

SHELTER WORKS

ENGINEERED FOR EXTREME CONDITIONS



UNIQUE NATURAL GAS COMPRESSION STATION EQUIPMENT PROTECTION

"It gets pretty cold here in the winter; because the equipment is critical to this operation, it has to be properly protected." That's how Randy Cunningham described one particular safety valve at a Midwestern natural gas transmission compressor station. "This particular location is critical to the flow of natural gas to the Chicago market and because it is elevated off the ground, it is difficult to maintain in the case of a frozen vent. Now, should any problems occur, they have a safe environment to work in."

This particular ball valve rotates in a vertical position and acts as the emergency shutdown valve for this facility. Temperatures in the area can fall to -10° in the winter months. When the valve is called on to move, the actuator vents a small amount of gas. If the vent should freeze, it may hinder the valve from moving, which would put expensive equipment at risk and potentially hinder the flow of gas. This could compromise the entire facility, which is why the equipment is now protected with the Shelter Works fiberglass enclosure.

Shelter Works custom-engineered compressor station equipment protection has been made specifically to cover and protect this critical safety device from the worst weather challenges that arise in that area. It has been designed for maximum functionality and minimum maintenance. The building has large skylights to provide light into the building and entry doors above and below. Shelter Works built the skirted enclosure on an elevated, galvanized steel platform so that workers are able to walk around the actuator without stepping on the pipes. For the most part, workers are using the entry door above. However, there is an alternate access panel to the pipes below, in case someone needs to service any of the pipes or electrical connections in the crawl space.





"They were very pleased, as they felt the enclosure came together just as they had hoped. It's a well-kept site, and the shelter just made it all that much safer. The 25-year warranty is great, and they will probably buy more in the future."

If you have a field equipment protection challenge, give us a call at (800) 794-8037 or fill out our online Request For Quote form.



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**Built for
Life.**

A FIBERGLASS EQUIPMENT SHELTER WITH ADDED R-VALUE AND FRANGIBILITY

Equipment shelters need to protect equipment from everything: freezing temperatures; snow; ice; rain; blistering summer heat; vandalism; and occasionally, from errant aircraft that may smash into them.

EXTREME TEMPERATURES AND YOUR EQUIPMENT SHELTER

Anyone who is been to upstate New York understands that region is susceptible to extreme temperatures in the winter. There is an airstrip on a military base that often experiences sustained temperatures of -20°F. On this airstrip, there is a refueling station for helicopters that had an old steel building that the military planned to knock down. Steel is a conductive material that is particularly susceptible to temperature swings (specifically expansion and contraction) and can easily transfer cold temperatures from the outside of the equipment shelter to the inside.

As they were considering how to approach this project, the team assigned to this project determined that the mechanical room did not have enough room to properly house some electric power panels that service the refueling station. Todd Jewett, Senior Project Manager of Pemco Contracting, had seen a Shelter Works equipment shelter at this same military facility that was protecting sewer equipment and suggested that Shelter Works fiberglass construction might provide the perfect answer for protecting those electric power panels and provide those servicing the equipment with protection from weather whenever they needed to service these panels. The composite design provides an inherent thermal barrier and dimensional stability with low conduction. Because Shelter Works equipment shelters are custom engineered, the team was able to specify added foam insulation during the construction of the walls and roof to get exactly the R-value they desired.

Definition of R-value:
a measure of resistance to the flow of heat through a given thickness of a material (such as insulation) with higher numbers indicating better insulating properties.


Definition of frangible:
readily or easily broken

Jewett said, "The fiberglass building is performing as needed, and we couldn't be happier. There have been no issues, which is exactly what you want from a building!"

In addition to the thermal properties of Shelter Works fiberglass construction and the non-conductive nature of the building, Shelter Works buildings meet a frangibility requirement often specified for airfields. Many times, buildings that are on or near airstrips sometimes need to meet certain frangibility requirements—that is, if an aircraft were to hit the building, the specification calls for a building that would be frangible if hit by an aircraft. The reason is that it's a lot easier and cheaper to replace the building than it is to replace the aircraft. In addition to the highly attractive 25-year warranty, ultra-lightweight construction and maintenance-free nature of these buildings, Shelter Works buildings meet these frangibility requirements.



FIBERGLASS ENCLOSURE FOR OUR MILITARY



The United States government maintains facilities in every possible climate available—blazing desert heat, ever-frozen Alaskan outposts, Florida airfields that stand up to hurricane season year after year, and military bases in the sticky humidity of the Gulf coast. Each of these government properties has field equipment that needs to be protected, and we find that the personnel in charge of that equipment consistently turn to Shelter Works, over other fiberglass enclosure manufacturers, to protect their equipment in every environment.

Our U.S. military personnel discovered that Shelter Works' fiberglass enclosures provide the perfect level of protection from heat, UV rays and freezing temperatures. They recently asked us to build an equipment shelter for one such facility located in the high desert area of the Mojave, a remote location that stretches across the Southern part of California and Nevada and the western edge of Arizona. This shelter will replace an old dilapidated wooden structure that inadequately protected a water tank and pumping station at the remote site

The Mojave offers two temperature extremes. In the summer, the average temperature is 105° F, but there are times of the year when temperatures can push 125° F for several weeks in a row. In the winter, the temperatures can dip as low as 0° F depending on the elevation. In both seasons, the strong sun exposure makes UV rays an additional point of consideration when choosing proper field equipment protection. Shelter Works' exterior gel coats offer a UV coating that provides exceptional protection from hydrolysis, temperature, oxidation, and UV radiation. Our gel coats are applied as part of the manufacturing process for a more even, overall coverage than secondary UV coats that are sprayed on after production. Plus, our proprietary FiberBeam™ construction for this particular shelter includes 1.5" foam core that insulates and helps to retain equipment generated heat, protecting the pressure tank and electrical equipment from winter temperature lows.

*The technician who commissioned the project noted,
"We are very pleased with the shelter, as it met all our requirements. With its
25-year warranty, we expect it to last a long time and will definitely consider a
Shelter Works fiberglass equipment building the next time we need one."*

IT'S NOT AN IGLOO, IT'S A FIBERGLASS SHELTER

Did you know that our shelters are being used by the telecommunications industry? As a matter of fact, we provided some custom fiberglass buildings to be used as microwave repeater stations just south of the Arctic Circle. They protect equipment in a remote region of Ontario, Canada just off of James Bay, between the Albany and Moose Rivers. The area is so off the beaten path, it doesn't even have an official name. In order to find it on a map, you have to use it's latitudinal and longitudinal coordinates.

Given the extreme temperatures and harsh environment, our customer chose fiberglass over metal because our fiberglass buildings are:



STRONGER

Composite materials have the highest strength to weight ratio. With the use of our proprietary composite lamination process, FiberBeam™ Technology, our fiberglass buildings, pound for pound, are stronger than steel. This provides the structural integrity needed to withstand the heavy snow loads and winds commonly found in this area.



LIGHTER

When you compare the weight of a fiberglass building to that of a metal building of the same size, the fiberglass one will weigh considerably less. This calculates into cheaper transportation and moving costs as well as ease of on-loading and off-loading. This comes in handy when the costs associated with transportation are a concern. These shelters are located in a very remote area where there are no roads. Once they reached the rail yard in the closest town, they were loaded onto the back of a truck and traveled a man-made ice road to their final destination.



BETTER INSULATED

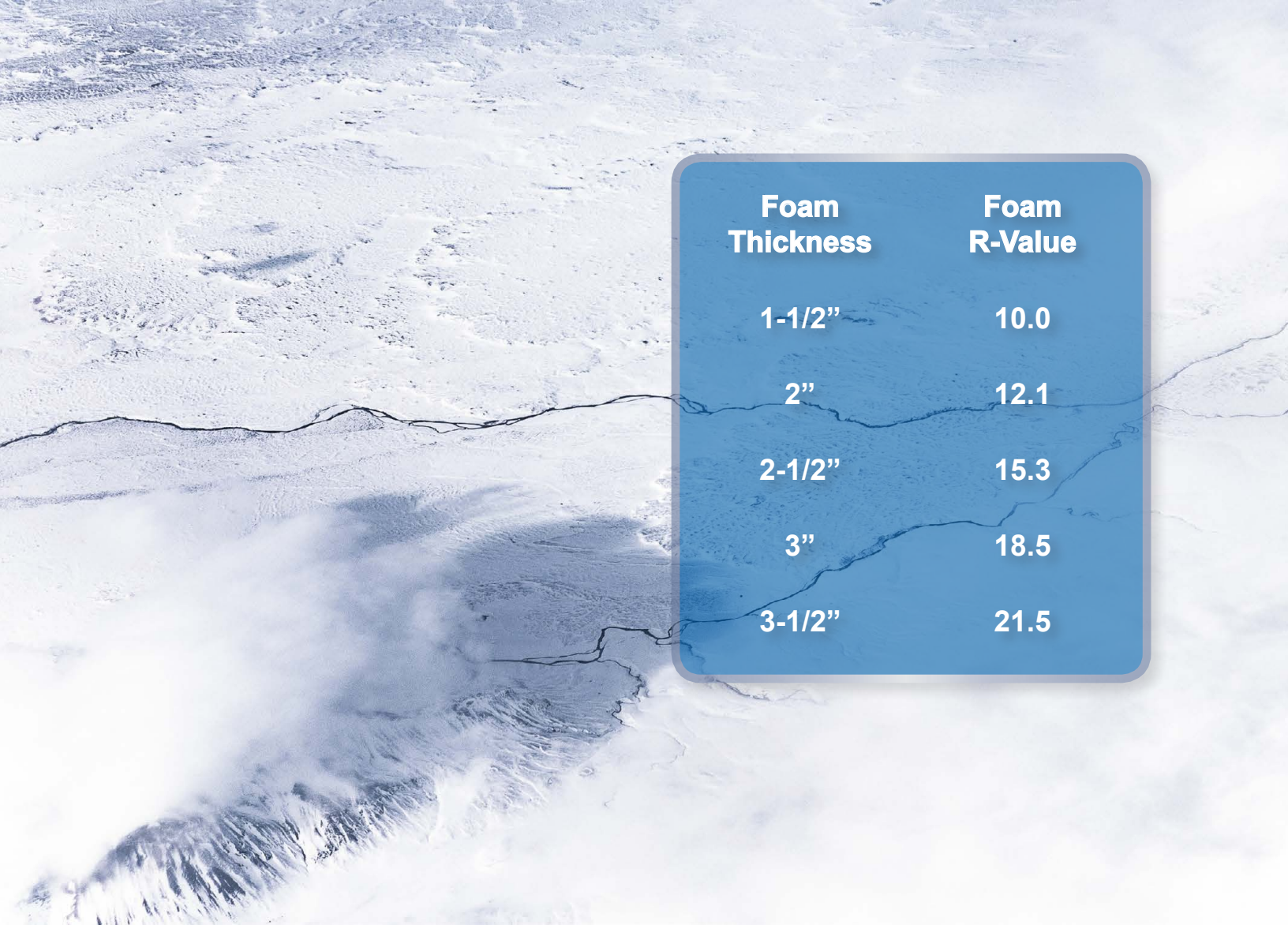
These shelters have custom 6" thick walls filled with foam insulation that provides for an estimated R-Value of 39. The average daily temperatures during the cold season, December through March, range from lows of -15 degrees F to highs of 16 degrees F. The average annual snowfall is 28 feet and a large portion of that snow will not even melt until the Spring thaw. Without thermal conductors like metal or wood studs, the walls on these shelters will keep the cold outside, where it belongs.



VANDAL AND CORROSION RESISTANT

In some parts of northern Canada, polar bears like to tear the siding off of metal buildings. Our shelters lack the seams to make that possible. Shelter Works buildings are better suited for harsh and damp environments because they will not corrode, rust, rot or decay, making them virtually maintenance free. They also come with our 25-year Warranty.





Foam Thickness	Foam R-Value
1-1/2"	10.0
2"	12.1
2-1/2"	15.3
3"	18.5
3-1/2"	21.5



CUSTOMIZATION

These shelters are multi-use and need a separate room to suit each purpose. We were able to split them into three sections by using partition walls. One room houses the telecom equipment and batteries for the shelter’s intended use as a repeater station. The second features wall mounted bunk beds to be used if and when a service technician’s helicopter is unable to depart due to inclement weather, while the third is for a generator room. Because there is no access to commercial electricity, these shelters will have to develop their own power by way of dual 48VDC generators which power a significant battery bank. The generators, located inside the shelter, are fueled by massive diesel tanks located on the outside. The diesel tanks need to supply enough fuel to last 3-4 months at a time.

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CUSTOM-SIZED DOORS AND COASTAL CODE REQUIREMENTS ARE NO PROBLEM FOR SHELTER WORKS

These were some of the challenges brought to us by a customer who needed electrical equipment shelters for a waste water treatment plant in Brownsville, TX.

There were three large buildings that had to be custom-made with oversized double doors measuring 6'4" wide by 8'2" tall that would allow the customer to bring large equipment into the shelter. Shelter Works is very accustomed to making custom modifications and was able to provide the doors to their special size requirements.

Because all three are within 1 mile of the Gulf of Mexico, they had to have wood embedded in walls, roof, and doors to meet coastal windborne debris code requirements. Furthermore, we had to provide air conditioners that were phenolic coated so that they would resist corrosion from the salt air.

All had to meet strict energy conservation rules ASHRAE 90.1 (2004) and International Energy Conservation Code (IECC – 2006). Our 3rd party Professional Engineering firm was responsible to ensure the shelters met these requirements with enough wall and roof insulation.

In addition to being energy efficient, these fiberglass buildings were cost effective and labor saving. *"In order to save time and speed up the installation, we switched from the original plan of doing a tilt-up concrete electrical equipment shelter to an FRP shelter,"* explains Paul Gilsdorf, Project Manager on the job.



"The functionality is just as good, and the maintenance of FRP is easier. By going with the Shelter Works structure, the roof maintenance is actually much lower."



PREFABRICATED FIBERGLASS BUILDING HOLDS UP IN ICE STORM

In addition to large pumping stations, there are many small pump houses that protect critical field equipment used in Fayetteville, Arkansas. One particular building protects a jet pump on a pneumatic tank at the bottom of the hill that allows water to flow to houses in a rural area of town.

During a large ice storm in 2010, a tree fell on the structure and damaged an antenna attached to the building. However, the structure itself didn't have a dent in it. *"As you can see, the building fared very well,"* said Aaron Watkins, Pump and Tank Technician for the City of Fayetteville. In addition, because the building had vents, city workers were able to put a generator into the structure so that water could continue to flow despite the power outage. For the municipal employees of the City of Fayetteville, the challenge was to keep citizens supplied with basic needs during this time of crisis. *"Even though many areas were without power for several weeks, no one went without water during that whole time,"* he explained.



While earlier buildings have been made of concrete, this shelter was specified as a prefabricated fiberglass building. When asked about why they chose a Shelter Works® fiberglass building, Watkins explained,

"These premade Shelter Works buildings save time and money. They are more cost-efficient to install and easier to maintain long-term. It saves tremendously on labor. Everything comes prewired; the electrical systems are already in place. Because everything comes included, you just hook it up and you're done."



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THE ONE THAT SURVIVED WAS BUILT BY US

In September of 2005, Hurricane Rita swept through Texas and Louisiana and caused over \$12 billion in damages. In the aftermath of this fourth-most intense hurricane, one of our representatives in Louisiana sent us these photos and said, *“The enclosure did not even have a ding on it, even though there was ample damage to houses, trees, etc. in the immediate area. You need to start claiming that your enclosures are ‘hurricane-proof’”*



Now we can!

While all Shelter Works® enclosures are designed utilizing our exclusive FiberBeam Technology™ and built to withstand Mother Nature at her most extreme, we previously hadn’t had them certified as such.

Now we do! In 2012, one of our customers had a need to have their Shelter Works fiberglass building rated to withstand 160 mph wind loads by an independent Professional Engineer in the State of Florida.

When hurricanes rip through a town, our customers need to have confidence that their critical field equipment is protected—even in a Category Five Hurricane.

When you need performance in the most extreme conditions possible, give us a call. Every Shelter Works enclosure is backed by the strongest guarantee in the industry to protect your critical field equipment.



SAFFIR-SIMPSON SCALE

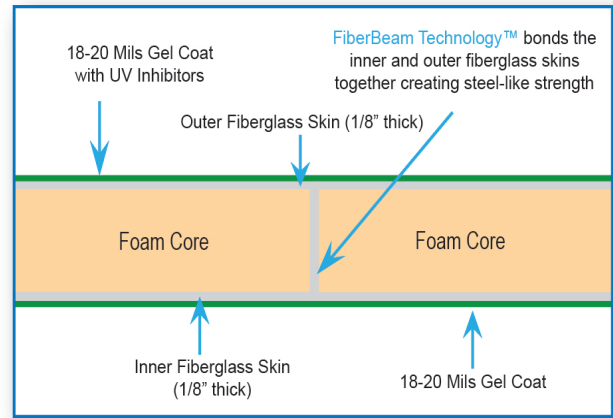
CATEGORY	WIND SPEEDS
Five	≥70 m/s, ≥137 knots, ≥157 mph, ≥252 km/h
Four	58–70 m/s, 113–136 knots, 130–156 mph, 209–251 km/h
Three	50–58 m/s, 96–112 knots, 111–129 mph, 178–208 km/h
Two	43–49 m/s, 83–95 knots, 96–110 mph, 154–177 km/h
One	33–42 m/s, 64–82 knots, 74–95 mph, 119–153 km/h
Tropical Storm	18–32 m/s, 34–63 knots, 39–73 mph, 63–118 km/h
Tropical Depression	≤17 m/s, ≤33 knots, ≤38 mph, ≤62 km/h



POUND FOR POUND STRONGER THAN STEEL WITH NO DELAMINATION

All of our fiberglass shelters and buildings use FiberBeam Technology, our innovative, proprietary composite lamination process that bonds inner and outer fiberglass skins with a series of integrated fiberglass I-beams. The beams are spaced every 12" throughout the walls, doors, and roof, resulting in a fiberglass composite building system that is equal to the strength of steel.

Foam is a great insulator but not a good structural material. That is why we developed FiberBeam™ Technology. When a typical FRP panel with foam core is placed under a load, the bond between the foam and the FRP is put under stress and can fail. With FiberBeam™, the same panel is more rigid and can withstand much higher stresses without any bowing or buckling.

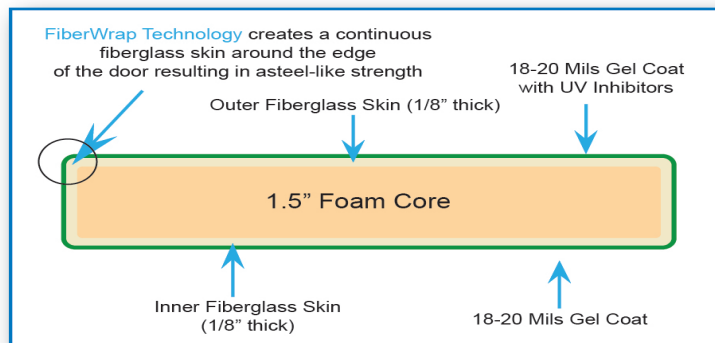


DID YOU KNOW... OUR PROPRIETARY DOORS CARRY THE ASTM E330 CERTIFICATION?

Our doors are made with our unique FiberWrap™ technology and are designed to withstand the pressures and forces found in tornadoes and hurricanes. In order to pass the ASTM's test, the door had to be able to sustain forces up to 150% of those you might experience in such a natural disaster. Shelter Works FiberWrap™ doors passed with flying colors.



We believe that the quality of our doors—from the base construction to the hardware to the gelcoat used for its durable finish—is important and expresses the quality of our entire building. It is the part of the building that experiences the most wear and tear, so it's important to us that it is as strong as we can make it.



HEAT, HUMIDITY AND FISH IN YOUR EQUIPMENT SHELTER? NO PROBLEM!

Alabama is hot and humid and along the water's edge, it's even worse. That's why the US Department of Agriculture specified Shelter Works to make another equipment enclosure to protect dozens of aquariums at an Alabama research facility. The equipment shelter, which houses 10-12 large tank aquariums in each structure, sits on the property with many other buildings with similar functions. The old building was constructed primarily of wood and was deteriorating in the high humidity environment.

The USDA conducts disease and pesticide research that is helping fish farmers to be more productive. When asked why the Shelter Works prefabricated buildings are specified and what about them is appealing, general contractor Mike McGinty of ETD Services explains,

"Shelter Works is building a product that my client is happy with. Customer satisfaction is what we're providing. Shelter Works delivers a fully operational building that is within the client's budget. That's what they need and that's what they're getting. Shelter Works is easy to do business with, and that's why the USDA keeps coming back to them."

Equipment for the interior of the shelter



Shelters to be replaced



New Shelter



SHELTER WORKS AND FLAME TESTING



The Freedom Series fiberglass buildings from Shelter Works also offer roof coatings that are ULC S107 Class C and ASTM E108 Compliant. In the first quarter of 2014, an independent testing agency ran tests on Shelter Works roof materials, proving our “Class C” designation. The series of tests included:

SPREAD OF FLAMES TEST

This test measures how quickly the fire spreads when a fan blows a flame onto the roof material for a sustained amount of time

INTERMITTENT FLAME TEST

This is similar to the Spread of Flame test but exposes the flame to the roof material on an intermittent basis, exposing it, then stopping, then exposing it, then stopping.

BURNING BRAND TEST

This test puts a combustible material on top of the roof to see what difference that makes on the test

In all cases, it passed for the “Class C” designation and in all three tests, there was no flaming of the underside of the deck.

What does this mean?

It means that all Shelter Works’ roof panels

- Are Certified “Class C” roofing material, compliant in standard testing against light fire exposures and are not readily flammable.
- Afford a measurable degree of fire protection to the roof deck.
- Do not slip from position and are not expected to produce firebrands, flying burning materials that continue to flame or glow after they have reached the floor.

These certifications may be required in projects where the environment has the potential for fire hazard. Rest assured that these gel coats have been tried, tested and certified.

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TELECOMMUNICATIONS SHELTERS IN THE ARCTIC

Ten miles outside of Anchorage, Alaska, there sits one of Shelter Works' telecommunication shelters, protecting an 8000-pound battery plant, relay racks, cable trays, fiber optic cables and coax cable as well. GCI Communications Corporation is the largest telecom carrier in Alaska, providing wired phone service, cell phone, Internet, Cable TV and data systems for the vast state of Alaska. They reached out to Shelter Works to meet their very exact specifications for a custom-engineered telecom shelter.

GCI Communications Corporation maintains a facility that handles telephone, cable, wireless and internet services throughout the state of Alaska. This telecommunications shelter is co-located with a fire station and a natural gas pump station and needed a fiberglass telecom shelter to protect the telecom equipment that could meet special requirements in terms of functionality, protection from the Alaskan weather, integration equipment, and finally, color.

FULLY INTEGRATED TELECOMMUNICATIONS SHELTER



"We were looking for a fiberglass telecom shelter that was aesthetically pleasing, built for Alaskan winters, and included an integration package all in one. I wanted one-stop shopping. I didn't want to get a building and then have to hire separate contractors for all the integration work that needed to be done. I've done that before and it slows everything down, is hard to manage, and isn't very cost- or time-efficient. I did not want to go down that road again, so when I found that Shelter Works makes custom telecommunications shelters, I was happy," explained Geoffrey Pamplin, Facilities Engineer for GCI Communications Corp.

He went on to explain, *"In addition to the integration work, we wanted a custom shelter in a certain color. The existing natural gas pump*

station that sits next to this telecom equipment shelter was a particular yellow color. People involved with the project wanted to match this color in order to maintain a pleasing aesthetic." It was easy for Shelter Works to include a custom gel coat in the development of the building; Pamplin worked with staff members to match the exact color using paint swatches.





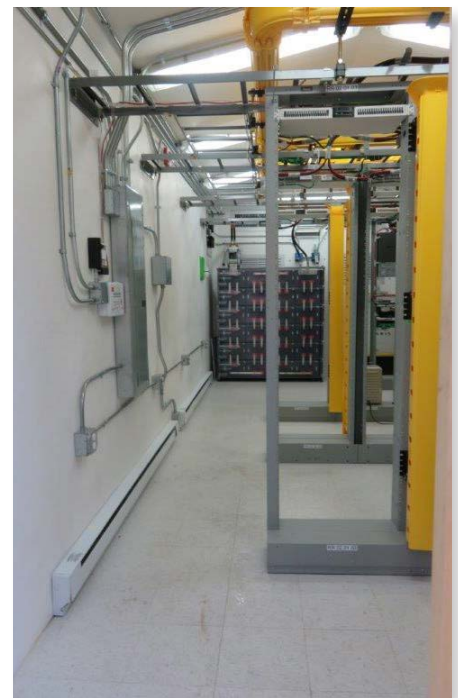
The floor structure was another challenge that needed special attention. The significant 8,000 pound weight of the battery plant required a weight distribution plate and an intricate reinforcement structure under the back three feet of the floor to accommodate 1500 pounds per square foot. In Alaska, they do not use concrete slabs for such projects for two main reasons: frost heaving is prevalent with such extreme winters, and if you need to add any additional floor penetrations, it is impractical to bore through the concrete. At its coldest, the facility can sustain several weeks of -20 degree temperatures and up to 2-3 feet of snowfall per day. For those servicing the equipment, they cannot afford to have the cold penetrate these telecommunications shelters, so proper insulation in the floors, walls and roofing is a must. These factors, combined with the need for a rodent guard on the bottom, posed no problem for the engineers at Shelter Works. The entire building has a full vapor barrier with no thermal bridges. Unlike any other telecom building manufacturers, this feature is unique to Shelter Works and comes standard with their composite design. In addition, there is a thermal barrier in the floor to isolate sub-zero temps from transferring from the steel base through to the interior floor.

While most of the snow is very dry due to the low temperatures, the spring snow can be quite wet and heavy, so the roof had to be developed in such a way as to handle 125 pounds of snow per square foot.

WEATHER-WISE TELECOM SHELTER

All weather conditions need to be factored into all Shelter Works telecommunications shelters. While summer temperatures only reach 65-70 degrees, it can seem so much hotter. The intensity of the continuous sunlight caused by the tilt of the earth towards the sun in summer, along with the heat generated by the equipment, means that multiple air conditioning units are also needed. A fire alarm and a free air cooling system can also operate off of the direct current battery plant in the event of a loss of power to ensure continual functionality.

The electrical requirements of such a telecom shelter are quite extensive, with relay racks that hold 500 pounds of equipment, cable trays, fiber optic jumpers, Ethernet cables, multiple air conditioning units and other integration necessities.



FIBERGLASS BUILDING INSTALLED IN THE REDWOOD FOREST

Because of our high-quality construction, Shelter Works is setting the standard for critical equipment protection to the California Department of Parks and Recreation.

Hasmet Celik, from Celik Engineering Corporation, had to overcome a host a construction challenges in protecting the potable water treatment equipment in the very popular Williams Grove Day Use Area of Humboldt Redwoods State Park which is located 225 miles north of San Francisco.

The 1960's-era shanty that was previously protecting the equipment was deteriorating, and the engineers in charge were looking for a more secure solution. "The area gets a great deal of traffic, both from people and from mountain lions, deer and other wildlife," Celik explained. "The decision-makers for this project chose Shelter Works' superior design to provide a more secure structure that would also protect against vandalism and vagrancy."

Another reason the design engineers specified a Shelter Works structure is the superior construction of the walls. It was easy to drill and anchor equipment to the walls using Unistrut.

The real challenges were with installation:

SPOTTED OWL MATING SEASON



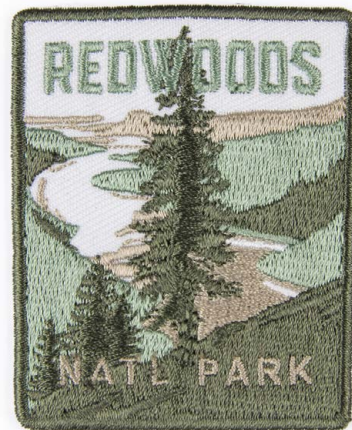
Because this is a protected area where spotted owls mate, the window of time for installation is very short (September 16-January 30). This falls in the rainy season, which makes the steep slopes very slippery and soil erosion an influencing factor.



ONLY WHEELBARROWS ALLOWED



The access way is one single trail where construction equipment is not allowed. The trail leads foot traffic directly on top of some exposed redwood tree roots that would be damaged if any construction equipment were used.



OTHER ENVIRONMENTAL CONSIDERATIONS



Celik and his team worked closely with environmental experts to determine the best way to install. With assistance from the local fire crew (who are inmates at the local prison), they were able to lower the building down from above, using the slope and some strategically placed branches to help slide the structure down the hill. "Because it was so lightweight and was sliding on organic matter (rather than on the soil itself), the building didn't get damaged—much to our surprise," Celik explained. "This shelter worked really well. We were worried that when we tipped the building on its side, the building might collapse, but it was so well built that those fears were totally unfounded."

HIGHWAY LANE CLOSURES NEEDED



They had to close lanes of the highways to accommodate the crane used to position the building. "Fortunately, it took less than a day to install because the shelter was well-built, durable and all ready to go," Celik reported.



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