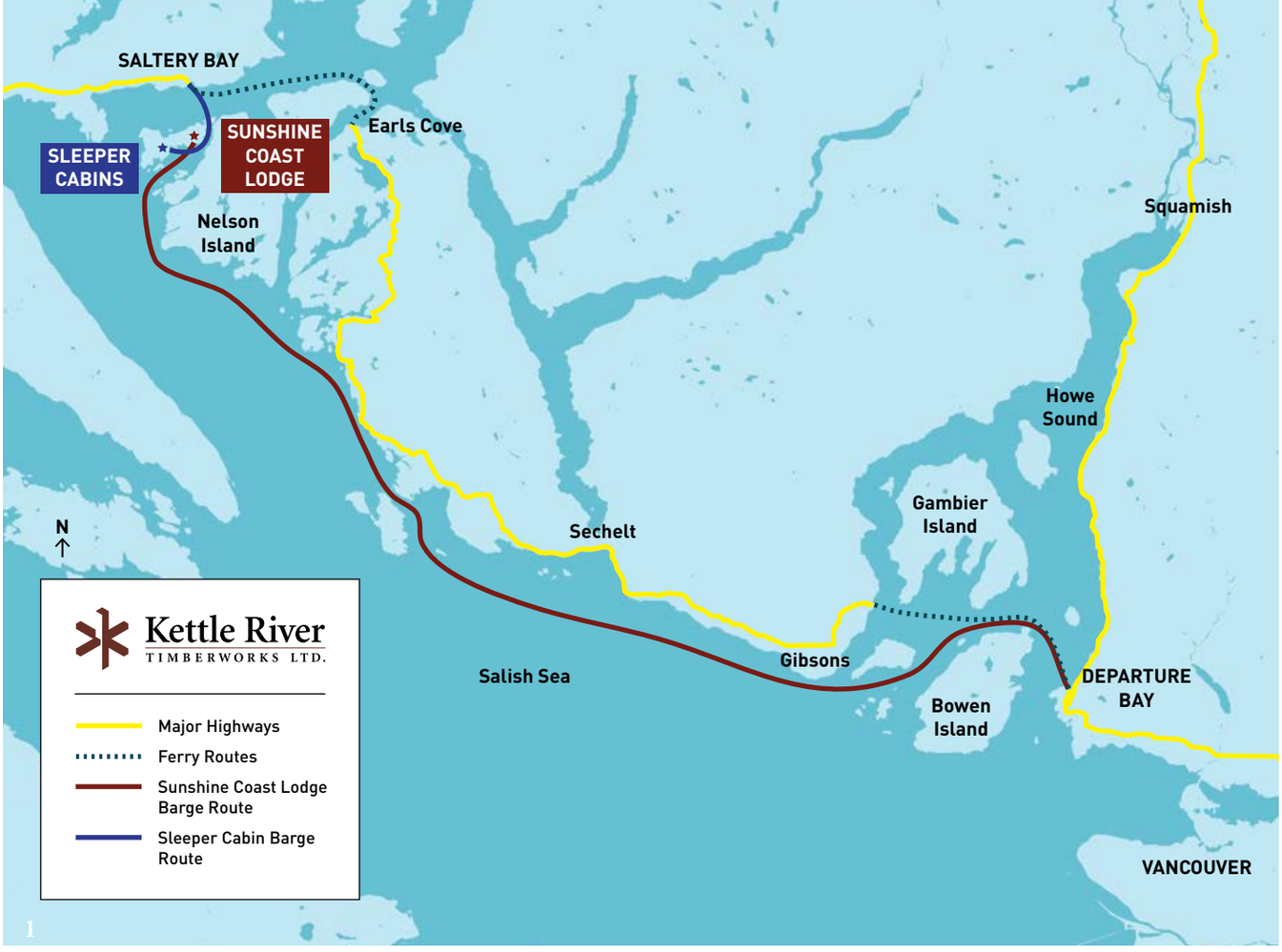
TIMBER FRAMING

JOURNAL OF THE TIMBER FRAMERS GUILD

Number 132, June 2019

Remote Framing in BC



Paula Heal

Into the Wild: Timber Framing in Remote Locations

THE last ice age left the coast of British Columbia carved up into a myriad of fjords and islets accessible only by boat or float plane. Over the last ten years, my company has had the opportunity to design and build more than a dozen timber frame homes along these remote waterways. These projects have ranged from elegant 260-sq.-ft. sleeper cabins to luxurious 4,000-sq.-ft. lodges. Remote timber framing projects are both extremely satisfying and challenging to complete, and over years of accumulated experience on these jobs I have learned many unexpected lessons.

The word "remote" has different meanings to different people. My definition describes a location that is: (1) inaccessible by a paved road; (2) unreachable by a regularly scheduled ferry; (3) sparsely populated with few, if any, neighbors apart from otters and eagles; (4) "off the grid," which in BC means no guaranteed access to the services that we take for granted in more urban areas, such as electricity, Wi-Fi, running water, sewage, coffee shops, or even cell phone service. While this last is slowly expanding up the coast, it is unlikely to ever reach the most sparsely populated areas. "Remote" also means no lumber yards or neighborhood hardware stores around the corner, which highlights the need for thorough advance planning.

For a homeowner, the appeal of a remote location is the tremendous beauty as well as the privacy. However, getting to these sites is often a multi-hour, multi-step voyage involving a ferry from Vancouver to the Sunshine Coast, driving up to Earls Cove or Saltery Bay and then taking a water taxi to the site itself. Most of these remote sites are located on the water, which makes for moderately easy access by boat or water taxi, although the shoreline and topographic features can make landing materials a challenge. Seasons, weather and currents are also necessary considerations

1 The map shows the location of the Sunshine Coast Lodge and the Sleeper Cabins relative to Vancouver, home of Kettle River Timberworks, Ltd. Materials for the Sunshine Coast Remote Lodge were trucked to Horseshoe Bay in Greater Vancouver. The trucks were then loaded directly onto the barge. The barge trip from Horseshoe Bay (shown in red) was six to seven hours but cost less than sending all the trucks up the coast on ferries. Materials for the sleeper cabins were trucked and ferried from Vancouver and nearby Squamish to Saltery Bay followed by a short one-hour barge trip (shown in blue) to the island. The yellow lines are roads; the dashed lines are the regularly scheduled ferry routes.

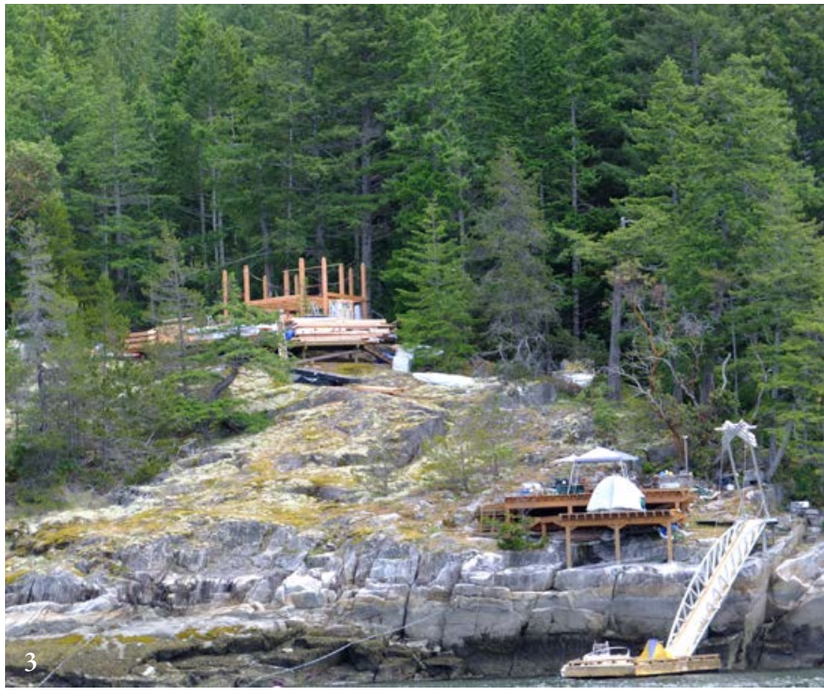
for accessing the site. A map showing the locations of two selected projects is shown in Figure 1, along with the crew and barge routes.

Our timber frame projects are typically initiated when clients approach us with a vision for what they want to build on their personal piece of paradise. After initial discussions, a project really kicks off with a site visit. This visit usually takes place shortly after the client engages us and before design starts, approximately eight to twelve months before the actual construction begins. Because of the amount of time and effort it takes to get to these remote building sites, we usually only make one pre-construction site visit. This means that we need to obtain and determine all the necessary information at once, such as site topography, the best place to build the house, and the best locations for material landing and storage (Fig. 2). We always take a lot of site photos, from as many angles as possible, which we refer to repeatedly during the planning and design process. Sometimes we use aerial photos of the property that were taken for real estate purposes, which has inspired us to think about using drones to capture images of the property from all angles. At this point we also try to determine crew accommodation and logistics.

Other first site visit considerations involve finding and identifying fresh water sources, the distance to the nearest transportation hub (for the crew's days off and in case of emergency), and any water hazards or tricky currents. Although many of the homes we build rely on rainwater collection, the residents of one island reportedly used a dowser to successfully identify an appropriate well site. Armed with this bundle of information, impressions, and photographs, we make the long trip home again to Vancouver to start the planning and design process.

A critical part of the initial site visit is to plan the landing site. This involves assessing the coastline to identify obstacles both above and below the waterline, which will determine how close a barge can get to the site. We need to determine if vehicles and equipment can be unloaded directly and where the material will be landed and stored. As most of the landing sites are very small (beaches are rare on BC's inner coast), we need to anticipate how much material is required and how to store it securely above the tideline. A key consideration is the range of the barge crane: if the distance between the barge and the landing site is too great, air support (i.e., a helicopter) may be required. In some cases, if the terrain is irregular or very steep, we may need to construct a platform in advance of the barge arrival so that we have a level place to land materials (Fig. 3).

All photos: Dave Petrina, except where noted



2 To capture information during site visits, we've purchased our own survey equipment to conduct a proper topographic survey of the site.

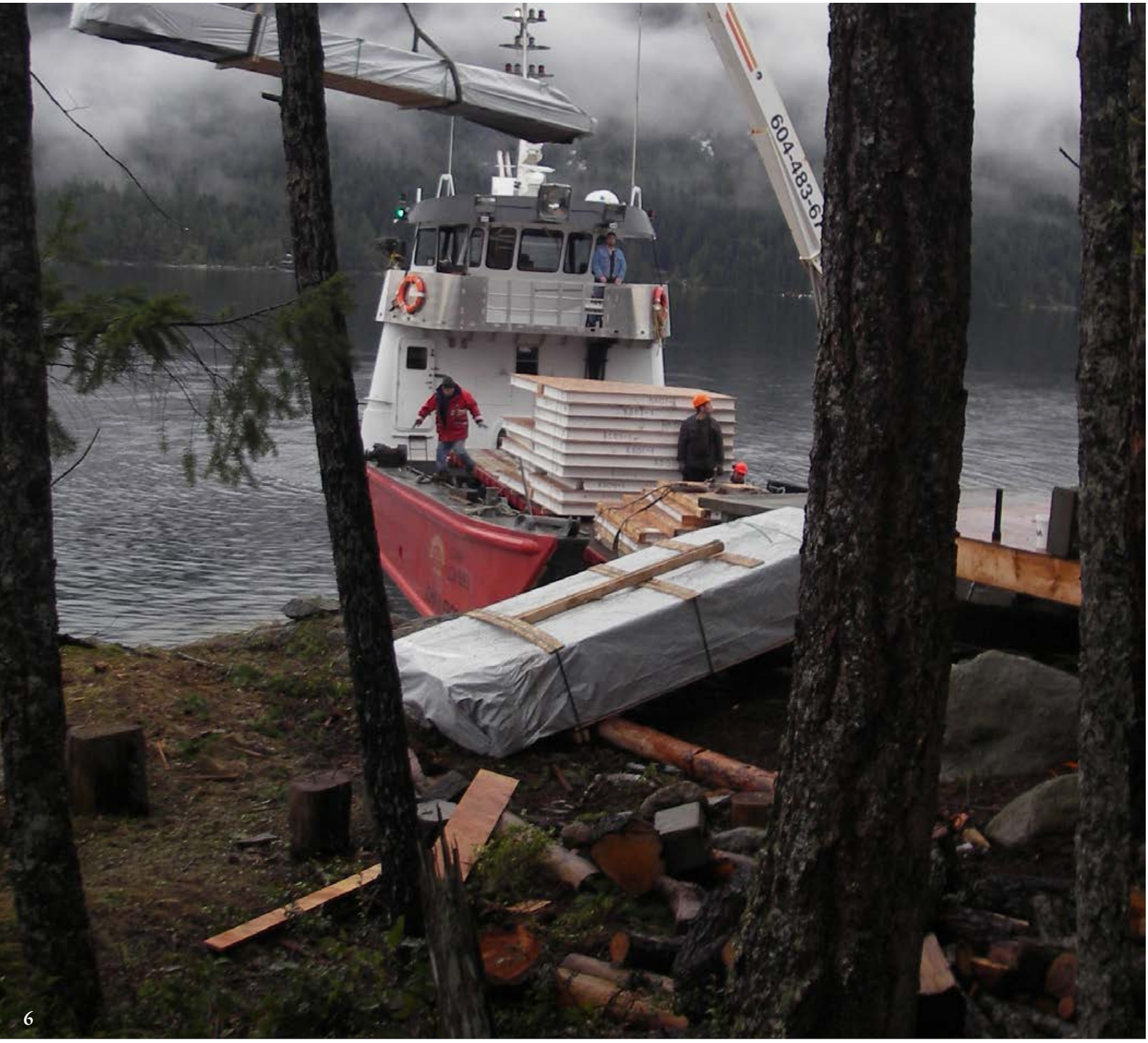
3 A sloping and irregular landing site requires careful planning for unloading and storage needs.

4 Pier construction for a house. When the site is irregular or sloped, temporary landing sites and living spaces also need to be fabricated.

5

5 Loading a barge. Each barge trip can cost up to $10,000 CAD per trip, including barge and the trucks. Larger projects can take about three to five barge trips to transport everything to the site.

6 Unloading the barge using a crane. When unloading the barge for the Sunshine Coast Lodge project, the crane swung a load too wide and the barge started to roll. This could have been a disaster. Fortunately the quick-thinking operator spooled the load down and dropped it into the sea (aka "salt chuck"). The load of timbers did not sink and the operator was able to drag the load in the water and then re-lift with better positioning.



6

Design considerations for remote homes Design plays a critical role in a successful remote build. Important elements to consider include foundations, framing strategies, and off-grid necessities. Sometimes an outside architect is brought in to support our team during the design phase, but for most projects all the design is conducted in-house. Our company has done both turn-key projects and others where only the frame and SIPs are supplied.

The first fact of life (or nature) is that most coastal building surfaces are not flat. Since many of the province's islands are made of smooth, solid granite, excavation is usually not desirable or even feasible. Most sites require some hand digging to reach the bedrock, and mechanical excavation is not financially or logistically practical. To minimize the use of concrete and blasting, many remote houses involve pier construction, or the use of concrete piers pinned to the rock as opposed to a full foundation (Fig. 4). Pier construction creates a nice dry storage space underneath the structure that critters are often drawn to.

Appropriate frame design influences the transportation and ease of raising a project and can also have a major impact on project costs. For remote sites, we favor a common rafter frame design that allows the house to be built piece by piece. Raising a bent or wall-style frame requires a crane, which is rarely a realistic option on remote sites.

Off-grid design involves incorporating both low- and high-tech solutions to make our clients' homes as comfortable and sustainable as possible. Many remote homes incorporate rainwater collection and low-tech gravity-fed water systems such as a water tank or reservoir located up a hill or on a raised platform. Other houses use solar power to pump water from a well to the holding tank; this ensures good water pressure even when the solar isn't available. Some clients recycle graywater from bathing for flush toilets while others use composting toilets. Typically, propane is

7 Unloading a barge with a helicopter. Helicopter lift capacity increases as the fuel is burned off, so the lightest loads are carried first with the heavier ones left for last.

8 Lifting without a crane. Here, four material lifts are being used to raise timbers.

9

10

used to power the stove, refrigerators and freezers, while the oven can be propane or wood-fired. Passive solar hot water heating can be used to supplement propane on-demand hot water heating systems. Although high-tech solar panels and battery systems can support lighting, they are insufficient to warm the house during the cold, wet West Coast winters which make wood stoves a necessity. Fortunately, there are several good wood stoves on the market that have an oven compartment, making them ideal for both heating and cooking. Even the remote coastline of BC is not a utopia, and these remote homes are vulnerable to intruders. We've had clients install remote cameras. One client had us design removable floorboards on a stair landing to conceal a secret vault. Another had us chopper in an 8x8 shipping container to serve as a remote Fort Knox for storing valuables such as boat motors, chainsaws, fishing gear, and fine Scotch when the home was vacant.

It's all about the planning: transportation and material logistics

Unlike standard building projects, we source and consolidate all of the equipment and hardware before the project begins so that it can be packed and barged to the site. Having completed more than a dozen of these projects, we have developed extensive checklists of the tools, building materials, generators, fuel, food, survival items, and first aid gear that we will need. Every hammer, chisel, and battery is included. Planning wisely and packing well minimizes the number of barge trips required and reduces the need for unexpected (and expensive) trips back to the mainland to pick up what we forgot.

Barge transport provides some additional interesting challenges. Most jobs have a narrow delivery window that is influenced by the currents and tides that appear at a different time and depth each day. If we don't come and go within the specific window, the current may be too powerful to navigate or else the barge may be grounded by the diminishing tide. Usually the barge driver will advise us about the best time to land, and we will schedule our day around that (Fig. 5).

Some of the islands, including Sidney and Gambier Islands, have rural roads but no vehicle ferries, so we can place loaded vehicles directly on the barge to transport the equipment to the property on their rural roads. This is often easier and faster than unloading directly from a barge but may require our truck drivers to do what few in the business are comfortable with. There is no room for error when truck drivers are required to back a tandem trailer onto a crowded open barge with a foot of grace or navigate kilometers of overgrown island roads with barely a place to turn around.

Finally, to add to the complexity, we have learned the hard way to be prepared to accommodate local culture. The BC coast has traditionally attracted colorful characters, some of whom have a pirate mentality. For example, we once had all materials and the whole crew ready and waiting for a barge that never showed up. We were unable to contact the operator that entire day and only later learned that he had decided to drop us for a more lucrative government contract relocating a herd of elk from an urban area to a more appropriate wilderness location.

9 A Roustabout in action.

10 Converted aerial work platform being used to lift materials.

11 While not our preferred method on remote sites, telehandlers can be used to lift beams.

12 Crew accommodations on site can include sailboats, tents, yurts, and old cabins. With sailboats, we need to be aware of the weather. On one job we had to leave a site at 2AM to avoid getting smashed on the rocks.

Landing the material on site presents its own set of challenges. We typically use the barge crane to lift materials directly from the barge to the landing site (Fig. 6), but other methods may be necessary if the landing site is far from the worksite. This may include moving the materials bucket brigade style from the barge up a bank to the worksite, though this manual approach can exhaust and demoralize a crew. Alternatively, on several occasions we have used a helicopter to shuttle everything from the barge up to the site in just a few hours. On one such project, a helicopter with an approximate 2200-pound lift capacity moved 25 tons of building materials in just 27 lifts. While this was accomplished in just an hour and a half, with one load hustled from the barge to the landing site every two and a half minutes, this approach requires even more planning: before barging, we had to decide what would be included in each helicopter load based on weight, materials were packaged appropriately, each load was numbered, and the drop location for each load was mapped. Still, we felt it was $8,000 CAD well spent (Fig. 7).

Building without a crane

The key factor that distinguishes remote timber framing raisings from many more typical building jobs is that we don't have the luxury of a crane. Although cranes are standard equipment on modern sites, it's helpful to remember that prior to the advent of the crane timber framing was done with many hands and pike poles and maybe the help of a gin pole. Today, there are a number of portable machines that can be used on remote job sites:

- ***Material lift.*** These can be rented from building supply stores. While their individual vertical lift capacity is limited, material lifts can be used in combination to lift heavier loads up to 2,000 lbs (Fig. 8).
- ***Roustabout.*** A Roustabout can lift up to roughly 1,500 lbs., which is greater in capacity than a single material lift (Fig. 9).
- ***Aerial work platform.*** A small lift can be transported to a remote location and adapted to a flexible lifting machine capable of lifting about 400 lbs. (Fig. 10).
- ***Chain fall.*** Chain falls and comealongs can be used for hoisting.
- ***Telehandler.*** A telehandler is a four-wheel drive, telescoping-boom forklift, ideal for both material handling and as a lifting device (Fig. 11).

13 Crew transport involves boats, water taxis, and on rare occasions, seaplanes.

Our preferred method is to use either a Roustabout or a material lift as these are compact, versatile, inexpensive, and can be packed to a jobsite fairly easily by just a few crew members. The lift can also be removed from a jobsite with a rugged boat such as a water taxi—no barge required. By contrast, a telehandler requires very good landing and worksites to drive the machine around. It's also an expensive piece of equipment to rent, can damage the site and requires a barge at the end of the project to transport it off site.

Unique labor force challenges: selecting the right crew and keeping them safe and happy

One the biggest success factors for remote construction projects is hiring the right group of people. You need to ensure that potential crew members fully understand what they are getting into—this isn't shop work! The rustic lifestyle doesn't work for everyone and I've had crew members decide, after only a few days, that this isn't the right scenario for them. In those cases, I returned them to the nearest transportation hub, settled their paycheck, and thanked them for giving the project a go.

THE CRITICAL SUCCESS ELEMENT FOR REMOTE BUILDS IS HIRING A CREW WHO THRIVE IN THE OUTDOORS.

Tips for adaptation to a remote building location:

- Wear the same clothes every day.
- Get used to being off social media.
- Rainwear is everyday wear.

For those who thrive in the outdoors, enjoy spending time in stunning natural locations, like being near water, and love camping, these projects can be a dream come true. Jobsite accommodations vary—we may sleep in tents, sailboats, yurts, crummy rented cabins, or rustic accommodations that we've built on site (Fig. 12). Since we build year-round, this sometimes means camping in the snow. While the ideal crew number varies with the scope of the project, we typically find that four or five members are ideal for an efficient team.

Expectation management about the crew schedule is important. Typically, on these jobs we work 12 hours per day, ten days at a stretch, followed by four days off. While we ideally try to leave the site at the end of day ten, the West Coast weather can be very unpredictable and sometimes it is necessary to spend another night on the site to wait out a storm.

In these remote locations, taking good care of the crew includes feeding them well. Everyone needs a good meal at the end of the day, but no one has the energy or patience to prepare a meal after 12 hours on the job. We plan out the full ten-day menu ahead of time and bring everything with us on site. We make sure that most meals are ready to go, requiring only minimal preparation, and we have many meals pre-made for us. Small things go a long way in keeping a remote crew happy: a couple of cold beers after a long day or some good quality chocolate can be a real morale booster. We replenish all the meal supplies when we return to Vancouver at the end of each ten-day work blast.

In addition to great meals, we try to provide our crew with other benefits. Depending on the specific site and client, we have hosted a family weekend on site in the summer time, where each crew member was invited to bring their family; we provided all the food as well as entertainment.

Dom Koric

14 Sunshine Coast Lodge.

Working out the details of crew transport and payment

As already emphasized, getting to and from a remote site can be challenging. In the past we were fortunate to have a sailor on the crew and were able to sail to the island on his boat. We have also had clients lend us boats for the duration of the project and on some of the jobs we have flown in with a seaplane, although this is the most expensive mode of transport by far (Fig. 13). One of the best options is a water taxi—having a professional captain in a seaworthy boat removes an element of risk. The downside of relying on a water taxi is that once you and the crew are dropped on the island, you need to be fully self-sufficient: no runs to the nearest marina for provisions!

It is important to be clear with your crew about payment for travel time. For example, the crew may have to spend a day in limbo waiting for water taxis and ferries on their trips to and from the job site. It helps to be clear upfront how they will be paid for their travel time: our practice has always been to pay people 50 percent of their standard working rate.

Safety considerations: dealing with the unexpected

"Remote" also means that access to medical services is limited, and planning for the unexpected can make or break the project. First and foremost, it is necessary to have an emergency evacuation plan in place in case of a serious accident. The evacuation plan needs to include knowing who to call: the ambulance, the Coast Guard, or private transport (water taxi). The evacuation plan also needs to include a viable method of contact: if you don't have cell service, you need to have VHF radio, including a valid VHF Operator's Licence, to call for help if necessary.

Although our hope would be that help could arrive in a short period of time, we need to be able to deal with any serious injuries and know how to stabilize someone for the 24 hours it may potentially take for a water taxi or the Coast Guard to arrive, especially if the weather is poor. In addition to a level-three first aid kit, spine-board, and oxygen, we always have at least one level-three first aid person on the crew, as per requirements of our regional workers' safety agency.

The big payoff: a completed timber frame home

Although the long days working on remote timber framing projects are hard, they bring many rewards. Apart from spending time outside and working as a team, one of the biggest rewards for the crew is the satisfaction of creating something unique, enduring and beautiful that we are truly proud of.

Although we are proud of every timber frame home we've built, a couple of our favorites are described below.

Sunshine Coast Lodge

The Sunshine Coast Lodge is a 2,900-sq.-ft. timber frame designed by Guild member Andrew Preston and engineered by Fire Tower Engineered Timber. It features structural insulated panel walls, a conventional roof, and operates completely off the grid. Between solar power and diesel backup generators, this has all the comforts of home. It has wood stove heat with baseboard backup, propane hot water, stove, and fridge, and even a central vacuum system. The project required 3,100 workhours on site (Fig. 14).

Sleeper cabins

On a small, half-acre island adjacent to the Sunshine Coast Lodge are two 400-sq.-ft. sleeper cabins. We designed the timber frame with engineering by ISL Engineering. With structural insulated panel roof and walls, these 20x20-ft. boxes were designed to have a large open space to accommodate the bedroom and living room. On the other side of a dividing wall is a bathroom and kitchenette. These required 450 workhours on site and took a crew of four only two weeks to complete (Fig. 15).

15 Completed sleeper cabins.

Demobilization and a return to civilization

Our clients choose their remote properties because of their unspoiled beauty, so it is our job to ensure that the job site is as pristine as possible when we leave. The first thing we do is to get our tools, gear, and waste materials off the island. Fortunately, with these timber frame homes being prefabricated, there is minimal construction waste. Some of the wood waste can be burned when permitted, but the rest has to be hauled off, usually by water taxi. We typically don't require a barge to exit a job unless we brought in a telehandler or a vehicle. We usually complete the projects with a big debrief to identify improvements for the next project and refinements of our extensive project checklists.

There is always a big sense of relief when we wrap up projects, as there is a lot of opportunity for things to go sideways during a remote build. The crew is usually pretty worn out after these projects

Dom Koric

MEMORABLE MOMENTS (GOOD AND BAD) FROM WORKING ON REMOTE SITES.

1. Night swims in phosphorescent algae off Nelson Island on the Sunshine Coast.
2. June 15, 2011, the historic date when the Vancouver Canucks played the seventh game of the Stanley Cup while our crew was on a build on Sidney Island. We managed to jury-rig a satellite dish so that we could watch the Canucks be defeated.
3. Waking up at 2AM to the sounds of a passing pod of orcas off Hardy Island.
4. The clients who showed up on their boat, unexpectedly, to serve us a steak dinner, complete with fine wine, by candlelight.
5. Sailing to Nelson Island in absolute pitch dark with Matthew (a crew member) on his boat. While he sailed, I had to stand on the bow of the sailboat with a flashlight and didn't see the bluffs of the island until we were about 10 feet away. Another great memory is racing across the water at nine to ten knots on his sailboat at the end of a build.
6. Finding petroglyphs on a client's site (Fig. 16).
7. Unloading a 3000-lb. load of timber from a barge to Nelson Island and having the crane cable snap and drop the load in front of a very shocked crew of guys. We were very lucky that no one was injured.
8. Receiving a text from a new hire on his first night on the job. He wrote that he was very tired, that "he missed me" and that "he loved me." He thought he was texting his girlfriend. We had a good chuckle.

and will often take a few extra days to recover before starting on the next project. I'm grateful that I've had the opportunity to work with such a great crew over the last few years. Their hard work and friendship have made everything worthwhile.

—Dave Petrina

Dave Petrina founded Kettle River Timberworks Ltd. in 2004 after a successful career as a mechanical engineer in the high technology industry (Fuel Cell Vehicle sector). Dave lives in Vancouver, BC, and spends his spare time with his family, riding his mountain bike through the woods, and planning dance parties for his friends.

This article is based on a presentation delivered at the Timber Framers Guild 2018 Western Conference, at Timberline Lodge, Mt. Hood, Oregon.

Acknowledgments: The author wishes to thank Chrystal Palaty for writing support, Jan Palaty (reader), and Amy Mair (editor) for helpful edits and comments.

16 Petroglyphs below the high tide line on a client's property.