



COLD CLIMATE HOUSING RESEARCH CENTER

CCHRC

MERTARVIK

HOUSING MASTER PLAN



Prepared for:

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Above: Advancing erosion at the Newtok village site.



Above: The Mertarvik Site in September, 2015



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HMH 4 2016 & VLIP 3 2012



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Newtok Village Council

The Cold Climate Housing Research Center has been tasked by the Newtok Village Council to complete a Housing Master Plan for the village of Mertarvik. This is to include a report on the housing needs of the community along with a roadmap for relocating. CCHRC has been deeply committed to assisting the people of Newtok for a number of years. We feel very fortunate to play a role in their effort to relocate to Mertarvik due to the imminent threat caused by erosion.

The following report contains an in-depth analysis of the community's housing needs, background on the relocation effort, strategies for developing phased housing and infrastructure at the new site, specific housing designs, and funding opportunities.

With the speed and severity of erosion at Newtok, we recognize the urgency of relocating and have recommended strategies to allow pioneer families to live at the new village before final infrastructure is in place, including self sufficient power, water, and waste systems. In each case, affordability was a driving factor in designing these systems.

The community of Newtok faces a unique opportunity to build homes and infrastructure that are cost-effective and appropriate for the region. CCHRC designs included in this report are examples specific for the climate, environment, and remote location of Newtok, and emphasize energy efficiency and healthy indoor air quality. We have also included plan sets developed by AVCP Regional Housing Authority that have been well vetted and built throughout the region. As Alaska communities are forced to adapt to a changing climate, Newtok will be an inspiration to other villages facing many of the same problems.

All of us at the Cold Climate Housing Research Center are committed to assisting the Newtok Village Council in any way we can. We are confident that the rich and vital culture, centuries of successful adaptation in the region, and deep commitment to finding solutions will lead to success. We look forward to the celebration of the day a Sustainable Northern Community is realized at Mertarvik.

Sincerely,

Jack Hébert
CEO/Founder
Cold Climate Housing Research Center



ACRONYMS

AAHA	Association of Alaska Housing Authorities
ACS	Alaska Community Survey
AEA	Alaska Energy Authority
AHFC	Alaska Housing Finance Corporation
ANA	Administration for Native Americans
ANCSA	Alaska Native Claims Settlement Act
ANTHC	Alaska Native Tribal Health Consortium
ARIS	Alaska Retrofit Information System
AVCP RHA	Association of Village Council Presidents - Regional Housing Authority
BEES	Building Energy Efficiency Standard
BIA	Bureau of Indian Affairs
BrHEAThe	Integrated heating and ventilation system
CCHRC	Cold Climate Housing Research Center
CDP	Census Designated Place
DCRA	Alaska Division of Community and Regional Affairs
EPA	Environmental Protection Agency
GPS	Global Positioning System
HIP	Housing Improvement Program
HRV	Heat Recovery Ventilator
HUD	Housing and Urban Development
IHBG	Indian Housing Block Program
IRT	Innovative Readiness Training
MEC	Mertarvik Evacuation Center
NAHASDA	Native American Housing Assistance and Self Determination Act
NPG	Newtok Planning Group
NTC	Newtok Traditional Council
NVC	Newtok Village Council
ONAP	Office of Native American Programs (part of the Housing and Urban Development)
PASS	Portable Arctic Sanitation System
REMOTE	Residential Exterior Membrane Outside-insulation TEchnique
RurAL CAP	Rural Alaska Community Action Program, Inc.
SIP	Structural Insulated Panel
USDA	United States Department of Agriculture
USDA RD	United States Department of Agriculture Rural Development
VA	Veteran's Affairs



INTRODUCTION

Executive Summary

In 2016, the Association of Village Council Presidents Regional Housing Authority (AVCP RHA), at the request of the Newtok Village Council (NVC), requested technical assistance in the development of a Surface Affordable Housing Master Plan for the planning and development of permanent affordable housing at the new village site, known as Mertarvik. The plan addresses the short-term and long-term housing and infrastructure needs of Mertarvik. It will also address the overcrowding issues of the current village site and the need for additional housing for young families, who left the village due to lack of housing, but want to return to the village.

A recent housing stock assessment in Newtok found that 12 of the 78 existing houses are in an acceptable condition to be relocated. The remaining 66 units are not in a condition to be relocated, nor would any amount of rehabilitation make them relocatable. CCHRC completed a Housing Needs Assessment and concluded that at least 105 new housing units will be needed at the Mertarvik site to meet the current housing needs. Other estimates that include planning for growth are up to 131 units. Based on this assessment, there will be a critical housing shortage at the new village site.

Newtok is eroding at an advanced rate, and the community cannot afford to wait for a fully constructed village to be finished before relocating to Mertarvik. It is more likely that people will need to move to the new community in stages, and that homes constructed in Mertarvik will need to operate without the benefit of community-wide infrastructure. These "Pioneer Families" should have wraparound services that provide electricity, clean water, safe disposal of human waste, and reliable heat, handled at the level of the individual home. As infrastructure comes online, these "Pioneer" dwellings will need to be able to plug in to that infrastructure.

This Master Plan addresses the need for a phased approach to housing and services at multiple scales, focusing on both the design standards of the individual home and collaboration with agencies on community-wide infrastructure. It also addresses the very real possibility that a disaster will develop at the old community site before the new community site is fully inhabited, and provides guidance on how to plan disaster-relief housing in such a way that it can meet permanent housing needs for the community.

CCHRC has a deep commitment to the people of Newtok that began in 2008. CCHRC staff are familiar with members of the Newtok Village Council, AVCP Regional Housing Authority, the Newtok Planning Group, and the DOWL Project Management team; and have worked hard to foster a relationship of mutual trust and respect. When invited by these groups, we have provided assistance with both housing and public buildings. As a 501(c)(3) nonprofit entity, our mission has been to provide housing guidance to Alaska communities in a climate where financial resources are increasingly scarce and must be used for the maximum benefit of the community. In these challenging times, all Alaskans must work together to address the economic and climatic realities that make relocation efforts so complex and difficult. Toward this end, we wish to emphasize that in order for the relocation effort to succeed, a holistic approach involving the varying expertise of Tribal Leaders, Regional Housing Authorities, State Agencies, and public and private industry will need to be implemented, so that each partner is able to offer up the services that they are most suited to contribute.



Project Description

The Mertarvik Housing Master Plan consists of the following key components:

Housing Development Need

The CCHRC team traveled to Newtok to perform a Housing Needs Assessment to be used as a primary planning tool in the Housing Master Plan. Drawing on prior needs assessments, and with the goal of both updating housing needs in Newtok and using that need specifically to plan the housing strategy in Mertarvik. The Housing Needs Assessment addresses overcrowding, family preferences, options for rent and ownership, special needs, and other factors to give the most detailed picture of the current housing shortage in the existing community of Newtok, so that this data may be used to create appropriate housing at the new site of Mertarvik.

Housing Design

In order for the residents of Newtok and the Newtok Village Council to effectively make decisions on what type of housing they would like to see developed in Mertarvik, CCHRC included multiple designs that could be used as a reference when Council members convey their desires and needs to any contractor that could potentially build homes in Mertarvik. CCHRC has included in this report five house designs that are developed to 100% with included construction documents and three house designs that are developed to 15% that focus on needs expressed by the community during CCHRC's site visits. The different types of housing included are the Demonstration House, the Quinhagak "Octagon" House, the "Hawk" Starter Home, AVCP RHA HMH 4 2016 and VLIP 3 2012, an Extended Family Duplex with Universal Design Principles, a larger home with a loft for Multi-generational families, and a Transitional Modular House Design that could be built quickly, if disaster occurs before enough housing has been developed.

Infrastructure Needs

Initially, it is anticipated that homes should be self-sufficient through incorporating decentralized water/sewer and electrical systems. This plan describes an approach, and examples, of how self-sufficient and decentralized systems can work. The project addresses how new houses can be constructed and retrofitted for centralized water/sewer and electrical systems in the future. Community-wide infrastructure will be designed and planned by other agencies, so the housing master plan will need to be adaptable and cognizant of how housing can best fit in with these concurrent plans.

Site Control

CCHRC staff coordinated with entities completing subdivision planning, surveying, platting and recording including the phasing of roads, infrastructure systems, and housing development during the site control process.

Funding Sources

The plan incorporates an in-depth discussion of potential funding sources that can be utilized to leverage for the housing development and infrastructure needs. These include State, Federal, and other funding sources.

Plan sets and other resources

100% Construction Documents for: Demonstration Home, Quinhagak "Octagon" House, Spenard Builders Supply-CCHRC "Hawk" 20FT x 20FT Starter Home, AVCP RHA HMH 4 2016, AVCP RHA VLIP 3 2012

REMOTE Wall description and wall section

BrHEAT v2.0 combined Heat and Ventilation System Diagram and overview

PASS Water and Wastewater Diagram and explanation



Project Partners

The following is an alphabetical list of project partners and their roles in the relocation of the village of Newtok to Mertarvik as of the publication of this report. Partners and roles are subject to change throughout the process of relocation.

Alaska Energy Authority

AEA is an independent corporation of the State of Alaska and the State's energy office whose mission is to reduce the cost of energy in Alaska. AEA is under contract with the Denali Commission to provide a master energy plan, power plant design, and bulk fuel system. The Housing Master Plan will coordinate closely with AEA's Energy Plan to ensure that the new housing is staged to be compatible with the development of small-scale and large-scale power distribution infrastructure.

Alaska Native Tribal Health Consortium

ANTHC provides health services for Alaska Native people at the Alaska Native Medical Center in Anchorage and across the state through outreach, training, education, disease and injury prevention, and rural water and sewer construction. ANTHC is providing geotechnical investigation and topographical surveys of the site, design of a washeteria, design of a water distribution and wastewater collection system, landfill design, and village layout.

Association of Alaska Housing Authorities

AAHA is a nonprofit membership agency that includes fourteen regional housing authorities and the Alaska Housing Finance Corporation. AAHA's mission is to increase the supply of safe, sanitary, and affordable housing and community development in Alaska. It provides legislative advocacy, development, funding information and technical assistance. This report was funded through a HUD Technical Assistance Grant administered through AAHA.

Association of Village Council Presidents Regional Housing Authority

AVCP RHA is the state chartered regional housing authority for the Yukon-Kuskokwim Delta region of Alaska. The housing authority provides affordable housing opportunities and services to program-eligible individuals and families. The programs include homeownership, rentals, rental vouchers, housing services, housing management, modernization, renovation, crime prevention and administration and planning, and construction of new housing, modernization and weatherization of homes using the force-account method of construction. In Mertarvik, AVCP RHA will be assisting with funding and construction of new homes.

Cold Climate Housing Research Center

CCHRC is an industry-based, nonprofit corporation created to facilitate the development, use, and testing of energy efficient, durable, healthy, and cost-effective building technologies for people living in circumpolar regions around the globe. Involved in Newtok since 2008, CCHRC created the original design for the Mertarvik Evacuation Center and designed a demonstration home that was built in Mertarvik in the summer of 2016. CCHRC is the primary author of this report and will be involved in Mertarvik in a Technical Advisory role, assisting with the design and construction of energy efficient, durable, and culturally appropriate structures.

Denali Commission

The Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. The Denali Commission is focused on increasing inter-agency cooperation in Alaska's remote communities. The Denali Commission is funding much of the current relocation planning.

**DOWL Engineering**

DOWL is a multi-disciplined consulting firm owned by senior managers from within the company, providing civil engineering and related services for more than 50 years. DOWL maintains in-house expertise in Environmental and Land Development, Water Resources, Transportation, Civil Engineering and Geo-Construction.

DOWL has been hired by the Newtok Village Council and the Denali Commission as lead project manager for planning and construction in Mertarvik. DOWL is coordinating the Newtok Design and Construction Group.

Goldstream Engineering

Goldstream Engineering specializes in on-site water and wastewater system design for residential and commercial facilities. The company's experience and expertise also includes civil engineering projects such as site grading and drainage plans, parking lots, roads, small airports, community water and wastewater design and treatment systems, regulatory permitting, environmental services, and construction management. Goldstream Engineering is designing the roads and coordinating development of the gravel quarry and road building.

Newtok Village Council

The NVC is the village leadership body and federally recognized tribal government.

Newtok Traditional Council

The NTC is the former village leadership council and worked closely with CCHRC on the original design for the Mertarvik Evacuation Center. The NTC initiated the relocation process in 1994. Tribal government duties were officially transferred to the NVC in 2015.

Newtok Planning Group

The NPG was formed in May 2006 when representatives from state and federal agencies and non-governmental organizations began meeting with Newtok to coordinate assistance in the relocation of the community to a new village site on Nelson Island. The NPG has convened regularly since its formation, working with Newtok and across agencies to leverage resources, secure funding, and to establish a framework and strategy for moving the relocation process forward. A list of all participants in the NPG is in the appendix of this report.



NEWTOK & MERTARVIK

Background

Newtok is a traditional Yup'ik Eskimo community of approximately 350 people located on the Ninglik River in Western Alaska. Progressive coastal erosion from ocean storm surges and degrading permafrost have created an untenable threat to the community. Multiple erosion studies concluded that there is no cost-effective way to halt this process, and that the people of Newtok must relocate to a new site. In 2006, the community began actively searching for solutions to the challenges posed by village-wide relocation.

Working with state and federal agencies, private contractors, and tribal entities, the community has made incremental progress toward relocating. The community selected a site for the new village, called Mertarvik, nine miles south of the current village across Baird Inlet. The Mertarvik site has sufficient elevation to protect the community from erosion and violent fall storms, and has appropriate land for a gravel quarry, an airstrip, public buildings, and housing. The new site also has an existing source of fresh water that has been used for generations by people in the region. Mertarvik is a Yup'ik word that translates roughly to "Getting water from the spring."

Housing has been called the single limiting factor to the Newtok community moving to Mertarvik (Newtok Planning Group, 2017). At least 66 households exist in the current village, and the population is young and growing quickly. A 2014 structural survey of homes at the existing village concluded that the vast majority are in poor condition and do not have the structural integrity to survive a move.

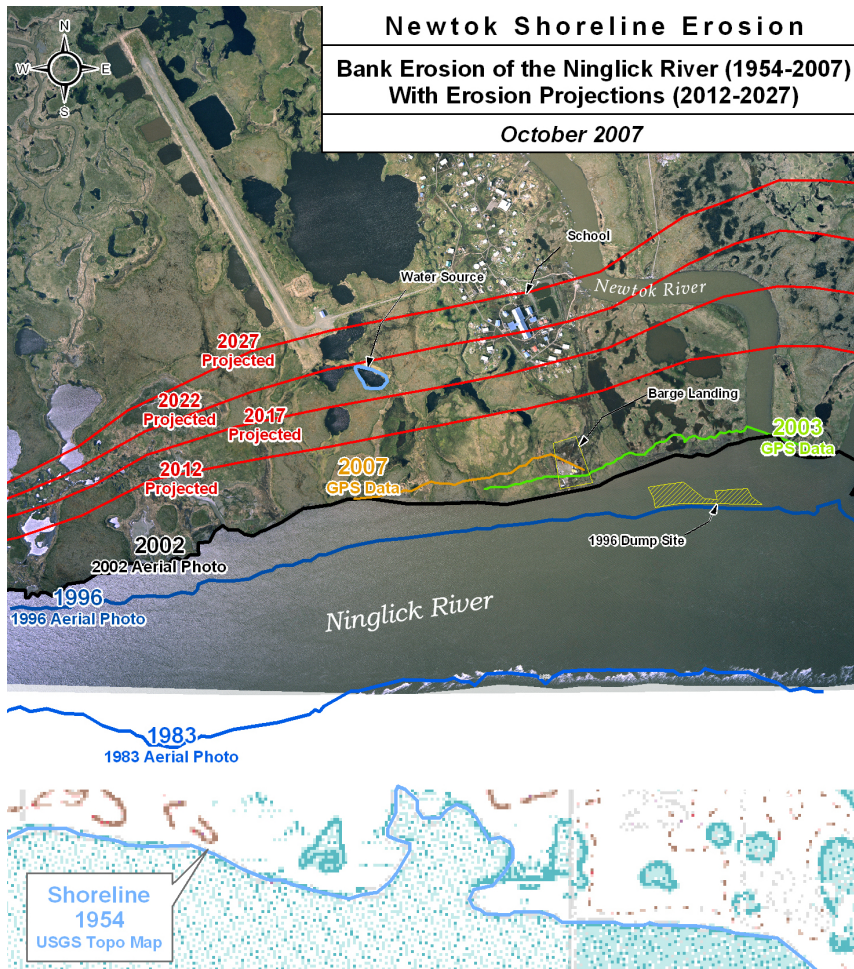
The Newtok Planning Group's website lists the following progress to date on housing at the new site, consisting of seven homes:

- According to the [Newtok Planning Group Website](#) at the time this report was published, the first three homes were acquired through Bureau of Indian Affairs (BIA) Housing Improvement Program (HIP) grants in 2006 and constructed in 2007.
- In 2010, Newtok received grants for three additional homes through the Association of Village Council Presidents Regional Housing Authority (AVCP RHA) through HUD's Native American Housing Assistance and Self Determination Act (NAHASDA) Program. The community decided to purchase Structural Insulated Panel (SIP) home packages. Members of the community received training on constructing with SIP panels and homes were completed in 2012.
- The seventh home is a demonstration house designed by the Cold Climate Housing Research Center (CCHRC), funded by a BIA HIP grant. The demonstration house is both extremely energy efficient and moveable. Originally the house was to be built in Newtok so the community could see the house as it was being constructed and then moved across the ice to Mertarvik. When the materials arrived in Newtok, the barge operator was unable to land in Newtok, so the materials were placed in Mertarvik. As a result of the original effort to build the house in Newtok, the house has a skiddable foundation and can be towed across the ice or tundra when needed. It contains a small water-treatment plant and a generator, which can be used before public utilities are available at the new site. Construction of the demonstration was completed over a six-and-a-half week period in summer 2016, using CCHRC instructors and a local crew.



Left and Below: These pictures were taken during a flyover of the Mertarvik site in 2014, after the IRT had finished its exercises. By 2014, the Mertarvik site had a barge landing, constructin staging area, Bivouac Site, gravel storage, MEC Foundation, six homes, four sheds/storage buildings, and temporary road materials (Durabase) stockpiled.

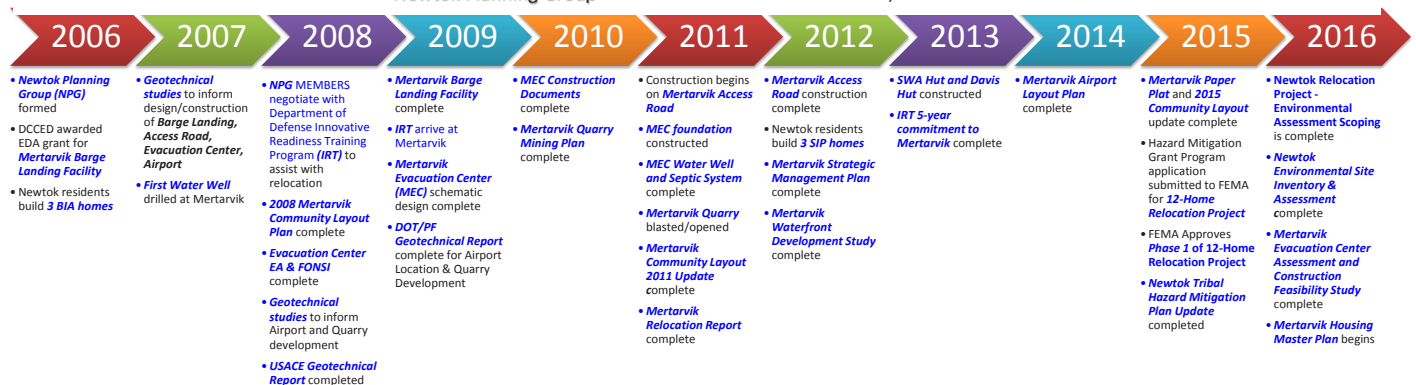




Left: The Army Corp of Engineers developed this graphic of estimated erosion of the shoreline at Newtok every five years. So far, the actual erosion has been in alignment with these estimates.

Below: A timeline developed by The Newtok Planning Group (Newtok Planning Group, 2017) showing activities toward the relocation effort from 2006-2016.

Newtok Planning Group: Relocation Activities at Mertarvik, 2006 - 2016





Above: Barges delivering at the shallow barge landing site lay anchor at high tide and then wait for low tide to rest on the shore.



Above: A barge at the shallow barge landing site waiting for tide change.



Above: Transport from Mertarvik to Newtok can only take place at high tide. Local skiffs are inaccessible at low tide.



Above: At high tide the boats are accessible at the deep barge landing site, but the lack of dock makes loading heavy materials challenging.



Above: The deep barge landing at tide change.



Above: Looking toward the low tide barge landing from the high tide barge landing at mid-tide.



Above: A view of the trail from the village to the site and the gravel quarry.



Above: The gravel quarry was originally developed by the IRT team.



Above: A view of the blasting and grading site above Mertarvik.



Above: The gravel quarry site viewed from the north.



Above: The Durabase road from the MEC site, looking downhill toward the staging area and barge landing.



Above: A significant amount of Durabase road material has been stockpiled at the staging area, along with steel dowels and cap pieces for assembly.



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HOUSING DEVELOPMENT NEED

The Cold Climate Housing Research Center (CCHRC) conducted a housing needs assessment on behalf of the Newtok Village Council to document the housing conditions in Newtok, Alaska and estimate the housing needs for the community's move to Mertarvik. CCHRC performed the housing assessment via interviews of community members in May 2016. This chapter contains the results of the survey. It also includes the procedure used for the housing assessment and results from past housing assessments done in Newtok.

The purpose of the housing needs assessment, stated in the Technical Assistance Grant administered by the Association of Alaska Housing Authorities (AAHA), is as follows:

"The housing needs assessment will include an assessment of overall need, as well as look into housing typologies that can address extended-family models and address overcrowded housing models. CCHRC will report the assessment results to AVCP RHA, ONAP, the Newtok Tribal Leadership, and the Newtok Planning Group."

Mertarvik Housing Needs

CCHRC staff asked 55 households, each living in a separate residence in Newtok, how many homes they would prefer once the community moved to Mertarvik. As many homes in Newtok are overcrowded, this question was meant to give each Newtok household the opportunity to state how they would like to live in the future. Some families wanted to remain in one house but increase the number of bedrooms, while others preferred to split up into different homes.

Of the 55 surveyed Newtok households, a total of 34 households indicated they would like to remain in one house when they moved to Mertarvik; 11 households preferred to split into two houses; and 10 preferred to live in three houses. This indicates a total of 86 houses will be needed in Mertarvik.

However, there are two additional considerations.

Eleven households were not or could not be surveyed. Thus, at least an additional 11 houses will be needed, increasing the total to **97 houses**.

Then, people who were surveyed identified an additional 8 families who would like to move back to Newtok or Mertarvik and require housing. In that case, the total would be 105 houses.

Home Characteristics

Interviewees also identified characteristics that they desired in homes for Mertarvik. As seen in the first row of Table 1, residents all chose to live in a single family home detached from other houses. No interviewees chose the apartment-style option that was presented in the survey. Elders were offered additional options (see the questions in Appendix C) that addressed if they would prefer to live with a caretaker.



Table 1: Description of homes needed in Mertarvik

Type of home	<p>Traditional single family home detached from other houses. This number includes some elders wishing to live in their own house - 82</p> <p>Traditional single family home for an elder living with a caretaker - 2</p> <p>Traditional single family home for an elder living with their relatives - 2</p> <p>Total 86</p>
Number of bedrooms	<p>1 bedroom - 6</p> <p>2 bedrooms - 21</p> <p>3 bedrooms - 25</p> <p>4 bedrooms - 33</p> <p>5 bedrooms - 1</p>
Number of bathrooms	<p>1 bathroom - 83</p> <p>2 bathrooms - 3</p>
Number of homes that would need special accommodations for disability access and movement (such as a wheelchair ramp or wider hallways)	<p>23 homes</p> <p>This is 27% of the 86 necessary homes from the surveys.</p>
Preferred heating fuels Interviewees could select more than one, total possible for each fuel is 86	<p>Fuel oil - 83</p> <p>Wood - 76</p> <p>Coal - 3</p> <p>Electricity - 1</p> <p>Wind turbine - 6</p> <p>Solar energy - 4</p>
Preferred plumbing options Interviewees could select more than one, total possible for each option is 86.	<p>Running hot and cold water - 82</p> <p>Bathroom with toilet - 82</p> <p>Bathtub and shower - 82</p> <p>Laundry room - 79</p> <p>Steamhouse - 64</p>



Home Financing

CCHRC employees asked how interviewees could help pay for new homes in Mertarvik. This question was asked in regards to each potential home in Mertarvik, thus there are more than 55 answers - families wishing to split into more than one home addressed payment for each potential home in Mertarvik. However, some interviewees declined to answer the question, or did not understand it, so the number of responses does not exactly match the number of homes needed in Mertarvik. Loans were presented as an option, as seen in the responses in the table below. However, CCHRC interviewers noted that many people in Newtok understood a loan to be similar to a rent-to-own program and that "yes" responses to using loans do not necessarily indicate willingness or desire to take out a traditional home loan with an interest rate.

The table below also includes the average and median monthly household incomes for each group of responses. In cases where a single Newtok household indicated that they would like to move into more than one home in Mertarvik, their monthly income was split equally between each potential new home's financing option for this analysis.

Table 2: Financing options

Financing option	Affirmative responses	Percent of the 76 total responses
The family has money to pay for the home upfront, or has already built the home in Mertarvik. Average household monthly income: \$1,718 Median household monthly income: \$1,765	4	5%
The family PREFERS to rent the home. If this option is not available, they would consider a rent-to-own or loan program. Average household monthly income: \$1,627 Median household monthly income: \$794 Household income analyses includes 6 homes reporting zero income.	26	34%
The family wishes to pay for the home using a rent-to-own program such as Mutual Help, or through a loan. Average household monthly income: \$2,386 Median household monthly income: \$1,849 Household income analyses includes 4 homes reporting zero income.	38	50%
The family wishes to rent the home and does not wish to consider a loan. Average household monthly income: \$650 Median household monthly income: \$600 Household income analyses includes 4 homes reporting zero income.	8	11%



Many people in Newtok are willing to participate in the construction of homes in Mertarvik, and would be willing to take construction training if it were available.

Table 3: People willing to help with construction in Mertarvik

Number of adults willing to participate in home construction in Mertarvik	Paid only - 9 Volunteer or paid - 112
Number of adults willing to participate in construction training for building homes	Paid only - 12 Volunteer or paid - 68

Newtok Population

CCHRC interviewed 55 households in Newtok during the first week of May, 2016. The team estimated a total of 66 households in Newtok, because there were at least 11 households that were not interviewed:

3 households already had a home in Mertarvik and declined the interview;

3 households were identified as being out of town; and

5 households declined to be interviewed for other reasons.

The 55 households that were interviewed represent approximately 83% of the total of 66 households.

All 55 interviewees provided the number of people living in their homes.

Table 4: Household population

Total number of people in the 55 households	303
Total number of people in the 55 households, including seasonal occupants	322
Average number of occupants per house	5.5
Average number of occupants per house, including seasonal occupants	5.8
Minimum number of people per house	0 (represents an individual with no home)
Maximum number of people per house	12
Number of households with someone that requires wheelchair or disability access for entry	3

Interviewers gathered demographic information for each adult in the household, including race, age, and income. The number of responses is indicated, as many interviewees did not know the monthly income of all adults in their household or chose not to answer those questions.



Table 5: Adult characteristics

Characteristic		Number of adults responding to question
Number of adults identified	157	N/A
Average age	39.3 years	150
Predominant race	Alaska Native or American Indian - 150 Other - 1	151
ANCSA Corporation	Calista - 125 Bristol Bay Native Corporation - 2 Cook Inlet Region Inc. - 1	128
Household monthly income	Average - \$2,435 Median - \$1,680 Range - \$0 to \$15,000 Zero income - 11 households \$1 to \$1,000 - 9 households \$1,001 to \$2,000 - 12 households \$2,001 to \$3,000 - 6 households \$3,001 to \$4,000 - 6 households \$4,001 to \$5,000 - 4 households Above \$5,000 - 7 households	55 surveys
Employment	Full time - 24 Local, state, federal government* - 21 Retail - 1 Other - 2 Part-time - 46 Local, state, federal government* - 27 Construction - 1 Service - 2 Retail - 3 Other - 12 Fishery/Cannery - 1 Seasonal - 3 Local, state, federal government* - 1 Construction - 1 Other - 1 Unemployed - 60 Retired - 16 Self-employed - 0 Subsistence - 2	151
Other sources of income	Dividends from state, Native Corporation - 129 Public assistance - 34 Retirement/Pension - 6 Social security - 24 Unemployment - 5 Child support - 1 Interest, estates, or trust income - 2 Violent Crime Compensation Board - 1	141

*Includes school



Newtok Housing Stock

Interviews addressed the homes that are currently occupied in Newtok. The purpose of these questions is to record the condition of the current housing stock and help establish the urgency of the move to Mertarvik. The interviewees documented the conditions of 54 buildings (one of the 55 interviewees is homeless). This does not represent all of the homes in Newtok as some households were not able to participate in the survey.

Table 6: Home characteristics

Characteristic	Responses	Number of responses
Building type	Single family residence - 50 Duplex - 2 Mobile home - 1 Other - 1	54
Average size in square feet (residents reported approximate sizes)	563 square feet	45
Decade built	2010 or later - 2 2000-2010 - 9 1990 - 1999 - 13 1980 - 1989 - 14 Before 1980 - 16	54
Number of separate rooms in the building	1 room - 10 2 rooms - 14 3 rooms - 8 4 rooms - 10 5 rooms - 8 6 rooms - 2 7 rooms - 1	53
Number of bathrooms in the building (As Newtok does not have a water/sewer system, "bathroom" in this case means a separate room to place the honey bucket or a basin for washing)	0 bathrooms - 16 1 bathroom - 36 2 bathrooms - 1	53
Homes where living areas other than bedrooms are used as a sleeping area at night	Only bedrooms used - 22 Other areas used - 31	53
Condition of the building	Good condition - 7 Needs minor repairs - 9 Needs major rehabilitation - 37	53
Buildings with a wheel chair ramp	None	54

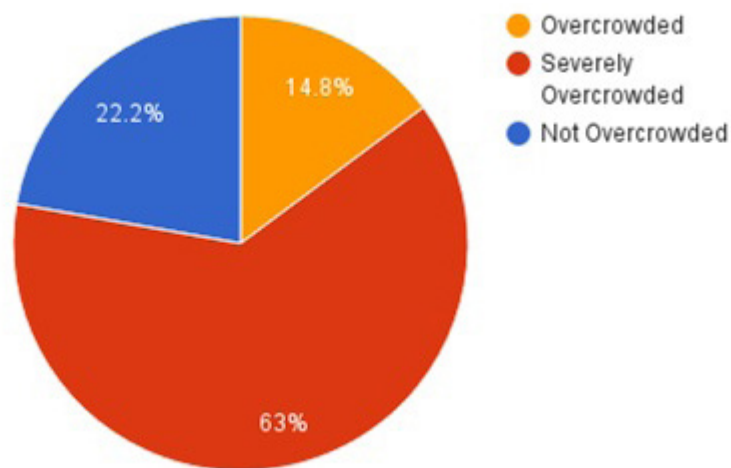


Overcrowding

In general, “overcrowding” is a subjective term based on cultural and personal values and varies widely across the globe. This assessment uses the U.S. Department of Housing and Urban Development’s definition of overcrowding where a housing unit is considered “overcrowded” if there is more than one person per room, and severely overcrowded if there are more than 1.5 people per room. In this case, a “room” includes any space separated by a partial or complete wall, including bedrooms, kitchens, living rooms, dining rooms, etc., but not including bathrooms, porches, balconies, foyers, halls, or unfinished basements.

For example, a three-bedroom house with a separate kitchen, dining room, and living room would be considered “overcrowded” if it had seven occupants or more, or “severely overcrowded” if it had 10 occupants or more. This definition was based on research into when overcrowding causes negative health and childhood education impacts for occupants (The United Kingdom Office of the Deputy Minister, 2004) (Econometrica, Inc. et. al., 2007).

Using this definition, the majority of homes surveyed were overcrowded, with most qualifying as “severely overcrowded.” The most overcrowded home had 11 occupants per room, more than seven times the number of people that would qualify the home as severely overcrowded.



Above: The majority of houses in Newtok are severely overcrowded.



Left: Older homes in Newtok are not raised up on pilings like newer homes from the 1990s and 2000s (right).



Home Features

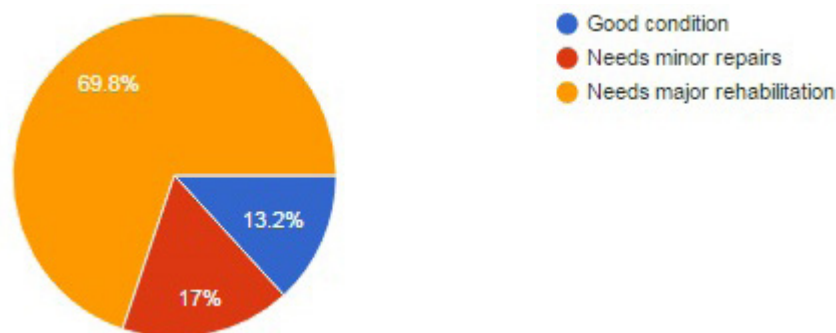
Interviewees also answered questions about the features of their homes. As one interviewee reported being homeless, the 55 surveys represent 54 homes.

Table 7: Home features

Feature	Number of homes reporting feature in the 55 surveys	Percent of the 54 homes with the feature
Electricity	52	96%
Electric stove or range	46	85%
Telephone service (includes cell phones)	42	78%
Refrigerator	37	69%
Passive ventilation (fresh 80s)	25	46%
Steamhouse	12	22%
Sink with a faucet	12	22%
Mechanical ventilation (bathroom fan)	8	15%
Gas stove or range	3	6%
Bathtub or shower	2	4%
Mechanical ventilation (HRV)	1	2%
Hot and cold running water	1	2%
Flush toilet	0	0%

Need for Repair

Thirty-seven buildings reported needing major rehabilitation, and another nine reported needing minor repairs. The number and types of problems with the homes are reported in Table 8. As one interviewee reported being homeless, the 55 surveys represent 54 homes.



Above: The majority of occupants of houses in Newtok reported that their homes were in need of major rehabilitation.



Above: Older homes in Newtok experience a range of problems, including moldy walls, leaky roofs, and broken foundations.

Table 8: Need for home repairs in Newtok

Problem	Number of homes reporting the problem in the 55 surveys	Percent of the 54 homes with the problem
Broken doors and/or windows	40	74%
Foundation is bad	39	72%
Mold on walls or rotting walls	36	67%
Poor/nonexistent ceiling insulation	33	61%
Insulation in the walls is poor	32	59%
Porch and/or steps need repair	30	56%
Roof leaks/needs repair	26	48%
Electric outlets do not work	20	37%
There are holes in the floor	19	35%
Insulation in the floor is poor	10	19%
Plumbing leaks	8	15%
Frozen pipes in winter	7	13%
Fire/smoke damage	7	13%
Other repairs needed	7	13%



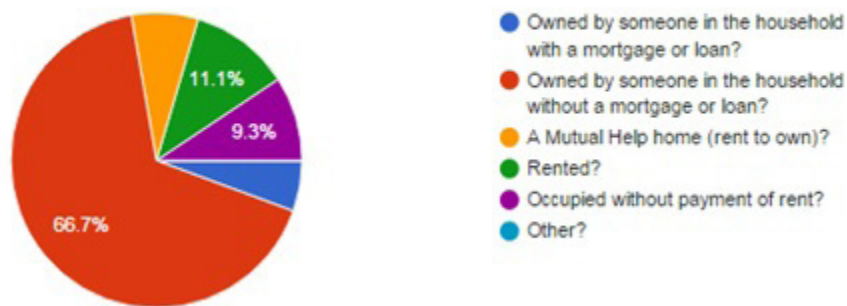
Home Financing

The majority of homes in Newtok are owned by someone in the household without a mortgage or loan. Out of 54 interviewees, 36 reported that the house was owned without a mortgage or loan. Three homes are owned by someone with a mortgage or loan, six homes are rented, five are occupied without payment of rent, and four homes are on a rent-to-own program.

The average rent for homes that are rented or rent-to-own is \$243 per month, with payments ranging from \$100 to \$900 per month. In all cases, rent was paid by members of the household.

No homes, rented or owned, were required to pay real estate taxes or insurance on the property.

Is this building: (54 responses)



Above: Many homes in Newtok are owned by the occupants without a mortgage or loan.

Utilities

All of the surveyed homes in Newtok use fuel oil or kerosene for heating. An additional 28 homes (52% of the surveyed homes) had a secondary heat source. Of those, 26 use a wood-fired appliance for secondary heat and the remaining 2 homes have electric back-up heat.

The majority of homes surveyed pay for heating fuel (93%) and electricity (94%). These utilities are paid separately from a mortgage or rent payment. Only one home reported having to pay for water. A total of 34 homes reported that they had a subsidy to help pay all or a portion of their utilities.

Methodology

Two CCHRC employees conducted the housing survey from April 30 to May 4, 2016. CCHRC planned the trip in coordination with the Newtok Village Council, selecting dates when many families would be present in Newtok because of river ice break-up.

Upon arrival in Newtok, CCHRC and the Newtok Village Council distributed fliers explaining the reason for the survey and how the results would be used. The flier is provided in Appendix B of this document. The CCHRC team conducted interviews in the school and in private homes. Family members and members of the Newtok Village Council helped translate questions for citizens who preferred to answer in Yupik. To ensure that no households were missed, CCHRC worked from a map of Newtok, accounting for all buildings that had been interviewed. CCHRC collected household names and addresses to prevent duplication of surveys. The majority of interviews, nearly 70%, were conducted with the head of the household; remaining interviews were done by the spouse of the head of household, children, or other relatives.



Above: Students in Newtok helped to distribute flyers about the survey.



Above: A CCHRC employee and a member of the village walk from house to house conducting interviews in May 2016.

The team interviewed a total of 55 households, or approximately 83% of the 66 households that the team estimated were in Newtok. There were at least 11 households that were not interviewed: 3 of these already had a home in Mertarvik and declined the interview; 3 households were out of town; and 5 households declined the interview.

To write the interview questions, CCHRC began with interview questions that were included in the 2012 housing assessment conducted by AVCP Regional Housing Authority, which were provided by CEO Mark Charlie. Overall, CCHRC kept the questions similar to allow comparison between the two surveys. However, CCHRC did customize questions for this survey:

In some instances, questions were deleted or consolidated to shorten the survey where possible.

In some instances, questions were added to gather more detail about a topic.

Questions were added about the number, type, and financing of houses to be built in Mertarvik.

CCHRC sent the draft survey for review by Romy Cadiente, Relocation Coordinator for the Newtok Village Council; Colleen Dushkin, grant administrator from AAHA; and Mark Charlie, CEO of AVCP RHA. These reviews helped CCHRC revise questions to better align with the community's goals for the survey. The final survey questions appear in Appendix C.



Past Housing Needs Assessments

A variety of previous projects included assessments of the housing in Newtok. Their results are listed below, with the most recent studies listed first.

Newtok Village Tribal Hazard Management Plan Update (2016)

This section contains information from a Tribal Hazard Management Plan Update (Newtok Village, 2015) and a telephone interview with Newtok Village Council Relocation Coordinator, Romy Cadiente, on March 8, 2016.

The document's main goal is to describe the hazard mitigation plan for Newtok, including the planning process, hazards and vulnerabilities in the area, and mitigation goals. It also included a description of the community and documented the residences currently in Newtok. Information specific to housing in Newtok is found in the table below.

Table 9: Newtok Hazard Mitigation Plan housing information

Population	450
Total occupied housing units	70
Main employers	School, health clinic, Traditional Council, Native Corporation, commercial fishing
Electricity	Ungusraq Power Company
Water	It is pumped from a nearby lake into a water treatment plant and transferred to the Village water tank. Residents then haul water from watering points in the village, collect rainwater in the summer, and thaw ice in the winter.
Wastewater	Honey buckets are used to dump waste along the Newtok River bank. There is no plumbing.



Above: Aerial map of Newtok (Newtok Village, 2015)



The Hazard Mitigation Plan Update also contains a map of the village and a list of all Newtok facilities and residences in the appendices. The list is accompanied by a photo of each structure with its GPS coordinates and estimated value. The estimates came from the survey question: "How much would it cost to replace the structure if it was destroyed?"

2013 Alaska Housing Assessment, Bethel Census Area

The 2013 Alaska Housing Assessment (Wiltse, et. al., 2014) compiled housing data by region and community. The data in the housing assessment was gathered from Alaska Community Surveys (ACS), the United State Census, and ARIS, a database of energy audits performed on residences in Alaska. In the case of Newtok, there was no ARIS data available, meaning the data below primarily comes from the ACS 5-year estimates, which have relatively high margins of error for small communities. Data on the Community Designated Place (CDP) of Newtok is listed in the following table.

Table 10: Information on the Newtok CDP from the 2013 Alaska Housing Assessment

2010 Population (Census data)	354
Housing occupancy (mix of data sources)	Owner-occupied: 49 Renter-occupied: 23 Vacant, recreational: 2 Other vacant: 2 Total: 76
Housing units by decade built (ACS data)	1950s: 3 1960s: 4 1970s: 15 1980s: 24 1990s: 21 2000-2011: 8 Total: 75
Overcrowded housing units (ACS data) Note that overcrowded indicates more than 1 person per room, and severely overcrowded indicates more than 1.5 people per room.	Severely overcrowded: 45 Overcrowded: 21 Occupied, not overcrowded: 15 Total: 81
Housing units completing an AHFC retrofit program, such as BEES, Home Energy Rebate Program, or Weatherization	None
Median annual household income	\$40,000



AVCP RHA Housing Needs Assessment (2012)

This housing needs assessment was summarized in a short document that gave general information about the community and population (AVCP RHA, 2012). It also tabulated findings from a survey of existing housing. Information was gathered from a survey distributed to Newtok households in 2010. A local interviewer, trained by AVCP RHA, went door to door with the survey questions (M. Charlie, AVCP RHA CEO, personal communication, March 9, 2016). The interviewer was able to obtain a total of 59 surveys, representing 84% of households. Survey results appear in the tables below.

Table 11: Newtok community information

2010 Population	354
2010 Occupied housing units	70
Average number of families per household	2.0
Average number of occupants per household	5.0
Average age for head of household	51-60
Percentage of households with a male head of household	86%
Average income per household	Monthly: \$2,151 Annual: \$25,812
Average income per head of household	Monthly: \$1,896 Annual: \$22,752

The second table summarizes the information about houses in Newtok. The survey detailed home characteristics such as size, occupancy, age, the number and type of rooms, energy use, condition, and any repair needs. From this information, AVCP RHA was able to divide homes into three main categories: homes in need of minor weatherization, homes in need of major rehabilitation, and homes that would need replaced. Some families said they would prefer to live in an apartment complex, probably due to the potential for lower rent, if that option existed (M. Charlie, AVCP RHA CEO, personal communication, March 9, 2016).

Table 12: Housing survey of existing housing in Newtok

Rehabilitation	40
Weatherization	4
New home	11
Multi-family triplex (1 household with 4 families)	1

Since this housing survey was conducted, there have been no repairs or weatherization of homes in Newtok. Funders are reluctant to commit to financing repairs or replacement of homes that will be left behind in Newtok in the upcoming move to Mertarvik. Thus, no work has been done to date in spite of the need for repairs to existing houses.

Denali Commission and Alaska DCRA Newtok Housing Analysis (2008)

This housing analysis was conducted in 2008 by interns from the Denali Commission and the Alaska Division of Community and Regional Affairs (Denali Commission & DCRA, 2008). Three interns visited Newtok in July 2008 to conduct a housing survey, which included questions in five categories: family makeup, property, income,



housing structure, and community help. To fill in the survey, interns used a housing map from the U.S. Army Corps of Engineers and went door to door interview the head of household or person present. There were some challenges with filling in the survey, including that the map was missing some homes and that the interviewers did not speak Yupik. In all, a total of 52 homes were interviewed. The main results of the surveys appear in the table below:

Table 13: Newtok housing analysis results

Family makeup	<ol style="list-style-type: none"> 1. Average people per household: 5.25. Occupancy ranged from one to 12 people in a single house. Many households also have guests or relatives stay with them during summer and/or winter seasons. 2. No household has plumbing. 3. Almost all families rely on subsistence activities for food; all families buy dry goods at the village store each month. 4. The average cost of food for the 45 homes answering this question was \$777/month with a range of \$80 to \$2,000.
Property	<ol style="list-style-type: none"> 1. The average stay in a home was 14.89 years, with a range of less than one year to 43 years. 2. Residents either owned their home, rented from AVCP RHA (average rent of \$100), or rented from a private landlord. 3. Most homes are heated by oil, electricity, or wood. Typical usage pattern was oil year-round with wood supplement during the winter. Average fuel use for the winter was approximately 205 gallons, with a range of 22 to 1,200 gallons. 4. Other household expenses included telephone, electricity, water, cable TV, and internet. However, very few homes had TV or internet.
Income	<ol style="list-style-type: none"> 1. The majority of people are seasonal workers. Seasonal jobs in Newtok include the cannery, school teacher and aide, and construction. 2. Almost all residents received the Permanent Fund Dividend and a Calista Corporation Dividend. 3. Other income sources included food stamps; Temporary Aid for Needy Families; Woman, Infant, and Children checks; social security, including disability and retirement; unemployment benefits, veteran's assistance; energy assistance from AVCP; retirement benefits; and other sources of income. 4. Average household income was \$2,439.86 per month for 26 households whose incomes were between \$1,921 and \$5,125 per month.
Housing structure	<ol style="list-style-type: none"> 1. Almost all residents were dissatisfied with their current housing situation. Reasons for this included that the homes were too small, too cold, had leaks, were drafty, did not have Arctic entries, had poor ventilation, had rotting walls, no plumbing, foundation problems and more. 2. For Mertarvik home size: 10 households would like a larger home for people to live together; 7 households would like smaller, separated homes with fewer people; and 1 liked the size of their current home. 3. Pictures of sample homes were shown to residents. 16 households preferred a white HUD home with a triadetic foundation. 14 households preferred a blue HUD home with 2 doorways, and a lot of windows. 5 households preferred an earthen home, and the remaining 6 households preferred a fourth undescribed picture. 4. Ideal home characteristics identified by Newtok residents included having running water in the bathroom and kitchen, a few bedrooms, porches, laundry rooms, ovens and/or stoves, separate steam houses, Arctic entries and/or dry rooms, and two separate entrances for fire safety.

**Community help**

1. 34 households would like to be involved in the building of new homes (only 3 do not want to be involved in building their new home).
2. Over 20 households are willing to volunteer labor and time to build their own home; 5 households would build if pay were offered; for some households, the amount of time they could volunteer depends on their other work schedule.



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HOUSING DESIGN

Methodology

Alaska has a long history of housing designs that fell short of meeting the physical and cultural needs of its residents. Failure of outside firms to fully anticipate the extreme physical environment of the Arctic and Subarctic climate, as well as a failure to understand the lifestyle and use patterns of rural Alaskans, resulted in more failures than successes in housing design in the region.

The relocation of the community to the new site at Mertarvik represents a once-in-a-generation opportunity to establish housing that is suitable for both the local climate and culture. It is impossible for a single house design to work for the entire community and it is impossible to only have one company designing and constructing these houses. In order to build the houses that Mertarvik needs, it will take efforts from multiple organizations and companies. The AVCP Regional Housing Authority has been building energy efficient housing in the region for years and has been actively involved in the planning of housing in Mertarvik. As of this report, AVCP Regional Housing Authority will be constructing at least four new homes in Mertarvik in the Summer of 2017.

Over the years, CCHRC staff has worked closely with the Newtok Village Council, AVCP Regional Housing Authority, and local residents to learn more about their region and lifestyle, gathering input on multiple visits over the course of eight years. During these visits, and also during a formal charette process to gather community input, CCHRC staff gathered input from villagers on the problems with their current housing, and explored possible solutions that the first new homes at Mertarvik could address. The primary goals of the design are to be energy efficient, warm, dry, mold free, durable, affordable, and replicable by local labor resources.

Any house that is built before village-wide infrastructure is present at the new site will need to be both self-sufficient and capable of plugging into that infrastructure when available. The need to relocate is too urgent to try and complete a fully functioning community grid, water and sewer system, and road system before the housing construction begins. The staged construction of housing will need to assume the first 'Pioneer Houses' will operate without the benefit of conventional infrastructure. If they can be designed to function off the grid until such time as village-wide infrastructure is implemented, then construction of both housing and infrastructure may take place concurrently without the absence of basic services or undo strains on quality of life. More conventional housing can then be constructed as conventional infrastructure is brought online.

The design of housing models for the community has also taken place in stages. In 2016, a demonstration home was designed with the community and built at Mertarvik. This demonstration home was built in six weeks with a local crew and CCHRC instructors as a training exercise for the local workforce to form a model for future work in the community. In the second stage, CCHRC staff returned to the community in November 2016 to discuss other possible housing models that would suit the needs of the community. Through this visit, it became apparent that the Newtok Village Council needed to see housing designs that have been built in other parts of the state that could work for them, and housing design concepts that were specific to their community and its needs. As no single housing model will suit the needs of every family and individual, CCHRC has included in this report, three house designs that are developed to 100% with included construction documents and three house designs that are developed to 15% that focus on needs expressed by the community during CCHRC's site visits. The different types of housing included are the Demonstration House, the Quinhagak "Octagon" House to which many community members expressed interest, the "Hawk" Starter Home, an Extended Family Duplex with Universal Design Principles, a larger home with a loft for Multi-generational families, and a Transitional Modular House Design that could be built quickly, if disaster occurs before enough housing has been developed.



Above: One of the three original homes built in Mertarvik in 2007 at the creek site.



Above: The three additional houses built up the hill near the MEC around 2012.



Above: Two garage buildings built by the IRT. These were used as a work camp by the crew of the CCHRC Demonstration Home constructed in 2016.



Above: Two more IRT work buildings, adjacent to the buildings pictured at left. These larger work buildings are empty.



Above: The CCHRC Mertarvik Demonstration Home was built at the former IRT Bivouac Site in 2016. The Bivouac Site has enough room for approximately five more homes of this size to be efficiently constructed. The homes could then be moved to their final site/plat.



Foundation Considerations

The house designs included in this report with the exception of the Demonstration Home, have either been designed for a site other than Mertarvik or are not developed enough to have a foundation system designed yet. As a result, below are images and captions that show what has been done in Mertarvik and also show what has been done elsewhere in Alaska. This information can be used as a reference when determining the design of foundation systems for future housing.



Above: There has been significant movement in this pad. The IRT shed foundations are not adjustable.



Above: At the original houses near the spring at Mertarvik, post and pad foundations rest directly on the ground.



Above: At the homes near the MEC, dunnage posts rest directly on an oversize footing. This type of foundation is potentially unstable.



Above: An adjustable pile foundation under construction in the village of Atmautluak. A cheater bar was later welded onto the wrench for periodic releveling of the foundation.



Above: At the Newtok Site, a building is moved on skids at Breakup to a new location in the village using a small dozer.



Above: The Triodetic foundation in the Demonstration Home allows for adjustability should differential movement in the frost layer or permafrost affect the home. The skids allow the building to be moved from the Bivouac Site to the home's final plat after construction.



Above: An adjustable foundation on cribbing in the village of Quinhagak. This home can be adjusted to account for movement of the ground over time.



Above: CCHRC has also designed and constructed foam "floating foundations", which span variations in the pad below it, should changes in the thermal regime of the soil cause settlement. The foundation can also be jacked with structural foam back to level if necessary.



Above: A home at the Mertarvik site in early winter. Snow drifting has already begun to accumulate. Snow drift will need to be considered carefully in the layout of adjacent houses and shape of new housing to ensure that the drifting issues of Newtok are not a problem in Mertarvik.



Above: An octagonal prototype in Quinhagak with an on-ground foundation. The geometry of the home self-scours wind-born snow to prevent drifting.



Mertarvik Demonstration Home



Above: The Mertarvik Demonstration Home was constructed by a local crew and CCHRC instructors in six-and-a-half weeks. It was built at the construction staging area near the barge landing, and will be towed to its final plat once the site is fully surveyed for housing.

An inclusive approach to designing and building in rural Alaska was pioneered by CCHRC and members of the community of Anaktuvuk Pass, Alaska, in the summer of 2008. Following design development and review by community members and partners, the first prototype home was built with a local workforce and housing authority in 2009. The construction cost reduction, extreme energy efficiency, and livability of the home have been remarkably successful. The local housing authority in Anaktuvuk Pass maintained ownership of the plans and built seven more homes in the region in the following years. The process was repeated in the villages of Quinhagak, Atmautluak, and Buckland, where CCHRC staff worked with the local housing authority to design and build homes that reflected the climate and culture of the local people. Some of these prototypes were monitored remotely for fuel consumption, electricity use, and foundation stability. Modifications were made based on the first winter's data and provided to the local housing authority or tribal government to improve on the designs.

The Mertarvik Demonstration Home was built in collaboration with village residents and has created mutual benefits for both partners. The CCHRC team has gained invaluable knowledge of physical conditions and adaptive techniques that can only be learned by living in a challenging environment for many years. In turn, the CCHRC team shares a knowledge base focused on innovation in building science and energy efficient construction practices derived from continuously evolving research and relationships with industry and professional communities.

The Newtok Village Council, village residents, and CCHRC staff worked together to finalize the design, select proper building materials, and choose the construction site. Due to the urgency of need for relocation, a construction staging site was chosen where homes could be built before traditional platting and siting was completed, with the intent to move homes to their final site as platting is finalized, without slowing down construction. Concurrently with design, the tribe served as Project Manager and employer during the build. Aside from CCHRC instructors, all construction labor was locally hired by the Tribe.



The Mertarvik Demonstration Home addresses the needs of a pioneer structure at the new community site. It must be habitable and comfortable before conventional infrastructure is implemented in the community. The home has been designed for the Yukon-Kuskokwim Delta environment, where wind-driven precipitation and foundation movement are common causes of building failure. A limited cash economy and mostly seasonal employment opportunities demanded the home have very low operating costs and the short summer building season required that it be quickly and economically constructed.

Features of the home include:

- A triodetic space-frame foundation that will allow residents to adjust the foundation of their home without the use of heavy equipment should any movement occur over time;
- Ski-shaped footings integrated into the foundation that allow the building to be moved from the construction staging area to its final plat;
- An integrated truss frame that allows for simple, rapid framing of the shell, thick walls, and a complete thermal break in the walls, roof, and floor;
- An elaturaq arctic entry with a dropped floor that forms a passive cold trap at the entrance to the home;
- A complete thermal envelope with high insulated value and minimal thermal bridging;
- Simple and efficient heating and ventilation systems;
- An in-house water treatment plant that produces potable water from multiple sources;
- A waterless toilet that dries solids for less odor and easier disposal of waste in the community;
- A power system with a transfer switch that allows the home to run off generator power, battery power, or a traditional grid.

Perhaps even more importantly, the local crew who built the home will be able to put their skills to use in future projects. Besides providing well-paying jobs to local residents, this design drastically reduces the cost of construction. The resident family was required to provide at least one household member to take the construction course and work with the crew on the project. The resident was given thorough instruction in all aspects of their home's components, operation, and maintenance requirements. The following pages show photos of the Mertarvik Demonstration Home, highlighting strategies for pioneer structures that are built before full services and infrastructure are present in the community. Some of these strategies, such as approaches to water, waste, power and heat, will be discussed in more depth later in this report.



Above: Until plats and pads have been developed, homes at the new site can incorporate ski-shaped footings to enable movement from the staging area.



Above: Triodetic foundations allow for adjustability should differential movement in the permafrost affect the home.



Above: Integrated Trusses greatly speed up construction time during a short season. Here a squirt boom was used to raise the trusses.



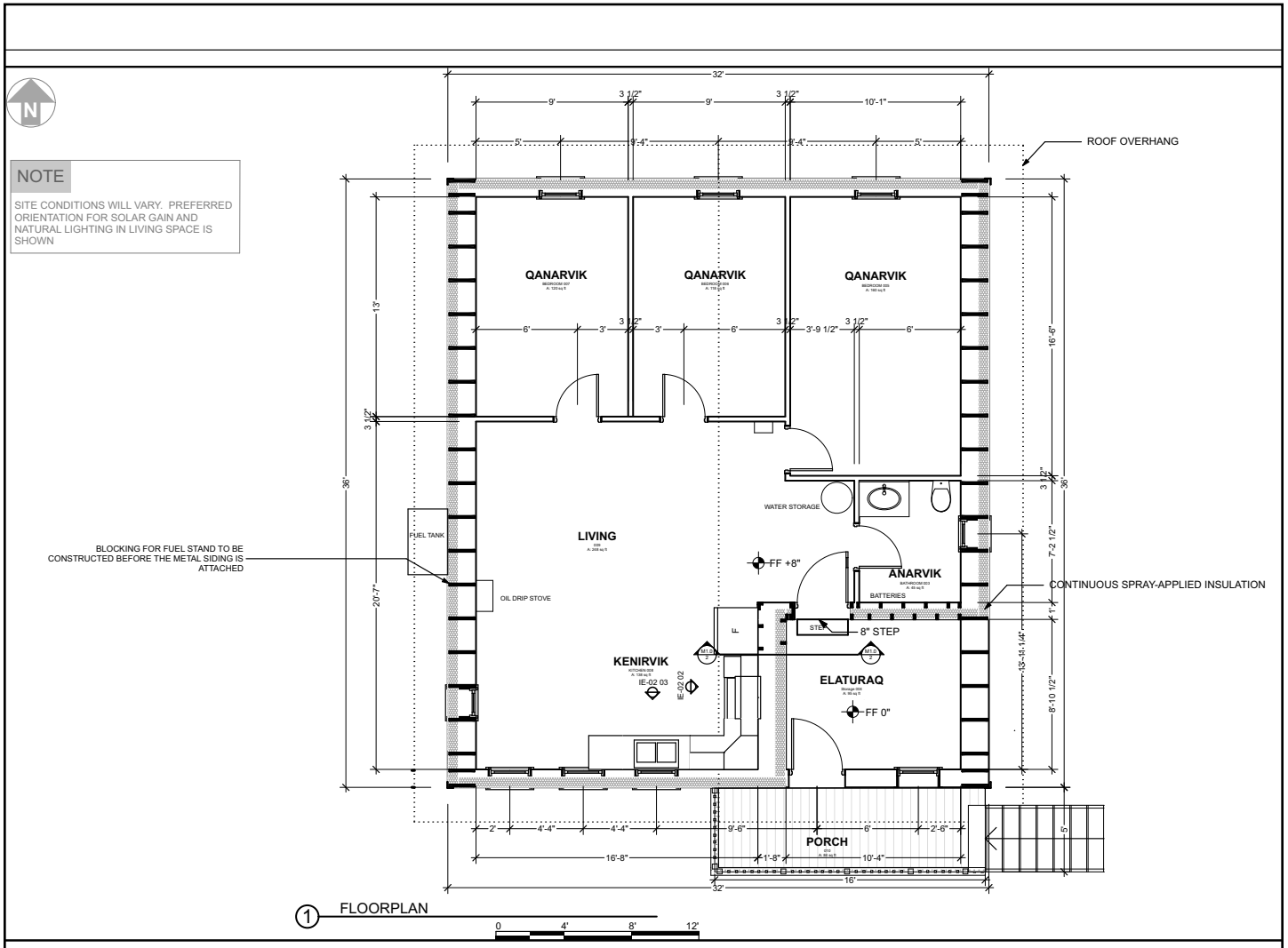
Above: The crew framed out the entire integrated truss structure in 1.5 days.



Above: Spray-applied polyurethane insulation creates a monolithic thermal envelope and also functions as a vapor retarder in the home, creating an extremely warm building envelope that requires ventilation.



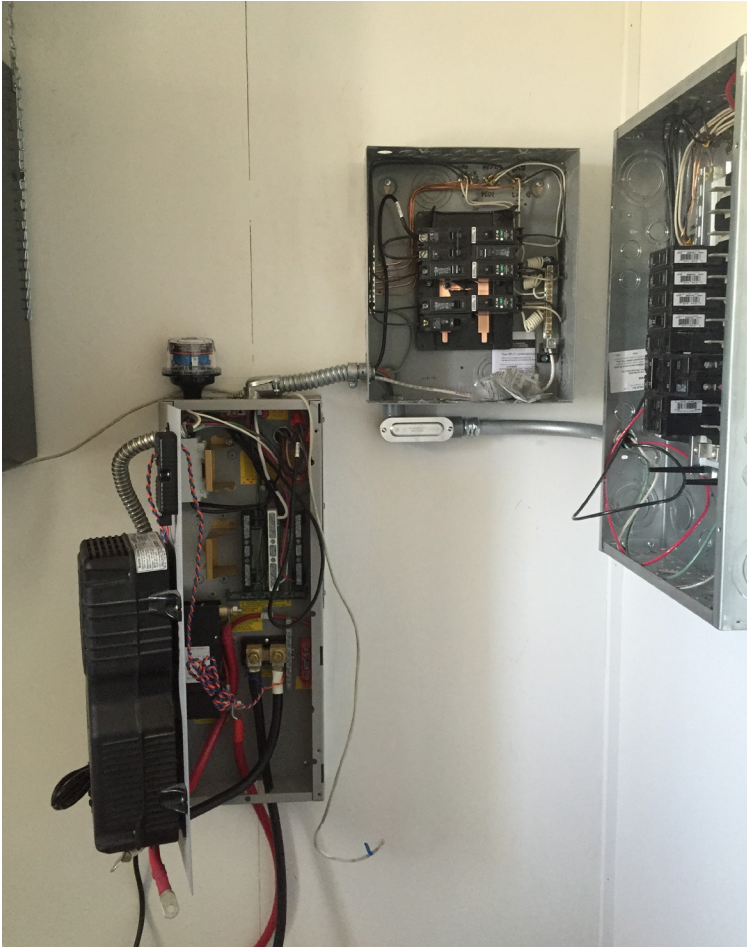
Above: Durable cladding such as ribbed metal sheathing will stand the test of time while minimizing maintenance, repainting, or water damage over time.



Above: The floorplan of the Mertarvik Demonstration Home is compact and lacks hallways, an element requested by rural occupants. The arctic entry is inside the thermal envelope but unconditioned, and the walls are filled with 7.5" of spray-applied polyurethane insulation, forming a monolithic thermal envelope with no seams, cracks, or thermal bridges.



Power



Above: The two panels with inverter and transfer switch in the Demonstration Home.



Above: Color-coded outlets in the Demonstration Home allow the occupant to know which outlets work when the house is on battery power.



Above: An occupant of the Demonstration Home goes through training with a licensed electrical administrator.



Above: The control panels for the electric system and the ventilation system are adjacent to each other in the main living space, giving occupant control to both systems.



Above: An occupant of the Demonstration Home goes through training with a licensed electrical administrator.



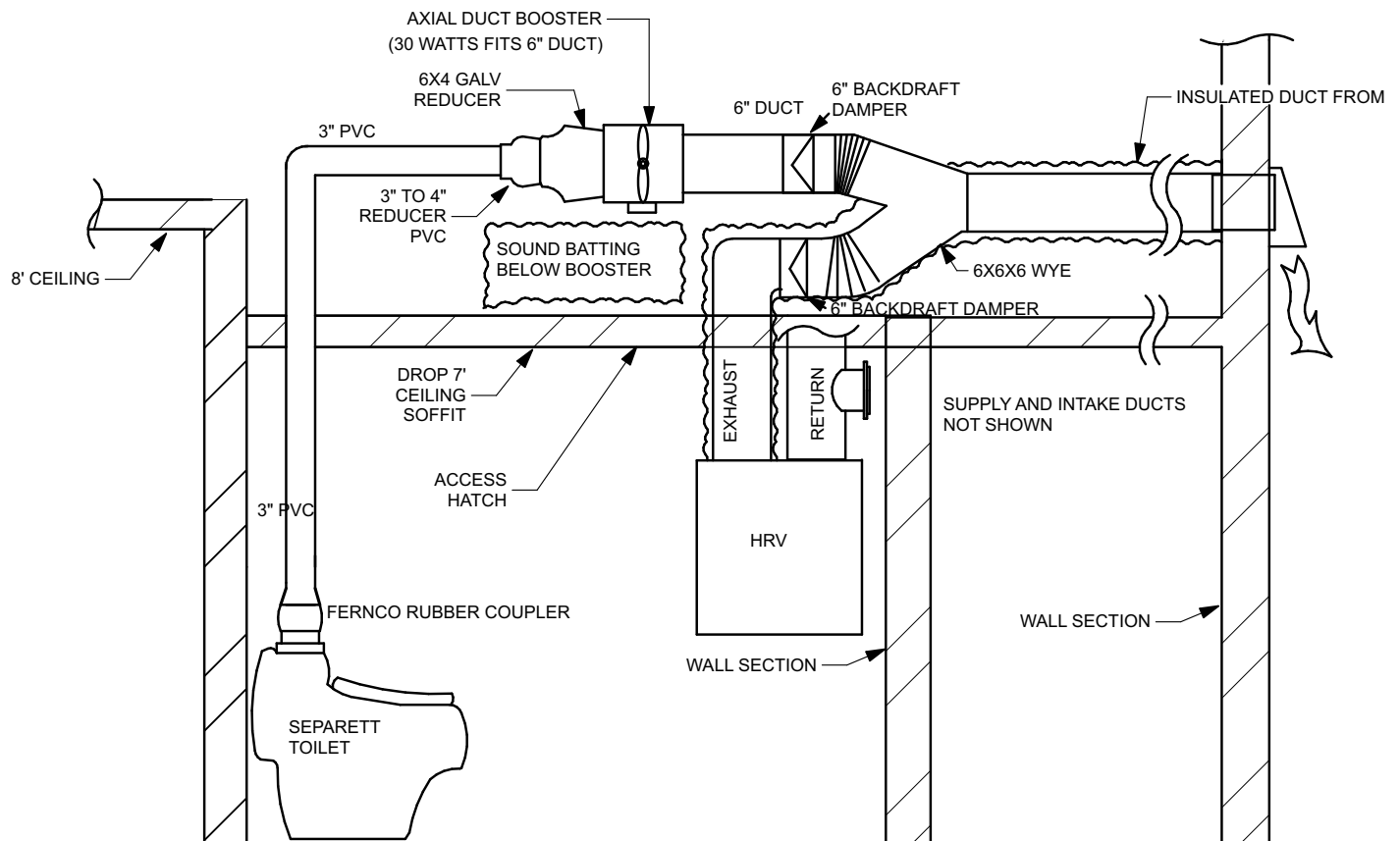
Ventilation



Above: The Heat Recovery Ventilator preheats fresh intake air before distributing it to the household.



Above: Residents of Atmautluak install a separating toilet in a prototype home.



Above: The Demonstration Home in Mertarvik uses a separating toilet as the exhaust port for the ventilation system. This keeps odors out of the house and accelerates the drying of solids. A damper keeps the system from short-circuiting the toilet when the ventilation system goes into recirculation mode.



Water and Waste



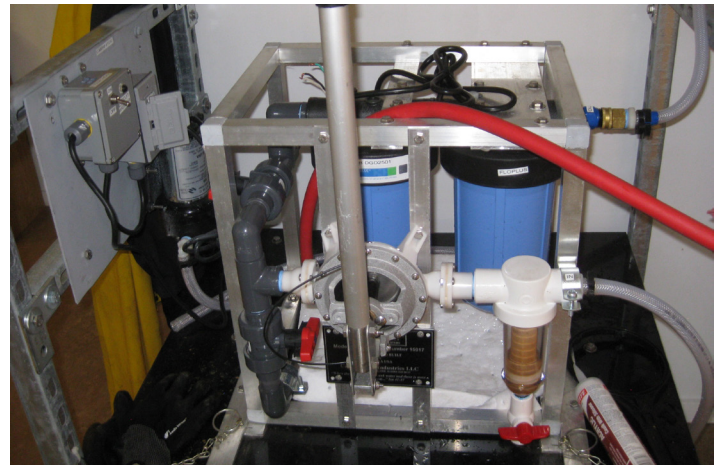
Above: The spring at Mertarvik has been a source of fresh water for generations. Laborers and visitors often stop to take on water here.



Above: Melted ice is a common source of fresh water in the winter.



Above: The water treatment plant in the Mertarvik Demonstration Home.



Above: Close up view of the pump and filter in the water treatment plant in the Demonstration House.



Above: A local Elder in Atmautluak explains the operations of the portable water treatment plant in Yup'ik.



Above: Campwater Industries and CCHRC Staff constructed a hand pump and well house to be used during the transitional phase.



Above: The original wellhead at the Mertarvik Evacuation Center site.



Above (both): The Alaska Lions Club funded the construction of the wellhouse at Mertarvik. This building, along with the water treatment plant, was used by residents at the Mertarvik site in summer 2016.



Above: The separating toilet comes with an optional urinal, or can separate the liquid and solid waste internally as well.



Above: An existing incinerator is used for garbage at the Mertarvik site during the transitional phase.



Above: The Demonstration Home in Mertarvik uses an oil drip stove, which does not require electricity to heat the home. Once electrical infrastructure is present in the village, homes may use the more common monitor or Toyotomi heating appliances.



Above: The septic and drainfield for the Mertarvik Evacuation Center is already in place, and may be a resource for waste disposal during the transitional phase.



Quinhagak “Octagon” House

In 2010, CCHRC worked with the village of Quinhagak to build an energy efficient octagonal house that reflected the climate and culture of the village. The Quinhagak Prototype Home was designed for the environment of the Yukon Kuskokwim Delta, where wind-driven rain and snow causes extreme building failures among many homes. The octagon shape lessens the surface area-to-volume ratio, significantly reducing the amount of surface area exposed to the cold compared to a rectangular model the same size. An elaturaq, or arctic entry, is wrapped around two of the eight walls, further improving heating efficiency and protecting the home from wet winds. The form of this house channels wind around the building, allowing for the scouring of snow in front of doors and windows, lessening problems with snow drifts.

Plan

This house has 1,080 square feet, 900 of which are conditioned (heated). It has three bedrooms, a bathroom, mechanical room, and a U-shaped kitchen that opens to the living/dining area. The open plan allows for more family interaction and lessens the possibility of cold areas within the house. The walls of this house are each 14 feet wide, 8 feet tall, and 8 inches deep. The width of these walls can be easily increased to make a larger floor plan that could provide more storage space or possibly an additional bedroom. For storage, there is a pantry in the kitchen and a large arctic entry.

Walls

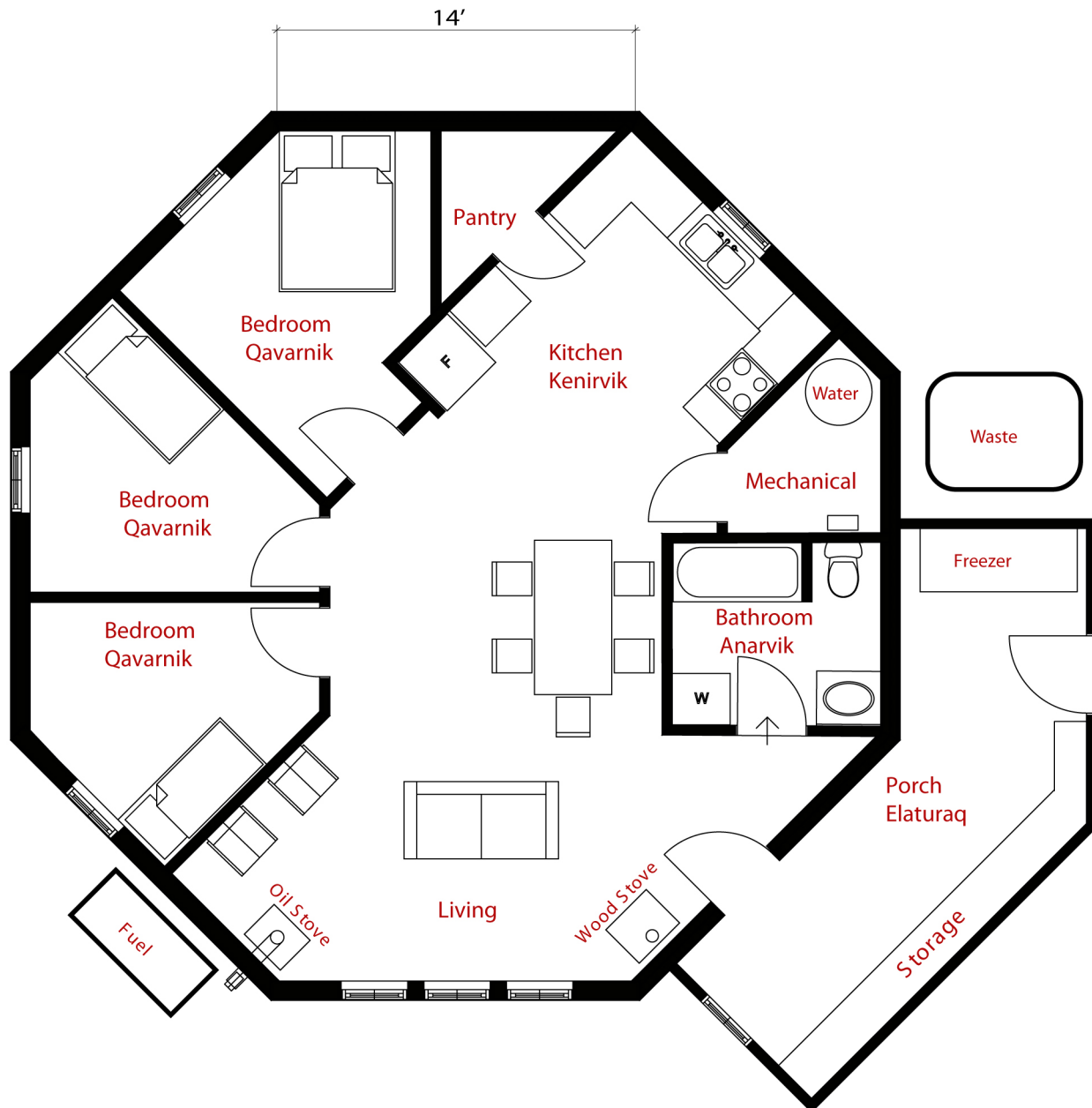
The walls of the prototype are comprised of 4-inch metal studs on the inside, a 3.5-inch plastic spacer in the middle, and a light-gauge angle-iron that holds the siding 7.5-inch out from the inside of the stud. The non-conductive plastic spacer minimizes the heat that escapes through the studs. Spray foam is applied continuously to the foundations, walls, and roof, creating a monolithic envelope with no gaps or thermal bridging. The design creates a simple, super-insulated wall (R-40) without the added material of traditional double-wall construction. The wall is light enough that it can be lifted and installed by four people.

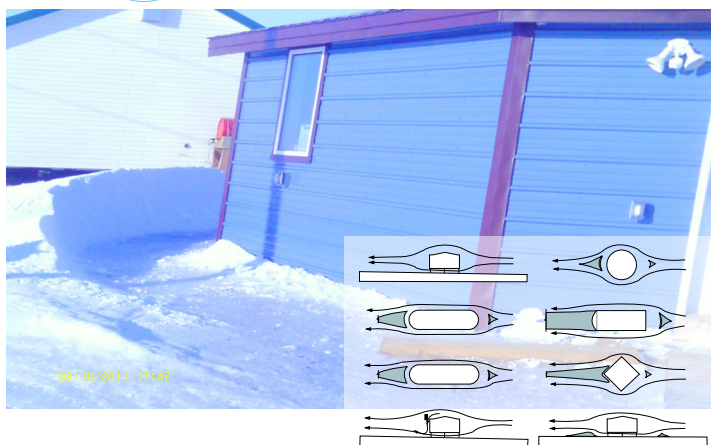


Above: The octagon-shaped prototype house in Quinhagak reflects traditional housing in the Bering Sea community.



Quinhagak House
Kuineramiut Ena
900 SF (conditioned)
1080 SF (total)





Above: The octagon form of the Quinhagak House allows the wind to move around it, scouring snow from the ground and preventing drifts in front of windows and doors.



Above: The sections of wall are light enough for four workers to carry. The wall system can be prefabricated inside a shop during the off-season or inclement weather and carried to the site during construction.



Above: Picture of interior. View looking from living/dining room into Kitchen.



Above: Picture of interior. View looking from kitchen into living/dining.



Above: Picture of interior. View looking from living/dining area toward bedrooms.



Above: Picture of interior. View looking from front entry into living/dining area showing open plan and lots of natural light through windows.



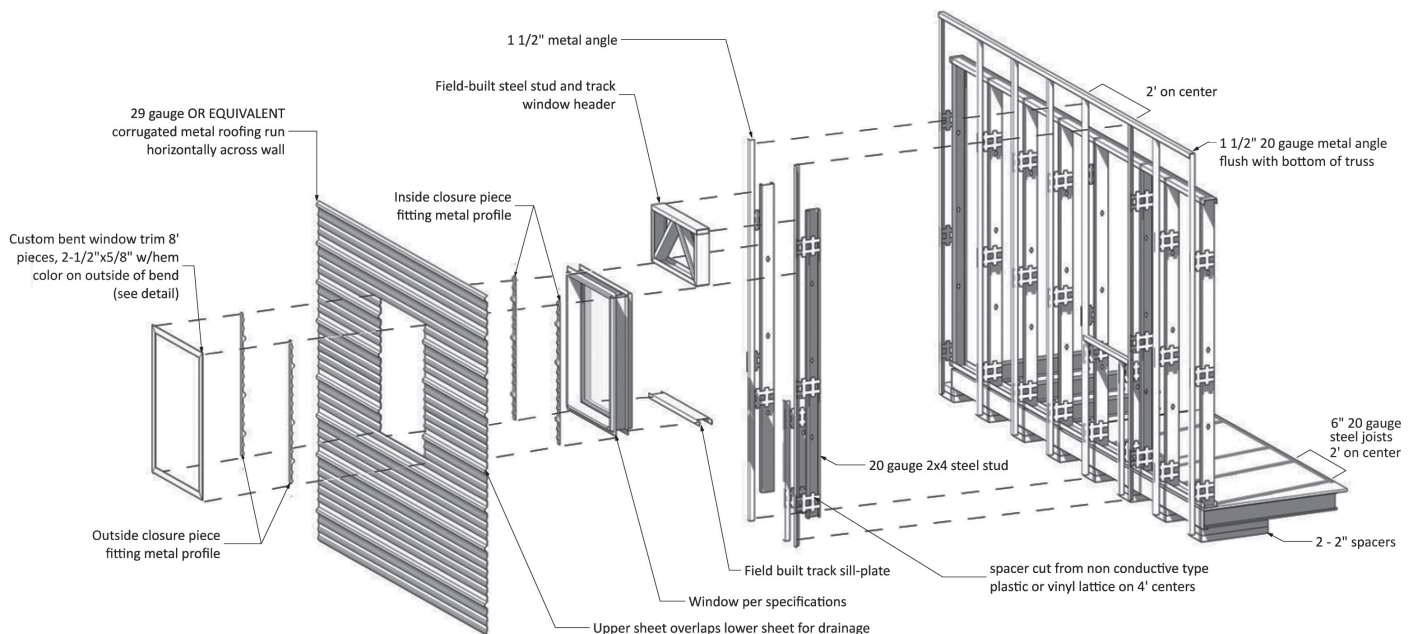
Roof

The Quinhagak roof features a pair of central steel hubs: the lower hub holds the bottom chords of the roof trusses in balanced tension and the upper hub holds the top chords in compression. This assembly allows the truss length to be half as long to span the building, which saves on shipping costs. Additionally, the hub allows for an open floorplan without columns. The roof is vented so it can dry out if any moisture works its way into the assembly.

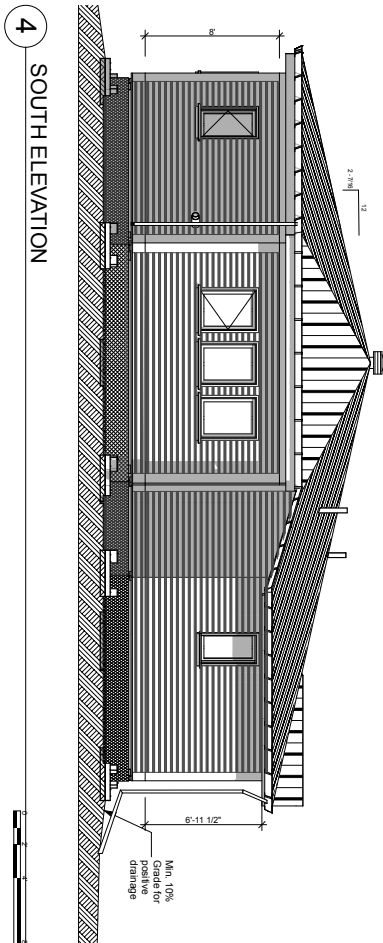
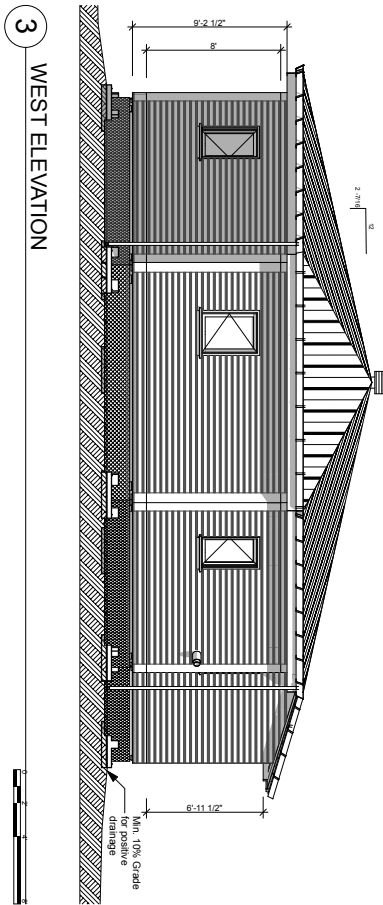
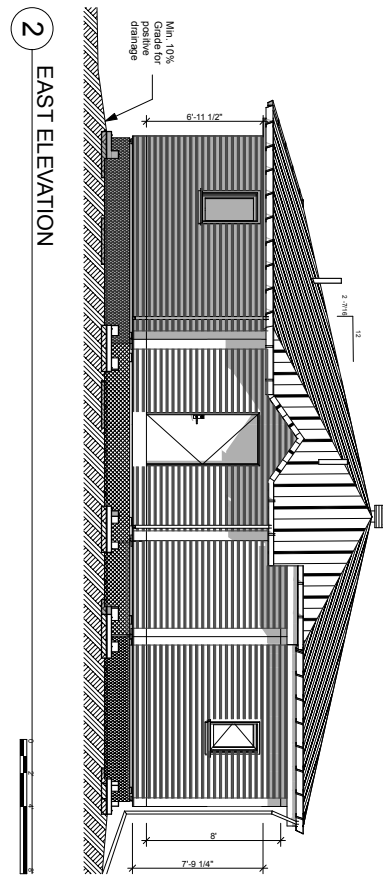
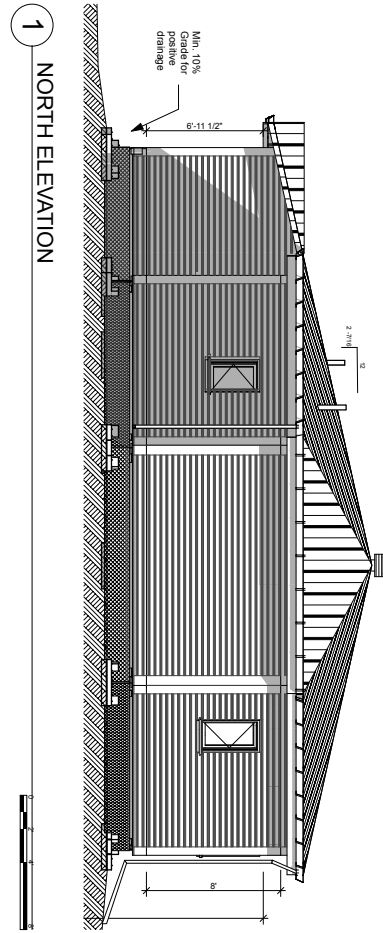
Foundation

Unlike most foundations in the region, the original Quinhagak prototype rests directly on an overbuilt gravel pad. The floor joists were elevated off the ground with EPS foam board spacers, and soy-based polyurethane foam was sprayed through the joists directly onto a geo-textile mat. This raft-like foundation provides an insulation value of R-60 and a very effective thermal break, so heat from inside the home can't escape through the floor joists directly into the ground.

After the original prototype was built an alternative foundation was developed that is on an adjustable post and pad foundation to be used where the ground is subject to larger amounts of surface and in-ground water flows.



Above: Exploded axonometric drawing of wall system. Metal studs and offset angled metal that siding is fastened to.





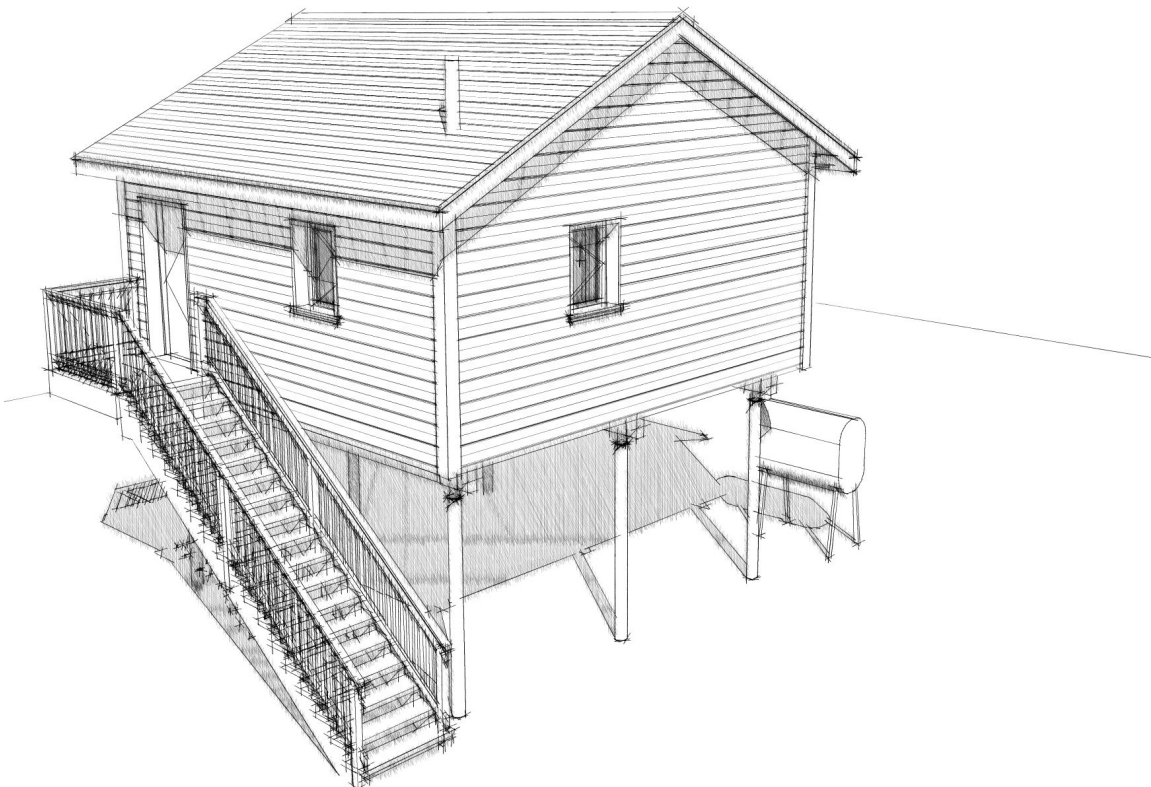
Spenard Builders Supply-CCHRC 20x20 “Hawk” Model Home Kit

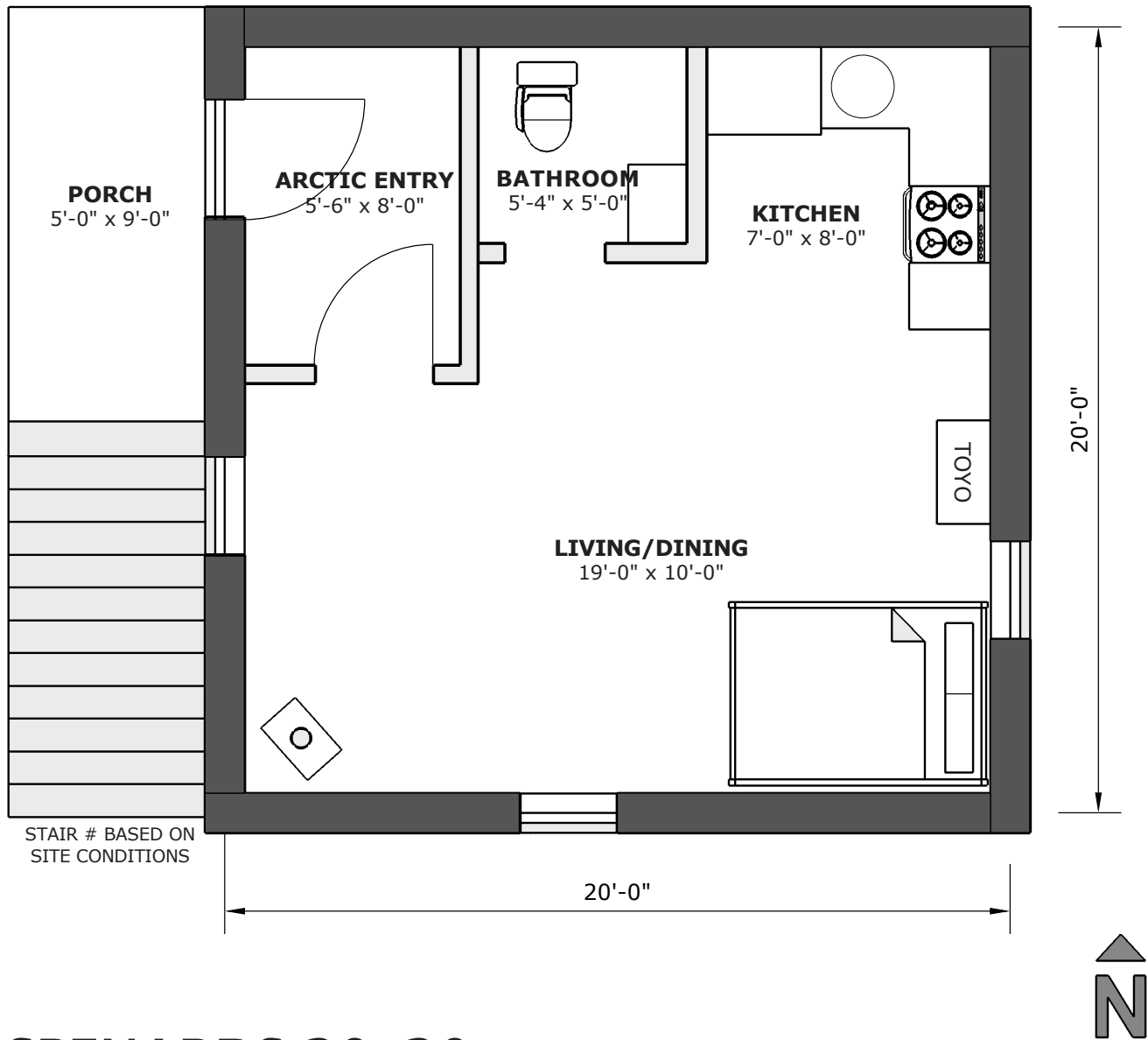
The ‘Hawk’ was designed by Spenard Builders Supply as a 400 square foot starter home. Exterior framing dimensions measure 20’x20’. Included in the floor plan is an arctic entry, and a separate room that serves as a bathroom and/or utility room, depending on need. The remaining usable space follows a studio apartment in function, whereby the kitchen, living room and bedroom all share the same space. This dwelling has provisions for both a wood stove and a Toyotomi type oil fired space heater. As none of the interior walls are structural, the floor plan can be readily changed to suit occupant needs.

The purpose of the ‘Hawk’ design is to provide a competitively priced smaller home that can be constructed quickly with a minimum of skilled labor. As the structure is smaller, the materials package is compact and several homes can typically be sent in one shipment.

This home can readily meet AHFC 5-star plus energy requirements in any of the 4 climate zones found within the state. The exterior walls are built using the REMOTE wall system, where varying thicknesses of foam board insulation are applied to the building exterior. For example, 4” of exterior insulation could meet energy standards in Southeast and Southcentral, while 6” of exterior insulation would meet energy efficiency requirements for the colder climates encountered in Alaska’s interior. The added benefit of the exterior insulation approach is that this system, when properly detailed, provides a vented rain screen directly behind the siding. A draining type house wrap behind the foam board provides an additional drainage plane behind the foam board. A section drawing of the REMOTE Wall is shown in this section and the construction manual is provided in the appendices. The roof system is a standard vented truss roof covered with metal roofing while the floor system contains batt insulation followed by a weather barrier and a continuous layer of foam board on the underside.

A wood frame structure of this type will provide a durable, long lasting structure that performs very efficiently in both Alaska’s maritime climates and the Interior. For more information on this home including pricing for this home kit, contact Curt Strobel or Steve Lusk at Spenard Builders Supply in Anchorage 907-452-5050.

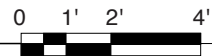




SPENARDS 20x20

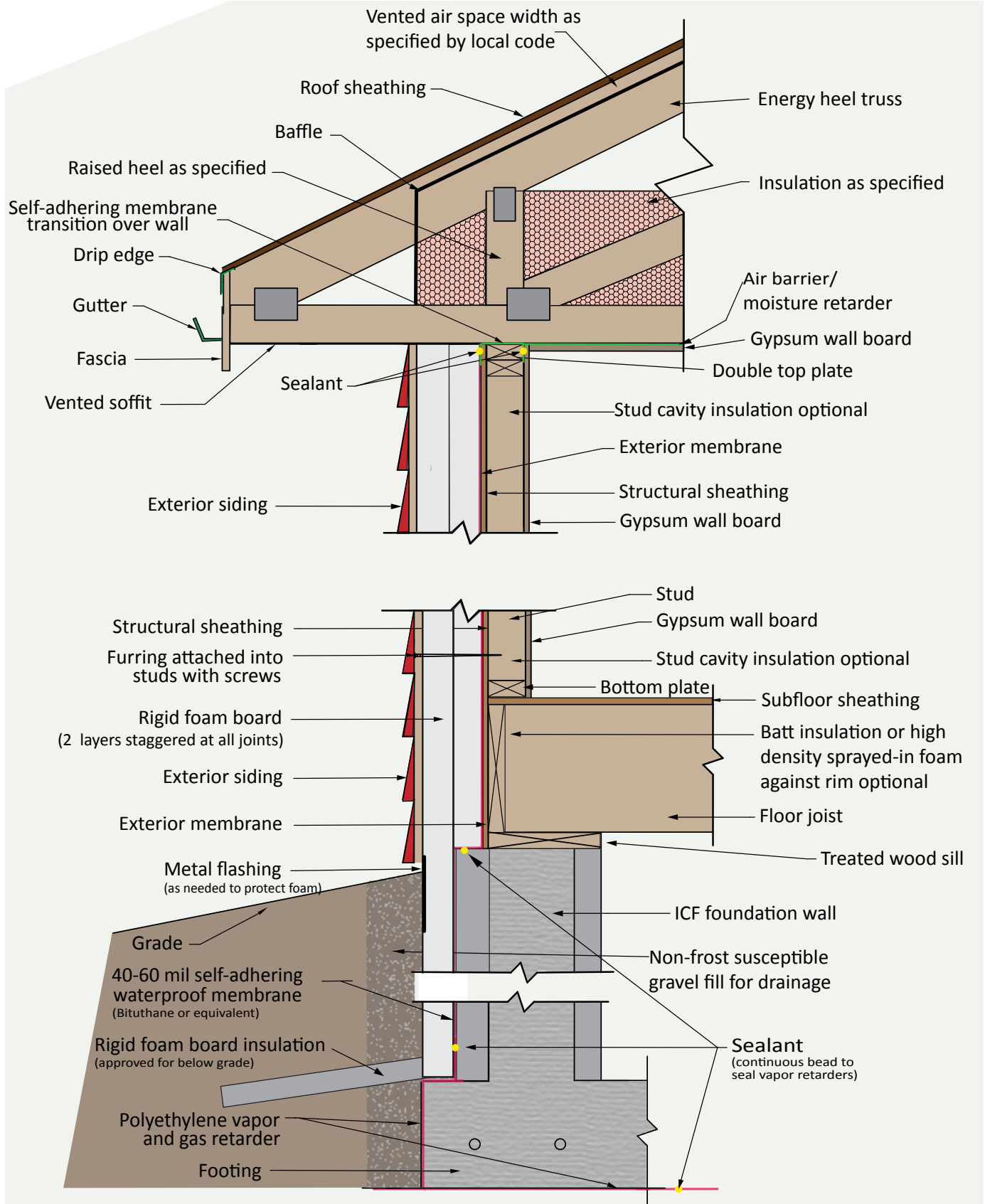
CCHRC UPGRADE JULY 2013

400 SQ.FT.





Section Through REMOTE Wall





AVCP Regional Housing Authority Single Family Houses



As of February 2017, Association of Village Council Presidents Regional Housing Authority (AVCP RHA) will be constructing four homes in Mertarvik in the summer of 2017 through Force Account. The two house designs shown on the following pages utilize construction techniques and materials that AVCP RHA has used to construct homes throughout the Yukon-Kuskokwim Delta. The Home Mortgage Home Program (HMH) 4 2016 and the Very Low Income Program (VLIP) 3 2012 are designed to use 8-inch prestressed foam core panels with a minimum of R-24 for the exterior walls, fiberglass loose fill insulation in the attic area and high performance batt insulation in the floor giving the roof and floor an R-value of 50. They can be built using either a steel pipe pile or post-and-pad foundation. They are heated with Toyotomi direct vent heaters and woodstove for back up. The exterior is clad with metal siding and roofing. The HMH 4 2016 is a 1392 square foot, four-bedroom, one bathroom house with a large open living room/kitchen/dining area, an enclosed arctic entry, and a covered outside entry. The VLIP 3 2012 is a 1008 square foot, three-bedroom, one bathroom house with a kitchen, a large living room, and an enclosed arctic entry.

AVCP RHA has worked hard to create an affordable house. The average cost of construction, according to their website at the time this report was published, is \$200/sf for a single story moderate design. They work hard to keep all components of the cost of construction down including strategizing with suppliers to load materials into the shipping containers in the order they are needed on the construction site to minimize material waste and increase the speed of construction. Their construction team is made up of highly skilled foreman, carpenters, and tradesman that are able to work efficiently and carefully. They try to hire local laborers whenever possible to help build the local economy of the villages they are building houses in.

If more information regarding these houses is desired, please contact the Development Department at AVCP Regional Housing Authority.

411 Ptarmigan Street Bethel, AK
PO Box 767, Bethel, AK 99559
Phone: 907-543-3121
Toll-Free: 800-478-4687

<http://www.avcphousing.org/admin/new-development/>





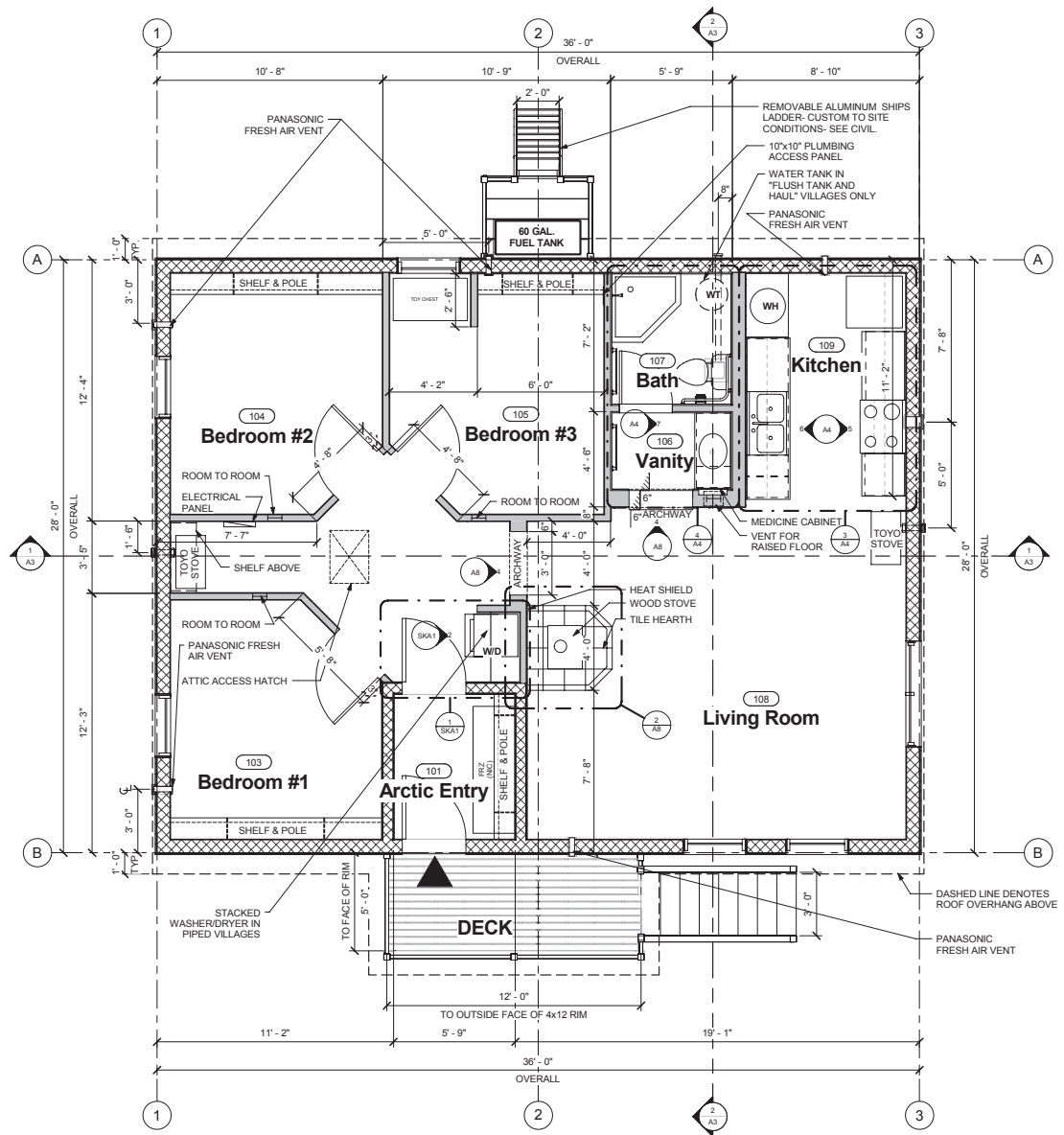
<p>3 RIGHT ELEVATION 1/4" = 1'-0"</p> <p>NOTE: METER READING STAND, ELECTRICAL METER BASE, AND TEL.COM SERVICE METER READING STAND SHOWN ON THIS VIEW CHANNEL FLASHING.</p> <p>ELECTRICAL SERVICE W/ WEATHERHEAD 2" RIGID CONDUIT TO POWER POLE</p> <p>9'-5" MIN. 4'-8" MIN.</p> <p>2'-2" UNSTRUCTURED EVERY 24"</p> <p>12</p> <p>3</p> <p>8'-11/8" TOP OF PLATE</p> <p>VARIES</p> <p>FINISH FLOOR 3/4"</p> <p>TOTO STOVE VENT</p>	<p>4 REAR ELEVATION 1/4" = 1'-0"</p> <p>PANASONIC VENTS, TYP.</p> <p>RANGE/STOVE HOOD VENT</p> <p>BATHROOM FAN EXHAUST</p> <p>7'-0"</p> <p>7'-8"</p> <p>7'-5"</p> <p>8'-11/8" TOP OF PLATE</p> <p>FINISH FLOOR 3/4"</p> <p>VARIES</p>
<p>2 LEFT ELEVATION 1/4" = 1'-0"</p> <p>PANASONIC VENT, TYP.</p> <p>7'-0"</p> <p>2'-0" MIN. TO PEAK</p> <p>8'-11/8" TOP OF PLATE</p> <p>VARIES</p>	<p>1 FRONT ELEVATION 1/4" = 1'-0"</p> <p>ASC STRATA RIB</p> <p>METAL ROOF</p> <p>METAL SIDING</p> <p>GUTTERS @ EAVES SLOPED 1/8" PER FOOT</p> <p>8'-11/8" TOP OF PLATE</p> <p>TOTO STOVE VENT</p> <p>5" MIN.</p> <p>6" STEEL PILE</p> <p>CHIMNEY CAP</p> <p>FUEL TANK & DECK</p> <p>PANASONIC VENTS, TYP.</p> <p>8" PASCAL, TYP.</p>



VERY LOW INCOME PROGRAM (3)

VLIP 3 2012 DRAWINGS

7/25/2012

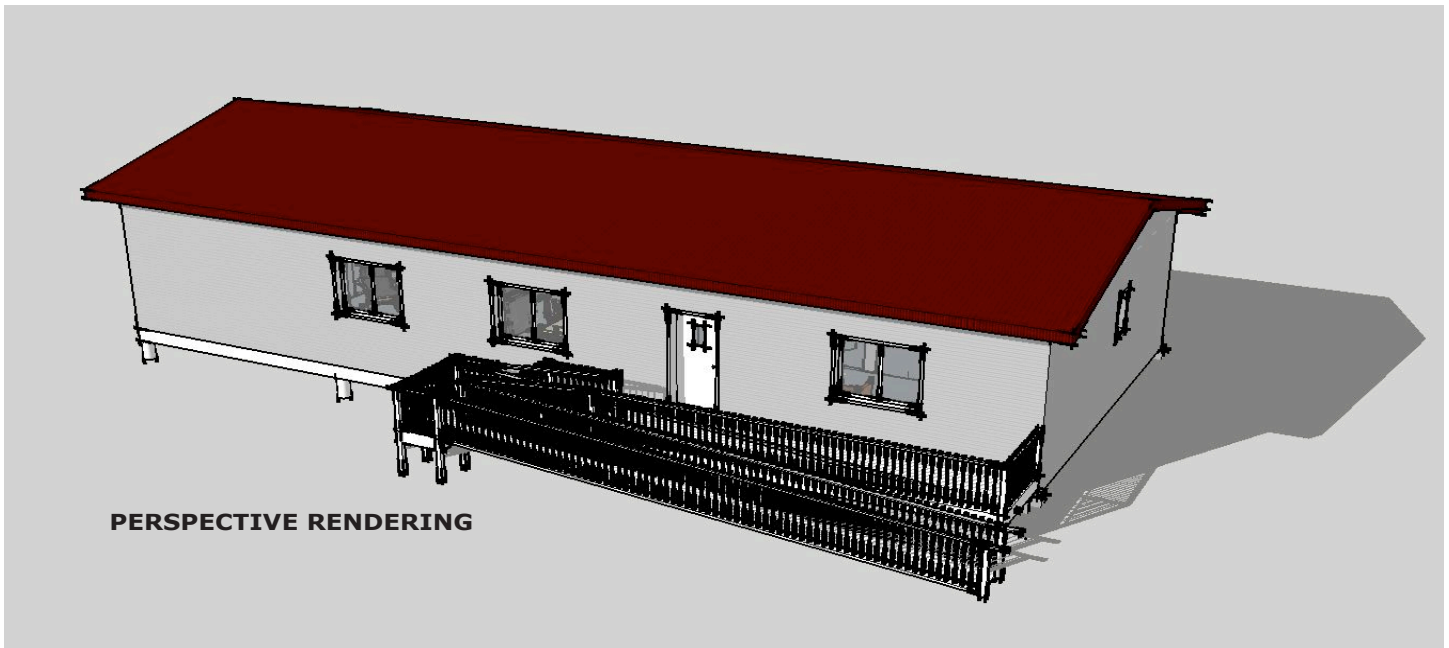




<p>2 REAR ELEVATION 1/4" = 1'-0"</p> <p>Labels: TOP PLATE 8'-1 1/8", FINISHED FLOOR, BATHROOM FAN EXHAUST, SWITCHED MOTION DETECTOR LIGHT, FUEL TANK & DECK, PANASONIC VENT TYP., GUTTERS @ EAVES SLOPED 1/8" PER FOOT, ELECTRICAL METER BASE, ELECTRICAL METER, TO POWER POLE, 2" RIGID WEATHERHEAD CONDUIT, 2" 3/4" KNOX LUMBER SUPPORT EVERY 24", ELECTRICAL METER BASE, PANASONIC VENT TYP., TOYVO STOVE VENT, FINISHED FLOOR.</p>	<p>3 RIGHT ELEVATION 1/4" = 1'-0"</p> <p>Labels: TOP PLATE 8'-1 1/8", FINISHED FLOOR, CABLE END VENT, TOYVO STOVE VENT- 5 MIN. CLEAR RADIUS TO OPENINGS, RANGE/STOVE HOOD VENT, 7'-4", 5'-0" MIN., 3'-12", FINISHED FLOOR, ALUMINUM SHIPS LADDER.</p>
<p>1 LEFT ELEVATION 1/4" = 1'-0"</p> <p>Labels: TOP PLATE 8'-1 1/8", FINISHED FLOOR, ALUMINUM SHIPS LADDER, TOYVO STOVE VENT, 3'-12", 5'-0" MIN., 7'-4", 5'-0" MIN., 2" 3/4" KNOX LUMBER SUPPORT EVERY 24", ELECTRICAL METER BASE, PANASONIC VENT TYP., TO POWER POLE, 2" RIGID WEATHERHEAD CONDUIT, ELECTRICAL METER, METER READING STAND, TEL. COM SERVICE, PANASONIC VENT TYP., TOYVO STOVE VENT, FINISHED FLOOR.</p> <p>NOTE: METER READING STAND, ELECTRICAL METER BASE, AND TEL. COM SERVICE ENTRANCE ARE LOCATED ON TREX W/ 3 CHANNEL FLASHING.</p>	<p>4 FRONT ELEVATION 1/4" = 1'-0"</p> <p>Labels: TOP PLATE 8'-1 1/8", FINISHED FLOOR, GUTTER SLOPES BACK TO BUILDING 1/8" PER FOOT, CHIMNEY CAP, LIGHT FIXTURE (SEE ELEC), PANASONIC VENT TYP., GUTTERS @ EAVES SLOPED 1/8" PER FOOT, ASC STRAP-A-RIB XL METAL ROOF, 8" FASCIA BOARD, ASC TRILAP METAL SIDING, FINISHED FLOOR, ELECTRICAL SERVICE POLE, ELECTRICAL METER BASE, ELECTRICAL METER, TOYVO STOVE VENT, FINISHED FLOOR.</p>



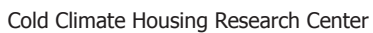
Single Family / Extended Family Duplex



Above: Rendering of computer model of 15% Duplex Design with shared porch and wheelchair ramp.

The family unit, in general, is ever changing. It increases in size due to children being born, marriages, and accepting extended family into the household. It decreases in size because of marriages, death, and people moving on to another phase of life (schooling, career, etc). It is difficult to design a house for such a dynamic unit. Yet, it is evident that the residents of Newtok need a house design that attempts to allow for these changes. CCHRC is proposing this 15% design concept of a duplex that is not necessarily meant for two separate households. One side of the duplex is a three-bedroom unit and one side is a one-bedroom unit. The units share a porch and an arctic entry. The one-bedroom unit was developed using universal design principles and a ramp to the porch was included in the design for wheelchair accessibility. As a result, one family could occupy the duplex in a variety of ways. The one-bedroom unit could be used for an Elder, who wants to maintain some independence, but still be with the family, it could be a starter home for a couple with a new baby, or rented out as a means of extra income for the household. In addition the three-bedroom unit's bathroom has been planned so that it could easily be adapted to meet universal design principles for accessibility if a person using a wheelchair were living in that unit.

The structure is simple and can use a variety of construction techniques such as double wall stick framing or an Integrated Truss System, shown in the Demonstration House above. As shown here, the house is 64 Feet x 28 Feet for a total of 1792 gross square feet. The three-bedroom unit is 1009 square feet and the one-bedroom unit is 422 square feet. The shared arctic entry is 61 square feet and the shared mechanical room is 66.5 square feet. It is adequately sized for a large chest freezer or coat and gear storage. Both units are "open-plans", where hallways are not used. This design provides for more communal interaction between occupants and makes it easier to maintain a consistent temperature throughout the house.



Overall Dimensions: 64'-0" (Total Width), 28'-0" (Top Section Width), 28'-6" (Middle Section Width), 7'-1 1/2" (Right Section Width), 16'-1 1/2" (Bottom Section Width).

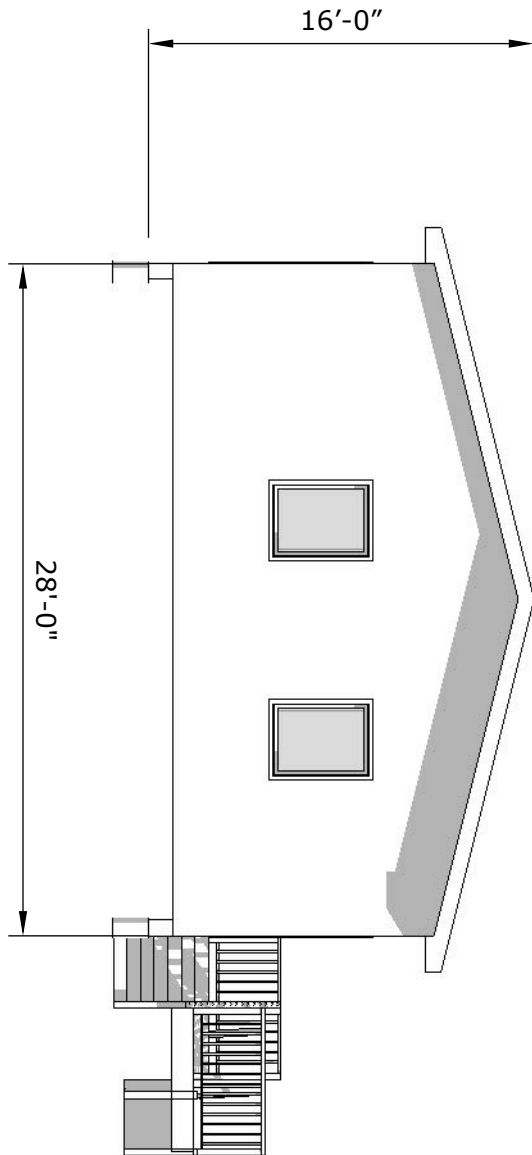
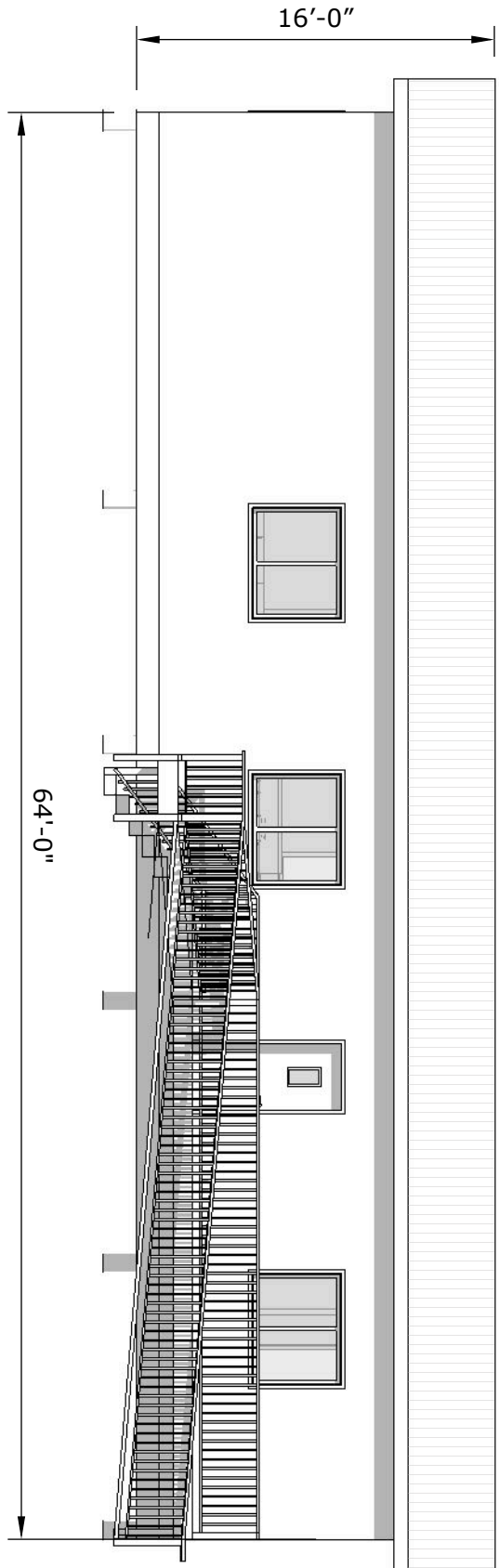
Left Unit (Top Section): 9'-6" (Bedroom 1 width), 12'-1 1/2" (Bedroom 2 width). Rooms include BEDROOM 1, BEDROOM 2, and BEDROOM 3. Closets (CL) are located in each bedroom.

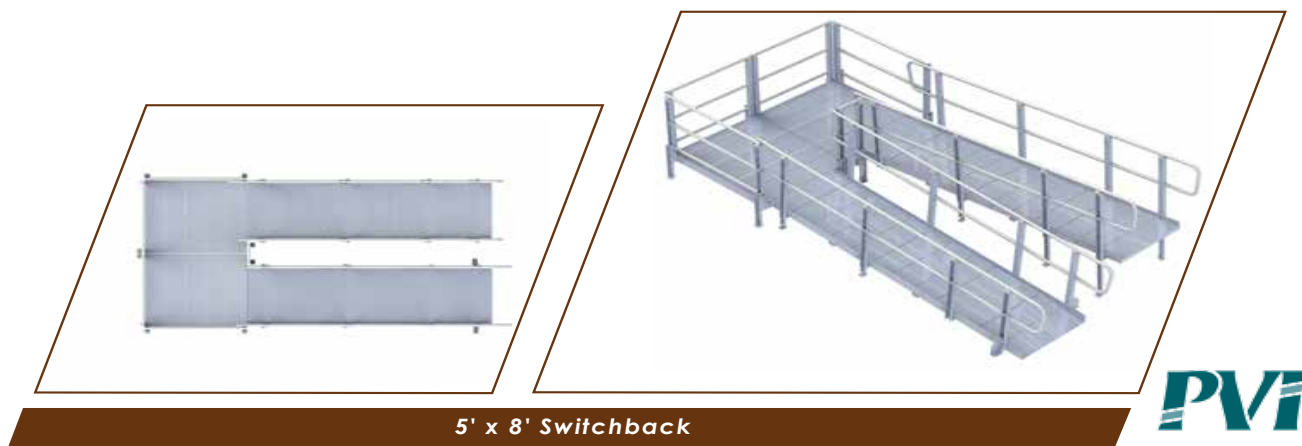
Left Unit (Middle Section): 28'-6" (Total width). Rooms include LIVING ROOM, DINING, and KITCHEN. A central area is labeled "W/D OR PANTRY". A BATH is located between the kitchen and the bedrooms. STAIRS are located on the left side.

Right Unit (Top Section): 7'-1 1/2" (Total width). Rooms include MECH (Mechanical) and a BEDROOM. A closet (CL) is located in the bedroom.

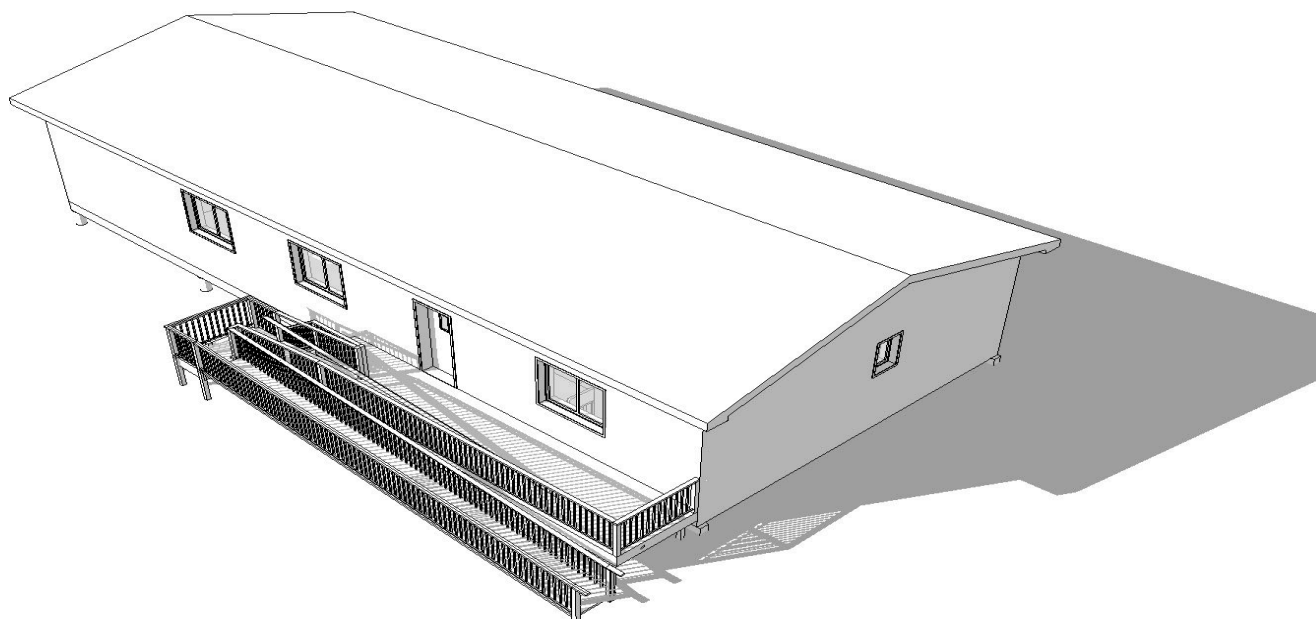
Right Unit (Middle Section): 7'-1 1/2" (Total width). Rooms include a BATH, KITCHEN, and LIVING ROOM. A closet (CL) is located in the living room.

Shared Features: A SHARED PORCH is located at the bottom of the plan. An ACCESS RAMP is located on the left side, adjacent to the stairs.

**SIDE ELEVATION****FRONT ELEVATION**



Above: Example of prefabricated modular ramp.



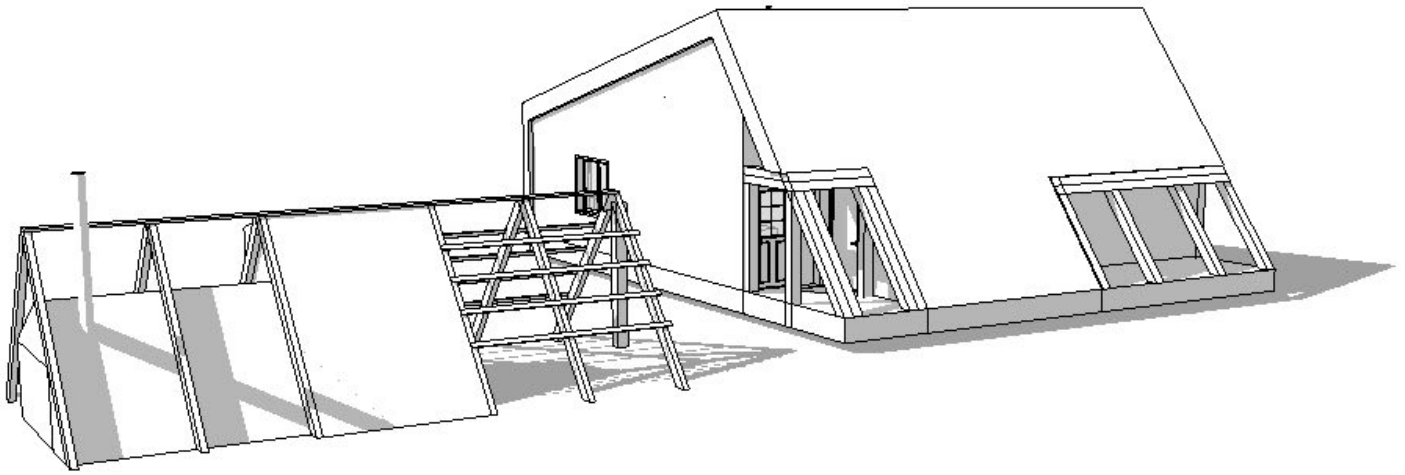
Above: View of ramp in computer generated 3D model.

The ramp could be built using wood deck construction techniques or use a prefabricated modular ramp with an adjustable foundation such as the one pictured above sold by Disability Systems, Inc. (CCHRC does not endorse a specific manufacturer or distributor.)

CCHRC recommends the duplex use CCHRC's BrHEAThe v2.0 combined heat and ventilation system. This system incorporates the HRV into the heating system. The HRV is tied to the boiler via a separate zone and a heat exchanger. Thus, the HRV provides fresh air and heat to all the rooms. This system ensures proper ventilation of the house for healthy indoor air quality while ensuring that the fresh air is heated to a level that is comfortable for occupants. CCHRC has tested and vetted this system and it can be built and maintained with standard parts. In order for this system to perform adequately, the duplex would need to be very well insulated. The duplex units would share a boiler but have two separate ventilation systems that use a Heat Recovery Ventilator (HRV). A diagram describing the system is on page 81.



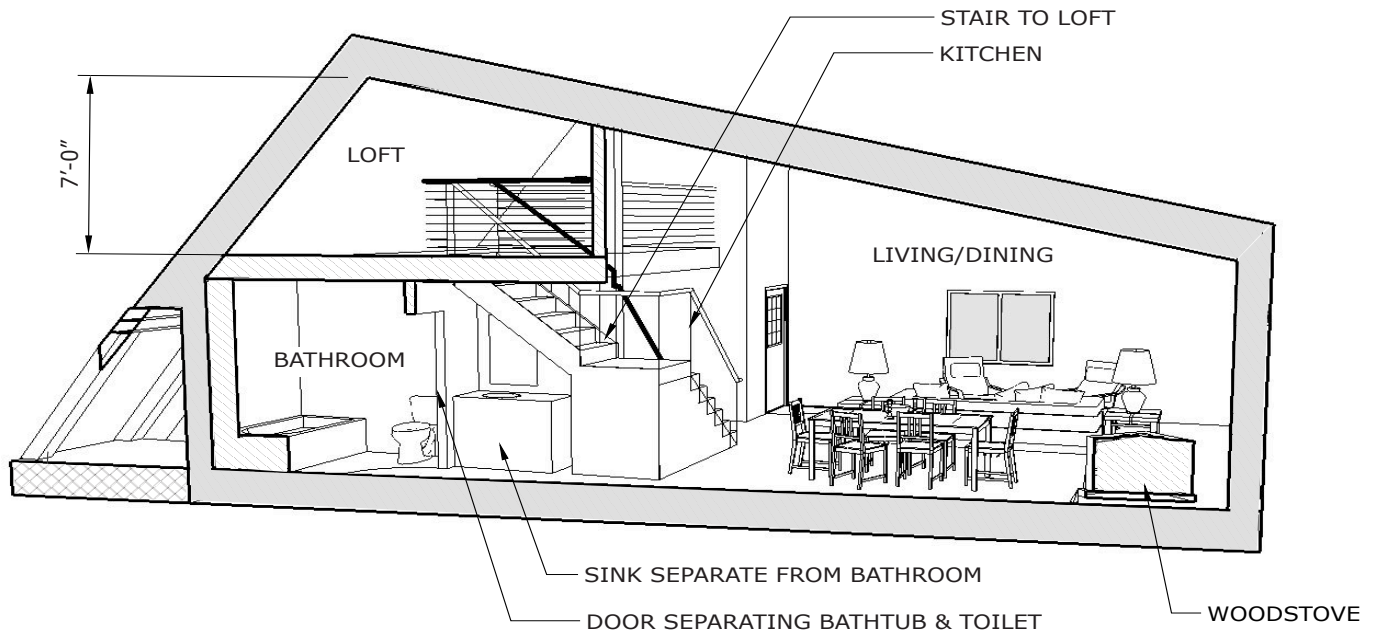
Larger/Multi-generational House



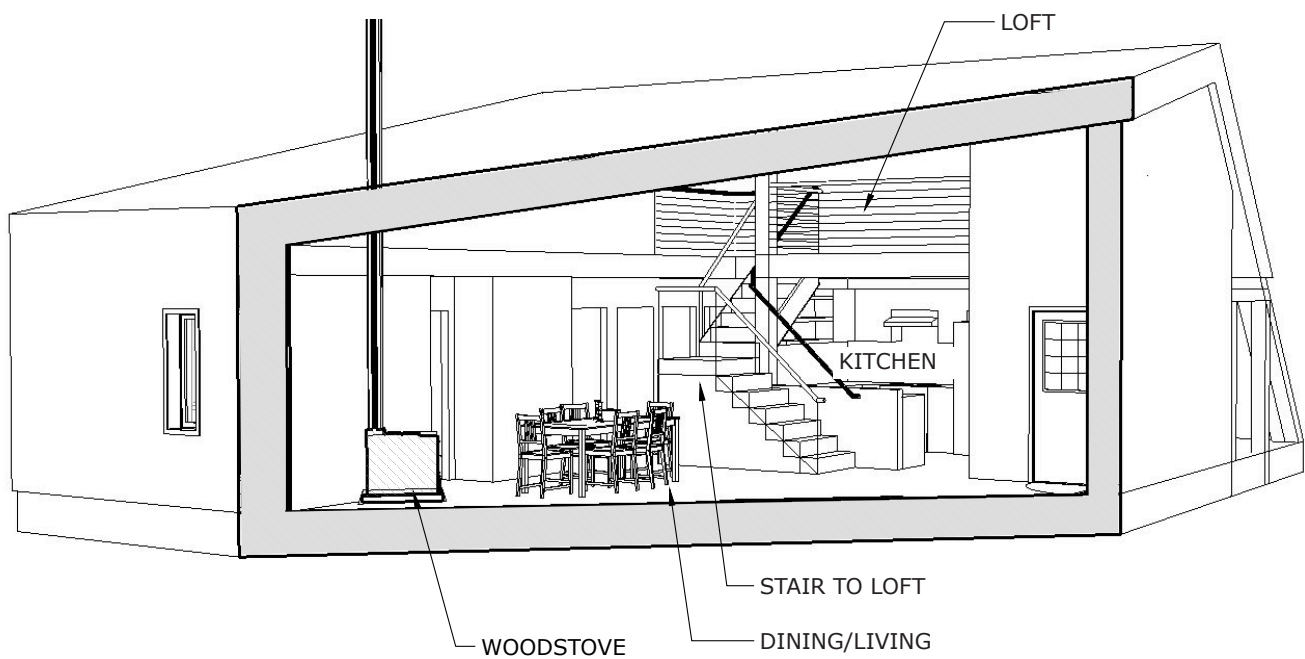
Overcrowded houses are a common problem in rural Alaska and the village of Newtok is no exception. The typical solution to this problem is to build more houses that are all roughly 1100 to 1200 square feet and have 3 bedrooms. Although more housing always eases the burden of overcrowding, it is not a solution that works for all families. Based on feedback from the November 2016 community meeting CCHRC held with the residents of Newtok, it became evident that not all families want to divide into separate houses. They do, however, know that most houses are too small for very large families such as ones that include multiple generations and extended family. CCHRC wanted to demonstrate what this type of house may look like with this 15% design concept.

This house is 1400 gross square feet plus a loft and exterior porches. The first floor has an interior of 1210 square feet and the loft is 224 square feet. The first floor has three bedrooms, an “open plan” living and dining room, kitchen, bathroom, arctic entry, and a mechanical room with a separate entrance. The bathroom sink has been separated from the bathroom that has the toilet and bathtub/shower. When there are many people living in one house, this gives access to the sink at all times for hand-washing, etc. The enclosed bathroom has been designed to be adaptable to universal design principles. If necessary, grab bars, a zero-threshold shower, and comfort height toilet could be added. It has been planned with the prescribed clearances in front of the tub, toilet, and sink.

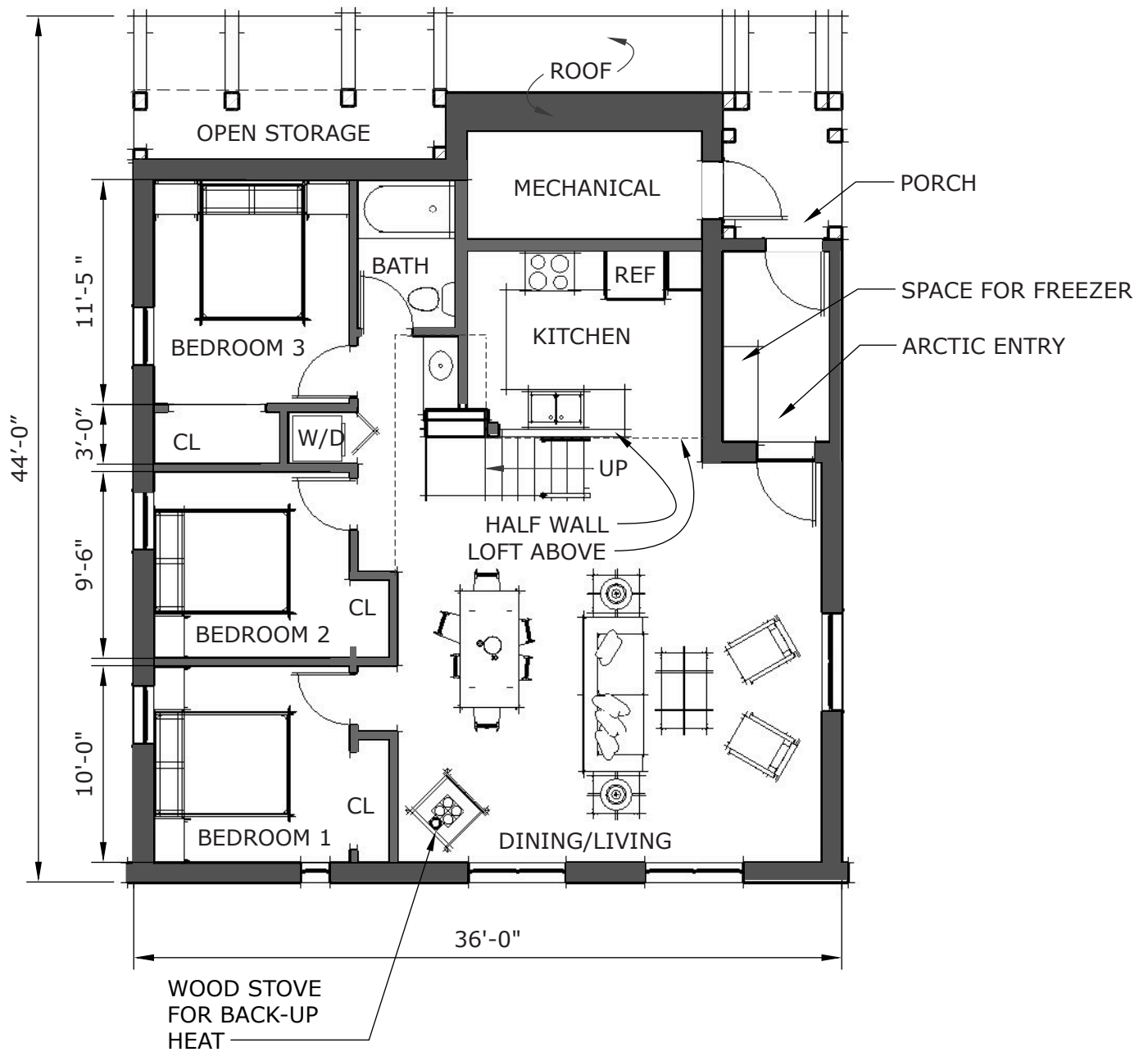
The loft was included in the design as a multi-purpose space. It could be used for more storage, but a full stairway and an egress window has been included so that this space could be considered habitable according to building code. It can be used as a guest room, another bedroom, a sewing room, children’s play area, etc. According to the International Residential Building Code Section 304.4, only the portion of the loft with a ceiling height of 5 feet can be included in the total habitable area. The 224 square feet mentioned earlier only includes this area. Another portion of this loft that has ceiling height below 5 feet has been enclosed and can be used for mechanical equipment and storage.



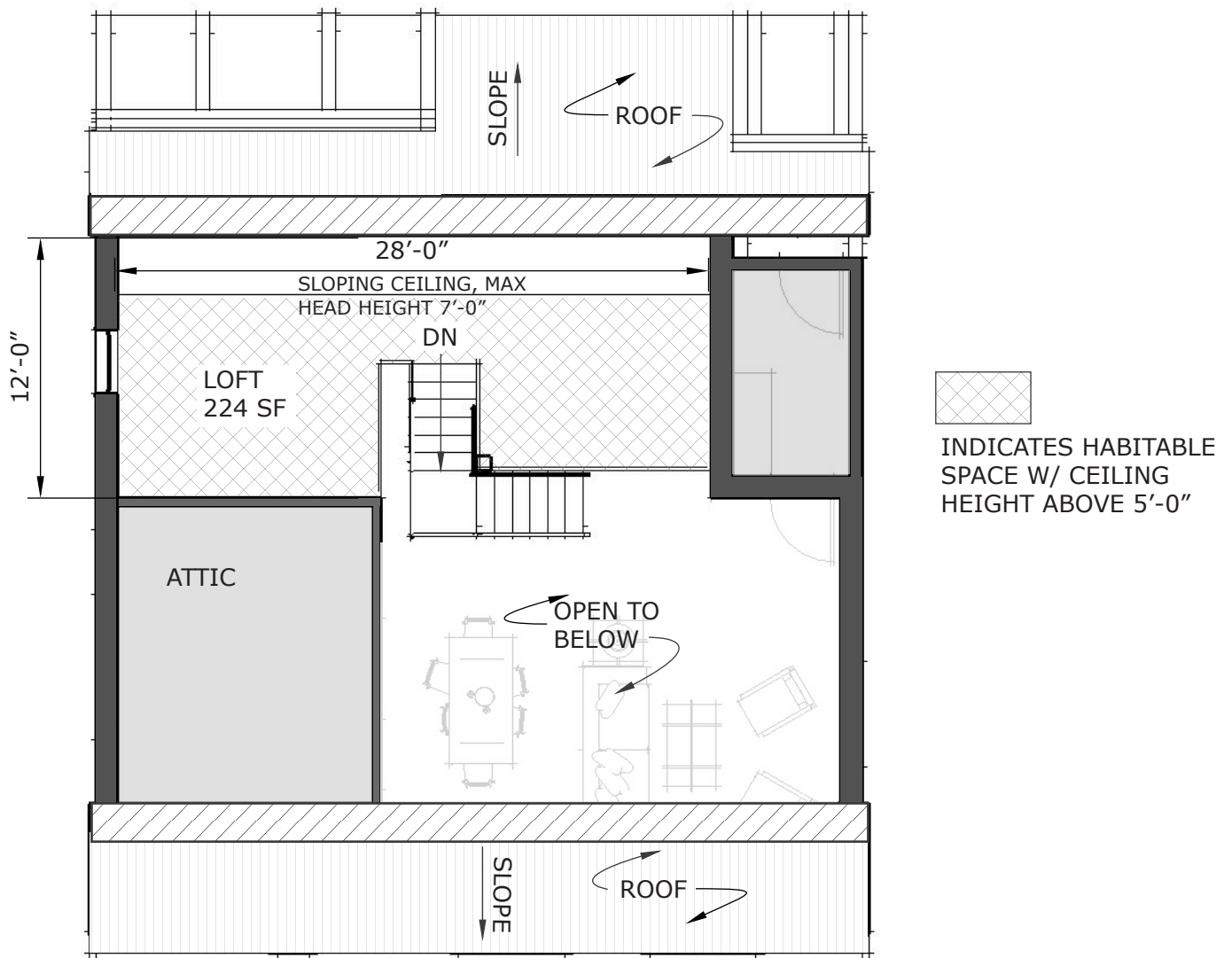
Above: Rendering of 3D Computer Model of House showing bedroom and living room windows.



Above: Rendering of 3D Computer Model of House showing bedroom and living room windows.



FIRST FLOOR PLAN



LOFT PLAN



In addition to a larger house with flexible space, CCHRC wanted to offer a design that reflected the culture of the region through its historical dwellings. Historically the Yup'ik people of Nelson Island lived in Qasgiqs and Enas as seen in adjacent photos. A Qasgiq was a traditional large semisubterranean men's community house used for communal gatherings as well as housing the men that were old enough to live without their mothers. The women and children lived in a similar, smaller structure, called an Ena. A picture of a community of these dwellings in Hooper Bay is shown in photo below. CCHRC has determined that it is not cost effective to place the new houses on Mertarvik into the hillside, but gave thought to the aesthetic appearance of this house to reflect the same form of these traditional houses. Therefore, the roof cladding wraps around the house and becomes the cladding for two of the walls. One side of the roof slopes down to the ground and the use of lumber at the entrances of these houses and in the storage areas reflects the entrance to the traditional Qasgiq and Ena dwellings. See renderings of the house on the next page.



Above: Historic photo of semi-subterranean housing in Nelson Island. Photo courtesy of Alaska Digital Archives.

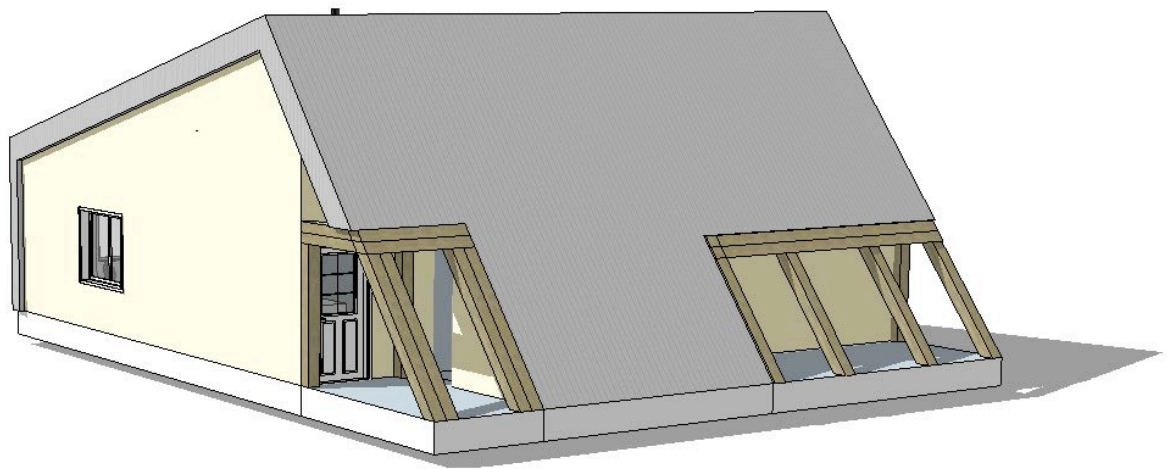


University of Alaska Anchorage, Archives & Special Collections

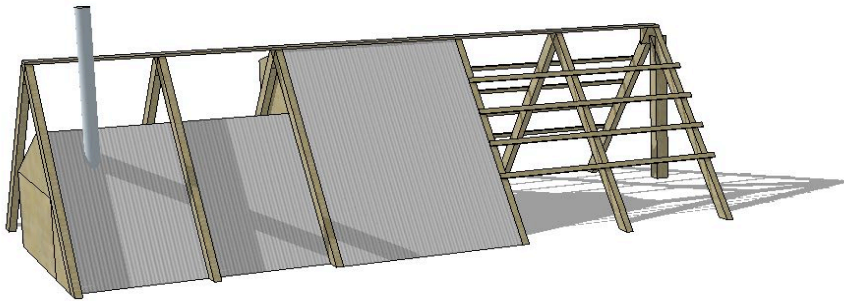
Above: Historic photo of semi-subterranean housing in Nelson Island. Photo courtesy of Alaska Digital Archives.



Left: Historic Photo of Hooper Bay dwellings. Photo by Edward S. Curtis 1929_ image ID#E5CD5227 www.old-picture.com



Above: Rendering of 3D computer model of house showing Lumber used at entrance and storage area.

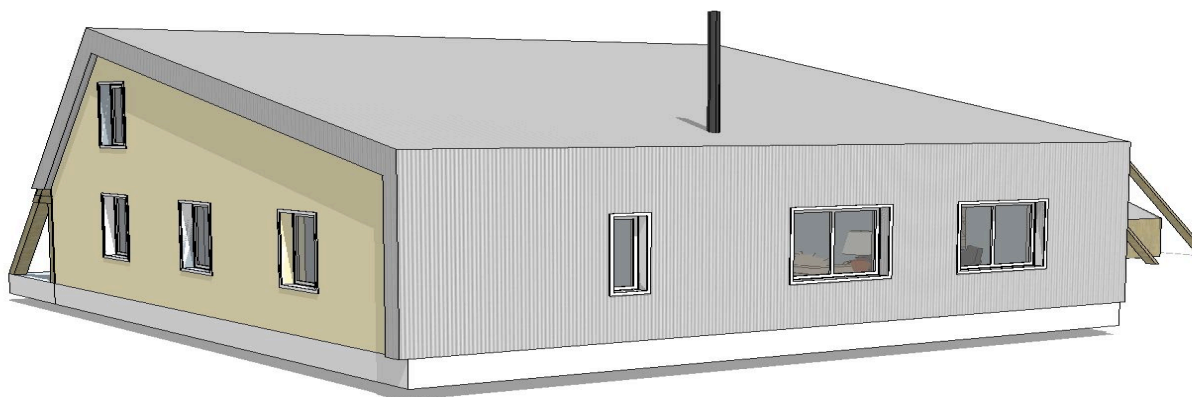


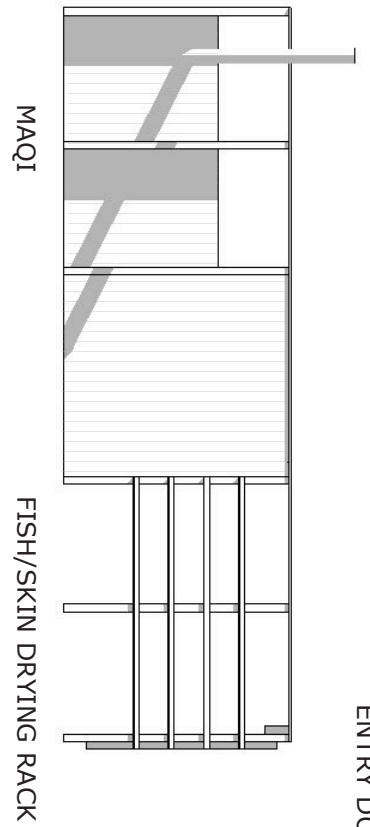
Above: Rendering of 3D computer model of fish drying rack and Maqi.

Right: Image of House by CCHRC & Tagiugmiullu Nunamiullu Housing Authority in Atqasuk, AK showing framework for fish drying rack integrated into the house.



Other aspects of cultural importance to the current residents of Newtok are maqis, or steam houses, and fish drying racks. The maqis are not only used for bathing, but for mental and physical healing and the subsistence lifestyle of the Yup'ik necessitates a fish drying rack. CCHRC thinks it is important to recognize the maqi and the fish drying rack as part of a Yup'ik house and include it in the design of the new houses in Mertarvik. It is standard practice in remote rural Alaska construction, to order 10% more of each material since often material is cut incorrectly during construction or used in the incorrect location and there is no convenient way to buy more materials quickly. As a result, there is often material left over after a house is built. CCHRC thinks that it will be possible, with input from Newtok residents, to design a simple maqi using the 10% extra materials. If the maqi is designed to do use this material, it will not only embrace this cultural aspect, but will reflect an aesthetic similar to the house.



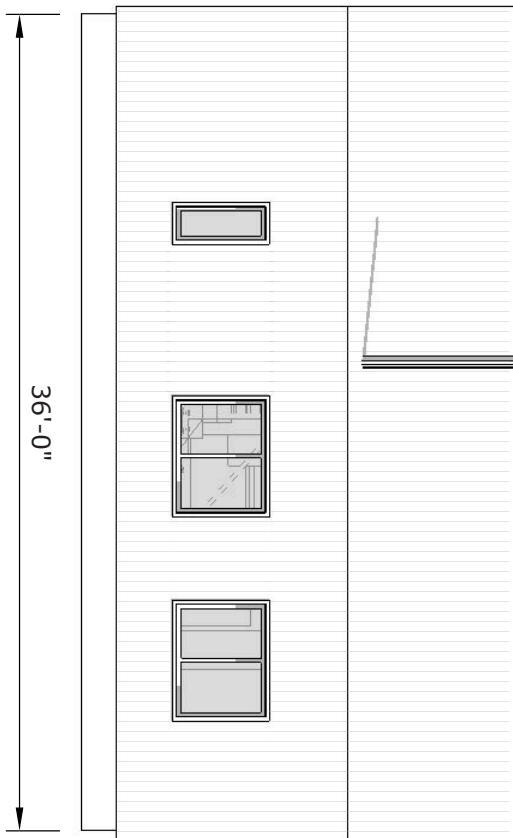


ENTRY DOOR

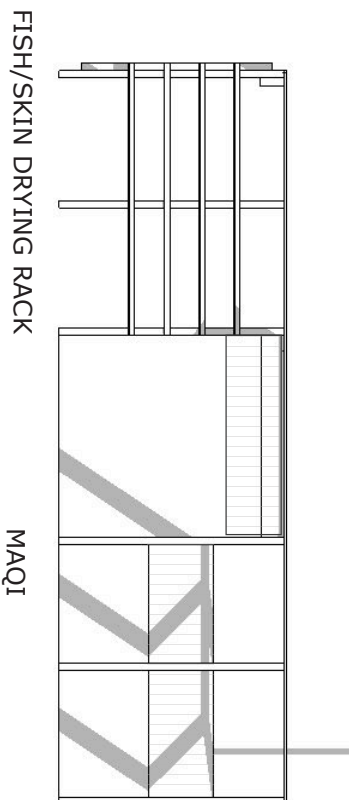
36'-0"

FRONT ELEVATION

EXTERIOR WOOD FRAMING



36'-0"

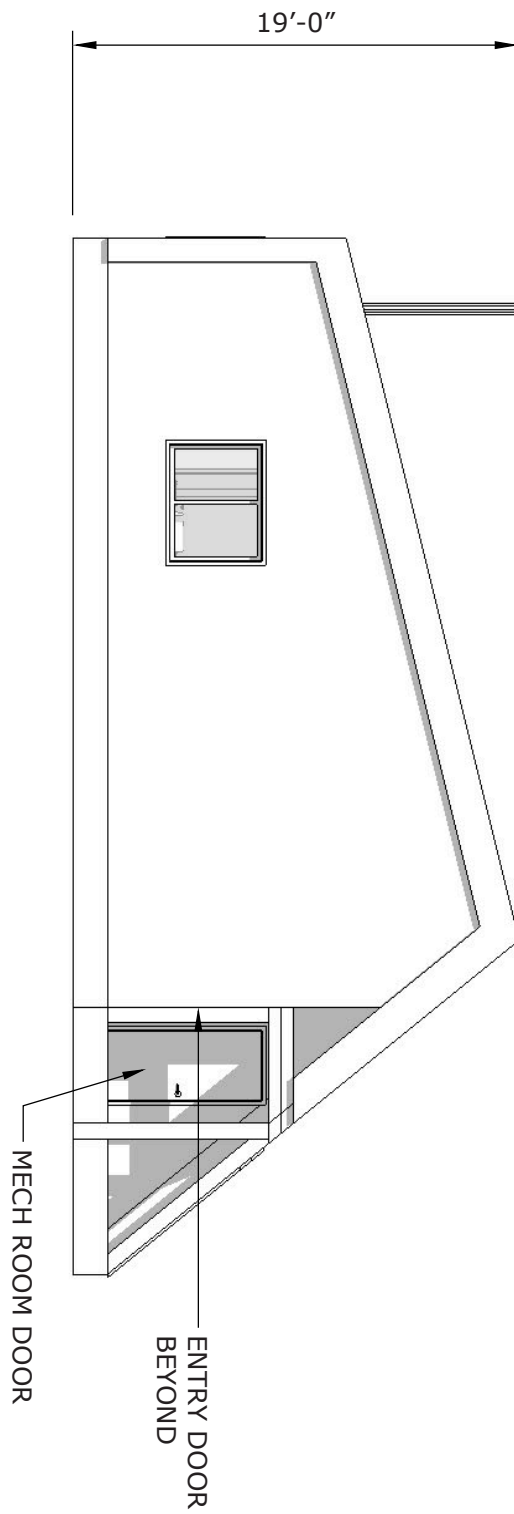
BACK ELEVATION

FISH/SKIN DRYING RACK

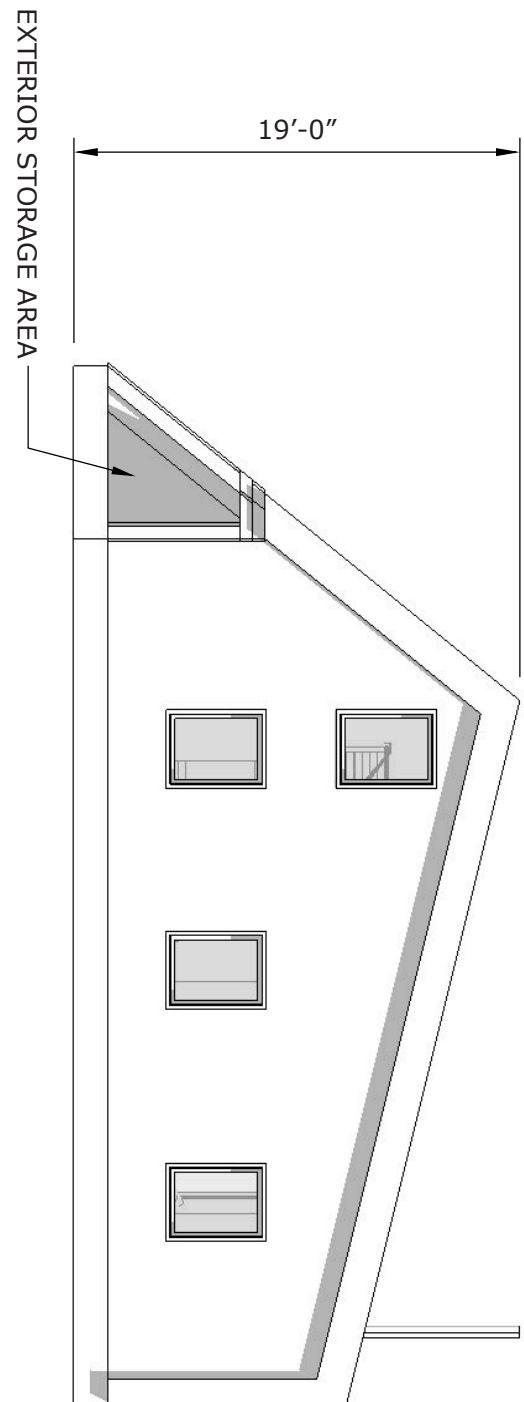
MAQI



LEFT ELEVATION



RIGHT ELEVATION

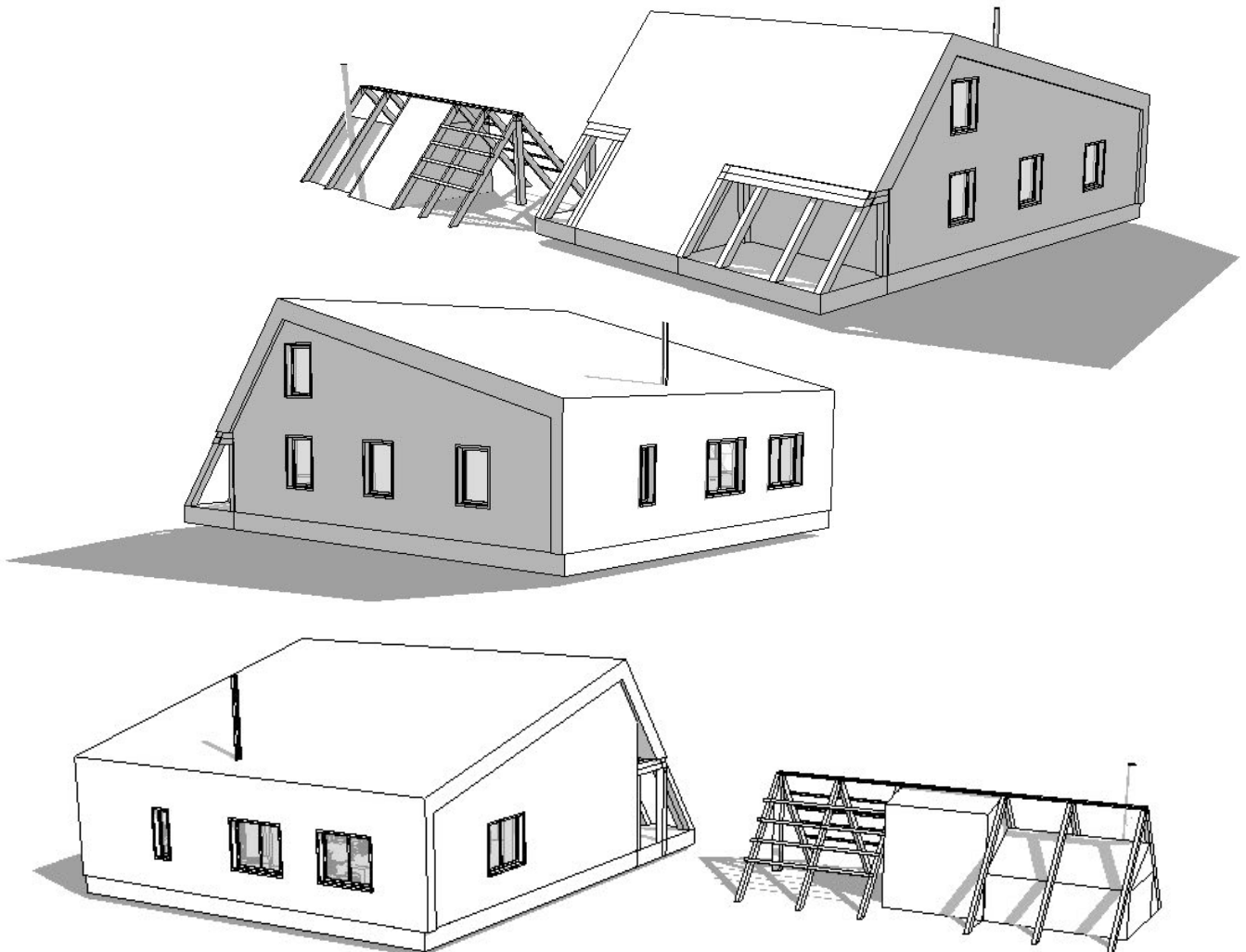




CCHRC proposes the use of the REMOTE Wall System for the construction of this house, but other construction systems could be used. The REMOTE Wall System is a building envelope technique described earlier in this document, see section on the 20x20 "Hawk" House. The house design features a roof that wraps around two of the building's walls. The REMOTE Wall System provides an easy way to insulate the walls and roof in the continuous manner that this design requires.

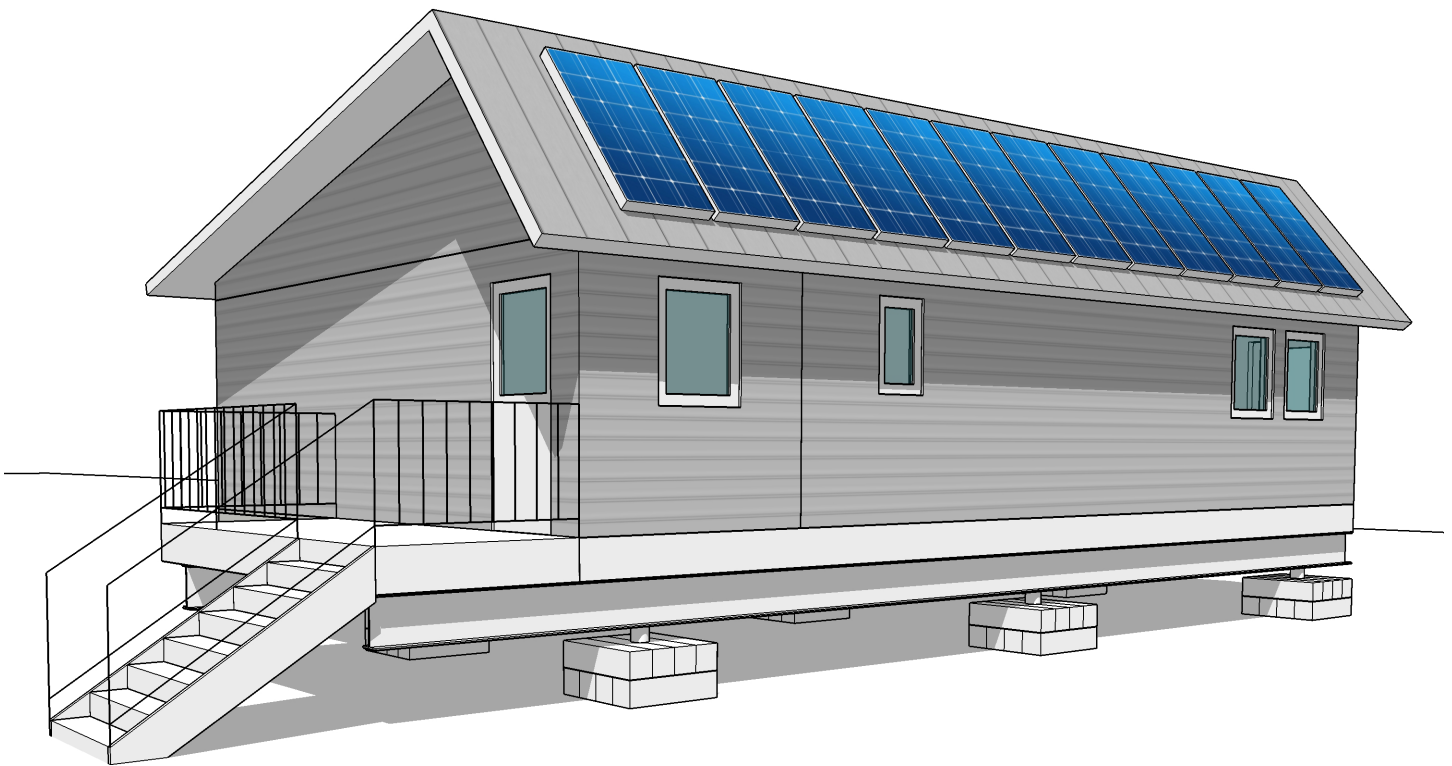
If the REMOTE Wall construction technique is used for the building envelope, or an alternative super-insulated type of construction, CCHRC proposes the use of the BrHEAThe v2.0 system for heating and ventilation. This system allows for the incorporation of solar thermal water heating and provides warm, healthy, fresh air throughout the house. The BrHEAThe v2.0 system is described in the section on the Single Family/Extended Family Duplex design.

This house has flexibility to be oriented based on what the occupant desires, or what the site requires. The entrance side of the house does not have any windows which prevents heat loss when this side is facing north. But, the entrance side roof is also sloped at an angle appropriate for solar panels (photovoltaic or thermal) if facing south. The opposite side of the house has large windows that if facing south, would allow a lot of natural light and passive heat gain into the house. If this side faces north, it would allow for a potential view of the water. Although the slope of the roof on this side is not ideal for solar panels, they could still be mounted to this roof using brackets that would hold them at the correct angle off of the roof.



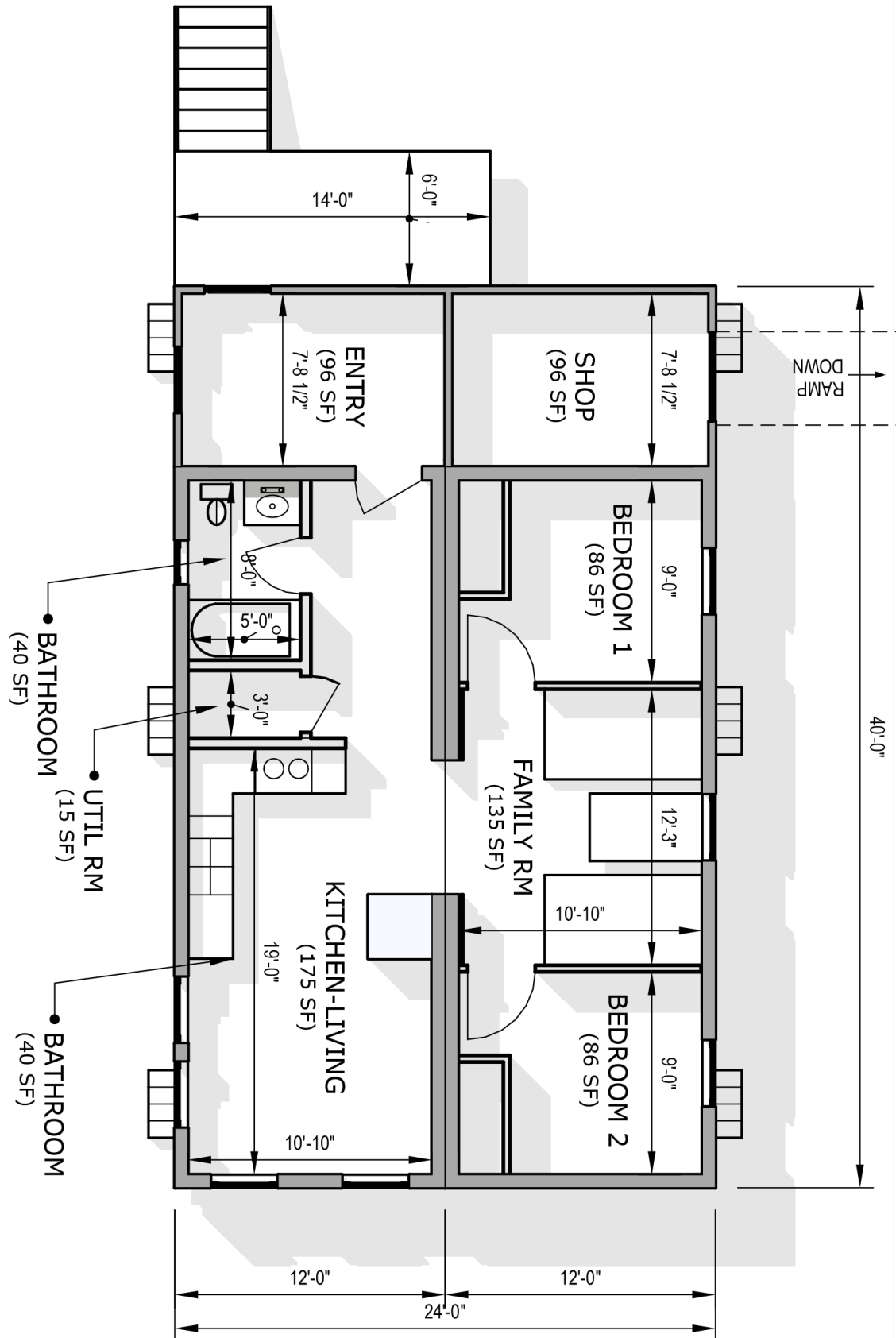


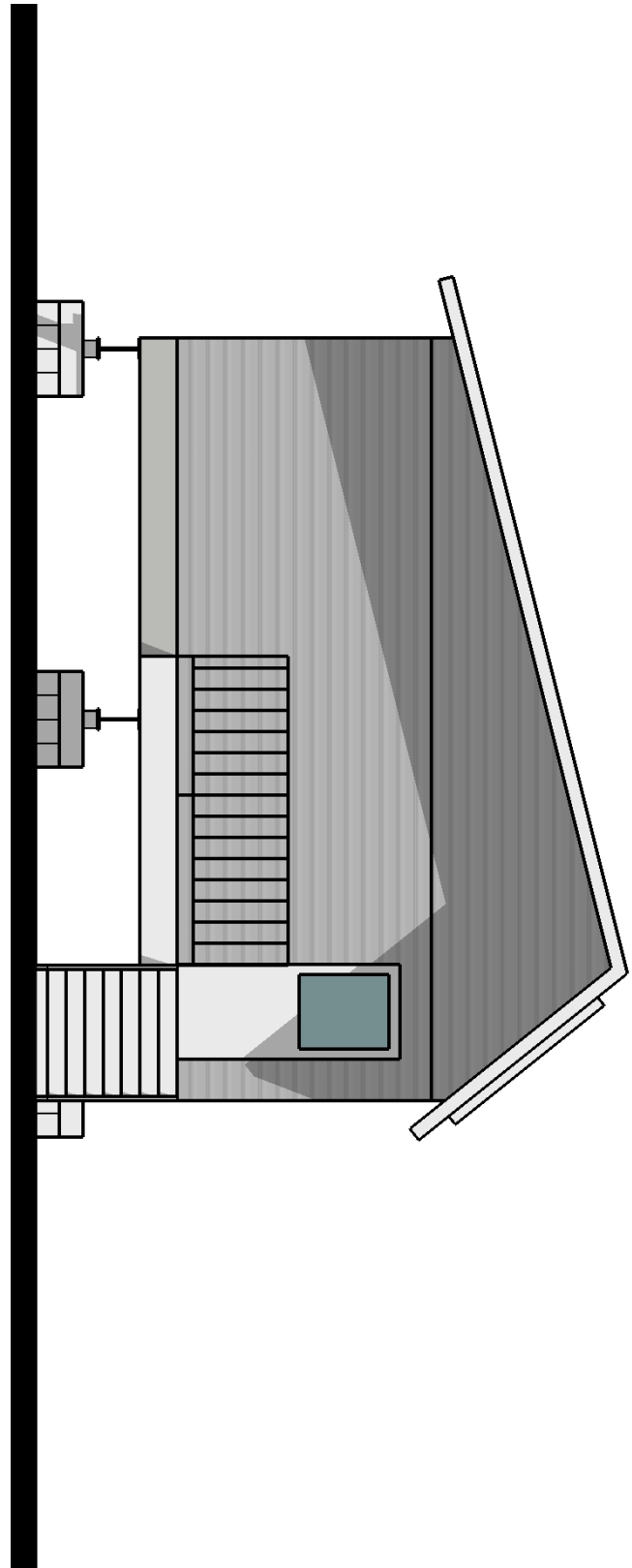
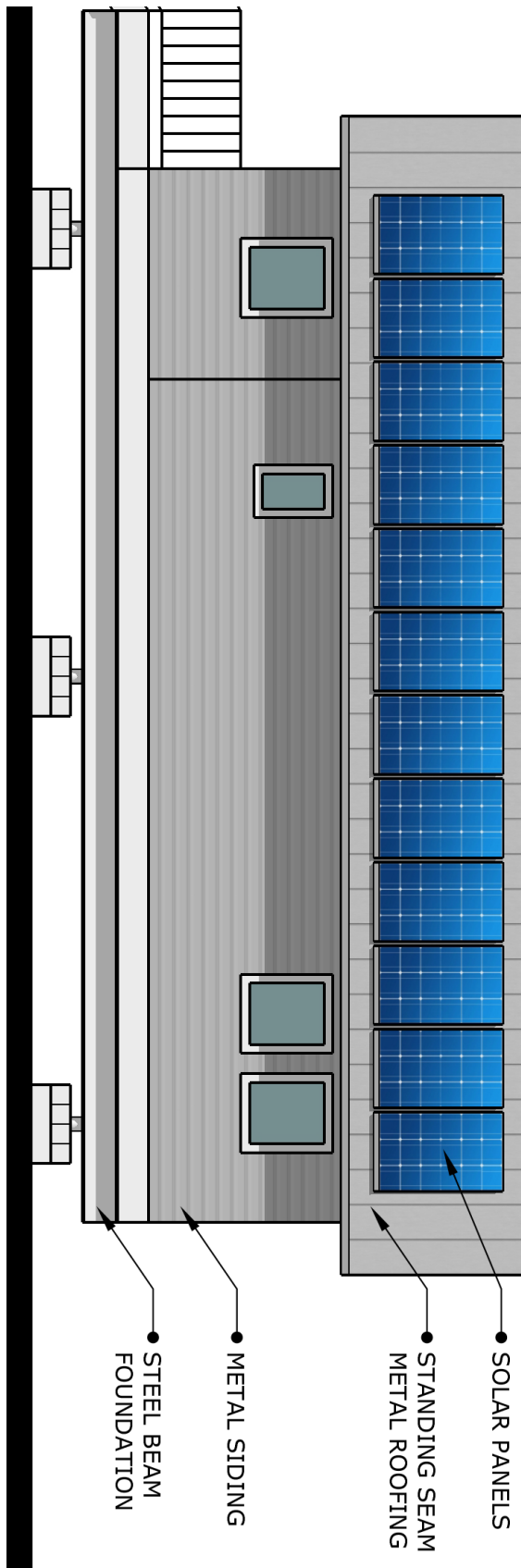
Transitional Housing



Most current home designs proposed for Mertarvik require a crew of approximately six people and a minimum of six to eight weeks to build, limiting the number of homes that can be built in one season. In the event that the current village in Newtok is rendered uninhabitable by erosion before a sufficient number of homes are built in Mertarvik, there needs to be a way to build more homes in one season. One solution is modular homes. These homes are comprised of multiple units that are prebuilt in a shop and can be shipped and assembled on-site. The shop could be located in Bethel, Anchorage, or Fairbanks. Modules could be built over the course of a winter and shipped and assembled in the summer. It is even possible to set up a large fabric tent shop in Mertarvik to extend the construction season.

This design utilizes two modules that are each 12' wide and 40' long. The modules can be transported to Mertarvik using equipment that will be in place for the road construction. They would be shipped complete with siding and interior finish, and would be placed on a steel beam foundation. A truss roof would be installed, sheeted, and covered with metal roofing. Stairs and a porch would complete the home.



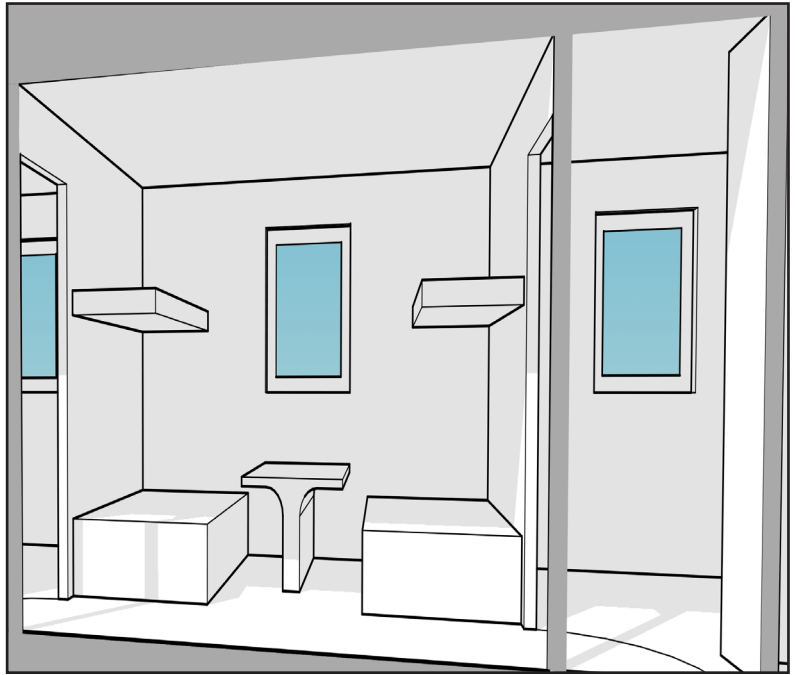




The home is designed to be heated with an oil boiler and HRV combined system (BrHEAThe). A woodstove could be added as backup heat. The bathroom could be outfitted with a transitional system such as the Portable Arctic Sanitation System (PASS), a gravity-fed water system and waterless toilet. Once central water and sewer is functional in Mertarvik, a full bathroom with shower and flush toilet can be installed in the space. Supply and drain lines could be roughed in during construction. The cook stove will be a 220 Volt electric range/oven. The asymmetrical roof design will work well for solar panels if the house is properly oriented.

The interior layout of the home is designed to function as a two-plus bedroom home. There are two full bedrooms with flexible space in between for bunk beds and a table.

The flexible space is an area that could be used by younger children or visiting family members. The table could serve as desk for homework or recreation projects. There are sliding doors to close this space off from the main living area.



The entrance includes an arctic entryway, meant to be conditioned—but cooler than the living space. This space has room for chest freezers and for storing food that should be kept cool but not frozen. Next to the entry there is a small shop space that can be accessed from the outside. The double doors are wide enough for a snow machine or four-wheeler to be pulled inside for repairs. This space can be heated as desired.



INFRASTRUCTURE NEEDS

Pioneer Phase House Systems

Staged village relocation poses unique challenges to infrastructure design. It is difficult to create housing without power, water, or waste infrastructure and still provide an acceptable standard of living. However, there is simply not enough time to design, fund, and build a power grid, water and waste system in Mertarvik before residents begin to move. It is vitally important that the construction of housing not be hindered by the timeline necessary to create village-wide infrastructure. Instead, “pioneer families” will need to move from Newtok to Mertarvik in order to create a foothold in the community. Only then will funding from certain agencies (the school district, the Federal Aviation Administration) be possible. For the first phases of pioneer occupation, a “micro-infrastructure” approach is encouraged for new housing. Below are some examples of this approach.

Power

Homes that are constructed before a village-wide grid is available must be self-sufficient for heating and electric generation. Current pioneer housing at the Mertarvik site incorporates gas and diesel generators for electricity. The Mertarvik Demonstration Home adds a transfer switch and battery bank to the electric system, so even when the generators are not running, a separate panel powers systems such as lights, ventilation, and a small number of receptacles. The inverter on the Demonstration home is solar/wind ready, and future pioneer homes should also be wired with a transfer switch, two panels, and inverter. A diagram of this system is provided on pages 82-83. Once village-wide power infrastructure is introduced, these homes can be linked to the grid.



Above: An oil-drip stove allows for heat without needing electricity, an important feature in the first pioneer homes built before the grid.

Heat

Most of the current houses in Mertarvik have wood stoves for heat. The Demonstration Home utilizes an oil drip stove, which does not require electricity, so that heat could be provided to the house when it was not occupied. This could be replaced with a traditional wood stove when the house is occupied year-round.



Fuel Storage

Currently most residents of Mertarvik have a 55 gallon container for storing fuel for their generators. Since there is no dock at the barge landing at Mertarvik, residents transport fuel from the barge landing using containers that they can carry by hand. They then transfer the fuel to their 55 gallon container using a manual syphon. Attached to the Demonstration Home is a 55 gallon fuel drum that is being used for fuel storage. It currently supplies fuel for the oil-drip stove. If the oil-drip stove is replaced with a wood stove, this fuel storage could be utilized for a Toyotomi direct vent oil heater.

In 2016, there was a bulk fuel delivery to Mertarvik which enabled residents to acquire fuel more easily. The fuel barge has a hose that they can send ashore to pump fuel into larger fuel storage tanks located at the barge landing. As the village develops, we anticipate this occurring more reliably.



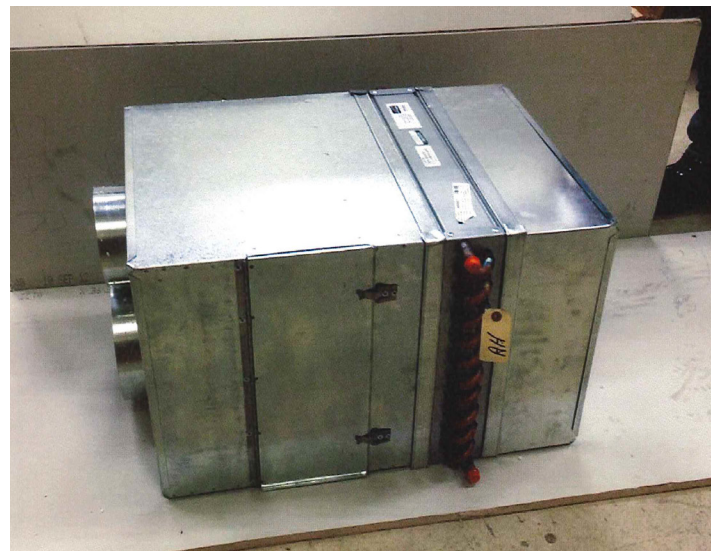
Above: Resident of Newtok uses manual syphon to transfer fuel from one container to another.

Ventilation

Modern energy efficient homes are much less drafty than the existing structures in Newtok and will require mechanical ventilation. Heat Recovery Ventilation is recommended for all new housing units at the Mertarvik site. In the Demonstration Home, the exhaust air duct is the toilet, which helps dry solid waste and eliminate odor from the house (See figure on bottom page 45).



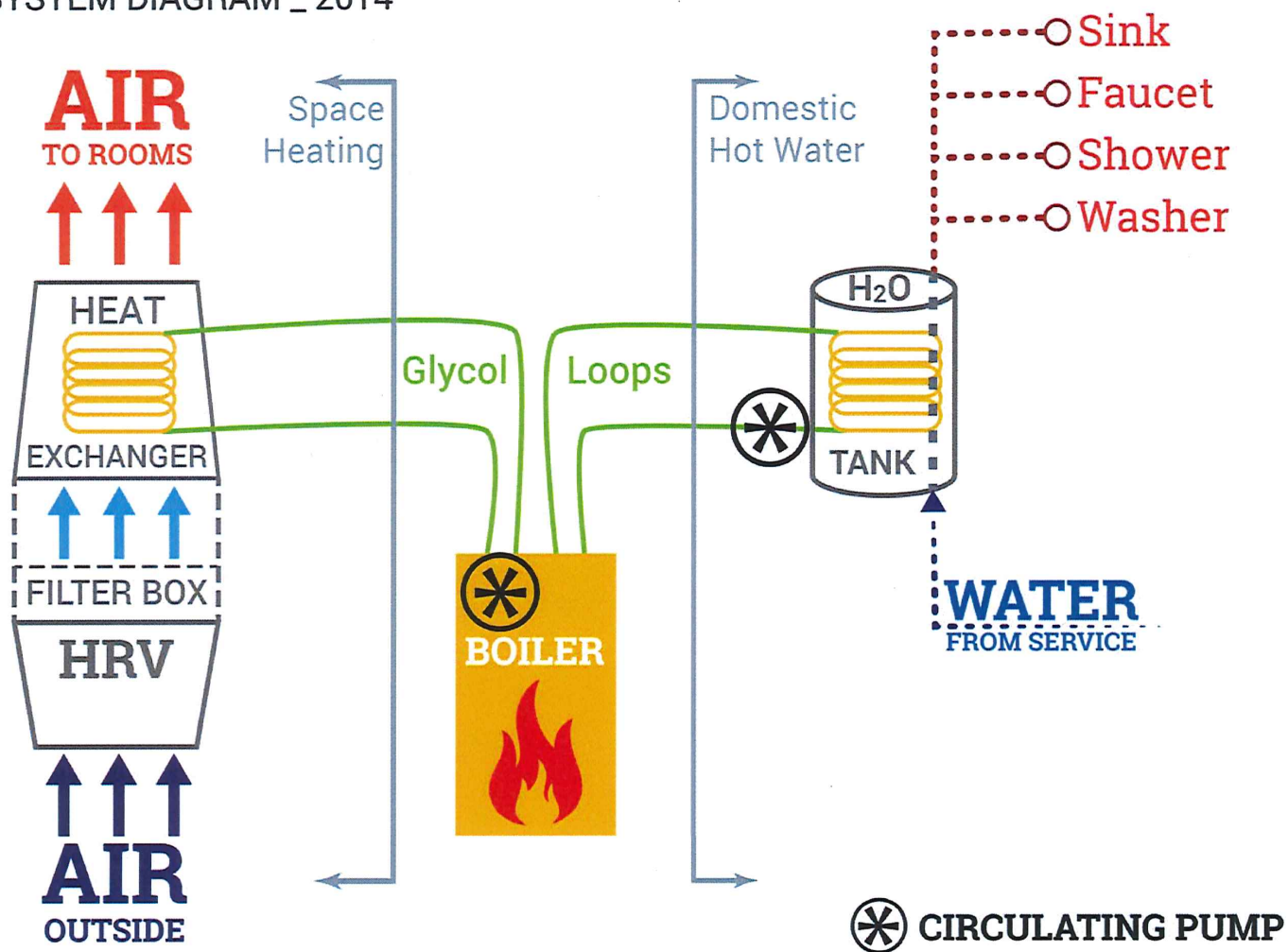
Above: Heat Recovery Ventilation saves energy by preheating incoming air while ensuring safe and healthy indoor air quality in the home.



Above: Picture of fabricated filter box / heat exchanger necessary for system.



brHEAThe 2.0 SYSTEM DIAGRAM _ 2014



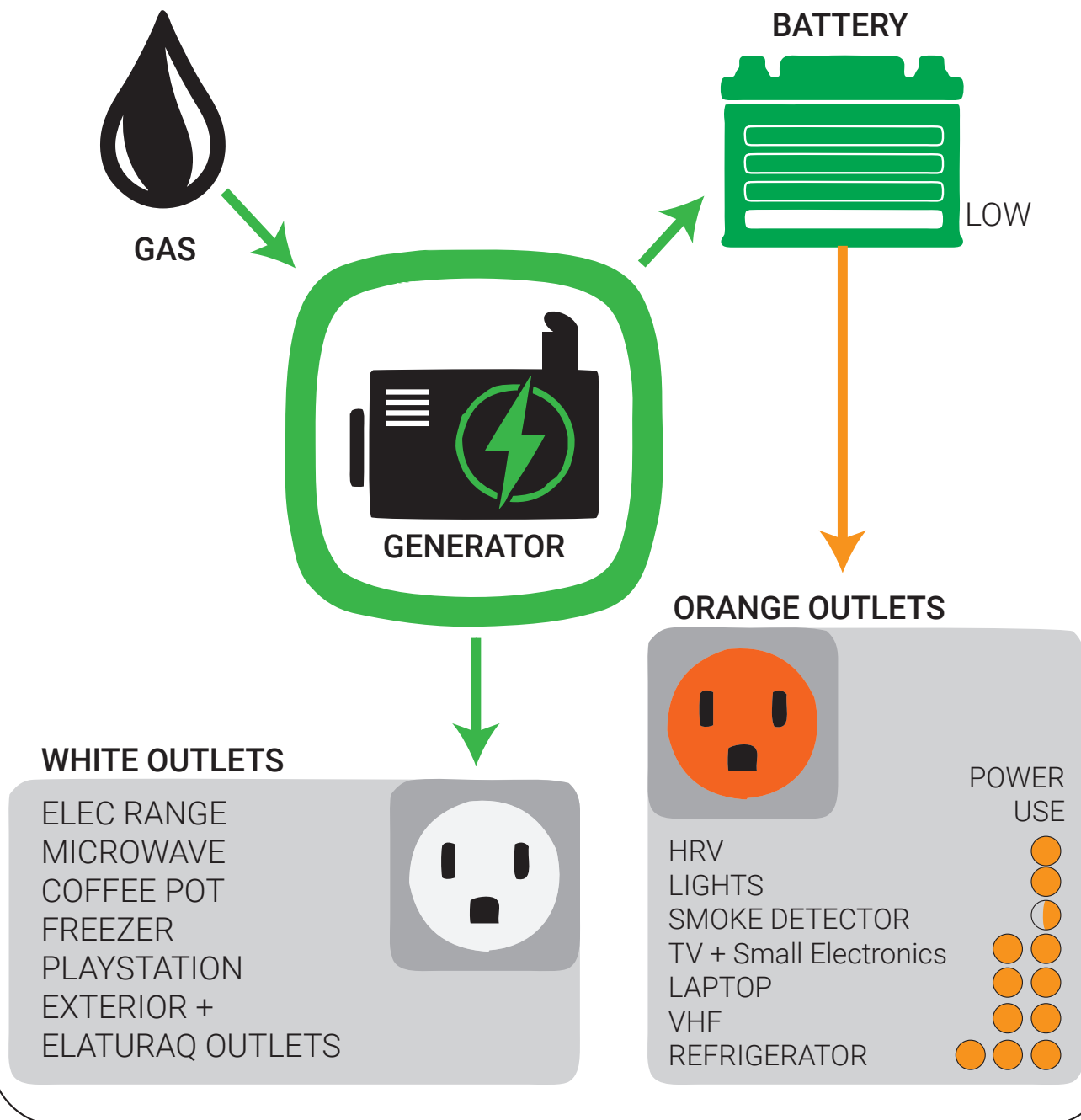
Above: Diagram describing BrHEAThe System.



Mertarvik Demonstration

POWER MODE

When the generator is **RUNNING** it is using **GAS** and charging the **BATTERY**. ORANGE and WHITE outlets have **POWER**

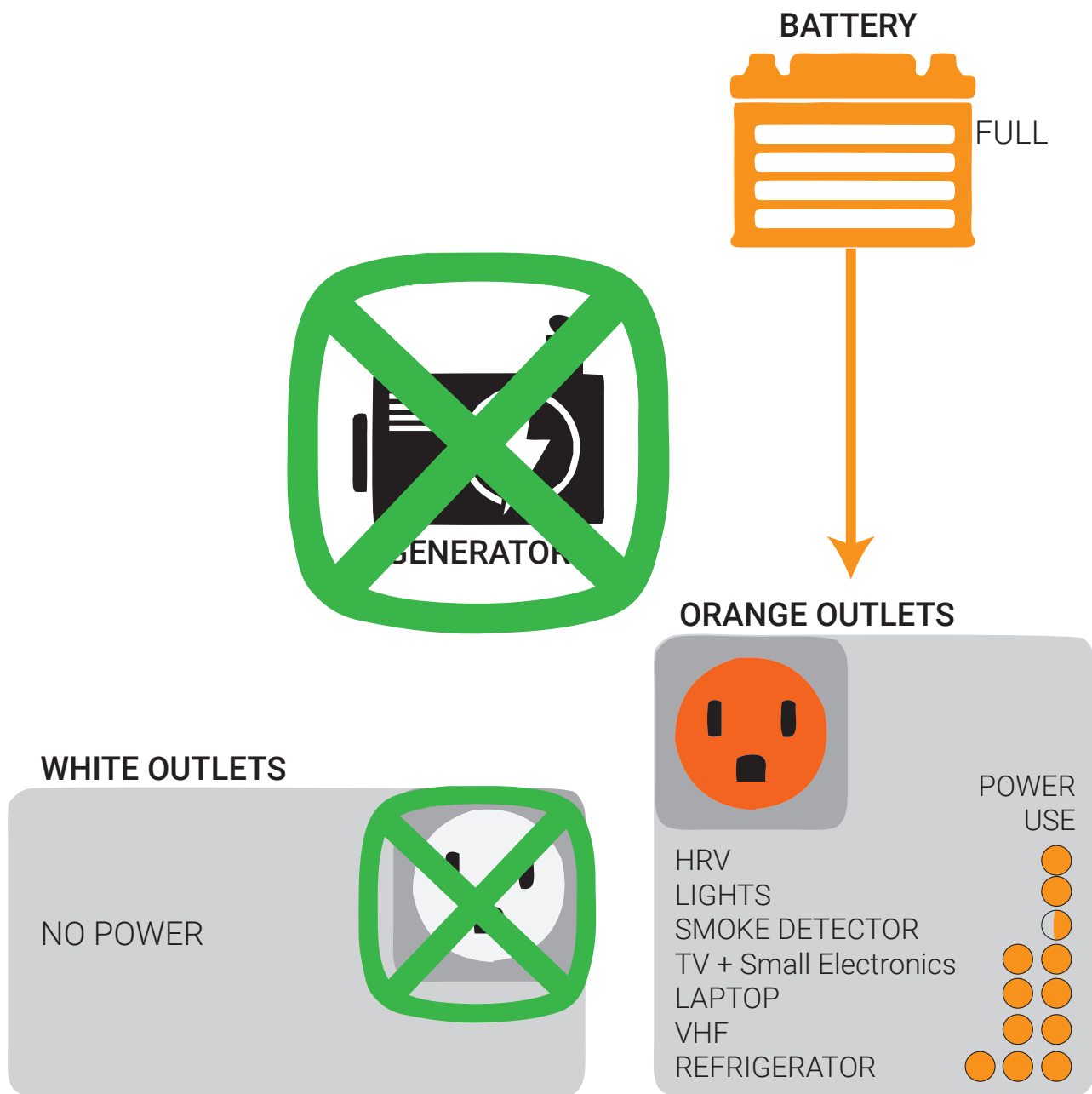




Home Power System

QUIET MODE

When the generator is **NOT RUNNING** the **BATTERY** is giving POWER to the ORANGE outlets only





Water & Wastewater

Newtok has no water or waste system. Honey buckets are dumped in the river and water is hauled from a treatment plant. Two freshwater wells have been dug at the Mertarvik site, and one was developed into a hand-pump system with enclosure in 2016. The water is clean but has some turbidity. The Portable Arctic Sanitation System (PASS), developed by ANTHC and CCHRC in 2015, will treat water gathered from the wells, the existing spring, rainwater catchment, or melted ice and make it potable. A diagram of the PASS System is located on pages 86-87. A PASS tower was set up next to the well enclosure in Summer 2016 for pioneer residents to become accustomed to the technology.

There is a fully functional septic and leach field system adjacent to the Mertarvik Evacuation Center (MEC) foundation. There is also an incinerator at the Mertarvik site. Design of a drop-off point to the septic and leach field is necessary for the pioneer stage of inhabitation at Mertarvik. Residents will be able to drop off honey-bucket waste at this location until the village-wide water/sewer system is implemented. Residents utilizing separating toilets, like the one used in the Demonstration Home, would be able to drop off the desiccated waste at either the septic or the incinerator. Other decentralized systems are encouraged for future housing that is built before the water/sewer system is completed.

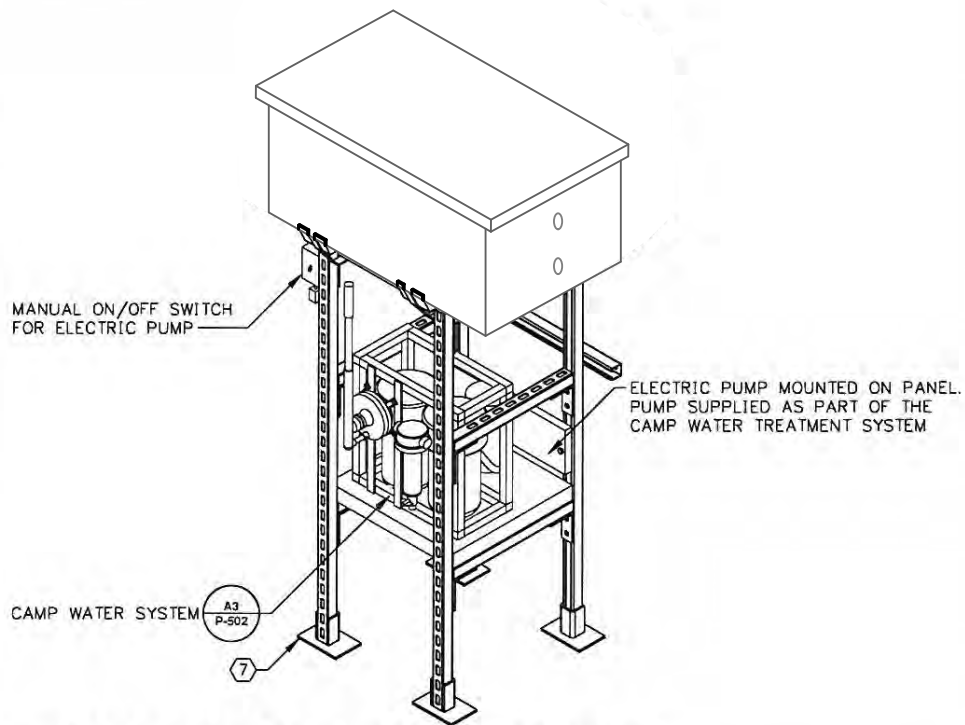
With these decentralized approaches to infrastructure, families can move to the Mertarvik site and enjoy a similar or even improved standard of living as their home in Newtok, even before conventional infrastructure is constructed.



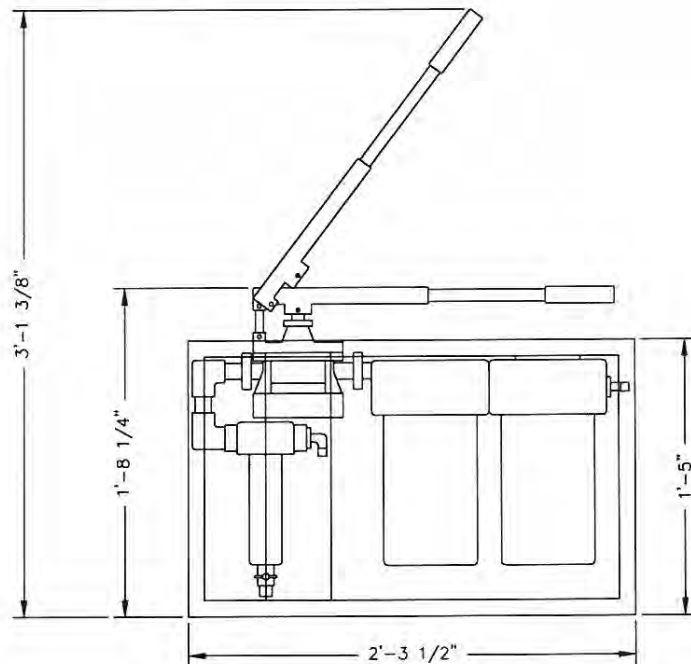
Above: Picture ice being melted in a pot on a stove for drinking water.



Above: Picture of model PASS water treatment system next to Separette brand separate toilet that desiccates solid waste for disposal.



Above: Axonometric drawing of PASS water treatment system.



Above: section drawing through manual pump and filters of PASS water treatment system.



CLEAN WATER AND SAFE WASTE



KEY

- | | |
|---------------------------|-------------------------|
| A) RAIN WATER CATCHMENT | F) GREY WATER TREATMENT |
| B) INTEGRATED VENTILATION | G) WATERLESS URINAL |
| C) GRAVITY FEED SUPPLY | H) WATER TREATMENT |
| D) SEPARATING TOILET | |
| E) LOW-FLOW SINK | |



WASTE DISPOSAL FOR

ALASKA



Y WATER TANK - PURGES TO
DOORS WHEN FULL
TERLESS URINAL
ER TREATMENT PLANT

ANTHC is partnering with CCHRC, CampWater Industries, and Lifewater Engineering to develop an In-Home Sanitation System for the community of Kivalina, located on a small island in the Chuckchi Sea in Northwest Alaska. Kivalina residents currently ration water and use a self-haul honeybucket system for sewage. The village is threatened by erosion and plans to move to the mainland in the future, which means they cannot get funding for a permanent piped sewer system.

The system developed for Kivalina will be tested in nine volunteer homes during 2015-2016. The systems are designed to use rainwater catchment and other traditional water sources, on-site water purification, and safe disposal of waste. The systems are 'stand-alone' models, meaning that as homes are moved to the new village site away from the eroding coastline, they can bring their clean water and safe sewer with them.

The testing going on in Kivalina today will help other remote communities address their own water and waste needs, and improve life for Alaskans.



COLD CLIMATE HOUSING RESEARCH CENTER
CCHRC

CampWater Industries
&
Lifewater Engineering



Village-Scale Infrastructure

A major challenge facing the Mertarvik project is the need to relocate community members before final village infrastructure is in place. This means homes will need to operate independently of central utilities, but be connected when necessary. The Mertarvik Design and Construction Team headed by DOWL is currently developing that schedule.

As of December 2016 ANTHC is developing a comprehensive site plan for Mertarvik with the locations of all building lots, roads, major buildings, and utilities. Initial quarry development and road construction is slated to occur during summer 2017. ANTHC is designing a buried pipe water and gravity sewer system. AEA is working on a design for the power generation and electrical grid. AEA will also be planning the bulk fuel plant. ANTHC is currently coordinating with telecom companies about how to provide phone and internet to the communities.

Roads and Foundations

As part of the townsite plan, ANTHC is laying out the locations of roads, services, and buildings. Goldstream Engineering is designing the roads. Currently the plan is to build a road to the quarry and approximately 2,000 feet of housing subdivision road with gravel pads for houses in the summer of 2017. Pioneer houses have been designed and built with triodetic foundations and skids so they can be moved to permanent locations at a later date. Until roads and gravel pads are in place, houses will be constructed such that they can be easily moved to their final location.

Post and pad foundations are typically the most economical foundations for residential structures. Post and pad foundations for residential structures should be designed so occupants can easily adjust and level the foundation without heavy equipment. That said, shallow bedrock does exist on site and may allow economical construction of a variety of permanent foundation systems. Permanent foundations would last for many decades with little maintenance. Larger structures requiring stronger foundations can hopefully be located in areas of shallow bedrock. Initial cost of installing a permanent foundation should be carefully weighed against the long-term value of that structure to the community. For instance, the feasibility of driven piles depends on the cost and availability of pile-driving equipment. As the bedrock is shallow, the shorter pile depth and reduced installation time may make such foundations viable—particularly for buildings such as washeterias, stores, clinics, schools, and equipment garages. Concrete foundations should also be considered; there is suitable aggregate available in the quarry, and Portland cement could be shipped in. Further evaluation is needed to determine whether sand is available on Nelson Island in sufficient quality and quantity. Beach sand in its natural state is usually not suitable for concrete due to the salt content and possible presence of organic matter. The cost of washing the sand will have to be weighed against the availability of sand from other sources, such as the quarry.

Water/Sewer

ANTHC is designing the water and sewer system for Mertarvik. They are currently planning on a piped water and gravity sewer system. The water supply will be sourced from wells while the sewer system will drain to a treatment lagoon. Because these systems may not be complete until the later phases of village construction, most of the houses should be designed with self-sufficient water and waste systems. The existing well can be used with a water hauling system. A water and waste treatment system like the Portable Arctic Sanitation System (PASS) could be used. A honey-bucket or sewage haul system is the least desirable option. In the intermediate stages of village construction a washeteria will serve as the central watering and laundry spot. When the central water/sewer system is complete houses could have traditional showers and toilets. Houses should be designed with a large enough bathroom to accommodate these options in the future, and keep walls in those rooms 2x6 or thicker to accommodate future plumbing. It is not recommended to install conventional plumbing fixtures until the water sewer system is complete.

Power

The first pioneer houses have been designed with standalone power systems, including generators, batteries, and inverters. These houses can also be connected to grid power when it is available. The growth and transition of



the power grid is currently being discussed with AEA and the Newtok Contractors group. Some of the generators used for the man camp and road construction projects may be available to form a small grid that could power some of the early homes. Long-term, Mertarvik is an ideal situation for a smart micro-grid with a high percentage of energy sourced from renewables. Diesel will be the main power source for the grid. AEA is considering a wind system with electric boilers in main community buildings to moderate the load. Solar power may be economical on an individual or a community level. Houses should be built renewables-ready, with wiring and junction boxes in place so solar panels or other alternative energy sources can be added later. If there is a wind system that uses excess wind energy to generate heat in the washeteria, the community should consider incentivizing use of the washeteria at times of high wind; possibly lower laundry rates at times when the renewables portion of the grid is generating excess power.

Heat

The pioneer homes are heated with wood or oil drip stoves and electrical power is supplied by gas/diesel generators. Once a reliable electrical grid is in place, homes can move away from independent gas generators and drip stoves and move toward oil boilers with combined heat and ventilation systems (the BrHEAThe system, diagram page 81) or Toyotomi Direct Vent stoves and an HRV. Residents have requested that wood stoves also be provided as a alternative heating source.

Fuel Storage

The current amount of fuel storage capability in Mertarvik is unknown. There are two large fuel storage tanks with approximately 5000 gallon storage capacity total near the barge landing in Mertarvik that are currently used for bulk fuel deliveries. Originally, one of these tanks was ordered by NVC for Newtok, but the barge captain refused to deliver it there because the shoreline was so eroded and delivered it to Mertarvik instead. Anecdotaly, there are also two more storage tanks, but their current condition is unknown. One is near the location of the Mertarvik Evacuation Center and the other is near the stack of Dura-base road material left by the contractor. All tanks hold approximately 5000-10,000 gallons of fuel if they are in usable condition. The Alaska Energy Authority will design a bulk fuel storage facility and distribution system.

Heating fuel consumption of homes will vary based on quality of construction, heat source for domestic hot water (oil or electric) and occupant behavior. AHFC energy ratings produced with the AkWarm software give an indication of energy consumption. A 1200 square foot 3-bedroom home in Mertarvik built to 5-star BEES standards would be expected to burn approximately 275 gallons of fuel per year for its heating load. The same house built to a 6-star standard would burn 165 gallons and an older or poorly built house that only rates 4 stars would burn 470 gallons. If domestic hot water is heated by a fuel-burning appliance, houses could burn an additional 150 gallons of fuel. If an electric hot water heater is used in combination with a diesel generator, it would consume between 400 and 730 gallons of diesel in the generator.

Phone/Data

Houses should be wired with Cat 5 or Cat 6 for future phone and DSL data service. It is possible that this service will be entirely wireless, but the up-front cost of building the houses with data cables is minor. Also, metal siding and foil-faced foam insulation can interfere with wireless signals.

School

The school district requires 25 full time students before starting the planning process for a new school; however ANTHC has engaged the school district and is discussing operating the Mertarvik School as a satellite facility to the Newtok School. It is likely that the school will offer distance education during the transition, possibly utilizing the Mertarvik Evacuation Center or other community space. Ideally the planning for the school would take into account that the school functions as a community center and multipurpose building, as in the "Kindergarten through Career" concept that is being explored by the current State of Alaska Governor's administration.



SITE PREPARATION

During the development of the proposal for the Technical Assistance Grant for developing the Surface Housing Master Plan, Site Control of Mertarvik for development purposes had not been obtained. As a result, one of CCHRC's tasks was to assist the Newtok Village Council with obtaining site control. When CCHRC was awarded the grant, Site Control had been obtained. As a result, CCHRC's assistance in this area was no longer needed.

However, through CCHRC's work on this master plan, it became evident that a resource that would be helpful to the Newtok Village Council during future housing development phases would be a guide, or checklist, for what to consider when making decisions on planning and developing a house site and selecting the house that will go on the site. Below is a list of questions and considerations that should be used as a reference throughout development of Mertarvik.

House Site Considerations for Preparation & Planning

Setbacks and Easements

When making decisions regarding lot sizes or where a house will be placed on a site, consider what the easements, setbacks, and right-of-ways are. If these have not been determined, ordinances regarding this need to be in place to avoid future land disputes, and hindrances to development and access.

Utilities

1. If Utilities, Water; Waste (septic, haul, sewer, Lifewater STP, other); Power; Phone & Internet, are in place in the village, consider how much it will cost to bring utilities to the house when determining the location of the house within the site.
2. It is not likely that individual wells will be drilled, but if a well is needed for water, determine where it will be before siting the house. Is a permit needed before drilling the well?
3. If a septic system is possible (soil percolation tests have been completed), consider the best location for a drain field when siting the house location. Septic systems are required to maintain at least 200' from public wells and 100' from private wells. Access to pump the septic tank should also be considered. There should be room on the lot for a replacement drainfield in the future. In some cases there are minimum lot sizes for septic systems. It is likely that using individual septic systems with drainfields will result in an unacceptable degree of sprawl in the village layout.

Topography (slopes) & Road/Walkway Access

1. Will the house require a driveway, boardwalk, walkways, or gravel pad? The cost of materials for these items may determine how close to the road the house needs to be.
2. Will the site require any excavation or grading? Will a gravel pad be needed to level the site or be needed for the foundation?
3. Consider drainage planes when siting and orienting the house.

Building Orientation

Typical village and urban plans orient the entrance of the house to the roadway or main pedestrian path. This isn't always the best orientation for obtaining the best views or with regards to solar heat gain, photovoltaic panels, or thermal panels. These factors will all need to be weighted to determine the best compromise between them.

1. If solar exposure is important to the design of the house or future occupant, determine which direction is South on the site. This will help to determine which direction the house should face to gain the most passive solar heat or where solar photovoltaic/thermal panels need to be placed. Home design with roof pitches designed for installation of solar panels should be situated accordingly.
3. Consider what views are important and adjust building orientation accordingly.
4. Consider importance, or lack of importance, to the entrance facing road or walkways and adjust building orientation accordingly.



Soil Type

When deciding on a foundation system, determine what soil conditions are on the site based on results of soil borings done on or near the site. The foundation system may have a factor on the design of the house or which house design can be used. For more information on geotechnical studies that have been conducted in Mertarvik, visit the [Geotechnical and Geophysical Studies section of the Newtok Planning Group website](#).

Wind Direction and Snow Drift

Drifting snow has caused significant problems in Newtok, blocking entrances and windows to buildings. Some of this problem can be lessened based on the shape/form of the building, but some of it relies on building orientation and proximity to other buildings. Houses need to be spaced adequately to allow the snow that is carried by the wind, which slows down when passing over a house, to have adequate space to fall to the ground before another building is in the wind's path. Orienting the building so the entrance is not in the leeward side of the building should be considered so that snow does not block the entrance. It is better if the wind can scour the entrance to a building.

Staking the House

It is important to stake out the corners of the house before dirt work is performed (excavation, creating gravel pad for foundation, etc). This way the placement of the house is ensured to meet all easement and setback requirements.



Above: A home at the Mertarvik site in early winter. Snow drifting has already begun to accumulate. Snow drift will need to be considered carefully in the layout of adjacent houses and shape of new housing to ensure that the drifting issues of Newtok are not a problem in Mertarvik.



Above: An octagonal prototype in Quinhagak with an on-ground foundation. The geometry of the home self-scours wind born snow to prevent drifting.



Above: A house in Newtok at the beginning of winter.



Above: The same house as at left in later winter. The home has been almost completely buried due to wind drift action.



FUNDING SOURCES

Funding for housing and infrastructure in Mertarvik will need to come from a variety of sources as no single funding source will be sufficient to build all the necessary homes. By leveraging the existing funding for houses with new opportunities, the Newtok Village Council will be more likely to build additional homes. This chapter lists funding sources that have been or are currently being utilized for Mertarvik homes, as well as possibilities for future funding opportunities. These funding options are grouped into federal agencies, state agencies, and other sources.

Where possible, specific details are included on how funding might be utilized in Mertarvik, and the first steps to apply for that funding source.

Newtok residents also are encouraged to contact the Loan & Grant officer at the AVCP Regional Housing Authority (AVCP RHA). This position serves as a resource to tribes and individuals to help with grant and loan applications. The consultation is free, and can include such services as helping tribes with grant applications to federal and state agencies, locating funding sources for large community projects or individual homes, explaining loan applications to individuals for home financing, introductions to financial institutions and agencies, and Yupik translation of applications. At the time of the publication of this report, Peter Evon serves as the Loan & Grant officer. His contact information at AVCP RHA is 907-543-3121 and pevon@avcphousing.org.

Current funding sources

According to the Newtok Planning Group [website](#), the first homes were built in Mertarvik in 2007. Additional homes were built in 2012, and a demonstration home was constructed in 2016. Funding is currently in place for further development of infrastructure and housing.

Denali Commission

The Denali Commission provided funding in 2016 to hire a project manager to oversee the entire relocation project. DOWL was selected as the project manager to represent the Newtok Village Council during the relocation project. DOWL is responsible for overseeing all project activities, contractors, and managing the entire budget. They are working to ensure all planning activities are moving towards implementation, including housing, roads, the Mertarvik Evacuation Center, training, energy needs, and more.

Association of Alaska Housing Authorities (AAHA)

Housing and Urban Development (HUD) funded the Mertarvik Housing Master Plan Report through a Training and Technical Assistance Program grant. Training and Technical Assistance grants are delivered to Indian Housing Block Grant recipients after a request is made through the local Alaska Office of Native American Programs. For this report, CCHRC is the technical assistance contractor providing direct technical assistance to AVCP RHA for Newtok to develop a Housing Master Plan.

The lead contacts for the grant are the AAHA Administrator, Colleen Dushkin, and CCHRC project manager, Judith Grunau. AAHA awarded a grant of \$209,000, in spring 2016 for the research and writing of a Housing Master Plan. In addition to this funding chapter, the report also addresses site control, housing development need, infrastructure needs, and new home designs.

Bureau of Indian Affairs (BIA)

In summer 2016, the Tribe used Housing Improvement Program (HIP) funds that were awarded to a tribal member to construct a home in Mertarvik. The home, currently occupied by the tribal member, was built by



a construction crew from Newtok under contract by the Tribe. The house is described in the Housing Design chapter of this report, and contains systems for electricity and water/sewer that can function independent of village infrastructure and be connected to larger grids when available.

Three tribal members received HIP funds in 2006. The Tribe was contracted to build the homes using the funds, and construction was completed in 2007. Those homes are currently occupied.

Housing and Urban Development (HUD)

The Newtok Village Council applied for, and was awarded, a \$900,000 grant through the Indian Community Development Block Grant Program (ICDBG) Imminent Threat program in 2014. The grant provides funding to leverage funds from other sources for actual construction of homes.

HUD's Indian Housing Development Block Grant Village Allocation Program also provided funding for Mertarvik in 2010. The Newtok Village Council used that funding to construct three homes in Mertarvik in 2012. The homes are occupied seasonally, and in need of renovation.

Federal Emergency Management Agency (FEMA)

After a storm on January 23, 2014 that was declared a federal disaster, the Newtok Village Council worked with the Alaska Division of Homeland Security and Emergency Management to apply for a Hazard Mitigation Grant from FEMA. An estimated \$2.7 million was allocated for the relocation of 12 homes that were deemed structurally sound enough to make the move to Mertarvik. However, the Newtok Village Council withdrew their application for the home relocation in October 2016. On February 1, 2017, CRW Engineering working with DOWL Engineering submitted an amended application on behalf of the Newtok Village Council. This application replaces the 12-home relocation project with a 13-home acquisition and demolition. As of the publication date of this report, the amended application is under review by the State of Alaska Department of Homeland Security and FEMA Region 10.

Federal funding sources

Federal funding for housing and infrastructure is available through several agencies. These agencies have funding available through grant and loan programs. While some programs offer funding on an annual basis, others are ongoing. Funding is available both for tribes and individuals.

Bureau of Indian Affairs (BIA)

BIA's Housing Improvement Program is a funding mechanism for Tribes to repair existing housing and provide new housing. This program has funded 3 homes built in Mertarvik in 2007 and one home in 2016.

Housing Improvement Program (HIP)

Eligibility: American Indians or Alaska Natives who live in a tribal service area.

Description: BIA's Housing Improvement Program (HIP) provides funding to repair existing housing and build new housing for tribal members. The Tribe can distribute the housing assistance application to tribal members. Members can submit the completed application to the Tribe year-round. When the Tribe receives completed applications, they can process a Tribal Annual Performance Report (TAPR). The report uses a point system based off of the HIP regulations and considers age, disability, income, household size, etc to allocation funding to tribal members in four areas:

A: Emergency repairs to improve safety and sanitation of existing homes.

B: Renovation that will bring homes up to standard.

C: Home replacement or new homes.

D: Mortgage buy-down program that leverages other loans such as USDA Rural Development, HUD Section 184, HUD Title VI funds, Community Development Financial Institutions, VA loans, and others.



Timeline: The TAPR must be submitted annually prior to the deadline. Each year, a letter to the tribal leader (President/Chief) contains the deadline for that year's TAPR. If the Tribe does not meet the annual TAPR deadline, none of their tribal members will be considered for the housing grants.

Regulations: 25 CFR 256. These were last revised in December 2015.

Next steps: To receive funding from [this program](#), tribes must submit an TAPR to the BIA. Then Alaskan Native Tribes can contact the Housing Program Specialist at the [Alaska regional office of Indian Affairs](#) for more information about applying to the program.

U.S. Department of Health and Human Services Administration for Native Americans (ANA)

ANA promotes Native American self-sufficiency through a variety of programs that foster economic development, health and well-being services, and youth and intergenerational activities in communities. They offer funding for community planning and training and technical assistance for project planning and development.

Social and Economic Development Strategies (SEDS)

Eligibility: Federally recognized Indian tribes

Description: The SEDS program provides financial assistance to tribes via grants that support local community development projects. Projects should reduce or eliminate community problems and achieve community goals. The SEDS program includes two special initiatives, a Native Asset Building Initiative (NABI) and Sustainable Employment and Economic Development Strategies (SEEDS).

Timeline: Timelines vary for each grant. Current funding opportunities and their deadlines for application are available on the [ANA website](#).

Regulations: Regulations for each grant appear in the [Funding Opportunity Announcements](#).

Next steps: More information on the SEDS program is available on the [ANA website](#). To learn more about upcoming grant announcements and for more information, contact [ANA staff](#).

Training and Technical Assistance

Eligibility: Federally recognized Indian tribes

Description: ANA offers three types of training for prospective applicants:

- 1) Project planning and development;
- 2) Pre-application training; and
- 3) Pre-application electronic technical assistance.

In the first type of training, project planning, tribes learn to create a project plan, identify obstacles to community goals, develop measurable outcomes, and estimate the resources and funding that will be needed to implement a project. The second two types of training focus on helping tribes to gain the skills necessary to apply for grants using the federal application process.

Timeline: Upcoming trainings for Alaska are listed on the [ANA Alaska region website](#).

Regulations: The trainings are free, but any travel costs are the responsibility of the tribe. For pre-application trainings, applicants must have a project idea in development.

Next steps: More information about the training and technical assistance is available on the [ANA website](#), and interested tribes should contact the [ANA Alaska region training and technical assistance center](#).

U.S. Department of Housing and Urban Development (HUD)

HUD has multiple programs that fund housing and related infrastructure. Block grant programs provide funding to tribes for community projects and other programs offer loans for tribes and individuals.

Indian Community Development Block Grant Program (ICDBG)

Eligibility: Indian tribes, bands, groups, nations, or Alaska Native Villages with an established relationship to the Federal government. In some cases, tribal organizations may apply to the program.

Description: This program provides direct grants for use in developing viable Indian and Alaska Native communities. Funding can be used for housing (rehabilitation, land acquisition, new housing construction), community facilities, and economic development (commercial, industrial, and agricultural projects). There are



two types of grants: single-purpose grants are competitively awarded and provide funds for activities designed to meet a specific community development need; and imminent threat grants address urgent problems that were not evident during the grant funding cycle or that require immediate action.

Timeline: An annual Notice of Funding Availability (NOFA) is published each year for single-purpose grants. Grants are awarded on a competitive basis to applicants. Imminent Threat grants are awarded on a first come-first serve basis to mitigate immediate threats to health and safety.

Regulations: Tribes must comply with nondiscrimination provisions and not have outstanding ICDBG financial obligations to HUD in arrears or not having an agreed-upon repayment schedule. Single purpose grants must primarily benefit low- and moderate-income persons. While a match is not required for grants, applications with a match will be scored higher and have a greater likelihood of being funded. There are also program-specific regulations. Finally, tribes need to be prepared to submit documentation of the community development need to be addressed, and documentation that the project will benefit the neediest segment of the population. The documentation should include quantitative data from sources such as community surveys, existing programs, or data from other agencies. It may also include Census or other demographic data. Documentation such as a comprehensive development plan or an operations and maintenance plan for community buildings is not required but demonstrates how the community will be responsible for the funded buildings.

Next steps: This [grant](#) can be used for land development in addition to housing. To learn more about the grants and how to apply for them, contact the [Alaska ONAP staff](#). The Tribe can also contact the Loan & Grant officer at the [AVCP Regional Housing Authority](#) for assistance with this and other funding opportunities.

Indian Housing Block Grant (IHBG)

Eligibility: Federally recognized Indian tribes or their tribally designated housing entity.

Description: This program is authorized under the Native American Housing Assistance and Self Determination Act of 1996 (NAHASDA). It is a formula-based grant program administered in Southwest Alaska by the Alaska ONAP office and AVCP Regional Housing Authority (AVCP RHA). The grants can be used for a range of housing activities, such as housing development, assistance to housing that was developed under the Indian Housing Program, housing services to eligible households, crime prevention and safety, and model activities that provide creative approaches to solving affordable housing problems. This funding is allocated to the regional housing authority (AVCP RHA), which typically uses it among its member villages in a rotating fashion.

Timeline: Annual

Regulations: To be eligible for funding, tribes must submit an Indian Housing Plan to HUD each year. Then, at the end of the year, recipients of the grant must submit an Annual Performance Report that documents their progress toward goals listed in their Indian Housing Plan.

Next steps: Currently, Newtok's current location is not in rotation for the [Indian Housing Block Grant Program](#) because of the upcoming move to Mertarvik. Instead, AVCP RHA will allocate IHBG to build homes at the new site. Currently, AVCP RHA has plans for building homes in Mertarvik in Summer 2017. For more information, contact [AVCP RHA staff](#).

Title VI Loan Guarantee

Eligibility: Federally recognized Indian tribes or their tribally designated housing entity.

Description: This program is authorized under the Native American Housing Assistance and Self Determination Act of 1996 (NAHASDA). It is administered by the Alaska ONAP office and AVCP RHA. The program provides financing guarantees to Indian tribes for private market loans to develop affordable housing. Eligible activities include creating new housing, rehabilitating housing, constructing community facilities, acquiring land for housing, preparing architectural and engineering plans, and financing costs. In Alaska, the program has been used to build modular housing units in Mountain Village and single-family units in Unalakleet, Kobuk, and Shungnuk. The program is very flexible, and Tribes can structure their loan with various terms, interest rates, and payment schedule.

Timeline: Applications are accepted year-round.

Regulations: A tribe pledges the need portion of the annual IHBG and the project's income as security to HUD in exchange for the loan guarantee. The maximum guarantee amount that a tribe can borrow is approximately five times the need portion. This total applies to the sum of the Title VI loans taken out by the tribe. The tribe will need to repay the Title VI loan but can use IHBG funds to do so.



Next steps: More information is available on the [program web page](#). Interested tribes in Southwest Alaska should contact [Alaska ONAP staff](#) and [AVCP RHA staff](#) for more information.

Section 184 Indian Home Loan Guarantee Program

Eligibility: American Indians, Alaska Natives, Alaska Villages, tribes, or tribally Designated Housing Entities

Description: This program, administered by the Alaska ONAP office, guarantees home loans for new construction, rehabilitation or purchase of existing homes, or refinancing. Lenders are provided with a 100% guarantee for the loans, thus encouraging them to lend to Native individuals and communities. The mortgages can be used on and off native lands for new construction, rehabilitation, the purchase of a new home, or refinancing.

Timeline: Applications are accepted year-round.

Regulations: Applicants must be credit-qualified and Native American. The program can be used anywhere in the State of Alaska.

Next steps: Visit the [program website](#) for more information and contact [Alaska ONAP staff](#) for assistance in applying. Residents can also contact the Loan & Grant officer at the [AVCP Regional Housing Authority](#) for assistance with this and other funding opportunities.

United States Department of Agriculture Rural Development (USDA RD)

USDA RD has multiple programs that fund housing and infrastructure in rural areas. Programs include grants to organizations and villages and loan options for individuals. All programs are administered through the Alaska USDA RD office.

Mutual Self-Help Housing Technical Assistance Grants

Eligibility: Government nonprofit organizations, federally recognized tribes, private nonprofit organizations. In general, lower-income borrowers with acceptable credit and the means to repay a low-interest mortgage loan from USDA RD are eligible for this program.

Description: This program provides grants to organizations to organize and conduct local self-help housing construction projects. Very-low- and low-income individuals construct their own homes as a group, with technical assistance from a USDA partner overseeing the project. Currently, approved USDA partners are RurAL CAP and the Alaska Community Development Corporation. Homebuyers dedicate at least 30 hours per week for at least 1 year, and perform 65% of the tasks involved in building the homes. The cost savings becomes the homebuyer's "sweat equity," which acts as a down payment on the home.

Timeline: Applications are accepted year-round. The development timeline for new projects is 18-24 months to the start of construction, and approximately 1 year of construction after a group of 8-10 families have completed the process for qualification for a low-interest mortgage loan.

Regulations: This program is governed by 7 CFR 1944-I.

Next steps: More information is available on the [program web page](#), and interested organizations should contact the [Single Family Housing and Communities Facilities](#) department of the Alaska USDA RD office. Also, organizations should contact either [RurAL CAP](#) or the [Alaska Community Development Corporation](#) for more information on how a project is implemented.

Single Family Housing Guaranteed Loan

Eligibility: Low- and moderate-income households who will occupy the dwelling as their primary residence. Applicants must be U.S. citizens, U.S. non-citizen nationals, or Qualified Aliens and have the legal capacity to incur a loan obligation. The homes must be in eligible rural areas.

Description: This program helps lenders provide rural low- to moderate-income homebuyers with loans. It provides a 90% loan guarantee to approved lenders to reduce the risk of extending loans for new or existing residences in rural areas.

Timeline: Applications are accepted year-round.

Regulations: The loans can be used for new or existing residential property. The loan amount can include a number of different accessories to the actual property, such as closing costs for the purchase, repairs to existing structures, insurance premiums, essential household equipment, energy efficient features, and site preparation costs. Finally, loans must come from an [approved lender](#). The program is governed by 7 CFR, Part 3555.



Next steps: Interested families start with an [approved lender](#), and should ask the loan officer about applying for this [program](#). General questions can also be directed to the USDA RD Alaska [Guaranteed Rural Housing Loan Specialist](#). Residents can also contact the Loan & Grant officer at the [AVCP Regional Housing Authority](#) for assistance with this and other funding opportunities.

Single Family Housing Direct Home Loan (Section 502 Direct Loan Program)

Eligibility: Low-income households in eligible rural areas may apply for the program if they are planning to occupy the home as their primary residence, are willing and able to repay debt, meet citizenship requirements, and are unable to obtain a loan from other resources.

Description: This program provides assistance to applicants to reduce their mortgage payment. The goal of the program is help low-income rural residents obtain safe and sanitary housing. The amount of assistance is determined by the adjusted family income. Also, people who borrow through the program will have zero down payment and are not required to carry private mortgage insurance. The program also offers low, fixed-interest rates (as low as 1% after the payment assistance) and up to a 38-year payback period.

Timeline: Applications are accepted year-round.

Regulations: Homes financed through this program must be moderate in size and contain no in-ground swimming pools or income-producing activities. The market value of the home has to be under a certain amount. The loan can be used for new or existing properties. In addition to covering the cost of buying or building a residence, funds can be used to repair structures, prepare sites, or provide water and sewage facilities. This program is governed by 7 CFR, Part 3550.

Next steps: More information is available on the [program web page](#) and interested organizations can contact the [Single Family Housing and Community Facilities department](#) of the Alaska USDA RD office. Residents can also contact the Loan & Grant officer at the [AVCP Regional Housing Authority](#) for assistance with this and other funding opportunities.

Single Family Repair Loans and Grants (Section 504 Home Repair Program)

Eligibility: Low-income households in eligible rural areas may apply for the program. They must be occupying the home as their primary residence, be willing and able to repay debt, meet citizenship requirements, and are unable to obtain a loan or grant from other resources.

Description: This program provides loans to very-low-income families to repair, improve, or modernize their existing homes. The loans have a maximum amount of \$20,000, and offer up to 20 year terms at 1% interest. The program also provides grants to elderly very-low-income homeowners to remove health and safety hazards in their home. Some examples of eligible repairs include roof replacement, winterization, purchasing or repairing a heating system, structural repairs, and water/sewer connection work.

Timeline: Applications are accepted year-round and are processed in the order that they are received.

Regulations: Homeowners must have a family income below 50% of the area median income. For grants, applicants must be age 62 or older. This program is governed by 7 CFR, Part 3550.

Next steps: More information is available on the [program web page](#), and interested organizations should contact the [Single Family Housing and Community Facilities department](#) of the Alaska USDA RD office. Residents can also contact the Loan & Grant officer at the [AVCP Regional Housing Authority](#) for assistance with this and other funding opportunities.

Rural Housing Site Development Loans

Eligibility: Private or public non-profit organizations and Federally-recognized Tribes.

Description: This program offers two types of loans, Section 523 and Section 524 loans, to purchase and develop housing sites for low- and moderate-income families. The Section 523 loans can be used for housing that is constructed by the Self-Help method. The Section 524 loans have no restrictions as to the method of construction.

Timeline: Applications are accepted year-round.

Regulations: The loans have a 2-year term. Section 523 loans have 3% interest rate and Section 524 loans are at market rate. Housing must be for low-income (50-80% of area median income) or moderate-income (\$5,500 above the low-income limit) families. Housing must be located in an eligible rural area. This program is governed by RD instructions 1924-A and 1924-C.



Next steps: More information is available on the [program web page](#), and interested organizations should contact the [Single Family Housing and Community Facilities department](#) of the Alaska USDA RD office. The Tribe can also contact the Loan & Grant officer at the [AVCP Regional Housing Authority](#) for assistance with this and other funding opportunities.

Rural Alaska Village Grants

Eligibility: Rural Alaska Native villages; ANTHC can also apply on behalf of a rural Alaska village.

Description: This program funds the planning, development, and construction of water and wastewater systems to improve health and sanitation conditions in rural Alaska. Installed systems vary, and can include piped water and sewer systems, wells, tank haul systems, washeterias, septic systems, and plumbing in homes. Villages can also use funds for technical assistance and training. Grants will cover 75% of project costs; the remaining 25% need to come from the State of Alaska.

Timeline: There are specific application openings each year; times fluctuate. It is announced on the State of Alaska website.

Regulations: Villages must have a population of less than 10,000, and the area median income cannot exceed 110% of the State metropolitan median income. Also, there must be a dire sanitation condition.

Next steps: The first consideration is the need for a 25% match for any of the [grants](#). The community of Newtok can work with their main contact at ANTHC to apply to the State of Alaska for the matching funds. They will then need a planning project first, to get an engineering report and environmental assessment to use for infrastructure projects. There have already been initial talks between USDA and ANTHC about putting Newtok in for a planning project to get those required documents. Questions about the program can be directed to the [Director of Water and Environmental Programs](#) at the Alaska USDA RD office.

Water and Waste Disposal Loans and Grants

Eligibility: State and local government entities, private nonprofits, and Federally-recognized tribes

Description: This program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage. Most funding is in the form of long-term low-interest loans; if funds are available, some funding may be in the form of a grant combined with a loan to keep interest payments reasonable. Loan terms are up to 40 years, and have a fixed interest rate based on the project need and the area median household income.

Timeline: Applications are accepted year-round.

Regulations: Projects must be located in rural areas or towns with fewer than 10,000 people or tribal lands in rural areas. A match is required. This program is governed by 7 CFR, Parts 1780 and 1782.

Next steps: The first step is to talk with the [Director of Water and Environmental Programs](#) at the Alaska USDA RD office for more [information](#), loan requirements, and help identifying potential projects.

Water and Waste Disposal Loan Guarantees

Eligibility: State and local government entities, private nonprofits, and Federally-recognized tribes may apply for loans through a private lender. The private lender applies for the loan guarantee.

Description: This program helps private lenders provide affordable loans to borrowers to finance projects to improve access to clean, reliable water and waste disposal systems for households and businesses in rural areas. For example, loans could be used to construct or improve facilities for drinking water, sanitary sewers, solid waste disposal, and storm water disposal facilities. The maximum guarantee is typically 90% of the loan amount, and interest rates can be fixed or variable. Loan terms can be up to 40 years.

Timeline: Applications are accepted year round.

Regulations: Projects must be located in rural areas or towns with fewer than 10,000 people or tribal lands in rural areas. Facilities constructed through the program must be used for public purposes. This program is governed by 7 CFR, Part 1779.

Next steps: This [program](#) comes through an [approved lender](#), so the first step is contacting a lender of choice to discuss the proposed project and apply to the program for the loan guarantee. General questions about the program can be directed to the [Director of Water and Environmental Programs](#) at the Alaska USDA RD office.



Solid Waste Management Grants

Eligibility: State and local government entities, private nonprofits, academic institutions, and federally-recognized tribes

Description: This program helps reduce or eliminate pollution of water resources by funding projects that provide technical assistance or training to improve the planning and management of solid waste sites. For instance, an evaluation of current landfill conditions or training to help communities reduce solid waste or close landfill sites. The program provides funds in the form of competitive grants.

Timeline: Applications are accepted through the Alaska USDA RD office each year from October 1 - December 31.

Regulations: Projects must be in a rural area or town with 10,000 or fewer people. Special consideration may be given for areas with smaller populations or lower income populations. This program is governed by 7 CFR 1775 Subpart D.

Next steps: This [program](#) is not for infrastructure. It will fund training for community members or landfill operators. There are other training programs as well, so a first step is to contact the [Director of Water and Environmental Programs](#) at the Alaska USDA RD office. If the Newtok Village Council has training related to solid waste that they would like to fund, the director can either help with an application to this program, or with ideas for other funding sources that may be more applicable.

U.S. Environmental Protection Agency (EPA)

Alaska Native Village Grant

Eligibility: Unincorporated communities with between 25 and 600 people; a second-class city; or a first class city with not more than 600 residents.

Description: The goal of this program is to assist Alaska rural communities with construction of new or improved drinking water and wastewater systems. This program provides technical support and funding to communities to design and construct water and wastewater systems, and to provide training in the operations and maintenance of the systems.

Timeline: Funding is appropriated for the program annually.

Regulations: The grant [guidelines](#) were updated in 2016 and are available on the program website. They include match requirements, administrative costs, pre-award costs, applicable laws, grant operations, environmental considerations, other requirements, and project officer responsibilities.

Next steps: More information is available on EPA's [website](#).

U.S. Department of Veterans Affairs (VA)

VA Home Loans

Eligibility: Servicemembers, Veterans, and eligible surviving spouses

Description: The VA Home Loan program provides a loan guaranty benefit to help applicants build, repair, retain, or adapt homes for their families. The loans are provided by private lenders, such as a bank or mortgage company. The VA guarantees a portion of the loan to enable the lender to offer more favorable terms. Different programs offered by the VA include a purchase loan to purchase a home, an interest rate reduction program, a Native American Direct Loan, and Adapted Housing Grants.

Timeline: Applications are accepted year-round.

Regulations: Applicants must meet the conditions for eligibility for the program which include requirements on length of service, duty status, and character of service. Specific information is available on the [VA website for home loans](#).

Next steps: Applicants must obtain a Certificate of Eligibility through mail, the VA website, or through a lender. More information is available [here](#).



State funding sources

Funding for housing and infrastructure projects is available through the State of Alaska. The Alaska Housing Finance Corporation (AHFC) offers grants, loans, and education for housing projects and individual home buyers. The Association of Alaska Housing Authorities also offers training and technical assistance to communities.

Alaska Housing Finance Corporation (AHFC)

AHFC's mission is to provide Alaskans with access to safe, quality, affordable housing. As part of that goal, AHFC offers loans and grants to individuals, regional housing authorities, and other organizations.

Supplemental Housing Development Grant Program

Eligibility: Regional Housing Authorities can apply for funding to supplement housing projects that have been approved for development by HUD.

Description: This program began in 1981 with the goal of promoting energy efficiency in rural housing. The funds from the program can be used to build energy efficient homes or rehabilitate existing housing units.

Timeline: Annual, funding announcement typically issued by AHFC in late summer.

Regulations: Funds are limited to 20% of HUD's total development cost per project, and can only be used for the following: on-site sewer and water facilities, road construction to project sites, electrical distribution facilities, and energy efficient design features in homes. To qualify, homes must meet the current Alaska BEES.

Next steps: The Newtok Village Council must work with the Housing Planning Manager at [AVCP Regional Housing Authority](#) (AVCP RHA) and provide them as much information as possible on the urgency of the situation and the work plan for the move. Then AVCP RHA can include tasks for Newtok in its annual application to the [program](#).

Teacher, Health Professional, and Public Safety Housing Program (THHP)

Eligibility: School districts, local governments, regional health corporations, housing authorities, and nonprofits.

Description: This program provides funding for rental housing for essential workers in rural Alaska. The goals are to improve housing conditions in small communities and reduce turnover of rural professionals. The program attempts to distribute funds equally throughout the geographic regions of Alaska and prioritizes energy efficient and safe housing projects.

Timeline: Annual, funding announcement typically issued by AHFC to registries in summer.

Regulations: The rental housing must be occupied by teachers, health professionals, or public safety workers for a minimum of 10 years following its construction. To be competitive, projects should include match funding. Including a operations and maintenance plan, or a comprehensive development plan, with the application will demonstrate that the community will be responsible for the building for its lifetime. Specific regulations for each year will be included in that year's funding announcement.

Next steps: To apply for this [grant](#), the first step is to register with AHFC in the spring. All registrants will be invited to the application process. For more information and questions, entities can contact the program manager (contact information on [this page](#)).

Rural Owner-Occupied and Non-Owner-Occupied Loan

Eligibility: For the owner-occupied loan, residents of small communities. A small community has less than 6,500 people and is not connected by road or rail to Anchorage or Fairbanks. For the non-owner-occupied loan, the borrower can be an Alaska resident, local government entity, or regional attendance area.

Description: This program offers loan funding for rural housing through [eligible lenders](#). The loan interest rate and terms are often more attractive than other loan programs in order to support residents in rural areas. In addition, these loans do not require mortgage insurance.

Timeline: Applications are accepted year-round.

Regulations: Borrowers must be residents of Alaska, and cannot be delinquent on child support. The home must be built to BEES standards, have proper inspections, and be built by licensed contractors with a residential endorsement. For the non-owner-occupied loan program, the property must be a duplex, triplex, or fourplex. In both cases, the interest rate will apply to the first \$250,000 of the loan amount. Loans in excess of that amount



receive a blended interest rate where the excess of \$250,000 is calculated at the Rural Program rate plus 1%.
Next steps: The first step is to contact a [lender](#) of your choice and ask about AHFC interest rate reduction options (described below) that can be added onto [this loan program](#).

Interest Rate Reduction Options

Eligibility: Alaskan borrowers can apply for these options if they meet the terms described below.

Description: AHFC offers two interest rate reductions for borrowers: one for low-income borrowers who have not owned a primary residence within the last three years and another for borrowers who purchase a newly constructed energy efficient home, an existing energy efficient home, or one to which energy efficiency improvements will be made within 365 days from closing.

Timeline: Applications are accepted year-round.

Regulations: For the low-income borrowers rate reduction program, borrowers must participate in an approved homeowner education class. For the energy efficiency program, new or existing homes must be 5 Star Plus or 6 Star, or the borrower must make energy improvements within 365 days of closing. Borrowers must be residents of Alaska and cannot be delinquent on child support. The home must be built to BEES standards, have proper inspections, and be built by licensed contractors with a residential endorsement. Interest rate reductions apply to the first \$200,000 of the loan amount for energy efficiency, and the first \$180,000 of loans for low-income borrowers.

Next steps: Interested individuals should begin at their [lender of choice](#) and ask the loan officer about these [options](#) to reduce the interest rate.

Affordable Housing Enhanced Loan Program (AHELP)

Eligibility: Low- and moderate-income Alaskan borrowers

Description: This program is a partnership between AHFC and another agency (a housing authority, a housing organization, or [an approved lender](#)) to help AHFC provide safe, affordable housing to low- and moderate-income Alaskan borrowers. In this program, the borrower receives down payment assistance, closing cost assistance, or secondary financing from a local, state, or federal government agency, nonprofit agency, or regional housing authority. The assistance can come in the form of a grant, deferred payment option, a forgivable loan, or a combination of these options. In the past, Alaskan housing authorities and NeighborWorks Alaska have collaborated with AHFC through this program. The program can provide a means to combine funding allocated for housing into a loan program, making loans more feasible for residents while also allowing the funding to reach more individuals.

Timeline: Programs can be set up at any time, and typically applications to them are accepted year-round.

Regulations: Different partners will have different regulations. However, AHFC requires that borrowers not own other residential property in the same general area, that the property be an owner-occupied single-family home, condominium, unit in a Common Interest Community, or Type I manufactured home. Also, borrowers must participate in an approved homebuyer education class.

Next steps: If an organization working on the move of Newtok to Mertarvik, such as the Newtok Village Council or AVCP Regional Housing Authority, would like to learn more about this [program](#), start by contacting an [AHFC lending officer](#).

HomeChoice Class

Eligibility: Anyone may take the course.

Description: HomeChoice is a free class for home buyers in Alaska. The course does not meet the federal requirement for homebuyer education because it does not include individual housing counseling sessions. However, it does cover many topics surrounding the process of buying a home, including money management, AHFC loan programs, insurance, purchase and sale contracts, home inspections, and energy efficient features. Attendees are also eligible for a \$250 discount on closing costs for home loans financed through AHFC.

Timeline: Class schedules can be found on AHFC's [website](#). For rural citizens, contact the [HomeChoice administrative assistant](#) at AHFC to schedule a class for your area, or arrange for a [home study](#) option.

Regulations: Attendees must pass a quiz at the end of the class to be eligible for the discount on closing costs. For rural classes, there must be at least 5 participants.

Next steps: If Newtok residents would be interested in a class, contact the [HomeChoice administrative assistant](#)



at AHFC. If possible, as much notice as possible is appreciated. Also, providing information about the specific community needs will allow the instructor to tailor the class to the particular location. For residents that are looking to use this class to meet a homebuyer education requirement, it is best to first check with the financing program to make sure that it will fulfill the requirement.

Association of Alaska Housing Authorities (AAHA)

AAHA members consist of the fourteen Alaskan regional housing authorities and the Alaska Housing Finance Corporation. Their Training and Technical Assistance Program funded this report, and is available to provide tribes with skill-building training.

Training and Technical Assistance Program

Eligibility: Indian Housing Block Grant recipients

Description: This program provides comprehensive training and/or technical assistance to organizations providing housing for Native Alaskans in order to build capacity and improve the effectiveness of Alaska's housing programs. Services are provided free of charge and can include needs assessments, on-site or remote technical assistance, training materials/tools that have been refined for Alaskan construction sites, and place-based trainings for groups.

Timeline: Applications are accepted year-round.

Regulations: Applicants must be a recipient of an Indian Housing Block Grant. The technical assistance will be provided by one of AAHA's team of technical assistance and training providers.

Next steps: This program can provide construction training and residential endorsement classes for local building crews. The program [website](#) contains link to the electronic application, and contact information for questions.

Other funding sources

Funding for housing projects is also available through nonprofit organizations and a national bank cooperative.

Federal Home Loan Banks (FHLBanks)

FHLBanks is an organization made up of regional cooperatives of local banks. In addition to providing member institutions liquidity for financing, FHLBanks has an Affordable Housing Program (AHP) which provides funding for housing and community development projects. The AHP is administered through the regional FHLBanks offices.

Affordable Housing Program (AHP) - Competitive Program

Eligibility: Local developers, nonprofits, housing authorities, or community organizations that will build or renovate housing for low- to moderate-income households. Many projects are designed for seniors, the disabled, homeless populations, first-time homeowners and others with limited resources or special needs.

Description: This program, administered in Alaska by FHLB Des Moines, is a private source of funding up to \$750,000 for financing purchase, construction, or rehabilitation of owner-occupied or rental residences. This program can be used for gap funding, or sole funding in a project. It is funded through 10% of the FHLBanks' net annual income. The program is run as a competitive grant program and was created in the Financial Institutions Reform, Recovery, and Enforcement Act of 1989. Grant applications are scored so that priority is given to projects that utilize the funding to create the greatest benefit.

Timeline: Funding announcement is issued annually, typically in June. Applicants will need to partner with an FHLB Des Moines member financial institution to act as the conduit of grant funds.

Regulations: There are income limits for households served, who must be at or below 80% of area median income. Income limits are based on the HUD and/or NAHASDA income limits and are updated annually. Also, there is a limit for funding per house; currently, \$40,000 per house is allowed. There is a time limit for projects if funding is received. Rental projects are given 3 years to completion, and homeownership projects must be completed in 2 years.



Next steps: If Newtok is considering applying to this [program](#), the first step is to become familiar with the program guidelines and competitive scoring criteria. Each year's guidelines are published in January in an AHP Implementation Plan. After reading this, potential applicants are welcome to call the [Community Investment Department](#) at FHLBanks with questions and submit summaries of their planned work for feedback. A pre-application or technical assistance period is open in March. Forms will be available on the website. Applicants will need to partner with a [member financial institution](#) to complete an application as the member institution will act as the conduit of grant funds.

Affordable Housing Program - Down Payment Assistance

Eligibility: Potential homeowners; requirements differ by program.

Description: Through this program, member banks can provide down payment and closing cost assistance to eligible local homeowners. Banks are then reimbursed up to \$450,000 annually by the FHLB Des Moines office. The program's goals are to help more families realize the dream of homeownership while helping member banks improve their relationship with the community. The program consist of three separate products:

1. HomeStart - Grants of up to \$5,000 per household for down payment and closing cost assistance. Total annual household income may not exceed 80% of the area median income.
2. HomeStart Plus - Grants of up to \$10,000 per household for down payment and closing cost assistance. Households must be the recipient of public housing assistance with the purchase of the home, and total household income may not exceed 80% of the area median income.
3. Native American Homeownership Initiative - Grants of up to \$10,000 per household for down payment, closing cost, homeownership counseling, or home repairs. At least one of the adult members of the household must be an enrolled member of a Federally Recognized Tribe or a member/shareholder of an Alaska Village or Regional Corporation, and total household income may not exceed 80% of the area median income.

Timeline: This program is annual, with funds available on a first-come, first-served basis.

Regulations: Area median incomes are determined by HUD and should be adjusted for household size.

Next steps: [Down payment assistance](#) is processed through [member institutions](#). Potential homeowners should contact a member bank of their choice and ask about the program.

NeighborWorks Alaska

NeighborWorks Alaska is a nonprofit dedicated to improving the quality of life for Alaskans by strengthening neighborhoods and creating new housing opportunities. They offer two programs for rural areas.

Homeowner Education

Eligibility: First-time homebuyers and anyone interested in learning more about homeownership

Description: NeighborWorks offers homeowner education via two different methods. First, they work with a funding partner to offer in-person homeowner classes. Second, Alaskans can access courses online via the NeighborWorks website. In both cases, classes cover content based on national curriculum standards for homebuyer education, including topics such as financial planning, goals and investments, and home occupant responsibilities. In the past, rural classes have been sponsored by organizations such as housing authorities.

Timeline: People can access homeowner classes online at any time; in person classes must first be arranged by a community, funder, and NeighborWorks Alaska.

Regulations: N/A

Next steps: Call NeighborWorks Alaska's [Director of Lending and Homeownership](#) to estimate costs of an [in-person class](#) and tailoring a program for Newtok.

Home Ownership Services

Eligibility: Each loan has differing regulations; loan options are described in this document in the sections corresponding to the funding agency.

Description: NeighborWorks offers several programs to help potential homeowners finance a house. If an organization, tribe, or Village Council has funding for a loan pool, NeighborWorks can provide technical assistance in setting up the loan pool. The group also offers USDA loan packaging and offers other loan programs, such as USDA, FHA, and AHFC loans. In either case, potential homeowners begin with one-on-one meetings (in person or on the telephone) with a housing counselor and then meet with a mortgage specialist to choose a program and apply for the loan.



Timeline: Varies. Individuals should begin with a homeowner education class and then proceed to housing counseling before working with a mortgage specialist.

Regulations: Varies depending on loan program.

Next steps: Contact NeighborWorks Alaska's [Director of Lending and Homeownership](#), who will be able to assess which [programs](#) may best be able to help with building Mertarvik homes, and begin to facilitate housing counseling for individuals ready to start the process of homeownership.



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MERTARVIK

Housing Master Plan

APPENDIX



Appendix A (Newtok Planning Group Participants)	P.108
Appendix B (Housing Needs Assessment Flyer)	P.109
Appendix C (Housing Needs Assessment Questions)	P.110

Supplemental Documentation (not on a numbered page):

Demonstration House Construction Documents

Quinhagak Octagon Construction Documents

SBS-CCHRC “Hawk” Starter Home Construction Documents

AVCP Regional Housing Authority:

 HMH 4 2016 Construction Documents

 VLIP 3 2012 Construction Documents



APPENDIX A

Newtok Planning Group Participants

Participants in the Newtok Planning Group

Native Village of Newtok

- Newtok Village Council
- Newtok Native Corporation

State of Alaska

- Alaska Department of Commerce, Community, and Economic Development— *group coordinator*
- Alaska Department of Environmental Conservation (DEC)/Village Safe Water Program
- Alaska Department of Transportation and Public Facilities
- Alaska Department of Military and Veterans Affairs/Division of Homeland Security and Emergency Management
- Alaska Department of Education and Early Development
- Alaska Department of Health and Social Services
- Alaska Industrial Development and Export Authority/Alaska Energy Authority
- Alaska Governor's Office
- Alaska Legislative Representatives:
 - Senator Lyman Hoffman's Office
 - Representative Herron's Office

Federal

- U.S. Army Corps of Engineers, Alaska District
- U.S. Department of Commerce, Economic Development Administration
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration
- U.S. Department of Defense, Innovative Readiness Training Program
- U.S. Department of Agriculture, Rural Development
- U.S. Department of Agriculture, Natural Resources Conservation Services
- U.S. Department of Housing and Urban Development
- U.S. Department of the Interior, Bureau of Indian Affairs
- U.S. Department of Transportation, Federal Aviation Administration
- U.S. Environmental Protection Agency
- Denali Commission
- Alaska Congressional Delegation
 - Senator Lisa Murkowski's Office
 - Representative Don Young's Office

Regional Organizations

- Association of Village Council Presidents, Regional Housing Authority
- Alaska Native Tribal Health Consortium
- Coastal Villages Region Fund
- Lower Kuskokwim School District
- Rural Alaska Community Action Program
- Yukon-Kuskokwim Health Corporation



APPENDIX B

Housing Needs Assessment Flyer

What do you want your community to look like?



2016 CCHRC + NEWTOK VILLAGE COUNCIL **HOUSING NEEDS ASSESSMENT**

Share your input and ideas to help shape the future of Newtok @ Metarvik

- What types of housing work for your family and your community?
- How many houses will be needed?
- How can the housing at the new site learn from, and build upon, traditional knowledge?
- What can be done to provide for our future generations?

CCHRC staff will be meeting with each household individually to talk with you about these very important topics.



APPENDIX C

Housing Needs Assessment Questions

Date_____

Name of household:_____

Address:_____

Interviewee
name(s):_____

Interviewee relationship to head of household (circle one):

Self

Spouse/partner

Elder (grandparent)

Child – biological

Child – foster

Grandchild

Sibling

Parent

Parent-in-law

Son or daughter-in-law

Other relative

Roomer or boarder

Housemate or roommate

Other non-relative



Population

Number of people living in the household year-round: _____

Number of people living in the household year-round including seasonal
occupants _____

Does any permanent resident of the household have a disability that requires a wheelchair or
other disability access? (Circle one)

Yes

No



Household resident characteristics and income – FILL IN FOR EVERY ADULT. USE ADDITIONAL SHEET IF NECESSARY.

	Adult #1	Adult #2	Adult #3	Adult #4
Name				
Age				
Male/Female				
Relationship to head of household – circle one	Self Spouse/partner Elder,grandparent Child – biological Child- adopted Child – foster Grandchild Sibling Parent Parent-in-law Child-in-law Other relative Roomer/boarder Housemate Other nonrelative	Self Spouse/partner Elder,grandparent Child – biological Child- adopted Child – foster Grandchild Sibling Parent Parent-in-law Child-in-law Other relative Roomer/boarder Housemate Other nonrelative	Self Spouse/partner Elder,grandparent Child – biological Child- adopted Child – foster Grandchild Sibling Parent Parent-in-law Child-in-law Other relative Roomer/boarder Housemate Other nonrelative	Self Spouse/partner Elder,grandparent Child – biological Child- adopted Child – foster Grandchild Sibling Parent Parent-in-law Child-in-law Other relative Roomer/boarder Housemate Other nonrelative
Predominant race- circle one	Alaska Native White Black Hispanic Asian Other	Alaska Native White Black Hispanic Asian Other	Alaska Native White Black Hispanic Asian Other	Alaska Native White Black Hispanic Asian Other



	Adult #1	Adult #2	Adult #3	Adult #4
If Alaska Native, are you a shareholder or descendent of a shareholder for any of the following regional corporations? – Circle one	Calista Bristol Bay Bering Straits Doyon NANA CIRI (Cook Inlet) ASRC (Arctic Slope) Aleut Koniag AHTNA Chugach Sealaska The 13 th Regional	Calista Bristol Bay Bering Straits Doyon NANA CIRI (Cook Inlet) ASRC (Arctic Slope) Aleut Koniag AHTNA Chugach Sealaska The 13 th Regional	Calista Bristol Bay Bering Straits Doyon NANA CIRI (Cook Inlet) ASRC (Arctic Slope) Aleut Koniag AHTNA Chugach Sealaska The 13 th Regional	Calista Bristol Bay Bering Straits Doyon NANA CIRI (Cook Inlet) ASRC (Arctic Slope) Aleut Koniag AHTNA Chugach Sealaska The 13 th Regional
Monthly income in \$				
Employment type and sector– circle all that apply	Full time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Part-time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Seasonal Local/state/fed gov Construction Fishing/Cannery Retail Service Other Self-employed Local/state/fed gov Construction Fishing/Cannery Retail Service Other Unemployed Retired Subsistence	Full time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Part-time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Seasonal Local/state/fed gov Construction Fishing/Cannery Retail Service Other Self-employed Local/state/fed gov Construction Fishing/Cannery Retail Service Other Unemployed Retired Subsistence	Full time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Part-time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Seasonal Local/state/fed gov Construction Fishing/Cannery Retail Service Other Self-employed Local/state/fed gov Construction Fishing/Cannery Retail Service Other Unemployed Retired Subsistence	Full time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Part-time Local/state/fed gov Construction Fishing/Cannery Retail Service Other Seasonal Local/state/fed gov Construction Fishing/Cannery Retail Service Other Self-employed Local/state/fed gov Construction Fishing/Cannery Retail Service Other Unemployed Retired Subsistence



	Adult #1	Adult #2	Adult #3	Adult #4
Other sources of income (circle all that apply)	Retirement Pension Rental income Interest Estates Trust income Dividends (PFD, Native Corp, etc) Unemployment Social security (includes retirement, supplemental (SSI), disability) Public assistance (includes SNAP, WIC, TANF) Veterans assistance Foster care funds Child support Alimony Other	Retirement Pension Rental income Interest Estates Trust income Dividends (PFD, Native Corp, etc) Unemployment Social security (includes retirement, supplemental (SSI), disability) Public assistance (includes SNAP, WIC, TANF) Veterans assistance Foster care funds Child support Alimony Other	Retirement Pension Rental income Interest Estates Trust income Dividends (PFD, Native Corp, etc) Unemployment Social security (includes retirement, supplemental (SSI), disability) Public assistance (includes SNAP, WIC, TANF) Veterans assistance Foster care funds Child support Alimony Other	Retirement Pension Rental income Interest Estates Trust income Dividends (PFD, Native Corp, etc) Unemployment Social security (includes retirement, supplemental (SSI), disability) Public assistance (includes SNAP, WIC, TANF) Veterans assistance Foster care funds Child support Alimony Other



Newtok housing characteristics

Is this one of the 12 homes to be relocated to Mertarvik by FEMA? (Circle one)

Yes

No

Which best describes this building? (Circle one)

Single family residence

Duplex

Building with more than 2 apartments

Mobile home

Boat, RV, van, etc.

Other

What is the approximate size of this building in square feet? _____

About when was this building built? (Circle one)

2010 or later

2000-2010

1990-1999

1980-1989

Before 1980

What year did the head of household move into this building? _____

How many separate rooms are in this building? Do not count bathrooms, utility rooms, halls. _____

How many bathrooms are in this building? Must be a separate room. _____

How many bedrooms are in this building? (efficiency style = 0) _____



Are there living areas other than bedrooms that are used as a sleeping area at night? (Circle one)

Yes No

IF YES, how many _____

Circle what the building has:

Hot and cold running water

Flush toilet (flush and haul)

Flush toilet (piped water and sewer)

Bathtub or shower

Steamhouse

Electricity

Sink with a faucet

Electric stove or range

Gas stove or range

Refrigerator

Telephone service (include cell phones)

Passive ventilation (fresh 80s)

Mechanical ventilation (bathroom fans)

Mechanical ventilation (HRV)

What is the condition of this building? (Circle one)

Good

Needs minor repairs

Needs major rehabilitation



Circle all problems with this house.

No repairs needed

Roof leaks and needs repaired or replaced

Insulation in the ceiling is poor or nonexistent

There are holes in the floor

Insulation in the pipes is poor (cold floor)

Frozen pipes in winter

Porch and/or steps need repair

Plumbing leaks (bathroom and/or kitchen)

Windows and/or doors are broken (include cracks, drafty, and those that do not open)

Cracks in the wall or ceiling

Insulation in the walls is poor

There is fire/smoke damage to portions of the building

Foundation is bad

Mold on walls or rotting walls

Electrical outlets do not work

Other repairs needed

Does this building have a wheel chair ramp attached to the house? (Circle one)

Yes

No



Newtok housing financing

Is this building...? (Circle one)

Owned by someone in the household with a mortgage or loan?

Owned by someone in the household without a mortgage or loan?

A Mutual Help home?

Rented?

Occupied without payment of rent?

Other?

IF RENTED

Who owns the building? (Circle one)

Landlord (resident of Newtok)

Landlord (not a resident of Newtok)

Other

What is the monthly rent? _____

Who pays the rent? (Circle one)

Members of the household pay all the rent

Members of the household pay a portion of the rent and a portion is subsidized by _____

IF OWNED

Does any member of the household have a mortgage, deed of trust, contract to purchase, or similar debt on this property? (Circle one)

Yes

No

Do you pay all of the mortgage/loan amount? (Circle one)

Yes



No, a portion is paid by _____

Are you required to pay fire, hazard, flood insurance on this property? (Circle one)

Yes No

Are you required to pay real estate taxes on this property? (Circle one)

Yes No

Newtok housing utilities

What is the primary fuel used for heating this building? (Circle one)

Fuel oil or kerosene

Wood

Coal

Electricity

Gas

Wind

Solar

Other

What is the secondary fuel used for heating this building?

Fuel oil or kerosene

Wood

Coal

Electricity

Gas

Wind

Solar

Other



Do you pay for heating fuel separate from your rent or mortgage payment? (Circle one)

Yes No

Do you pay for electricity separate from your rent or mortgage payment? (Circle one)

Yes No

Do you pay for water and sewer separate from your rent or mortgage payment? (Circle one)

Yes No

Do you pay all of the utilities or is there a subsidy?

Yes No, it is subsidized by _____

Mertarvik housing number and type

Do you know any former Newtok families who are considering returning to Mertarvik and would require housing? How many? (Include names to avoid double counting)

0. No families

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____



How many housing units in Mertarvik would the current household prefer to live in?-

For each house **WITH ELDERS** answer the following:

	House #1	House #2	House #3	House #4
What type of housing is preferred?	Single family detached house (elder living alone or with spouse) Single family detached house (with caretaker) Single family detached house (with relatives) Apartment-style housing unit (elder living alone or with spouse) Apartment-style housing unit (with caretaker) Apartment-style housing unit (with relatives)	Single family detached house (elder living alone or with spouse) Single family detached house (with caretaker) Single family detached house (with relatives) Apartment-style housing unit (elder living alone or with spouse) Apartment-style housing unit (with caretaker) Apartment-style housing unit (with relatives)	Single family detached house (elder living alone or with spouse) Single family detached house (with caretaker) Single family detached house (with relatives) Apartment-style housing unit (elder living alone or with spouse) Apartment-style housing unit (with caretaker) Apartment-style housing unit (with relatives)	Single family detached house (elder living alone or with spouse) Single family detached house (with caretaker) Single family detached house (with relatives) Apartment-style housing unit (elder living alone or with spouse) Apartment-style housing unit (with caretaker) Apartment-style housing unit (with relatives)
How many bedrooms would the family prefer?				
How many bathrooms would the family prefer?				



Would anyone require the house to be ADA compliant?	Yes	Yes	Yes	Yes
	No	No	No	No
What fuel is preferred for heating? (Circle all that would be preferred)	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other
What plumbing options are preferred? Circle all that would be preferred)	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house
How would the family prefer the home to be financed? (Circle one)	Own – pay for up front Own – pay for with mortgage or loan Rent Other:	Own – pay for up front Own – pay for with mortgage or loan Rent Other:	Own – pay for up front Own – pay for with mortgage or loan Rent Other:	Own – pay for up front Own – pay for with mortgage or loan Rent Other:



<p>If RENT above, would the family be willing to finance with a loan if a home with rent is not available in a timely fashion?</p>	<p>Yes</p> <p>No</p>	<p>Yes</p> <p>No</p>	<p>Yes</p> <p>No</p>	<p>Yes</p> <p>No</p>
<p>How many adults would be willing to participate in the construction of the home?</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>
<p>How many adults would be willing to participate in construction training for building homes?</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>	<p>Paid only? _____</p> <p>Volunteer or pay? _____</p>



For each house **WITHOUT ELDERS** answer the following:

	House #1	House #2	House #3	House #4
What type of housing is preferred?	Single family detached house Apartment-style housing unit	Single family detached house Apartment-style housing unit	Single family detached house Apartment-style housing unit	Single family detached house Apartment-style housing unit
How many bedrooms would the family prefer?				
How many bathrooms would the family prefer?				
Would anyone require the house to be ADA compliant?	Yes No	Yes No	Yes No	Yes No
What fuel is preferred for heating? (Circle all that would be preferred)	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other	Fuel oil/kerosene Wood Coal Electricity Gas Wind Solar Other
What plumbing options are preferred? Circle all that would be preferred)	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house	Running hot and cold water Bathroom with toilet Bathtub and shower Laundry room Steam house



How would the family prefer the home to be financed? (Circle one)	Own – pay for up front Own – pay for with mortgage or loan Rent Other:	Own – pay for up front Own – pay for with mortgage or loan Rent Other:	Own – pay for up front Own – pay for with mortgage or loan Rent Other:	Own – pay for up front Own – pay for with mortgage or loan Rent Other:
If RENT above, would the family be willing to finance with a loan if a home with rent is not available in a timely fashion?	Yes No	Yes No	Yes No	Yes No
How many adults would be willing to participate in the construction of the home?	Paid only? _____ Volunteer or pay? _____	Paid only? _____ Volunteer or pay? _____	Paid only? _____ Volunteer or pay? _____	Paid only? _____ Volunteer or pay? _____
How many adults would be willing to participate in construction training for building homes?	Paid only? _____ Volunteer or pay? _____	Paid only? _____ Volunteer or pay? _____	Paid only? _____ Volunteer or pay? _____	Paid only? _____ Volunteer or pay? _____