



PRESERVATION
OF AFFORDABLE
HOUSING

Building Science Boondoggle #26
Westford, MA
August 2024



PRESERVATION
OF AFFORDABLE
HOUSING

Changes in the Industry:

Focus on enclosures

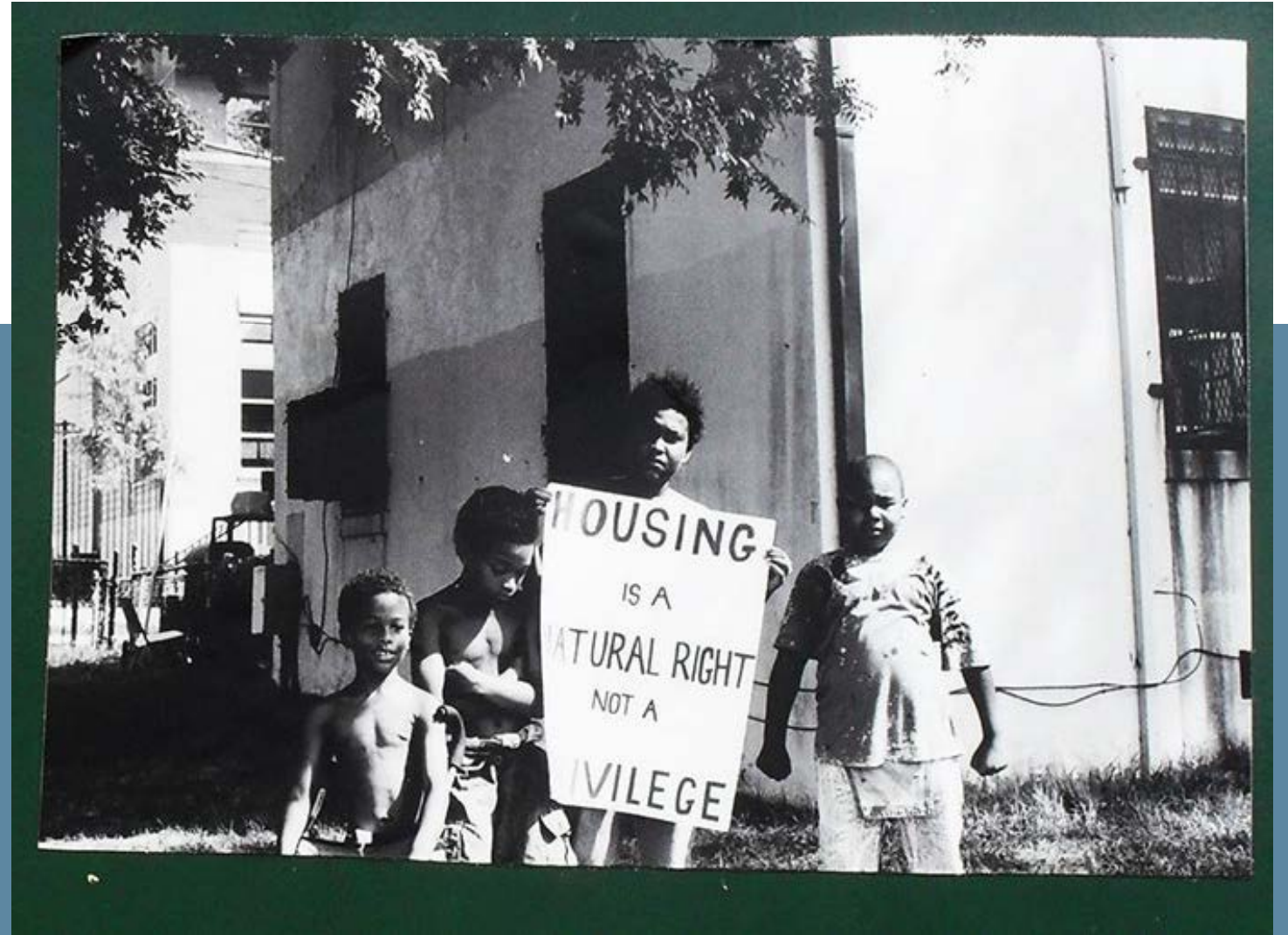
Indoor air quality

Convert to All Electric

Reduction of Carbon

Better Renewables

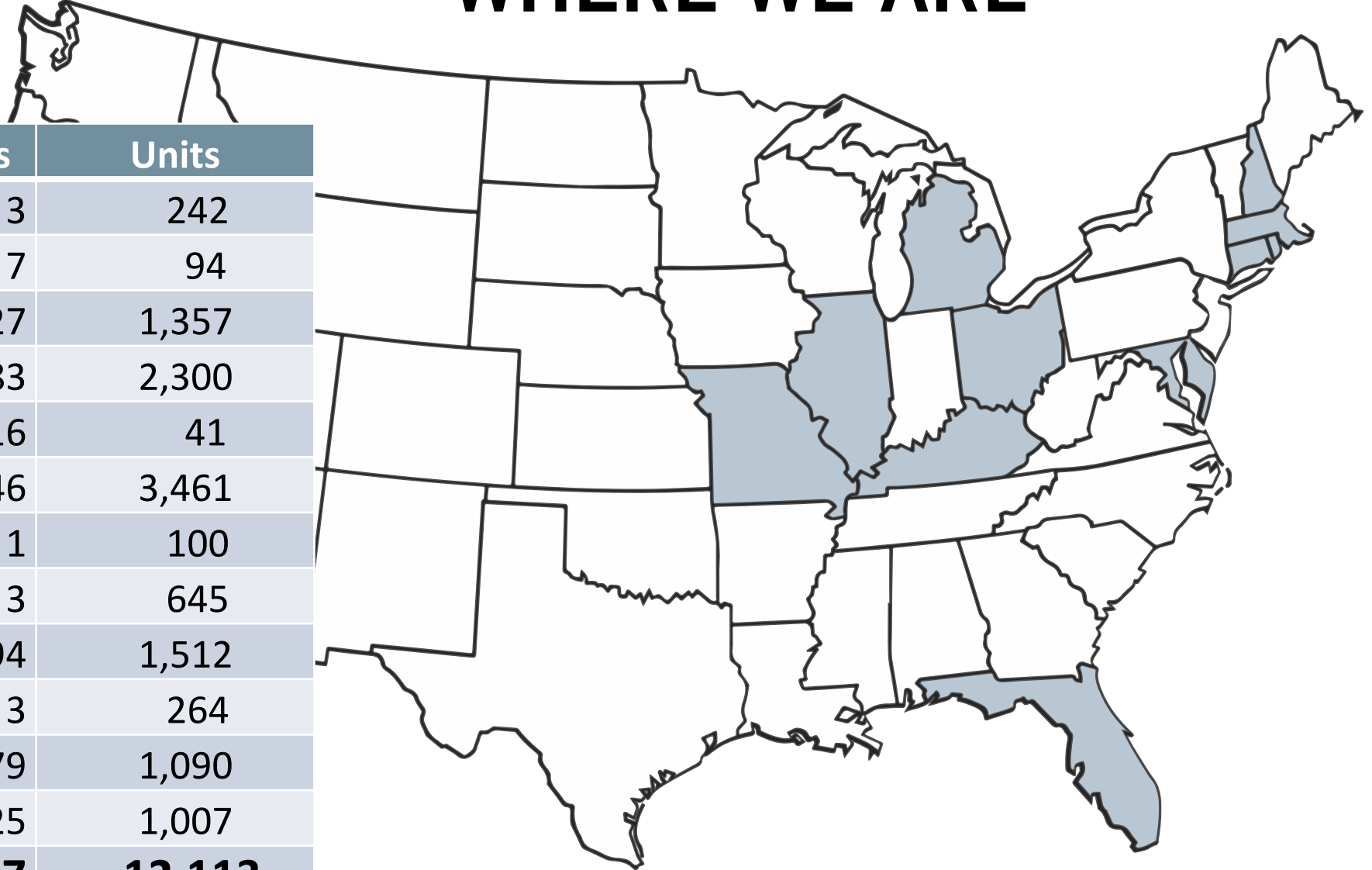
Embodied Carbon



Barry Farm, 1950s



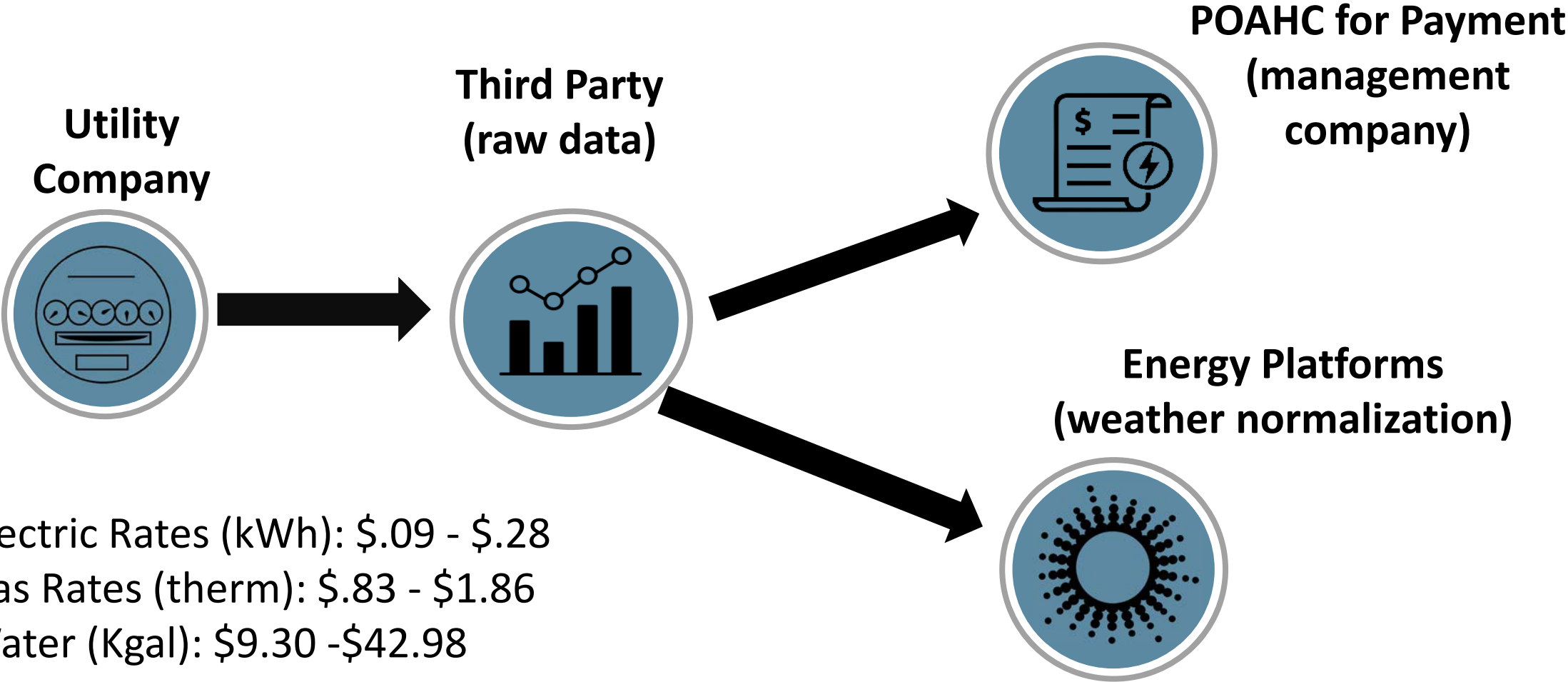
WHERE WE ARE



| | Properties | Buildings | Units |
|--------------|------------|------------|---------------|
| CT | 3 | 3 | 242 |
| DC | 1 | 7 | 94 |
| FL | 8 | 27 | 1,357 |
| IL | 32 | 83 | 2,300 |
| KY | 1 | 16 | 41 |
| MA | 39 | 146 | 3,461 |
| MD | 1 | 1 | 100 |
| MI | 3 | 3 | 645 |
| MO | 13 | 294 | 1,512 |
| NH | 3 | 3 | 264 |
| OH | 21 | 279 | 1,090 |
| RI | 13 | 25 | 1,007 |
| TOTAL | 138 | 887 | 12,113 |

CORPORATE OFFICES: BOSTON | CHICAGO | KANSAS CITY | WASHINGTON, D.C.

In 2023, we were responsible for:
2,538 utility accounts and over 16 million in utility costs.



POAH's Affordable Multifamily Housing

| | |
|-------------------------|---------------------|
| Connecticut | 257 |
| Washington, D.C. | 94 |
| Florida | 1,356 |
| Illinois | 2,155 |
| Kentucky | 41 |
| Maine | 123 |
| Massachusetts | 3,426 |
| Maryland | 100 |
| Michigan | 645 |
| Missouri | 1,538 |
| New Hampshire | 264 |
| Ohio | 1,104 |
| Rhode Island | 1,007 |
| TOTAL | 13,000 units |

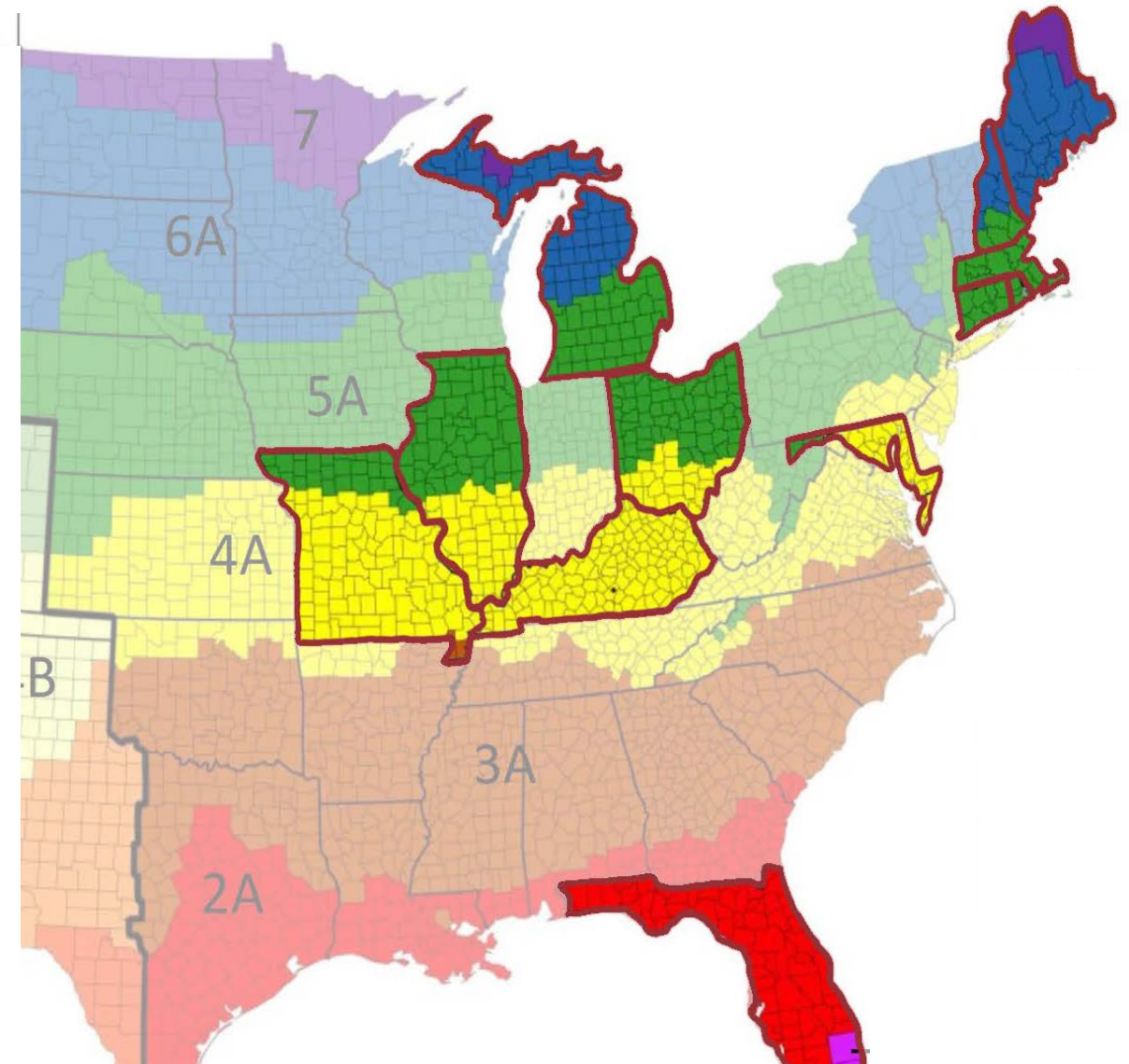
Passive House Units in Design/Construction:

347 (of 900)

60

123

267



CORPORATE OFFICES: BOSTON | CHICAGO | KANSAS CITY | WASHINGTON, D.C.



How do we fund projects?

Rent Subsidies

LIHTC – Low Income Housing Tax Credits

Other Federal Money - HOME

State Sources – Neighborhood Housing Trust

ITCs – Investment Tax Credit

HTCs – Federal and State Historic Tax credits

AECs – Alternative Energy Credits

EACs – Community Justice Credits

Specific Energy Related Loans/Grants

A Recent Sources and Uses for a Project in Boston

| Sources | | Uses | |
|------------------------|-------------------|--------------------------|-------------------|
| First Mortgage (bonds) | 6,301,000 | Acquisition | 1,200,000 |
| DHCD – HOME | 825,000 | Construction | 20,649,000 |
| DND – NHT | 750,000 | Soft Costs | 6,754,761 |
| DHCD – AHTF | 1,000,000 | | |
| CPA | 1,750,000 | Reserves | 640,267 |
| DHCD - HSF | 1,000,000 | Developer Fee – Paid | 1,337,877 |
| DHCD – CATNHP | 750,000 | Developer Fee - Deferred | 791,368 |
| DHCD – CBH | 450,000 | | |
| Equity – Federal LIHTC | 12,613,288 | | |
| Equity – State LIHTC | 3,200,000 | | |
| Deferred Developer Fee | 791,368 | | |
| Energy Grants | | | |
| TOTAL | 31,498,654 | TOTAL | 31,498,654 |



How do we encourage better buildings?

Operational Savings

Specific Energy Related Loans/Grants

Utilities

State DOE

Healthy Units

Federal Programs

GRRP

GRRF



How can we require it?

Building Codes

PHIUS Certification

Utility/Carbon Data Tracking

Strategic Plan Goals

Better Climate Challenge

“A level of statewide greenhouse gas emissions that is equal in quantity to the amount of carbon dioxide or its equivalent that is removed from the atmosphere and stored annually by, or attributable to, the Commonwealth; provided, however, that in no event shall the level of emissions be greater than a level that is 85 percent below the 1990 level.”

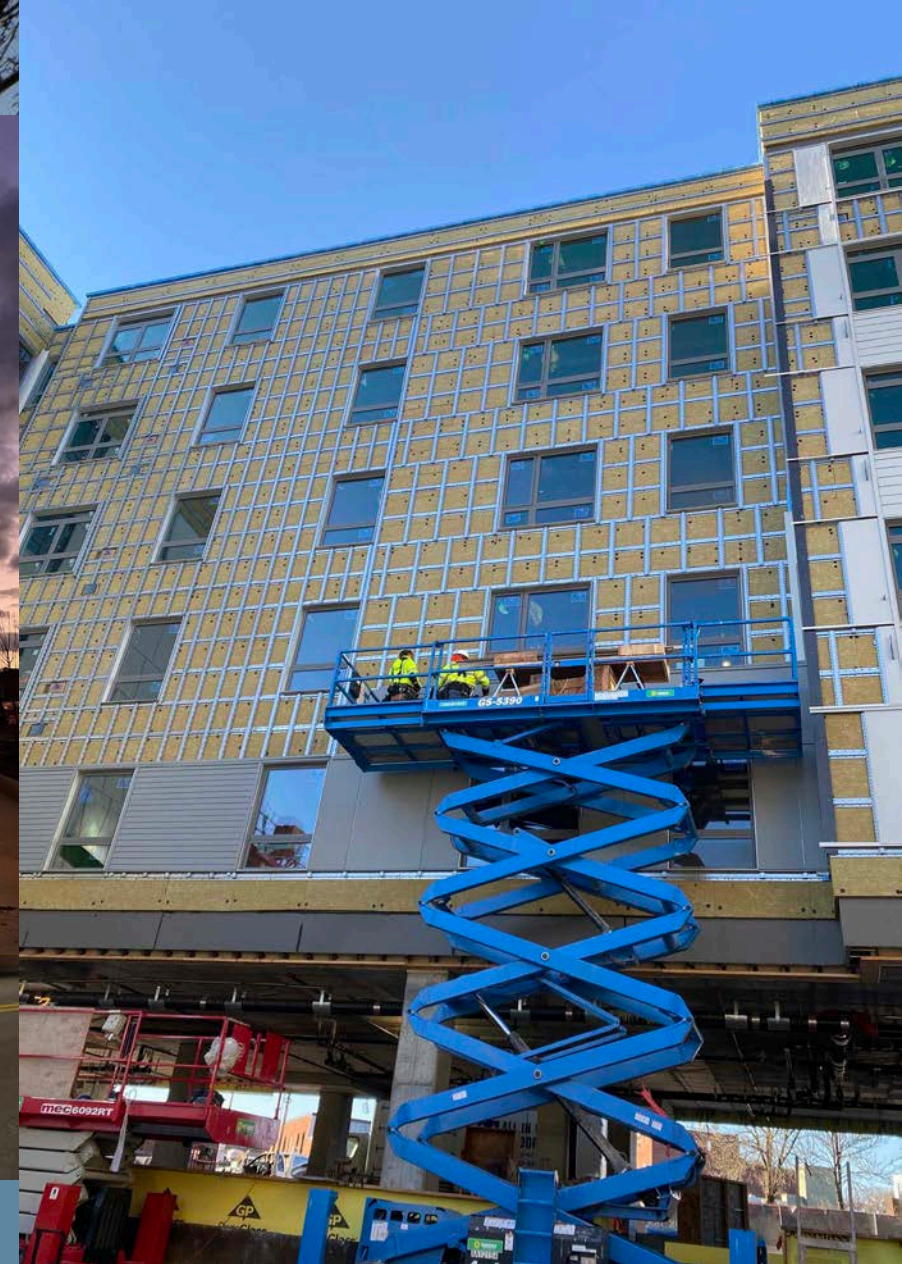


WELCOME TO THE BASIS OF DESIGN

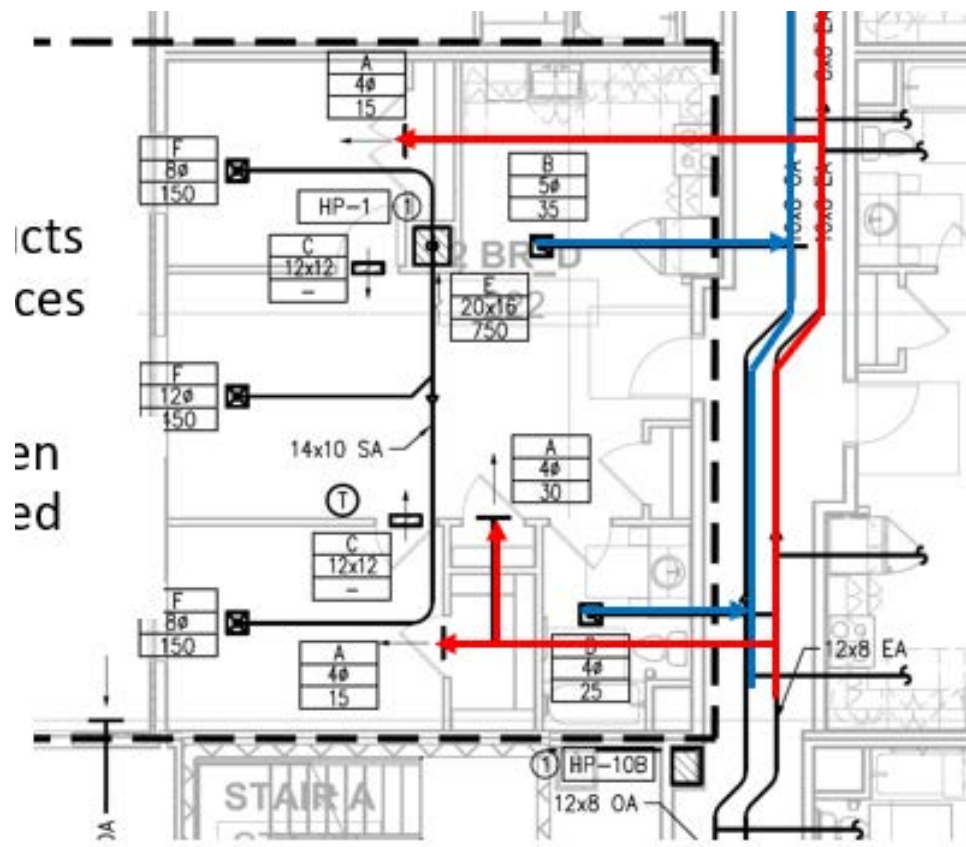
A POAH Building Design Resource



PASSIVE HOUSE PROJECTS IN DESIGN



The Loop at Mattapan Station



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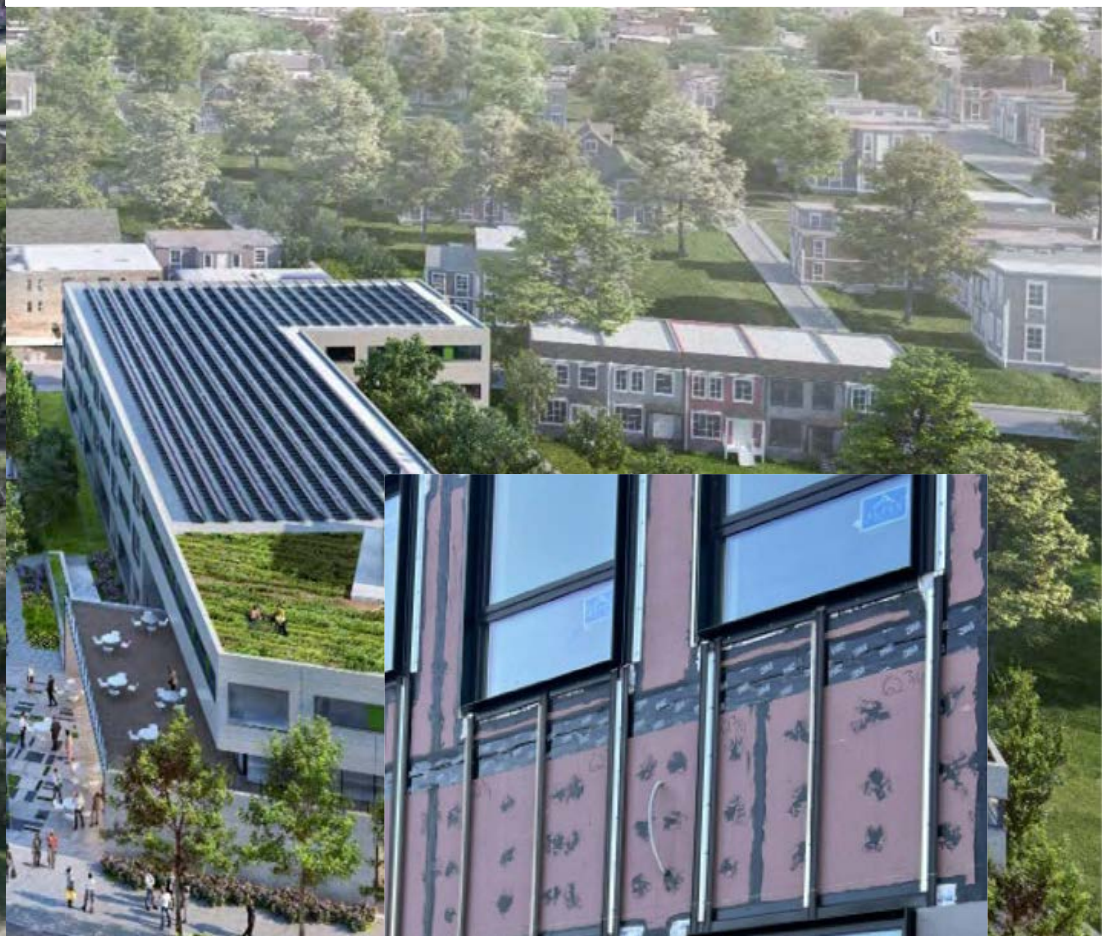
Passive Design – Sample Floor

- Three ERV systems/floor
- Horizontal supply/return ducts to each unit (three systems)
- Smaller duct/less CFM per system
- Three supply penetrations and three exhaust penetrations per floor



Passive Design – Ceiling-Mounted ERV





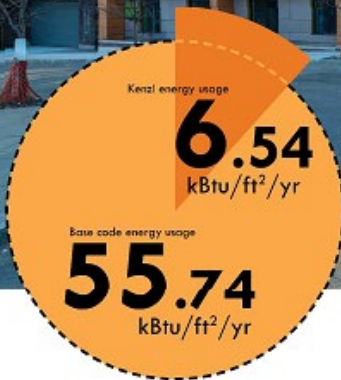
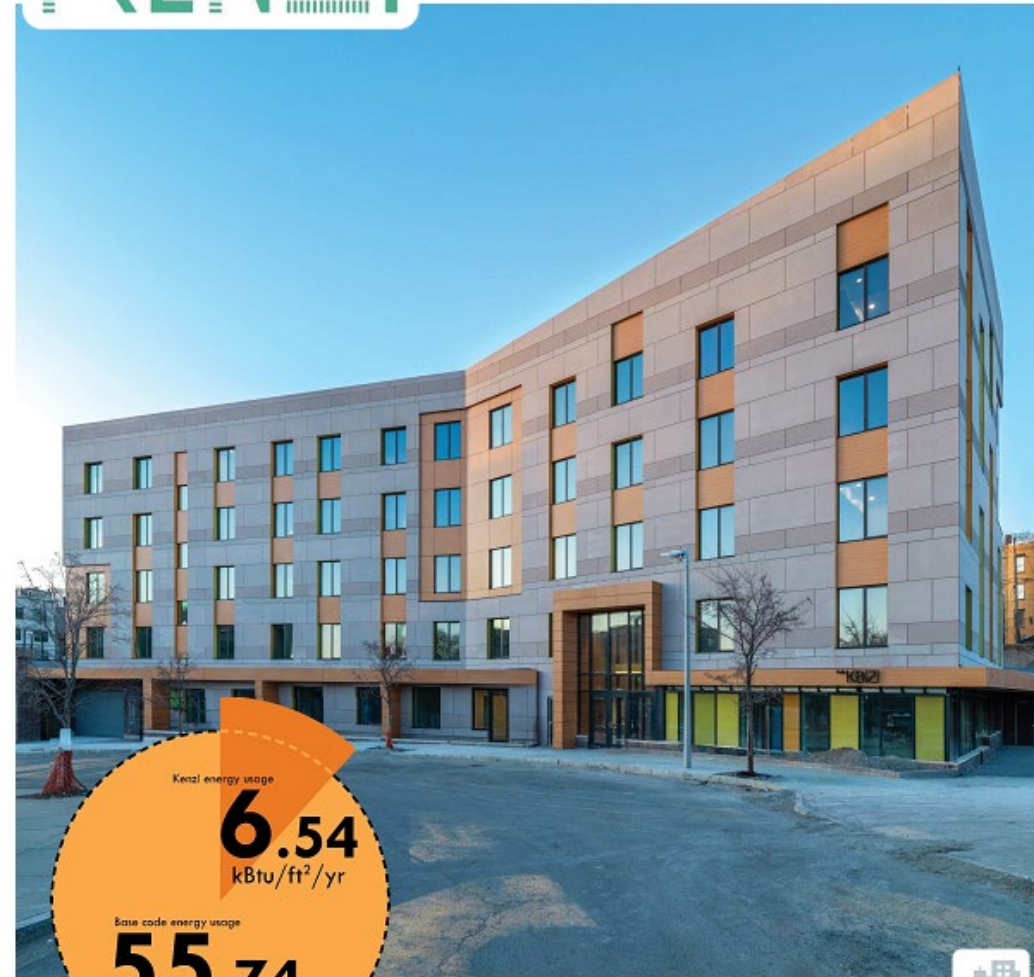
C40 – Fifth City Common, Chicago, IL

THE KENZ

STATS
50 units, age-restricted, affordable housing
Completed Spring 2024

RECOGNITION
PHIUS 2021 Design Certified
LEED Gold eligible with 73.5 points
EPA Indoor AirPlus
DoE Zero Energy Ready
EnergyStar Homes

Developer: POAH (Preservation of Affordable Housing)
Architect: DREAM Collaborative
Cedar: JS Consulting Engineers, LLC
MEP Engineer: Paterson Engineering Inc.
Civil Engineer: DeValle Zrain Inc.
Structural Engineer: RJ Farah
Landscape Architect: Deborah Myers Landscape Architects
Passive House Consultant: Building Evolution Corporation
PHIUS Verifier: CLEAResult
PV: Sunbug Solar & ReVision Energy Company
Battery: Current Storage Solutions
Contractor: NB General Contracting



D/R/E/A/M COLLABORATIVE POAH
POWERED BY DIVERSITY



GLAVEL

- Foam Glass Gravel used under Passive House boundary slabs
- Thermal insulation of R1.7 per compacted inch
- Compressive strength of 116psi
- Made from >95% recycled glass



BATTERY STORAGE USAGE



BESS System



Salem Heights
281 Units Family
Salem, MA

107 kw PV Vertical Array

270 kw PV Rooftop Array



Vertical PV

Sources

(construction related)

- 4% LIHTC Allocation
- State Soft Loans
- Utility Incentive

Total \$50,000,000

Uses

| | Pricing | Per Unit |
|-------------------------------|---------------------|---------------|
| HVAC | \$ 9,500,000 | \$34k |
| Enclosure | \$17,600,000 | \$63K |
| Relocation | \$1,120,000 | \$4k |
| Demo & Site Work | \$5,600,000 | \$20k |
| Solar PV | \$790,000 | |
| Other Non-DER Scope | \$5,200,000 | \$26k |
| Total Hard Cost* | \$50,700,000 | \$180k |
| Total Hard Cost – DER* | \$44,100,000 | \$157K |

Salem Heights 281 Units



Proposed Barry Farm Redevelopment

Approximately 900 units in total, including 725 affordable housing units

Building 1A

139 units
22,800 SF retail space
PIS Date - 1/2025

Building 2

184 units
10,500 SF retail space
PIS Date - 1/2026

Building 3

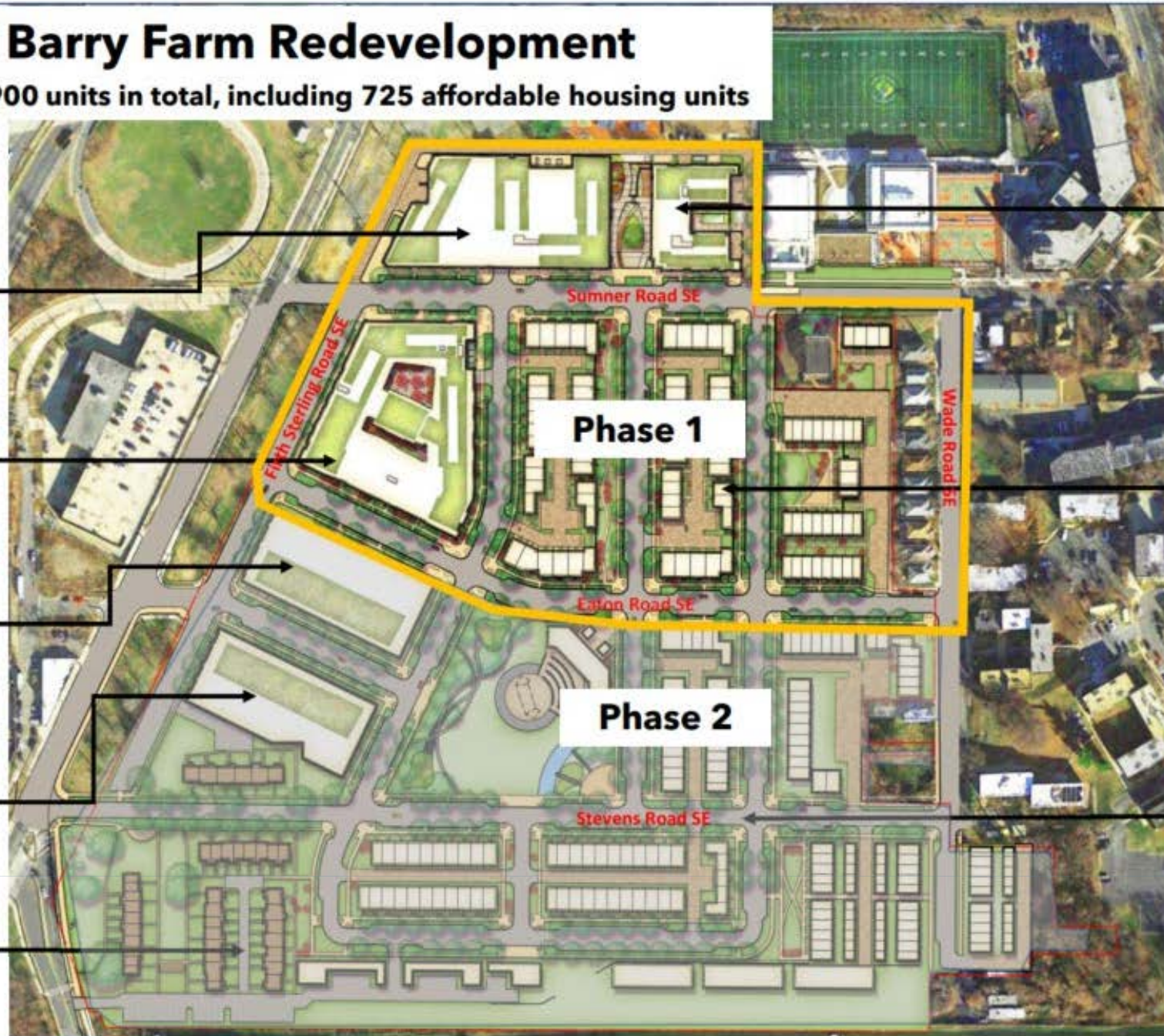
116 units
0 SF retail space
PIS Date TBD

Building 4

116 units
0 SF retail space
PIS Date TBD

5 Historic Buildings

32 units



Building 1B

108 units
5,096 SF retail space
PIS Date - 9/2023

Phase 1 Townhomes

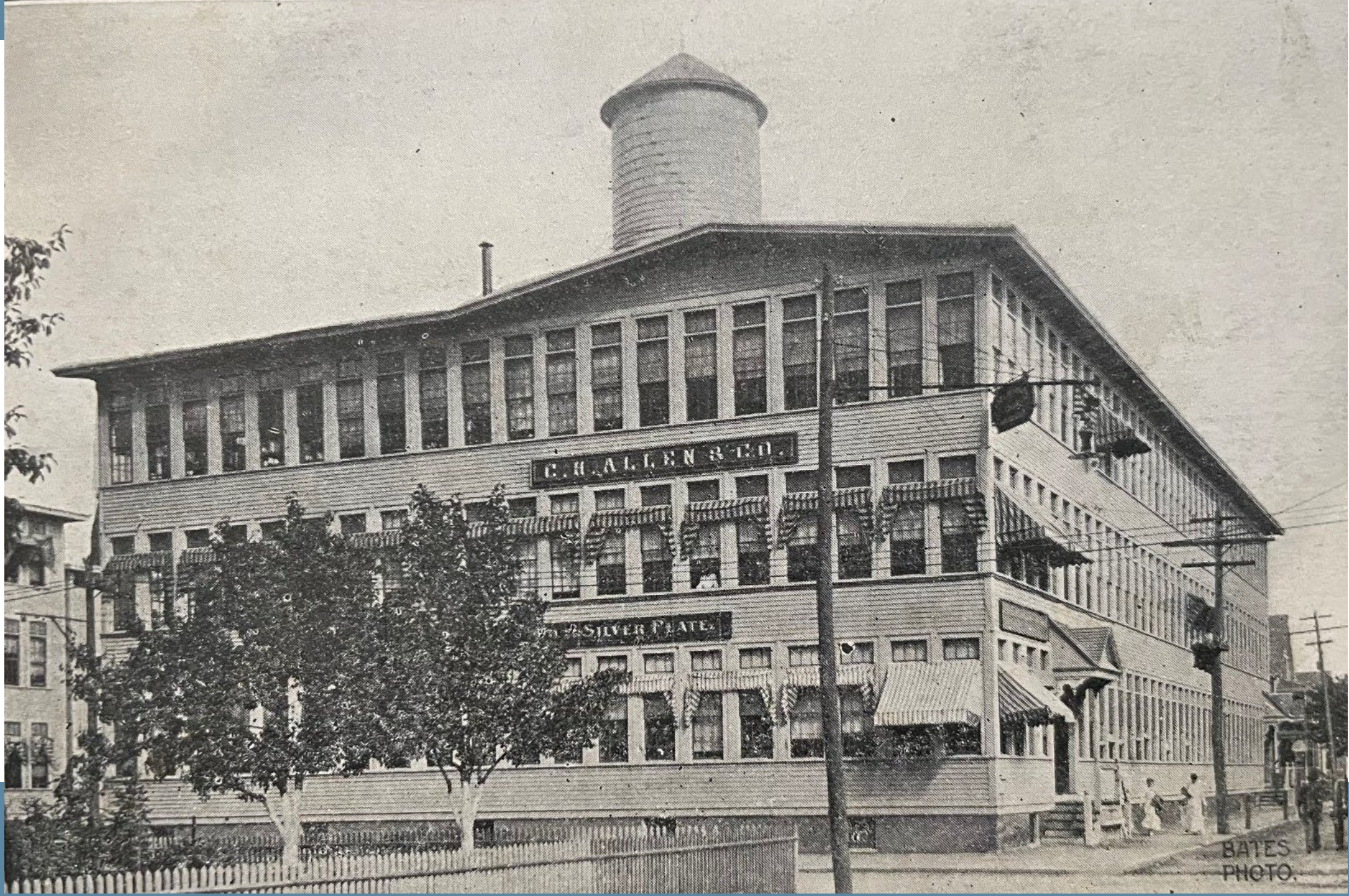
115 units
0 SF retail space
PIS Date - 6/2025

Phase 2 Townhomes

154 unit
0 SF retail space
PIS Date TBD



The Asberry, Barry Farm



E. H. ALLEN & CO.

SILVER PLATE

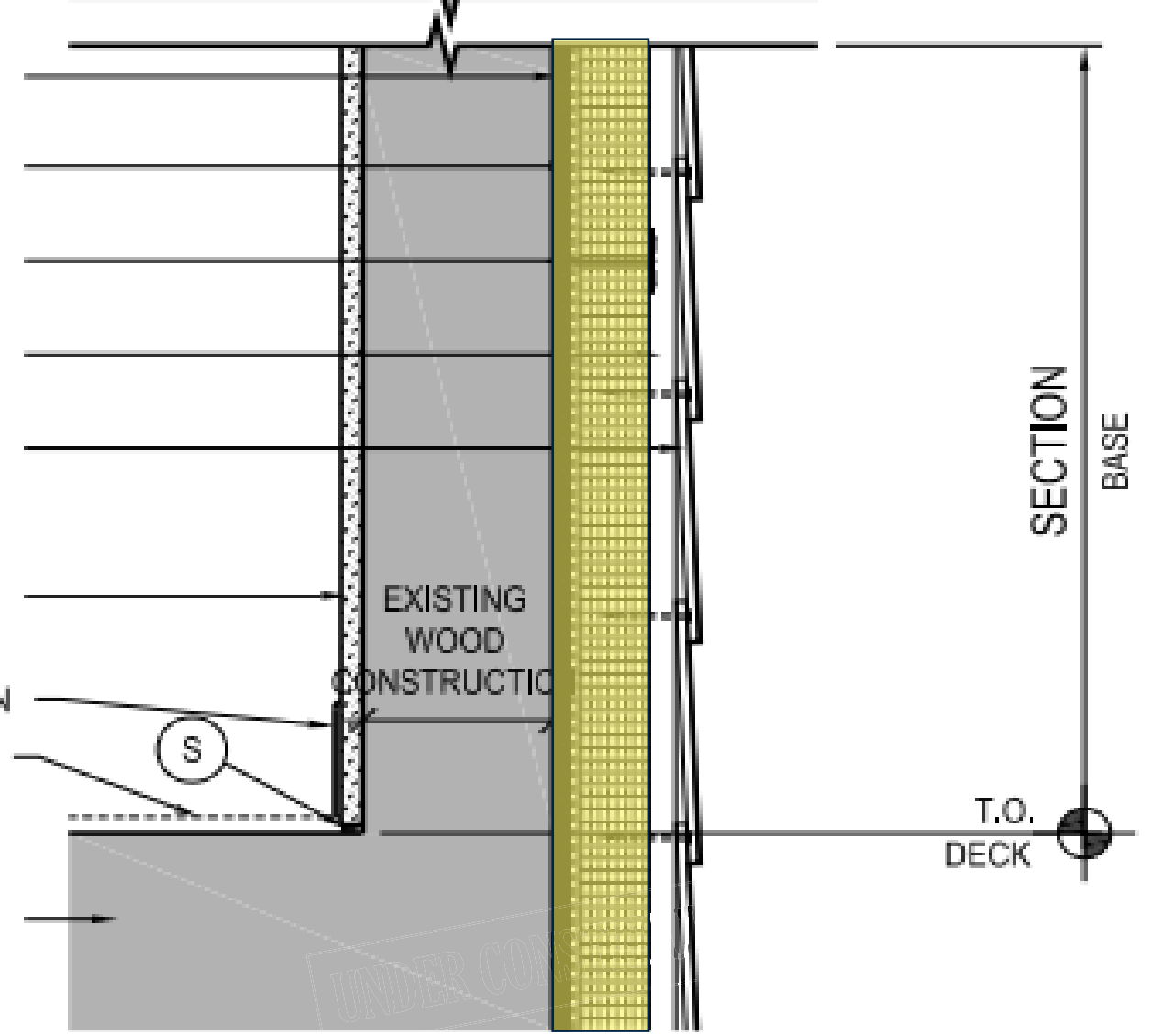
BATES
PHOTO.



EXISTING EXTERIOR SHEATHING. REPLACE DAMAGED/ROTTING SHEATHING AS NECESSARY
 FULLY ADHERED WEATHER RESISTIVE BARRIER / AIR AND WATER BARRIER
 2" MINERAL WOOL INSULATION BOARD, SECURED WITH FASTENERS AND INSULATION PLATES
 1x4 PT FURRING STRIPS @ 16" O.C. (BEYOND) ATTACHED TO HORIZONTAL Z CHANNELS
 WOOD LAP SIDING TO MATCH EXISTING. FULLY PRIME ALL SIDES, INCLUDING ALL FIELD CUTS

EXISTING INTERIOR GWB. REPAIR/REPLACE, PATCH, & FINISH GWB AS NECESSARY
 EXISTING BASE TO REMAIN
 EXISTING FINISHED FLOORING TO REMAIN

EXISTING SLAB



Gardner Terrace 1, Attleboro MA





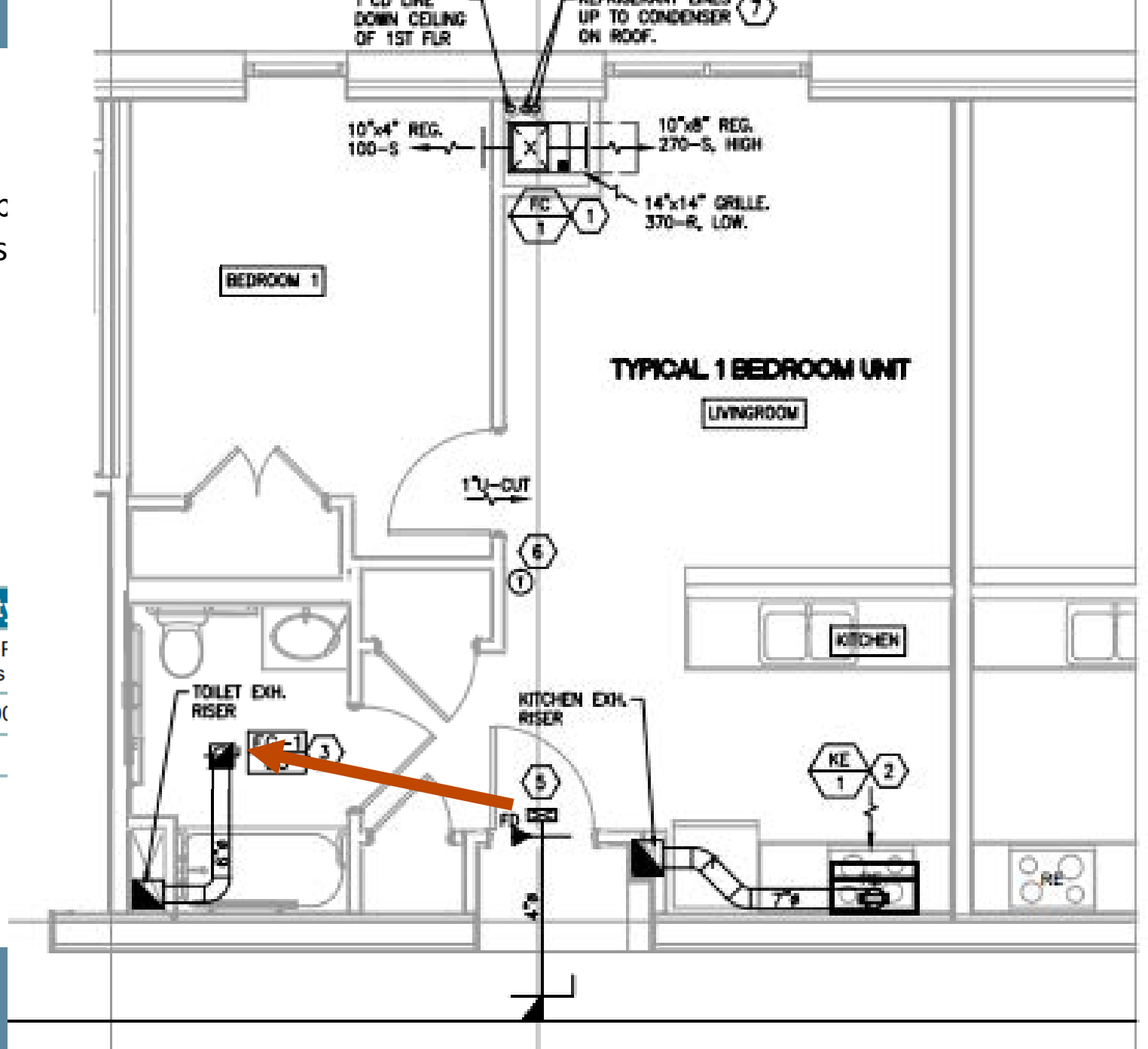
Complaints started out that the
bathrooms were cold.

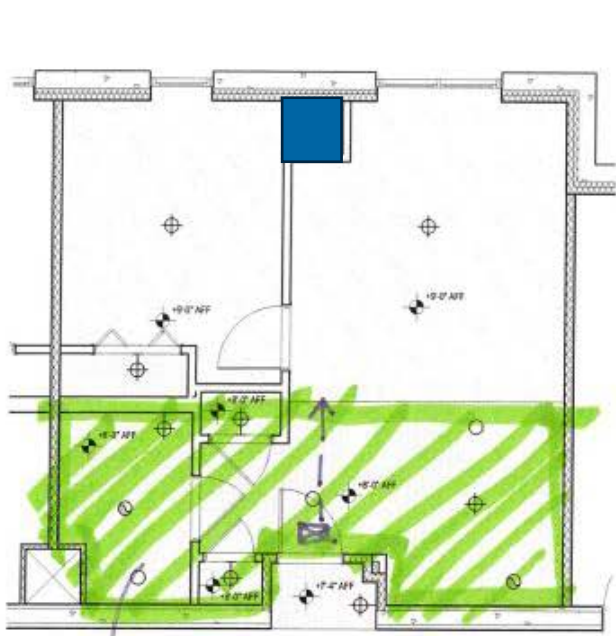
Insert drawing that clearly shows supply
allowable reduction from the 80 cfm/s

Show short cycling path on drawing.

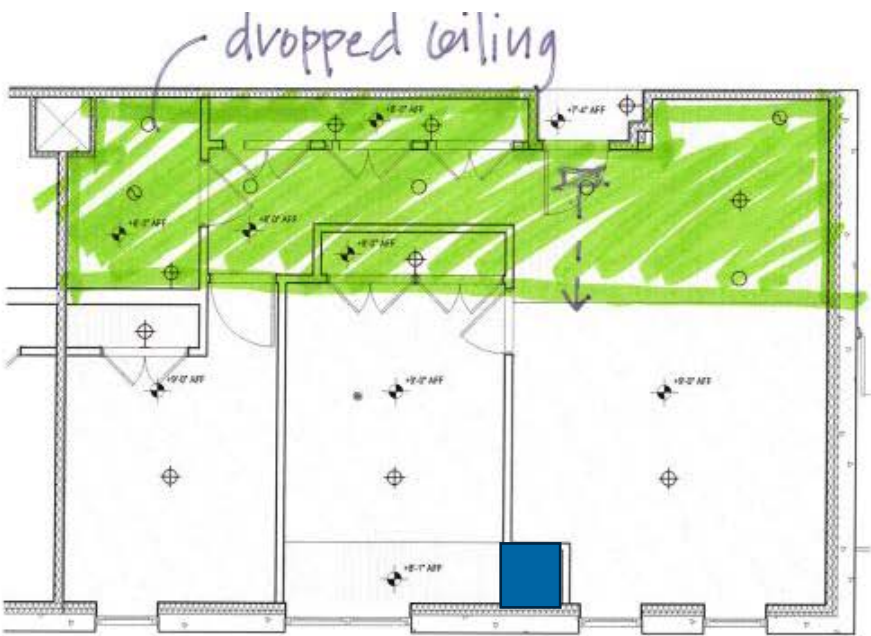
Desired Indoor Air Quality

| | |
|-------------------|--|
| Air Changes | 0.4 ACH but not less than 15 CFM/person (ASHRAE 62.2) 60 CFM per unit based on exhaust requirements |
| Carbon Dioxide | Outside Air Plus 700 PPM; No greater than 1,000 PPM |
| Relative Humidity | 30-60% |

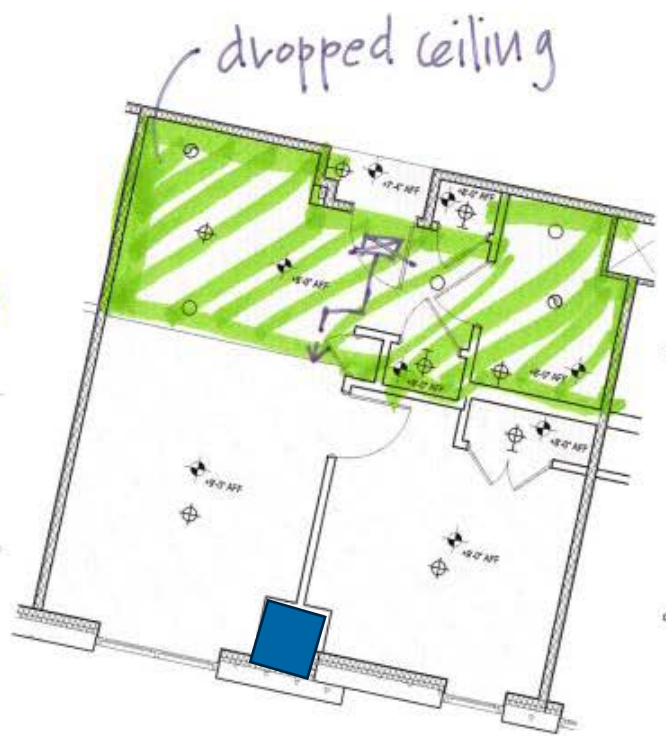




dropped ceiling



dropped ceiling



dropped ceiling

REFLECTED CEILING PLAN TYP. NOTE
SEE ENLARGED PLANS FOR UNIT REFLECTED
ALL CEILING FAN BLADES TO BE W/IN #2 AFF

- LEGEND
- 2x2 ACoustical CEIL
 - GYPSUM BOARD
 - TRESPA PANELS, SEE
 - BIRCH PLYWOOD PAM 502
 - POPCORN FINISH ON
 - PAINTED UNDERSIDE
 - 2x6 HSS STL OR ALUM
 - STEEL OR ALUM CANI
 - CEILING MOUNTED FL
 - RECESSED CAN LIGH
 - EXHAUST FAN
 - SURFACE/WALL MOUN
 - 2x2 FLOURESCENT LU
 - 2x4 FLOURESCENT LU
 - 1x4 FLOURESCENT LU
 - LINEAR FLOURESCEN
 - SUPPLY DIFFUSER
 - RETURN GRILLE

4 ONE BEDROOM UNIT REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"

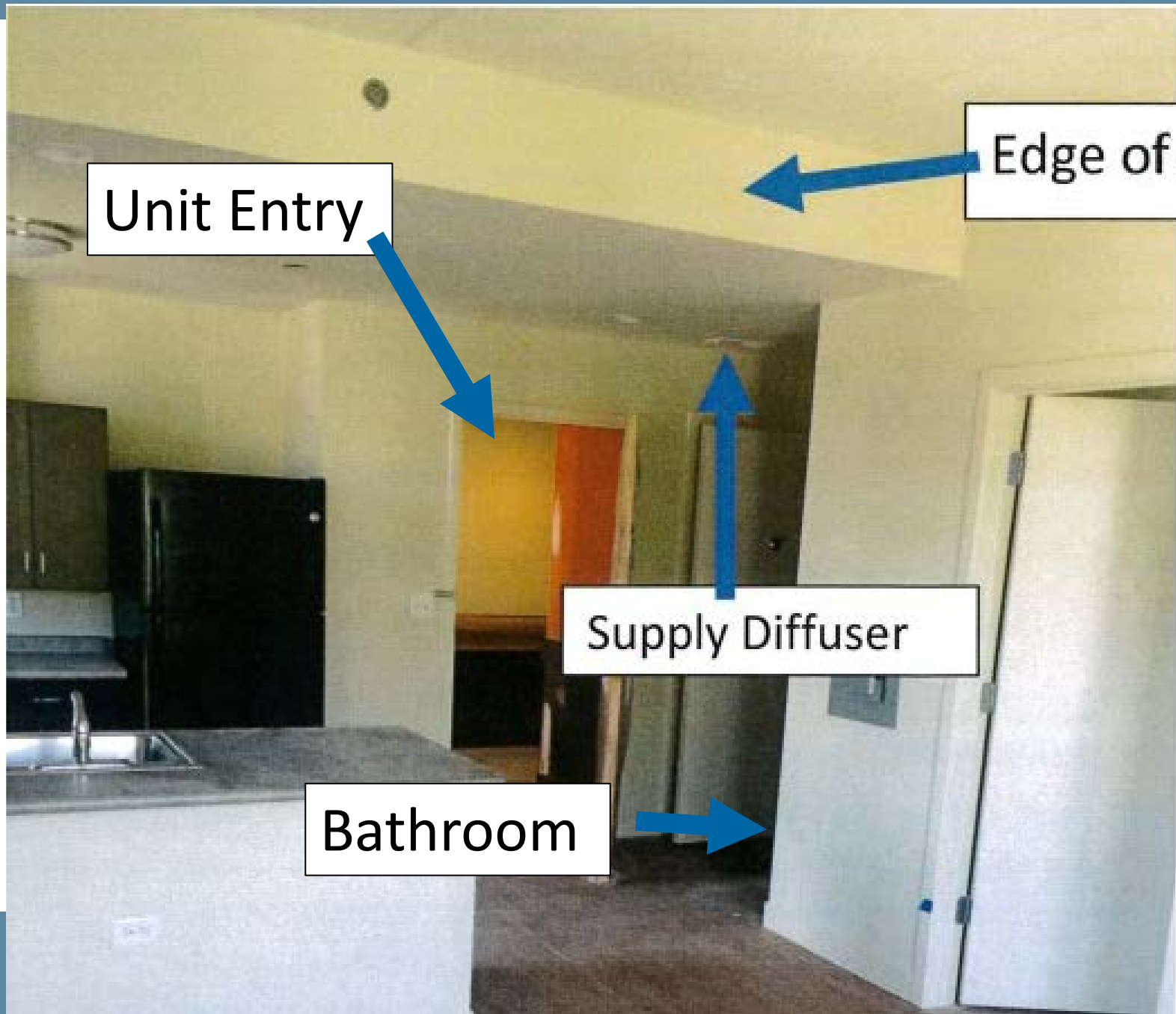
5 TWO BEDROOM UNIT REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"

6 TYPE 504 ONE BEDROOM UNIT REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"

Supply Diffuser

--- potential relocation of diffuser

1 of 3

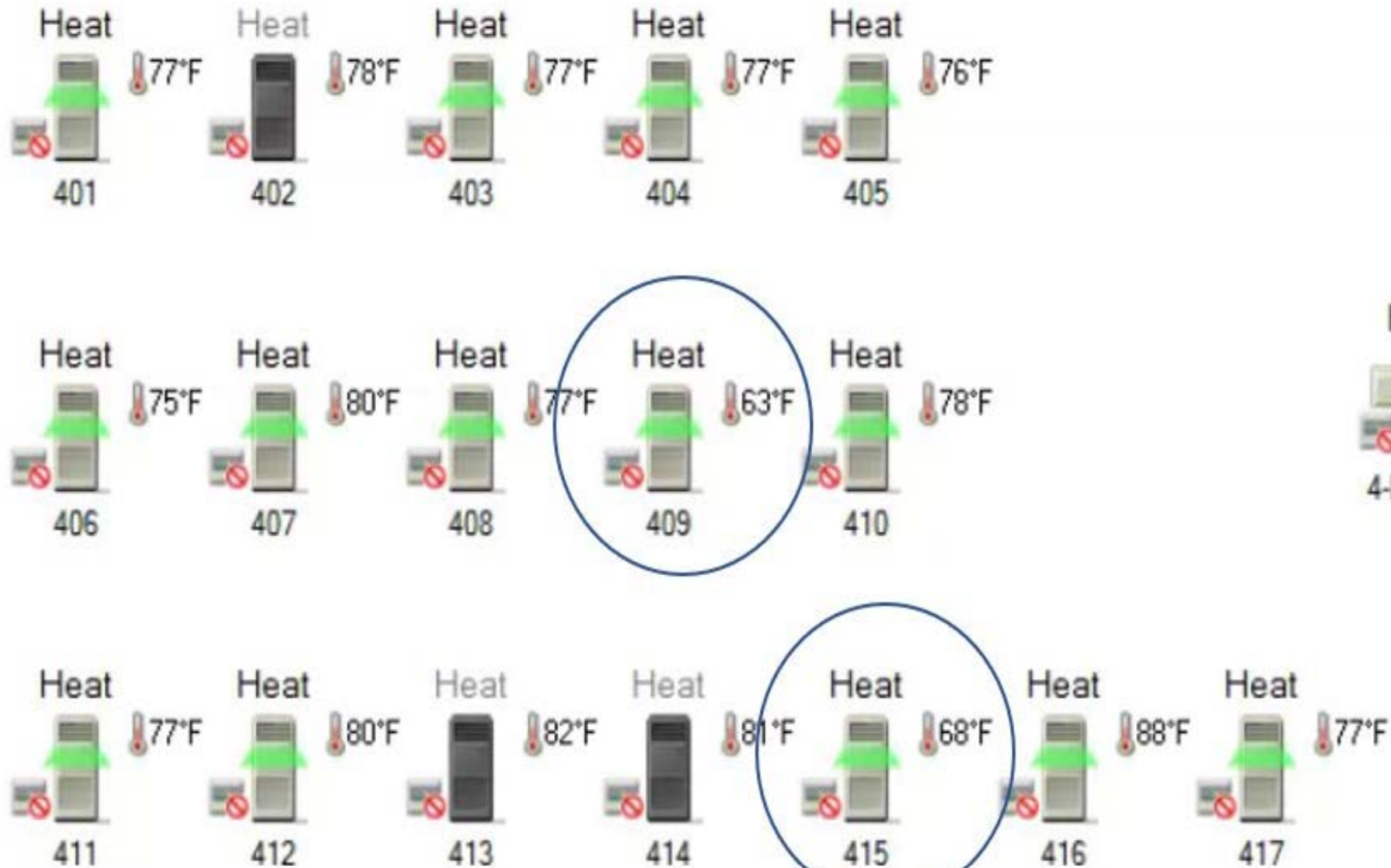


Unit Entry

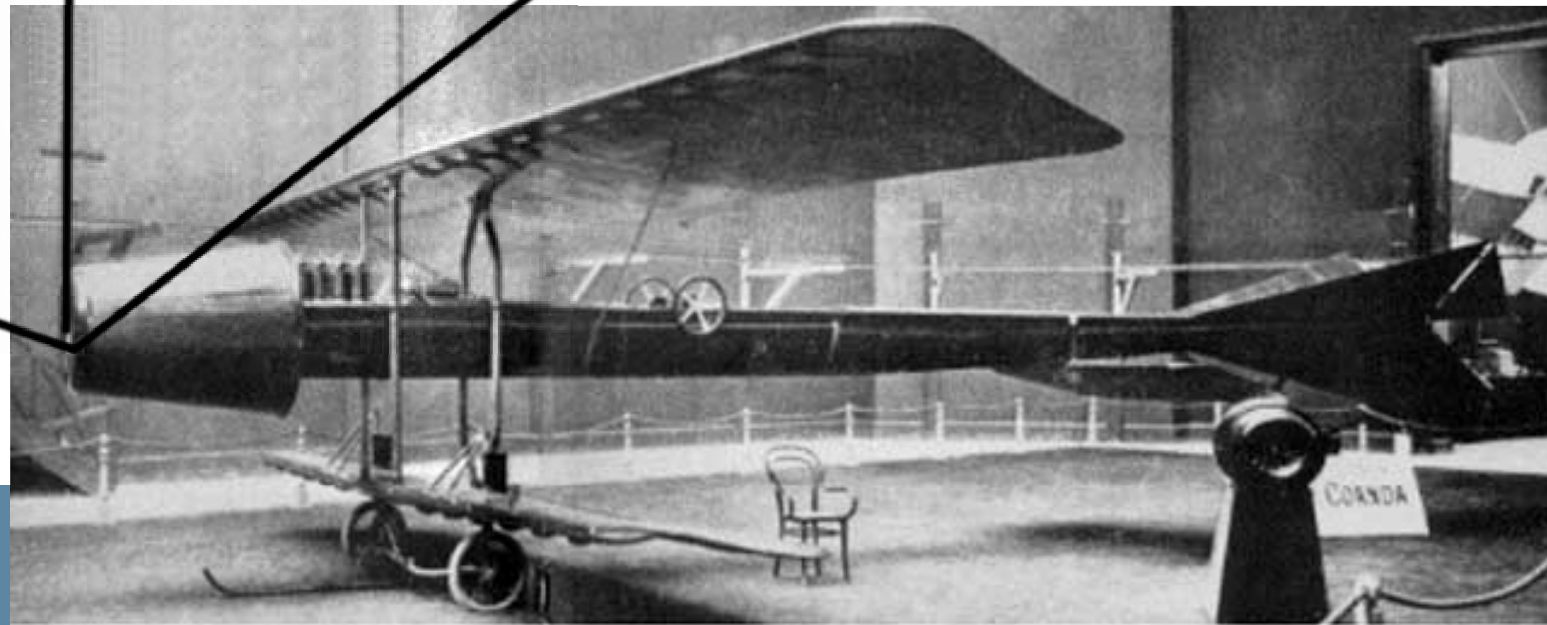
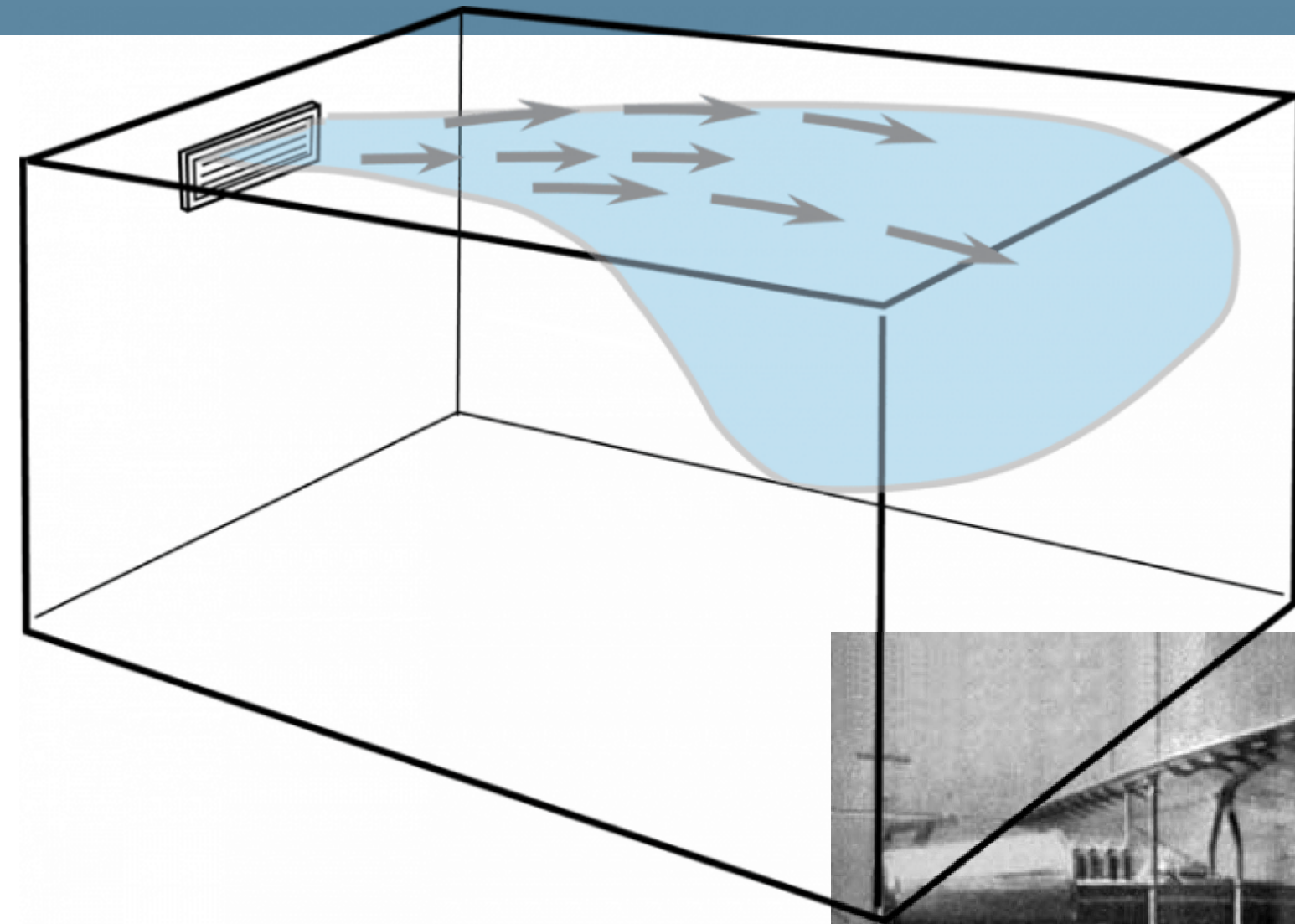
Edge of soffit.

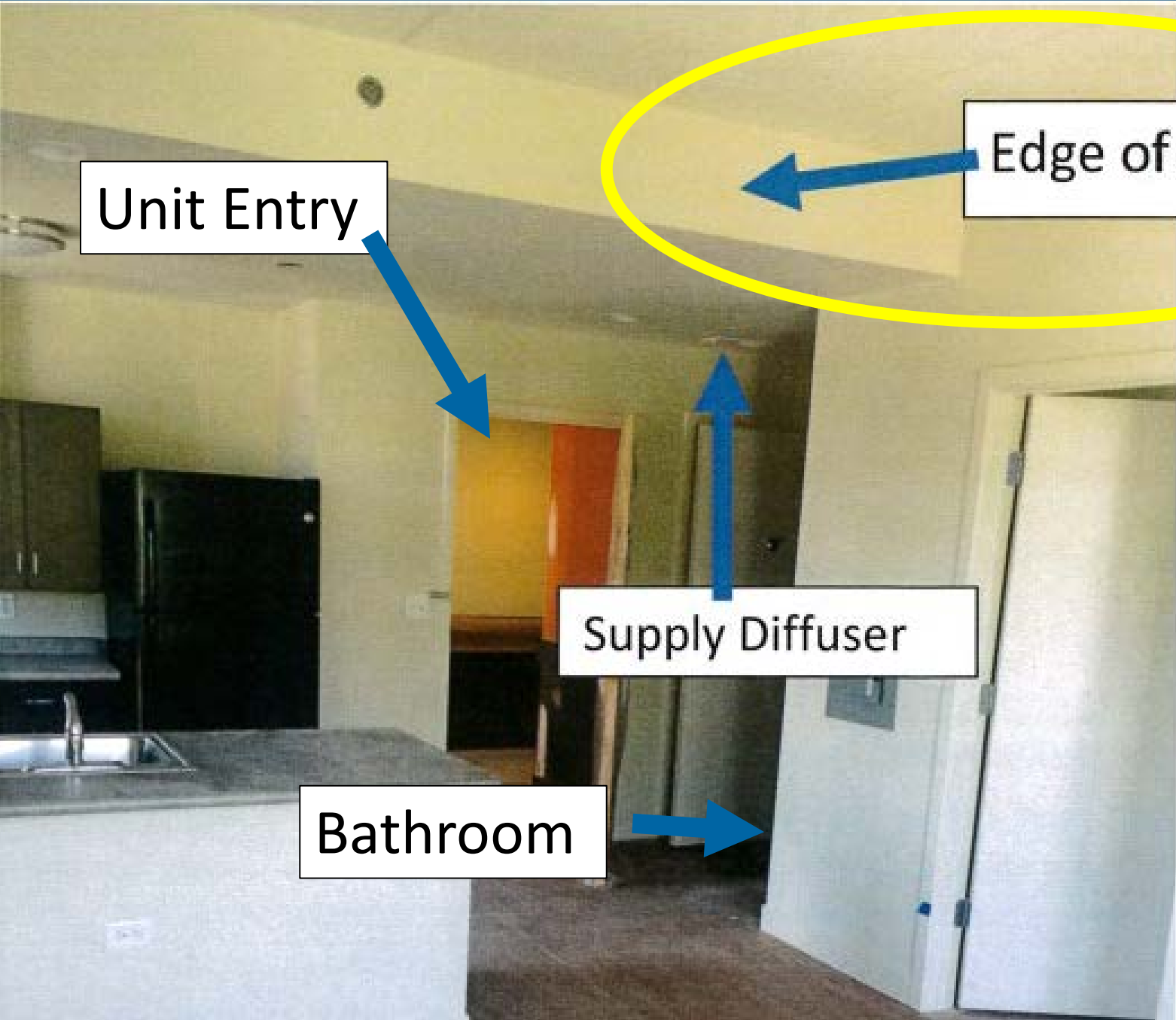
Supply Diffuser

Bathroom

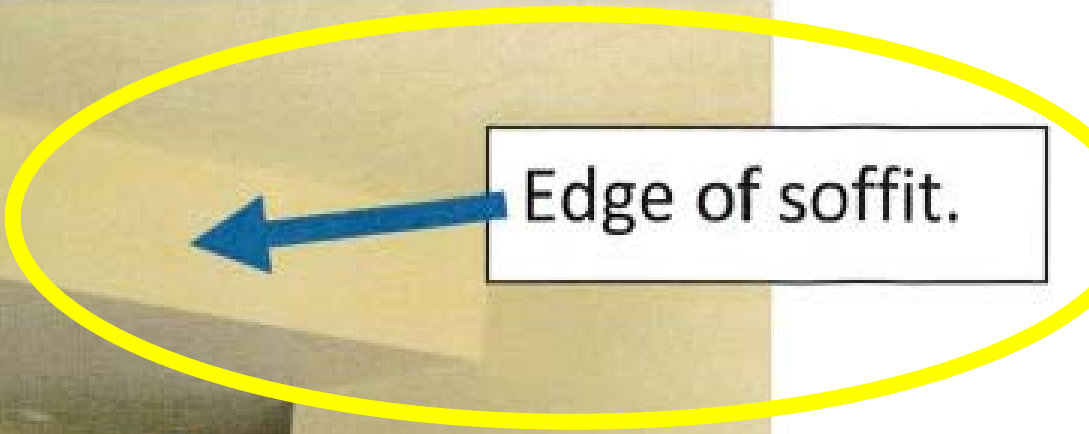


Coanda Effect





Unit Entry



Edge of soffit.



Supply Diffuser



Bathroom





**SALEM FAIRWEATHER DEEP ENERGY
EXTERIOR RETROFIT
FEASIBILITY STUDY**

Team:
Onion Flats, Architect
Building Evolution Corp,
Enclosure and MEP Consultants
Haycon, Precon Services



Sources

Uses

| | Amount |
|---------------------------------|---------------------|
| CLIMATE READY HOMES (LISC) | \$1,000,000 |
| LEAN | \$3,302,000 |
| MA DOER | \$5,080,000 |
| GRRP (HUD) | \$7,620,000 |
| Private Donor | \$2,000,000 |
| GGRF (EPA) | <i>tbd</i> |
| HEEHR (equipment upgrades) | \$1,778,000 |
| DOE HOMES Rebate | \$1,016,000 |
| Total Possible | \$22,000,000 |
| Total Committed to Date: | \$16,000,000 |

| | Pricing | Per Unit |
|-------------------------|---------------------|------------|
| HVAC+DHW | \$ 9,900,000 | \$78k |
| Enclosure | \$5,100,000 | \$40K |
| Relocation | \$0 | \$0 |
| Demo & Site Work | \$400,000 | \$3k |
| Solar PV | \$350,000 | |
| Other Non-DER Scope | \$1,000,000 | \$8k |
| Total Hard Cost* | \$19,000,000 | \$k |
| Total DER Cost* | \$18,000,000 | \$K |

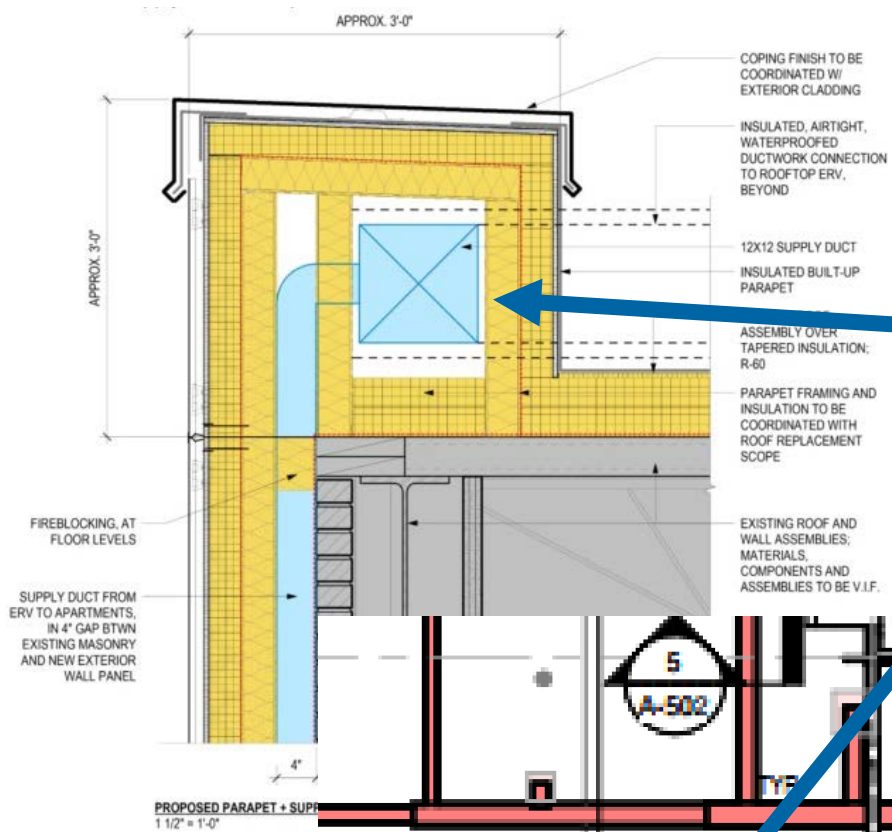
Salem Fairweather 127 Units

Ductwork from rooftop ERV to Window Jamb



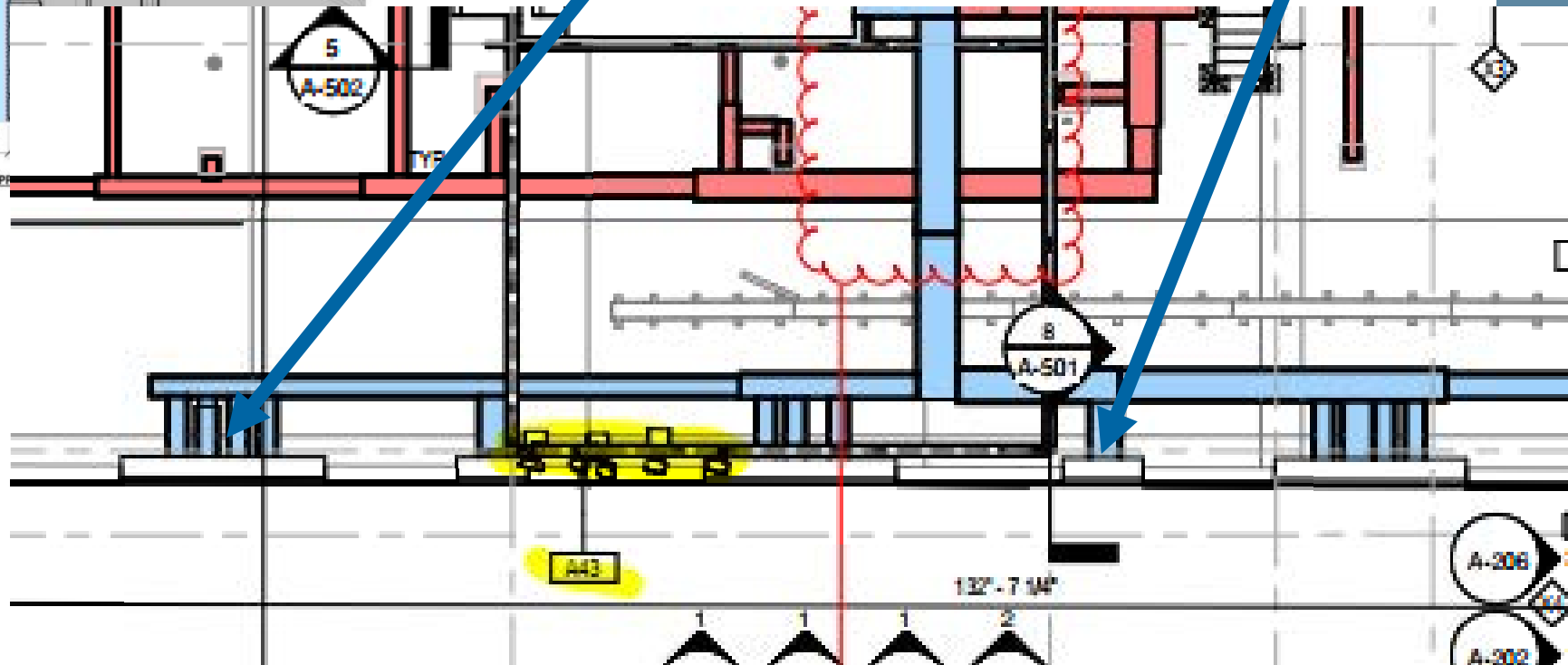
Refrigerant Line

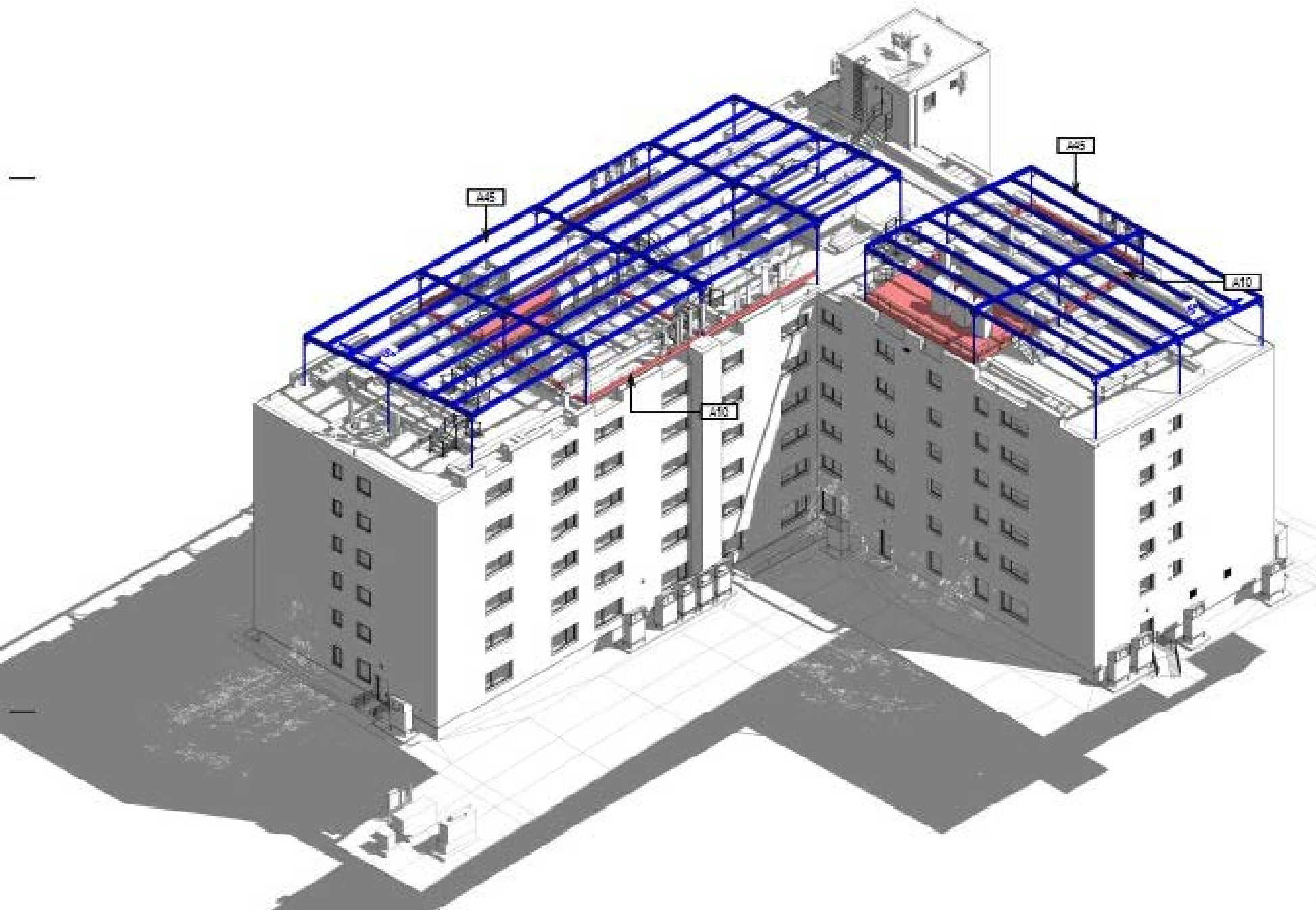
Rat Trap



Discontinuous Parapet

Using Cavity Created on Exterior wall to run Mechanical Equipment





Maximizing Solar PV Production (canopy over mechanical equipment and cell tower equipment)

Ground Mount and Roof Canopy Array will produce 225,000 kwh, 40% of our load.

Replicable?



Salem Fairweather



Beverly Fairweather



Danvers Fairweather



Peabody Fairweather

