FOOTBRIDGE

Madison, Connecticut

Green Hill Brook meanders through second growth forests and open farmland as it flows to Long Island Sound. Ferns and other low woodland plants blanket the stream's steep banks. The root systems of large oaks, maples, and poplars, intertwined with timeworn outcroppings of granite ledge, form an intricate structure that stabilizes the thin layer of forest soils in this wetland habitat.

The client wished to cross to property that he owned on the brook's far bank and asked us to insert a path and bridge in this delicate ecosystem. The difficult topography, limited access, and environmental sensitivity of the site led us to a solution for a bridge that would minimize its impact on the landscape during construction and into the future.

We conceived of the bridge as a continuation of the narrow access path that switchbacks across the steep grade from the client's house and lawn. It is a slender, curving, 70-foot long plank of glue- and bolt-laminated southern yellow pine that spans from a natural gate formed by a large double tulip tree and an outcropping of ledge on the near bank. A pair of stainless steel pipes on pin connections spring from available exposed ledge to create two mid-span supports. The bridge deck lands on a beam that cantilevers from deep footings in the soft soil of the far bank, providing an overlook to views down the gorge to the south.

We formed the bridge as a structurally monolithic slab, prefabricated off-site in six parallel glue-laminated S- shaped lengths of southern yellow pine timber, craned into position on temporary shoring and then clamped together by pre-drilled, threaded rods.

By raising the height and extending the length of the bridge, we were able to keep the structure above high water levels and the abutments well back from the streambed. The design of the bridge as a monolithic laminated structure allows for its cross-sectional depth to be minimized.

In order to reduce foot and equipment traffic within the floodplain of the stream, we chose to avoid the invasive excavation of forming and pouring of concrete footings and piers. Instead, we took advantage of the ledge exposed by the erosion of the streambed to create structural foundations for the bridge. We feathered the six glue-laminated sections into pockets in the east bank's existing stone abutments, cutting each end to specific length to maximize its bearing area on the irregular contour of the natural rock face.

In designing the bridge and planning its construction, we worked to minimize its environmental impact. The offsite prefabrication of nearly all components and their careful installation from staging areas outside of the wetland areas dramatically reduced assembly time and the associated heavy foot or machine traffic of more typical site-built projects. By confining the use of epoxy resin glues to the shop assembly, employing low-V.O.C.-producing structural polyisocyanurate glues when working on site, and specifying, when available, arsenic- and chromium-free wood preservatives, we attempted to minimize the toxicity of the materials and products that would make up the bridge. We also found that careful planning allowed us to mitigate the high labor costs of protracted work within a regulated wetland area. Using a 50-ton crane with a 190-foot boom and extension, a tree crew climbed and tied back major branches of large trees to prevent their damage as the riggers wove the 70-foot sections through the forest and down the gorge, and with a skilled crew that was well-versed in the assembly process, we were able to deliver, install, and stabilize the bridge deck in one day.