

# ALASKA

## EMERGENCY AND DISASTER HOMEOWNER'S HANDBOOK

June 2020



### **Arthur Nash**

Associate Professor–Energy Specialist  
Cooperative Extension Service  
University of Alaska Fairbanks  
[alnashjr@alaska.edu](mailto:alnashjr@alaska.edu)

### **Davin Holen**

Assistant Professor–Coastal Community Resilience Specialist  
Alaska Sea Grant Marine Advisory Program  
University of Alaska Fairbanks  
[dlholen@alaska.edu](mailto:dlholen@alaska.edu)



We would like to thank Dennis Hwang and Daren Okimoto at the University of Hawai'i Sea Grant College Program and the National Oceanic and Atmospheric Administration for support, content material, and images in this handbook. Material content has also been added from the Cooperative Extension Service at the University of Alaska Fairbanks, and was published by Alaska Sea Grant. Additional thanks to Daniel Losk and Ty Cordova at State Farm Insurance for funding the printing and Justin Fox at Simpson Strong-Tie for diagrams. Thanks also to the Cold Climate Housing Research Center for technical assistance in producing the manual, Leslie Shallcross of UAF Cooperative Extension, and the Alaska Center for Climate Assessment and Policy at the International Arctic Research Center for climate diagrams. Thank you to Dawn Montano at Alaska Sea Grant for the layout of this publication.

For housing questions on this material, technical assistance or referrals, contact: Art Nash, [alnashjr@alaska.edu](mailto:alnashjr@alaska.edu) or 907-474-6366.

Disclaimer: The information provided in this manual is advice that will vary according to the type of emergency, the construction style and conditions on the ground or at sea. Check with an engineer or contractor for construction advice after an event.

Cover photo, right, courtesy of Tony Weyiouanna.

Alaska Sea Grant is a marine research, education, and extension service headquartered at the University of Alaska Fairbanks. Alaska Sea Grant is supported by the National Oceanic and Atmospheric Administration Office of Sea Grant, Department of Commerce, under grant no. NA18OAR4170078 (project A/152-44) and by the University of Alaska with funds appropriated by the state. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: <https://www.alaska.edu/nondiscrimination>.

Alaska Sea Grant  
University of Alaska Fairbanks  
PO Box 755040  
Fairbanks, Alaska 99775-5040

MAB-79  
2020  
<https://doi.org/10.4027/acdh.2020>

# CONTENTS

5	<b>Part 1 Introduction: Is your home ready?</b> Alaska: A Challenging Landscape in which to Build This Handbook
8	<b>Part 2 Natural Hazards</b> A Changing Climate Wildfires Earthquakes Tsunamis Flooding Inland Windstorms Winter Snowstorms
16	<b>Part 3 Emergency Planning</b> Alaska's Emergency Planning System Community Communications
17	<b>Part 4 Household Preparedness for Energy, Food &amp; Water</b> Emergency Kit Heating, Cooking & Lighting Generation Food Considerations Clean Water Surplus
26	<b>Part 5 Defense of Home Property</b> Foundation Clipping Building Materials Mitigation Matters
32	<b>Part 6 Conclusion</b>



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*The first thing that any family or household should have is an emergency response plan for major disasters, so your family can plan before an event strikes, and you can take care of the matters having been prepared.*

—State of Alaska Department  
of Homeland Security and  
Emergency Management

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# PART 1

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## INTRODUCTION: IS YOUR HOME READY?

### Alaska: A Challenging Landscape in Which to Build

Alaska has a low population density and few roads connecting communities across the vast state. Since the early 1970s the population, especially of urban communities, has grown as people moved to the state, attracted to high paying oil jobs, commercial fisheries, government jobs, and to provide services to the natural resource rich state. There are several urban areas in Alaska encompassing Anchorage, the Matanuska-Susitna Borough (Mat-Su), and Kenai Peninsula, Fairbanks, and Juneau with easily accessible stores; however, there are still many communities located in rural areas that are only accessible via airplane or boat. This provides logistical challenges when building homes that can withstand extreme conditions such as heavy rains throughout Southeast Alaska or high winds and freezing temperatures in northern Alaska.



In fall of 2018, Alaskans were reminded they live in earthquake country when a 7.1 magnitude earthquake was centered close to Anchorage and the Mat-Su, the center of half the State's population. Because of lessons learned from the 1964 Good Friday earthquake, local government and the state moved quickly to fix infrastructure within days; however, the damage to homes was extensive. Unlike the 1964 earthquake,

power was restored quickly and there was little disruption to basic goods and services. In 1964, there was also the compounded danger of resulting tsunamis. Residents along Alaska's coast know that flooding from tsunamis is a present problem resulting in its own damage to homes when subsequent earthquakes and tremors hit; there are signs pointing to evacuation routes throughout several Alaskan coastal communities. In this case, the tsunamis themselves swept away entire Alaskan piers, villages, homes and even caused fatalities in the Lower 48.

People who have lived in South Central and Interior Alaska in the last couple decades have probably experienced being inundated by the smoke that accompanies the many wildfires

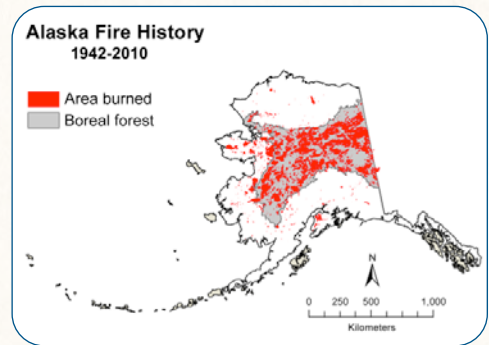




each summer—smoke so thick at times that you cannot even see vehicles more than a car length in front of you, even with headlights on! In the summer of 2019, Southcentral Alaska experienced the Swan Lake fire on the Kenai Peninsula, one of the largest urban/rural interface Alaskan fires in recent memory, which kept much of Southcentral Alaska covered in smoke throughout the summer. This was coupled with three fires in the Mat-Su in July and August, the Montana Creek, Malaspina, and McKinley fires. Fires in Yukon territory kept parts of Southeast Alaska near Haines, Skagway, and Klukwan covered in smoke that same summer, and residents could only spend short periods of time outside for several weeks. Overall, 2.5 million acres in Alaska burned in 2019, mostly caused by lightning strikes which have increased in recent years. In the McKinley fire, many cabins and homes were damaged or completely consumed by flames, and for those residents, ‘defensible space’ becomes a mantra for clearing the area around the house, garage, and sheds of any flammable items.

Alaska residents who have been around since the 1990s remember being stuck in traffic, grounded planes and cars seized in driveways when volcanic ash fell in Southcentral Alaska. While there was no danger of spewing lava or of lost power to homes, the ash alone could ruin engines if it was brought into air intakes due to its abrasive characteristics. There were respiratory problems for those with lung issues.

Alaskans who live in the coastal areas in Alaska realize that there can always be flooding from storm surges and coastal inundation. The recent dramatic increase in the thaw of permafrost and loss of shore fast ice in the fall has led to increased coastal inundation and erosion of the coast. This is also seen on river systems in Interior Alaska where permafrost is thawing. For many, it is a seasonal danger to their homes for which they make annual preparations during break up of ice on the rivers. Many homeowners along the Yukon River are aware of seasonal flooding and routinely put their household items





into boxes and tubs for storage stored six-foot-high on shelving all along the inside perimeter of the home. Residents keep a keen eye on the daily water level until breakup is far enough along to prevent ice jamming and back flooding into their homes. All of these issues lead to a challenging building environment for Alaska.

### **This Handbook**

With these types of potentially dangerous events affecting people throughout Alaska, there are a few important principals. First, realize that unlike in the continental US, there may not be the warning sirens and lights utilized to let those living in or near communities know of a predicted event that is about to hit. In addition, many rural communities do not have designated first responders.

All Alaskans, whether you live in an urban area or in a rural community, need to build for potential hazards, including preparing the surrounding area of the home, and if necessary, be prepared at the home level for proper evacuation in case you need to leave your premises. Next prepare the house structure so that when you return after a disaster it is in the best condition possible. Lastly, have tools on hand that will allow you to make a home as habitable as possible in the shortest order when returning from an evacuation.

This handbook has been designed with materials from the State of Alaska Division of Homeland Security and Emergency Management, the Extension Disaster and Emergency Network, as well as eXtension to give you the best opportunity to be prepared for an evacuation, knowing what to do when moving back in, and having your home structure prepared for a disaster event should you stay put during and after. This may also include electrical outages from events as common as winter snowstorms. There are also a few tools provided to prepare your home for the harsh conditions of Alaska, as well as ensure that the area surrounding the home is safe.



# PART 2

## NATURAL HAZARDS

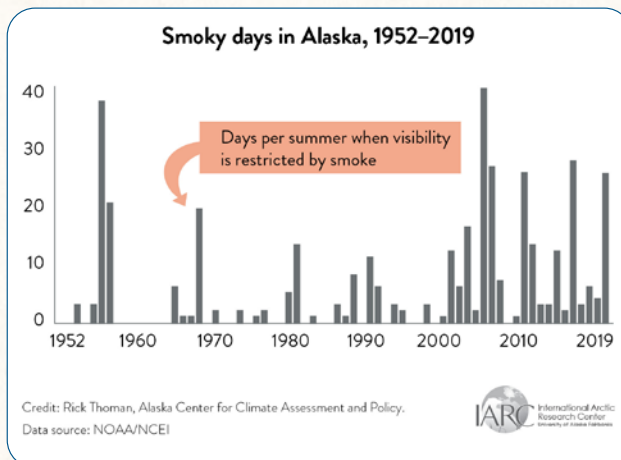
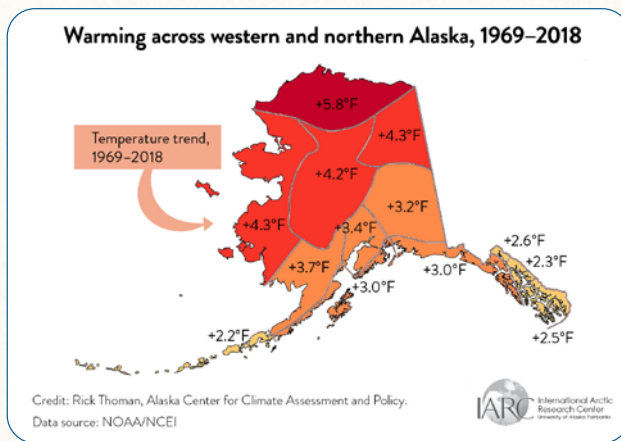
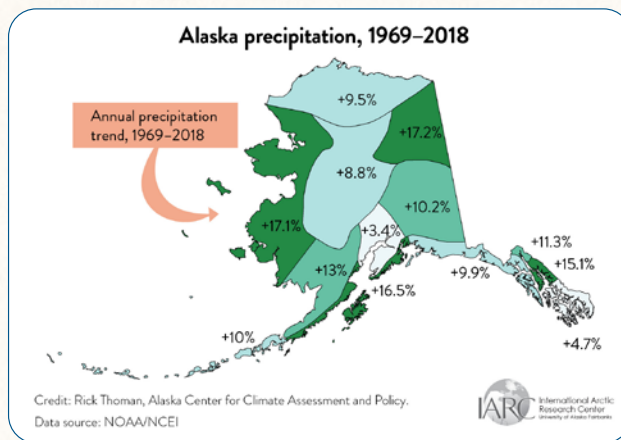


### A CHANGING CLIMATE

Since 1969 Alaska has seen a dramatic increase in temperature ranging from 2.2° Fahrenheit in the Aleutians to 5.8° in the Arctic.<sup>1</sup> Alaska is warming at twice the rate as the rest of the US, and temperatures are projected to increase by 4°–8° by mid-century and an average statewide of 10°–12° by the end of the century.<sup>2</sup> In addition, there will be higher precipitation statewide. However, with an increase in precipitation, some of that increase will not be enough to keep pace with warming temperatures, and some areas of the state will actually see drier conditions leading to drought and wildfire. Since 2000, there has been a dramatic increase in the number of smoky days with reduced

<sup>1</sup> Thoman, R. & J. E. Walsh. (2019). *Alaska's changing environment: documenting Alaska's physical and biological changes through observations*. H. R. McFarland, Ed. International Arctic Research Center, University of Alaska Fairbanks.

<sup>2</sup> Markon, C., S. Gray, M. Berman, L. Eerkes-Medrano, T. Hennessy, H. Huntington, J. Littell, M. McCammon, R. Thoman, and S. Trainor, 2018: *Alaska. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 1185–1241. doi: 10.7930/NCA4.2018.CH26





visibility in Alaska. Lightning strikes in June and July have increased in recent years, especially in the interior of Alaska, and are expected to double by the end of the 21st century. With increasing temperatures leading to dry weather in the summer, forest fires and smoke events may become more common. Coastal residents of Alaska in the north are seeing a later freeze up, especially in the Beaufort and Chukchi seas. Fall and early winter storms are having a greater impact as there is no longer shore fast ice at the time the storms occur, and therefore coastal inundation is an increasing problem.



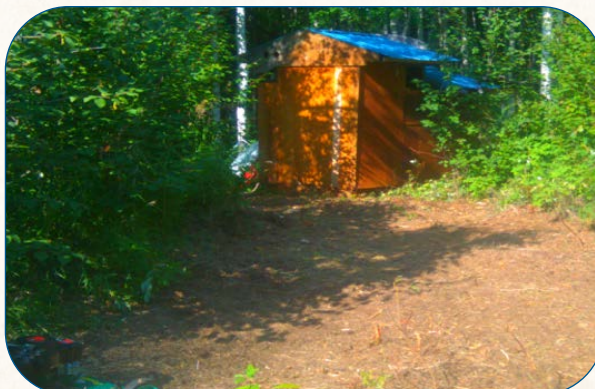
When considering improvements to homes, homeowners may want to take into consideration potential future scenarios of increasing temperatures, poor air quality due to increasing smoke, increased precipitation, and in western Alaska and the Arctic, an increase in coastal inundation. For example, when retrofitting a home heating system, a fresh air exchanger may be a good addition to bring in cooler filtered air as temperatures increase and smoke may be present. When burying waterlines, homeowners might want to consider that there may be a reduced snowpack around homes, and freezing temperatures can impact shallow buried water lines, therefore burying the waterlines deeper may be necessary. Rain may be more common than snow in shoulder seasons, so roofs should be reinforced, and houses should have adequate vapor barriers to guard against water leaking into a home. Although making improvements to a home can be costly, making repairs can be even more costly. Thinking about what Alaska might look like in 20, 30, or even 40 years from now will help you consider improvements that can last for years to come.

## WILDFIRES

This section is adapted from *Emergency Preparedness for Alaskans: Wildfires*.<sup>3</sup>

Although wildfires are a natural part of the boreal forest ecosystem, changes in climate—which have been especially pronounced in higher latitudes—have led to an increase in the number and severity of wildfires in Alaska over the past 50 years. According to the Alaska Center for Climate Assessment and Policy, the area burned by wildfires in the state from 2000 to 2009 was twice as large as the area burned in any decade in the previous 40 years.

Many factors are contributing to the increase in wildfires in Alaska. For example, warmer temperatures have led to longer snow-free periods, changes in vegetation patterns have altered the way fires progress, and migration of new bugs have been



<sup>3</sup> *Emergency Preparedness for Alaskans: Wildfires* by A. Nash, UAF Cooperative Extension Publication SAL-00202



introduced to Alaskan forests, causing a surplus of dead fuel. Existing pests such as the spruce bark beetle, which require continuous days of warm weather to spread, have been able to move through large forests quickly due to the increase in temperature in the summer. Alaska's boreal forest and other ecosystems are certain to experience more changes in the years to come. These changes will be visible in the types and frequencies of wildfires. In general, it is worth learning about the impacts these changes will bring and think of ways to prepare for them.

Most Alaskan wildfires burn the boreal forests, which are areas bounded by the Alaska Range on the south and the Brooks Range on the north. In this dry, Arctic desert climate, hundreds of lightning strikes a day can touch off multiple fires throughout the boreal forest, which is made up mainly of black and white spruce, along with deciduous trees, such as aspen and birch, and shrubs such as willow and alder. Cottonwood and poplar trees are additional prevalent fuel types in South Central Alaska. (Although fires also occur in tundra ecosystems, they are generally smaller and less frequent.) Government agencies and scientists are working to understand wildfires and predict when they might occur, but when it comes to fire, nothing is certain and thus the best thing to do is to be prepared.

Start preparing your home area by creating a defensible space around your house. Defensible space is the area needed to stop or slow the spread of wildfire around your home and should extend at least 30 feet from the house in all directions, with additional thinning of the forest to 50 feet.

- Remove trees within 30 feet of the home, especially trees that can quickly catch fire such as spruce.
- Thin trees and brush and dispose of debris out to 50 feet of the home.
- Remove dead limbs, leaves and other litter.
- Mow dry grasses and weeds.
- Maintain an irrigated green belt.
- Leave adequate space between groups of shrubs and the branches of trees
- Prune tree branches to at least 10 feet above ground.
- Stack firewood at least 30 feet away from the home.
- Locate fuel storage tanks at least 30 feet from the home.
- Keep roofs and gutters clean.
- Reduce the density of the surrounding forest.



What else can you do to protect the dwelling and lawn?

- If you are building or remodeling, think about fire protection by using fire-resistant or noncombustible materials on the roof, and/or treat combustible materials such as decks, siding and trim with fire-retardant chemicals.
- Design your yard with fire protection in mind and plant fire-resistant trees and shrubs, e.g., hardwoods rather than spruce or pine.
- Keep a metal rake, axe, handsaw/chainsaw, bucket, shovel and ladder handy.
- Maintain an outside water source. If you don't have a well, a water storage container with a pump and a hose could save your home.
- Have a garden hose with a "Y" junction and multiple pieces long enough to reach any part of the house or other structures.



Wildfires can overwhelm an area quickly, so be sure you have a plan to evacuate when necessary. There are many good resources available to help you prepare for a wildfire. The Alaska Department of Natural Resources Division of Forestry has a comprehensive booklet, *Firewise Alaska*, that explains how to maintain defensible space, modify your home for fire protection, landscape for fire protection, and provide an effective water supply, and what to do when faced with a wildfire.

- Post emergency phone numbers and sign up for reverse 911 and alerts.
- Clearly identify your home and make sure there is good access.
- Have an evacuation plan with several escape routes—and practice it.
- Put together an emergency kit with supplies (food, water, first aid, clothing, radio, valuables, important documents, etc.) in case you have to evacuate.

## EARTHQUAKES

Earthquakes are easily felt by residents and often the damage that results is reparable and doesn't require evacuating the premises. New wells may need to be drilled, septic lines may be broken, or homes built off the ground in permafrost areas may be jolted, but fatalities are rare. There is Alaskan seismic information available at the Alaska Earthquake Center (<https://earthquake.alaska.edu>). On this site, information can be accessed about current and recent seismic events in Alaska.





According to the State of Alaska Division of Homeland Security and Emergency Management (<https://ready.alaska.gov>), all Alaskans live with earthquake hazards. The Alaska Earthquake Center detects an average of four earthquakes an hour. Reducing your risk of injury and decreasing property damage from an earthquake starts with knowing what faults are in your area so that you can begin to prepare your family. Also, take these steps:

- Identify potential hazards in your home and begin to fix them.
- Create a disaster-preparedness plan.
- Create disaster kits.
- Identify your building's potential weaknesses and begin to fix them.
- Protect yourself during earthquake shaking.
- After the quake, check for injuries and damage.
- When safe, continue to follow your disaster-preparedness plan.



## WINDSTORMS

This section is adapted from *Emergency Preparedness for Alaskans: Wildfires*.<sup>4</sup>

Basic emergency preparedness involves risk assessment, preventative measures and mitigation. Is your property in a wind-prone area? The Matanuska Valley, Delta Junction, and other river valleys are known for significant winds, and Fairbanks has been experiencing increased high winds. Alaska is rarely affected by tornadoes, but thunderstorms may also result in high winds. Straight-line winds are becoming more frequent and can cause damage similar to that caused by a tornado. Alaska's Aleutian Islands and western coastal areas are often exposed to significant fall and winter storms, with strong winds that may impact large areas of the state. These storms gather strength from large expanses of open ocean and may cause storm surges and flooding. Because the fall coastal ice pack forms later in Western Alaska due to increasing warming in the north, there is no longer an ice buffer to protect the coast from erosion during fall and winter storms. As a result, lowlying communities are struggling to make plans to retreat to higher ground. Storm surges may also be caused by tsunamis, distant hurricanes or other weather events and can cause similar flooding. Tidal fluctuations can also impact the surge and flooding effects. The National Oceanic and Atmospheric Administration

<sup>4</sup> *Emergency Preparedness for Alaskans: Wind Events*, by D. Hecimovich and V. Barber UAF Cooperative Extension Publication SAL-00200

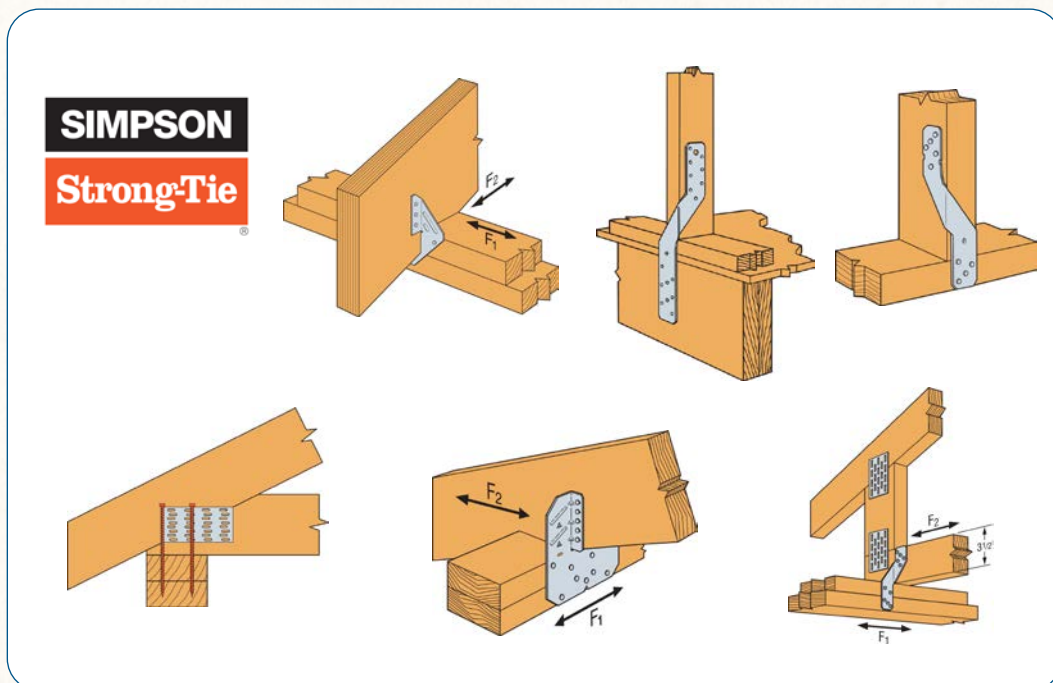


(NOAA) is responsible for issuing storm and tsunami warnings and alerts, often from weather events thousands of miles away, via commercial radio, television, local warning systems, weather stations or other sources. Some steps you can take to reduce property loss in a storm or high wind conditions are:



- Trim or remove trees close to structures and secure outdoor items.
- Fasten straps or clips to building roofs to reduce damage.
- Use storm shutters or plywood for window protection.
- Make sure to secure or store any loose items on your property.

Often the addition of roof ties and foundation ties to structures will add strength to the structure and mitigate the impacts of wind, as well as earthquakes. For this reason, we have included some simple and inexpensive ties that are available at hardware stores throughout Alaska. These can be added during construction of a house or to strengthen existing structures. In addition, newer fasteners (screws) are now available that can easily be inserted and can take the place of a metal tie. The images included here show the most common ties available and how to use them in construction and retrofitting a roof, or tying down a house to a post foundation.





High winds can result in power outages at any time of the year. Check for trees hanging over power lines adjacent to your property. If you see that there are trees that may come down on the power line, call your local electrical utility. Do not attempt to remove trees around power lines, and avoid downed power lines and immediately report these to power companies or other emergency contacts.

Winter storms can be particularly dangerous, not only because of low temperatures but also because of blowing snow that may affect visibility. Blowing glacial silt, dust and other allergens associated with wind events can cause or exacerbate respiratory problems.



## VOLCANOES

Alaska has many active and historically active volcanoes which cause problems, and the ash that they release can be dangerous. Generally speaking, those that have compromised respiratory conditions can guard themselves with the simple N-95 mask. Ash itself can adequately be cleaned up at home so that it is no longer a respiratory hazard nor endangers vehicle engines from being damaged. One of the most protracted problems with volcanic ash in Alaska is the interruption of the travel of goods and people in and out of the state due to the damage that occurs with engine intake of the dust. While these two events, earthquakes and volcanic activity, are not the most life-threatening of events, they can cause immediate respiratory problems and may require special attention for those with allergies and asthma.

# FLOODS



At the end of May 2013, more than 130 homes were damaged to some extent and 100 were destroyed during break up flooding in Galena. One year later, people from outside volunteered to get 25 homes repaired and conduct 11 rebuilds. Aside from structural integrity being compromised, much of the damage was from moisture in homes contributing to mold, as well as insulation being matted down to the point it provided



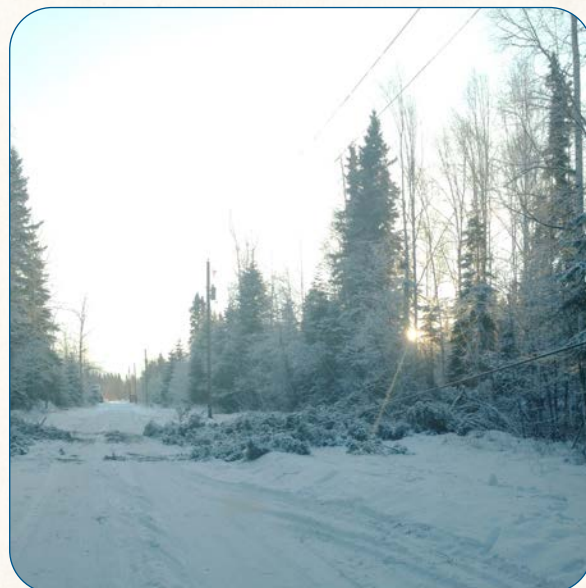
little or no heat retention. Preparing for a flood is a seasonal way of life for many Yukon river residents. For other parts of the state, floods may develop slowly or be a sudden flash flood, and not only during break up. While not always predictable, steps may be taken to be ready for evacuation and to reduce the flooding impact. Regardless of prepping that has occurred, residents need to know how to safely

approach their flooded home, get it dried out, and work at keeping the house healthy. Upon getting back to a home that has been hit by (receded) floodwaters, it is necessary to **take an assessment and dry out the interior walls and floor of the dwelling as soon as it is safe and possible.**

# SNOWSTORMS



With warmer winters this past half decade, there are now wet, heavy snows in some parts of the state where dry flaky snow previously was the norm. In addition, in months where it used to be below freezing, we are seeing temperatures hovering around freezing and thus experiencing combinations of sleet mixed with snow. Prolonged exposure has caused extra weight on tree limbs thus snapping nearby powerlines.



# PART 3

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## EMERGENCY PLANNING

It becomes all the more important under these conditions to have on hand supplies for lighting, cooking and heat. Difficulties have as of late been in the fall, following a fairly wet end of summer saturation in surrounding soils which may affect tree rootings. Have a chainsaw on hand with fresh gas and tools to change or sharpen chains, and pointed shovels on hand as well to clear suddenly obstructed areas.

As well as preparing for a potential event, it is important to explore how to keep yourself safe throughout the recovery and remediation process. You will want to determine how to sanitize drinking water systems if you had a flooded holding tank or well by consulting *Flood Preparation and Recovery for Drinking Water Systems* from the Alaska Department of Environment Conservation (AK DEC). Also check your septic system by following the guidelines. Next, make decisions about food. Any meats that have been in a freezer or refrigerator with the power off must be checked to see if they are still frozen solid. Remember, when in doubt, throw it out!

When re-entering a home, the first thing to do is to check the fire and CO detectors and alarms. It is important to be aware of carbon monoxide poisoning. Pulling vapor barrier and insulation from walls and floors helps to reduce molding. Decide whether to keep or dispose of clothing, linens, leather and other household items. (If you decide to keep them, be sure to clean and dry them properly.) Inspect vehicles. Open the cab, roll down the windows and lift the hood to dry out the vehicle. Dry out home electronics. Check the fans, remove silt and other debris from vents on appliances. Put small devices, such as cell phones and tablets, in a zipper-type bag of rice to help the drying out process. Strip all house wiring that was soaked and replace switches that were submerged.







Before an emergency hits, sit down together with your family and decide how you will contact each other, where to go and what you will do to communicate and possibly reconnect if you have family members who live outside your community. Keep a copy of whatever plan you make (no matter the severity or the simplicity) in the seven-day emergency supply kit. You may want to include primary emergency contact phone numbers, secondary contact, and emails. The local fire and emergency management systems number is important to list as well. Also keep important contacts like medical insurance numbers and rental contacts (if you are a landlord). Additionally, electricity and connectivity issues may limit the use of credit cards to purchase essentials. You may want to include cash (around \$200) in your emergency kit in several denominations. Other critical documents that you'll have on hand or in your kit are:

- personal identification such as a photocopy of a driver's license
- birth certificate
- baptismal certificates
- passports
- IRB card
- Social Security card
- credit card account
- property deeds and titles
- wills
- immunization records medications and prescriptions
- tax returns
- stock and bond certificates
- inventory of household goods with photographs

If you need to evacuate, make sure outdoor spigots and your utilities are shut off. Be sure to discuss and practice evacuation plans with your family (or co-workers at your office during work hours). Community evacuation routes are usually marked, but it is beneficial to be aware of these routes ahead of emergencies. If you are driving out away from your property, be aware of other potential flood areas. As little as six inches of water may stall a car, and a foot of water will float many vehicles. Securely tie down any ATV or boat before leaving the property, and if able, you should put a plug in the breather hole of your above-ground fuel tank (with brass plug for the fuel line inlet) in case your tank gets tipped over by incoming waters or debris. This will prevent the tank from emptying and reduce the clean up when you get back home.

# ENERGY CONSIDERATIONS

When it comes to having energy when you are off the grid or when your electricity is down, many residents in Alaska have resources to learn about year-round renewable energy options such as solar, wind and hydro. Yet the scale, capital outlay and heat distribution usually require a substantial investment which does not fit the person who has grid connection throughout the year (but needs some sort of heat, cooking flame or lighting in a week of unexpected circumstances). Homes near Fairbanks, Alaska, the state's second largest city, have experienced unexpected electrical outages lasting a week, both in the fall of 2013 and the winter of 2015. The cause of these outages were unusual ice storms which overloaded trees, thus touching off snapped power lines. While these events weren't the typical flood, earthquake, or volcanic ash disasters which Local Emergency Community Planners (LECPs) generally prepare the residents in their districts for, they nonetheless affected a large number of households who needed to get heat for cooking, disinfecting, along with lighting, until temporary housing could be found. In the 2015 event, every retail vendor with diesel and gas generators in their inventory sold out within 48 hours. Anecdotally, in some cases, gas stations in the affected areas were not able to sell fuel due to their power also being out. Though generators will be investigated later, one of the recent marketed developments for those who want 110-volt electricity for home appliances, but who do not have the arm strength to pull a cord to start a gas generator (or are not sure they want the noise or exhaust output), is the availability of off-the-shelf 1800-watt solar generators on carts.



While FEMA requests citizens nationwide have an emergency 72-hour “bug-out” kit ready at all times, the general Alaska recommendation among emergency planning personnel has been to have a one week kit prepared. Foods such as minute rice, quick oats, teas, etc., can provide quick carbohydrates. Yet not addressed in bug-out kit lists is a heating device for cooking and lighting that can sustainably utilize local fuels in case of a prolonged

evacuation. Space and size for a family are only a consideration when rounding out the kits. In Alaska, where earthquakes, ash plumes from volcanoes, floods and tsunamis can easily and suddenly separate residents from home rescue shelters, it is imperative that families have some sort of combustion device that can utilize local fuel sources, that will last at least a week before power is restored, and depending how remote residents are, possibly longer. It is important to think through fuels and food-handling, so that before a

disaster, preparation options are explored. (Displaced families in stress need to reliably cook foods, provide heat and have hot water for sterilizing and drinking.)

Often, when predictions of large storms are broadcasted, there is a run on generators of all sizes from the building supply, big box hardware and outdoor sportsman stores. Most consumer generators for residential applications (5kw or less) run off gas, where the larger 'gen sets' (10kw or more) tend to be diesel in Alaska. It is important to know which generator you are getting and to properly label fuel. Gas should always be stored in red containers, and diesel in green (with kerosene indicated by yellow containers).



You do not want to accidentally switch the wrong fuel.

Running diesel in a gas gen set will clog up the plugs at the very least and make it impossible to run. Trying to run gas in a diesel gen set is not good as the gas can ruin the inside mechanisms. If the fuel is going to be stored for an unknown emergency, diesel can keep its firepower for years, though there can be a possibility of algae contamination. Gas, on the other hand, should have a booster or stabilizer additive put in every 6 months or so to keep it from going 'flat.'

Generators can help with heating, electricity for lights or appliances, and well pumps. How to use them to use your precious fuel supply in the most efficient way is something to think through ahead of a disaster. Thankfully in Alaska, many residents spend a significant amount of time in remote locations for recreation, subsistence activities at summer camps, during trapping and hunting seasons, or while conducting off-grid seasonal work such as mining. There are many energy options and appliances that have become affordable in the last couple of decades that can make remote living similar to home living (beyond providing mere 110-volt electrical capabilities and space heat).



Thinking through energy sources and costs is important. To operate appliances off grid, there are fuel costs beyond what we pay at the pump when topping off fuel tanks. Before investing in generators, battery banks, a new stove or other appliances for a no-electricity solution to a disaster, think about how to utilize, or possibly consolidate, your current sources of energy so that any changes you make will cost less than what you are paying today, while maintaining or increasing quality. Try to take an inventory of all the appliances you now have. You may realize ways to reduce the need for bringing in



diesel or gas by becoming more energy efficient; for example, insulating better, installing a vapor barrier, swapping out incandescent light bulbs for LEDs, etc.

As you are thinking about which type of technology you want to invest in for emergencies, monitor how much energy you use and then assess the energy requirements for each technology. In other words, consider your future usage to estimate your future

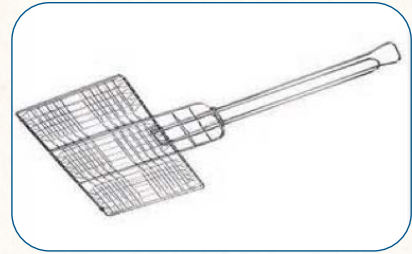
demand for fuel; then look at the quality and extent of nearby resources. To understand how you use energy, list the items that currently use energy and then estimate how many hours per day each is used. When you estimate usage, you should include start-up energy as well as continuous load, then try to size (and use) appliances and other energy users accordingly to keep the size down and portability of your systems at a strong level.



For prolonged outages, if liquid fuel is not available or runs out, local biomass is a viable fuel answer for most parts of the state. Temporary stoves from #10 cans, gallon metal coffee cans, or five-gallon paint pails can be utilized for emergencies. These in turn have a smaller diameter stovepipe and a soup can that can be inserted into them at angles and with vermiculite/perlite insulation between the nestled stovepipes and large can. An insulated burn pot design accompanies these design features so that the temperature can rise to catch the different flash points of various wood gasses that normally escape

without burning up (in an open fire) thus using less wood and producing fewer emissions than traditional stoves in an appealingly portable design. When in unfamiliar places and trying to keep a stressed family fed and warm, the more attention that can be given to the device rather than worries about fuel gathering, the better. In the field, a simple way to efficiently cook outdoors is utilizing 3 two-celled cinder blocks with one “I” cinder block. When arranged by simple friction fit as pictured (with a metal cook ring between the top block cap and the pan or kettle used), small diameter wood, brush and grasses can be placed in horizontally with a 90 degree turn, so that the gasses are mixing with the air at the crook of the turn as well as when hitting the bottom of the pan, thus flashing off otherwise escaping heating British Thermal Units (BTUs). If no pan is available, a simple hinged metal cooking frame can keep sliced vegetables or stripped meats flush on the top of the cinder block (avoiding the cook ring).

Another trick is to check your fireplace if you are able to stay in your dwelling after a disaster, to see if the chimney is intact and venting fumes. From there, you can use your interior log holder as a grate to cook meats, potatoes in tin foil, or even potable water. You may even have a simple flat sheet of plywood with sheet metal on one side and handles on the other to cook like an outdoor 'oven.' You just need to make sure that no fumes are leaking into the house on the level with the fireplace, or subsequent levels above.



If you have a temporary direct vent heater you want to use for prolonged power outages, be sure to raise the exit point for exhaust that extends well beyond the height of known water lines from past floods.



There are off-the-shelf types of biomass stoves that can use local fuels. A couple of manufactured stoves of family scale are: the Kelly Kettle, StoveTec, and Biolite stoves. The Kelly Kettle is a vertical tube for the exhaust on a bottom pan burner that has a water jacket around it; thus the unit heats water on the side and cooks foods on a pan at the end of the exhaust tube. The world leader in rocket stove research, Aprovecho Center, has put its best technology into a bucket called StoveTec that has kiln fire brick as insulation and a fluked top which allows for a third party addition of 8" stove pipe over the exhaust hole, which can heat hot water when a quarter inch copper pipe is coiled on the inside of the stovepipe. The stove can be bought also for about 20% more cost and offers a second (lower door) for 9 charcoal briquettes. The Biolite is unique in that it utilizes thermal-electric plate, inside the burn chamber, a small electric fan that can be powered to act as a bellows and thus aggravates the flames and increasing BTU yields from flue gasses flashing per turbulence. Each of these stoves, as they are sold, needs to be operated outside to release carbon monoxide in the smoke they create. It should be mentioned that operating such stoves is not only a way to reduce the ecological stress on biomass stocks while getting the same utility out of the fire, but these units often originated in part to relieve safety concerns for those (usually women) in third and fourth world nations who often have to travel out from their safe home areas to collect more slash or ground rotting fuels. Thus with these designs, a more complete combustion has contributed to solving respiratory issues and reducing black carbon/soot.





Aside from biomass, one of the more common styles of stoves utilized for camping through the decades is the white gas two-burner “suit case” stoves by Coleman. Other manufacturers now make the stove accepting dual fuels (unleaded gasoline and white gas). The advantage with these liquid fuels is the flowing nature that allows them to work in arctic temperatures; yet spilling is always a hazard. In addition, a number of hot plates and upright stoves utilizing 1-pound small propane bottles are on the market. These “disposable” cartridges can easily be refilled from typical 5-gallon barbecue tanks, yet in subzero weather it is difficult to get the propane vapors to flow. These small bottles can be used also with on-demand hot water heaters from Coleman and Zodi for dish cleaning or heating common cleaning water.

## FOOD CONSIDERATIONS

Given that there are many types of “instant foods” that are non-perishable and will provide quick carbohydrates with limited hot water (mash potatoes, minute rice, ramen, quick oats, etc.), it is not difficult to store such foods that will keep for an emergency and be readily at hand to utilize the calories. Lightweight jerky meats and compact dehydrated fruits are common at the grocery store for any one-week emergency “bug out” kit, yet what of a water source? And what are the cooking options? Who and how many are you needing to feed? And how do you keep food safe?

When choosing which foods to have, consider the following:

- low weight and low volume
- high calorie
- minimal preparation
- long shelf life
- good tasting foods that require minimal cooking for the available water

Thus, you may consider canned meats, vegetables, fruits, juices, cocoa mix, coffee, tea, tomato sauce, peanut/nut butters, jam, crackers, granola bars, trail mix, sugar,

salt, pepper, dry cereal, instant oats, rice, pasta, and beans. Remember to keep in mind the food consistency for the age groups you are feeding. Soft foods for infants and non-stringy meats (tuna, canned chicken, pork in beans, etc.) for elders with dentures are a good rule of thumb.

For cooled foods you have a concern over, the refrigerator may maintain a safe temperature for only about 4 hours after the power goes out. If you have a thermometer you may be able to gauge whether foods are safe. A full freezer may stay cold for longer if it is not opened often. A baggie with ice cubes inside will tell you if you are above freezing. Throw away leftovers and perishable foods that have been held above 40°F for more than 2 hours such as:

- meats, poultry, fish, seafood, lunch meats, hot dogs
- milk, cream, sour cream, yogurt, cream cheese,
- cottage cheese, soft cheeses, soy milk and eggs

Hard cheese and processed cheese, butter and margarine can usually be kept. In the end, follow the old adage, “when in doubt, throw it out.”

## DRINKING WATER CONSIDERATIONS

This section is adapted from *Emergency Water Supply*.<sup>5</sup>

Clean water is essential, and that is why emergency planners say you should have 7 gallons of water per person (and pet) in case you need to evacuate. The water should be stored in clear containers that will allow UV rays to help disinfect it naturally. These containers should be moveable over different terrain. Round 3- to 6-gallon jugs tend to work best. Remember, water weighs about 8 pounds per gallon. Clean water from private wells or public water systems should be stored away from household cleaners or any other volatile organic compounds. It is always best to rotate out the stored water every six months.

If you haven't stored water and your regular source is not potable, you may have 60 gallons stored in your hot water tank. When the disaster hits, or just prior if you have advance warning, turn off the water supply to the house to prevent contamination from the supply source. You can use ice or any other frozen water in the refrigerator by thawing it. Water in the toilet tank (not in the toilet bowl) can be used if it doesn't have a hanging deodorizer or other chemicals. If you happen to have gutters on your home, you can redirect and use rainwater. Ponds can be used, but remember that they may be contaminated if the water is brackish, smells, or if there is a sheen of material floating on

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<sup>5</sup> *Emergency Water Supply* (<https://www.uaf.edu/ces/files/Emergency-water-supply.pdf>)



it. If you rely on city or municipal water, you may be asked by the water utility to boil it. Heat the water to a full, rolling boil for at least one minute. Check with the utility or the Alaska Department of Environmental Conservation for bulletin updates.

There are other ways to disinfect your water from bacteria (but NOT chemical contamination). You can add a drop of regular, unscented, dye-free bleach to a quart of water, but allow it to take effect for a half hour before using the water. That comes out to a half teaspoon per 10 gallons if the water is clear. If cloudy, double the amount of added bleach. You can use a filter in a straw, cup or pump unit. You just want to make sure it filters out particles larger than 5 microns. If the water is disinfected and tastes flat, you can freshen the water by pouring it back and forth several times between two clean jars or food-grade containers.

<b>Volume of Water</b>	<b>Amount of 6% bleach to add</b>	<b>Amount of 8.25% bleach to add</b>
1 quart/liter	2 drops	2 drops
1 gallon	8 drops	6 drops
2 gallons	16 drops (1/4 tsp.)	12 drops (1/8 tsp.)
4 gallons	1/3 tsp.	1/4 tsp.
8 gallons	2/3 tsp.	1/2 tsp.

*Source: Environmental Protection Agency*

After flooding, wells sometimes need to be disinfected. If you are in doubt, disinfect. Remove the sealed plates from the top of the well casing. Then pour chlorine bleach down the well casing. Follow this up with running or pouring available water down the casing until you smell the chlorine scent of the bleach. Then reapply the well plates. Inside the house, run the pump and turn on the faucets until you smell chlorine, then close them. Let the chlorine solution stay in the pipes for at least two hours. Open faucets and run the water until the chlorine odor is gone. If you have an in-line water filter, replace the cartridge after the disinfection is complete. If you have a water softener, bypass that before disinfecting. Another way to ensure a safe water supply during an emergency is to make sure that you have a portable water filter. They can be purchased at camping and hunting stores and can clean water to human consumption standards easily from almost any source.

After an earthquake or flood, it is also a good idea to have your water tested to make sure that it is free of contaminants. Remember, one of the most important elements in an emergency or disaster—especially in case of a prolonged electrical outage—is water, for keeping hydrated during stressful times, for disinfecting, and for preparing food. Take care of your water and it will take care of your health.

# PART 5

## DEFENSE OF HOME PROPERTY

### An Earthquake-Ready Home

Steps to ensure your home and family are prepared for an earthquake.

#### Your Home Is Structurally Sound

Homes that are tied together from the roof to the foundation are much more likely to remain standing during an earthquake. This creates a continuous load path that helps hold the house together.

Most newer homes are built with a continuous load path, which is like a chain that ties the house together from the roof to the foundation.

#### WHAT IS A CONTINUOUS LOAD PATH?

This method of construction uses a system of wood, metal connectors, fasteners, and shearwalls to connect the structural frame of the house together.

#### Your Home Has Been Retrofitted

If your home was built prior to 1985, it may need to be retrofitted. A seismic retrofit strengthens your home's structural frame, including:

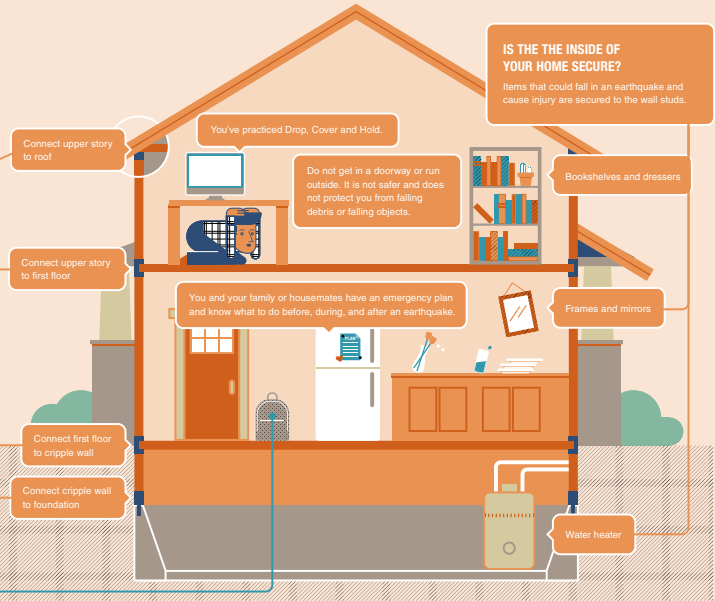
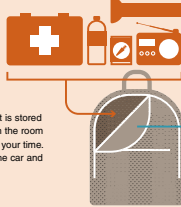
- ▶ Your home is bolted to the foundation.
- ▶ The cripple wall is reinforced.
- ▶ The cripple wall is attached to the first floor.

#### Your Family Is Prepared

You have a disaster supplies kit that includes:

- ✓ Food
- ✓ Water
- ✓ A radio
- ✓ Flashlight
- ✓ First aid kit

Your emergency kit is stored near the exit and in the room you spend most of your time. Also keep one in the car and one at work.



Sources  
[www.safestronghome.com](http://www.safestronghome.com)  
[www.earthquakecountry.info](http://www.earthquakecountry.info)  
[www.redcross.org](http://www.redcross.org)  
[www.oregon.gov](http://www.oregon.gov)  
[www.shakeout.org](http://www.shakeout.org)

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## FOUNDATION PREPARATIONS

One of the most troublesome results of an earthquake, flood, or tsunami is a foundation failure. Securing the structure to your foundation is probably the best investment you can make to assure that your home will weather these disasters. This is also true for hurricanes, which though we don't experience in Alaska, we do have coastal homes exposed to 100+mph sheer winds. You want to do what you can to make sure that 1) the foundation is stable and 2) the home is attached solidly to the foundation. This is all the more essential in the case of buildings built up on pad and post due to being on top of permafrost.

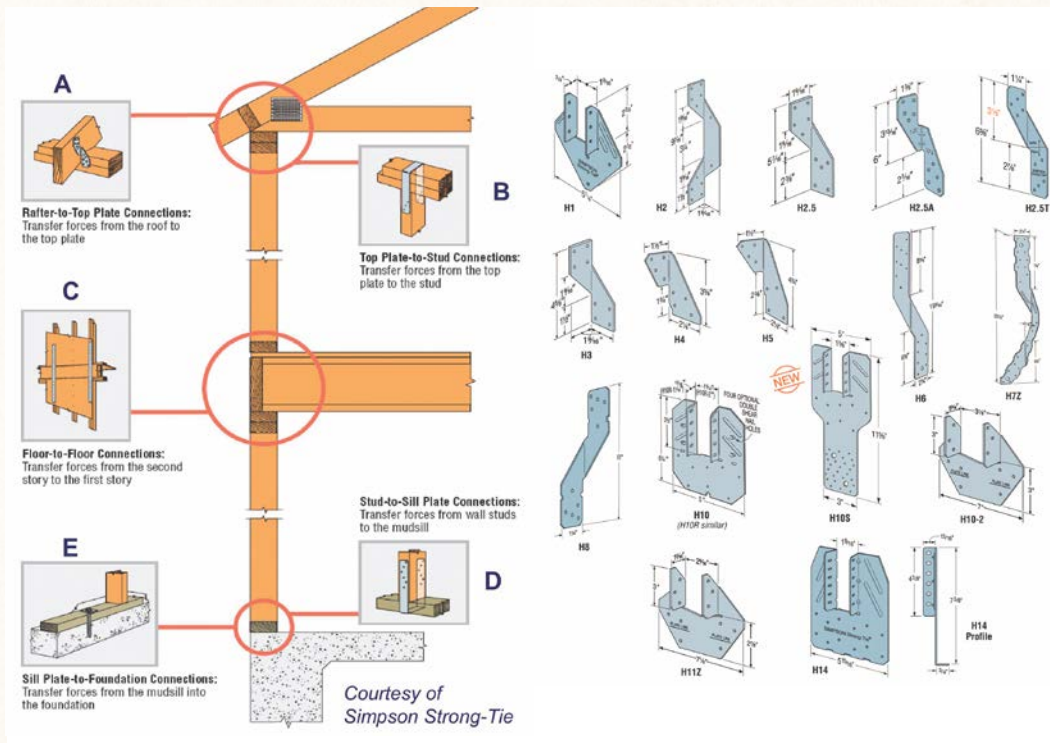
If the home is set up on crib timbers, you want to make sure that they are attached to each other and are





connected well to the base of the structure. Hurricanes are of great assistance in this, and come in several different sizes and shapes (see the figures below and on page 13). To prevent the insulation shaking out from pad and post foundations, stapling buffalo board or plywood is the best way to assure that the spaces between the floor joist voids stay filled with fiberglass insulation.

City codes on the road system often require there to be large metal straps on the interior of the corners for seismic stabilization.



For retrofits, hurricane clips attach the roof structure to a horizontal ridge beam, which is in turn attached to the vertical post with a metal strap, to thus tie the load from the roof to the foundation, or create the complete load path connection.

It is possible in many older houses to strengthen certain portions of the structure by attempting to complete the continuous



load path connection. In particular, the weakest link in most houses, the roof-to-wall connection, can be fortified with hurricane clips. You can install the hurricane clips after consultation with a licensed structural engineer or architect, or you can hire a licensed contractor who has experience in this area. Other portions of this work, unrelated to the hurricane clips, will most often require the work of a licensed contractor.

You should consult with a licensed structural engineer or architect if your house is being retrofitted, even if you perform some of this work yourself for roof-to-wall connections, wall-to-foundation connections, or to transfer the load path around windows and doors.

Aside from clips and connectors, stability is also dependent on the soils and the connection to the soils. In flooded communities, often FEMA or other agencies will require that all homes be built up above the elevation of the floodplain with pile-driven well casings or some other sort of wooden poles.

If you have a foundation with a crawl space, you want to be sure to utilize vertical beams which are nailed or adhered to the beam or joist above; but even more importantly, it is best to have a cement pad under each, with an imbedded piece of rebar which can then be inserted into an appropriate drilled hole to accommodate the half foot or so of rebar. This type of beam prep allows for easily aligned jacking and shimming later, should there be settling, but also provides more stability in case of an earthquake or horizontal blow to the home (such as in a tsunami).

It is also important to provide screwing or nailing of the vertical supporting beam from several angles from underneath to avoid splitting of the wood at a single point



of adhesion, (as could easily happen in an earthquake. Better yet, if you are using dimensional or rough-cut milled lumber for your beams, use metal strong ties that fit so that you can nail or screw the galvanized tie to both the vertical supporting beam, as well as the joist(s) or beam above.



In stable soils where there is no building in permafrost, there may be interlocking cinder blocks with poured cement in the cell voids, as well as possible rebar mixed into each cell. Saturation of soils with a flood, the shaking of an earthquake, or the force of a tsunami can break the mortar between the blocks, and also possibly shift the blocks laterally. If you see such invasive movement, have a structural engineer check out the foundation to make sure that it is safe to be living in, and to determine if there is any bracing or possible outside excavation that can create a more supportive option. If the structure of the cinder block pony wall is safe, you can fill in the cracks with cement repair material, which comes in a caulking gun or pail and is applied with a putty knife.

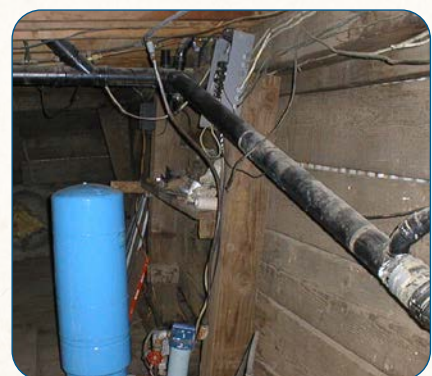


Many homes have three-quarter inch or one inch plywood as flooring underneath the carpet, vinyl or tile. The moisture from storms or flood events means the plywood may have to be pulled up and aired out, especially if the floor joists are flush on the ground and there is no crawl space or basement to circulate air with fans. Although OSB or chipboard is less expensive, it is better to use normal plywood—or better yet, treated plywood—which will better resist rot when moisture is trapped between the ground and the flooring.

Also, if you do have to pull up the floorboards, plywood is more forgiving than chipboard to re-screw down without protruding pieces ‘telegraphing’ bumps under the carpet, tile, or especially vinyl. It is important in order to save your insulation to have it encased between the floor joists by friction fit, but also to nail or staple to the bottom of the joists chicken wire or use buffalo fiber board or 1-inch blue board foam. Even if you build right on the ground, you may want to put chicken wire between joists to keep the insulation intact. If there is any movement of the home from earthquake or flood, you want it all kept together.

The other thing to consider is that most people have combustion devices in their crawl space, basement or utility room which need to be secured, and for large items like hot water heaters (which when full, usually weigh close to 500 lbs.) or vertical propane tanks on the outside of the home, the easiest way to keep things in place is to wrap the item in plumber’s tape and secure it to the closest walls. The same treatment should go for trees that are embedded into the structure.

Be sure to try to prevent lateral as well as vertical movement or disconnection should there be a sideways shaking force from earthquakes or a vertical force/drop from flooding.



## SECURE OBJECTS INSIDE YOUR HOME



Be sure to strap down your water heater, and anchor down your china cabinets, bookshelves, and picture frames



Especially important is the securing of exhaust vents which can be shaken loose or knocked loose without the homeowner knowing. Any combustion creates carbon monoxide, and being that it is tasteless, odorless, and invisible, it can be a poisoning harm to residents long after the disaster has happened and people are relocated into their homes.

Small machine metal screws can be used to secure joints between straight pieces of vent piping and corners, to try to minimize possible leakages—and of course, a follow-up wrap with duct tape on each joint is good. This is the case with galvanized air ducting connections. For black stove pipe joints, a silver high-temperature 2-inch tape would be used instead.

# CONCLUSION

While we can't prevent the natural disasters which hit much of Alaska, by preparing our property and homes, we may be able to mitigate losses and shorten the recovery time to get back into our homes. Depending on the disaster, dwelling and property preparation can reduce damage as to how the structure sits, moisture damage in the wall, or flooring failure. While the building materials are something we work with in advance to help lessen such problems, there are also other appliances and fixtures we want to make sure are stoutly connected, to reduce difficulties later with poor indoor air quality at best, and carbon monoxide poisoning at worst.

In Alaska, personal preparation also includes seven days of materials for every family member and pet who may need to relocate or 'wait it out' at home until the power comes back on. Along with instant foods, first aid supplies, communication devices and appropriate clothing for year-round weather, it is crucial to think ahead above energy fuels and devices for cooking, sterilizing water, and lighting. Remember, compactness, weight and portability are all very important considerations to be spelled out ahead of time before you have to possibly readjust in the structure, relocate to another part of your property (or possibly evacuate your community). Where communities are often far apart, Alaskans need to have as much as they can on hand, due to tenuous evacuation routes and often a sparse amount of neighboring communities to escape to and rely on.

Finally, knowing about the safe and nutritious aspect of foods you have packed, as well as what is in your refrigerator or freezer after an outage, is critical. There are simple indicators such as a bag of ice or various thermometers that may help out when you have limited foods and no electricity. Also, knowing the amount and appropriate types of food for various people you are looking after in the event of a disaster ought be thought out ahead of time. Be prepared and stay safe.





