Division of Environmental Health & Engineering

Lasting Solutions to Promote Healthy Lifestyles

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ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

Innovative Design, Research and Development

Portable Alternative Sanitation System (P.A.S.S.)

Why P.A.S.S.?

Strategy to Eligibility
Improved Sanitation
Improved Quality of Life

Honey Bucket

Outhouse

P.A.S.S. unit

Flush/Haul System

Piped

Levels of sanitation service in rural Alaska

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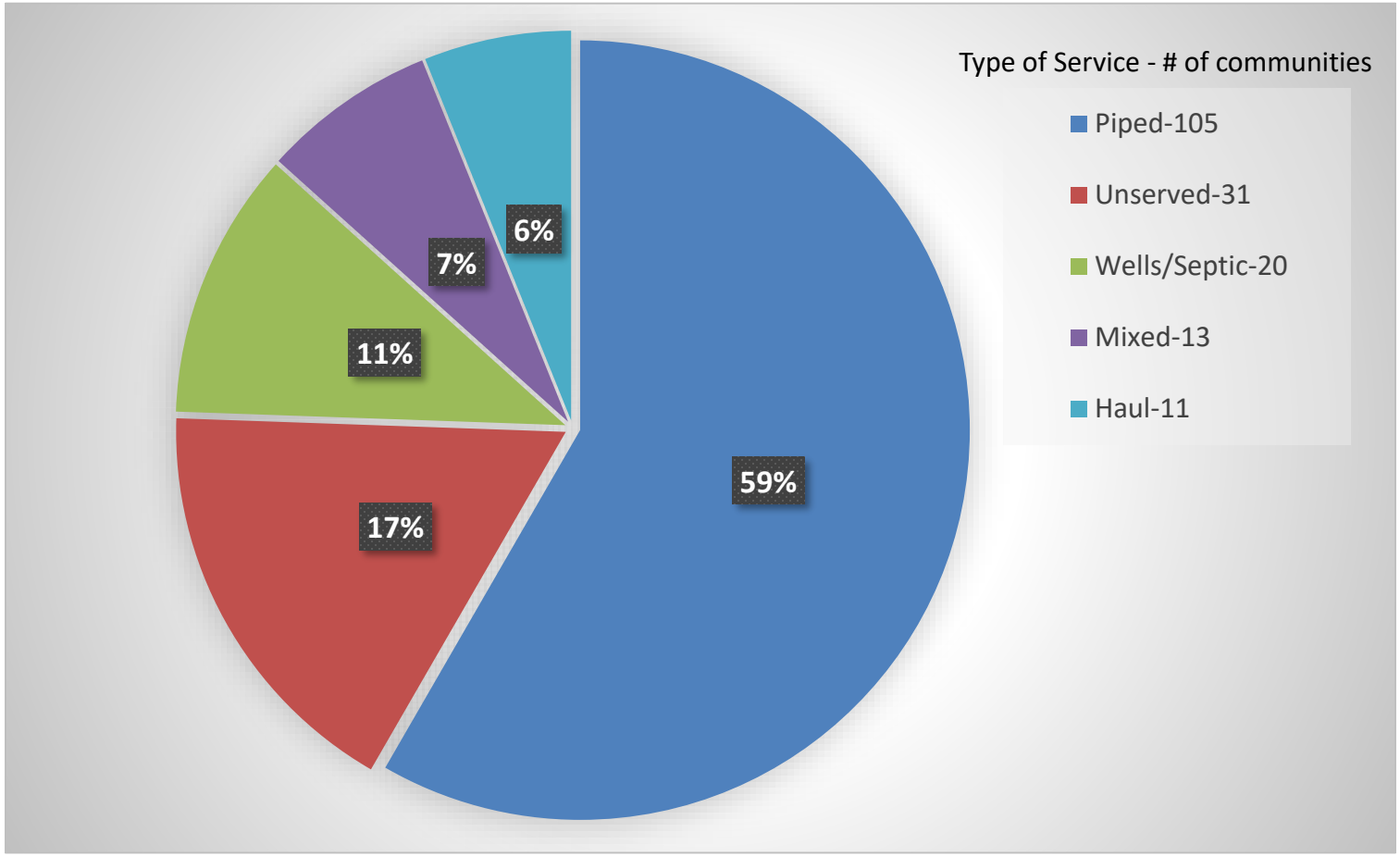
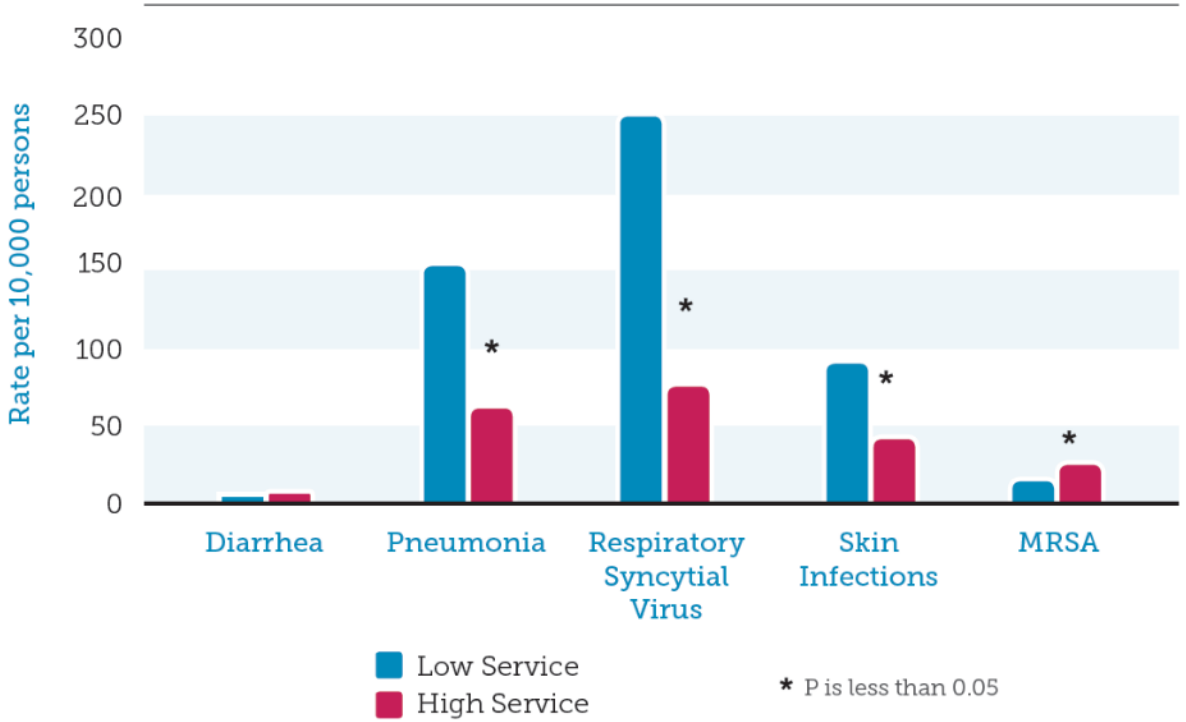
State of Alaska Sanitation Profile 2017



Infectious Diseases and Sanitation in Rural Alaska

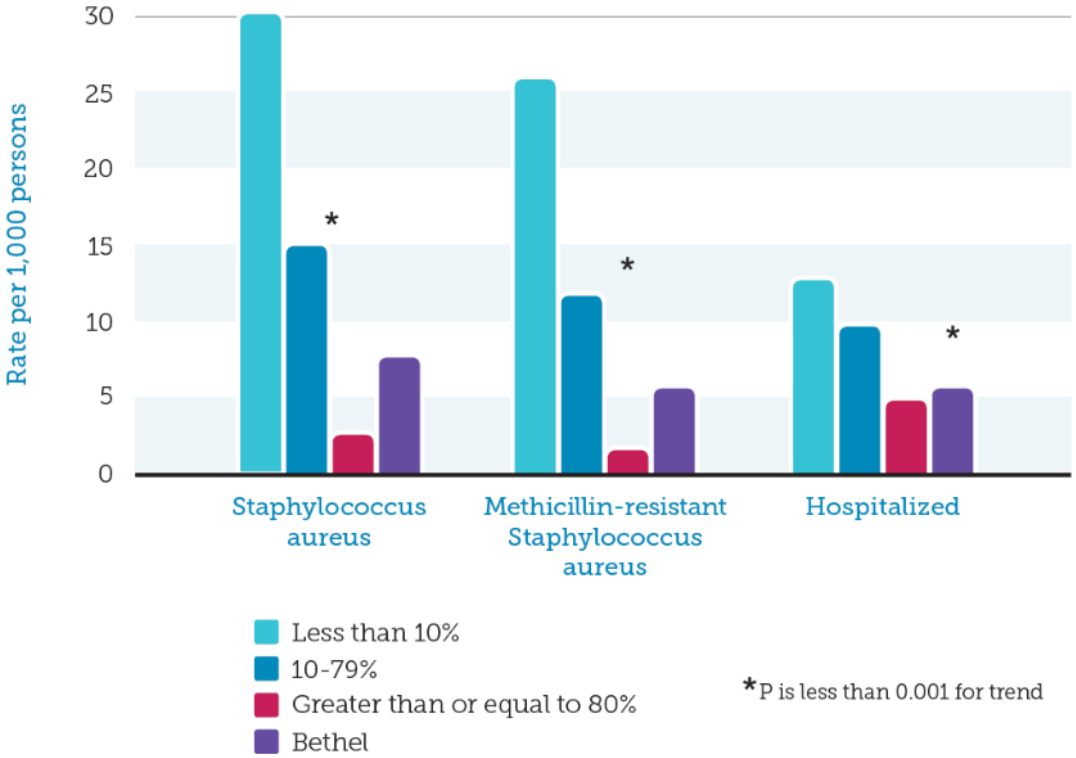
- $1.6 billion in sanitation infrastructure
- Study conducted by CDC and ANTHC on health impacts
- 7 regions and the Yukon-Kuskokwim region studied
- Diseases often spread by contaminated hands, coughs and sneezes

Hospitalization rates
for "High" and "Low" Water Service Regions,
Alaska, 2000-2004



Skin infection rates

compared with rate of water service in village of residence, all ages, YK Region, 1999-2000



*P is less than 0.001 for trend

This study was a partnership between the Centers for Disease Control Arctic Investigations Program and Alaska Native Tribal Health Consortium Environmental Health Support program.

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CDC CENTERS FOR DISEASE CONTROL AND PREVENTION

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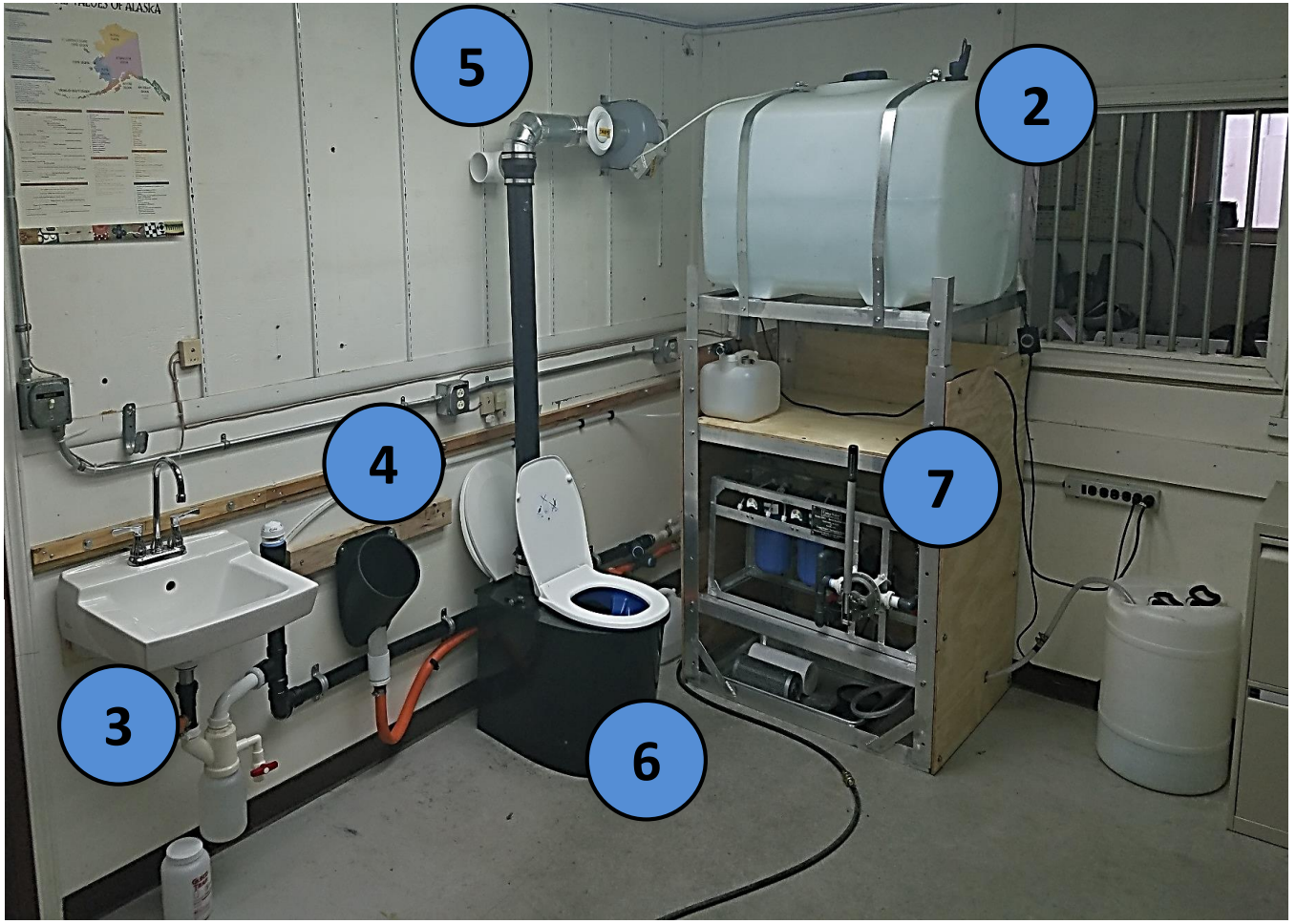
History of PASS R&D:

May 2015	Launch of R&D PASS 1.0 project in Kivalina
August 2015	Installations Completed in 9 homes
Sep/Dec/Feb 2015/16	1/3/6-month follow-up interviews with homeowners
2016 – 2017	Design modifications completed to PASS 2.0
	New seepage pit design, New toilet design
June 2017	Launch of R&D PASS in Chalkyitsik, Alatna, Allakaket
August 2017	Upgrade to PASS 2.0 in 2 homes in Kivalina
November 2017	Installations Completed in 2 homes in Chalkyitsik
January 2018	Installations Completed in 3 homes in Alatna
January 2018	Installations Completed in 2 homes in Allakaket
January 2018	Installation Completed in 1 home in Oscarville
August 2018	Upgrades to PASS 2.0 in 6 homes in Kivalina
September 2018	Installation of 2 homes in Allakaket to be completed
January 2019	R&D complete, Manufacturing/Deployment Phase begins
Summer 2019/20	Installation of 45 PASS 2.0 units in Kivalina
	Installation of units in Mertarvik

Benefits P.A.S.S. unit:

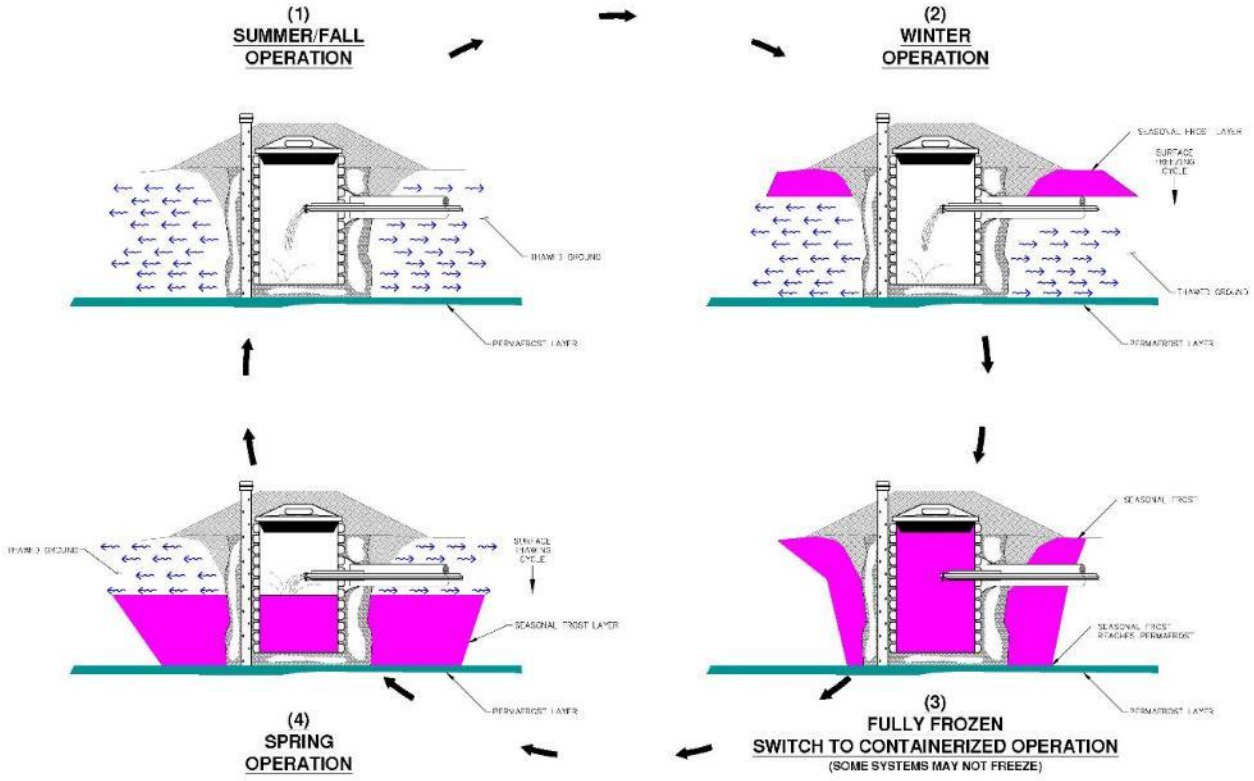
- **1. RAIN CATCHMENT:** Sediment separator begins filtering as it captures the raw water.
- **2. WATER STORAGE TANK:** Dual-filtration system prior to water storage changes how we think of our potable water and its storage.
- **3. LOW-FLOW SINK:** A gravity-fed flow of water to wash hands allows for better hygiene and **NO MORE WASH BASIN!**
- **4. WATERLESS URINAL:** Separating the liquid waste allows for less disposal and less odor.
- **5. INTEGRATED VENTILATION:** An energy-efficient combined ventilation system dries the solid waste, reduces odors, and ventilates the home – creating better air circulation throughout the home.
- **6. SEPARATING TOILET:** Waste is separated into liquid and solid components where the liquid is disposed of into a seepage pit and dried solids are disposed of in the landfill. This toilet provides the option to revert to a containerized system if the drainage system freezes in the cold winter months. **NO MORE HONEY BUCKET!**
- **7. WATER TREATMENT SYSTEM:** The water treatment system incorporates cartridge filters and chlorination for point-of-use treatment to ensure the water is safe to drink despite its condition upon entering the system.

Typical System Layout:



1. RAIN CATCHMENT
2. WATER STORAGE TANK
3. LOW-FLOW SINK
4. WATERLESS URINAL
5. INTEGRATED VENTILATION
6. SEPARATING TOILET
7. WATER TREATMENT SYSTEM

Engineering design to work with environment: Freeze/Thaw cycle seepage pit



Working **WITH** the environment, not against it.

Challenges:

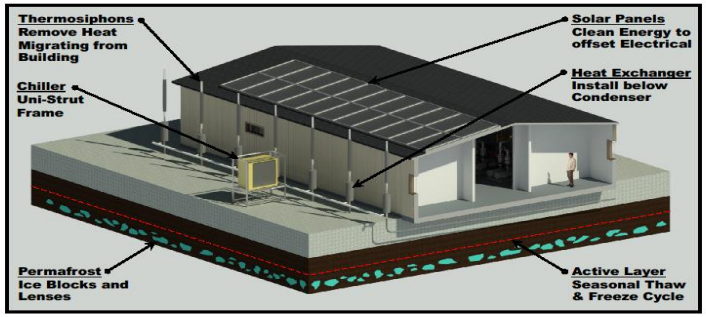
- Soil conditions need to be perkable
- Temperature variances could freeze system drainage pit
- Design retrofitting to current housing infrastructure could require extensive remodels
- Homeowner buy-in is essential for success
- User education must be provided one-on-one
- Short-term alternative, possibly only alternative

Opportunities:

- Low Cost compared to piped infrastructure
- Stand alone system with low electrical use
- Portability of components
- Potential for homeowner add-on: circulating pump, hot water on demand, shower
- Potential for phased design approach while awaiting infrastructure

Supporting Infrastructure:

Modular Water Treatment Plant



Modular Laundromat/Washeteria

- Watering Point – Water Treatment Plant, School, Raw Water Source
- Solid Waste Disposal system
- Landfill

Cost for P.A.S.S. unit:

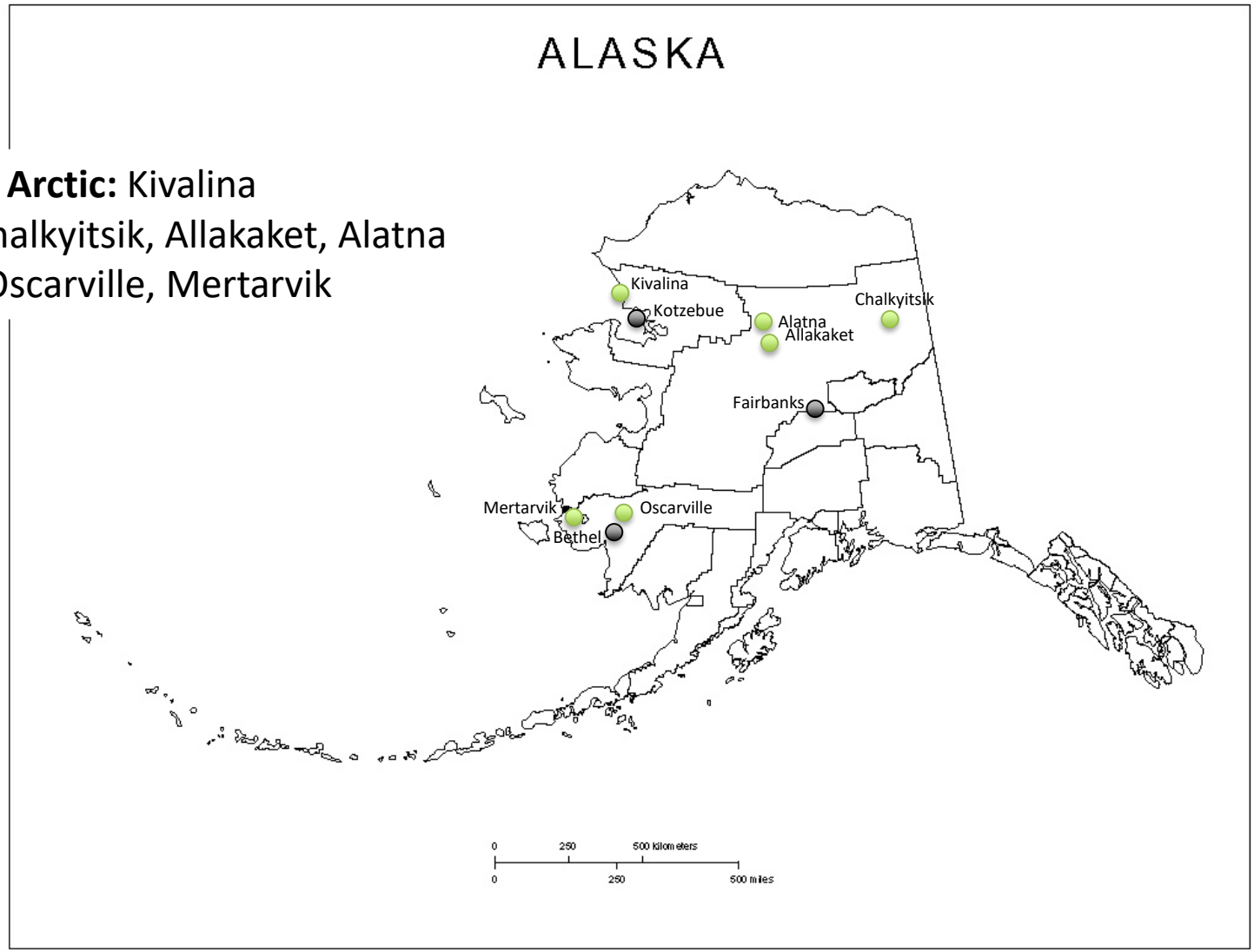
Materials ONLY:

Seepage Pit	$600.00
Diverting Toilet	$1,926.00
Ventilation	$500.00
Water Treatment System & Tank	$5,567.00
Rain Catchment System	$500.00
Sink, Faucet, & Misc. Plumbing fittings and valves	$1,000.00
	$10,093.00 TOTAL

Variable Costs:

Archeological
Remodeling
Installation
Logistics and transportation
Design & Engineering (if needed)

Northwest Arctic: Kivalina
Interior: Chalkyitsik, Allakaket, Alatna
YK Delta: Oscarville, Mertarvik



Current PASS Projects

Current Projects:

Northwest Arctic: Kivalina
Interior: Chalkyitsik, Allakaket, Alatna
YK Delta: Oscarville

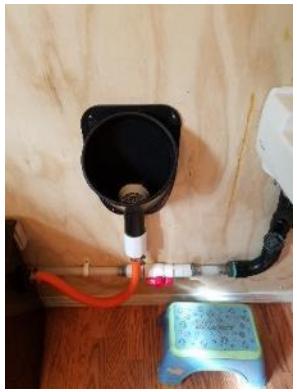
Elder, Allakaket

Seepage Pit, Chalkyitsik

Elder Home, Allakaket

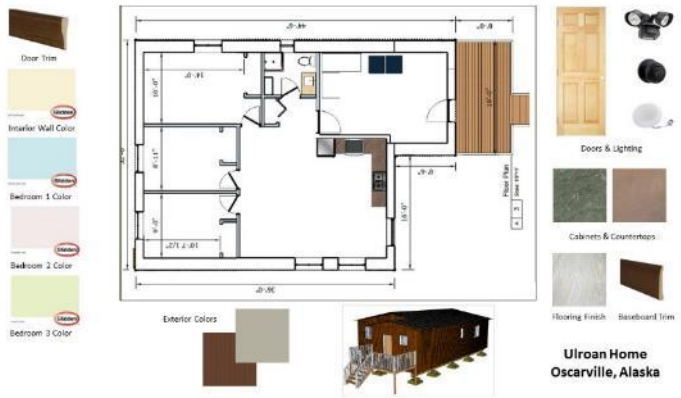
Current Projects:

Chalkyitsik Home
Complete Install
Bath remodel
Elder + 3 grandkids



Current Projects:

Oscarville Home
Complete Install
New Construction
2 Adults, 5 children



Design Boards

Finished Kitchen

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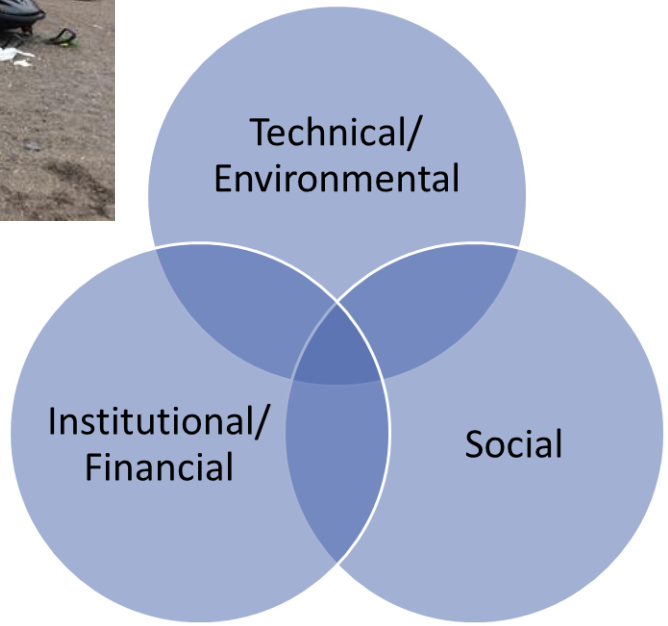
PASS Health Impact Study

Research Questions

1) How is water used inside and outside of the home?
2) How is waste managed inside and outside of the home?
3) Have the PASS units improved overall health and well-being?
4) How have the PASS units affected household water access, sources, and uses?
5) Does the water component of the PASS units fit into existing community values, traditional knowledge, and practices?

Village	Year 1 Control Households	Year 1 pre-PASS	Year 2 Control	Year 2 post-PASS
Kivalina	11	22	11	22
Newtok	9	17	9	0
Mertarvik	0	0	0	17

Sustainability Assessment



Questions?

Quyana! Taikuu!
Thank you!

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