Walter Payton Center, the indoor practice facility for the Chicago Bears Football Club, is the only timber-framed facility utilized by the National Football League. Housing a full-sized football field, the 200-foot by 400-foot Payton Center features a superstructure consisting of twenty-one, three-hinge glue-laminated (glu-lam) timber arches with 85 feet clear at the crown. The roof is supported by 20-foot glu-lam purlins that also support the tongue and groove decking. The original roof featured corrugated metal systems on each side of the fabric, and the top third was covered with a semi-translucent, fabric-steel cable system anchored into the main arches with lag bolts.

In the spring of 2004, Payton Center began experiencing excessive water infiltration, resulting in a wet playing field, which presented a safety risk to players. LZA Technology Division conducted an invasive survey and structural investigation to identify, quantify and assess the amount of structural damage in order to repair the problem. The investigation revealed unabated water infiltration under the hard roof from the fabric roof. The moisture from the leak was attacking the end grain, plywood sheathing, and openings of the arches and the wood decking. The resulting dry rot was compromising the structural integrity of the facility.

The construction manager and design team were under tight time constraints to repair the facility during the off-season to make it available for training camp. Because there was no opportunity to completely open the roof's problematic areas prior to the actual repair work, the full extent of the problem was unknown. Therefore, to accommodate the aggressive repair schedule and prevent project delays, LZA Technology provided a constant on-site presence to quickly react to each newly discovered condition. As more decay was uncovered, pressure mounted on the contractor because more repairs needed to be completed prior to installing the new roof.

The repair process was a balance of controlling the decay removal and performing the work without shoring. In order to provide lateral stability for the overall structure, sufficient arch and deck material had to remain in place. The roof's arches ranged in depth from 36 to 60 inches deep with a depth of 56 inches at the quarter-point splice locations. The extent of decay varied with areas near the splices experiencing decay reaching 18 inches deep. LZA Technology developed a repair program, which addressed each arch in terms of the depth of decay and the type of repair required. For extensively decayed areas, the repair required a new steel plate with shear connectors and lag and through bolts. One face of each end arch was exposed to the elements, and the north half of the west arch had a significant amount of decay throughout its length. It was decided to remove and replace this piece for expediency and economics. Hence, a part of the structure was shored and the new piece was mated and installed with precision crane work.

In addition to the structural deterioration of the arches, the decking and plywood were also affected by high moisture content, 30 to 40 percent, and environmental contaminants such as mold. Approximately 39,000 square feet of plywood was replaced and approximately 9,560

square feet of decking. As part of the remediation, a timber in-fill and a new metal standing seam roof were designed in the area of the original fabric roof.

The detailed repair work closely resembled furniture making, as the wood removed required a carefully fitted substitution that was glued and anchored in place. Finally, supplemental steel plates with shear plates and through bolts were designed to restore capacity at the splices and points where excessive loss of material weakened the arches.

The problems encountered at Walter Payton Center are another object lesson in the three rules to maintain longevity in wood structures: Keep them dry, do not let them stay wet and keep moisture away.