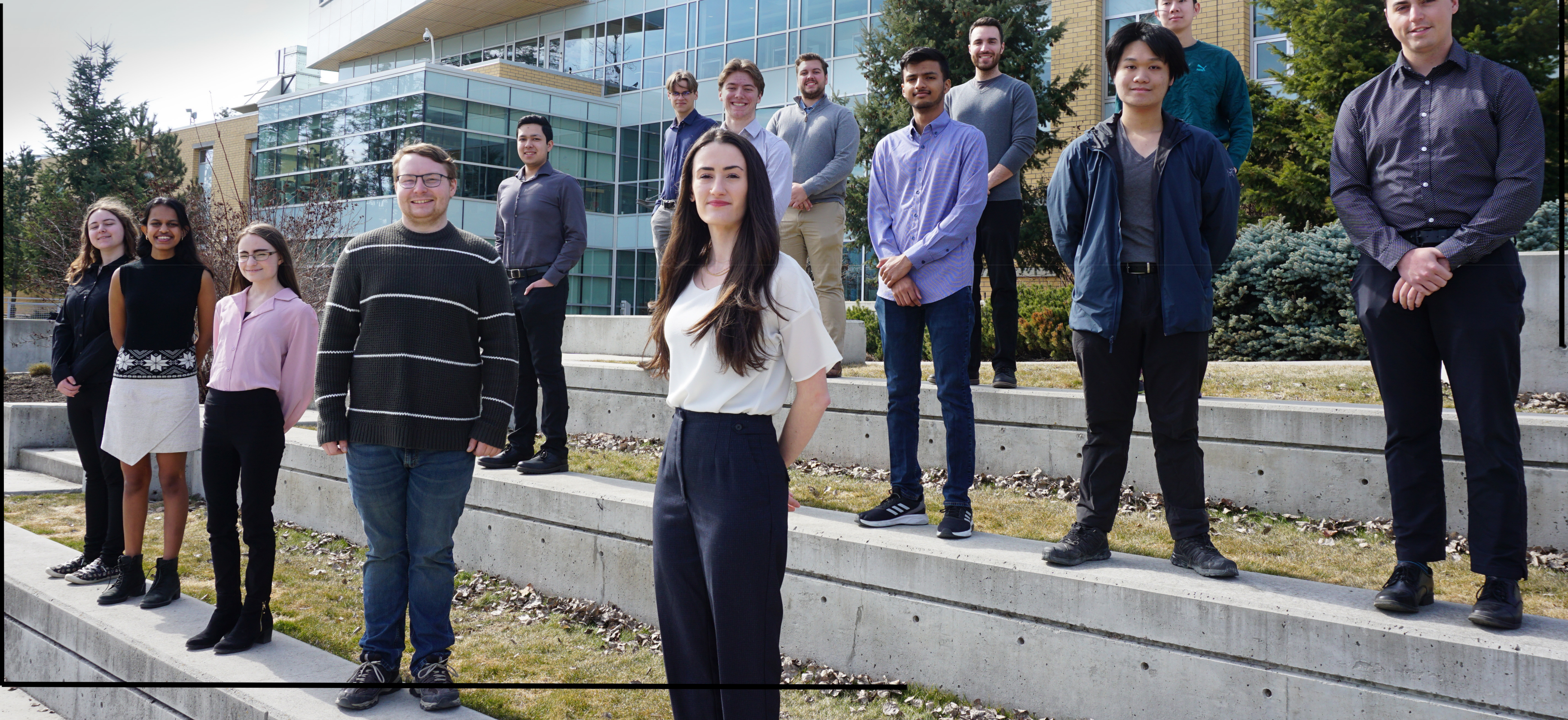




Innovate, Design, Sustain: River Crossing

The University of British Columbia Okanagan
Thompson Rivers University

Innovate, Design, Sustain



Site Analysis



Fraser River

Thompson River

Trans-Canada Highway

Proposed Build Site

Railway

Main Street

- Residential Zoning
- Commercial Zoning
- Proposed Build Site



Local Context

On June 21, 2021 a wildfire devastated the Village of Lytton in 10 minutes.

Rebuilding efforts have faced significant delays.

Almost two years later, the residents of Lytton have yet to return home.



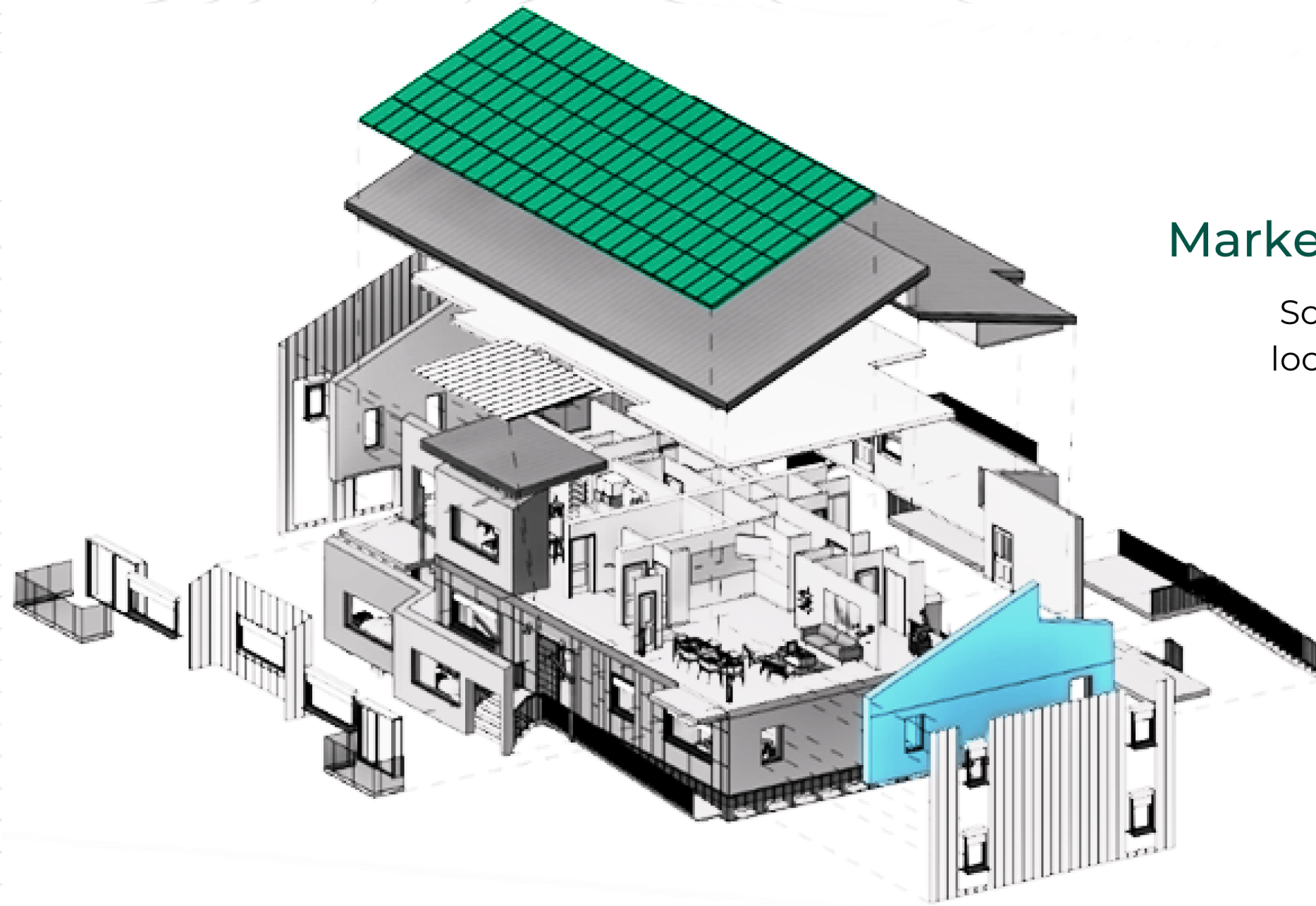
Design Strategy



River Crossing offers the residents of Lytton an opportunity to rebuild a resilient and sustainable community that will last for generations.



Design Strategy



Market-ready & Scalable

Scalable design incorporates locally sourced, prefabricated materials

Multigenerational

Promotes family connection and social regeneration

1 Resilient & Durable

Withstands extreme weather and natural disasters

2

3

High-performance

Optimizes energy consumption and generation to reach net-zero

4



Market Analysis



Diversifying housing opportunities while preserving the environment

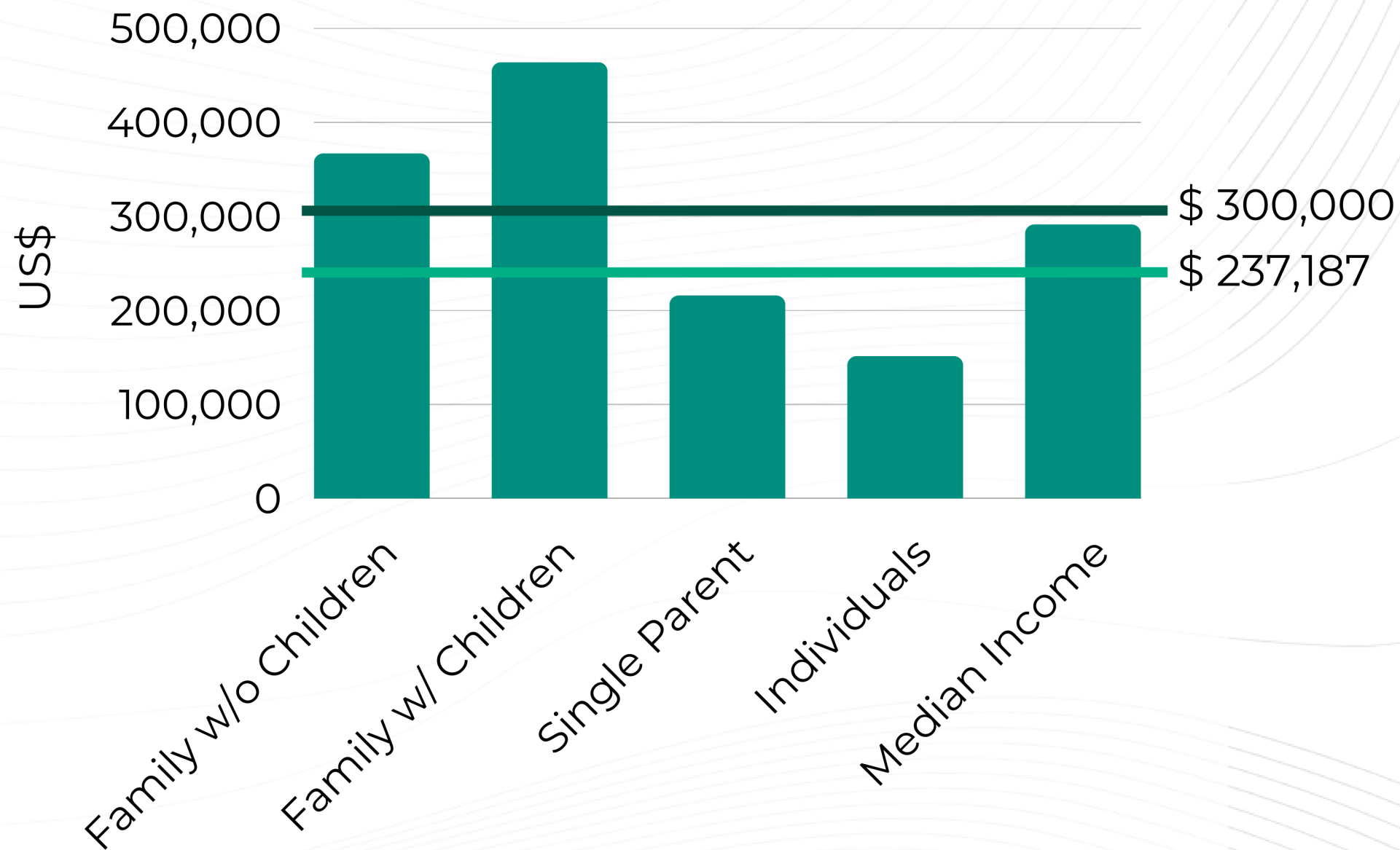


Accessible, inclusive family homes

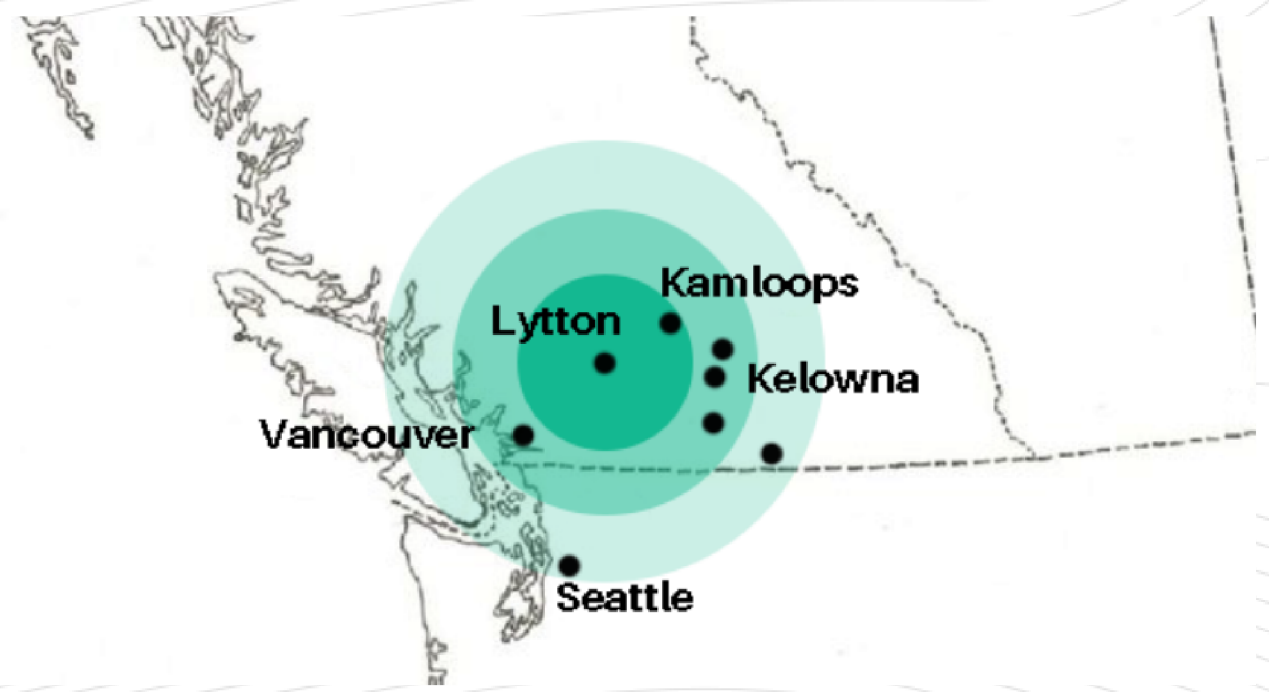
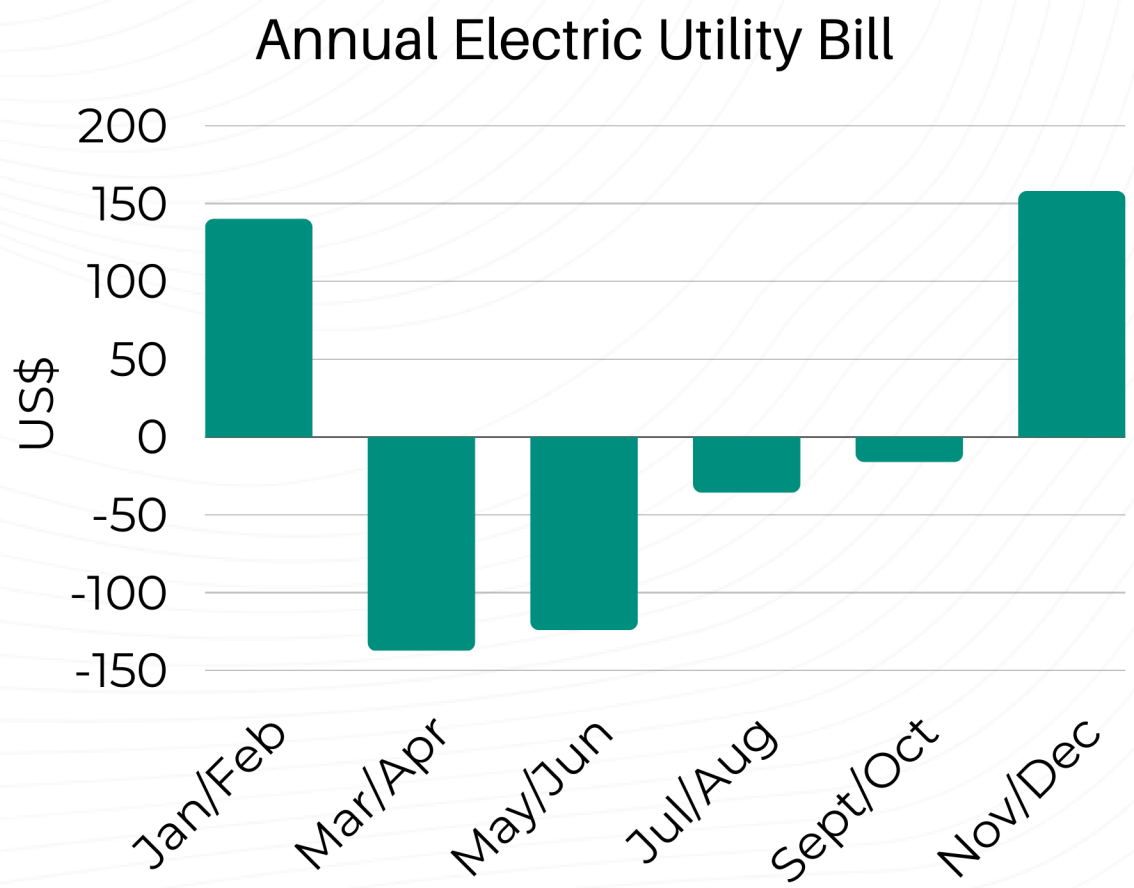
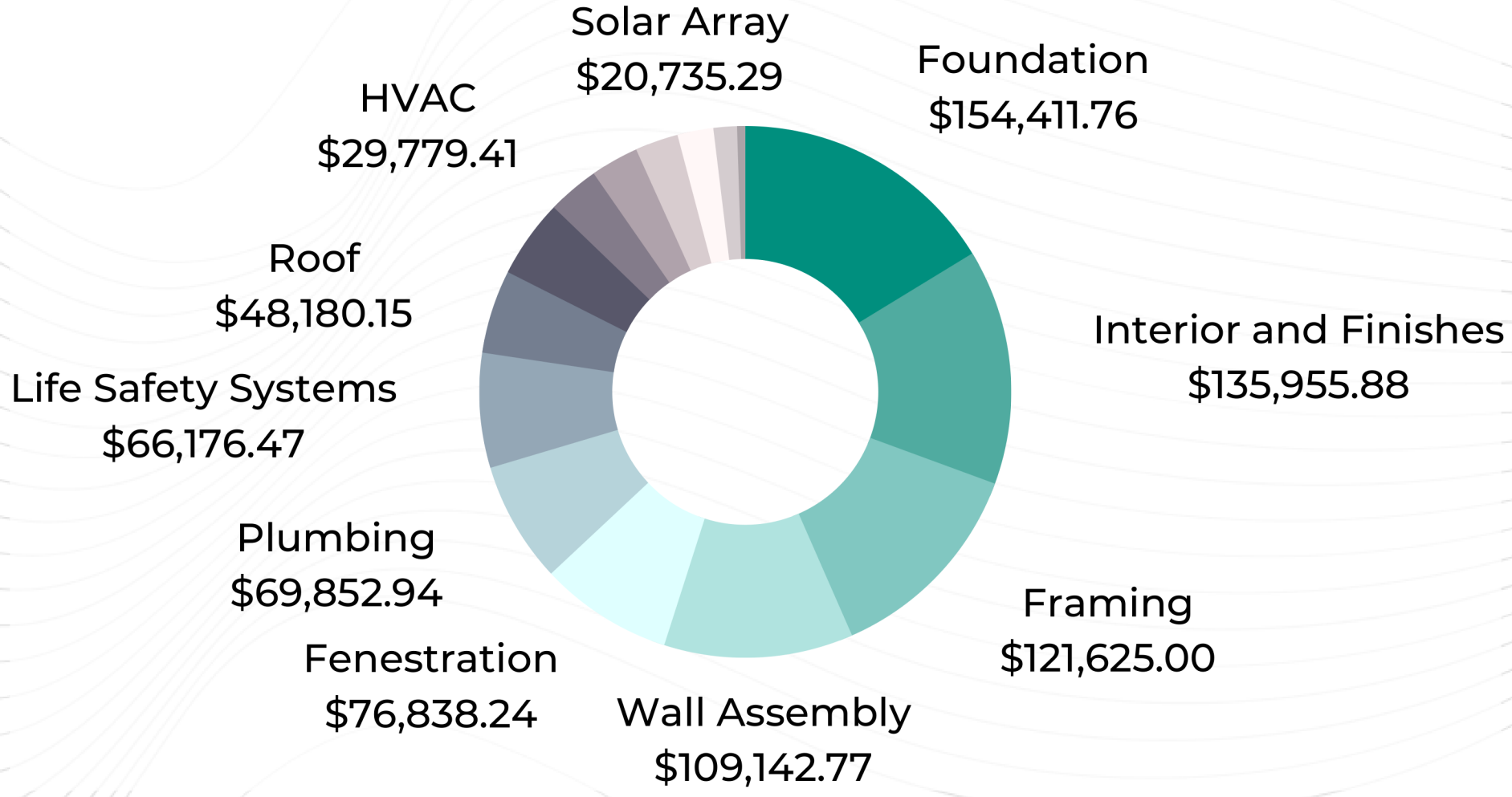


Rezoning increases urban density and rental stock

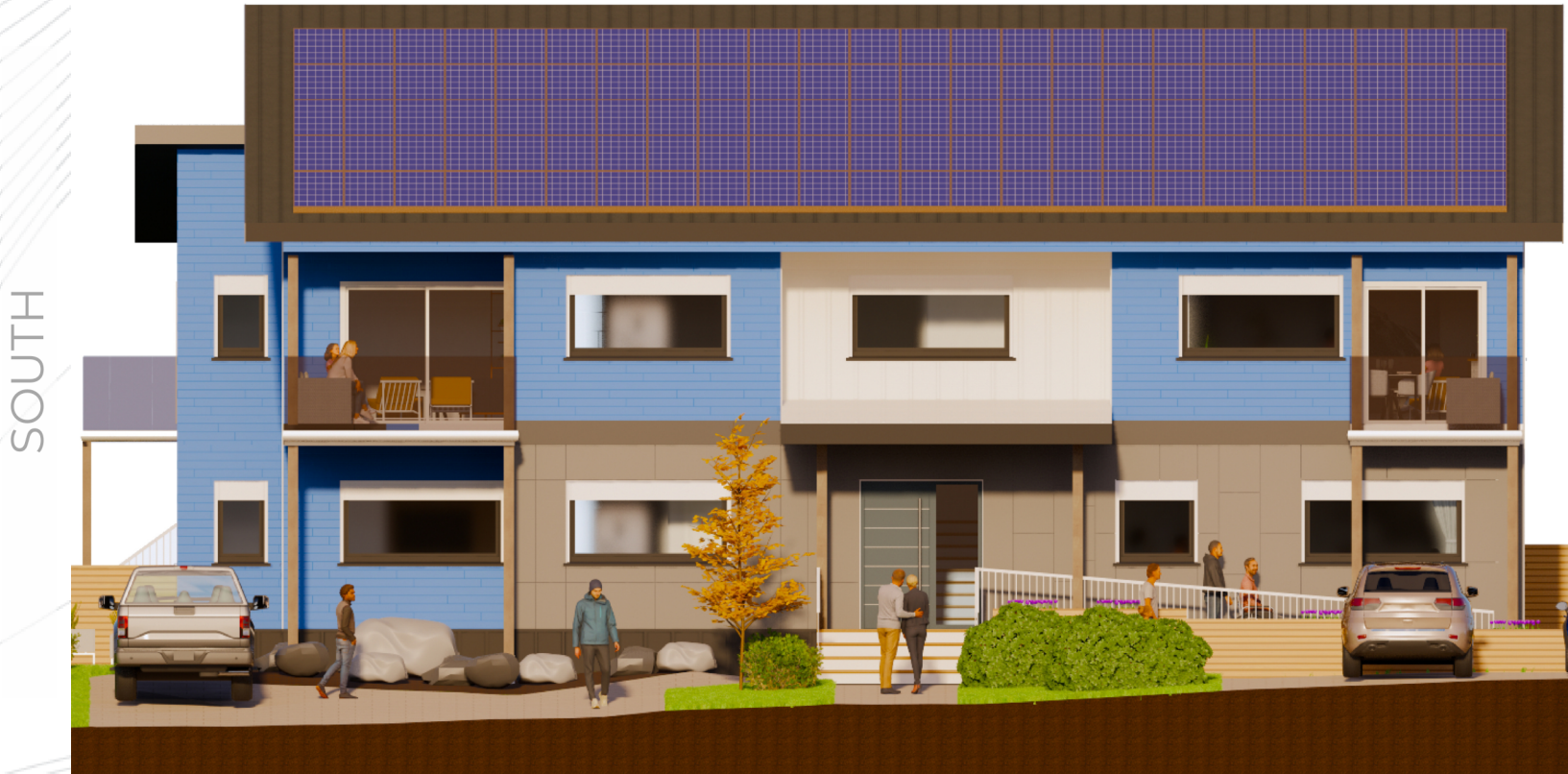
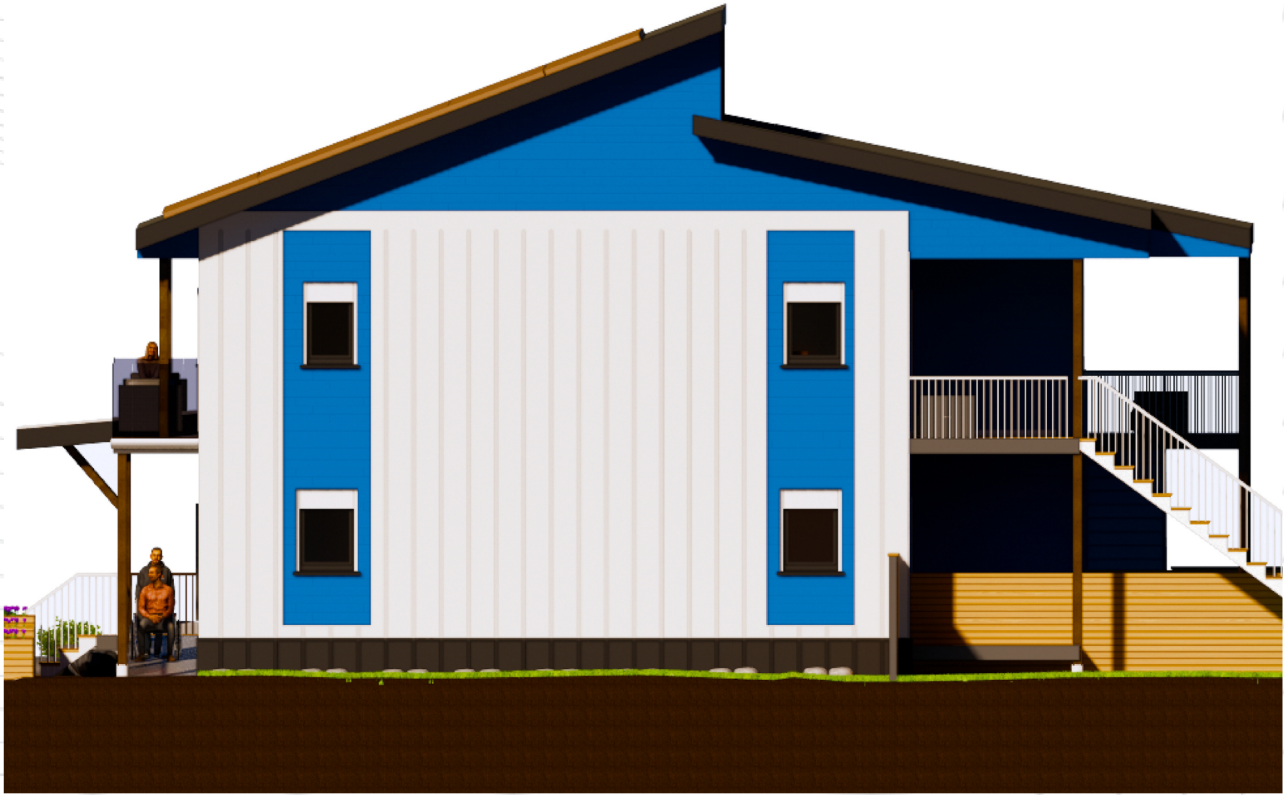
2019 Affordable Purchase Price vs. Market Price Single Family Detached vs. River Crossing's Average Construction Cost Per Unit



Market Analysis



Architecture: Exterior Design



Architecture: Interior Design



COTTAGE STYLE MODERN



BOHEMIAN MINIMALIST



Architecture: Landscaping

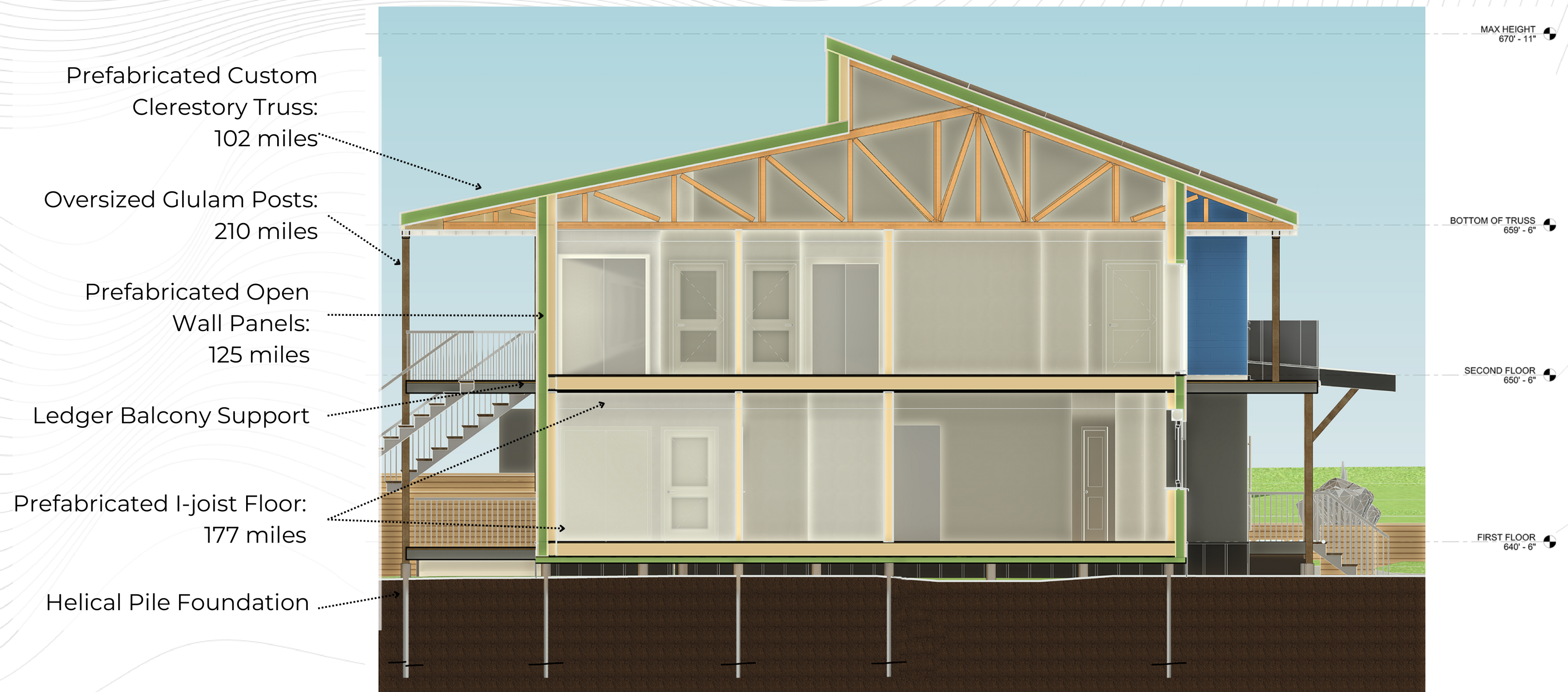


ZONE 1A
No Vegetation or
Combustible Materials

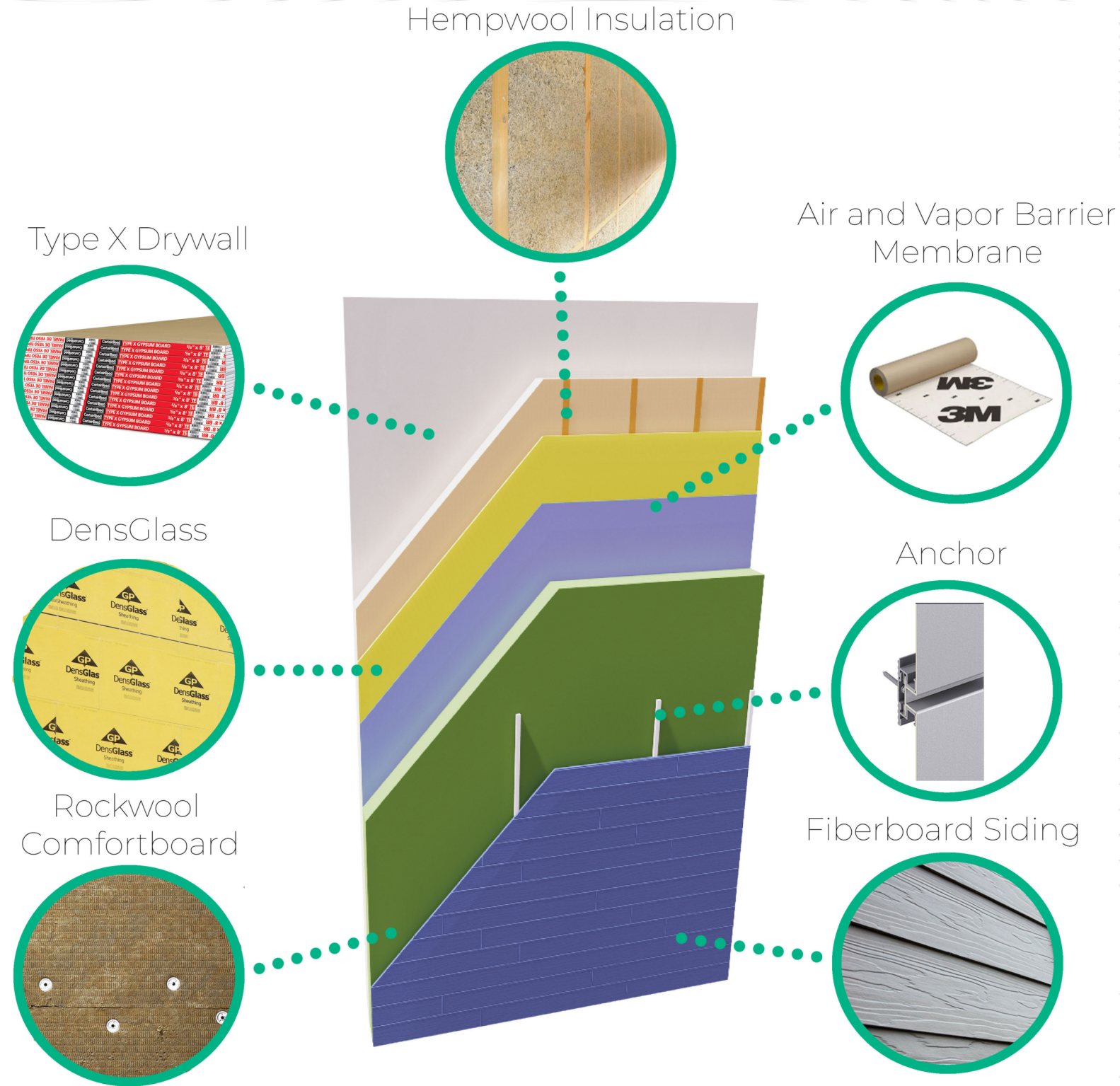
ZONE 1
Strict Vegetation
Maintenance



Engineering: Structural



Engineering: Building Envelope

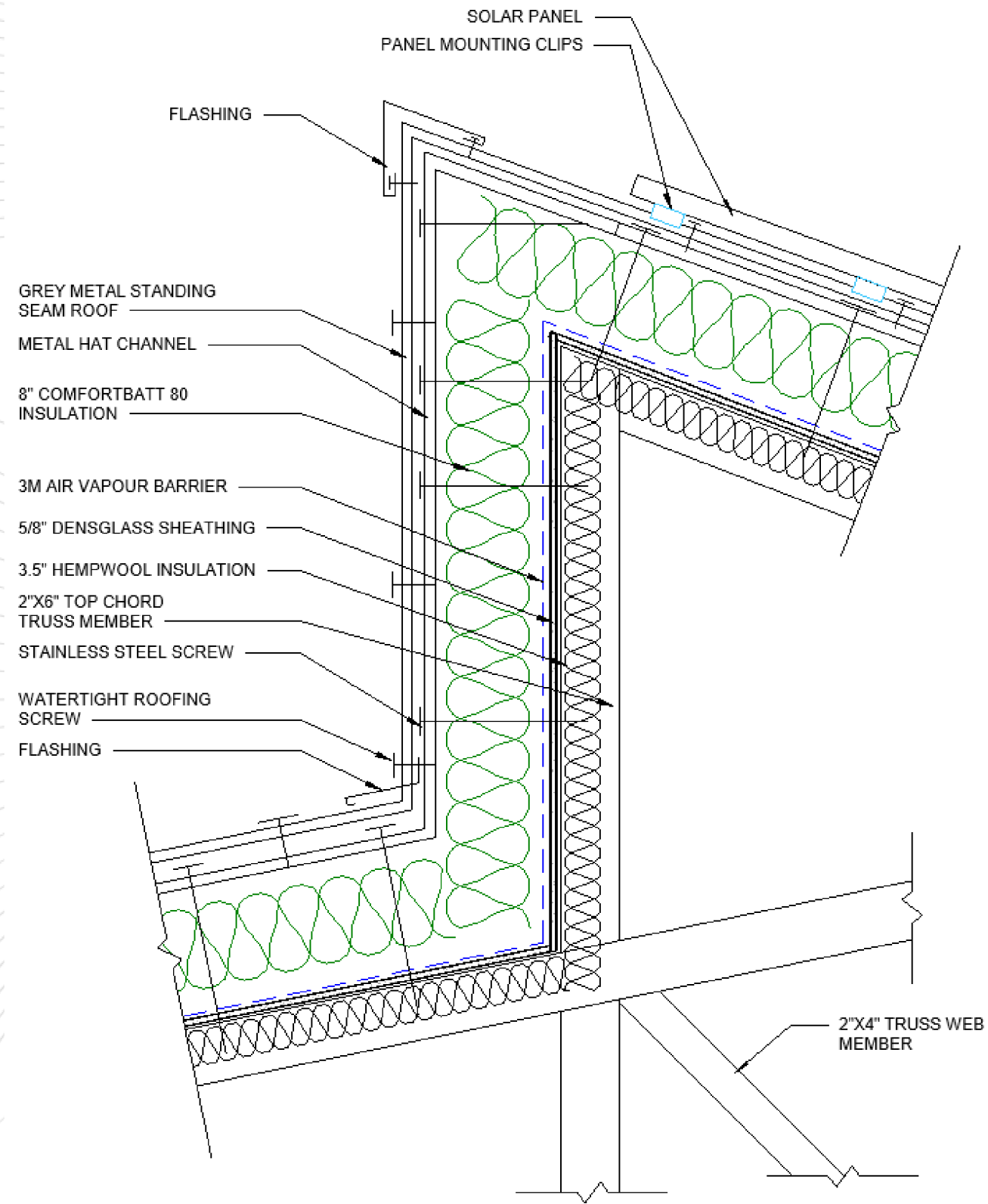


Performance Requirements	BCBC	IECC	DOE ZERH	River Crossing
Exterior Wall: External	-	R7.5	R7.5	R21.0
Exterior Wall: Cavity	-	R13.0	R13.0	R13.0
Exterior Wall: Equivalent	R15.8	-	-	R37.9
Roof	R39.2	R49.0	R49.0	R50.1
Crawlspace	R25.6	R30.0	R30.0	R69.2
Door	U0.32	U0.70	U0.17	U0.08
Window	U0.32	U0.70	U0.27	U0.16

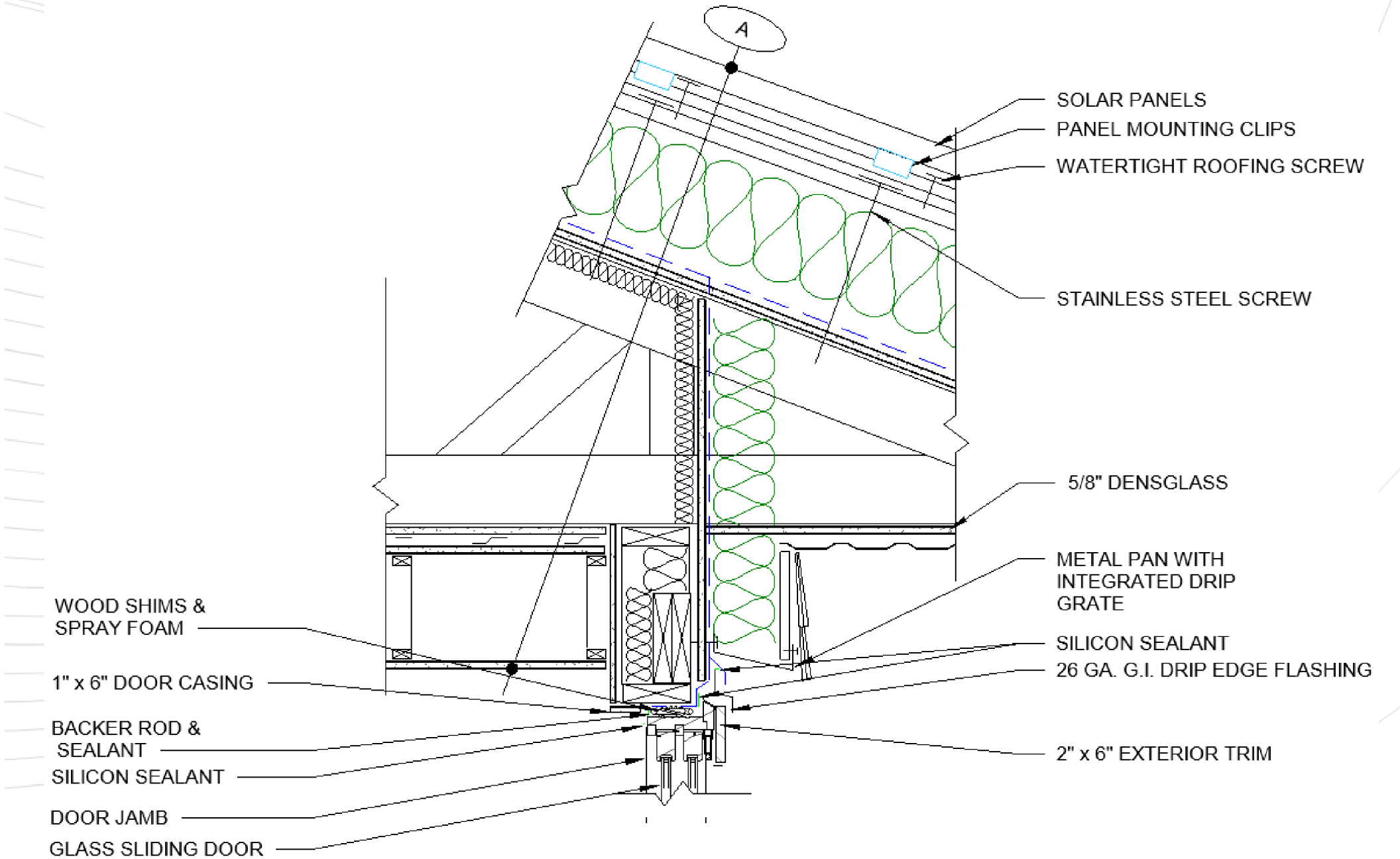
EXTERIOR WALL ASSEMBLY



Engineering: Building Envelope



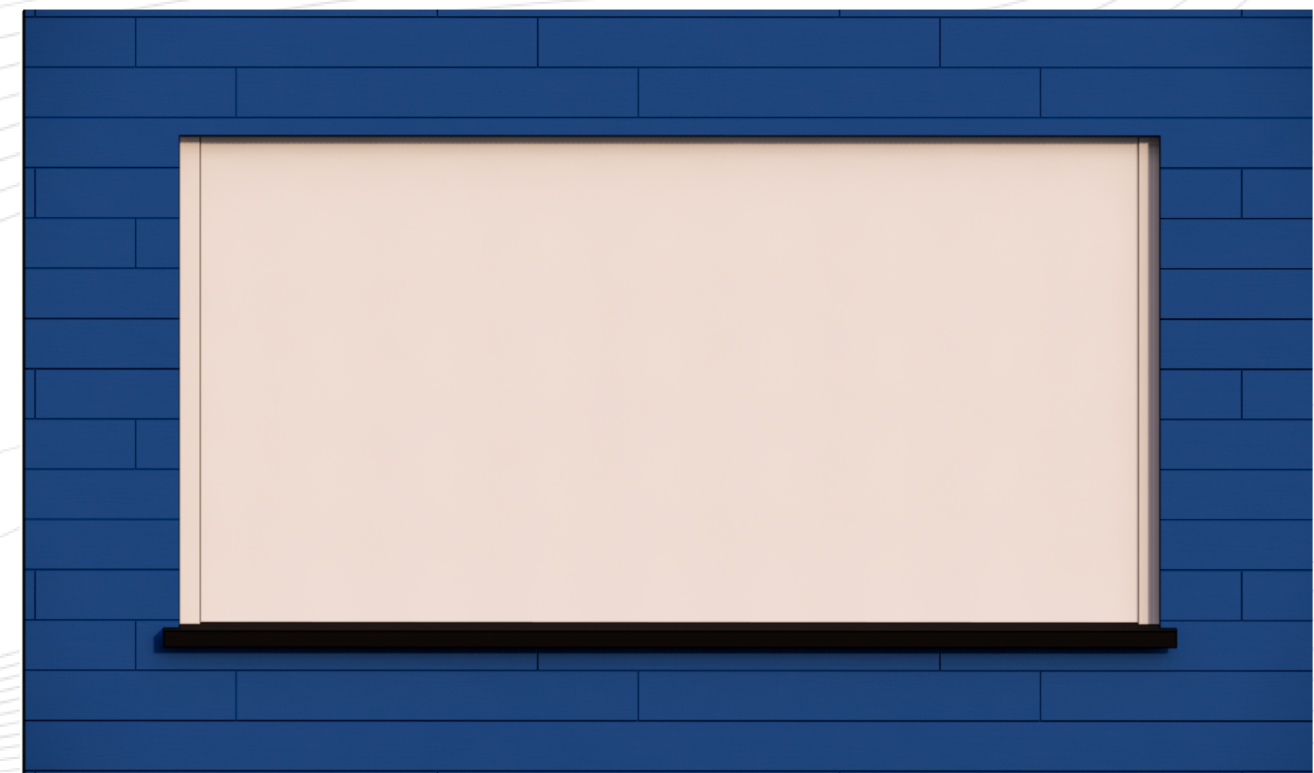
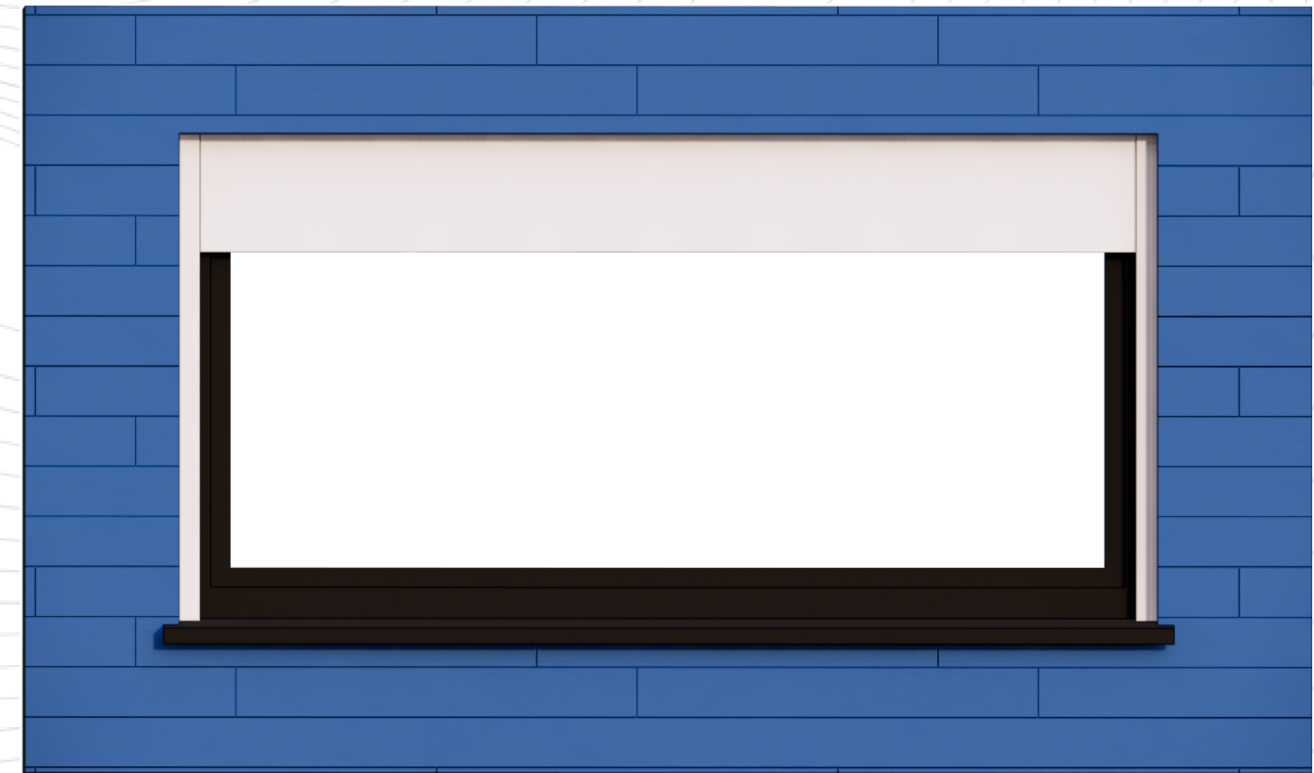
ROOF PEAK DETAIL



WALL- ROOF DETAIL



Engineering: Building Envelope

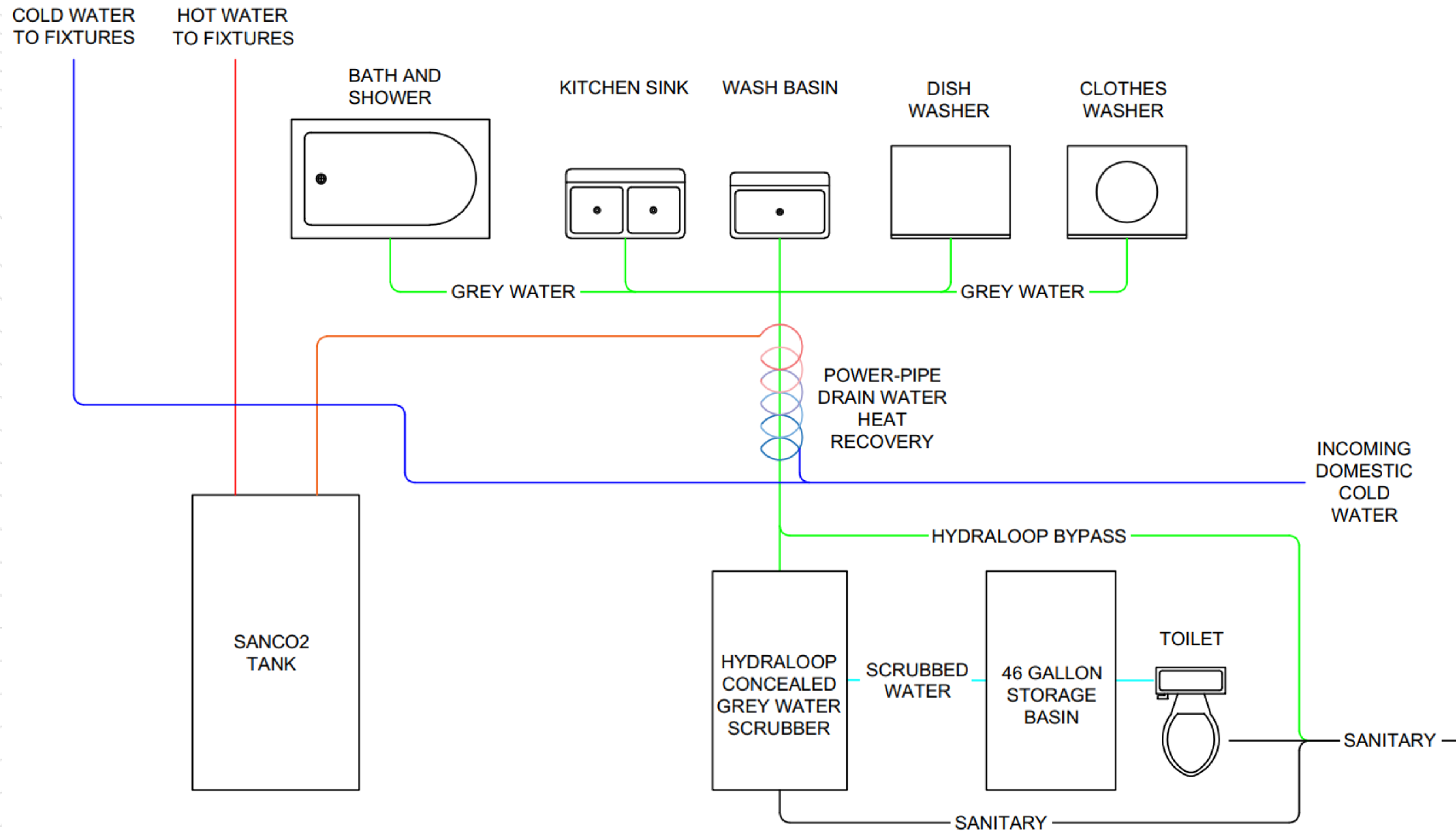


ONE FOOT CLOSURE

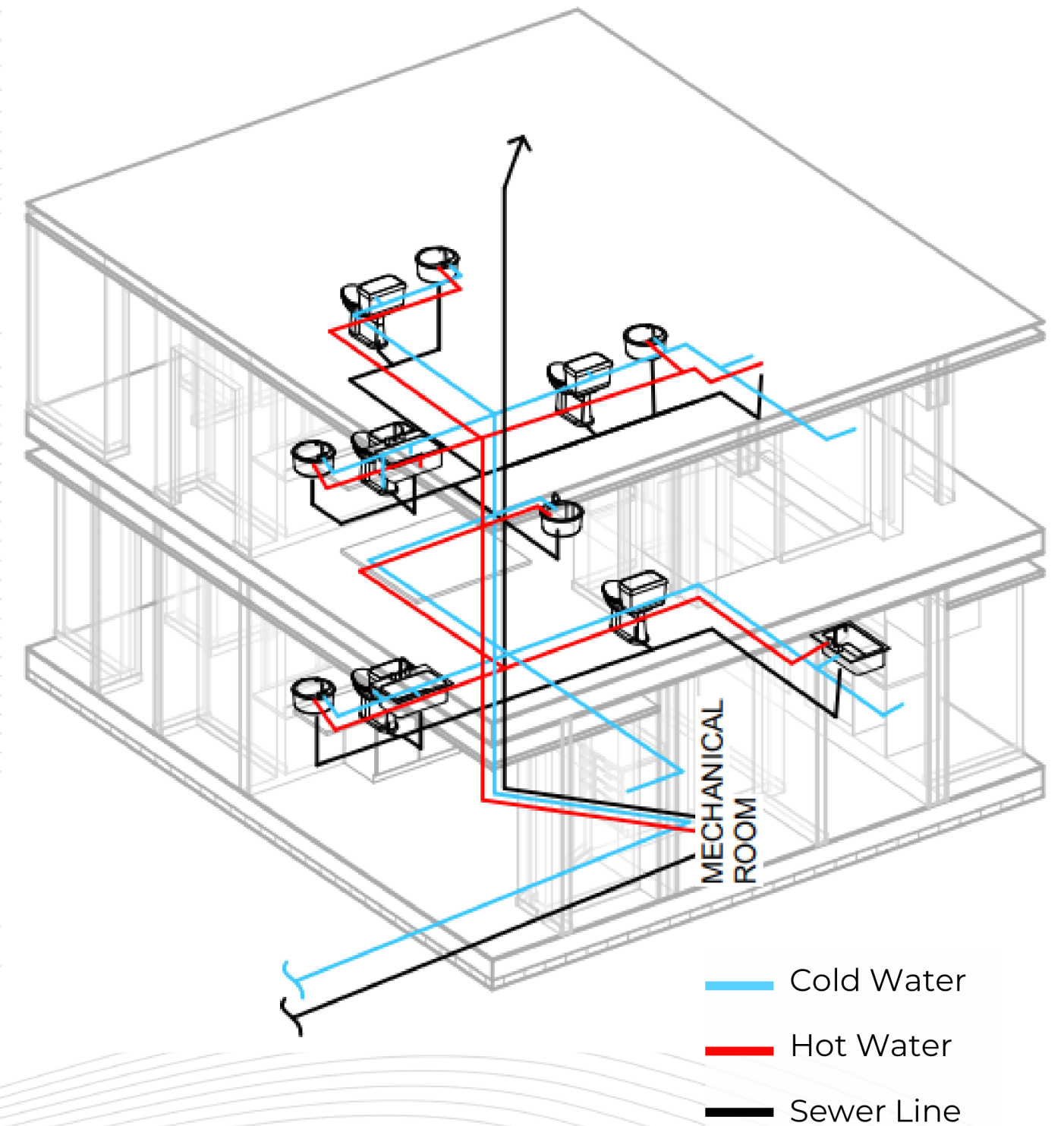
FULL CLOSURE



Engineering: Water Distribution



DRAIN WATER HEAT RECOVERY AND SCRUBBING SYSTEM



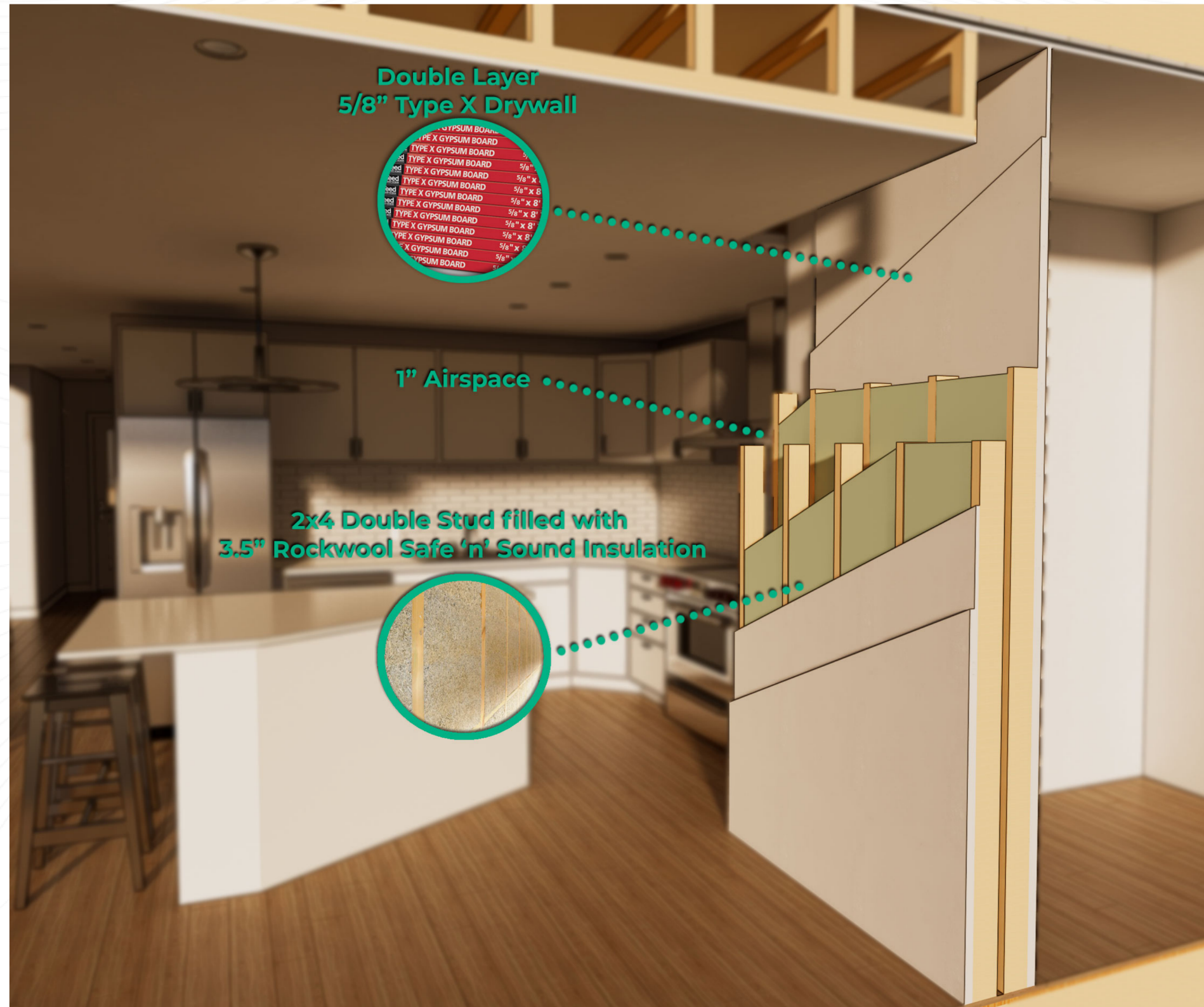
- Cold Water
- Hot Water
- Sewer Line

Durability & Resilience



-
-
-
-
-
-
-
-
-
-
-
-
-

Durability & Resilience



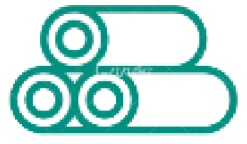
DEMISING WALL ASSEMBLY

- 1 Interior demising wall
STC rating of 66
- 2 Load Bearing Fire
Rating of 1.5hr
- 3 Non-Load Bearing Fire
Rating of 2hr



Embodied Environmental Impact

Raw Material Extraction



Material Production



Recycling & Reuse



Transportation



Demolition



Construction



30.7%

10.9%

2%

56.4%

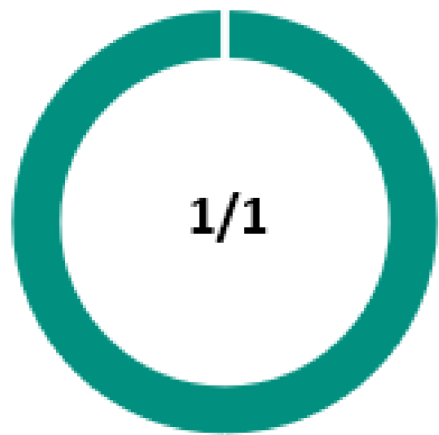
Global Warming Potential

- Product
- Transportation
- Maintenance & Replacement
- End of Life

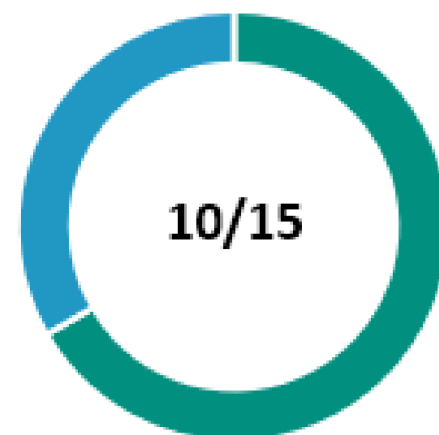


LEED Platinum

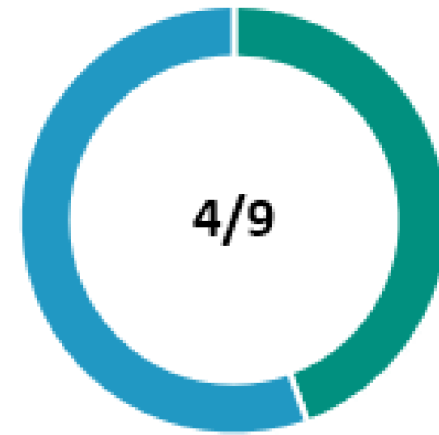
Integrative Process



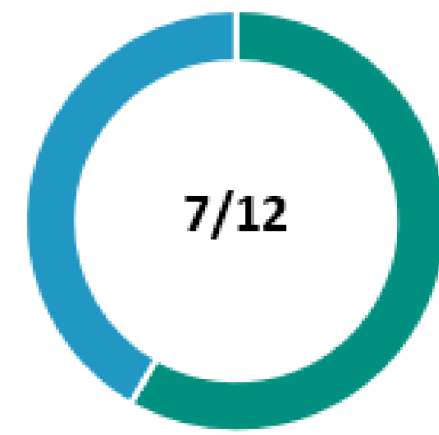
Location and Transportation



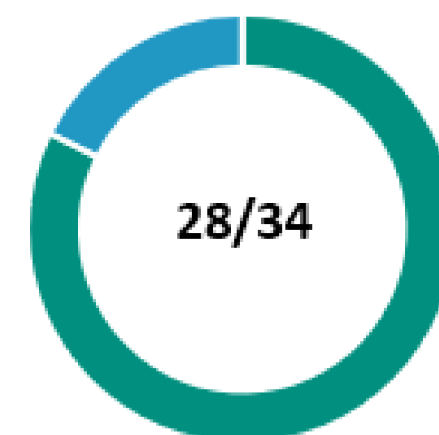
Sustainable Sites



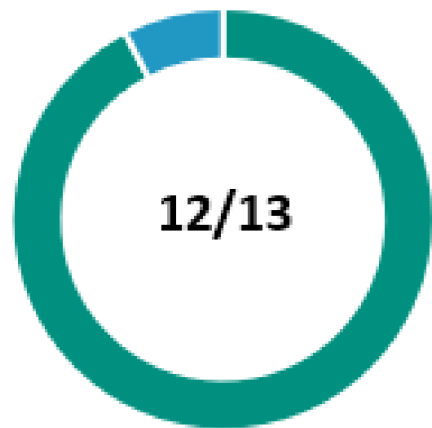
Water Efficiency



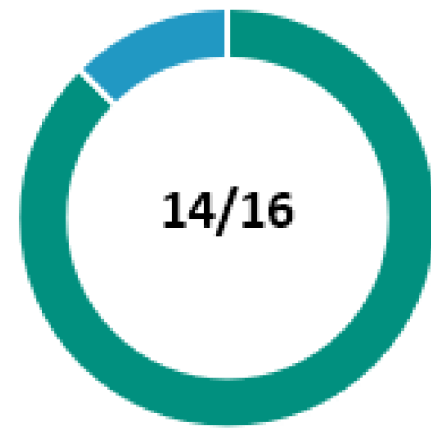
Energy and Atmosphere



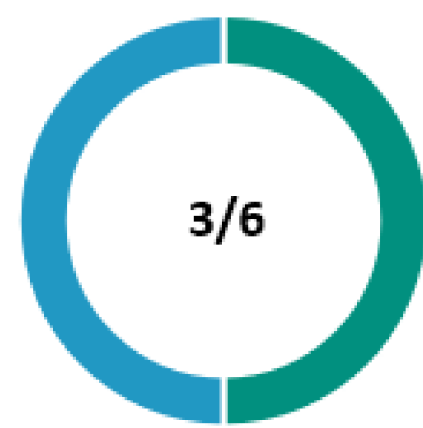
Material and Resources



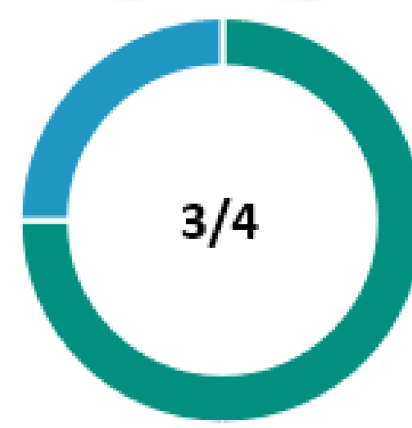
Indoor air quality



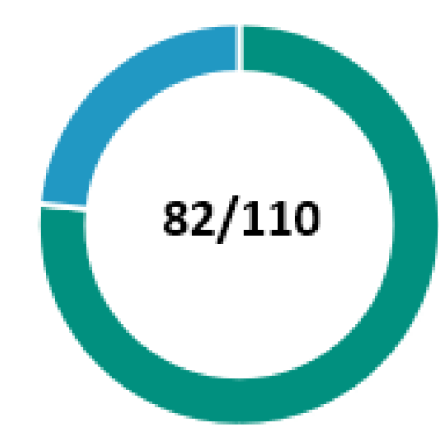
Innovation



Regional Priority

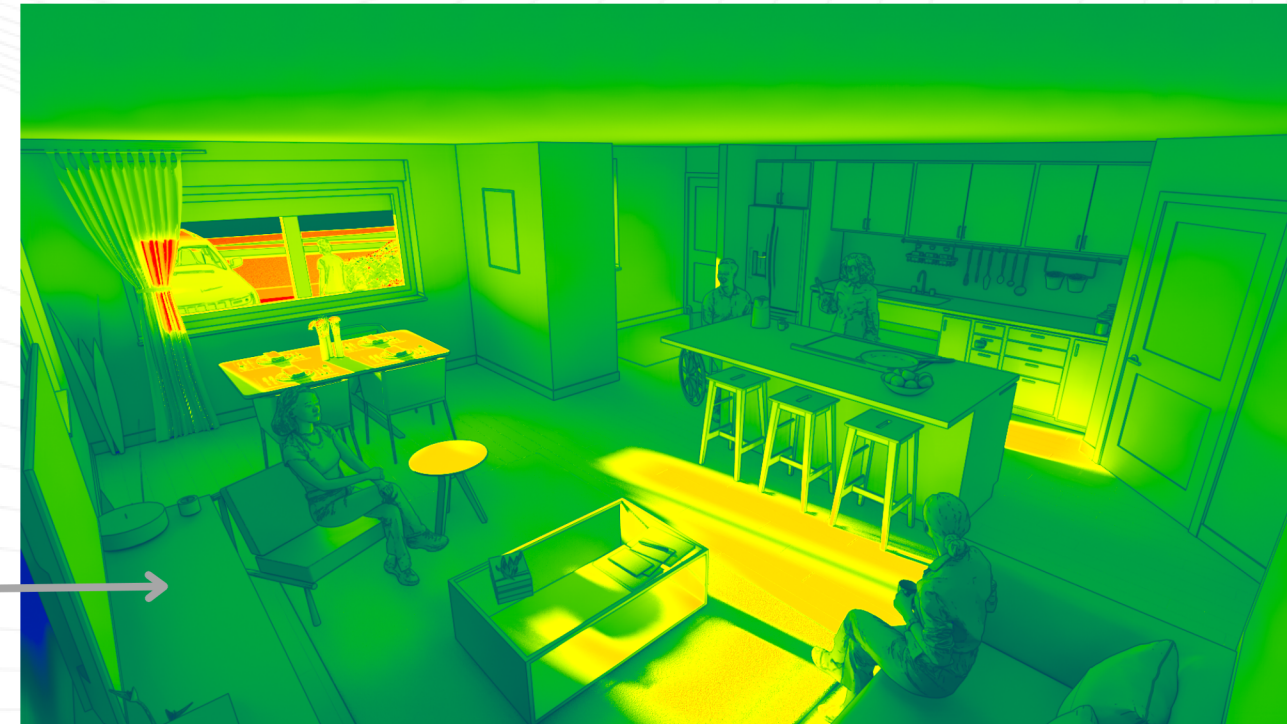
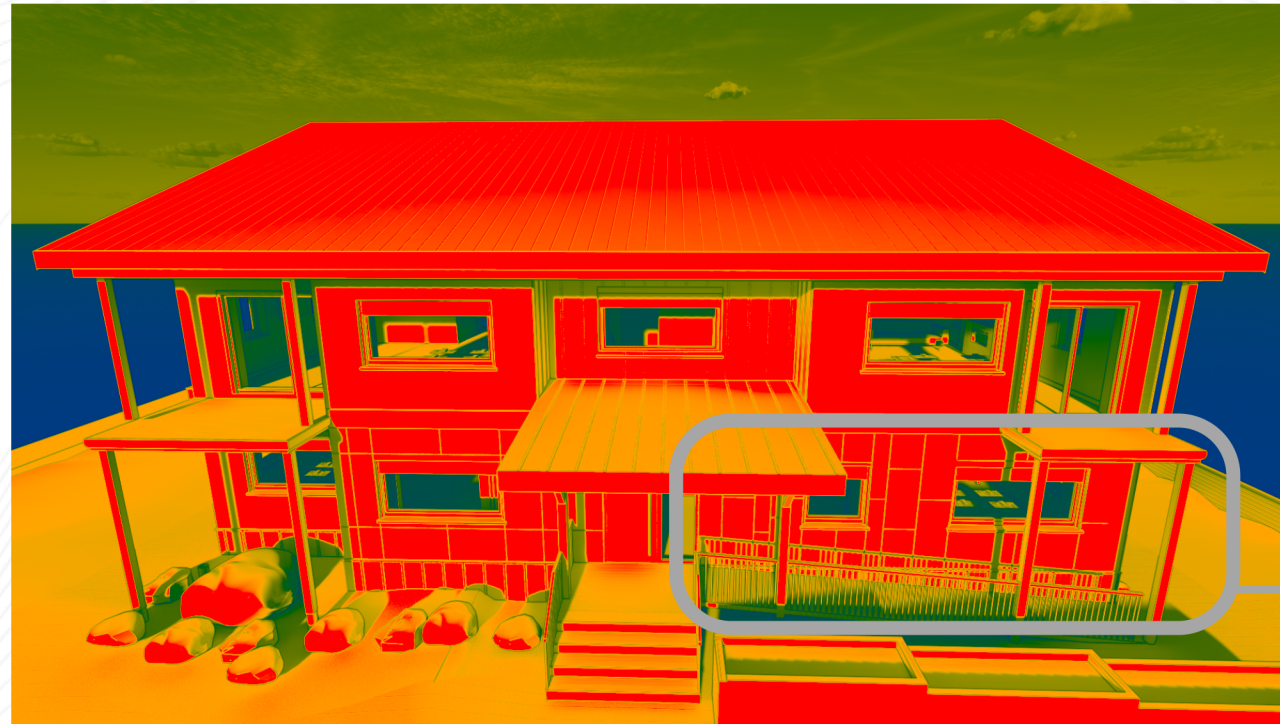


Total LEED Points.

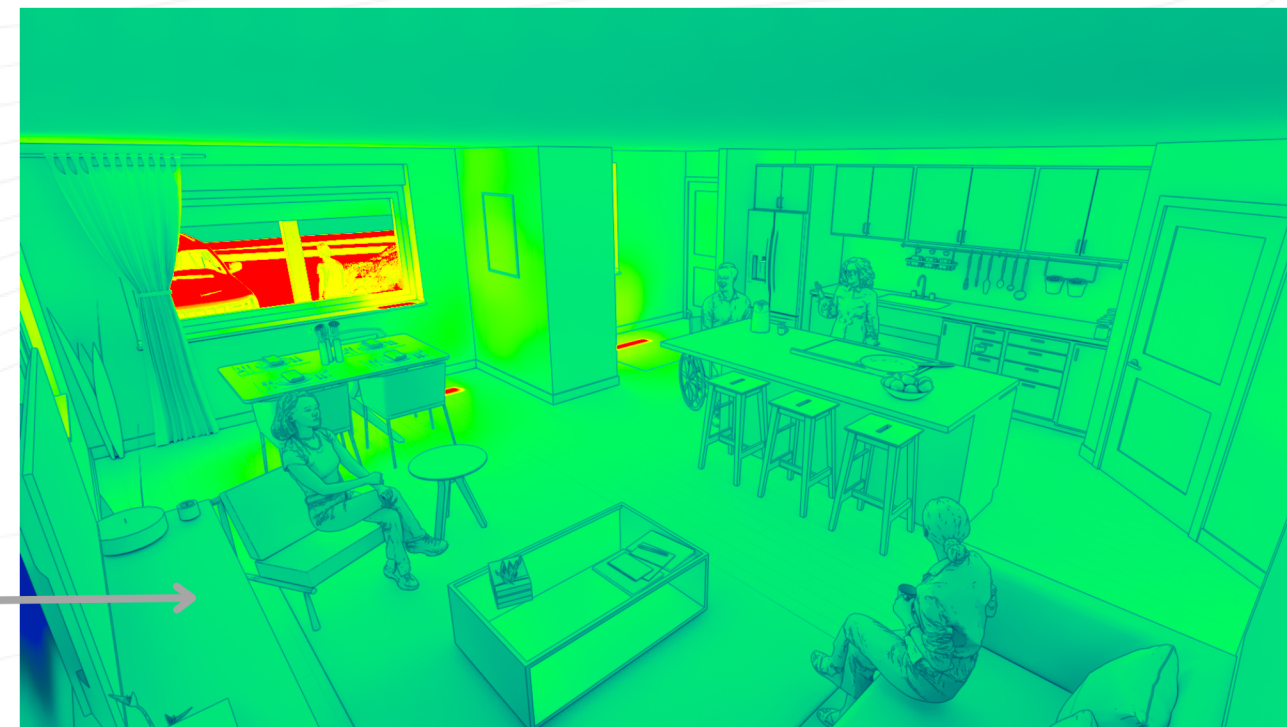
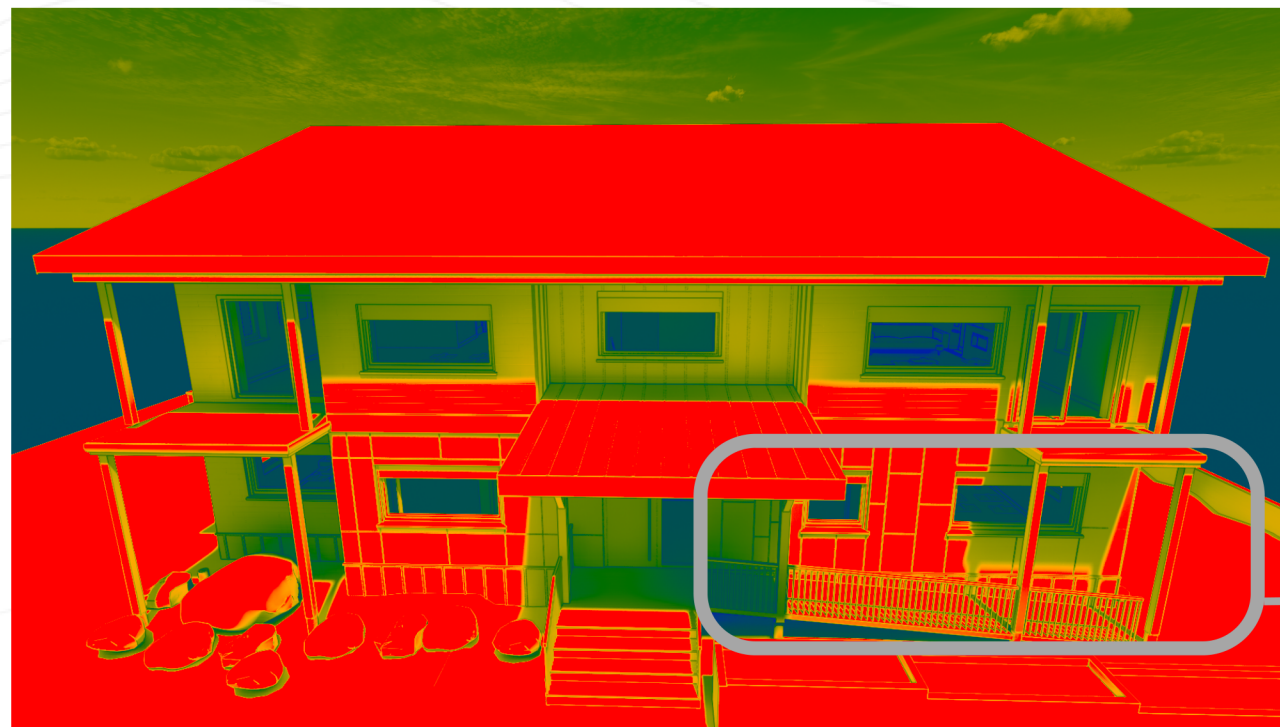


Integrated Performance: Passive Design

WINTER SUN



SUMMER SUN



Integrated Performance: Lighting



ARTIFICIAL LIGHTING DISPURTION



EVENING LIGHTING



Occupant Experience



- Icon: Group of people
- Icon: Location pin
- Icon: Target
- Icon: Dollar sign
- Icon: House
- Icon: Building
- Icon: Fire
- Icon: Leaf
- Icon: Lightbulb
- Icon: People with hearts
- Icon: Plug
- Icon: Lightning bolt
- Icon: Sun and solar panel

Occupant Experience: Accessibility



ACCESSIBILITY RAMP



ACCESSIBLE KITCHEN



Occupant Experience: Maintenance



Easy Yard Maintenance



LED Lights



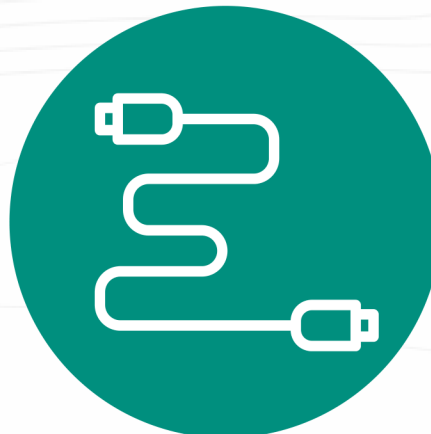
Automatic Leak Detection



Self-cleaning HVAC



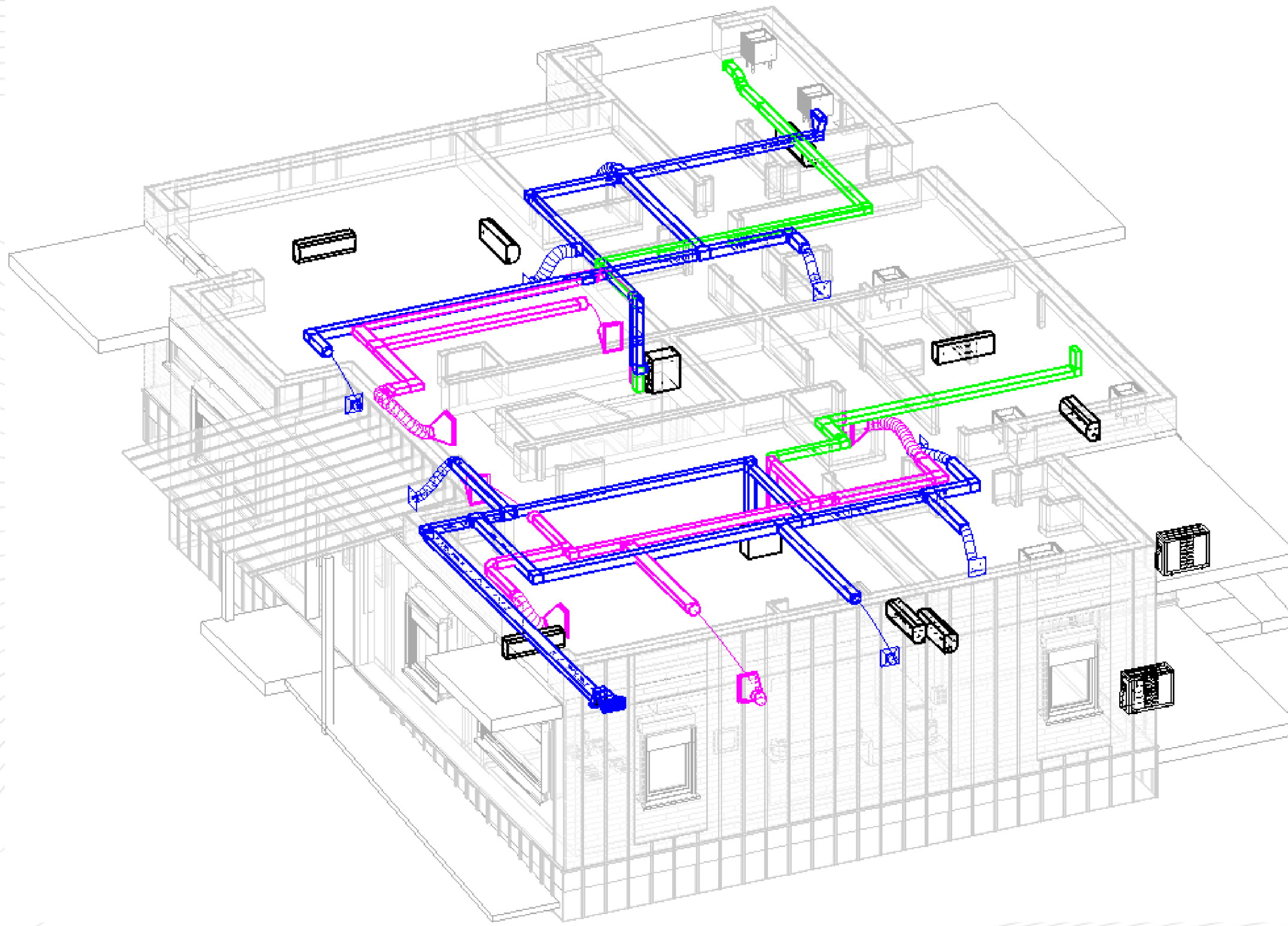
Smart Thermostat







Connected Systems



Comfort & Environmental Quality



Heat Pump	
SEER	22.5
Min. Operating Temperature	-22F
Range	48,000 BTU
Filters	Silver Ion
HRV	
Filters	MERV13
Adjusted SHR at -25F	78%
Air Flow	142 CMF

-  Mini-Split
-  Exhaust Air
-  Return Air
-  Supply Air



Comfort & Environmental Quality

55 decibel Reduction
STC rating of 55

35 decibel Interior

90 decibel Exterior

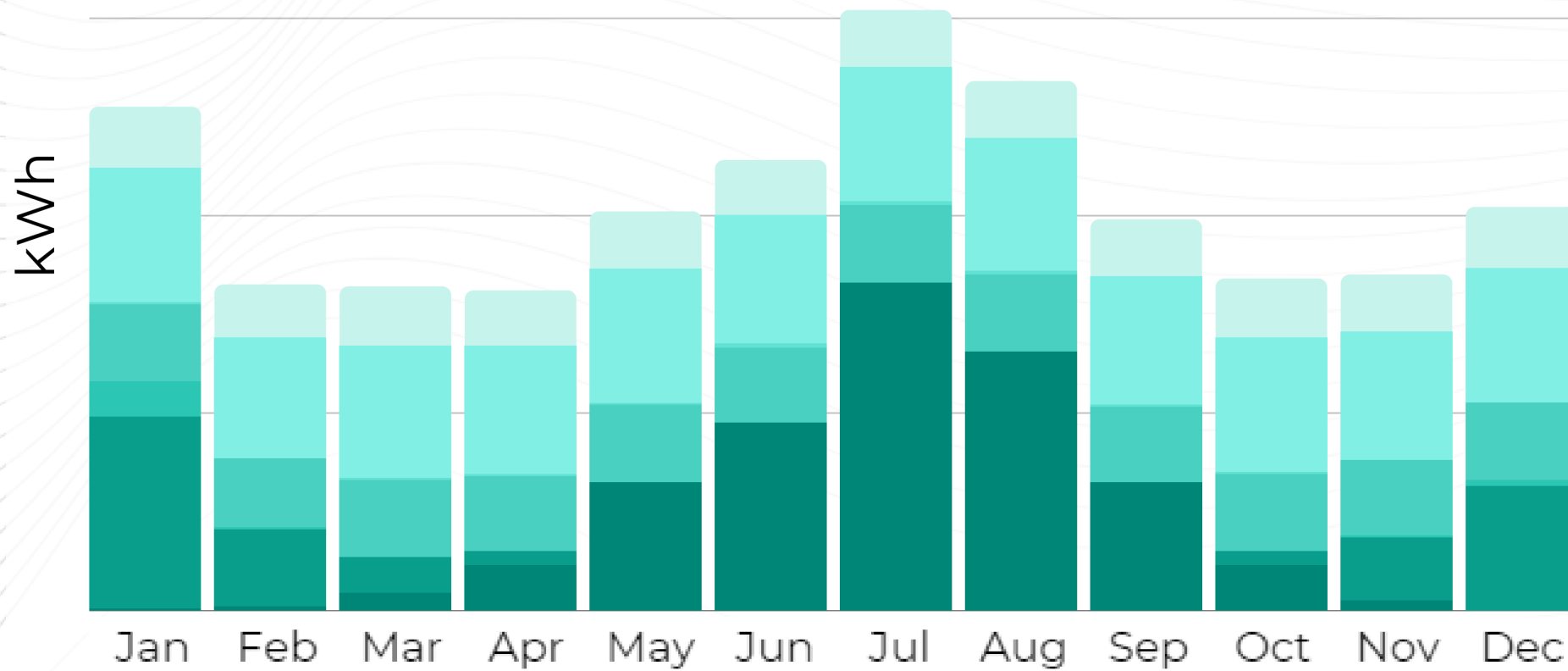


Energy Performance

Annual Energy Consumption

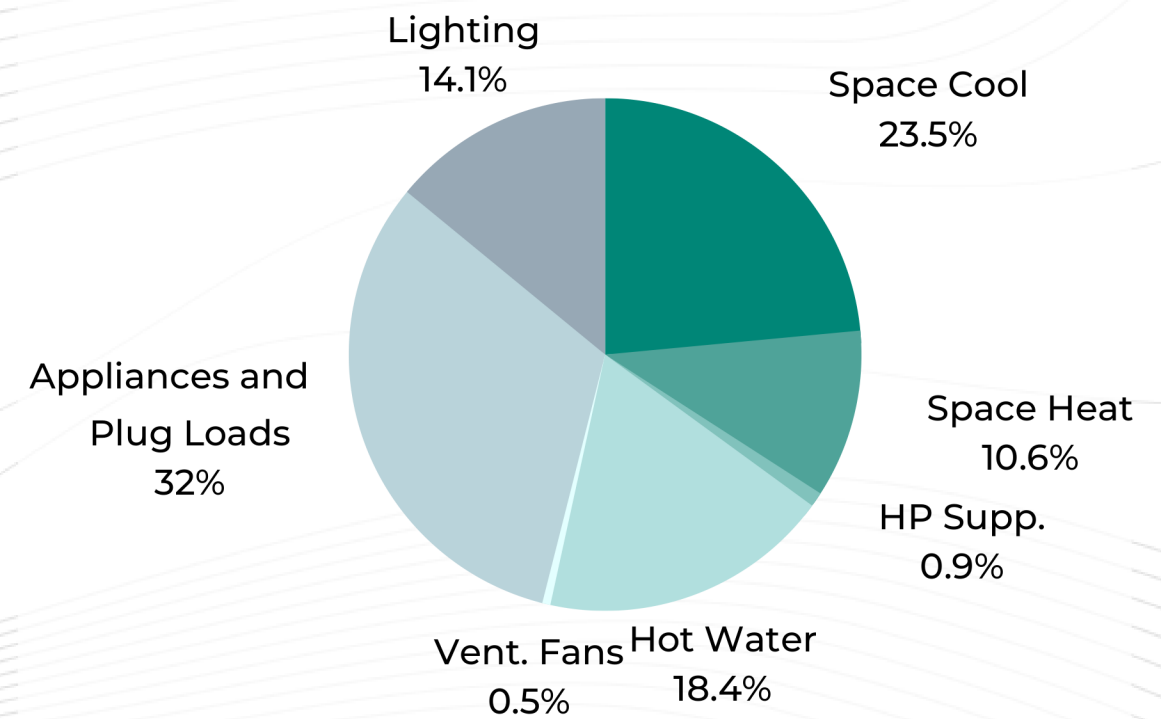
- Space Cool
- Space Heat
- HP Supp.
- Hot Water
- Vent. Fans
- Plug loads and appliances
- Lighting

Total: 24,858 kWh



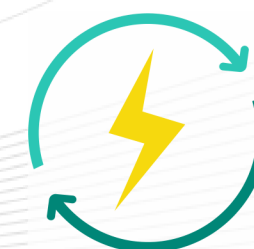
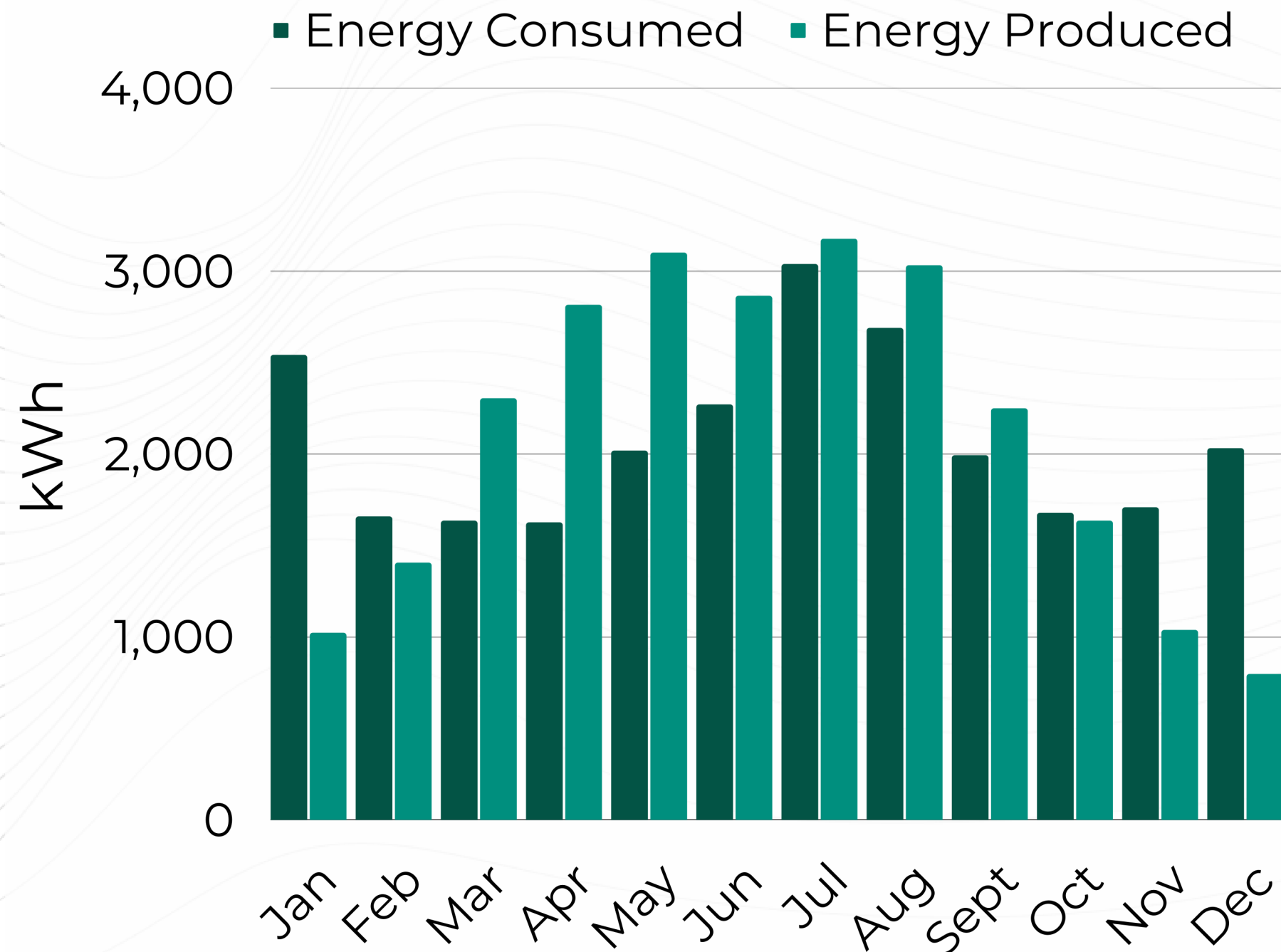
Unit No.	HERS Before PV	HERS With PV
Unit 101	31	-12
Unit 102	30	-15
Unit 201	32	-10
Unit 202	31	-12

Energy Consumption by End Use



Renewable Energy Generation

Annual Energy Consumption vs. Production



97.4% of BC Hydro energy in 2022 came from renewable sources



Rebuilding Lytton in 2023

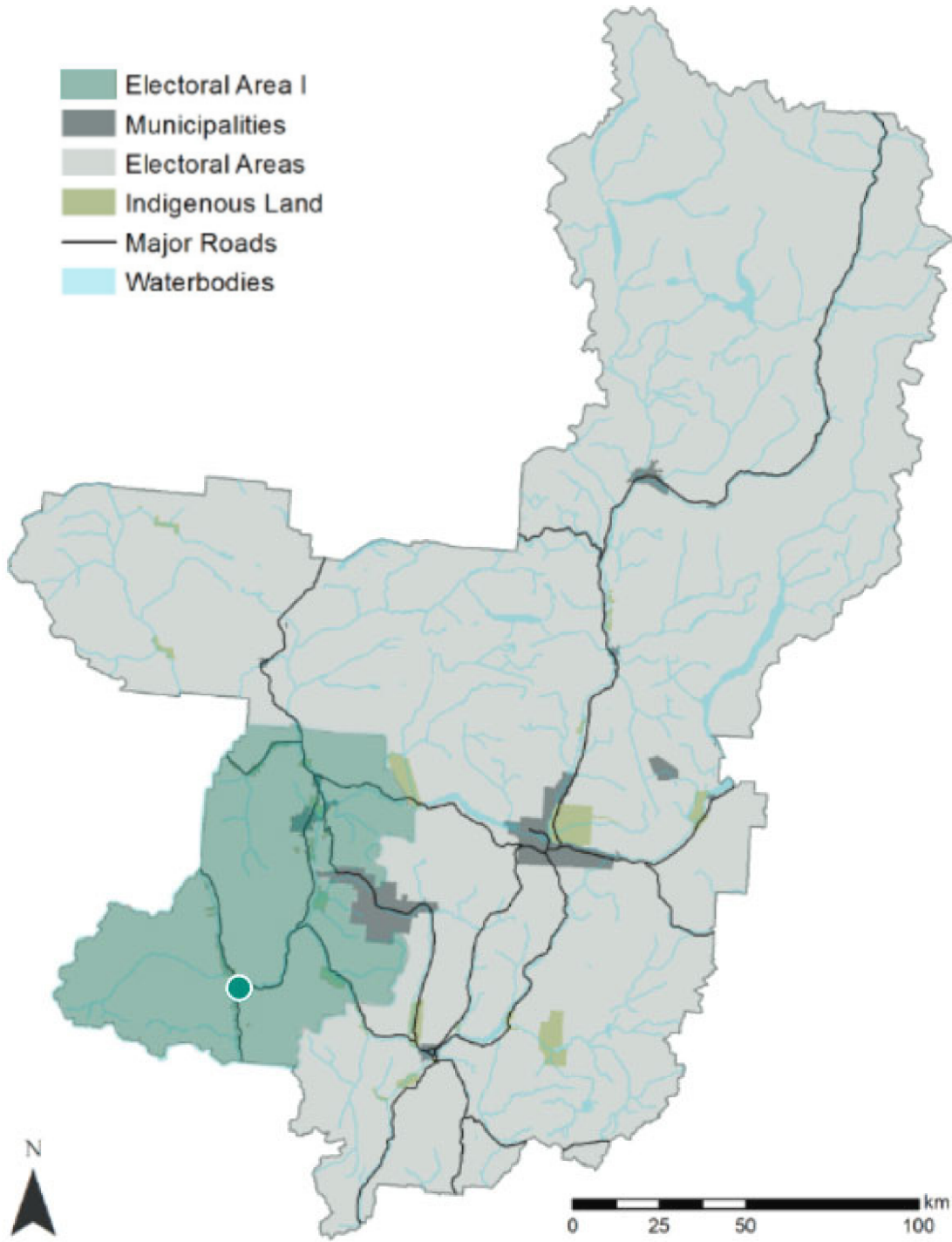


Innovate, Design, Sustain.

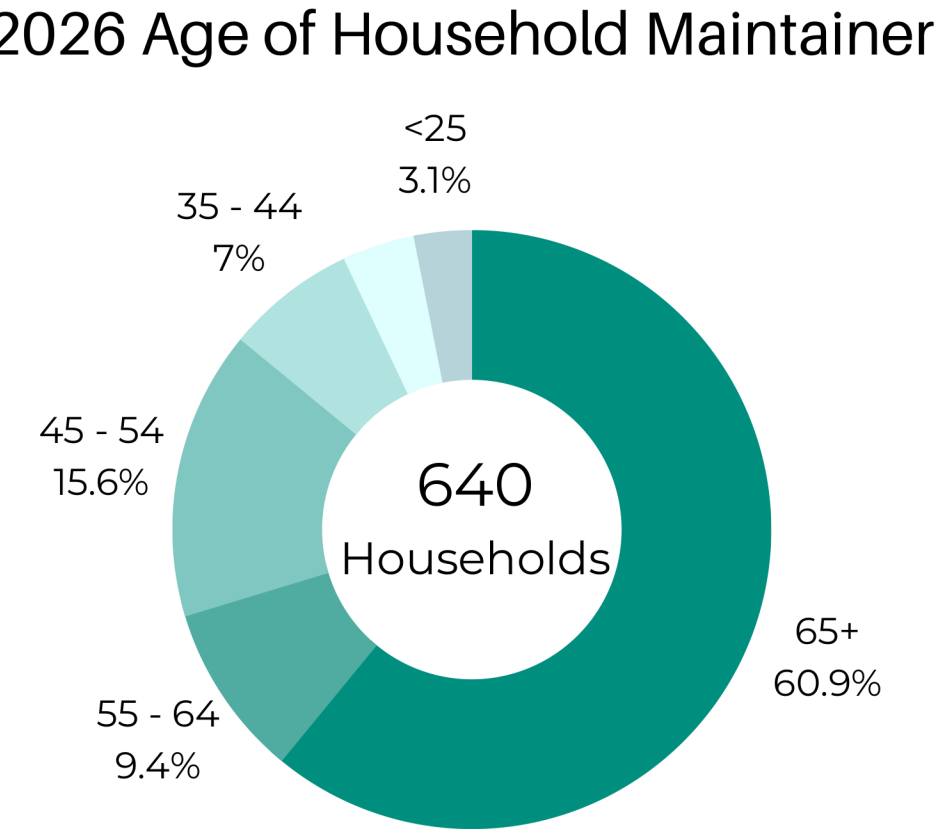
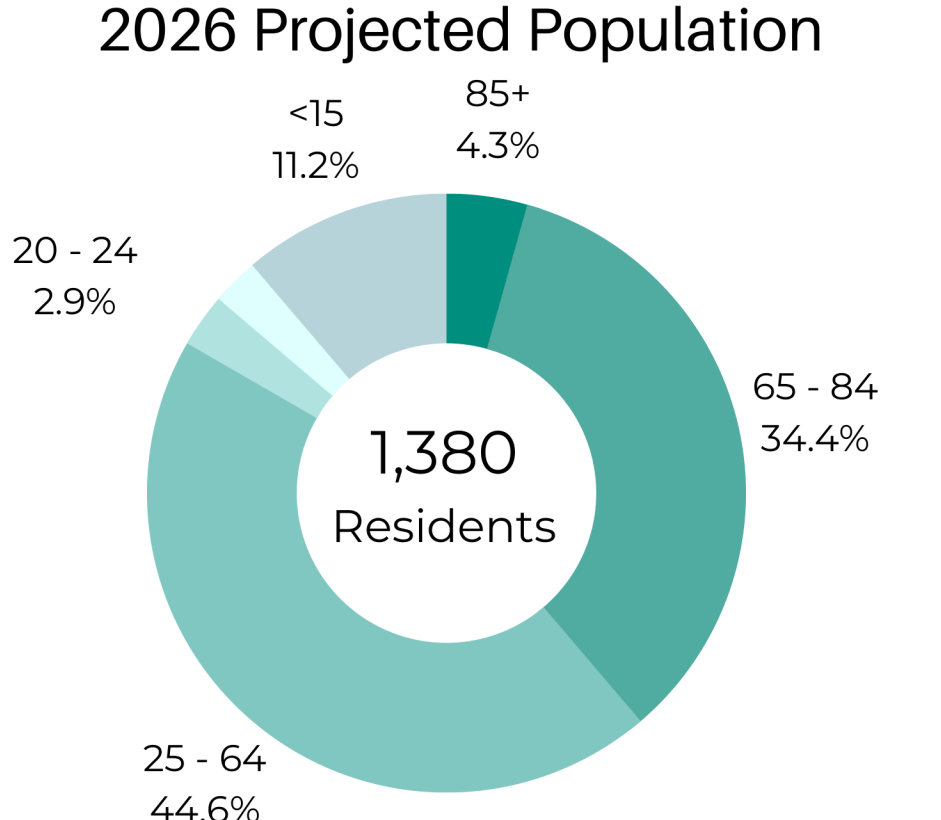
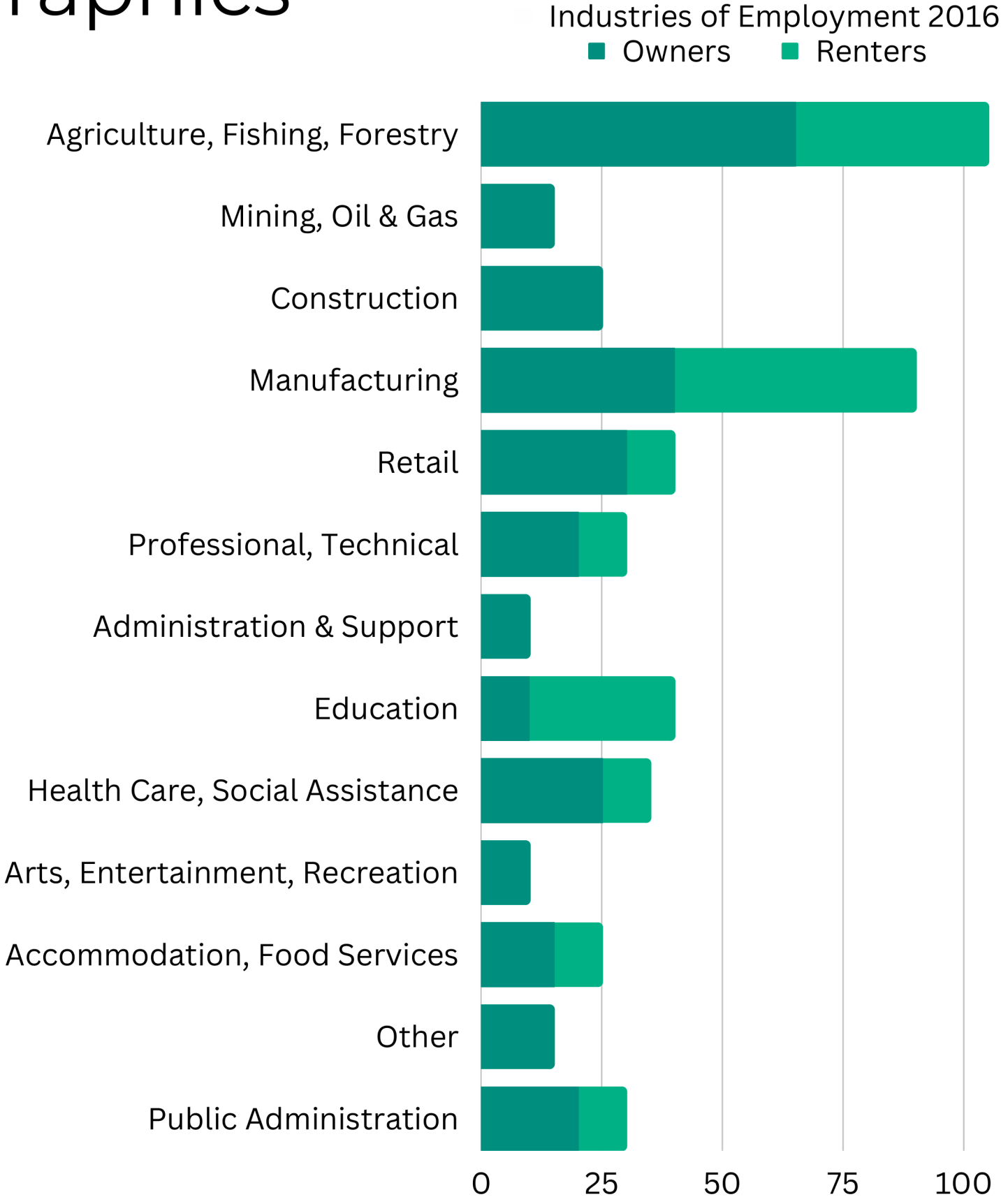
Solar Decathlon Semi-Final Presentation | © 2023 IDS at UBC Okanagan



Appendix 1: Demographics

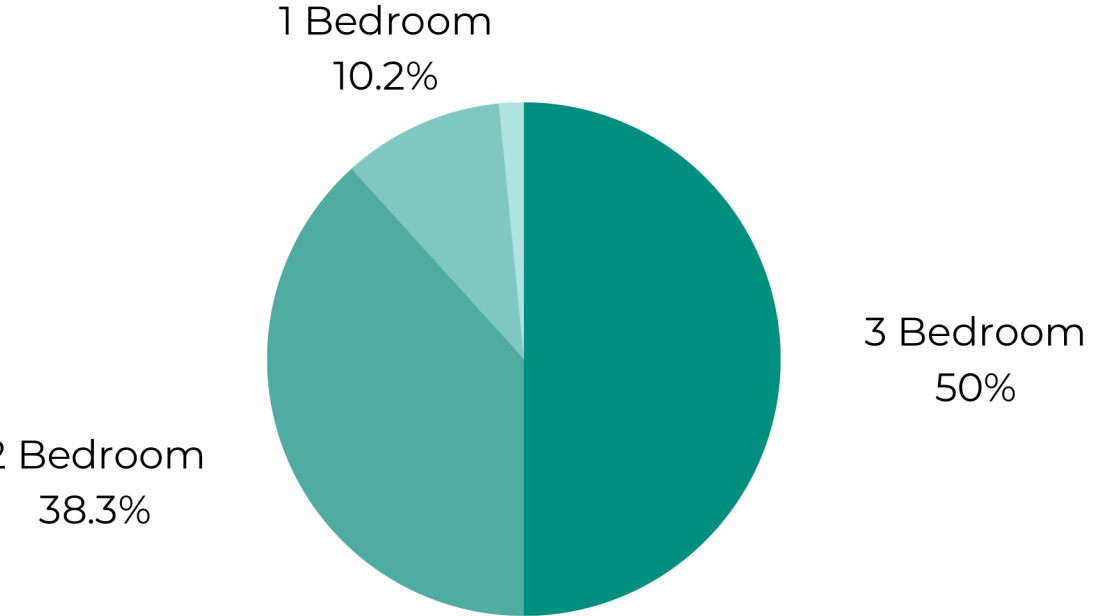


Thompson-Nicola Regional District
Electoral Area I

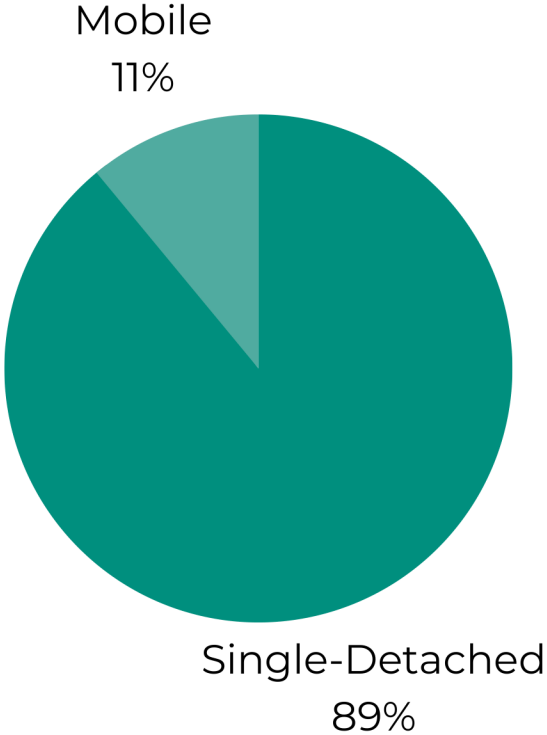


Appendix 2: Housing Demand & Affordability

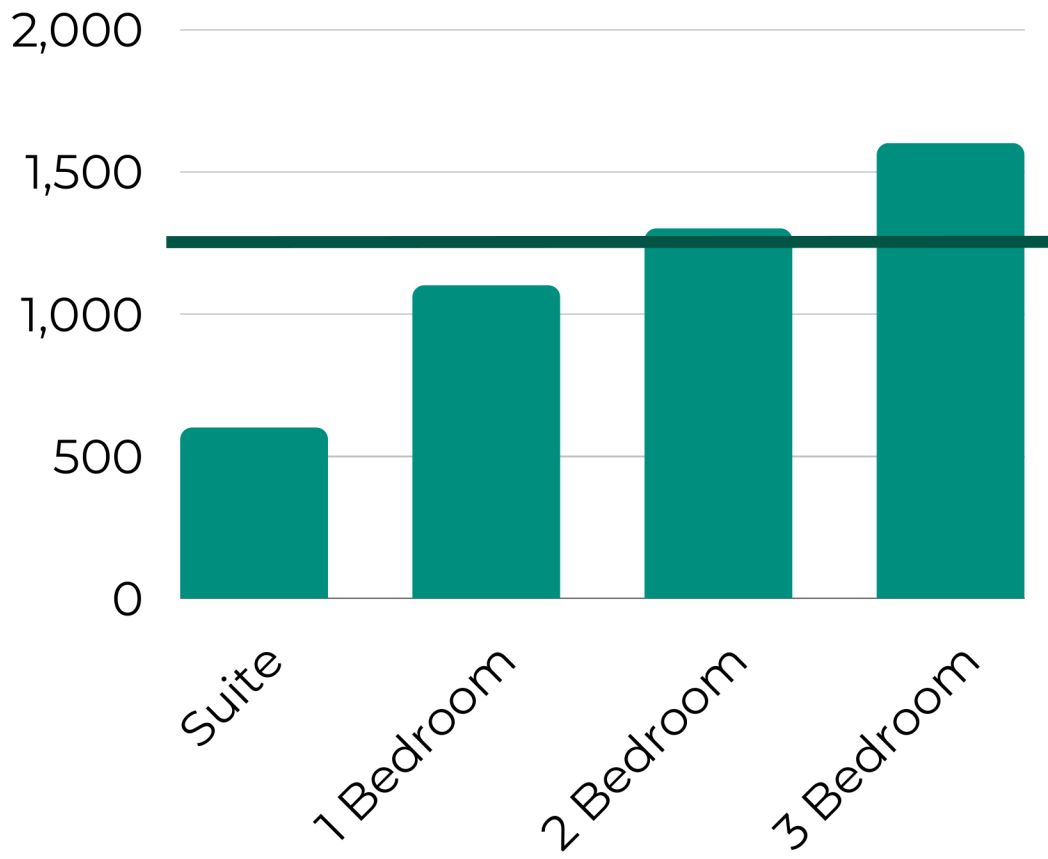
Projected Housing Demand in 2026



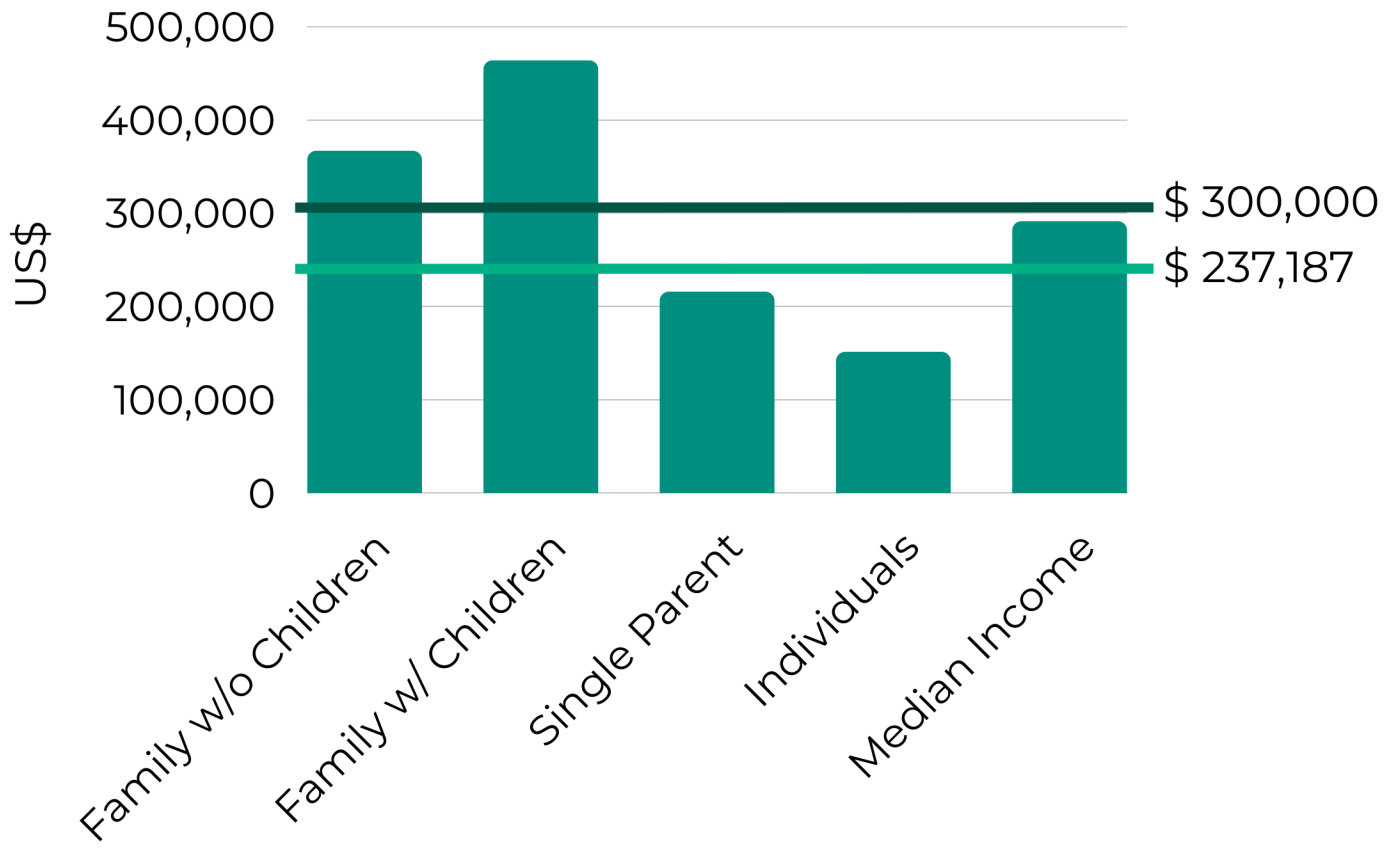
Dwelling Types Available in 2016



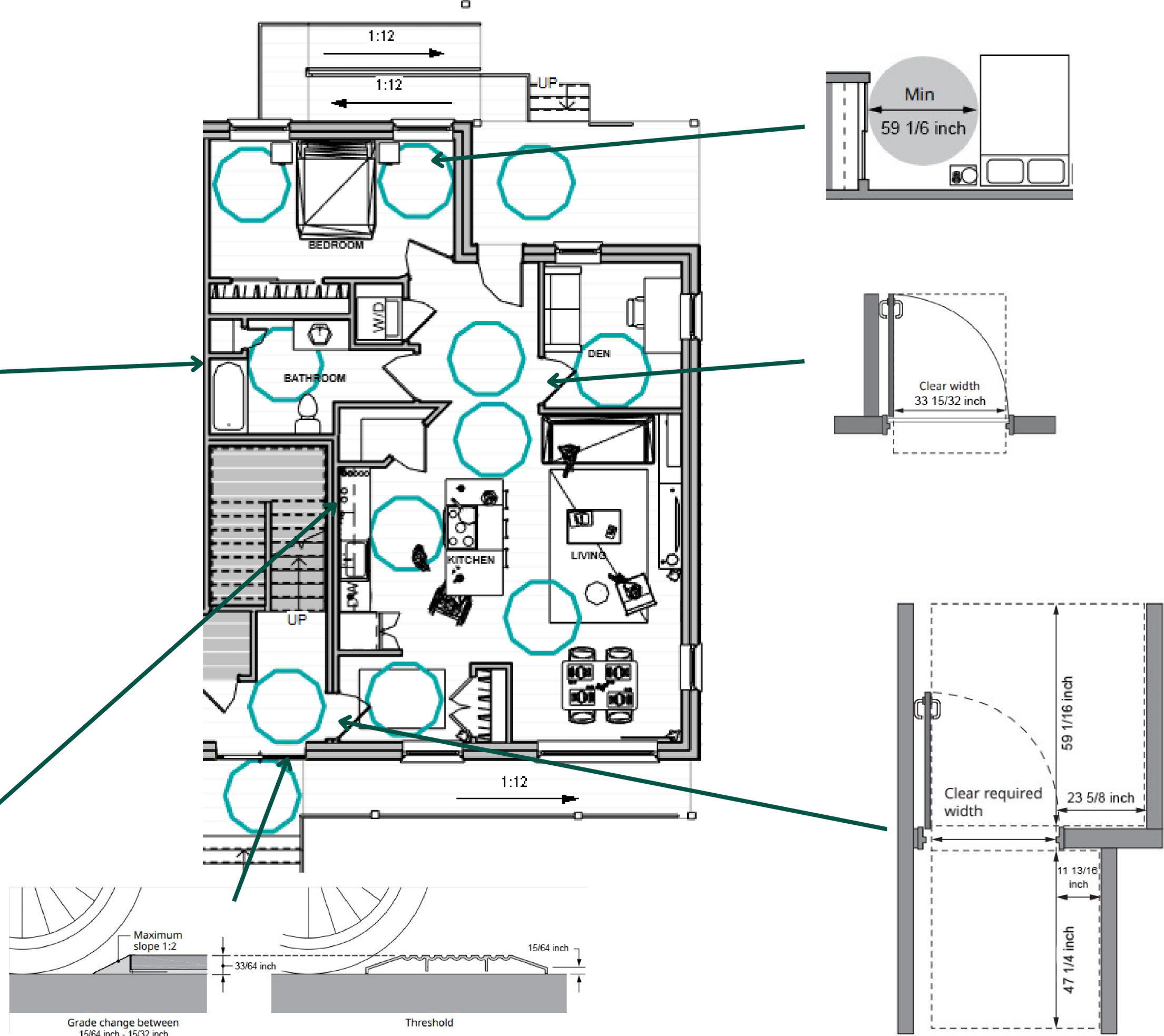
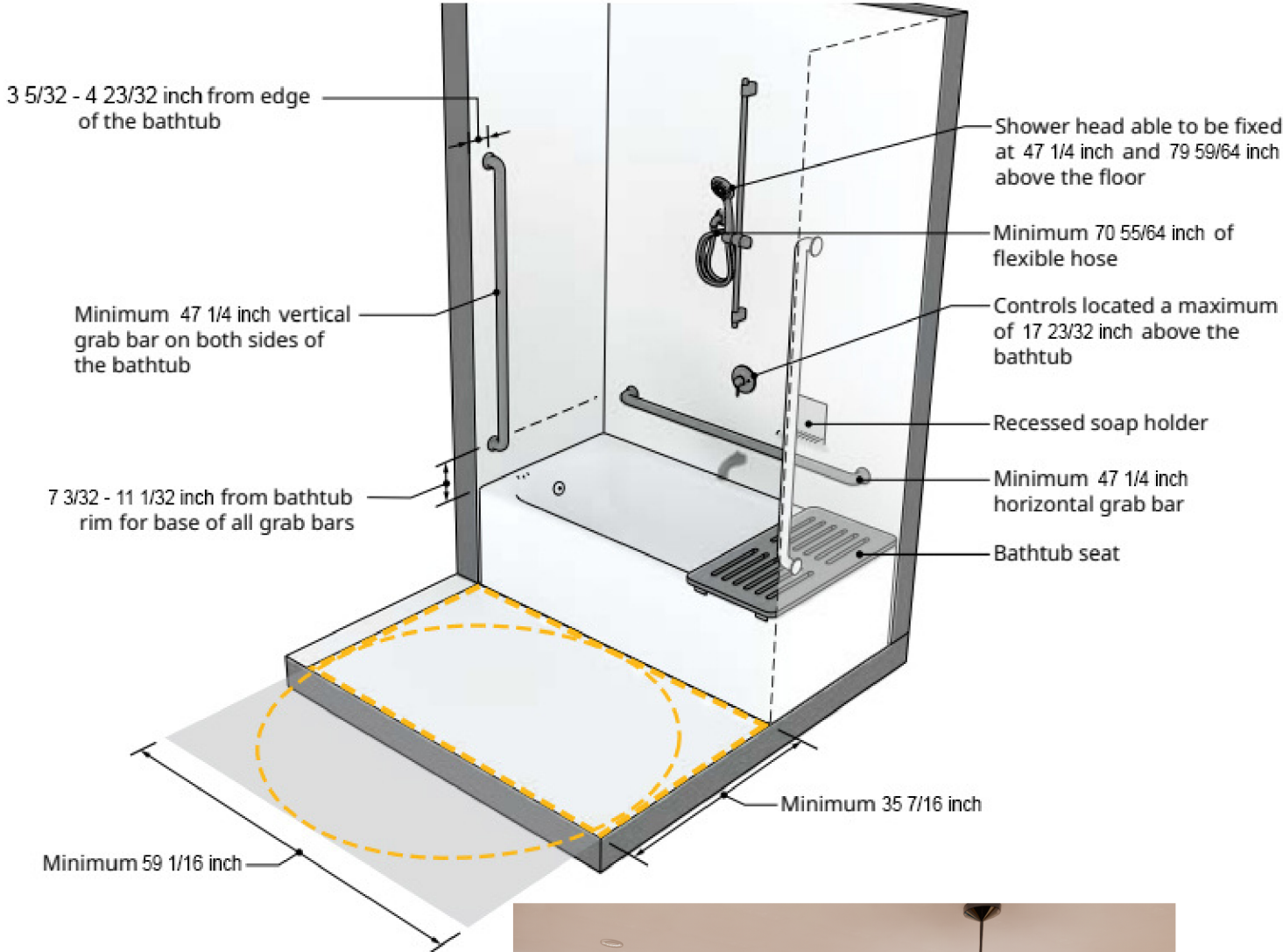
2019 Market Rent by Dwelling Type vs. Median Affordability



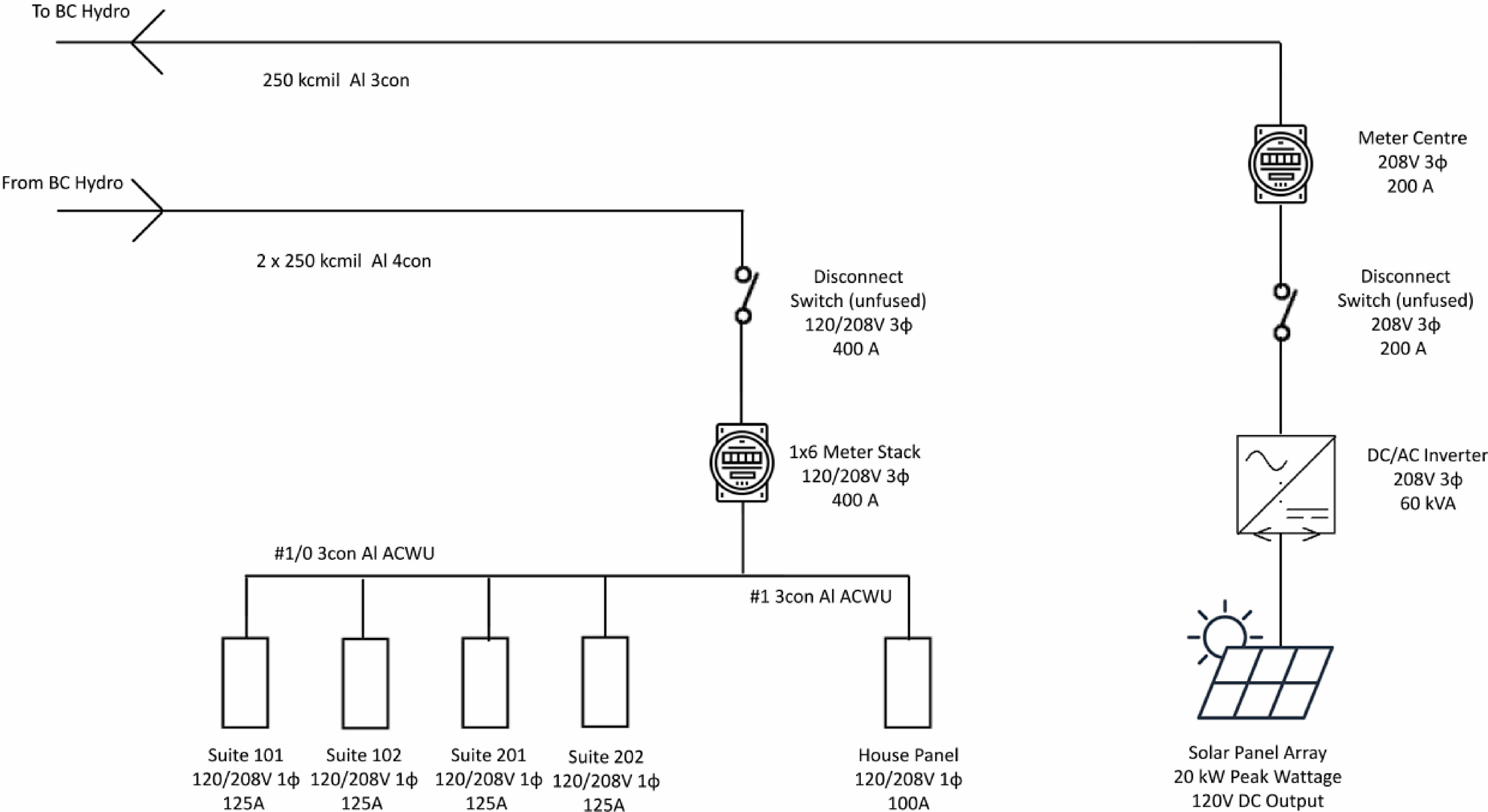
2019 Affordable Purchase Price vs. Market Price Single Family Detached vs. River Crossing's Average Construction Cost Per Unit



Appendix 3: Accessibility

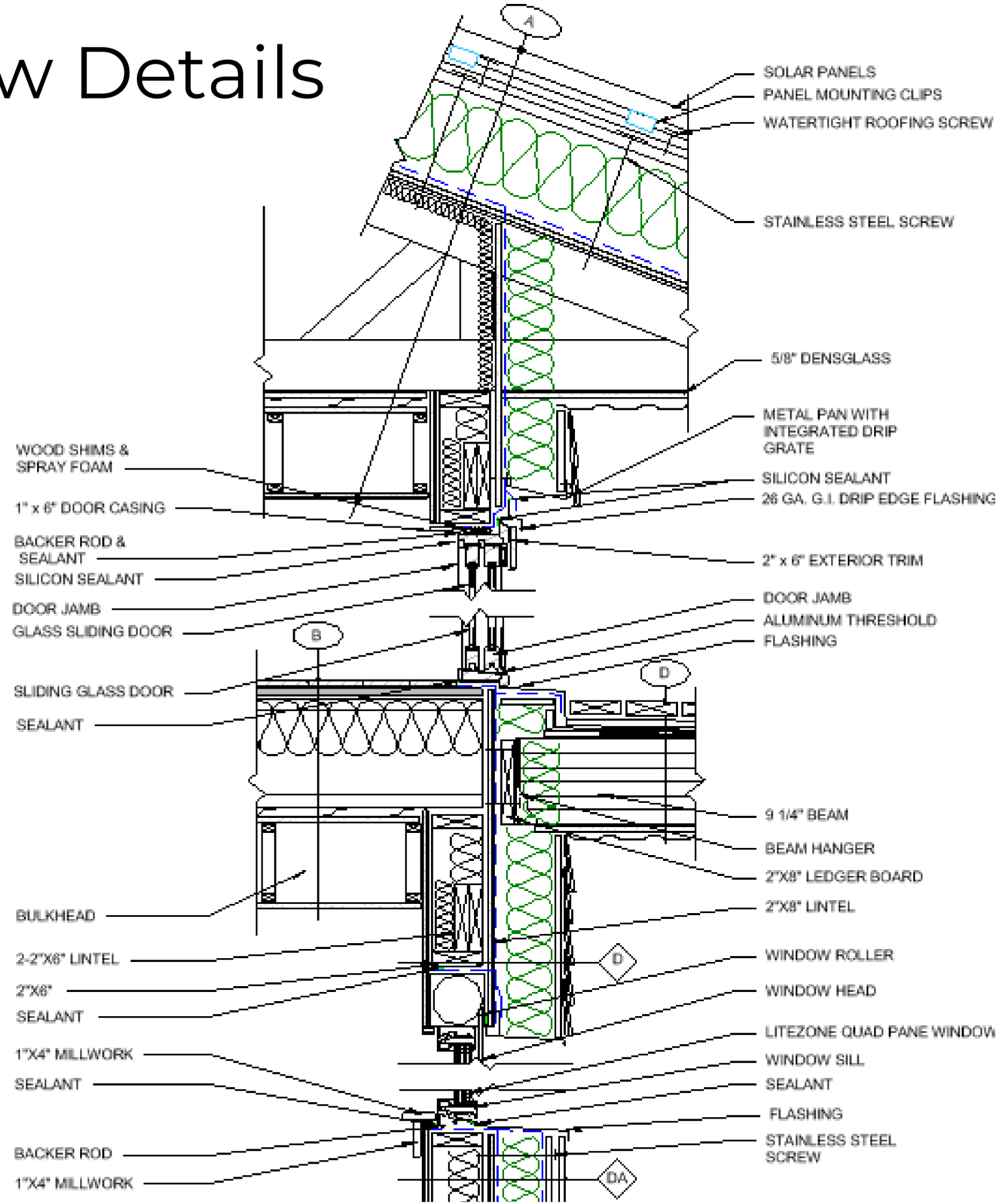
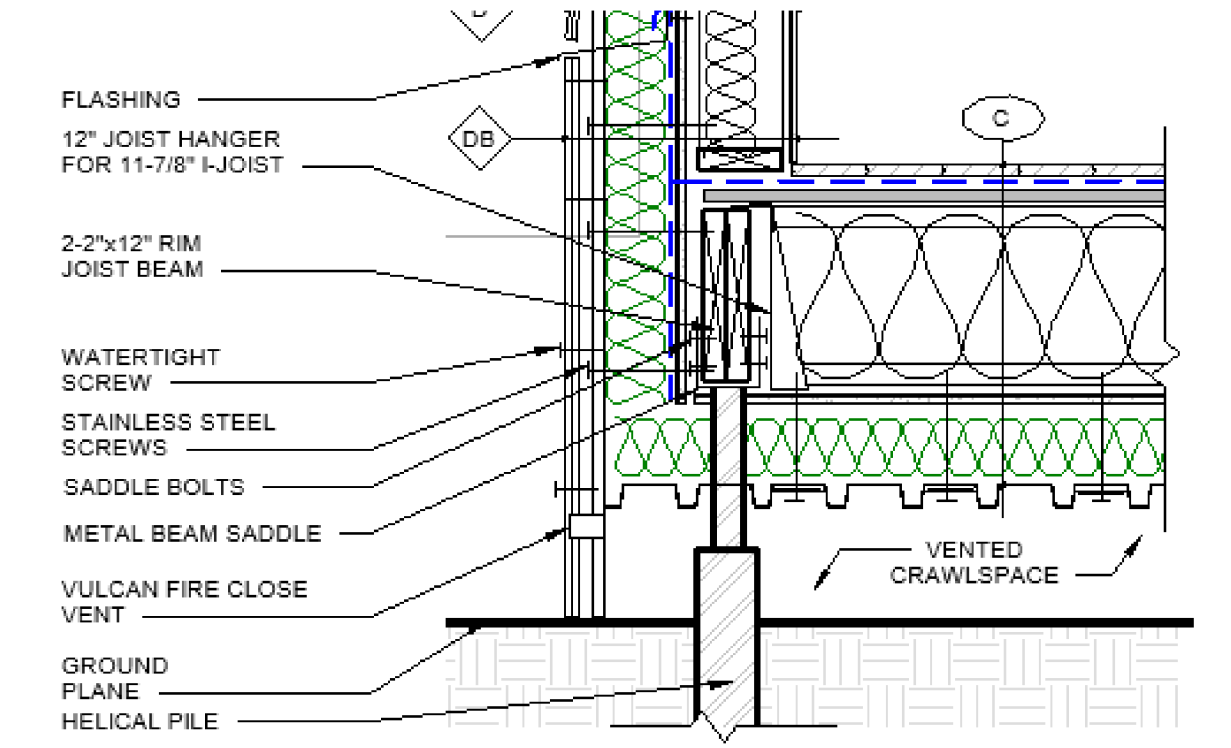
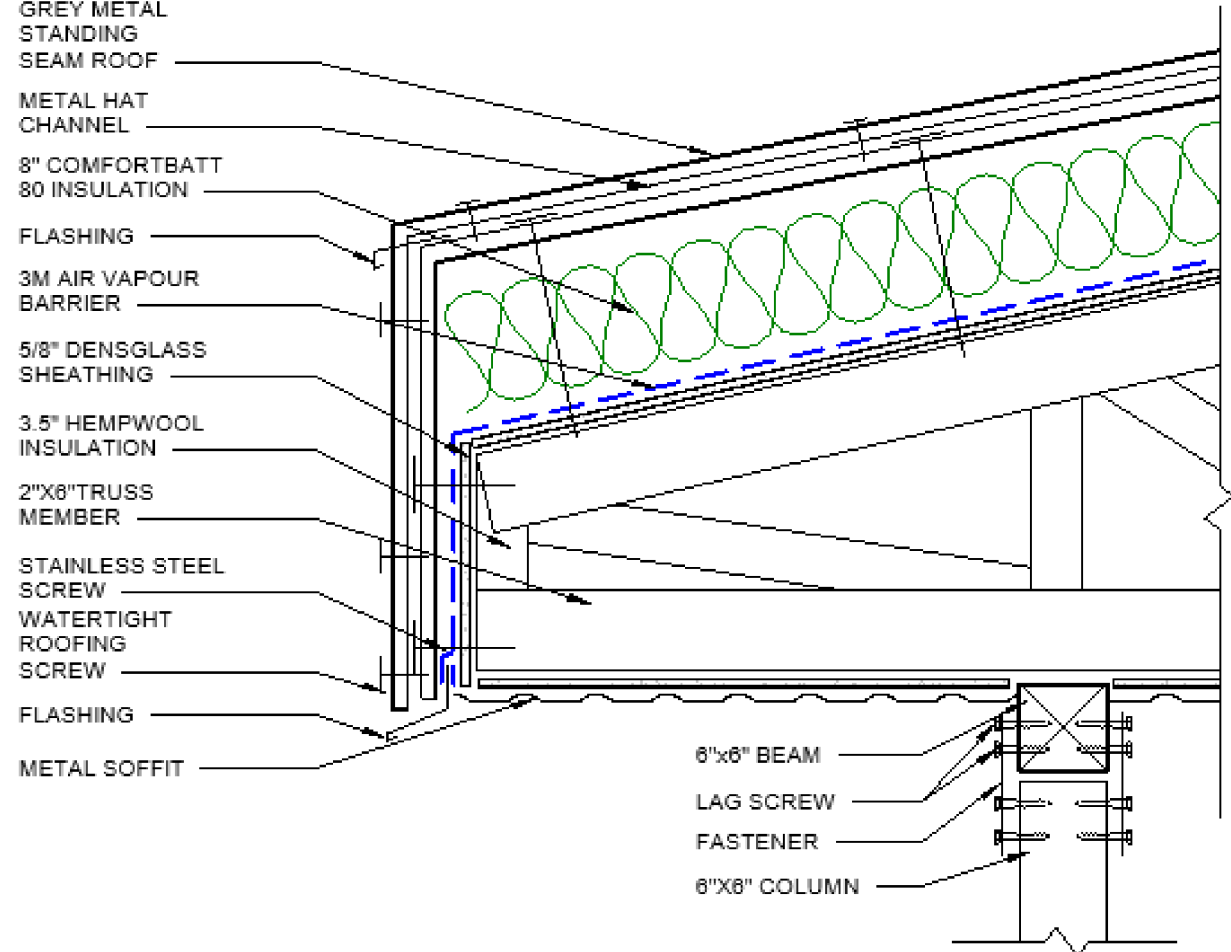


Appendix 4: BC Hydro Net Metering Grid Tie-in

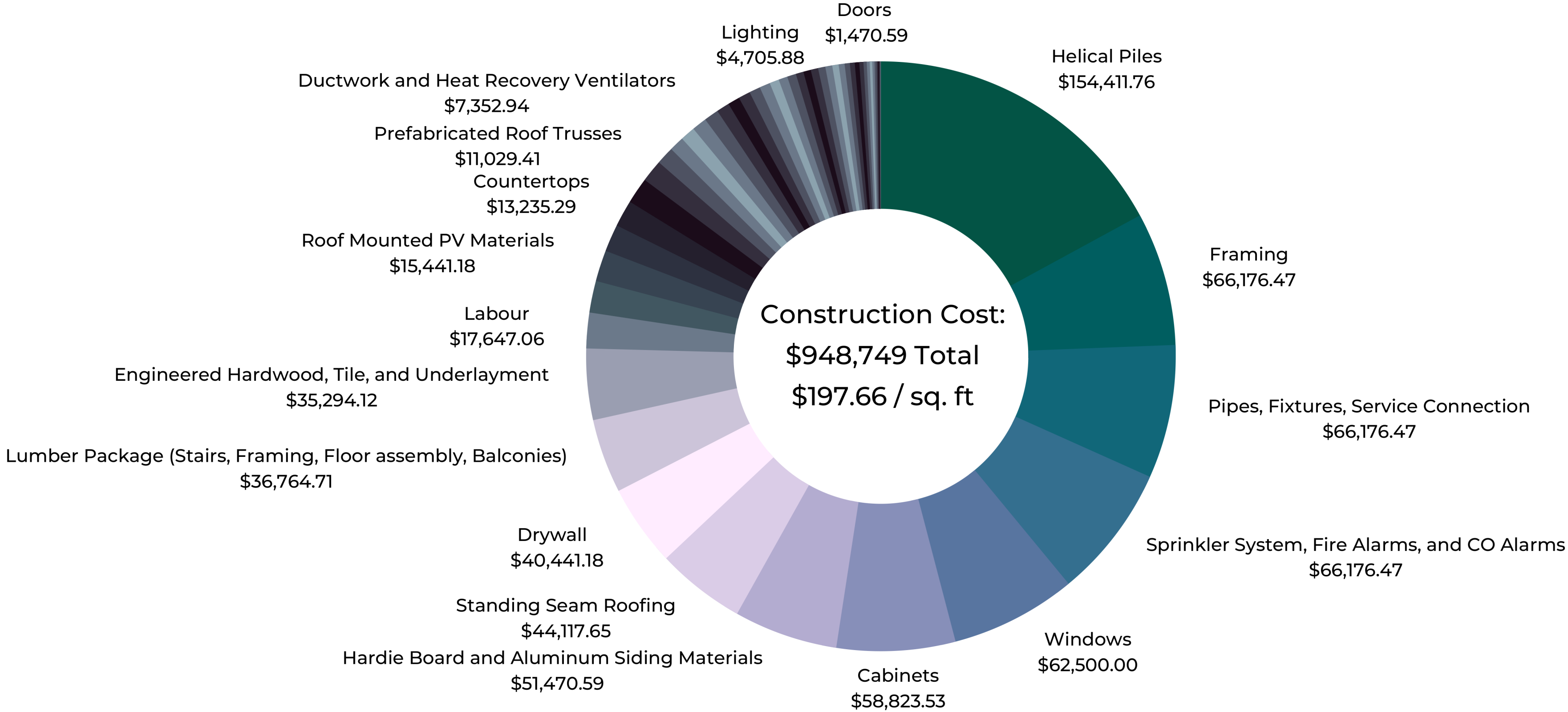


Appendix 5: Envelope Wall and Window Details

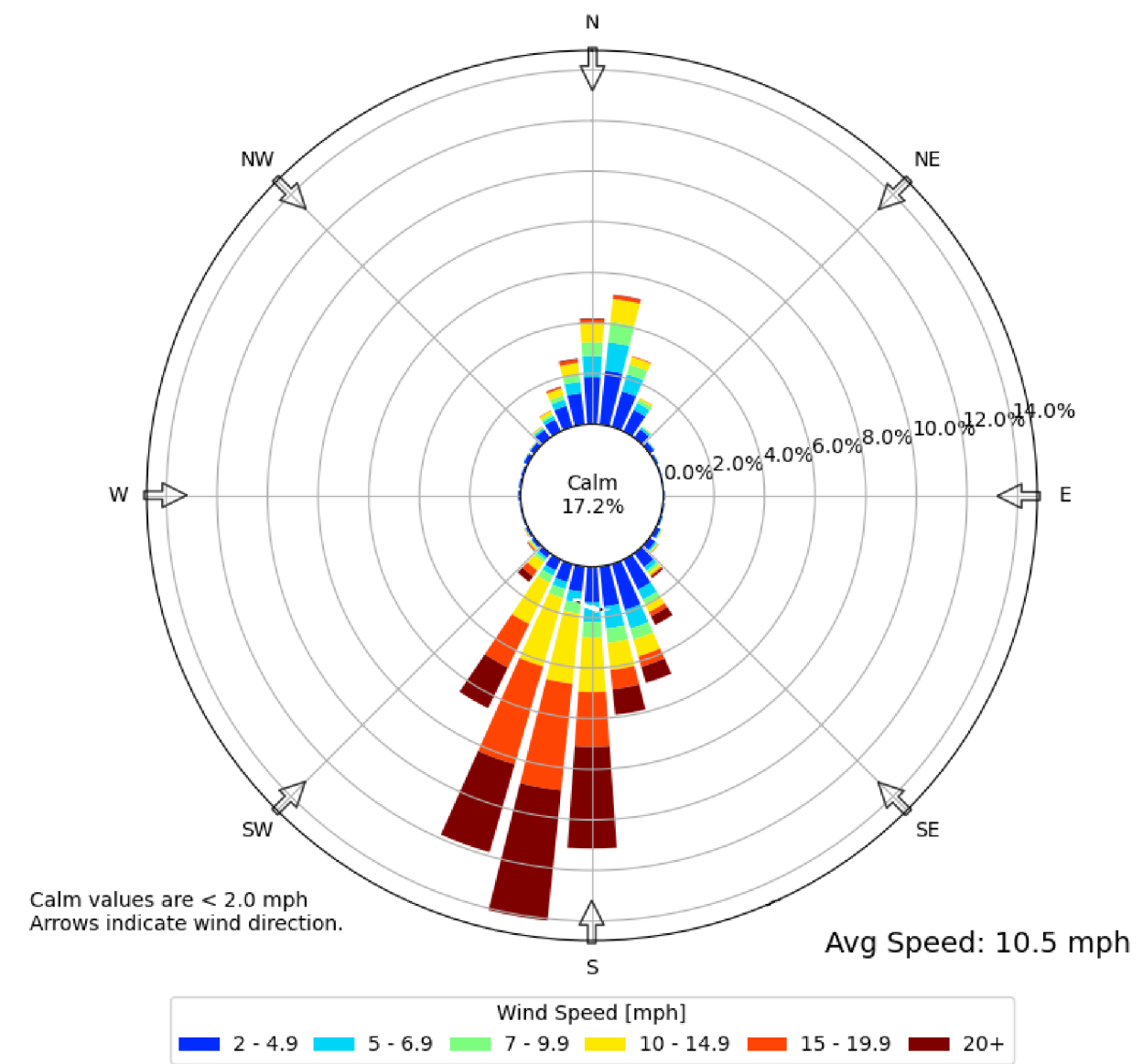
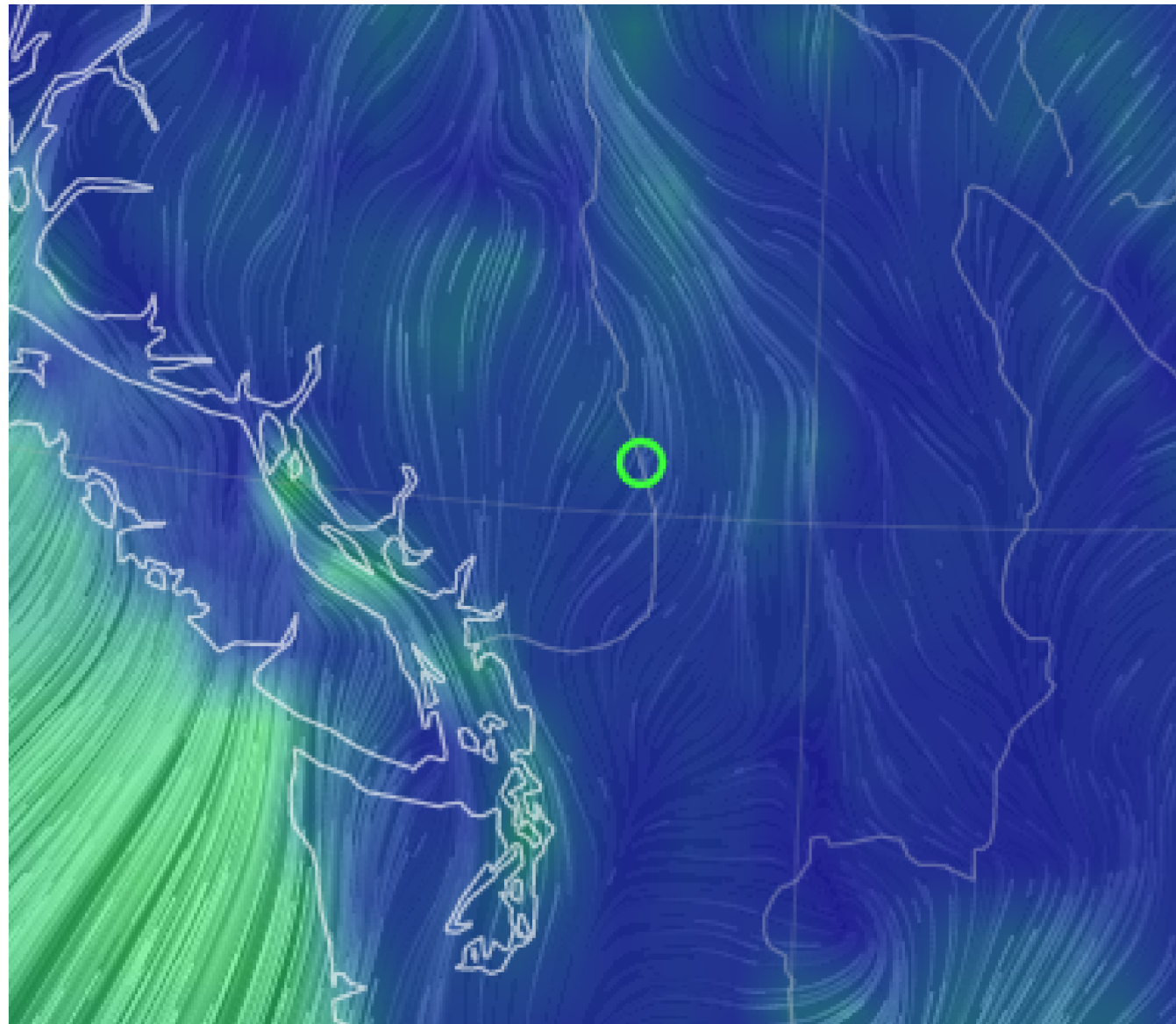
Performance Requirements	IECC	River Crossing
Exterior Wall: External	R7.5	R21.0
Exterior Wall: Cavity	R13.0	R13.0
Exterior Wall: Equivalent	-	R37.9
Roof	R49.0	R50.1
Crawlspace	R30.0	R69.2
Door	U0.70	U0.08
Window	U0.70	U0.16



Appendix 5: Construction Cost



Appendix 7: Wind Patterns



Appendix 8: Mechanical Specifications



Senville Multi-Zone Air-to-Air Heat Pump

48,000 BTU

Quad Zone

WiFi enabled (iOS & Android)

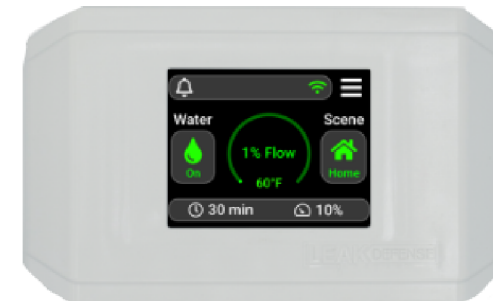
Minimum Operating Temperature: -22F

Self-cleaning, leakage detection

Diagnostics display

De-humidification

Silver Ion Filter (Anti-Microbial)



Leak Defense System

Control panel

System valve on the main line

Integrates with appliances

Remote system monitoring



H150-TRG Standard Residential Heat Recovery Ventilator

120 VAC, 60Hz, 1.3A, 156W

Frost control: automatic timed recirculation

Extremely durable polypropylene core

Motorized impellers (backward-inclined)

MERV13 Filters



SANCO2 Heat Pump Water Heater

83-gallon tank

Delivery rating: 115 gallons in first hour

15 400 BTU/hr

Allows use of off-peak power

Minimum Operating Temperature: -20F

CO2 used as refrigerant



Invita WiFi Thermostat

Remote temperature and humidity control

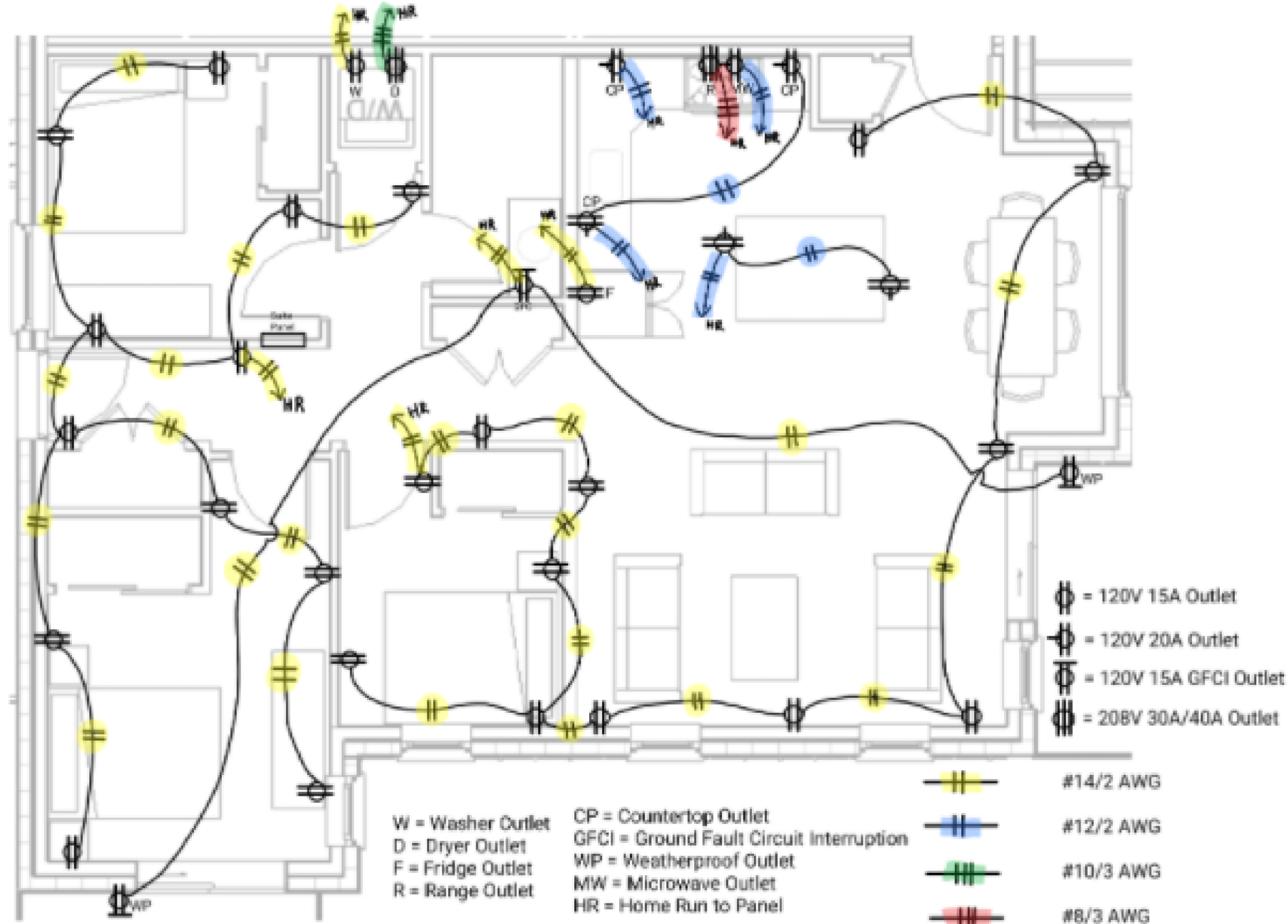
Energy monitoring

Programmable

Appendix 9: Power Wiring Diagram

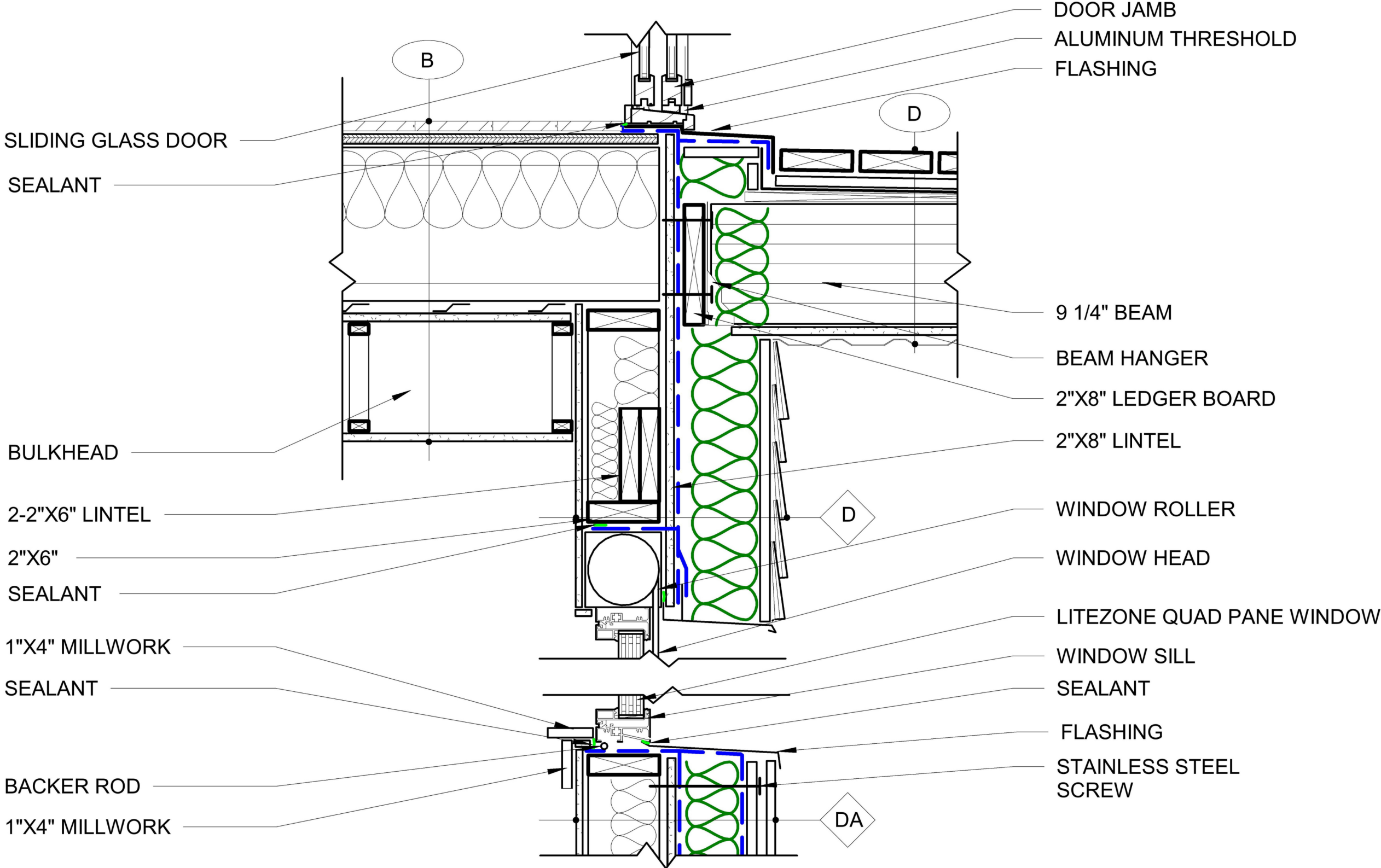


① LIGHTING LAYOUT
3/32" = 1'-0"



② POWER LAYOUT
3/32" = 1'-0"

Appendix 10: Window Envelope Detail



WINDOW-WALL DETAIL