TREEHOUSE VILLAGE

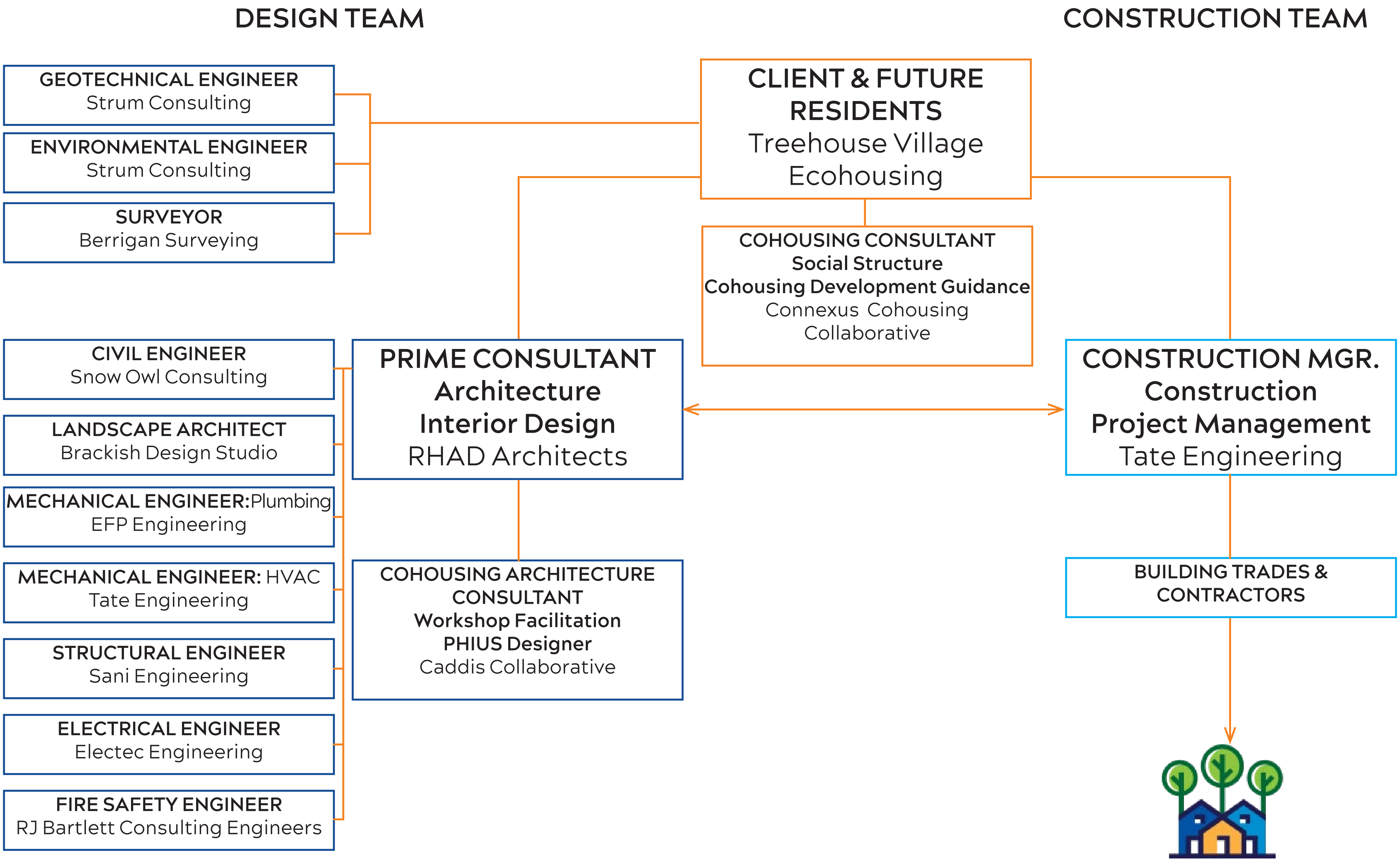
ECOHOUSING

RHAD

ARCHITECTS

TATE

ENGINEERING



TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

OUR PLANET
Living Lightly on the Earth

OUR NEIGHBORS
Sharing Resources, Joy, and Welcoming to All

OURSELVES
Living in a Comfortable and Healthy Home

SITE DESIGN WORKSHOP
AUGUST 2019

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

COMMON HOUSE WORKSHOP
SEPTEMBER 2019

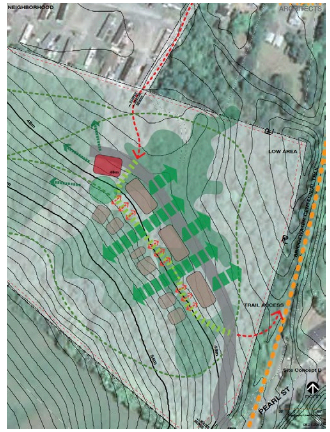
Gather
Indoor / Outdoor community meeting space
Home fire / hearth
Community bulletin boards
Hangout space near kitchen
Seating adjacent to cooking area
Conversation areas without impeding movement

Live
Mail
Mudroom, space to remove boots, coat hooks
Laundry
Two ensuite guestrooms
Garden
Workshop
Shop Area
Shared office
Bookshelves
Storage

Play
Children spaces integrated with main spaces
Indoor / outdoor space off main gathering space
Indoor / outdoor kid play space, appropriate
Nature play adjacent to Common House, water, dirt
Teen Space
Toy Storage

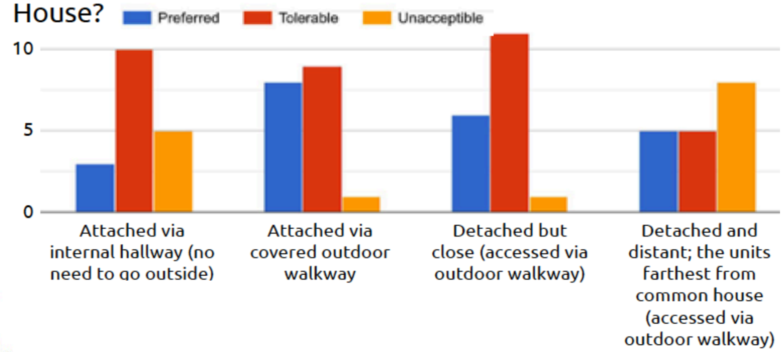
Cook
Dining room
Clean kitchen food storage

Relax
Quiet nooks
Windowseat with views to forest / garden
Space for yoga



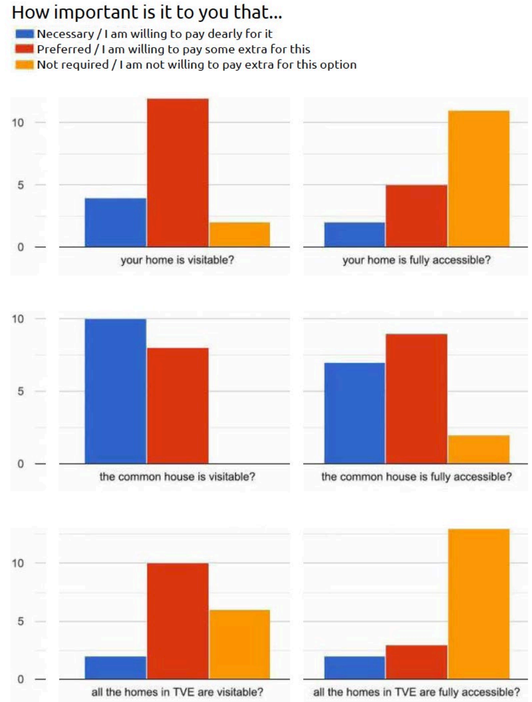
Access to Common House

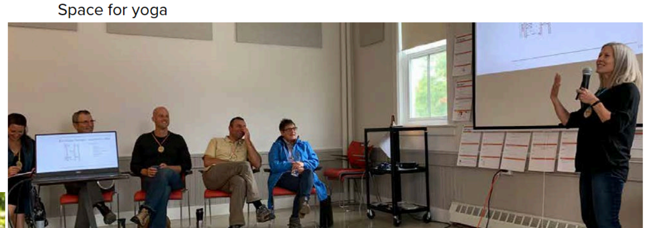
How do you feel about your unit's proximity to the Common House?



Community Accessibility

How important is it to you that...





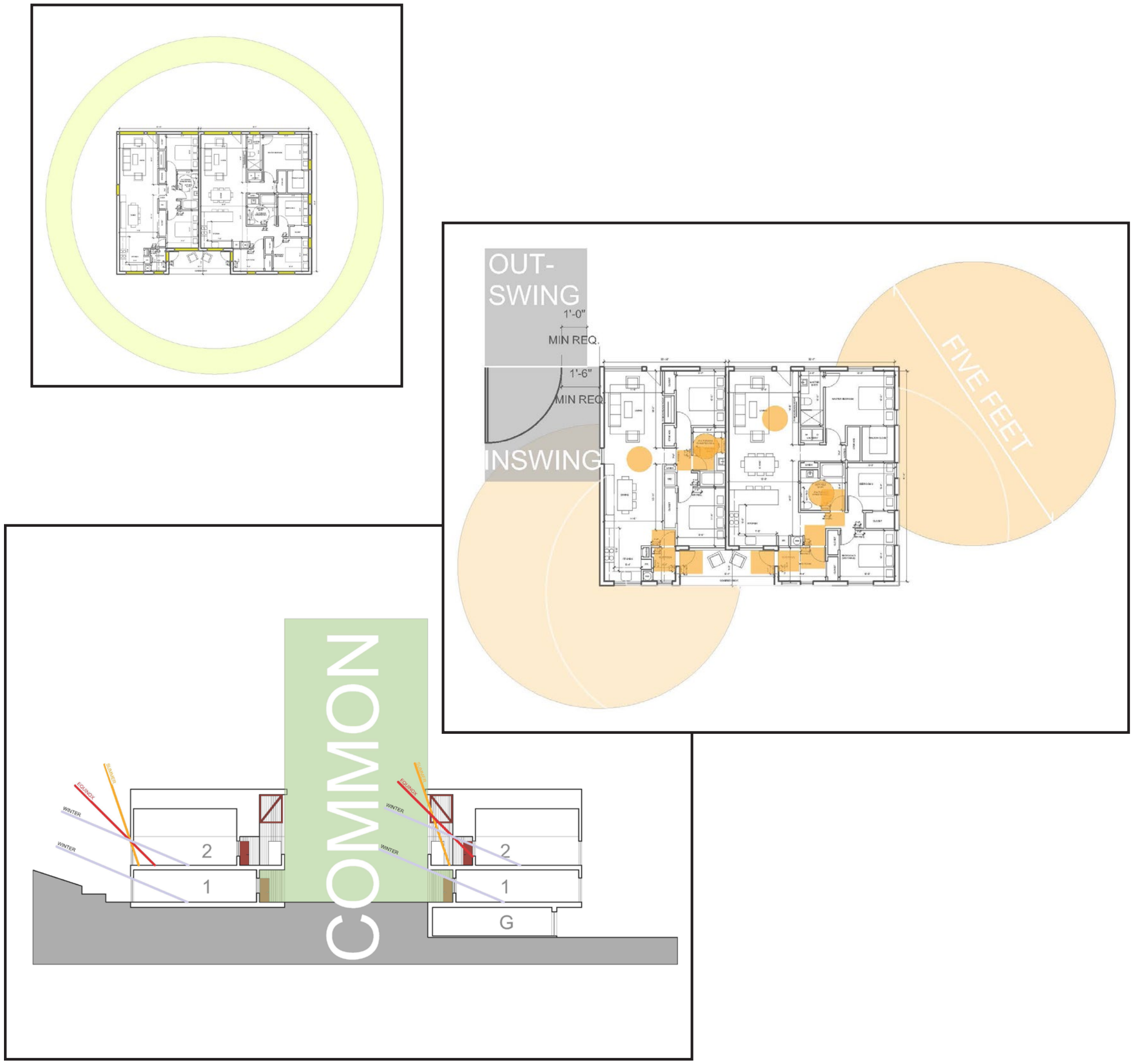
TREEHOUSE VILLAGE ECOHOUSING

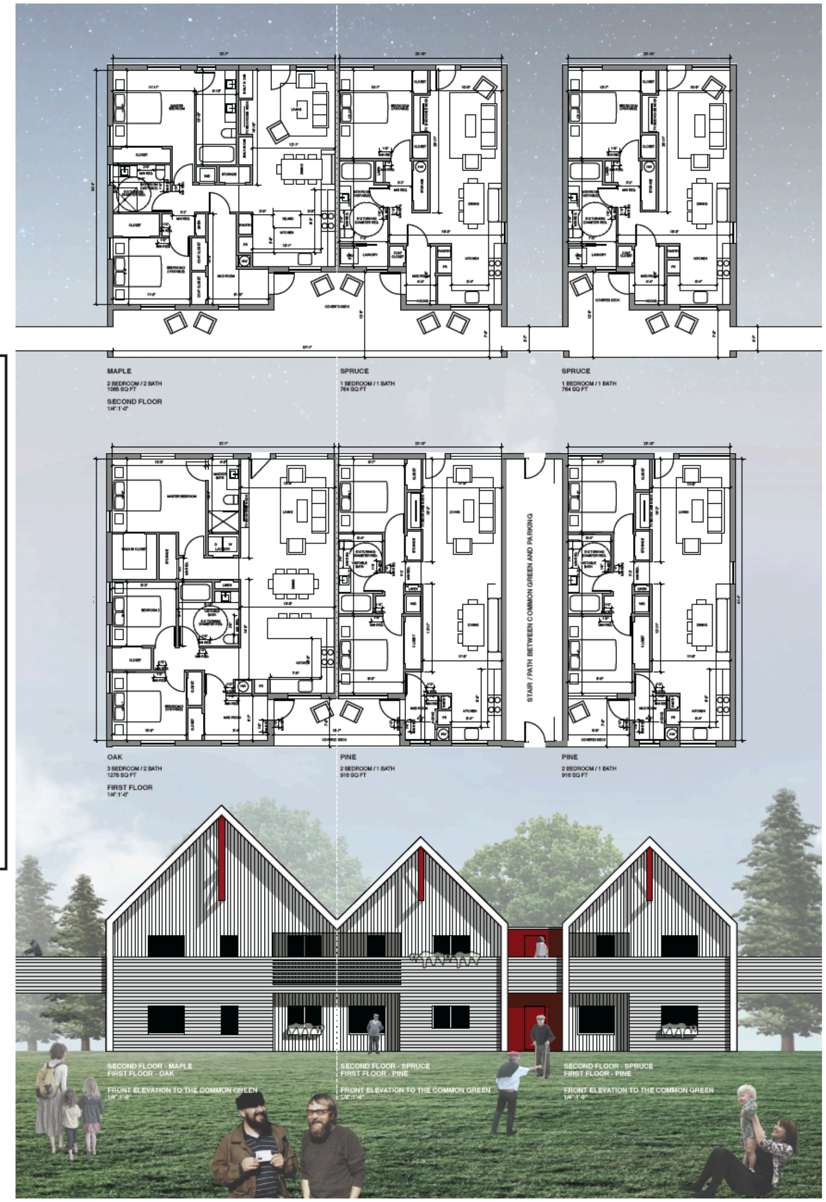
RHAD ARCHITECTS

TATE ENGINEERING

PRIVATE HOME WORKSHOP

NOVEMBER 2019



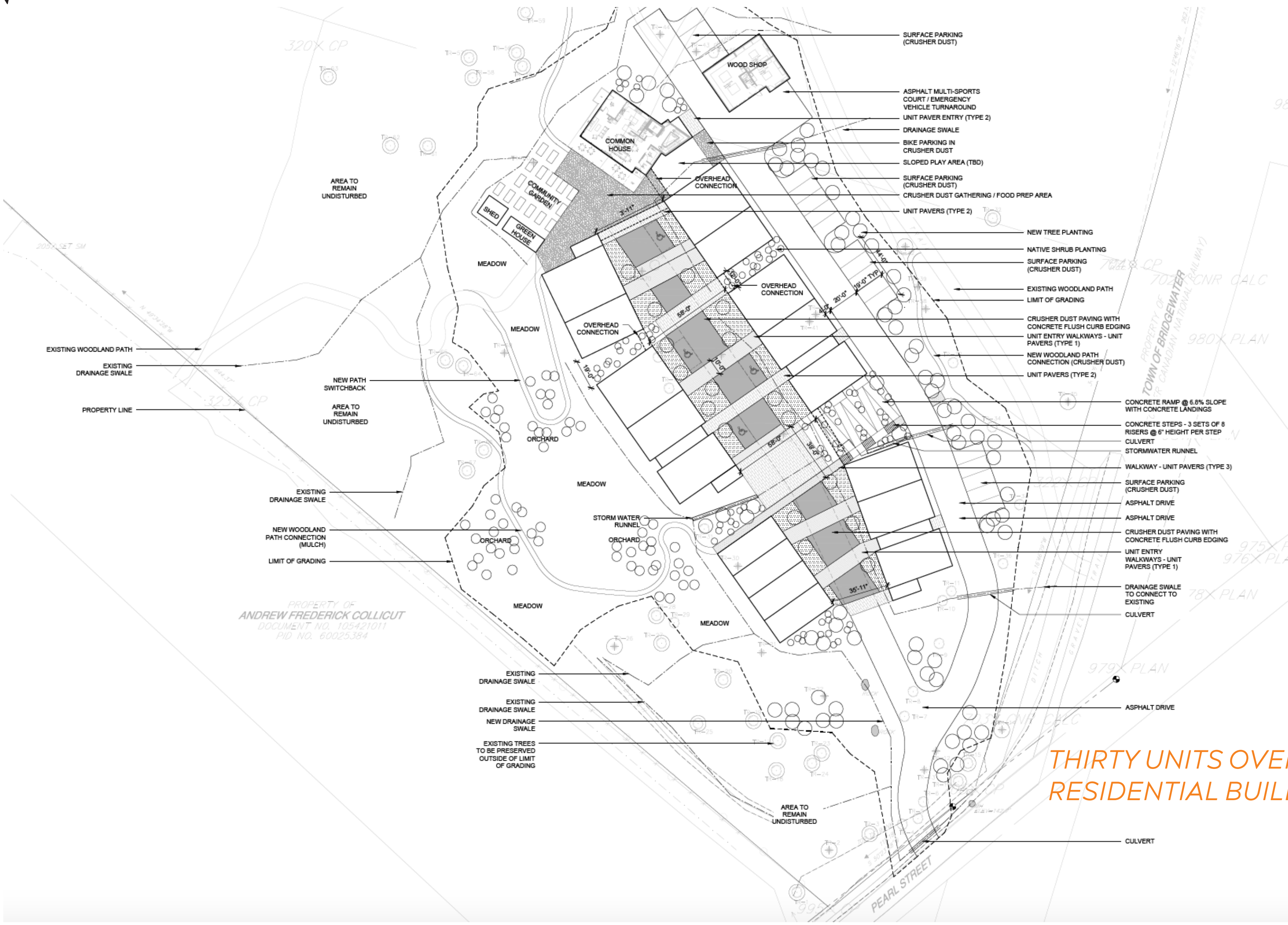


TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

SCHEMATIC DESIGN
SITE PLAN



THIRTY UNITS OVER SIX RESIDENTIAL BUILDINGS

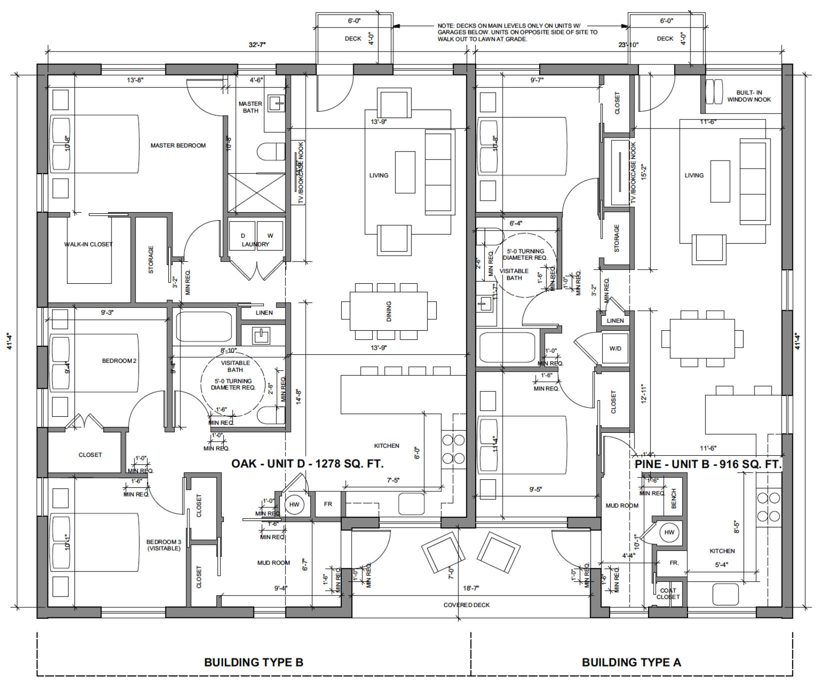
TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

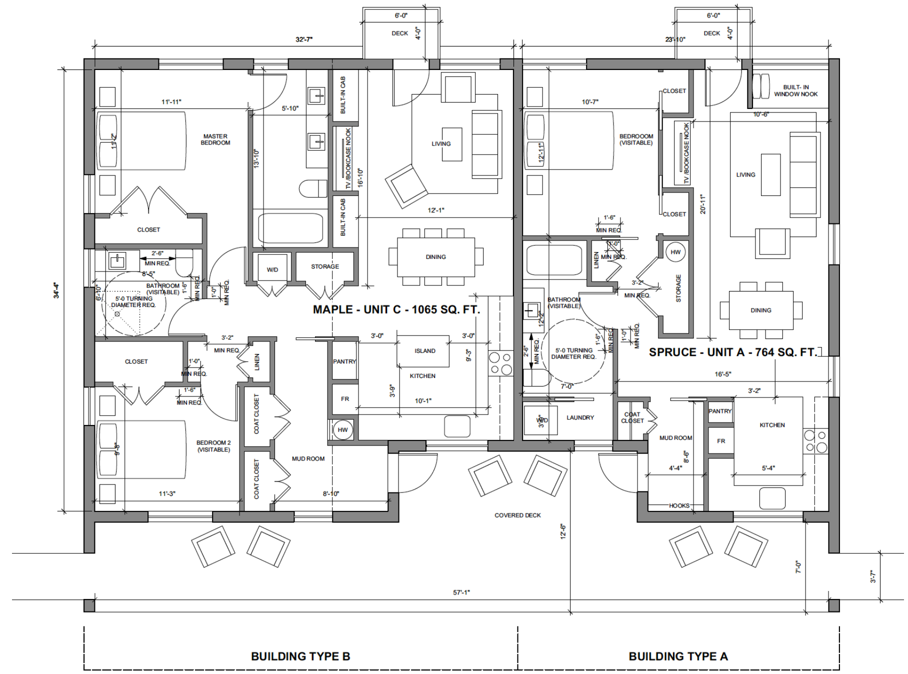
SCHEMATIC DESIGN
PRIVATE UNIT PLANS

STACKED FLATS



3 BR

2 BR



2 BR

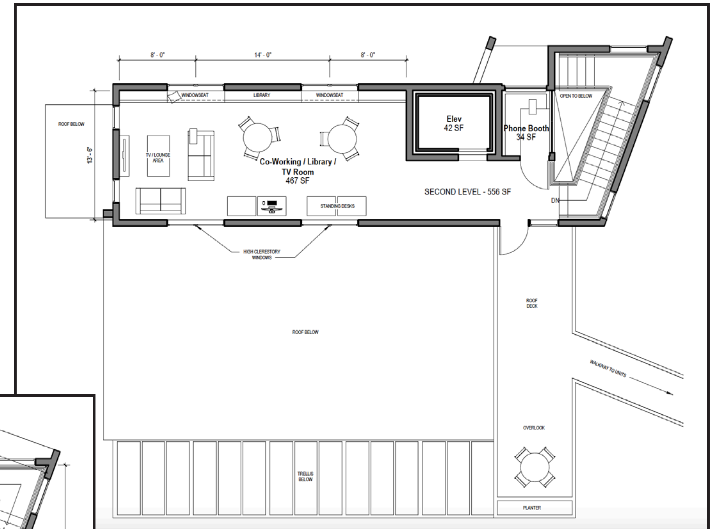
1 BR

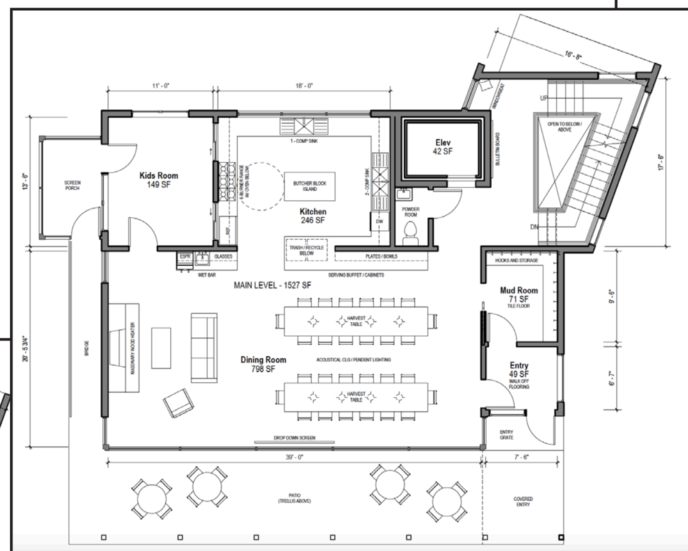
TREEHOUSE VILLAGE
ECOHOUSING

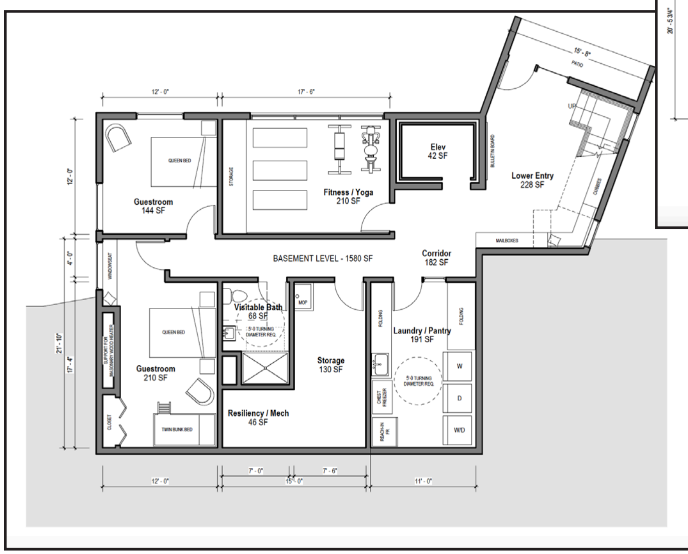
RHAD
ARCHITECTS

TATE
ENGINEERING

SCHEMATIC DESIGN
COMMON HOUSE PLANS





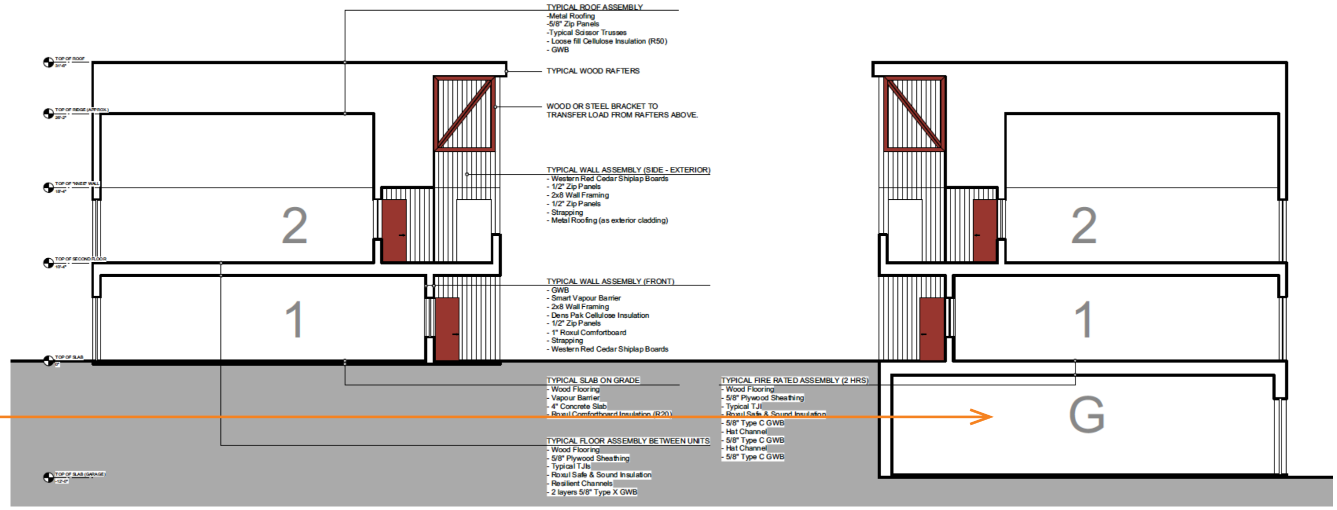


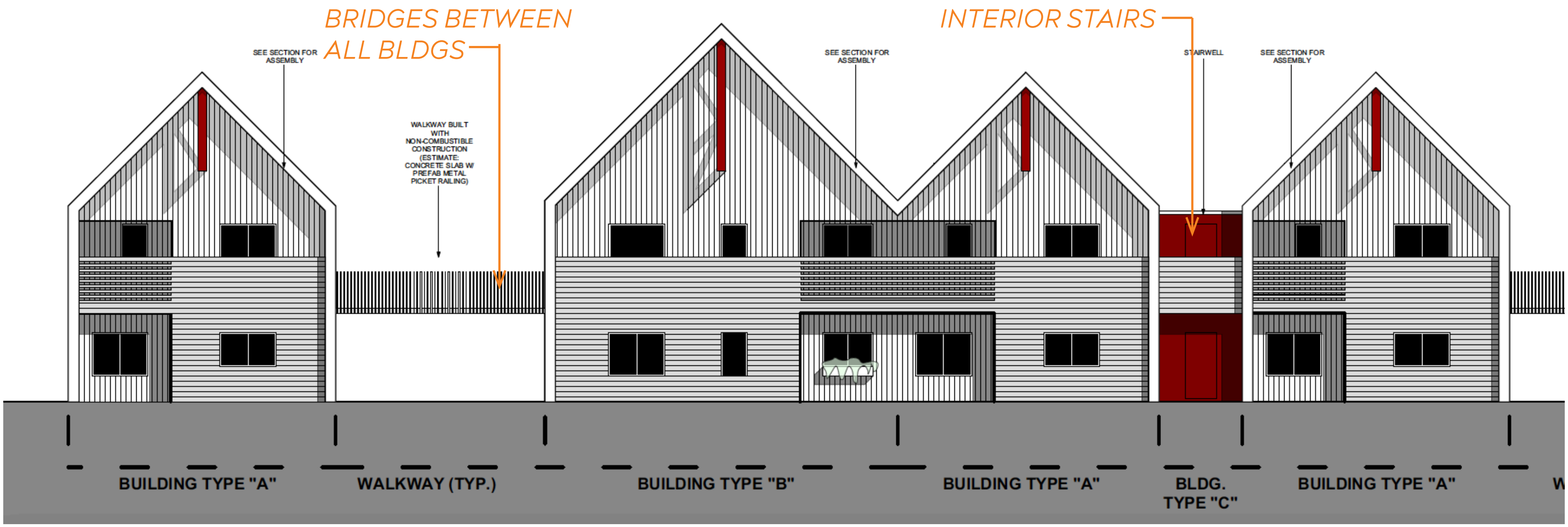
TREEHOUSE VILLAGE
ECOHOUSING

RHAD
ARCHITECTS

TATE
ENGINEERING

SCHEMATIC DESIGN
ELEVATIONS & SECTION





TREEHOUSE VILLAGE
ECOHOUSING

RHAD
ARCHITECTS

TATE
ENGINEERING

SCHEMATIC DESIGN
ENERGY MODELING

Specific building characteristics with reference to the treated floor area					The PHPP has not been filled completely; it is not valid as verification		
	Parameter	Unit	Value		Criteria	Alternative criteria	Fullfilled?²
	Treated floor area	m²	354.7				
Space heating	Heating demand	kWh/(m²a)	35	≤	15	-	no
	Heating load	W/m²	16	≤	-	10	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	-
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	6	≤	10		yes
	Frequency of excessively high humidity (> 12 g/kg)	%	12	≤	20		yes
Airtightness	Pressurization test result n_{50}	1/h	0.6	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)		≤	#N/A		#N/A
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	42	≤	-	-	-
	Generation of renewable energy (in relation to pro-jected building footprint area)	kWh/(m²a)	0	≥	-	-	

² Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

Passive House Classic? **no**

Task: | First name: | Surname: | Signature:

Issued on: | City:

SAME WALL ASSEMBLIES,... DIFFERENT WINDOWS!

PRELIMINARY MODELING COMPLETED USING PHPP SOFTWARE

Specific building characteristics with reference to the treated floor area					The PHPP has not been filled completely; it is not valid as verification		
	Parameter	Unit	Value		Criteria	Alternative criteria	Fullfilled?²
	Treated floor area	m²	354.7				
Space heating	Heating demand	kWh/(m²a)	18	≤	15	-	no
	Heating load	W/m²	12	≤	-	10	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	-
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	33	≤	10		no
	Frequency of excessively high humidity (> 12 g/kg)	%	31	≤	20		no
Airtightness	Pressurization test result n_{50}	1/h	0.6	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)		≤	#N/A		#N/A
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	62	≤	-	-	-
	Generation of renewable energy (in relation to pro-jected building footprint area)	kWh/(m²a)	0	≥	-	-	

² Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

Passive House Classic? **no**

Task: | First name: | Surname: | Signature:

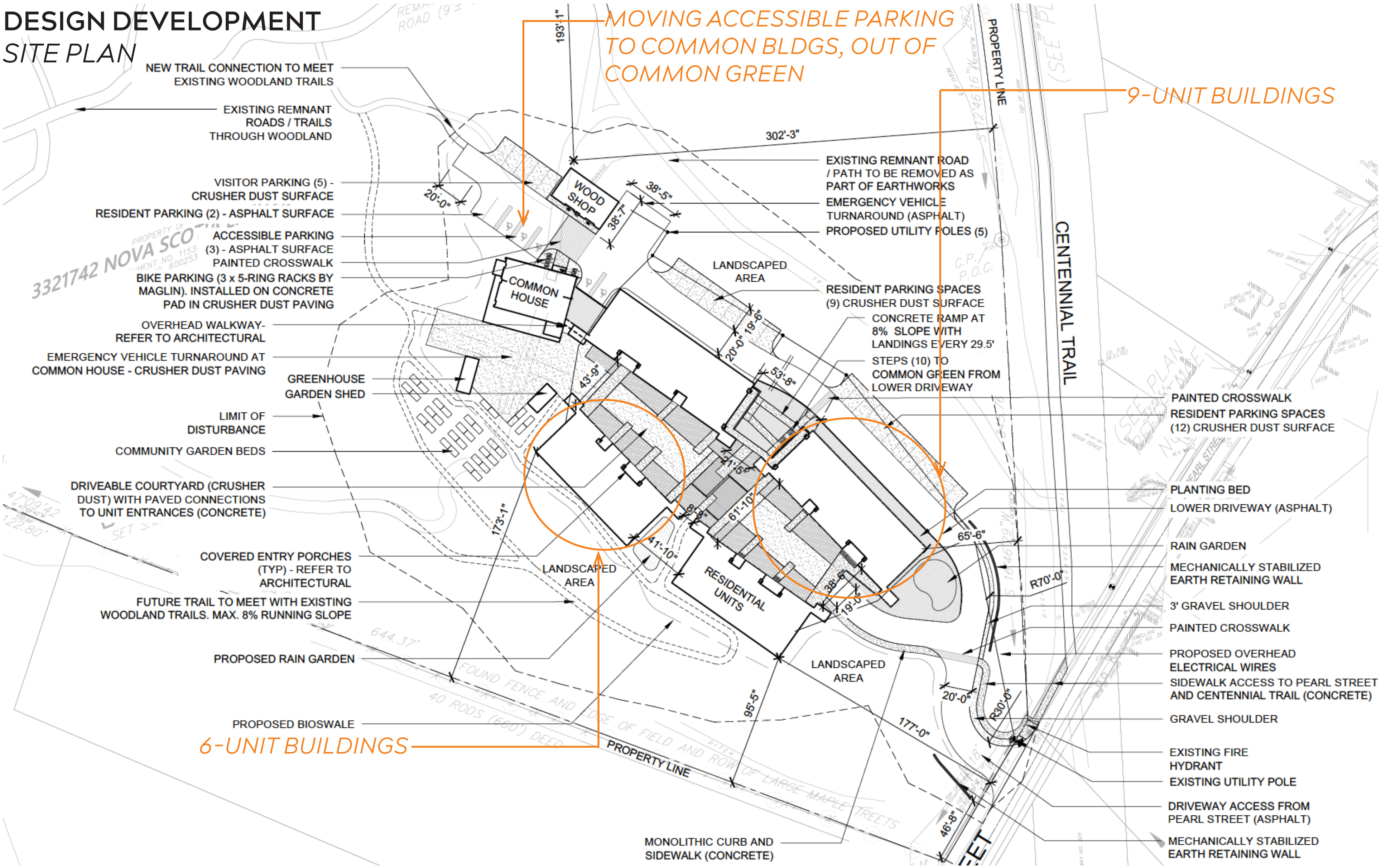
Issued on: | City:

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

DESIGN DEVELOPMENT
SITE PLAN



TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

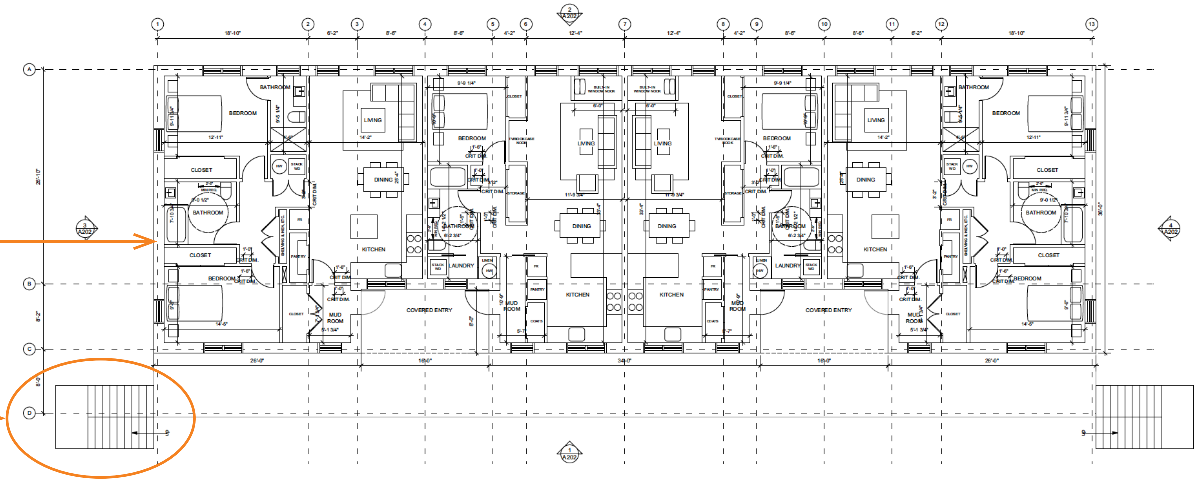
TATE ENGINEERING

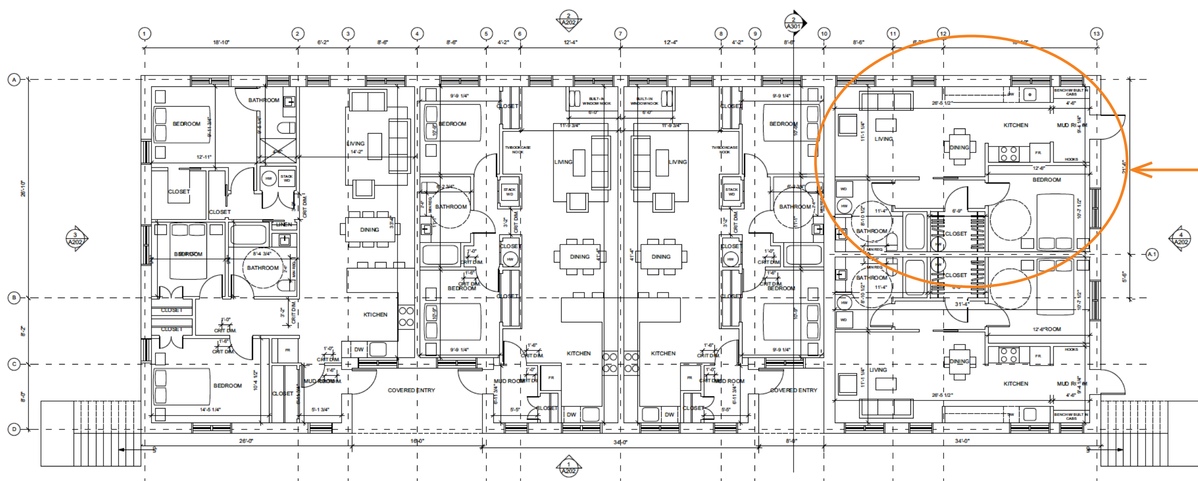
DESIGN DEVELOPMENT

PRIVATE UNITS PLANS

NO COMPROMISE ON WALL ASSEMBLIES!

STAIRS REPLACING BRIDGES BETWEEN ALL BUILDINGS





NEW "MICRO" 1-BR UNITS

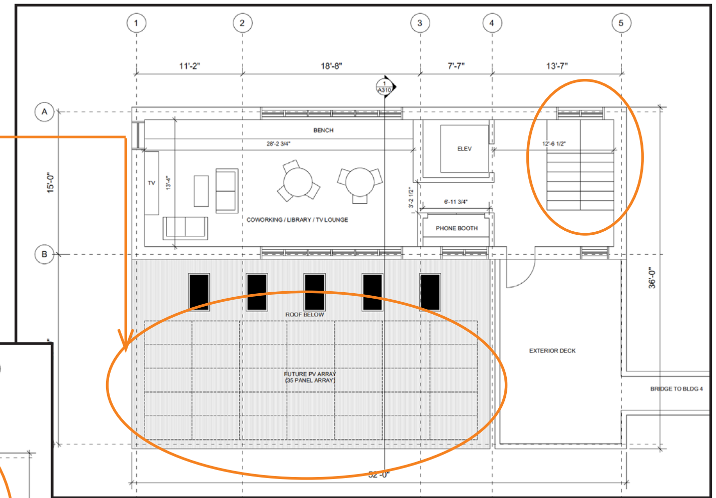
TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

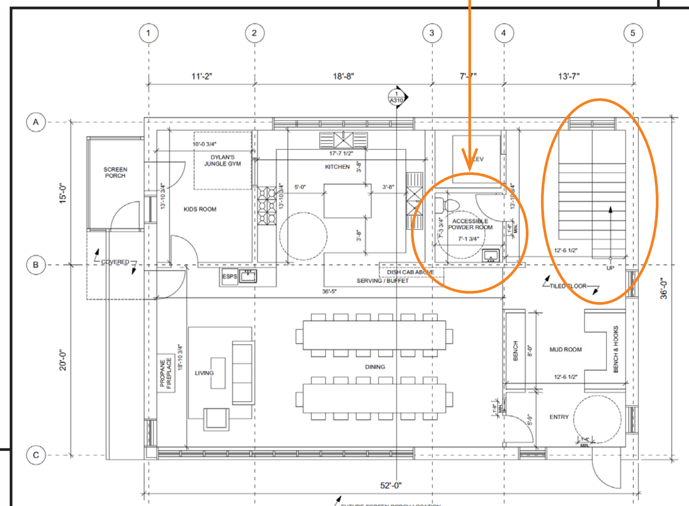
TATE ENGINEERING

DESIGN DEVELOPMENT
COMMON HOUSE

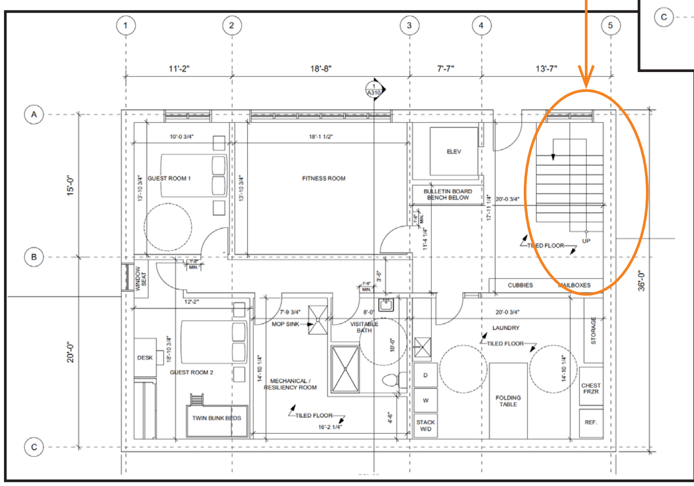
SOLAR ARRAY ON ROOF



POWDER ROOM CHANGED TO VISITABLE BATHROOM

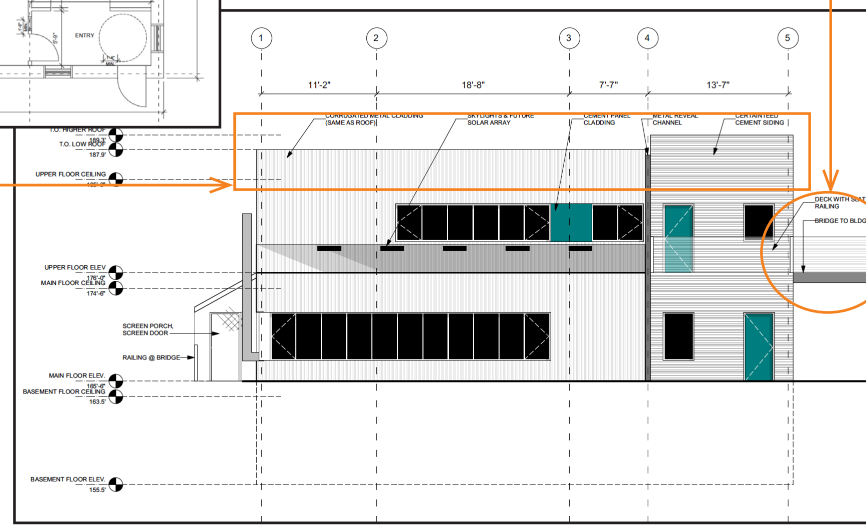


STAIRS BROUGHT INTO SIMPLIFIED FORM



ONLY ONE PEDESTRIAN BRIDGE FROM COMMON HOUSE

GABLE ROOFS TO SHED ROOFS



TREEHOUSE VILLAGE
ECOHOUSING

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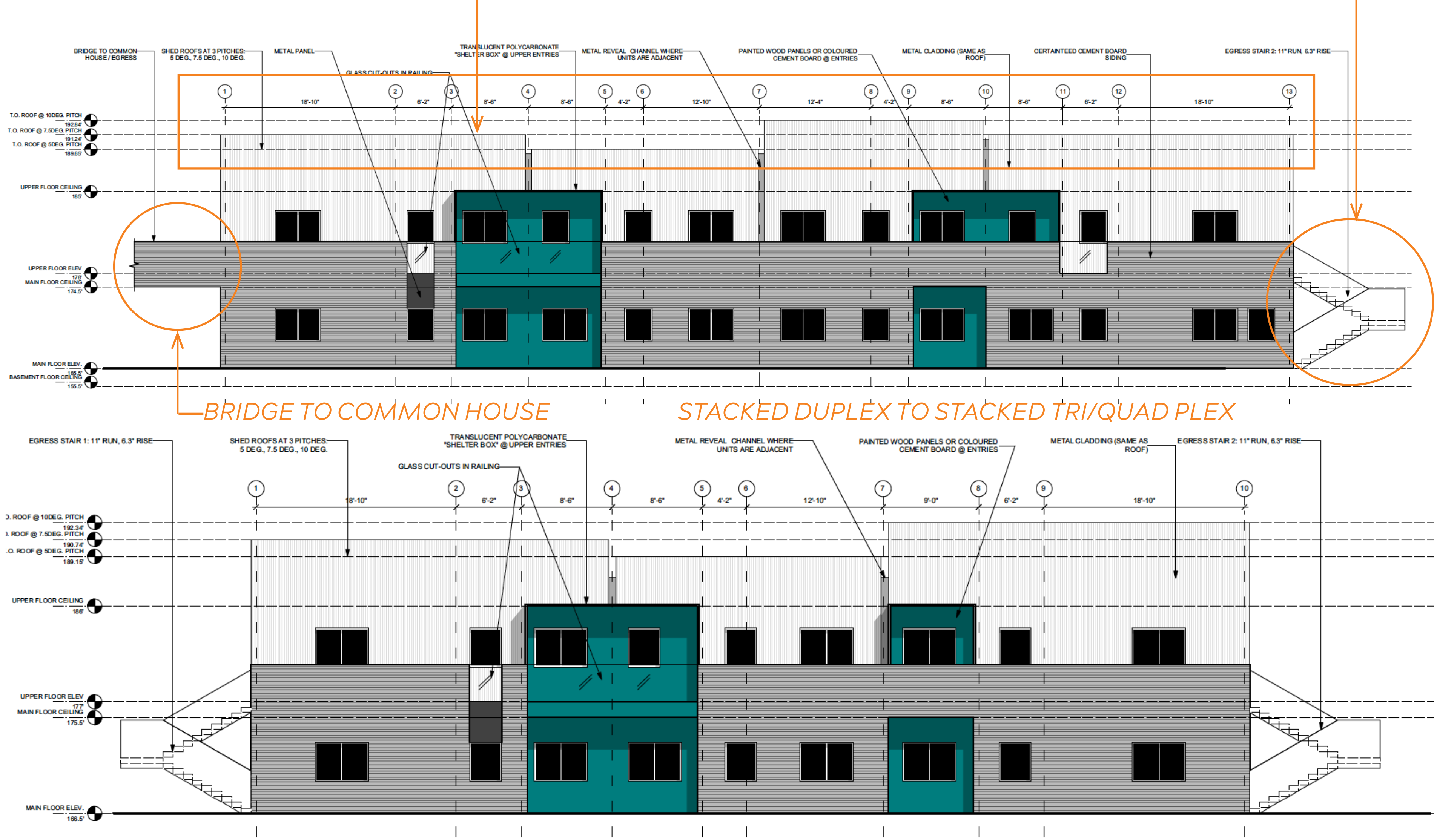
ELEVATIONS & SECTION



TREEHOUSE VILLAGE
ECOHOUSING

RHAD
ARCHITECTS

TATE
ENGINEERING

DESIGN DEVELOPMENT

ENERGY MODELING (JUNE 2020)

PHIUS+ 2018 VERIFICATION 1

BUILDING INFORMATION

Category:	**Residential**
Status:	**In planning**
Building type:	**New construction**
Year of construction:	**2020**
Units:	**6**
Number of occupants:	**19 (Design)**
Occupant density:	**334.1** ft²/Person

Boundary conditions

Climate:	**SHEARWATER, NS**	
Internal heat gains:	**0.9**	Btu/hr ft²
Interior temperature:	**68**	°F
Overheat temperature:	**77**	°F

Building geometry

Enclosed volume:	**69,815.1**	ft³
Net-volume:	**58,275**	ft³
Total area envelope:	**13,512.2**	ft²
Area/Volume Ratio:	**0.2**	1/ft
Floor area:	**6,348**	ft²
Envelope area/iCFA:	**2.129**	

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: **PHIUS+ 2018**

Heating demand

specific:	**7.02**	kBtu/ft²yr
target:	**7.3**	kBtu/ft²yr
total:	44,563.77	kBtu/yr

Cooling demand

sensible:	**1**	kBtu/ft²yr
latent:	**1.34**	kBtu/ft²yr
specific:	**2.34**	kBtu/ft²yr
target:	**3.6**	kBtu/ft²yr
total:	14,863.37	kBtu/yr

Heating load

specific:	**4.29**	Btu/hr ft²
target:	**5.7**	Btu/hr ft²
total:	27,257.7	Btu/hr

Cooling load

specific:	**1.09**	Btu/hr ft²
target:	**1.9**	Btu/hr ft²
total:	6,939.82	Btu/hr

CHANGE FROM INTERNATIONAL PASSIVE HOUSE TO PHIUS

SLIGHTLY OVER SOURCE ENERGY TARGET

AIR TIGHTNESS TARGET IS MORE THAN P.H. INT'L

HIGH FREQUENCY OF OVERHEATING

PHIUS+ 2018 VERIFICATION 2

Source energy

total:	**75,662.27**	kWh/yr
specific:	**3,982**	kWh/Person yr
target:	**3,840**	kWh/Person yr
total:	**258,144.91**	kBtu/yr
specific:	40.67	kBtu/ft²yr

Site energy

total:	131,706.59	kBtu/yr
specific:	20.75	kBtu/ft²yr
total:	38,603.2	kWh/yr
specific:	6.08	kWh/ft²

Air tightness

ACH50:	**0.7**	1/hr
CFM50 per envelope area:	**0.05**	cfm/ft²
target:	**0.83**	1/hr
target CFM50:	**0.06**	cfm/ft²

PASSIVEHOUSE RECOMMENDATIONS

Sensible recovery efficiency:	**84.9**	%
Frequency of overheating: Cooling system is required	**25.2**	%

Frequency of overheating only applies if there is not a [properly sized] cooling system installed.

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

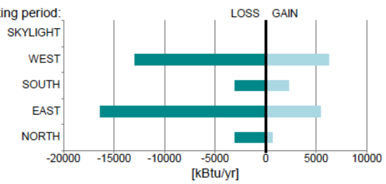
TATE ENGINEERING

DESIGN DEVELOPMENT
ENERGY MODELING (JUNE 2020)

BUILDING ELEMENTS

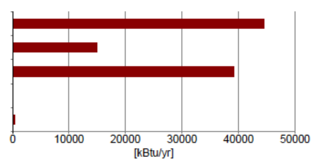
Windows

Average SHGC:	0.33	
Average solar reduction factor heating:	0.52	
Average solar reduction factor cooling:	0.54	
Average U-value:	0.259	Btu/hr ft² °F
Total glazing area:	481.3	ft²
Total window area:	715	ft²



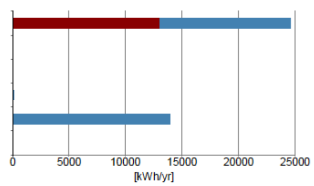
HVAC

Total heating demand:	44,564	kBtu/yr
Total cooling demand:	14,863	kBtu/yr
Total DHW energy demand:	39,234	kBtu/yr
Solar DHW contribution:	0	kBtu/yr
Auxiliary electricity:	387	kBtu/yr



Electricity

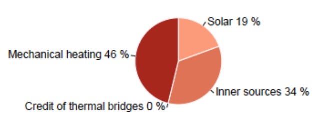
Direct heating / DHW:	24,561	kWh/yr
Heatpump heating:	0	kWh/yr
Cooling:	0	kWh/yr
HVAC auxiliary energy:	113	kWh/yr
Appliances:	13,929	kWh/yr
Renewable generation, coincident production and use:	0	kWh/yr
Total electricity demand:	38,603	kWh/yr



HEAT FLOW - HEATING PERIOD

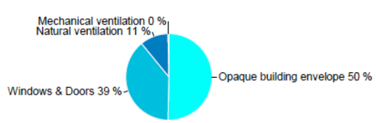
Heat gains

Solar:	18,507	kBtu/yr
Inner sources:	32,905	kBtu/yr
Credit of thermal bridges:	0	kBtu/yr
Mechanical heating:	44,564	kBtu/yr



Heat losses

Opaque building envelope:	48,364	kBtu/yr
Windows & Doors:	37,161	kBtu/yr
Natural ventilation:	10,097	kBtu/yr
Mechanical ventilation:	353	kBtu/yr

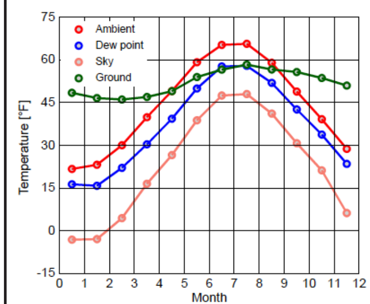


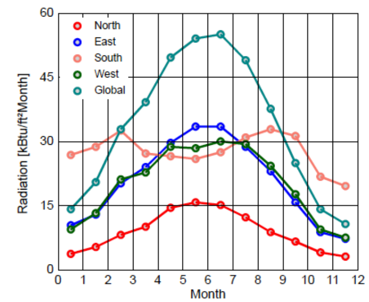
CLIMATE

Latitude:	44.6	°
Longitude:	-63.5	°
Elevation of weather station:	278.9	ft
Elevation of building site:	367.5	ft
Heat capacity air:	0.018	Btu/ft³F
Daily temperature swing summer:	14	°F
Average wind speed:	13.1	ft/s

Ground

Average ground surface temperature:	45.7	°F
Amplitude ground surface temperature:	54	°F
Ground thermal conductivity:	1.2	Btu/hr ft °F
Ground heat capacity:	29.8	Btu/ft³F
Depth below grade of groundwater:	9.8	ft
Flow rate groundwater:	0.2	ft/d





Calculation parameters

Length of heating period:	243	days/yr
Heating degree hours:	190.9	kFh/a
Phase shift months:	1.4	mths
Time constant heating demand:	272.7	hr
Time constant cooling demand:	0	hr
Time constant cooling demand with night ventilation:	0	hr

Climate for		Heating load 1	Heating load 2	Cooling
Temperature	[°F]	7.5	21.2	69.6
Solar radiation North	[Btu/hr ft²]	5.1	3.8	21.9
Solar radiation East	[Btu/hr ft²]	15.2	5.7	55.2
Solar radiation South	[Btu/hr ft²]	38.7	15.2	44.7
Solar radiation West	[Btu/hr ft²]	12	7.3	46.6
Solar radiation Global	[Btu/hr ft²]	19.7	10.5	83.4

Relevant boundary conditions for heating load calculation: Heating load 1

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

DESIGN DEVELOPMENT

ENERGY MODELING (JUNE 2020)

PHIUS+ 2018 VERIFICATION

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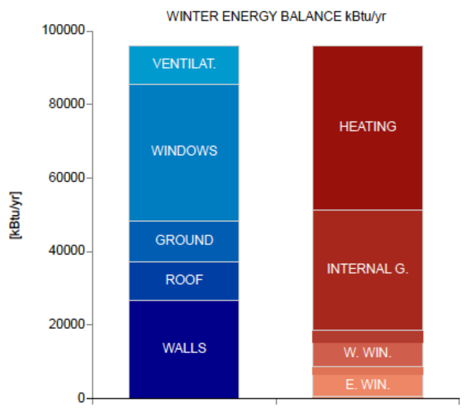
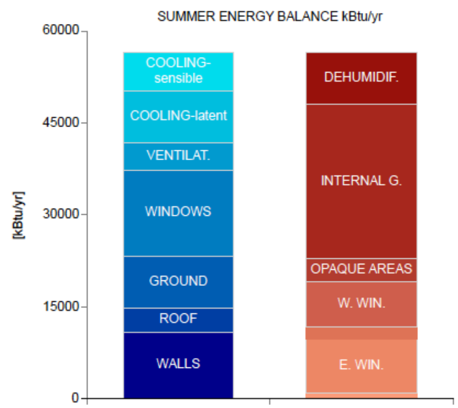
ANNUAL HEAT DEMAND

Transmission losses :	85,526	kBtu/yr
Ventilation losses:	10,450	kBtu/yr
Total heat losses:	95,976	kBtu/yr
Solar heat gains:	18,720	kBtu/yr
Internal heat gains:	33,282	kBtu/yr
Total heat gains:	52,002	kBtu/yr
Utilization factor:	98.9	%
Useful heat gains:	51,412	kBtu/yr
Annual heat demand:	44,564	kBtu/yr
Specific annual heat demand:	7,020.8	Btu/ft²yr

ANNUAL COOLING DEMAND

Solar heat gains:	22,874	kBtu/yr
Internal heat gains:	25,207	kBtu/yr
Total heat gains:	48,081	kBtu/yr
Transmission losses :	45,036	kBtu/yr
Ventilation losses:	5,314	kBtu/yr
Total heat losses:	50,350	kBtu/yr
Utilization factor:	82.8	%
Useful heat losses:	41,715	kBtu/yr
Cooling demand - sensible:	6,366	kBtu/yr
Cooling demand - latent:	8,497	kBtu/yr
Annual cooling demand:	14,863	kBtu/yr
Specific annual cooling demand:	2.3	kBtu/ft²yr

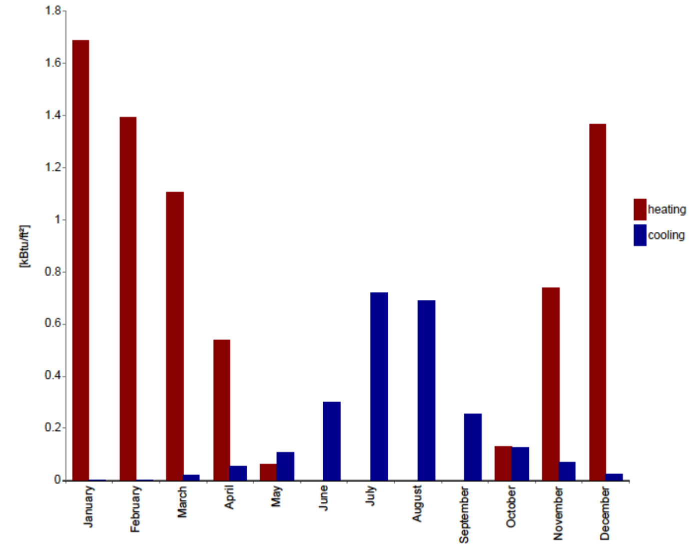




PHIUS+ 2018 VERIFICATION

6

SPECIFIC HEAT/COOLING DEMAND MONTHLY



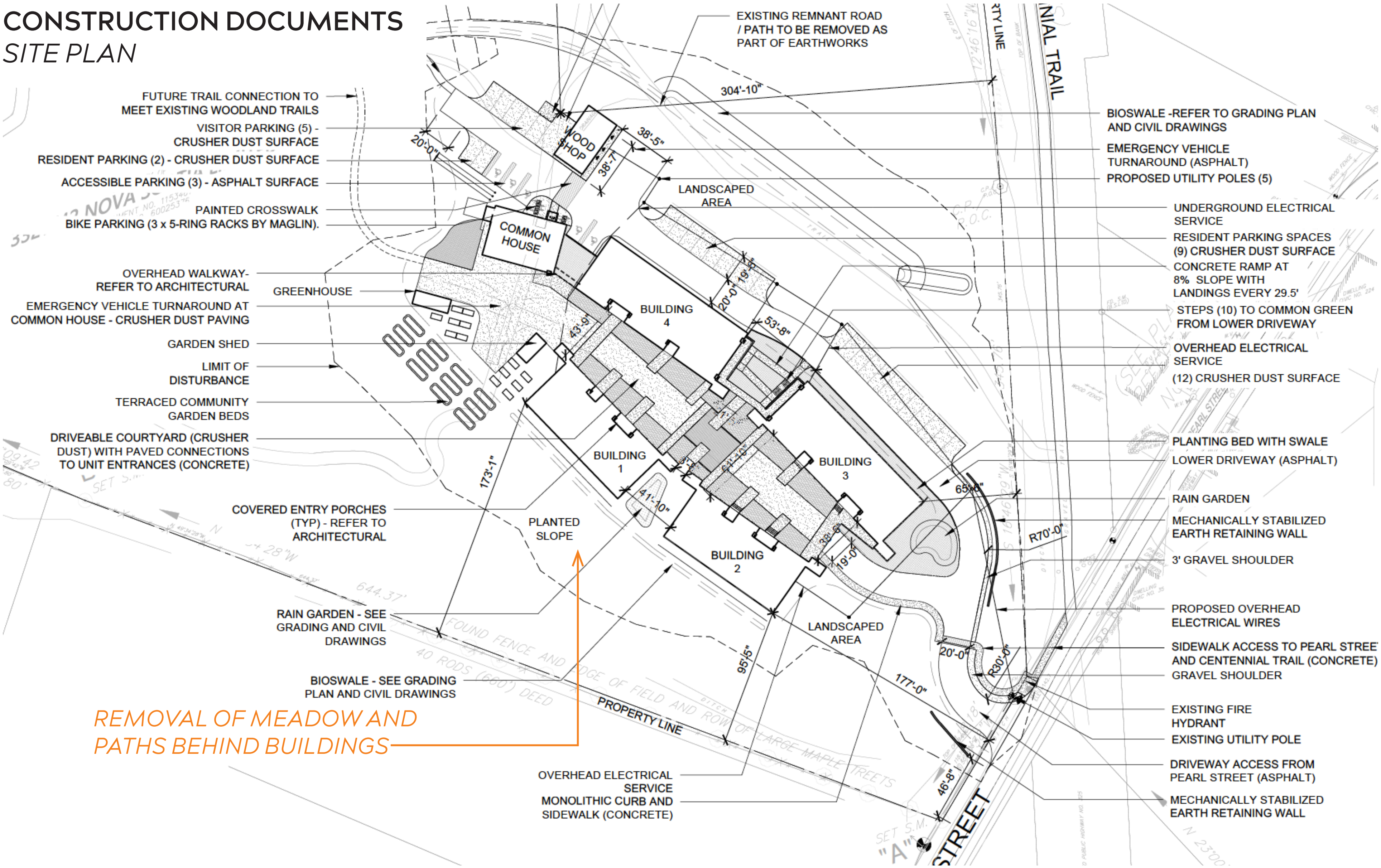
Month	Heating [kBtu/ft²]	Cooling [kBtu/ft²]
January	1.7	0
February	1.4	0
March	1.1	0
April	0.5	0.1
May	0.1	0.1
June	0	0.3
July	0	0.7
August	0	0.7
September	0	0.3
October	0.1	0.1
November	0.7	0.1
December	1.4	0

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

CONSTRUCTION DOCUMENTS
SITE PLAN



TREEHOUSE VILLAGE
ECOHOUSING

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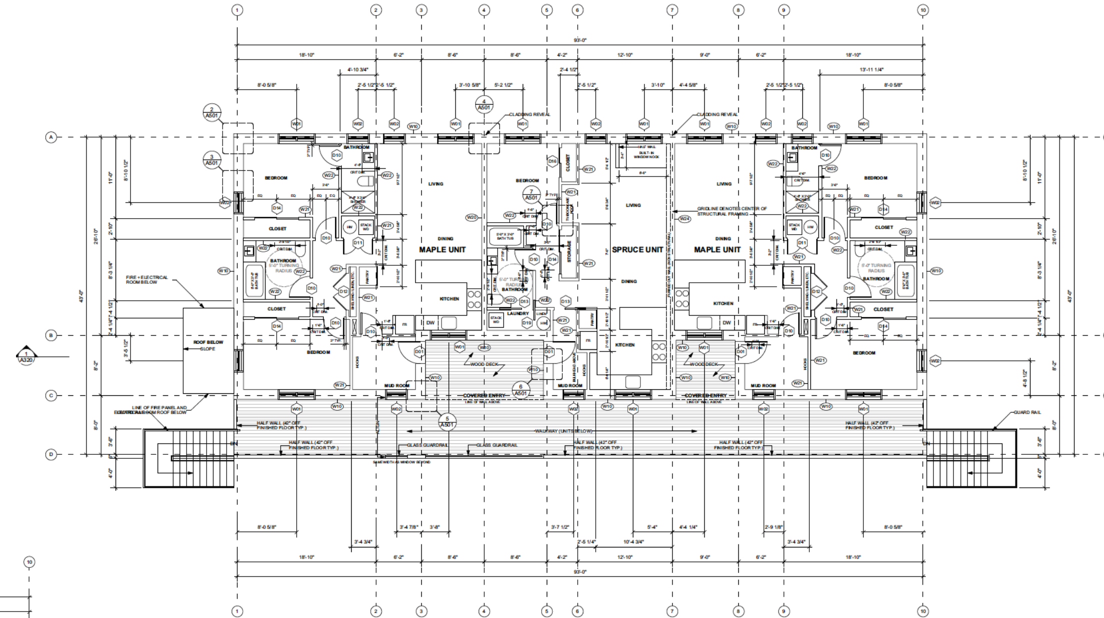
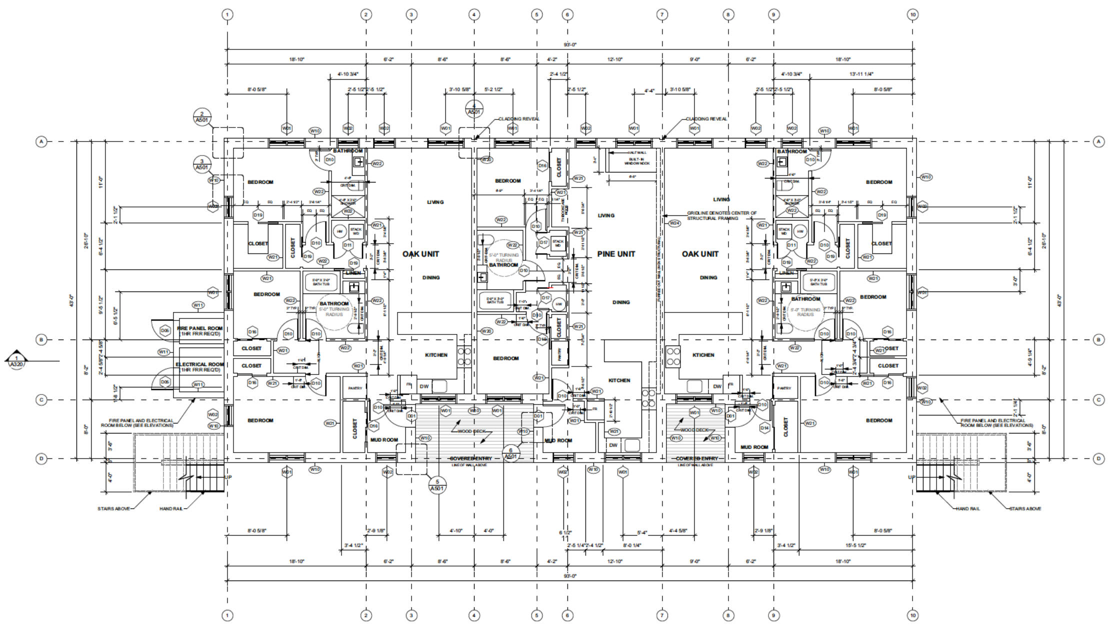
CONSTRUCTION DOCUMENTS
PLANS





TREEHOUSE VILLAGE
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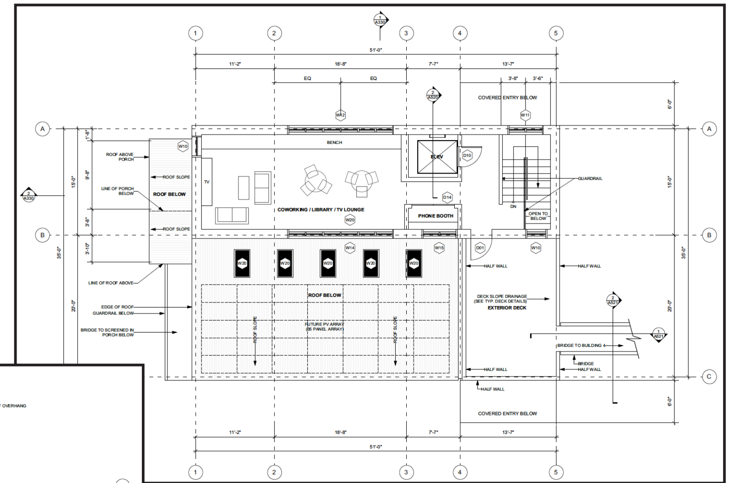
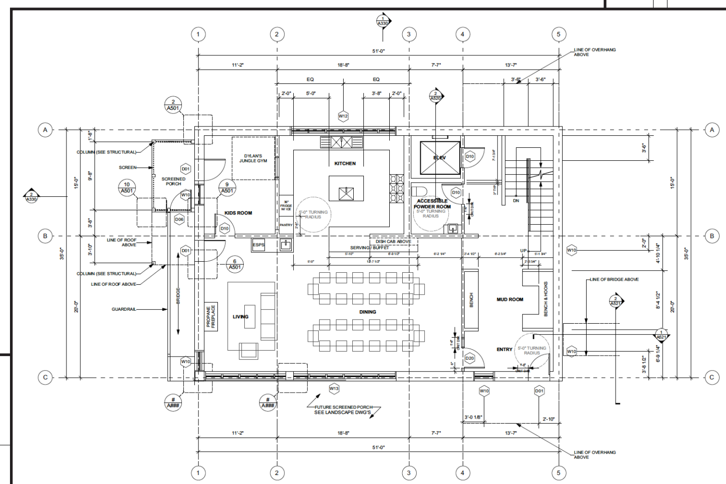
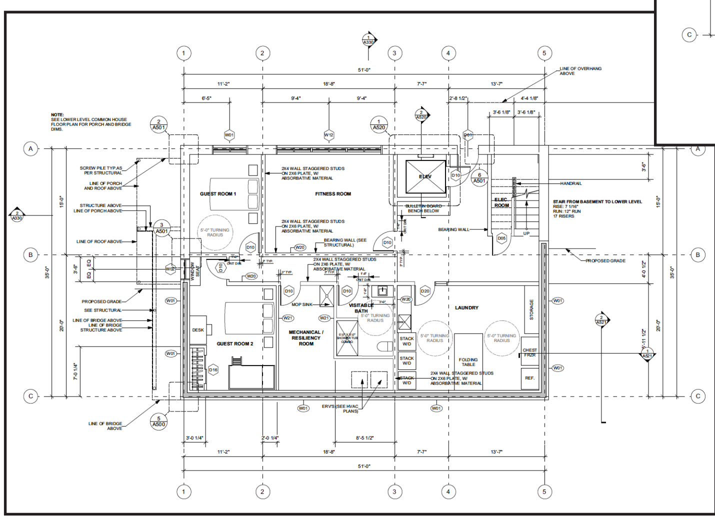
COMMON HOUSE







TREEHOUSE VILLAGE
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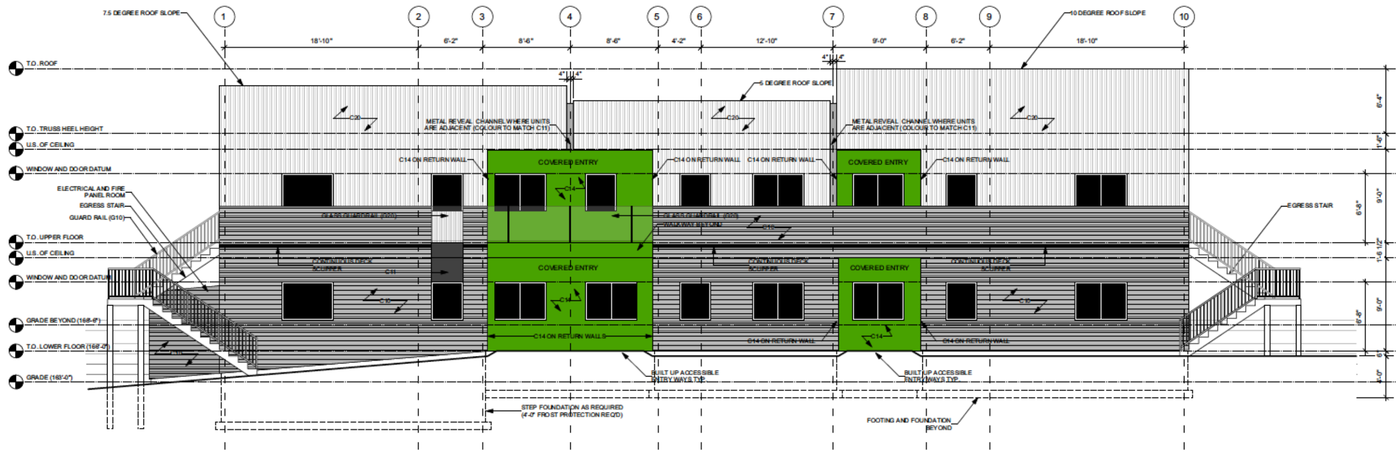
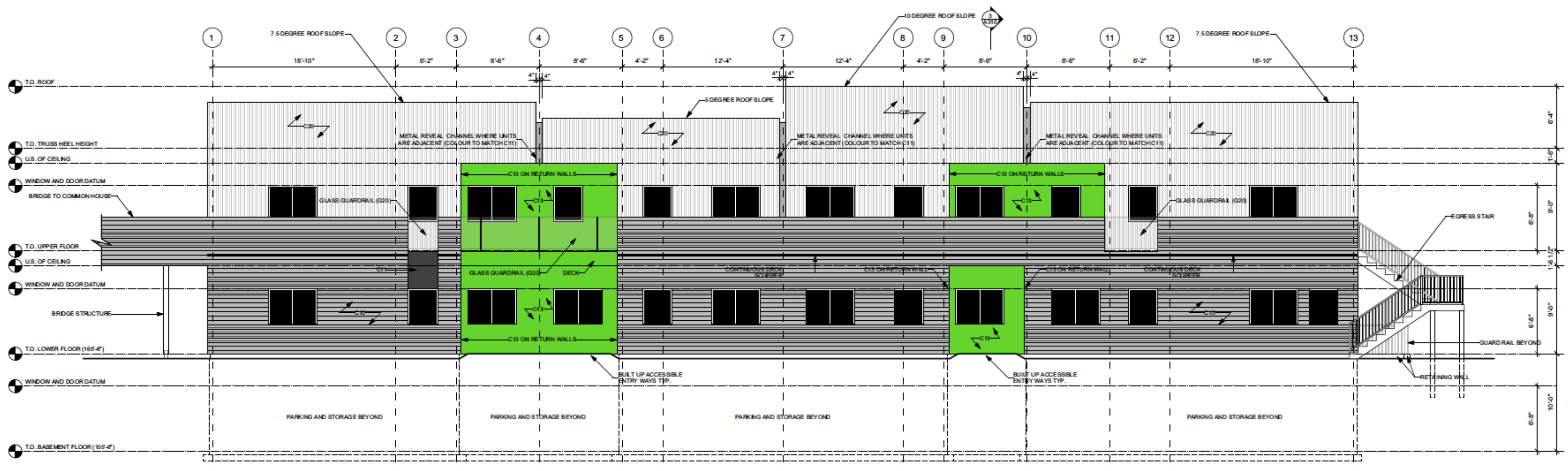
ELEVATIONS - PRIVATE UNITS





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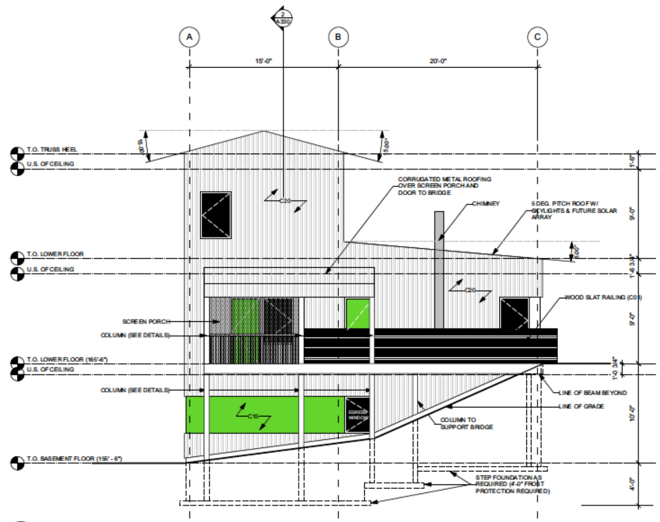
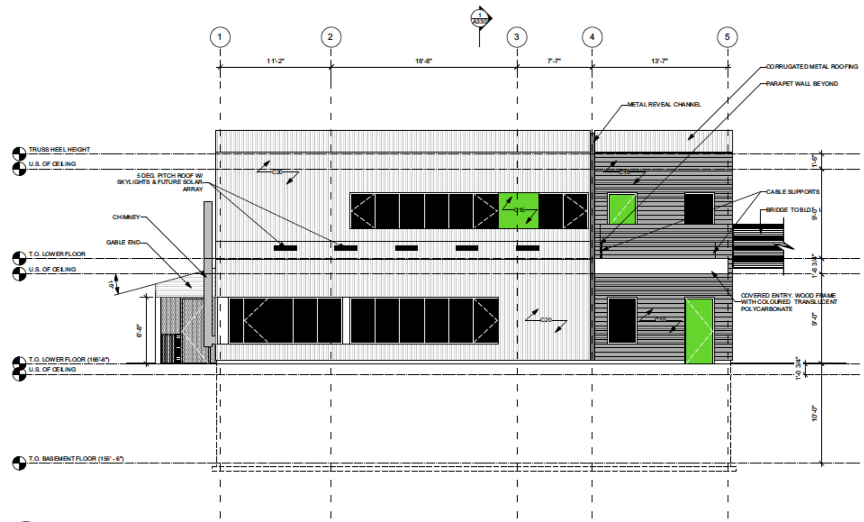
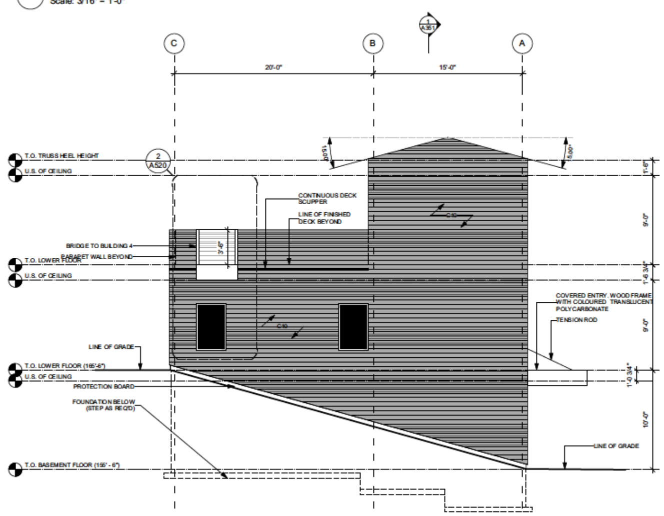
ELEVATIONS - COMMON HOUSE



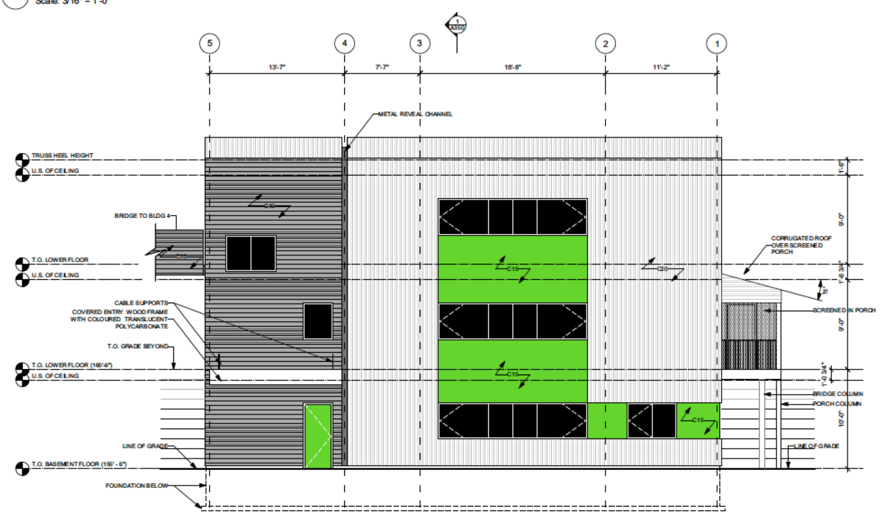
1 BUILDING 5 WEST ELEVATION
Scale: 3/16" = 1'-0"



2 BUILDING 5 SOUTH ELEVATION
Scale: 3/16" = 1'-0"



3 BUILDING 5 EAST ELEVATION
Scale: 3/16" = 1'-0"



4 BUILDING 5 NORTH ELEVATION
Scale: 3/16" = 1'-0"

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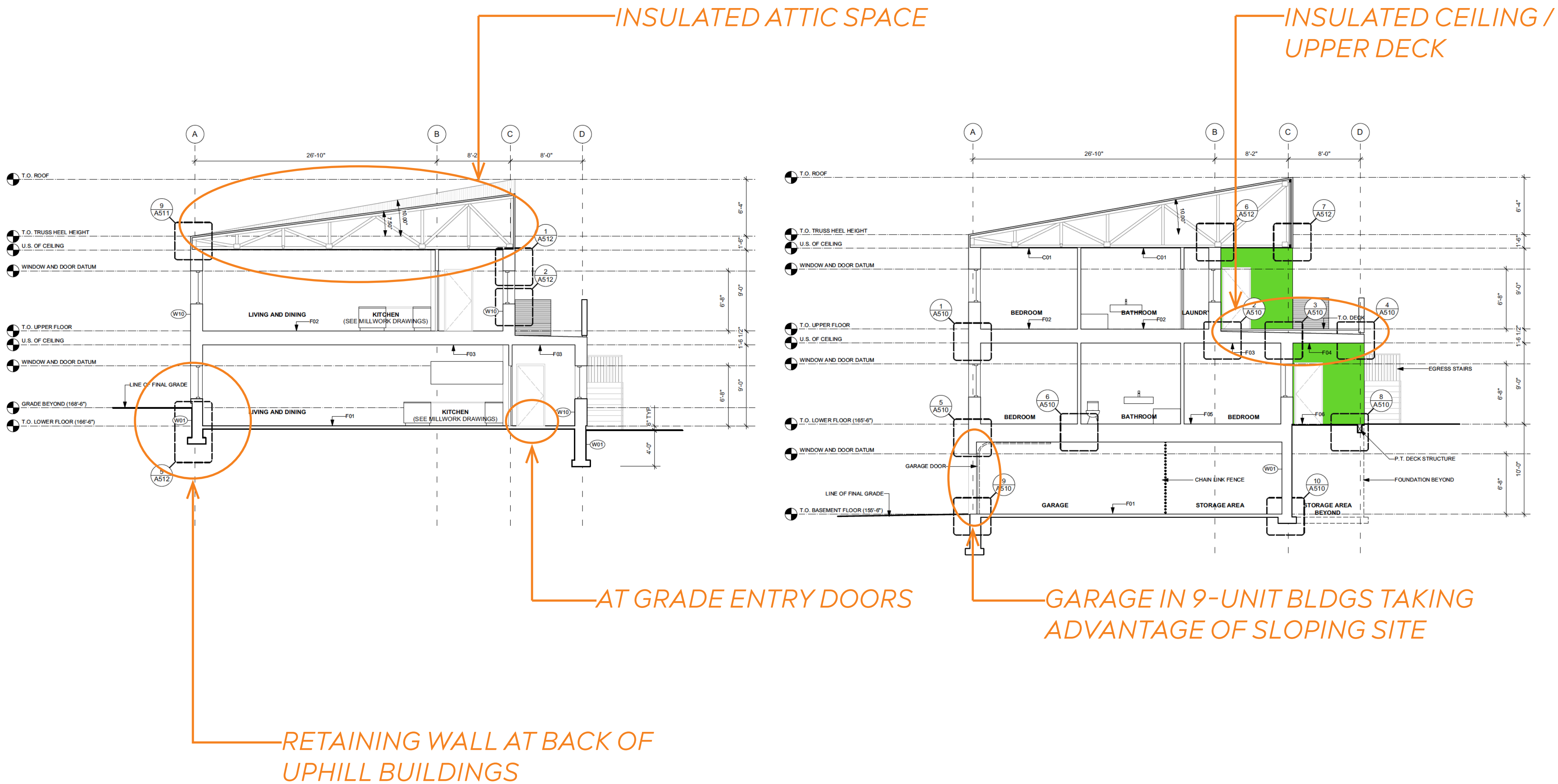
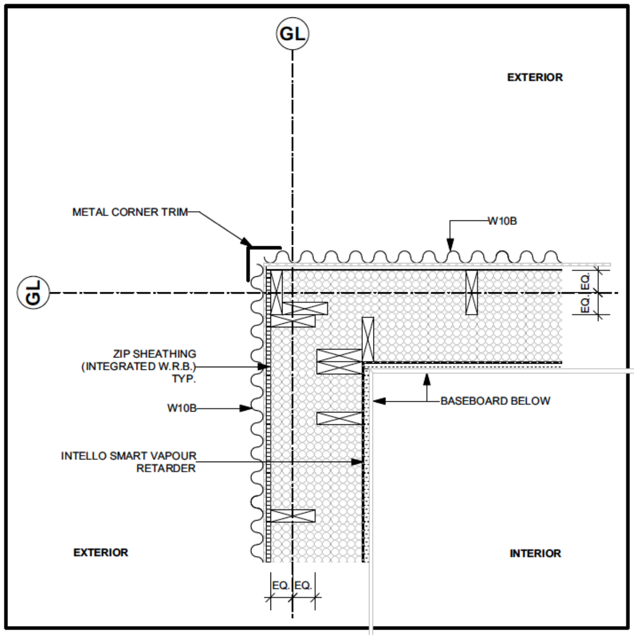
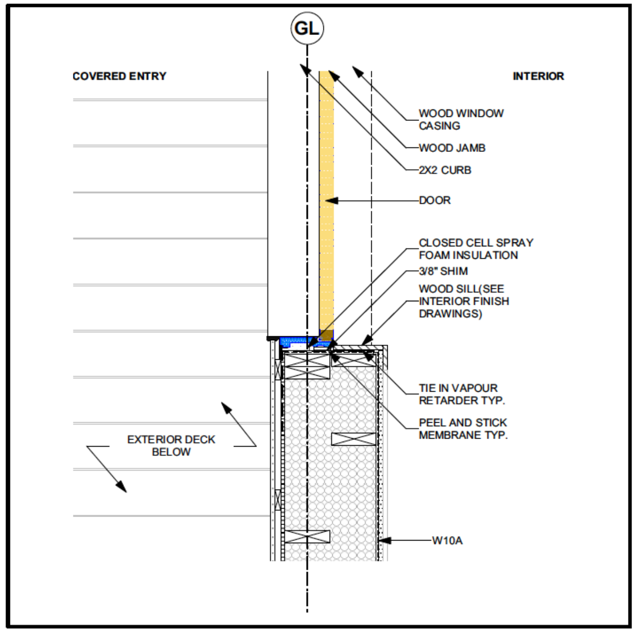
SECTIONS



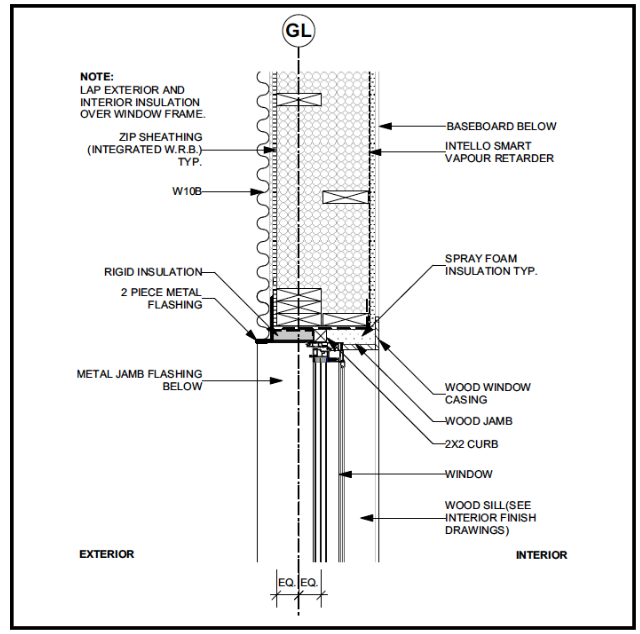
CONSTRUCTION DOCUMENTS
PLAN DETAILS



TYPICAL CORNER DETAIL



TYPICAL DOOR JAMB DETAIL



TYPICAL WINDOW JAMB DETAIL

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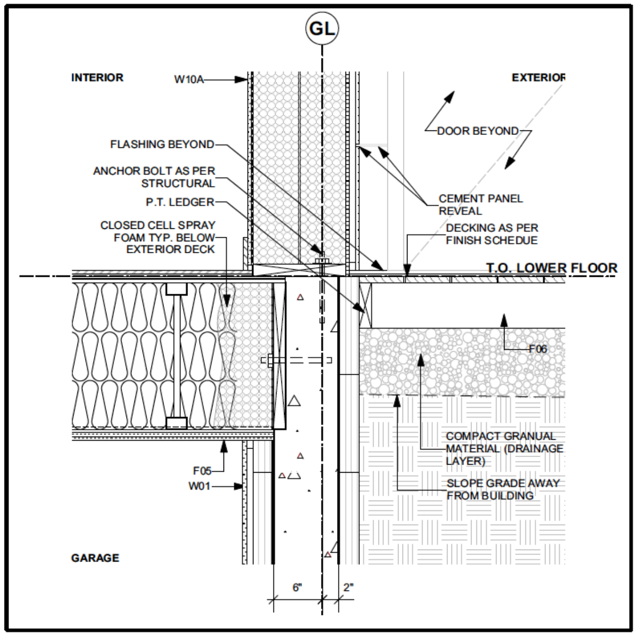
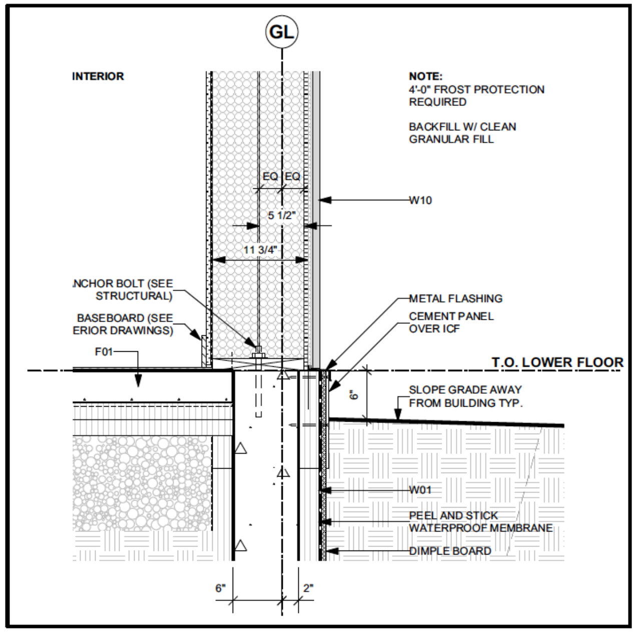
SECTION DETAILS - GROUND CONDITIONS

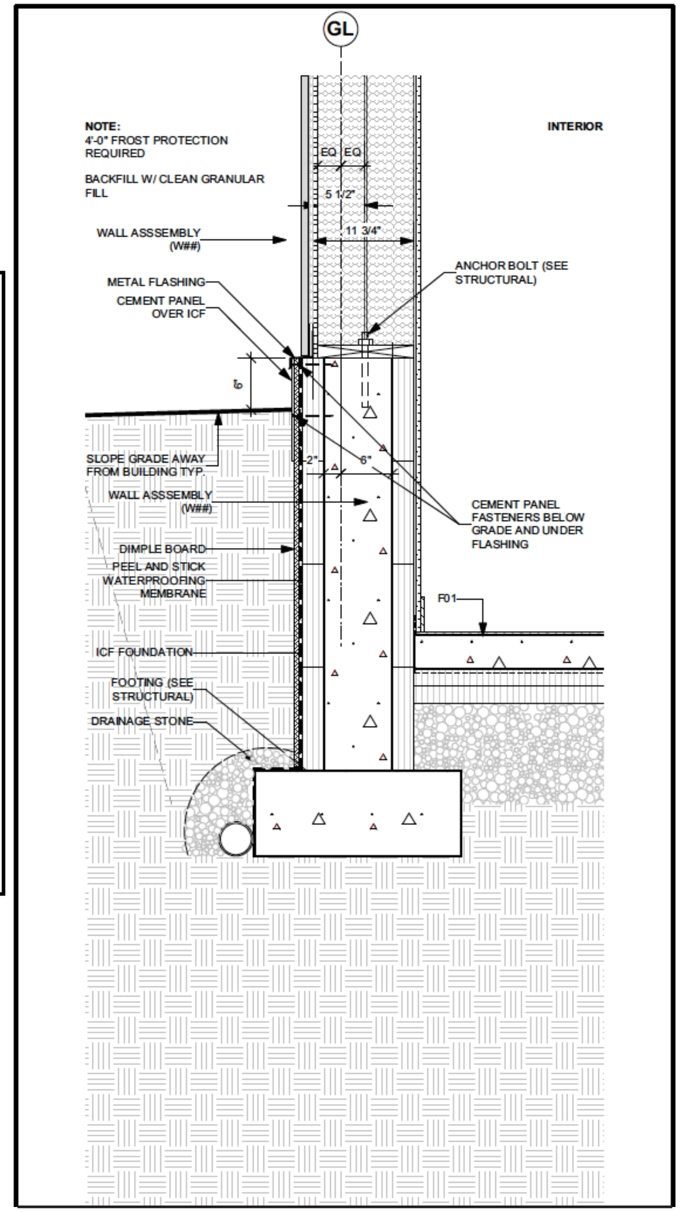


TYPICAL FOUNDATION/FLOOR DETAIL OVER GARAGE



TYPICAL FOUNDATION/FLOOR DETAIL @ SLAB

TYPICAL FOUNDATION/FLOOR DETAIL @ SLAB / RETAINING WALL



TREEHOUSE VILLAGE ECOHOUSING

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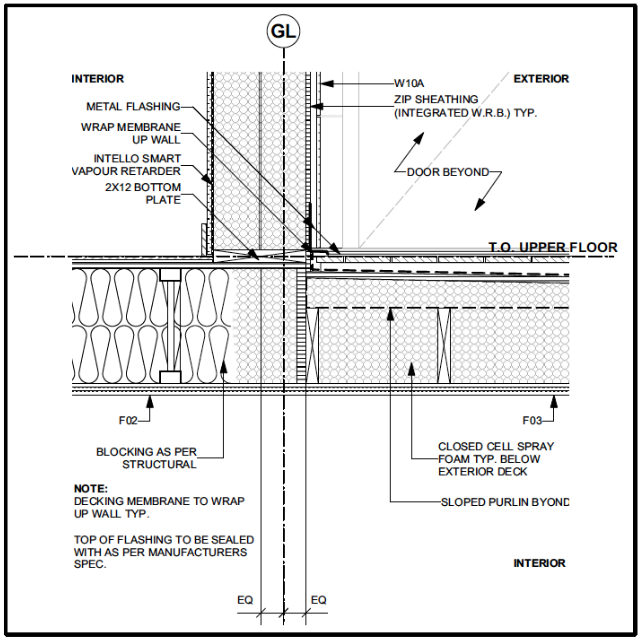
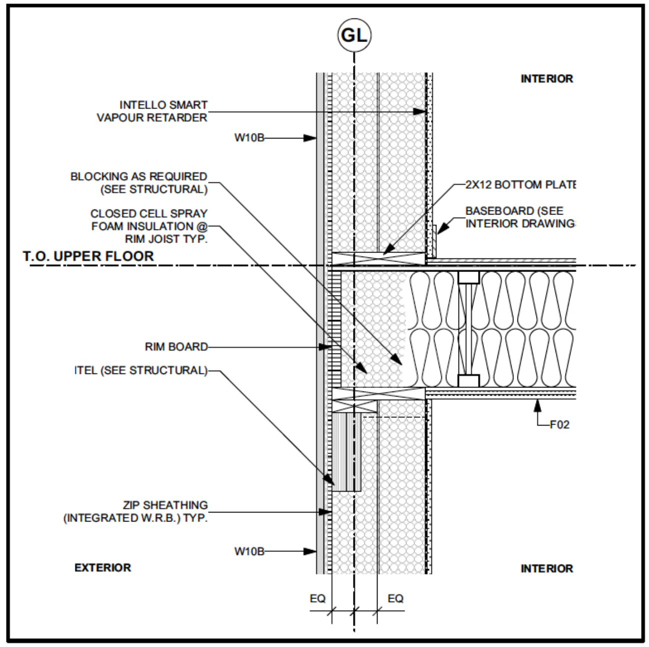
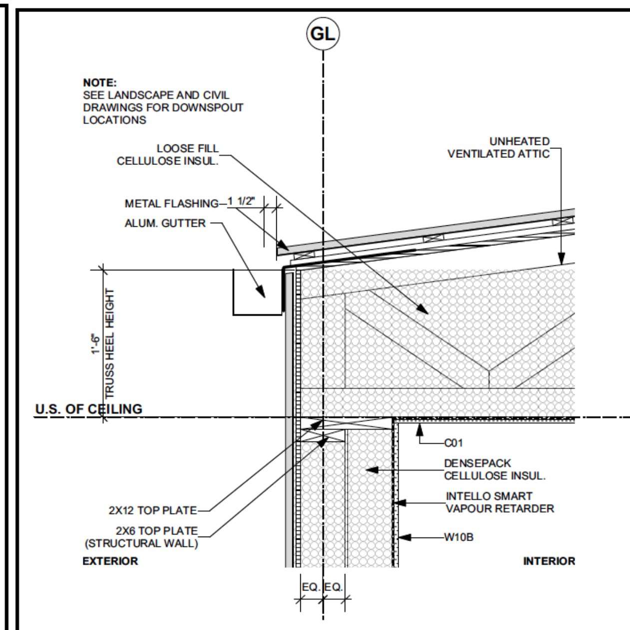
SECTION DETAILS -TYP.



TYPICAL FLOOR DETAIL @ UPPER DECK



TYPICAL FLOOR DETAIL @ FIRST TO SECOND STOREY



TYPICAL ROOF DETAIL @ WALL

TREEHOUSE VILLAGE ECOHOUSING

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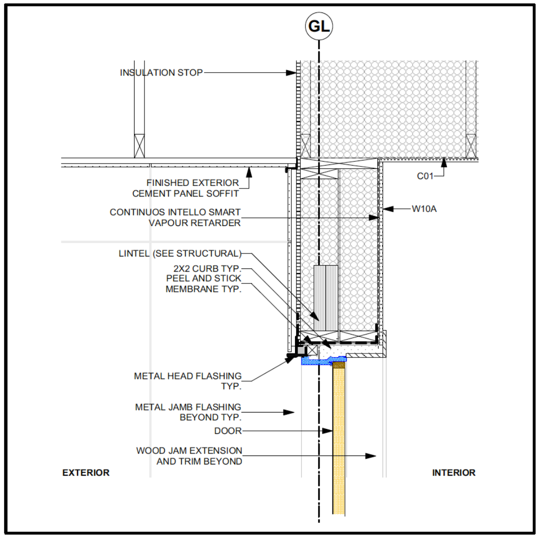
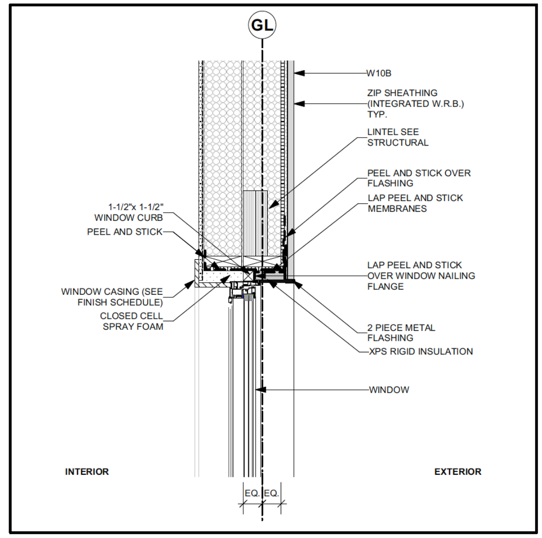
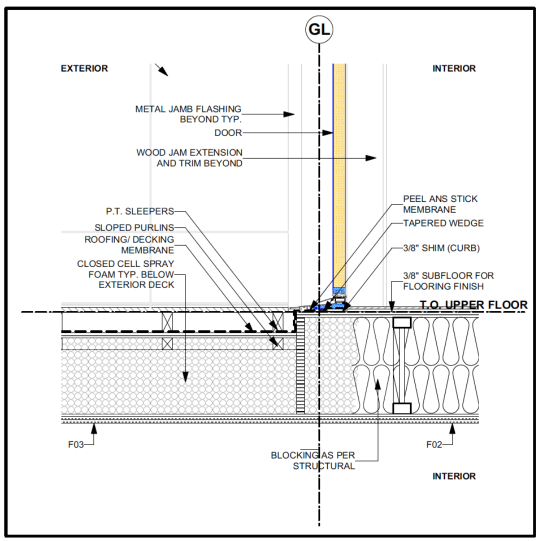
SECTION DETAILS - WINDOWS & DOORS



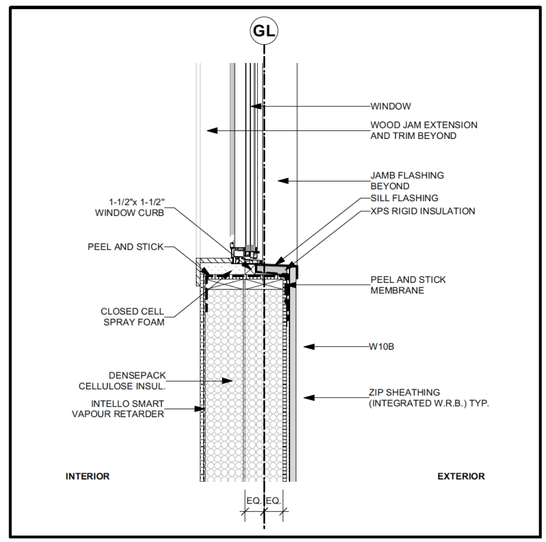
TYPICAL DOOR HEADER



TYPICAL WINDOW HEADER



TYPICAL DOOR SILL (BARRIER FREE)



TYPICAL WINDOW SILL

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

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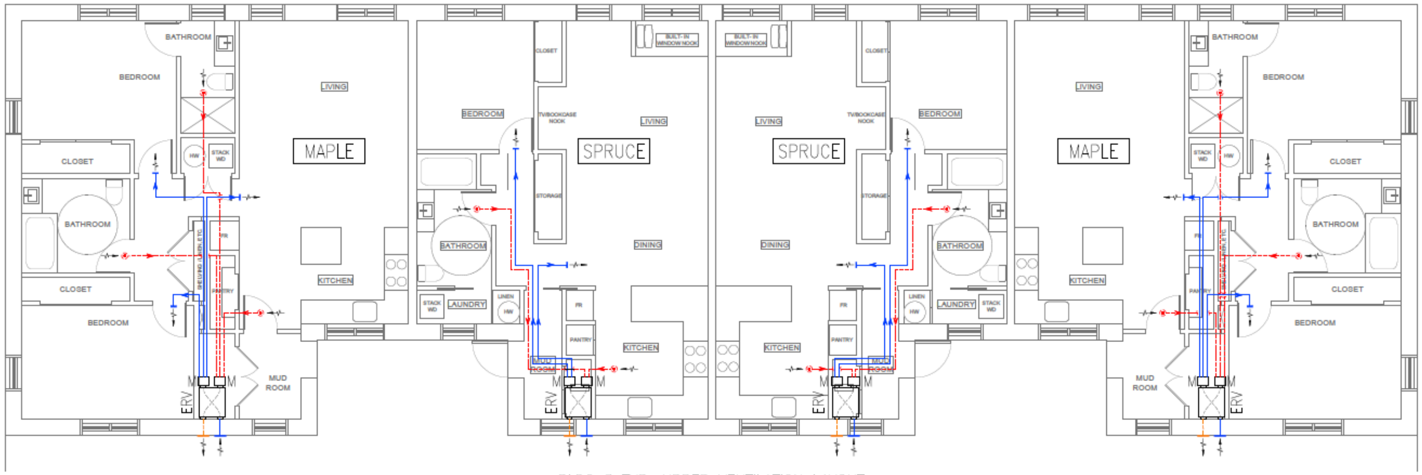
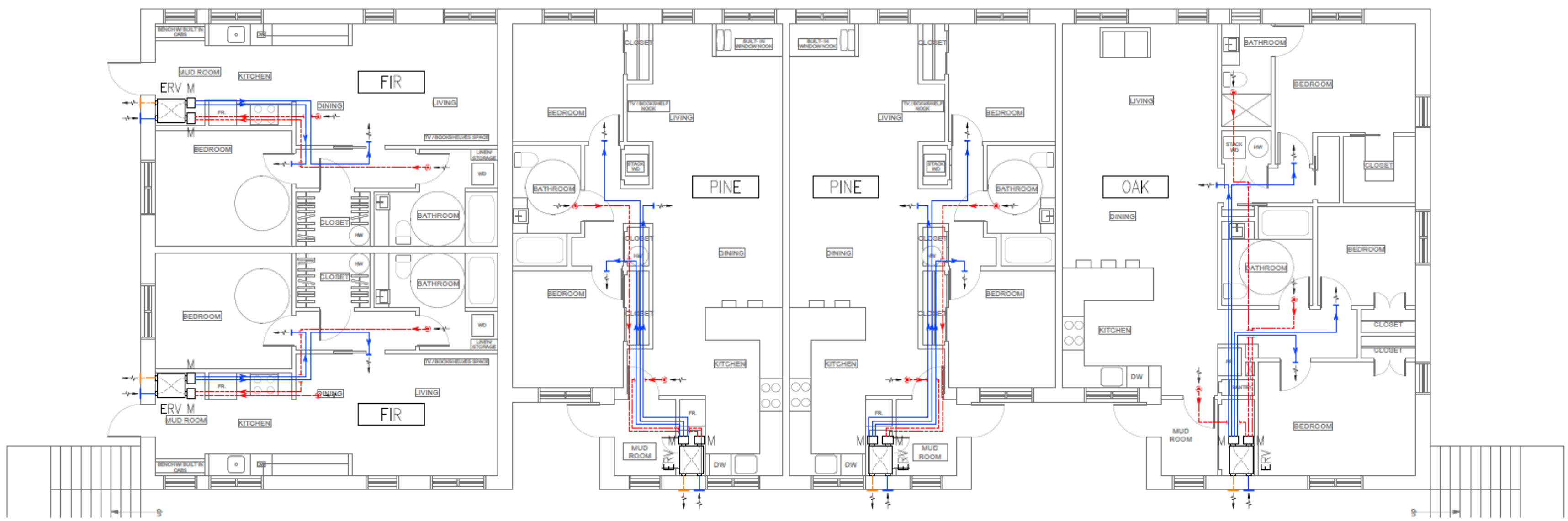
MECHANICAL – PRIVATE UNITS



BLDG 3 TYP. UPPER VENTILATION LAYOUT



TREEHOUSE VILLAGE ECOHOUSING

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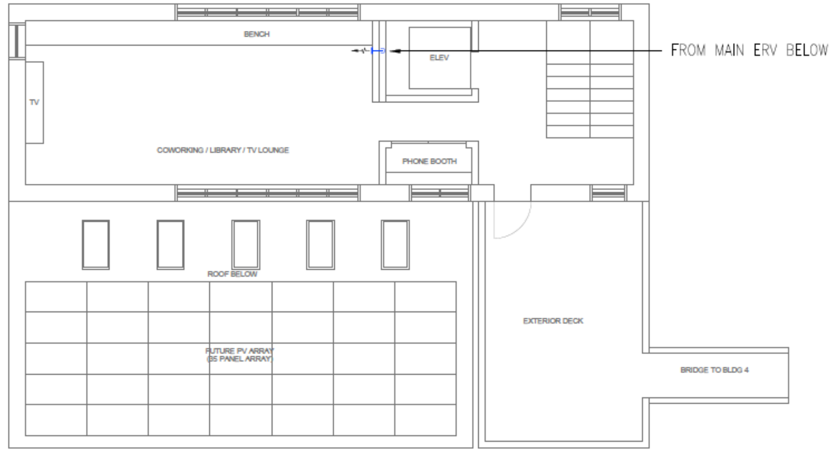
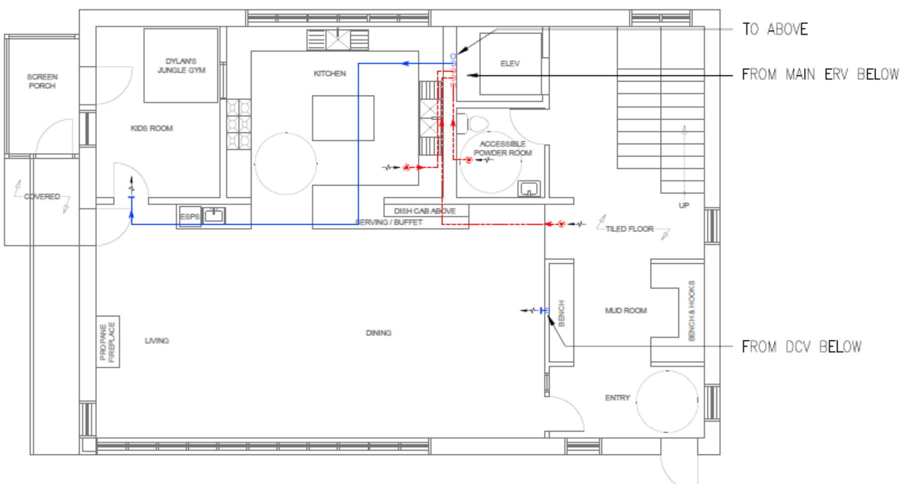
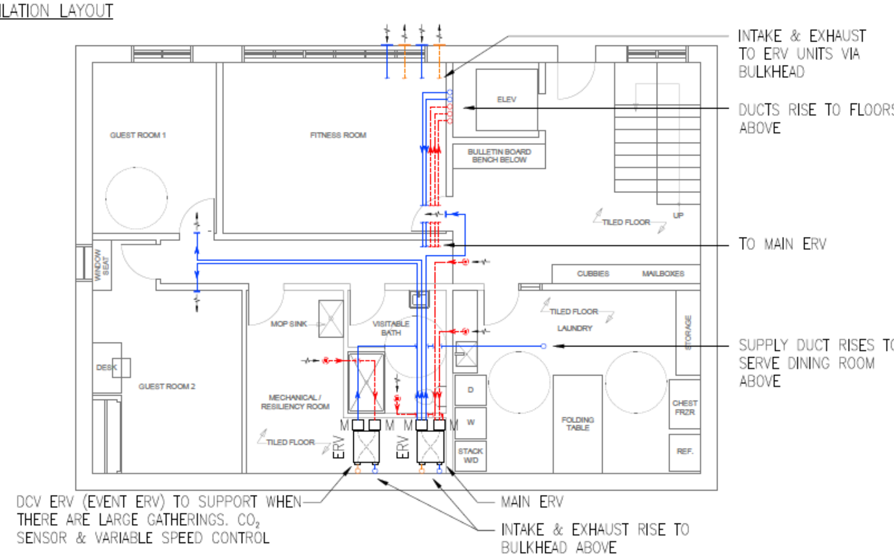
MECHANICAL - COMMON HOUSE



BLDG 5 UPPER LEVEL VENTILATION LAYOUT



BLDG 5 MAIN LEVEL VENTILATION LAYOUT



BLDG 5 LOWER LEVEL VENTILATION LAYOUT

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

CONSTRUCTION DOCUMENTS

ENERGY MODELING - DECEMBER 2020

PHIUS+ 2018 VERIFICATION — 1

BUILDING INFORMATION

Category:	**Residential**
Status:	**In planning**
Building type:	**New construction**
Year of construction:	**2020**
Units:	**6**
Number of occupants:	**19 (Design)**
Occupant density:	**33.7** m²/Person

Boundary conditions

Climate:	**SHEARWATER, NS**	
Internal heat gains:	**3.8**	W/m²
Interior temperature:	**20**	°C
Overheat temperature:	**25**	°C

Building geometry

Enclosed volume:	**2,085.7**	m³
Net-volume:	**1,759**	m³
Total area envelope:	**1,304.7**	m²
Area/Volume Ratio:	**0.6**	1/m
Floor area:	**641.2**	m²
Envelope area/iCFA:	**2.035**	

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: **PHIUS+ 2018**

Heating demand

specific:	**16.4**	kWh/m²a
target:	**23.34**	kWh/m²a
total:	10,518.14	kWh/a

Cooling demand

sensible:	**1.62**	kWh/m²a
latent:	**0.06**	kWh/m²a
specific:	**1.68**	kWh/m²a
target:	**11.36**	kWh/m²a
total:	1,078.07	kWh/a

Heating load

specific:	**13.45**	W/m²
target:	**17.98**	W/m²
total:	8,621.16	W

Cooling load

specific:	**2.95**	W/m²
target:	**5.99**	W/m²
total:	1,892.26	W

MEETING SOURCE ENERGY TARGET

FREQUENCY OF OVERHEATING HAS DECREASED

PHIUS+ 2018 VERIFICATION — 2

Source energy

total:	**70,324.6**	kWh/a
specific:	**3,701**	kWh/Person a
target:	**3,840**	kWh/Person a
specific:	109.67	kWh/m²a

Site energy

total:	35,879.9	kWh/a
specific:	55.96	kWh/m²a

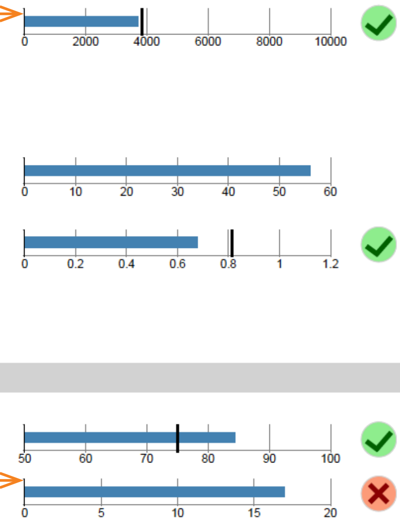
Air tightness

ACH50:	**0.68**	1/h
CFM50 per envelope area:	**0.91**	m³/m²h
target:	**0.81**	1/h
target CFM50:	**1.1**	m³/m²h

PASSIVEHOUSE RECOMMENDATIONS

Sensible recovery efficiency:	**84.4**	%
Frequency of overheating: Cooling system is required	**17**	%

Frequency of overheating only applies if there is not a [properly sized] cooling system installed.



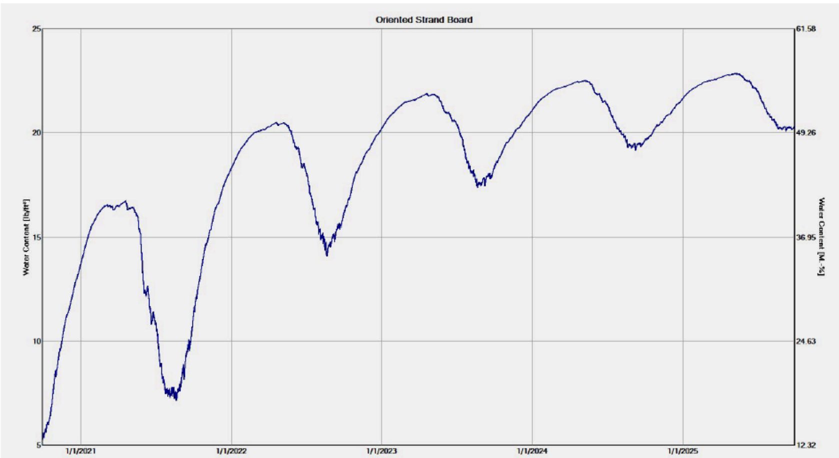
TREEHOUSE VILLAGE ECOHOUSING

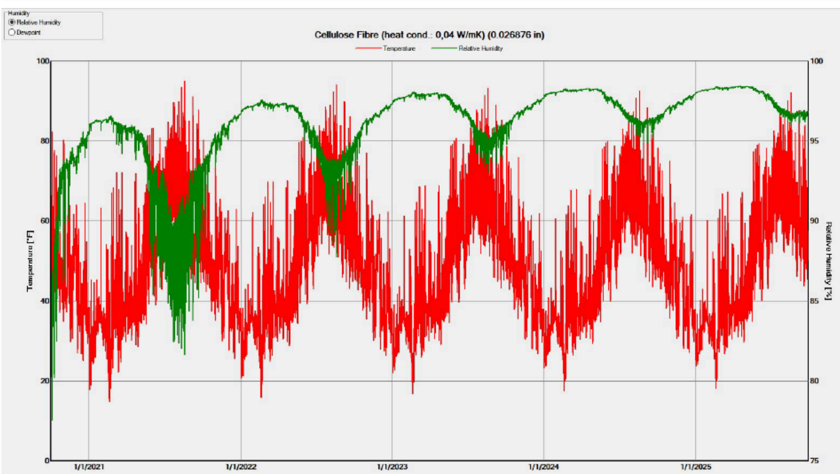
RHAD ARCHITECTS

TATE ENGINEERING

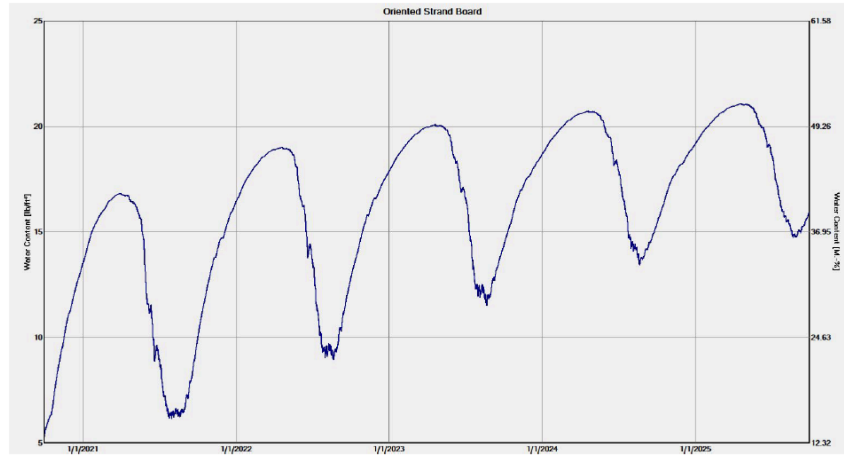
Simulation Results:

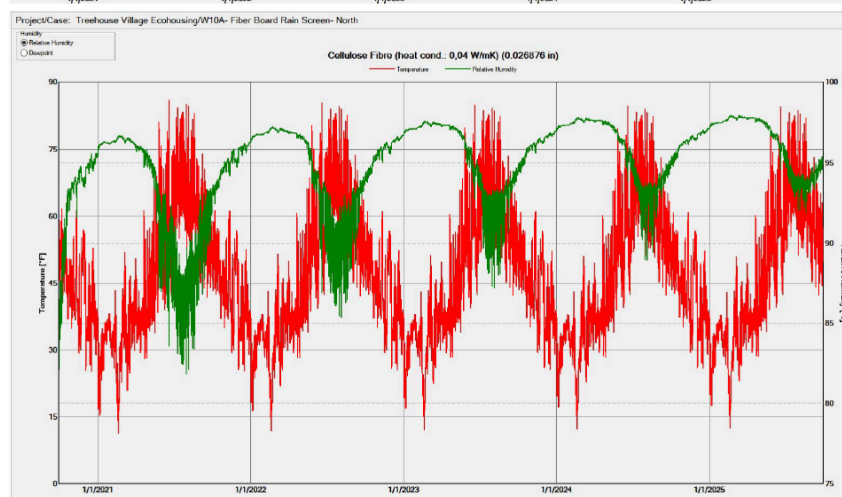
Case 1: W10A- Fiber Board Rain Screen - South facing
Does not pass.





Case 2: W10A- Fiber Board Rain Screen- North
Does not pass.



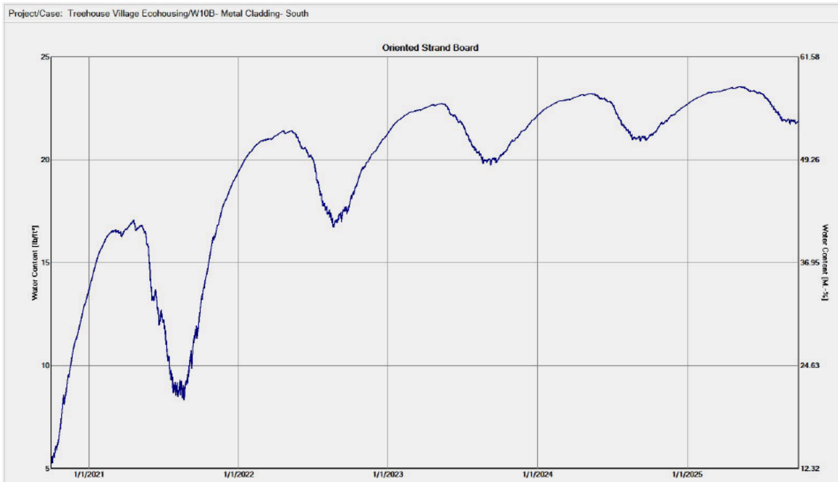


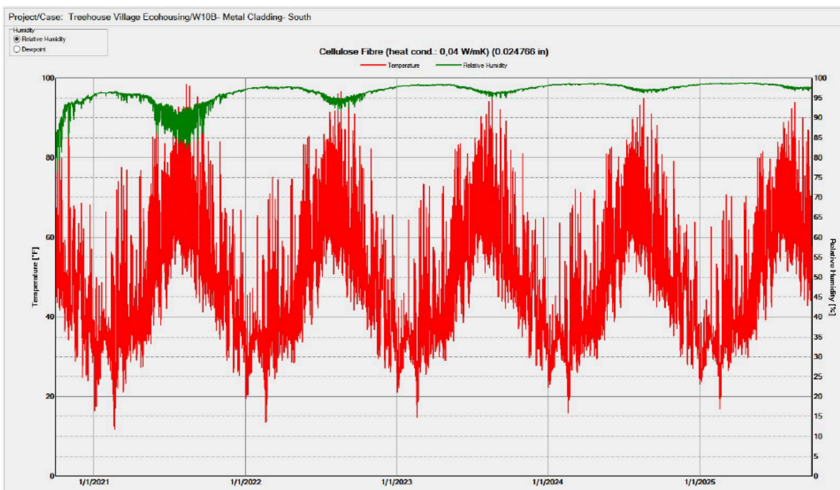
CONSTRUCTION DOCUMENTS

HYGROTHERMAL TESTING - DECEMBER 2020

Case 3: W10B- Metal Cladding- South

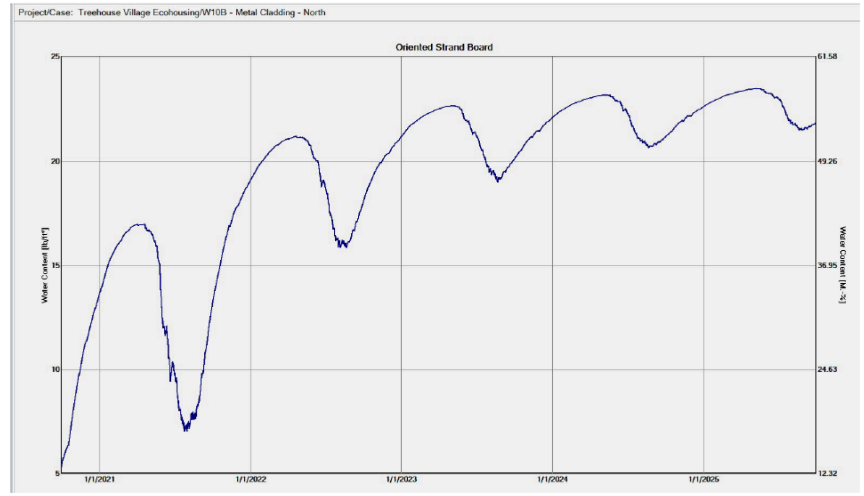
Does not pass.

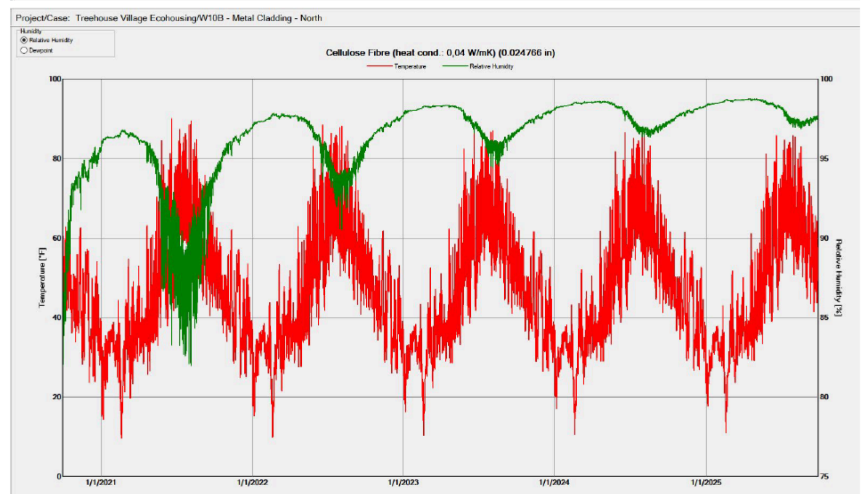




Case 4: W10B - Metal Cladding - North

Does not pass.





TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

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CONSTRUCTION DOCUMENTS

REVISED ASSEMBLIES TESTING - DECEMBER 2020

New Wall Assembly Developed As A Result Of Hygrothermal Testing To Include:

- Closed Cell Spray Foam Insulation Replacing Outboard Cellulose
- Dense Pack Cellulose Remaining Between Inboard Studs

Another Option Would Have Been To Add Rigid Foam "Out"Sulation

WUFI®Passive

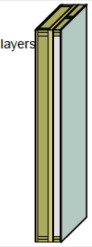
Assembly (Id.2): Typical Exterior Wall

Inhomogenous layers

Thermal resistance: 51.433 / 29.611 hr ft² °F/Btu (EN ISO 6946 / homogenous layers)

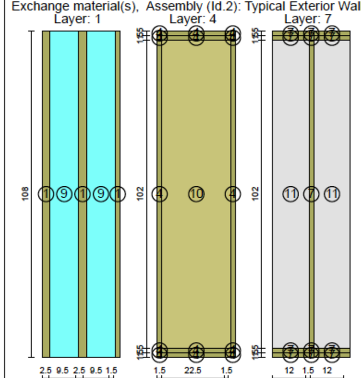
Heat transfer coefficient (U-value): 0.019 Btu/hr ft² °F

Thickness: 13.031 in



Nr.	Material/Layer (from outside to inside)	ρ [lb/ft³]	c [Btu/lb°F]	λ [Btu/hr ft °F]	Thickness [in]	Color
1	Spruce	24.97	0.45	0.0497	0.5	
2	weather resistive barrier (sd=0,1m)	8.12	0.55	1.3289	0.039	
3	OSB 3 (oriented strand board)	37.14	0.33	0.0606	0.5	
4	Spruce	24.97	0.45	0.0497	5.5	
5	Sprayed Polyurethane Foam; closed cell	2.43	0.35	0.0144	2	
6	Air Layer 10 mm	0.08	0.24	0.041	0.5	
7	Spruce	24.97	0.45	0.0497	3.5	
8	Gypsum Board (USA)	53.06	0.21	0.0942	0.492	
	Exchange materials					
9	Air Layer 10 mm	0.08	0.24	0.041	---	
10	Sprayed Polyurethane Foam; closed cell	2.43	0.35	0.0144	---	
11	Cellulose Insulation	3.43	0.61	0.0206	---	

Exchange material(s), Assembly (Id.2): Typical Exterior Wall



TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

CONSTRUCTION PROCUREMENT

CHANGE TO ICF

Due to the skyrocketing cost of wood and other building supplies, costing exercises were completed by the Construction Management team to determine if ICF was a more economical construction method for the project.

To much of the Team's surprise, it was!

In addition to the switch to ICF wall construction from wood, the floors were also swapped out for a concrete floor system.

Moving forward with the construction of the project, the Team will work through Shop Drawings to work out the details of all new ICF and concrete assemblies.

CONSTRUCTION PROCUREMENT

VALUE ENGINEERING / CONTEMPLATED CHANGES

Should in-floor heating be included in the washrooms and mud rooms?

How much PV is required now? And how much can be installed ready?

Should the development be built in phases?

Do we need a secondary water access point to loop the development's system?

Should we remove some windows?

What about mechanical cooling? What can we do now to prep for this in the future?

What if we added a second basement level to the other downhill building to work with the existing topography?

Is the ERV providing enough heat, or is supplementary heating required?

Should the Workshop be built first to act as the Construction Trailer?

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

CONSTRUCTION PROCUREMENT

ENERGY MODELING - UPDATED WITH CHANGES

PHIUS+ 2018 VERIFICATION 1

BUILDING INFORMATION

Category:	Residential
Status:	In planning
Building type:	New construction
Year of construction:	2020
Units:	6
Number of occupants:	19 (Design)
Occupant density:	363.3 ft²/Person

Boundary conditions

Climate:	SHEARWATER, NS
Internal heat gains:	1.2 Btu/hr ft²
Interior temperature:	68 °F
Overheat temperature:	77 °F

Building geometry

Enclosed volume:	83,686.7 ft³
Net-volume:	62,118 ft³
Total area envelope:	15,058.5 ft²
Area/Volume Ratio:	0.2 1/ft
Floor area:	6,902 ft²
Envelope area/iCFA:	2.182

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2018

Heating demand

specific:	4.38 kBtu/ft²yr
target:	7.4 kBtu/ft²yr
total:	30,246.2 kBtu/yr

Cooling demand

sensible:	0.52 kBtu/ft²yr
latent:	0.02 kBtu/ft²yr
specific:	0.54 kBtu/ft²yr
target:	3.6 kBtu/ft²yr
total:	3,730.28 kBtu/yr

Heating load

specific:	3.8 Btu/hr ft²
target:	5.7 Btu/hr ft²
total:	26,194.99 Btu/hr

Cooling load

specific:	1.02 Btu/hr ft²
target:	1.9 Btu/hr ft²
total:	7,050.47 Btu/hr

MORE PV WILL NEED TO BE ADDED TO MEET TARGET

FREQUENCY OF OVERHEATING CONTINUES TO DECLINE

PHIUS+ 2018 VERIFICATION 2

Source energy

total:	76,046.96 kWh/yr
specific:	4,002 kWh/Person yr
target:	3,840 kWh/Person yr
total:	259,457.38 kBtu/yr
specific:	37.6 kBtu/ft²yr

Site energy

total:	132,376.21 kBtu/yr
specific:	19.18 kBtu/ft²yr
total:	38,799.47 kWh/yr
specific:	5.62 kWh/ft²

Air tightness

ACH50:	0.6 1/hr
CFM50 per envelope area:	0.04 cfm/ft²
target:	0.87 1/hr
target CFM50:	0.06 cfm/ft²

PASSIVEHOUSE RECOMMENDATIONS

Sensible recovery efficiency:	84 %
Frequency of overheating: Cooling system is required	14.2 %

Frequency of overheating only applies if there is not a [properly sized] cooling system installed.

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

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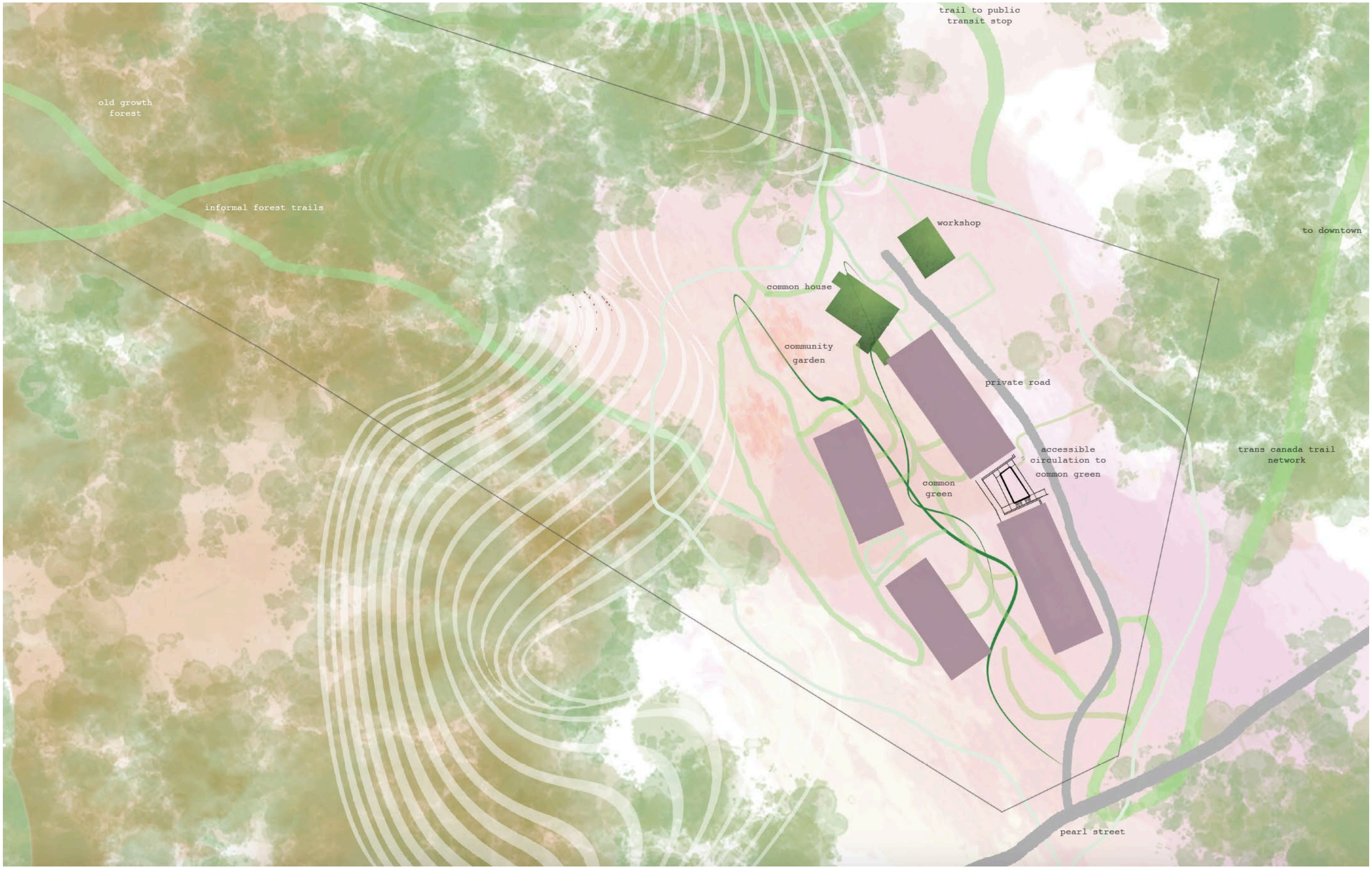
TATE ENGINEERING



TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

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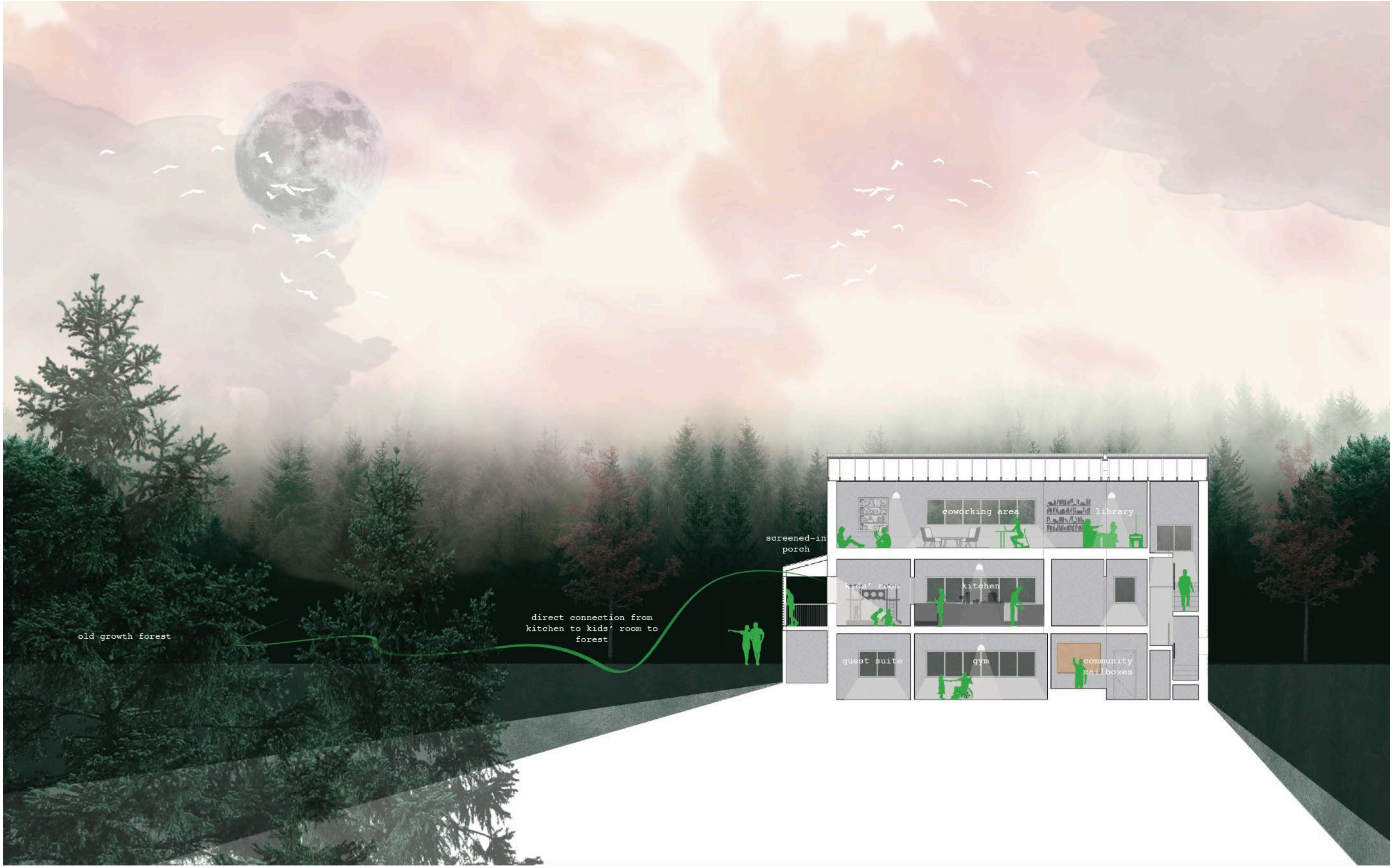
TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING



TREEHOUSE VILLAGE
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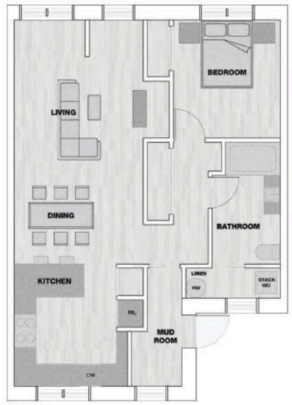
TATE
ENGINEERING

TREEHOUSE VILLAGE ECOHOUSING

RHAD ARCHITECTS

TATE ENGINEERING

upper level



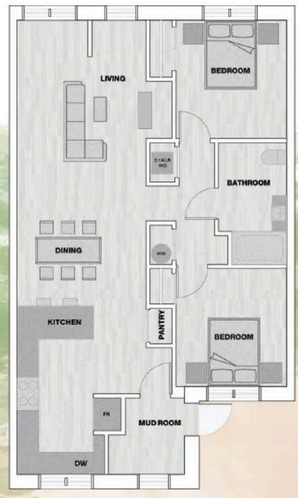
SPRUCE
1 bdrm
1 bath

MAPLE
2 bdrm
2 bath

to encourage a multi-generational demographic, a variety of units were developed including one, two, and three-bedroom suites ranging in size from approximately 55 to 115 square metres. three-bedroom units were placed on the main levels to ensure that children would have easy and direct access to the common green and forest. one and two-bedroom units are available on both the main and upper floor to allow residents to choose their location within the community.

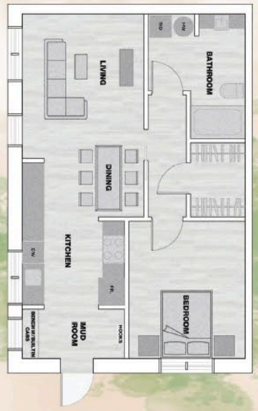
all kitchen sinks have a direct view the common green to encourage passive engagement of all community members into and across the green. all units were developed to be visitable by all, including those with disabilities, and adaptable to the changing needs of residents.

lower level



PINE
2 bdrm
1 bath

OAK
3 bdrm
2 bath



FIR
1 bdrm
1 bath

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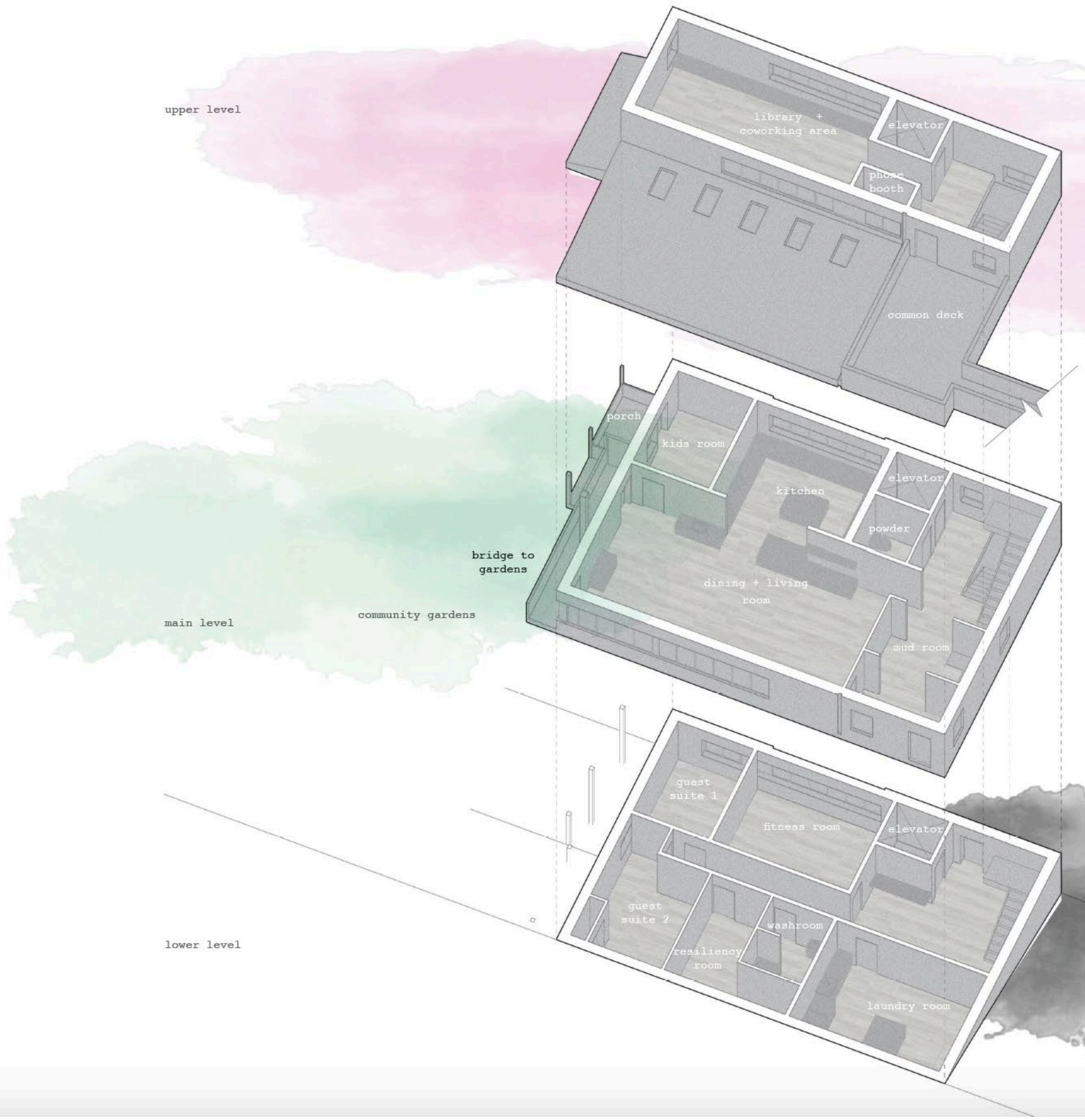

the common house is truly the central hearth of the entire cohousing development, a focal point at the end of the common green where all residents and visitors can come as they are, and share their lives and common values.

the lower level of the common house, which opens up to the private road level houses the fitness room, guest suites, and a shared laundry room in addition to the mechanical + resiliency centre which will house all of the development's renewable energy infrastructure and controls.

the main level has a wide bank of windows that act as a direct extension of the shared kitchen, dining and living room within. directly adjacent to the kitchen is the kids room. it is open to the living and kitchen areas and opens up directly onto a screen porch and bridge that leads into the untouched 14 acre forest beyond encouraging curiosity and natural play.

the upper level houses a co-working and library space to be used by those who are home-schooling or working remotely during the day and as a games night or teen hangout zone by night. the main circulation zone exits on to a common deck, overlooking the common green, and on to a bridge which leads to the upper level of the private units, making these upper units fully accessible to people living with a mobility disability.

private road

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THANK YOU!

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