



K E H L - 0

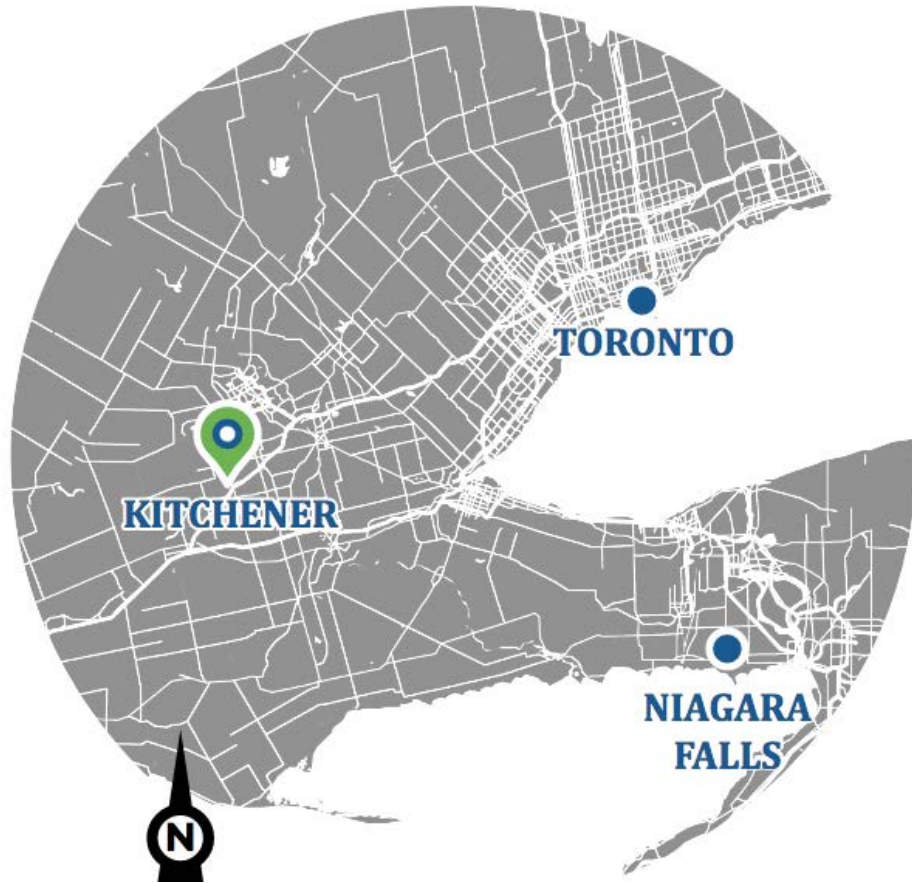
RACE TO ZERO

ATTACHED HOUSING

PRESENTATION

APRIL 22, 2018





1919
Hrs
Hours of
Sunshine
per Year



4.2"
2.3"
Average
Monthly
Precipitation
Extremes



14"
0.2"
Average
Winter
Monthly
Snowfall

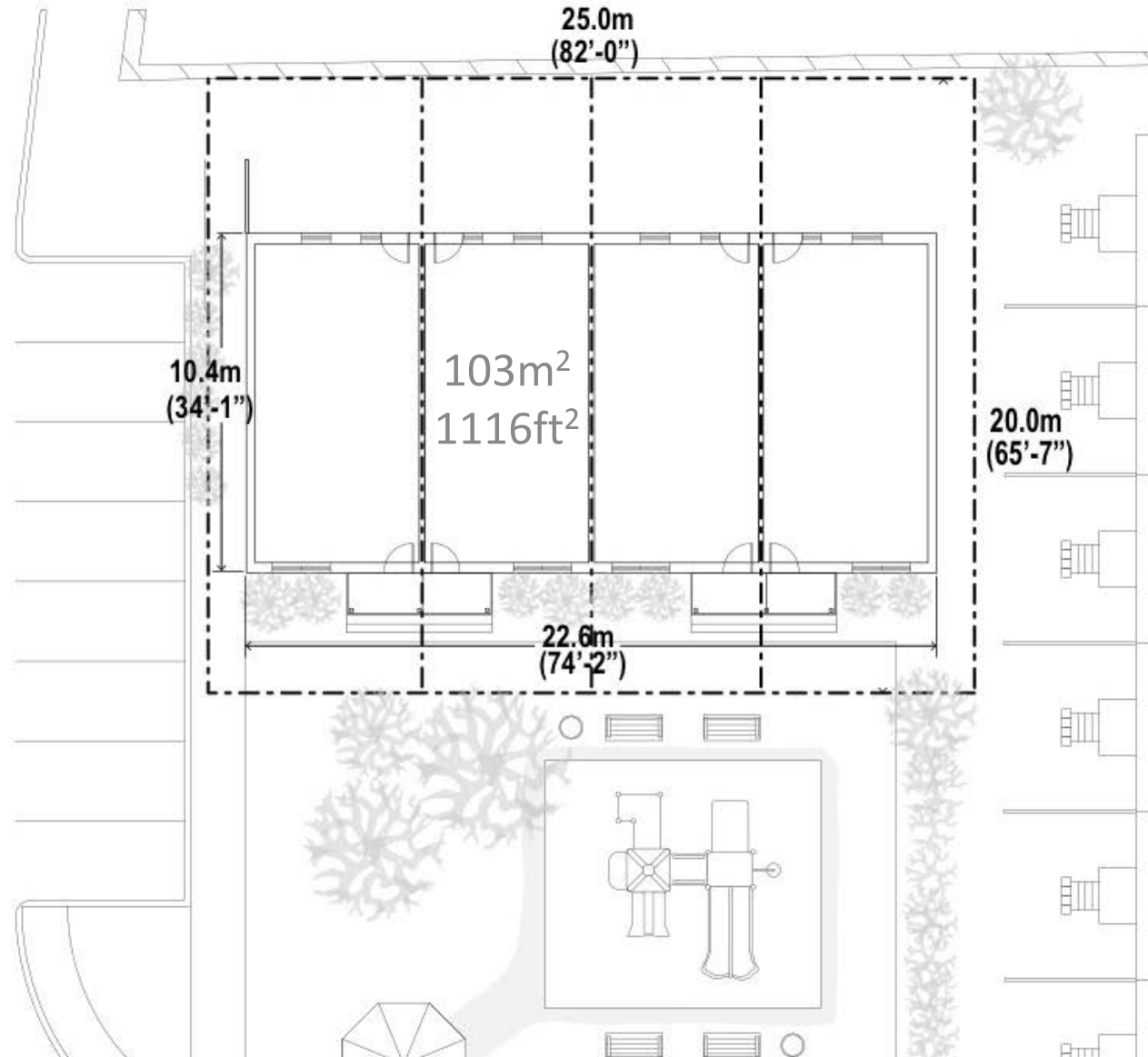


7.9
MPH
Average
Daily
Wind Speed



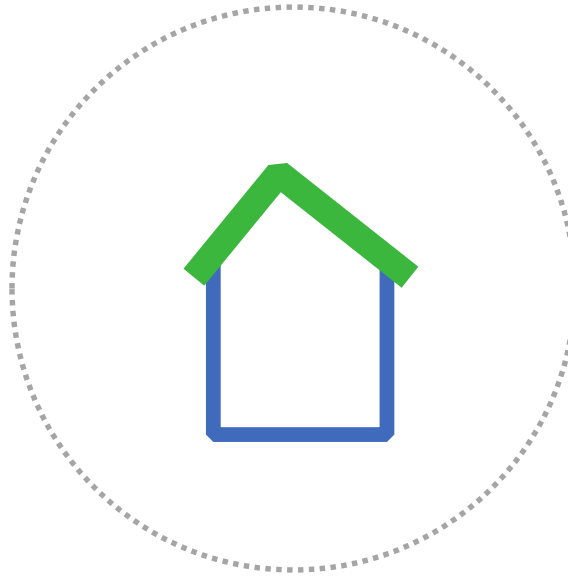
14°F
79°F
Daily
Averages
Extremes







INCLUSIVENESS

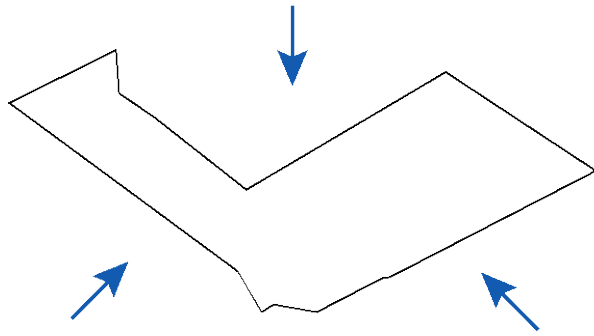


EASY
CONSTRUCTABILITY

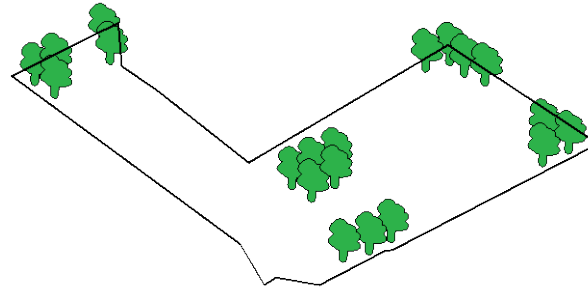


ADAPTABILITY

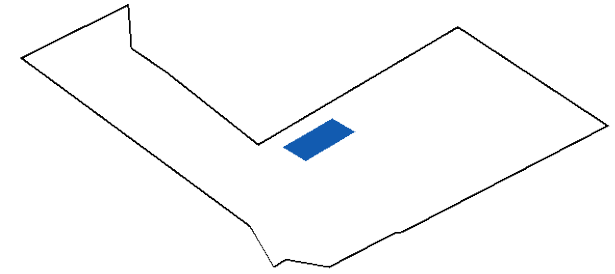




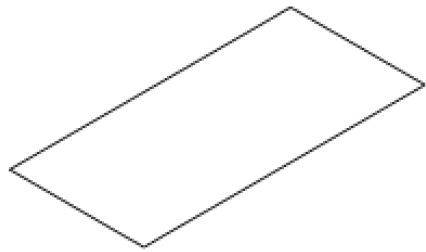
L-SHAPED COMMUNITY



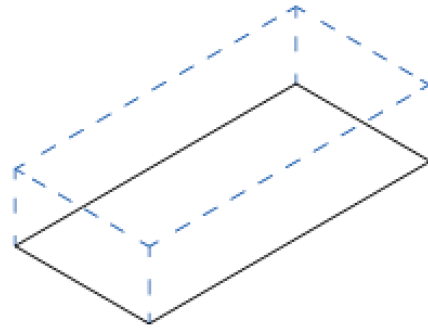
GREEN SPACES



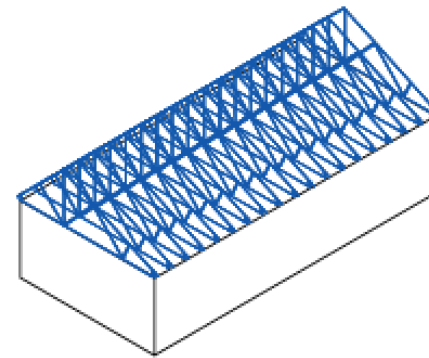
KEHL-0



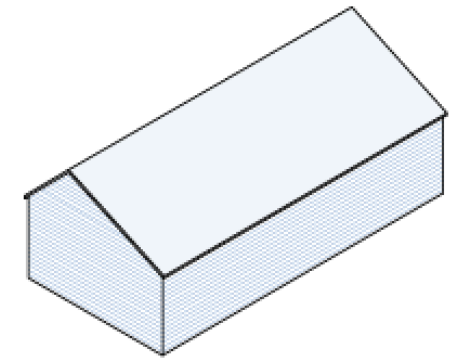
RECTANGULAR PLAN



EXTRUDE



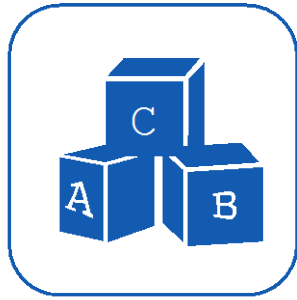
PREFABRICATED TRUSS



SIMPLE FINISHES



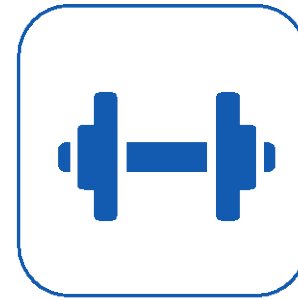
ACCESSIBILITY



PLAY



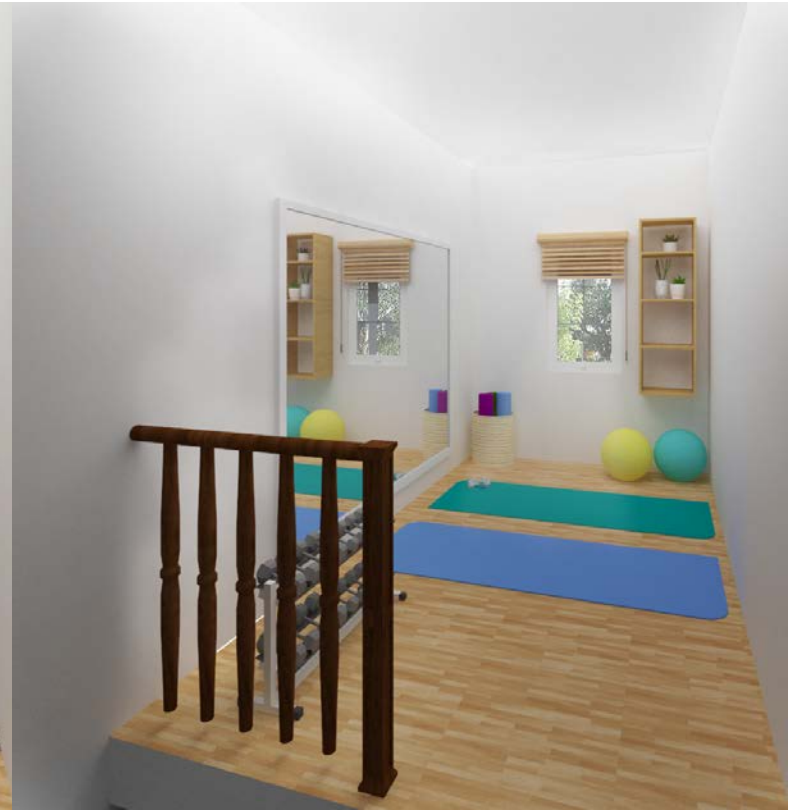
WORK



EXERCISE



CREATE



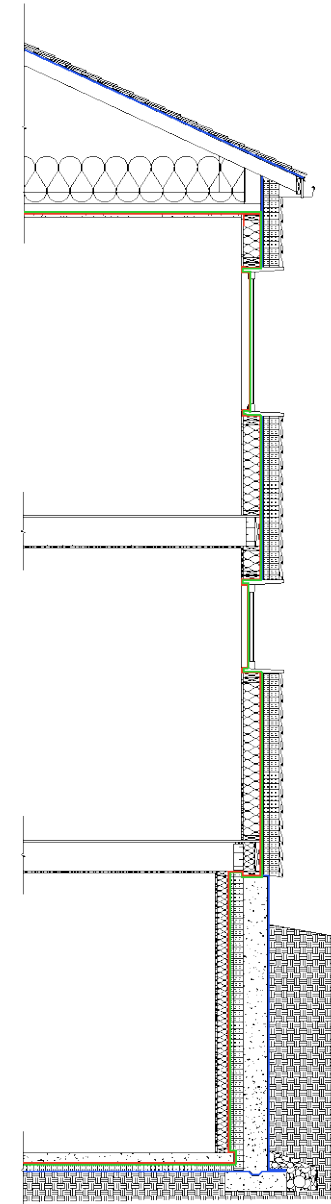
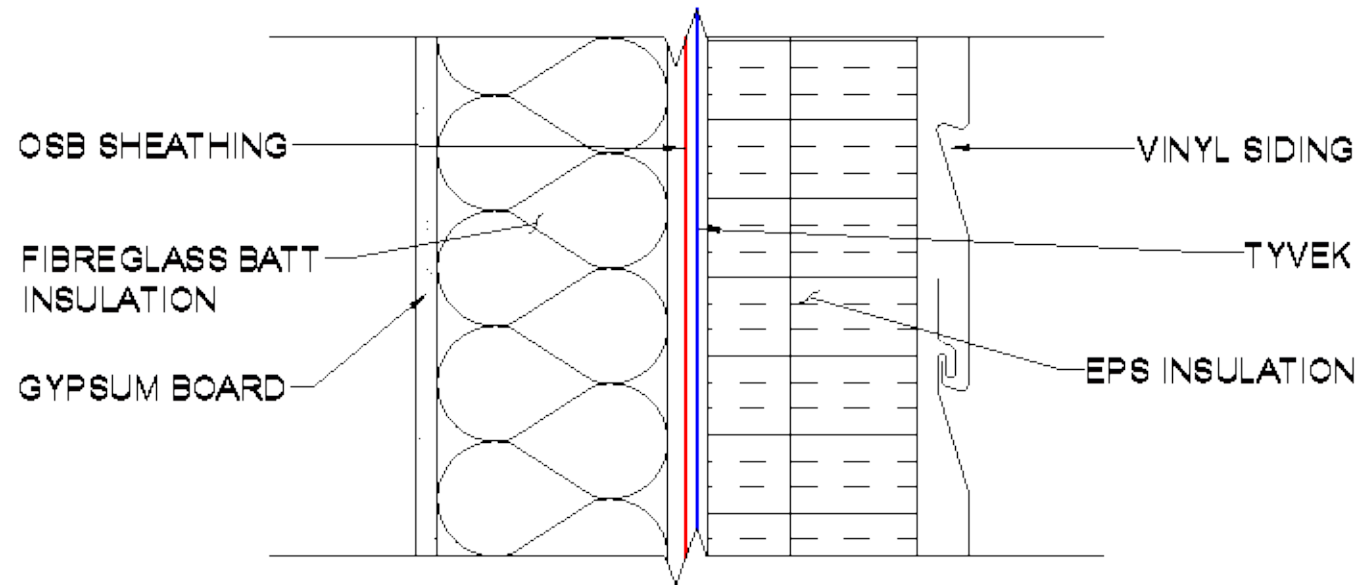




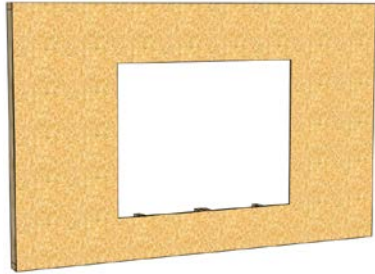
BUILDING ENCLOSURE



Overall Wall Section



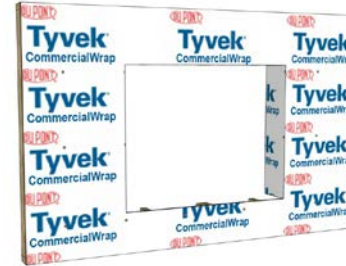
Window Installation Guide



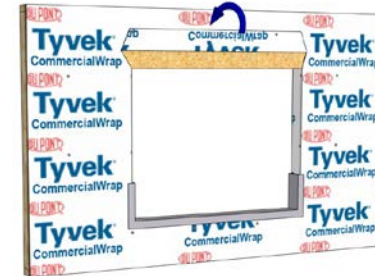
Step 1



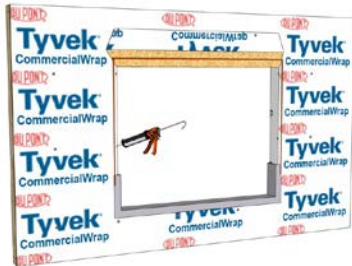
Step 2



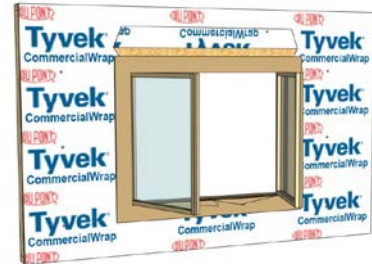
Step 3



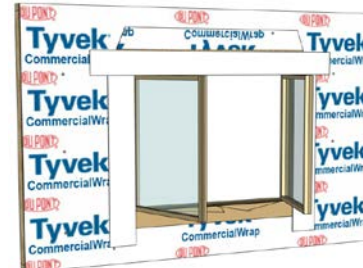
Step 4



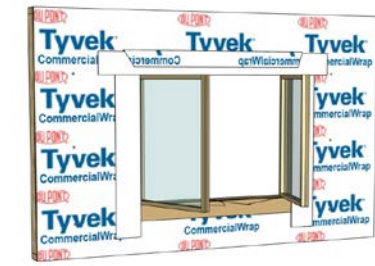
Step 5



Step 6

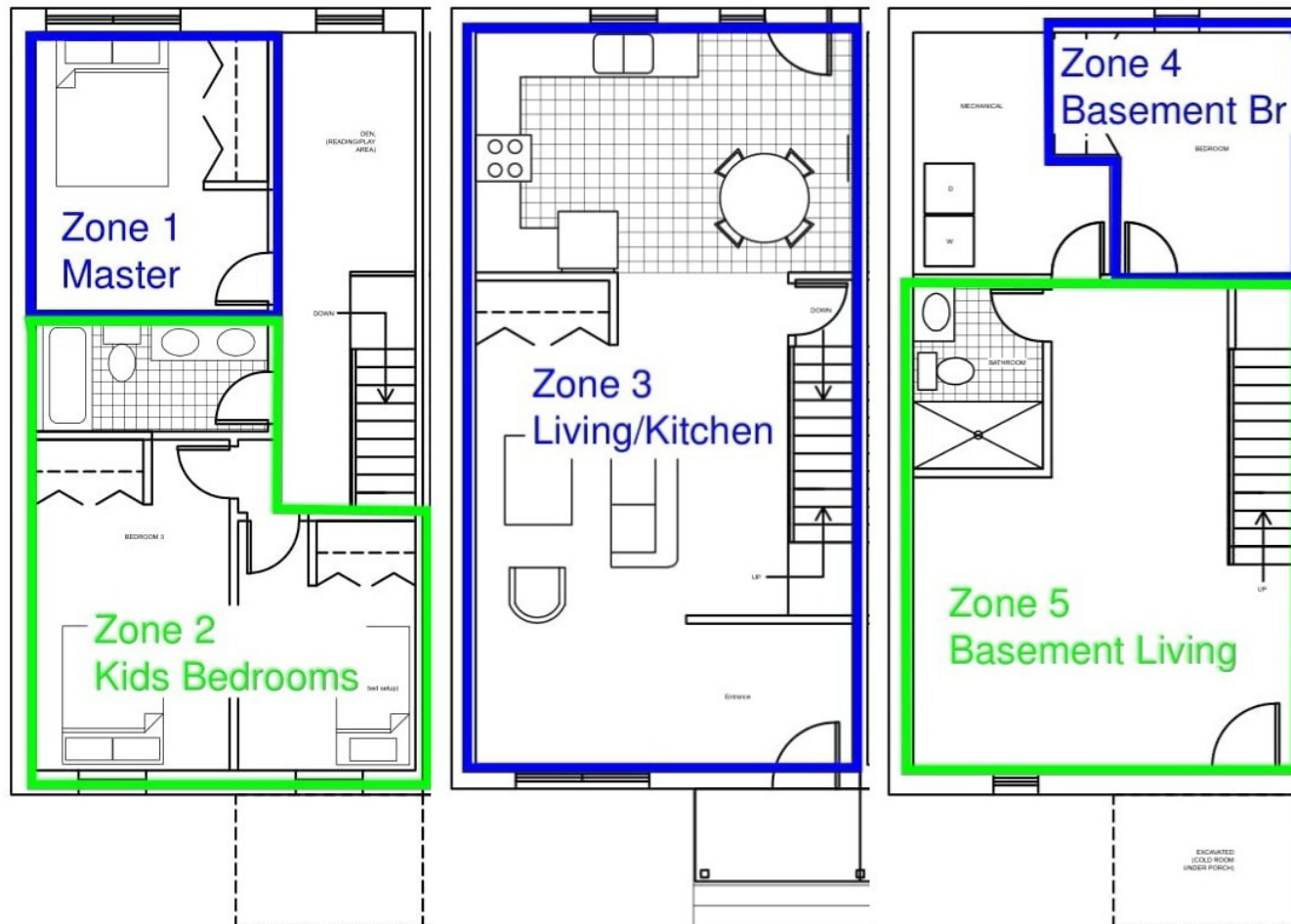


Step 7



Step 8

MEP SYSTEMS



ZONE 1 & 4 DUCTLESS



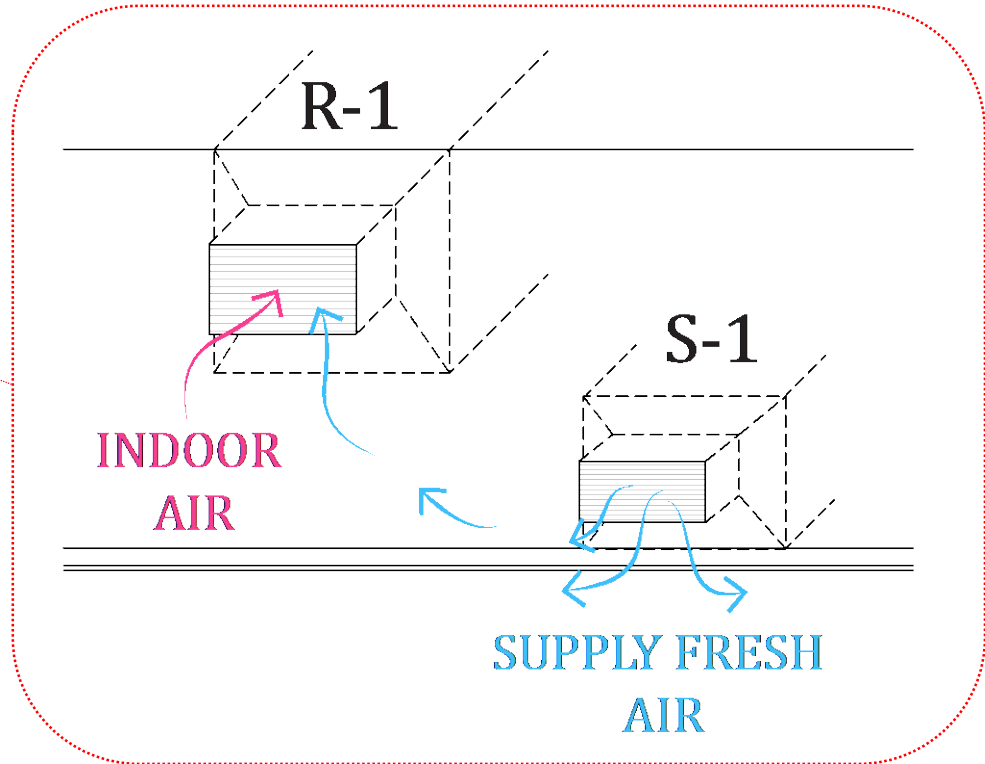
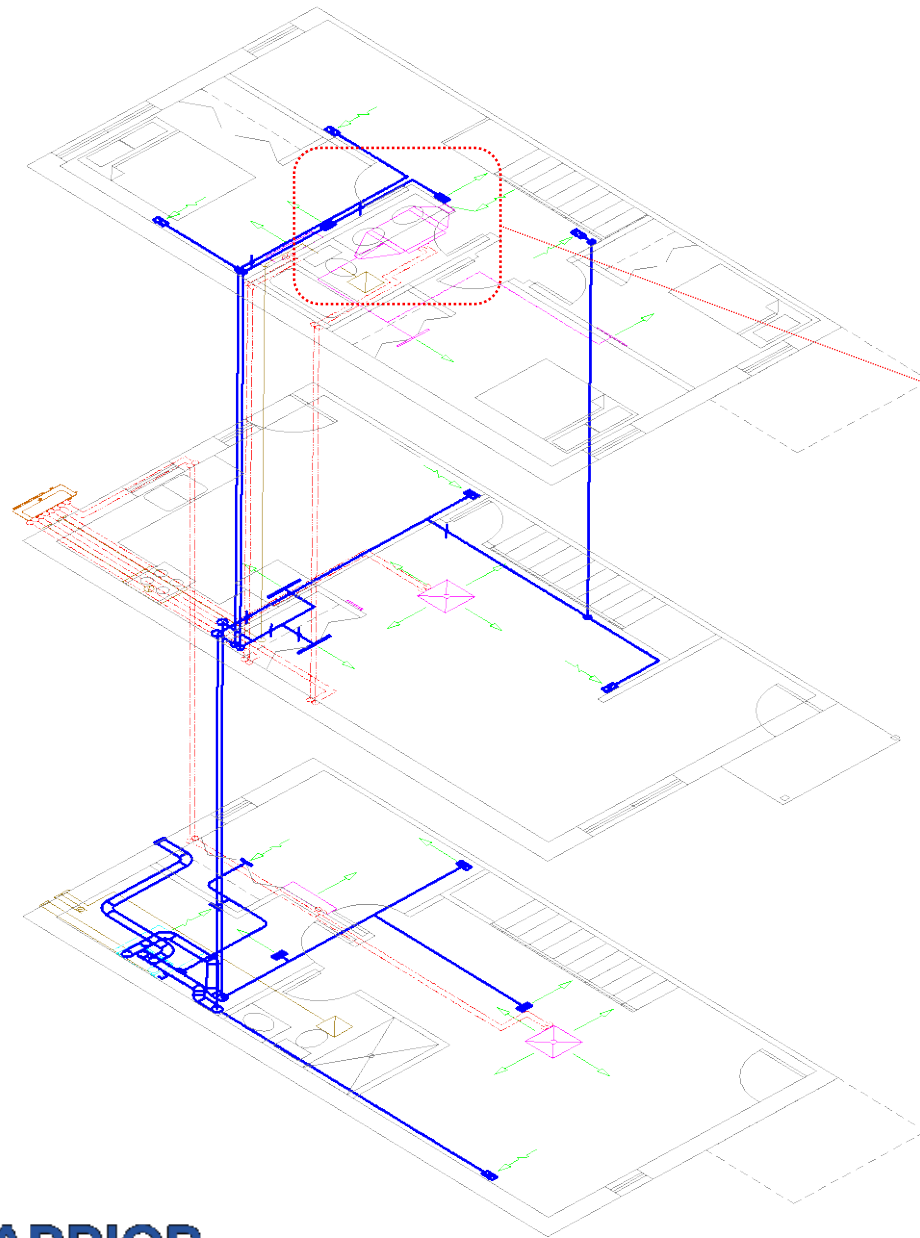
ZONE 2 DUCTED



ZONE 3 & 5 DUCTLESS

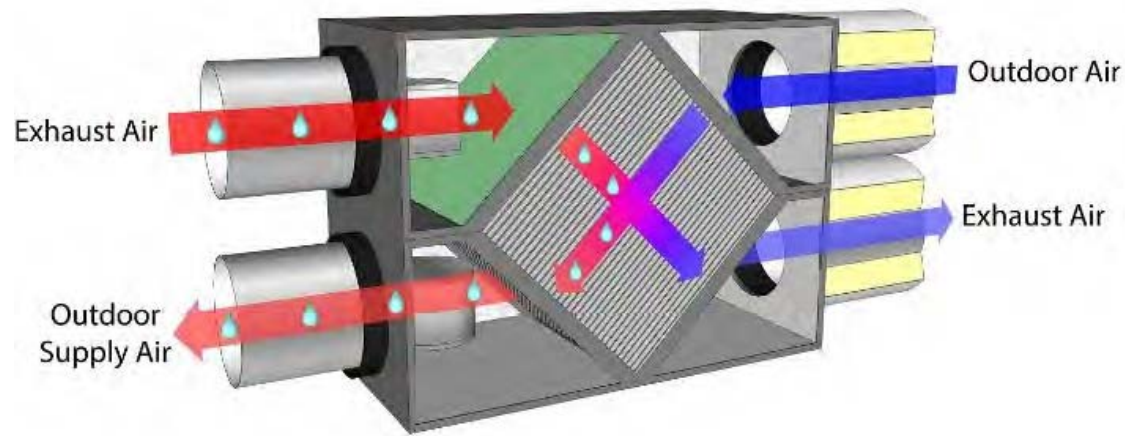


OUTDOOR CONDENSER

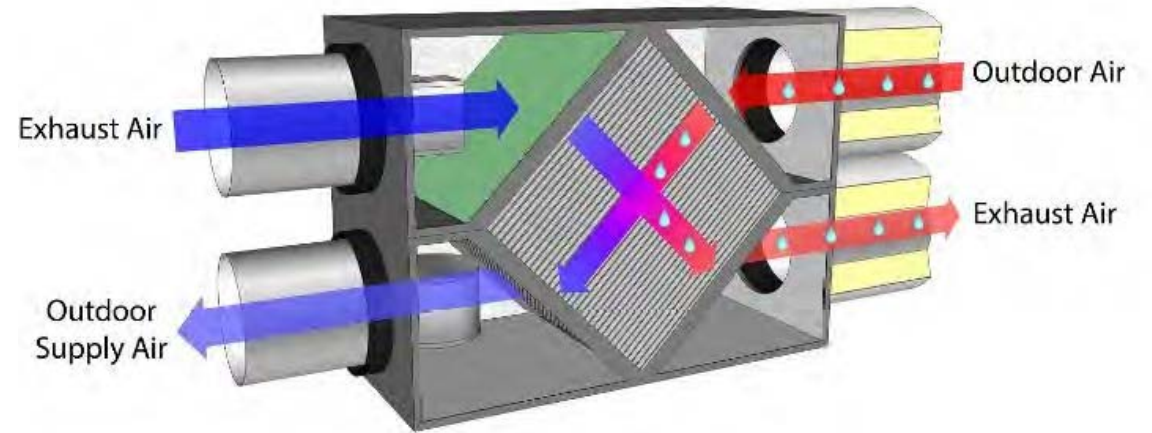


- ERV
- Ventilation Ducting
- Indoor Heat Pump Equipment
- Outdoor Heat Pump Equipment
- Heat Pump Refrigerant Lines
- Exhaust Ductwork and Grilles
- Air Flow

ERV Schematic



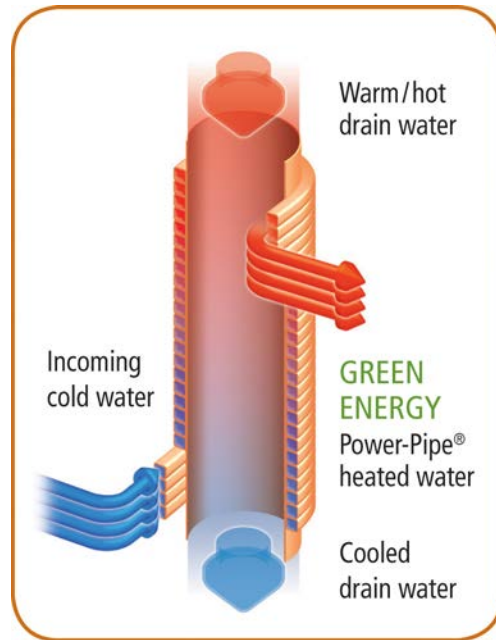
WINTER
OPERATION



SUMMER
OPERATION

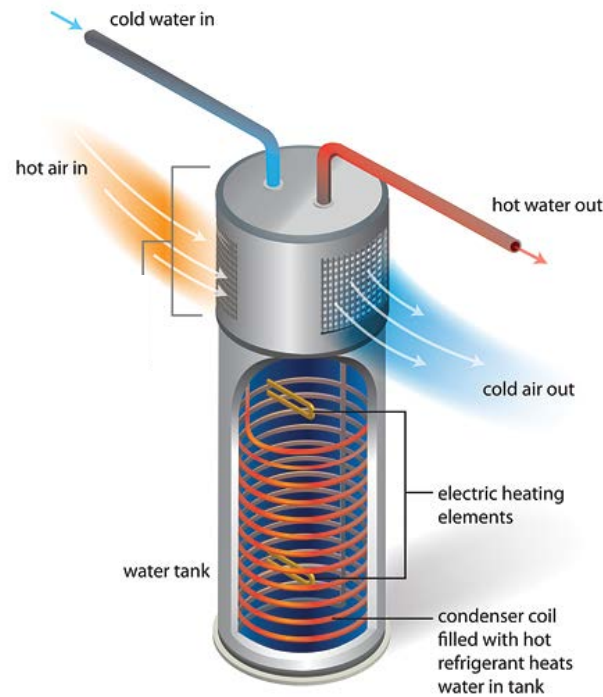
Source:(RDH, 2015)

Plumbing



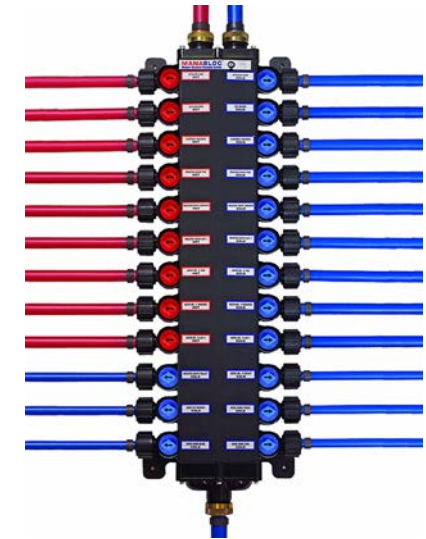
© 2009 RenewABILITY Energy Inc.

DRAIN WATER
HEAT RECOVERY



Source: (EnergyStar, 2012)

HEAT PUMP HYBRID
ELECTRIC WATER HEATER



Source: (Viega, 2017)

PEX MANIFOLD
DISTRIBUTION SYSTEM

Source: (Residential Energy Consumption Survey, 2009)

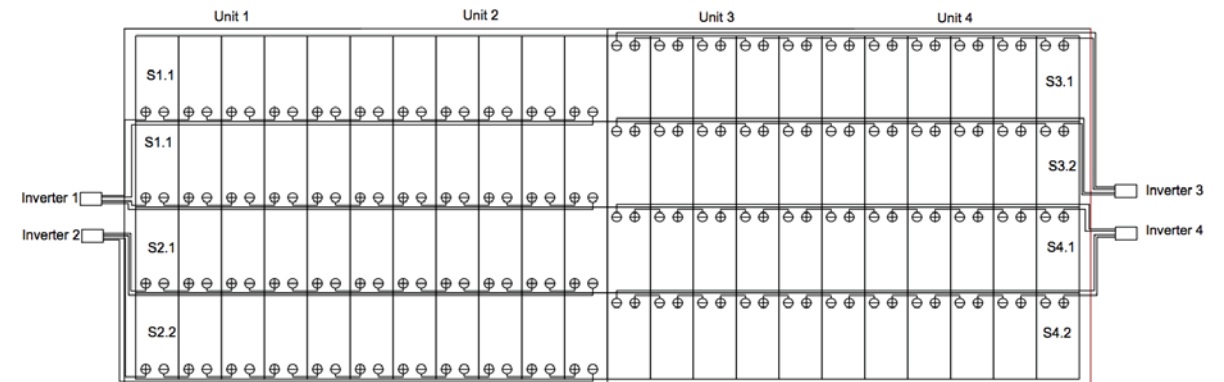
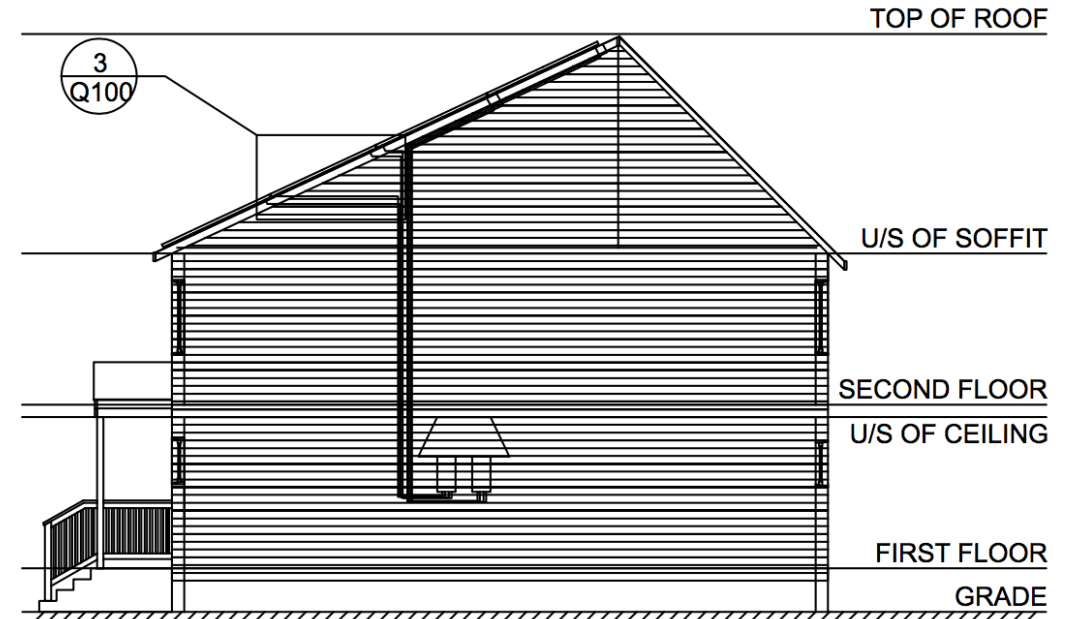
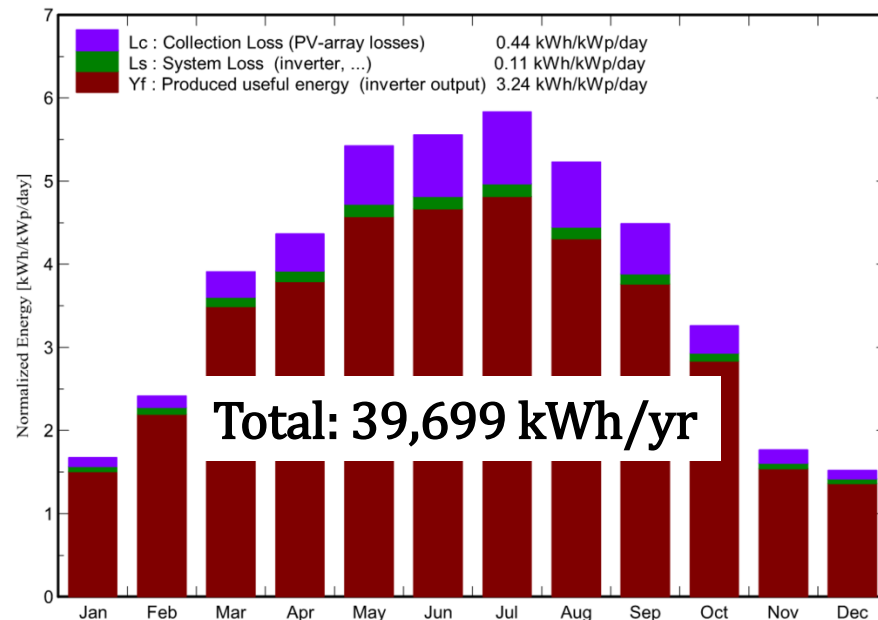
ENERGY ANALYSIS



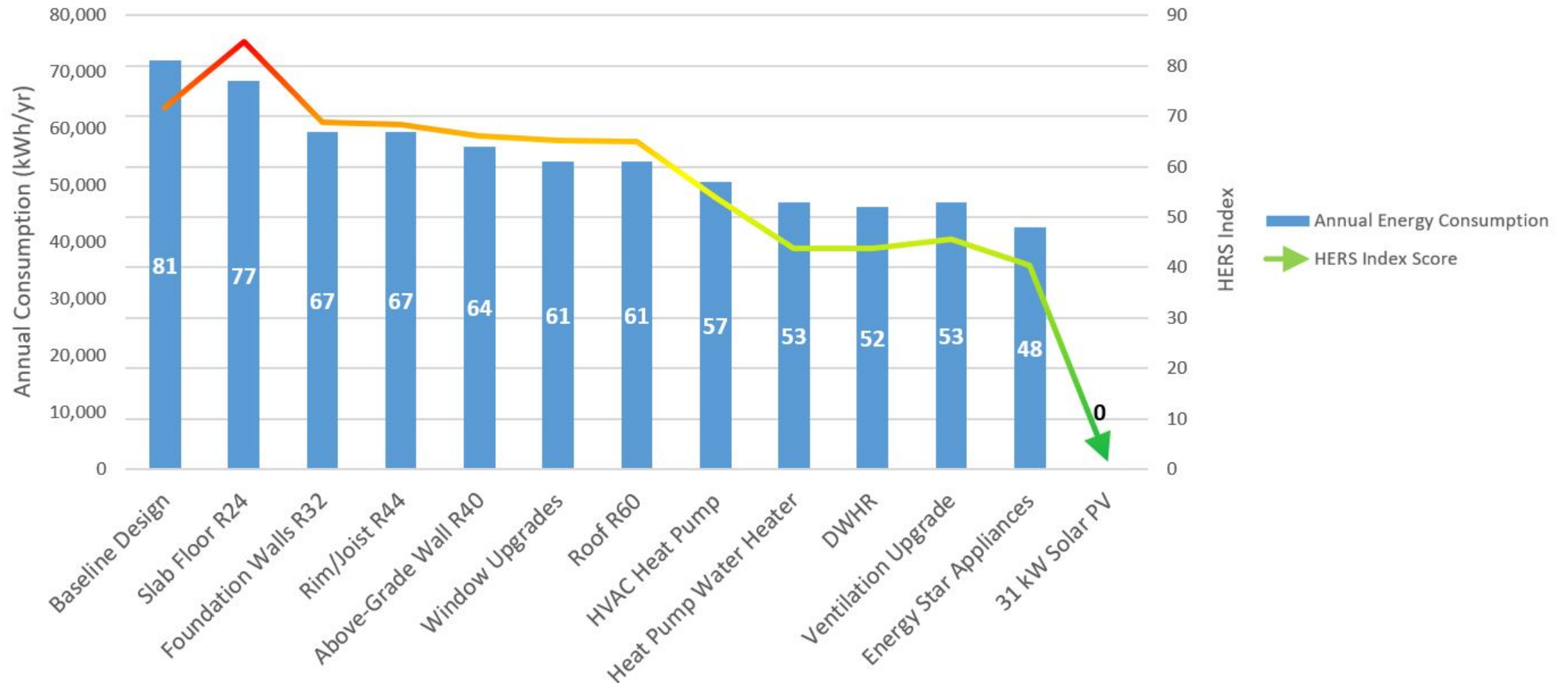
Renewable Energy



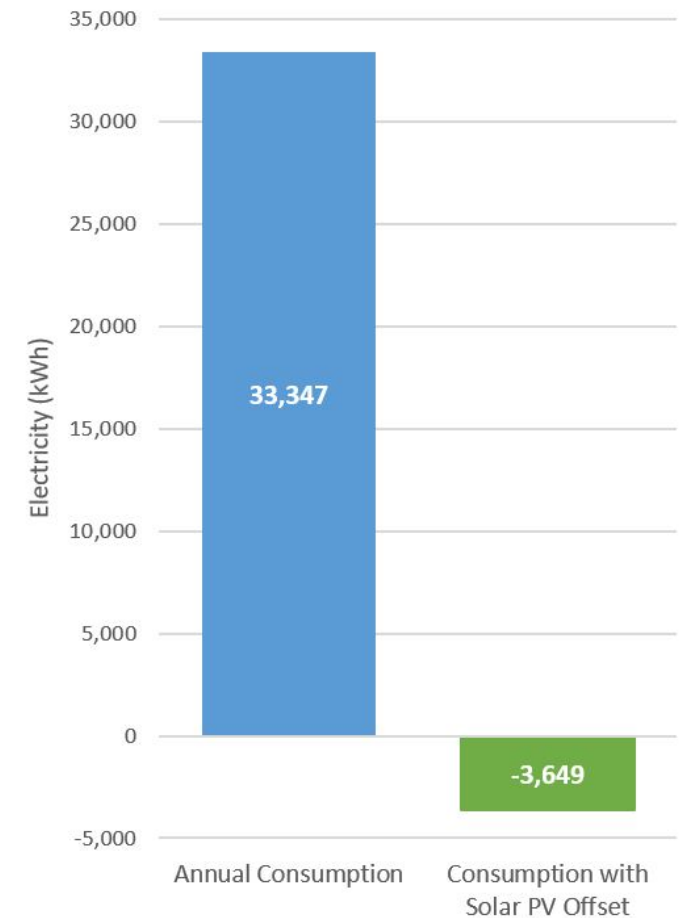
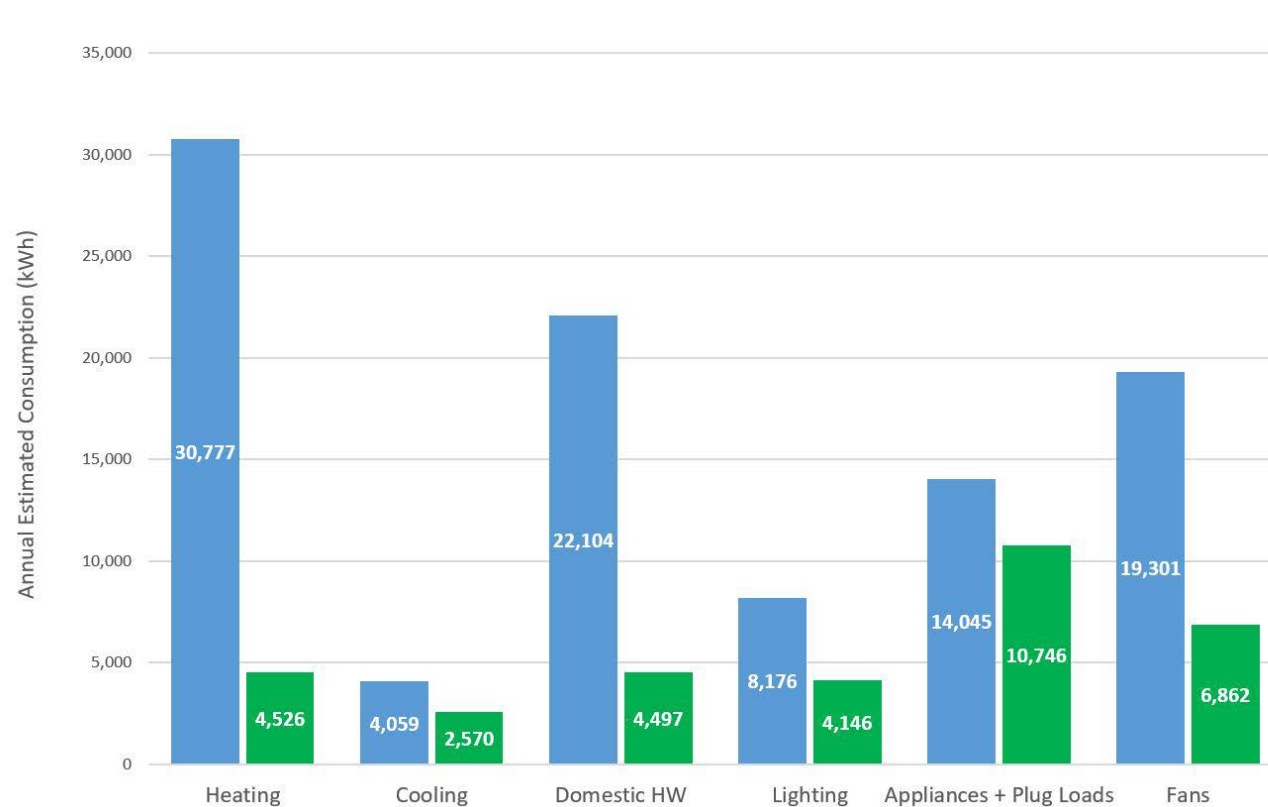
Normalized productions (per installed kWp): Nominal power 7.81 kWp



REM/Rate Design Iterations



Baseline vs Kehl-0 Energy Consumption





WARRIOR
HOME

University of Waterloo
Habitat
for Humanity®
Campus Chapter



K E H L - 0



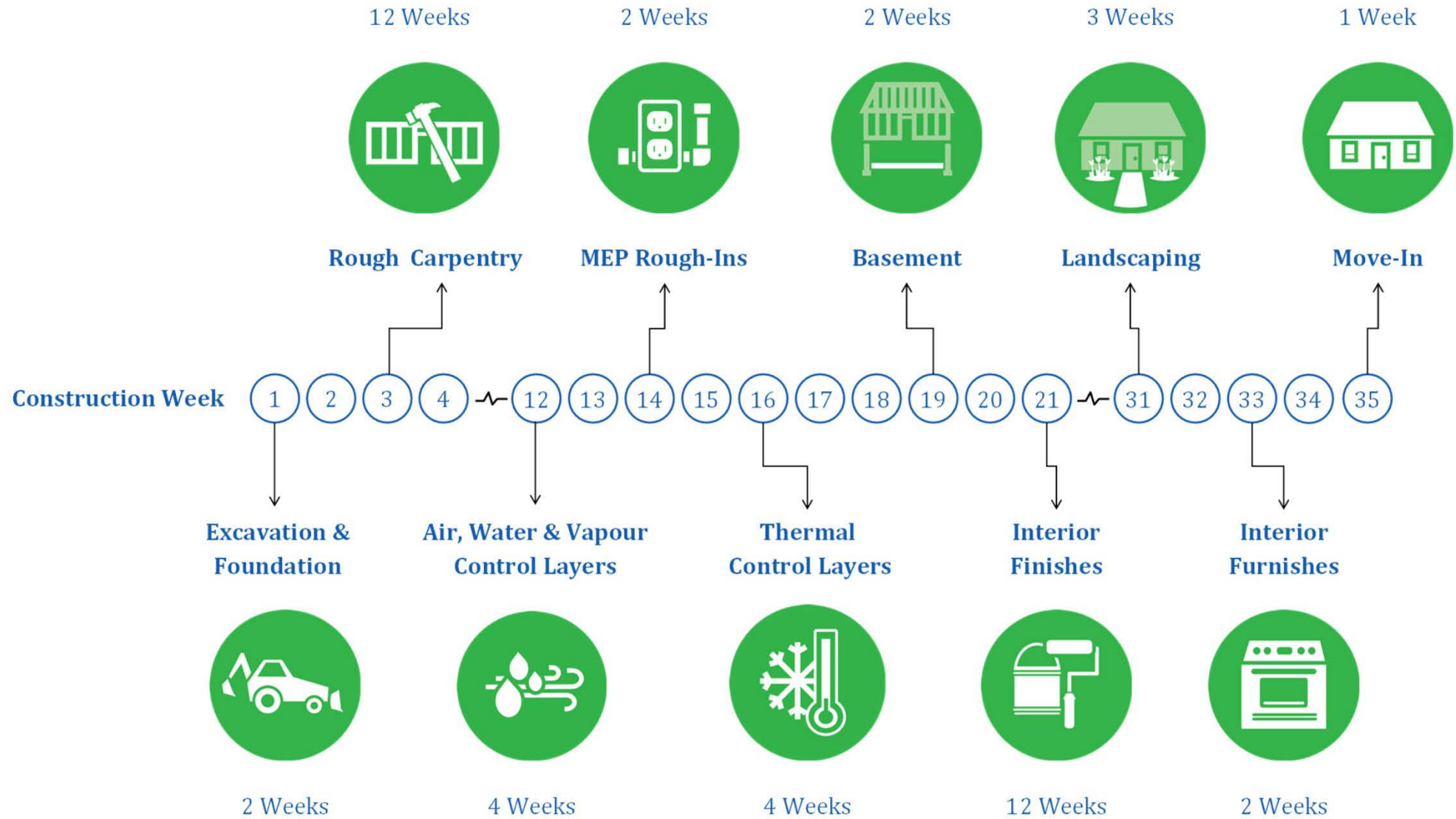
<\$150,000
Cost to Build



\$260,000
Cost to Buy

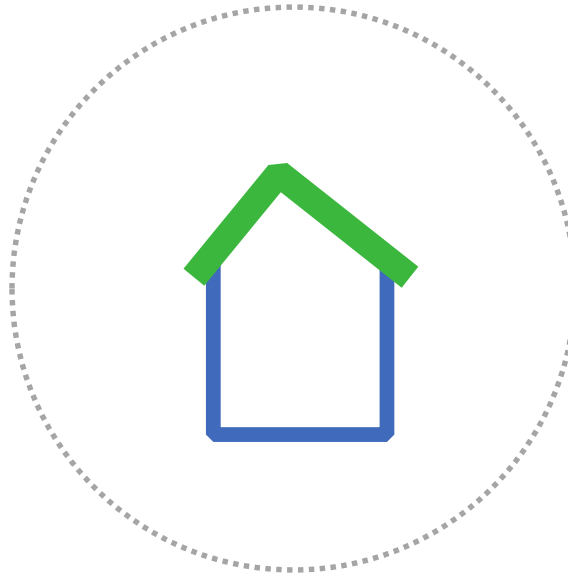


\$1800/Month
Cost to Own





INCLUSIVENESS



EASY
CONSTRUCTABILITY



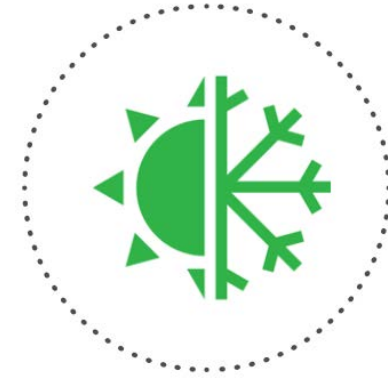
ADAPTABILITY



ARCHITECTURE



BUILDING ENCLOSURE



HVAC & PLUMBING



INTERIOR DESIGN



RENEWABLES



SUSTAINABLE LIVING

