

STATE OF VERMONT Division for Historic Preservation VERMONT ARCHITECTURAL RESOURCE INVENTORY Individual Property Survey Form	SURVEY NUMBER: (Assigned by VDHP)
	Listed in State Register ☐ Eligible for State Register Yes ☐ -or- No ☐ Date:
	PRESENT FORMAL NAME: Quonset Hut / Town Garage
	ORIGINAL FORMAL NAME: U.S. Navy Steel Arch Rib Utility Building
COUNTY : Caledonia	PRESENT USE: Garage and Storage
TOWN: Hardwick	ORIGINAL USE: unknown
ADDRESS: Creamery Street, Town Garage Complex	ARCHITECT/ENGINEER: U.S. Navy Department Bureau Yards and Docks
COMMON NAME: Quonset Hut / Town Garage	BUILDER/CONTRACTOR: unknown
PROPERTY TYPE: U.S. Navy Steel Arch Rib Utility Building.	DATE BUILT: c.1944
OWNER: Town of Hardwick ADDRESS: 20 Church Street, Hardwick VT 05843	
ACCESSIBILITY TO PUBLIC: Yes ☒ No ☐ Restricted ☐	PHYSICAL CONDITION OF STRUCTURE: Good ☐ Fair ☒ Poor ☐
	STYLE: Quonset Hut/Steel Rib Arch Utility Building
GENERAL DESCRIPTION: Structural System: 1. <u>Foundation</u> : Stone ☐ Brick ☐ Concrete ☒ Concrete Block ☐ 2. <u>Wall Structure</u> a. Wood Frame: Post & Beam ☐ Plank ☐ Balloon ☐ Platform ☐ b. Load Bearing Masonry: Brick ☐ Stone ☐ Concrete ☐ Concrete Block ☐ c. Metal: Iron ☐ Steel ☒ d. Other: 3. <u>Wall Cladding</u> : Clapboard ☐ Board & Batten ☐ Wood Shingle ☐ Shiplap ☐ Novelty ☐ Asbestos Shingle ☐ Aluminum Siding ☐ Asphalt Shingle ☐ Vinyl Siding ☐ Brick Veneer ☐ Stone Veneer ☐ Other: Corrugated Sheet Metal 4. <u>Roof Structure</u> Truss: Wood ☐ Iron ☐ Steel ☒ Concrete ☐ Other: 5. <u>Roof Covering</u> : Slate ☐ Wood Shingle ☐ Asphalt Shingle ☐ Sheet Metal ☐ Built Up ☐ Rolled ☐ Tile ☐ Standing Seam ☐ Other: Corrugated Sheet Metal 6. <u>Engineering Structure</u> : 7. Other:	
Appendages: Porches ☐ Towers ☐ Cupolas ☐ Dormers ☐ Chimneys ☐ Sheds ☐ Ells ☐ Wings ☐ Bay Window ☐ Other:	
Roof Styles: Gable ☐ Hip ☐ Shed ☐ Flat ☐ Mansard ☐ Gambrel ☐ Jerkinhead ☐ Saw Tooth ☐ With Monitor ☐ With Bellcast ☐ With Parapet ☐ With False Front ☐ Other: Steel Arch Rib Framed Semicylindrical Building	
Number of Stories: 1 Entrance Location: East Bulkhead Number of Bays: 1 x 8 Approximate Dimensions: 40' x 80'	

ADDITIONAL ARCHITECTURAL OR STRUCTURAL DESCRIPTION:

The c. 1944 Hardwick Quonset Hut/Steel Arch Rib Utility Building was purchased by the Town of Hardwick in 1946 for use as a Town Garage. Although commonly referred to as the Quonset Hut, the Hardwick building is more accurately described as a Steel Arch Rib Utility Building, a larger version of the well-known Quonset Hut. The Hardwick Utility Building is now one of five buildings that make up the Hardwick Town Garage complex. The five buildings occur linearly, west to east, along Creamery Street and immediately north of the railbed of the former St. Johnsbury and Lake Champlain Railroad, now the Lamoille Valley Rail Trail. Four of the buildings are located on the north side of Creamery Street, three of which are owned by the Town of Hardwick. These include the western-most c. 2015 Cold Storage building, the Utility Building/Town Garage and the larger Town Garage building that was erected in 1972. The fourth building houses and is owned by the Hardwick Rescue Squad and was constructed in 1982. The eastern-most of the five buildings on Creamery Street is the 1926 former Hood Creamery or milk filling station. Located on the south side of Creamery Street and within the rail trail right-of-way, the former Creamery is owned by the State of Vermont and leased to the Town for miscellaneous storage, including road salt which is stored in the east end of the building. The Hardwick Downtown Historic District, which was listed on the National Register in 1982, occurs immediately south of the rail bed and extends along the length of Creamery Street and along both sides of Maple Street/Slapp Hill, east of Creamery Street.

The standard-design Hardwick Utility Building is a single-story, rectangular, 40' by 80' semicylindrical structure; the radius of the arch/height of the building is presumed to be 20', based on available Erection Manuals (U.S. Navy Seabees Museum). The building is supported on a poured concrete wall of unknown depth and oriented so that the 40' elevations are east and west facing. The 80' long elevations are built of steel I-section arch rib framing and sheathed with factory-curved, vertically-oriented sheets of corrugated metal. There is no structural distinction between wall and roof on the arch-framed elevations. The shorter end walls or bulkheads exhibit steel stud wall framing and are sheathed with flat sheets of horizontally-oriented corrugated metal. The corrugated sheathing is attached with what appear to be spring head nails with steel or fiber washers.

The south facing elevation is defined by two groups of four approximately 3'-1" x 4"-7" window openings. Each group is centered in one-half of the elevation. Each opening is filled with a two-part metal window. The upper part is a four-light window that is side-hinged to open as a louver. The bottom part is a two-light fixed window. The windows' individual lights are horizontally-oriented. Each window header is flashed with sheet metal that is tucked under the corrugated sheathing above the opening. The bottom of the header flashing is formed to flair out as a narrow shade over the window. The sills, which are approximately 36" above the ground, are similarly flashed. The flashing covers the sloping wood sills and bends to extend approximately 4" over the corrugated sheathing below the openings. The fenestration pattern across the elevation is enhanced by the juxtaposition of the flat window units set into the curve of the arch rib framing and corrugated metal sheathing and by the effect of light as it reflects off the glass.

The semicylindrical east elevation or bulkhead features a centered garage bay opening and a man door located in the southern corner of the wall. Approximately 6' of the wall surfaces that flank the garage bay opening are sheathed with vertically-oriented boarding rather than corrugated sheeting. The height of the poured concrete foundation wall steps up under the vertically-boarded sections of east wall, where two courses of concrete block have been added. The garage opening is filled with a metal overhead garage door; the man door is made of a single piece of fiber board. The joint or intersection of the vertical bulkhead frame and the arched frame is covered with overlapping pieces of crimped flashing. The crimped flashing is tucked under the curved arch sheathing and overtop of the flat bulkhead sheathing. A rectangular metal louver is centered near the top of the wall. A wide piece of sheet metal flashing located immediately above the garage bay opening stretches across the entire width of the elevation and tucks under the crimped

flashing at the edges of the wall. A non-historic, 3-sided, board and batten shed has been built in front of the east wall, north of the garage bay. The shed spans the north portion of the wall but is not physically attached to the Utility Building. The shed provides cover over a gasoline pump.

A historic photo taken c. 1952-53 (based on the model years of the trucks in the photo) shows an earlier and likely the original appearance of the Utility Building. The east bulkhead featured a double-wide garage bay opening filled with four sliding wooden doors. The doors were held on a wall-mounted track that extended out beyond the 40' wide elevation. Otherwise, the east elevation was solid, without a man door or louver. The south elevation has not been altered.



Photo 1. . View NW, c. 1952-53, showing the east bulkhead and south elevations. Photo courtesy of the Hardwick Historical Society.

The alterations that resulted in the current appearance of the east bulkhead were made prior to 1993. A photo taken c.1993 shows that the width of the wide garage bay had been reduced by the construction of wooden stud walls sided with vertical boarding on both sides of the original opening. The track that held the four sliding doors was also removed.



Photo 2. . View NW, c. 1993. The opening on the east bulkhead has been reduced in width by the construction of wooden stud walls sheathed with vertical boarding. The opening is now filled with an overhead garage door. The upper corner of the added man door is also visible in the photo. The date of the added louver is unknown. Photo courtesy of the Hardwick Historical Society.

The 80' long north elevation is solid. Several arched ribs and pieces of corrugated sheathing have been bent and/or detached at the west end of the elevation. This damage was reportedly caused when road sand, which is stored behind the Utility Building, was dumped against the building.

The arch-shaped west bulkhead exhibits a single four-light over two-light metal window in the southern half of the wall that matches the windows in the south elevation but is without header flashing. The single window also occurs a bit higher in the wall than those in the south elevation. The otherwise solid wall includes clear evidence of a former centered, wide opening that has been infilled with corrugated metal. The opening appears to have been the same height as the opening in the east bulkhead. Unlike the corrugated sheathing elsewhere on the building, the patch in the west wall is attached with common nails without washers. It also appears that subsequent to the infill, paired windows were let into the patched area just north of center. The windows have been removed but the openings indicate that the paired windows were taller and narrower than the original windows. The openings are now filled with some sort of fiber board; the metal sill flashing, which is still in place, does not match the sill flashing associated with the other windows in the Utility Building. At some point a portion of the corrugated metal at the bottom south corner of the patch was cut out; the hole in the metal is filled with fiberboard. A small shelf supported on wall brackets is mounted near the top of the west bulkhead.

The west bulkhead includes the same crimped flashing at the joint between the west stud frame and the steel arch framing. The louver at the top of the wall is larger than the east bulkhead louver and may be

original because it matches a louver style shown in several Erection Manuals (U.S. Navy Seabees Museum). The north and south corners of the west bulkhead have been damaged by apparent impacts.

The interior of the Hardwick Utility Building is open in plan and without any interior finish. The steel arch rib and bulkhead stud wall frames are exposed, as is the underside of the corrugated metal sheathing. The floor is dirt. Rough boards have been attached to the lower portion of the arch framing for the length of the south elevation; the boards extend from the steel channel plate or sill to approximately 28" above the level of the wooden window sills. Similar boarding has been randomly attached to some of the arch framing on the north elevation. The boarding was presumably installed to protect the framing from impact. A horizontally-oriented wooden frame that is suspended above the floor level extends the length of the interior space; the ends of the frame are supported on the header above the east bulkhead door and the header above the former opening in the west bulkhead. The suspended frame is also supported along its length by 2 x 4s nailed to the wood frame and to each steel rib above. The frame was apparently constructed to support the added overhead garage door. An electric breaker box that appears to date from the mid-20th century is mounted on the east bulkhead wall, north of the man door. A large gasoline storage tank that supplies fuel to the gas pump in front of the east bulkhead stands in the northeast corner of the interior. An assortment of materials and supplies has been stacked near or against the walls, especially the west bulkhead, making them difficult to access. Otherwise, the space remains unincumbered. The damage to the western end of the north elevation is quite evident on the interior, where some of the framing members are bent and corrugated sheathing is missing. There is also damage to framing at the south corner of the west bulkhead. Some Town vehicles are housed in the building.

The arched ribs, purlins and studs with which the Hardwick Utility Building was built appear to exhibit H or I-section shapes but it is evident that those members were not fabricated or rolled as that shape. There is a very clear joint or groove in the middle of each flange that runs the length of the member. It appears that the ribs, purlins and studs are made of two deformed channels joined back to back. The channel webbing of those members is not flat but was rolled with a curved or W-shape. The W-shape of the webbing is quite evident along the length of the ribs, despite 79 years of rust and dust. The visual characteristics of the ribs, purlins and studs are consistent with a unique framing design developed in the 1930s by Stran-Steel, a division of Great Lakes Steel Corporation.

The steel arch rib frame of the north and south elevations incorporates twenty-one 6", I-section ribs that are screwed to a 6" channel plate at 4' on center. The 21 ribs enclose twenty structural bays. Each rib is apparently assembled from three sections but the splice plates are nearly impossible to decipher because of they occur above the added framing associated with the overhead garage door. One splice plate is visible on the second or third rib in the southwest corner of the building, another is visible in the middle of the south elevation. The arch frame also includes 2- 5/16" I-section purlins which run horizontally for the length of the building, resting on each rib and presumably screwed to the outside or top flange. The number of purlins is unknown because the added wood framing blocks the view of the upper third of the steel arch frame. There are four evenly-spaced purlins on the visible portions of the north and south elevations; it is likely that there are also purlins at the bottom of these elevations, now hidden by the added boarding and the accumulation of material.

Each purlin/rib connection is stabilized by two pieces of 1" plate steel that appear to wrap around the arch rib. In fact, each piece is nailed into the groove between the purlin channels and into the inside or bottom groove between the rib channels. The steel arch rib frame also incorporates standard cross bridging which is centered between the purlins and provides lateral stability. The cross bridging, which is made of 1" angles, is generally nailed into the grooves between the rib channels, although some of the bridging appears to be nailed to a flange.

Boarding, possibly 1 x 6s, runs parallel to and at the height of the two purlins immediately below the added wooden frame. The boards are nailed to the bottom flange of each arch rib at the rib/purlin intersections and extend nearly the length of the Utility Building. The boarding carries electrical conduit that appears to emerge from the breaker box on the east bulkhead wall. Several lighting fixtures are also mounted on the boarding. Sections of the boards are broken and dangling from the points of attachment indicating that the lighting system is no longer working.

The stud wall framing of the east bulkhead reveals the width of the original wide bay opening. Each end of the wall exhibits two metal-framed bays defined by two I-section studs. Wooden stud walls sheathed with plywood have been added between the metal framing and the existing garage bay opening. The wooden stud walls rest on the two courses of concrete block that increase the height of the original poured concrete foundation wall.

The stud wall framing of the west bulkhead appears to be intact and includes four bays defined by four I-section studs on each side of the original wide opening. The interior bays that flank the former opening are significantly narrower than the other stud bays. The limited number of girts and the header above the door opening are difficult to see but appear to be channels. A wooden frame has been added within the original opening. The wood posts are attached directly to the metal studs that framed the opening. The wood header or lintel is several inches below the original metal plate. The wood frame may have been added to provide a nailing surface when the west opening was infilled.

RELATED RESOURCES ON THE PROPERTY: Former Hood Creamery / Milk Filling Station

HISTORICAL OVERVIEW:

The United States began preparations for its imminent involvement in the Second World War several years before the attack on the U.S. Naval Base at Pearl Harbor in December 1941. Preparation, or mobilization, for each branch of the military included the procurement and distribution of supplies, including food, clothing and shelter for military personnel, production of war materials and construction of military facilities, many of which were considered as temporary (Garner, 11). The Bureau of Yards and Docks was the Navy department responsible for those duties at the time.

The use of temporary military buildings and facilities was not unique to World War Two. Specific building types constructed in response to a national emergency and deemed to be expendable following the conclusion of the emergency were first used during the Civil War. The Union Army used standard frames for large tents; standardized plans for temporary wooden barracks were introduced in 1864 (Ibid, 20).

As part of the World War Two mobilization effort, Congress approved increased appropriations for the Navy which in turn recommended the construction of twenty-two new bases in the U.S. and overseas (Decker, 1). One of the new facilities was the Quonset Point Naval Air Station in North Kingstown, Rhode Island. The Bureau of Yards and Docks contracted with the George A. Fuller Company of Chicago to build the facility; construction began in 1940. The Fuller Company, one of the largest construction firms in the country at the time, was also involved in the building of a number of architecturally significant 20th century structures, among them the Lincoln Memorial and U.S. Supreme Court, and after the war, Sidmore Owings and Merrill's Lever House and Mies Van der Rohe's Seagram Building.

In 1940 the U.S. and Great Britain signed the Destroyers for Bases Agreement which provided England with 50 much-needed World War One destroyers in exchange for 99-year leases of a number of British air and naval bases in the Caribbean and Newfoundland. The following year Congress passed the Lend Lease Act which allowed the United States to lend or lease military supplies to any nation whose defense was

considered critical to the defense of the U.S. In exchange for supplies, Britain transferred ownership of four properties in North Ireland and Scotland to be developed by the U.S. as forward bases (Decker, 2).

That same year the Navy initiated a program to design, mass produce and ship prefabricated, demountable buildings in which to house U.S. troops sent to the new forward bases in the British Isles and elsewhere. The work to design and produce the portable buildings as well as to construct a facility in which to manufacture them was added to the George A. Fuller Company's contract for the construction of the naval air station at Quonset Point. The manufacturing facility, the Davisville Naval Construction Battalion Center, was built adjacent to the Quonset Point Naval Air Station. The location provided direct access to the railroad for receiving and shipping in the continental U.S and to the pier at Quonset Point for shipping abroad.

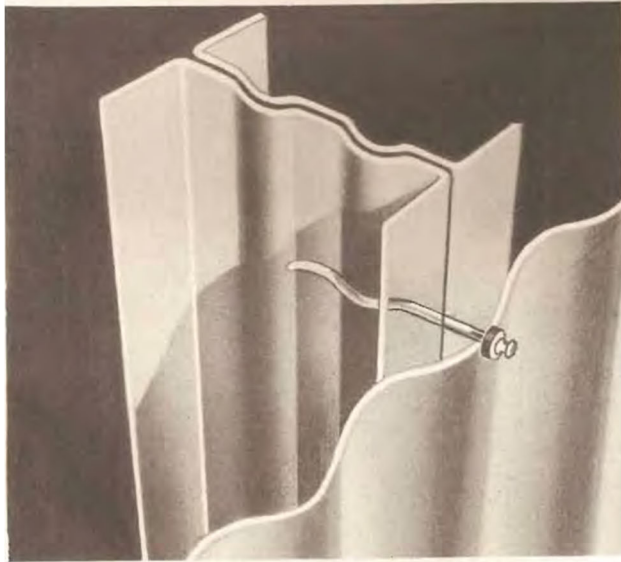
A team of four Fuller employees lead by architect Otto Brandenberger was assembled to design the new building which was to be based on the semicircular, corrugated metal-sided, Nissen Bow Hut used by the British in World War One. The semicircular shape of the Nissen Hut was the starting point for the hut to be designed at Quonset Point because it provided added strength and could deflect shell fragments. The design team was also instructed to develop a simple prefabricated structure that could be easily assembled by unskilled labor (Ibid, 6).

The first design was produced by the Fuller team in May of 1941. The 16' x 36' Standard Hut, later identified as the Quonset T-rib Hut, was built of arched ribs made of three T-sections and sided with corrugated sheet metal. Vertically-oriented corrugated siding was specified but the process of bending corrugated metal was difficult, especially in the quantity required for mass production. Anderson Sheet Metal Company of Providence, Rhode Island, a sub-contractor to the Fuller Company, developed a process of rolling the corrugated sheets to achieve the required curved shape. The interior walls of the new huts were insulated and finished; the floor was wood. Production of the T-rib Huts began before the final plans were officially approved and even before the manufacturing facility was completed. The first prefabricated huts were shipped overseas in June of 1941, attesting to the urgency of the mobilization effort (Ibid, 9). Shipments to bases in the U.S. began soon thereafter. The Bureau of Yards and Docks officially named the new design the Quonset Hut to distinguish it from its predecessor, the Nissen Bow Hut, in July of 1941 (Ibid, 13).

Almost simultaneously the design of the T-rib Hut was modified to accommodate an initial forty-one uses in addition to shelter, such as laundry, hospital and barbershop (Ibid). Modifications included the addition of windows in the arched elevations, interior partitions and a variety of furnishings and equipment. The plans were also amended to improve the livability of huts to be sent to the tropics and to cold climates. Reportedly, the Fuller Company had designed and produced approximately 8,200 T-rib Quonset Huts at the Davisville Naval Construction Battalion Center by the end of 1941 (Ibid, 16).

The production of specialized huts made it clear that interior partitions, furniture and equipment resulted in significant unused space because of the curve of the arch ribs. In response the Fuller team produced a new design, the Quonset 16' x 36' Redesign, which replaced the original semicylindrical form with 4' vertical side walls capped with an arched roof built with two-section ribs.

A second significant design change was the use of Stran-Steel framing members. Stran-Steel, a division of the Great Lakes Steel Corporation, had developed the unique framing system in the 1930s. The Homes of Tomorrow exhibit at the 1933 Chicago World Fair featured a house constructed with a Stran-Steel frame. The system incorporated two light-weight, deformed C channels, spot welded back to back to form I-sections that were used for ribs, purlins and studs (*U.S. Navy Quonset Hut*). The webs of the channels were formed with a W-shape that when welded together created a curving joint or groove. Nails, when driven into the nailing groove, would become deformed and therefore tight and secure. The nailing groove eliminated the need for many of the bolt connections required for standard steel framing at the time.



PHANTOM VIEW SHOWING NAIL IN NAILING GROOVE

THE STRAN-STEEL NAILING GROOVE

The distinctive feature of Stran-Steel is the nailing groove. This groove is in all Stran-Steel joists, arch ribs and studs, which are made by welding two pieces of steel together. The small space remaining between these pieces is just large enough to admit an ordinary nail. When a nail is driven into the groove, it is deformed and clinched in a grip of steel with a holding power much greater than that of wood. In this manner collateral materials are secured to the steel framework with the ordinary hammer-and-nails method. Construction in which Stran-Steel framing is used proceeds in the same way as with ordinary framing. Dimensions of Stran-Steel members conform exactly to the requirements of the collateral materials used with it.

Snip taken from " 'Erection Instructions for the U.S. Navy Steel Arch Rib Utility Buildings' Manufactured for Navy Department Bureau of Yards and Docks by Stran-Steel Division of Great Lakes Steel Corporation, Design November 1944".

Stran-Steel framing had been used to build additions to some Quonset T-rib Huts but was specified on the plans for the 16' x 36' Quonset Redesigns by late 1941 (Ibid, 17). The corrugated sheet metal sheathing was attached with double-headed nails driven by hand into the nailing grooves of the purlins. Standard plans for a larger, 24' wide Redesign that could be assembled in varying lengths, apparently up to 60', were also introduced.

The United States and Great Britain declared war on Japan on December 8, 1941; three days later Germany declared war on the U.S. The Bureau of Yards and Docks immediately authorized funding to procure additional equipment and materials for shipment to advanced bases. Orders for Quonset Huts also increased dramatically. The factory at West Davisville was enlarged and a second adjoining factory was soon built but the manufacturing facilities at Quonset Point were ultimately unable to keep up with demand. In February 1942 the process began to phase out production of the huts at Quonset Point; production was to be transferred to civilian manufacturers. Within a few months the Navy and the George A. Fuller Company subcontracted the design and production of the huts to the Stran-Steel Division of Great Lakes Steel Corporation, Detroit, Michigan (Ibid, 23). Reportedly, the Fuller Company produced 32,352 T-rib and Redesign huts at the West Davisville facility in less than two years (Ibid). The role of the Quonset Point Naval Air Station and the Fuller Company would again focus on purchasing, storing and shipping materials and equipment, including complete prefabricated Quonset Huts, to advance bases overseas and to bases in the U.S.

In March of 1942, the Bureau of Yards and Docks established Construction Battalions, or the Seabees, to replace civilian contractors who had built and supplied military bases outside the U.S. before the Second World War. The Seabees were predominantly carpenters and tradesmen in civilian life, many of whom received military training at Quonset Point. The Seabees were assigned the responsibility for not only assembling Quonset Huts but also building complete advance bases, roads, harbors, airstrips and more overseas. Civilian contractors would continue to build training facilities and naval air stations in the U.S. (Garner, 17).

The third and final significant change to the design of the Quonset Hut occurred after the Navy had contracted production to Stran-Steel. Titled the New Arch Rib Stran-Steel Hut, often abbreviated SSAR, but still referred to as Quonset Hut, the new building was designed in two sizes, 20' x 48' and 20' x 56'. The full semicircular, three section arch rib design was restored as elimination of the vertical walls of the Redesign reduced shipping weight and made assembly easier. Factory-curved, vertically-oriented, corrugated sheets were retained at the ridge of the Stran-Steel huts but the remaining wall surface was now sheathed with flat, horizontally-oriented corrugated metal. The use of flat metal reduced the production cost and made packing and shipping easier and less costly. By the end of the war, in September 1945, approximately 120,000 prefabricated Stran-Steel Quonset Huts, designed to be adaptable to at least eighty-six uses, had been produced and shipped worldwide (Decker, 24).

The three primary versions of Quonset Hut design accommodated many specific purposes but the 24' Quonset Redesign that could be expanded to 60' in length, production of which ceased in 1942, and the Stran-Steel 20' x 56' were apparently the largest huts initially available. Sources suggest that a much larger Quonset Hut, the 40' x 100' Steel Arch Rib Utility Building, was generally over time, in conjunction with the evolution of the three primary designs. The four Utility Building Erection Manuals available on the U.S. Navy Seabees Museum website are dated November 1944 (U.S. Navy Steel Arch Rib Utility Buildings), World War II (Arch Rib Utility and Storage Building), 1949 (Quonset 40 -Type A, plans dated 10/48) and 1950 (Quonset 40 Building). Although two of them were published after the war, as Erection Manuals, many of the working drawings, illustrations, photographs, options and narratives are common to all four, having been carried forward from earlier plans. Stran-Steel framing is the standard in each of the manuals but the use of factory-curved, vertically-oriented corrugated sheathing on the full arch is specified only in the 1944 *Erection Instructions for the U.S. Navy Steel Arch Rib Utility Buildings*. The other three manuals specify vertically-orientated corrugated metal only at the ridge. The two distinct patterns of corrugated sheathing suggest that 40' x 100' Steel Arch Rib Utility Buildings may have been manufactured by the George A. Fuller Company at Quonset Point and by the Stran-Steel Company in Michigan.

The Steel Arch Rib Utility Buildings, like the smaller versions of Quonset Huts, could be adapted for tropical or cold climates and modified to meet specific needs. They were typically built directly on the ground or on a gravel or concrete pad; the interiors were generally unfinished. Often referred to as Elephant Huts, the very large buildings could be assembled by ten men in less than 300 hours, weighted approximately 23,000 pounds, and required only 23 shipping crates and 383 cubic feet of shipping space (Anchorage Museum). The 1944 Erection manual included instructions for converting the 40' x 100' Utility Building, which was designed to be able to be enlarged in both directions, into a Multiple Utility Building of up to 100' x 102' (Ibid). Reportedly, 11, 800 prefabricated Utility Buildings had been manufactured by the end of the war and shipped to advance bases abroad as well as to the continental U.S. (Ibid).

When the war finally ended in September of 1945, the Navy no longer needed all of the more than 160,000 Quonset Huts and Utility Buildings that had been designed, fabricated and shipped worldwide in the course of only a few years. Viewed as temporary, most had served their purpose. But at the same time, there was a significant building demand in the U.S. The housing shortage was especially felt on college and university campuses because so many veterans were able to pursue higher education on the G.I. Bill. Many Quonsets and Utility Buildings that had been shipped to Europe were dismantled and shipped back to the U.S. to be auctioned or sold as government surplus (Colman, 3). The federal government gave federal agencies priority to bid on surplus property before it was auctioned to the public (Rogers, *Nissen and Quonset Huts*). Surplus Quonset Huts found new uses as dormitories and single-family residences on campuses. They were also auctioned or sold as temporary facilities for federal agencies as well as for more permanent municipal, residential, commercial and agricultural purposes. Surplus Quonset Huts provided much needed temporary housing but the semicylindrical form made use of the interior space difficult. The form was more conducive

for commercial, industrial and agricultural purposes. Surplus Utility Buildings were typically reused for commercial, industrial and agricultural purposes.

A number of private companies manufactured and sold Quonset-like, semicylindrical buildings to the government during the war, among them the Butler Hut, the Pacific Hut and the Armco Hut. Five Armco Ammunition Storage Bunkers were built at the Vermont National Guard's Camp Johnson c. 1941. Two of the historic Armco bunkers are extant (Sagerman, 1-2). Production of the Quonset-like buildings, and of the Stran-Steel Hut, continued for a time after the war. Contemporary semicylindrical buildings are still produced for agricultural and industrial uses.

Surplus Quonset Huts were apparently fairly common in Vermont for several decades following the war. Like elsewhere, the Vermont huts served many purposes; retail, storage, repair shops, homes and even a movie theatre (Colman, 1--2). A Stran-Steel Hut was reassembled on the UVM campus c. 1947. Initially used to house research animals used in medical experiments., it is now used for storage by the Geology Department (Ibid, 3). Many other Vermont Quonset Huts are no longer standing so that the property type is becoming increasingly rare.

The 1947 Annual Report of the Town of Hardwick featured a photograph of the "New Town Garage" on its cover. The Report also published the Town's expenses for 1946, the year the Town purchased the Utility Building. The purchase price was \$4136.75; the total price including labor and materials to reassemble the demountable structure was \$8409.65. Unfortunately, other Town Records from the period were apparently destroyed when the Town Offices were relocated. The *Hardwick Gazette*, *Burlington Free Press* and *Morrisville News and Citizen* did not report on the Town's accusation of the surplus Utility Building although each of the newspapers did publish articles about Quonset Huts reused as student housing as well as a variety of commercial uses in various locations. Further research may reveal information about the original location and use of the Hardwick Steel Arch Rib Utility Building.

Typically, a Steel Arch Rib Utility Building measured 40' x 100' but the standardized plans allowed for deviations. It is possible that the original dimensions of the Hardwick building may have been the existing 40' x 80'; it is also possible that the Utility Building may have been reduced in length when it was reassembled in its new location.

Details of the Stran-Steel frame of the Hardwick Utility Building are for the most part consistent with the framing plan illustrated in the 1944 Erection Manual, although there are several deviations. The 1944 manual shows evenly-spaced purlins around the circumference of the arch. The added suspended wooden frame in the Hardwick building blocks the view of the upper portion of the arch frame but the purlins lower in the frame are obvious. The other three Erection manuals show purlins only near the top of the arch. The 1944 plans do not include the standard cross bridging exhibited in the Hardwick Utility Building but the same bridging is shown in the WWII manual, which also shows solid bridging. The bulkhead framing appears to be consistent among the four manuals; the original east bulkhead framing of the Hardwick Utility Building is an exception. The manuals do not illustrate a similar framing option and the resulting double-wide garage bay opening but there is pictorial evidence that some Quonset buildings did feature comparable openings.



Photo from the website *U.S. Navy Quonset Hut, Weapons of Mass Construction*. Several of the Utility Buildings in the second row of the photo appear to have very wide bulkhead openings.

The working drawings in the four available Erection Manuals show windows only in the bulkhead elevations of the Utility Buildings, although the 1949 manual does include an additional plan sheet showing the installation of a window in an arch elevation. The windows shown in the 1944 manual are paired two-light windows. The manuals compiled in 1949 and 1950, subsequent to the initial assembly and 1946 relocation of the Hardwick Utility Building, include paired four-light over two-light bulkhead windows that appear to match the single window units in the arch-framed south elevation of the earlier Hardwick building. Reportedly, symmetrical installation of windows, and doors, in arch elevations were standard options in Utility Buildings after January 1945 (Rogers, *Nissen and Quonset Huts*).

The Seabees were well known for innovative modifications of Quonset Huts and Utility Buildings for specific geographical locations and climates and for a variety of uses. Presumably civilian contractors made similar modifications when deemed necessary. The standard design of Quonset Huts and Utility Buildings evolved very quickly, overlapping between 1941 and 1945, as did various options. The Erection manuals served as guidelines for assembly but cannot be considered final construction documents, which can account for discrepancies between information in an erection manual and an actual building. Additional deviations can occur when a standard, prefabricated building is dismantled and reassembling elsewhere for a new use.

The Hardwick Steel Arch Rib Utility Building is historically significant because of its direct association with the intense mobilization effort undertaken by the U.S. Navy in the lead up to and during World War Two. Its distinctive semicylindrical form and massing and unique framing are typical of thousands of prefabricated, demountable buildings designed and manufactured by and for the Bureau of Yards and Docks between 1941 and 1945. Its location and specific use in the war years have not been determined but its acquisition by the Town of Hardwick for \$4136.75 in 1946 supports the belief that it was one of many surplus military buildings sold by the federal government immediately following the war. The size of the building and various design

details suggest it was fabricated c.1944. its sale and relocation for use as a Town Garage occurred well over 50 years ago and is part of the historic evolution of the building. The relocation and new use of the Hardwick Utility Building is also typical of the many Quonset Huts and Utility Buildings that had served their original purpose during World War Two and were then reused to help meet new needs in the U.S. after the war.

The Hardwick Utility Building is also historically significant because so few were manufactured when compared to more than 150,000 smaller Quonset Huts produced in the same time period. The number of extant Steel Arch Rib Utility Buildings manufactured by the Navy in the mid-century is unknown.

The Hardwick Utility Building has architectural/engineering significance as a generally well-preserved example of a standard, prefabricated U.S. Navy Steel Arch Rib Utility Building designed and fabricated during the Second World War. The Hardwick building exhibits the distinctive semicylinder form, rectangular massing, steel arch rib framing and corrugated sheathing that are character-defining features of the standard design Utility Building as well as the various smaller versions of the U.S. Navy Quonset Huts.

The Hardwick building is 20' shorter than the 40' x 100' foot print of the "Basis Unit" illustrated in the 1944 *Erection Instructions for the U.S. Navy Steel Arch Rib Utility Buildings* but the standardized plans allow for incremental modifications.

The exterior appearance of the building was altered when the width of the original double-wide garage bay opening on the east bulkhead was reduced. The narrower garage bay opening was likely filled with an overhead garage door rather than sliding wood doors to improve operability in winter. The modifications of the front entry are important because the original double-wide opening may have been associated with a specific use of the building during the war. Available plans for Quonset Huts and Utility Buildings show the use of sliding wood doors in garage bay openings. The opening in the west bulkhead was not altered when it was infilled and the change can be considered to be reversible. Despite the alteration to the east bulkhead, the significant architectural features of the Hardwick Utility Building of form and massing are intact, as are most historic materials, including factory curved, vertically-oriented corrugated sheathing, crimped end-wall flashing and two-part steel windows.

Unique Stran-Steel framing was specified for Navy Utility Buildings and most Quonset Huts fabricated during the Second World War. The significant framing system has been retained in the Hardwick building. The alteration to the east bulkhead involved the construction of wood stud walls to narrow the double-wide opening but did not physically alter the Stran-Steel stud framing because the added wooden walls were built adjacent to the steel framing. The huge, open plan interior of the Utility building has not been altered.

The Hardwick Utility Building was removed from its original military setting over 50 years ago ; its setting in Hardwick is considered historic. Its integrity of association and feeling, with a Naval installation during the war and as a demountable and temporary building, changed with its relocation to Hardwick and reuse as a Town Garage. But despite the new location and new use, the utilitarian feeling of the building is unchanged. Its intact and legible form, massing and materials continue to convey the building's association with the efforts of the U.S. Navy during World War Two.

The Hardwick Steel Arch Rib Utility Building retains integrity of location, design, setting, materials, workmanship, feeling and association and therefore, appears eligible for listing in the Vermont State Register and National Register of Historic Places.

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SURROUNDING ENVIRONMENT: Open ☐ Woodland ☐ Scattered Buildings ☐ Moderately Built Up ☒ Densely Built Up ☐ Residential ☐ Commercial ☐ Agricultural ☐ Industrial ☐ Mixed Use ☐ Roadside Strip Development ☐ Other:	
RECORDED BY:	Mary Jo Llewellyn
ORGANIZATION :	Mary Jo Llewellyn Preservation Services
DATE RECORDED:	March 2025

ATTACHMENTS: Please insert maps and photographs here. Use additional pages if necessary.



Photo 1. Hardwick Quonset Hut/Hardwick Town Garage. View NW, showing the south and east bulkhead elevations. Available architectural plans for a Quonset Hut refer to the vertical, end elevations as bulkheads. The 8 windows in the south elevation are grouped so that 4 are centered in each half of the elevation.



Photo 2. New NW, showing the east bulkhead. The centered garage bay opening is flanked by narrow sections of wall sided with vertical boarding rather than horizontally-oriented corrugated metal. The man door in the south corner of the bulkhead is made of single piece of fiberboard. The non-historic shed-roofed structure north of the garage bay door covers the Town Garage gasoline pump and is not structurally attached to the Quonset Hut.



Photo 3. View SW, showing the solid north elevation. Some of the corrugated sheathing and associated framing at the west end of the elevation is bent and damaged, reportedly by road sand that had been piled against the building. The shed over the gas tank is not structurally attached to the Quonset Hut.



Photo 4. View NE, showing the west bulkhead and the south elevation. The original wide opening in the west bulkhead has been infilled with sheet metal. The single window in the south corner matches the windows on the south elevation but is located higher in the wall. The louver at the top of the wall is larger than the east bulkhead louver and may be original because it matches a louver style shown in several Quonset Hut Manuals (US Navy Seabees Museum). Note the close proximity of the sandpile to the Quonset Hut.



Photo 5. View W, showing the east bulkhead. Wooden stud walls sided with vertical boarding were constructed to reduce the width of the original opening. The originally opening included a wall-mounted track which extended out beyond the 40' width of the elevation and supported 4 sliding wooden doors. The doors and track were removed when opening was altered. Sheet metal flashing that now overs the track area is tucked under the historic crimped flashing.



PPHotos 6 and 7. View west, showing the crimped end wall flashing at the southeast building corner. The end wall flashing extends around the perimeter of the east and west bulkhead elevations and is tucked beneath the corrugated metal sheathing on the north and south elevations.



Photo 8. View W. The wall mounted track that held the 4 original sliding wooden garage doors was removed. Wide flashing was installed over the area of track attachment. The added flashing is tucked under the historic crimped flashing the overs the joint between the bulkhead and the arched rib framing.



Photo 9. Two courses of concrete block were added to increase the height of the original poured concrete wall under the added, wooden stud-framed sections. Note that the original concrete wall is broken and heaved.



Photo 10. View NE, showing the eight, 3'-1" x 4"-7" window openings in the south elevation. The openings are spaced so that four are centered in each half of the elevation. There are two solid structural bays in the center and at each end of the elevation and single bays between each window opening. Note the short poured concrete foundation wall. The depth of the wall is unknown



Photos 11 and 12. View west showing a typical four-light over-two light metal window. The four-light top windows are side-hinged to operate as louvers. The bottom two-light windows are fixed. The individual lights are horizontally-oriented. The flat window units are mounted into the arch-shaped south elevation.



Photos 13 and 14. View NE showing the sheet metal window header and sill flashing. The header flashing is tucked under the corrugated sheet metal and has been formed to provide a narrow shade above the windows. The sill flashing protects the wooden sills. The fenestration pattern is enhanced by the juxtaposition of the flat window units and the arch shape of the south elevation.



Photo 15. View NE, west bulkhead. The now infilled wide, centered opening appears to have been the same height as the opening in the east bulkhead. The added paired window openings in the patched area are taller and narrower than the original windows; the sill flashing has been retained but is narrower than the sill flashing associated with the original windows.



Photos 16 and 17. View NE, showing damage to the SW (left) and NW corners of the west bulkhead. Note the crimped end wall flashing around the perimeter of the west bulkhead.



Photo 18. View SW, showing the unfortunate damaged west end of the north elevation.



Photo 19. View SW, showing the south elevation, steel arch rib framing and the 8 windows. The windows are located so that four are centered in each half of the elevation. There are two solid structural bays in the center and at each end of the elevation and single bays between each window opening. The floor is dirt. Various materials and supplies are stored near or against the bottom of the wall.



Photo 20. View NW, showing the metal stud-wall-framed west bulkhead and a portion of the arch-rib-framed north elevation. Some of the corrugated Sheathing and rib framing at the west end of the north elevation is damaged, broken or missing. An added wood frame suspended above the floor extends the length of the building and obscures the view of the upper third of the arched rib frame.



Photo 21. View NE showing the eastern portion of the north elevation and the east bulkhead. The added wood frame is supported on the header above the existing east bulkhead opening and on the header of the now infilled west bulkhead door. The large tank in the NE corner of the Quonset Gut contains gasoline.



Photo 22. View NE showing the interior of the east bulkhead. The width of the original opening was reduced by the construction of wood stud walls inboard of the historic metal stud framing. The added man door was let into the metal stud-framed SE corner. . Note that the added suspended wood frame spans the width of the original opening.



Photos 23 and 24. View east showing the added wooden stud walls north of the existing bulkhead opening (left) and south of the opening. The metal stud walls that flank the original opening each contain two structural bays. The wooden studs are butted up against the interior metal studs. The tracks for the overhead garage door are mounted to the underside of the suspended wooden frame.



Photo 25. View W, showing the west bulkhead. The wide opening has been infilled but its original width does not appear to have been altered. The metal stud walls that flank the opening are each four bays wide. The stud bays immediately adjacent to the original opening are significantly narrower than the other bays.



Photo 26, left. View NW showing the stud wall north of the former west bulkhead door. The I-section wall studs are slightly smaller than the I-section arch ribs. Photo 27, right. View SW, showing a damaged I-section Stud in the west bulkhead. The I-section ribs, purlins and studs are made of 2 channels joined back to back. Note the groove or joint in the center of the flange on the I-section stud.



Photo 28. View NW. The stud walls on both sides of the former opening in the west bulkhead are each four bays wide; the interior bays that flank the opening are quite narrow. A wooden frame has been added within the original opening. The wood posts are attached directly to the metal studs that framed the opening. The wood header is several inches below the original channel plate. The wood frame may have been added to provide a nailing surface when the west opening was infilled.

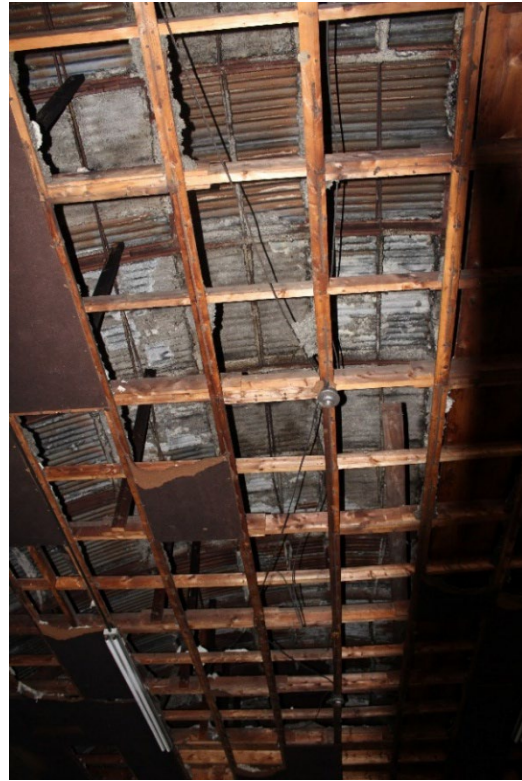


Photo 29, left, view SW showing the junction of the south arch rib framing and the west stud wall framing. The I-section studs are smaller than the I-section ribs. The added boarding that carries the electrical conduit is adjacent to the purlin immediately below the added wood frame. Photo 30, right. The added wood frame makes it difficult to see the ribs and purlins above. The suspended frame is supported along its length by 2 x 4s that are nailed to the wood frame and to each steel rib above

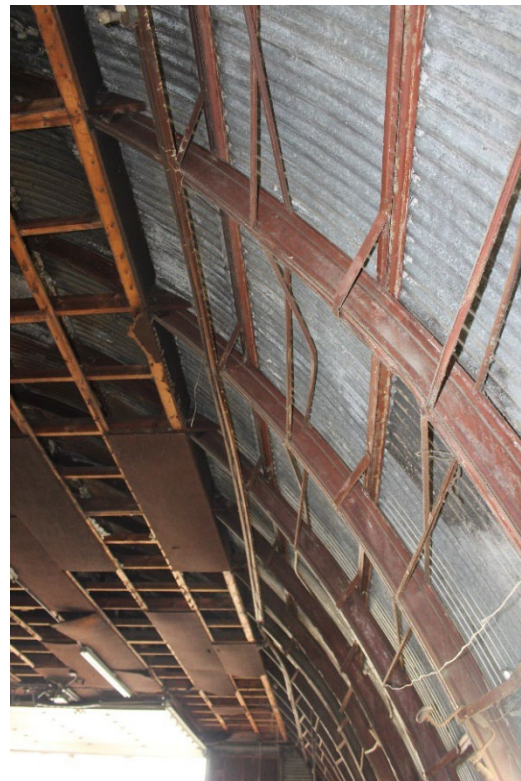


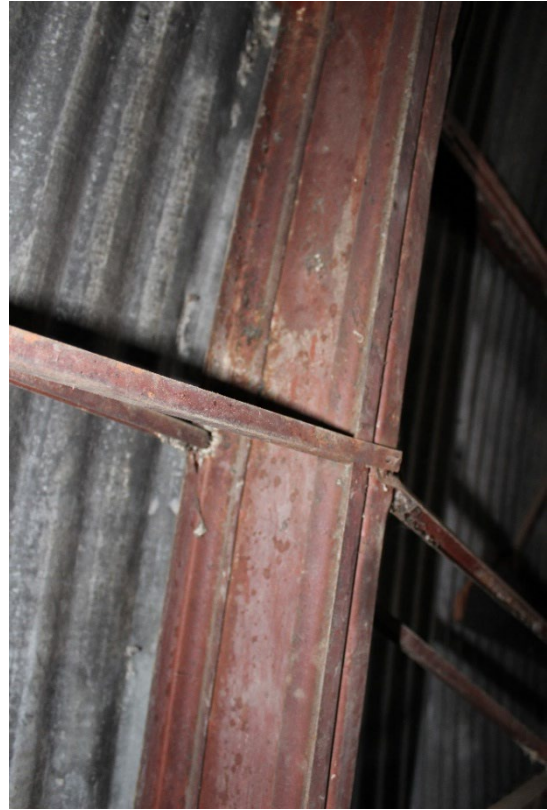
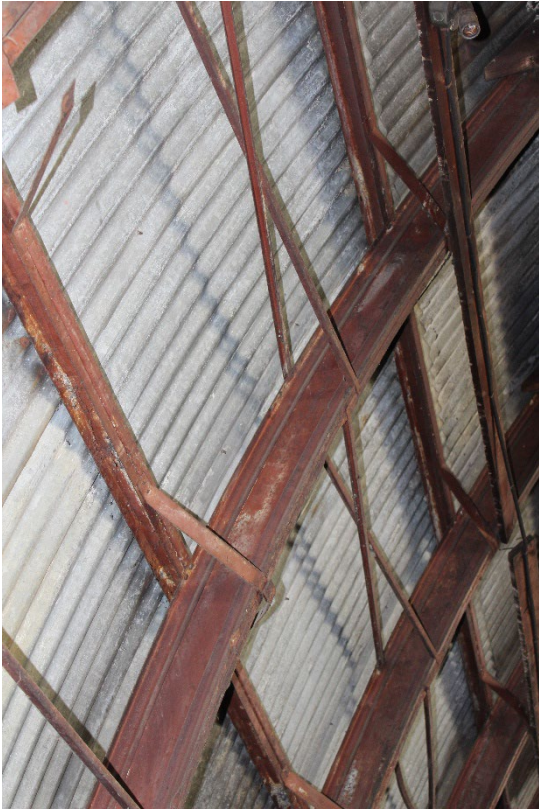
Photo 31, left, view SW. A splice plate that joins 2 sections of an arch rib is visible on the left side of the photo, just below the north/south oriented framing member. Photo 32, right, view east. A splice plate in the third furthest rib is barely visible above the wood frame.



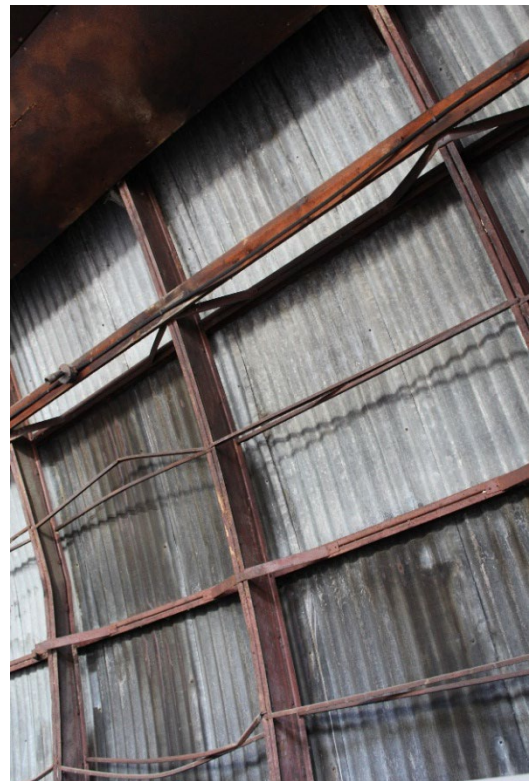
Photo 33. View SE. The steel arch rib framing consists of twenty-one 6", I-section ribs spaced 4' on center that enclose 20 structural bays. Each rib is apparently assembled from three spliced sections. The arch frame also includes 2- 5/16" I-section purlins which run horizontally for the length of the building and are screwed to the outside or top flange of the ribs. The frame also incorporates standard cross bridging which is centered between the purlins and provides lateral stability.



Photo 34 and 35. Detail of the intersection of a 6" I-section rib and a 2 and 5/16" I-section purlin. The ribs and purlins are made of 2 channels that are welded together back to back. The joint between the 2 channels creates a very clear groove in the middle of each flange that runs the length of the member. Each purlin/rib connection is stabilized by two pieces of 1" plate steel, each of which is nailed into the groove between the 2 channels in the I-section purlin and into the groove between the 2 channels of the I-section rib.



Photos 36 and 37. Standard cross bridging is made of 1" angles and is centered between the purlins. The bridging is nailed into the grooves between the 2 channels of the I-section ribs. The webbing of the ribs, purlins and studs is not flat but was rolled with a curved or W-shape. The W-shape formed into the webs of the ribs is quite evident, despite 70 years of rust and dust.



Photos 38, left. View SE showing the electrical breaker box on the east bulkhead wall. Conduit runs from the box up along the metal stud to the right of the box. Photo 39, right, showing a lighting fixture mounted on the boarding that carries the conduit.

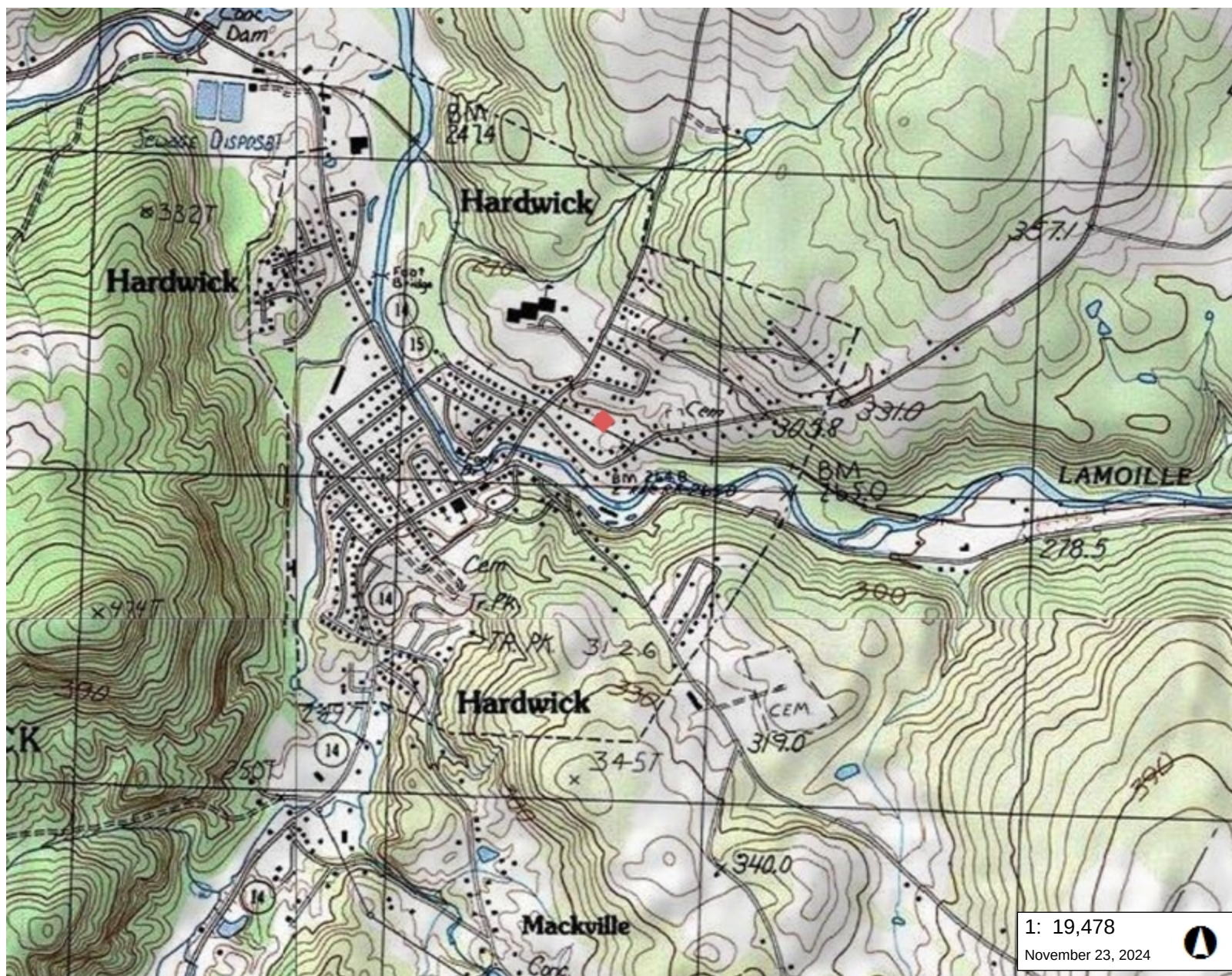


Photo 40. View west (left) and Photo 41. View east. The four-light upper windows are side-hinged to open as louvers. The bottom two-light windows are fixed. Each flat window unit spans the width of a structural bay. Each bay is defined by 2 of the 21 steel arch ribs. Window sills are wooden.



LEGEND

NOTES



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November 23, 2024



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1" = 1623 Ft.

1cm = 195 Meters

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LEGEND



1: 2,435

November 23, 2024



NOTES

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1" = 203 Ft. 1cm = 24 Meters

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