

Department of Energy- Tribal Energy Program  
Native Village of Unalakleet- Feasibility Study for Retrofit of 14-Plex

*"Promoting and advancing the development of healthy, durable, and sustainable shelter for Alaskans and other Circumpolar people ."*

*Research • Innovation • Education*



COLD CLIMATE HOUSING RESEARCH CENTER

**CCHRC**



# CCHRC Research and Testing Facility



LEED Platinum



# SIEMENS

Runner-up  
Smartest Building in America



# Organization



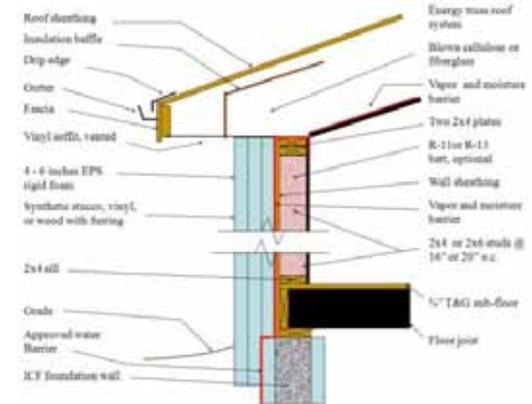
Building Science  
Design & Consulting  
Public Policy  
Outreach & Education





# Research Programs

## Building Envelopes & Materials



## Energy & Mechanical Systems



## Policy & Program Development



**AkWarm**  
Program Version: 1.03d  
**Alaska Housing**  
FINANCE CORPORATION  
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# The Need

32.5% of the housing stock is considered in need of major repair or falling apart.

74.4 % of households are considered drafty.

21.8% of households are unable to maintain 70° F on cold days in the winter.

37.4% of households reported having mold or mildew in the home.

Fuel oil prices reach as high as \$10/gallon.

55.9% of households have income less than \$20,000.

Arctic is changing, 184 Alaskan communities threatened by erosion





# Energy Efficiency – the First Step



Sustainable Housing for all Alaska



# Sustainable Northern Communities



Indigenous  
Wisdom  
+  
21<sup>st</sup>  
Century  
Technology





# Energy and Cost Efficient



Earth berming



Sod



Waste water treatment



Heating and ventilation



Lighting



Alternative energy



# Sustainable Northern Communities

*"We need housing. Our young people have no place to live."*  
George Paneak (1950-2009) Former Mayor of Anaktuvuk Pass

## Design Challenges

- 16,000 HDD
- Electricity \$.60/kWh
- Heating Oil \$8/gallon
- 1,400 gallons/yr.
- New house is \$750,000
- Last house built ten years ago
- Context appropriate housing
- Transportation costs

## Construction Outcomes

- Cost significantly less than new home quotes
- 87 gallons fuel Nov.-April
- Completed in four weeks
- Local work force
- Approaches net 0





# Quinhagak House Construction





# Quinhagak House - Performance

- 130 gallons fuel oil first winter
- Superior indoor air
- Built in 6 weeks
- Local labor force
- Light materials
- High owner comfort
- Significantly less cost
- Durable





# Atqasuk- Point Lay- Kaktovik-Wainwright



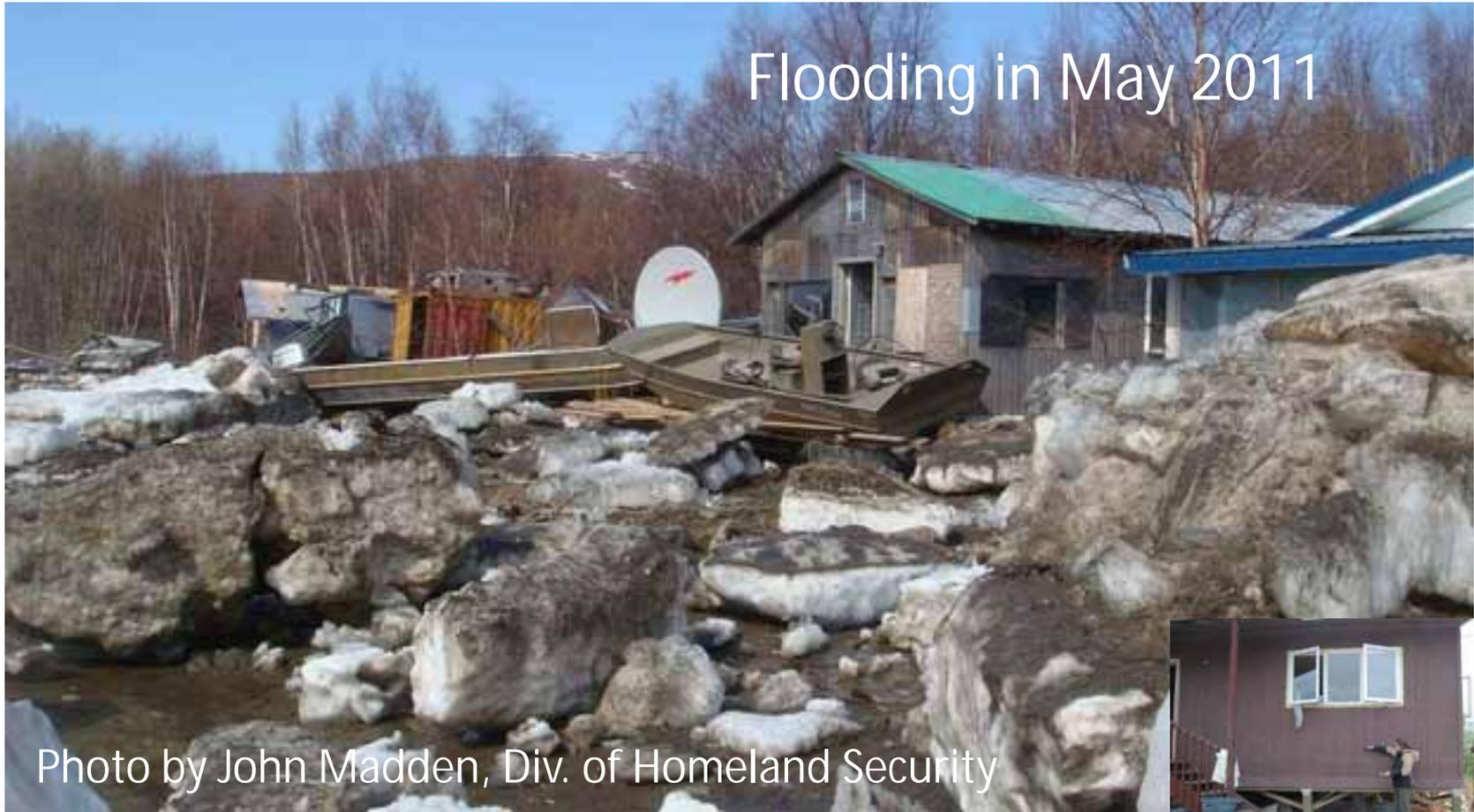
- Walls: Steel studs with plastic offsets
- R-60 spray foam insulation
- Metal siding



- Insulated Thermal raft foundation
- All utilities incorporated
- Light, energy efficient, lower cost



# Crooked Creek





# Crooked Creek

## The Challenge



- TIME – need 9 replacement homes by winter
- Building above floodplain
- Design must be easy to ship, quick to build
- Single modular design for small cabin and 4-BR house
- Very low cost





# The UAF Sustainable Village



**A dynamic and evolving community at the University of Alaska Fairbanks, committed to the tenets of sustainability, demonstrating what can be achieved to secure an enduring future for people of the circumpolar north.**



# The UAF Sustainable Village



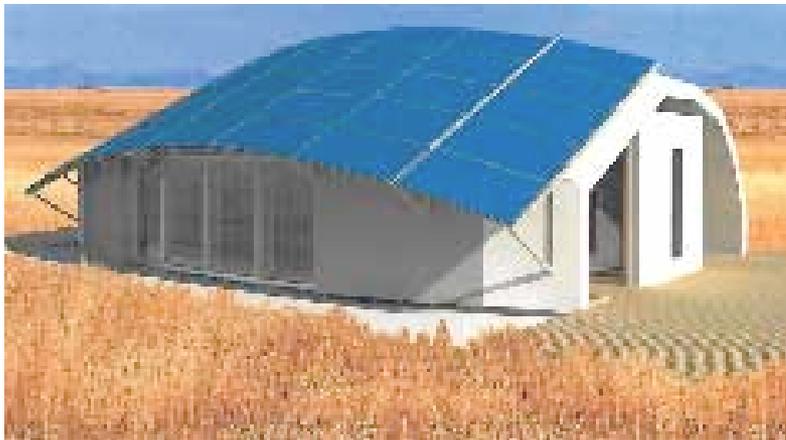
**A RESEARCH PROJECT IN SUSTAINABLE LIVING**



# UAF Sustainable Village



Construction first phase  
Spring 2012



**MODULAR CONSTRUCTION**  
The modular construction of assembly, disassembly and transport.

**ULTRA SOLAR ARRAY**  
Solar panel array for power generation.



# Unalakleet



Sustainable Housing for all Alaska



# Native Village of Unalakleet

14 Apartments  
14 Families





# Native Village of Unalakleet

## Nurture the Partnership

### Assess condition of building on site

- Structural
- Mechanical/electrical
- Presence of mold and contaminants
- Explore Strategies

### Run Energy Models of Options

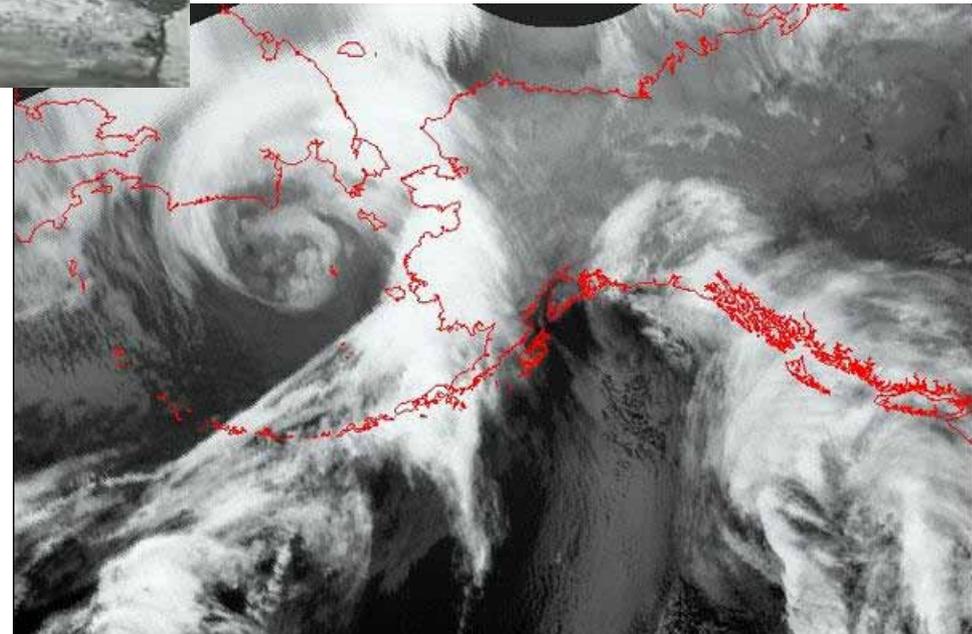
- Analyze Results
- Economics and Paybacks

### Work with community on strategies to maximize benefits

- Local labor training and employment
- Energy efficiencies to lower cost and keep money in village
- Demonstrate a path forward

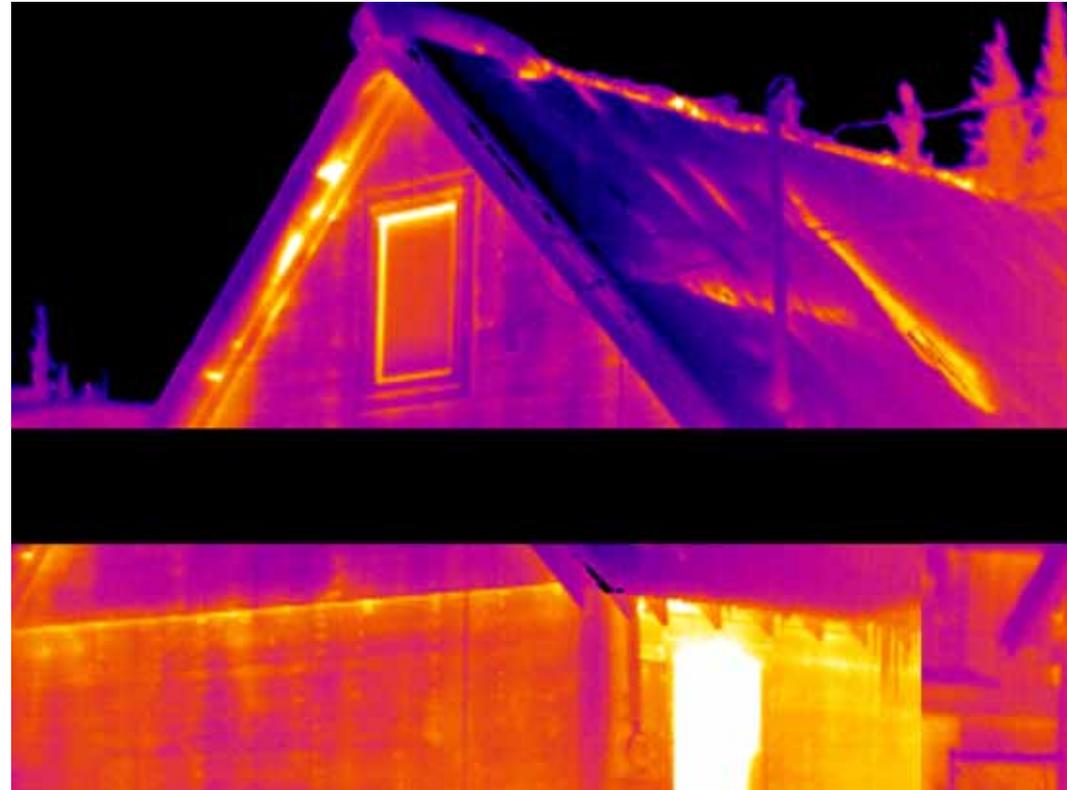


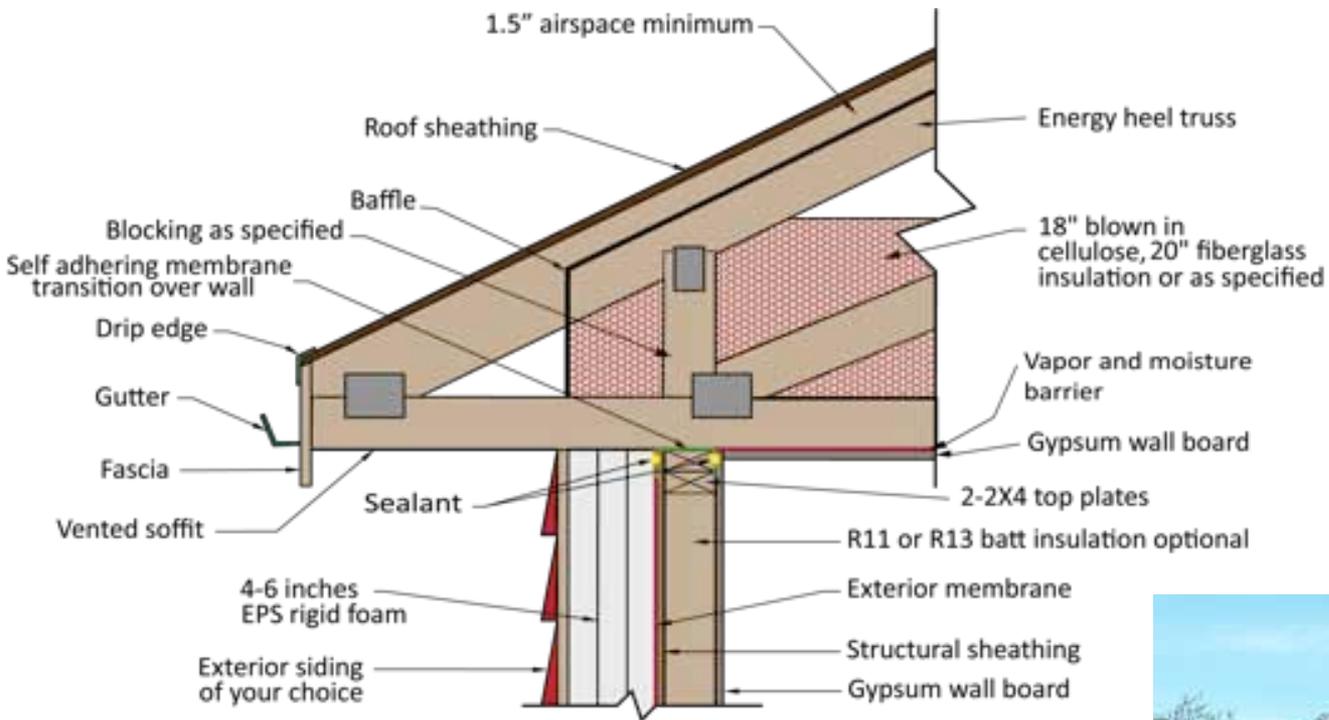
# Unalakleet





# Native Village of Unalakleet





# REMOTE WALLS



# Native Village of Unalakleet





# Native Village of Unalakleet





# The Future of Housing

What do we *want*? What do we *need*? How will we live?





# SUSTAINABLE NORTHERN COMMUNITIES



## COLLABORATION





# Quyana, Quyanaq, Gunalcheesh, Thank You



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# Connect with us!



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