

DELAWARE AND RARITAN CANAL SAFETY ISSUES

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS



Prepared By:

Delaware & Raritan Canal Transportation Safety Study Commission

April 1996

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Prepared By:

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For Submission To:

***Governor Christine Todd Whitman
Honorable Donald DiFrancesco, New Jersey Senate President
Honorable Jack Collins, New Jersey Assembly Speaker***

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Finally, special thanks are due to interested residents, and members and managers of organizations and public agencies who contributed their insights and comments and who so willingly accommodated the Commission's requests for information.

*-Caroline Swartz, Chair
Delaware and Raritan Canal Transportation Safety Study Commission*

Delaware & Raritan Canal Safety Issues: Findings, Conclusions, and Recommendations

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DELAWARE & RARITAN CANAL TRANSPORTATION SAFETY STUDY COMMISSION

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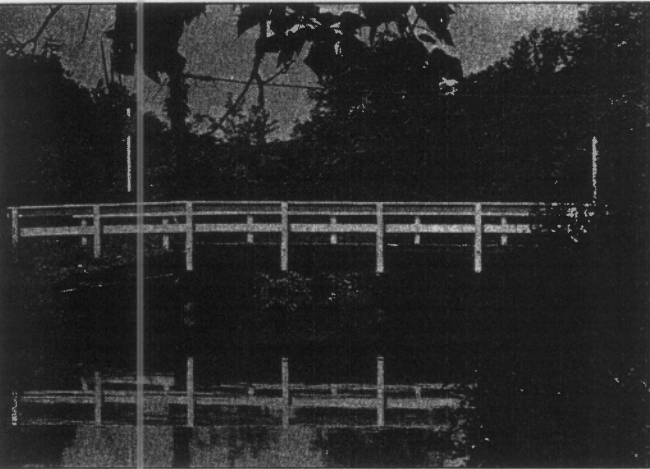
THE DELAWARE & RARITAN CANAL TRANSPORTATION SAFETY STUDY COMMISSION

Executive Summary

Background

The Delaware & Raritan Canal State Park is a widely used and valued resource.

Continued public enjoyment of the Park demands, among many considerations,



Courtesy of Delaware & Raritan Canal Commission

that an acceptable measure of safety be provided to those using it and traveling nearby. At the same time, efforts to reduce safety concerns and to minimize potential accidents must be accomplished in ways that protect its recreational, ecological, historic and aesthetic resources, the very attributes which draw thousands of visitors each day.

During the 1980s, three fatal accidents involving motor vehicles occurred in and near the Delaware & Raritan Canal State Park. In June of 1988, a meeting was convened between state agency representatives and legislators to discuss the nature

of the accidents and to determine what could be done to minimize future traffic safety hazards, both at bridge crossings and on roads that run parallel to the Canal. It was determined at this meeting that the following items would require legislative action:

- the need to conduct a more detailed study of safety hazards
- the need to clearly spell out governmental jurisdiction for vehicle safety on and adjacent to the Canal
- the need to develop a funding base to implement a transportation safety program

In 1990, the State Legislature took action on these issues. Noting that the benefits associated with the Canal have been threatened by public safety concerns, especially related to bridge crossings and parallel roads, the Legislature introduced a bill which established the Delaware & Raritan Canal Transportation Safety Study Commission. The bill was signed into law in 1992 (P.L. 1991, ch. 344; codified at N.J.S.A. 13:13-12.8 and N.J.S.A. 13:13-3.1 to 3.4).

The Study Commission was directed "to study transportation, recreational, and other safety hazards associated with the Delaware & Raritan Canal, and to inquire into the ways in which these hazards might be reduced." In addition, the Commission was directed to address "intergovernmental and jurisdictional questions concerning bridges that traverse the canal, the condition of barriers, guardrails, and fences along the canal,

maintaining the historic and aesthetic integrity of the canal, and the costs associated with the construction and maintenance of these structures.”

At the same time that the Legislature created the Study Commission, it also expanded the powers and responsibilities of the New Jersey Department of Transportation with respect to canal-related projects, while removing certain approval responsibilities from the New Jersey Department of Environmental Protection and Delaware & Raritan Canal Commission. However, in so doing, the Legislature acknowledged that this alteration was intended to be an interim measure only, while the Study Commission investigated and reported on relevant public safety issues and recommendations.

The Commission first convened on April 2, 1993. Bylaws were adopted on June 4, 1993 and meetings were held monthly. The following goals were formulated by the Study Commission to help guide the transportation safety study process:

Goal #1: Address jurisdictional issues regarding safety concerns associated with the Canal.

Goal #2: Investigate transportation, recreational and other safety concerns associated with the Delaware & Raritan Canal and recommend ways in which these may be reduced while maintaining the integrity of the Canal Park as a recreational, aesthetic, historic and eco-

logical resource and as a public water supply.

Goal #3: Provide opportunities for public education and involvement during the study process.

In accord with P.L. 1991, c. 344, the Commission is now reporting its findings, conclusions and recommendations to the Governor and the Legislature.

Summary of Study Commission Recommendations

The recommendations presented in this report were developed after careful analysis and consultation with experts in the fields of transportation safety, parks and recreation, water supply and historic resources, and after public input. The recommendations call for legislative actions, gubernatorial actions and state agency actions to provide needed funding, jurisdictional allocations, infrastructure improvements and park maintenance needs. Report recommendations also include county and local initiatives.

The following is a summary of key recommendations. A detailed discussion on these and additional recommendations is contained in Chapter IV.

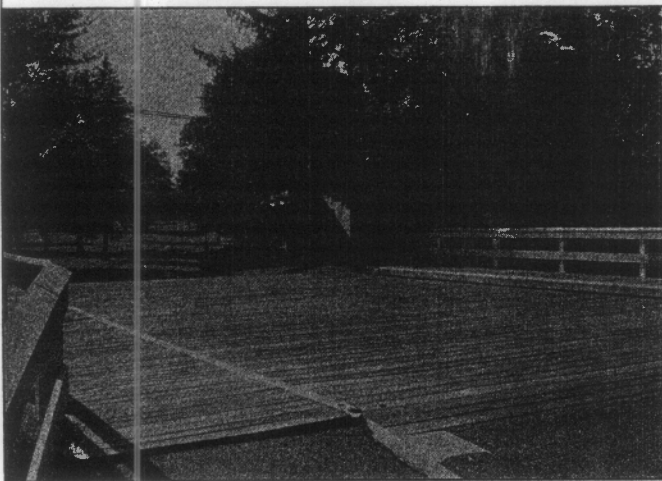
Jurisdictional and Intergovernmental Responsibilities:

The Study Commission recommends that the Department of Environmental Protection and Delaware & Raritan Canal Commission approval authorities, which were temporarily suspended as a result of N.J.S.A. 13:13-3.1 et seq., be returned. This will require legislative action.

The approval authorities over state agency projects that both the Department of Environmental Protection and Delaware & Raritan Canal Commission maintained prior to enactment of N.J.S.A. 13:13-3.1 *et seq.* did not in themselves obstruct needed safety improvements to canal crossings. These approval authorities provided valuable assurance that the Canal Park's cultural, aesthetic and recreational values will be preserved.

The absence of needed interagency coordination and communication slowed the process in the past.

Therefore, to address the need for better coordination among state agencies, especially on technical and planning issues, the Commission recommends an



Courtesy of Delaware & Raritan Canal Commission

Executive Order to formalize the existing Delaware & Raritan Canal State Park Interagency Task Force as the coordinating group for all transportation and safety issues related to the Delaware & Raritan Canal State Park, and, that said Task Force be expanded to include participation by the New Jersey Department of Transportation.

Such an Executive Order will provide a means to reduce or eliminate project review delays and facilitate communication between affected state agencies. With regard to safety, the inclusion of the New Jersey Department of Transportation will assure that projects the Department proposes will be presented and discussed early-on with other key state agencies so that their respective requirements and priorities will be satisfactorily addressed.

Bridge and Rail Safety:

The Study Commission recommends that prototype designs for bridges and railing systems be developed by the New Jersey Department of Transportation with input from the state agencies comprising the Interagency Task Force. The design and crash testing of timber bridge railing systems that the New Jersey Department of Transportation is currently undertaking with federal funds should become part of the prototype design program.

Infrastructure Needs:

The Commission has identified the need for guiderails along parallel roads to protect vehicles from driving off the road into the Canal. It also recommends detailed studies by the New Jersey Department of Transportation, with input from the Interagency Task Force, to determine infrastructure needs on roadways that approach and tie into canal crossings. This includes road realignments and improved signage.

Funding:

The New Jersey Department of Transportation has obtained \$444,936 in

federal dollars, primarily through the Intermodal Surface Transportation Efficiency Act (ISTEA), to develop timber prototype railings both for wooden bridges and other Delaware & Raritan Canal bridges.

The Department has also planned for an accelerated program to upgrade Delaware & Raritan Canal bridge railings and has budgeted \$4.4 million in State funding during the next three years (FY 96-98) to complete safety improvements of the existing railing systems. This accelerated upgrading of bridge railings over the next three years is intended as an improvement to correct existing safety concerns related to bridge railings.

At this time, it is uncertain whether, or to what extent, the results of the federally-funded project will be used, since its completion is not expected to occur until well after construction of the railing safety improvements begin. However, the prototype timber bridge railing designs that are being developed through the federally-funded project will be used in the future when bridges are up for replacement.

In addition, an estimated \$9 million should be appropriated to the New Jersey Department of Transportation to provide for canal bridge repairs, primarily of decks and substructures. The New Jersey Department of Transportation has identified 25 bridges which need such rehabilitation.

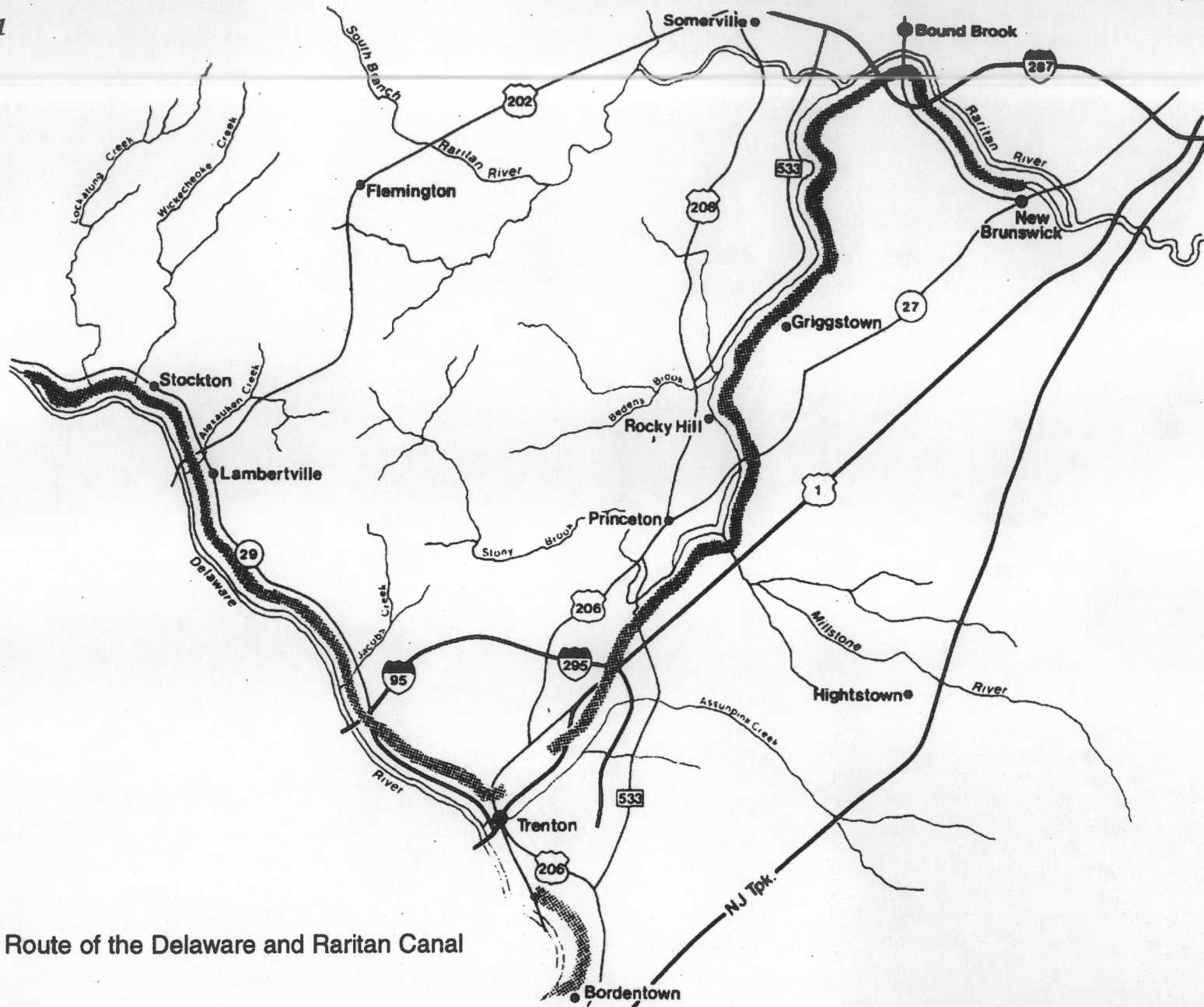
Two million dollars should be appropriated to provide for parallel roadside barriers.

One million dollars annually, additional to the current level of funding, is recommended to be appropriated to the New Jersey Department of Environmental Protection, Division of Parks and Forestry, for continued operation, public information and maintenance of the Delaware and Raritan Canal State Park.

This Park is the third most heavily visited in New Jersey with attendance increasing from some 447,000 in 1985 to over 681,700 in 1995. Since 1985, over 25 miles of trails have also been developed and open to the public, mainly in the Park's most densely populated and heavily used urban areas requiring extraordinary resources to maintain and provide a safe, enjoyable experience to its patrons.

Over the last five years, staffing levels at the Park have decreased by 19%, from 21 in FY90 to 17 today. In addition, current staffing levels are only 50% of the core level staffing established by the Office of Management and Budget in 1988 for the maintenance and operation of this unique Park. With existing resources of approximately \$840,000 for its operation, the Division of Parks and Forestry estimates its needs of over \$1,840,000 to efficiently and effectively manage this valuable resource and to implement the specific recommendations contained elsewhere in this report.

Figure 1



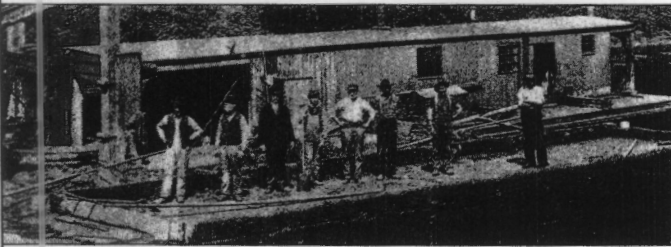
The Route of the Delaware and Raritan Canal

CHAPTER I

INTRODUCTION — THE DELAWARE & RARITAN CANAL

History of the Delaware & Raritan Canal

Pre-1940



Courtesy of Delaware & Raritan Canal Commission

The Delaware & Raritan Canal was originally conceived by William Penn in 1676 as an inland waterway to move goods and people between Philadelphia and New York. This idea lay dormant for over 100 years. In 1830, the New Jersey State Legislature finally granted a charter to a canal company to traverse central New Jersey. The first section of the Canal from Trenton to Kingston opened in September of 1833. The official Canal opening took place June 25, 1834.

The Canal's path is a large meandering "Y." The main canal connects the Delaware River at Bordentown with the Raritan River in New Brunswick. Trenton is the highest point of elevation on this 44-mile-long waterway. A 22-mile-long feeder canal was built to supply water to the main canal. The feeder draws water from the Delaware River at Raven Rock (between Frenchtown and Lambertville) and runs next to the Delaware River all the way to Trenton, where it joins the main canal.

The Canal operated for 99 years and was an important element in the prosperity of Central New Jersey in the latter half of the nineteenth century. Its connections with New York and Philadelphia meant markets for New Jersey products and trade to provide the needs of New Jersey's citizens. During the Canal's busiest years, coal accounted for 80% of the total tonnage. In its busiest year, 1871, the Delaware & Raritan Canal had more traffic than the more famous Erie Canal.

In 1871, with the acquisition of a 999-year lease of the Canal by the Pennsylvania Railroad Co. (PRR), the Canal's impact and usage began to decline. The Canal could not effectively compete with the ever-advancing rail network. Some believe that the PRR's acquisition was intentional to reduce the economic viability of the Canal. Repairs became infrequent and rates were increased.

In the spring of 1933, the Canal failed to reopen after its customary winter closing. The 1830 charter required forfeiture to the State for failure to operate for three consecutive years. Initiated as a federal Works Progress Administration (WPA) project in 1936, a part of the Canal in Trenton was filled, leaving the portion in Hamilton Township cut off and abandoned.

In 1937, the PRR turned the Canal over to the State with 933 years left on its lease.

The Canal, as a navigable commercial waterway, had lasted 99 years before becoming obsolete. Now the Canal would become important as a source of water to the industries and towns growing in the Canal region.

Post-1940

In 1944, rehabilitation began on the rest of the Canal to enable it to serve as a water conduit under the direction of the State's Division of Water Resources, now part of the New Jersey Department of Environmental Protection. Responsibility for the Canal as a water supply was turned over to New Jersey Water Supply Authority, which has been the Canal's official guardian for over thirteen years, providing for the sale of approximately 70.4 million gallons of water per day with an annual income of about \$5,500,000.

In 1973, the Delaware & Raritan Canal and seventeen related structures were made part of the National Register of Historic Places. In 1974, the New Jersey State Legislature established the Delaware & Raritan Canal State Park and the Delaware & Raritan Canal Commission.

Four agencies share responsibility for the administration of the Canal Park: the Delaware & Raritan Canal Commission; the Division of Parks and Forestry within the New Jersey Department of Environmental Protection; and the New Jersey Water Supply Authority. In addition, the New Jersey Department of Transportation maintains the bridges over the Canal.

Today, the Canal serves as the potable water source for about 700,000 people in Central New Jersey, while the Canal Park is the third most heavily used state park in New Jersey (after Liberty State Park and Island Beach State Park). In view of its importance, the public must be able to use the Delaware & Raritan Canal Park in a safe and environmentally sound manner.

The Delaware & Raritan Canal Commission, New Jersey Department of Environmental Protection, New Jersey Water Supply Authority and New Jersey Department of Transportation share responsibility for the administration of the Canal Park.

Park as a Public Resource

The Delaware & Raritan Canal State Park is a widely used and valued resource. The Delaware & Raritan Canal State Park Master Plan points out that the Park is a resource that attracts and holds public affection.



Continued public enjoyment of the Park demands, among many considerations, that an acceptable measure of safety be provided to those using it and traveling nearby. At the same time, efforts to reduce safety concerns and to minimize potential accidents must be accomplished in ways that protect its recreational, ecological, historic and aesthetic resources, the very attributes which draw thousands of visitors each day.

Canal Park Environment

Just as the Canal represents a barrier to vehicles traveling between two points, each vehicle crossing is an intrusion into the State Park. The Delaware & Raritan Canal Commission has adopted policies and strategies for reviewing projects that affect the Park. The Delaware & Raritan Canal State Park Master Plan offers several

principles which help guide decisions about the physical development of the Park:

- The Canal Park is a linear park.
- The Canal Park must retain a degree of serenity and separation from the manmade world. Vehicular intrusion either from roads that enter the Park or from those that run parallel to it should be avoided.
- As a multiple use resource, each of the Canal Park's primary roles must be given equal importance. Any development of the Canal Park should accommodate the Canal's historical qualities, its function as a recreational site, its role as a water supply system and its role as a nature preserve.
- The Canal Park is a site for recreational activities.
- The Canal is a historic resource. All repair, maintenance and development work on the Canal and its associated structures should conform to the Secretary of Interior's Standards and Guidelines for Rehabilitation. The Canal Park's historic character is derived as much from the context through which the Canal flows as from the Canal's structures. That context—the area that can be seen from the Canal and its towpath—should be preserved in a manner that reflects

its historic nature. The Canal Park should provide an appropriate context for nearby historic structures, landscapes and sites.

- The Canal Park is a means of enhancing urban areas. The recreational, historical and natural conservation objectives are all applicable to urban areas through which the Canal flows and should be appropriately applied there." ¹

In addition to the aforesaid principles, the Master Plan also distinguishes between areas along the Canal according to a series of "environmental types" by which they are categorized. Environmental types describe the unique surroundings immediately adjacent to the Canal Park.

They have been used as guidelines in evaluating development projects for their compatibility with a given area, although they have generally not been used in reviewing bridge projects. Environmental types are defined as follows:

- Natural: very little signs of man's influence.
- Rural: natural conditions dominate but unobtrusive signs of man's impact may be visible from the towpath.
- Suburban: open spaces dominate, although those spaces are chiefly defined by manmade structures; regularly placed houses sit adjacent to the Canal Park.

- **Transportation:** highways abut the Canal Park, creating the sense of a confined narrow corridor in the Park.
- **Urban:** dense development surrounds the Park.
- **Special node:** short sections of the Park, usually connected to points where roads cross the Canal, with a character unlike what is on either side or that present special development potential.

Because the Canal Park is linear in configuration and very narrow, drivers approaching a bridge may not even be aware of their entry into the Park when crossing, despite the presence of state park signs and despite the standardized design of canal bridges. Drivers are even less likely to realize they are entering a park prior to actually crossing the Canal, while traveling on the approach roadways. This is exacerbated by a lack of advance warnings on the approach roads to alert drivers that they are entering a park and prompt them to adjust speed and steering.

Historical Significance of Canal Bridges

Most of the bridges constructed after World War II are not historically significant structures, according to the New Jersey Department of Transportation records. The staff of the State Historic Preservation Office (SHPO), housed within the New Jersey Department of Environmental Protection, have confirmed that most of today's bridges post-date the Canal's era of historical significance when the Canal ceased operation

as a transportation corridor. Nonetheless, historic preservation specialists consider the bridges to be one of the most significant design elements in the Park.²

The Canal bridges are considered to be one of the most significant historical design elements in the Canal Park.

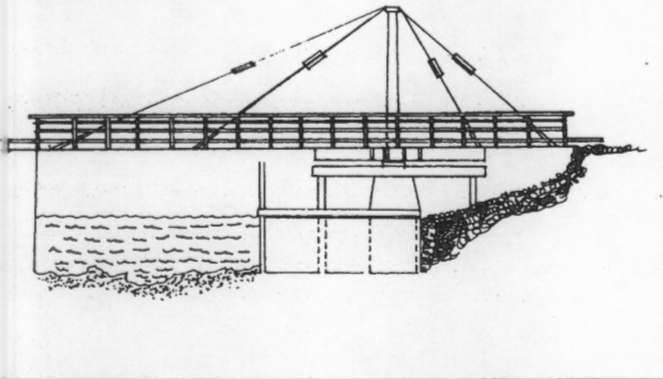
Moreover, both the Delaware & Raritan Canal State Park Master Plan and 1980 Design Guide acknowledge that they are consistent with the Park's historical ambience.

In reviewing projects affecting national and state historic register properties or structures, SHPO uses the Secretary of the Interior's Standards for the Treatment of Historic Properties (1992).³ One of these standards which is of particular importance in reviewing canal projects states that the historic character of a property must be retained and preserved. In this regard, SHPO staff note that while the structural components of the bridges may not be historically significant themselves, bridge appearance is important in relation to the historic character of the Canal. Thus, bridges should be compatible and in character with the history of the Canal.

Historic preservation specialists suggest that in developing designs for new bridges, it is important to incorporate characteristics of existing canal bridges.⁴ Present day bridges in fact retain many of the design elements of their predecessors. The earliest known bridge design was the "A" frame. Bridges of this style were timber, with simple handrails and uprights

spaced at roughly four-foot intervals. Most had a single horizontal rail which was painted white. The "A" frame bridges were replaced by the "King" post bridges between 1911 and 1913. Much like the "A" frame bridges, these were built to a typical prototype consisting of timber

Figure 2



Courtesy of Harvey Steinberg

King Post swing bridge at Kingston

materials and simple rails similar to the "A" frame predecessor. In 1932, the closing of the Canal to navigation obviated the need for movable bridges. Consequently, these bridges were largely replaced with fixed timber bridges built to a prototype in the 1940's.

Historic preservation specialists have documented that maintenance of historical bridge design, carried on through generations of prototypes, is vital to the Canal's historical integrity. Typical design elements include the flat wooden decks and open, white rails. SHPO has gone on record indicating its preference for wooden bridge railing systems. If there are no wooden bridge railings that have been crash tested and meet AASHTO (American Association of State Highway and Transportation Officials)⁵ standards, then metal railings painted white would be the next best alternative.⁶

Most likely, all of the original Delaware & Raritan Canal bridges were constructed of timber. However, over time, this changed, especially in urban areas. Indeed, historical documents and photographs reveal a great deal of diversity in structure and design. Steel structures were prevalent in urban areas, while timber swing bridges dominated the rural landscape. This suggests, according to SHPO staff, that new bridge designs can similarly reflect a good deal of diversity, incorporating, for example, different design elements into bridges in rural areas from those in urban places.⁷

Natural Resources

The Delaware & Raritan Canal Park is linear, over 60 miles in length, covering 3,600 acres. It is very narrow, generally ranging in width from as little as 60 feet to 200 feet, but as wide as 2,000 feet in one section of Franklin Township, Somerset County.

The Canal Park is generally blessed by a wide variety of natural resources, characterized by the flow of canal water; 24 tributary streams; 76 drainage basins; two different physiographic provinces—Piedmont and Intercoastal; a wide variety of floodplain, marsh, and upland vegetation; animal life ranging from many species of natural game fish, turtles, and frogs to about 200 bird species, deer, and small mammals.

Recreation

The Delaware & Raritan Canal State Park offers numerous recreational opportunities. The historic towpath along the main canal offers bank run material or

crushed stone surfaces for hiking, jogging, horseback riding and biking. Canoes, kayaks and small boats can be launched at the several access points along the Canal and Delaware River. Fishing, picnicking and camping are also available to visitors to the Delaware & Raritan Canal State Park. The frequent transit of bicyclists, hikers, joggers, runners, and sometimes horseback riders between the Park and adjacent areas presents safety issues related to vehicular traffic.

Park Protection and Enhancement Programs

Since creation of the Delaware & Raritan Canal State Park in 1974, there have been numerous examples of projects and initiatives led by citizen organizations as diverse as historical societies, greenway groups, and canal societies and by municipal, county, state and federal government to enhance or preserve the integrity of the Delaware & Raritan Canal State Park. Designation in 1973 of the Canal and related structures on the National Register of Historic Places has already been noted. Other examples follow.

Federal Programs

The Delaware & Raritan Canal was included in the National Trails System in 1992. The National Trails System Act of 1968 established a policy for creating a system of recreation, scenic and historic trails that increase public access to outdoor areas and historic resources, primarily in urban areas but also in more remote locations.

State Programs

The New Jersey State Development and Redevelopment Plan identifies the Delaware & Raritan Canal as an area of critical concern that should be considered for future inclusion in the Plan.

In 1991, an intergovernmental steering committee, led by the New Jersey Department of Transportation, was created to develop a State Scenic Byways Program. This program is designed to encourage appropriate management of highways that offer visual or physical access to particularly outstanding scenic, historic, cultural, recreational, natural or archeological resources.

In order to "test" the effectiveness of the Scenic Byways Program, the State is undertaking a pilot project to designate the first scenic byway in New Jersey. Route 29, a State highway which runs next to the Delaware & Raritan Canal, has been designated as the project area. The result of this effort will be a series of recommended management measures and capital investments needed to protect the scenic, recreational, historical and other important resources within the corridor.

County Programs

The Somerset County Planning Board prepared a Scenic Corridor and Roadway Study in July of 1992. The report identifies scenic roadways and corridors in Somerset County according to the presence of valuable and unique visual resources. It then recommends alternative engineering standards for roadway design,

bridges and culverts, guiderails and other transportation facilities; landscaping and lighting; and land use and site planning strategies, all geared toward protection of scenic resources. A map of scenic corridors and roadways shows that roughly 12 miles of Somerset County and local roads bordering the Canal and crossing the Canal are designated as scenic roadways.

Local Programs

The City of Trenton and Capital City Redevelopment Corporation are currently planning improvements to create a major recreational and open space amenity along the Canal and to promote housing and economic revitalization.

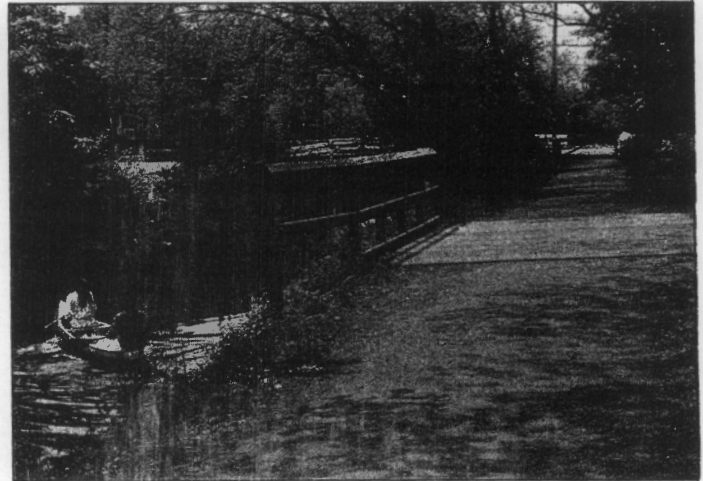
Trends Affecting Park Usage and Safety

According to the Division of Parks and Forestry, the Delaware & Raritan Canal State Park is the third most heavily used State Park in New Jersey. An estimated 2,000 people visit the Park daily during the week, with many additional visitors on weekends. Attendance has increased from approximately 447,000 to over 681,700 between 1985 and 1995. Reasons for its popularity are many. Its central

The Delaware & Raritan Canal State Park is the third most heavily used State Park in New Jersey.

location in one of the most populated regions of New Jersey, coupled with its linear configuration, make the Park accessible to a large number of people. The Park and immediate areas surrounding it

offer a variety of recreational opportunities. A survey conducted in 1988 by the



Courtesy of Delaware & Raritan Canal Commission

New Jersey Department of Environmental Protection determined that bicycling, walking, jogging, fishing, canoeing and camping are among the 20 most popular outdoor recreational activities in New Jersey. The Canal Park area accommodates all of these activities.

According to Park rangers, the Park draws visitors from a large geographic area. Not surprisingly, most Park users are from surrounding municipalities. However, people throughout the Central New Jersey region take advantage of its accessibility and recreational opportunities. The Park even draws visitors from Philadelphia and New York for day and weekend trips, particularly because of its campground and boat access areas.

Park rangers have observed a trend in the growing numbers of bicyclists that use the towpath and adjacent roadways. Increased park usage for bicycling and for other purposes will likely continue in the future, given anticipated population growth within the Central New Jersey

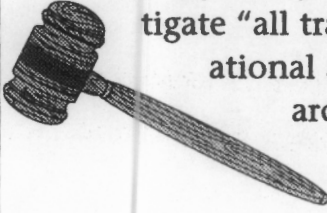
area. Between 1990 and 2010, population forecasts prepared by the five counties which the Canal travels through or adjoins suggest an overall population increase of about 16 to 18 percent in the five county region.

Future residential, commercial, and road development within the Central New Jersey area will have far-reaching consequences for the Canal Park and its environs. Beyond a potential increase in Park visitation, increased vehicular traffic resulting from development will have a direct bearing on safety considerations within and near the Park.

CHAPTER II

SAFETY

Introduction



The State Legislature directed the Delaware & Raritan Canal Transportation Safety Study Commission to investigate "all transportation, recreational and other safety hazards associated with the Delaware & Raritan Canal..." For the purposes of this study, the Commission adopted the following definition of "safety concern" as it pertains to the Delaware & Raritan Canal State Park:

Any situation or structural deficiency that poses a potential danger or hazard to people traveling in or near the Delaware & Raritan Canal State Park and people using and working in the Canal Park who are exercising responsible judgment in the conduct of their activities.

The State of New Jersey has an obligation to provide a reasonable level of public safety with respect to the Park. Also, the public has a responsibility to act in a way that does not place people in unnecessary jeopardy.

Thus, while the Delaware & Raritan Canal, by virtue of its being a waterway, can be considered a safety concern, the level and manner of protection afforded the public must be balanced by an assumption of reasonable judgment to be exercised by park users.

The following is a discussion of safety concerns identified by the Study Commission. These are placed into one of two categories. "Vehicular safety concerns" refer to those that relate to motor vehicle users, while "other safety concerns" include potential hazards to pedestrians, bicyclists and other park users.

Vehicular Safety Concerns ***Accident History at Canal Crossings***

A total of four vehicular accidents have occurred approaching Canal crossings since 1984.⁸ Three of these accidents resulted in fatalities, although one of two which occurred at the Wilburtha Road crossing in Ewing Township was due to the driver's heart attack.

As a result of these accidents, the Legislature concluded that there may be "deficient safety at bridges" crossing the Canal. Beyond the bridge structure itself, the Legislature further concluded that substandard or missing approach rails that tie into these bridges may contribute to safety hazards at canal crossings. In response to such declarations stated in N.J.S.A. 13:13-3.1 *et seq.*, the Study Commission began its investigation by reviewing the structural integrity of bridges and approach railings.

It should be noted that data collection and preliminary evaluation revealed that the factors compromising safety at canal crossings went beyond structural considerations of bridges and approach railings, initially considered the primary focus of investigation. In fact, circumstances that at first appeared to some as the cause of potentially dangerous situations were sub-

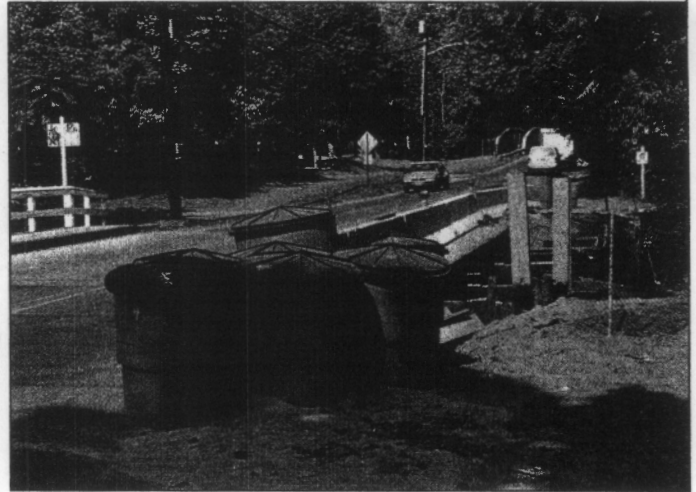
sequently deemed symptomatic of a much more complex problem. An examination of bridge safety, therefore, was broadened to include traffic and roadway conditions on roads that lead up to bridges (approach roads), aesthetic and historic standards that state agencies use to review projects, and interagency coordination in expediting bridge and roadway improvements or construction.

Of the four vehicular accidents approaching canal crossings since 1984, two incidents at the Wilburtha Road bridge in Ewing Township and the Alexander Road bridge between Princeton and West Windsor Townships resulted in fatalities; an incident at the Weston Causeway bridge in Franklin Township resulted in injury.

During the 10-year period studied, a total of 827 million vehicles crossed the Canal. This translates into an overall accident rate of one per 276 million crossings. Fatalities occurred at a rate of one per 414 million crossings. Analysis of accident rates at individual bridge locations during the year of each incident also revealed relatively low rates of one per 803,000 on Wilburtha Road, one per 1.7 million on Alexander Road and one per 1.2 million on the Weston Causeway.

In all of the accident locations, the bridges were constructed of timber and the bridge rails and approach rails failed to meet current safety standards. However, none of the accidents involved vehicles driving off the main bridge structure; rather, the automobile drivers lost control as they approached the bridges, crashing through approach structures.

All of the accidents occurred during the winter. The roads were posted at 40 mph but normally require speed reduction and steering adjustments, even in good weather, to negotiate the roadway alignments approaching the bridges.



Courtesy of Harvey Steinberg

Bridge repairs underway on Alexander Road, Princeton and West Windsor Township, 1995.

Although the three locations accommodated low daily traffic volumes (under 5,000 vehicles per day), two of the approach roads had been widened and realigned shortly before the accidents occurred, and this may have influenced the speed at which drivers approached the bridges.

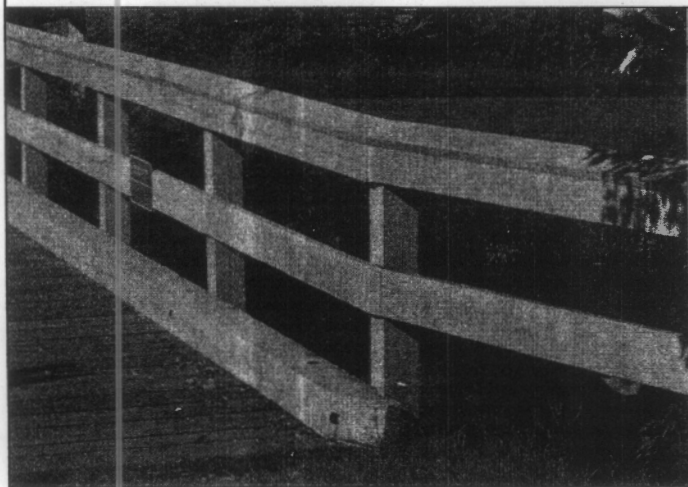
On the Weston Causeway, not long before the accident, Somerset County replaced what had been a 90-degree turn on the approach road with construction of a sweeping curve. Similarly, shortly before the Wilburtha Road accident, Ewing Township required a nearby developer to widen the approach road. Before this, the road curved abruptly on a steep decline as it approached the bridge. As a result of the improvements, the road still approached on a sharp decline, but was

widened significantly. At the Alexander Road bridge, no roadway improvements were constructed. However, a driver approaching the Canal from the east (as the accident car did) travels on a wide flat road until the point where the road turns abruptly and descends. This situation gives the driver a warning, but only at the last moment, to slow down and drive carefully.

Various factors, then, including weather, vehicle speed and approach roadway geometry, may have contributed to these hazardous situations, causing the drivers to lose control of their vehicles.

Existing Characteristics of Canal Bridges

Although a total of 57 vehicular bridges cross the Canal, the scope of this study was limited to 48 crossings which exclude federal, interstate and state bridges that



Courtesy of Delaware & Raritan Canal Commission

the U.S. Department of Transportation and the New Jersey Department of Transportation have judged meet current safety standards. Most bridges (32) that were reviewed by the Study Commission were constructed during a twelve-year

period following World War II. Twelve bridges originate from the 1920's or earlier. The oldest structures are located in urban settings, while post war bridges were designed for rural settings to accommodate relatively low traffic volumes.

The majority of canal bridges (31) are made of timber, with the remaining 17 constructed of concrete, steel or a combination of materials.

The majority of canal bridges (31) are made of timber, with the remaining 17 constructed of concrete, steel or a combination of materials. Of the timber bridges, public use is prohibited in six locations and restricted or limited at an additional seven. Eighteen timber bridges are open to the public and serve as part of a local roadway network.

Twenty-three bridges have posted weight restrictions, including six which are posted at 15 tons or less. Twenty bridges have unrestricted load limits. Actual vehicular weight loads traversing canal bridges exceed posted weight limits.⁹

The 48 canal bridges under review handle approximately 226,700 daily vehicular crossings. Upon closer examination, one can observe variation in traffic volumes among the bridges. While the majority carry relatively low volumes of traffic, ten structures carry 10,000 or more vehicles per day. Of these, seven are found in urban settings and the remaining three high volume bridges are situated in suburban or rural locations. At the other extreme, some bridges carry 10 or fewer vehicles per day. (See Appendix E for bridge data.)

Twenty-seven bridges have a wooden deck surface. Wooden decks may retain moisture longer than impervious surfaces and, coupled with wearing over time, are considered to have more slippery driving conditions than concrete or asphalt. Wooden decks are most commonly found on bridges carrying fewer than 5,000 cars per day. Only one wooden bridge which also has a wooden deck surface carries high traffic volumes (more than 10,000 vehicles per day), namely the Route 518 crossing in Rocky Hill. Three bridges with daily traffic greater than 5,000 but less than 6,000 vehicles per day have a wooden deck. Although major accidents have occurred at three locations with wooden deck surfaces, the deck conditions were not considered to have had any bearing on the incidents.

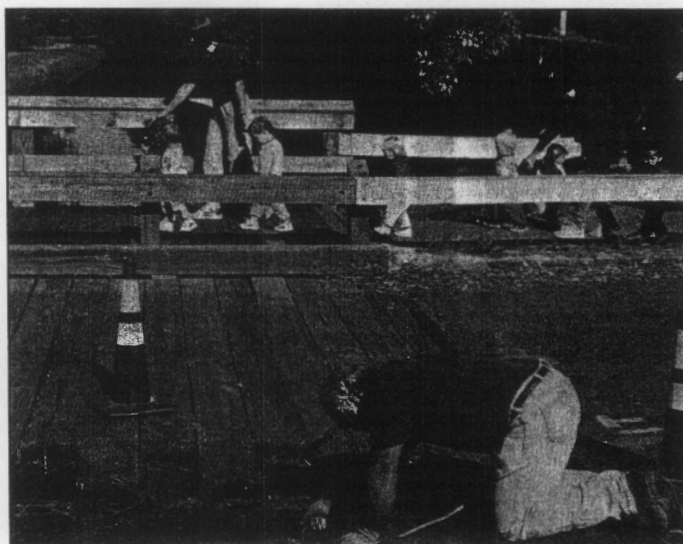
Bridge Maintenance and Repairs

Bridge replacement and repair is a continuing process, affected by at least the following factors:

- reports of traffic accidents and fatalities
- changing conditions at the crossings
- degradation of existing structures
- availability of new materials and techniques for replacement and repair
- changes in structural standards.

Structural standards which apply to a bridge are determined by the standards in effect at the time of original construction. When major rehabilitation or replacement

is performed, the then-current standards come to apply. Although standards may change, such changes do not necessarily dictate immediate bridge replacement, or even repair, since new standards may simply reflect availability of newer materials and techniques without major improvement in safety.



Courtesy of Harvey Steinberg

Generally, most repairs have been accomplished by in-kind measures, that is replacement of materials with like materials in order to maintain bridges at standards applicable at the time of construction. This approach prevails until a bridge qualifies for replacement through a statewide prioritization process. Review and ranking of bridge reconstruction needs are done on an individual basis. Therefore, rather than being considered collectively, canal bridges are evaluated individually through a statewide ranking system.

This statewide prioritization process is used to identify bridge repair and replacement needs that qualify for Federal Highway Administration (FHWA) funds. The New Jersey Department of Transportation evaluates bridge structural integrity and ranks bridge repair or

replacement needs based on periodic inspections. These inspections take place at least once every two years. They cover over 115 items, primarily for bridge structures and railing systems. Specifications pertaining to approach roadway conditions and alignments are available but less comprehensive. Thus, the FHWA funding is directed more toward bridge structural needs, rather than to safety improvements related to broader traffic safety considerations at canal crossings, such as approach roadway conditions and traffic patterns. Based on the results of the inspections, the New Jersey Department of Transportation appraises bridge sufficiency according to two principles:

- structural deficiency relating to minimal structural standards.
- functional obsolescence relating to a bridge's capacity to handle current traffic demands.¹⁰

Together, these principles help to establish maintenance, rehabilitation, reconstruction, and replacement priorities of bridges statewide. Bridges that do not qualify for federal bridge funds may still be in need of safety improvements. Accepted safety standards, such as road geometry and bridge and approach railings, are identified in the FHWA's National Bridge Inspection Standards (NBIS). However, these items do not contribute enough weight to qualify the bridges for federal funds on their own.

Those bridges which do not qualify for federal funds may be identified where serious accidents have occurred or where the New Jersey Department of

Transportation has determined that deficient bridge and approach features exist. The New Jersey Department of Transportation has identified 25 Delaware & Raritan Canal bridges in need of rehabilitation involving primarily deck and substructure repairs. This will cost an estimated \$9 million in state funding.

Pre-approved Designs for Delaware & Raritan Canal Structures

At present, the New Jersey Department of Transportation is developing prototype bridge rail systems, including approach rails, for canal bridges (see pp. 22 and 24). Early interagency coordination has already occurred and will help to ensure that the various concerns of all agencies are addressed as railing designs are developed. In addition, an early railing developed by the New Jersey Department of Transportation and installed at the Wilburtha Road bridge in 1990 was intended, at the time, to be a prototype.

The New Jersey Water Supply Authority has also developed three different designs to repair canal culverts. Water Supply officials have noted that these designs have been through the reviews of relevant state agencies in the past and now have assurance of rapid approvals in the future. Besides those noted above, the Study Commission has found no other examples of prototype structures developed for canal purposes by state agencies.

Approach Roadway Characteristics

Clearly, the structural integrity of the bridges and rails plays a key role in evaluating vehicular safety at bridge crossings. Other factors of major importance include

traffic patterns and the approach roadways.¹¹ More specifically, a driver's ability to safely negotiate a bridge crossing will depend on:

- the speed traveled as the driver approaches the bridges.
- the driver's ability to see a reasonable distance in order to adjust speed and direction.
- the volume of traffic on the approach roads.
- the mix of vehicles on the approach roads.
- the number and location of various intersections (e.g. roadway intersections, driveways, parking lots, etc.) where additional traffic may enter or exit the approach roads. This is commonly referred to as "side friction".
- the type and condition of road surface and width.

Indeed, the driver's ability to safely cross canal bridges is compromised in many locations due to approach roadway conditions and alignments. Accepted standards attempt to limit the decisions or distracting elements confronting a driver as a means of improving traffic safety. Ideally, a free flow of traffic moving at a relatively constant speed with gradual turns and limited access can reduce external influences and decrease the potential for accidents. Yet, approach roads intersect with other roadways, driveways and private service roads at 23 bridge locations (Refer to Appendix E).

CASE STUDY: SAFETY CONCERN

Conditions at the Port Mercer bridge and its approach road demonstrate how traffic safety may be compromised. Port Mercer is a historic hamlet consisting of a tight cluster of houses and structures at the juncture of Lawrence, West Windsor and Princeton Townships. Despite the rural character of the immediate surroundings, Port Mercer is a throughway for traffic crossing Route 1, only one half mile away. The Port Mercer bridge, a modest timber structure, serves as a major canal crossing for over 12,000 vehicles daily. County Route 533 is a two-lane road that approaches the bridge. East on Route 533 is a four-lane overpass over Route 1. There is only one sign indicating a 40 mph speed limit on the County road and that is located on the Route 1 exit ramp. Notice of the bridge's 15 ton weight limit is not provided in advance of the bridge. Furthermore, two poorly visible driveways enter onto the County road within 50 feet of the bridge and no warning sign is posted.

On the western side of the bridge, Route 533 terminates at a "T" intersection with Province Line Road to the left and Quaker Road to the right, both restricted to 40 mph speed limits. However, neither road is signed for an approaching intersection or possible turning movements. The traffic flow traveling both east and west requires a 90 degree turn when crossing the bridge. A parking lot is located north of the bridge on Province Line Road. When large tractor trailers exit Route 1 and then observe the posted weight limit of the bridge, the only available option for them is to cross the bridge and turn around in the parking lot, causing additional hazardous conditions on a narrow road. Thus, a combination of abrupt changes in roadway conditions, coupled with driveway intersections, high speed limits, heavy traffic volumes and lack of adequate warning signs all contribute to a very hazardous situation.

Professionals note that a driver's line of sight and roadway geometry are also critical factors that influence traffic safety.

Vehicular safety at canal crossings is not dictated by the structural integrity of bridges and railings alone. Other important factors include the condition and alignment of approach roads as well as traffic patterns.

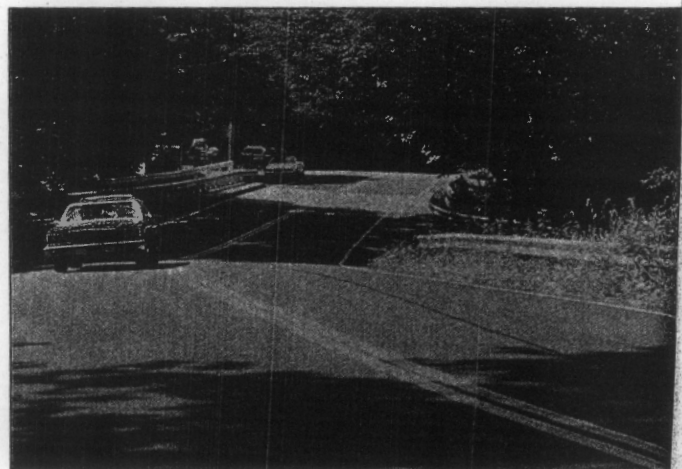
When a driver is unable to see a change in roadway width or an approach to a narrow bridge due to elevation changes or curves in the road, he may be unable to adjust steering and/or speed in adequate time. New Jersey Department of Transportation professionals have observed that roadway alignments approaching seven existing canal bridges are unsatisfactory. Most of the approach roads are under county jurisdiction and some are under municipal jurisdiction. Any improvements to them will therefore require coordination with the applicable county or local government.

Speed limits play an important role in determining traffic safety as well. The posted speed limit on most approach roads at canal crossings is 40 mph. Where roadway geometry impedes a driver's ability to see far enough ahead, a reduction in speed, below the posted limit, may be necessary.

The mix in types of vehicles using the canal bridges presents a potentially hazardous situation. Increased development during the 1980's brought additional traffic to the canal region and increased congestion on primary roads, including both cars and trucks. Cars and trucks seeking

to bypass congestion on major roadways have discovered alternative routes through the Canal Park, with both increased volume and mix in types of vehicles contributing to traffic safety concerns.

Finally, the geometry of the approach roads greatly affects traffic safety. On the one hand, roadway widening and realignment to increase sight distance can improve traffic safety. Under certain conditions, however, such improvements encourage higher speeds and may attract larger vehicles. Thus, if improvements occur on a particular segment of roadway in advance of a canal crossing and are followed by abrupt narrowing immediately prior to the crossing, a driver may be unable to safely adjust his steering or speed if he is not alerted well in advance of the change in conditions. Likewise, such an improvement on the roadway segment immediately prior to the crossing creates a hazardous situation if the bridge structure itself is not correspondingly improved.



Courtesy of Harvey Steinberg

Approach to canal crossing on Wilburtha Road, Ewing Township

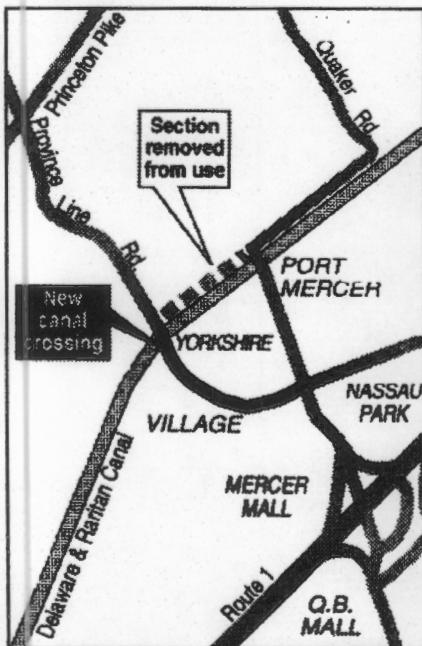
While subject to debate, there has been some suggestion that appropriate landscaping, such as the presence of street

CASE STUDY: SAFETY ENHANCEMENT

Another example of traffic considerations on the approaches to canal crossings provides insight into appropriate traffic safety enhancement measures. A proposed major commercial development and proposed residential developments in West Windsor and Lawrence Townships will require the construction of a new canal crossing on Province Line Road (see figures 3 & 4). Bridge engineers representing WalMart, the commercial developer, are working in concert with State, County and local agencies to design a bridge to cross the Canal.

The bridge will create another link to Route 1, diverting the additional traffic generated by the new development away from Port Mercer. In addition, the posted speed limit of Province Line Road will be reduced from 40 mph to 25 mph. Shoulders will be constructed to accommodate an emergency lane but will be composed of turf material rather than asphalt in order to create a sense of a narrower roadway to slow traffic down. Moreover, pedestrian safety will be enhanced at the bridge crossing, with a continuous pedestrian path under the bridge.

Figure 3



Courtesy of Tom Lederer, Lawrence Ledger

Location of new bridge under construction on Province Line Road, Lawrence Township.

trees, and other techniques to create a sense of a narrow passage can heighten safety, providing other conditions do not counteract this. These counteracting conditions include:

- high speed limits
- wide lanes at bridge approaches
- heavy traffic volumes and vehicle mix.

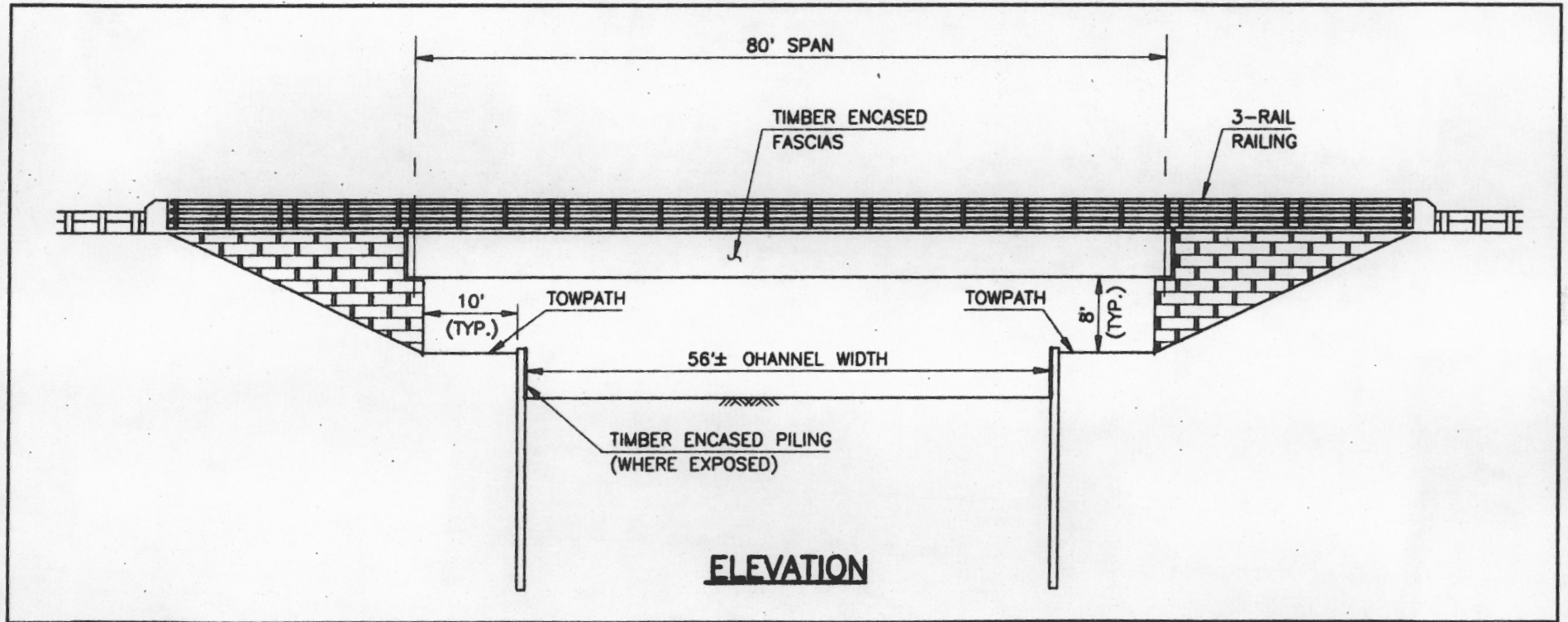
Upgrading of Railings at Canal Crossings

Bridge rails include the railing on the bridge itself (bridge rail), the rail on the road approaching the bridge (approach guiderail), the transition between the approach guiderail and the bridge rail, and the termination or anchoring of the approach rail.

Much of the attention accorded bridge safety has been focused on railing systems, more specifically, the bridge approach rails. As a result of a fatal accident in 1988 at the Wilburtha Road bridge, the New Jersey Department of Transportation developed and installed a bridge and approach guiderail system which was intended to serve as a possible prototype. This is a "W" beam constructed of steel and painted white. While the rail design did not necessarily conform to aesthetic and historic standards of all agencies involved, it was deemed the most cost-effective design and expedient solution that met then-current safety standards.

The New Jersey Department of Transportation has upgraded bridge rails to current standards at three locations: the Harrison Street bridge joining West

Figure 4



Design elements of new bridge under construction on Province Line Road, Lawrence Township

Windsor and Princeton Townships, the Whitehead Road bridge in Lawrence Township, and the Wilburtha Road bridge in Ewing Township.

The New Jersey Department of Transportation has recently initiated a program for short term safety improvements. Specifically, the program involves upgrading railing systems at all canal crossings where existing railings are deemed deficient by the New Jersey Department of Transportation. This accelerated upgrading of bridge railings over the next three years is intended as an improvement to correct existing safety problems related to bridge railings.

On a separate note, the New Jersey Department of Transportation has obtained \$444,936 in Federal monies primarily through the Intermodal Surface Transportation Efficiency Act (ISTEA) to develop crash-tested designs of timber bridge and approach rail systems specifically for Delaware & Raritan Canal bridges. This provides the opportunity to improve canal bridges under one dedicated program, avoiding statewide competition on a bridge-by-bridge basis for Federal Highway Administration (FHWA) bridge improvement funds.

Aesthetics is to play a much greater role in the design of future prototype canal bridge rail systems under the ISTEA program. This is intended to result in railing systems that not only meet current standards but also are designed with sensitivity to the Canal Park's historical integrity.

The New Jersey Department of Transportation has budgeted \$4.4 million

in State funding during the next three years to complete construction of the railing safety improvements. At this time, it is uncertain whether, or to what extent, the results of the ISTEA-funded project will be used, since completion of the ISTEA-funded project is not expected to occur until well after construction of the railing safety improvements begins. However, the prototype timber bridge railing designs that are being developed through the ISTEA-funded project will be used in the future when bridges are up for replacement.

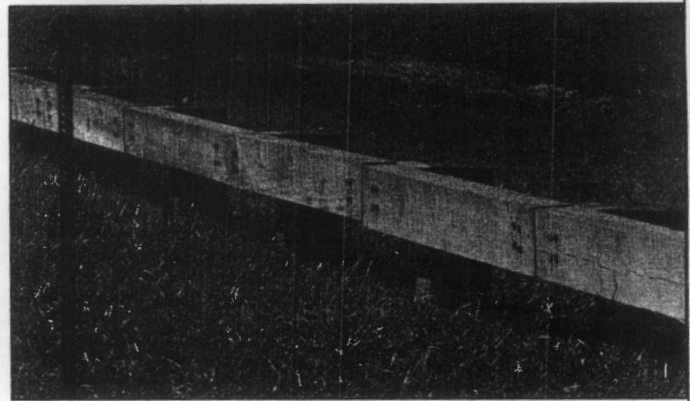
Accidents Involving Parallel Roads

Since 1984, there has been a total of seven accidents involving vehicles entering the Canal from parallel roads or dead-ends documented in New Jersey Department of Environmental Protection records.¹² In 1983, two Rider College students died when their automobile was driven from a restaurant parking lot around a steel guiderail and down an access road into the Canal in Lawrence Township. None of the other accidents resulted in fatalities. The accidents generally involved one or more of the following conditions:

- roadway conditions were icy.
- roadside barriers were deteriorated or absent.
- a vehicle tried to avoid an animal crossing the road.
- the driver fell asleep at the wheel and the vehicle rolled down the dead end into the Canal.

- one vehicle crossed into another lane while attempting to pass.

One incident occurred on Route 29 when a driver lost control of the vehicle due to icy conditions and drove into the Canal. Several other accidents occurred in icy conditions on Route 29 but did not result in vehicles entering the Canal.



Courtesy of Federal Highway Administration

Steel-backed timber guiderail

Roadside Barriers on Parallel Roads

Manmade roadside guiderails or barriers exist within 100 feet of the Canal along roughly half the length of the Park. These barriers were installed in order to prevent vehicles from running off of the road and into the Canal. The Study Commission, in conjunction with the Division of Parks and Forestry, conducted an inventory of barriers that parallel the Park to make a preliminary judgment about their structural soundness and ability to protect drivers. This inventory included an investigation of barriers on parallel roadways and those on perpendicular streets which terminate at the Canal Park (See also p. 26). The Study Commission also researched records of vehicular accidents at these locations.

Roadside Barriers: Function and Materials

Roadside barriers, such as steel guiderails and concrete barriers, are used to protect motorists from either natural or manmade hazards located alongside roadways. According to AASHTO, roadside barriers should only be installed if fixed objects or natural features adjacent to the road are considered more hazardous than the barrier itself. In other words, barriers are warranted only if the consequence of hitting a

fixed object or running off of the road is more serious than hitting the barrier itself.¹³

Several types of roadside barriers are recommended for use by AASHTO. Barriers such as "W-beam" systems, concrete barriers, stone masonry walls and steel-backed timber railing systems are just a few examples. All of these have demonstrated satisfactory field performance in terms of construction, maintenance and accident experience and have met established criteria in crash tests. Determination of appropriate types of barriers can depend upon many factors, including types and weight of vehicles using the roadways, design speeds, cost variation and aesthetic considerations.

W-beam guiderails are constructed of galvanized steel. One distinct advantage of these railing systems from a safety standpoint is that they are flexible. Thus, when a vehicle hits the guiderail, there is a lower impact force upon the vehicle.

Cor-ten guiderails are constructed of weatherized steel and have a more rustic appearance.



Canal Road, Franklin Township

The steel-backed timber alternative consists of wood rails backed with a steel plate and supported by timber posts. The steel plate provides tensile strength to the system and the wood members give a more rustic appearance than steel or concrete.

The Federal Highway Administration has developed standards for steel-backed timber barriers. These have been crash tested at 50 and 60 mph speeds. While developed for use on Federal lands, they can be used generally at locations where impacts within ranges to which they have been crash tested can be expected.¹⁴ In New Jersey, approximately 1,160 linear feet of steel-backed timber guiderail was installed on the Weston Causeway between Manville and Franklin in the vicinity of the Millstone River Crossing.¹⁵

Roadside Barrier Inventory

In July of 1993, the Division of Parks and Forestry conducted an inventory of roadside barriers within 100 feet of the Delaware & Raritan Canal State Park.¹⁶ The following observations were made:

- There are approximately 32 miles of

parallel roadways within 100 feet of the Canal.

- Roughly 24 miles of parallel roadways are protected within New Jersey Department of Transportation-approved W-beam guiderail systems.
- Approximately three miles of roadway are protected with deteriorated wire rope and wooden post guiderail. These are located along Canal Road in Franklin Township, Somerset County. Roughly one half mile of roadway is protected by timber guiderail.¹⁷
- Approximately 4.5 miles of roadway are either bordered by natural barriers, such as drainage ditches, stands of mature trees or large stretches of open space, or abut the Canal with little or no protective barrier between the road and waterway.
- Many types of barriers exist at streets that dead end at the Canal Park. These include guiderail, tree stumps, large rocks, and wooden railings. Several streets terminate at the Canal Park with no barriers present, including some locations where the road slopes abruptly toward the Canal.
- Most parallel roads, except for Route 1 and Route 29, are municipal or county roads. Speed limits vary on these roads from 25 mph to 40 mph.

Other Safety Concerns

The inventory of "other safety concerns" described below was identified by Study Commission members based on

personal and professional knowledge. Several were reiterated by the public at Commission meetings and special public forums. It should be recognized that those concerns mentioned here may be incomplete; parties connected with Park operations should be alert to other concerns that may surface in various ways. Following is a description of findings and conclusions related to "other safety concerns."

Waterway Awareness

The Canal cross-section is generally trapezoidal in shape. The width of the waterway ranges from thirty feet to over a hundred feet at the water's surface. The side slopes of the Canal are relatively steep and are nearly vertical in some locations. Water depths are as much as eight feet. The depth of the Canal is not readily apparent because of murky water which can also hide submerged objects. Water velocities are in the range of two-tenths to one-half of a foot per second. A recreational user of the Canal might sense the water movement but, because of the vegetation along the Canal, would not have a feel for the depth or the fact that the Canal has near vertical side walls.

In most locations there is a towpath on one side of the Canal and in some locations there is a path on both sides of it. The Canal path is in some places immediately next to the Canal and in some places there is a separation of a hundred feet.

Although swimming is prohibited in Canal Park, there have been 11 drowning incidents dating back to the 1960's.¹⁸ Two were determined to be suicides; the others

appear to be accidental. A contributing factor in these incidents may have been a lack of awareness of the presence or depth of the Canal.

Flow Control Structures and Spillways

The Delaware & Raritan Canal waterway contains several structures related to its former use as a transportation corridor and present use for water supply purposes. Due to changes in elevation, numerous locks were constructed along the waterway. In addition, flood preventing structures were built to release excess water from the Canal during flooding conditions. To comply with Public Employees Occupational Safety and Hazards Act



Courtesy of Harvey Steinberg

(PEOSHA) regulations, railings were installed by the New Jersey Water Supply Authority at crosswalks used by its employees to access nonpublic operational areas.

There is no historical documentation of any mishaps relating to patrons being injured on canal locks. However, due to the physical characteristics of these structures, and the flow of water through them, they could pose a potential hazard to park patrons who may be unaware of their existence and possible danger.

No safety criteria have been established (state or national building codes) which require the installation of safety railings or fencing for recreational users. The provision of railings or fencing in public access and recreation areas is, therefore, a policy decision that rests with the owners of the property, namely the New Jersey Department of Environmental Protection, Division of Parks and Forestry.

Fencing, Barriers and Pedestrian Crossings

Fences and barriers can be found next to the Canal in several locations. These structures are intended to guide or bar vehicular, pedestrian and bicycle use. The nature of these structures varies greatly. For example, a steel and wooden gate located at one intersection between a road and the towpath may be followed by a barrier consisting of a gate and boulder combination at the next intersection. This lack of uniformity, where patrons are confronted with varied obstacles, can lead to confusion and potential mishaps.

Additionally, there are many towpath-roadway intersections lacking crosswalk markings, signage or traffic signals, and preceded by less than desirable approach roadway geometry. All these factors can contribute to potential safety hazards to pedestrians and bicyclists attempting to cross roadways where they intersect the towpath.

Bicycle Accidents on the Towpath

Two factors contribute to bicycle accidents on the Park towpath: the fact that it accommodates multiple uses and activi-

ties and the surface material of the towpath. The Park towpath is designated as a "mixed-use trail." As such, it accommodates hiking, jogging, strolling, bicycling and horseback riding. No motorized vehicles may use the trail except for maintenance and enforcement personnel. However, the nature and variety of allowed uses create the potential for accidents. Two recorded incidents resulted in injury when bicyclists either collided or attempted to avoid collision.

The improved surface of the towpath is constructed of either "trap rock quarry dust" or the "I-5" bank run mixture, both of which require a considerable amount of maintenance. Due to the nature of the material, it is subject to erosion, compaction and frost heaving during different times of the year. This material is also subject to vegetative intrusion of tree roots, weeds and other growth because of its loose granular composition. The Division of Parks and Forestry, in conjunction with the New Jersey Water Supply Authority, has established an annual resurfacing program for the improved sections of the Canal towpath. Unfortunately, the demand for resurfacing far exceeds the capabilities of the New Jersey Water



Courtesy of Harvey Steinberg

Supply Authority and the Division's funding resources.

Bicycle Safety Concerns on Parallel Roads

Roads parallel to the Canal are popular biking routes. Many of these roads are designated as biking routes on maps available to the public.

Biking occurs year-round, but is especially heavy in spring, summer, and fall. During these seasons, early evening biking is popular. On weekends, the volume of bicycles on Canal Road in Franklin Township and some other parallel roads is very heavy. Individual riders, riders in pairs or small groups, large clubs of riders (typically 10-20), and families with children (often with a child and parent sharing a single bicycle) use this road. These bikers reach the parallel roads by the use of Canal Park and other parking areas, and by the use of intersecting roads.

The safety problem associated with the sometimes heavy bike traffic is, of course, the fact that most parallel roads are typical rural roads — narrow, no shoulders, bends and turns with poor visibility, and varying pavements. These conditions become potentially hazardous because of the high volume of automobile and truck traffic on many parallel roads, e.g. Canal Road from Millstone to Route 518 in Rocky Hill. Speed limits are variable, not well marked, and often exceeded. Intersections with driveways and roads both through and adjacent to the Canal Park are frequent.

Although no history of bicycle accidents has been compiled, the potential for seri-

ous accidents appears to exist. This is true for runners and joggers as well, who also use the parallel roads.

Environmental Concerns

There are many easements and rights of way for utilities traversing and paralleling the Park. These easements include natural gas, gasoline, oil, electric, telephone, water and sewer lines.

Potential hazards exist for which the resultant natural resource damage could be extensive, though only one such instance directly related to these easements and rights of way is known to have occurred to date. Considerable natural resource and structural damage resulted along a one-mile section of the Park when a contractor ruptured a gasoline transmission line in West Windsor Township in 1986. The ruptured transmission line subsequently ignited. The administrative agencies responsible for granting and overseeing easements and rights of way are currently consolidating all of their records to insure that all agencies have thorough knowledge of their location and existence.

Other potential hazards which could be characterized under this heading include those related to vegetation along this corridor. Although mishaps have occurred, none have been reported to park personnel. The Division of Parks and Forestry is unable to adequately maintain the vegetation along the towpath. Trail patrons are subjected to such things as poison ivy, overgrown brush along trail shoulders, low hanging branches and dead or dying trees falling across the Canal towpath.

Each of these situations has a potential to harm or injure park patrons while walking, jogging or bicycling along the trail.

Vandalism, Crime and Special Urban Concerns

Concern over the occurrence of vandalism and crime in the Delaware & Raritan Canal State Park has been expressed primarily by residents of the City of Trenton. This section of the Park is one of the last remaining areas yet to be developed and actively maintained by the Division of Parks and Forestry. The Canal Park has been reported to function as a means of "escape" for vandals and burglars because it is undeveloped and underpopulated.

In addition, field observations of the Park in Trenton along the stretch between West Trenton and Lawrence Township revealed the following:

- garbage
- high grass and weeds
- inadequate and defective fences
- graffiti
- limited signage
- hidden structures
- deteriorated bridges
- very limited access to the Canal
- high traffic volume areas creating erosion

The Division of Parks and Forestry has received ISTEPA funding to improve the towpath within the Cities of Trenton and Lambertville.¹⁹ This funding will contribute to resurfacing and redevelopment of the Park from Lower Ferry Road to the Battle Monument. The towpath will be cleared and resurfaced, trees trimmed and bridges redecked. In addition, the City of Trenton, in cooperation with the Capital City Redevelopment Corporation, is hoping to secure state funding to assist in park improvements and housing and economic revitalization along sections of the Canal.²⁰

Accident Records

There are upwards of 23 local enforcement agencies that respond to both vehicular and nonvehicular incidents in the communities surrounding the Delaware & Raritan Canal Park. When the New Jersey Department of Environmental Protection, Division of Parks and Forestry, is notified of serious accidents, crimes, suicides and other incidents within the confines of the Park, these occurrences are generally documented, with copies of police reports maintained by park personnel.

The New Jersey Department of Environmental Protection is alerted to such incidents either through first hand knowledge by Park staff, through citizen reports or through communication by local police units. However, there is no statutory requirement that police departments notify the New Jersey Department of Environmental Protection of such incidents or that they forward police reports to them.

When a motor vehicle accident occurs on any public roadway in New Jersey and the police are notified, the police officer who investigates the accident and files the report must use a standardized police report form. "Reportable accidents," those which either result in injury, death, or at least \$500 damage, are subsequently filed with the Division of Motor Vehicles. DMV then forwards a copy to the New Jersey Department of Transportation Accident Records Section within the Division of Transportation Data Technology.

The Accident Records Section maintains a database and files of all reportable motor vehicle accidents on all public roadways. This includes motor vehicular accidents involving pedestrians and bicyclists as well. In order to analyze the extent and nature of accidents that have occurred on roads around the Park, hard copy files of the roadway police records would have to be pulled in order to review the complete set of facts reported on the police accident form. Due to the size of the database and files, this could be a lengthy and complicated process. Moreover, the database and files exclude those accidents and incidents which might occur off of a public road, within and around the Canal Park. Likewise they exclude accidents that do not involve motor vehicles.

Thus, there appears to be no system of information from which one could readily retrieve all records of incidents related to the Canal Park.

SAFETY STUDY CONCLUSIONS

Bridges, Bridge Approach Rails, and Approach Roadways

1) Current New Jersey Department of Transportation practices regarding bridge inspections and maintenance are sufficient for identifying and addressing structural safety problems related to bridges and their railing systems.

Bridge inspections are conducted every two years to identify structural safety problems. Additionally, the New Jersey Department of Transportation has initiated a pilot project to develop crash-tested bridge and approach railing systems that specifically targets Delaware & Raritan Canal bridges. It has also budgeted state funding to complete timber bridge railing improvements.

Specific studies of safety issues, concerning the Delaware & Raritan Canal, by agencies with jurisdictional responsibility are very limited. As discussed elsewhere in this report, the New Jersey Department of Transportation does inspect bridges that cross the Canal to identify safety and capacity needs, and the New Jersey Department of Transportation is currently studying safe wooden bridge design under a Federal ISTEA grant. The New Jersey Water Supply Authority conducts periodic safety inspections on water supply structures relative to the State Public Employees Occupational Safety and Health Act (PEOSHA).

2) Traffic and roadway conditions leading up to Canal bridges have a significant effect on overall vehicular safety at the bridges.

Accident histories and field observations both suggest that traffic patterns and roadway configurations can significantly influence vehicular safety at bridge crossings. When the New Jersey Department of Transportation evaluates needed safety enhancements at bridge crossings, it should examine not only bridge structural safety but also vehicular safety on the approach roads. Traffic safety improvements may need to include several measures such as:

- slowing traffic down – alerting drivers that they are entering a park and realigning roadways where heavy volumes, side friction and other complicating factors are present at bridge crossings.
- diverting high-volume, high-speed traffic away from more rural, unimproved canal crossings by using traffic lights, stop signs, speed limits, landscaping, and other measures that discourage high-volume, high-speed traffic.

3) The development of prototype elements for bridge railing systems would help expedite review and construction of safety improvements.

Development of prototypes can be very helpful in expediting project reviews and minimize engineering costs, particularly if

relevant agencies are involved early on in the development of the designs.

4) Bridge or roadway safety improvements should be undertaken in a way that is consistent with the aesthetic and historic character of the Delaware & Raritan Canal State Park.

The Canal Park is characterized by great variation in surrounding environments, ranging from urban to suburban to rural. In addition, the evolution of canal bridge structures reveals a good deal of diversity, again reflective of the kind of environment in which the bridges are situated. Development of prototype designs that reflect such variation will not only help to protect important aesthetic and historic qualities of the Park but can actually enhance these features. Results of the ISTEA-funded timber bridge study will be used to develop prototype designs for bridge railings that not only meet current standards but also address historic and aesthetic concerns.

Roadside Barriers

5) A combination of factors, including deficient barriers or an absence of barriers, high speed traffic, poor roadway conditions and poor judgment on the part of the driver can contribute to potentially hazardous conditions for motor vehicle traffic on roadways that parallel the Canal.

Both natural and manmade barriers can function effectively in preventing vehicles from driving off the road and into the

Canal. The determination of appropriate barriers should be based not only on engineering principles such as roadway design speed, vehicle mix and vehicle weight, etc. but also on aesthetic and historic considerations and the diversity in character of areas surrounding the Park.

Pedestrians and Bicyclists

6) Pedestrians and bicyclists – the major users of the Delaware & Raritan Canal Park – face various potential safety hazards when using the towpath, when travelling on roads parallel to the Canal and at towpath-roadway intersections.

Public education as well as improved signage can help raise awareness on the part of towpath users and motor vehicle operators of the various safety concerns they may confront in and around the Park. Efforts to reduce vehicle speed at and near the Canal Park should also enhance safety for both pedestrians and bicyclists.

CHAPTER III

JURISDICTIONAL ISSUES

Several state agencies have responsibilities associated with the multifunctional aspects of the Delaware & Raritan Canal. Some of these responsibilities, however, were altered, recently, with the enactment of N.J.S.A. 13:13-3.1 *et seq.*, which established the Delaware & Raritan Canal Transportation Safety Study Commission.

In adopting this Act, the Legislature expanded the powers and responsibilities of the New Jersey Department of Transportation, while retracting certain approval authorities of the New Jersey Department of Environmental Protection and the Delaware & Raritan Canal Commission. In doing so, the Legislature pointed out that this alteration was intended to be a temporary measure only "until further direction from the Legislature." It was intended as an interim measure while a newly created study commission investigates relevant public safety issues and reports its findings, conclusions and recommendations to the Legislature.

After reviewing the Study Commission report, the State Legislature will determine what further action will be required concerning jurisdictional issues. To provide guidance to the Legislature and governmental agencies, the Study Commission has made recommendations regarding future jurisdictional allocations of governmental entities. These are based on an analysis of responsibilities that existed both prior to and subsequent to the enactment of 13:13-3.1 *et seq.*

Jurisdictional Responsibilities Regarding

Canal Crossings:

New Jersey Department of Environmental Protection

In 1974, N.J.S.A. 13:13A-1, the Delaware & Raritan Canal State Park Law created the Delaware & Raritan Canal State Park. The Canal Park property is owned by the State of New Jersey. The responsible organization within the State is the New Jersey Department of Environmental Protection. Within the New Jersey Department of Environmental Protection, operational responsibility rests with the Division of Parks and Forestry.



N.J.S.A. 13:13-12.7 states that "the Department of Conservation and Development (predecessor organization to the New Jersey Department of Environmental Protection) shall in addition, improve such portions of said Canal and its appurtenances as it may deem proper to develop for recreational and park use; provided, said use shall not reasonably interfere with the efficient operation of said Canal as a source of industrial water supply."

Prior to the enactment of N.J.S.A. 13:13-3.1 *et seq.* in 1992, the New Jersey Department of Environmental Protection also had authority to grant or deny consent for any project which would encroach upon any site included in the New Jersey Register of Historic Places. The Delaware & Raritan Canal is on both the State and National Registers of Historic

Places. The New Jersey Department of Environmental Protection Commissioner was mandated to "solicit the advice and recommendations of the Historic Sites Council," housed within the New Jersey Department of Environmental Protection Division of Parks and Forestry, prior to granting or denying consent.

The New Jersey Department of Environmental Protection no longer has historic approval powers over the design and repair of existing bridges, guiderails and barriers on the Canal. The New Jersey Department of Transportation need only consult with the New Jersey Department of Environmental Protection not less than 30 days prior to undertaking maintenance, repair, rehabilitation and replacement of any existing vehicle bridges carrying state, county or municipal roads and any guiderails or barriers along the approaches to these vehicle bridges over the Delaware & Raritan Canal.

New Jersey Water Supply Authority (NJWSA)



The New Jersey Water Supply Authority Act of 1981 N.J.S.A. 58:1b created the New Jersey Water Supply Authority, and by N.J.S.A. 5:1B-5 all water supply facilities then owned and operated by the State were transferred to that Authority. Included in this was the Delaware & Raritan Canal Transmission Complex (comprised of the Canal and land that is part of the canal structure).

As part of this transfer of water supply facilities, the New Jersey Department of

Environmental Protection, Parks and Forestry entered into a long term lease and management agreement with the New Jersey Water Supply Authority that makes Parks and Forestry responsible for the property and recreational aspects of the Canal Park, while the New Jersey Water Supply Authority is responsible for the operation of the Canal as a water supply facility.

Delaware & Raritan Canal Commission

The Delaware & Raritan Canal State Park Law of 1974

also created the Delaware



& Raritan Canal Commission. The Law empowered the Canal Commission to develop a Master Plan for the development and protection of the Park and a delineated review zone within which the Commission will review public and private projects that might adversely affect the Park.

With respect to State agency projects, the Canal State Park Law granted the Canal Commission authority to:

- review and approve, reject or modify, any state project planned or state permits issued in the Park, and submit its decision to the Governor; (N.J.S.A. 13:13A-13.d.).
- approve all state actions within the review zone that impact on the Park, and ensure that these actions conform as nearly as possible to the Commission's Master Plan and relevant local plans or initiatives.

The state actions that the Canal Commission reviews include the operations of the Division of Water Resources concerning water supply and quality; the Division of Parks and Forestry in developing recreational facilities; and the activities of any other state department or agency that might affect the Park. (N.J.S.A. 13:13A-14.b.)

The above authorities were in effect before the 1991 Act. However, this Act suspends the ability of the Delaware & Raritan Canal Commission to approve New Jersey Department of Transportation actions regarding the maintenance, repair, rehabilitation and replacement of existing vehicle bridges carrying state, county or municipal roads and any guiderails or barriers along the approaches to these vehicle bridges over the Delaware & Raritan Canal. The New Jersey Department of Transportation need only consult with the Delaware & Raritan Canal Commission not less than 30 days before undertaking said actions.

New Jersey Department of Transportation



The New Jersey Department of Transportation has jurisdiction over existing canal bridges and guiderails along with the approaches to these bridges for the purposes of maintenance, repair, rehabilitation and replacement.

N.J.S.A. 13:13-12.8 entitled Bridges, Maintenance and Repair by Highway Commission states "The State Highway Commission (predecessor to the New Jersey Department of Transportation) in cooperation with the Department of

Conservation and Development (predecessor to the New Jersey Department of Environmental Protection) is empowered and directed to enter upon and take possession of all of the existing vehicle bridges over said Canal and to maintain, repair and keep the same in safe condition."

N.J.S.A. 13:13-3.1 *et seq.* amends these provisions. In effect, it grants the New Jersey Department of Transportation additional powers and responsibilities. First, the New Jersey Department of Transportation is now responsible not only for existing vehicle bridges over the Delaware & Raritan Canal carrying public roads, but also any guardrail or barrier along the approaches to these bridges.

Second, the same law grants the New Jersey Department of Transportation control and responsibility for maintenance, repair, rehabilitation and replacement of these bridges. In order to protect the public safety, the Department of Transportation Commissioner may order the closing of public access, including roads, highways, sidewalks, tracks, paths or passageways, leading to, in, under or near any such bridge.

Third, the New Jersey Department of Transportation need only "consult" with the New Jersey Department of Environmental Protection and the Delaware & Raritan Canal Commission prior to undertaking any maintenance, repair, rehabilitation and replacement on these bridges. Said consultation must occur not less than 30 days before taking action.

Fourth, the new legislation grants the

New Jersey Department of Transportation responsibility for the design of any bridges or structures appurtenant thereto along or traversing the Canal.

Although the New Jersey Department of Transportation currently has jurisdiction over existing canal bridges and approach rails, it is not clear to what extent this jurisdiction extends to new bridges and new bridge approach rails.

Existing legislation is ambiguous regarding New Jersey Department of Transportation's jurisdiction over new canal bridges and their approach rails.

There is currently under design a new bridge over the Canal in Lawrence Township. This bridge is being designed by the County of Mercer. When constructed it appears to be the only bridge across the Canal Park not under the jurisdiction of the New Jersey Department of Transportation.

Delaware & Raritan Canal State Park Interagency Task Force

In 1986, the New Jersey Department of Environmental Protection and the New Jersey Water Supply Authority entered a property lease agreement that will remain in effect for 99 years. Among the provisions of this lease was the stipulation that the New Jersey Department of Environmental Protection and the New Jersey Water Supply Authority establish a committee, to be comprised of representatives from both agencies as well as the Delaware & Raritan Canal Commission, to coordinate implementation and perfor-

mance of the agreement and to discuss proposed maintenance and construction projects affecting the Canal.

The Delaware and Raritan Canal State Park Interagency Task Force meets quarterly to review and discuss park-related projects, providing the opportunity for interagency input on a regular basis.

For the past five years, this Interagency Task Force, known as the Delaware & Raritan Canal State Park Interagency Task Force, has been meeting quarterly to carry out these mandates. Park-related projects are reviewed and discussed among Task Force members, providing opportunity for interagency input. Membership includes the New Jersey Department of Environmental Protection, Division of Parks and Forestry, and State Historic Preservation Office; New Jersey Water Supply Authority and Delaware & Raritan Canal Commission. Due to the nature of projects discussed, it is the technical staff of the various departments that generally participates in these meetings.

Since the inception of the Study Commission, the Task Force, at the Commission's request, has involved the New Jersey Department of Transportation in its quarterly meetings.

Clearly, projects undertaken by the New Jersey Department of Transportation in or near the Canal have bearing on the Park and impact on operations of all member state agencies. The inclusion of the New Jersey Department of Transportation in the Task Force is a logical step toward

initiating and maintaining regular communication. However, the expansion of the Task Force is on an informal basis, since the New Jersey Department of Transportation's membership was not addressed in the lease agreement.

The recent inclusion of the New Jersey Department of Transportation in the Interagency Task Force should help facilitate and expedite safety improvements.

Interagency Coordination

Prior to the enactment of N.J.S.A. 13:13-3.1 et seq., the Delaware and Raritan Canal Commission had approval authority over New Jersey Department of Transportation projects. That authority was established with the enactment of the Delaware and Raritan Canal State Park Law of 1974 (N.J.S.A. 13:13A-1 et seq.) and was a recognition by the Legislature that a plethora of governmental entities at municipal, county, and state levels all make decisions that impact the Canal State Park. The Canal Commission is instructed in that statute to prepare a Master Plan for the Canal State Park and to assure that all governmental – as well as private – actions are in conformance with that Plan. This review authority has been very effective in assuring that cultural, aesthetic, recreational, and other values that the public derives from the Canal State Park are respected and preserved by each governmental entity with its own parochial interests.

The review by the New Jersey Department of Environmental Protection

further insures that the historical values that have made the Canal State Park eligible for inclusion on the National Register of Historical Places will be respected and preserved. The State Historic Preservation Office within the New Jersey Department of Environmental Protection reviews proposed governmental projects to assure their compliance with standards which have secured the State's historic heritage for future generations of New Jersey citizens to profit from and enjoy.

Interagency coordination at the early stages of project reviews enhances the ability to efficiently and effectively address safety problems.

The approval authorities over State agency projects that both the New Jersey Department of Environmental Protection and the Delaware & Raritan Canal Commission maintained prior to enactment of N.J.S.A. 13:13-3.1 et seq. did not in themselves obstruct needed safety improvements to canal crossings. What appears to have contributed to slowing the process in the past was the absence of needed interagency coordination and communication.

Depending upon the nature of bridge improvements or construction, many state agencies, local government agencies and private sector interests may be involved in the review process. The time involved in reviewing and approving projects has a bearing on efficient delivery of safety measures and, depending on the nature of the project, reviews may be very lengthy.

Typically, bridge repairs undertaken by the New Jersey Department of Transportation have been in-kind and have not required extensive reviews by the Delaware & Raritan Canal Commission. However, more substantial projects have been subjected to a lengthy review process. An example of this was the review of a new bridge at the Harrison Street canal crossing in West Windsor Township, which was eventually constructed in 1989. Perhaps the most significant reason for the lengthy review of the Harrison Street crossing was the lack of coordination among state agencies at the very early stages of bridge design.

Many of the lessons learned from the Harrison Street bridge project were in fact incorporated into the review process involving designs for the new bridge crossing planned for Province Line Road (see p. 23). The developer's bridge engineer met with the New Jersey Department of Transportation, New Jersey Water Supply Authority, New Jersey Department of Environmental Protection and the Delaware & Raritan Canal Commission early on in the conceptual design stages to work out an agreed-upon plan, not only for the bridge structure but also for improvements to the approach road. Expectations of all state agencies were clearly expressed at this early stage, and concessions made on all fronts to arrive at a mutually acceptable plan. The bridge engineer has estimated a savings of roughly \$100,000, 7% of the total project cost, just in designing the structure, with additional savings expected once formal review is initiated. Additionally, the time frame involved in developing the bridge design was under one year, despite the fact that

The review process in developing the proposed bridge in Lawrence Township serves as a model, in many ways, for efficiently and effectively addressing bridge safety through a coordinated interagency review process that began at the earliest stages of conceptual designs.

approval of the bridge was part of review and approval of three major development projects in two different municipalities, involving municipal, county and state reviews.

This is the kind of interaction that needs to occur in any major bridge and roadway improvement or construction project if vehicular safety is to be assured and costs controlled.

Similarly, the recent involvement of the New Jersey Department of Transportation in the Interagency Task Force should help facilitate and expedite safety improvements if such involvement continues. Already, the various state agencies have begun discussions with the New Jersey Department of Transportation on the Department's plans to design and construct new railings for bridges and bridge approaches at the Canal. Problems and issues will, in this way, be handled early in the design process.

Another example of interagency coordination occurred even before the Task Force expansion. In January of 1994, a temporary task force was created, comprised of Study Commission members, to specifically address state agency concerns regarding

a federally-funded project the New Jersey Department of Transportation is pursuing to develop crash-tested timber bridge and approach railing designs. The four state agency representatives serving on the Study Commission and one public member (as an observer) met with the New Jersey Department of Transportation and its consultants in January of 1994 to discuss design considerations of bridge railings. These ranged from ensuring adequate access to the towpath for park maintenance crews, water supply crews and recreational users to bridge aesthetics and appropriate historic treatment. The purpose of this meeting was to relay concerns and priorities among the relevant state agencies early in the project so that the need for redesigning railings and the potential for delays would be minimized.

Interagency coordination at the early stages of project reviews, such as that demonstrated above, enhances the ability to address safety problems in a timely manner. Cooperative efforts properly set up facilitate efficiency and outcome.

Jurisdictional Responsibilities Related to Parallel Road Guiderails

In 1981, an opinion from the Attorney General's office was issued clarifying governmental responsibilities for guiderails on roadways that parallel the Delaware & Raritan Canal State Park (Appendix C).

According to this opinion, the governmental entity, be it local, county or state, which controls a given road also has responsibility for maintaining the guiderails and other barriers along those

roads where said barriers are intended to serve as traffic safety measures.

An inventory of barriers along roads within 100 feet of and parallel to the Canal was conducted jointly by the Study Commission and New Jersey Department of Environmental Protection in 1993. The inventory showed that safety is lacking in certain locations, due either to deficient barriers or an absence of needed barriers (See also pp. 25 & 26). Appropriate measures to remedy this problem must include consideration of reassigning jurisdictional responsibilities. For the State to assume full responsibility for all parallel road barriers, and thus parallel roads themselves, would result in both county and local relinquishment of said powers. The loss of control over said roadways at county and local levels could create complex political difficulties. At the same time, it is clear that some measure(s) needs to be taken to better ensure future maintenance and repair or protective infrastructure.

CHAPTER IV

RECOMMENDATIONS

Introduction

Government has a responsibility to provide reasonable protection to the public against potential safety hazards. At the same time, the Delaware & Raritan Canal State Park is a valuable resource whose special assets must be preserved. The recommendations cited below are designed to reduce the potential for future safety hazards to the public in and near the Delaware & Raritan Canal Park, while according reasonable sensitivity to the Park as a public resource. More specifically, they are intended to:

- provide heightened efficiency and coordination among state agencies with review and approval responsibilities for safety enhancements within and near the Delaware & Raritan Canal.
- reduce traffic safety concerns on or near bridge crossings.
- reduce safety concerns to pedestrians and bicyclists at towpath-roadway intersections, on roads parallel to the Canal and within the Park.
- reduce the possibility of vehicles driving into the Canal from parallel or intersecting roads.

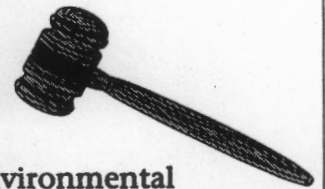
Recommended actions are organized into legislative actions, gubernatorial

actions and state agency actions. They are further distinguished between those designated for immediate implementation (*), those warranting implementation within the next five years (**), and those more likely to occur in the long term (***).

Legislative Actions

Legislation should be enacted by the New Jersey Legislature to:

- * restore approval authorities of the New Jersey Department of Environmental Protection and the Delaware & Raritan Canal Commission to that which had existed before enactment of N.J.S.A. 13:13-3.1 *et seq.* This legislation should allow action to remedy safety problems by the New Jersey Department of Transportation without prior review and approval of said agencies under emergency conditions, as provided for under existing laws and regulations.
- * provide the New Jersey Department of Transportation with control and responsibility for maintenance, repair, rehabilitation and replacement not only of existing vehicle bridges crossing the Canal and their approach rails, as currently mandated, but also of future bridges and approach rails.
- * appropriate \$9 million for future repairs, primarily of deck & substructure, of 25 Delaware & Raritan Canal bridges.

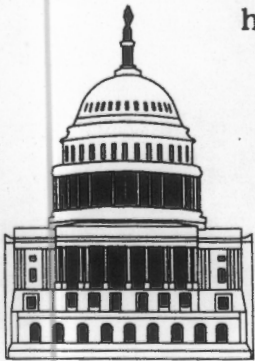


* earmark \$2 million toward installation of guiderails and barriers along roadways parallel to the Canal through the local aid program. Legislation appropriating said funds should also call attention to the fact that the government entities responsible for parallel roads are also responsible for maintaining the barriers along those roads. This language reminds counties and municipalities of their responsibility and, implicitly, their liability.

* appropriate an additional \$1 million annually toward continued operation and maintenance of the Delaware & Raritan Canal State Park to bring staffing up to 60 employees.

Gubernatorial Action

* An executive order should be executed to formalize the existing Delaware & Raritan Canal State Park Interagency Task Force.



The Study Commission has concluded that the New Jersey Department of Environmental Protection and Delaware & Raritan Canal Commission approval powers in and of themselves did not slow down the

process of facilitating safety improvements. Rather, there has, in the past, been insufficient coordination, communication and planning between state agencies at the earliest stages of project development when needed most.

The current Delaware & Raritan Canal State Park Interagency Task Force, comprised of representatives of the New Jersey Department of Environmental Protection, New Jersey Water Supply Authority and Delaware & Raritan Canal Commission, has met quarterly, for the past five years to discuss park-related projects. The Task Force was created as part of a property lease agreement signed in 1986 between the New Jersey Department of Environmental Protection and the New Jersey Water Supply Authority. Contained in this lease was the provision that the New Jersey Department of Environmental Protection and the New Jersey Water Supply Authority establish a committee to meet at least twice a year to coordinate implementation and performance of the lease and discuss proposed maintenance and construction projects. It also directed that the Delaware & Raritan Canal Commission be included in the committee. Absent from this lease agreement was the inclusion of the New Jersey Department of Transportation. The Executive Order should contain language that accomplishes the following:

- reinforces the need for the Task Force to reduce project review delays and facilitate communication between the affected state agencies.
- specifies that the Task Force be comprised of representatives from the New Jersey Department of Environmental Protection, Division of Parks and Forestry and State Historic Preservation Office; New Jersey Water Supply

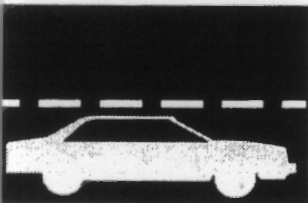
Authority; Delaware & Raritan Canal Commission; and New Jersey Department of Transportation.

- acknowledges the importance of retaining Task Force representatives who function at the technical level. It is at this technical, rather than policy level, that most problems and issues have been resolved pertaining to specific project designs.
- charges the Task Force with the responsibility to address all issues raised in this report for further study and resolution.
- specifies that the Task Force continue to meet at least four times per year.

- * reevaluate speed limits approaching bridge crossings and improve signage to warn through-traffic of special conditions including side friction, pedestrian crossings and poor roadway alignments; encourage a maximum of 25 mph speed limit at crossings (exclusive of interstate, Federal and State highway crossings). The speed limit should be enforced.
- * encourage a 25 mph speed limit on all roads parallel to and within 100 feet of the Canal unless specific roadway conditions justify higher speeds, to prevent motor vehicle and bicycle accidents. The speed limit should be enforced.
- * oversee a detailed survey, conducted by a qualified surveyor/engineer, along all roadways within 100 feet of and parallel to the Canal, including roads that deadend at the Canal. The survey should determine the exact locations of existing guiderails and barriers; the precise location of potential hazards where gaps and defects in barriers exists; and the precise location of natural barriers including vegetative buffers and ditches which may provide adequate protection; install guiderails and barriers where critical safety problems are determined to exist based on the aforesaid survey.

State Agency Actions

New Jersey Department of Transportation



The New Jersey Department of Transportation should undertake the following while ensuring that input from the Task Force is

solicited and received at the earliest stages of planning:

- * prioritize the most critical locations for upgrading bridge railings and bridge approach railings that are either lacking or substandard (currently underway).

- ** initiate a design project to develop a standard guiderail for roads parallel to the Canal. Consideration should be given to steel-backed timber as well as the results of the ISTE A project.

- ** provide improved and standardized signage for vehicles on bridge approach roads alerting them that they are approaching a park where interface with pedestrians, bicyclists and side friction warrant adjustment in driver behavior.
- ** install crosswalks, advance crossing signs and crossing signs at towpath-roadway intersections in coordination with the New Jersey Department of Environmental Protection.
- ** develop prototype bridge designs appropriate for locations where high volumes of traffic exist or are anticipated and where the long term need to efficiently move traffic through the Park exists (could be labeled as "high capacity transportation corridors").
- ** develop prototype bridge designs appropriate for locations where low traffic volumes exist or are anticipated; where minimal park intrusion or disturbances is expected; and where the Division of Parks and Forestry and the Delaware & Raritan Canal Commission establish the need for preservation (could be labelled as "low capacity transportation corridors").
- ** utilize highway features to discourage traffic and high speeds in designated low capacity corridors such as stop signs, traffic lights, roadway markings and landscape features.

- ** test rumble strips or other surface treatments at several locations and make further recommendations about their usage at towpath-roadway intersections at or near bridges.
- *** coordinate the improvement of sub-standard approach roadway alignments as part of any bridge replacement program with counties and municipalities.

Delaware & Raritan Canal State Park Interagency Task Force

The Task Force should place on its agenda safety enhancement projects being undertaken by the New Jersey



Department of Transportation and provide timely input into the plans and designs. Specific actions that the Task Force should take as it provides input to the New Jersey Department of Transportation for safety-related improvements to bridge rails and bridge approach railings include the need to:

- * relay to the New Jersey Department of Transportation specific performance and aesthetic standards desired for the bridge railing and bridge approach railing designs being developed by the New Jersey Department of Transportation.

* convene with the New Jersey Department of Transportation-retained consultant who is developing crash-tested designs for bridge railings and bridge approach railings with ISTEA funding. The Task Force should convey specific performance standards, such as needed access to the towpath by Park and New Jersey Water Supply Authority personnel and the public. In addition it should evaluate crash testing, construction material and design options based on the findings of the timber rail study, recommending appropriate designs and standards.

** the Interagency Task Force should investigate more efficient ways to obtain and consolidate accident data in and around the Canal Park.

** allocate resources toward towpath resurfacing and vegetative maintenance; increased safety patrol within the Park, especially within the City of Trenton where previous problems have been reported; and needed infrastructure improvements to the Park within the city where redevelopment of the Canal Park is occurring. Careful consideration should be given to the use of barriers to prevent young children from unwittingly entering the Canal.

** install and maintain barriers, gates and fencing along the Canal where determined to be needed by the appropriate administrative agency, including barriers at locks, flow control structures and spillways. Structures should meet aesthetic considerations of the Secretary of Interior's Standards for the Treatment of Historic Properties.

New Jersey Department of Environmental Protection



The New Jersey Department of Environmental Protection should undertake the following actions:

** expand public informational and educational programs to heighten public awareness of the physical characteristics and inherent safety concerns of the Canal waterway and for safe use of the Canal towpath; the rules and regulations pertaining to a multipurpose path; and the potential hazards to bicycle riders on parallel roads.

Other Actions

* temporary warning signs should be erected by the appropriate government entities with responsibility for roads parallel to the Canal when road surfaces are made slippery by oiling and laying of gravel. This will alert bicyclists to potential hazards.

** state agencies should maintain thorough records of the numerous easements and rights of way for utilities traversing and paralleling the Canal Park, plainly marking critical utility paths. As a minimum measure to promote safety consciousness, utility companies should be asked to provide planning documents for maintenance and hazard prevention.

**** the New Jersey Department of Transportation, counties and municipalities should design future roadway improvements to accommodate bicycle safe routes in accordance with the goals, objectives and strategies stated in the New Jersey Department of Transportation Statewide Bicycle and Pedestrian Master Plan for the State of New Jersey and in accordance with the Scenic Byway Management Plan for Route 29. Possible techniques include shoulders or separated bicycle lanes.**

CHAPTER V

Appendices

- A. Delaware & Raritan Canal Transportation Safety Study Commission
Organizational Planning Process
- B. P.L. 1991, Ch 344
- C. Select Correspondence
- D. Summary of Public Comments
- E. Delaware & Raritan Canal Bridge Inventory
- F. Accident Data
- G. Catalog of Road Guides
- H. Delaware & Raritan Canal State Park Operational Analysis

APPENDICES

A. Delaware & Raritan Canal Transportation Safety Study Commission Organizational Planning Process

A. PLANNING

Introduction

In 1990, members of the State Legislature noted that "the benefits associated with the Canal have been threatened by deficient safety at bridges that traverse the Canal, as well as the substandard construction or total lack of needed barriers and guardrail along the approaches to the Canal, and the various roads that parallel its length." As a result of this recognition, a law was enacted in 1992 to assign temporary jurisdiction over certain canal structures to the New Jersey Department of Transportation and to create a commission to be known as the Delaware & Raritan Canal Transportation Safety Study Commission. The Commission was empowered "To study all transportation, recreational, and other safety hazards associated with the Delaware & Raritan Canal, and to inquire into the ways in which these hazards might be reduced."

The Commission adopted the following definition for safety concern:

Any situation or structural deficiency that poses a potential danger or hazard to people traveling in or near the Delaware & Raritan Canal State Park and people using the Canal Park who are exercising reasonable judgment in the conduct of their activities.

Organization of the Commission

The Delaware & Raritan Canal Transportation Safety Study Commission was created by Chapter 344 of the Laws of 1991 (P.L. 1991, c. 344, approved

January 9, 1992) with 13 members appointed as follows:

- two members of the Senate of different political parties and two members of the General Assembly of different political parties.
- one representative each from the New Jersey Department of Transportation, New Jersey Department of Environmental Protection, Delaware & Raritan Canal Commission, and New Jersey Water Supply Authority.
- five public members, appointed by the Governor, four from the counties of Hunterdon, Somerset, Mercer, and Middlesex, including two people residing in municipalities adjacent to the Delaware & Raritan Canal State Park. Members serve without compensation.

The Commission first convened on April 2, 1993. Meetings were generally held monthly through 1994. Bylaws were adopted on June 4, 1993. In accord with P.L. 1991, c. 344, the Commission is to report its findings, conclusions and recommendations to the Governor and the Legislature.

In 1993, the Legislature appropriated \$12,000 to the New Jersey Department of Transportation from the General Fund for use exclusively for the duties and responsibilities of the Commission (The legislature originally appropriated \$5,000, which was subsequently increased). Funding was carried over into FY96 to allow the Commission to extend its time frame in order to complete a comprehensive study.

Study Methodology

To accomplish the Commission's duties within the time frame allotted, the Commission formed the following working committees:

- Planning Committee
- Jurisdictional Research Committee
- Vehicular Hazards Research Committee
- Other Hazards Research Committee
- Writing Committee
- Public Participation Committee

Each of these committees met independently as necessary and reported its findings and conclusions by means of written minutes to the full Commission at the monthly Commission meetings. The working committees sought and used a variety of information resources, as reported in the main body of this report.

Looking to the Governing Law

Planning by the Commission began with its extensive exploration of the provisions of P.L. 1991, c. 344, the New Jersey State enactment which created the Commission and articulated its functions, resources, and limits. This legislation was reviewed in conjunction with the larger statutory scheme of which it is a part, and with other legal determinations and opinions.

The language of the law was directly utilized to formulate the objectives of the study and later to confirm and refine them. Chapter 344 also raised the major subjects from which the Commission derived its study topics and tools, while providing boundaries that kept the Commission on course relative to its charge.

Components of the Study Process

The process used by the Commission to undertake its study consisted of seven fundamental components:

- determination of scope of the study
- identification of safety hazards
- formulation of study goals and objectives
- formation of committees
- research, information gathering, and analysis
- public meetings
- preparation of a report

Chapter 344 states that the Commission is to study "all transportation, recreational and other safety hazards associated with the Delaware & Raritan Canal and inquire into ways in which these hazards might be reduced." The Commission interpreted the language broadly, deciding early on that while the focus of its study efforts would rest with bridges and with guidrails along the Canal, it would also

investigate a litany of additional hazards. The Commission developed an initial list of safety concerns based on personal and professional knowledge. The list was later refined as additional information was gathered and public comments solicited.

Research Committees

The three primary components of the study included jurisdictional questions regarding bridge safety and other safety considerations; investigation of safety concerns relating to motor vehicles; and investigation of other safety concerns. Thus, three research committees were created:

- Jurisdictional Research Committee
- Vehicular Hazards Research Committee
- Other Hazards Research Committee

Research committees met between regular monthly Commission meetings as necessary and reported their findings, conclusions and recommendations to the full Commission.

Administrative and Organizational Task Committees

Three additional committees were formed to conduct administrative and organizational tasks:

- Public Participation Committee
- Planning Committee
- Writing Committee

The Public Participation Committee was formed to develop a process for soliciting public input and to organize special public meetings. This was later consolidated with the Planning Committee. A Planning Committee was established to furnish a process and framework for the efforts of the Commission and its other constituent committees. Part of this framework was the formulation of study goals and objectives. The Writing Committee was created to prepare the Commission report documenting findings, conclusions and recommendations.

Information Sources

Because of the makeup of the Study Commission, much of the information needed was available from Commission members. Representatives of the New Jersey Department of Environmental Protection, Division of Parks and Forestry; Delaware & Raritan Canal Commission; New Jersey Department of Transportation; and New Jersey Water Supply Authority each provided insight on pertinent regulations. Other sources of information included published maps to determine where other entities, such as counties and municipal government, may have local jurisdiction; presentations and correspondence to the Study Commission by the State's Bureau of Risk Management and Department of Law and Public Safety in order to understand issues related to the protection of the State's interests relative to the Canal and to the safety of the general public; and presentations and correspondence by the State Historic Preservation Office and the Delaware & Raritan Canal Commission relative to their roles in project reviews.

Various information sources were used by the Commission to identify safety concerns. These included:

- published and file materials from various State agencies
- direct field observations
- interviews with professional engineers, historic preservation experts and attorneys
- presentations at full Commission meetings by experts on key topics in the several subject areas covered by the committees
- public comments solicited at regular Commission meetings as well as special public meetings.

Experts in the various aspects of Delaware & Raritan Canal operations and potential safety hazards were invited to make presentations to full Commission and committee meetings as another source of information. Related reports were sought and distributed to Commission members. The Commission's findings and preliminary recommendations, compiled in a draft report, were released for public comment.

Public Participation

Public participation provided one very important source of information on safety concerns associated with the Delaware & Raritan Canal. Such input was sought by opening all monthly meetings to the public for comments, and by holding informal evening public meetings in October

1993 in Lambertville, Trenton, and Franklin Township. A second set of meetings was held in September 1995 to solicit public response to the Study Commission's draft report.

The public was notified of the opportunities for input by publicity releases to a mailing list of over 130 addresses, including 18 newspapers and other media.

Following the second set of public meetings, the Commission modified and finalized this report.

Goals and Objectives

The following goals and objectives were formulated by the Planning Committee to guide the work of the other committees and the Commission as a whole:

Goal #1:

Address jurisdictional issues regarding safety concerns associated with the Canal.

Objective 1: Identify the various governmental entities with ownership and or maintenance and development responsibilities for the Canal Park and associated structures and roadways on and adjacent to the park.

Objective 2: Study possible ambiguities and shortcomings of jurisdictional mandates upon various governmental entities respecting ownership, maintenance and development of the Canal Park and associated structures and roadways.

Objective 3: Recommend strategies that clearly spell out jurisdiction and

liability responsibilities of governmental entities for ensuring safety on and adjacent to the Canal.

Goal #2:

Investigate transportation, recreational and other safety concerns associated with the Delaware & Raritan Canal and recommend ways in which these may be reduced while maintaining the integrity of the Canal Park as a recreational, aesthetic, historic and ecological resource and as a public water supply.

Objective 1: Deal with "safety hazards" in a way that encompasses engineering principles and standards as they pertain to:

- a) the various types of physical settings within the area in and near the Canal Park and
- b) activities and behavior patterns of people who use or travel within the Canal Park area, which may compromise safety or increase safety concerns.

Objective 2: Determine the level of attention and study to be accorded to each safety concern identified by the Study Commission, taking into account legislative intent, risks to public health and safety, and other significant factors.

Objective 3: Analyze the nature of safety concerns to be investigated, including their causes and impacts as well as organizations and agencies accountable for addressing safety concerns.

Objective 4: Use documentation of past accidents as well as personal and professional experience to identify deficient conditions and safety concerns and to seek ways to reduce them.

Objective 5: Explore the need for physical improvements, regulatory and enforcement mechanisms, planning solutions, education, legislative actions, additional studies and other means to address safety concerns.

Objective 6: Ensure that recommended actions, programs and strategies for reducing safety concerns associated with the Canal consider, and, if possible, enhance the existing policies and programs that attempt to preserve the Canal Park's integrity with respect to its recreational, aesthetic, historic and ecological attributes and its function as a public water supply system. These include, but are not limited to, scenic roadway/byway programs, the Delaware and Raritan Canal State Park Master Plan and its designation of "environmental types," and the New Jersey State Development and Redevelopment Plan.

Objective 7: Ensure that recommended actions, programs and strategies allow for adequate access to the Canal Park for park users, maintenance crews and Water Supply staff.

Goal #3:

Provide opportunities for public education and involvement during the study process.

Objective 1: Invite the public to attend and participate in regular monthly Commission meetings.

Objective 2: Host public informational meetings in representative locations near or along the Canal to disseminate information and solicit input from the public.

APPENDICES

B. P.L. 1991, Ch 344

§1 - Note to §§4-12
§§4-7 - C.13:13-3.1
to 13:13-3.4
§§8-12 - T & E
§13 - Approp.
§14 - Note to §§1-13

P.L.1991, CHAPTER 344, approved January 9, 1992
1990 Assembly No. 61 (Second Reprint)

1 AN ACT concerning the Delaware and Raritan Canal, assigning
2 temporary jurisdiction over certain structures thereof to the
3 Department of Transportation, creating a commission to
4 review the safety of certain structures, amending R.S.13:13-3
5 and P.L.1944, c.172, supplementing chapter 13 of Title 13 of
6 the Revised Statutes, and making an appropriation.

7
8 BE IT ENACTED by the Senate and General Assembly of the
9 State of New Jersey:

10 1. (New section) The Legislature finds and declares that:

11 a. Governor Peter Vroom and members of the Legislature
12 officially opened the Delaware and Raritan Canal on June 24,
13 1834, providing an avenue for transportation between
14 Philadelphia and New York, and providing markets for New
15 Jersey farm goods, as well as industrial products from the cities
16 of Trenton and New Brunswick;

17 b. The canal operated as an avenue for commercial goods from
18 1834 until the winter of 1932-33 when it was closed to
19 navigation, and began its present function of providing a valuable
20 water supply, historic, recreation, and ecological resource that
21 continues to be used by the citizens of this State;

22 c. The value of the canal was recognized by the Legislature,
23 when the 60 mile area of land along the canal was established as
24 a state park, as well as the federal government, which placed the
25 canal on the National Registry of Historic Places;

26 d. However, the benefits associated with the canal have been
27 threatened by deficient safety at bridges that traverse the canal,
28 as well as the substandard construction or total lack of needed
29 barriers and guardrails along the approaches to the canal, and the
30 various roads that parallel its length;

31 e. It is therefore altogether fitting and proper for the
32 Legislature to create a study commission to investigate the
33 relevant public safety issues regarding the Delaware and Raritan
34 Canal, and during the period of investigation to provide for
35 interim jurisdiction by the Department of Transportation so that
36 persons using, or traveling near this precious resource are
37 protected.

38 2. R.S.13:13-3 is amended to read as follows:

EXPLANATION—Matter enclosed in bold-faced brackets [thus] in the
above bill is not enacted and is intended to be omitted in the law.

Matter underlined thus is new matter.

Matter enclosed in superscript numerals has been adopted as follows:

¹ Assembly ATR committee amendments adopted April 26, 1990.

² Assembly floor amendments adopted May 14, 1990.

1 13:13-3. The canal and feeder shall continue to be a public
2 highway, and, until the legislature shall have further directed the
3 use or disposition of the canal and feeder, the [department of
4 conservation and development] Department of Environmental
5 Protection ²or its designee, the New Jersey Water Supply
6 Authority,² shall, until further directions of the legislature,
7 [maintain, repair and keep in safe condition existing highway
8 bridges over the canal and feeder, except such bridges as are now
9 fully maintained as state highway or county bridges,] repair and
10 preserve the banks of the canal and feeder, and at all times keep
11 a flow of water through the canal at a level heretofore
12 maintained when the canal was in operation ²or as necessary to
13 conduct dredging operations or effect repairs², except that,
14 during the period of December fifteenth of each year and March
15 first of the ensuing year, the department [of conservation and
16 development] may close the canal or maintain such flow of water
17 as it deems desirable or necessary to comply with any contract
18 for the sale of water.

19 To insure the flow aforesaid and in order to preserve sanitary
20 conditions in the canal and about the banks thereof and the
21 towpath adjacent thereto, the feeder, the canal and the banks
22 thereof and the towpath shall be kept free of weeds and other
23 growth, save and except such growth as, in the judgment of the
24 department [of conservation and development], is conducive to
25 the appearance of the canal and feeder and the banks and
26 towpath thereof.

27 ²[Until February first, one thousand nine hundred and
28 thirty-five, the department [of conservation and development]
29 shall keep the feeder aforesaid free of weeds and other growth,
30 so that the flow of water may not be impeded, and shall keep the
31 banks of the feeder in good repair and the wickets of the locks in
32 the canal in such condition that they may be opened for the flow
33 of water. Save and except as in this paragraph provided, the
34 department [of conservation and development] shall not be
35 required to do any other repairs to maintain the aforesaid water
36 level until February first, one thousand nine hundred and
37 thirty-five.]²

38 (cf: R.S.13:13-3)

39 3. Section 8 of P.L.1944, c.172 (C.13:13-12.8) is amended to
40 read as follows:

41 8. [The State Highway Commission] The provisions of any law,
42 rule, or regulation to the contrary notwithstanding, and until
43 further direction from the Legislature, the Department of
44 Transportation in co-operation with the Department of
45 [Conservation and Development] Environmental Protection is
46 empowered and directed to enter upon and take possession of, all
47 of the existing vehicle bridges carrying State, county, or
48 municipal roads and any guardrails or barriers along the

1 approaches to any such vehicle bridges over the [said] canal [and
2 to maintain, repair and keep the same in safe condition. The cost
3 of the same shall be borne and paid out of funds appropriated as
4 highway funds].

5 (cf: P.L.1944, c.172, s.8)

6 4. (New section) The provisions of any law, rule, or regulation
7 to the contrary notwithstanding, and until further direction from
8 the Legislature, the Department of Transportation shall have
9 control and responsibility for the maintenance, repair,
10 rehabilitation and replacement of any existing vehicle bridges
11 over the Delaware and Raritan Canal carrying State, county, or
12 municipal roads and any guardrails or barriers along the
13 approaches to these vehicle bridges. The commissioner, in
14 accordance with generally accepted engineering principles,
15 standards or techniques, may, in order to protect the public
16 safety, order the closing of public access, including roads,
17 highways, sidewalk, tracks, paths or passageways, leading to, in,
18 under or near any bridge described pursuant to this amendatory
19 and supplementary act, the provisions of any law, rule, or
20 regulation to the contrary notwithstanding.

21 5. (New section) The Department of Transportation shall
22 consult with the Department of Environmental Protection and the
23 Delaware and Raritan Canal Commission, not less than 30 days
24 before the Department of Transportation undertakes, or causes to
25 be undertaken, any maintenance, repair, rehabilitation and
26 replacement performed upon any existing vehicle bridges carrying
27 State, county, or municipal roads and any guardrails or barriers
28 along the approaches to these vehicle bridges over the Delaware
29 and Raritan Canal. The provisions of section 5 of P.L.1974, c.118
30 (C.13:13A-5), ²Section 4 of P.L. 1970, c. 286 (C. 13:1B-15.131),²
31 or any other law, rule, or regulation to the contrary
32 notwithstanding, the Department of Transportation shall be
33 responsible for the design of any bridges or structures
34 appurtenant thereto along or traversing the canal.

35 6. (New section) Each person, agency of the State or
36 instrumentality thereof owning or controlling a right-of-way
37 shall provide permission for the use of and sufficient access to
38 that right-of-way, and any other incidental services required by
39 the Department of Transportation to undertake its
40 responsibilities under this amendatory and supplementary act.

41 7. (New section) The Commissioner of Transportation shall,
42 pursuant to the "Administrative Procedure Act," P.L.1968, c.410
43 (C.52:14B-1 et seq.) adopt the rules and regulations necessary to
44 carry out its responsibilities under the provisions of this
45 amendatory and supplementary act.

46 8. (New section) There is created a commission to be known
47 as the Delaware and Raritan Canal Transportation Safety Study
48 Commission with a membership of 13 members appointed as

1 follows:

2 a. Two members of the Senate, to be appointed by the
3 President thereof, who shall be of different political parties, and
4 two members of the General Assembly, to be appointed by the
5 Speaker thereof, who shall be of different political parties. The
6 members appointed from the Legislature shall serve only as long
7 as they are members of the House to which they were elected;

8 b. One representative from the Department of Transportation
9 appointed by the commissioner thereof, one representative of the
10 Department of Environmental Protection appointed by the
11 commissioner thereof, one representative of the Delaware and
12 Raritan Canal Commission appointed from the membership of
13 that commission, and one representative of the New Jersey Water
14 Supply Authority appointed by the executive director thereof; and

15 c. Five public members, to be appointed by the Governor, four
16 of whom shall be chosen from among persons residing in the
17 counties of Hunterdon, Somerset, Mercer, and Middlesex, and two
18 of whom chosen from persons residing in municipalities adjacent
19 to the Delaware and Raritan Canal State Park. In making the
20 appointments to the commission, the Governor shall consider the
21 recommendations of concerned environmental groups;
22 transportation groups; historical associations; and members of
23 relevant professions.

24 All appointments shall be made within 60 days of the effective
25 date of this act. Vacancies in the membership of the commission
26 shall be filled in the same manner as the original appointments
27 were made. Members of the commission shall serve without
28 compensation for performing their duties as members, but the
29 commission may, within the limits of funds appropriated or
30 otherwise made available therefor, reimburse members for the
31 actual expenses necessarily incurred in the performance of their
32 duties.

33 9. (New section) The commission shall organize within 30 days
34 after the appointment of its members. The members appointed
35 under subsections a. and c., only, of section 8 of this amendatory
36 and supplementary act shall designate one of the members
37 appointed under subsection a. or c., only, of section 8 as chairman
38 of the commission. The commission shall convene as soon as
39 practicable after the appointment of its members, to select a
40 chairman in the manner described in this section and to hold an
41 organizational meeting. The commission also shall select a
42 secretary who need not be a member of the commission.

43 10. (New section) It shall be the duty of the commission to
44 study all transportation, recreational, and other safety hazards
45 associated with the Delaware and Raritan Canal, and to inquire
46 into the ways in which these hazards might be ²[mitigated]
47 reduced². In conducting the study, the commission shall address
48 such issues as, but shall not necessarily be limited to, the

1 intergovernmental and jurisdictional questions concerning bridges
2 that traverse the canal, the condition of barriers, guardrails, and
3 fences along the canal, ²maintaining the historic and aesthetic
4 integrity of the canal,² and the costs associated with the
5 construction and maintenance of these structures.

6 11. (New section) The commission shall be entitled to call to
7 its assistance and avail itself of the services and assistance of
8 officials and employees of the State and its political subdivisions
9 and their departments, boards, bureaus, authorities, commissions,
10 and agencies as it may require and as may be available to it for
11 its purposes, and to employ stenographic, and clerical assistants
12 and incur such traveling and other miscellaneous expenses as
13 necessary, in order to perform its duties, and may expend any
14 funds appropriated or otherwise made available to it for the
15 purposes of its study. In addition, the Departments of
16 Transportation and Environmental Protection, the Delaware and
17 Raritan Canal Commission, and the New Jersey Water Supply
18 Authority shall provide whatever staff assistance the commission
19 may request.

20 12. (New section) The commission may meet and hold hearings
21 at any time and at any place or places as it shall designate. The
22 commission shall report its findings, conclusions and
23 recommendations to the Governor and the Legislature as soon as
24 practicable but not later than 15 months after the organizational
25 meeting provided for pursuant to section 9 of this amendatory
26 and supplementary act, along with any proposed legislation which
27 it may desire to recommend for adoption by the Legislature.

28 13. There is appropriated ¹[\$75,000] \$5,000¹ to the
29 Department of Transportation from the General Fund to be used
30 exclusively for the duties and responsibilities of the Delaware and
31 Raritan Canal Transportation Safety Study Commission as
32 described in this amendatory and supplementary act.

33 14. This act shall take effect immediately, and sections 8
34 through 12 shall expire 16 months following the date of the
35 organizational meeting provided for pursuant to section 9 of this
36 act.

37 38 39 NATURAL RESOURCES 40

41 Assigns temporary jurisdiction for repair and maintenance of
42 Delaware and Raritan Canal bridges and barriers to DOT; creates
43 Delaware and Raritan Canal Transportation Safety Study
44 Commission; appropriates \$5,000.

APPENDICES

C. Select Correspondence

Franklin Township



SOMERSET COUNTY
TOWNSHIP MANAGER

MUNICIPAL BUILDING
475 DEMOTT LANE
P.O. BOX 6704
SOMERSET, N.J. 08875-6704

TEL. 908-873-2500
FAX 908-873-1059

January 26, 1995

Ms. Caroline Swartz, Chairwoman
Delaware and Raritan Canal
Transportation Safety Study Commission
c/o Hunterdon County Planning Board
One East Main Street
Flemington, NJ 08822-1200

Re: *Delaware and Raritan Canal.*

Dear Chairwoman Caroline Swartz:

Franklin Township located in Somerset County, New Jersey, is bordered by the Delaware and Raritan Canal from our boundary with New Brunswick south, all the way to Princeton Township. I am advised by my staff that the Township has approximately 29,000 linear feet of canal immediately adjacent to municipal roadways. Over the last two years, we have been working with the Delaware and Raritan Canal Commission in order to obtain information as to an acceptable guard rail system for installation along the canal. I am tentatively advised that a wood laminated product is about to be designated as being aesthetically acceptable, while at the same time meeting engineering safety standards. I am also advised that the cost of this guard rail system, is approximately \$50 per foot.

Given the extent of exposed canal within Franklin Township, the cost of installing such a guard rail system is staggering. I have learned from both James Amon of the D&R Canal Commission, and Thomas Baxter of the NJ Water Supply Authority, that the D&R Canal Transportation Safety Study Commission is preparing recommendations regarding the installation of guard rails on roads paralleling the canal.

The purpose of this letter is to request of the Safety Study Commission, that any recommendation regarding the installation of guard rails be directly tied to a requirement that the state accept

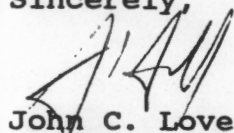
Ms. Caroline Swartz, Chairwoman

January 26, 1995

full responsibility for the funding of such an improvement. Given the estimated cost of \$1,450,000 to install guard rails along Franklin's portion of the canal, you can appreciate our community's concern with regards to the impact on both budgets and taxation levels.

Thank you for your consideration of this letter.

Sincerely,



John C. Lovell
Township Manager

JCL/emg

cc: Township Council
Chief Livak
James Pettit
Andrew Twiford
Thomas Baxter, NJ Water Supply Authority
James Amon, D&R Canal Commission



New Jersey
Department of Transportation

Division of Bridge Design • CN 615 • Trenton, New Jersey 08625-0615

Christine Todd Whitman, Governor

Frank J. Wilson, Commissioner

August 1, 1994

AUG 5 1994

Ms. Caroline J. Swartz
Chair
Delaware & Raritan Canal Transportation
Safety Study Commission
c/o Hunterdon County Planning Board
One East Main Street
Flemington, New Jersey 08822-1200

Re: Safety Improvements - Delaware & Raritan Canal Bridges

Dear Ms. Swartz:

Please refer to your letter dated July 7, 1994 to Commissioner Frank J. Wilson relative to D&R Canal Transportation Safety Study Commission's findings that has been referred to this office for response.

As already agreed to, we will participate with the Interagency Task Force in helping and trying to expedite and achieve on a short term basis, safety improvements to compliment the canal environment to the maximum extent possible. I assure you that the Department will do everything possible to minimize adverse impact to these bridges.

Thank you for your recommendations that will be shared with our consultant during interim and as well as research and design activities. As you know we have selected consultant A.G. Lichtenstein for this sensitive project. This firm has demonstrated expertise in this area and has on it's New Jersey staff a full time architectural historian who specializes in bridges. At the present, the Consultant is in the process of developing timber crash tested performance level railing as per AASHTO guide specifications.

Please be assured that this Department is committed to address and improve safety concerns relative to all the bridge crossings over D&R Canal in consultation with all concerned agencies including the D&R Canal Interagency Task Force.

Sincerely,

Kenneth C. Afferton
Assistant Commissioner for
Design & Right of Way

DELAWARE AND RARITAN CANAL TRANSPORTATION SAFETY STUDY COMMISSION

c/o Hunterdon County Planning Board
Administration Building, One East Main Street, Flemington, NJ 08822-1200

July 7, 1994

Commissioner Frank J. Wilson
New Jersey Department of Transportation
CN 600
Trenton, NJ 08625-0600

Dear Commissioner Wilson:

The Delaware and Raritan Canal Transportation Safety Study Commission has spent the past 15 months researching safety concerns related to Delaware and Raritan Canal bridges. The Study Commission has also been made aware of your Department's plans to provide railing safety improvements at canal crossings and that this work is being accelerated due to a recent out of court settlement.

In light of NJDOT's plans, I would like to share with you some of our preliminary findings. It is the Commission's hope that the findings of our research may assist NJDOT in its designation of priorities and resources for ensuring traffic safety.

Our research has revealed the following:

1. A review of NJDEPE files covering canal related accidents since 1984 indicates the following frequency of a canal bridge accident measured in year(s) of occurrence.

<u>Event</u>	<u>Frequency of Occurrence per Million Crossings</u>
Accidents involving canal bridges since 1984	.003
Fatalities involving canal bridges since 1984	.002
Fatalities at Wilburtha location in 1988	.8
Fatalities at Alexander location in 1990	1.25

Commissioner Wilson, page 2
July 7, 1994

2. It is unfortunate and indeed tragic that serious accidents and fatalities have occurred at canal crossings in the past and may occur again in the future. However, guiderails may not be able to fully compensate for contributing hazardous conditions such as less than satisfactory approach road alignment, winter or poor weather conditions, lack of appropriate signage indicating speed reduction, side friction or poor vehicle mix. All of these conditions are present at canal crossing accident locations.

As you know, our Commission has been directed by the Legislature to address safety concerns while attempting to maintain the Canal Park's special character. In so doing, the Commission members have supported a number of recommended actions. Among them are:

1. Encourage NJDOT, with input from the existing D&R Canal Interagency Task Force, to address the numerous conditions at canal crossings which contribute to potential hazards through speed limit reductions, realignments of approach roads, signage improvements, among other techniques;
2. Encourage the D&R Canal Interagency Task Force, on which NJDOT serves at our Commission's suggestion, to prioritize and accelerate its review and recommendations regarding plans to upgrade railing systems at canal crossings. The Task Force successfully demonstrated an ability to resolve numerous intragovernmental conflicts in the past, most notably in its review of the proposed canal crossing at Province Line Road. We are confident that it can successfully tackle other complex issues as well;
3. Encourage the same Task Force to accelerate its interaction with NJDOT and consultants regarding the current NJDOT timber bridge project funded through ISTEAs. Earlier this year, Study Commission representatives, including State agency members, met with NJDOT and its consultants to provide input into the development of crash tested bridge and approach railings. The Study Commission recommends that the Interagency Task Force continue intragovernmental dialogue by similarly convening with NJDOT and consultants.

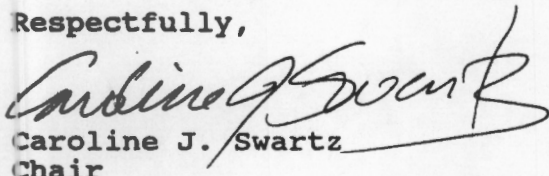
Thanks largely to the commitment of Bob Pege and other Task Force members, many of the Study Commission's recommendations are already being carried out and various State agency concerns being addressed.

Commissioner Wilson, page 3
July 7, 1994

We hope that our comments prove helpful in evaluating the prioritization and allocation of Departmental resources for addressing safety issues at Canal crossings and would be happy to share additional data and findings as well. We also feel that the pending contributions of the Interagency Task Force and the results of the ISTEA-funded project will provide an increased and durable dividend toward facilitating needed safety improvements.

Thank you very much for your consideration.

Respectfully,



Caroline J. Swartz
Chair

cc: Commissioner Robert Shinn, NJDEPE
Members, D&R Canal Trans. Saf. St. Commission
Jim Amon, Executive Director, D&R Canal Commission
Terry Karschner, Acting Administrator, SHPO



State of New Jersey
DEPARTMENT OF LAW AND PUBLIC SAFETY
DIVISION OF LAW

RICHARD J. HUGHES JUSTICE COMPLEX
25 MARKET STREET
CN
TRENTON, NJ 08625-0

JAVIER LOVECCHIA
ASSISTANT ATTORNEY GENERAL
DIRECTOR

(609) 633-2038

December 12, 1994

Carl Nordstrom, Deputy Chief
Department of Environmental Protection
Division of Parks & Forestry
501 E. State St., Floor 4
CN 404
Trenton, New Jersey 08625-0404

Re: Delaware and Raritan Canal Safety Commission
DOL Docket No. 94-80275

Dear Mr. Nordstrom:

You have requested legal advice as to whether P.L. 1991, c. 344 (the Act) permits the Department of Transportation (DOT) to design and construct bridges and guardrails on the Delaware and Raritan Canal (D & R Canal) without approval from DEP or review by the Historic Sites Council, heretofore required pursuant to N.J.S.A. 13:1B-15.131.

For the reasons set forth below, it is our opinion that the DEP no longer has approval power, pursuant to N.J.S.A. 13:1B-15.131, over DOT's design and construction of bridges and guardrails on the canal. Such approval power pursuant to that statute was superseded by the Act. However, both DEP and the Historic Sites Council continue to have non-binding review power, the results of which DOT should consider in furtherance of specifically stated legislative intent, discussed below.

BACKGROUND

The D&R Canal operated as an avenue for commercial goods from 1834 until 1932; it was subsequently established as a State park in 1974 and placed on the New Jersey Register of Historic Places. See, P.L. 1991, c. 344 §1. Numerous bridges traverse the canal, providing public vehicle access to park areas from the various roads which parallel the canal's length. See, Id.

Prior to the January 9, 1992 effective date of the Act, (which is codified at N.J.S.A. 13:13-12.8, and N.J.S.A. 13:13-3.1 to 3.4), N.J.S.A. 13:1B-15.131 mandated that no State agency could undertake any project which would encroach upon any site included in the New Jersey Register of Historic Places without "application to, and the prior written authorization or consent of, the Commissioner of Environmental Protection." The statute also mandated that the DEP Commissioner "solicit the advice and recommendations of the Historic Sites Council" prior to granting or denying such consent.

The Historic Sites Council is situated within DEP's Division of Parks and Forestry, and consists of 11 members appointed by the Governor. N.J.S.A. 13:1B-15.108. A separate entity, the Delaware and Raritan Canal Commission, also exists within the DEP; it is composed of nine members appointed by the Governor. N.J.S.A. 13:13A-11a. DEP is required to obtain the approval of the Delaware and Raritan Canal Commission prior to any development or installation of improvements by DEP within D&R Canal State Park. N.J.S.A. 13:13A-5a.

ANALYSIS

The Act does not amend the text of N.J.S.A. 13:1B-15.131. However, in the Act, the Legislature found and declared that the benefits of the canal park "have been threatened by deficient safety at bridges that traverse the canal, as well as the substandard construction or total lack of needed barriers and guardrails along" the canal. P.L. 1991, c. 344, §1d, at Statutory Note, N.J.S.A. 13:13-3.1. The Act created a study commission to investigate public safety issues at the canal and, "during the period of investigation [provides] for interim jurisdiction by the Department of Transportation so that [the public] are protected." P.L. 1991, c. 344, §1e at Statutory Note, N.J.S.A. 13:13-3.1. The Act added a new section, codified at N.J.S.A. 13:13-3.1, which provides as follows:

The provisions of any law, rule or regulation to the contrary notwithstanding, and until further direction from the Legislature, the Department of Transportation shall have control and responsibility for the maintenance, repair, rehabilitation and replacement of any existing vehicle bridges over the Delaware and Raritan Canal carrying State, county or municipal roads and any guardrails or barriers along the approaches to these vehicle bridges. The commissioner, in accordance with generally accepted engineering

principles, standards or techniques, may, in order to protect the public safety, order the closing of public access, including roads, highways, sidewalk, tracks, paths or passageways, leading to, in, under or near any bridge described pursuant to this amendatory and supplementary act, the provisions of any law, rule, or regulation to the contrary notwithstanding. [Emphasis added].

The Act also added a section, codified, at N.J.S.A. 13:13-3.2, which provides:

The Department of Transportation shall consult with the Department of Environmental Protection and the Delaware and Raritan Canal Commission, not less than 30 days before the Department of Transportation undertakes, or causes to be undertaken, any maintenance, repair, rehabilitation and replacement performed upon any existing vehicle bridges carrying State, county, or municipal roads and any guardrails or barriers along the approaches to these vehicle bridges over the Delaware and Raritan Canal. The provisions of section 5 of P.L.1974, c. 118 (C. 13:13A-5), Section 4 of P.L.1970, c. 268 (C. 13:1B-15.131), or any other law, rule or regulation to the contrary notwithstanding, the Department of Transportation shall be responsible for the design of any bridges or structures appurtenant thereto along or traversing the canal. [Emphasis added].

Based upon the language of these two sections added by the Act, it is clear that the Legislature intended to vest the authority for repair of bridges, guardrails and barriers in DOT, with only a consultation or review role reserved in DEP and the Historic Sites Council. The Legislature provided that, the provisions of any other law notwithstanding, DOT shall have control and responsibility for the maintenance and repair of all bridges, guardrails and barriers. The Legislature also provided that DOT needs only to consult with DEP 30 days before DOT takes action. When read together these two provisions clearly indicate that DOT was granted authority to take such action without the approval of DEP, the Historic Sites Council and the Delaware and Raritan Canal Commission.

Further, both the Senate Natural Resources and Agricultural Committee and the Assembly Transportation Committee statements (dated Dec. 13, 1990 and April 26, 1990, respectively)

state that DOT shall take interim responsibility for repair and maintenance of all bridges and guardrails on the canal, and that DOT is required to "consult" with DEP 30 days prior to commencement of any construction, but that DOT "will be the ultimate arbiter of safety structure or bridge design." The Assembly Statement states that DOT will be "guided primarily by the need to ensure safe travel for the public."

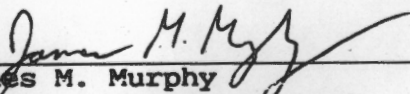
The Senate Committee Statement also states, however, that "it is not the intent of the committee to exempt the actions of the Department of Transportation from review by the Delaware and Raritan Canal Commission and the Department of Environmental Protection in accordance with the Act establishing the Register of Historic Places, P.L. 1970, c.268 (C. 13:1B-15.128 et seq.)." Additionally, DEP is obviously not precluded from continuing to solicit the advice and recommendations of the Historic Sites Council during DEP's 30 day review period, or from incorporating the Council's advice and recommendations into its own position when it is consulted by DOT.

It is therefore clear, from both the plain wording of the statute and the legislative history of its enactment, that the law intended that DOT and DEP are to work together in cooperation in order to preserve the natural and historic resources of the canal; DEP does not, however, retain its historic approval power over the design and repair of existing bridges, guardrails and barriers on the canal until further legislative amendment returns that power.

Very truly yours,

DEBORAH T. PORITZ
ATTORNEY GENERAL OF NEW JERSEY

By:


James M. Murphy
Deputy Attorney General

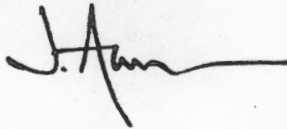
February 1, 1994



MEMORANDUM

DELAWARE AND RARITAN
CANAL COMMISSION

TO: Carl R. Nordstrom, Deputy Director
Division of Parks and Forestry

FROM: James C. Amon
Executive Director 

SUBJECT: Canal Bridges

Attached is a list of all the automobile bridges over the D&R Canal, excluding the Interstate Highway bridges and their ramps. Also excluded from this list are the bridges that were built for pedestrian use only and the active and inactive railroad bridges.

1. There are 48 bridges in total.
2. There are 17 bridges made of concrete, steel, or a combination:

Bridge Street (Stockton)	N. Warren
Bridge Street (Lambertville)	N. Broad
Upper Ferry	Montgomery
Prospect	U.S. Route One
Calhoun	Harrison
Hanover	New Route 27
Passaic	Millstone Causeway
Willow	South Bound Brook
	Landing Lane

3. There are 6 bridges with no public use by cars at any time:

Farm Bridge (Irelands)	Farm Bridge (near Rocky Hill)
Farm Bridge (Jimison)	Griggstown lock
Farm Bridge (Workhouse)	5 Mile lock

4. There are 6 bridges that give access only to the Canal Park or to one house:

Bull's Island	Farm Bridge (Fireman's)
Prallsville Lock	Scudder's Falls
Lambertville Locktender	Old Route 27

PRALLSVILLE MILLS P.O. BOX 539 STOCKTON, NJ 08559-0539 609-397-2000 FAX: 609-397-1081

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5. The Zarephath bridge gives access only to the Pillar of Fire Campus.
6. There are 18 wood bridges open to the public and serving as part of a road network.

I suggest that none of the bridges listed under #'s 1, 2, 3, 4 and 5 above need to be considered for changes to enhance their safety. The eighteen wooden bridges that remain can be grouped many different ways, but the following categories are most meaningful to me:

- A. The Coryell Street bridge in Lambertville and the three Titusville bridges do not need to be changed because the approach road geometry assures a very slow speed and because of the low volume of traffic they receive.
- B. Washington Crossing, Lower Ferry Road, Carnegie Road, Baker's Basin, Quakerbridge, and the Griggstown and Blackwell's Mills Causeways are sensitive park locations and should receive special design considerations. Alexander Road and Wilburtha Road would also belong in this category but they both have such terrible approach road geometry that they need special safety considerations. The most important safety change would be to realign those approach roads.
- C. Hermitage Avenue, Whitehead Road, Washington Road, Route 518, and the Weston Causeway are all high use and potentially high speed bridges and should be given first consideration for enhanced structural features.

I hope that this information is useful.

cc: N. Zerbe
G. Keith

BRIDGE	LOCATION	COMMENT
Bull's Island	M.P. 0 - Delaware Twp.	Wood bridge, posted 15 tons, one lane, the only traffic is to or from Bull's Island
Prallsville lock	M.P. 2.94 - Stockton	Gravel roadway over concrete lock structure, wood rails, access to Gallup house and for WSA access to spillway
Bridge Street	M.P. 3.38 - Stockton	Concrete bridge, leads to bridge across Delaware River
Farm Bridge (Irelands)	M.P. 5.18 - Delaware Twp.	Wood bridge, 1 lane, gates forbid access by cars at all times
Farm Bridge (Jimison or Barbers)	M.P. 5.72 - Delaware Twp.	Wood bridge, 1 lane, used for patrol and maintenance only
Coryell Street	M.P. 6.64 - Lambertville	Wood bridge, 2 lane, links city streets at highly congested location, very slow traffic
Bridge Street	M.P. 6.67 - Lambertville	concrete bridge, 2 lane, connects with bridge across the Delaware River
Lambertville Locktender's drive	M.P. 7.25 - Lambertville	Wood, 1 lane, over bypass on drive to locktender's house
Farm Bridge - Fireman's	M.P. 8.42 - West Amwell Twp.	Wood, 1 lane, access to parking area only
River Drive - Titusville (Clayhans)	M.P. 11.81 - Hopewell Twp.	Wood, 1 lane, 90 turns close to both ends, light traffic use.
Church Street - Titusville	M.P. 12.45 - Hopewell Twp.	Wood - 2 lane, most traffic must approach after taking 90 turn, light traffic use.
Grant Street - Titusville	M.P. 13.06 - Hopewell Twp.	Wood, 2 lane, very light traffic use.
Washington Crossing	M.P. 13.60 - Hopewell Twp.	Wood, 2 lane, access to bridge over Delaware River, geometry of access assures slow traffic
Scudder's Falls	M.P. 15.89 - Ewing Twp.	Wood, 2 lane, access to Canal Park parking area
Upper Ferry Road	M.P. 16.79 - Ewing Twp.	Concrete, 2 lane, straight approaches on both sides
Wilburtha Road	M.P. 17.25 - Ewing Twp.	Wood, 2 lane, accident site, guide rail retro-fit
Lower Ferry Road	M.P. 18.12 - Ewing Twp.	Wood, straight approaches on both sides, golf course
Hermitage Ave.	M.P. 20.30 - Trenton	Wood, 2 lane, city street
Prospect St.	M.P. 20.30 - Trenton	Concrete, 2 lane, city street
Calhoun St.	M.P. 21.06 - Trenton	Concrete, 2 lane, city street
Hanover St.	M.P. 21.16 - Trenton	Concrete, 2 lane, city street
Passaic St.	M.P. 21.35 - Trenton	Concrete, 2 lane, city street
Willow St.	M.P. 21.42 - Trenton	Concrete, plaza-like crossing at intersection
N. Warren St.	M.P. 21.59 - Trenton	Concrete, 2 lane, city street

BRIDGE	LOCATION	COMMENT
N. Broad St.	M.P. 21.62 - Trenton	Concrete, 2 lane, city street
Montgomery St.	M.P. 21.71 - Trenton	Concrete, 2 lane, city street
Whitehead Rd.	M.P. 24.18 - Lawrence Twp.	Wood with asphalt deck - heavily used
Carnegie Rd.	M.P. 25.86 - Lawrence Twp.	Wood, 2 lane, straight approach from east, ascending hill from west, moderate traffic use
Baker's Basin	M.P. 26.48 - Lawrence Twp.	Wood, 2 lane, straight approach
U.S. Route One	M.P. 26.93 - Lawrence Twp.	Concrete
Quakerbridge Rd.	M.P. 28.93 - Lawrence/Princeton/W. Windsor	Wood, 2 lane, geometry to be changed
Alexander Rd.	M.P. 31.19 - Princeton/West Windsor	Wood, 2 lane, poor geometry to east
Washington Rd.	M.P. 31.76 - Princeton/West Windsor	Wood with asphalt surface, 2 lane, straight approach, high speed, heavy use
Harrison St.	M.P. 32.37 - Princeton/West Windsor	New concrete bridge
Old Rte. 27 (Kingston)	M.P. 35.13 - Franklin	Wood, access to parking lot, one house
New Rte. 27 (Kingston)	M.P. 35.2 - Franklin	Concrete & steel, heavy traffic use
Route 518 (Rocky Hill)	M.P. 37.0 - Franklin	Wood, 2 lane, will have traffic light near east side soon
Farm Bridge	M.P. 38.01 - Franklin	Wood, 1 lane, no public use
Griggstown Lock	M.P. 39.34 - Franklin	Wood, 1 lane, no public use
Griggstown Causeway	M.P. 40.16 - Franklin	Wood, 2 lanes, critical park location
Blackwell's Mills Causeway	M.P. 43.70 - Franklin	Wood, 2 lanes, critical park location
Millstone Causeway	M.P. 45.79 - Franklin	Concrete
Weston Causeway (Manville)	M.P. 47.93 - Franklin	Wood with asphalt deck, bad geometry to east, causeway to west to be widened and raised.
Zarephath	M.P. 48.50 - Franklin	Wood, 2 lane, access to college that is nearly defunct.
South Bound Brook	M.P. 51.62 - South Bound Brook	Steel, access to bridge over Raritan River, traffic light on other side, swing bridge
Five Mile Lock	M.P. 53.18 - Franklin	Wood, no rail, no public use
Landing Lane	M.P. 56.84 - New Brunswick	Concrete and steel, swing bridge, traffic light at one end.

DEC-16-93 THU 14:28

NJ WATER SUPPLY

FAX NO. 9086385241

P.02/04

12/16/1993 16:45

FROM DRCC

TO 19086385241

P.02



State of New Jersey

DEPARTMENT OF LAW AND PUBLIC SAFETY
DIVISION OF LAW

RICHARD J. HUGHES JUSTICE COMPLEX
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TRENTON 08625

KENNETH S. LEVY
ASSISTANT ATTORNEY GENERAL
DIRECTOR

ROBERT J. DEL TUPO
ATTORNEY GENERAL

(609) 292-4965

July 27, 1990

Mr. James C. Amon, Executive Director
Delaware and Raritan Canal Commission
Prallsville Mills
P.O. Box 539
Stockton, New Jersey 08559-0539



Re: 90-0129 (Supplemental Opinion):
Whether the Delaware and Raritan Canal
Commission Can Approve, Disapprove or
Modify State Actions Within the Review
Zone Surrounding the Delaware and
Raritan Canal State Park.

Dear Mr. Amon:

This letter is intended to supplement and clarify the June 20, 1990 letter opinion from this office construing the authority of the Delaware and Raritan Canal Commission with respect to proposed State actions in the statutory review zone surrounding the Canal Park. That opinion concluded that the Commission had no discretion but to approve State actions in the review zone although it was also required to insure that such State actions conform as nearly as possible to the Commission Master Plan and relevant local plans or initiatives. The conclusion was based upon the differences in the language used by the Legislature to empower the Commission to review State actions in the review zone as compared to the language used to empower it to review State projects within the park itself. In the first case, the Legislature empowered the Commission to "review and approve, reject or modify any State project planned or State permits issued in the Park, and submit its decision to the Governor." N.J.S.A. 13:13A-13.d. In the second case, the Legislature stated, "The commission shall approve all

July 27, 1990

Page 2

State actions within the review zone that impact on the park, and insure that these actions conform as nearly as possible to the Commission's master plan and relevant local plans and initiatives." N.J.S.A. 13:13A-14.b. The opinion reasoned that because the Legislature failed in the latter case to specifically state that the Commission could "reject or modify" planned State actions in the review zone, as it had done with respect to State projects in the park, the Legislature must have intended for the Commission to be bound to approve all State actions in the review zone. For the following reasons, however, it must be concluded that, while the Commission's powers are more circumscribed with respect to planned State actions in the review zone, the Legislature must have intended to permit the Commission to withhold its approval of such actions in appropriate circumstances as a means of insuring conformance as nearly as possible with the master plan and relevant local plans and initiatives.

It is clear from the legislative findings and declarations that the Legislature was concerned with the fact that the canal and its surroundings could be "adversely affected by surrounding development..." and that "decisions which affect the canal and the State owned land appertaining thereto are often made by different State agencies..." N.J.S.A. 13:13A-2.a. Therefore, the Legislature declared it necessary to establish the Commission "to prepare, adopt, and implement a master plan for the physical development of the park, and to review State and local actions that impact on the park to insure..." conformance with the plan to the extent possible. N.J.S.A. 13:13A-2.b. In order to address these concerns, the Legislature gave the Commission certain powers over State projects and actions. With respect to the park itself, the powers are broad. As noted above, without establishing specific limiting criteria, the Legislature empowered the Commission to review and approve, reject or modify projects in the park.

With respect to the review zone, the power of the Commission is more limited. There the Commission must review State actions in light of their conformance as nearly as possible to the Commission's master plan and relevant local plans or initiatives. The Commission's power is thus circumscribed by this standard. However, even this limited power must be construed to include the

* Although N.J.S.A. 13:13A-13.d does not specifically set forth limiting criteria, the legislative findings and declarations do establish some standards to guide the Commission in its decision making. Furthermore, the Commission's actions within the park would be subject to challenge under the arbitrary, capricious or unreasonable standard applicable to actions of all State agencies. See Campbell v. Dept. of Civil Service, 39 N.J. 556 (1963).

DEC-16-93 THU 14:29

NJ WATER SUPPLY

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FROM DRCC

TO 19086385241

July 27, 1990

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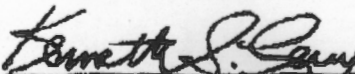
power to withhold approval of State actions that do not so conform because in the absence of the power to withhold approval the power to insure conformance is illusory. Therefore, the Legislature's direction to the Commission that it "shall approve all State actions within the review zone" must be read to include the power to withhold approval in order to insure that State actions do conform as nearly as possible to the master plan.

The power to withhold approval thus gives the Commission the ability to effectively ensure that State agencies consult in good faith with the Commission prior to taking action within the review zone. The ability to withhold approval would ensure that the Commission has the opportunity to review the proposed state action, compare it with the master plan, advise the State agency of any non-conformance and work with the State agency toward a mutually acceptable revision resulting in conformance "as nearly as possible" to the master plan. N.J.S.A. 13:13A-14.b. It should be noted, however, that the ability to withhold approval does not necessarily confer final authority over the issue upon the Commission. Under principles established in Rutgers v. Piluso, 60 N.J. 142 (1972), in cases where consultation between the Commission and the State agency proposing to act in the review zone does not result in agreement, a further analysis would be necessary to determine whether the Legislature intended for the State agency to be able to proceed with the planned action notwithstanding the inability to reach agreement through consultation. While the Rutgers case dealt with whether a State agency was immune from municipal land use regulation, the conclusion that one must look to legislative intent in order to make sense of apparently conflicting statutory authority is equally applicable here. Should such an impasse occur, legislative intent would have to be determined in light of the State agency involved and the action proposed in the review zone.

I hope that this clarifies any ambiguity that may have been contained in our previous advice. I would be happy to discuss any questions or concerns you might have at your convenience.

Very truly yours,

ROBERT J. DEL TUFO
ATTORNEY GENERAL OF NEW JERSEY



Kenneth S. Levy, Director
Assistant Attorney General



P-I
17-2-31
S.G.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF THE COMMISSIONER
CN 402
TRENTON N J 08625
609-292-2885

June 17, 1988

TO: Memorandum of Record

FROM: Lawrence Schmidt, Director
Planning Group
Department of Environmental Protection

SUBJECT: D & R Canal, Vehicular Safety Issues

Larry Schmidt of the Department of Environmental Protection convened a meeting of all affected parties within State Government to discuss the practical aspects of coordinating safety related issues on D & R Canal bridges and the roadways parallel to the canal. (attendance sign up sheet attached). The issue was originally raised at a DEP/DOT liaison meeting on March 3, 1988. That meeting took place shortly after a man drowned in the D & R Canal after his vehicle slid off of Wilburtha Road and through the wing guard rail attached to the canal bridge.

The meeting began with a discussion of the legal advise (A.G.'s opinion dated February 1981) regarding jurisdictional aspects of guard rails on or adjacent to the canal. The group decided not to dwell on the legal question of jurisdiction but rather focus on what actions could be taken in resolving currently unanswered safety questions. The first question raised was whether or not the D & R Canal Commission or the Office of New Jersey Heritage had ever approved a generic design for a guard rail or bridge guide rail for the canal or its impact zone. Jim Amon responded by saying that Franklin Township received approval for a guard rail constructed of cortenz steel with a wooden rail on Canal Road running parallel to the D & R Canal. However, Jim indicated that the Commission does not have a generic design that could be utilized by the various government entities on or adjacent to the canal.

Larry Schmidt then raised a second issue. Has there been an inventory of areas along the Canal where safety hazards exist? Richard Famularo of the Water Supply Authority responded by indicating that his agency prepared a study of the entire 60 miles of the Canal back in 1986. This study primarily focused on open areas between roadways

and the canal where motor vehicles could pass and plunge into the canal. Rich said that his report was transmitted to all affected entities within State government and to municipalities and counties along the canal corridor. He produced a letter sent to Commissioner Gluck on July 1, 1986 and a response from Deputy Commissioner Michael Barrett dated August 14, 1986 (copies attached). John Kraml of Parks and Forestry did not recall receiving the report. Rich and Greg Chase said they thought it was sent to Paul Stern the Park Superintendent. Larry Schmidt suggested that the 1986 Report be photocopied and fresh copies sent to all present at this meeting. Richard Famularo and Greg Chase agreed to update the report and expand it to include structurally questionable guide rails along canal bridges and approaches to bridges. Larry Schmidt asked that the updated report be completed and distributed by September 1, 1988.

Nancy Zerbe and Terry Pfoutz of the Office of New Jersey Heritage commented on the D & R Canal as a property listed on the State and National Registers of Historic Places. In their review capacity, the staff of the Office of New Jersey Heritage would not seek historic restoration of fences or guard rails along the canal. Both Nancy and Terry recognized that safety should be of overriding consideration in any capital improvements. The key to an approvable design should be "compatible" with the historic elements of the canal and the canal park. Jim Amon agreed that such a focus would also hold true for the D & R Canal Commission.

Bob Page of the DOT stated that any projects undertaken which were funded by the Federal Highway Administration would require state-of-the-art safety design and possible crash testing. He further made an observation that the railings that exist on bridges today are for the most part unsafe in terms of being able to restrain a vehicle.

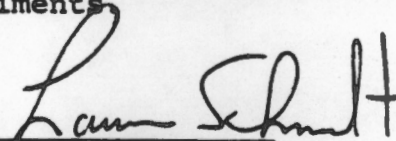
Larry Schmidt recommended follow-up activities to address the current situation. It was suggested that the D & R Canal Commission seek financial assistance from a private foundation and/or the Office of New Jersey Heritage to develop guidelines and/or a generic design for guard rails and bridge railing on the canal. Jim Amon responded by indicating that he would be receptive to taking on that responsibility. It was suggested that the National Endowment for the Arts or the New Jersey Council on the Arts may be the appropriate entities for seeking financial assistance. If a match is required, Terry Pfoutz said that federal pass-through money from the Office of New Jersey Heritage could be used. However, the money would have to be obligated before September 30 of this year, or the funding would then have to wait until the next funding cycle.

Larry Schmidt then suggested that the safety issue may be ripe for consideration by the New Jersey Legislature. He suggested a piece of legislation be introduced that would accomplish the following:

1. Clearly spell out jurisdiction for vehicle safety on and adjacent to the canal by governmental entities (DOT, DEP/Parks and Forests, Water Supply Authority, counties, municipalities).
2. Conduct a more detailed study of safety hazards.
3. Develop a funding base to implement a safety program.

The group agreed that such an approach is appropriate. Larry volunteered to take the lead pending approval by Deputy Commissioner Michael Catania for him to work with candidate legislative sponsors.

The group agreed to reconvene in approximately 6 months to report on progress and/or impediments.


Lawrence Schmidt

LS/ss
distribution to all in attendance

6/17/88

D&R Canal
Guard Rail - Technical Issues

Larry Schmitt City Engineer	DEP Planning Group Div Parks & Forestry - C CD	292-2662 292-2662
Jim Anon	D&R Canal Commission	397-2000
Nancy Zerbe	Office of NJ Heritage	292-2663
DAN SANDERS	OFFICE OF NJ HERITAGE	633-2397
Robert A. Page	NJ DOT	530-2548
DANIEL J WOLFE		
Terry Pfoutz	Off. of NJ Heritage	292-2023
Ed Myer	N.J. Water Supply Authority	(201) 638-6121
A. Gregory Chase	N.J. Water Supply Authority	201-638-6121
Richard R. Famularo	N.J. Water Supply Authority	201-638-6121
Robert Vanzo	N.J. Water Supply Authority	201-638-6121
Don Bramer	NJWSA	



State of New Jersey

4-3 (2.6.1)
12-2-71
2.6.

JOHN J. DEGNAN
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DEPARTMENT OF LAW AND PUBLIC SAFETY

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DEPUTY ATTORNEY GENERAL
ASSISTANT SECTION CHIEF

February 2, 1981

Steven J. Picco, Assistant Commissioner
Department of Environmental Protection
Regulatory and Governmental Affairs
Labor and Industry Building - Room 803
Trenton, New Jersey 08625

Re: AAA No. M80-4361

Dear Mr. Picco:

You have submitted the following request for legal advice:

"Who is responsible for the maintenance, replacement or installation of vehicular guard rails on the various highways and roads parallel to the Delaware and Raritan Canal?"

The Delaware-Raritan Canal was acquired by the State of New Jersey in 1937 by quitclaim deed from the United New Jersey Railroad and Canal Company and the Pennsylvania Railroad Company.* The canal is presently a source of water supply and a State Park used for recreational purposes. N.J.S.A. 13:13-12.1. A determination of this issue relies upon specific statutory provisions dealing with canal or road maintenance and contractual agreements between the State and predecessors in title and/or the appropriate counties and municipalities. A review of the foregoing leads to the conclusion that vehicular guard rails on

*Title to the canal actually vested in the State in 1934 when possession was taken. N.J.S.A. 13:13-1.

roads running along the canal are the responsibility of the State agency, municipality or county having jurisdiction over the particular roadway in question.

Title 27 generally establishes the authority to finance and maintain State, county and municipal roads. The Commissioner of Transportation is empowered to maintain and repair State highways. N.J.S.A. 27:7-11. See N.J.S.A. 27:7-21(c). The maintenance of county roads is included within the general powers of each board of chosen freeholders. N.J.S.A. 27:16-1(d); 27:16-6. Similarly, each municipality is generally empowered to maintain roads within their jurisdiction. See N.J.S.A. 27:22-4. It follows that maintenance of appurtenant guard rails is governed by these provisions, provided that said guard rails were intended as a safety measure in conjunction with vehicular traffic on the roadway.

The Statutes pertaining specifically to the Delaware-Raritan Canal are devoid of any language which would lead to a different conclusion. N.J.S.A. 13:13-1 et seq. plainly expresses and limits the State's maintenance responsibilities (pertaining to the canal) to highway bridges over the canal and feeder, preservation of the canal banks, and preservation of the flow of water. It is also clear that the legislature did not envision maintenance of these guard rails, which protect adjoining roads, to be part of the State Park maintenance scheme. N.J.S.A. 13:13A-1 et seq.

A reading of the quitclaim deed conveying title in the canal property from the United New Jersey Railroad Company and the Pennsylvania Railroad Company to the State of New Jersey (and accompanying schedule of lands released and easements reserved to the railroads) reveals a similar absence of any provision which would place the responsibility of maintaining vehicular guard rails on adjacent roadways upon the State. Lastly, there exists no significant history of usage which would support the proposition that this duty has been impliedly cast upon or accepted by the State Department of Environmental Protection.

It is therefore clear that highways and roads adjacent to canal property fall within the above guidelines. It also follows that guard rails abutting portions of a road or highway located on canal property are similarly the responsibility of

that entity having jurisdiction over the road or highway. N.J.S.A. 27:7-53 et seq. deals with situations where roads exist on land owned by the State and only attributes financial and supervisory responsibilities to the State. These provisions do not shift the responsibility to maintain.

There may also exist situations where a guard rail is a common appurtenance to both the roadway and the canal. Maintenance responsibility of guard rails in these areas depends upon the intended use of the guard rail in question. If said guard rail serves to protect the canal as a water supply system, maintenance would be the responsibility of the Department of Environmental Protection. N.J.S.A. 13:13-1 et seq. As a corollary, if the guard rail is a road improvement or characteristic, the entity having jurisdiction over the roadway possesses the duty to maintain. In the event the guard rail (as a common appurtenance) provides a dual function, i.e., serves as a safety feature to both the canal and the roadway, both the Department of Environmental Protection and the entity having jurisdiction over the roadway would be responsible for maintenance.

Based upon the above analysis, you are advised that the provisions of Title 27 of the New Jersey Statutes apply to the maintenance of the roadways in question (including guard rails) as they would to any other State, county or municipal road. In sum, each entity retains jurisdiction and the concomitant duty to maintain vehicular guard rails appurtenant to their roadways running along the canal. This obtains unless the guard rail serves to protect the water supply or the canal banks, in which case the Department of Environmental Protection bears (or shares) the maintenance responsibility.

Very truly yours,

JOHN J. DEGNAN
Attorney General of New Jersey

By: John J. Maiorana
John J. Maiorana
Deputy Attorney General

APPENDICES

D. Summary of Public Comments

**SUMMARY OF COMMENTS RAISED AT PUBLIC MEETINGS
OCTOBER 6 AND 7, 1993
Delaware and Raritan Canal Transportation Safety Study Commission**

Safety Issues Identified by the Public

- Curves in roadways as well as the presence of trees create a line of sight obstruction, particularly in Trenton and on Canal Road.
- Spillways are treacherous in the wintertime (Bound Brook area).
- Excessive crowns in the road in several areas create a hazard for cars and bicycles.
- Speed limits are too high and not enforced.
- There is a need for access for handicapped people.
- Exposed tree roots on the towpath create a hazard, particularly in select locations between Trenton and New Brunswick.
- Some plank bridges have slippery surfaces (e.g. Rocky Hill).
- Oil and chippings on roads parallel to the Canal Park create a safety hazard.
- The bridge at Baker's Basin is a problem because of poor sight distance on the approach road. Increased traffic on Franklin Corner Road will exacerbate bridge safety concerns. Physical constraints (e.g. presence of wetlands) will limit the ability to address bridge safety.
- There is an absence of signage for towpath users where the path crosses Route 1 to indicate how pedestrians may negotiate their way across the highway.
- Dumping of garbage (e.g. furniture) is a problem where Cherry Tree Lane ends at the Canal.
- From Whitehead Road to Carnegie Road, there is a path on both sides of the Canal. A sign is needed to inform path users where the towpath continues and the other path becomes a dead end.
- Several canal houses sit very close to the roadways.
- Isolation and crime in areas of Trenton / "unsavory nature" of the Canal from Whitehead to Mulberry Street are problems.
- Guiderail creates a hazard for towpath users who must cross over it at Port Mercer in order to continue on the path.

- There is a lack of warning signs to alert traffic about construction techniques being used on roads.
- Millstone bridge is in need of repair; it is used by cars, bicyclists and pedestrians alike.

Recommended Actions Suggested by the Public

- There should be clear demarkation of pedestrian crossings via crosswalks and signage alerting cars to pedestrian crossings.
- There is a need for additional resources commensurate with increased towpath usage in the future: rangers must be empowered to provide enforcement; bicycle patrols should be instituted.
- There is a need to develop different designs for new bridges that replace existing timber bridges according to their locations in the Park.
- The Commission should recommend that municipal master plans, particularly land use and circulation elements, be analyzed to identify future expected population and traffic increases and future roadway construction plans. This is important information to help anticipate future expected bridge improvements.
- There is a need for cross-hatching or rumble strips at pedestrian/towpath crossings.
- There is a need for warning signs alerting traffic to construction techniques/activities on roadways.
- There is a need to enforce use of bicycle bells.
- The tunnel under Route 27 needs lighting. A sign should be installed to alert people of the presence of the tunnel so that pedestrians do not cross Route 27.

SUMMARY OF COMMENTS RAISED AT PUBLIC MEETINGS
ON DRAFT FINAL REPORT
SEPTEMBER 12 AND 13, 1995
Delaware and Raritan Canal Transportation Safety Study Commission

Issues and Recommendations Identified by the Public

- During the past year, five vehicular accidents occurred on Canal Road.
- Protective barriers are needed on Canal Road in Franklin Township and must be funded by the State.

APPENDICES

E. Delaware & Raritan Canal Bridge Inventory

Delaware and Raritan Canal

N.J. STATE LIBRARY
P.O. BOX 520
TRENTON, NJ 08625-0520

BRIDGE INVENTORY (1)

FEEDER CANAL	AGE			CONSTRUCTION MATERIAL		AVG. DAILY TRAFFIC (IN '000S)				RESTRICTED WEIGHT LOAD	APPROVED RAILING SYSTEM MEETS CURRENT STANDARDS		PRESENCE OF SIDE FRICTION (2)	UNSATISFACTORY APPROACH ROAD ALIGNMENT	OCCURENCE OF VEHICULAR ACCIDENTS	QUALIFIES FOR REPLACEMENT	ENVIRON. TYPE (3)
	60+	35+	<35	Wood	Other	10+	5+	1+	<0.5		Bridge Rail	ApproachRail					
Montgomery St.	X				X		X										U
N. Broad St.	X				X		X									X	U
Warren St.	X				X		X										U
N. Willow St.	X				X		X										U
Passaic St.	X				X			X									U
W. Hanover St.	X				X		X						X				U
Calhoun St.	X				X	X							X				U
Prospect St.	X				X	X							X				U
Hermitage Ave.		X		X			X			X			X			X	U
Lower Ferry Rd.		X		X			X			X				X		X	S
Wilburtha Rd.		X		X				X		X	X	X	X	X	X		R
McCallins-Upper Ferry Rd.	X				X		X						X				R
Bernard Dr.		X		X					X	X							R
Washington Crossing Rd.		X		X			X			X			X	X			T
Grant St.		X		X					X	X			X				T
Church Rd.		X		X					X	X			X				T
River Dr.		X		X					X	X			X				T

(1)Source: NJDOT. Inventory limited to the 48 non-state, non-federal bridges.

(2)Side friction refers to roads or driveways that intersect bridge approach roads, producing traffic near the canal crossings.

(3)Environmental types describe the various settings through which the Delaware & Raritan Canal passes. The Delaware and Raritan Canal State Park Master Plan identifies six environmental types as follows:

Rural (R) Urban (U) Suburban (S) Natural (N) Transportation (T) Special Node (P)

FEEDER CANAL	AGE			CONSTRUCTION MATERIAL		AVG. DAILY TRAFFIC (IN '000S)				RESTRICTED WEIGHT LOAD	APPROVED RAILING SYSTEM MEETS CURRENT STANDARDS		PRESENCE OF SIDE FRICTION (2)	UNSATISFACTORY APPROACH ROAD ALIGNMENT	OCCURENCE OF VEHICULAR ACCIDENTS	QUALIFIES FOR REPLACEMENT	ENVIRON. TYPE (3)
	60+	35+	<35	Wood	Other	10+	5+	1+	<0.5		Bridge Rail	ApproachRail					
Edges Rd.		X		X					X	no public access			X	X			T
Ashton's Farm		X		X					X	X						X	T
Lock #3 Feeder		X		X					X	X			X			X	U
Bridge St. - Lambertville	X				X	X							X				U
Coryell St.		X		X				X		X						X	U
Barber's Farm			X	X					X								U
Holcomb Bridge			X	X					X	no public access							P
Bridge St. - Stockton	X				X			X									S
Prallsville		X			X				X								P
Raven Rock		X			X				X								R

(1)Source: NJDOT. Inventory limited to the 48 non-state, non-federal bridges.

(2)Side friction refers to roads or driveways that intersect bridge approach roads, producing traffic near the canal crossings.

(3)Environmental types describe the various settings through which the Delaware & Raritan Canal passes. The Delaware and Raritan Canal State Park Master Plan identifies six environmental types as follows:

Rural (R) Urban (U) Suburban (S) Natural (N) Transportation (T) Special Node (P)

MAIN CANAL	AGE			CONSTRUCTION MATERIAL.		AVG. DAILY TRAFFIC (IN '000S)				RESTRICTED WEIGHT LOAD	APPROVED RAILING SYSTEM MEETS CURRENT STANDARDS		PRESENCE OF SIDE FRICTION (2)	UNSATISFACTORY APPROACH ROAD ALIGNMENT	OCCURENCE OF VEHICULAR ACCIDENTS	QUALIFIES FOR REPLACEMENT	ENVIRON. TYPE (3)
	60 +	35 +	<35	Wood	Other	10 +	5 +	1 +	<0.5		Bridge Rail	ApproachRail					
Mulberry St.		X			X	X							X				T
Whitehead Rd.		X			X	X					X	X					T
Carnegie Rd.		X		X				X		X						X	T
Bakers Basin Rd.		X		X			X			X			X	X			T
Quaker Rd.		X		X		X				X			X			X	P
Alexander Rd.		X		X			X			X					X		P
Washington Rd.		X			X		X			X						X	R
Harrison St.			X		X				X		X	X					R
Old Rte. 27 - Kingston		X		X					X	X							R
Rte. 518 - Rocky Hill		X		X		X				X			X			X	R
Lock 9 - Bypass		X		X					X	no public access	X	X				X	R
Farmers Bridge - at Lock 9		X		X					X	no public access	X	X					R
Lock 9 - Canal		X			X				X	no public access	X	X				X	R
Griggstown		X		X				X		X			X			X	P
Blackwells Mills		X		X				X		X			X				R
Amwell Rd.		X			X	X				X			X			X	R
Weston Causeway		X		X				X		X			X	X	X		R
Alma White College		X		X				X		X			X				R
Main St. - S. Boundbrook	X				X	X					X		X			X	U
Landing Lane	X				X	X										X	S
5 Mile Lock			X	X					X	no public access							S

(1)Source: NJDOT. Inventory limited to the 48 non-state, non-federal bridges.

(2)Side friction refers to roads or driveways that intersect bridge approach roads, producing traffic near the canal crossings.

(3)Environmental types describe the various settings through which the Delaware & Raritan Canal passes. The Delaware and Raritan Canal State Park Master Plan identifies six environmental types as follows:

Rural (R) Urban (U) Suburban (S) Natural (N) Transportation (T) Special Node (P)

APPENDICES

F. Accident Data

N.J. STATE LIBRARY
P.O. BOX 520
TRENTON, NJ 08625-0520

Vehicular Related Incidents

<u>Date</u>	<u>Description</u>
08/09/84	Recovered stolen van from just south of South Bound Brook Lock.
08/17/84	Recovered stolen motorcycle from South Bound Brook Lock.
12/28/84	Motor vehicle accident (car) Weston Causeway Bridge.
11/26/85	Motor vehicle accident (car) 300 feet south of Grouser Road.
02/10/86	Accident occurred on Wilburtha Road after driver of vehicle suffered a heart attack and died, lost control of vehicle and entered the Canal.
02/28/86	Recovered stolen car 1/3 mile south of Jacques Road.
05/21/86	Recovered stolen car 2/10 mile north of Carnegie Road.
07/20/86	Speeding vehicle crashed through fence south of Pedicaris Gate.
09/20/87	Stolen vehicle in canal at Belle Mountain Gate.
09/22/87	Recovered stolen car under Route 1 overpass at Whitehouse Road.
01/13/88	Stolen vehicle in canal at Hermatage Avenue.
02/12/88	Vehicle skidded on ice and entered at Wilburtha Road. One fatality.
03/14/88	Motor vehicle accident (pick-up truck) 1/2 mile north of Blackwells Mill Road.
04/12/88	Cab of pick-up dumped into Canal at Duck Island.
04/23/88	Stolen vehicle in canal 25 yards north of Bridge Street, Lambertville.
01/27/90	Vehicle skidded on ice at milepost 17.6, Route 29.
01/27/90	Automobile traveling southbound on Rte. 29 lost control on ice, struck guardrail, went over guardrail and into Canal. No fatalities.
01/27/90	Automobile traveling southbound on Rte. 29 lost control on ice, struck guardrail, went over guardrail and hit tree just short of Canal.

Vehicular Related Incidents cont'd

- 01/27/90 Automobile lost control on ice on Rte. 29, veered across northbound lane and hit a utility pole.
- 01/27/90 Automobile lost control on ice on Rte. 29, hitting northbound lane embankment.
- 03/08/90 Recovered stolen car 100 feet south of Whitehead Road.
- 03/13/90 Motor vehicle accident (car) Alexander Road Bridge (fatality).
- 02/16/91 Pick-up rolled backwards into canal 1/2 mile south of Lambertville, PBA Gate.
- 03/20/91 Motor vehicle accident (pick-up truck) 1/2 mile north of Coppermine Road.
- 05/23/92 Recovered stolen A.T.V. 50 feet north of Weston Causeway.
- 11/30/92 Recovered stolen car under Route 1 overpass at Whitehead Road.
- 02/03/93 Recovered stolen car 200 feet south of Cherry Tree Lane.
- 02/12/93 Semi-trailer broke loose rolled into Canal between Valley Road and Pleasant Valley Road.
- 05/10/94 Recovered stolen vehicle from Canal in Lawrence Township.
- 02/24/95 Attempted suicide at Millstone River/Griggstown Causeway in which vehicle was driven at high speed through guardrail and into Millstone River.
- 08/06/95 Driver of utility vehicle struck fence on corner of Blackwells Mills and Canal Roads while attempting to avoid oncoming vehicle.

Non-Vehicular Related Incidents

<u>Date</u>	<u>Description</u>
09/30/90	Woman bitten by dog in Princeton area on towpath.
05/01/90	Drowning. A fisherman drowned when his boat overturned in the Canal by the Somerset Diner, Easton Avenue, Franklin Township.
10/18/91	Injury to park visitor. A female hiker twisted her ankle on path and fell.
04/03/92	Motorcycle accident with injury to leg of 17 year old male on towpath between Carnegie and Whitehead Road.
05/09/92	Injured cyclist at towpath south of Alexander Road where path is narrow. Cyclist fell forward over handlebar hitting the ground with left shoulder fracturing his clavicle.
06/04/92	Injured cyclist, Kingston Lock Gate, a 9 year old rode into the gate.
10/15/92	Young female jogger passed out on towpath between Rocky Hill and Little Valley.
11/23/92	The body of a man who had been missing for several days was found in the Canal by the Kingston Lock. The man had been jogging and had a history of medical problems.
11/27/92	Three young males drowned while attempting to cross the Canal near Port Mercer, West Windsor. The youths were fleeing a stolen car they had left on Route 1.
06/24/93	Man fell from bicycle lacerating left elbow one mile south of Bull's Island.
10/11/93	Woman fell from bicycle, injuring right ankle near Church Rd. in Titusville.
06/11/94	Man fell over handlebars of bicycle causing laceration to left knee and abrasions to right forearm and over right eye south of Wilburtha Rd in W. Trenton.
06/13/94	Cyclist fell sustaining scrapes and bruises when cycle upset at spillway between Little Valley and Rocky Hill.
06/29/94	Cyclist fractured hip while attempting to free foot from bicycle on towpath between Griggstown and Blackwells Mills Road.

Non-Vehicular Related Incidents cont'd

- 08/09/94 Male youth collided with another bicyclist north of Bull's Island.
- 08/26/94 Woman bicyclist became tangled with another bicyclist, and fell at Washington's Crossing near Rte. 546.
- 09/18/94 Handicapped motorized cycle chair rider fell into Canal in Lambertville after losing control of her chair, after portion of Canal bank that was not stabilized gave way. Victim was treated for minor abrasions and released.
- 04/19/95 Suicide in Franklin Township on Canal Road where woman apparently entered Canal.
- 05/24/95 Injuries sustained by cyclist who hit upward slope in towpath while traveling at high speed north of 5-Mile Lock.
- 05/31/95 Injuries sustained by cyclist while attempting to avoid puddle on towpath north of Griggstown Causeway.
- 07/25/95 Woman injured when attacked by dog on towpath north of Rocky Hill parking area.
- 08/10/95 Man alleged to have broken his ankle on 06/02/95 after slipping on Canal bank.

APPENDICES

G. Catalog of Road Guides

Delaware and Raritan Canal Guide Rail Inventory
 July 30, 1993

CATALOG OF ROAD GUIDES*

Mile	CD-26	2-Wire	12-inch Timber	Less 100' Gap
0 - 0.2	0.2			
0.2 - 1.4	.1			
1.4 - 2.9	1.2			.3
2.9 - 3.9	.9			
3.9 - 5.0	.9			.2
5.0 - 7.2	.2			2.0
7.2 - 16.0	8.6			.2
16.0 - 18.1	1.9			.3
18.1 - 22.9	.3			
22.9 - 23.2				
23.2 - 24.2	.9			.1
24.2 - 27.2	.3			
27.2 - 28.5	.3			
28.5 - 29.2	.7			
29.2 - 31.5	.1			
31.5 - 32.9	.1			
32.9 - 35.2	1.2			
35.2 - 37.1	.2			
37.1 - 40.2		3.1		
49.2 - 42.5				
42.5 - 49.0	.9		.4	.2
49.0 - 50.5	.3			
50.5 - 53.2	.3			.2
53.2 - 56.9	5.0			1.1
Total Miles	24.6	3.1	.4	4.6

*Roads that are parallel to and within 100 feet of the Delaware and Raritan Canal

Inventory conducted by Div. of Parks & Forestry, NJDEP

START

0.0

0.2

1.4

2.9

3.9

5.0

Bull's Island

Delaware River

Locketong Creek

Wickechecke Creek

Prattsville

STOCKTON

Breckville

Alexauken Creek

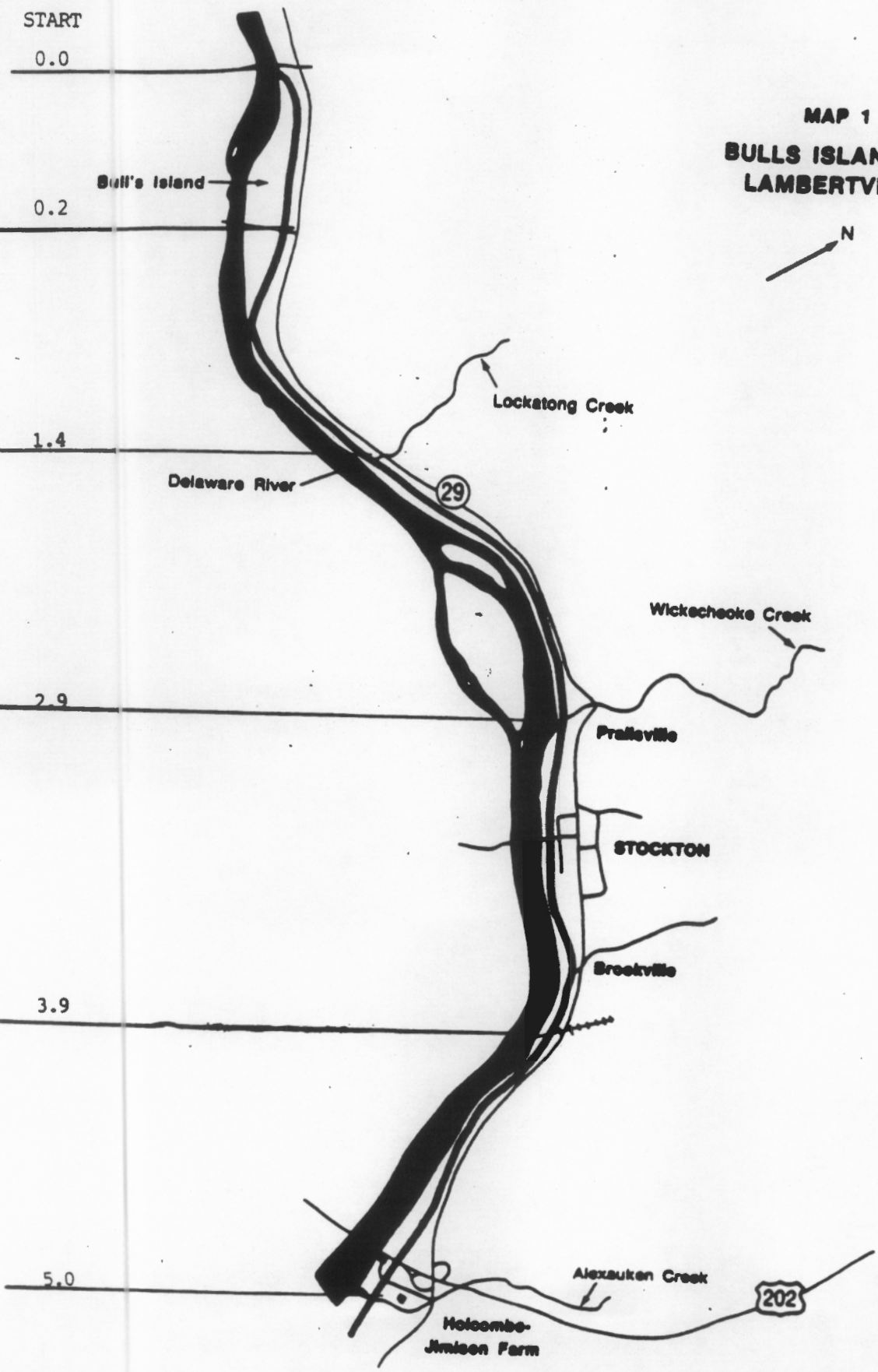
Holcombe-Jimison Farm

29

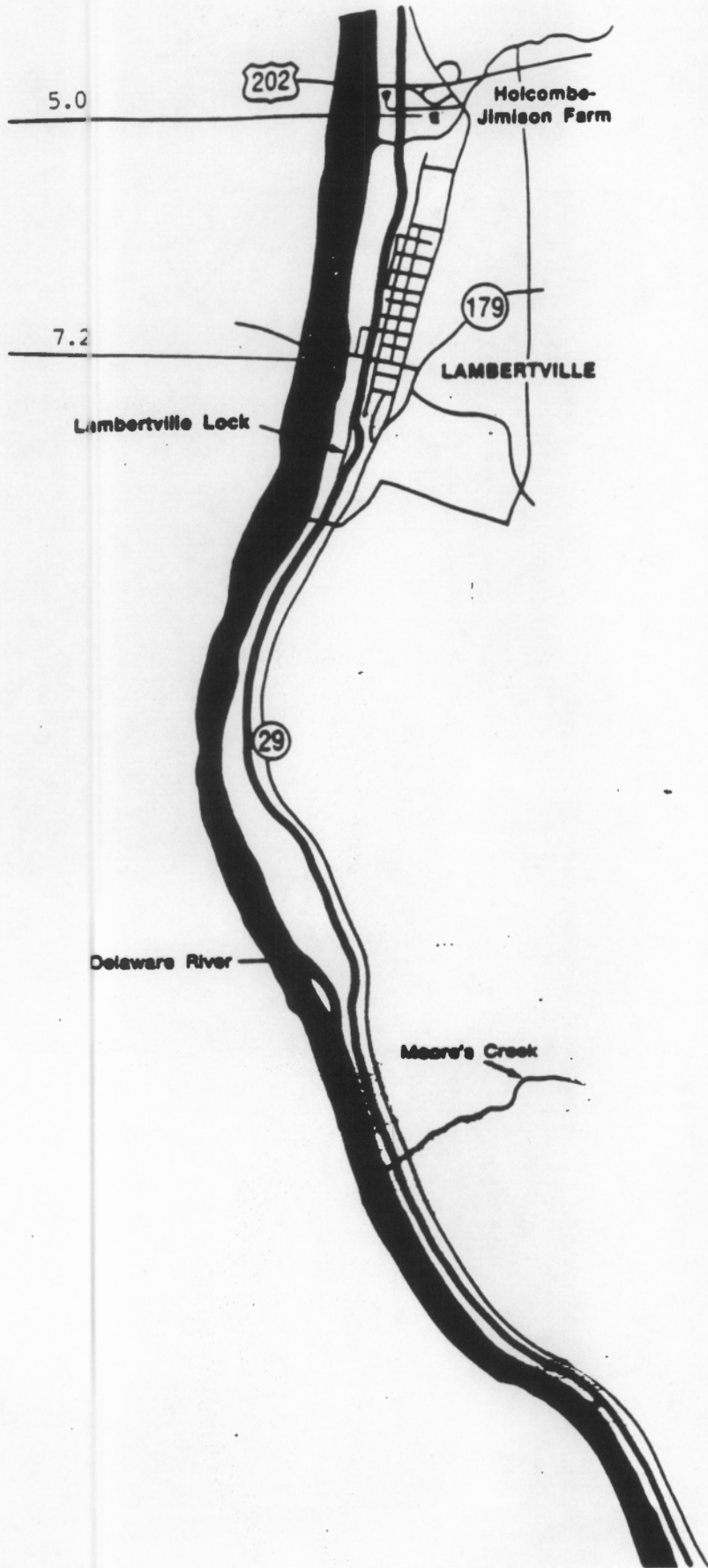
202

MAP 1 BULLS ISLAND TO LAMBERTVILLE

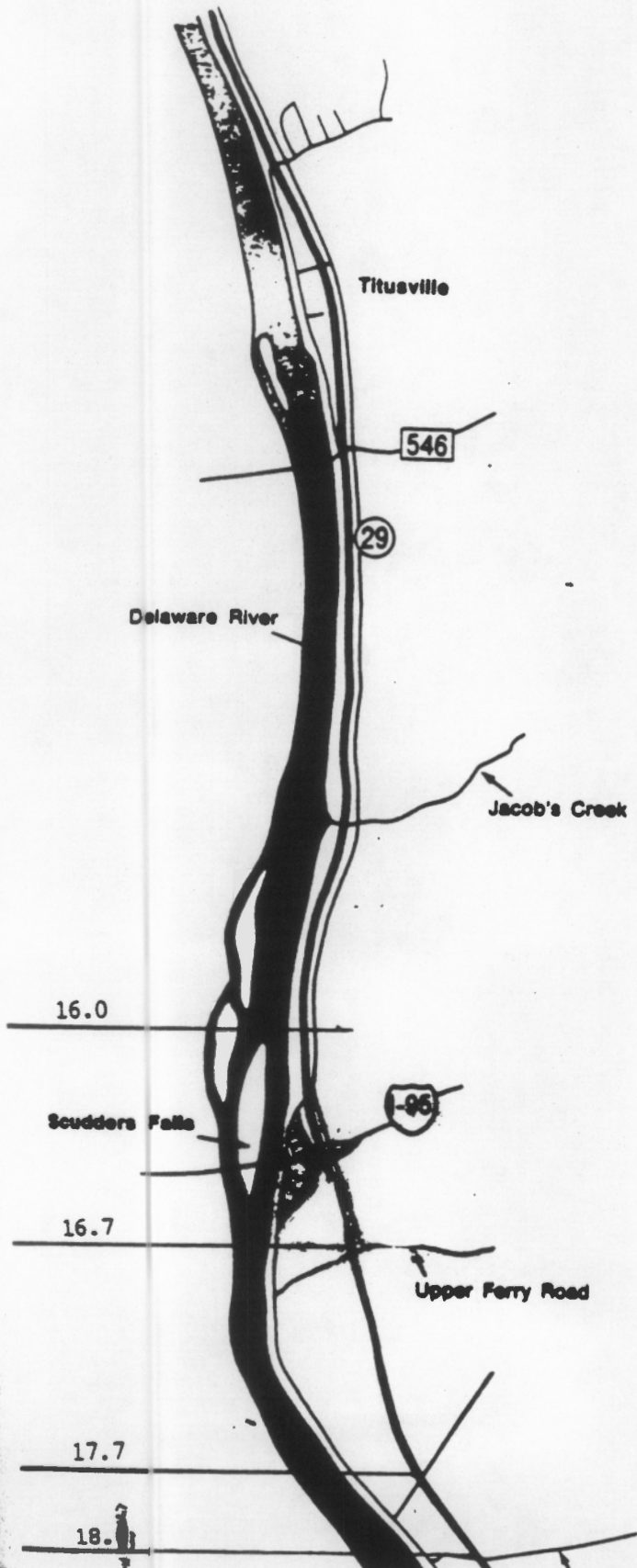
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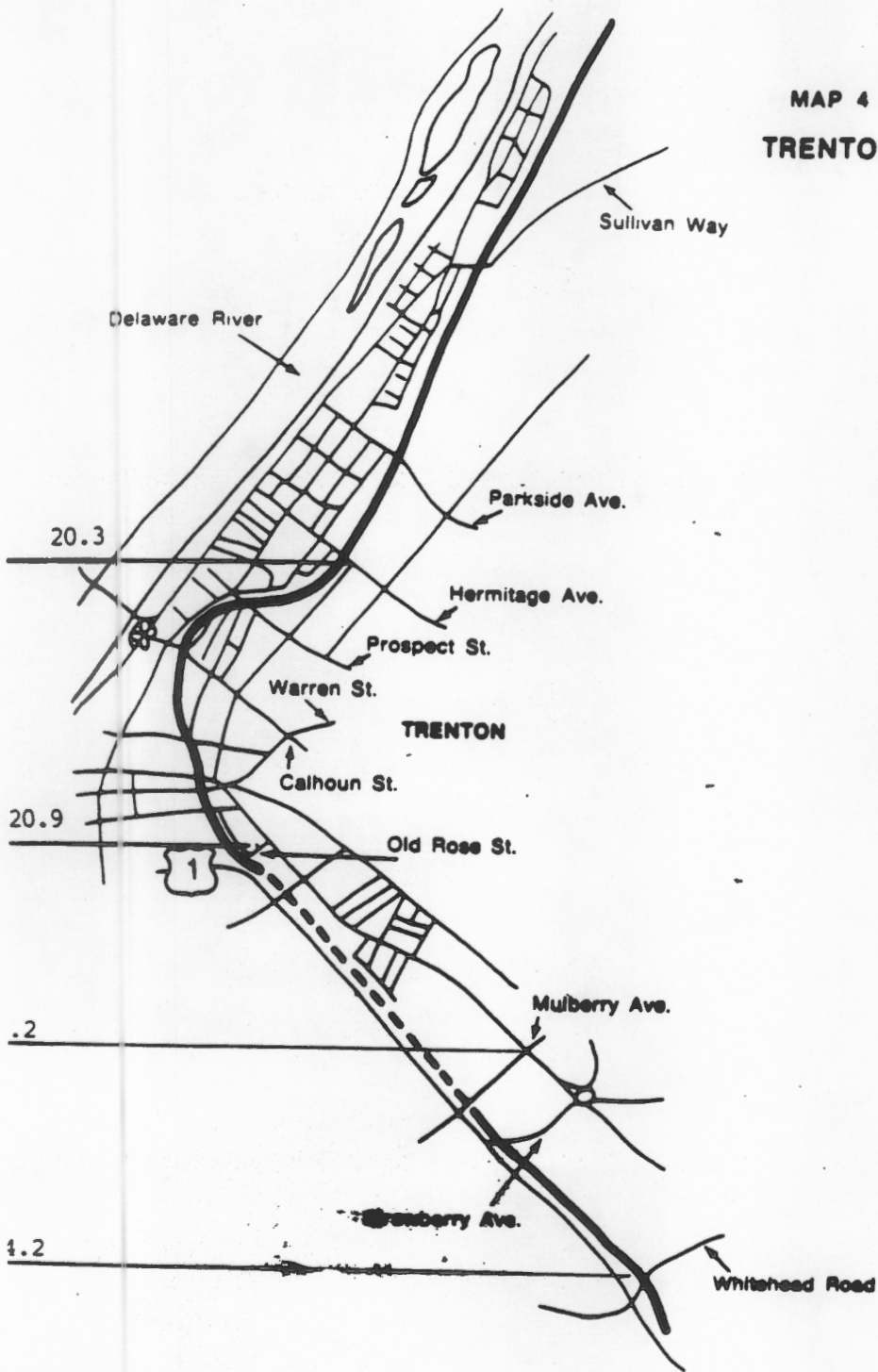
MAP 2
LAMBERTVILLE TO
TITUSVILLE



MAP 3
TITUSVILLE TO
SCUDDERS FALLS



MAP 4
TRENTON

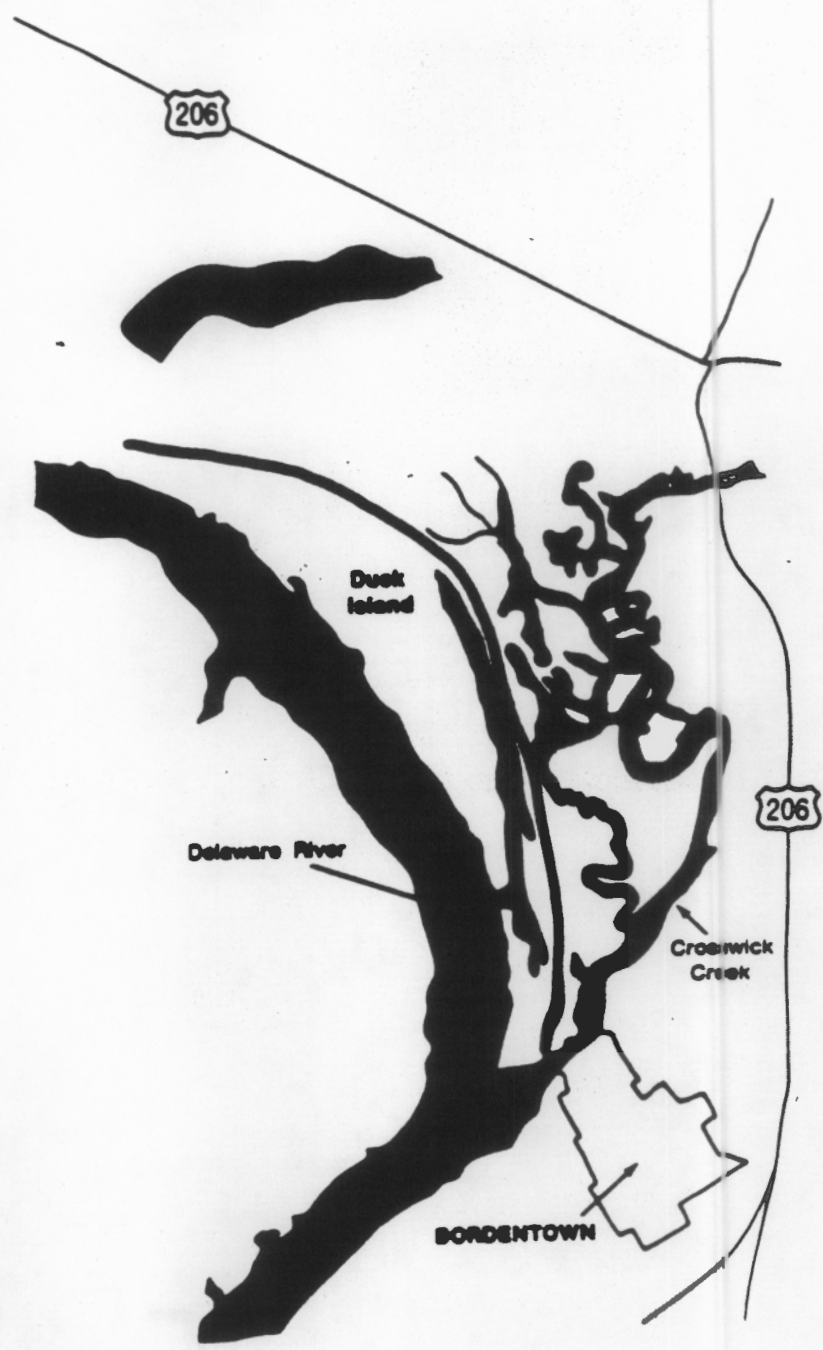


MAP 5
DUCK ISLAND

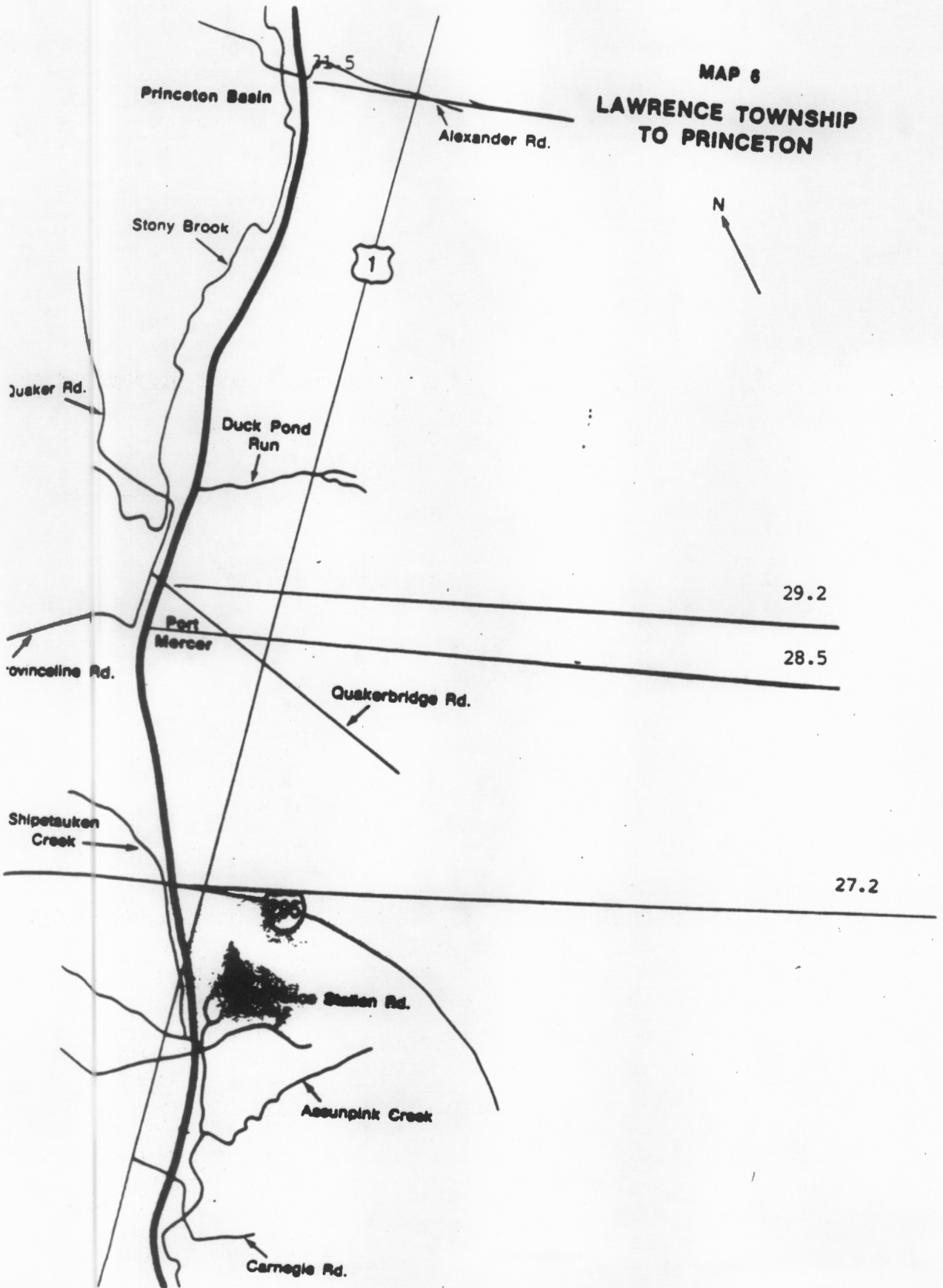


Note
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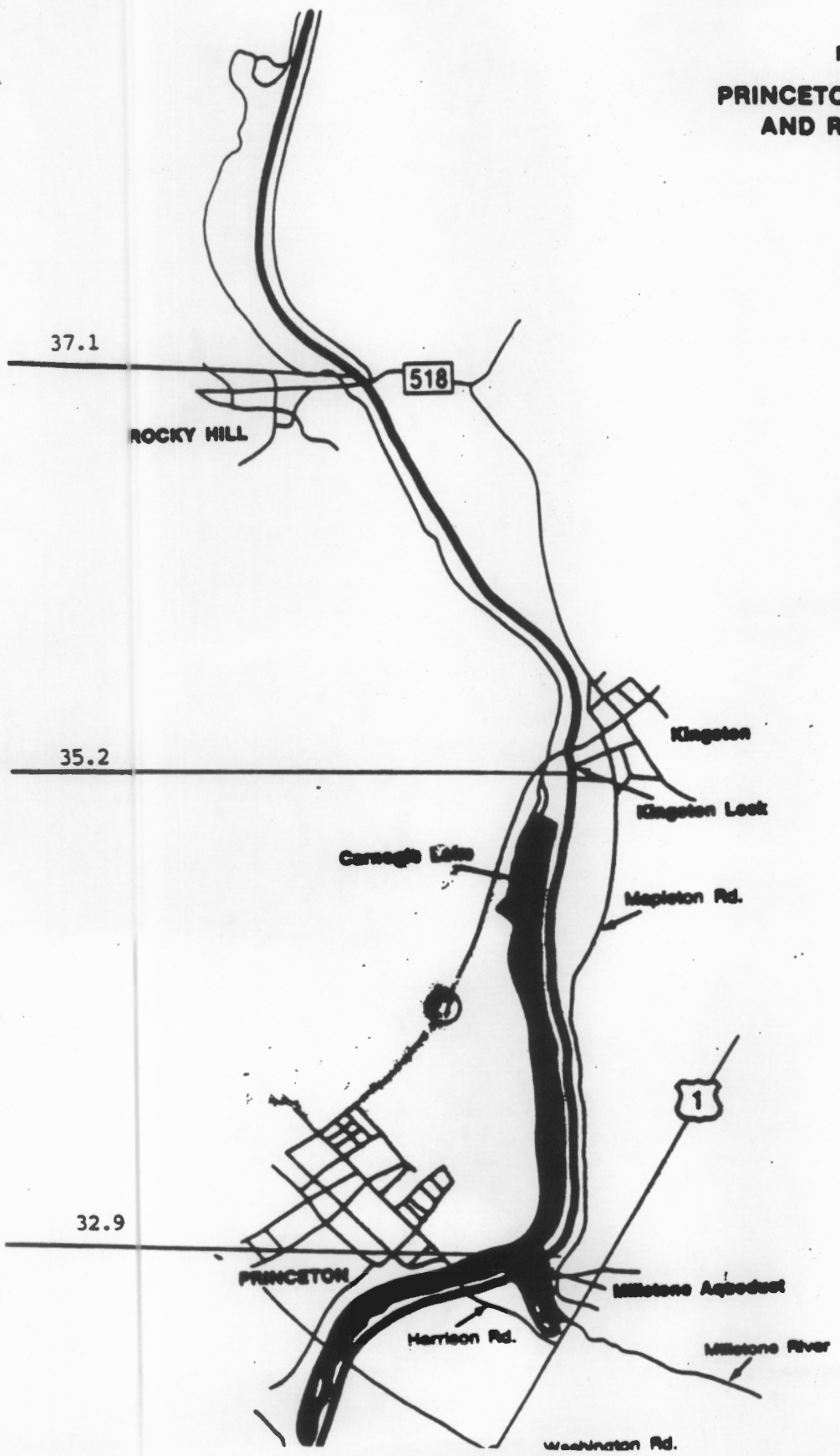
Ref only



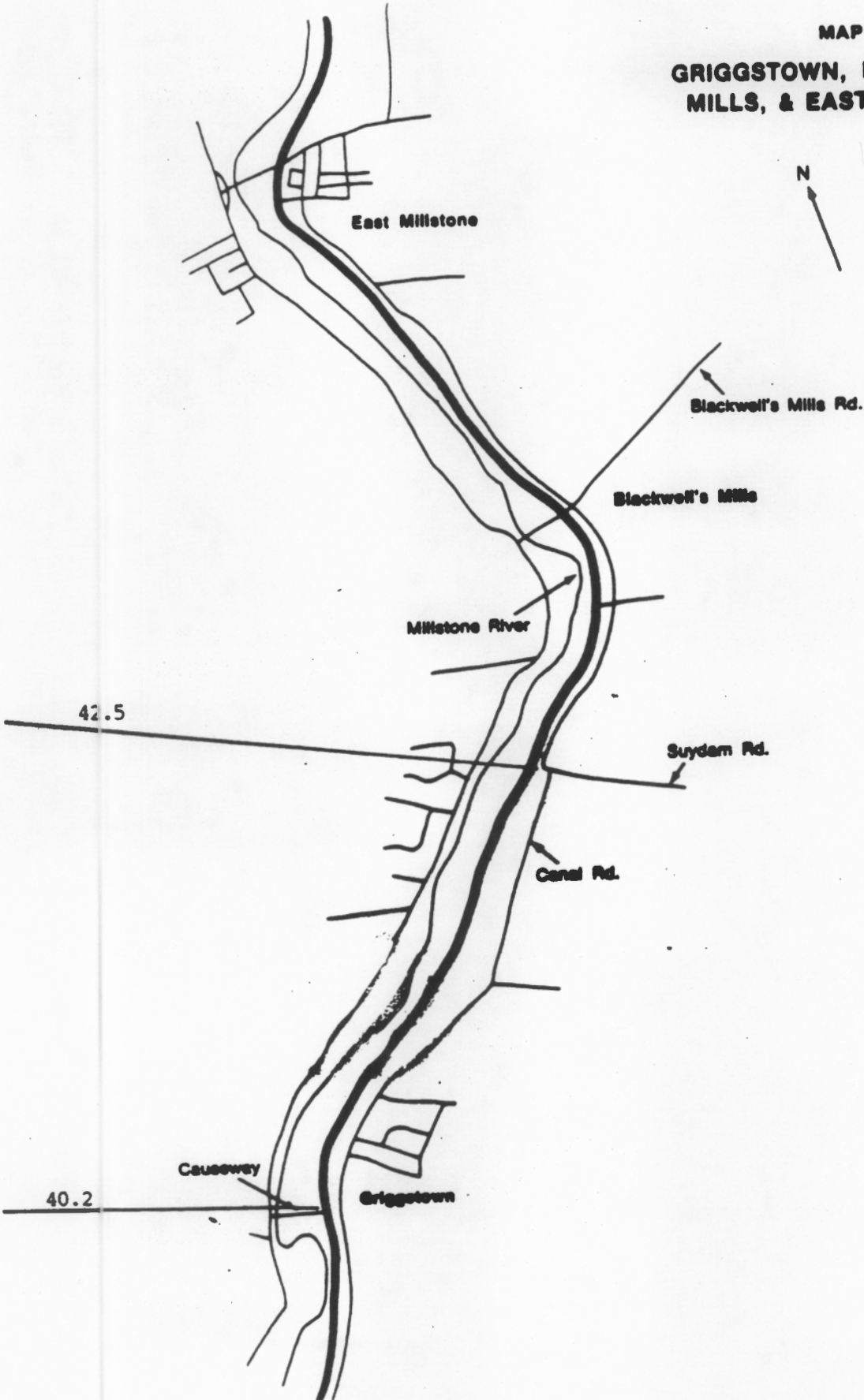
**MAP 6
LAWRENCE TOWNSHIP
TO PRINCETON**



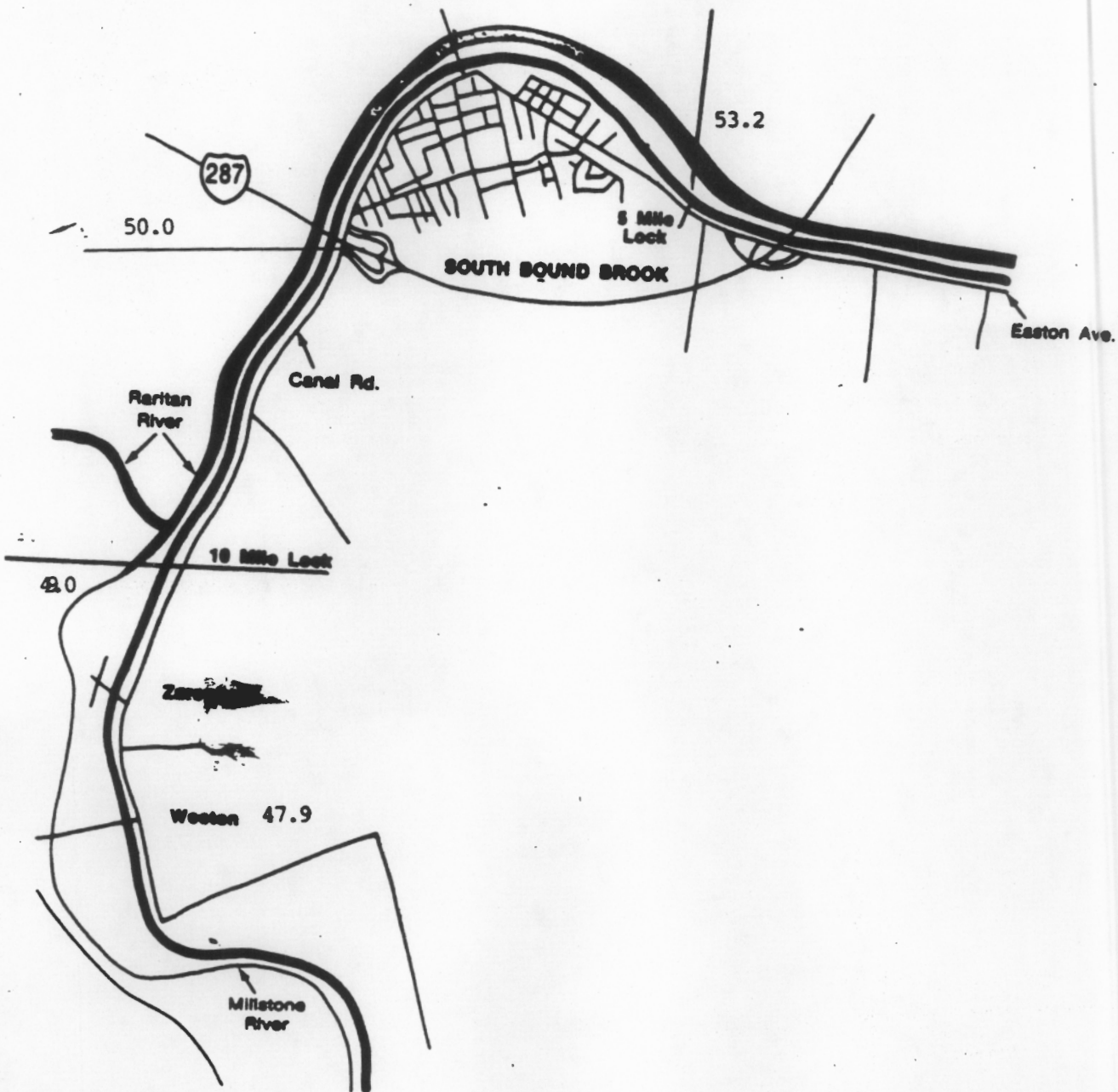
MAP 7
PRINCETON, KINGSTON
AND ROCKY HILL



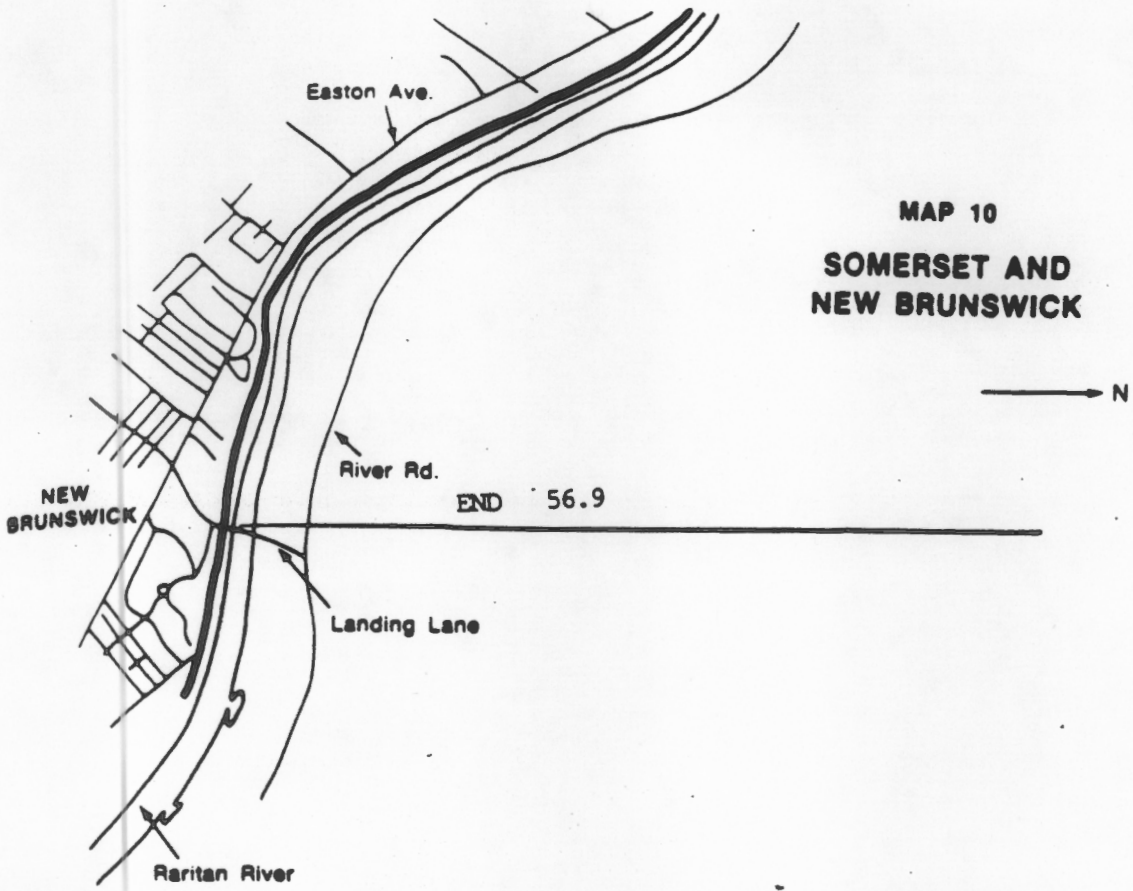
MAP 8
GRIGGSTOWN, BLACKWELL'S
MILLS, & EAST MILLSTONE



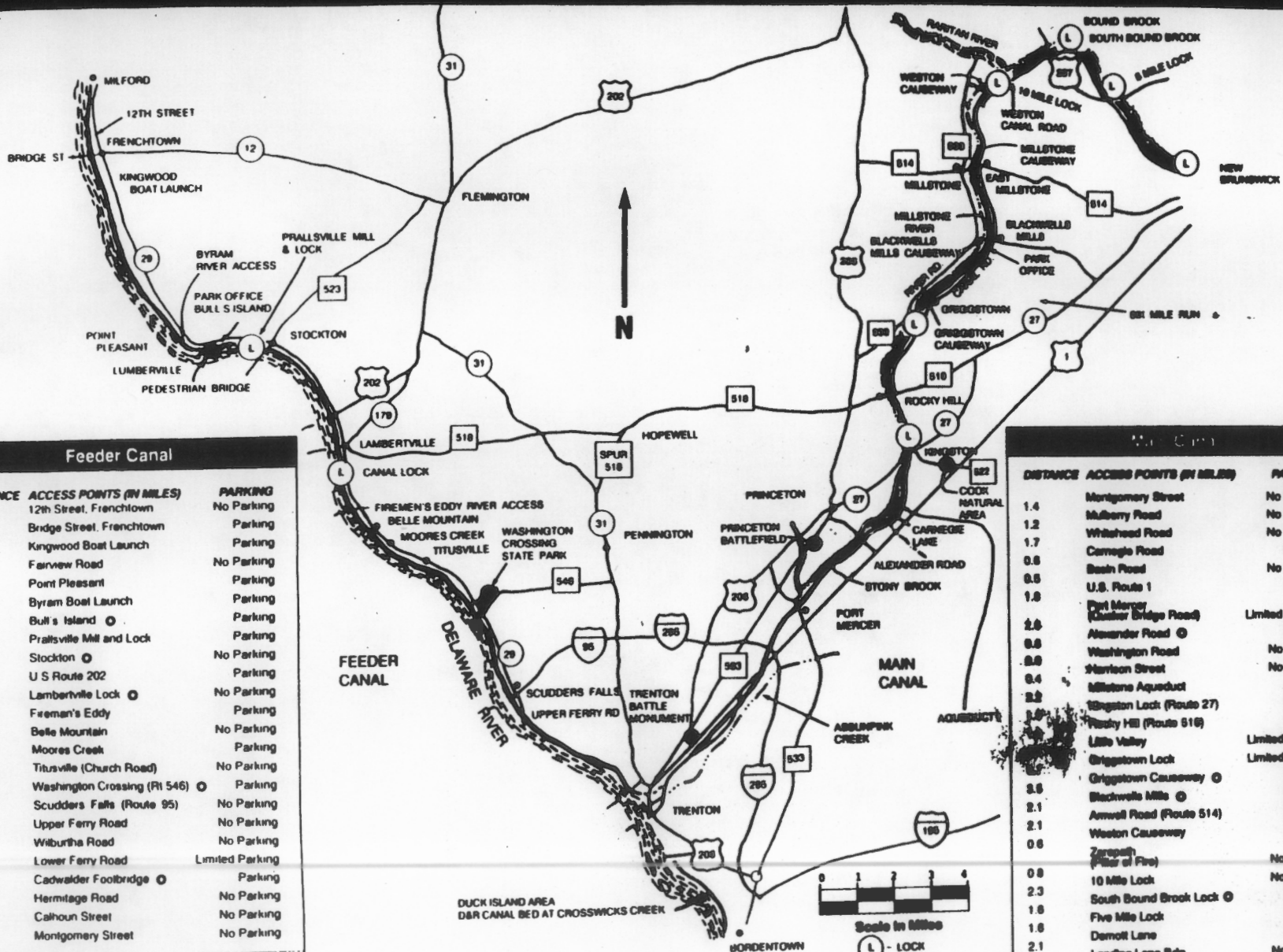
MAP 9
WESTON AND SOUTH
BOUND BROOK



MAP 10
SOMERSET AND
NEW BRUNSWICK



D&R Canal State Park



Feeder Canal

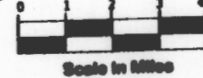
DISTANCE	ACCESS POINTS (IN MILES)	PARKING
07	12th Street, Frenchtown	No Parking
09	Bridge Street, Frenchtown	Parking
09	Kingwood Boat Launch	Parking
14	Farview Road	No Parking
48	Point Pleasant	Parking
09	Byram Boat Launch	Parking
09	Bull's Island	Parking
30	Prairiesville Mill and Lock	Parking
03	Stockton	No Parking
24	U S Route 202	Parking
15	Lambertville Lock	No Parking
11	Fireman's Eddy	Parking
09	Belle Mountain	No Parking
10	Moore's Creek	Parking
22	Titusville (Church Road)	No Parking
12	Washington Crossing (Rt 546)	Parking
24	Scudders Falls (Route 95)	No Parking
08	Upper Ferry Road	No Parking
04	Wilbur's Road	No Parking
09	Lower Ferry Road	Limited Parking
17	Cadwaller Footbridge	Parking
15	Hermitage Road	No Parking
18	Calhoun Street	No Parking
17	Montgomery Street	No Parking

⊙ Picnic Area

Main Canal

DISTANCE	ACCESS POINTS (IN MILES)	PARKING
1.4	Montgomery Street	No Parking
1.2	Mulberry Road	No Parking
1.7	Whitehead Road	No Parking
0.8	Carnegie Road	Parking
0.8	Beach Road	No Parking
0.8	U.S. Route 1	Parking
1.8	Port Mender (Cluster Bridge Road)	Limited Parking
2.8	Alexander Road	Parking
0.8	Washington Road	No Parking
0.8	Harlequin Street	No Parking
0.4	Millstone Aqueduct	Parking
2.2	10 Mile Lock (Route 27)	Parking
1.8	Rocky Hill (Route 518)	Parking
1.8	Little Valley	Limited Parking
0.8	Griggstown Lock	Limited Parking
0.8	Griggstown Causeway	Parking
0.8	Blackwells Mills	Parking
2.1	Anwell Road (Route 514)	Parking
2.1	Weston Causeway	Parking
0.6	Zareph (Four of Five)	No Parking
0.8	10 Mile Lock	No Parking
2.3	South Bound Brook Lock	Parking
1.8	Five Mile Lock	Parking
1.8	Demott Lane	Parking
2.1	Landing Lane Bdg	No Parking

⊙ Picnic Area



L - LOCK

CATALOG OF ROAD GUIDES

Mile	CD-26	2-Wire	12-inch Timber	Less 100' Gap
0 - 0.2	0.2			
0.2 - 1.4	.1			
1.4 - 2.9	1.2			.3
2.9 - 3.9	.9			
3.9 - 5.0	.9			.2
5.0 - 7.2	.2			2.0
7.2 - 16.0	8.6			.2
16.0 - 18.1	1.9			.3
18.1 - 22.9	.3			
22.9 - 23.2				
23.2 - 24.2	.9			.1
24.2 - 27.2	.3			
27.2 - 28.5	.3			
28.5 - 29.2	.7			
29.2 - 31.5	.1			
31.5 - 32.9	.1			
32.9 - 35.2	1.2			
35.2 - 37.1	.2			
37.1 - 40.2		3.1		
49.2 - 42.5				
42.5 - 49.0	.9		.4	.2
49.0 - 50.5	.3			
50.5 - 53.2	.3			.2
53.2 - 56.9	5.0			1.1

Delaware & Raritan Canal
Guide Rail Inventory
July 30, 1993
East Side

See Map #1

Starting at Bull's Island Where the Delaware River Feeds the D & R Canal

(Mile 0.0)

Bull's Island Campground between Route 29 and the Delaware River on the island's north end starts the Delaware & Raritan Canal and this "Guide Rail Inventory." This inventory will cover the east and west sides of the canal. The east side has most of the guide rail installation, but the west side will be covered also in this inventory under the heading "West Side." A NJDOT drawing CD-26 describes much of the construction of the railing in this inventory. Such railing will be noted as "CD-26," and all other types of guide railing will be described as the inventory continues.

Map 1 East Side:-

START OF CANAL TO BULL'S ISLAND (QUARRY ROAD)

(Mile 0.0 to 0.2)

CD-26 (No Rub Rail) starts at 0.0, ends at Quarry Road which is the entrance to Bull's Island Campground and the road to the "Foot Bridge" (to Pennsylvania). See "West Side Inventory" for details on this road.

FROM QUARRY ROAD TO LOCKATONG CREEK BRIDGE ALONG ROUTE 29

(Mile 0.2 to 1.4)

No guide rails between Route 29 and the canal. The average distance between the road and canal is less than 100'. The canal and Route 29 are separated for most of this area with mature woodland between them and some bank and ditch work. About 50 feet from Lockatong Creek Bridge CD-26 (No Rub Rail) continues to the bridge. No guide rail for 1.2 miles in this stretch.

FROM SOUTH SIDE OF LOCKATONG CREEK TO NORTH SIDE OF WICKECHEOKE CREEK ALONG ROUTE 29 (PRALLSVILLE)

(Mile 1.4 to 2.9)

Route 29 and the canal are within 100 feet from each other most of this 1.5 mile stretch, but there is much mature woodland between them.

Starting at Lockatong Creek Bridge CD-26 (N.R.R.) runs for 50 feet and stops; at 2.2 starts again, runs to mile 2.4, stops. Re-starts at 2.5, runs to 2.6, stops; restarts at 2.7, ends at 2.9. The approximate total of these gaps equals .3 miles and total CD-26 (N.R.R.) equals 1.2 miles for this 1.5 stretch along Route 29.

PRALLSVILLE (PRALLSVILLE MILL COMPLEX)

(Mile 2.9)

There is about 300 feet of CD-26 (N.R.R.) protecting this area along Route 29. There is an entrance (30 feet) and an exit (30 feet) going through this guide railing at each end.

Much happens in this small space at the Prallsville Mill Complex. Visitor's come to the nine buildings and grounds are carefully maintained. There is a lot of canal exposure as well as the Wickecheoke Creek flowing through. There are also races - both exposed and below ground, a canal crossing the site, and the canal lock. The Delaware and Raritan Canal Commission also has offices in this complex. This guide rail inventory notes here that additional guide rail work should be required in this area for expanded traffic.

FROM PRALLSVILLE COMPLEX TO BROOKVILLE RAILROAD CROSSING

(Mile 2.9 to 3.9)

The canal and old railroad crossing path separate at the Prallsville Lock and they remain about 200 yards apart until they rejoin at the Railroad Bridge south of Stockton in the community of Brookville. Many of the houses on the east side of the canal have maintained private yards right to the water's edge. There are no guide rails along this area except for the bridge that crosses the canal to Pennsylvania on Bridge Street. The canal bridge has wood railing, but because of its wood construction it offers very little resistance if a vehicle were to come in contact with it. The bridge's southwest corner has a possible entrance for vehicles to fall into the canal and there is no guide railing to prevent this. Just north of bridge street is Ferry Street. Ferry Street dead ends at the canal but there is no guide railing at its dead end. Ferry Street gives very easy access to the canal's water for vehicles.

Returning to Route 29 at Brookville Road, CD-26 (N.R.R.) starts again and runs to the Brookville railroad bridge. There's an opening of the guide railing for the railroad at this point at (mile 3.9.).

FROM BROOKVILLE R/R CROSSING TO HOLCOMBE-JIMISON FARM

(Mile 3.9 to 5.0)

Route 29 is very close to the canal except for the area near Holcombe-Jimison Farm. Trap Rock Industry quarry trucks dominate much of the road use and are a source of much dust and noise.

At the R/R crossing CD-26 (N.R.R.) starts and it ends 400 feet (approx.) from the cemetery fencing. The cemetery fencing continues to Route 202. The above 400 feet has no guide railing and the

page 3

shoulder is used for parking. This area is used for trash dumping and looks very shabby.

U.S. Route 202 crosses the canal but at a considerable height and its embankments and bridge are all protected by CD-26 and bridge railings. CD-26 continues to the road leading to the Holcombe-Jimison Farm # (mile 5.0).

HOLCOMBE-JIMISON FARM

(Mile 5.0)

A road from Route 29 continues past the farm entrance and goes to a canal bridge. The bridge has wood rails and all four corners offer easy access for vehicles to enter the canal. The Water Supply Authority mainly uses this bridge to truck landfill and materials for the canal.

See Map # 2

FROM HOLCOMBE-JIMISON FARM TO LAMBERTVILLE LOCK

(Mile 5.0 to 7.2)

This section of the canal runs along the western edge of Lambertville. The railroad tracks are there and used for the entire section. Several of Lambertville's roads and streets cross or dead end at the canal. At the south end of town is Lambertville Cavello Park and some open area around the lock. Route 29 is more than 100' from the canal. All other parallel streets are more than 100' from the canal.

THE STREETS OF LAMBERTVILLE THAT CROSS OR DEAD END AT THE CANAL

North to South

Cherry Street:-

Dead ends at Union Street more than 100' from canal.

Arnett Street:-

Same as Cherry Street.

Elm Street:-

Dead ends more than 100' from canal.

Buttonwood Street:-

Dead ends; has a few large rocks and a tree stump near canal.

Perry Street:-

Dead ends at canal but there is a section of guide rail that's in poor shape at end.

Delaware Ave:-

Dead ends at canal. There's some obstruction at the end of this street, but not done to standards of present requirements.

Jefferson Street:-

Dead ends on Clinton Street.

Delevan Street:-

Dead ends within 30' from canal. Has a double 2"x10"x24' long wooden obstruction about 24" high on 4"x6" "I" beams at 6 foot centers. This obstruction can not meet standards.

York Street:-

Dead ends within 30 feet from canal. Road splits in 2 sections. North section acts like a driveway, slopes down into canal. South section remains at street level, but a light bent metal fence ends the road, which at this point drops 10 feet down then on to a foot path next to the canal. This street offers unusual hazards to vehicles approaching the dead end.

Coryyell Street:-

Bridge across canal with wooden guide railing. All 4 corners of this bridge are accessible to vehicles which then can enter the canal's waters running perpendicular to Coryyell Street.

Bridge Street:-

Bridge Street crosses over the canal then to Pennsylvania. The canal bridge has rugged concrete 4' high sides, but the southeast corner has easy vehicle access and no guide railing. This could be a hazardous area.

Ferry Street:-

A direct street to the canal. There's no protection and Ferry Street slopes towards the canal. This is the worst condition in Lambertville for vehicles possibly driving into the canal. Road slopes and no guide rail or barriers.

Swan Street:-

Dead ends at South Union Street.

Mt. Hope Street:-

Dead ends at canal; a 60 foot steel barrier similar to CD-26 (N.R.R.) but has 10 foot centers and 4"x6" "I" beams x 24" high for mounting. It's possible by turning right, then left to easily enter the canal from an improved surface next to the canal.

Feeder Street:-

Dead ends more than 100' from canal.

FROM LAMBERTVILLE LOCK TO SCUDDERS FALLS

(Mile 7.2 to 16.0)

The canal is closely paralleled by Route 29 for all this section. There is good beam guide rail construction and it's rather recently done in most of this section along Route 29. The details of NJDOT CD-26 best describe this section, except the rub rail has been omitted in most of the construction.

The CD-26 (N.R.R.) starts at the end of Lambertville and continues to the exit of the Golden Nugget. This may be a fireman's access to the canal, but it's directly opposite a vehicle exit from the Golden Nugget. It bears consideration because of the possibility of entering into the canal waters so easily.

The CD-26 (N.R.R.) continues from the Golden Nugget to Feddlers Creek Road. At Feddlers Creek Road a bridge crosses the canal. There is a gap between the CD-26 and the bridge wood guide railing; a vehicle can enter unobstructed into the canal's waters. On the opposite side of the bridge the towpath/railroad makes it easier to enter the canal, both on the north and south ends between the bridge and the gates.

The CD-26 (N.R.R.) continues between Route 29 and the canal to Church Road Bridge where very similar conditions exist as noted for Feddlers Creek Bridge across the canal. From Church Road to Route 546, which leads to Pennsylvania, the CD-26 continues, except for a maintenance break and a parking area. At 546 the bridge is heavily used across the canal. All four corners offer easy access to the canal's water by vehicle, especially where 546 from Pennsylvania crosses the canal bridge. Between the path gates and the bridge there are no guide rails and entering the canal can only be avoided by making sharp turns. The 546 bridge has wooden guide rails, the same style and design as the Church Street Bridge.

FROM SCUDDERS FALLS TO LOWER FERRY ROAD

(Mile 16.0 to 18.1)

There are 4 bridges that cross the canal:

- Mile 16 Scudders Falls Bridge
- Mile 16.7 Upper Ferry Bridge
- Mile 17.7 Wilburtha Road
- Mile 18 Lower Ferry Road

The above bridges have wooden guide rails and all four corners offer easy access to the canal; Lower Ferry Road also has heavy golf cart travel. Mile 16 to Mile 16.7 along roadways Routes 29, 175, 95 has continuous beam guide rail CD-26 (N.R.R.) except on 95, which has CD-26 on all exit and entrance roads.

In the area between Upper Ferry Road and Lower Ferry Road (except bridges) there aren't any guide rails along the canal between miles 16.7 and 18.1 because of its rural setting.

FROM LOWER FERRY ROAD TO OLD ROSE STREET

(Mile 18.1 to 22.9)

From Lower Ferry Road, which is within the boundary of the City of Trenton, the canal has no guide rails except at Sullivan Way and Parkside Ave. Beginning at Sullivan Way aqueduct, the canal has a five-foot tall chain-link fence on both banks.

FROM HERMITAGE AVE TO OLD ROSE STREET

The following roads cross the canal:

1. Hermitage Ave.
2. Prospect Street
3. pedestrian bridge (Prospect & Calhoun St.)
4. Calhoun Street
5. West Hanover Street
6. Passaic Street
7. Spring & Willow intersection
8. Warren Street
9. North Broad Street
10. Montgomery Street

The canal then runs along Holland Street, then disappears into a culvert. After the culvert there is only one crossing in Trenton, and that is a spur of Route 1 leading to Strawberry Street.

The above area has unmistakable signs of urban problems and the guide rail construction sometimes varies within one bridge many ways and cannot be easily cataloged as one single condition or construction within the scope of this report.

FROM OLD ROSE STREET TO MULBERRY STREET

(Mile 22.9 to 23.2)

U.S. Route 1 is built over this portion of the canal. The canal flows in two box culverts beneath the highway.

MULBERRY STREET TO WHITEHEAD ROAD

(Mile 23.2 to 24.2)

The canal emerges from the culvert that carries it under Route 1. Route 1 (the nearest road) has CD-26 for the entire distance along the canal. At 24.0 Cherry Tree Lane dead-ends at the canal. There is some open space at this point and access to the canal is possible. At 24.2 Whitehead Road: This is a very congested area, Whitehead Road and Route 1 all inter-crossing. The roads have CD-26 by the canal.

FROM WHITEHEAD ROAD TO INTERSTATE 295 CROSSING

(Mile 24.2 to 27.2)

Mile 24.2 Whitehead Road canal has good beam guide rails construction along canal. At mile 25.8 Carnegie Road crosses with mostly wood guide rail construction and some metal CD-26 along the roadway. There is parking for 20 cars in this area, and the guide rail bears investigation to bring up to CD-26 standards. Lawrence Station Road crossing has wood and CD-26 (N.R.R.), but there is car width clearance to the canal's water.

Mile 26.9: a small parking area with access to the canal at Route 1 (I-295) ramp. Has good section of CD-26 guide railing.

FROM INTERSTATE 295 TO PERT MERCER PROVINCELINE ROAD

(Mile 27.2 to 28.5)

There are no highways within 100 feet of the canal.

PROVINCELINE ROAD TO QUAKERBRIDGE ROAD

(Mile 28.5 to 29.2)

Provinceline Road had CD-26 (N.R.R.), then at Quakerbridge Road it intersects with CD-26 (N.R.R.) on Quakerbridge Road. The canal house has a dirt road along side of it with no guide railing.

FROM QUAKER ROAD TO ALEXANDER ROAD

(Mile 29.2 to 31.5)

There are no highways within 100 feet of the canal in this stretch. There are some dirt roads and lanes, but not much traffic on them till you reach Alexander Road.

At Alexander Road a bridge has mostly wooden railing, but there is CD-26 leading to it. There are no real barriers between the path gates allowing easy access to vehicles to enter the canal's waters.

FROM ALEXANDER ROAD TO MILLSTONE AQUEDUCT

(Mile 31.5 to 32.9)

At 32.0 Washington Road crosses the canal with small parking lots east of canal. This bridge also has easy access on the west side because of wood and large spaces open to canal's water. There are no major highways paralleling the canal within 100 feet and also no guide rail.

At 32.6 Harrison Street, this bridge has real rugged construction. Broken automobile parts and long paint scrapes on this bridge prove it can handle impact, but on the west side there is easy vehicle entrance to the canal because of lack of guide rail protection.

At mile 32.9 Millstone Aqueduct there is a large parking lot with some guide rail but vehicles can use boat ramp lane to enter the canal.

FROM MILLSTONE AQUEDUCT TO KINGSTON LOCK

: (Mile 32.9 to 35.2)

Mapleton Road sits right on the canal's eastern bank and within 100 feet from mile 32.9 to 34.1 where the distance is

greater than 100 feet. Within the 100' less area, CD-26 (N.R.R.) exists, but some of the post center lines appear to be greater than 6'3", the standard required for CD-26 (N.R.R.). Also, there are a couple of damaged areas along this stretch. Also the 15" ground line to W-Beam Rail Element varies, possibly past DOT tolerances. At Kingston Lock area, Route 27 and a D & R wooden bridge cross; both require additional guide railing.

FROM KINGSTON LOCK TO ROCKY HILL (ROUTE 518 CROSSING)

(Mile 35.2 to 37.1)

The highway Route 603 does not come within 100 feet of the canal and ends at Route 518. Route 518 does cross the canal. There is a small parking lot off Route 518. The bridge at Route 518 has wood guide rails, and on the towpath side (west) there is easy access to the canal's water by vehicles. There is some CD-26 on Route 518, but there's enough room for vehicles to pass through into the canal.

FROM ROCKY HILL (BRIDGE ROUTE 518) TO GRIGGSTOWN CAUSEWAY

(Mile 37.1 to 40.2)

To the east of the canal is canal road, a narrow rural road. To the west for most of this section is River Road. River Road has the Millstone River to the east of it, then the canal well over 100 feet away. Canal Road is on the easterly bank of the canal and at times less than ten feet from Canal Road. Starting at Route 518 and Canal Road there are 2 strands of wire rope supported on 24" above-ground wood posts, approximately 10" to 12" diameter wooden posts (at 6 to 8 foot center lines). Top wire rope is about 24" from ground level; bottom wire rope is about 15" from ground level. This will be noted as "2-wire" as this survey continues. This railing is only used in this section of the cataloging.

Stop sign at mile 37.1 Canal Road & Route 518: 2-wire begins and continues to mile 37.7. At 37.7 there may be 2-wire, but it's been knocked down. At 38.4 there is 2-wire but in very poor condition (canal less than ten feet from road). At 38.4 no wire is visible. At 39.0 2-wire exists off and on, down and up, and in very poor shape to the Griggstown Causeway at mile 40.2. This is the end of the 2-wire and it will not appear elsewhere in this catalog.

Note that there are 3.1 miles of very poor section of guide rail along the canal. The close, small road and the absence of a shoulder along the canal makes this a matter of concern.

THE GRIGGSTOWN CAUSEWAY TO SUYDAM ROAD

(Mile 40.2 to 42.5)

This section of Canal Road is more than 100 feet from the canal.

FROM SUYDAM ROAD TO 10 MILE LOCK

(Mile 42.5 to 49.0)

Canal Road runs very close to the canal to East Millstone. There is an apparent need for more CD-26 (N.R.R.) type of beam guide rail, but from Suydam Road to East Millstone there is none on Canal Road. There are wooden guide rails in a few sections on this stretch made up of 4"x12" timber. They are about 24" high, mounted on wooden 12 inch diameter posts on 8 foot centers (also mounted on "I" beams 8"x8" (est.)).

For this section such guide rail construction shall be noted as "12-inch timber" in this catalog.

1. 2/10 mile from Blackwells Mill Road, 12-inch timber runs for approximately 300 feet.
2. 3/10 mile from Blackwells Mill Road, 12-inch timber runs for approximately 100 feet.
3. 1.1 miles from Blackwells Mill Road, 12-inch timber runs for approximately 100 feet.
4. 1.3 miles from Blackwells Mill Road, 12-inch timber runs for approximately 100 feet.
5. There are a few short 15-foot lengths on 12-inch timber in this area.

CD-26 (N.R.R.) starts 100 feet from Grouser Road and ends at Grouser Road. The supporting posts on this beam guide rail exceed the 6'3" standard and the W-Beam Rail element appears less than 12 1/4 wide. The railing is bent and rusted in places. At Grouser Road to East Milestone Bridge there are two 12-inch timber rails of 200 feet. The first is 1/10 mile from Grouser Road, the second 2/10 mile from Grouser Road. No such guide rail construction exists in this catalog after the second section of 12-inch timber. At East Millstone Bridge on Route 514 there is easy access to the canal on the west side.

At Canal Road to Weston the road is over 100 feet apart till it takes a sharp left toward the bank of the canal. There is no railing in this section, and there is a water filled ditch between the road and the canal. This conditions runs to (Amwell Road 45.8 mile) Weston Bridge DOT "3000-166" which crosses the canal. There is easy access to canal's water on the westerly side where it is short 15 foot section of Bridge guide wood railing.

Starting at the Weston Bridge (at mile 47.9) turn on Canal Road, there are 100 feet of CD-26 (N.R.R.) then an open break to the Zarephath Lock Locktender's House at mile 48.4. It is possible to turn in here, although a "restricted" sign is present, and there's no parking straight into the unprotected lock area.

At 10 Mile Lock (mile 49.2) there is no parking, but again it's possible to drive into canal's water.

FROM 10 MILE LOCK TO WESTON CROSSING OF I-287

(Mile 49.1 to 50.5)

On the west side of the canal, the Raritan River closes in on the towpath. On the east side of the canal, Weston Canal Road is heavily used and there are industrial buildings on large lots. CD-26 is almost continuous along the canal, but there are sections where the top of the canal bank is 10 to 15 feet above the roadway, and there are sections where no guide rail is required. About 300 feet approaching I-287, CD-26 starts. I-287 is supported by heavy long bridge columns, and they also act as guide members.

FROM CROSSING OF I-287 TO 5 MILE LOCK

(Mile 50.5 to 53.2)

Guide rail CD-26 follows the canal's easterly edge to 5 Mile Lock. Much of the high sides of the canal also forms a barrier.

Mile 51.7 Brook Lock (Lock 11): There is a small parking area here and a walkway across the lock. There is CD-26 (N.R.R.) protecting the parking area.

From this point, the distance from the highway widens to more than 100 feet, and at mile 53.1 returns to the canal at 53.2. CD-26 starts here again at 53.1 to mile 53.2.

FROM 5 MILE LOCK TO LANDING LANE BRIDGE

(Mile 53.2 to 56.9)

From 5 Mile Lock CD-26 continues without break to Landing Lane Bridge. This is a long, relatively straight section. Easton Ave. is quite close in places and has 4 lanes of high-speed traffic and shopping areas.

APPENDICES

H. Delaware & Raritan Canal State Park Operational Analysis

DRAFT

DELAWARE AND RARITAN CANAL STATE PARK

**OPERATIONAL ANALYSIS
MODEL STAFFING PLAN**

AUGUST, 1994

Prepared by

**Division of Parks & Forestry
New Jersey Department of Environmental Protection**

DELAWARE AND RARITAN CANAL STATE PARK OPERATIONAL ANALYSIS

The Delaware and Raritan Canal State Park is a 67-mile linear park spread out over five counties and twenty-three municipalities. The major area units of the park each have their own unique staffing needs as noted below:

Main Canal

This section of the Delaware and Raritan Canal and the Millstone River project extending from Landing Lane in New Brunswick to Mulberry Street in Trenton. This section also includes the Cook Natural Area in Kingston.

Suggested staffing is as follows:

- 1 Chief Ranger (E)
- 2 Rangers (E)
- 1 Maintenance Supervisor 1 (E)
- 2 Maintenance Specialist 1(1E)
- 2 Maintenance Specialist 2 (E)
- 1 Park Naturalist
- 4 Seasonal Maintenance employees (E)

Feeder Canal and Bull's Island

This section of the Delaware and Raritan Canal State Park includes park area from Lower Ferry Road to Bull's Island Recreation Area and the Bel-Del extension from Bull's Island to the Milford limit and the Frenchtown North properties.

Bull's Island

The section of the Delaware and Raritan Canal State Park made up of the 100 site campground, day use area, Bull's Island natural area, Bryam boat launching site, south launch and canal boat launch. The campgrounds are open seven days a week, April through November.

- 1 Chief Ranger (E)
- 3 Rangers (E)

- 1 Maintenance Supervisor 1 (E)
- 2 Maintenance Specialist 1 (E)
- 2 Maintenance Specialist 2 (E)
- 1 Park Naturalist
- 1 Clean Communities Crew (E)
- 4 Summer Seasonal Maintenance (E)
- 3 Visitor Service Assistants (E)

Trenton

This section of the Delaware and Raritan Canal State Park is from Lower Ferry Road to Mulberry Street comprising the canal's multi-use trail through the City of Trenton, the abandoned railroad corridor from Jarvis Place to Willow Street and Duck Island.

There are very few structures in this section of the park. The path and its surrounding vegetation is the main amenity of this portion of the park. The largest percentage of this section's staff time will be spent keeping the area clean and controlling the adjacent vegetation. The largest portion of this sections law enforcement activities will be prohibiting undesirable uses of the trail. Double ranger patrols are planned.

Suggested Staffing is as follows:

- 1 Chief Ranger
- 4 Rangers
- 1 Maintenance Supervisor 1
- 1 Maintenance Specialist 1
- 3 Maintenance Specialist 2
- 1 Clean Community Crew
- 1 Park Naturalist
- 2 Visitor Service Assistants

Equipment Crew

When all the various segments of the Delaware and Raritan Canal State Park are considered with their associated heavy vehicular, agricultural, and hand held equipment the quantity of equipment begins to approach 200. A staff is

needed to maintain and repair these pieces of equipment with a centrally located well equipped shop. This function will remain at the Blacksmiths Mills facility as proposed.

Suggested Staffing is as follows:

- 1 Crew Supervisor Garage Operator
- 1 Mechanic

Building Crew

When all the various segments of the Delaware and Raritan Canal State Park are considered its structure inventory approaches 125 structures ranging from small outbuildings to 150 year old dutch barns. Due to insufficient funding over the last few decades all structures are in need of extensive repairs or renovations. A roving crew of skilled craftsmen are needed to stabilize these structures.

Suggested Staffing is as follows:

- 1 Carpenter
- 1 Plumber
- 1 Mason
- 1 Electrician
- 4 Maintenance Specialist 2

Administration

The roll of the parks administrative staff is to provide centralized purchasing, account monitoring, capital improvement project coordination, reporting, mapping, interagency coordination, grant and lease administration to the various segments of the park.

Suggested Staffing is as follows:

- 1 Superintendent 1 (E)
- 1 Park Office Assistant 1 (E)
- 1 Clerk Typist
- 1 Project Specialist
- 1 Seasonal Clerical Worker (E)

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ENDNOTES

1. James C. Amon, *Delaware and Raritan Canal State Park Master Plan, Second Edition*, May, 1989, n.p., pp. 31-38.
2. Historic preservation specialists consulted by the Study Commission include Robert von Zumbusch, William McKelvey and Dan Saunders. Mr. von Zumbusch was the Senior Architect and Project Director for the Delaware and Raritan Canal State Park Historical and Recreational Development Plan. Mr. McKelvey is an authority on canal history and has authored several books on the history of the D&R Canal. Mr. Saunders is on the staff of the State Historic Preservation Office.
3. See U.S. Department of the Interior, National Park Service, *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, 1992, n.p.:Washington DC, October 1992 for a description of the standards for preservation, rehabilitation, restoration and reconstruction.
4. Presentation by Dan Saunders, State Historic Preservation Office, to the Delaware and Raritan Canal Transportation Safety Study Commission, November 5, 1993.
5. AASHTO, the American Association of State Highway and Transportation Officials, formulates highway engineering policies and standards which are used by the federal and state Departments of Transportation.
6. Correspondence from Nancy Zerbe, Administrator, Office of New Jersey Heritage (now referred to as the State Historic Preservation Office) to John Kraml, Special Assistant to the Director of the Division of Parks and Forestry, New Jersey Department of Environmental Protection, May 25, 1990.
7. Presentation by Dan Saunders, State Historic Preservation Office, to the Delaware and Raritan Canal Transportation Safety Study Commission, November 5, 1993.
8. One of the fatal accidents at the Wilburtha Road crossing resulted from the driver's heart attack and is not included in subsequent descriptions of approach roadway conditions or accident rates discussed in this report.
9. New Jersey Department of Transportation, 1991 bridge inspection reports.
10. Assistance in explaining standards used by the New Jersey Department of Transportation was provided by Salim M. Baig, P.E., Chief, New Jersey Department of Transportation Bureau of Structural Evaluation, Division of Bridge Design.

11. The following New Jersey Department of Transportation engineers explained traffic safety considerations: Salim M. Baig, P.E., Chief, Bureau of Structural Evaluation, Division of Bridge Design; William Anderson, P.E., Supervising Engineer, Bureau of Traffic Engineering and Safety Programs; George Kuziw, P.E., Manager, Bureau of Transportation Data Development; Jeff Harvey, P.E., Project Engineer, Bureau of Regional Design.
12. The New Jersey Department of Environmental Protection retains records of police reports involving vehicles entering the Canal. The Study Commission obtained and reviewed this information (see also Appendix F for a list and brief description of canal related incidents).
13. Task Force for Roadside Safety of the Standing Committee on Highways, *Roadside Design Guide*, Washington DC:AASHTO, October 1988, pp. 5-1 - 5-2.
14. Id. at 5-13; see also U.S. Department of Transportation, Federal Highway Administration, Memorandum Regarding Approval of Steel-backed Timber Guardrail, Stone Masonry Guardwall and Precast Concrete Guardwall, March 12, 1990.
15. The Somerset County Department of Public Works received approval by the Delaware and Raritan Canal Commission for new bridge approach rails at the Blackwell's Mills Millstone River crossing that feature steel-backed timber construction. Also, see New Jersey Department of Transportation, *Scenic Byway Management Plan for New Jersey Route 29 - Draft*, March 1994.
16. See Appendix G.
17. The timber guiderail referenced here is not the same system as the steel-backed timber alternative developed by the Federal Highway Administration for use on Federal lands (for more on FHWA standards, see p. 24 of this report).
18. See Appendix F for a list and description of canal-related incidents, both vehicular and nonvehicular-related. The primary source of information contained in Appendix F is the New Jersey Department of Environmental Protection, the Division of Parks and Forestry. The Appendix does not include all criminal incidents reported to the New Jersey Department of Environmental Protection. Furthermore, it only documents motor vehicle incidents dating back to 1984 and nonmotor vehicle incidents dating back to 1990.
19. A total of \$1.5 million in ISTEA funding is allocated toward towpath completion and improvements within Trenton and Lambertville. Phase 1 construction has already been completed. Phase 2 is expected to be completed by spring 1996.
20. Urban Partners and Lane Frenchman and Associates, Inc., *Canal Banks Community Planning Study - Draft Final Report*, July 14, 1993.

BIBLIOGRAPHY

James C. Amon, *Delaware and Raritan Canal State Park Design Guide*, 1980.

James C. Amon, *Delaware and Raritan Canal State Park Master Plan, Second Edition*, n.p., May, 1989.

New Jersey Department of Transportation, *Scenic Byway Management Plan for New Jersey Route 29 - Draft*, March 1994.

New Jersey State Planning Commission, *New Jersey State Development and Redevelopment Plan*, June 12, 1992.

New Jersey Department of Environmental Protection, *New Jersey State Outdoor Recreation Plan*, 1988.

Somerset County Planning Board, *Somerset County Scenic Corridor and Roadway Study*, July 1992.

Task Force for Roadside Safety of the Standing Committee on Highways, *Roadside Design Guide*, Washington DC:AASHTO, October 1988.

Urban Partners and Lane Frenchman and Associates, Inc., *Canal Banks Community Planning Study - Draft Final Report*, July 14, 1993.

U.S. Department of the Interior, Heritage Conservation and Recreation Service, *National Recreation Trails, Information and Application Procedure*.

U.S. Department of the Interior, National Park Service, *The Secretary of the Interior's Standards for the Treatment of Historic Properties - 1992*, Washington, D.C., October 1992.

U.S. Department of Transportation, Federal Highway Administration, *Memorandum Regarding Approval of Steel-backed Timber Guardrail, Stone Masonry Guardwall and Precast Concrete Guardwall*, March 12, 1990.