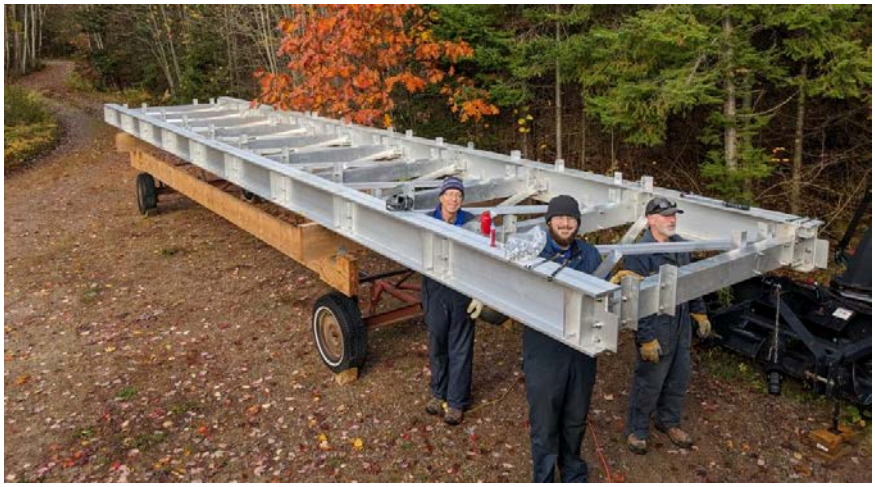
Bridge Status #2

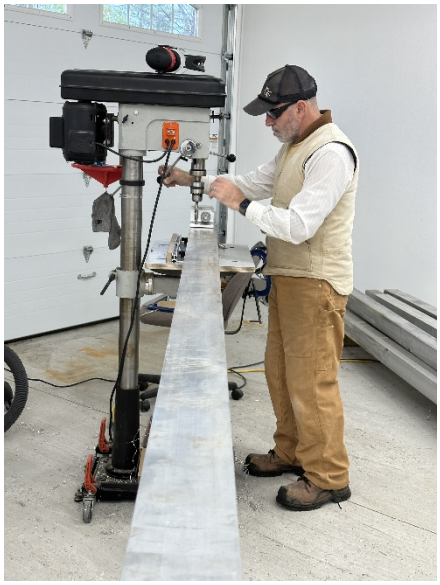
2023 November 23

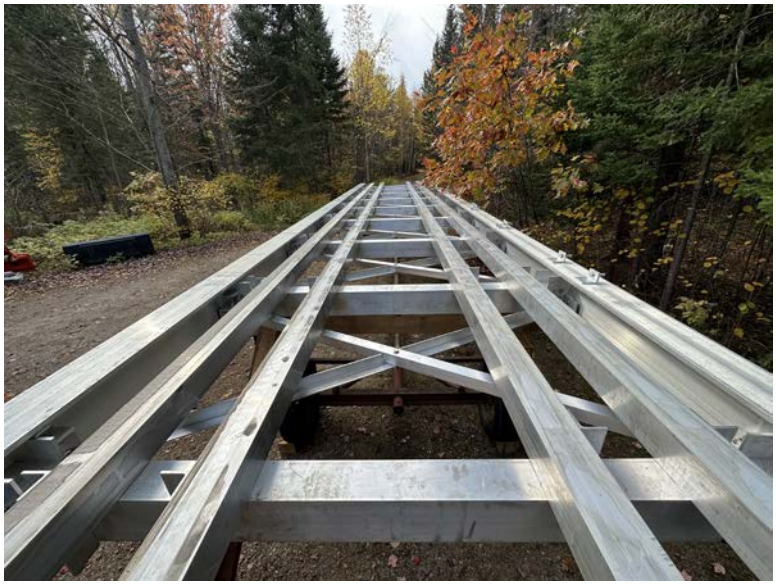
Construction of Bridge

The previous status report showed the bridge frame without the stringers or wooden deck, as shown in the photo below. Tim Sykes led the construction at his place on Ross Meadowcroft's wagon.



Four stringers, made of 4-inch square aluminum tubing running the full length of the bridge, were drilled to match the holes in the brackets and then bolted to the framework. These stringers reduce the span of the wooden planks (which run across the bridge) so that they will be capable of supporting concentrated loads from maintenance vehicles (e.g., a tractor).

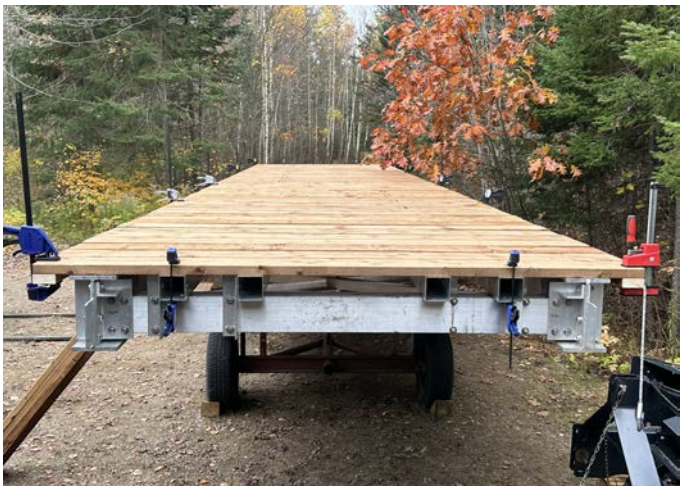
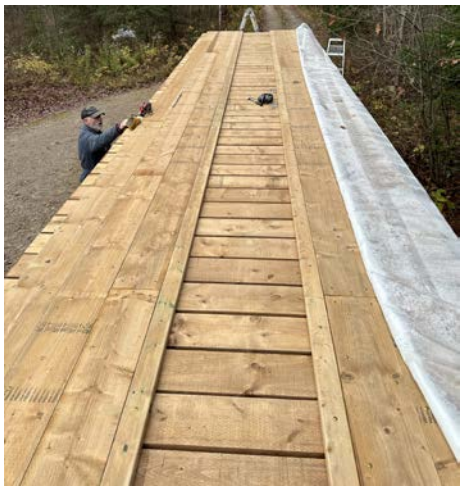




All fasteners were stainless steel, mostly ½" and 5/8" diameter. Loosening of nuts was prevented using either locknuts with nylon inserts plus Loctite, or double nuts plus Loctite, torqued to the appropriate level.

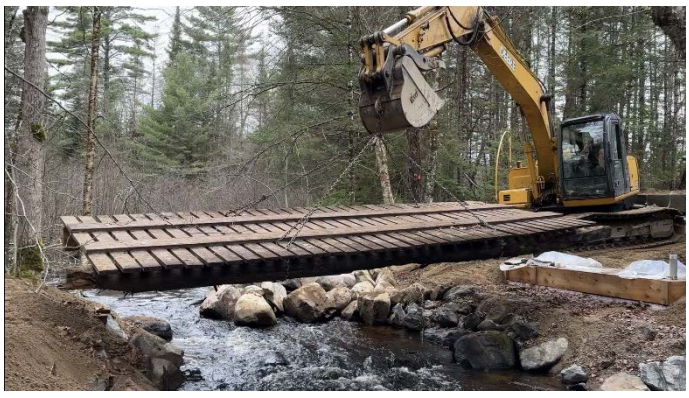
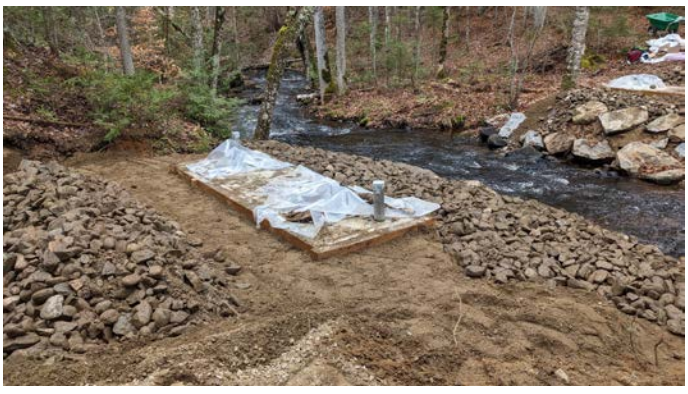
The wooden deck was then installed. Shown in the photo below on the left is the first layer, consisting of 8-foot long planks running across the bridge, followed by longitudinal runners to spread wheel loads to multiple planks and increase overall rigidity (shown in the photo on the right). Layers of wood were attached together using large-head self-drilling outdoor screws (5/16" GRK RSS). The deck and the stringers were both designed to slide slightly on the substructure

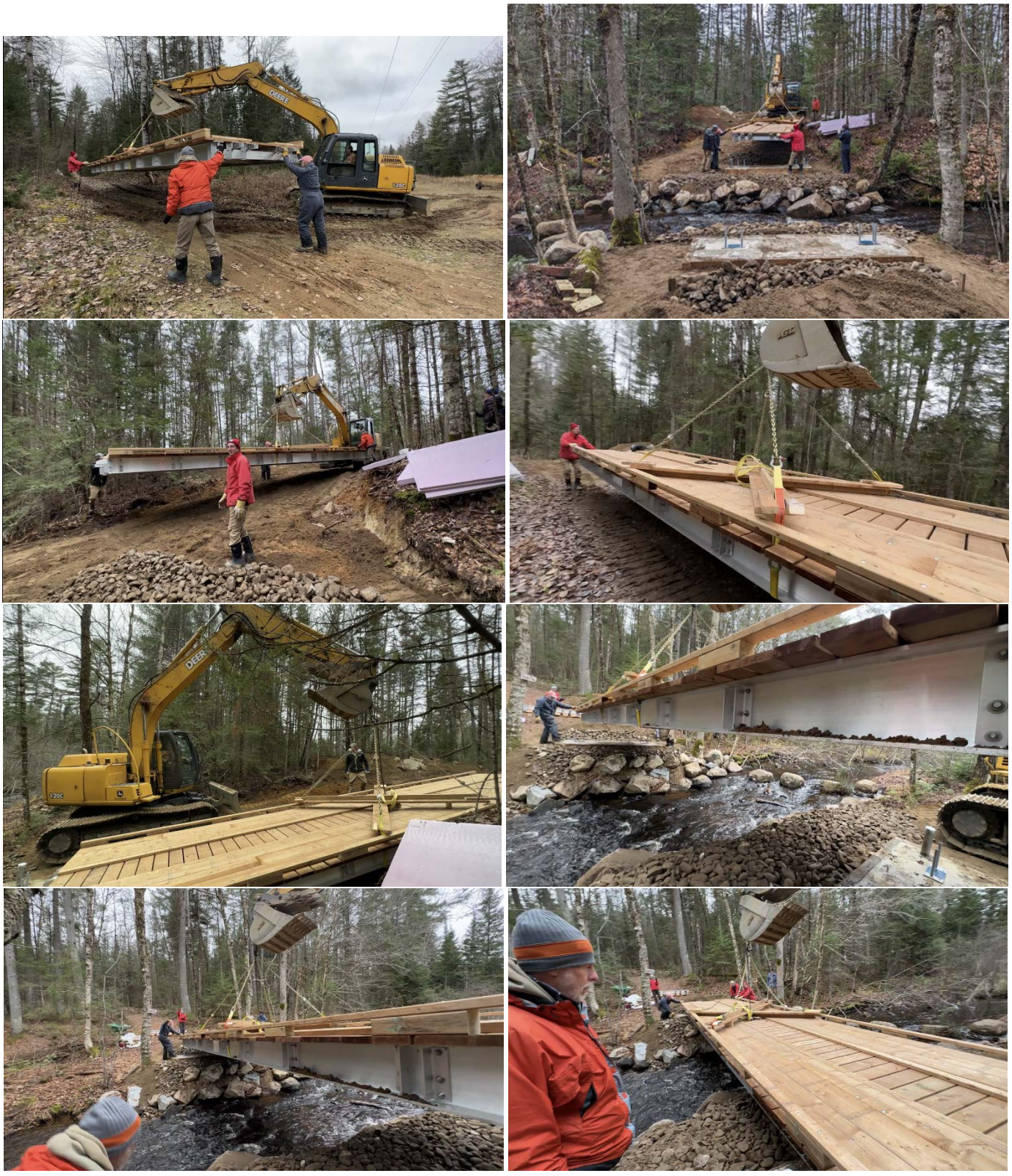
when the bridge is heavily loaded. Curbs, shown in the installation photos later in this report, were then added to the edges of the deck.

Installation

The day before installation, Tim towed the assembled bridge from his house to a location near the installation site using his tractor. Early on November 7, Tracy Lance and his son arrived. While his son obtained aggregate from their pit, Tracy and the volunteer crew finished placing insulation (to prevent frost heave under the footings) and then aggregate at the north end of the bridge. Tracy removed the old bridge and lifted gravel and stones across the creek to the far (south) side for later use once the new bridge was in place. When the site was ready, Tracy carried the new bridge from the power line to site. We had earlier built an X-shaped spreader to ensure that lifting forces on the bridge were vertical and to keep the straps in position. We had purchased the straps and chains a few years earlier for another job. The 5,000 lb weight of the bridge was well within the lifting capacity of Tracy's excavator, but it was right at the limit for tipping when the bridge was held lengthwise in front of the excavator, which required a 19-foot reach. (This awkward lifting orientation was required to pass through the relatively narrow trail.) Once at the bridge site, he re-oriented the excavator to lift at about 45° to one side for better stability and control. We had previously marked the desired locations of the anchoring studs on the I-beams and had placed plastic protective sleeves on the embedded studs. Tracy, along with helpers guiding the bridge at each end, was able to set the bridge down accurately within about ½ inch. After it was set in place, one person at each end of the bridge was able to slide it sideways by hand until it was centred between anchoring studs. This was easily done because we had lubricated the bearing plates with an extremely viscous waterproof grease.

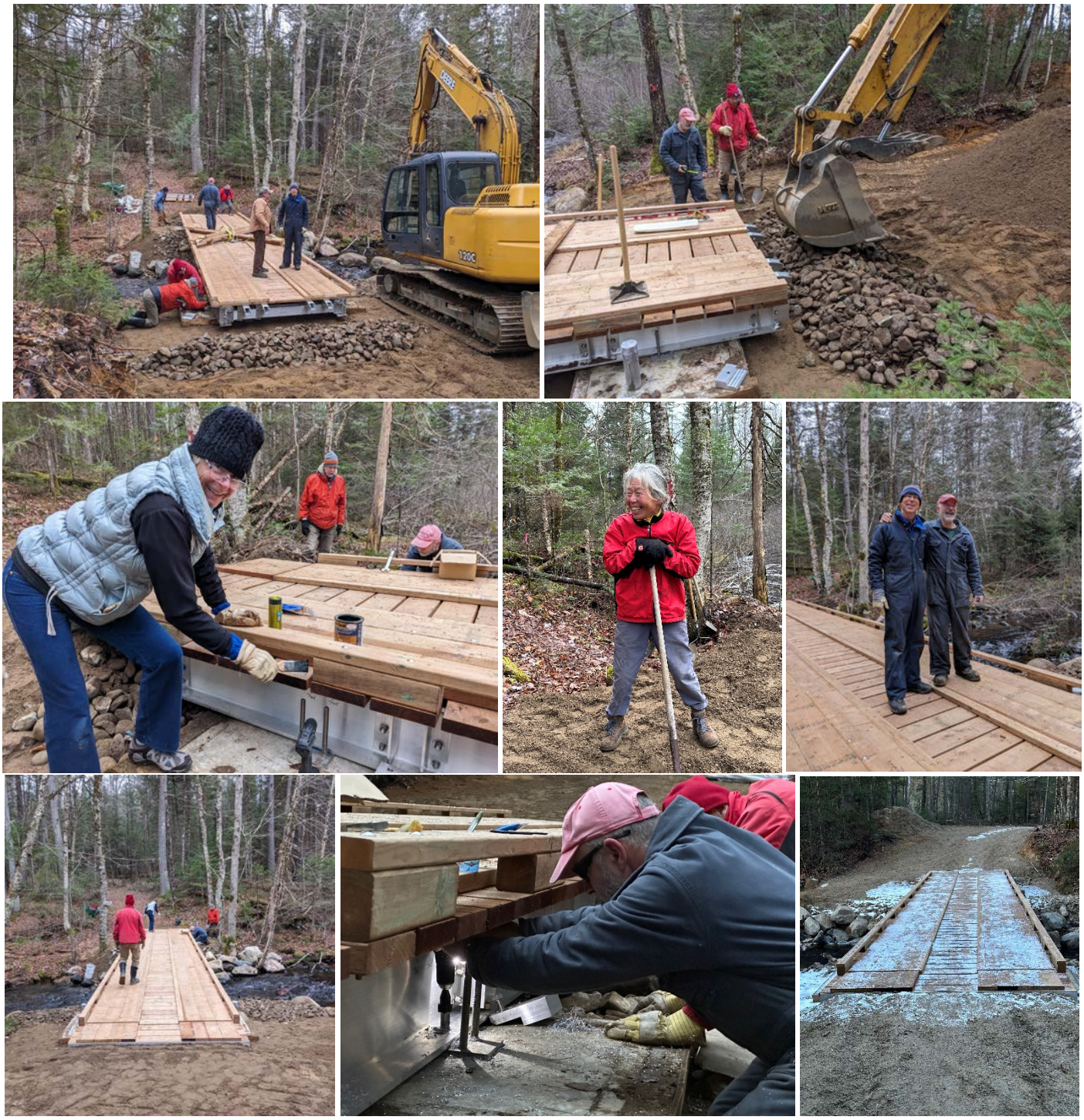





The next step was to install a transition ramp at each end of the bridge and make final adjustments to the surrounding ground. This was done by volunteers on the south side and by Tracy on the north side.

Finally, at the end of the day once the main crew had finished, Tim and Doug drilled holes in the lower flange to fix the southern end of the bridge in place and then we installed clamping plates. The northern end also has clamping plates,

but, to accommodate differential thermal expansion and heavy loading, this end of the bridge is free to slide on bearing plates embedded in the concrete footings.



David Rhodes

(Photos by David Rhodes and Helena Rummens.)