

Mayo Woodlands Modern — Leung-Patel Residence

Project Data:

Home Owners: Lydia Leung & Mayur Patel

Location: Rochester, MN

Style: Modern

Size: 3 bedrooms, 2783 SF

Climate Zone: IECC 6

Completion: October 2018



Overview

“We wanted a modern home that is functional, relatively compact, and balances luxuries/comfort while minimizing our carbon footprint — and consumes less energy than average.

It is so comfortable while being so efficient. It is nice to know that I’m not leaving a greater carbon footprint by having my house warm and toasty in the winter. “ —Lydia Leung

Planning & Design

Rather than starting with a desired floor plan, square footage or number of rooms, the home owners took a different approach—examining goals, lifestyle and design preferences with the architect first, then finding a desired lot and designing the house based on the shape and orientation of that lot.

The architect contacted both XRG Concepts and Licht ‘n Stein Consulting during the planning and design process to get recommendations. The builder, architect, energy rater, and consultant all collaborated to decide on the wall construction and building envelope. All decisions were made to minimize heat loss or gain from outside while maximizing passive solar gain in the winter time.

A Note From The Architect

Hiring an architect to design a home encompasses so much more than just construction. It includes: siting, influences, context, theme, style, function, performance, attention to detail, and most cases, sustainability. My involvement was to help them step by step through the process so that they had their ideal vision for their future home translated into reality.

From the onset, they knew they wanted to embrace sustainability. They were intrigued by both the idea of living simply, and within means, but also using limited resources with minimal impact on the environment. But there was so much more that they conveyed in their initial visioning session.

There was a lot of back and forth to get the parts and pieces to fit on the site, with the proper solar orientation. This was the most important part of the design, in my opinion. And it is likely the part of the process that is most compromised by a home builder.

The main living space was intentionally open and had large south facing windows for winter solar gain, and a shading trellis that was specially designed to block the summer solar heat gain. Roof shapes were evaluated to make sure it allowed space for a PV array. Specific recommendations on thermal properties, windows, doors, mechanical systems, and finishes were evaluated as well.

—Adam Ferrari, 9.SQUARE

“We are able to conserve energy without at all sacrificing comfort.”

Modeled Performance Data:

HERS Index Score: 21

Blower Door Results: 1.64 ACH50
783 CFM50

Estimated Annual Energy:

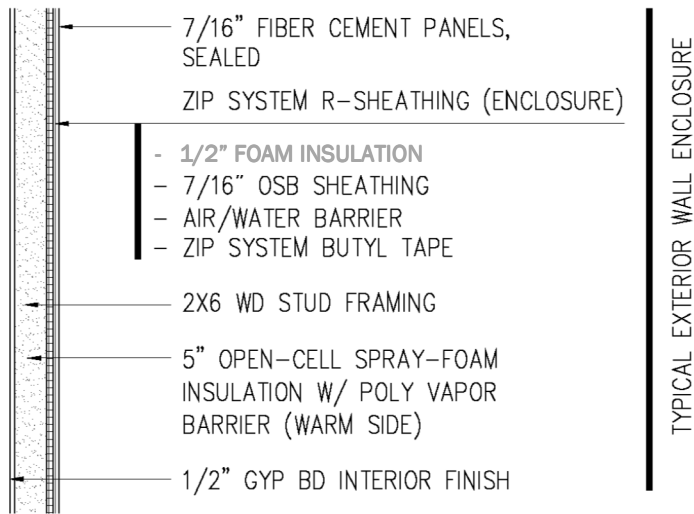
Total Energy Use 93.1 MMBtu

- Photovoltaics (PV) 29.7 MMBtu

End Energy Use: 63.4 MMBtu

EUI 22.8 kBtu/SF/yr

Envelope



Heating & Cooling

The home is heated and cooled with a natural gas furnace, standard air conditioner, and a multi-zone hydronic distribution natural gas boiler. The guest suite and main living area is heated and cooled with ductless mini-split air-source heat pumps.

If the home owners did it all over again, they would have forgone the HVAC (forced air distribution) and did all mini-splits with in-floor heating—to be even more compact (from an energy standpoint and space saving standpoint).



Key Features

Building Shell	
Foundation	R-10.0 Edge R-20.0 Under Slab R-53.8 Exposed Floor
Walls	R-24.0 Above Grade
Roof	R-49.0 Ceiling Flat R-61.2 Vaulted Ceiling
Windows	Duxton Windows U-Value: 0.180 SHGC: 0.560 South 0.350 Other
Mechanical Systems	
Heating & Cooling	Natural Gas Furnace 97.0 AFUE Hydronic Distribution Natural Gas Boiler 96.0 AFUE Air-Source Heat Pump 20.0 SEER, 10.0 HSPF
Water Heating	Natural Gas Water Heater 0.72 EF, 50.0 Gal
Ventilation	Balanced HRV 57 cfm, 50 watts
Miscellaneous	
Appliances	Energy Star Certified

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