



alaska center for
APPROPRIATE TECHNOLOGY



One Housing Authorities Journey
to a More Sustainable Future

Presented by

Dan Duame,
AHA Executive Director

AHA Prototype Projects Team

Acknowledgments:



Reina, LLC / Arctic Sun, LLC

- Thorsten Chlupp, President; Builder / Designer
- Karl Kassel, Gen. Mgr., Arctic Sun, LLC
- Nathan Stumpff, Project Mgrs: Certified PV & Solar Installer

Earth Dwell, Ltd. / RMH Design

- Bly Windstorm, Builder / Designer
- Robert, Horner, Architect

- Ed Paulus, Director,
AHA Construction Dept.



Lauri Strauss, President, CEO
AIA, LEED AP BD+C

21903 42nd Place W
Mountlake Terrace, WA 98043
907.317.5040
lauri@design2LAST.com
www.design2LAST.com
LBC Certification



AHA – Past & Present

Doing **great work** all
across our region

but


Can we do **even** better?

Performance
& Cost?



AHA' s Mission:

“The mission of the Aleutian Housing Authority, working in partnership with member tribes, is to contribute to the **building of healthy, stable communities** throughout the Aleutian/Pribilof region by being the **primary provider of quality, affordable housing** and housing related support services; expanding and **improving community infrastructure**; and being a **major generator of opportunities for employment and economic development.**”



AHA Core Values

Commitment

Teamwork

Communications

Integrity

Accountability

Partnership

Innovation

We are committed to excellence. We are active in our communities. As an organization, we are committed to our staff in the belief that working at the company must be stimulating and enjoyable. We live up to our commitments – we do what we say we are going to do.

We believe our mission can be accomplished only through the collective efforts of our Board, staff, essential partners and program participants. We will listen and be respectful to each team member, the Board of Commissioners, essential partners and program participants, for their contributions to the team; mutual respect is the foundation of our success.

We believe that active, open and honest communication within our organization and between our organization and to those we serve or deal with is essential to our success.

We act honestly and ethically in all aspects of our business – doing the right thing – not the easy thing. We understand that our individual actions are the essence of our reputation and respect as a service organization. We do not allow business situations or personal relationships to compromise or weaken our policies or standards for integrity.

We are responsible and answerable to each other, those we serve and those who have entrusted us with resources to carry out our mission.

We strive to continually build and maintain strong partnerships with our clients, tribes, communities and business partners.

We are always seeking continuous improvement. We are never afraid to question the status quo.

AHA - Looking to the Future



Innovation

We are always seeking continuous
improvement. We are never afraid
to question the status quo.

**LIVING
ALEUTIAN
HOME
DESIGN
COMPETITION**



QUESTION?

Why a Competition

► Overall Strategy:

“Mine” for ideas from a broad international base of expertise rather than a single architect or firm



What is there to lose?

May find out we are doing about as well as we can.

Competition Objectives:

- ▶ Increase performance
 - Highest Performing, healthiest low-income affordable home currently being built;
- ▶ Decrease cost
- ▶ Produce replicable design/model

Competition Partner:

Cascadia GBC



- Cascadia Green Building Council :
 - One of three original chapters of the U.S. Green Building Council;
 - Only international chapter in North America.
 - Covers Oregon, Washington, British Columbia, Alaska, Idaho and Montana.
- Cascadia's mission is: "... to lead a transformation toward a built environment that is socially just, culturally rich and ecologically restorative."

→ (www.cascadiagbc.org)

COMPETITION DESIGN STANDARD: LBC 2.0



- LBC is a philosophy, advocacy tool and certification program that addresses development at all scales.
- **Seven (7) performance areas (“Petals”):** Site, Water (Net zero), Energy (Net zero), Health, Materials, Equity and Beauty.
- Purpose is straightforward – it defines the most advanced measure of sustainability in the built environment possible today and acts to diminish the gap between current limits and ideal solutions. Whether your project is a single building, a park, a college campus or even a complete neighborhood community, Living Building Challenge provides a framework for design, construction and the symbiotic relationship between people and all aspects of the built environment.
- Certification based on 12-month documented performance; not modeling / point system

COMPETITION RESULTS



Number of Initial Entries & Countries

Country	# of Entries	Country	# of Entries	Country	# of Entries
Argentina	1	Spain	11	Netherlands	3
Austria	1	France	3	New Zealand	2
Australia	1	Great Britain	9	Poland	4
Bosnia	1	Hong Kong	17	Portugal	1
Barbados	1	Hungary	2	Russia	1
Canada	13	Italy	9	USA	91
China	2	Japan	1	South Africa	1
Germany	8	Korea	6		
Denmark	2	Mexico	1		

Total number of Entries: 192

THE WINNERS



BY TALLER ABIERTO:

JULIO RODRIGUEZ PAREJA
IGNACIO ROMAN SANTIAGO
DANIEL MARTINEZ DIAZ



Competition Summary

We learned a lot ...but ...

One Step Backwards –

Two Steps Forward:

Process evolved into two on-going prototype projects:

Octagon Model

Stabilized-insulated Rammed Earth Model

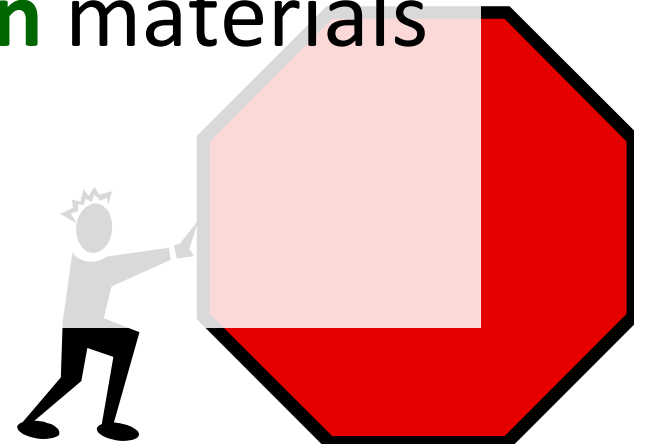
Attempting to combine LBC w/ Passive House Construction & Certification



Model 1: Octagon (Sand Point)

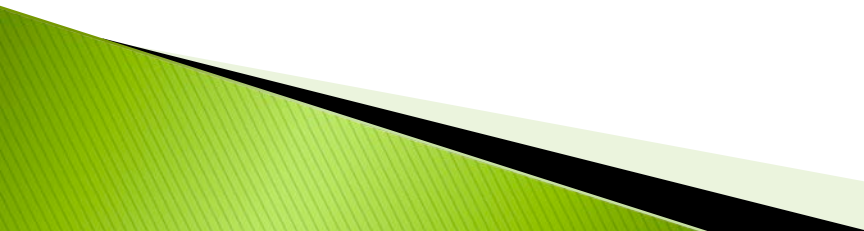
► Design goals

- LBC & Passive House certification
- Maximum use of renewables
- Maximum use of **green** materials
 - LBC “**Red List**”




Model 1: Octagon (Sand Point)

Design Results:

- LBC Petal recognition (6 of 7; Water excluded)
 - Passive House certification
 - Net-zero energy (grid tied, but no sell-back)
 - R-values; (60 – foundation, walls & roof)
 - Walls
- 

Model 1: Octagon (Sand Point)

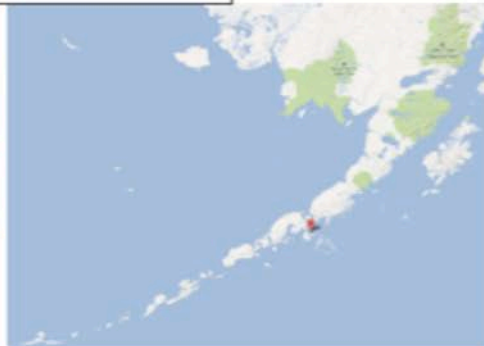
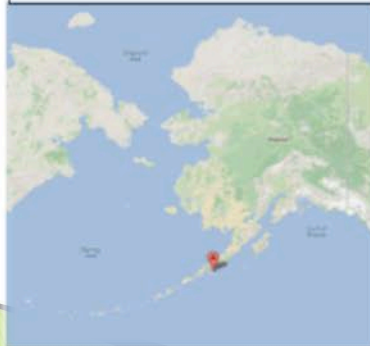
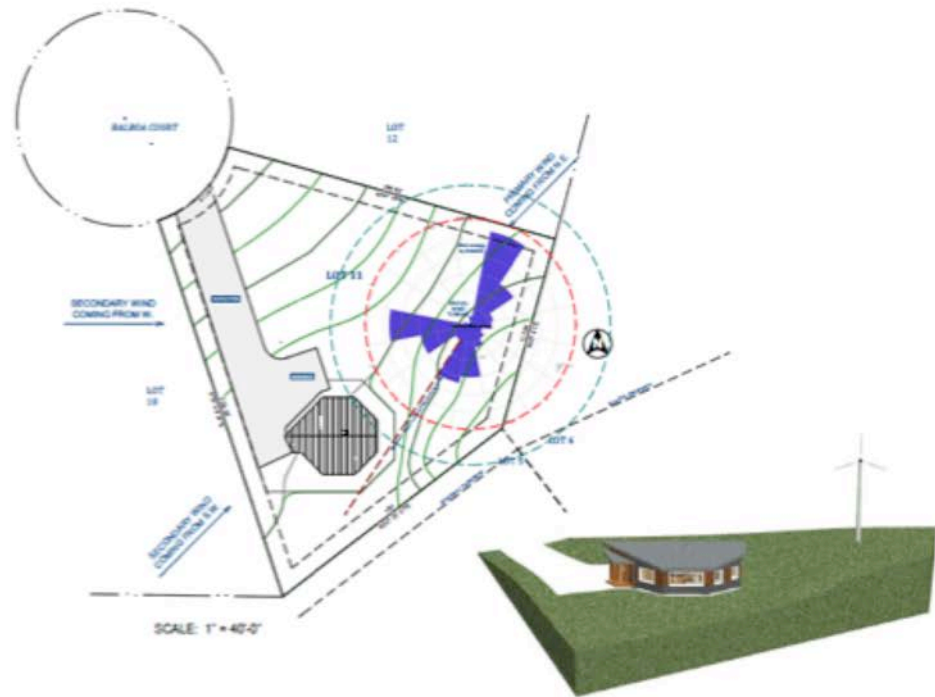
Design Results:

- Foundation system: metal studs & spray foam
 - Wall Framing / thickness = 18" (2x4 structural wall w/ rock wool insulation & exterior sheeting)
 - Heating & domestic H/W: Wind generator (Ventura Vt-10Kw); 1000 gal water storage tank; Novus 300 HRV system; on-demand H/W "booster"
 - LED Lighting
 - Fiberglass, insulated windows / doors
- 

Living Aleutian Home Design - Sand Point

DRAWING INDEX

SHEET	TITLE
G1.1	TITLE SHEET, DRAWING INDEX, CODE DATA
G1.2	LEGEND, ABBREVIATIONS & GENERAL NOTES
C1	SITE PLAN
A1	FLOOR PLAN
A2	ROOF PLAN
A3	ELEVATIONS
A4	BUILDING SECTIONS
A5.1	CONSTRUCTION DETAILS
A5.2	CONSTRUCTION DETAILS
A6.1	ENLARGED KITCHEN PLAN w/INTERIOR ELEVATIONS
A6.2	ENLARGED BATHROOM PLAN w/INTERIOR ELEVATIONS
A7	SCHEDULES & ARCHITECTURAL SPECIFICATIONS
A8	INTERIOR RENDERINGS
M1	PLUMBING PLAN
M2	HRV PLAN
M3	MECHANICAL PLAN
E1	LIGHTING PLAN
E2	ELECTRICAL SERVICES PLAN AND DETAILS
S1	GENERAL STRUCTURAL NOTES
S2	FOUNDATION & FLOOR FRAMING PLAN
S3	ROOF, PORCH & LOFT FRAMING PLAN
S4	BUILDING SECTION
S5	STRUCTURAL DETAILS
S6	STRUCTURAL DETAILS STORAGE TANK



Living Aleutian Home Design - Sand Point

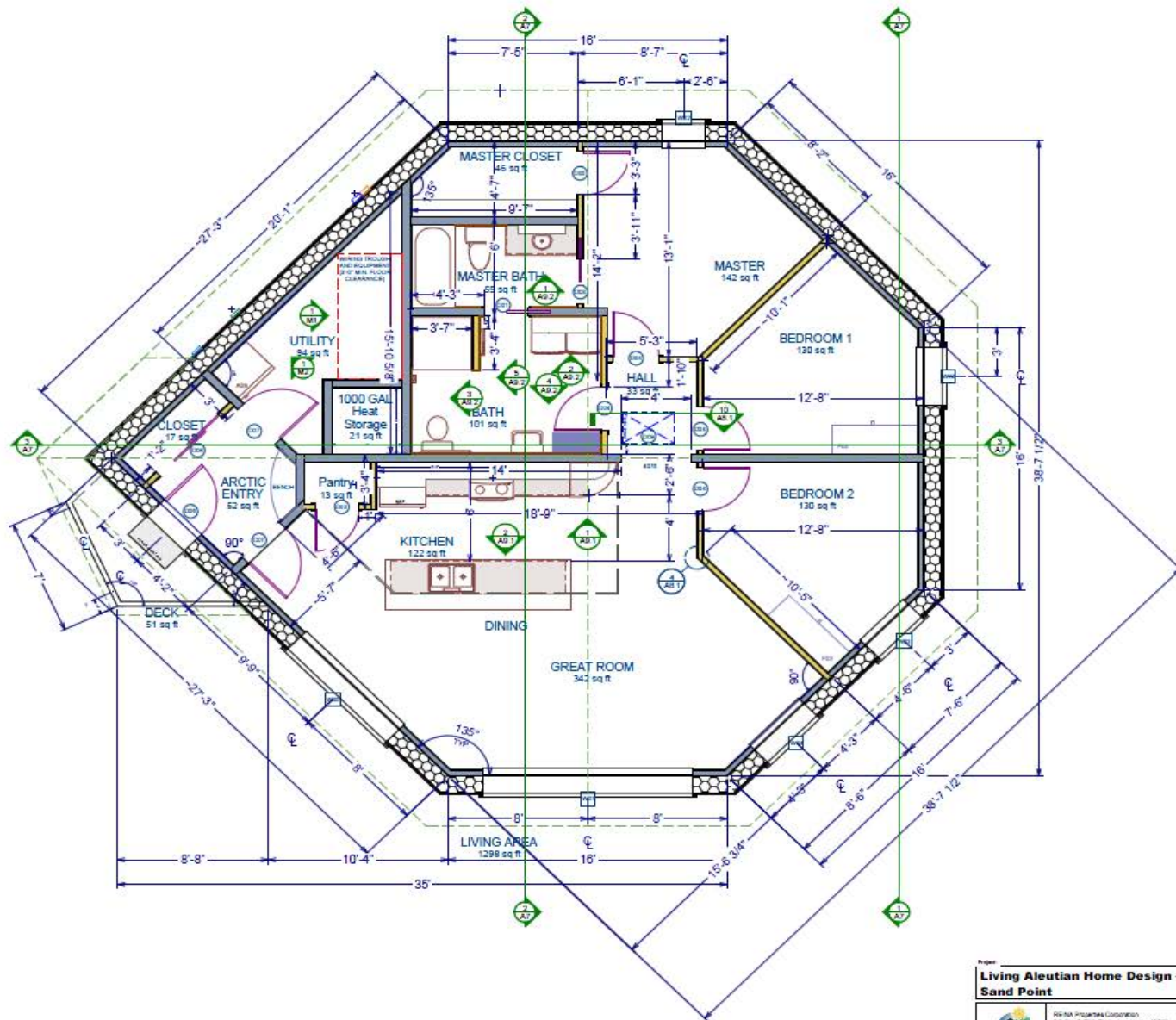
REINA

DESIGNER: THOMAS CHAPPEL

Scale: 1/4" = 1'-0"

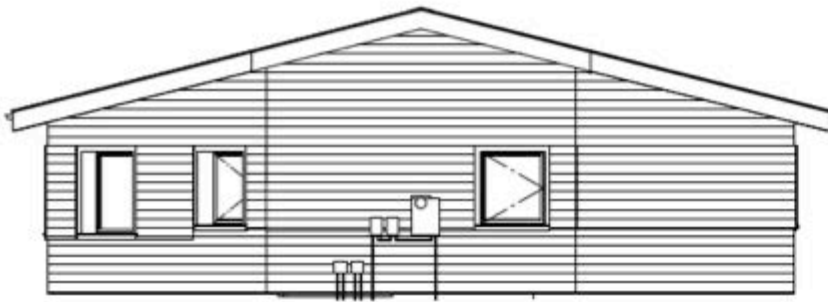
Date: 04/18/2013

G1.1



FLOOR PLAN

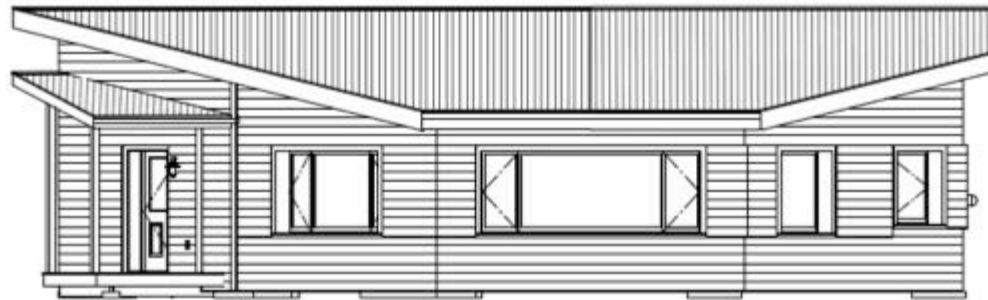
Project: Living Aleutian Home Design - Sand Point	
	REINA Properties Corporation PO Box 341066, Fairbanks, Alaska 99734 Phone: 907-457-1200 Fax: 907-457-0560 Email: info@reina-properties.com
	Design by: Thomas Chapp Scale: 1/4" = 1'-0" Date: 04/16/2013
	A1



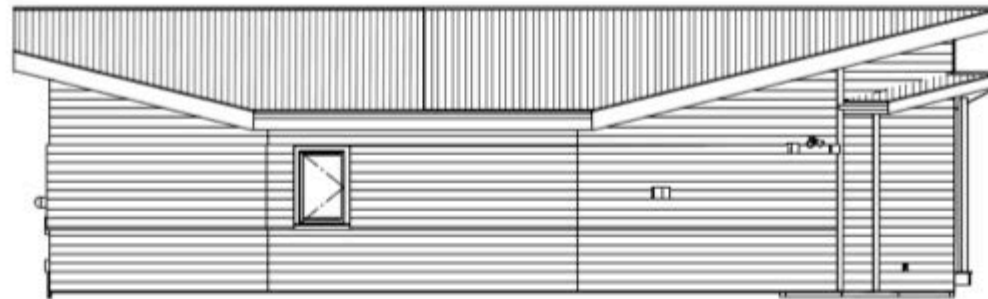
EAST ELEVATION



WEST ELEVATION



SOUTH ELEVATION

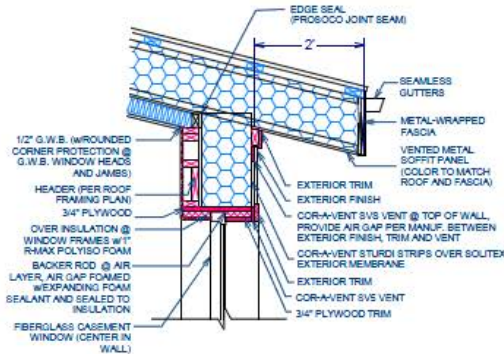


NORTH ELEVATION

Project: Living Aleutian Home Design - Sand Point	
	REINA Properties LLC 10100 10th Avenue, Suite 101 Anchorage, AK 99507 Tel: 907.457.1107 Email: info@reina-properties.com
Design by: Thomas Group Scale: 1/4" = 1'-0" Date: 04/18/2013	Sheet: A3

R-60 ROOF
HOT ROOF VENTED
3:12 SLOPE
CONSTRUCTION AS FOLLOWS:

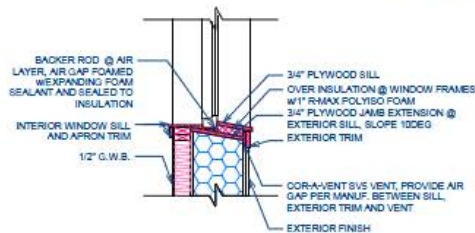
- METAL ROOFING
- 2x4 STUDS LAYED FLAT TO PROVIDE AIRSPACE @ 24" O.C.
- ROOFING MEMBRANE (SOLITEX MENTO PLUS)
- 1 1/2" R-48 SOI 50-2.0 ROOF FRAMING w/12" INSULATION (ROXUL)
- 1/2" CDX PLYWOOD w/LIQUID V.B. (PROSOCCO R-GUARD FAST FLASH)
- 2x4 CEILING FRAMING w/R-11 BATT INSULATION
- 5/8" G.W.B.



NOTES:
1) ALL WINDOWS: 100% FLASH (PROSOCCO R-GUARD FAST FLASH)

1 TYP. WINDOW HEAD

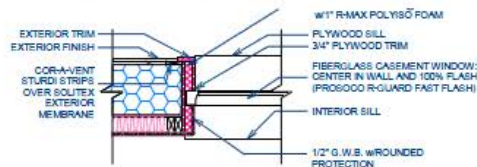
SCALE: 3/4" = 1'-0"



NOTES:
1) ALL WINDOWS: 100% FLASH (PROSOCCO R-GUARD FAST FLASH)

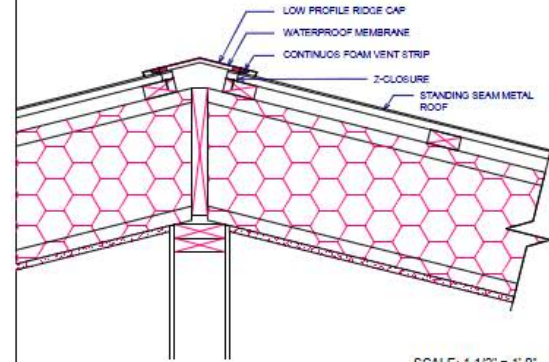
2 TYP. WINDOW SILL

SCALE: 3/4" = 1'-0"



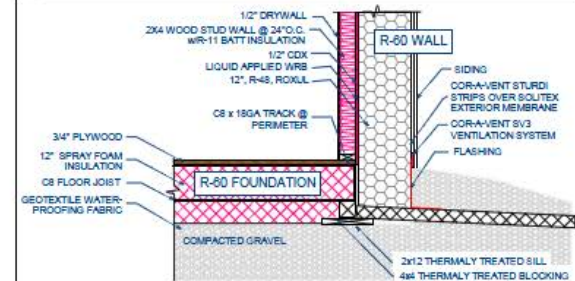
3 TYP. WINDOW JAMB

SCALE: 3/4" = 1'-0"



SCALE: 1 1/2" = 1'-0"

4 RIDGE VENT



SCALE: 3/4" = 1'-0"

5 FOUNDATION @ EXTERIOR WALL

Project:
Living Aleutian Home Design - Sand Point



REINA PROJECTS CORPORATION
PO Box 10100, Fairbanks, Alaska 99710
Phone: 907-451-1300
Fax: 907-451-2300
Email: info@reina-projects.com

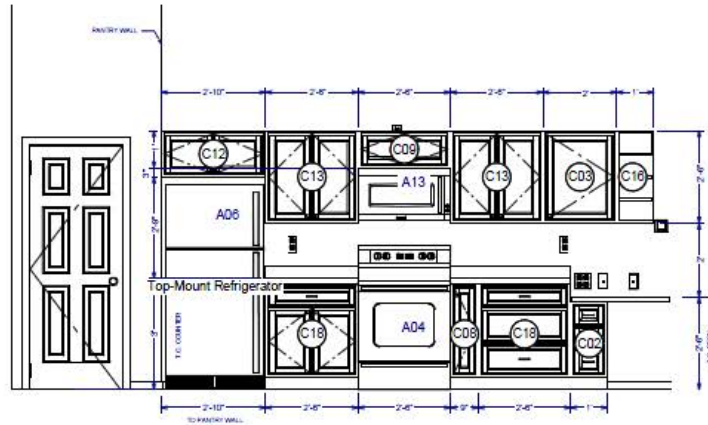
Design by: Thomas Chapp

Scale: 1/4" = 1'-0"

Date: 04/18/2013

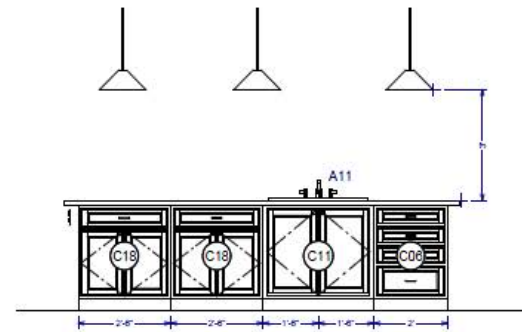
Sheet:

A5.2

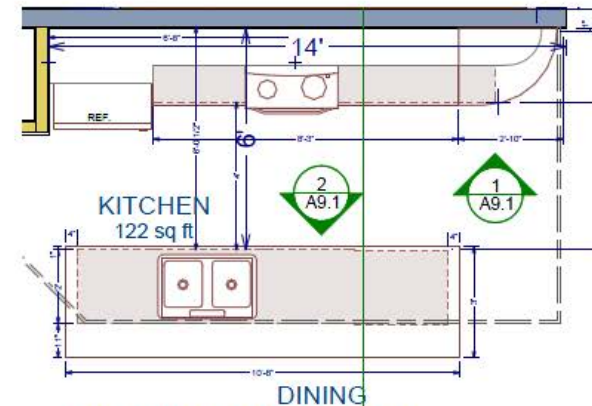


1 KITCHEN ELEVATION - NORTH WALL
A9.1 SCALE: 1/2" = 1'-0"

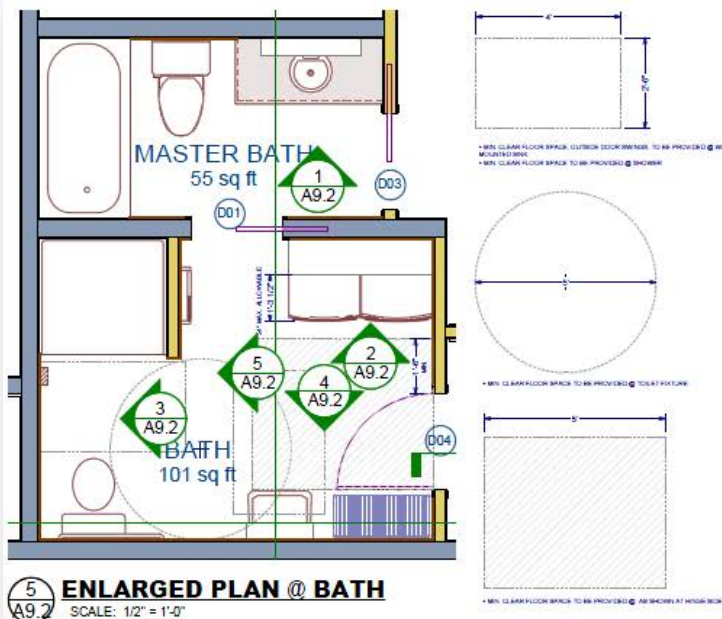
NUMBER	QTY	DIMENSIONS	CABINET SCHEDULE		
			BOTTOM	DESCRIPTION	MANUFACTURER COMMENTS
C01	2	126X1236	0"	BASE CABINET	
C02	1	126X480	0"	BASE CABINET	
C03	1	24X12X30	54"	WALL CABINET	
C04	1	22X802	44"	WALL CABINET	
C05	1	24X21X36	0"	BASE CABINET	
C06	1	24X24X36	0"	BASE CABINET	
C08	1	60X408	0"	BASE CABINET	
C09	1	30X12X12	72"	WALL CABINET	
A10	1	33X808	48"	WALL CABINET	
A11	1	36X24X36	0"	BASE CABINET	
A12	1	36X18X18	36"	WALL CABINET	
C13	2	30X12X30	54"	WALL CABINET	
C14	2	48X12X48	34"	WALL CABINET	
C16	2	12X12X30	54"	RADIUS END WALL CABINET	
C18	1	30X24X36	0"	BASE CABINET	



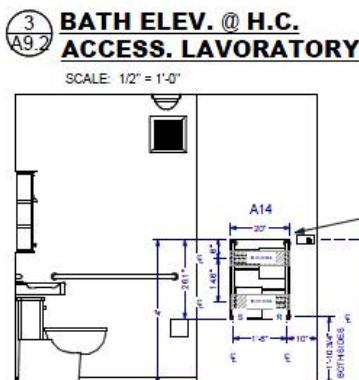
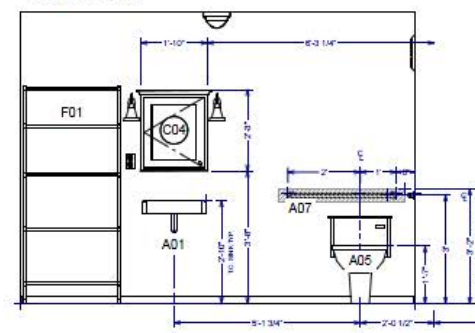
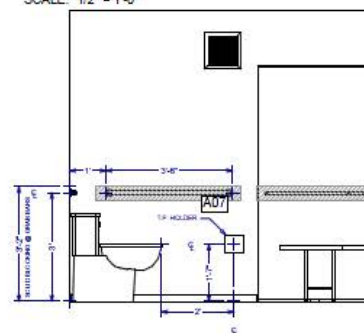
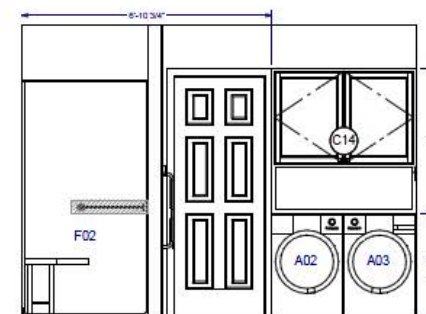
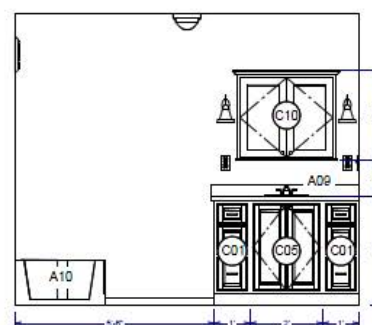
2 KITCHEN ELEVATION - ISLAND
A9.1 SCALE: 1/2" = 1'-0"



3 ENLARGED KITCHEN PLAN
A9.1 SCALE: 1/2" = 1'-0"



NUMBER	QTY	DIMENSIONS	CABINET SCHEDULE	DESCRIPTION	MANUFACTURER
C01	1	120x48x30"	27"	BASE CABINET	
C02	1	120x48x30"	27"	BASE CABINET	
C03	1	120x48x30"	27"	BASE CABINET	
C04	1	120x48x30"	27"	BASE CABINET	
C05	1	120x48x30"	27"	BASE CABINET	
C06	1	120x48x30"	27"	BASE CABINET	
C07	1	120x48x30"	27"	BASE CABINET	
C08	1	120x48x30"	27"	BASE CABINET	
C09	1	120x48x30"	27"	BASE CABINET	
C10	1	120x48x30"	27"	BASE CABINET	
C11	1	120x48x30"	27"	BASE CABINET	
C12	1	120x48x30"	27"	BASE CABINET	
C13	1	120x48x30"	27"	BASE CABINET	
C14	1	120x48x30"	27"	BASE CABINET	
C15	1	120x48x30"	27"	BASE CABINET	
C16	1	120x48x30"	27"	BASE CABINET	
C17	1	120x48x30"	27"	BASE CABINET	
C18	1	120x48x30"	27"	BASE CABINET	



NOTES:
 1) PROVIDE 3/4" COPPER SUPPLY AND RETURN PIPING FOR OMNI-PANEL HYDRONIC TOWEL WARMER RADIATOR. PER MANUF. INSTRUCTIONS USE BACK-YEAR PIPING TO WALL INSTALLATION GUIDELINES.
 2) PROVIDE BLOCKING AS NECESSARY TO MOUNT TOWEL WARMER.

Project:
Living Aleutian Home Design - Sand Point



Design by: Thomas Chapp
 Scale: 1/2" = 1'-0"
 Date: 04/18/2013
A6.2

INTERIOR RENDERINGS



Project: Living Aleutian Home Design - Sand Point	
 REINA 10000 100th Avenue, Suite 100 Everett, WA 98203 Phone: 425.451.1000 Fax: 425.451.1001 Email: info@reina.com	
Design by: Thomas Chapp Scale: 1/4" = 1'-0" Date: 04/18/2013	Sheet: A8







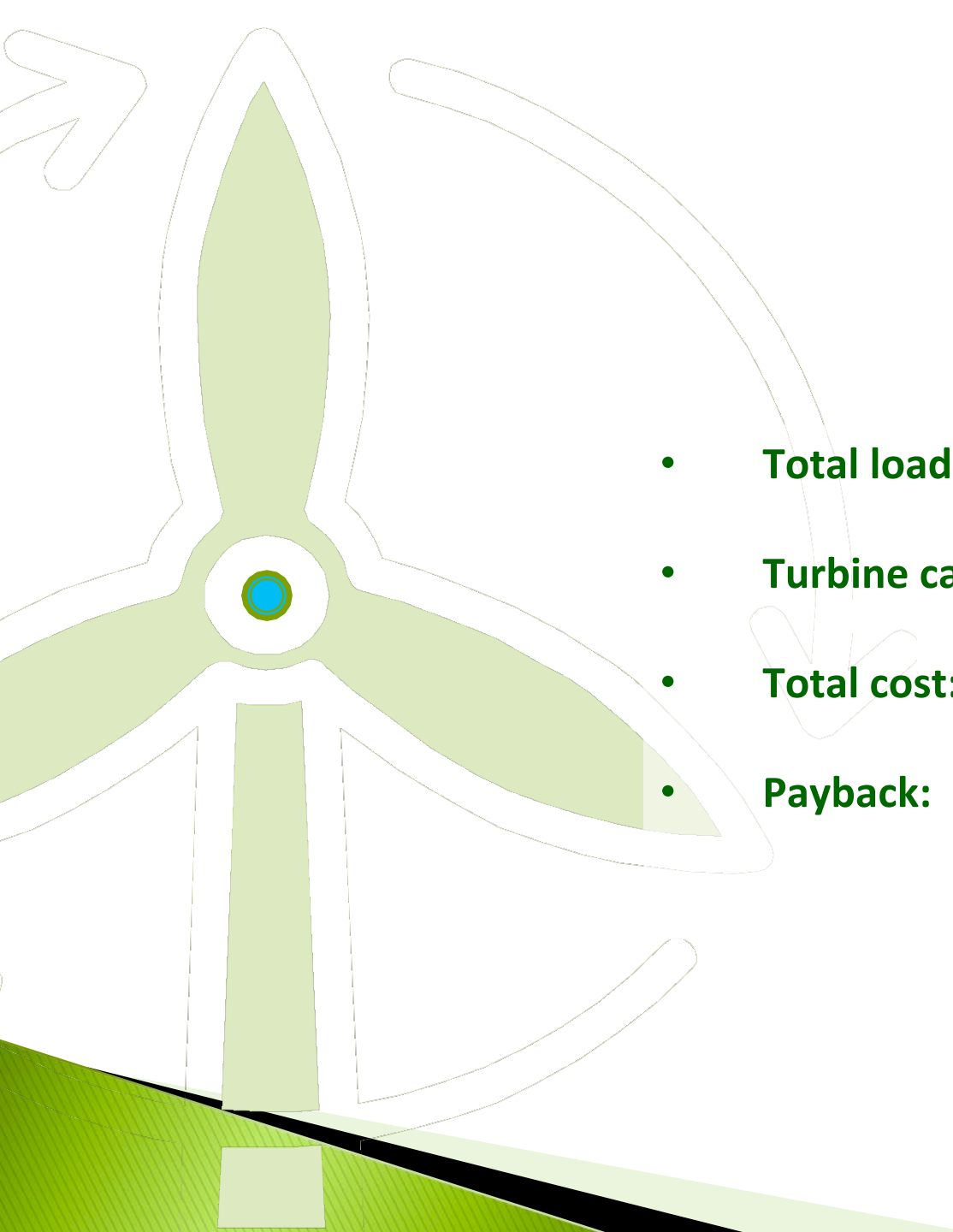






Self Supporting, Fold Over Tower





- **Total load requirements: 18,164 kWh/year**
- **Turbine capacity: 86% (15,612 kWh/yr)**
- **Total cost: \$87K**
- **Payback: @ .55 /kWh = 10.1 yrs.
@ .87/kWh = 6.4 yrs.**

Model 1: Octagon (Palmer)

► *Original* Design goals:

- LBC & Passive House certification
- Maximum use of renewables
- Maximum use of **green** materials

► *Revised* Design goals:

- Passive House Cert only
- Natural gas boiler
- Revised material use (e.g., dense pack cellulose)
 - Limited application of “**Red List**”

Model 2: SRE (Palmer)

- ▶ *Original* Design goals:
 - LBC & Passive House certification
 - Maximum use of renewables
 - Maximum use of “green” materials
- ▶ *Revised* Design goals:
 - Passive House Cert only
 - High efficiency Mod-Con Natural gas boiler; thermal solar collectors (probably rejected)
 - Revised material use (e.g., dense pack cellulose)
 - Less strict adherence to “Red List”

Model 2: Stabilized Rammed Earth (SRE) (Palmer)

so what
is SRE ?

90% of the material
used in the wall is
from a local source.

Non-toxic oxides
provide broad color
possibilities. Rammed
earth is LEED
certification friendly
and is a structural
component of the
building design.



Earthen
Material is
mixed on site
then delivered
to the wall.



Delivery methods include conveyors, pumps, and front end loaders.

Mixing and delivery equipment can be scaled to the project.



The process
allows a local raw
material to be
converted into a
superior wall
system with a
low carbon
footprint



If history is
any gauge, the
lifespan of the
walls will be
measured
in many
generations.



XPS Foam Insulation



Rock Wool Insulation



Walls are structurally engineered and reinforced with steel.

XPS Foam Insulation



Rock Wool Insulation



Rigid insulations used include EPS, XPS, polyiso, rockwool, and even plant-based polyurethane.

XPS Foam Insulation



Rock Wool Insulation

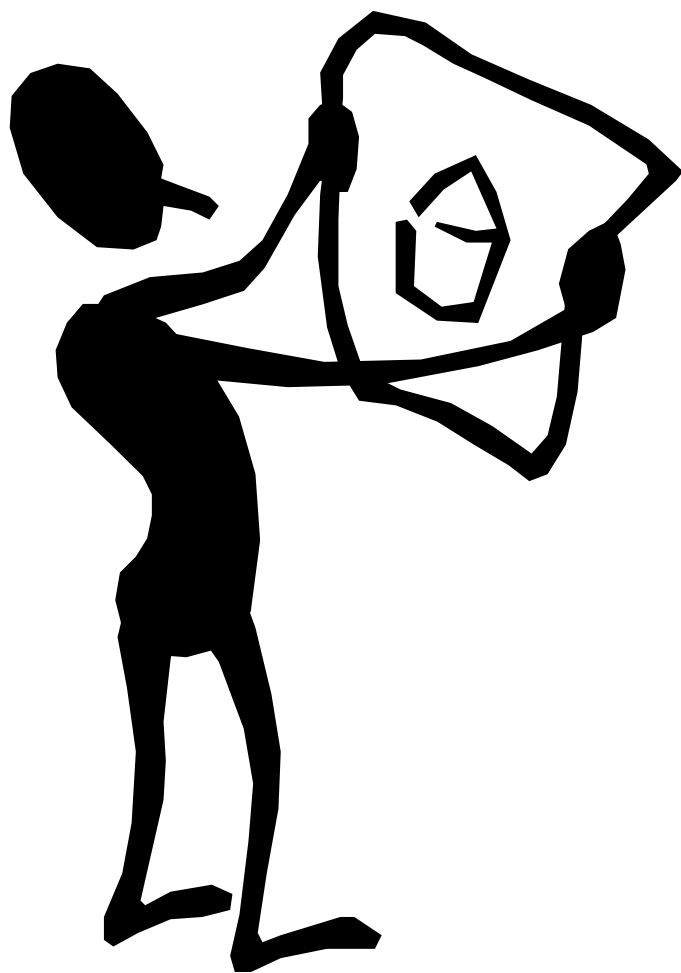


Electrical boxes are placed during construction with metal or plastic conduit. Electricians install wire after the walls are completed.

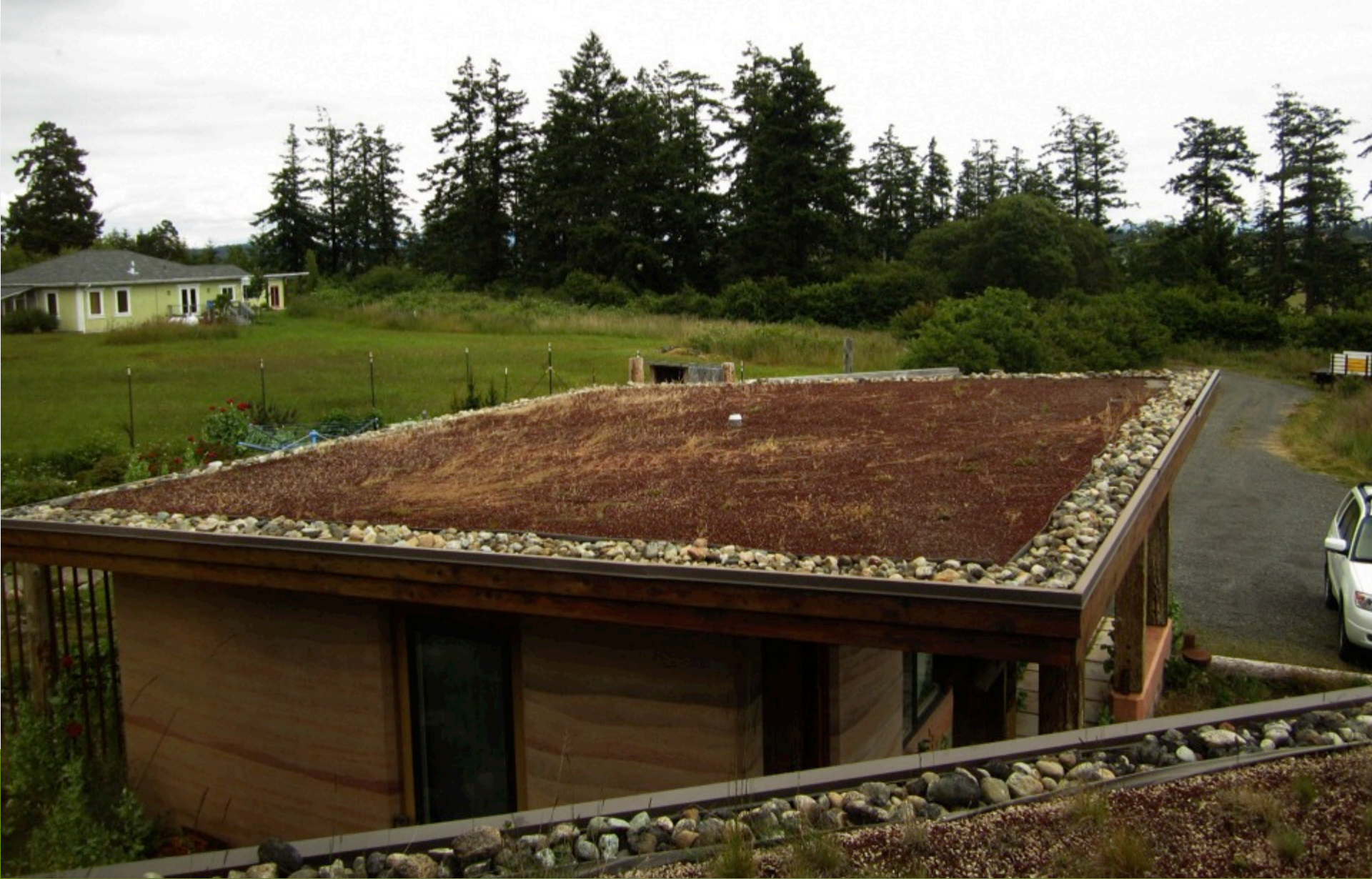
What does SRE
Home look
like





















How do you
build one?







aggregate



natural elements



log anyone







Pneumatic
tamperers fully
compress soil
“lifts” as wall is
constructed
incrementally.

Access for
wall builders is
important.

Formwork
must be
capable of
withstanding
the pressure
created as
through ties
are not used.





Working the walls

Tamping down











Tongue and groove construction at wall seams creates an airtight structure.

A typical 18" thick wall is a high mass R-26 construction with an excellent combined thermal performance that has been estimated as equivalent to an R-50 conventional wall system.







...there's no
place like

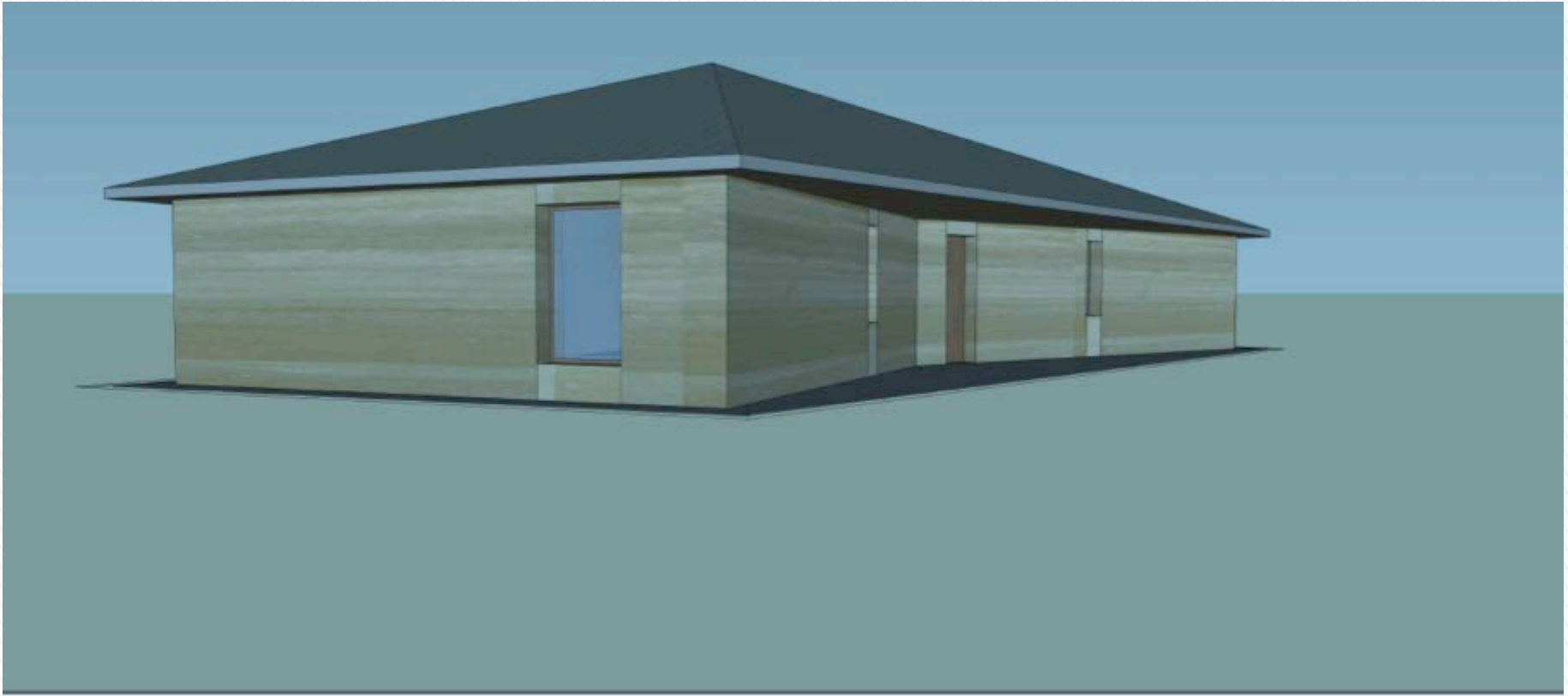


“home”

What is AHA
actually going
to build







Earth Dwell & RMH Design



Earth Dwell & RMH Design



Earth Dwell & RMH Design



Earth Dwell & RMH Design

- ① Polished Concrete or Stone Counter integral with sill for solar collection.
- ② Interior doors 1/2 glazed where appropriate
- ③ 2224 sf Footprint
- ④ 1831 sf Living

- ④ Flatscreen T.B.D.
- ⑤
- ⑥ A/V ratio of footprint = .314
- ⑦ Stacked HE washer & dryer & folding table

- ⑧ Interior Window



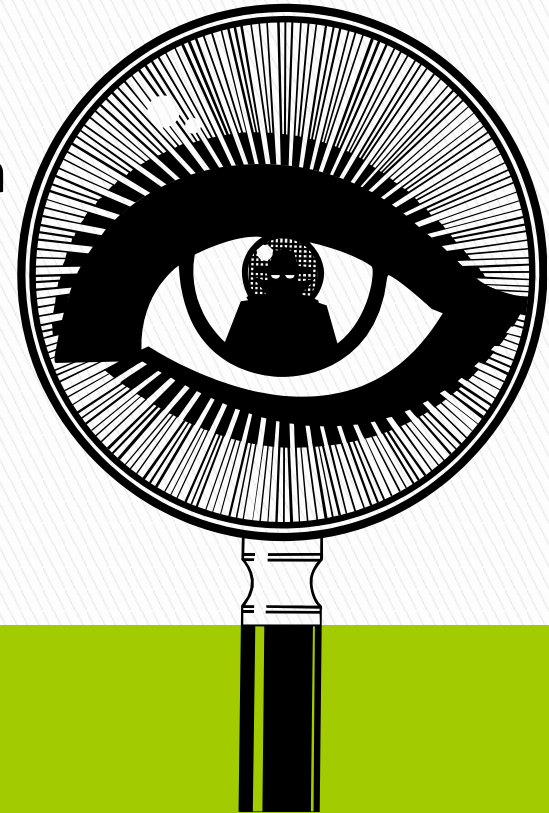
Earth Dwell & RMH Design

- [illegible]

Earth Dwell & RMH Design

SRE Research Component

- ▶ Task 1: Monitor the SRE building for its energy use, thermal, moisture and structural performance and durability.
- ▶ Task 2: Determine the mechanical and thermal mass properties of SRE to establish suitability for Alaska and to compare with conventional construction materials.
- ▶ Task 3: Document the design goals and details of SRE construction.



In Closing



**Better
performing
buildings?**



**Most
definitely!**

In Closing

A green 3D speech bubble with a black outline and a small tail pointing towards the bottom right.

**Less
Money?**

A blue 3D speech bubble with a black outline, a small starburst effect at the top left, and a tail pointing towards the bottom left.

**To Construct,
Probably Not**

A large orange 3D speech bubble with a black outline and a tail pointing towards the bottom right.

**For the End User,
Most Definitely**

In Closing



**Replicable
within
Region?**



**Octagon –
Most definitely**



**Rammed Earth –
remains to be seen**



QUESTIONS



alaska center for
APPROPRIATE TECHNOLOGY



On behalf of ACAT & AHA
Thank You for joining us!



Dan Duame

Executive Director
Aleutian Housing Authority
Tel: 907.563.2146 Fax:
907.563.3105
Toll Free AK 1.800.478.5614
Dan.duame@aleutian-housing.com