SMALL SCALE COMMERCIAL RETROFITS

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Principle

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SILVER LAKE PASSIVE
CAMP & CONFERENCE CENTER LODGE

Location: Sharon, CT
Climate zone: 5a
Total iCFA: 2,422 SF

Heating demand: 4.97 kBtu/ft²yr
Cooling demand: 0.95 kBtu/ft²yr
Heating load: 4.11 Btu/hr ft²
Cooling load: 1.61 Btu/hr ft²
Primary energy: 27.29 kBtu/ft²yr

RA STUDIO
RIVER ARCHITECTS STUDIO

Location: Cold Spring, NY
Climate zone: 5a
Total iCFA: 1,096 SF

Heating demand: 5.64 kBtu/ft²yr
Cooling demand: 0.52 kBtu/ft²yr
Heating load: 5.94 Btu/hr ft²
Cooling load: 0.6 Btu/hr ft²
Primary energy: 38.16 kBtu/ft²yr
EXISTING BUILDING
- framing to remain and be repaired as required
- existing cavities used for “fallback” insulation
- sheathing based on existing conditions
  a. remove and install new sheathing
  b. install new sheathing over
  c. repair and reuse existing

AIR BARRIER
- product specification based on sheathing

INSULATED I-JOIST -or- LARSEN TRUSS WALL
- truss size determined through energy modeling
- blown in cellulose insulation

WEATHER RESISTANT BARRIER
- product specification based on conditions

RAINSCREEN
- siding installed on staggered furring
SILVER LAKE PASSIVE
CAMP & CONFERENCE CENTER LODGE

Location: Sharon, CT
Climate zone: 5a
Total iCFA: 2,422 SF
NEW SOLAR HOT WATER STORAGE ZONE (Unconditioned)
- R-23 Walls
- R-30 Slab

(36x) EXISTING CMU PIERS (Primary footings)
- Existing floor girders
- CMU piers on concrete footings
- Fully vented crawlspace

EXISTING STONE FIREPLACE
- Continuous stonework from crawlspace to roof penetration
- Strong desire from client to keep working fireplace

FOUNDATION / PIER PLAN
NEW HARDWOOD FLOOR
- Meets structural loads, but not enough depth to meet insulation requirements

MODIFIED LARSEN TRUSS AND CELLULOSE INSULATION
- OSB webs built off existing floor joists
- Blown in dense-pack cellulose insulation

WEATHER RESISTANT BARRIER
- Product specification based on conditions (vapor)

CONTINUOUS VENTILATED GAP
- Sheathing furred out 1-1/2" min to provide continuous air gap

CEMENTITIOUS CLADDING MATERIAL

EXISTING CMU AND BRICK FOUNDATION PIER
3M ‘3015’ AIR BARRIER
- 36” wide rolls overlapping to ‘shrink wrap’ existing floor and ensure air-tightness on a less-than-ideal substrate

FULLY TAPED OSB SUBFLOOR
- a new subfloor is installed and fully taped to create a fail safe in our airtight floor

PRO CLIMA ‘INTELLO’ AIR BARRIER
- Air barrier and smart vapor control installed on existing rafters
RA STUDIO
RIVER ARCHITECTS STUDIO

Location: Cold Spring, NY
Climate zone: 5a
Total iCFA: 1,096 SF
HISTORIC PHOTO OF MAIN STREET
- The original construction date is unknown, however it is shown on Sanborn maps as early as 1887.
NEW - T.O. SLAB
-5' - 9"
NEW - FIRST FLOOR
3' - 0 1/8"
NEW - BOTTOM OF ROOF
14' - 9 1/8"
NEW - TOP OF ROOF
24' - 9 5/16"

BUILDING SECTION

= AIR BARRIER
= WRB

THERMALLY BROKEN LIGHT WELLS IN PLACE OF EXISTING ATTIC VENTS
EXISTING FRAMING
NEW INSULATED EXTERIOR CAVITY
HIGH PERFORMANCE SIMULATED DOUBLE HUNG WINDOWS
STONWORK TO MATCH HISTORIC ORIGINAL
BUILDING RAISED FOR HABITABLE BASEMENT
RECYCLED EPS INSIDE FOUNDATION WALL
CONTINUOUS AIR BARRIER BELOW SLAB
EXCAVATION FINDINGS
- While the existing foundation seemed to be in good condition from inside, excavation for a new rear foundation wall revealed that was not the case.
**INTERIOR BRACING**
- The building was rigorously braced to ensure things stayed in place while moving the building.

**TEMPORARY LOCATION**
- While originally the building was to be only lifted for repairs, the additional work required a complete temporary move.

**NEW FOUNDATION WALL**
- Once the new foundation wall was complete and cured, the building was moved and set back in place - 2'-8" higher than the original.
iCFA (WALKABLE FLOOR AREA)
- proportional to space conditioning targets

ENVELOPE AREA
- proportional to transmission heat loss
- $H_t = U \times A \times \Delta T$

\textbf{SMALL SCALE COMMERCIAL RETROFITS}

\textbf{SMALL BLDG PENALTY}

- Indirect way of putting pressure on material efficiency through compact forms and attached units during design

But, what about existing building retrofits that already have a set envelope?
SMALL SCALE COMMERCIAL RETROITS

ARCHITECTS

SMALL BLDG PENALTY

ENVELOPE AREA
(Proportional to transmission heat loss)

iCFA
(Proportional to space conditioning targets)

SILVER LAKE PASSIVE PASS
1 : 3.3

FORM FACTORY PASS
1 : 2.9
(Add hypothetical 300ft² Mezzanine)

FORM FACTORY FAIL - PEAK HEAT
1 : 3.6

BLUESTONE WORKSHOP PASS
1 : 2.6

BLUESTONE WORKSHOP FAIL - PEAK HEAT
1 : 6.2

1 : 1 ratio

1 : 2.6 ratio

1 : 3.3 ratio
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FINISHED PROJECT

ESTIMATED COMPLETION: NOV '16
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ENERGY MODEL

Case: 178 Main Street - Revised
Location: Cornwall, ON
Building: 2 Storey Office/Administrative Building

- Non-residential
- Residential
- In planning

Parameters:
- Building category: Non-residential
- Occupancy type: Residential
- Building status: Revised
- Type: New
- Indoor temperature: 68°F
- Internal gains setting: Calculated
- Internal heat gains: 1.5 kW
- Occupancy setting method: Design
- Number of occupants: 70
- Number of units: 2

Zones:
- Interior

Data states/results:
- Heating demand: 5.64 kWh/yr
- Cooling demand: 0.52 kWh/yr
- Heating load: 5.94 kWh/yr
- Cooling load: 0.6 kWh/yr
- Primary energy: 38.16 kWh/yr
- Site energy: -1.79 kWh/yr

ARCHITECTS
SMALL SCALE COMMERCIAL RETROFITS
ENERGY MODEL

WUFI®
Wagner Solar
77% Solar Contribution

SOLAR HOT WATER COLLECTORS
- (4x) Euro L20 AR panels
- 112 ft² Surface area
- 30° Inclination
- Direct Southern exposure

SUPPLY:
- 100 gal / day
- 120° F

SMALL GAS-FIRED BOILER
- 30 kBTU/hr capacity

(2x) HOT WATER TANKS
- 120 gal capacity
- Located in basement

18 occupants x 4.3 gal / day = 77.4 gal / day
SILVER LAKE PASSIVE
CAMP & CONFERENCE CENTER LODGE

SYSTEM
- 77% Solar hot water
- 42% System efficiency

= TOTAL ENERGY CONSUMPTION
= SOLAR CONTRIBUTION
Total equipment load:
7,991.6 kWh/yr (29,268 kBTU/yr)

Hudson Solar
7,107 kWh/yr (24,226 kBTU/yr)
CA200 ERV @ 100 cfm
(125 max cfm)
ERV efficiency: 80% (derated 12%)
Electrical efficiency: .63 W/cfm

CA350 HRV @ 100 cfm
(215 max cfm)
HRV efficiency: 89%
Electrical efficiency: .32 W/cfm

ComfoFond
Geothermal heat exchanger
Efficiency: 60%

12,219 kWh/yr (41,823 kBTU/yr) Target = 12,218 kWh/yr
WHAT'S NEXT?  MULTI-ZONE COMMERCIAL

SEMINARY HILL
COMMERCIAL CIDERY & EVENT SPACE
Location: Callicoon, NY
Climate zone: 6a

ZONE 1: Cidery  ZONE 2: Event Space
Total iCFA: 3,598 SF  Total iCFA: 3,053 SF
What happens when PHIUS standards move from *human* comfort ...

Heating set temperature: 68° F
Cooling set temperature: 77° F

... to *apple* comfort?

Heating set temperature: 55° F
Cooling set temperature: 70° F
THANK YOU

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