

Introduction

The Appalachian Trail is a continuous, marked, national scenic trail meandering 2,160 miles from Georgia to Maine. More than 73 miles of it runs through New Jersey — from the Delaware Water Gap to Greenwood Lake. In 1978, the Appalachian Trail Amendment to the National Trails System Act authorized the United States Department of the Interior to establish a 1,000-foot-wide protective corridor around the Trail for portions that are outside State or Federal Parkland. The State of New Jersey took the lead to acquire a continuous protective trail corridor. This was announced with great fanfare in 1980, by then-Governor Thomas Kean.

However, because of wetlands and river crossings, the Appalachian Trail departs from the corridor in two locations — Wallkill River and Pochuck Creek (Figure 1). Constructing bridges over these two waterways to place the trail within the corridor remains the number one priority of the Appalachian Trail project partners in New Jersey. This goal is outlined in the New Jersey Appalachian Trail Management Plan.



Figure 1. The Appalachian Trail map indicating the 2.1 mile detour outside the trail corridor that will eventually be eliminated as a result of completing the Pochuck Quagmire Bridge. *Map Courtesy of the NY-NJ Trail Conference.*



Site Description

To provide a trail corridor from Pochuck Mountain to Wawayanda Mountain, within Vernon Valley, the New Jersey State Park Service and the National Park Service acquired 141.1 acres between Sussex County Route 517 and Canal Road. The cost of this land was \$399,050.

Unfortunately, the Appalachian Trail could not be placed practically within this trail corridor until the 60-foot-wide Pochuck Creek could be crossed safely by hikers. The creek is up to eight feet deep, with steep, slick clay banks, and a deceptive current. A 3,000-foot-wide floodplain wetland covers both sides of Pochuck Creek. Crisscrossed with tributaries and ditches, this floodplain has poor soil conditions and is normally inundated.

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The wetland approach on either side of the creek is a quagmire into which a hiker can sink waist deep even during the dry summer months. The quagmire has been described as a “sea of dark, oozing, quivering, leg-sucking black muck with rank weeds and lush, slimy water plants.”

This area is classified as an Exceptional Resource Value Wetland because of the habitat it provides for a variety of threatened and endangered species. In flood conditions, the creek returns the valley to the prehistoric 3,000-foot wide lake it once was.

Before the Pochuck Quagmire Bridge was built, hikers wishing to continue on the Appalachian Trail, were forced to detour the quagmire by following a dangerous 2.1 mile circuitous roadwalk along Sussex County Route 517 and Maple Grange Road to Canal Road. The detour along the heavily traveled county roadway with poor sight distances is shown in Figure 1, the Appalachian Trail map, on the preceding page.

The Great Pochuck Quagmire Bridge project was initiated to address this problem. The primary goal of the project was to provide a safe, practical, cost-effective creek crossing that would place the Appalachian Trail within the corridor and eliminate the hazardous roadwalk. Phase 1 of this objective has been accomplished through the construction of the Pochuck Quagmire Pedestrian Suspension Bridge.

Project Background

Before deciding to build a suspension bridge, the project partners rejected several other structural design alternatives. The various alternatives were either too expensive or impractical. The following section provides the decision process of the project partners in selecting the suspension bridge alternative.

Project Design History

The Pochuck Creek Bridge had three design phases:

1. Department of Treasury, Division of Building and Construction (DBC) Project No. P375 - Phase 1 Pre-Design Study



2. CCA.60 Light Frame Construction Suspension Bridge
3. Completed Timber Suspension Bridge

Phase I Pre-Design

In 1985, the New Jersey Department of Treasury, DBC of the performed a phase I pre-design study of the Pochuck Creek crossing. The study recommended a 4-foot-wide by 80-foot-long prefabricated steel truss bridge, set one-foot above the top of the creek bank. The pre-design study recommendation did not take into account the serious, frequent flooding and logjams of Pochuck Creek. The estimated construction cost of bridge alternatives varied from \$114,000 to \$208,000 in 1985 dollars. Construction of a truss bridge would require a bulldozed access road, pile driving equipment, and a crane. The cost estimates did not include these expenses. Also, the Pochuck Quagmire is an Exceptional Resource Value Wetland, and under the 1987 New Jersey Freshwater Wetlands Protection Act, construction with such an impact is prohibited in an Exceptional Resource Value Wetland.

The pre-design study identified the need for a “catwalk” approach on 550 piles (timber posts) across the west side wetlands. The 22-inch-wide, 2-foot-tall, no-guard rail west side catwalk was estimated to cost an additional \$235,000 in 1985 dollars.

The phase I study provided basic hydrology, hydraulic, soils, and environmental information. Taking the access and total site work costs into consideration, the project cost ran into hundreds of thousands of dollars. Because of the more stringent wetlands regulations and the cost of the project, the State of New Jersey, Division of Parks and Forestry, made a decision to proceed with an alternative bridge design or system.

CCA.60 Light Frame Construction Suspension Bridge

Because of the importance of the Pochuck Creek crossing for hiker safety, the NY-NJ Trail Conference and the NJ Division of Parks and Forestry seriously committed to this project in 1991. The NY-NJ Trail Conference provided the administrative and engineering leadership on the project, via the private volunteer sector. Several criteria were identified. These are as follows:

- Original project construction budget was \$10,000.
- Foundation design must address poor soil and riverbank conditions.
- Because of flood-driven logjams, the bridge must provide adequate clearance to debris carried by the 100-year flood level.
- Design must assume that all construction material and equipment would be hand-carried to the site. As a result, only hand tools would be available for construction.
- Design employed light frame construction techniques with CCA.60 SYP foundation grade dimension lumber.
- To provide for high clearance and a wide span, a suspension bridge was identified as the best type of bridge for the difficult site conditions. This type of bridge is also the most efficient from a weight-strength perspective.

A suspension design, utilizing CCA .60 southern yellow pine dimension lumber for the foundation and towers, was prepared, permits obtained, and in September of 1993, construction was initiated by a correctional facility work crew, supervised by State Park staff.



Final Project — Completed Timber Suspension Bridge

In the fall of 1994, the scope of the project was radically redefined because of the following:

- GPU Energy, a regional utility company, came “on-board” as a project volunteer, making people, material, heavy equipment, and expertise available to the project.
- Project partners made handicap accessibility from Route 517, across the quagmire, over the creek, and through the woods to Canal Road, a project goal. The bridge was no longer just for the agile, intrepid hiker, but for all segments of the population, including school children and senior citizens. The design standards were redefined with an enhanced emphasis on public safety.
- The NY-NJ Trail Conference applied for and received a \$10,000 grant from the USDA Forest Service Wood In Transportation Program. The State of New Jersey matched this grant 2:1 with \$22,323. Private donations added \$6,000. The project construction budget was set at \$36,000. The NJDEP Division of Parks and Forestry provided \$26,000 in funding for the project administration, survey, engineering, and environmental permits.

A unique public-private partnership consisting of a volunteer nonprofit group, State Park Service, a corporate volunteer, and even correctional facility workcrews was born.

During the planning phase, the primary project goal remained the same — eliminate the dangerous 2.1 mile roadwalk via placement of the Appalachian Trail within the designated and previously purchased trail corridor. This would require the construction of a safe, practical, cost-effective, and durable bridge over the Pochuck Creek.

Additional project goals established by the project partners were as follows:

- Preserve the primitive trail experience by constructing a bridge with a rustic appearance.
- Comply with the Appalachian Trail Conference policy on stream crossings.
- Utilize previously purchased material and/or donated material.
- Comply with the NJDEP wetlands and flood hazard area rules and regulations.
- Take advantage of GPU Energy expertise and standard practice, where practical, when developing the bridge design.
- Provide a handicap accessible section of the Appalachian Trail.
- Provide a site for environmental and floodplain education as well as wildlife and bird observation, while keeping visitors off the fragile flora.

Engineering Challenges to Overcome

Review of the pre-design study, various literature searches, numerous site inspections, and discussions with project partners defined the critical design problems. The problems were as follows:

- Low budget.
- Meandering 60-foot-wide stream channel.
- Steep, undercut, and unstable banks.
- Extremely poor soil conditions consisting of alluvial silt, clay, organic muck, and a high water table.