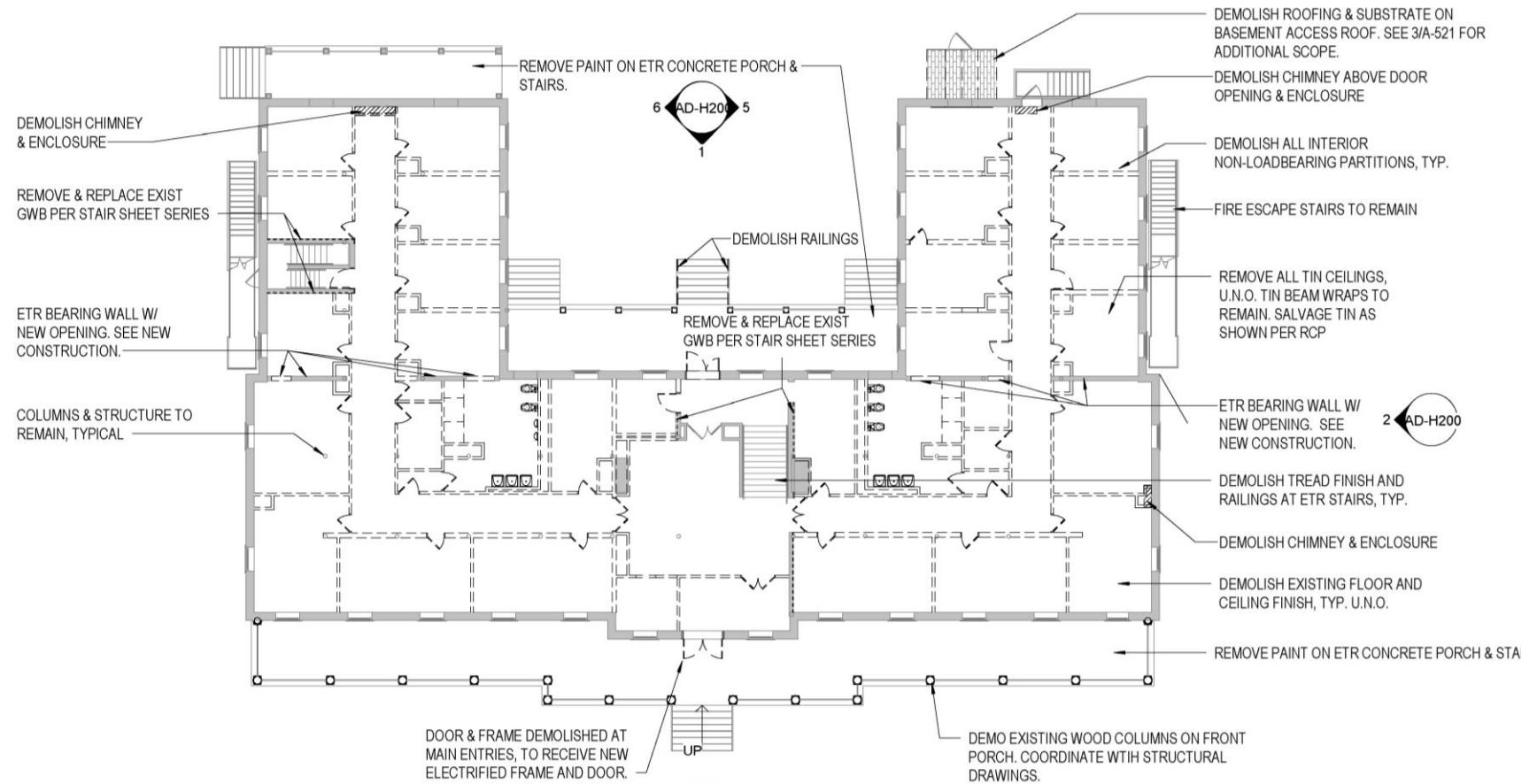
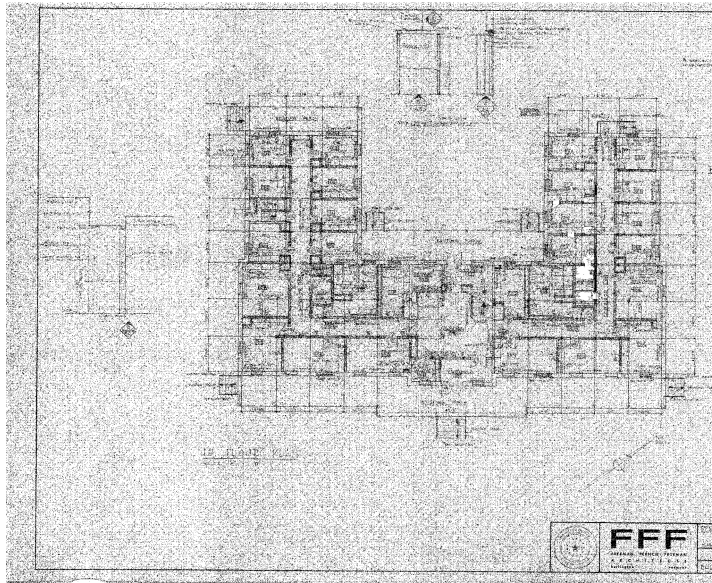
• PROPOSED SYSTEM RECOMMENDATIONS

- Heating:
 - Heating will be provided by a new higher efficiency hot water boiler served by natural gas similar to the existing unit in Purtill Hall (Weil-McLain Model 88



Starting Point Feasibility Study

- Architectural, MEP, and Structural Assessments
- Code Review
- Building Energy Analysis



Initial Documents

Demolition plan

- Existing Documentation from Previous Renovations
- Site Verification
- Demolition Drawings



Executing the Demo Plan

Selective deconstruction

- Salvage Historic Materials
- Properly Dispose of Waste
- Identify Hidden Conditions
- Prep for New Work

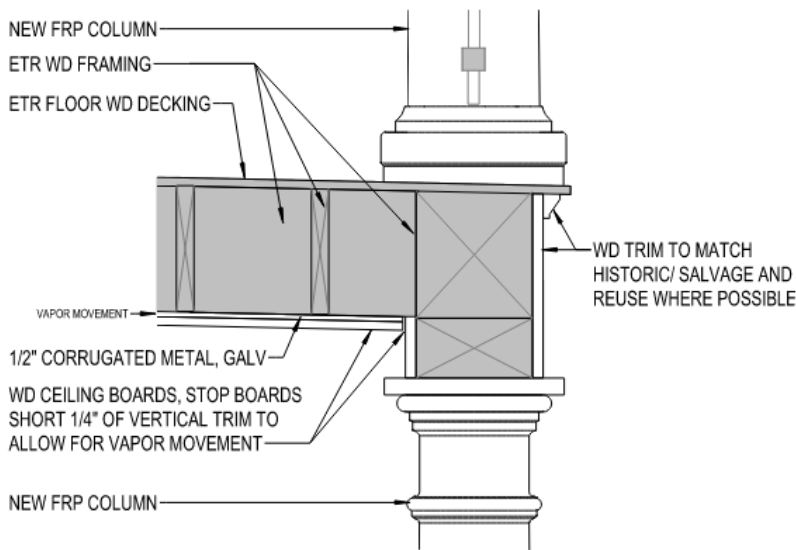


- Historical Importance
- Structural Hazard
- Aesthetic Liability
- Lack of Accessibility
- Budget Limitations

Design Focus

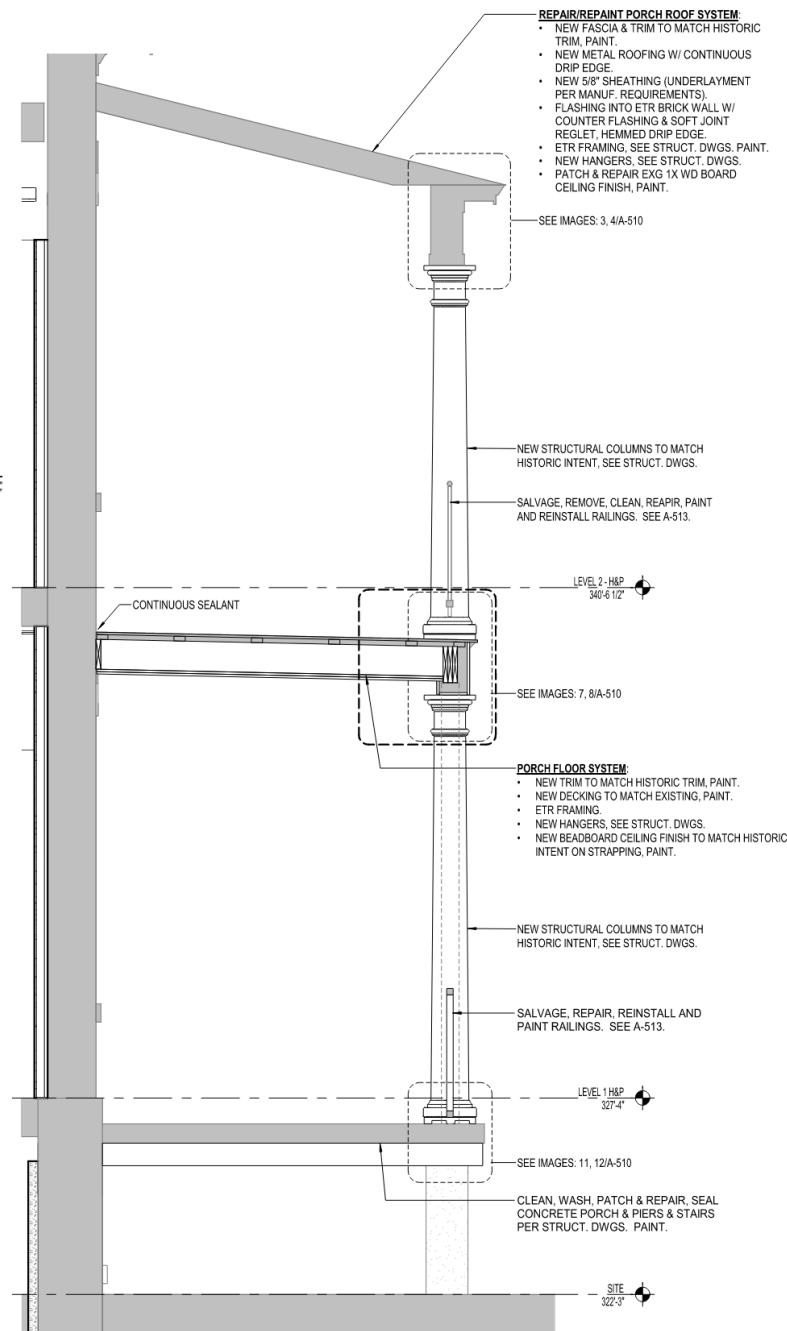
Porches



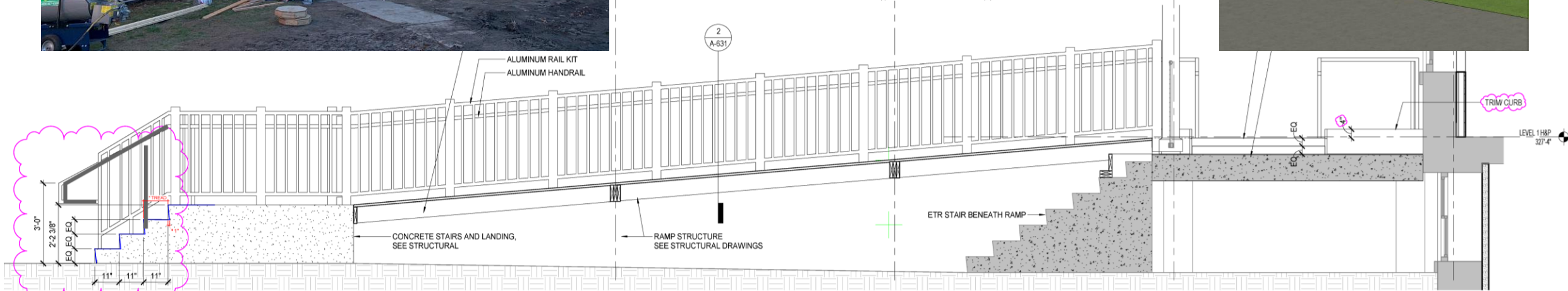
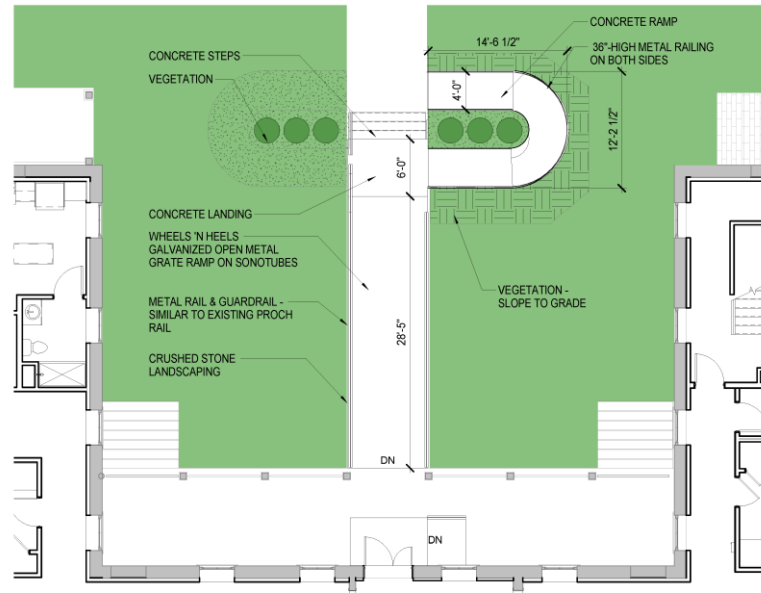


Design Solution

Porches



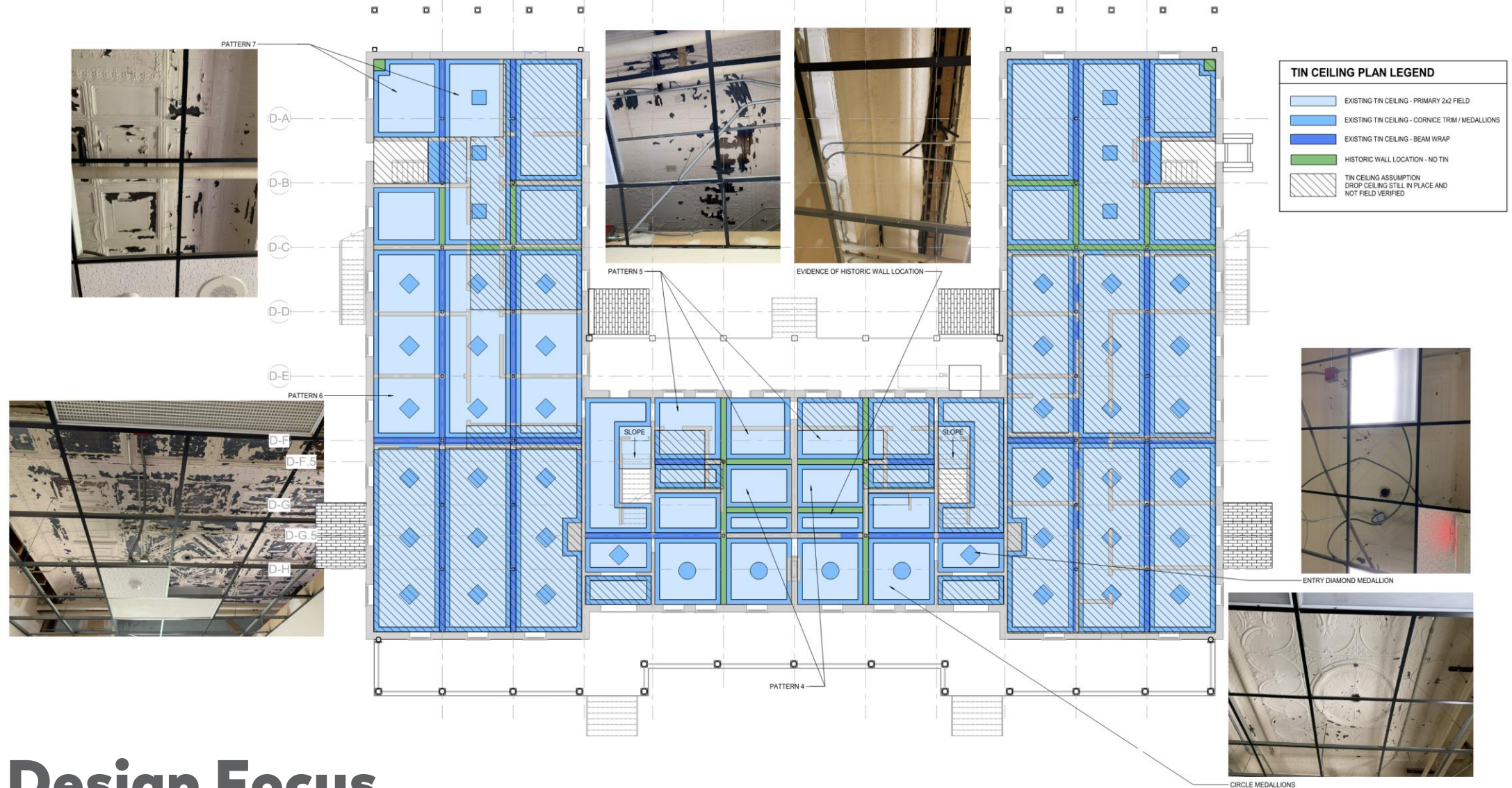
- Structurally Sound
- Resolving Inherent Water Damage
- Retaining Historic Integrity



Design Solution

Porches

- Inclusive Entry Experience
- Historically Appropriate
- Ceremonial but Affordable



Design Focus

Historic Pressed Metal Ceilings

- Uncover the hidden elements
- Evaluate existing materials
- Determine what can be retained

GENERAL NOTES:

1. PROVIDE SHOP DRAWINGS SHOWING FIELD CONDITIONS (PR 05).



24" x 24" FIELD TILE



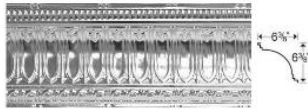
PATTERN A
WF NORMAN CUSTOM REPRODUCTION
24" x 24"



PATTERN B
WF NORMAN CUSTOM REPRODUCTION
24" x 24"



CORNICE TRIM A



SHANKO, 900 ROYALTON, 6 3/8" x 6 3/8"



PHOTO OF EXISTING BEAM WRAP & BORDER



FLAT TRIM A



WF NORMAN, 214 MOLDING, 3" x 48"



FILLER BORDER



WF NORMAN, PART 249, 18" x 36", WIDTH VARIES

CUT TILE SO CENTER PATTERN
IS ALWAYS INSTALLED



PHOTO OF EXISTING MEDALLION



MEDALLION FIELD, WF NORMAN, PANEL 209, 24" x 48"



TIN MEDALLION - 48" x 48"



MEDALLION BORDER TRIM, WF NORMAN,
MOLDING 153 & CORNER TRIM 153



EXISTING TO REMAIN HISTORIC TIN
BEAM WRAPS, 10" WIDE

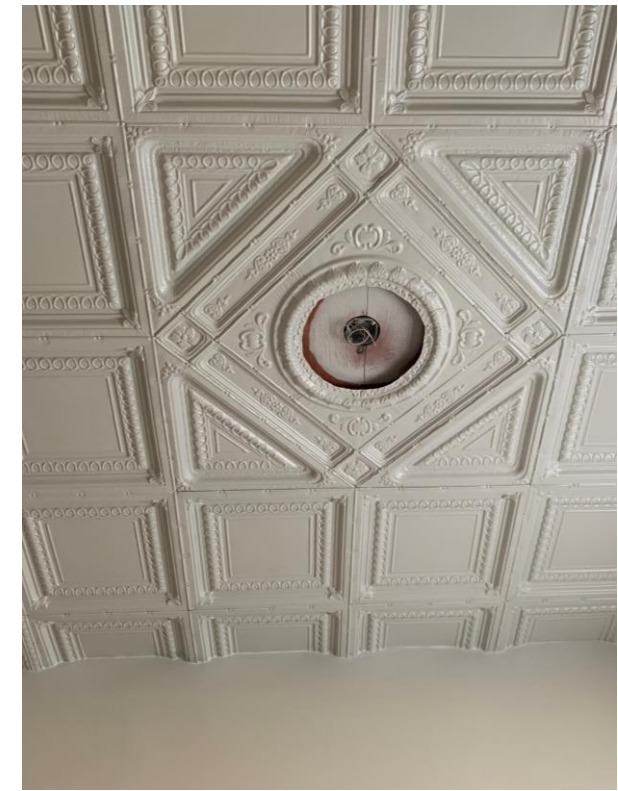
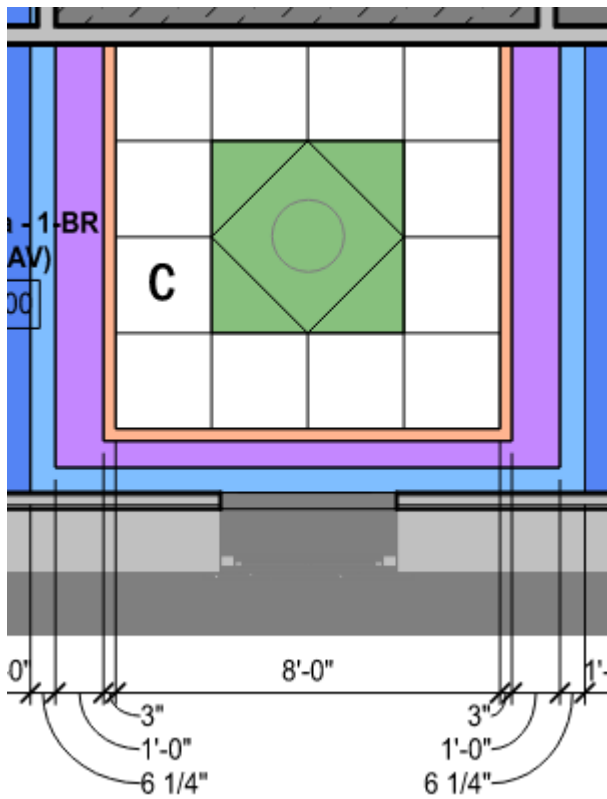


WHEN BEAM WRAP IS REQUIRED TO PATCH, REPLACE OR IS
MISSING PROVIDE WF NORMAN CEILING PANEL 209, 24" x 48"



Design Solution Pressed Metal Ceilings

- Areas to be retained
- Existing materials reuse
- Acceptable replacement materials



Construction

Pressed Metal Ceilings

- Planned solution
- Develop the framework
- Install the product
- Finish the product

WALL TYPE 1 – Multi-wythe masonry, below-ceiling

Components (right to left):

- Interior finish:
 - Existing: 1/2" painted gypsum over 1" plaster and lath, wood furring (modeled as air layer)
 - Renovated: SPF (closed & open) in new stud Cavity with new painted drywall
- 3 Wythes brick masonry:
 - Assumes similar properties for all brick wythes
 - 3.72" depth with 0.375" joints
 - No exterior coating

Orientation:

- Northwest exposure (worst case based on climate)
- >30'-high walls below a steep-slope roof with medium exposure

Initial Water Content:

- WC at 80% RH for all components per ASHRAE 160 for existing walls.

Surface Transfer Coefficient:

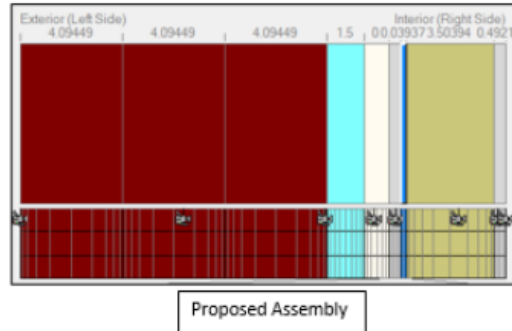
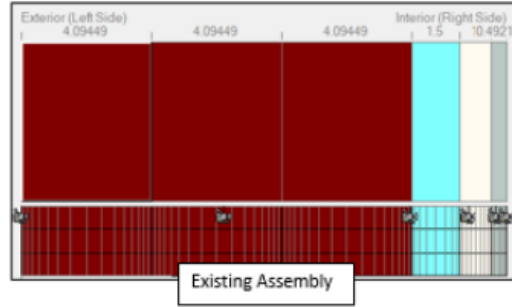
- Interior surface:
 - 5 perm (assumed for existing and renovated latex paint)
- Exterior surface:
 - No coating
 - Clay brick (old), red
 - Grass for ground reflectivity
 - Adhering fraction of rain - no absorption

Climate:

- Exterior: Burlington, VT Map/File selected
- Interior: Sine curve
 - Temp: $69.8 \pm 1.8^{\circ}\text{F}$ RH: $50 \pm 10\%$

Monitor Positions:

- Exterior surface (default)
- Middle of brick
- Interior face of brick
- Middle of plaster
- Middle of gypsum layer(s)
- Middle of SPF
- Interior surface (default)



- Resident Comfort
- Energy Savings
- Preserve Historic Construction
- Hygrothermal Analysis

Technical Focus

Exterior Wall Insulation

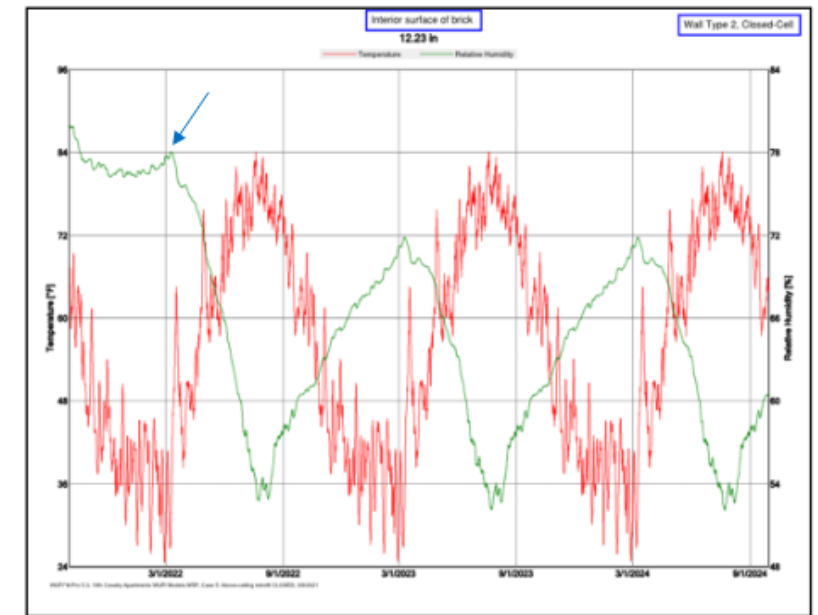


Figure 7 – Graph of temperature (red) and RH (green) of the interior brick wythe for the closed-cell SPF retrofit condition at Wall Type 2.

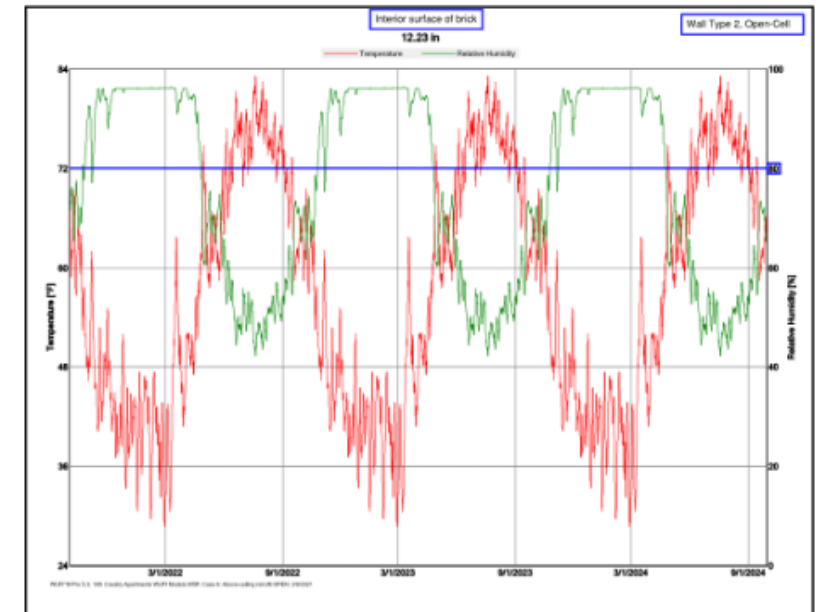
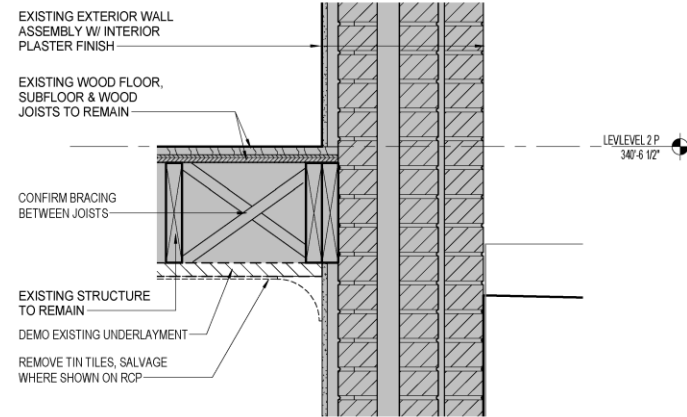
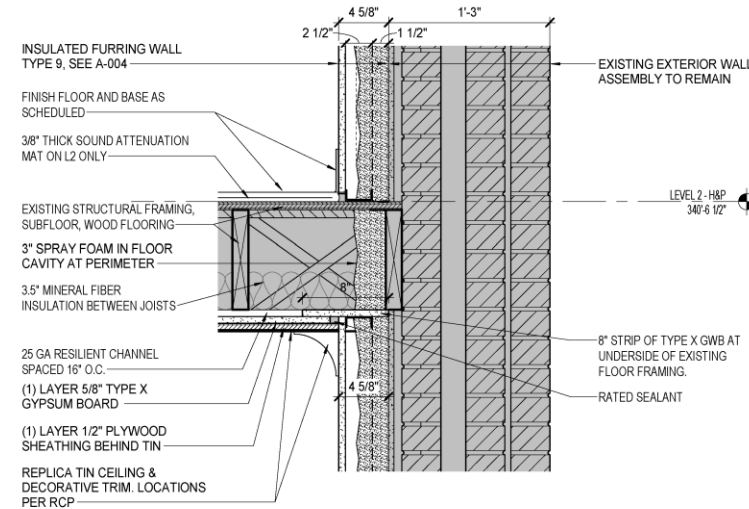


Figure 8 – Graph of temperature (red) and RH (green) of the interior brick wythe for the open-cell SPF retrofit condition at Wall Type 2.



2 EXISTING + DEMO EXTERIOR WALL-FLOOR ASSEMBLY DETAIL
A-520 SCALE: 1 1/2" = 1'-0"



3 PROPOSED EXTERIOR WALL-FLOOR ASSEMBLY DETAIL AT TIN CLG
A-520 SCALE: 1 1/2" = 1'-0"



Technical Solution

Exterior Wall Insulation

- Multi-Wythe Load Bearing Brick Masonry
- Apply Insulation to Existing Plaster
- Leave Air Gap
- Furred Out GWB Finish



January 25, 2018

Jim Moody
Trowel Trades Supply
206 Hegeman Avenue
Colchester, VT 05446
Phone: 802-655-3116

Subject: SGS Mortar Color

SGS Mortar Colors are pure mineral pigments designed to be used with all cementitious materials whether they may be a Type N, S, M or O strength masonry cement or portland and lime mixture. The colors are products of finely milled 95-99% minus 325 mesh inorganic iron oxides. SGS Mortar Colors meet the standards established by ASTM C979, "Pigments for Integrally Colored Concrete".

Solomon Colors, Inc. warrants that their mortar colors conform to the description and standards as stated on the product packaging (specific product literature). If properly mixed and applied, SGS warrants the concentrated mortar color to be alkali resistant, uniform, limeproof and sunfast. The exclusive remedy of the user or buyer and the limit of the liability of this company shall be the purchase price paid by the user or buyer for the quantity of the SGS product involved.

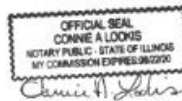
SGS Mortar Colors have been tested in accordance with ASTM C-91 for compressive strength test per requirements of ASTM C-270 of Type S strength of 1800 PSI at 28 days. The tests are compiled by mixing the maximum loading of SGS pre-measured color units with a commercially acquired ASTM Type S masonry cement and Type S blend of one part portland cement and 1/4 part hydrated lime. In both cement mixes the PSI strength at 28 days well exceeded the requirements set for a Type S strength or 1800 PSI at 28 days.

If properly mixed in accordance with our directions, the color should remain the same as the color that is achieved for the life of the building exclusive of normal weathering.

Sincerely,

SOLOMON COLORS, INC.

Richard R. Solomon



R.R.S/sp

Notarized this 25th day of January, 2018.

CORPORATE OFFICE: 4090 Color Plant Rd., Springfield, IL 62762
Ph: (217) 522-3112
WESTERN FACILITY: 1371 Laurel Avenue., Reno, CA 92376
Ph: (909) 464-3399

An Employee Owned Company



47 Gauthier Drive #10
802.487.7007 fax 802.878.9550
www.lisztrestoration.com

Engelberth Construction, Inc.
150 Water Tower Circle
Colchester, VT 05446

RE: 10 Calvary Apartments Masonry/Concrete Restoration Submittals

Proposed materials for use at the 10 Calvary Apartment Project.

Mortar for the repointing work will be high calcium lime putty mortar mixed at a 3:1 masonry sand to lime putty ratio.
Mortar Color additive- Solomon Grind
Masonry cleaner is SureKlean 'Heavy Duty Restoration Cleaner'.
Concrete patching material will be Sil Pro VOH repair mortar.

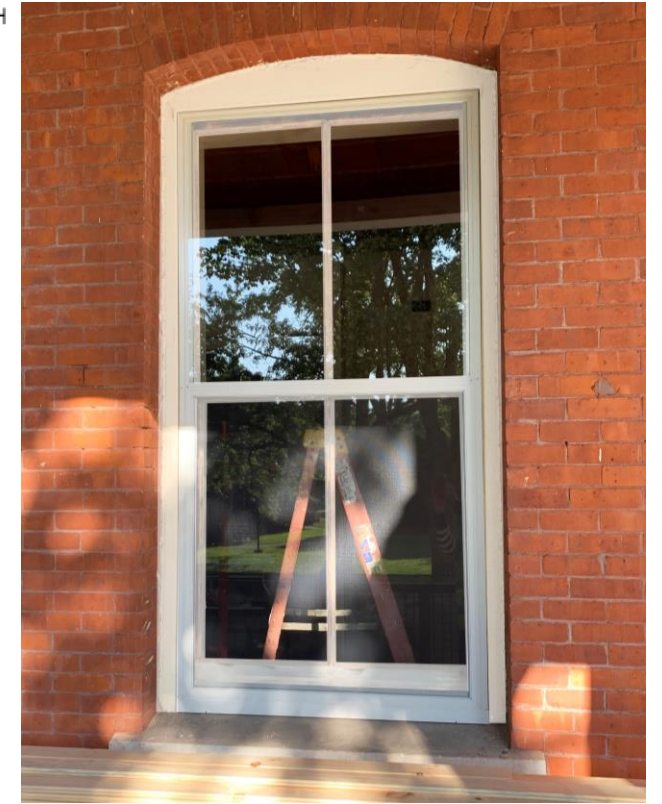
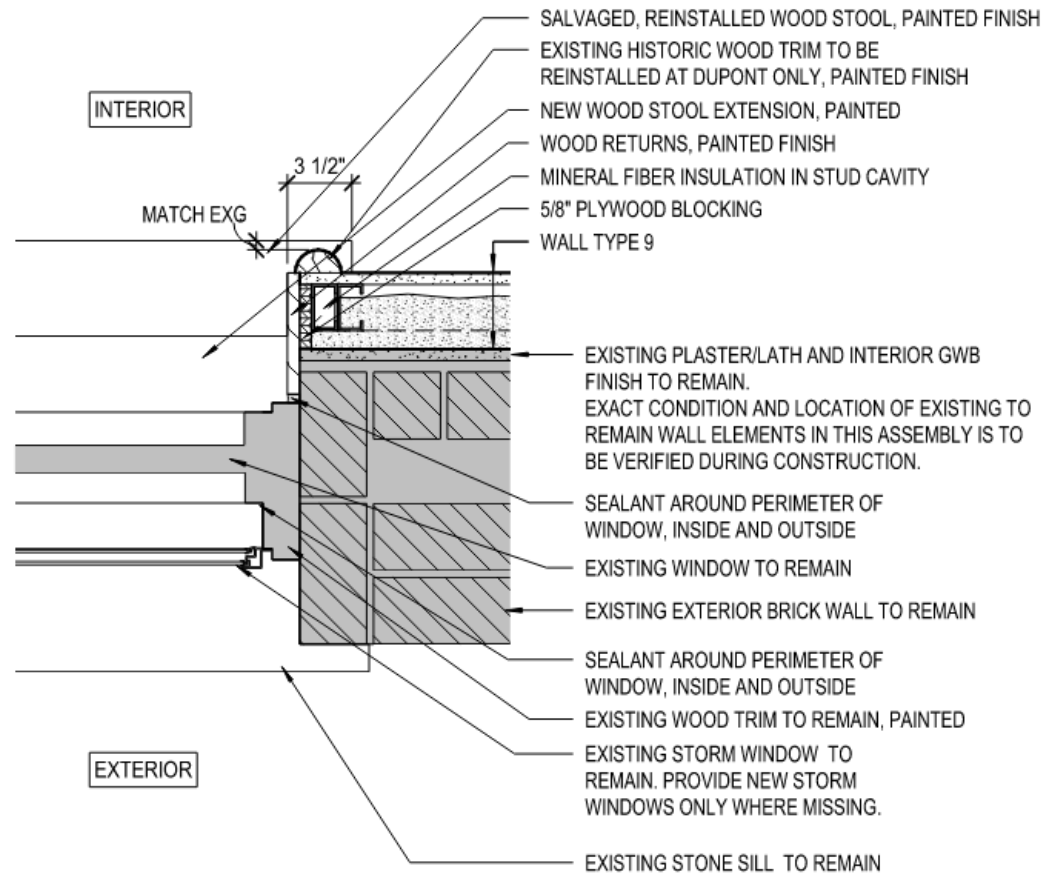
Thank you,

Paul List
Liszt Historical Restoration, Inc.



Technical Solution

Masonry



Technical Solution

Storm Windows

- Resident Comfort
- Energy Savings
- Limited Product Sources
- Preservation Requirements

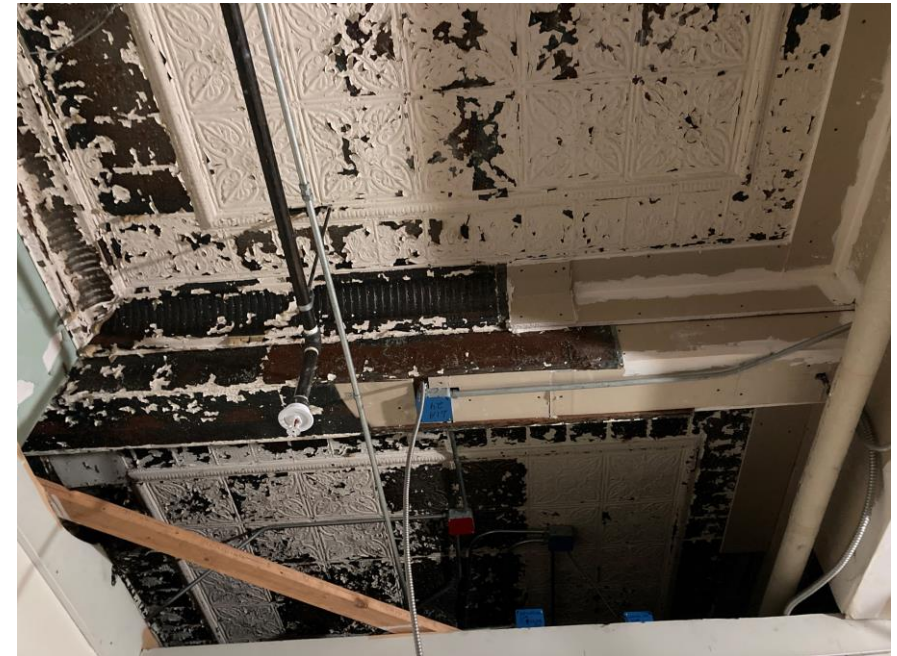
Environmental Abatement

- Hazardous materials identified throughout building
- Lead paint on tin ceilings and finishes
- PCB contamination in columns and slab
- Asbestos removed prior to demolition
- Soil management required on site



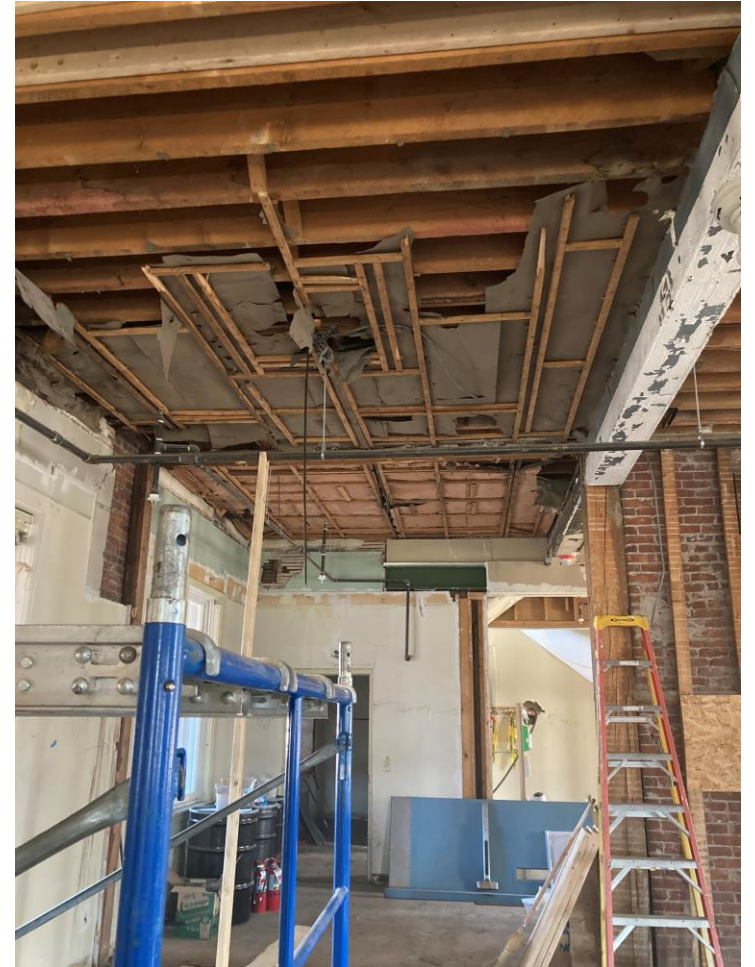
Demolition

- Full abatement completed
- Tin ceilings and structural elements reviewed in place
- Historic elements preserved
- Existing structural features preserved



Demolition

- Tin ceilings reviewed in place
- Tin ceilings carefully removed and stored for salvage
- Tim beam wraps preserved in place



Historic Feature Preservation

- Original tin documented and cataloged
- Materials cleaned, stabilized, stored
- Mockups built to compare with historic profiles



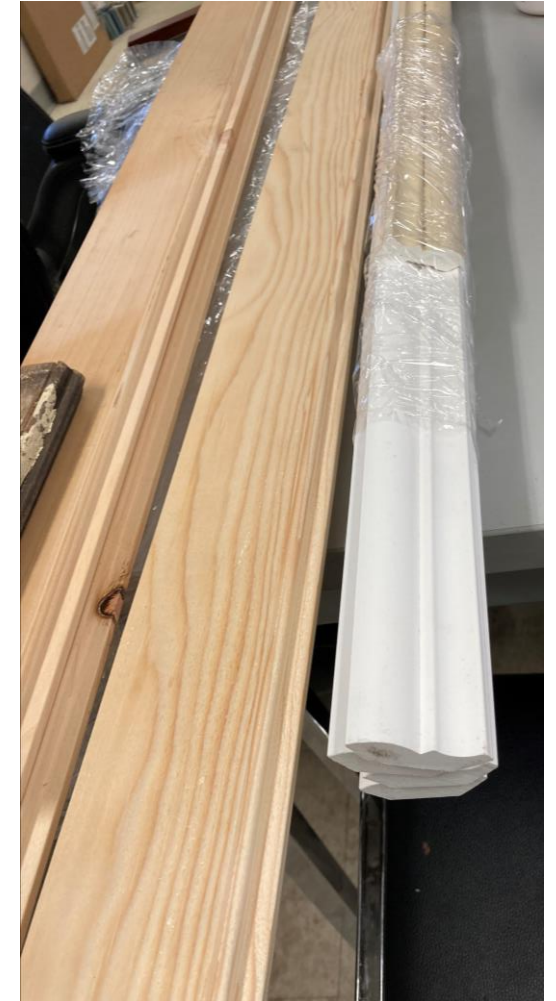
Historic Feature Preservation

- Original tin documented and cataloged
- Materials cleaned, stabilized, stored
- Salvaged materials reused in final construction



Historic Feature Preservation

- Original exterior trim documented and cataloged
- Stock and custom trim profiles compared to historic profiles



Construction Approach

- Phased construction improved efficiency
- Approach adjusted after existing conditions were exposed
- Strong field leadership and coordination across trades
- Minimal impact to historic structure



Mechanical Systems

- Energy recovery units located in attic
- Existing vents reused for intake and exhaust
- Ductwork routed through corridors into unit soffits
- Hydronic baseboard heat with high efficiency boilers in basement
- Sprinkler piping in soffits/sidewall heads



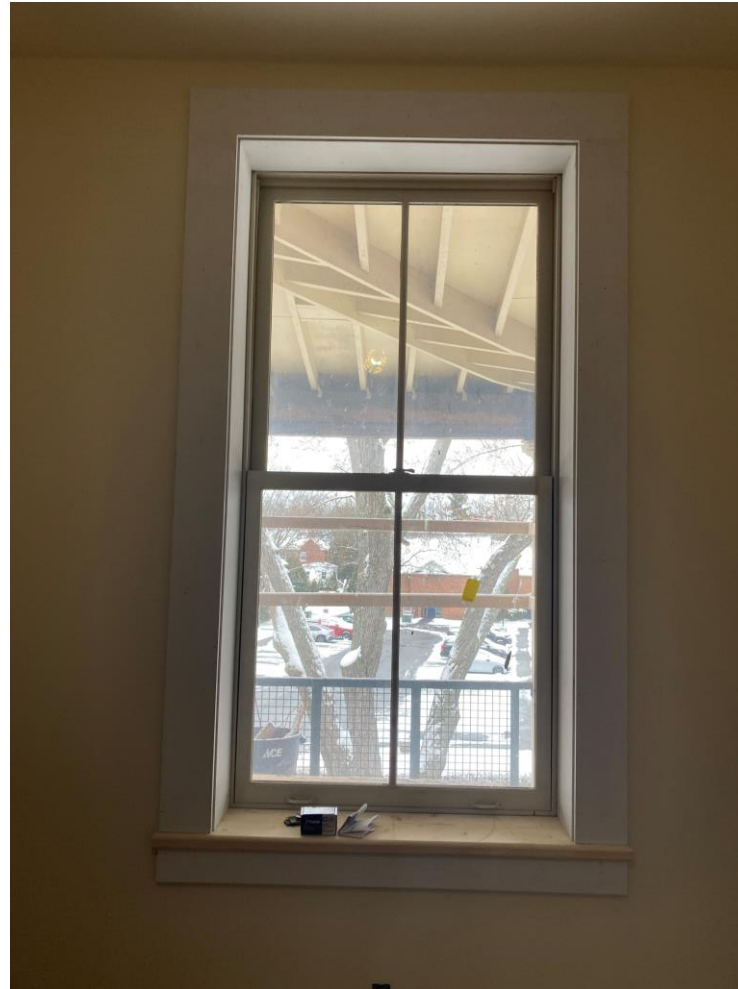
Mushroom Ventilators

- Cleaned and bird screens added
- Reused for ventilation intake and exhaust air



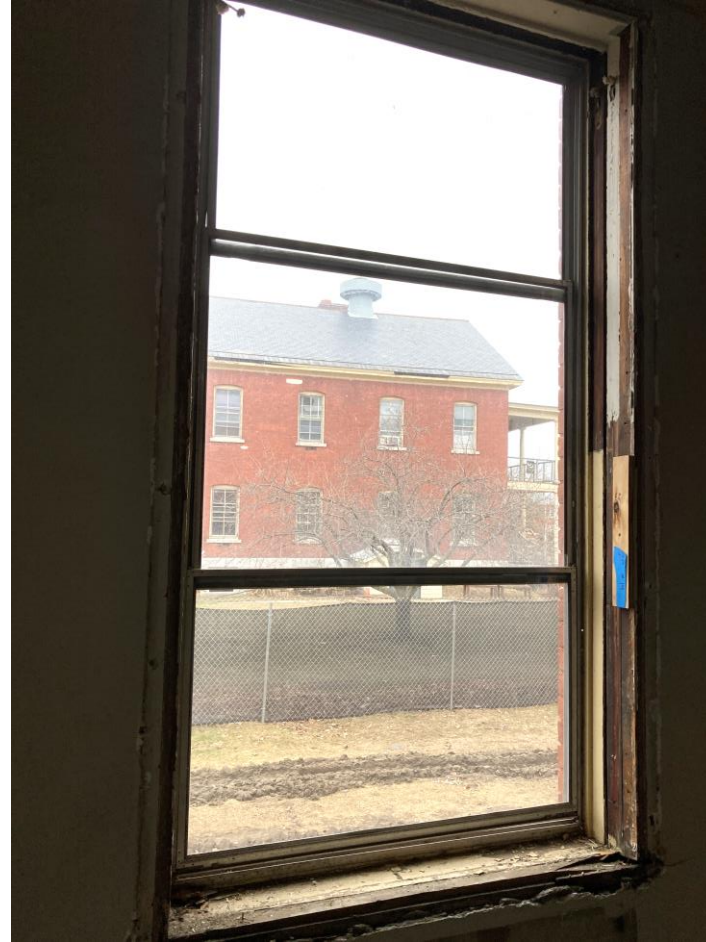
Window Restoration

- New trim installed on thickened wall
- Trim profiles reviewed for historic compliance



Window Restoration

- Historic sashes removed and restored offsite
- Existing half round trim removed, restored, and reinstalled
- Historic storm windows installed to improve energy efficiency



Tin Ceiling Installation Apartments

- Tin profiles selected/created to match historic profiles
- New tin installed over fire-rated assemblies
- Existing beam wraps repaired and reused



Tin Ceiling Restoration Lobbies

- Original tin salvaged, stabilized and reinstalled in lobbies and common areas
- Scraped to refusal
- Elastomeric coating applied to stabilize surface
- Tin reinstalled over fire-rated assemblies and finished



Tin Ceiling Restoration Community Room

- Original tin salvaged, stabilized and reinstalled in lobbies and common areas
- Scraped to refusal
- Elastomeric coating applied to stabilize surface
- Tin reinstalled over fire-rated assemblies and finished



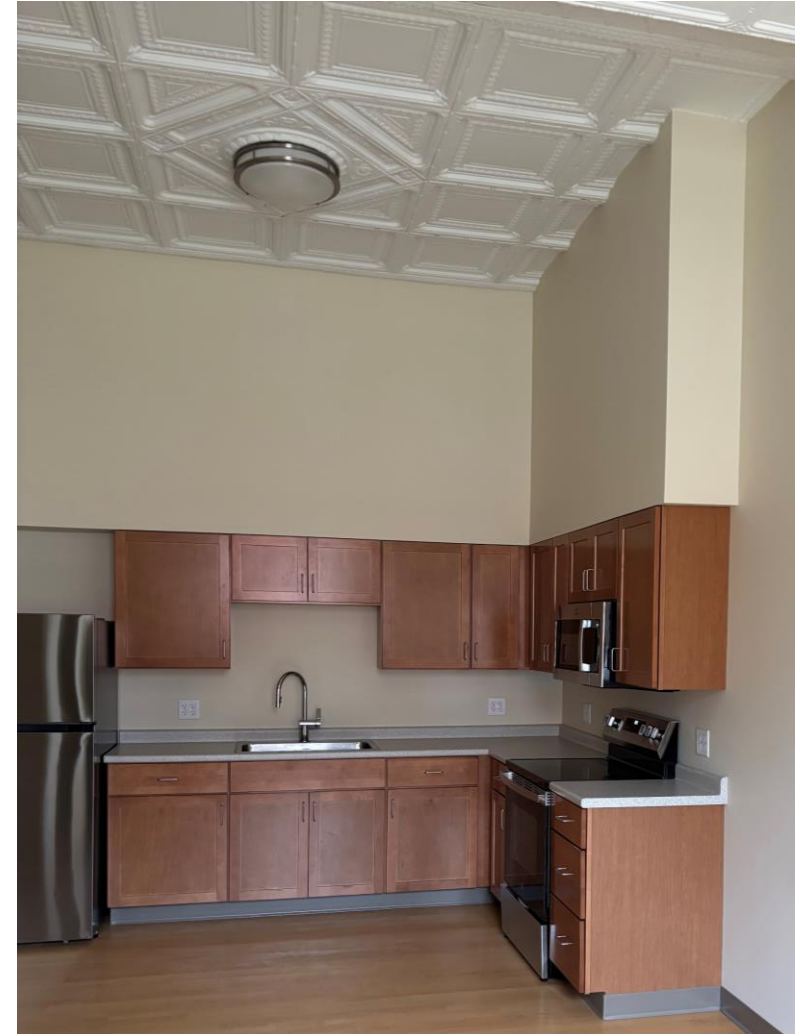
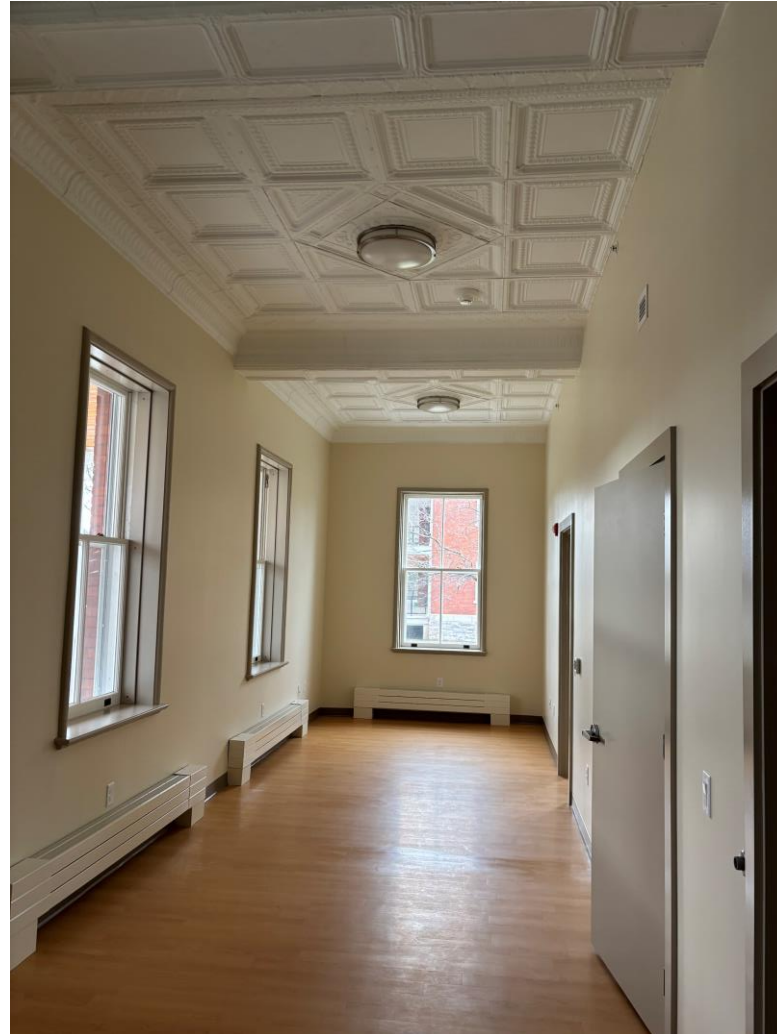
Occupancy

- Historic volumes and features maintained
- Modern finishes integrated
- Homes created for 65 households



Occupancy

- Historic volumes and features maintained
- Modern finishes integrated
- Homes created for 65 households



Resident Feedback

“Affordable and well-designed”

“Love the historic character with modern upgrades”

“Quiet, comfortable living spaces”

“Great location”



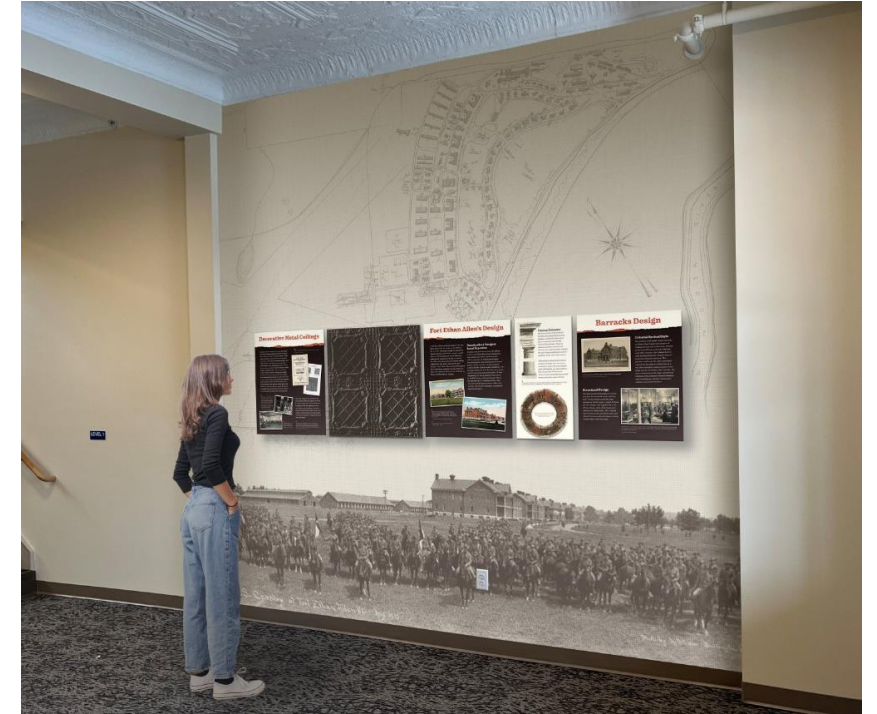
Historic Interpretive Panels

- Exterior signage explains site history
- Preserves story for residents and visitors



History Displays

- Wallpaper murals with historic image of the 10th Cavalry will be hung in the lobbies of 33 and 81 Ethan Allen Ave and the Community Room at 123 Ethan Allen Ave
- Pay honor to the history of the buildings and site



History Displays

- Wall graphics to be installed in lobbies of each building
- Three themes:
 - Design
 - Community
 - People



Closing



Reinvestment in these buildings preserved an important part of Vermont's history, remediated environmental contaminants, improved energy efficiency and created permanently affordable housing. The buildings were designed to meet the Secretary of the Interior's Standards for Rehabilitation, Universal Design, and Efficiency Vermont's standards for historic structures.

Thank You

Britta Tonn

VHB

btonn@vhb.com

Kirsten Merriman Shapiro

Champlain Housing Trust

[kirstenmerrimanshapiro@](mailto:kirstenmerrimanshapiro@champlainhousingtrust.org)

[champlainhousingtrust.org](mailto:kirstenmerrimanshapiro@champlainhousingtrust.org)

Sandra Silla

Evernorth

ssilla@evernorthus.org

Shawn Brennan

Freeman French Freeman

sbrennan@fffinc.com



Circa 1920s photograph of Cavalry maneuvers on the Fort Ethan Allen parade ground. Source: Leslie Jones Collection. Courtesy of the Trustees of the Boston Public Library.