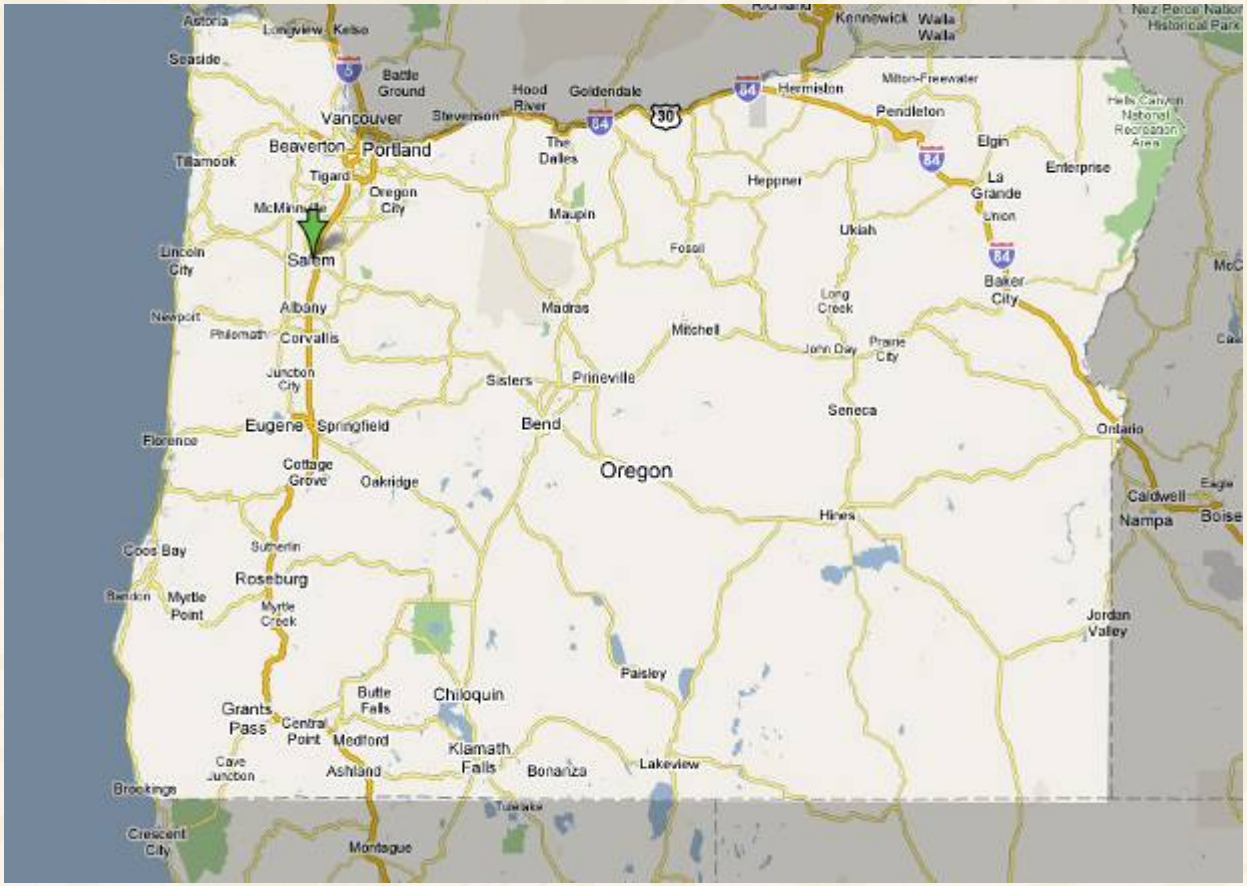
Towards A Zero-Energy Community at Pringle Creek

Green Land Development of the Year
LEED-H Platinum

James Meyer, AIA, Principal, Opsis Architecture

Pringle Creek COMMUNITY

LET'S BUILD A PLACE...



The story unfolds in Salem, Oregon.

Salem and the Fairview Area

The site: former Fairview Training Center

Master Planning

Creating The Framework

Collaborative Planning: Charette and Design Workshop

Pringle Creek builds on the Fairview Principles

Why Pringle Creek?

- **Pringle Creek is designed and programmed to be a world-class model of sustainable development - a living laboratory and place to celebrate innovation and community.**
- **Showcase Oregon's leadership role in Sustainability**
- **Communicate the social, cultural, economic and environmental benefits of SD**
- **Connect to business, institutions with workshops, classes, forums**
- **Create a community that is vibrant**
- **Every decision has been made with these goals in mind:**

Stewardship

"A **community** taking care of the land as a parent nurtures a child and protecting it for the good of all things."

Community

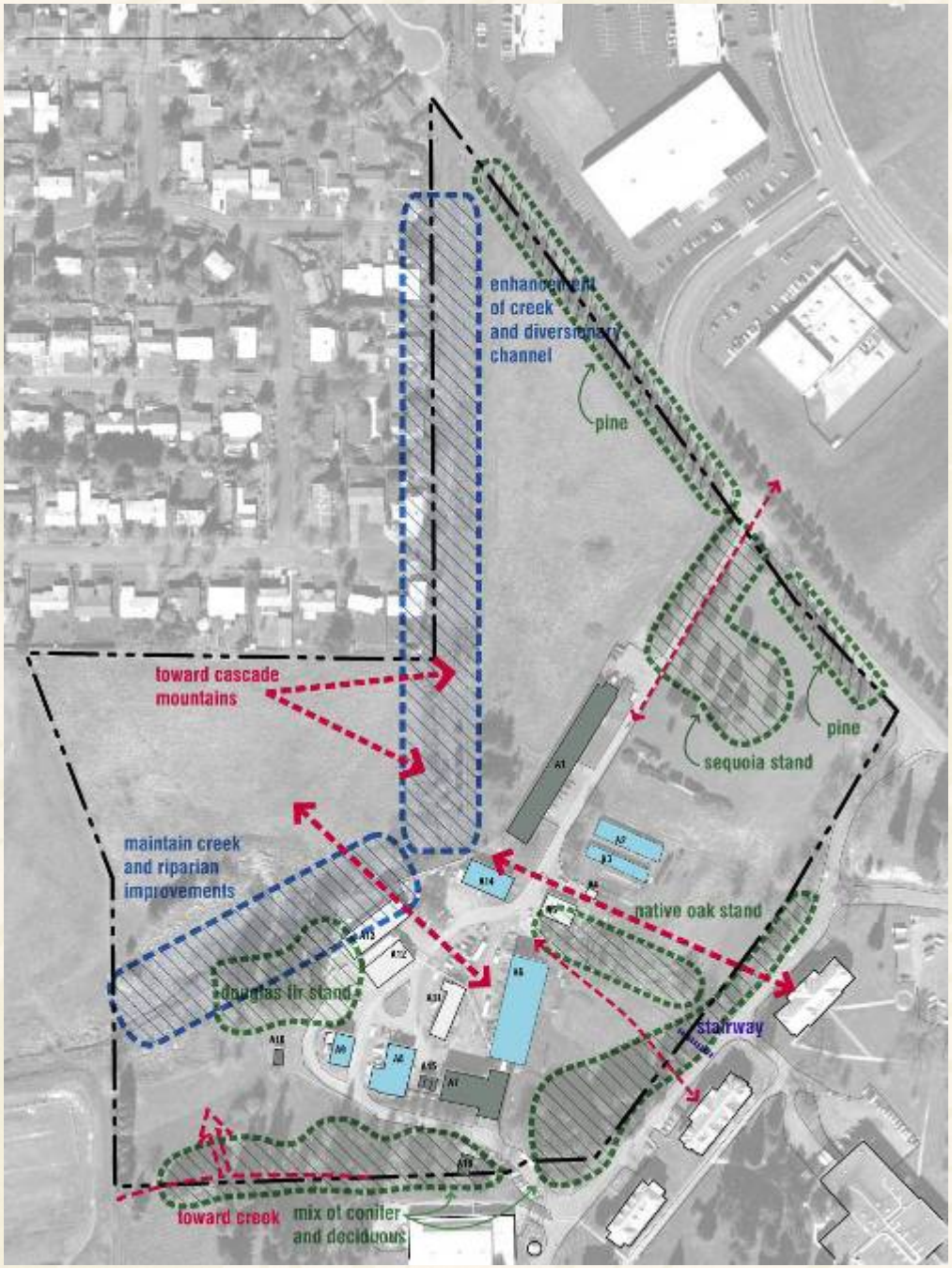
“Embracing all of Salem and its surroundings with its diversity of inhabitants by living lightly on the land.”

Recognizing the special environmental features of the property, three major goals have guided the planning of Pringle Creek Community:

- **Embrace sustainable land use principles**
- **Build ecological systems**
- **Promote smart transportation and movement principles**

Principles and standards are, by intention, performance goals to be interpreted with creativity and flexibility, not specifications to be applied narrowly and precisely.


HOUSING
TYPE SURVEY


enhancement
of creek
and diversionary
channel
pine
toward cascade
mountains
pine
sequoia stand
maintain creek
and riparian
improvements
native oak stand
douglas fir stand
stairway
toward creek
mix of conifer
and deciduous

Community Master Planning Principles

LAND USE

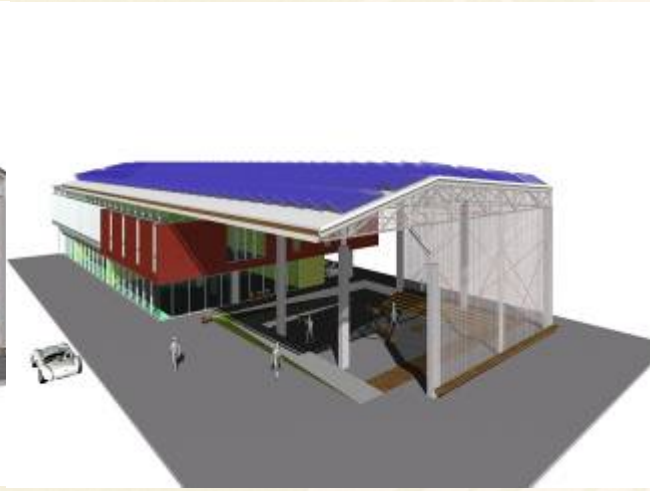
1. **Encourage Economic and Social Diversity**
2. **Create a Village Center**
3. **Reuse and Retrofit Existing Buildings and Landscapes**
4. **Create Local Employment**
5. **Build Efficiencies by Building Green**

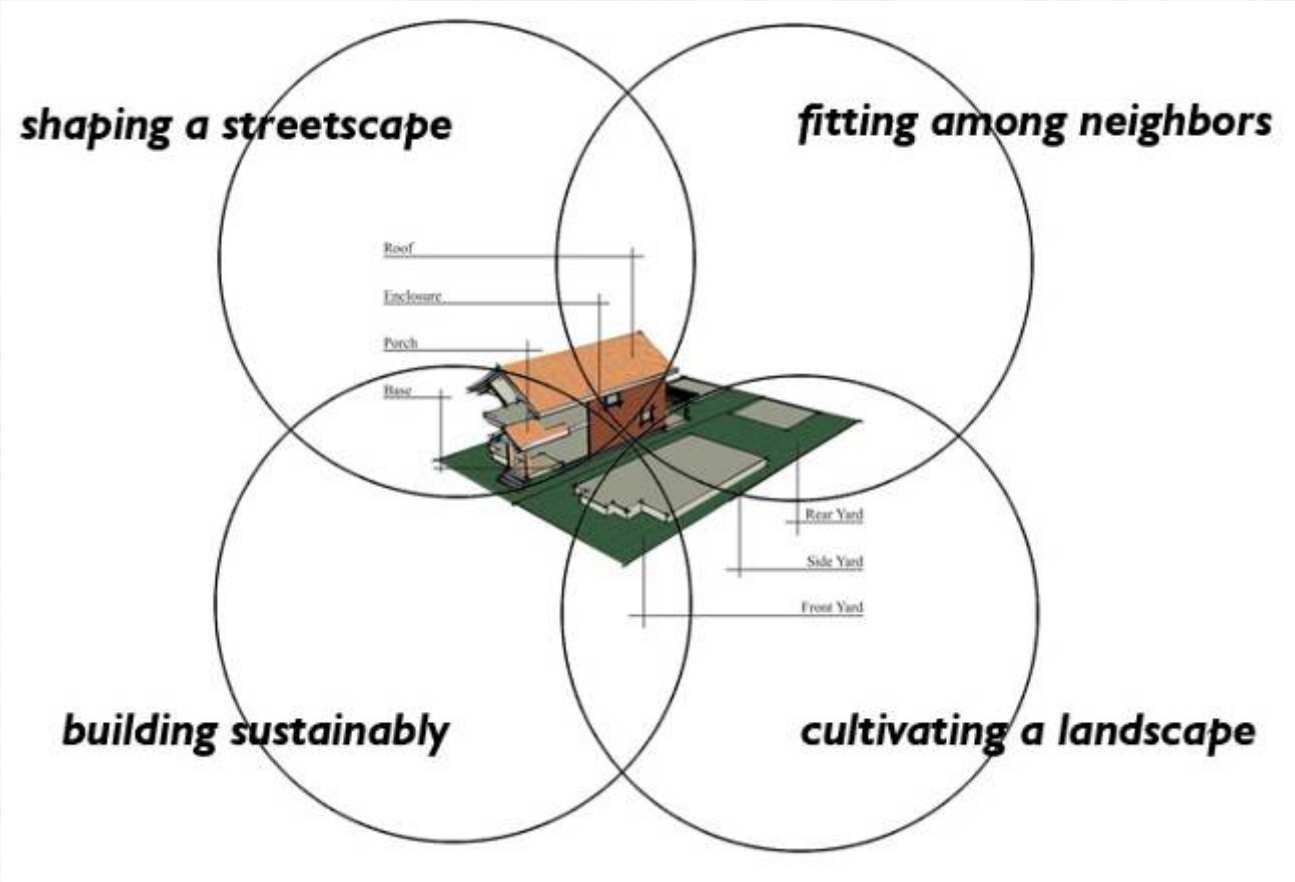
Community Master Planning Principles

ECOLOGICAL and Movement SYSTEMS

6. **Respect the landscape**
7. **Eliminate impact to the regional watershed**
8. **Layer the system**
9. **Close the cycle of energy and material flows**
10. **Use green corridors for people and living things**
11. **Eliminate impact to the regional watershed**

Final Village Center Concept





Residential Design

Environmentally honest, healthy, and most of all, sustainable.

Residential Planning Principles

A. A Community of Diverse Households
B. A Lively Community-based Public Domain
C. A Robust Natural Landscape
D. A Simple Architectural Vocabulary
E. Neighborly Buildings and Yards
F. Sustainable Site Planning, Design and Construction

Household Types → Dwelling Types

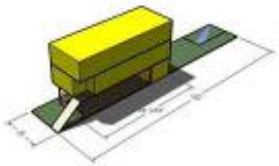
larger

smaller

more expensive

less expensive

LIVE-WORK STUDIO (upper unit)



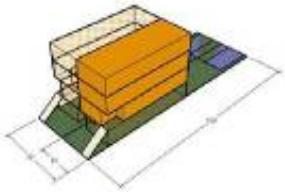
PRINCIPAL (UPPER) UNIT

Two storey, two bedroom dwelling stacked above lower unit. Longitudinal walls are shared with adjacent units allowing light and ventilation along the two short sides. Vertical stratification of private and public activities. Single parking space provided at rear of lot. Private outdoor space accessed via at-grade public space with access to rear garden and parking garage.

1500 *FLOOR AREA* *PARCEL AREA* **1100**

2 *BEDROOMS* *TOTAL UNITS* **6**

16FT STACKED TOWNHOUSE (upper unit)



PRINCIPAL (UPPER) UNIT

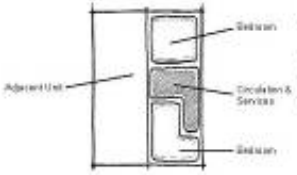
Three storey, four bedroom dwelling stacked above wider lower unit. Longitudinal walls are shared with adjacent units allowing light and ventilation along the two short sides. Vertical stratification of private and public activities. Single parking space provided at rear of lot. Private outdoor space accessed via dining room with access to rear garden and parking garage.

2100 *FLOOR AREA* *PARCEL AREA* **1000**

4 *BEDROOMS*

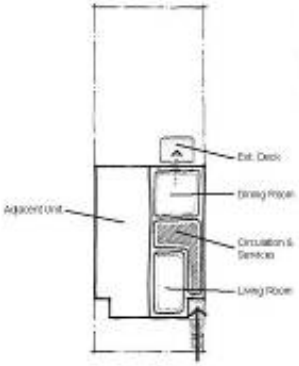
4TH LEVEL - PRIVATE FLOOR

"Dumbbell" organization with private (bedroom) spaces subdivided by the circulation and service functions. Each room is the full 16' width of the home and can act as a bedroom, office, library, den or study. These spaces can potentially access an outdoor terrace.



3RD LEVEL - PRIVATE FLOOR

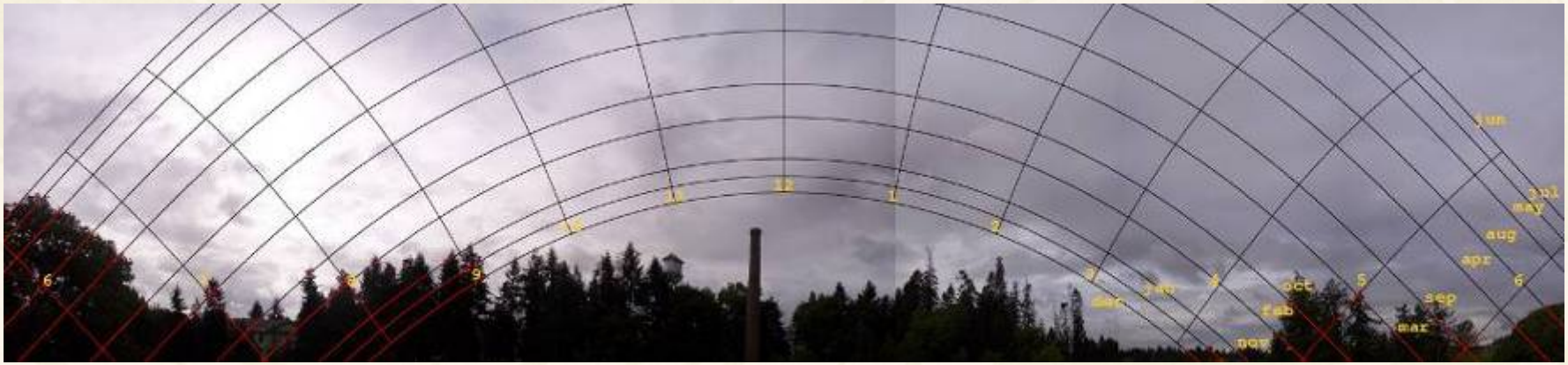
"Dumbbell" organization with private (bedroom) spaces subdivided by the circulation and service functions. Each room is the full 16' width of the home and act as a bedroom office, library, den or study.



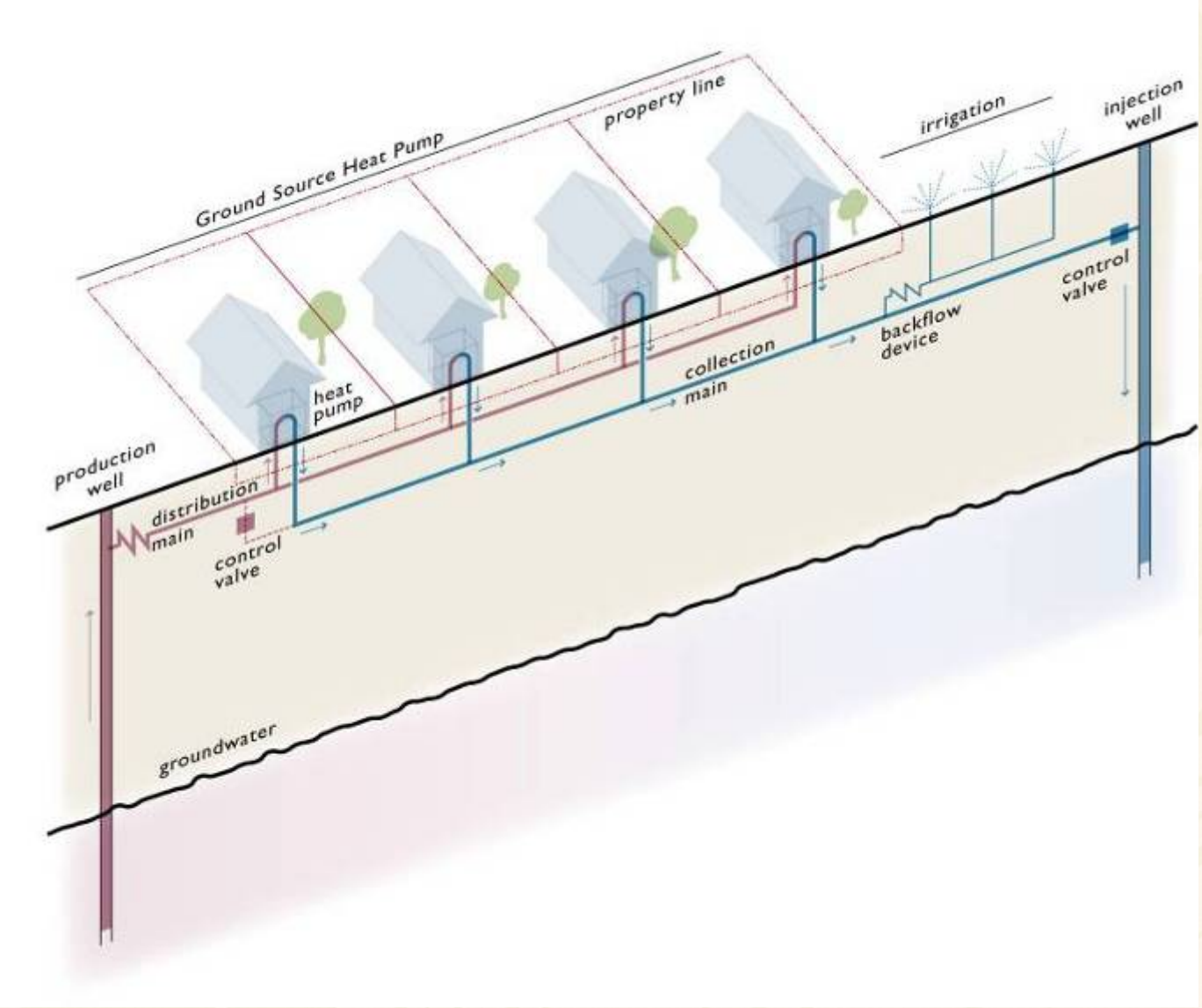
ENTRY (2ND) LEVEL - PUBLIC FLOOR

"Dumbbell" organization with public (kitchen, living, dining) spaces subdivided by the circulation and service functions. Access to the backyard is via the outdoor deck located at the rear of the dwelling.

Sun Angle Calculations



Geothermal System Diagram



Solar Analysis & Geothermal Potential

Dwelling Types And Their Distribution

1. DETACHED TYPES
    a. Small Lot Single Family
    b. Carbon Neutral
    c. Coach Lane
    d. Cottage Courtyard
    e. Treehouse

2. ATTACHED
    a. Tandem duplex
    b. Side-by-side duplex
    c. Rowhouse
    d. Stacked townhouse

3. MIXED USE
    a. Loft Living Studios
    b. Boiler Building

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MASTER PLAN FRAMEWORK: Principal streets and slopes

CREEKSIDE STREET
Characterized by a diversity of house types and densities of the freestanding variety appropriate to the fragile riparian edge and creating a "creekside picturesque" dwelling environment.
Dwelling types: SMALL FREESTANDING, TANDEM DUPLEX, SIDE-SIDE DUPLEX, COACH/LANE HOUSE

A- STREET
"High" street into Pringle with high-density, street-oriented house types that create define a well defined street wall.
Dwelling types: ROWHOUSE, STACKED TOWNHOUSE, TANDEM DUPLEX, SIDE-SIDE DUPLEX, SMALL LOT SINGLE FAMILY, LOFT LIVING STUDIOS

SOUTH-FACING SLOPES
Primary location for house types that incorporate solar design strategies.
Dwelling types: CARBON NEUTRAL FREESTANDING, COTTAGE COURTYARD UNITS

NORTH-FACING SLOPES
Mews area diversity of freestanding house types closely spaced in order to create an intimate pedestrian environment.
Dwelling types: COTTAGE COURTYARD UNITS, TREE-HOUSE, TANDEM DUPLEX, SIDE-SIDE DUPLEX

FAIRVIEW-SIDE STREETS
Has a diversity of house types grouped into clusters creating multi-unit freestanding buildings sharing the visual qualities of Fairview's Crescent buildings within view.
Dwelling types: ROWHOUSE, STACKED TOWNHOUSE, TANDEM DUPLEX, SIDE-SIDE DUPLEX, SMALL LOT SINGLE FAMILY, LOFT LIVING STUDIOS

MASTER PLAN FRAMEWORK: Special dwelling areas

STRONG ROAD
Dwelling units whose scale, street-facing front doors and porches command a presence along Strong Road.

GATEWAY BUILDINGS
Dwelling units whose scale, street-facing front doors and porches command a presence along Strong Road and the Main Street of Pringle Creek.

"WORKING VILLAGE"
An area composed of Loft Living Studios located within a "weaver" like streetscape.

DOUBLE FRONTING LOTS
Require dwelling types that address both frontages equally. This is to be done using architectural elements (i.e. porches, windows, etc.) and/or dwelling type (i.e. Coach/Lane House).

COTTAGE COURTYARD DEVELOPMENTS
Are located on irregularly shaped lots through the Pringle Creek Community. They include shared courtyard, access easements, and shared parking

VILLAGE CENTER
A mix of uses that support Pringle Creek Community goals of stewardship of the environment and bringing people together.

MASTER PLAN FRAMEWORK: Public Open Spaces

AREA PLANS

The following pages illustrate site planning principles in each of the 8 areas enumerated at right. Each site plan highlights significant dwelling types, landscape elements, shared amenities and access requirements. Dwellings in some areas may have access to geothermal energy sources (as noted).

LEGEND

- Common Area- Children's Play Park
- Street Parking
- Community Gardens
- Walkway
- Existing Tree
- Pathway

AREA 1: DOUBLE FRONTING LOTS

*Geothermal Potential

LANDSCAPE ELEMENTS: Fences, hedges, etc. shall be sited and designed to define the interface of public and private space and direct a neighborly face to the street.

CORNER BUILDING: Corner dwellings shall be sited and designed to direct a neighborly public face toward both streets.

FRONT DOORS & ACCESS: Entries and porches shall be sited and designed to direct a neighborly face to the street.

DWELLING TYPE: Coach/Lane homes located above garages to be accessed via "E" Street.

COMMON AREA PARKING: At grade parking shall be located at rear of lot via [illegible]

DWELLING TYPE: Mixed-use, ground oriented commercial, Loft Living Studios and Rowhouses types shall be sited and designed to direct a lively and neighborly public face to the street.

AREA 2: SOUTH FACING SLOPES

FRONT DOORS & ACCESS: Entries and porches shall be sited and designed to direct a neighborly face to the street.

CORNER BUILDING: Corner dwellings shall be sited and designed to direct a neighborly public face toward both streets.

DWELLING TYPE: Carbon Neutral Cottage Courtyard Units

SOLAR ACCESS & VIEWS: All homes shall be designed to capture long views, fit slope, capture solar gain and provide a private courtyard.

AREA 4: NORTH FACING SLOPES

*Geothermal Potential

FRONT DOORS & ACCESS: Entries and porches shall be sited and designed to direct a neighborly face to the street.

LANDSCAPE ELEMENTS: Fences, hedges, etc. shall be sited and designed to define the interface of public and private space and direct a neighborly face to the street.

REGENERATED BUILDING: Caption

DWELLING TYPE: Cottage Courtyard Units with common internal courtyard .

CORNER BUILDING: Corner dwellings shall be sited and designed to direct a neighborly public face toward both streets.

COMMON AREA PARKING: At grade shared parking structures.

DWELLING TYPE: Compact footprint, vertically oriented Townhome dwelling units.

AREA 5: WORKING VILLAGE

*Geothermal Potential

LANDSCAPE ELEMENTS: Fences, hedges, etc. shall be sited and designed to define the interface of public and private space and direct a neighborly face to the street.

DWELLING TYPE: Mixed-use, ground oriented commercial, Loft Living Studios and Rowhouses types shall be sited and designed to direct a lively and neighborly public face to the street.

CORNER BUILDING: Corner dwellings shall be sited and designed to direct a neighborly public face toward both streets.

REGENERATED BUILDING: Caption

DWELLING TYPE: Loft Living Studios shall be sited and designed to direct a lively and neighborly public face to "woonerf"-like street.

FRONT DOORS & ACCESS: Entries and porches shall be sited and designed to direct a neighborly face to the street.

COMMON AREA PARKING: At grade parking shall be located at rear of lots, along alleys.

AREA 6: GREENHOUSE GARDENS

*Geothermal Potential

FRONT DOORS & ACCESS: Entries and porches shall be sited and designed to direct a neighborly face to the street.

LANDSCAPE ELEMENTS: Fences, hedges, etc. shall be sited and designed to define the interface of public and private spaces and direct a neighborly face to the street.

COMMON AREA PARKING: At grade parking shall be located at rear of lots, along alleys.

DWELLING TYPE: Mixed-use, ground oriented commercial, Loft Living Studios and Rowhouses types shall be sited and designed to direct a lively and neighborly public face to the street.

CORNER BUILDING: Corner dwellings shall be sited and designed to direct a neighborly public face toward both streets.

REGENERATED BUILDING: Caption

NEW BUILDING: Caption

AREA 7: SEQUOIA GROVE

COMMON AREA PARKING: At grade parking shall be located at rear of lots, along alleys.

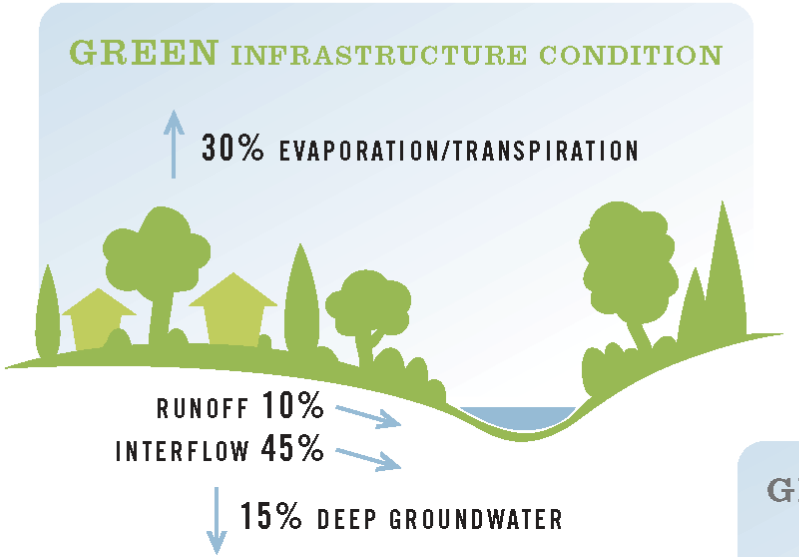
FRONT DOORS & ACCESS: Entries and porches shall be sited and designed to direct a neighborly face to the street.

LANDSCAPE ELEMENTS: Fences, hedges, etc. shall be sited and designed to define the interface of public and private spaces and direct a neighborly face to the street.

DWELLING TYPE: Mixed-use, ground oriented commercial, Loft Living Studios and Rowhouses types shall be sited and designed to direct a lively and neighborly public face to the street.

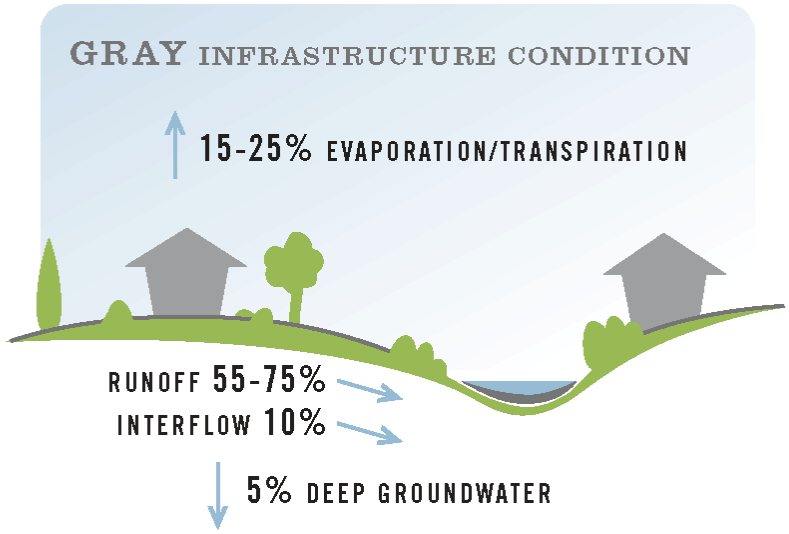
CORNER BUILDING: Corner dwellings shall be sited and designed to direct a neighborly public face toward both streets.

Green Streets



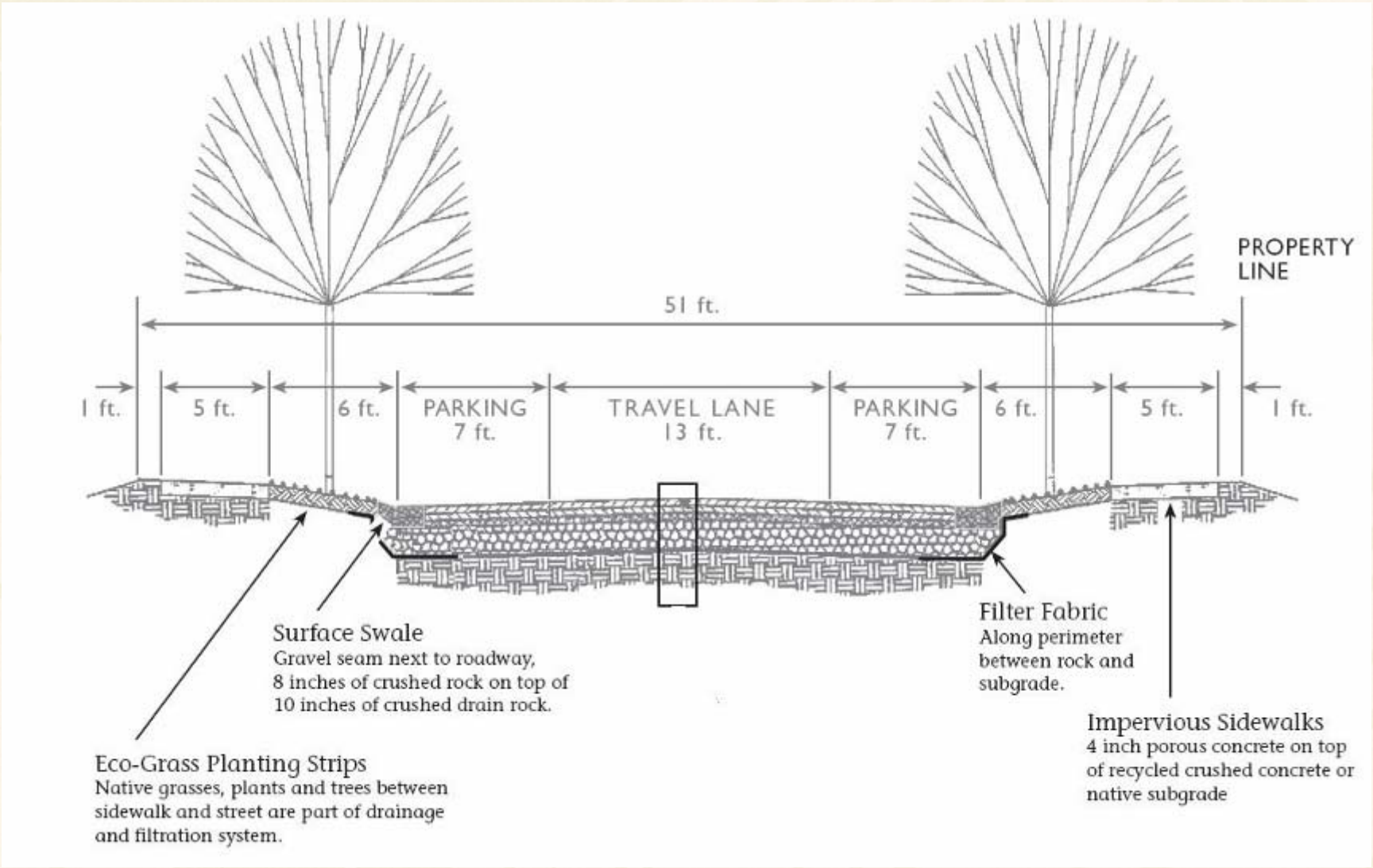
"When one tugs at a single thing in **NATURE**, he finds it attached to the rest of the world."

JOHN MUIR



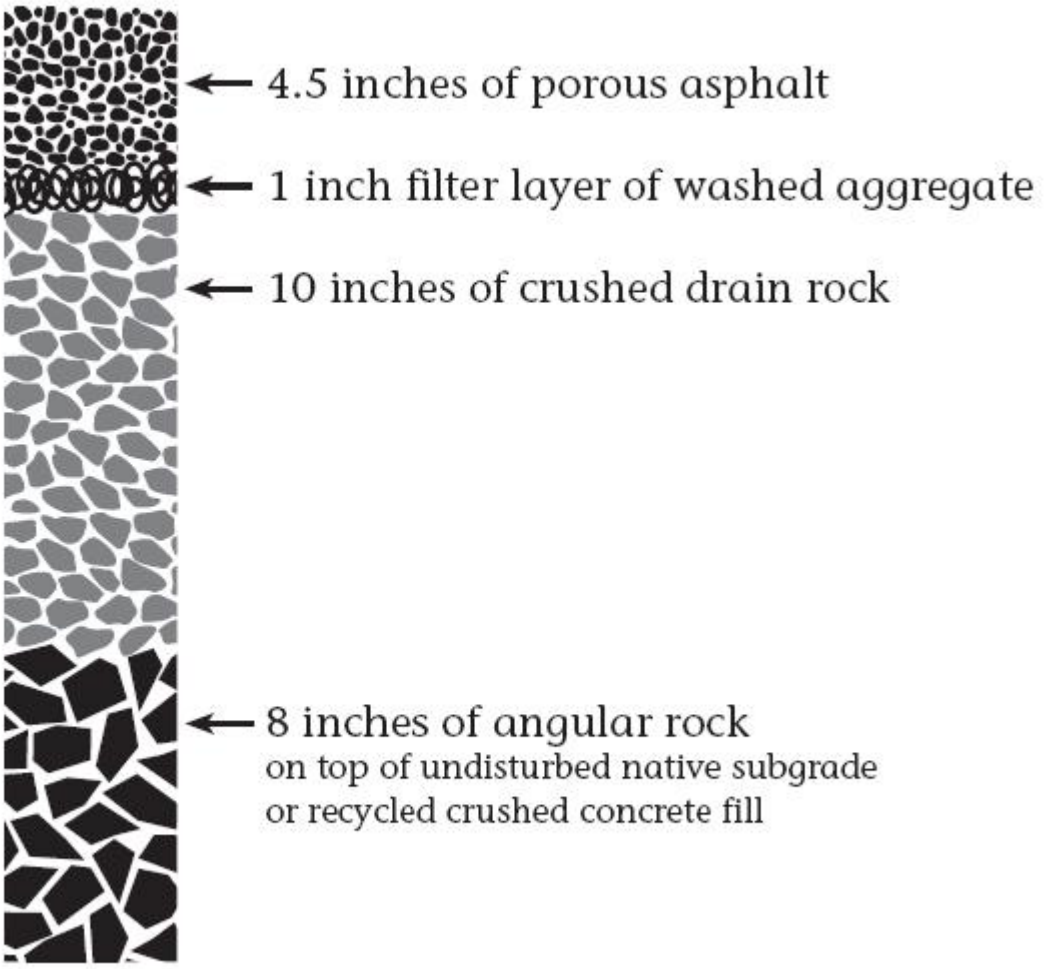
SOURCE: LANDFOOD.UBC.CA/SXD

Green Streets



Green Streets

Porous Street Section:



Green Streets

Green Streets

Green Streets

Green Streets

Green Streets

Green Streets

Pervious Main Street at Entry

Impervious Pavement Meets Pervious Pavement

Impervious Pavement Meets Pervious Pavement

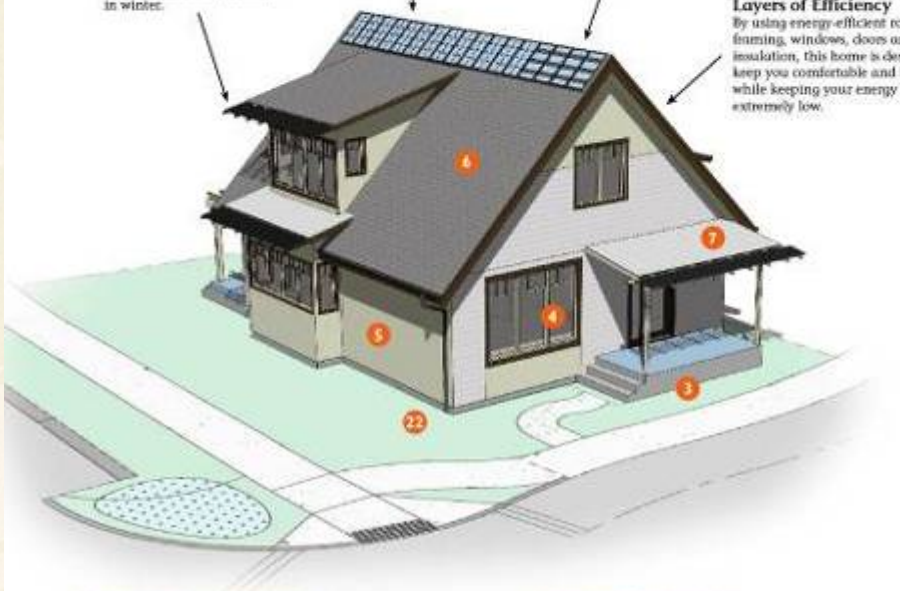
GREEN FEATURES OF COTTAGE HOME

Solar Screens
Built on south facing exposures, screens provide shade on window exteriors in summer, and allow sunlight and solar warmth in winter.

Solar Electric
Photovoltaic (PV) panels generate electricity year-round. Power generated but not used is sold back to utility company.

Solar Water
Panels pre-heat water before sending to water heater.

Layers of Efficiency
By using energy-efficient roofing, framing, windows, doors and insulation, this home is designed to keep you comfortable and healthy, while keeping your energy bills extremely low.



EXTERIOR CONTRUCTION:

1 Exterior wall and roof framing uses advanced framing techniques with engineered lumber and FSC-certified* lumber to allow more insulation and reduce the need of extraneous framing lumber without compromising the structural integrity of the house
2 High performance exterior envelope insulation at roof and walls uses a combination of formaldehyde free spray-foam insulation, blown cellulose, and rigid polyisocyanurate insulation
3 Foundation: 30% fly-ash concrete mix
4 Windows: Jeld-Wen EnergyStar™ Low-E glass
Low maintenance aluminum clad exterior on wood
U value = .32 (Code requirement: U = .40)
Locally sourced and manufactured in Bend
18% window to wall area
5 Siding: Pre-primed Hardi-Plank™ cement fiber lap siding
6 Roofing: Elk Composition,Cool Color series (reflectance of .27)
7 Metal Roofing: Locally sourced, high recycled content, Cool Color series, 50 year life
8 Low-VOC** paint on exterior surfaces

*FSC: Forestry Stewardship Council
An international, non-profit organization committed to the conservation, protection and restoration of the world's working forests

**VOC: Volatile Organic Compounds
Materials made with Low-VOC's have almost no harmful off-gases

INTERIOR MATERIALS:

9 Flooring: Locally-sourced Madrone hardwood floors with low-VOC** natural finish. Carpeting is 100% Wool (No-VOC)
10 No-VOC paint in the interior
11 Cabinets: Formaldyhyde-free cabinetry with Beech doors and water-based, low-VOC finish
12 Greenguard-certified Natural Quartz solid surface countertops and mantel

ENERGY & RESOURCE SYSTEMS:

13 Geothermal: Water-to-Air, High Efficiency Heat Pump
14 Zoned Energy Recovery Ventilator: Fresh air and heat recovery
15 Solar Water Pre-Heating: 40 tube thermomax system
16 Solar Electric System: 2kW Photovoltaic
17 Compact Florescent Lamps (CFLs) in all lighting fixtures
18 EnergyStar™ Appliances (kitchen, laundry, electronics)
19 Dual Flush Toilets: 1.6/.9 gallons per flush (gpf)
20 Shower Heads: 1.6 gallons per minute (gpm)
21 Kitchen Faucet: 1.0 gpm Vanity Faucet: 1.5 gpm
22 Native drought tolerant plants and limited lawn irrigated with a drip irrigation system. Optional Rainwater Harvesting collects water run-off from roofs and stores in cisterns to irrigate landscaping in the dry season. Plantings also reduce need for herbicides.

Cottage House

1. **Maximize the thermal performance of the exterior walls and the roof in order to minimize the heat loss of the house.**

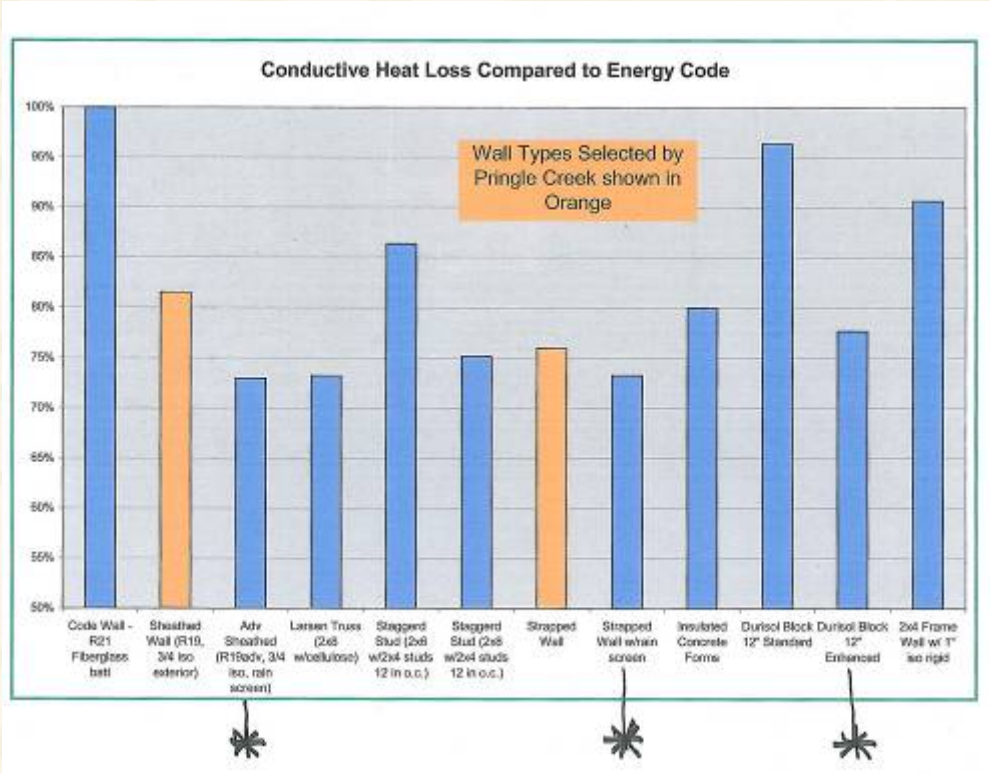
2. **Efficiently plan and orient the house to minimize heat gain, reduce size, and maximize daylight and ventilation.**

3. **Indoor Air Quality + healthy materials: All materials were sourced for the natural characteristics and environmentally benign qualities.**

4. **Selecting a third party monitoring system that will self regulate to increase performance in the future.**

Cottage House

- **Energy Efficiency**
  - **Small footprint**
  - **High performance exterior envelope**
  - **EnergyStar® appliances**
  - **Energy recovery ventilation system**
  - **2050 watt solar electric array**
- **Energy Footprint: 35% that of a typical home**



Summary Information

SolR 39 Pringle Cottage Final.xls

General Information

Project	Cottage
Location	Pringle Creek
City	Salem
Date	10/2/2006
Weather File	Salem
Tdesign	18.0 F

Design Inputs

Occupants	2	
T indoor	68	F
T setback	60	F
DHW Temp	120	F
CDD Base	65	F
Ventilation	150	cfm
ERV Effic	70%	
Electricity	0.085	$/kWh
Gas	1.30	$/therm

Solar Inputs

PV Array	2,060	watts
DC to AC	80%	
TSRF	98%	from sunchart
DHW	50	gpd
ST Area	40	ft2
ST to DHW	100%	
ST Efficiency	40%	
Passive	40%	

House Summary

Total Heated	1340	ft2
Wall Area	1825	ft2
Window Area	348	ft2
Door Area	63	ft2
Net Wall Area	1415	ft2
Below Grade	282	ft2
Crawl	0	ft2
Slab/Basement	141	ft
Attic	0	ft2
Vault	995	ft2
Window:Floor	25.8%	
Roof:Floor	74%	
Wall:Floor	136%	
Uo	0.097	Btu/hr-ft2-F
UAo	302	Btu/F

Design Summary

MMBtu? TRUE

Design	18,642	Btuh
Intl. Gain	2,013	Btuh
Tbp	59.7	F
HDD	3,200	at Tbp
Infil+Vent	0.33	ACH
Heating	8.0	MMBtu
Cooling	0.2	MMBtu
Water Heating	1.4	MMBtu
Lights & App	14.5	MMBtu
Solar Electric	(7.6)	MMBtu
TOTAL	16.4	MMBtu

Gas	32.1	Therms/yr
Electricity	3,864	kwh/yr
Energy Cost	$ 370	per year

Monthly Energy

warning: cooling not very accurate

	HEATING		COOLING	DHW	H axis ?	EQUIPMENT			SOLAR ENERGY EQUIPMENT			
	Ground Source Heat Pun		DX Cooling	HPWH	GFX ?				Passive	Active	SDHW	PV
	Electric	Gas	Electric	Electric	Gas	Lights	Plug	Gas	Passive	Active	SDHW	PV
January	1,622	-	-	309	-	318	683	267	-	-	(283)	(198)
February	1,171	-	-	189	-	293	683	267	-	-	(384)	(361)
March	1,148	-	-	147	-	262	683	267	-	-	(598)	(566)
April	748	-	-	61	-	229	683	267	-	-	(730)	(752)
May	292	-	20	17	-	201	683	267	-	-	(881)	(971)
June	-	-	39	-	-	187	683	267	-	-	(886)	(975)
July	-	-	74	-	-	193	683	267	-	-	(892)	(975)
August	-	-	66	-	-	218	683	267	-	-	(872)	(971)
September	-	-	38	10	-	250	683	267	-	-	(807)	(752)
October	470	-	8	100	-	283	683	267	-	-	(566)	(566)
November	1,051	-	-	213	-	311	683	267	-	-	(304)	(361)
December	1,456	-	-	324	-	325	683	267	-	-	(236)	(196)
TOTAL (kBtu)	7,960	-	245	1,369	-	3,072	8,194	3,209	-	-	(7,438)	(7,647)
TOTAL (kwh)	2,331	-	72	401	-	900	2,400	940	-	-	(2,179)	(2,240)
		GFX	FALSE	H-axis CW	TRUE				FALSE	FALSE	TRUE	TRUE

Gross Energy

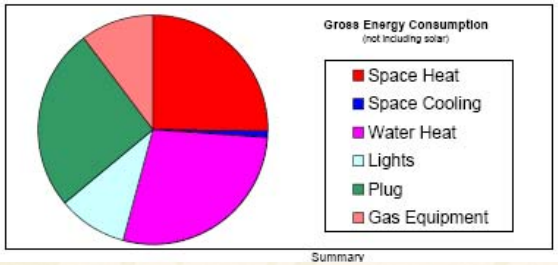
	therms Gas	kwh Electric	kwh Total
Space Heat	-	2,331	2,331
Space Cooling		72	72
Water Heat	-	2,580	2,580
Lights		900	900
Plug		2,400	2,400
Gas Equipment	32.1		940
Total	32.1	8,282	5,222

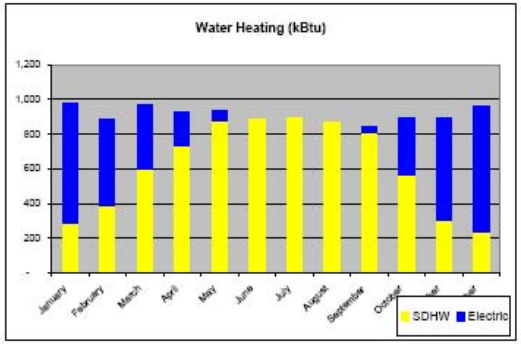
Solar Contribution

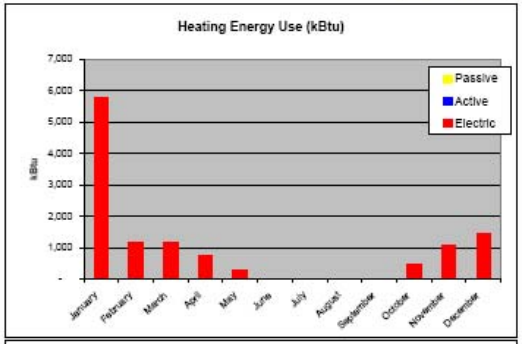
	kwh Load	kwh Solar	kwh Net	kwh SSF
Space Heating (offset by passive and active)	2,331	-	2,331	0%
Water Heating (offsett by SDHW)	3,204	2,179	1,025	68%
Cooling, Lights and Plug (offset by PV)	3,371	2,240	1,131	66%
Gas Equipment	940	-	940	0%
Total Energy	9,847	4,419	5,428	45%

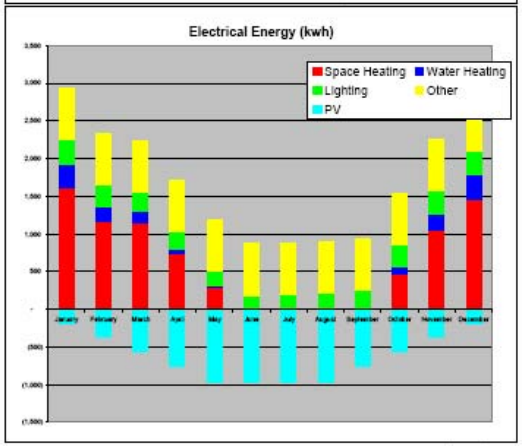
Net Energy

	Electricity		Gas	
Net Energy	3,864	kwh	32.1	therms
Cost	$ 328	per year	$ 42	per year









Demonstration of Building Materials

Cottage House

- **LEED ™ – H Platinum Certified**
  - **Maximized thermal performance**
  - **Efficient floorplan and orientation**
  - **Exceptional indoor air quality and healthy materials selection**
  - **Third party monitoring system for future performance**

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  - **Small footprint**
  - **High performance exterior envelope**
  - **EnergyStar® appliances**
  - **Energy recovery ventilation system**
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Cottage House

- Environmentally Sensitive Design
  - Open floorplan
  - High ceilings
  - Long views
  - Extensive daylighting
- Environmentally Sensitive Materials
  - Concrete mix with 30% fly ash
  - EnergyStar® windows with low-E glass
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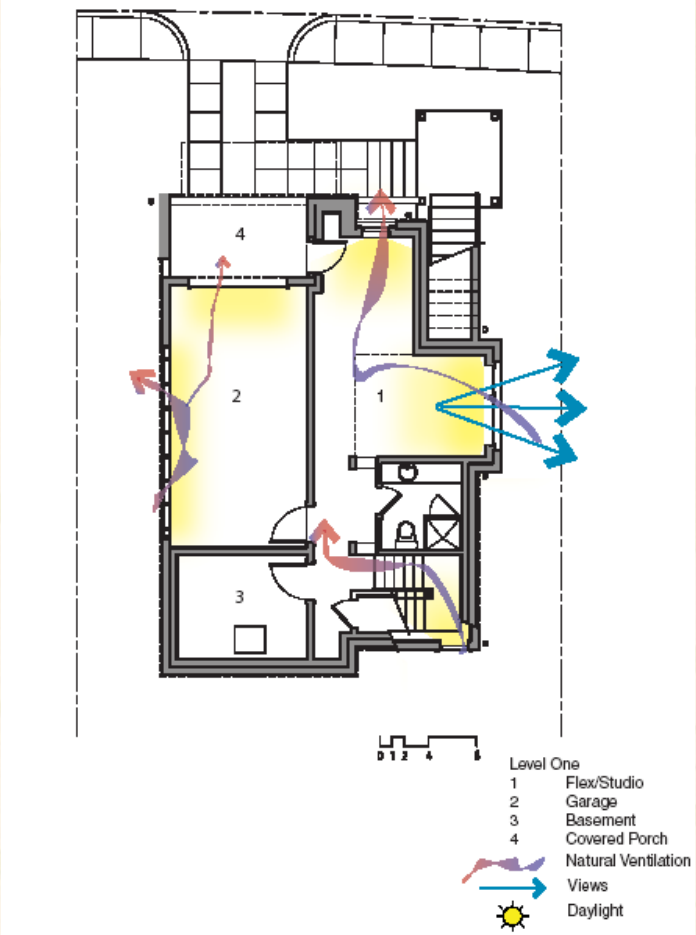
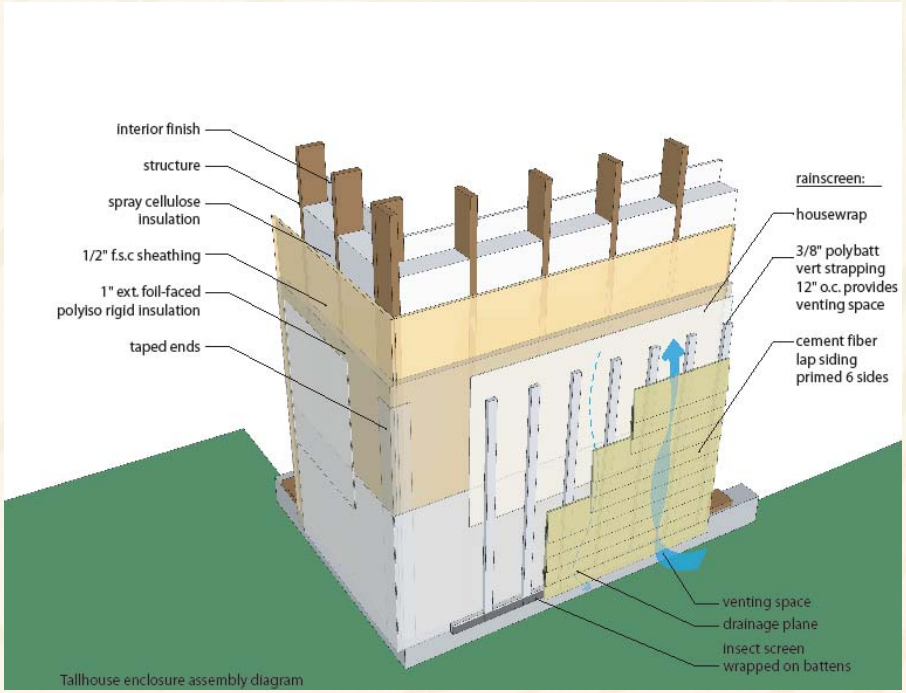


Tallhouse

- **Environmentally Sensitive Design**
  - **Ambient Daylighting in Major Spaces**
  - **Exterior Sunshading Reduces Unwanted Summer Heat Gain**
  - **Sun angles were evaluated to design overhangs that allow ideal amounts of light into the home**

Tallhouse

- **Environmentally Sensitive Design**
  - **Rainscreen sided exterior sheathed in a radiant barrier of foil-faced rigid insulation minimizes heat loss and gain**



Tallhouse

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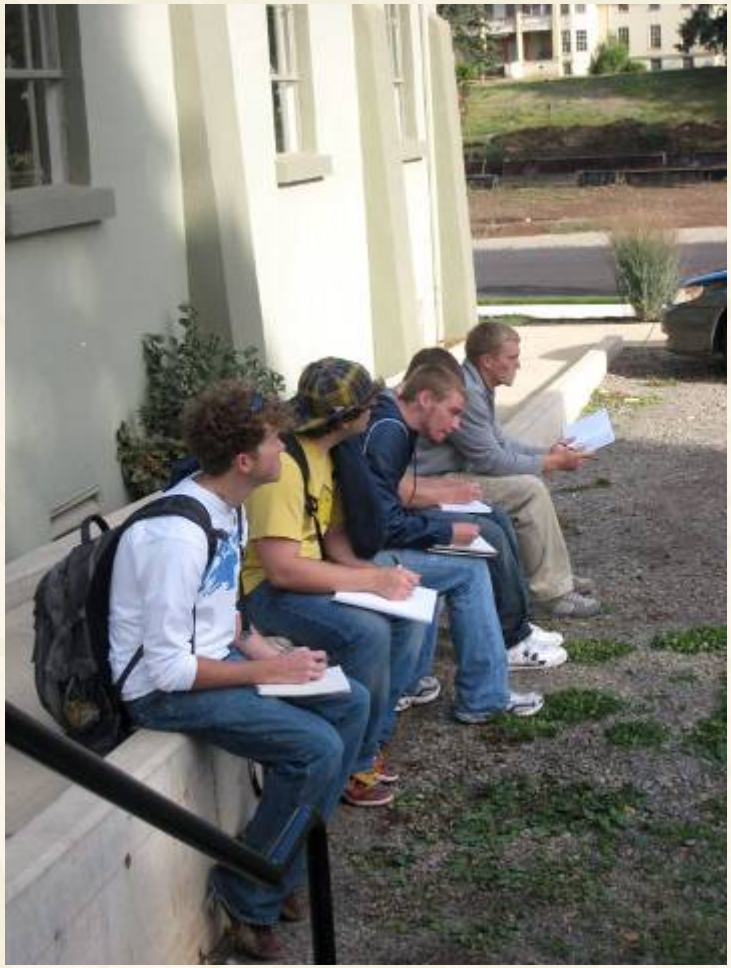
Pringle Creek Community is exploring every sustainable avenue in one living laboratory: from locally grown food to working with pubic schools on the science of nutrition; from rainwater management to green construction; from alternative energy to zero-energy, from urban forestry to community governance

Pringle Creek: A Living Laboratory



Pringle Creek: A Living Laboratory

Together we are defining stewardship or our culture, community, citizens through education…

“Building Sustainable Communities – Opening the Door for Partnerships”

pringlecreekcommunity.com

opsisarch.com