

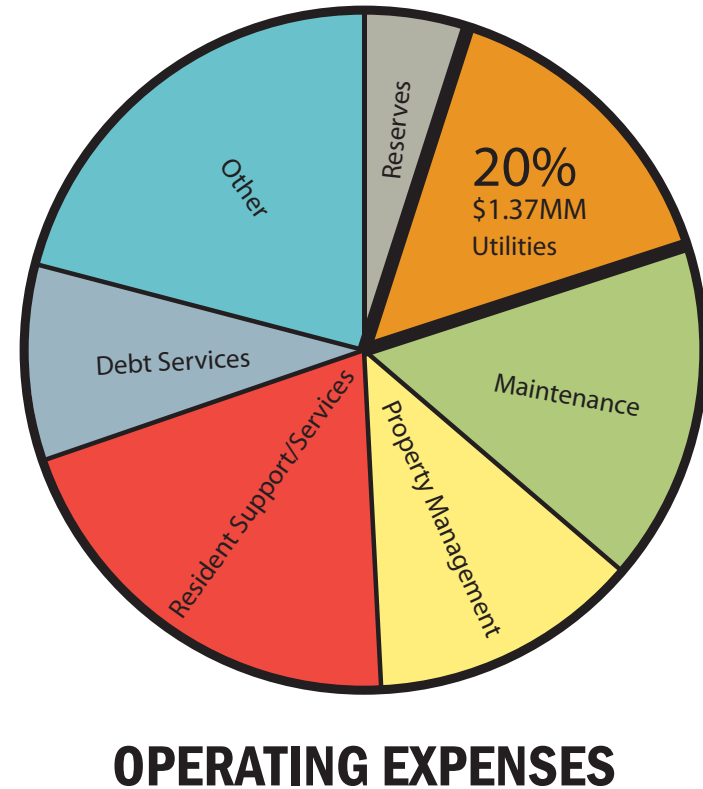
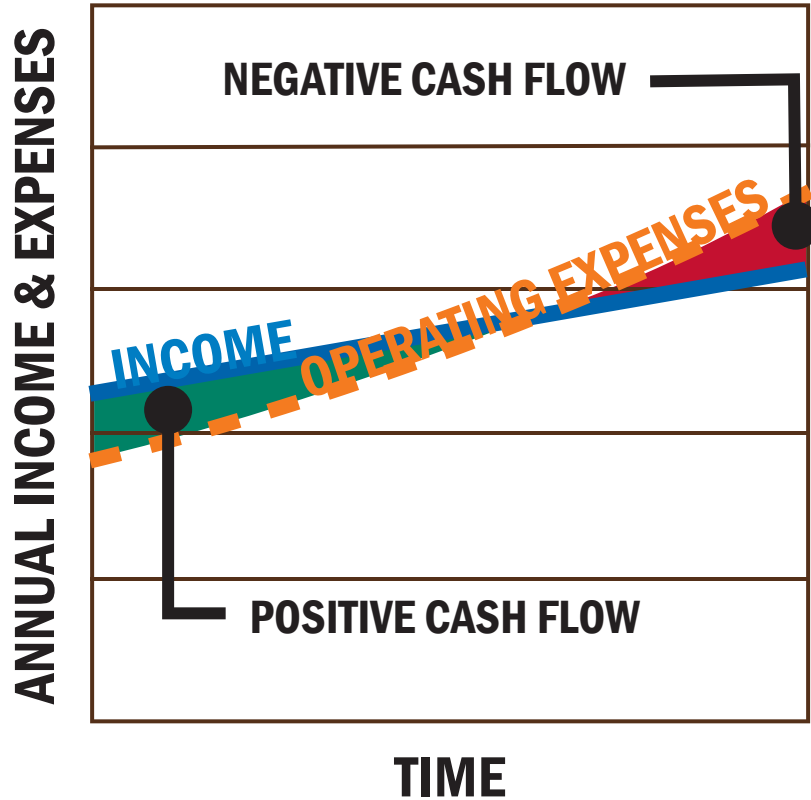


# **Multi-family Passive House Rehabilitation**

**The feasibility of improving affordability  
and health for low income individuals  
through extreme energy efficiency**

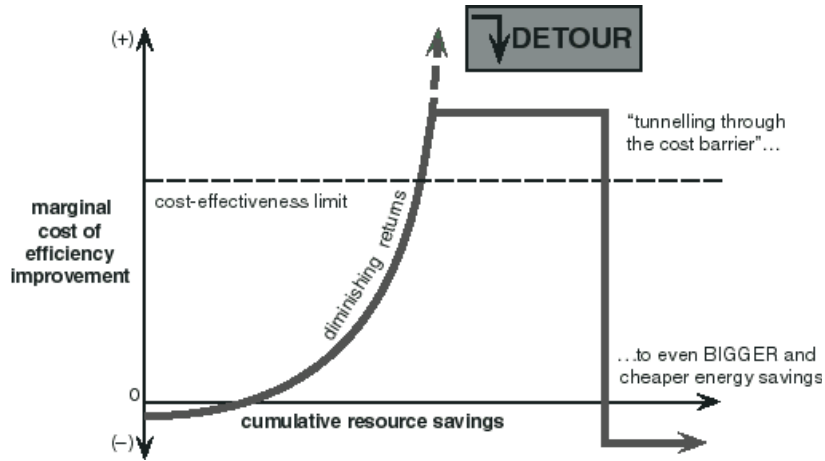


# Affordable Housing Crisis

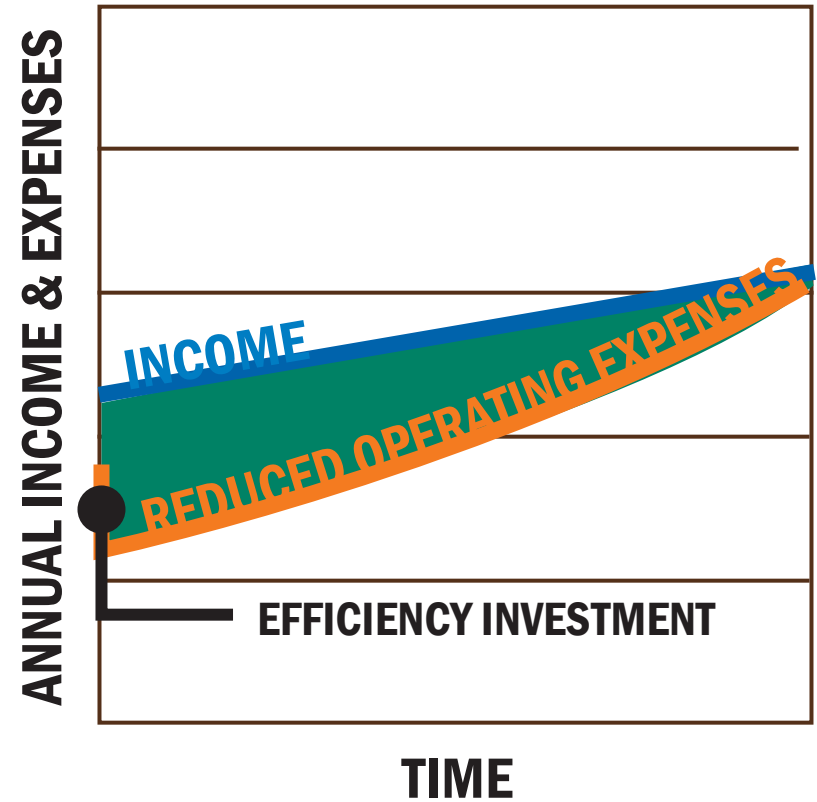


# PH Efficiency Solution

## TUNNELING THROUGH THE COST BARRIER



Source: Hawken & Lovins, Natural Capitalism



## project team



Central City Concern



SERA Architects



Walsh Construction



Green Hammer



PAE Consulting Engineers

# Mark O. Hatfield Building



1930 (north & east elevation)



today (north & east elevation)



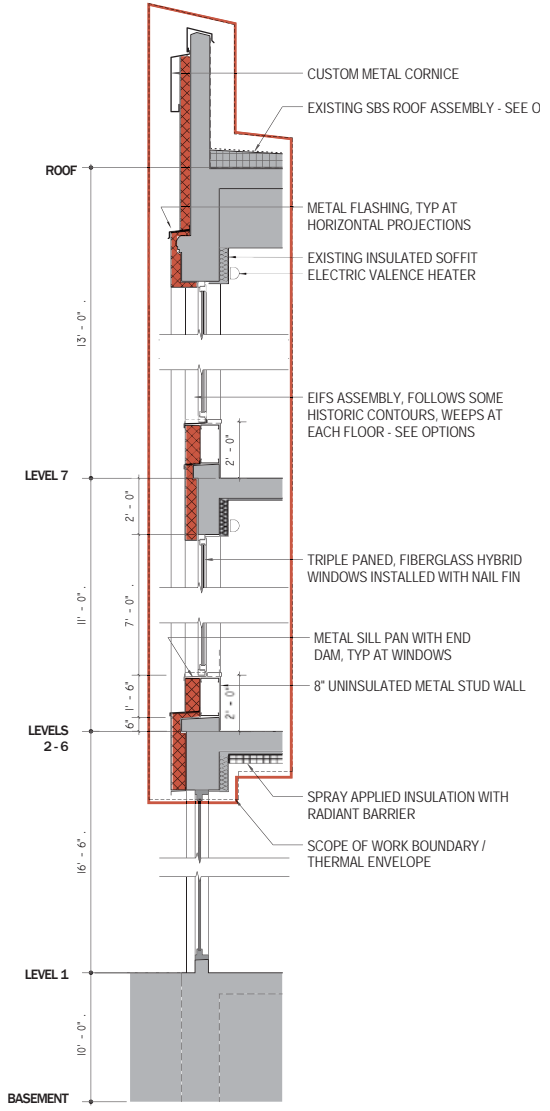
spalling concrete



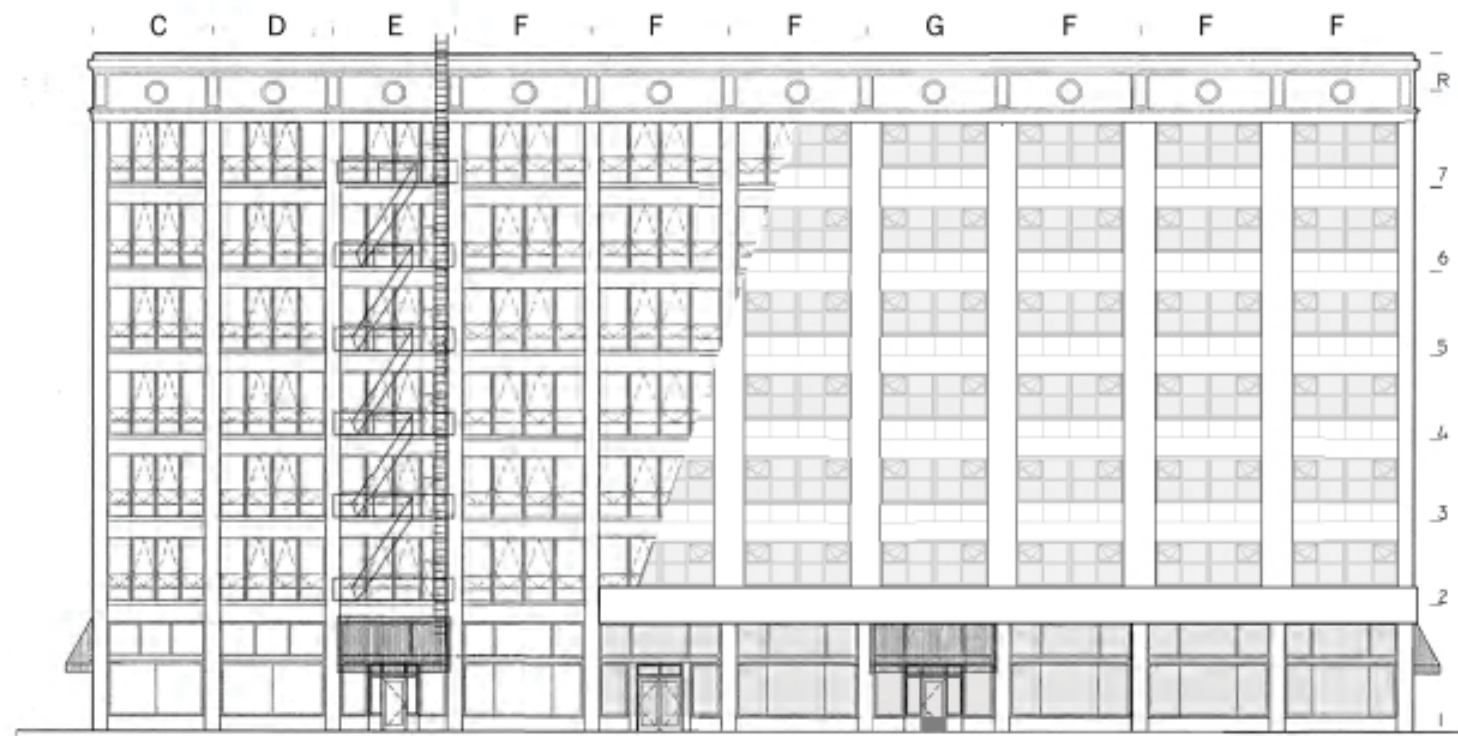
today (south & east elevation)

# Mark O. Hatfield Building

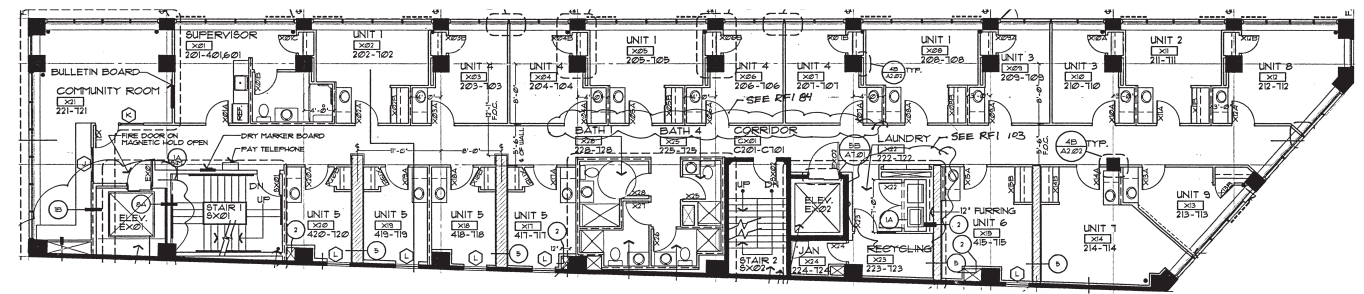
- 7 stories + basement
- 48,000 SF
- 106 single occupancy units
- completed in 1910;
- renovated in 1931, 1965, & 1994
- concrete frame construction



proposed PH section

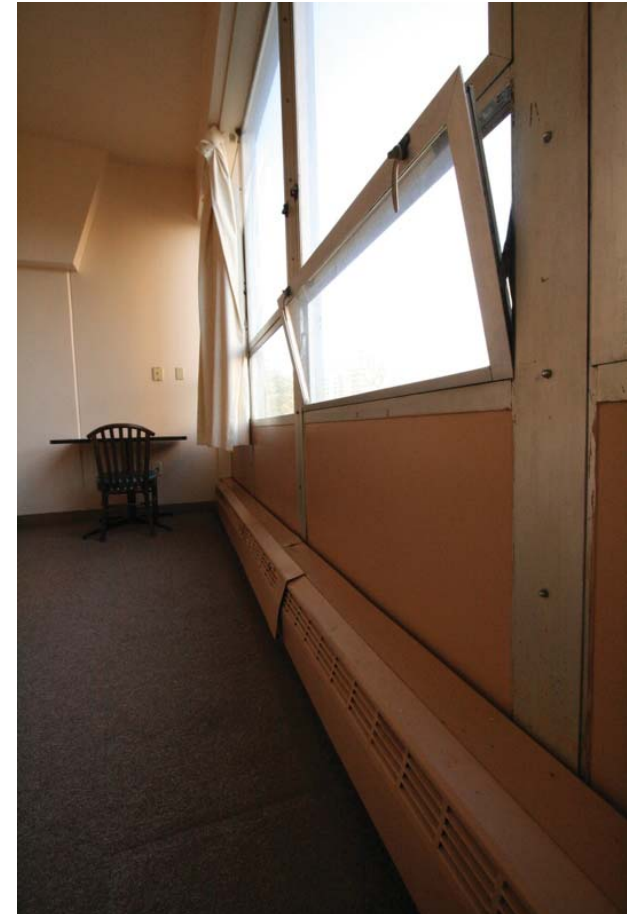


existing north elevation

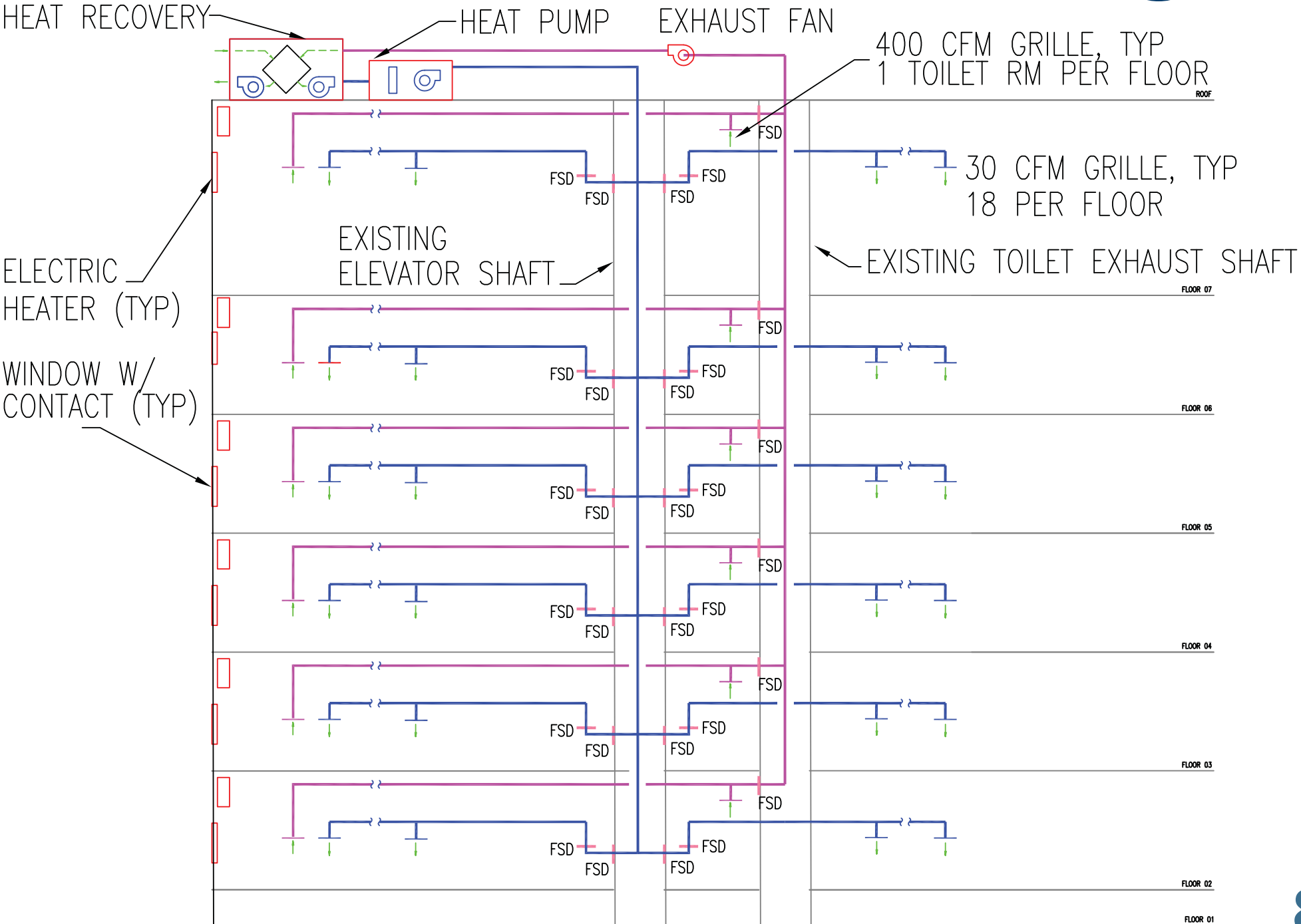


existing typical upper floor plan

# Mark O. Hatfield Building



# Mark O. Hatfield Building

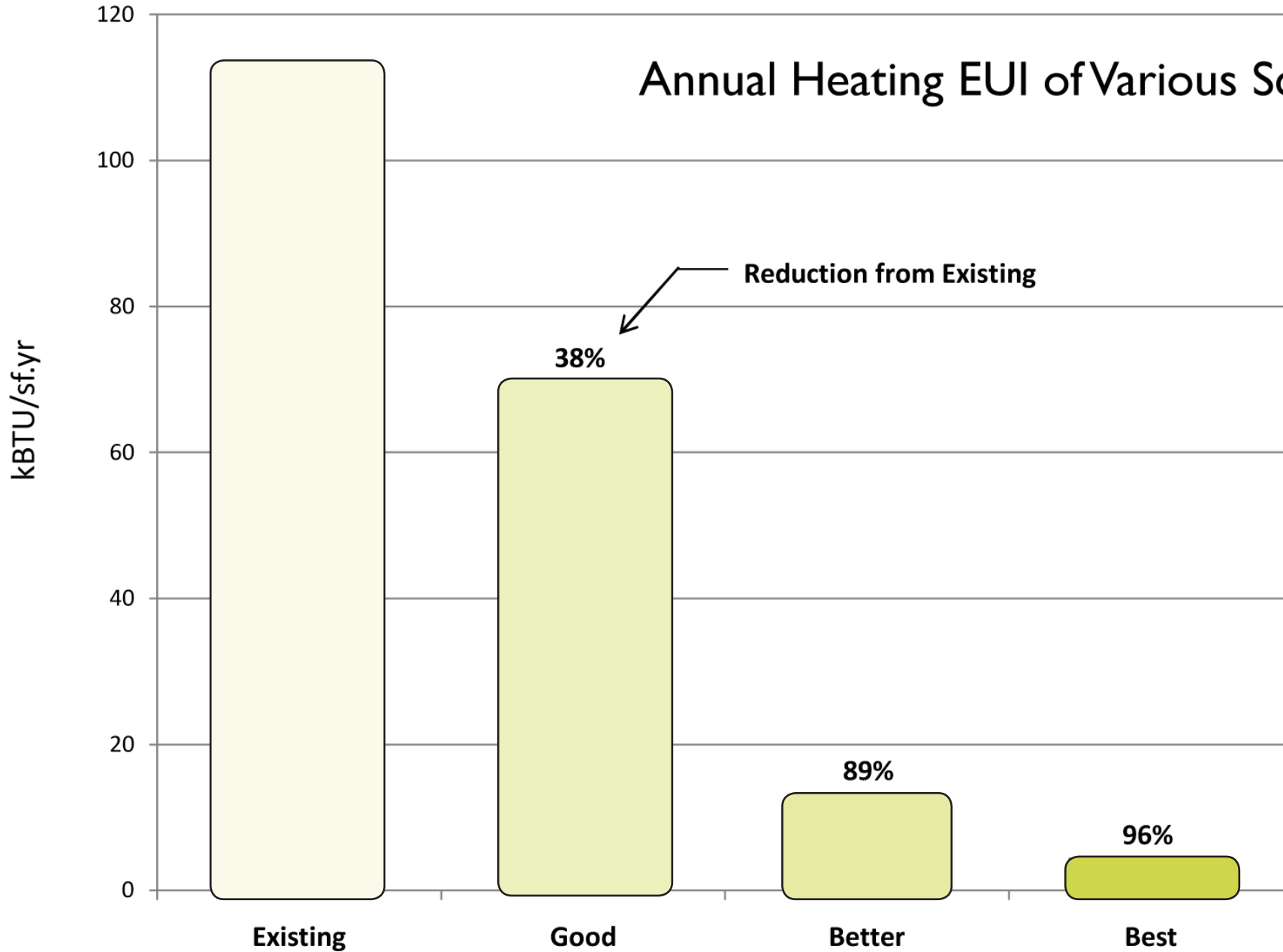


# Feasibility: Good, Better, & Best

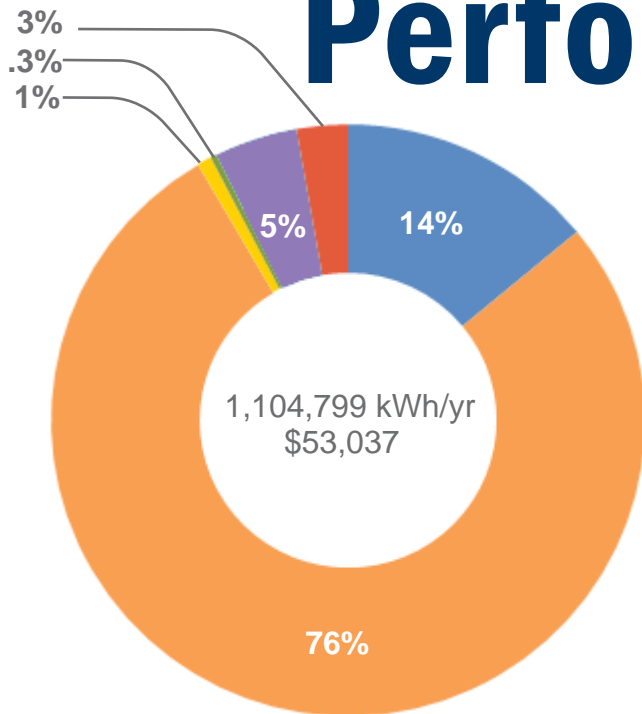
<b>ASSEMBLY COMPONENT OPTIONS</b>	<b>Existing Building</b>	<b>Good Rehab</b>	<b>Better Rehab</b>	<b>Best Rehab Passive House</b>
Wall Insulation	none	none	2" EPS Exterior Insulation	6" EPS Exterior Insulation
Roof Insulation	Existing 4" Polyiso Board	Existing 4" Polyiso Board w/limited repair	Existing 4" Polyiso Board w/limited repair	Existing 4" Polyiso Board w/limited repair
Window Frame	Aluminum (not thermally broken)	Fiberglass (Cascadia 300 tilt/turn)	Fiberglass (Cascadia 300 tilt/turn)	Fiberglass/Vinyl (Rehau Geneo Euroline 4700)
Window Glazing	Single Pane	2-pane/Cardinal LoE 366 Argon	3-pane/Cardinal LoE 366/180 Argon	3-pane Rehau Geneo PHZ
Airtightness (ACH at 50 pa)	10	5.00	0.60	0.60
<b>HEATING &amp; VENTILATION</b>				
Space Heating System	central boiler with unit steam radiators	existing central boiler to remain, new steam radiators, repaired distribution pipe	unit electric cove radiant heaters (1kW), central heat pump to temper supply air	unit electric cove radiant heaters (1kW), central heat pump to temper supply air
Ventilation	operable windows, common room PTAC, common bathroom exhaust	operable windows, common room PTAC, common bathroom exhaust	operable windows, central HRV with unit supply and common bathroom exhaust	operable windows, central HRV with unit supply and common bathroom exhaust
Ventilation Heat Recovery	none	none	yes, central 83% efficient model	yes, central 93% efficient model

# Performance

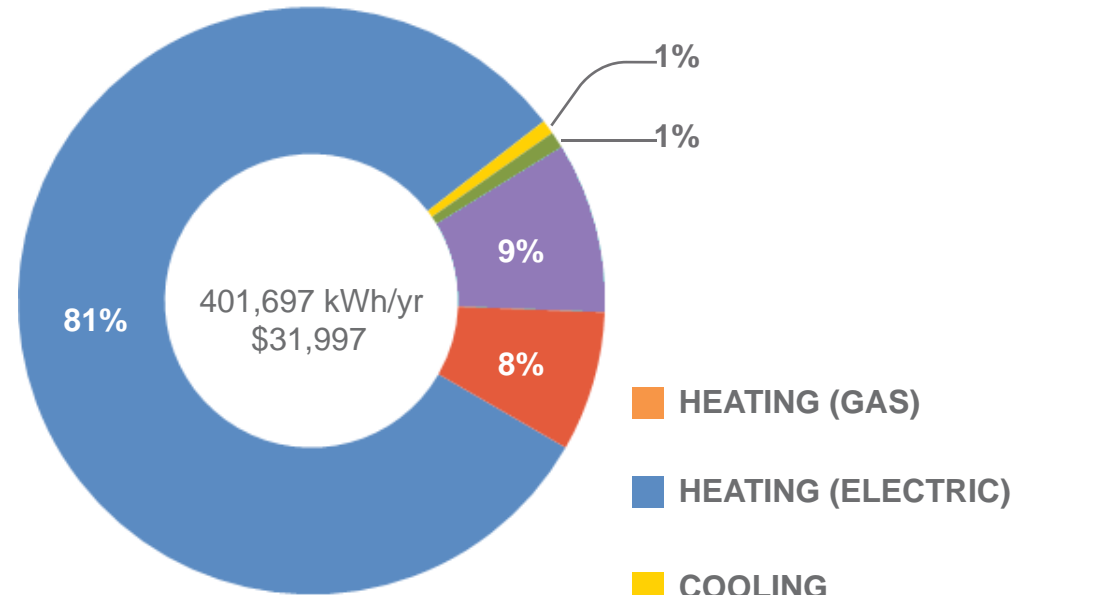
Annual Heating EUI of Various Scenarios



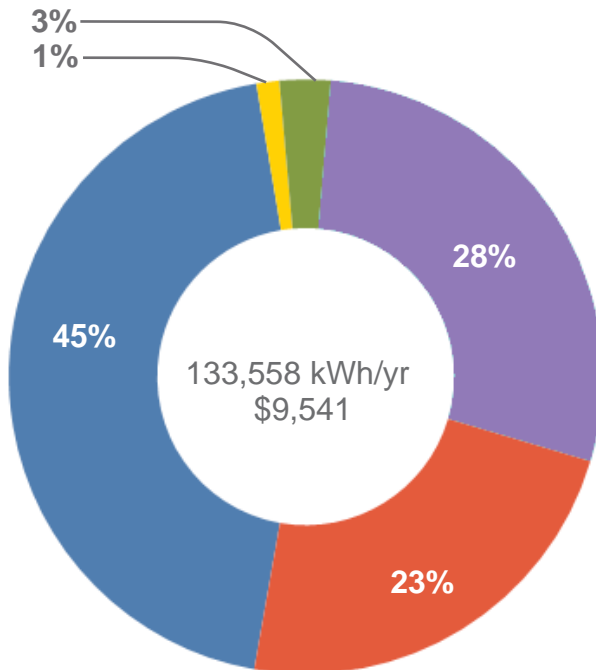
# Performance & Savings



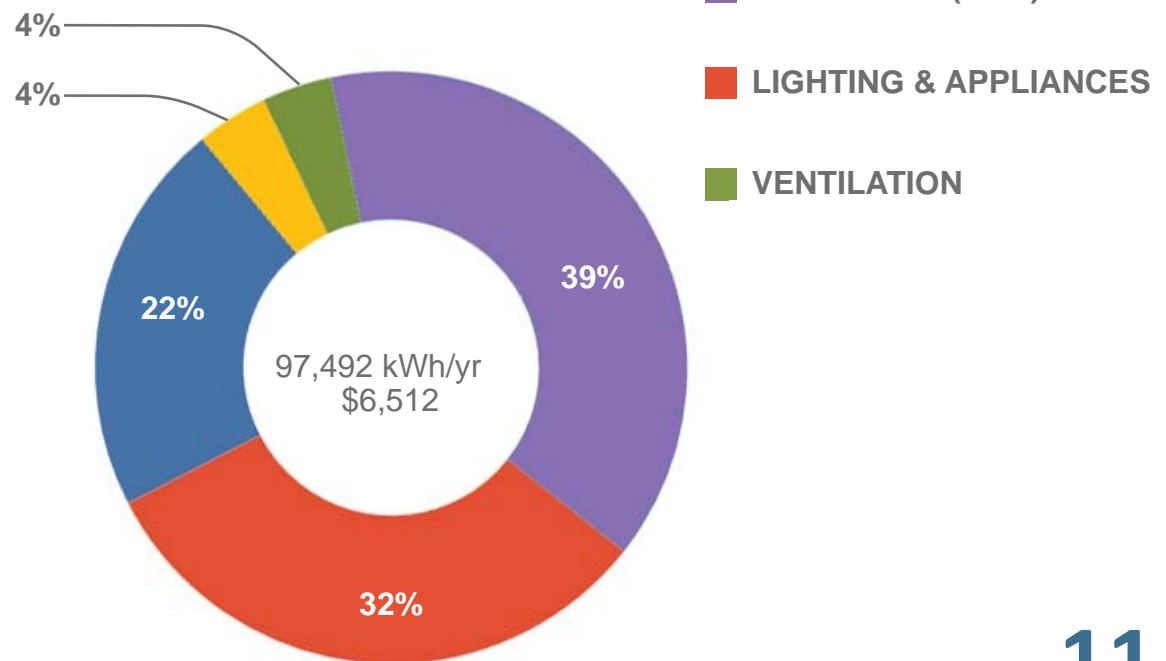
existing building



good rehab



better rehab



best rehab (passive house)

# Capital Cost

	Good	Better	Best
1000 General Requirements	\$373,507	\$373,507	\$373,507
2100 Site Work	\$98,389	\$103,389	\$103,389
7000 Thermal & Moisture Protection	\$30,783	\$45,998	\$46,862
8000 Doors & Windows	\$325,027	\$369,843	\$397,563
9000 Finishes	\$949,469	\$1,337,865	\$1,425,925
10000 Specialties	\$0	\$2,500	\$2,500
12000 Furnishings	\$29,777	\$29,146	\$26,463
15000 Mechanical	\$296,059	\$560,059	\$703,259
16000 Electrical	\$281,030	\$441,743	\$450,713
17000 Other	\$201,524	\$236,115	\$253,363
OH&P	\$96,959	\$131,256	\$141,883
Insurance	\$33,532	\$45,393	\$49,068
Performance Bond (GC)	\$18,822	\$24,718	\$26,545
Performance Bond (sub)	\$10,342	\$14,001	\$15,134
<b>TOTAL CONSTRUCTION</b>	<b>\$2,745,220</b>	<b>\$3,715,533</b>	<b>\$4,016,174</b>
<b>construction cost/SF</b>	<b>\$57</b>	<b>\$78</b>	<b>\$84</b>

# Capital Cost



# Feasibility pre-Conclusions

- **There is a premium to go PH, however...**
- **With structural issues, 'Good' may not be enough to preserve the building**
- **PH Hatfield rehab costs are in line with other rehabs**
- **A building replacement would likely cost 2X that of a PH rehab**
- **Energy savings in a PH Hatfield may be 45k annually**
- **Structural savings in a PH Hatfield may be 275k every 15 years**
- **Capitalized energy & structural savings equal \$800,000 (20yr, 5%)**
- **Feasibility study is a tool to respond to needs, make financial case and fundraise**
- **Feasibility study has helped owner commitment to a PH Hatfield**
- **With limited capital, A phased approach may be necessary**

# coming soon...

## Multi-Family **PASSIVE HOUSE**

Mark O. Hatfield Building | Portland, Oregon



**DRAFT**  
**NOT FOR DISTRIBUTION**