THREE HIGH- PERFORMANCE HOMES, THREE APPROACHES

IN THE WOODS -
ALEX CARVER
NORTHERN TIMBERS
CONSTRUCTION

RIVER VIEW -
TOM LEBOEUF
NORTHEAST CRAFTSMEN GROUP AND H.J. LEBOEUF INC.

LAKE DUNMORE -
JARED MOATS
STRUCTURAL ENERGY CORPORATION

JEAN TERWILLIGER, ARCHITECT
VERMONT INTEGRATED ARCHITECTURE, P.C., MIDDLEBURY, VT
PRESENTATION GOALS

EXPLAIN BASIC PERFORMANCE TARGETS OF HIGH PERFORMANCE HOME DESIGN

ELEMENTS OF A HIGH PERFORMANCE ENVELOPE SYSTEM
• COMPARE PERFORMANCE, COST AND CONSTRUCTABILITY
• CONSTRUCTION CHALLENGES AND TRADE-OFFS

DESIGN ELEMENTS FOR UNIQUE HIGH PERFORMANCE HOMES
• TAKING ADVANTAGE OF SOLAR AND SITE FEATURES
• MEETING CLIENTS’ NEEDS, PERSONALITIES AND LIFESTYLES
COMMON FEATURES & GOALS

SMALL LOTS WITH NEIGHBORS

INDOOR/OUTDOOR CONNECTION TO LAND

FULL TIME RESIDENCES FOR EMPTY NESTERS OR RETIREES

DESIRE FOR OPEN LIVING SPACE

NEED FOR OFFICE/STUDY/STUDIO ENTRY/MUDROOM

POTENTIAL FOR SINGLE LEVEL LIVING

MINIMIZE ENERGY AND MAINTENANCE COSTS

HELP COMBAT CLIMATE CHANGE
EFFICIENCY VERMONT HIGH PERFORMANCE HOME SUMMARY

(VERMONT CLIMATE: 6500-8000+ HHD DEPENDING ON LOCATION AND ELEVATION)

ENVELOPE:

- R-30 BASEMENT WALLS, SLAB PERIMETER AND UNDER SLAB
- R-40 ABOVE GRADE WALLS
- R-40 EXPOSED FLOORS
- R-60 CEILINGS- FLAT OR SLOPED
- R-5 WINDOWS (MAX U= .21)
- R-4 DOORS (MAX U= .25)
- 1 ACH50 MAX. BLOWER DOOR RESULT
EFFICIENCY VERMONT HIGH PERFORMANCE HOME SUMMARY

SYSTEMS:

• EFFICIENT HEAT RECOVERY VENTILATION

• HEAT PUMP or ENERGY STAR RATED HEATING SYSTEM

• HEAT PUMP HOT WATER HEATER or ELECTRIC HOT WATER WITH DRAIN WATER HEAT RECOVERY

• ENERGY STAR APPLIANCES

• 95% ENERGY STAR LED AND/OR CFL LIGHTING
IN THE WOODS
SITE AND SITE PLAN

SITE PLAN
.46 Acre

ZONE A: 816 sq ft
Program:

Home and yoga studio

Small lot .4 acres
Sun and Privacy
2 BR
Place to write
Desire for angle in design
Cathedral ceiling
IN THE WOODS

MECHANICALS

HVAC:
2 pair Lunos E2 and bathroom fans
2 heat pump heads
Small woodstove with dedicated outdoor air
Electric hot water heater with drainwater heat recovery
HERS: 42
(Home Energy Rating System)

Square Feet: 1445 sf.
Volume: 12645 cu. ft.
Blower Door: 155 cfm50, .74 ACH50

Predicted Energy Use:
- 31.2 MMBtu, $1500
- 5.9 MMBtu heating

Energy Use:
- 26 MMBtu,
- 19.1 kbtu/sf/yr,
- $1260, 6905 kwh/yr electric,
- 1/10 cord wood
ENVELOPE SYSTEMS:

Foundation:
Concrete footing and ICF frost wall for 4’ grade change
Extra interior insulation at slab edge
Slab on grade- 8” EPS under 4” concrete

Arctic wall:
2x4 at 24” oc
OSB sheathing (taped as air barrier)
9 1/2” continuous I-joists
Cellulose outer contained by Mento Plus water barrier
Mineral wool in mechanical cavity
Corrugated metal siding

Roof:
16” I-joist with dense pack cellulose
Intello inner vapor/air control layer
1 1/2” strapping with mineral wool batt,
2x4 framing above sheathing for vent cavity and eaves;
Standing seam metal roof

Stick framed entry and screen porch- local hemlock
ARCTIC WALL COMPONENTS

2 x 4 frame
OSB Sheathing
2x for Bucks
Double wall spans several floors

Bulk of insulation outside the air barrier

Vented siding
Interior Roxul insulation or Damp spray

External & Internal chase and mechanicals

Expedites building process
- R-60 Roof
- Continuous vapor barrier
- Cold roof assembly
- Overhangs