CULTURAL RESOURCE INVESTIGATION

REHABILITATION OF THE PRALLSVILLE CULVERTS

DELAWARE AND RARITAN CANAL
BOROUGH OF STOCKTON
HUNTERDON COUNTY, NEW JERSEY

APRIL 13, 2001

Prepared for:
New Jersey Water Supply Authority
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ABSTRACT

In January and February of 2001 the Cultural Resource Consulting Group completed a cultural resource investigation in preparation for the rehabilitation of two culverts associated with the Prallsville Lock and Spillway, located in the Borough of Stockton, Hunterdon County, on the Delaware and Raritan Canal. The study was performed for the New Jersey Water Supply Authority. The Delaware and Raritan Canal is listed on the State and National Registers of Historic Places (SR 11/30/72; NR 5/11/73). This study was required under Section 106 of the National Historic Preservation Act and under the State Register Act of 1970. The purpose of the study was to accurately identify and delineate both the historic and current extent of the culverts at Prallsville, to recommend steps for their rehabilitation according to the Secretary of Interior's Standards for the Treatment of Historic Properties (36 CFR 68), and to ensure that the preliminary project designs meet these standards (assessment of effect).

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1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of the study was to accurately identify and delineate both the historic and current extent of the culverts at Prallsville, to recommend steps for their rehabilitation according to the Secretary of Interior's Standards for the Treatment of Historic Properties (36 CFR 68), and to assess the effect of the proposed undertaking on the National Register-listed property.

1.2 Summary of the Scope of Work

The New Jersey Water Supply Authority has requested the following: historical research, and the preparation of a cultural resource report designed to review and comment on proposed rehabilitation plans, applying the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68).

1.3 Study Administration

The New Jersey Water Supply Authority, Clinton, N.J., contracted the Cultural Resource Consulting Group (CRCG) of Highland Park, N.J. to conduct this investigation. The subject property is owned by the State of New Jersey, as part of the Delaware and Raritan Canal State Park.

1.4 Description of the Undertaking and Proposed Project

This cultural resource investigation was made necessary by the planned rehabilitation of the two Prallsville Culverts (Figure 1). The undertaking will involve the deconstruction, partial excavation, and reconstruction of several elements of the culverts, as well as the temporary use of staging and storage areas.

1.5 Applicable Regulations (Permits and Funding)

This investigation was performed in compliance with Section 106 of the National Historic Preservation Act (36 CFR 800) and the New Jersey Register of Historic Places Act of 1970 (Chapter 268, Laws of 1970 - N.J.S.A. 13:1B.128; N.J.A.C. 7:4-1.1 *et seq.*)

1.6 Subject Property

The boundaries of the resource as defined by the National Register nomination extend for 100 yards in either direction from the canal centerline. In addition, a temporary

staging/storage area has been proposed between the outlets of the two culverts (see Figure 7).

1.7 Area of Potential Effects (A.P.E.)

The A.P.E. consists of the area immediately adjacent to the culverts and a temporary staging/storage area (See Figure 7).

1.8 Dates the Study Was Conducted

Research was conducted in January and February of 2001. The report was completed in March of 2001.

1.9 Study Conditions and Constraints

The study was not subject to any constraints.

1.10 Acknowledgments and Citation

Several individuals and agencies have contributed to the completion of this work.

Edward Buss, P.E., New Jersey Water Supply Authority
Ibrahim Shaikh, P.E., New Jersey Water Supply Authority
Rickie Langenbach, New Jersey Water Supply Authority
Martin Maver, P.E., A. G. Lichtenstein
Deborah Fimbel, New Jersey Historic Preservation Office

This report was researched and written by James Lee, M.A. (Principal Investigator), with contributions by Richard Veit, Ph.D., and was edited by Kristian Eshelman. Illustrations were prepared by Joanna Krenzel and Gregory Smith. Peter A. Primavera served as the project director.

This report can be cited as:

Cultural Resource Consulting Group
2001 *Cultural Resource Survey: Rehabilitation of the Prallsville Culverts, Delaware and Raritan Canal, Borough of Stockton, Hunterdon County, New Jersey*. Prepared for the New Jersey Water Supply Authority, Clinton, N.J.

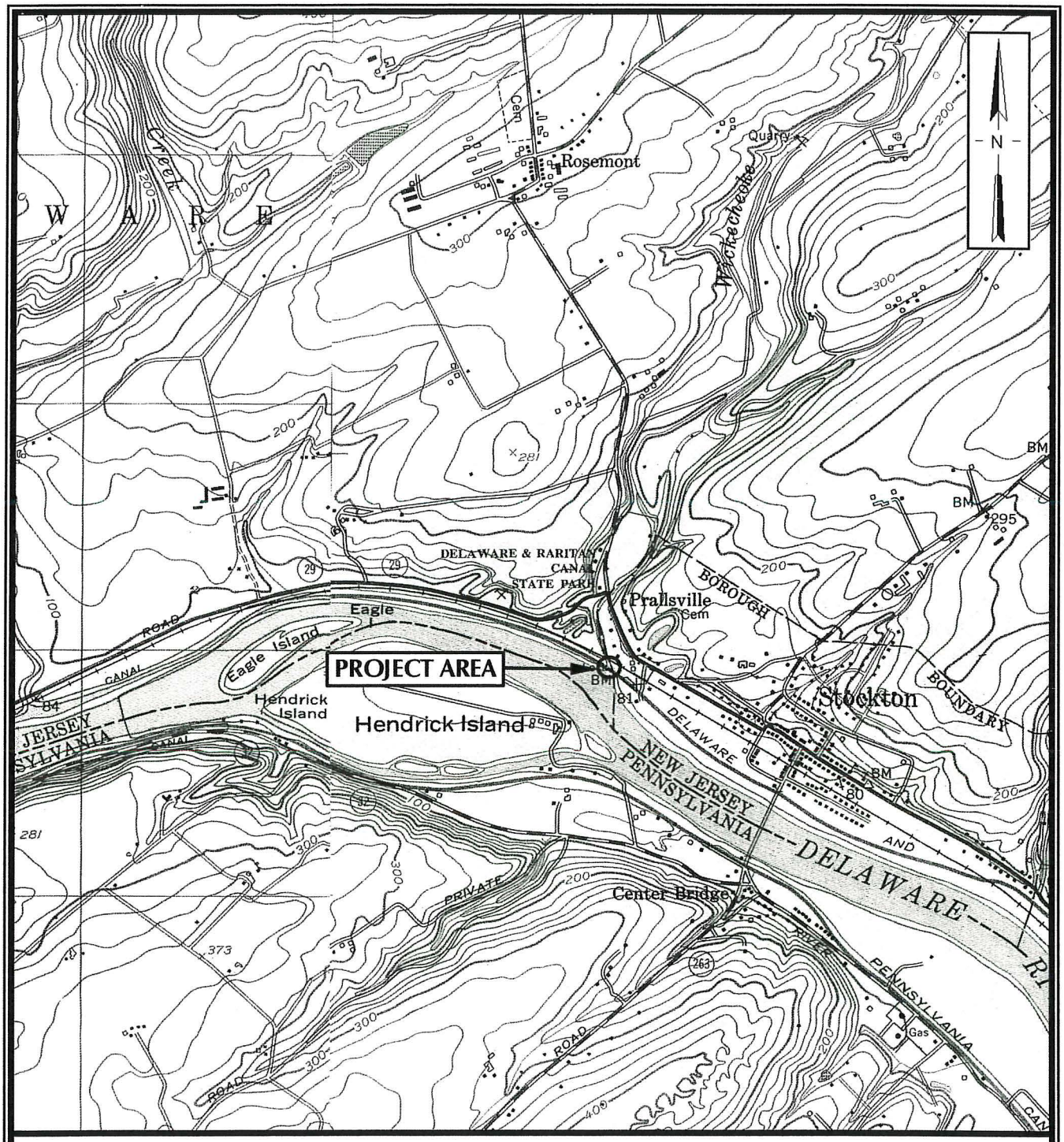

Figure 1: USGS 7.5' Quadrangle locator map: Stockton N.J.-Pa. 1954 (photorevised 1981) and Lumberville, Pa.-N.J. 1997.

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Rehabilitation of the Prallsville Culverts
Delaware and Raritan Canal
Borough of Stockton, Hunterdon County, New Jersey

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2.0 BACKGROUND RESEARCH AND METHODS

2.1 Research Methods

Background research focused first on defining the history of the study area, specifically the construction and repair episodes of the Delaware and Raritan Canal as a functioning canal and later as a water source. Second, the potential for other archaeological resources in the Area of Potential Effects was investigated. Appropriate repositories were contacted in order to collect information on the historic and prehistoric background of the study area. These repositories included:

Rutgers University-Alexander Library, Department of Special Collections and Archives (New Brunswick, N.J.)

Department of Environmental Protection, Historic Preservation Office (Trenton, N.J.)

New Jersey State Museum, Bureau of Archaeology/Ethnology (Trenton, N.J.)

New Jersey State Library (Trenton, N.J.)

The New Jersey Water Supply Authority (Clinton, N.J.)

New Jersey State Archives (Trenton, N.J.) (Please note that several important sources, including early maps of the canal, were not available at the time this report was written due to the Archives' recent relocation).

Relevant primary and secondary sources housed at these repositories were examined in order to provide a comprehensive historical statement of the site. Although primary documentation on the construction of the Delaware and Raritan Canal is limited, several published histories of the Delaware and Raritan Canal are available (Madeira 1941; Veit 1963; McKelvey 1975; Menzies 1976; Delaware and Raritan Canal Commission 1977). The Delaware and Raritan Canal has been the scene of repeated archaeological investigation (Morrell 1994:81). Reports prepared in conjunction with these archaeological investigations were examined for information relevant to this undertaking (Historic Conservation and Interpretation, Inc. 1985, 1987, 1990, 1992; Hunter Research, Inc. 1990, 1991, 1992a, 1992b; Ebasco Services, Inc. 1993; Richard Grubb & Associates, Inc. [RGA] 1996; CRCG 1997a, CRCG 1997b, and CRCG 1998). The Hunter Research Associates report (1992b) examining the Prallsville complex was particularly helpful.

2.2 Environmental Setting

The culverts are located beneath the Delaware and Raritan Canal along the east bank of the Delaware River (Figure 1). The northern culvert stretches from the Wickecheoke Creek to the Delaware River. It lies within the Piedmont physiographic province of New Jersey, which in this area is underlain primarily by Lockatong Argillite and red shales. The Delaware River has cut through the substrate, depositing alluvial terraces along the river valley. The canal was most likely built against the terrace edge with a berm built up on the river side. A red shale bedrock forms the floor of each of the culverts.

The embankment above the culverts is currently in use as a path or unpaved road (Plates 8 and 9). The path's primary use is for recreational activities such as fishing, hiking, jogging, and bicycling as part of the Delaware and Raritan Canal State Park. Vegetation on the crest of the embankment is limited to maintained grass.

2.3 Prehistoric Background

Although the Delaware and Raritan Canal is significant as a historic engineering and architectural feature, the possible presence of other cultural resources within the area of potential effects merits further consideration. The prehistoric development of New Jersey has been well presented by numerous authors on a variety of occasions (e.g., Chesler 1982; Kraft 1986), and will not be repeated in detail here. Some general statements about the prehistoric sensitivity of the study area are, however, in order.

It seems likely that the vicinity of the culverts would have been attractive to the Native American inhabitants of the region, given its elevation and proximity to a major watercourse. However, the extensive earth-moving activities associated with the construction of the canal and nearby mill complex undoubtedly removed any evidence of Native American occupation within the study area. Subsurface investigation at the Lockatong Spillway to the north of the study area in a very similar environment produced no evidence of prehistoric occupation. This investigation determined a large portion of the area surrounding the Lockatong Spillway to have been heavily disturbed by the construction of the canal and flood episodes of the Delaware River (CRCG 1997a). A similar pattern of disturbance would be expected in the vicinity of the Prallsville Culverts.

2.4 Historical Background

The Delaware and Raritan Canal

The early 19th century was a time of great economic expansion in the young United States. One especially pressing need of the time was for an efficient transportation network to move goods to their markets (Lane 1939) and raw materials to the manufacturer. While the

possibility of a canal crossing the narrow waist of New Jersey was investigated by William Penn as early as 1676 (Schwarz 1981:25), it was not until 1796 that a group called the Assunpink Creek Navigation Company was incorporated with the goal of building a canal linking the Delaware and Raritan rivers (Madeira 1941:7; Schwarz 1981:25). No action seems to have been taken under their charter. A second peak of interest in the first and second decades of the 19th century also appears to have been premature. In 1808 Albert Gallatin, the U.S. Secretary of the Treasury, suggested in his "Report on the Roads and Canals" that a canal be cut across central New Jersey (Veit 1963:60; McKelvey 1975:4). A canal route across the center of the state would be a source of speculation for over twenty years with no concrete results. Surprisingly, in light of its difficult path through the hilly uplands of northern New Jersey, the Morris Canal was the first canal to be completed in the state, preceding the Delaware and Raritan by several years. Begun in 1822 at the urging of George P. Macculloch and designed to link the ironworks of northern New Jersey with their markets to the east and the coal fields of Pennsylvania in the west, the Morris Canal was finished in 1831 (Cunningham 1966:135).

Finally, after years of inaction and deadlock, a charter was granted to the Delaware and Raritan Canal Company on February 4, 1830. At the same time, in an audacious attempt at political placation, the Camden and Amboy Railroad was also granted its charter for a line following a largely parallel course. While the railroad company rapidly sold its stock, the canal took several months to raise sufficient funds (Veit 1963:62; Drago 1972:129). In 1831 the two companies merged and formed the Joint Companies, a successful attempt to limit competition. This allowed the Delaware and Raritan Canal to establish a positive economic position which it maintained until the final decades of the 19th century (Hunter Research, Inc. 1990:3-4; Menzies 1976; Veit 1963).

Under the direction of Canvass White, a former senior surveyor on the Erie Canal, excavations were begun for the Delaware and Raritan in the fall of 1830. Unlike the Morris Canal, originally known as the Morris and Essex, which relied heavily on inclined planes and a complicated series of locks to cross northern New Jersey, the Delaware and Raritan Canal chose the line of least resistance—with regard to topography—across the state (Figure 2). Even so, the rapid construction of the latter canal, which was 43 miles long in four years, was impressive (Veit 1963:9). When constructed it was one of the widest canals in the United States. Even with its relatively level course, 14 locks were constructed along the canal and one on the feeder to accommodate changes in elevation (Schwarz 1981:25). The completed canal was Y shaped, due to the ingenious addition of a feeder canal starting at Bull's Island, which ensured a reliable source of water (Figure 3).

The entire construction was completed without the aid of machines, at a cost of roughly $2,830,000 (Delaware and Raritan Canal Commission 1977:1). Many of the laborers were of Irish descent, part of the great flood of hard-working Irish immigrants who arrived in New Jersey in the early 19th century (Cunningham 1966:228). With simple hand tools and horse-drawn scrapers they excavated the cut of the canal. The cost in terms of lives lost during the

four-year project was high. Victims of unhealthy living conditions and poor food, many of the workmen fell prey to an epidemic of Asiatic cholera in 1832 (Veit 1963:64-65).

The original specifications for the canal called for a 43-mile-long trench, 50 feet wide at the top and 40 feet wide at the bottom, with a depth of 5 feet. These designs were changed before construction began and the main channel was widened to 75 feet at the top and 60 feet at the bottom with a depth of 7 feet (Madeira 1941:31; Veit 1963:70). The 22-mile-long feeder, though not quite so large, was expanded proportionally. This widening and deepening of the canal proved to be a wise idea, for its northerly contemporary, the Morris Canal, was plagued by its inadequate proportions throughout its lifetime (Drago 1972:123; Cunningham 1966:136).

The canal builders were constrained both by the physical geography of the route chosen, and the existing cultural landscape, roads, towns, etc. A variety of water-control features were integral to the canal's operation. These included locks to surmount elevations, spillways to maintain water levels within the canal, culverts channeling pre-existing watercourses under segments of canal, and aqueducts. These structures were the products of skilled stonemasons. Since many of these structures were submerged, or partially submerged, hydraulic mortar, which sets under water, was a necessity. During the construction of the Erie Canal, which connected the Great Lakes with the Atlantic Ocean, a high-quality naturally hydraulic lime was discovered (Nielson 1986:4). This lime was pulverized, burned, and soaked in water to produce a hydraulic mortar. Sand or aggregate and sometimes clay or other silicates were added to the mortar mix.

Thanks in part to the noncompetition agreement with the Camden and Amboy Railroad, the canal was a rapid success. It served primarily as a means of transporting freight across the state while—at least initially—the railroad served the passenger trade. One of the most important freights transported on the waterway was coal, the lifeblood of New Jersey's canals. As commerce increased several capital improvements were undertaken on the canal. In 1849 the two uppermost locks on the main line were replaced with drop gates. The length of the locks was also increased to allow them to handle two boats at the same time, and in 1851 the main line was dredged to a depth of 8 feet (Cawley and Cawley 1970:34; McKelvey 1975:4-5; Veit 1963:23). These improvements allowed for the faster passage of all boats, as well as making it possible for boats of deeper draught to use the canal. The use of steam packets on the canal led to some erosion of the banks and in 1853 the banks had riprap, or stone armor, installed as a preventative against this erosion.

The canal's economic effect on the development of the central New Jersey is unclear. Some authors have argued that in comparison to the railroad its effect was minimal (Veit 1963) while others have emphasized its important and lasting economic consequences (Hunter Research, Inc. 1990:3-6). Though probably of smaller effect than the railroads in stimulating economic growth, the canal transported a wide variety of materials. It also led to the development of some small support communities such as Princeton Basin, Port Mercer, and

Bakers Basin (Hunter Research, Inc. 1990:3-7) A list of toll rates for the canal from 1848 includes everything from apples to wood but is skewed towards raw materials including bricks, charcoal, iron, marble, plaster, shingles, and stone (Drago 1972:131). For roughly one hundred years, the Delaware and Raritan Canal served as a conduit for commercial traffic across the state.

Most of that freight was transported in barges, some towed by mules along the towpaths and others by steam-driven tugs. The barges came in two classes. Those which also saw use on the Pennsylvania Canal were 90 feet long by 10½ feet wide and had a draw of 7½ feet of water when they were loaded (Delaware and Raritan Canal Commission 1977:3). Also used were river boats from the Hudson and Erie Canal which were 100 feet long 17½ feet wide and drew 7 feet of water when loaded (Delaware and Raritan Canal Commission 1977:3).

The canal's heyday lasted from roughly 1850 to 1875. During this time it served as an important route for freight of all kinds, but particularly for coal. The tonnage carried on the canal peaked in 1871 at 2,990,000 tons, and by 1933 had dropped to 28,000 tons (Veit 1963:80). The demise of the canal can be traced to the construction of the Reading Railroad, which laid its own rails across the state in 1876. Prior to this the Reading had been one of the main suppliers of coal to the canal (Veit 1963:81). With the lease of the Joint Companies by the Pennsylvania Railroad in 1877 there came restrictions on carrying any coal which would directly compete with that carried by the railroads. With the expansion of the Pennsylvania Railroad's mainline across the state to four tracks, the canal's days were numbered. By 1893 the canal was operating at a deficit (Richard Grubb Associates 1996:6-8), and after 1900 the canal never again showed a profit. For the last years of the canal, pleasure craft, especially yachts, made up the bulk of the vessels traversing it. It closed for the winter in 1932 and failed to reopen the next year.

The Delaware and Raritan Canal feeder parallels the Delaware River and extends from Raven Rock in Hunterdon County through Stockton, Lambertville, Titusville, and Washington Crossing to Trenton in Mercer County (Figure 2). This canal segment continued to Bordentown in Burlington County as a canal extension. Pioneer settlement in this Delaware River Valley area began in the first half of the 18th century. Population density remained low, but farm-oriented communities began to develop early on. The construction of the canal feeder fostered the growth of small hamlets along its course.

The 22-mile feeder canal contained 3 locks, 37 pivot bridges, 15 culverts, and several spillways (Richard Grubb Associates 1996:6-4). The canal was constructed between two man-made, earthen berms, with the outer berm separating it from the Delaware River. One of the berms was also utilized as the towpath. Specifications for the feeder canal indicate the feeder's intended dimensions: 60 feet wide at the water line, 50 feet wide at the base and 6 feet deep.

In addition to supplying the main branch of the D&R canal, The feeder was utilized to transport coal and other items by barge and towpath navigation. During the 1850s, the competing Belvidere Delaware Railroad, or "Bel-Del," was constructed along the banks of the feeder canal. The Bel-Del afforded the communities along its Delaware River path the opportunity to participate in a larger regional economy (Hunter Research, Inc. 1990: 4-11).

Along the southern portion of the feeder the Belvidere Delaware Railroad was constructed upon the west berm; it crossed over to the east berm in the northern portion. The introduction of the railroad may have necessitated changing the feeder's original design, such as constructing a new towpath on the opposing side of the canal in some locations when the railroad was installed. The Delaware and Raritan Canal was officially abandoned in 1933. The feeder canal remained open but had been discontinued as a transportation route, at least for coal, by 1923 (Richard Grubb Associates 1996: 6-8).

While portions of the canal that run through the city of Trenton were filled in as part of a WPA project (Hunter Research, Inc. 1990:3-8), the remainder of both the main canal and the feeder still carry water. In 1944 many of the old stone locks and wooden viaducts were replaced with poured concrete sluicegates installed by the state to regulate the flow of water. Plans were examined to fill in the canal or incorporate it into the inland waterway system (Delaware and Raritan Canal Commission 1977:5). While the canal was no longer useful as a transportation route, its water was an important resource for the industries and inhabitants of central New Jersey. Soon after the state took over the canal it began selling its water (Menzies 1976:116). This trend continued, and by 1976 New Brunswick was taking over half of its water from the canal (Menzies 1976:120). In 1973 the canal was nominated to the National Register of Historic Places, and the following year it became a state park, with the Delaware and Raritan Canal Commission being authorized to administer the park (Delaware and Raritan Canal Commission 1977:5, 78-83; McKelvey 1975:5). Today it serves as an important source of water for central New Jersey as well as an important recreation area.

Site-Specific History

Prior to the construction of the Delaware and Raritan Feeder Canal in the early 1830s, a grist mill, oil mill, plaster mill, and sawmill were located at the confluence of the Wickecheoke Creek and the Delaware River (Porter and Rutsch 1985)(Figure 3). These mills were fed by a millpond, sustained by a millrace located further upstream along the Wickecheoke. The water fed through the gristmill emptied directly into the Wickecheoke Creek through a short tailrace, while the sawmill discharged water into the Delaware River via a longer tailrace. The outlets of both of these tailraces are still visible.

The construction of the canal in this area presented a problem for the operation of the mills. The Wickecheoke Creek now emptied directly into the canal. Although overflow during periods of flooding was directed into the Delaware River via a spillway, the presence of the

canal did raise the level of the creek to such an extent that it would have impeded the effectiveness of the mill's tailrace. The grist mill would no longer able to discharge water into the creek. In an Article of Agreement between the Delaware and Raritan Canal Company and William L. Hoppock and John S. Wilson (the mill owners at the time) dated June 27, 1833, the canal company guaranteed not to interrupt the flow of water to the mills. This agreement further provided for the construction of the two culverts under consideration by this report:

> Second, the company agrees to be at the expense of building the necessary culvert from the old grist mill to carry of the water used for said mill so as no injury is done to said mill and to keep it in repair at all times.
> Third, the water for the other two run of stones is to be carried out by the culvert for the oil mill at the expense of the company and to be kept by them in repair so as no injury is done to said mills (Hunterdon County Special Deed:4 358).

The northern culvert is basically a continuation of the gristmill's tailrace. A waste gate connects the Wickecheoke Creek to the turbine, after which the water is discharged into an L-shaped pit. This L-shaped, stone-walled pit was built to connect and redirect the tailrace to the culvert. This culvert ran under the canal, changing directions twice, before emptying into the Delaware River at an appropriate elevation.

The Bel-Del line of the Pennsylvania Railroad was built over the top of the culvert adjacent to the canal (Figures 4 and 5), and the spillway next to its outlet was modernized in the late 1940s-early 1950s. Once the mill ceased operation the culvert largely passed out of memory until 1985, when a leak in the culvert barrel developed into a breach, spilling the Delaware and Raritan Canal into the Delaware River (Figure 6). This breach was patched by the NJWSA at the time and this section of the canal was re-watered. The maintenance and monitoring of this culvert has become increasingly important since. Sometime since the construction of the culvert, its outlet headwall appears to have been removed or destroyed. This probably occurred during a Delaware River flood event.

The construction of the canal also blocked the tailrace of the oil mill, sawmill and a small adjacent brook from emptying into the Delaware River. As provided in the above-mentioned article of agreement, the canal company built a rectangular stone-walled pit to connect the original tailrace with a new straight culvert which carried the flow under the canal before emptying into the Delaware. The exact reason a pit was used to connect the tailrace with the culvert in what seems an unnecessarily complicated way is not clear. Although it would have been easier to connect the tailrace and culvert directly to each other, obviating the need for the pit entirely, the canal company may have wanted a clear physical distinction between the tailrace and culvert, limiting the canal company's maintenance responsibilities and liabilities to the culvert. Alternately, a physical or geological reason, such as varying depths of bedrock under the canal, may have prevented the direct extension of the tailrace.

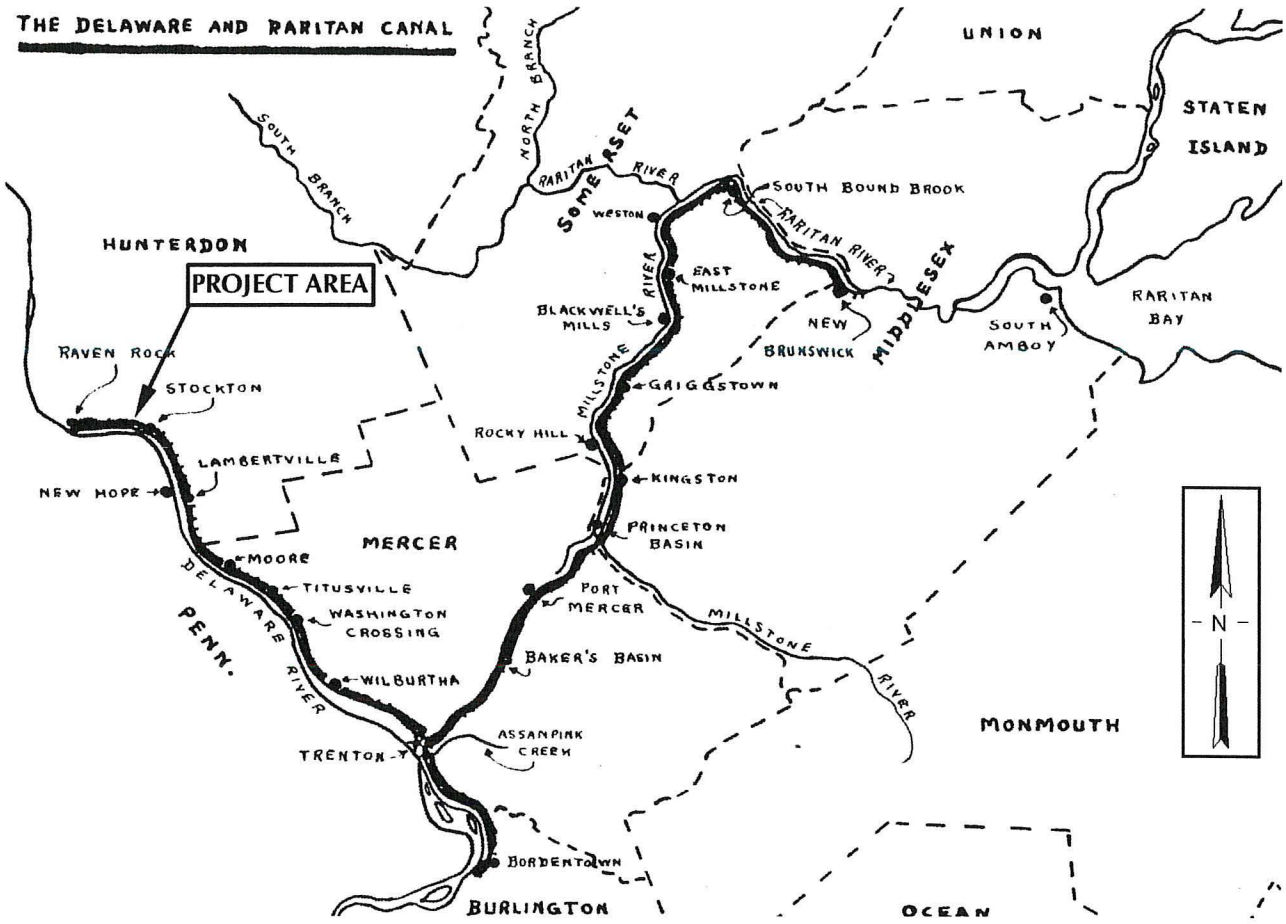

Figure 2: Map showing the route of the Delaware and Raritan Canal.

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Delaware and Raritan Canal
Borough of Stockton, Hunterdon County, New Jersey

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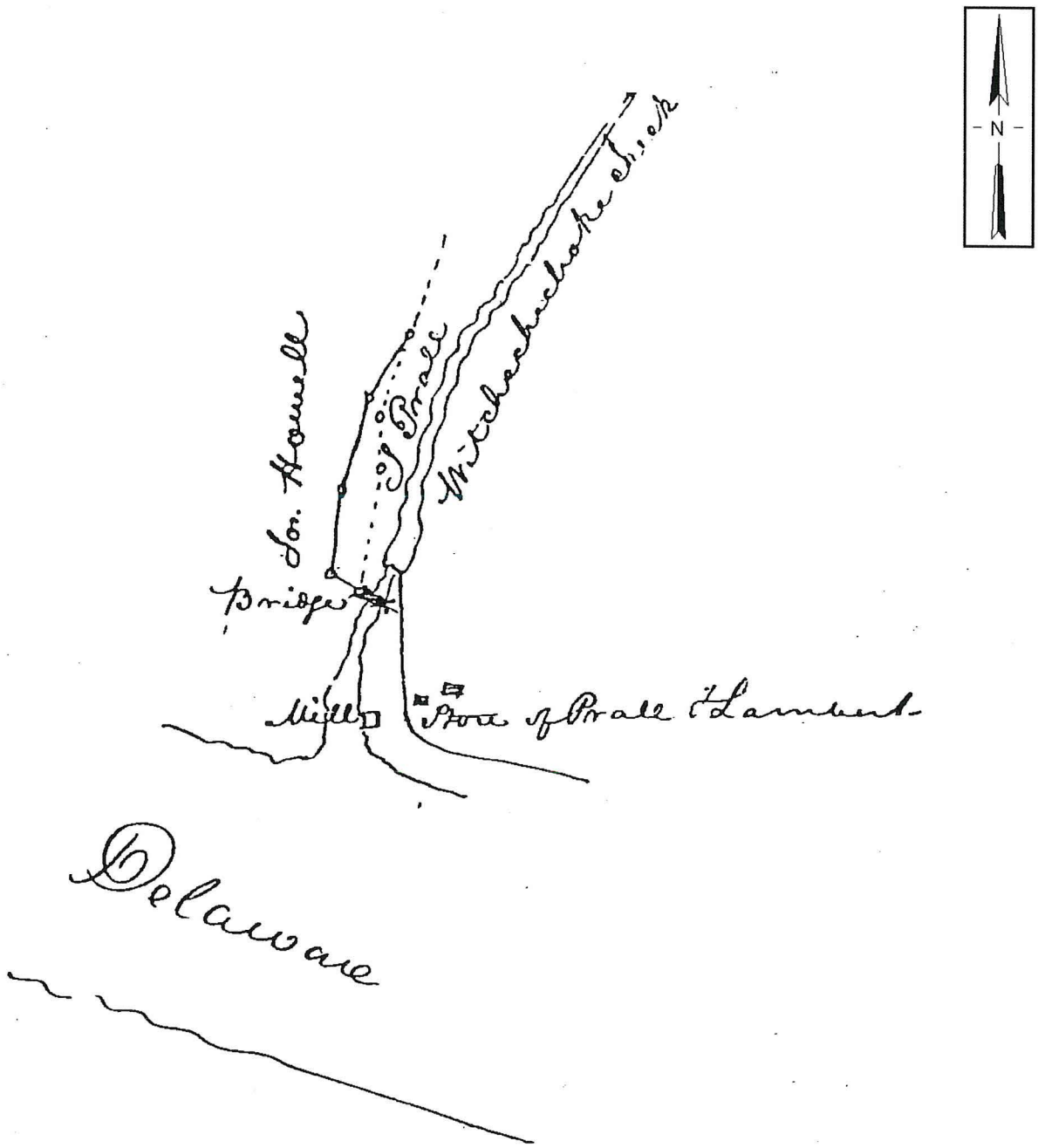

Figure 3: 1813 Road return survey map showing the vicinity of the project prior to the construction of the feeder canal.

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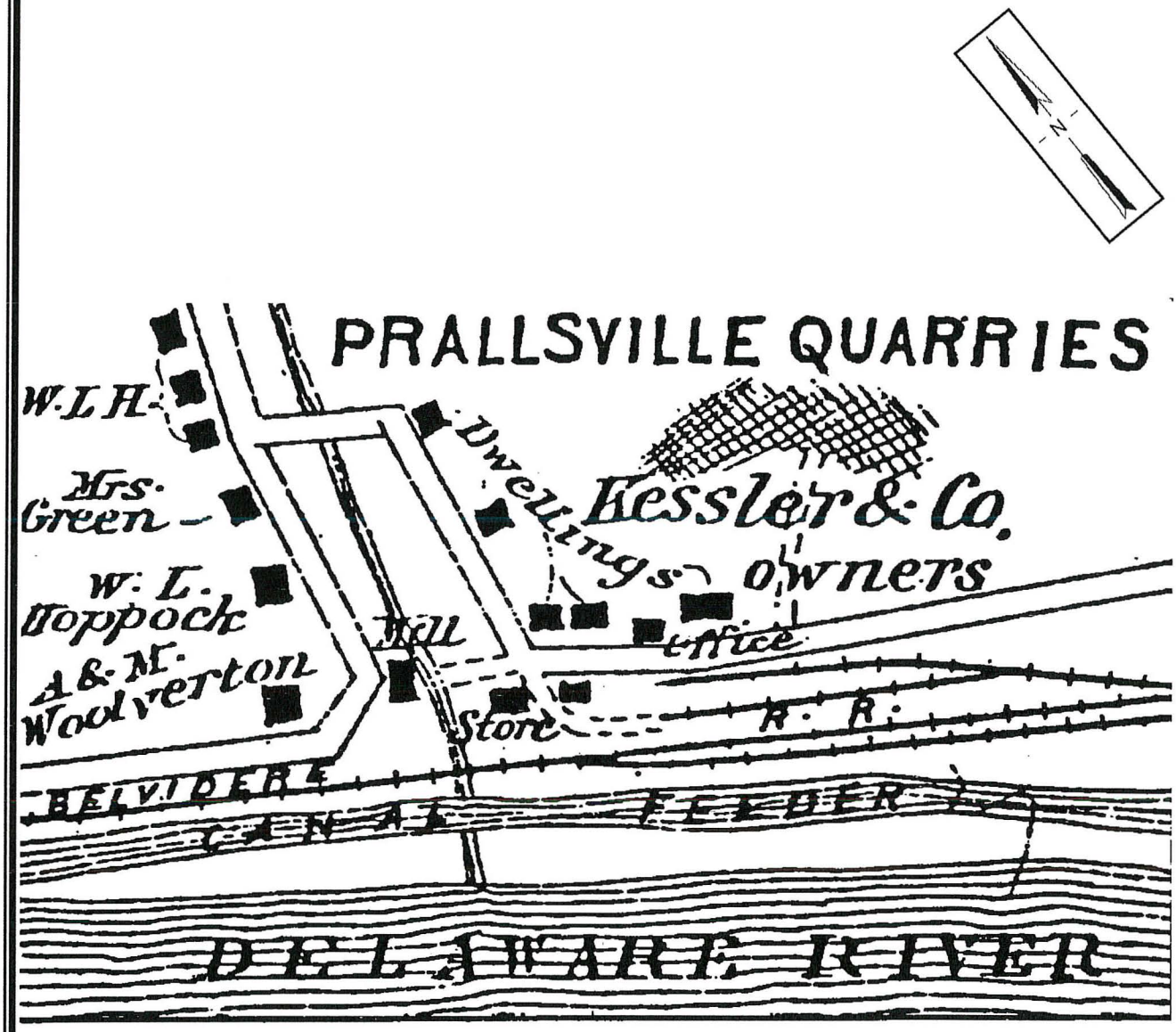

Figure 4: 1873 Beers Atlas showing the general location of the culverts. Scale is approximate.

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Rehabilitation of the Prallsville Culverts
Delaware and Raritan Canal
Borough of Stockton, Hunterdon County, New Jersey

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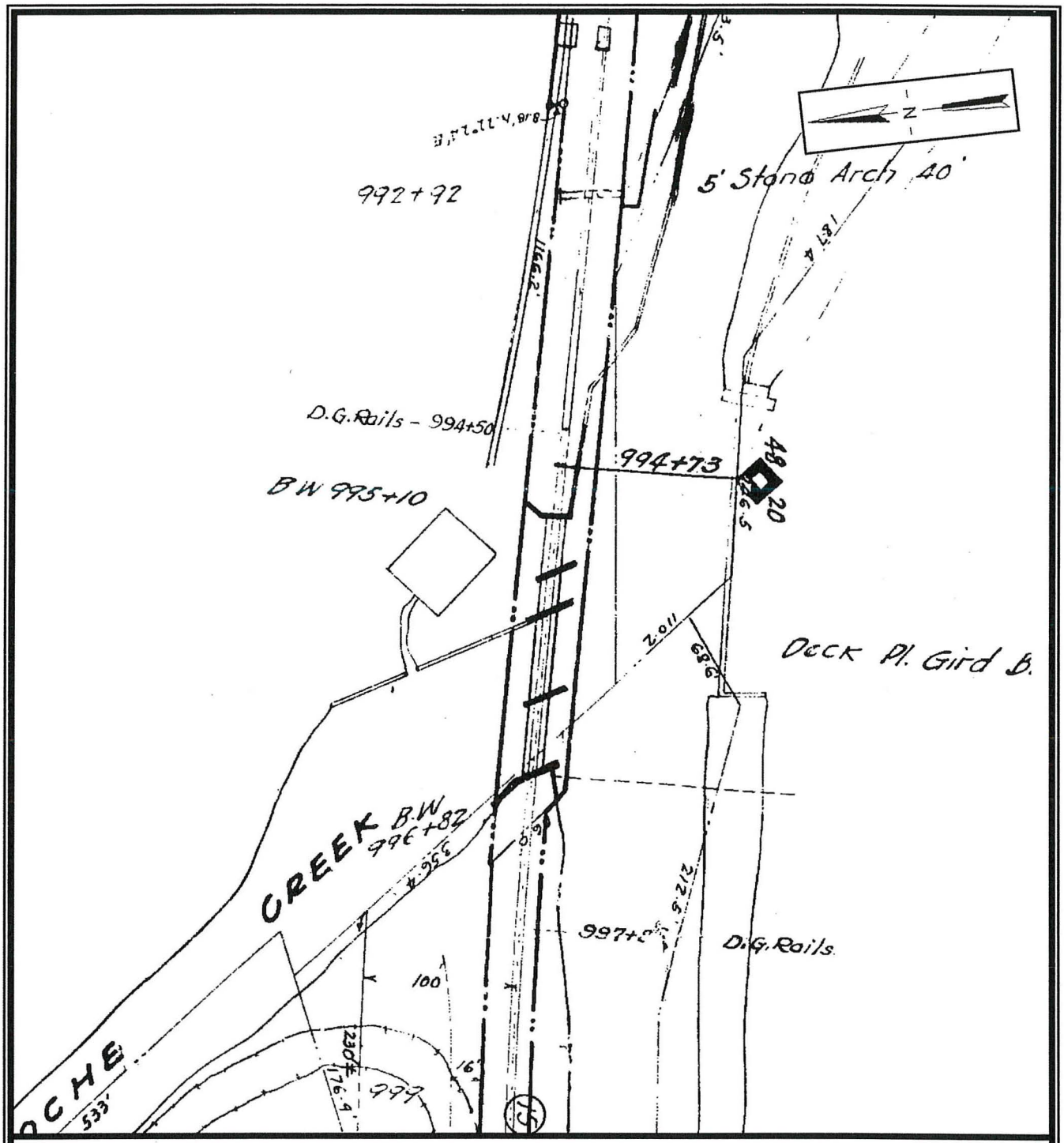

Figure 5: 1914 UNJRRCC Map showing the location of the culverts.

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Rehabilitation of the Prallsville Culverts
Delaware and Raritan Canal
Borough of Stockton, Hunterdon County, New Jersey

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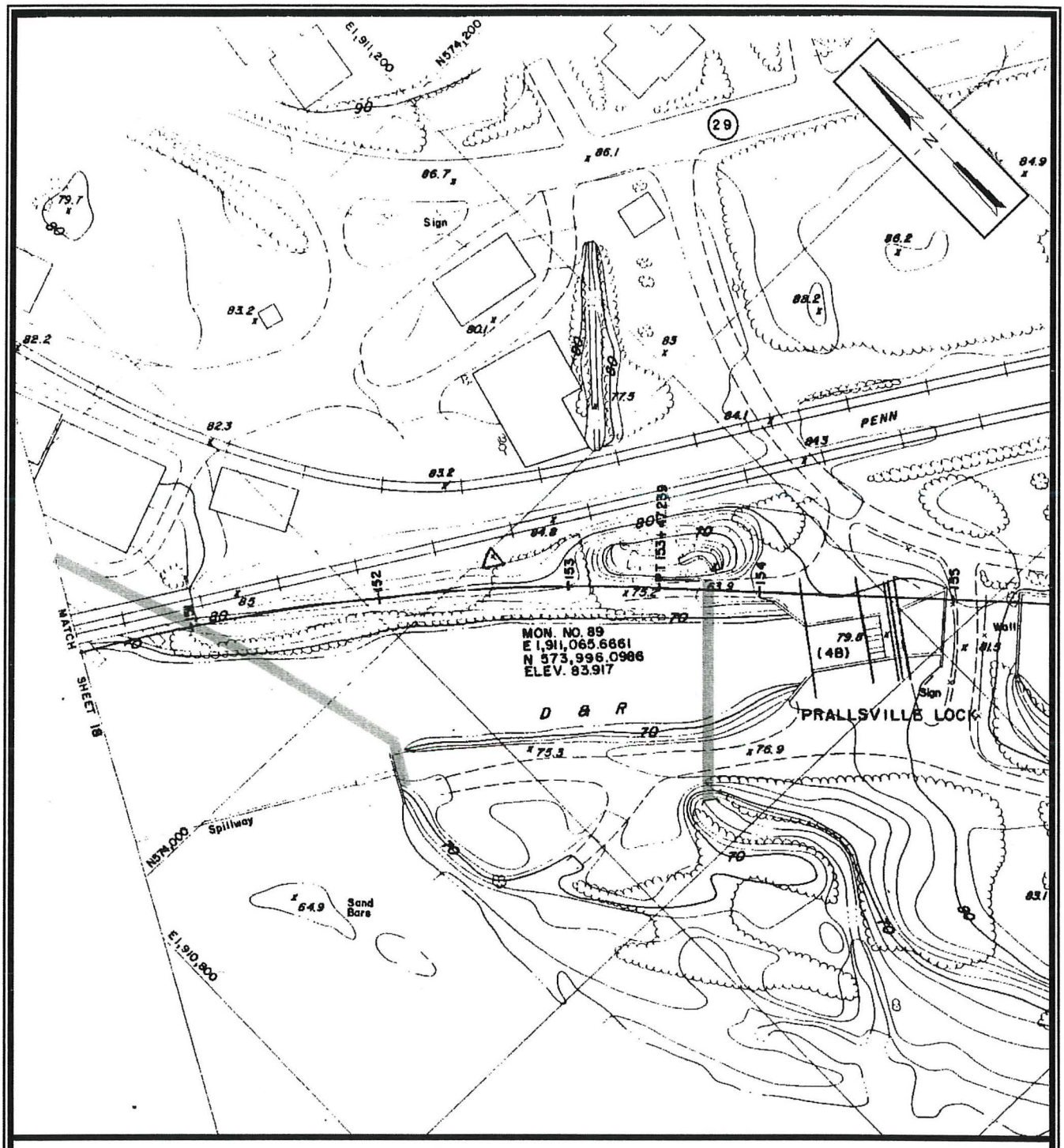

Figure 6: 1979 Reutter Survey Map showing the location of the culverts.

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Borough of Stockton, Hunterdon County, New Jersey

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3.0 CURRENT STRUCTURAL CONDITIONS

The northern culvert extends for a distance of 248 feet from the Wickecheoke Creek just to the north of the Prallsville Mill complex, under the Delaware and Raritan Canal, to the Delaware River (Figure 7). The culvert is a typical barrel culvert measuring 8 feet in width and varying in height from 3 to 5 feet. Inspections of the culvert barrels were carried out by Atlantic Engineering after the cleaning (2001). The floor of the culvert is argillaceous shale bedrock and stone used to form the barrel is a mix of sandstones and shales. While, the inlet headwall is in good condition, having been restored during work on the Prallsville Mill, the outlet headwall is entirely missing (Plate 1). The barrel simply ends. Although stone retaining walls are present at the outlet, these do not appear to have been extensions of the outlet headwall (Plate 2). The stonework within the barrel is also in good shape, with most of the mortar still in place between the stones. This culvert did suffer leakage in 1981, emptying a length of the canal into the Delaware River. Although the breach was patched with concrete by the NJWSA, a leak still exists in the barrel and will be patched as part of the rehabilitation.

The southern culvert is much shorter in length, extending 120 feet. This culvert is part of a system of drainage features much like the northern culvert. A third culvert/tailrace, which is not part of the current study (Plate 4), brings water from a sawmill located within the Prallsville Mill complex to an open, rectangular, stonewalled pit (Plate 3). From this pit, water flows into the southern culvert to the Delaware River (Plate 6). The pit is considered part of the current project. The inlet headwall (Plate 5) of the southern culvert has a skim coat of mortar over stone and appears in good condition. The barrel of this culvert is in very good condition (Atlantic Engineering 2001), and, while made of the same materials, the southern culvert barrel construction is slightly different. In this culvert the barrel consists of a segmented arch (an arch supported by vertical walls) with a center height of 4 feet (Plates 7 and 8)as opposed to the continuous arch construction of the northern culvert. The outlet headwall appears in good condition, although the top three courses of stone have lost the majority of their grout (Plate 9). The headwall is a curved type which rests on shale bedrock.

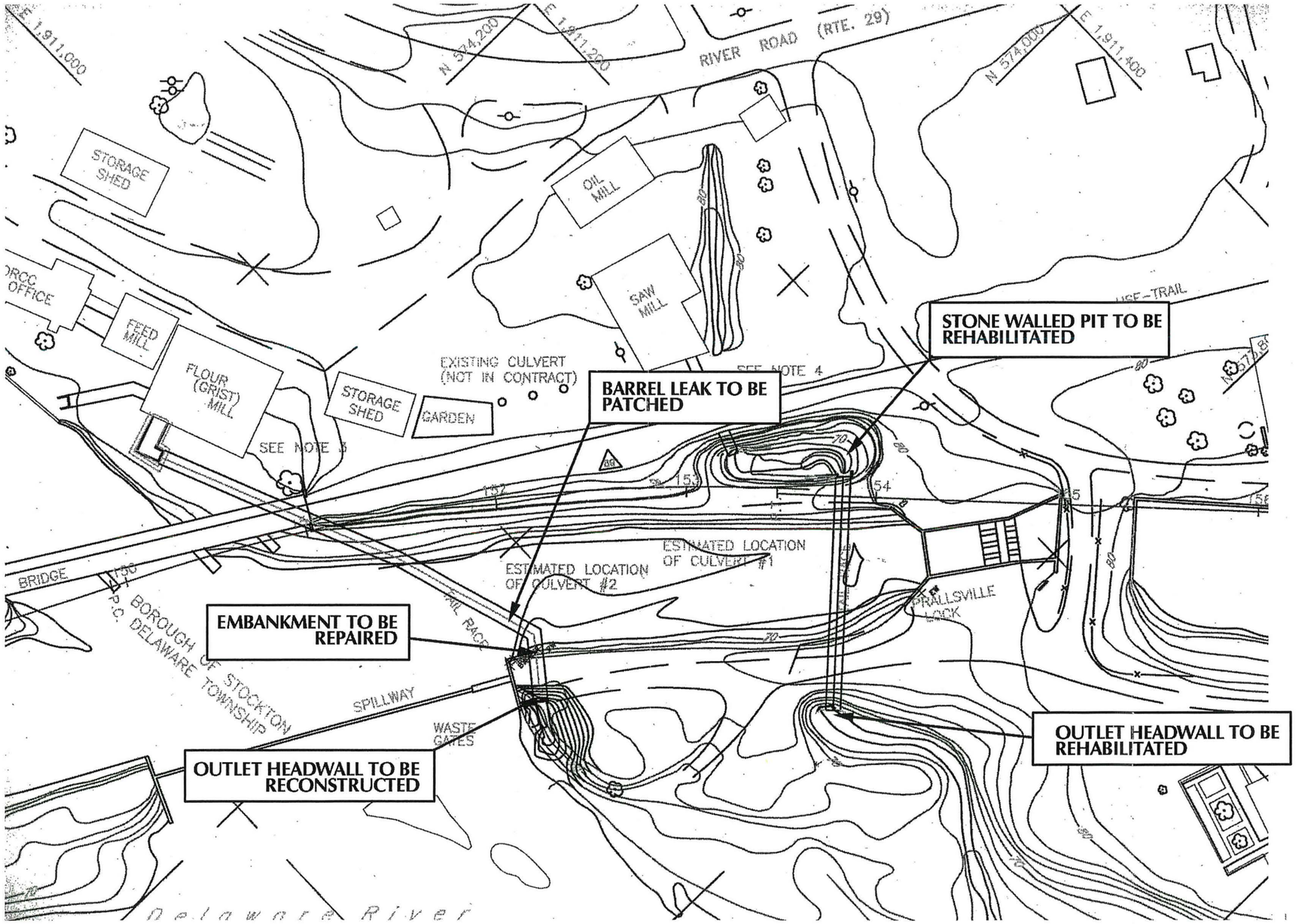

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Figure 7: Map showing proposed work on the Prallsville culverts.

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Borough of Stockton, Hunterdon County, New Jersey

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4.0 ASSESSMENT OF PROJECT EFFECTS

An effect is defined as:

> [an] alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register (36 CFR 800.16[i]).
>
> the result of an action which causes or may cause any change, whether beneficial or adverse, in the quality of the historical, architectural, archaeological or cultural characteristics that qualified an historic property to meet the criteria for evaluation for the New Jersey Register . . . (Splain 1999:71).

An adverse effect if defined as follows:

> An adverse effect is found when an undertaking may alter, directly or indirectly, [any] of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5[a][1]).

The Area of Potential Effects for this project as initially proposed includes the culverts themselves and the canal towpath situated between the outlets. The Prallsville Culverts are included in the National Register of Historic Places as a contributing element of the Delaware and Raritan Canal.

The proposed rehabilitation will have an effect (36 CFR 800.16[i]) on the Prallsville Culverts. However, because the rehabilitation will be carried out according to the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68), this effect is not considered adverse (see definition above).

5.0 RECOMMENDATIONS AND CONCLUSIONS

In discussion of potential rehabilitation schemes with the project engineer, several relevant points emerged that need to be examined here. Primarily, it must be kept in mind that the culverts are listed on the National Register of Historic Places as part of the Delaware and Raritan Canal. Due to this status, the rehabilitation effort should conform to the Secretary of the Interior's Standards for the Rehabilitation of Historic Structures.

>> The barrels of the culverts should be selectively patched where critical leaks and gaps are present to prevent further deterioration of the barrels' integrity. This patching should be done by re-grouting appropriate stone into place.

>> The outlet of the northern culvert then needs to be rebuilt entirely using the outlet headwall of the southern culvert as a model. This headwall should be constructed with hand-laid stones grouted into place.

>> The riverside and canalside embankments above the northern and southern culverts should be stabilized either with matting or (especially on the canal side above the northern culvert) with a hand-laid, grouted stone retaining wall. The use of modern dumped rip-rap and/or gabbion baskets should be avoided in this highly visible location.

>> The deteriorating portions of the stone walls of the pit that surround the inlet of the southern culvert should be dismantled, and replaced with hand-laid, grouted stone walls.

>> The outlet of the southern culvert also needs to be dismantled down to stable stonework and then rebuilt using the existing stone, grouted into place.

In addition to these specific recommendations, contractors (most importantly the masonry contractor) used to perform this rehabilitation should demonstrate experience in performing rehabilitations to historic structures; materials used in this rehabilitation should be approved by the cultural resource consultant; and any excavation work carried out as part of this rehabilitation should be monitored by an archaeologist.

Provided the Secretary of the Interior's Guidelines are followed the physical act of rehabilitation will only affect the culvert and embankments. As noted above, this effect will not be adverse because it will not diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5[a][1]). No further archaeological investigations, apart from construction monitoring, are recommended.

The rehabilitation of the Prallsville Culverts will benefit the public by preserving two functional elements of an important New Jersey historic resource and by maintaining the functionality of the canal as a modern resevoir. This project provides a good example of how modern adaptive reuse of historic properties can aid in their preservation.

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APPENDIX A:
PHOTO PLATES

Plate 1: View northeast of the outlet of the northern culvert.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 2, EXP. 27, NEG. 4

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Plate 2: View east of the retaining wall adjacent to the northern culvert's outlet.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 2, EXP. 22, NEG. 43

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Plate 3: View west of the stone-walled pit at the inlet of the southern culvert.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 1, EXP. 21, NEG. 7

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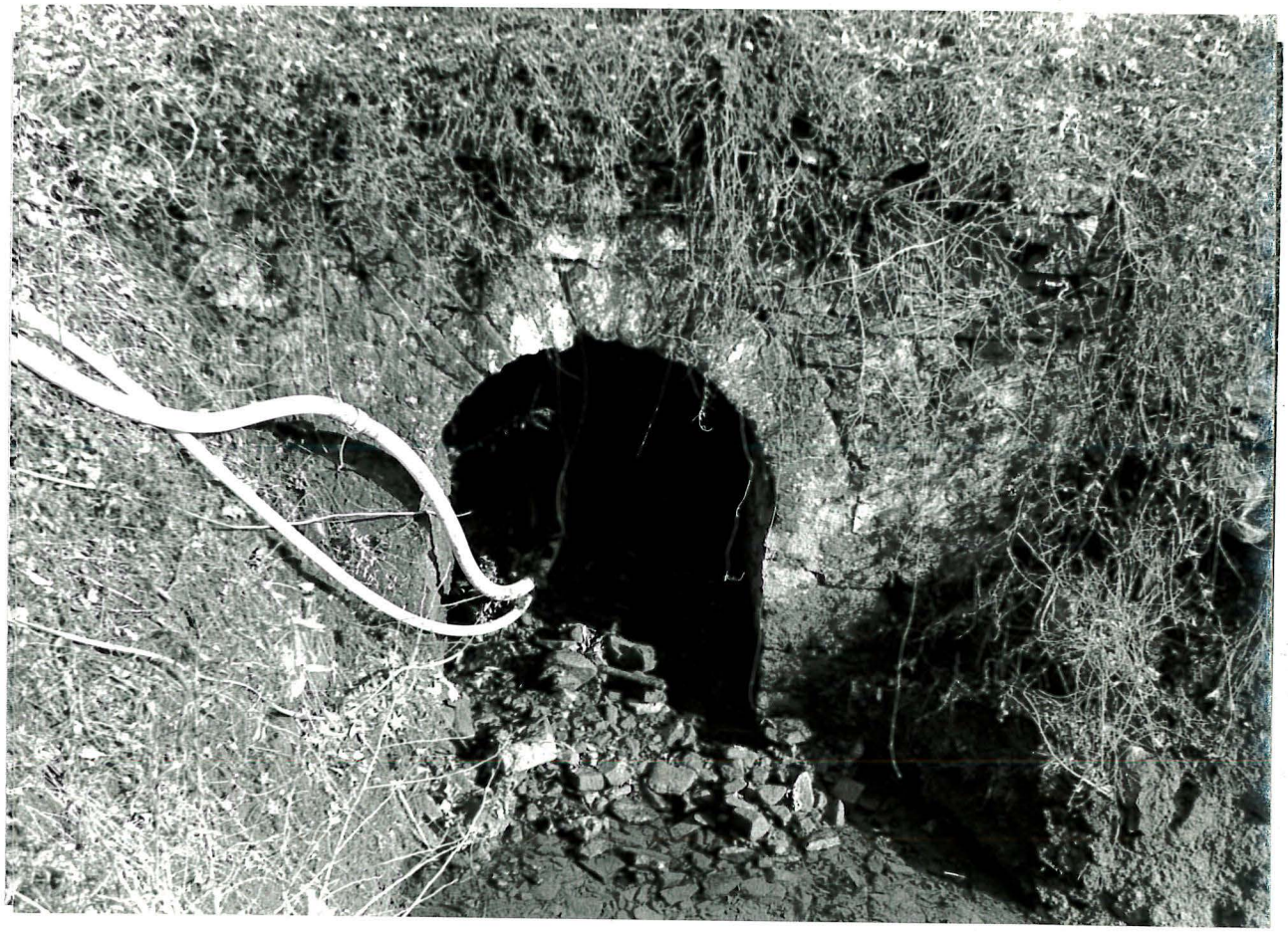

Plate 4: View northeast of the outlet of the sawmill tailrace at the northern end of the stone-walled pit.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 1, EXP. 28, NEG. 14

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Plate 5: View southwest of the inlet headwall of the southern culvert.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 1, EXP. 18, NEG. 4

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Plate 6: View northeast of the outlet headwall of the southern culvert prior to cleaning.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 1, EXP. 3, NEG. 24

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Plate 7: View northeast of the outlet headwall of the southern culvert after cleaning.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 4, EXP. 16, NEG. 9

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Plate 8: View northeast of the northwestern wingwall of the southern culvert's outlet.

DATE: 02/08/01
PHOTOGRAPHER:
JAMES LEE
ROLL 3, EXP. 23, NEG. 23

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APPENDIX B: INVESTIGATOR QUALIFICATIONS

APPENDIX C: HISTORIC PRESERVATION OFFICE ANNOTATED BIBLIOGRAPHIC FORM

HISTORIC PRESERVATION OFFICE
ANNOTATED BIBLIOGRAPHY FORM

Author(s):	James Lee (Cultural Resource Consulting Group)
Title:	Cultural Resource Investigation: Rehabilitation of the Prallsville Culverts, Borough of Stockton, Hunterdon County, New Jersey.
Location:	The confluence of the Wickecheoke Creek, the Delaware and Raritan Canal, and the Delaware River
Drainage Basin:	Delaware Bay
USGS Quad:	Stockton, N.J.-PA.
Project:	Two culvert rehabilitations
Level of Survey:	Phase IB (identification) and II (evaluation and assessment)
Cultural Resources:	National Register-listed Delaware and Raritan Canal