

Cape Cod Rail Trail Extension

Sandwich to Dennis,
Massachusetts

Prepared for

Cape Cod Commission
Barnstable, Massachusetts

Prepared by

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Watertown, Massachusetts

December 1994

TRANSPORTATION FEASIBILITY STUDY

CAPE COD RAIL TRAIL EXTENSION
Sandwich to Dennis

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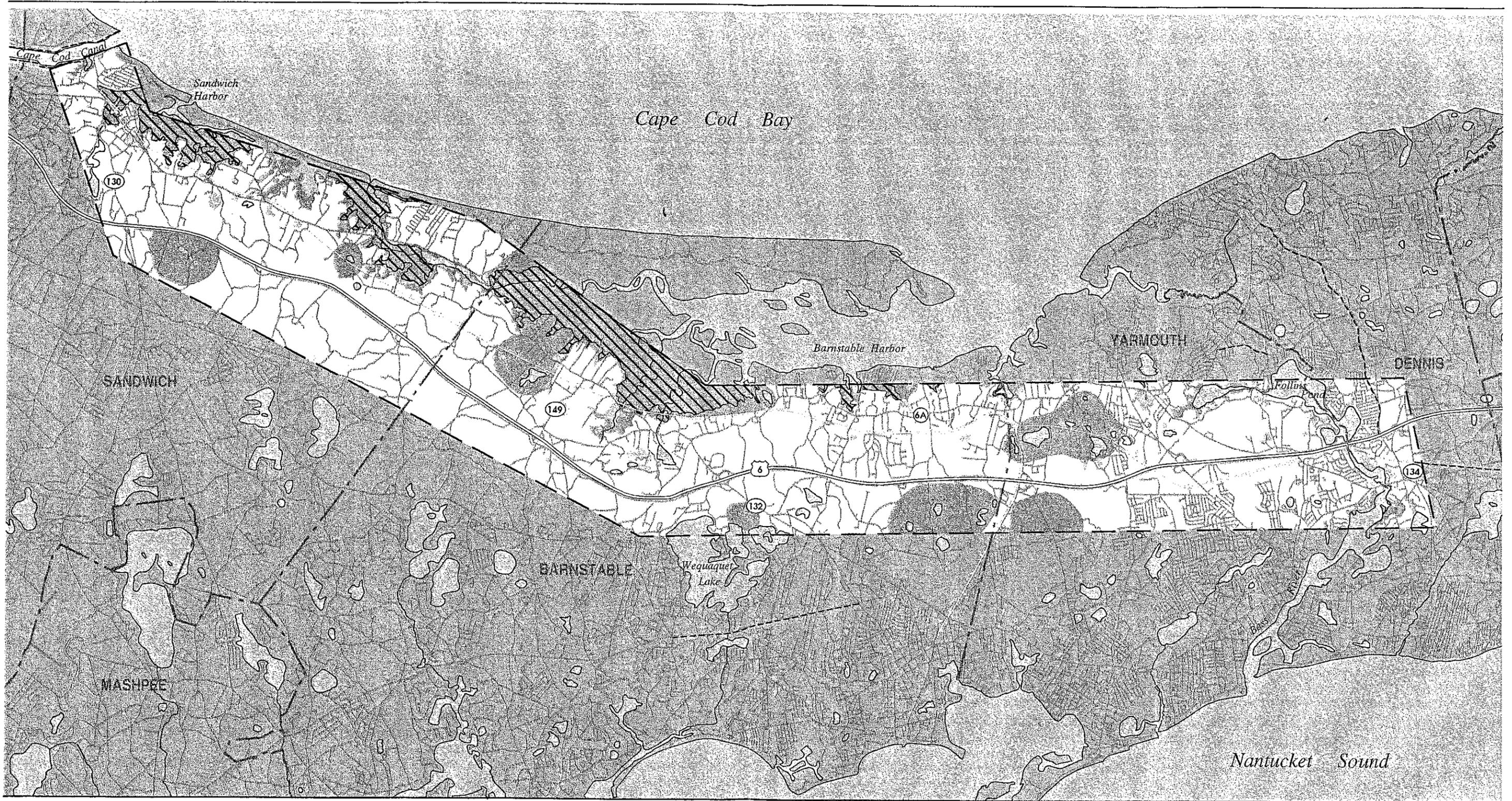
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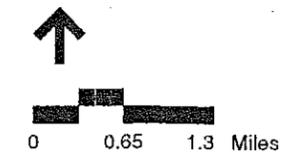
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Vanasse Hangen Brustlin, Inc.

Figure 1
Study Area



INTRODUCTION

PROJECT PURPOSE

The Cape Cod Commission (CCC) is seeking to improve the bicycle transportation network throughout the Cape and, specifically, east/west travel from the Cape Cod Canal to Orleans. Toward this objective, and with a grant from the U.S. Environmental Protection Agency (EPA), the Commission retained Vanasse Hangen Brustlin, Inc. to conduct a feasibility study of extending the existing Cape Cod Rail Trail by constructing a multi-use recreational trail within the existing right-of-way (ROW) owned by the Massachusetts Executive Office of Transportation and Construction (EOTC) and operated by Bay Colony Railroad.

This study examined constructing the rail trail from the Cape Cod Canal in Sandwich to an eastern terminus at Route 134 in Dennis. The western end of the trail, as proposed, would connect with existing bike paths along the Cape Cod Canal. The eastern end of the trail would connect with the existing Cape Cod Rail Trail. The entire study area was 23 miles long (Figure 1). Recently, the Cape Cod Commission issued a Request for Proposals (RFP) to conduct a bicycle accommodation study of a parallel corridor along Route 6A from Sandwich to Orleans.

STUDY PROCESS

VHB conducted its study of the rail trail extension in two phases. The first phase was a macro-level review of the planning concept which identified key environmental constraints that might affect the constructability of the rail trail. This effort determined that constructing the western half of the rail trail from Sandwich through the Route 6A intersection in Barnstable was unfeasible due to major environmental constraints. That analysis is documented in this memorandum.

The next phase of the study moved into a micro-level design feasibility review of the remaining 10-mile section of the rail trail. This effort featured three primary components:

- To review how the proposed trail would tie into the existing system of bicycle paths and link its users to key attractions and destinations along the mid-Cape;
- To identify key design issues critical to its construction; and

- To review important operational concerns associated with sharing the right-of-way with an active railroad.

A public participation process was initiated at the beginning of the project and maintained through the course of the trail development to ensure that the final rail trail would meet public needs and acceptability. A 17-member Bicycle Advisory Committee was convened, and met monthly throughout the duration of the study. This Committee included representatives from the EOTC, the Environmental Protection Agency (EPA), the Massachusetts Highway Department (MHD), the Division of Environmental Management (DEM), the Towns of Barnstable, Yarmouth, and Dennis, and Mad About Cycling (MAC). Meeting notes for all Advisory Committee meetings and the public meetings are attached as Appendix B. A public meeting was held in Barnstable on October 25, 1994, to obtain additional comments on the proposed trail.

TRAIL SYSTEM PLANNING AND DESIGN

INTRODUCTION

The trail system planning effort summarized in this report focused on four components: environmental feasibility, transportation linkages; design feasibility and system enhancements; and optional issues. Transportation linkages describe how the path begins and ends and how it links to the overall surface transportation network. Design feasibility and system enhancements focus on the key elements of the design of the rail trail, including right-of-way, cross-section, structural requirements, and at-grade crossings and system enhancements including alternative alignments and other features that would make the trail more attractive and safer for its users.

ENVIRONMENTAL FEASIBILITY

Environmental constraints which may affect the placement of a bikeway along the existing railroad right-of-way (ROW) were investigated for the entire length of the study area, and are documented in Appendix A. This constraints mapping effort was based primarily on available published data sources. A field reconnaissance of the entire route was conducted using a "HiRail" vehicle, and sensitive areas were also investigated on foot by the consultant and members of the BAC. This information was used during the identification of feasible alternatives. More detailed, site specific, field investigations and wetland delineation will be required during final design and implementation.

The following constraints were evaluated for this project:

- Floodplains
- Surface Water Resources
- Wetlands and Areas of Critical Environmental Concern (ACEC)
- Rare and Endangered Species
- Cultural Resources (Archaeologic and Historic)
- Hazardous Materials

This report identifies the type of constraints present, and their location relative to the project, to evaluate the feasibility of constructing a bike path within the ROW. Natural environmental features (wetlands, floodplains, rare species, ACECs) and certain cultural resources (historic, archaeologic) are protected by regulations or regulatory policy which require that adverse impacts be avoided or minimized.

As a result of the analysis of environmental constraints, the western portion of the Cape Cod Rail line, extending from Freezer Road in Sandwich to the "Green Bridge" at Route 6A, was determined not to be feasible due to its potential environmental impacts.

Along this portion of the rail line, the single track crosses numerous wetlands on narrow filled causeways. The rail bed would require widening by approximately 25 feet to accommodate a bicycle path through these areas. This would result in substantial impacts to surface waters, floodplain, wetlands, the Sandy Neck Barrier Beach ACEC, and rare species.

- New crossings of Mill Creek, Dock Creek, Springhill Creek, Bridge Creek, Brickyard Creek, Scorton Creek, and Boat Cove Creek would be required.
- Fill would be required in the (coastal) floodplain at each of these crossings.
- Salt marsh impacts within the Old Harbor Creek marsh system, the Scorton Creek marsh system, and Great Marsh could reach 3 acres, even with minimization of impacts.
- Anadromous fish runs at Scorton Creek and Boat Cove Creek could be affected.
- The salt marsh impacts would result in the loss of wetlands within an Area of Critical Environmental Concern, and could affect habitat of a state-listed rare species, the Diamondback Terrapin.

These rather substantial impacts to critical resource areas would require extensive environmental review. The project would be categorically included for preparation of an Environmental Impact Report under MEPA due to the losses of salt marsh and work within an ACEC. The salt marsh could not be filled for trail construction without the issuance of a Variance under the Massachusetts Wetlands Protection Act, which would require that there was a substantial public benefit and that there were no feasible alternatives. Water quality regulations effectively prohibit filling of wetlands within an ACEC. Federal regulations under Section 404 of the Clean Water Act would also require demonstration of an overriding public need, and no feasible alternatives.

The environmental review process would be extensive, costly and lengthy, with only limited probability of success. While it may be possible to sufficiently demonstrate that the construction of a bicycle path from Sandwich to Barnstable met the overriding public need criterion, there are likely to be feasible alternative routes (such as the location of a bicycle path along Route 6A) that would not affect critical wetland resources. Use of a network of local roadways and other minor arterial roadways may also be feasible. For these reasons, the Bicycle Advisory Committee agreed that the western portion of the proposed rail trail was not feasible.

TRANSPORTATION LINKAGES

The rail trail would primarily serve as a regional transportation facility and secondarily as a recreational facility. The initial proposal called for a 23-mile trail extension that would provide a major east-west corridor paralleling

Routes 6 and 6A through the heart of the mid-Cape. This concept clearly meets both transportation and recreational needs. However, early field work conducted as part of this study demonstrated that constructing the trail between Sandwich and Barnstable was not feasible as a result of wetland impacts on the western portion of the corridor. Starting the trail in Barnstable complicates the problem of linking the trail system with the existing surface transportation network and area traffic generators. Significant study effort was focused on integrating this segment of the rail trail into the overall Cape Cod bicycle network.

Western Terminus

Through field review by VHB and discussions with members of the Bicycle Advisory Committee, the Cape Cod Community College (CCCC) in the vicinity of Exit 6 on Route 6 was identified as an appropriate western terminus of the bike path. Besides being a major traffic generator in and of itself, the CCCC is highly visible and is located in close proximity to the state-sponsored park and ride lot on the opposite side of Route 132. The park and ride lot is currently served by several intercity bus lines.

Several alternatives were defined for linking the Cape Cod Community College with the rail right-of-way both east and west of the "Green Bridge" at Route 6A in Barnstable, as depicted in Figure 2. The first alternative (Alternative 1) examined a connection west of the Green Bridge. This alternative was ruled out because of wetland impacts and the necessity to cross Route 6A, several culvert underpasses, and Route 6A again, along the rail ROW. Two alternatives were reviewed for cross country connections east of the Green Bridge: the first, a northerly route (Alternative 2) connecting with the railroad ROW via Barnstable Conservation land in the vicinity of the Overlook Trail; and the latter via a southerly route to Old Jail Lane (Alternative 3). Both of these alignments require cooperation from one or two land owners, although they primarily traverse publicly-owned lands along their routes to the CCCC. From an engineering standpoint, both alignments appear feasible with minimal environmental impact.

Several discussions were held with Barnstable officials and representatives of the Jail Lane Preserve during the course of this study that were very positive about the prospects of building this trail link. The general consensus was that the southernmost alignment was preferred because it is the least disruptive to the existing network of hiking trails in the area. Introduction of the concept of a trail linkage was also favorably received by the Cape Cod Community College. Should neither of these alternatives prove feasible during the design of the project, the trail could be started in Barnstable Center, in the vicinity of the county offices. Although weekday parking is severely limited, adequate parking would be available on weekends.

Eastern Terminus

The next major system linkage issue to be addressed as part of this study was how to end the trail at its eastern terminus in Dennis. The objective of this rail link was to connect with the existing Cape Cod Rail Trail at Route 134 in Dennis. However, constructing the trail along the railroad ROW without special

treatment of the crossing at Route 134 may present a dangerous situation for bicyclists and pedestrians. An additional pedestrian traffic signal at Route 134 is not feasible due to traffic congestion in this area. Several alternatives to redirect trail traffic were defined for the eastern end of the corridor which would still achieve the linkage to the Rail Trail. These alternatives are also illustrated in Figure 2 and include options with and without a new crossing of the Bass River.

Should the Bass River crossing prove too costly for early implementation, two over road alternatives to connect to Route 134 were identified. A northern route utilizes North Dennis Road to Setucket Road/Old Bass River Road (to an existing bikepath) to Main Street and Route 134 (Alternative 4). This alignment could tie into the existing culvert crossing of Route 134 just south of the Route 6 interchange but is probably too lengthy and inconvenient to provide an attractive bicycle route. The southern route consists of North Main Street to High Bank Road to Main Street to Route 134 (Alternative 5). This alternative would utilize an existing traffic signal at Main Street and Great Western Road to bring bicycles across Route 134. The southern route appears even more problematic as it serves heavy traffic volumes. Widening of existing roadways to accommodate bicycle traffic is not feasible, since this route travels through the South Dennis Historic District.

Several additional routes are possible between the Bass River crossing and Route 134. The first option is to carry the trail all the way along the railroad ROW to Route 134 (Alternative 6). This appears to be the best direct alignment but would require a new grade separated crossing of Route 134 and reconstruction of the existing trail staging area. Two additional options propose constructing the rail trail as far as Main Street at the Dennis town offices and designating the trail over road via a northern route (Alternative 7) to the existing culvert crossing of Route 134 (just south of the Route 6 interchange) or southerly to the traffic signal of Route 134 at Main Street and Upper County Road (Alternative 8). The northern route would utilize an existing grade separated crossing of Route 134 but would also necessitate building a trail connector around the Patriot Square Plaza. The southern route would designate the trail over road along Great Western Road to the existing rail trail. Both alignments are circuitous and would require signage and some roadway improvements to safely accommodate traffic flows. These alignments were discounted because of these impacts and concerns that bicyclists may opt to cut across to Route 134 directly instead of traveling around to safer crossings.

A final alignment (Alternative 9) which utilizes the rest area right-of-way along Route 6 and subdivision roads through the Riverdale residential area to access Old Bass River Road, Main Street and Old Main Street to the Route 134 culvert crossing (or alternatively staying within the Route 6 ROW) was also investigated. Although the former Route 6 rest area would provide a picnic and staging area for the bicycle trail, this alignment does not offer any significant advantages over the direct connection to Route 134 via the existing railroad right-of-way. Furthermore, it would require modification to the Bass River Road bridge over Route 6 and could impact the long-term plans by the Massachusetts Department to upgrade the Route 6/Route 134 interchange.

Station Avenue

Through the Yarmouth section of the trail, several alternatives were identified in the vicinity of Station Avenue, a major north-south arterial with heavy traffic flow. Three alignments were considered: one using the existing rail ROW; a northern alternative using White's Path; and a preferred alternative to the south using Old Town House Road. Both White's Path and Old Town House Road have signalized intersections with Station Avenue which could be used to control bicycle and pedestrian traffic. Coincidentally, the Old Town House Road has been considered previously by the Town of Yarmouth as a desirable bicycle corridor. Bringing the trail directly to Station Avenue along the rail right-of-way would require either a new pedestrian signal at the crossing or, preferably, a grade separation. This would be a more costly treatment than using the Old Town House Road alignment and the existing signal.

From field review and public input, the White's Path alternative was dismissed because it offered no significant advantages over the existing rail corridor.

User Destinations

Along the entire route between Barnstable and Dennis, a number of key attractions and recreational opportunities were identified. These potential user destinations are also depicted in Figure 2 and include the Cape Cod Community College, Barnstable Center, the pond complex, the A&P shopping center, the Yarmouth-Dennis Regional High School, the Flax Pond Recreational Area, Bass River and Patriot Square. The final design plans for the corridor should define how a physical connection is made between the rail trail and these area attractions and how the trail users are directed to their destinations along the corridor.

DESIGN FEASIBILITY ISSUES

This section of the report highlights key design issues which will affect the feasibility and costs of constructing the rail trail from Barnstable to Dennis. A complete set of conceptual design plans (at a scale of 1 inch equals 200 feet) with typical cross-sections and construction details are provided as a companion document to this report. These plans should be referred to for detail on the trail alignment through the project area, signage and crossing plans, and adjacent right-of-way impacts.

Cross-Section

The prime function of this bikeway is to provide an alternate transportation mode to the automobile. However, past experiences on other projects have shown that these facilities are frequently shared with recreational users such as pedestrians, in-line skaters, and joggers. This diversity of users must be taken into consideration in designing the appropriate cross-sections for the trail.

The facility will be designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) and other MHD-approved standards. These recommend a minimum trail width of 8 feet and a

desirable width of 10 feet.¹ In reviewing cross-section alternatives, a 10-foot trail with 2-foot unpaved shoulders was viewed as a workable treatment to minimize right-of-way impacts without sacrificing the utility of the trail. The Bicycle Advisory Committee was unanimous in their recommendation for a 10-foot cross-section for this project. This cross-section would provide adequate capacity initially with the flexibility to accommodate the needs of different users in the future. It was agreed that departure from this design standard would only be in cases of severe environmental constraints.

In placing the trail cross-section within the rail corridor, the design objective was to maintain a 15-foot offset from the end of the ties to the edge of the trail. This condition was requested in early discussions with the Bay Colony Railroad concerning sharing use of the corridor. This design objective was achieved without land use impacts throughout those portions of the trail which are to be located within the 82.5-foot rail right-of-way. However, this objective was not attainable without easements or land taking in sections where the right-of-way width is 66.0 feet or less (see discussion below). In these cases, a minimum offset of 8 feet was maintained. In all cases, a chain link fence separating the trail from the rail is proposed. While this fence may detract from the aesthetic appearance of the trail, it is viewed as an important safety feature to separate the corridor uses. The fence should be designed to provide space between the bottom of the fence and the substrate to allow medium-sized mammals (raccoons, skunks, fox, coyote) to pass beneath the fence. It would, however, present a barrier to the movement of larger mammals such as deer.

Additional details on the cross-sectional treatment for various segments of the corridor are provided in the conceptual design plans.

Right-of-Way

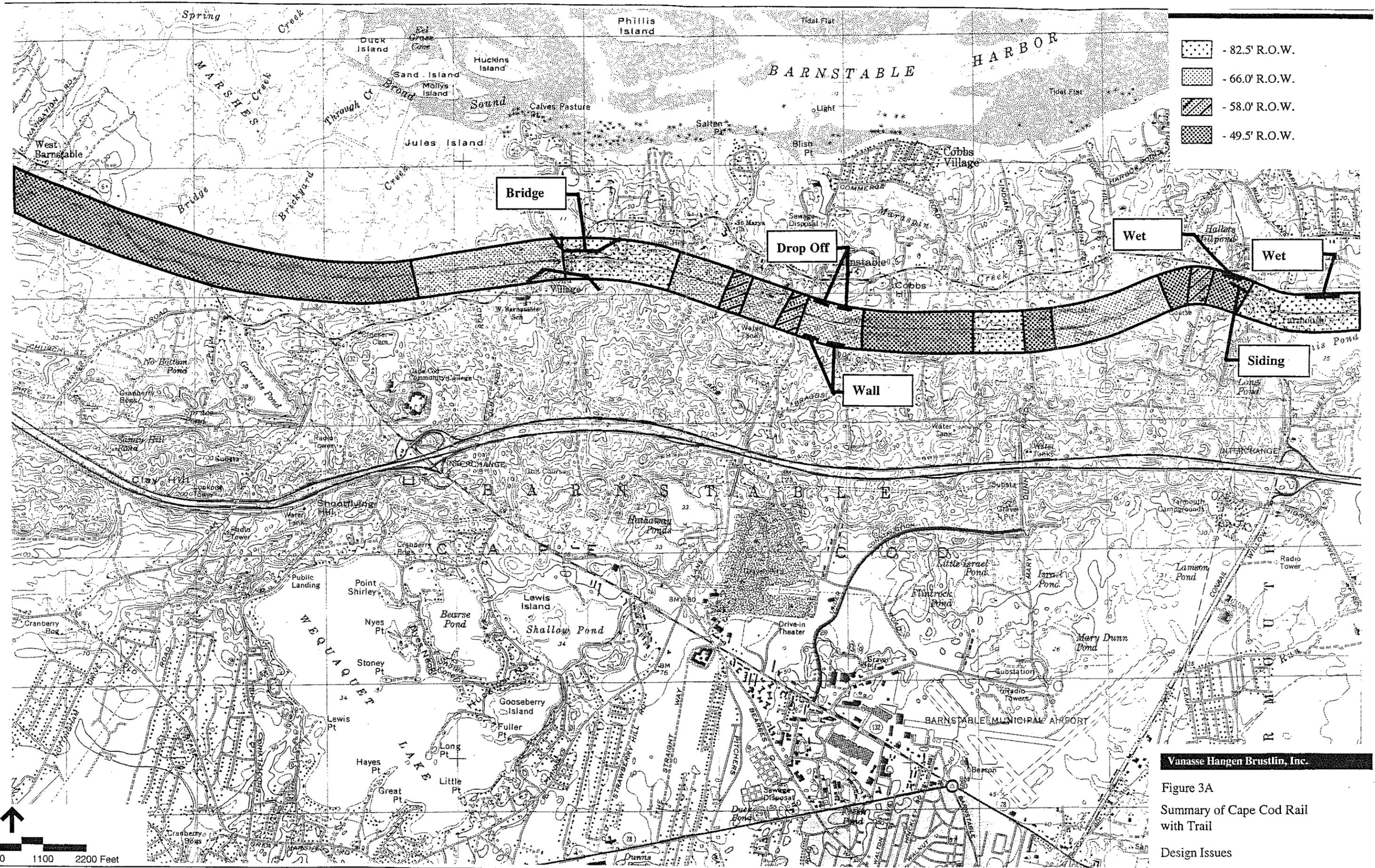
The right-of-way along the existing rail corridor owned by the Executive Office of Transportation and Construction was researched through right-of-way plans and assessor's maps. The results of this research are summarized in Figure 3.

As noted by the figure, the right-of-way for the section of the corridor under consideration varies from 49.5 feet to 82.5 feet. Significant variation in the right-of-way exists between the Green Bridge in Barnstable and Yarmouth Station. Significant constraints, in terms of positioning the trail within the rail right-of-way, are present from Old Jail Lane through the area of the County Farm, at Mary Dunn Road, and past the Cummaquid Golf Course. It is expected that easements and/or takings will be necessary from as many as 40 landowners through this section of the corridor. This portion of the corridor represents approximately 2 miles of the total 9.5 mile trail. Encroachments into the ROW also occur in several areas. Locations of the parcels likely to be affected by trail construction are shown on the conceptual design plans. Opportunities to bypass certain sections of this constrained area by using over-road alignments exist, although they are not as direct as using the rail corridor.

Beginning at Yarmouth Station and extending through Route 134, the rail right-of-way is 82.5 feet and can accommodate the shared use with no additional ROW impacts.

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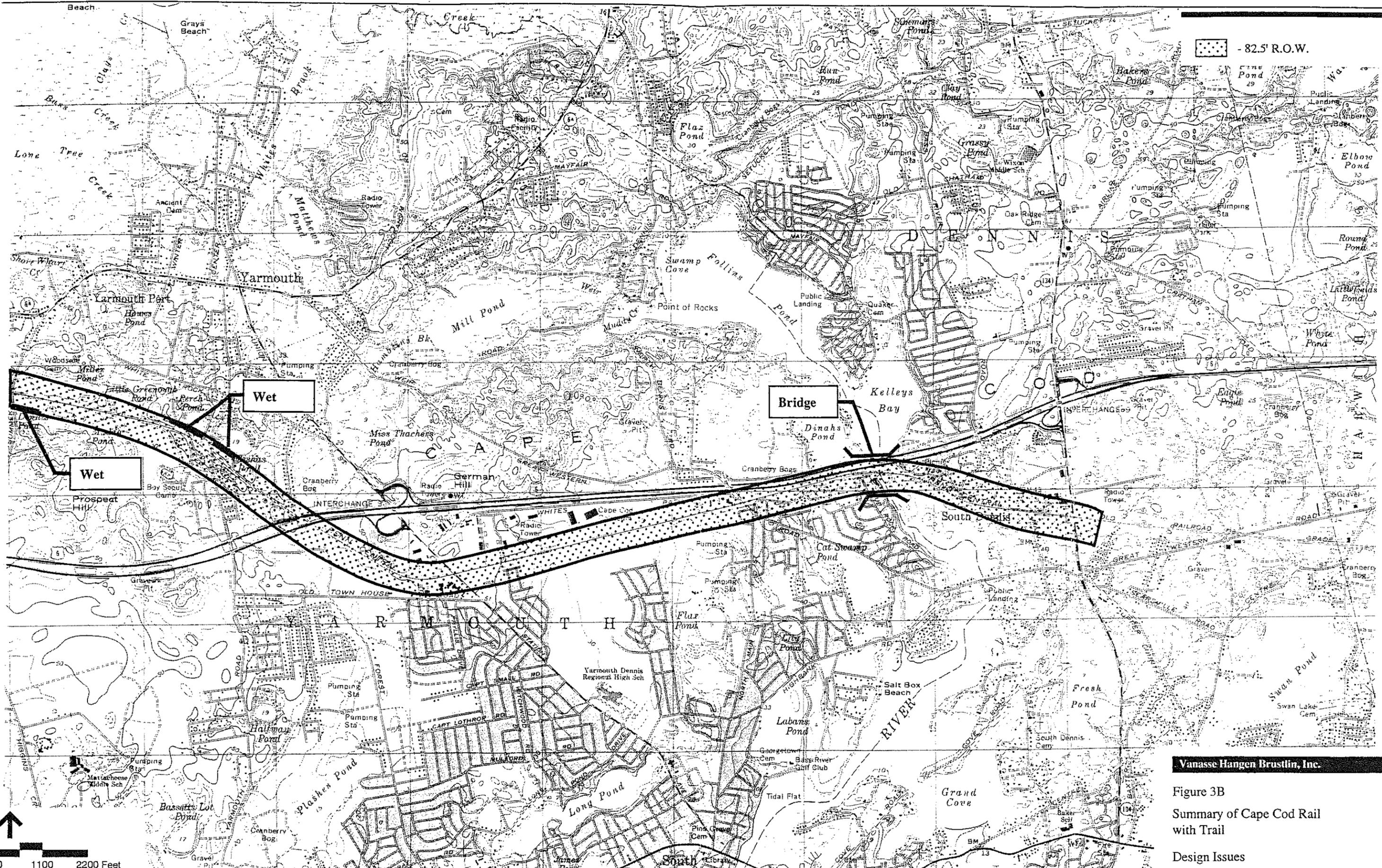
"Guide for the Development of Bicycle Facilities", American Association of State Highway and Transportation Officials, August 1991.



-  - 82.5' R.O.W.
-  - 66.0' R.O.W.
-  - 58.0' R.O.W.
-  - 49.5' R.O.W.

Vanasse Hangen Brustlin, Inc.

Figure 3A
 Summary of Cape Cod Rail
 with Trail
 Design Issues



Vanasse Hangen Brustlin, Inc.

Figure 3B
 Summary of Cape Cod Rail
 with Trail
 Design Issues

Structural Requirements

Two significant bridge structures are required for trail construction along the rail right-of-way at the Greenough ponds and the Bass River.

As planned, the Greenough bridge would be a wooden structure on piles located on the north side of the existing causeway. A bridge is required for a distance of approximately 400 feet to eliminate any direct impacts to adjacent bank and wetlands. The location of the trail and the structural treatment along this section of the project area are shown in the conceptual design plans that accompany this report. Opportunity may exist to bypass this crossing by moving the trail to the north of Little Greenough Pond across land owned by the Yarmouth Historical Society and the Boy Scouts of America. This option is worthy of further study as it could reduce costs and may offer an enhancement over the existing trail alignment.

Crossing the Bass River is proposed on the north side of the existing railroad tracks. A 70-foot simple span is recommended that features a reinforced concrete deck with steel stringers that utilize the existing stone abutments. The trail approach to the river span would be constructed on wooden structures set on piles to minimize the impact on the adjacent environmental resources. A total of approximately 200 feet of approach structure is needed on the west side of the river and 50 feet on the east side. Again, details of this crossing are provided in the conceptual design plans.

Two additional structures may be incorporated into the design of the trail to provide grade separated crossings at Station Avenue and Route 134. These underpasses would utilize precast box culverts with retaining walls on the approaches. These structures could be constructed within the existing ROW and would be designed to provide adequate lateral and vertical clearance to accommodate the proposed trail cross-section.

At-grade Crossings

There are potentially 14 locations along the corridor at which the rail trail would cross public roadways. Each of these locations was reviewed in the field to assess safety, geometry, sight distance, grades and operations. Appropriate traffic control devices will be important to control traffic and provide a safe crossing at the various locations. These crossings, from west to east, are:

- Old Jail Lane
- Pine Lane
- Hyannis Road
- Bragg's Lane
- Mary Dunn Road
- Marston's Lane
- Willow Street
- Summer Street
- Pine Street
- West Yarmouth Road
- Station Avenue
- White's Path
- Old Bass River Road/Main Street

- Route 134

In most cases, the appropriate traffic control consists of signage and crosswalks, since the side street volumes are very low. Locations of these treatments are provided in the conceptual design plans.

Two significant intersections would require further consideration: Station Avenue in Yarmouth and Route 134 in Dennis. These are locations where multi-lane roadways carrying high traffic volumes pose a threat to conflicting bicycle and pedestrian traffic. Previous sections of this report presented alternatives to these locations by relocating the crossings to points where existing traffic signals or grade separation would improve safety. In the case of Station Avenue, this could involve relocating the trail to Old Town House Road and incorporating a pedestrian crossing into the Old Town House Road traffic signal. However, unless the trail is realigned to intersect at this signal, it is believed that an enforcement problem will develop that will result in bicyclists illegally crossing Station Avenue at the railroad ROW. A preferred alternative would be to construct a grade separated crossing at the existing rail ROW. Both alternatives are feasible from an environmental and design perspective.

Numerous alignment alternatives were also investigated for the Route 134 crossing. A controlled bicycle crossing at existing traffic signals located north or south of the railroad right-of-way is feasible. However, without a clearly developed and well-signed trail directing bicycle traffic to these locations, illegal crossing of Route 134 at the existing Cape Cod Rail Trail may result. Furthermore, using the existing culvert crossing located south of the Route 6 overpass requires that additional links be developed to connect with the existing rail trail. It was the consensus of the Bicycle Advisory Committee that a grade separated crossing of Route 134 at the existing railroad right-of-way is the most desirable alternative. This action would require reconstruction of the existing Cape Cod Rail Trail staging area.

SYSTEM ENHANCEMENTS

Additional considerations in planning the rail trail extension identified system enhancements which could increase the attractiveness and usage of the Rail Trail. For the purposes of this study these include:

- Staging areas
- Alternative alignments using adjacent public lands
- Bicycle amenities

As a transportation facility, the bikeway must be located near areas of existing or potential bicycle travel. Specifically, the bikeway should be accessible to major residential areas where the bicyclists can enter the path and travel to a specific destination such as schools, libraries, commercial districts, places of employment and recreational areas. Key attractions along the route were identified through field reconnaissance and public input. These locations are identified in Figure 2. Final design of the bicycle path should give further consideration to providing linkages to these locations.

Staging Areas

Accessibility to the trail can be further enhanced by developing staging areas, which consist of trail heads with adjacent parking facilities. Potential staging areas were identified at nine locations along the approximate 10-mile corridor. Staging locations identified where parking currently exists include:

- Route 132 park-and-ride lot in Barnstable;
- Cape Cod Community College in Barnstable;
- Barnstable Center (weekends only);
- Village Plaza on Station Avenue in Yarmouth;
- Town of Dennis offices; and,
- Patriot Square Shopping Center in Dennis.

Potential new staging locations at which parking areas would be constructed include:

- The Mary Dunn Road intersection in Barnstable;
- Yarmouth Station; and,
- The proposed Yarmouth Landfill Reuse Area.

The potential to develop several of these locations as trail heads and parking areas should be investigated during the design phase of the project.

Bicycle Amenities

Bicycle amenities include street fixtures such as bicycle racks, signage and public rest rooms to serve users of the recreational trail. The proposed staging areas are obvious candidates for these types of enhancements. Other key locations to consider during the design phase of the project might include in Barnstable Center at the county government buildings, at the A&P shopping center on Station Road in Yarmouth, at the Dennis Pond Beach in Yarmouth, at the Dennis Town offices and at the Patriot Square Shopping Center on Route 134 in Dennis.

OPERATIONAL ISSUES

Discussions regarding extension of the Cape Cod Rail Trail in Dennis through the shared use of the EOTC right-of-way, operated by Bay Colony Railroad, were initiated a number of years ago by the Towns of Dennis and Yarmouth. Response from the railroad was positive, although several operational conditions for shared use, which are discussed in this section of the report, were identified. The Executive Office of Transportation and Construction's involvement in this effort officially began with the issuance of the RFP. EOTC had membership on the Bicycle Advisory Committee formed for this effort and the project team solicited their input throughout the course of the study. Key correspondence from both the Bay Colony Railroad and the EOTC concerning this project is included in Appendix C to this report.

Rail Trails - Background

Transportation corridors that are shared by active rail lines and bicycle paths are a relatively recent development, following a series of conversions of abandoned rail lines to recreational paths. In 1993, the Rails-to-Trails Conservancy conducted a survey of 16 trails which were located in active rail corridors.² The survey included trails in California, Colorado, Illinois, Iowa, Massachusetts, New Jersey, North Carolina, Ohio, Washington, and West Virginia.

These trails varied in design characteristics. Approximately half are adjacent to high-speed, high-frequency main lines used by freight or mass transit, while the other half are within low-speed, low-frequency corridors. The total corridor width ranges from 18 to 1500 feet, with an average width of 188 feet. Trail widths range from 8 to 14 feet, with 10 feet being the most commonly used dimension.

Distance from the centerline of the track to the nearest edge of the path averages 50 feet, but varies from 8 to 200 feet. Four of the existing 16 trails are located 8 to 12 feet from the centerline of the track. The separation of track and trail is accomplished by distance, grade separation, and/or physical barriers (vegetation, ditches, or fencing). All trails include at-grade crossings of the rail line and roadways. Importantly, the trail managers surveyed reported no train-trail user accidents along the trail corridors. The study concluded that trails adjacent to rails appear no more dangerous than trails constructed alone or adjacent to roadways.

With respect to maintenance, sharing a right-of-way can offer substantial benefits. Trail managers cited the railroad's ROW maintenance programs as a significant advantage when the trail was close to the tracks, as this reduced the trail's maintenance costs. In many cases, agreements were reached to identify responsibilities for maintenance.

Railroad Issues

In reviewing the rail trail proposal at the outset of this study, Bay Colony Railroad identified several issues relative to the design and operation of the trail. Key issues which are summarized in correspondence provided in the Appendix included:

Design

- The path must be kept to a minimum of 15 feet from the end of the ties and separated from the track by fencing to protect all parties.
- Side lights and bells must be installed at grade crossings to protect bike riders.
- Brush cutting must be done to railroad standards by the Commission along the right-of-way on the side utilized for the bikeway.

^{2/}

"Rails-with-Trails: Sharing Corridors for Recreation and Transportation," Rails to Trails Conservancy, Washington, D.C., 1993.

- The bikeway must be located outside of the crossing gates and signals.

Operational

- "Save harmless" agreements must be drawn up protecting the Commonwealth, Bay Colony Railroad, Amtrak, Cape Cod Railroad and other users of the railroad right-of-way.
- Protective insurance to be provided for the Commonwealth and railroads.
- The railroad would have the right to close the bikeway for railroad maintenance purposes at the Commission's expense.
- The railroad will retain the right to move, alter, or cross the bikeway for the purpose of railroad construction and maintenance activities or the installation of new tracks or railroad facilities. The Commission would be responsible for any expenses.
- Any crossing of sidetracks would be at the Commission's expense and in a manner approved by the railroad.
- All agreements and plans must be approved by the Commonwealth and operating railroads.

Through this study it was determined that all of the design issues identified by the railroad for the rail trail can be satisfied. Resolution of the operational issues would take the form of agreements among the affected parties that would be developed during the design phase of the project.

EOTC Issues

Specific concerns of the EOTC relative to the construction of the rail trail were expressed in writing after their receipt of the draft Final Report for this project. The minor design and operational issues they raised can be easily addressed during the design of the corridor. However, the EOTC's overriding concern is the policy issue surrounding the shared use of railroad rights-of-way. Through correspondence with EOTC and a meeting with the project team, their current position is that the EOTC railroad right-of-way should be viewed as the location of last resort for construction of an east-west bicycle corridor. They urged the Cape Cod Commission and adjacent communities to assess alternative alignments through the study area. A few of these options are discussed below.

Alternative Alignments

Beyond the operational issues expressed by the EOTC, there are several locations along the corridor where deviations from the existing rail right-of-way may be desirable. These locations offer opportunities to vary the alignment of the trail and provide additional scenic views. The most feasible alternatives defined through field review and public input are identified in the conceptual design plans and include:

- Extension of the trail to the Cape Cod Community College, principally through Barnstable conservation land to Old Jail or Pine Lane.
- Use of adjacent lands in the area bordered by Dennis Pond to the west and Pine Street to the east, including Miller Pond, Muddy Pond and the Greenough ponds (referred to as the pond complex). An extensive network of existing trails exist through the pond complex that may provide important transportation links or interesting recreational diversions. Bypassing the Greenough Pond crossing through a trail network to the north may prove to be a more cost effective alignment if the necessary right-of-way and public commitment can be secured.
- Along Old Town House Road in Yarmouth. A concept that was developed locally by the Town of Yarmouth involved an alignment which stretched from Willow Street to Dennis using available roadway and utility rights-of-way. Planning work on this alignment was originally completed by VHB in January of 1988 under contract with the Town of Yarmouth.
- Through the County Farm property to the south of the railroad right-of-way.

The potential of these and over-road alternatives should be further studied and incorporated into the trail design where feasible and desirable. The Cape Cod Commission has recently initiated a Route 6A Bicycle Accommodation Study which will examine other alternative routes.

Future Considerations

A possible expansion of the Rail Trail network within the study area corridor might involve the development of a bicycle path along the Hyannis Rail spur. This would connect Yarmouth Station with the proposed Intermodal Center in Hyannis. No active studies are underway to consider the alignment but much interest was expressed during the course of this study.

CONCLUSIONS

RECOMMENDED ROUTE

Through the design feasibility review and public input process, a consensus was reached on the preferred alignment for the Cape Cod Rail Trail Extension within the existing railroad right-of-way through Barnstable, Yarmouth and Dennis. It is acknowledged that EOTC has expressed policy concerns over shared use of the railroad right-of-way. Furthermore, several additional planning efforts currently underway by local and regional agencies must be considered with this study's findings to develop the eventual recommended east-west bicycle plan for the Cape.

The 10-mile extension of the Rail Trail recommended by this study would begin at the Cape Cod Community College at Exit 6 of the Mid-Cape Highway (Route 6). The trail would join the EOTC rail right-of-way in the vicinity of Old Jail Lane or Pine Lane in Barnstable. The trail would remain within the rail right-of-way through Route 134 in Dennis. A new culvert crossing under Route 134 would provide a connector to the existing Cape Cod Rail Trail.

Major structural crossings are proposed at the Greenough Ponds and the Bass River. These treatments, as designed, will minimize the trail's impact to sensitive environmental resources.

At-grade road crossings are required at 12 locations. Most of these can be safely accommodated by traffic control signage and the placement of crosswalks. A grade separated crossing is proposed for Station Avenue to be located between White's Path and Old Town Road. Alternatively, if the path is relocated to Old Town House Road, a pedestrian signal could be incorporated into the existing signal. This signal would service bicycle traffic crossing Station Avenue from the east or west along the bikepath. Delays to vehicle traffic on Station Avenue due to the addition of a pedestrian phase to the signal could be minimized with the re-establishment of signal coordination along the corridor. Activation of the signal could be accomplished by standard pedestrian pushbuttons or an automatic bicycle detection system.

Several issues with respect to right-of-way will have to be resolved during the design phase of the trail development. Specifically, one or two private landowners may be affected by continuation of the trail to the Cape Cod Community College and both the Town and the College must make a commitment to this proposal. Along the rail corridor, right-of-way easements and/or takings will also be required from approximately 40 landowners along

portions of the trail in Barnstable. The costs of these takings have not been factored into the construction costs for the project.

Finally, the project may require phasing depending upon the availability of design and construction funds, and obstacles which may arise in obtaining the necessary right-of-way, and operational issues raised by the EOTC or Bay Colony. There are several workable options for phasing the project that could be developed as the design of the trail evolves.

Proposed cross-sections, locations, and signage of the recommended bicycle trail are provided in the conceptual design plans that accompany this report. The following sections address specific segments of the proposed trail.

Old Jail Lane to Mary Dunn Road

Access to this end of the trail would initially be over Old Jail Lane from the existing parking area at the Jail Lane Preserve. The trail would follow the south side of the ROW through this segment, since adequate ROW width is generally available. Crosswalks would be required at Railroad Avenue, Hyannis Road, Braggs Lane, and Mary Dunn Lane. A retaining wall would be required east of Hyannis Road. Additional ROW, at least grading easements during construction, would be required east of Bragg's Lane due to ROW constraints.

Mary Dunn Road to Willow Street

The trail would remain south of the tracks throughout this segment, primarily to avoid impacts to wetlands east of Marston's Lane. Additional ROW would be required just east of Mary Dunn Road. Encroachments into the ROW in the vicinity of Marstons Lane will need to be addressed during the design phase. The trail will need to cross a spur track just west of Willow Street. Special treatment will need to be provided to ensure that bicyclists dismount and safely cross at this location.

Willow Street to Summer Street

Due to the presence of a spur track connection, the at-grade crossing of Willow Street will have to be offset approximately 100 feet. The trail is proposed to be south of the tracks between Willow and Summer Streets to minimize impacts to the large wetland system east of Willow Street.

Summer Street to Station Avenue

At Summer Street, the trail would cross the tracks on a proposed crosswalk to continue along the north side of the tracks. Again, special treatment will be provided to ensure a safe crossing. This shift in alignment is required to avoid impacts to wetlands at Muddy Pond. Several off-ROW alternatives are potentially feasible in this segment, including use of an existing foot trail south of Millers Pond and a possible new alignment around Little Greenough Pond. The trail is proposed to cross Little Greenough Pond on a pile-supported structure to minimize wetland impacts. Crosswalks in this segment will be

required at Pine Street and West Yarmouth Street. The trail will utilize the existing underpass at Route 6, where width is limited. Crossing Station Avenue at the ROW would require installation of a new pedestrian signal, which may result in additional traffic congestion or hazardous conditions. An on-road alternative using Frucan Avenue and Old Townhouse Road would permit bicyclists to cross Station Avenue at an existing signal.

Station Avenue to Main Street

The trail would continue along the north side of the tracks, without requiring any roadway crossings, to the Bass River. Approaches to the crossing would use pile-supported structures to minimize impacts to coastal wetland resources. A bridge, at the same elevation as the railroad bridge, could be constructed using the existing abutments. In the future, use of the former Route 6 Rest Area as a parking and picnic area should be investigated. The trail would continue along the north side of the track until reaching the Dennis Town offices at Main Street. The Town office parking lot could serve as a (weekend) staging area for this segment.

Main Street to Cape Cod Rail Trail

A grade separated crossing of Route 134 at the ROW is recommended due to the potential hazardous conflicts and traffic congestion that would result from an at-grade crossing. Bicyclists would be routed through a culvert tunnel under Route 134 to connect with the existing trail. This would require reconstruction of the existing parking areas.

PRELIMINARY COST ESTIMATE

Preliminary construction cost estimates were developed as part of the design feasibility report. These estimates are broken down by major trail sections and design features along the corridor and are summarized in Table 1.

Table 1

SUMMARY OF CONSTRUCTION COSTS FOR THE CAPE COD RAIL TRAIL EXTENSION*

Location	Cost Estimate (1994 Dollars)
In Barnstable: From east of the Green Bridge to the Yarmouth town line	\$ 825,000
In Yarmouth: From the Barnstable town line to the Dennis town line (excluding the Greenough and Bass River bridges but including the Station Avenue culvert)	\$1,530,000
Greenough Bridge	\$ 600,000
Bass River Bridge	\$ 525,000
In Dennis: From the Bass River to Route 134 (excluding the Bass River bridge but including the Route 134 culvert)	\$ 525,000
Extension to the Cape Cod Community College from just east of the Green Bridge	\$ 330,000
Total Project Costs	\$4,335,000

* Includes all design and construction costs and a 20 percent contingency factor. Excludes the cost of right-of-way acquisition.

ENVIRONMENTAL PERMITTING

Construction of the rail trail along the proposed alignment would require the issuance of environmental permits, and coordination with several regulatory agencies. This section identifies the required permits and coordination.

MEPA Review

The project would require review under the Massachusetts Environmental Policy Act (MEPA). MEPA jurisdiction is triggered for two reasons: the project would require issuance of a Chapter 91 (Waterways) License for the Bass River Crossing, and it would be state-funded with a project cost of greater than \$1 million. While the rail trail would not be categorically included for preparation of an Environmental Impact Report (EIR), MEPA could require an EIR if substantial concerns were raised about environmental impacts during public review of the Environmental Notification Form (ENF).

NEPA Review

If federal funding were available for rail trail construction, the project would also be subject to review under the National Environmental Policy Act (NEPA). It appears likely that environmental impacts are sufficiently small that the project would be considered as a Categorical Exclusion (CE), which would be obtained by preparation and filing a CE Checklist with the Massachusetts Highway Department. If the project did not meet the CE requirements, an Environmental Assessment (EA) may be needed. Preparation of the CE checklist would be simultaneous and parallel with preparation of the ENF under MEPA.

Cape Cod Commission Review

At its discretion, the Cape Cod Commission could determine that the proposed rail trail was a Development of Regional Impact (DRI), and require review of the project to determine whether it met the minimum performance standards established by the Regional Policy Plan. The DRI application and review could proceed simultaneously with the MEPA review.

Wetland Protection Act and Local Bylaws

Construction of the rail trail would require the issuance of Orders of Conditions by the Barnstable, Yarmouth and Dennis Conservation Commissions. In Barnstable, work would occur within 100 feet of protected wetland areas, particularly at the Marston's Lane crossing. It may not be possible to maintain the Commission's required 50-foot setback from the edge of wetlands in all locations. In Yarmouth, construction would affect approximately 3000 square feet of Bordering Vegetated Wetland east of Yarmouth Station, and would cross Little Greenough Pond. It is anticipated that this crossing could be constructed with no loss of BVW or Bank, although some shading impacts may occur. The segment of the Bike Path east of Yarmouth Station would require the issuance of a Variance under the local By-law. It may not be possible to maintain the required 35-foot undisturbed vegetative buffer between the edge of the bike path and wetlands in all locations in Yarmouth. Several segments of the trail would be within the buffer zone of other ponds and wetlands. The Bass River crossing would require review by the Yarmouth and Dennis Conservation Commissions, but could be constructed without direct impacts to salt marsh.

Water Quality Certification

Water Quality Certification, under Section 401 of the Clean Water Act, would be required for the rail trail segment east of Yarmouth Station. If the wetland loss is restricted to less than 5000 square feet, Certification could be issued by the DEP simultaneously with the Conservation Commission's Order of Conditions.

Corps of Engineers Permit

A Department of the Army Permit under Section 404 of the Clean Water Act would be required for the rail trail segment east of Yarmouth Station. If the wetland loss is restricted to less than 5000 square feet, the project could be allowed under the Statewide Programatic General Permit on issuance of an Order of Conditions, and would not require an individual permit application.

Chapter 91 License

The Bass River crossing would require issuance of a Chapter 91 (Waterways) License from the DEP, since this crossing would require the placement of additional fill within a filled tideland, and would affect a navigable waterway.

Coast Guard Bridge Permit

A Coast Guard Bridge Permit would be required for construction of the Bass River crossing. This permit insures that the navigational capacities of the river are not affected by the proposed bridge. No substantial issues are anticipated with regard to this permit, if the new crossing is designed in such a way as to not restrict the vertical or horizontal clearances currently provided by the railroad bridge.

Natural Heritage Program Coordination

Additional investigations for state-listed rare species will be required at the proposed Greenough Pond crossing. The Natural Heritage Program has indicated that several coastal plain pondshore species may occur in this area. None were identified during this study, since water elevations had not reached the late-summer low levels necessary for pondshore species emergence. Investigation of this area during September low water levels, and continued coordination with the Natural Heritage Program, will be necessary to ensure that the proposed bridge crossing does not adversely affect these species by shading.

Historical/Cultural Resources

Portions of the proposed rail trail are within the Old Kings Highway, West Barnstable Village, and South Dennis Historic Districts. Construction of a rail trail within these areas will require coordination with the Historic District Commissions to ensure that the rail trail does not affect historic resources. This may be an issue where the rail right-of-way is not sufficiently wide to allow all construction within the ROW.

Construction in the vicinity of the Bass River, Greenough Ponds and Dennis Pond may affect potential archaeological resources. Additional research, utilizing reconnaissance-level investigations, is likely to be required in these areas. Coordination with the Massachusetts Historical Commission will be necessary as project design moves forward.

Construction of the bike trail at the Mary Dunn Road crossing would also have to be carefully designed to avoid impacts to the cemetery immediately adjacent to the ROW.

APPENDICES

Appendix A - Environmental Constraints

Appendix B - Public Participation

Appendix C - Correspondence

Appendix A

**Environmental
Constraints**

APPENDIX A ENVIRONMENTAL CONSTRAINTS

STUDY AREA

The project area extends through four towns following a railroad corridor that runs parallel to Route 6. Situated along Cape Cod's northwest edge in Barnstable County, the project area is in the towns of Sandwich, Barnstable, Yarmouth, and Dennis. The study corridor used in this identification of constraints was a corridor approximately 1000 feet wide using the railroad as the centerline.

The constraints analysis for each of the constraint categories are presented in an order which reflects a progression from physical features (water resources) to biological features (wetlands and rare species), to social features (cultural resources). Each discussion of a constraint category is presented in the following format:

- Rationale - Describes the reasons why the constraint category is important with respect to bikeway planning.
- Data Sources - Lists the source(s) of information used in the mapping and analysis.
- Mapped Information - Lists the information presented on the map associated with that constraint category.
- Results - Presents a discussion of the constraint map. This subsection also presents regulatory and institutional aspects of constraint attributes, as applicable.

SURFACE WATER RESOURCES

Rationale

Surface water resources are prominent and important features of the natural environment. Surface water resources may be used for public drinking water supplies as well as for various industrial and agricultural uses. Larger surface water bodies such as rivers and lakes may host a variety of recreational activities including swimming, fishing, and boating. Rivers, streams, and lakes also provide habitat for a variety of fishes and wildlife and often contribute

greatly to the aesthetic quality of an area. The Federal Clean Water Act and the EPA regulations which implement the Act call for the enhancement and protection of surface waters from pollution in order to ensure that they are capable of supporting these uses.

Data Sources

U.S.G.S. Topographic Maps. Dennis (1974), Hyannis (1979), Sagamore (1979), and Sandwich (1972) Quadrangles.

VanLuven, David. 1990. Cape Cod Critical Habitats Atlas.

Mapped Information

Surface Waters (Figure 1)

Results

The following is a list of the named tributaries shown on the U.S.G.S topographic maps. This list also identifies the larger waterbodies located within the project corridor.

- Mill Creek flows northward under the railroad corridor and into Sandwich Harbor.
- Dock Creek flows generally northward under the railroad corridor in Sandwich and into Sandwich Harbor.
- Spring Hill Creek flows northward under the railroad corridor and into Sandwich Harbor.
- Boat Cove Creek flows northward under the railroad corridor in West Barnstable into Barnstable Harbor.
- Brickyard Creek flows northward from its headwaters in West Barnstable into Barnstable Harbor.
- Bass River serves as part of the town boundary for Yarmouth and Dennis; it flows southward under the railroad corridor south of Route 6 and into Nantucket Sound.
- Hoxie Pond is a seven acre pond located on both sides of the railroad ROW where Old County Road crosses the railroad in East Sandwich.
- Two unnamed ponds less than five acres in size are adjacent to the ROW in Sandwich, one is just west of Quaker Meetinghouse Road, and the second is 1000 feet east of Chase Road.
- Flax Pond is adjacent to the ROW in Barnstable and is less than five acres in size.

- Dennis Pond is just east of Yarmouth Station along the southern edge of the ROW and is approximately 30 acres in size.
- The Pond Complex is five ponds, 5 to 10 acres in size, just west of where the railroad crosses under Route 6 with one pond to the south and four ponds north of the ROW.
- Greenough Pond, approximately 20 acres in size, is along the south edge of the ROW in the location of the pond complex.

The surface tributaries within the project area have been generally classified as Class SB waters of the Coastal and Marine Classes. The Class SB rating indicates that these waters are suitable for recreational uses. Class SB waters provide good fish habitat and good aesthetic value and may be suitable for shellfish harvesting in approved areas.

Although the ponds within the project area were not classified, the larger waterbodies in the vicinity have been classified as Class B waters of the Inland Water Classes. The Class B rating indicates that these waters are suitable for recreation, irrigation, and agricultural uses. Class B waters provide good fish habitat and consistently good aesthetic value and may be used as public water supplies with appropriate filtration and disinfection.

Regulatory Constraints

The Federal Clean Water Act (33 USC 1251 *et seq.*) was established with the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. In accordance with the Clean Water Act, Massachusetts has adopted water quality standards (314 CMR 4.00 *et seq.*) which designate the most sensitive uses for which the waters of the Commonwealth will be enhanced, maintained, and protected.

FLOODPLAINS

Rationale

Floodplains are flat, low-lying areas adjacent to streams and rivers. They provide a natural means of detaining floodwaters and thereby protecting downstream properties from damage. Development in the floodplain reduces this flood storage capability and places the development in the floodplain and downstream properties at risk.

Avoidance of development in floodplains is federal policy as set forth in Executive Order 11988 and the regulations of the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA).

Data Source

FEMA Flood Insurance Rate Maps, Nos. 250012-0001, 250012-0002, and 250012-0003, for the Town of Sandwich, Massachusetts, July 1992.

FEMA Flood Insurance Rate Maps, Nos. 250001-0001, 250001-0003, 250001-0005, 250001-0011, and 250001-0015, for the Town of Barnstable, Massachusetts, August 1985.

FEMA Flood Insurance Rate Maps, Nos. 250015-0001, 250015-0002, 250015-0003, and 250015-0004, for the Town of Yarmouth, Massachusetts, June 1986.

FEMA Flood Insurance Rate Maps, No. 250005-0006, for the Town of Dennis, Massachusetts, July 1986.

Mapped Information

100-Year Floodplain (A Zones) (Figure 1)

Results

There are six areas in Sandwich that have floodplain in the area of the railroad ROW. The first area at Mill Creek extends across for 600 feet, the second at Dock Creek runs adjacent to the railroad ROW on both sides for 1100 feet, the next floodplain at a tributary of Old Harbor Creek extends across the railroad ROW for 1150 feet, the fourth at Spring Hill Creek runs adjacent to the ROW for 200 feet on both sides, the fifth at the cranberry bogs that extend up to Foster Road in East Sandwich crosses the railroad ROW for 70 feet, and the last, at a Scorton Creek tributary, extends across the ROW for 260 feet at the State Fish Hatchery. There are two areas in Barnstable that have floodplain in the area of the railroad corridor, the first at Boat Cove Creek extends across the ROW for 150 feet, and the second at Bridge Creek and Brickyard Creek extends across the railroad ROW for 3500 feet. In both Yarmouth and Dennis the floodplain associated with the Bass River extends across the railroad ROW for 50 feet.

Regulatory Constraints

Alterations within the 100-year floodplain require careful study and mitigation to retain the flood storage capacity. Executive Order 11988 requires all federal agencies to avoid impacts to floodplains whenever possible, and to minimize floodplain impacts where such impacts are unavoidable. FHWA requires projects in floodplains which result in a 1 foot or greater increase in floodwater elevation to provide compensating floodwater storage in the vicinity of the impact area. Such protection is especially important in floodplains of major rivers and coastal areas, where the effects of flooding are most dramatic.

WETLANDS & AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Rationale

Wetlands are protected pursuant to Section 404 of the Federal Clean Water Act, the Massachusetts Wetlands Protection Act (M.G.L. c. 131, s.40), and local Wetlands Protection By-laws. Wetlands are areas which are inundated or

saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetland areas may provide a variety of functions including flood control, pollutant attenuation, sediment stabilization, nutrient transport, ground water recharge or discharge, and fish and wildlife habitat.

Areas of Critical Environmental Concern (ACEC), under 301 CMR 12.00, are areas designated as being of regional or statewide significance. The Massachusetts CZM office administers programs and provides information regarding Coastal ACECs. One such area, the Sandy Neck Barrier Beach System, is located within the study area.

Data Sources

Massachusetts Coastal Zone Management. 1989. Areas of Critical Environmental Concern. Site Summaries and Maps for All Designated Areas in Coastal Massachusetts.

U.S.G.S. Topographic Maps. Dennis (1974), Hyannis (1979), Sagamore (1979), and Sandwich (1972) Quadrangles.

VanLuven, David. 1990. Cape Cod Critical Habitats Atlas.

Field Reconnaissance.

Mapped Information

Wetlands (Figure 1) and Areas of Critical Environmental Concern (Figure A-1).

Results

Four major wetland systems are located adjacent to the right-of-way of the Bay Colony Railroad tracks. These wetland systems include two large areas of salt marshes associated with Old Harbor Creek and its tributaries in Sandwich as well as the "Great Marshes" associated with the tributaries of Barnstable Harbor in the Town of Barnstable. The railroad right-of-way also crosses several freshwater tributaries which drain into the large salt marshes of the Scorton Creek estuary. The Great Marshes as well as much of the Scorton Creek marsh system north of the railroad right-of-way form a large part of the Sandy Neck Barrier Beach System Area of Critical Environmental Concern (ACEC). The fourth major wetland system in the project area is the Bass River System on the Yarmouth/Dennis corporate boundary. In addition to these large wetland areas, numerous smaller wetlands and cranberry bogs are located adjacent to the railroad right-of-way. Several Coastal Plain Ponds occur adjacent to the railroad right-of-way.

The Bay Colony Railroad tracks cross wetlands associated with the Old Harbor Creek estuary at approximately six locations near the western limits of the project area in the Town of Sandwich. The railroad right-of-way crosses three named and two unnamed tributaries of Old Harbor Creek, including Mill Creek,

Dock Creek, and Springhill Creek. Salt marshes dominated by smooth cordgrass (*Spartina alterniflora*) and salt meadow hay (*Spartina patens*) border each of these tidal creeks, extending to the base of the ballast slopes of the railbed. Salt marsh vegetation borders the ballast slopes to the north and to the south at each of these stream crossings with the exception of Dock Creek where brackish marshes dominated by common reed (*Phragmites australis*) occur on the south side of the tracks. Mill Creek and Dock Creek have been identified as anadromous fish runs by the Massachusetts Division of Marine Fisheries (DMF).

The Bay Colony Railroad right-of-way crosses several wetlands associated with unnamed tributaries of Scorton Creek in the Town of Sandwich. Adjacent to the railroad right-of-way these wetlands are nontidal freshwater wetlands which drain to the salt marshes to the north. One tributary to Scorton Creek crossed by the right-of-way has been designated as an anadromous fish run by the DMF.

Between West Barnstable and Pond Village the Bay Colony Railroad tracks cross the Great Marshes at three locations. These salt marshes are part of the Sandy Neck Barrier Beach System ACEC. This 8,447-acre area also includes the Sandy Neck Barrier Beaches, Scorton Harbor, Scorton Creek, Barnstable Harbor, and the surrounding salt marshes and uplands to the 10.5 foot elevation above mean sea level. This area is the largest barrier beach complex between Rhode Island and Cape Ann and provides habitat for over 300 species of birds, 160 species of vascular plants, and rare plants and animals. The large salt marshes contained within this ACEC support substantial shellbeds which help maintain the high water quality of the area. Boat Cove Creek, which drains into the ACEC to the north, is freshwater at the point where the railroad tracks cross it. This stream has been designated as an anadromous fish run by the DMF.

The Bass River is the fourth major wetland system crossed by the Bay Colony Railroad tracks. At the point where the right-of-way crosses the Bass River, the river is tidal and is bordered by narrow beaches and small areas of salt marsh vegetation. The Bass River has been designated as shellfish habitat and an anadromous fish run by the DMF.

Numerous small palustrine wetlands are located adjacent to the railroad right-of-way. These wetlands are much more numerous west of Pond Village in Barnstable, however, wetlands are scattered along the eastern segment of the right-of-way as well. Palustrine wetlands within the project area include forested, shrub, and emergent wetlands with forested wetlands being the predominant wetland cover type. Forested wetlands within the project area are generally dominated by red maple (*Acer rubrum*). Several swamps dominated by blackgum (*Nyssa sylvatica*) and one Atlantic white cedar (*Chamaecyparis thyoides*) swamp also occur adjacent to the right-of-way. Common plants within shrub and emergent wetlands within the project area include alder (*Alnus serrulata*), silky dogwood (*Cornus amomum*), common reed, and cattails (*Typha latifolia*). Additionally, numerous cultivated cranberry (*Vaccinium macrocarpon*) bogs occur adjacent to the railroad right-of-way in the western part of the study area between Sandwich and West Barnstable.

Several Coastal Plain Ponds are located in close proximity to the Bay Colony Railroad right-of-way. These ponds contain a globally rare habitat type characterized by certain rare plant species. Coastal Plain Ponds adjacent to the railroad right-of-way include Hoxie Pond, Dennis Pond, a small unnamed pond on the opposite side of the tracks from Dennis Pond, Muddy Pond, Greenough

Pond, and Little Greenough Pond. Coastal Plain Pond Shore Communities are discussed in more detail in the Rare and Endangered Species section of this report.

Regulatory Constraints

Actions which impact wetlands subject to state jurisdiction would require that a Notice of Intent be filed with the Conservation Commission of the town within which the action would take place. This Notice of Intent must ensure that the proposed action is in conformance with the General Performance Standards established for each of the affected wetland resource areas subject to the Massachusetts Wetlands Protection Act Regulations. Major wetland constraints within the project area which limit the feasibility of the development of the bikeway along portions of the Bay Colony Railroad right-of-way include the Sandy Neck Barrier Beach System ACEC, Salt Marshes, Bordering Vegetated wetlands, and cranberry bogs.

ACEC

Areas of Critical Environmental Concern, under 301 CMR 12.00 are areas designated as being of statewide or regional significance due to their natural resource values. The General Provisions of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.24(5)) state that no project which adversely affects an Area of Critical Environmental Concern will be permitted.

The Bay Colony Railroad tracks pass through salt marshes and adjacent habitats of the Sandy Neck Barrier Beach System ACEC. Approximately 4500 linear feet of the railroad right-of-way between West Barnstable and Pond Village are located within the ACEC. Any action associated with the development of a bikeway along the railroad right-of-way which would require fill or construction within any portion of the ACEC, would require a Variance from the Massachusetts Wetlands Protection Act Regulations.

Salt Marsh

The Massachusetts Wetlands Protection Act Regulations (310 CMR 10.32(2)) define Salt Marsh as a coastal wetland which is dominated by smooth cordgrass and/or salt meadow hay and which extends landward to the highest high tide line. The Wetlands Protection Act Regulations (310 CMR 10.32(3)) also state that no project which destroys any portion of a Salt Marsh or adversely affects the productivity of a Salt Marsh will be permitted.

The Bay Colony Railroad tracks cross state-regulated Salt Marshes at approximately nine locations along the proposed bikeway route. Six of these crossings occur in the western portion of the study area where the tracks cross several tributaries of Old Harbor Creek west of Springhill Road in Sandwich. The remaining three crossings occur between West Barnstable and Pond Village where the tracks cross Salt Marshes associated with the Sandy Neck Barrier Beach System ACEC. If any action associated with the development of a bikeway along the railroad right-of-way would require fill or construction within

any Salt Marsh, a Variance from the Massachusetts Wetlands Protection Act Regulations would be required.

Bordering Vegetated Wetland

Bordering Vegetated Wetlands are freshwater wetlands which border on creeks, rivers, streams, ponds, or lakes. The limit of Bordering Vegetated Wetlands is the line within which greater than 50 percent of the vegetational community consists of wetland plant species (310 CMR 10.55(2)). The Massachusetts Wetlands Protection Act Regulations state that an Order of Conditions permitting up to 5000 square feet of alteration of Bordering Vegetated Wetlands may be issued provided that the General Performance Standards established within the Regulations are met (310 CMR 10.55(4)(b)). Any action which would adversely affect greater than 5000 square feet of Bordering Vegetated Wetlands would require a Variance from the Wetlands Protection Act Regulations.

In addition, the local Wetlands Protection By-laws of the Towns of Barnstable (Ch. III Article XXVII), Yarmouth (Ch. 143 Sect. 2D) and Dennis (Article XV) generally require a 50-foot setback to wetlands, and do not allow the placement of fill in wetlands without issuance of a Variance by the Commission.

Bordering Vegetated Wetlands occur at various locations along the railroad right-of-way, but are most numerous in the western portion of the study area. West of Pond Village, construction of the bikeway within the railroad right-of-way would likely result in the alteration of greater than 5000 square feet of Bordering Vegetated Wetlands due to the large number of wetlands along this portion of the railroad. East of Pond Village, however, relatively few wetlands are located adjacent to the right-of-way, and only one substantial Bordering Vegetated Wetland problem area occurs in this area: the Greenough Pond crossing.

Cranberry Bogs

In accordance with the Massachusetts Wetlands Protection Act Regulations, cranberry bogs are regulated as Bordering Vegetated Wetlands. In addition to being subject to the General Performance Standards established for Bordering Vegetated Wetlands, any construction within a cranberry bog would result require extremely costly land acquisitions to compensate for the loss of valuable agricultural land. For this reason, cranberry bogs were considered to be severe constraints to bicycle path location.

Other Constraints

In addition to Salt Marsh and Bordering Vegetated Wetlands the following state-regulated wetland resource areas occur along portions of the railroad right-of-way:

- Land Under the Ocean,
- Coastal Beach,
- Coastal Bank,
- Land Containing Shellfish,

- "Fish Run",
- Inland Bank, and
- Land Under Water Bodies and Waterways.

Additionally, state-regulated Bordering Land Subject to Flooding, Isolated Land Subject to Flooding, and Land Subject to Coastal Storm Flowage may be present within the railroad right-of-way. Any action which adversely affects any of the wetland resource areas listed above must comply with the General Performance Standards established in the Wetlands Protection Act Regulations.

As discussed earlier, wetlands are most numerous in the western portion of the study area, and construction of a bikeway within the railroad right-of-way between Freezer Road and Pond Village would not be feasible due to impacts to salt marshes, freshwater wetlands, and cranberry bogs. Only two substantial wetland problems occur east of Pond Village: the Greenough Pond and Bass River Crossings.

RARE AND ENDANGERED SPECIES

Rationale

State and Federal laws protect those plants and animals that are considered to be endangered, threatened, or reduced in number, by protecting the organisms directly and by protecting their habitat. Massachusetts regulations protecting rare plant species by prohibiting the "taking" of any individuals of the species, and direct other state agencies to take actions necessary to ensure that rare species are not adversely impacted.

Data Sources

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Massachusetts Coastal Zone Management. 1989. *Areas of Critical Environmental Concern. Site Summaries and Maps for All Designated Areas in Coastal Massachusetts*.

Massachusetts Natural Heritage and Endangered Species Program. 1994. *Massachusetts Natural Heritage Atlas*.

VanLuven, David. 1990. *Cape Cod Critical Habitats Atlas*.

Mapped Information

Rare species sites (Figure A-1).

Results

Correspondence with the U.S. Fish and Wildlife Service indicates that the only federally listed threatened or endangered species known to occur within the project area are occasional transient bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*). Both of these species are also listed by the Massachusetts Natural Heritage and Endangered Species Program (MNHESP) as Endangered in the Massachusetts.

The MNHESP has identified several species of rare, threatened, or endangered species known to occur within the project area. The majority of these species are associated with either Coastal Plain Pond Shore Communities, the Sandy Neck Barrier Beach System Area of Critical Environmental Concern (ACEC), or the salt marshes of the Old Harbor Creek estuary. An area of cranberry bogs and adjacent wetlands in West Barnstable provides additional rare species habitat.

Coastal Plain Pondshore Communities

Coastal Plain Pondshore Communities are a globally rare wetland habitat type characterized by seasonally fluctuating water levels which provide ephemeral, sandy shorelines required for the emergence of the plant species typical of this habitat type. Coastal Plain Pondshore Communities typically occur on moraine and outwash plains less than ten miles of the coast and contain plant associations and species which are rare throughout the region and often rare rangewide. Typical plant species of Coastal Plain Pondshore Communities in southeast New England include Plymouth gentian (*Sabatia kennedyana*), pink tickseed (*Coreopsis rosea*), and slender arrowhead (*Sagittaria teres*) (Enser and Caljouw, 1989).

Areas designated as Coastal Plain Pondshore Communities by the MNHESP include those ponds within the approximate state-listed rare species habitat. Hoxie Pond, Dennis Pond, a small pond on the opposite side of the railroad tracks from Dennis Pond, Muddy Pond, Greenough Pond, and Little Greenough Pond are state-listed Coastal Plain Ponds adjacent to the Bay Colony Railroad right-of-way within the project area. The MNHESP has identified the following species which are known to occur in Coastal Plain Pondshore Communities within the study area:

- Pondshore knotweed (*Polygonum puritanum*), SC
- Plymouth gentian (*Sabatia kennedyana*), SC
- Terete arrowhead (*Sagittaria teres*), SC
- Water-willow stem borer (*Papaipema sulphurata*), T
- Redroot (*Lachnanthes caroliniana*), SC
- Long-beaked bald-sedge (*Psilocarya scirpoides*), SC
- Wright's panic grass (*Panicum wrightianum*), SC

Sandy Neck Barrier Beach System ACEC and Old Harbor Creek Estuary

The Sandy Neck Barrier Beach System ACEC provides nesting and feeding habitat for the State Endangered northern diamondback terrapin (*Malaclemys t. terrapin*). Diamondback terrapins inhabit salt marshes and contiguous water up

to the high tide line, feeding on mollusks, crustaceans, and plant material in the marshes. These turtles nest just above the high tide line along the sandy edges of salt marshes or stream banks.

Regulatory Constraints

The Endangered Species Act of 1973, which is administered jointly by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), ensures the continued existence of Federally-listed threatened and endangered species by protecting those species and their habitats. No Federally-listed Threatened or Endangered species are known to occur within the study area.

The Massachusetts Endangered Species Act (M.G.L. c. 131A) establishes procedures for listing Endangered, Threatened, and Special Concern species native to Massachusetts. This legislation also establishes rules and prohibitions regarding activities which take designated species or alter their Significant Habitats. The Massachusetts Wetlands Protection Act Regulations prohibit work within any state-regulated resource area which would adversely affect the specified habitat of any rare vertebrate or invertebrate species.

CULTURAL RESOURCES

Rationale

National Register sites are protected under the National Historic Preservation Act, Section 106. The recognition of historical sites or structures results from criteria based on historic, architectural, or archaeological importance as applied by the National Historic Preservation Act. Individual properties and historic districts are listed in the State Register of Historic Places as well as the National Register of Historic Places.

Potential impacts to historic and archaeological sites may be either direct or indirect. Direct impacts include the physical taking of the property or parts of the property, while indirect impacts are effects that impair the use of the property for intended purposes. Indirect impacts generally result from noise, visual intrusion, or obstruction of access to the property.

Data Sources

State Register of Historic Places 1992, Massachusetts Historical Commission.

Mapped archaeological information from the Cape Cod Commission.

Mapped Information

Architectural/Historic Sites listed on the National and State Registers and areas of expected moderate to high Archaeological Sensitivity (Figure A-2).

Results

There are three historic areas in Barnstable that are within 500 feet of the railroad right-of-way (ROW). The West Barnstable town boundary marker on Great Hill Road is approximately 500 feet south of the ROW. Old King's Highway Regional Historic District crosses the railroad tracks east of Meetinghouse Way and again at Pond Village. West Barnstable Village Historic District crosses the railroad tracks at Meetinghouse Way and abuts the ROW from Keveney Lane to the town corporate boundary. Dennis has one location where the South Dennis Historic District crosses the railroad tracks at Main Street.

Areas of expected moderate to high Archaeological Sensitivity along river courses and waterbodies within the study area were mapped (Figure A-2). These areas are described as having factors including present and past topography, exposure, slope, distance to water and availability of food, which present a strong likelihood that archaeological sites exist. These general areas of expected Archaeological Sensitivity are defined because the majority of archaeological sites that potentially exist in Massachusetts have not yet been field identified.

The river courses with expected moderate to high Archaeological Sensitivity include Bridge Creek and Brickyard Creek in Barnstable and the Bass River in Yarmouth and Dennis. Waterbodies with mapped Archaeological Sensitivity include an unnamed pond west of Quaker Meetinghouse Road, Hoxie Pond, and Nye Pond in Sandwich, an unnamed pond located between Maple and Willow Streets and Hinckley Pond in Barnstable, Dennis Pond, Miller Pond, Muddy Pond, Little Greenough Pond, Greenough Pond, Perch Pond, Elishas Pond, and Dinahs Pond in Yarmouth.

There are three cemeteries located within 500 feet of the railroad ROW and all occur in Barnstable. The first on Meetinghouse Way is approximately 200 feet from the ROW, the second on Route 6A just west of Old Jail Lane is approximately 200 feet from the ROW, and the last on Mary Dunn Road abuts the railroad ROW to the north.

Regulatory Constraints

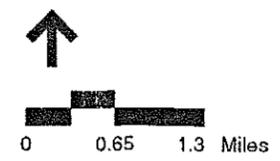
Several federal and state laws recognize the cultural significance of historic and archaeological resources and provide means for their protection. Section 106 of the National Historic Preservation Act, as amended (16 U.S.C. 470f), requires the identification of all properties on or eligible for inclusion on the National Register of Historic Places, determination of impacts, review and comment by the Advisory Council on Historic Preservation, and mitigation of damages. Section 4(f) of the Department of Transportation Act declares that it is national policy to preserve significant historic sites that might be taken for a transportation project, and allows use only if there is no feasible and prudent alternative and damage has been minimized.

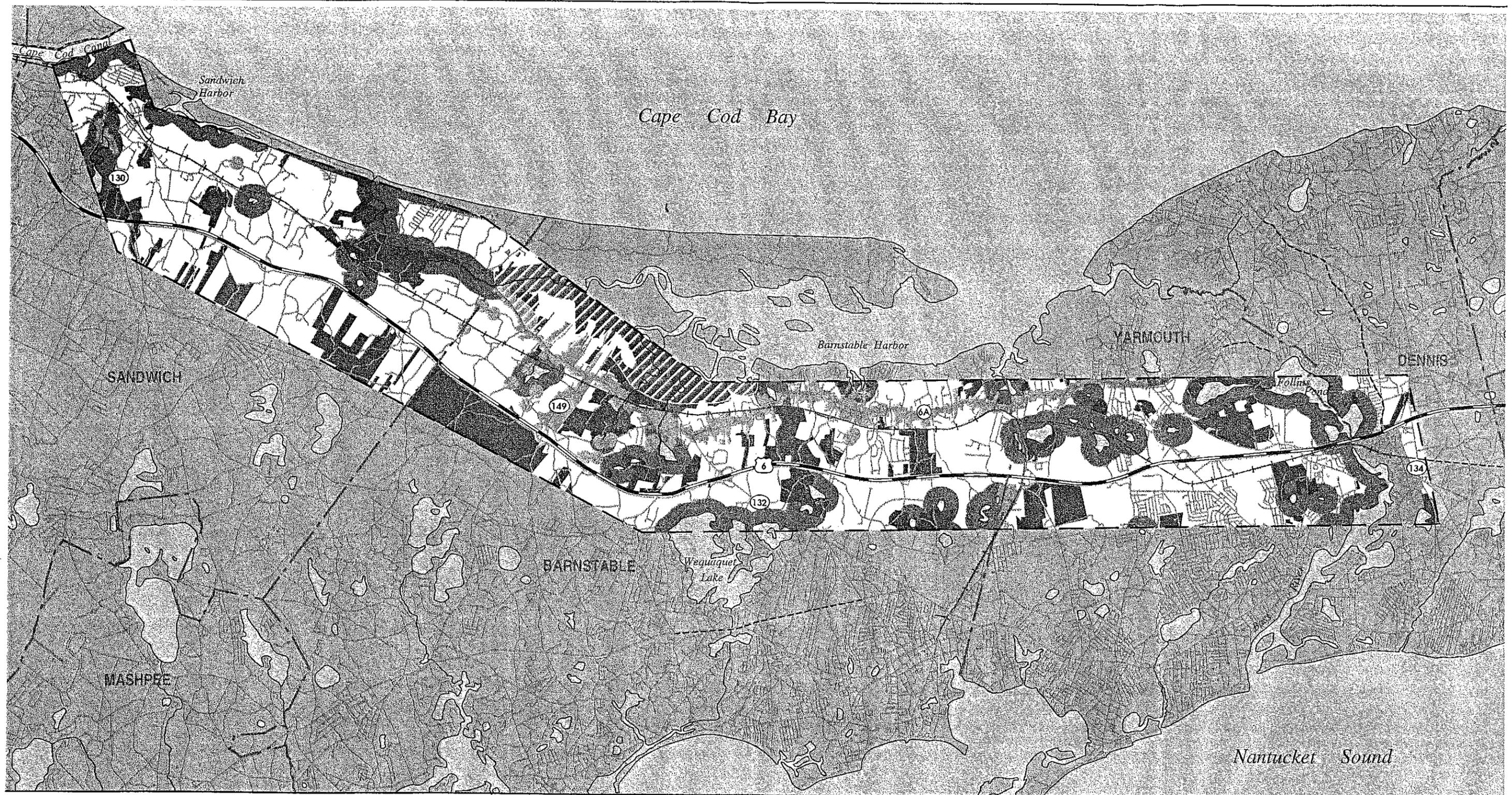


- | | |
|---|--|
|  Study Area |  Shellfish |
|  Rare Plants |  Vegetation |
|  Rare Animals |  ACEC |
|  Rare Plants & Animals | |

Vanasse Hangen Brustlin, Inc.

Figure A-1
Rare Species,
Fisheries, and
Critical Habitats

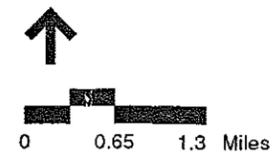




- | | | | |
|---|----------------------------|---|--------------|
|  | Study Area |  | Open Space |
|  | Archaeological Sensitivity |  | Scenic Lands |
|  | Historic Districts | | |
|  | Historic Sites | | |

Vanasse Hangen Brustlin, Inc.

Figure A-2
 Historical and Archaeological
 Resources, Scenic and Protected
 Lands, and Hazardous Sites



Appendix B

Public Participation

**Bicycle Advisory
Committee Members**

Bart Hague, Chief of Environmental Studies
United States Environmental Protection Agency, Region 1
J.F. Kennedy Federal Building
Boston, Massachusetts 02203-2211

Frank Bahr
Mad About Cycling
86 Oakwood Ave.
Falmouth, MA 02540
(508) 457-2000 (2910)

Josh Lehman
Massachusetts Highway Department
10 Park Plaza
Boston, MA 02116
(617) 973-7329

Thomas Allan
Massachusetts Highway Dept. - District V
1000 County Road
Taunton, MA 02780

George Bartholomew
Bay Colony Railroad
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South Carver, MA 02366

Bruce Rosinoff
Cape Cod Commission
3225 Main Street
Barnstable, MA 02630-0226

Beth Boardman
Executive Office of Transportation and Construction
10 Park Plaza
Boston, MA 02116

Neil Holland
Cape Cod Joint Transportation Committee
53 Neel Rd.

Harwichport, MA 02646 (508) 432-1590

Robert Mumford
c/o Cape Cod Bikeways Committee
3225 Main Street
Barnstable, MA 02630-0226

Joe Rodricks, Dennis Town Engineer
Dennis Town Offices
PO Box 1419
South Dennis, MA 02660
(508) 394-8300

Pat Ellis
#85, Route 130
Sandwich, MA 02563
(508) 833-8002, 8003

George Allaire
Yarmouth Town Hall
1146 Route 28
South Yarmouth, MA 02664
(508) 398-2231 (290)

Laura Harbottle,
Barnstable Planning Department
Town Offices, ~~207 Main Street~~ *230 South St*
Hyannis, MA 02601
790-6290

Roland Dupont
Town of Bourne
24 Perry Ave.
Buzzards Bay, MA 02532
(508) 759-0600

Christopher Rigby
Association for the Preservation of Cape Cod
PO Box 636
Orleans, MA 02653
(508) 255-4142

Danny O'Brian
Department of Environmental Management
100 Cambridge Street, 19th Floor
Boston, MA 02202
(617) 727-3180

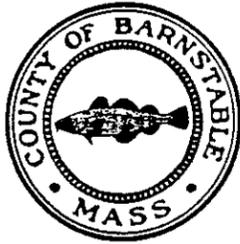
Christopher Miner, Chairman
Old Kings Highway Regional Historic Commission
PO Box 1406
Orleans, MA 02653
255-2999 (H)
255-5563 (W)

NEWSLETTER MAILING LIST

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Francis Worrell
11 Old Salt Ln.
Yarmouthport, MA 02675
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Cynthia Cole
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CAPE COD COMMISSION

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BAC MEETING MINUTES

TO: Bikeway Advisory Committee Members
Cape Cod Commission Staff
VHB Staff
Interested Parties

FROM: Jeff Lacy, Bikeway Project Coordinator 

DATE: 5/18/94

RE: 5/5/94 BAC Meeting

Attendance: Jeff Lacy, CCC
Dave Clark, CCC
Joe Magni, VHB
Lisa Standley, VHB
Ruth Bonsignore, VHB
Frank Bahr, MAC
Bart Hague, EPA
Danny O'Brian, DEM
George Allaire, Town of Yarmouth
Joe Rodericks, Town of Dennis
Laura Harbottle, Town of Barnstable
Tom Allan, MHD Dist. V

Jeff Lacy opened the meeting at 7:00 PM in the Cape Commission Library and gave a short overview of the EPA-funded Bikeway Study. The thrust of the study is to assess the feasibility of, and develop designs and alignments for, a "rail with trail" between Sandwich and Dennis using the existing, active railroad right of way.

Joe Magni outlined the VHB approach to the study and cited some of the advantages of this proposal, including the infrequency and slow speed of the train traffic, the advantages of dealing with one rather than multiple owners (of the bikeway alignment), the open vistas available to bikers from the railroad right of way, and the potential for connections to various points of interest.

Lisa Standley reviewed the findings from the joint VHB/CCC field trip several weeks earlier. Very significant environmental constraints were found to exist to the west of the intersection of the railroad track and Route 6A in Barnstable (known as the "Green Bridge"). These constraints include numerous wetlands/ salt marsh/stream/cranberry bog crossings, and the presence of floodplain, historic sites, rare and endangered species habitats, possible hazardous waste contamination and Areas of Critical Environmental Concern (ACECs). Although some constraints are found east of the Green Bridge, they are less problematic, especially relating to wetlands permitting for this remaining 9.5 mile length. **After discussion, the group agreed to only consider this 9.5 mile portion for the remaining alignment and design phases of this bikeway study.**

Ruth Bonsignore discussed the engineering considerations attendant to establishing a ten foot wide bikepath within the railroad right of way. Some of the issues were horizontal and vertical separation between the tracks and the bikepath and the width of the railroad right of way (including encroachments). In general, the tracks are centered on the ROW. Of the 9.5 miles of ROW east of the Green Bridge, 7.5 miles are 82.5 feet wide, 1.0 miles are 62 feet wide, and 1.0 miles are 49.5 feet wide.

Ms. Bonsignore mentioned three sites where structural issues would be significant - the Green Bridge, the Mid-Cape Highway (Route 6) crossing, and the Bass River crossing. Several adjacent ponds and wetland areas along the ROW could also create environmental issues. She indicated that some type of barrier will likely be required by the railroad (whether a fence, vegetation, or grade separation may depend upon the particular site characteristics and negotiations with the railroad). Some existing rails with trails maintain only a 3-5 foot separation in places. Finally, she encouraged the group to look at the bikeway as a part of the whole, multi-modal system within this east/west corridor.

George Allaire said that, from previous discussions, the railroad's overriding concern was safety.

A number of paved bikeway widths were discussed, from 8 to 12 feet. It was agreed that ten feet is the current design standard for bikepaths, and will apply for this project.

George Allaire asked if wooden causeways are still allowed.

Lisa Standley replied that they must be located high above the water surface, there are safety and maintenance issues, and that costs are high. Wooden causeways may be appropriate at the pond crossing, however. A 45 inch high rail would be required on both sides of a bike bridge.

There was some discussion of the amount of train activity ("trash" train once per day), and the condition of the tracks (poor conditions in eastern portions of the ROW).

In the 9.5 miles east of the Green Bridge, there would be 13 road grade crossings, four that would be critical. Station Road may present the greatest challenge from a traffic engineering standpoint.

The crossing of the Bass River was discussed in terms of tidal effects and clearances for boat traffic that must be maintained. Joe Rodericks mentioned that he had been investigating pre-fabricated timber bridge spans as a possibility.

George Allaire suggested that a link from this bikeway alignment to Hyannis could be achieved in the future via the active railroad ROW and spur that now heads in that direction. Bart Hague voiced support for this concept as a part of a greater, non-motorized transportation system on Cape Cod.

There was some discussion about a terminus for the bikeway somewhere in Barnstable Village. Laura Harbottle mentioned Phinney's Lane in Barnstable center or the Cape Cod Community College as possibilities. She felt the location of, and facilities at, the western staging area are very important to consider.

Joe Rodericks would like to facilitate bike travel down Route 134 toward the scenic attractions to the south.

Tom Allan spoke of the Massachusetts highway Department's desire to widen Route 6A in Sandwich to better accommodate bike traffic. This could provide the westerly extension in lieu of the wetlands-restricted portions of the railroad ROW.

Jeff Lacy mentioned that a separate study will be undertaken to assess bicycle feasibility and designs for the whole Route 6A corridor, which should fully encompass the portions of the railroad ROW corridor west of the Green Bridge that were eliminated from further phases of this study..

The next meeting of the BAC will be held at 7:00 PM on Thursday June 9, 1994 in the Library of the Cape Cod Commission in Barnstable Village.



CAPE COD COMMISSION

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BAC MEETING MINUTES

TO: Bikeway Advisory Committee Members
Cape Cod Commission Staff
VHB Staff
Interested Parties

FROM: Jeff Lacy, Bikeway Project Coordinator

DATE: 6/15/94

RE: 6/9/94 BAC Meeting

Attendance: Jeff Lacy, CCC
Bob Mumford, CCC
Priscilla LeClerc, CCC
Joe Magni, VHB
Lisa Standley, VHB
Ruth Bonsignore, VHB
Frank Bahr, Mad About Cycling (MAC)
Danny O'Brian, DEM
Joe Rodrick, Town of Dennis
Tom Allan, MHD Dist. V

Jeff Lacy opened the meeting at 7:00 PM in the Cape Commission Library and gave a short overview of the current status of the Bikeway Study. A field trip was conducted earlier the same day by Ruth Bonsignore, Lisa Standley and Jeff Lacy. Areas along the railroad right of way east of the Green Bridge area in Barnstable (now the limits of the study area) were examined for their environmental sensitivity and bikeway construction feasibility. A meeting agenda was passed out (attached). Notes taken by Lisa Standley are also attached.

Lisa Standley gave an overview of the topics VHB would like to discuss with the group at this meeting, including access onto/off the bikepath, an appropriate terminus at the western end, and environmental and engineering issues at specific points on the alignment.

Ruth Bonsignore reviewed some of the environmental problems east of the Green Bridge, primarily wetlands and ponds directly adjacent to the railroad right of way. An appropriate terminus at the western end was discussed, with the Cape Cod Community College, Green Bridge area, and the County Government Complex the most likely. Various other locations were discussed as possible staging areas (for those entering the bikepath) along the route. A map of railroad right of way widths was presented and discussed. Lengths where narrowness of the right of way is anticipated to be a constraint were identified (with engineering solutions discussed).

Joe Rodrick asked about environmental constraints to the immediate west of the Green Bridge.

Lisa Standley explained the numerous areas of adjacent wetlands discovered on the field trip earlier the same day.

There was some discussion about hooking the bikepath into roads that could route bikers down to some of the Barnstable Bay beaches. The Barnstable representative will be asked about this at the next BAC meeting.

The group agreed that the CCCC would be the best terminus for the bikepath.

Bob Mumford mentioned that the parking areas at CCCC are presently underutilized. The state would have to be consulted if any use of the CCCC parking areas was proposed.

As the railroad right of way is remote from CCCC, an easement over lands between CCCC and the County Complex (where the bikepath could join the railroad right of way) would be required. Aerial photos of these lands were viewed and ownership patterns discussed. VHB will research ownership of these lands and potential alignments across the parcels.

Parking is a problem at the County Complex, so careful planning and approval from the County Commissioners would be required.

The Greenough Pond area is a potential scenic highlight along the bikepath. The Boy Scout camp there might also be an attraction. However, the Pond is divided by a narrow railbed with steep sides, and any use of the rail right of way at this location will necessitate a structural solution that may impact upon the pond and its bordering vegetated wetlands. A wooden bikepath cantilevered off the railbed and on piers was discussed as a likely approach.

The group discussed various alternative routes around the somewhat un-scenic areas around the Yarmouth transfer station, landfill and industrial area. A route to the south of the railroad right of way looked promising.

Ruth Bonsignore mentioned that, on an earlier field trip along the railroad tracks,

the train was quite loud and menacing as it approached. Separation from the train should be maximized wherever possible.

A long discussion was held concerning the Bass River crossing and alternatives to making that possibly expensive crossing. Cost estimates and environmental issues were discussed. In the final report VHB will prepare cost estimates for that segment of the bikepath with and without a river crossing. Joe Magni mentioned that \$40-50 was a reasonable cost per foot for a bikepath.

Bob Mumford suggested use of the Route 6 right of way from the Bass River crossing directly to the bike tunnel under Route 134.

Numerous crossing locations for Route 134 were discussed. This is a problem road to get across unless the bike tunnel can be used.

Possible routing through the Indian Lands in Dennis was discussed, as was the routing around the back of the Patriot Square shopping complex..

Ruth Bonsignore passed out and discussed a handout entitled Rails-With-Trails: Design Issues (attached). In general, the bikepath "wants" to be on the south side of the tracks over the approximately ten miles in this linear study area.

As the railroad has indicated it will require some form of barrier between the bikepath and the tracks, alternatives were discussed including vegetation, vertical separation, chain-link fencing and other types of fencing. Chain-link was viewed as disadvantageous from an aesthetic standpoint, while establishing vegetation in the small separation between the path and tracks would be problematic.

In places where the right of way is narrow, but steep, grading easements might be required in order to maintain proper slope angles when returning to grade.

Ruth Bonsignore said that the next phase in the study will look at structural issues at critical crossings, and will involve additional field work for wetlands areas and areas where major construction would be required.

Joe Rodrick suggested consideration be given to segmentation of the study area according to opportunities and constraints. Three distinct segments were discussed, however no agreement was reached as to appropriate divisions. It was mentioned that Mass Highways and EOTC have supported phasing of projects in the past.

Willow Street was suggested as a potential access point to the Bikepath.

The next BAC meeting was scheduled for Thursday, July 14th at 2:00 PM starting at the offices of the Cape Cod Commission in Barnstable Village. Most of the afternoon will be spent out in the field (all BAC members are invited), with a return to the Commission offices in late afternoon for pizza and a follow-up meeting.



101 Walnut Street
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Watertown, MA 02272
617 924 1770
FAX 617 924 2286

<input type="checkbox"/> Memorandum	<input type="checkbox"/> Transmittal	<input checked="" type="checkbox"/> Meeting Notes	<input type="checkbox"/> Phone Notes
Date/Time: July 14, 1994 2:00 PM	Place: Cape Cod Commission	Project No.: 3914	
Attendees: Jeff Lacy, CCC David Clark, CCC Kathy Sferra, CCC George Allaire, Yarmouth Joe Rodricks, Dennis Laura Harbottle, Barnstable Ruth Bonsignore, VHB Lisa Standley, VHB Frank Bahr, MAC		Re: Bicycle Advisory Committee Meeting #3	
Notes taken by: L. Standley			

The Bicycle Advisory Committee (BAC) met at 2:00 at the Cape Cod Commission offices for a short discussion of issues and progress since the previous meeting, then visited several critical locations along the proposed path. F. Bahr was unable to attend the earlier portion of the meeting, but met with J. Lacy and L. Standley after the site visit.

A representative of WCOD radio station met briefly with the group. He proposed that the bike path be named for the Horton family, strong bicycle advocates killed in an automobile accident. A foundation is being established, supported by voluntary contributions, to raise money for design of the bike path.

At the meeting, R. Bonsignore presented alternatives for access at the western end of the path. An existing trail system on town-owned lands off of Old Jail Lane may provide a partial connection between the railroad and the Cape Cod Community College, although there are privately owned parcels west of the town lands that may present acquisition problems. Use of the Route 6 ROW may be an alternative for connection. L. Harbottle will pursue identification of intervening landowners, and initiate contacts with the Community College. As a course of action for the final report, these routes will be shown as alternatives for Phase II extension of the bike path from Barnstable Center, the most feasible western terminus.

Locations for a bike path off of the rail ROW between Yarmouth Station (Willow Street) and Pine Street were discussed. VHB needs to identify adjacent landowners in locations where an off-ROW alignment may be feasible or desirable. J. Rodricks was concerned that if the trail meanders off the ROW, commuter riders may prefer to stay on Route 6A. Since one primary purpose of the path is to provide an attractive alternative to Route 6A, the effects of diverging too far off the ROW should be considered.

Date: December 8, 1994
Ref: 3914

Issues with ROW width were also discussed. There are several locations where slope easements will be needed in order to construct the bike path. J. Rodricks suggested obtaining wider permanent easements in these locations to allow the bike path to have greater separation from the tracks and a consistent 10 foot cross-section. Landowner liability issues will need to be resolved.

The group (D. Clark, K. Sferra, L. Harbottle, G. Allaire, J. Rodricks, R. Bonsignore, L. Standley) then visited critical segments of the bike path to examine right-of-way issues, areas of wetland impact, and areas where bridges or other structures may be required. The site visit included the localities listed below:

- Cummaquid Golf Course at Marston's Lane: existing ROW encroachments and adjacent wetlands were examined. The path will have to be located outside of the signals.
- Wetlands west of Dennis Pond: L. Standley determined that construction of the bike path south of the RR tracks would fill approximately 3500 square feet of wetlands, as opposed to over 5000 sf to the north.
- Dennis Pond/Summer Street: Summer St. would be an appropriate place for the bike path to cross from south to north.
- It was discussed that the use of a separate alignment east of Dennis Pond would increase maintenance of the bike path, since it would have two vegetated edges rather than one.
- Greenough Ponds: Placement of the path on the north of the causeway vs. on a new alignment around the north side of the pond was discussed. It was felt that this would not be an extreme deviation, and that cost would probably be the determinant. R. Bonsignore discussed three potential structural treatments: a separate bridge, a bridge with one side mounted on a kneewall and the other side supported by piles, and a structure on fill placed behind sheet piling. The fill/sheet piling alternative would result in unacceptable impacts to the vegetated bank.
- Bass River: Environmental impacts resulting from placement of the path do not differ between the north and south alignments. Based on field measurements, it appears that sheet piling and fill could be used to construct the bike path without any loss of salt marsh. Aesthetic impacts of sheet piling would have to be considered. Selection of the north or south alignment would be determined by the route chosen east of the Bass River.
- The field team reviewed the utility easement south of RR, between the Bass River and Dennis Town Offices. This easement contains a dirt road that provides a good alternative route to the railroad. Some widening would be needed, and the grades would have to be adjusted to avoid steep slopes and limited sight distances. Wetlands are directly adjacent to the dirt road in some

Date: December 8, 1994

Ref: 3914

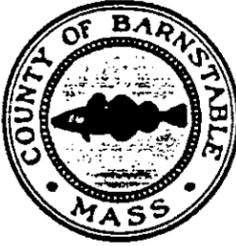
locations, but widening could occur on the upgradient side of the road without any wetland impacts. Views of the marsh are better from the RR ROW.

- Continuation of the bike path through the former Route 6 Rest Area onto residential subdivision roadways is possible, but does not provide good direct connections to the tunnel under Route 134 because it still relies on Old Bass River Road/Olde Dennis Road links. Using the Route 6 ROW is a remote possibility.
- The group agreed that the Route 134 tunnel was the preferred location for crossing the highway. Several alternative routes from the RR ROW at or west of the Dennis Town Offices to the tunnel were discussed. These require further investigation, but appear to be feasible.

Following the site walk, J. Lacy and F. Bahr met with L. Standley and R. Bonsignore to review results and discuss the project's next stages. The group noted that the visual impact of the bike path - specifically the removal of vegetated buffers between residences and the railroad - will have to be considered. L. Standley suggested that, during the design phase of the project, a series of site visits with adjacent landowners be held to identify concerns and resolve issues.

VHB will prepare the draft report, and distribute to BAC members during the week of August 8th. The BAC will meet on Thursday, August 18th to review and discuss the draft report. The format and schedule for the public meeting will be discussed at that meeting.

cc: J. Lacy, CCC
R. Bonsignore, VHB
J. Magni, VHB



bl
CAPE COD COMMISSION

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CAPE COD RAIL TRAIL EXTENSION PUBLIC MEETING MINUTES

TO: Bikeway Advisory Committee Members
Cape Cod Commission Staff
VHB Staff
Interested Parties

FROM: David Clark, Bikeway Project Coordinator *DC*

DATE: 10/27/94

RE: 10/25/94 Meeting at Assembly of Delegates Room in Barnstable Village

Attendance: Bob Mumford, CCC
David Clark, CCC
Priscilla Leclerc, CCC
Marilyn Fifield, CCC
Ruth Bonsignore, VHB
Lisa Standley, VHB
Ajin Hu, MSI
Tim Millar, Harwich
John Powers, Hyannisport
Francis Worell, Yarmouth
Bernard Spieker, Orleans
Frank Bahr, MAC
Kevin Lynch, Falmouth
Thomas Bunker, BSS Design

Bob Mumford opened the meeting with a brief overview of other Cape Cod Commission bicycle planning activities, including the extension of the Shining Sea Bicycle Path in Falmouth and the spur of the rail trail in Harwich and Chatham. Mr. Mumford then explained the purpose of this project was to examine the feasibility of extending the Cape Cod Rail Trail westerly from Dennis along the active railroad line. The study was funded by the US Environmental Protection Agency under an air quality program that recognizes the air quality benefits attained through increased bicycle usage as a viable form of transportation.

Lisa Standley, project manager from VHB, presented the basic outline for the study process and discussed the formation of the Bicycle Advisory Committee (BAC) and their role in the planning process of the trail. Ms. Standley then identified that the first portion of the study focused on the entire corridor and identified environmental, engineering, and other issues that constrained the project along the railroad right-of-way. All environmental constraints were looked at, including floodplains, surface water resources, wetlands, Areas of Critical Environmental Concern (ACEC), rare and endangered species, cultural resources and hazardous materials.

Ms. Standley said that early on in the study the constraints from the wetlands and salt marsh made the project west of the "green bridge" at Route 6A in West Barnstable infeasible. Regulations prohibit the filling of salt marshes and that bridging the wetlands and marshes would be cost prohibited. Based on these constraints VHB concluded that a bicycle path along the railroad right-of-way is infeasible because of the environmental damage it would ensue to the wetlands, salt marshes, and impacts to rare animal habitats and ACECs. Therefore, the remainder of the study focused on the area east of the "green bridge."

Ruth Bonsignore, Transportation Systems Engineer for VHB, discussed the terminus points for the proposed trail. The location of the western terminus should provide linkage to a number of attractions and enable the bike path to function as an alternative to Rt 6A. Therefore, the Cape Cod Community College seemed the most logical endpoint. Discussions with the Town of Barnstable and the College led to a possible alignment through conservation and college property with impacts to only a couple of private land owners. The most logical eastern terminus was the existing rail trail at Rt 134 in South Dennis.

Ms. Bonsignore then presented some design issues that came up during the project, these included that the width of the bikepath was to be 10 feet with a 15 foot offset from the edge of the track. For most of the project the right-of-way is 82.5 feet which is wide enough to accommodate these widths. However, for approximately 2 miles of the project the right-of-way is less than 82.5 feet, at these locations easements from approximately 40 private land owners would have to be obtained in order to maintain the 15 foot offset from the rail.

Ms. Bonsignore briefly highlighted the four new structures which are proposed for the project. These include a bridge across Little Greenough Pond, a bridge over the Bass River, and tunnels at Station Avenue and Route 134. Ms. Bonsignore then presented the concerns of the EOTC, including maintaining the 15 foot offset, a physical barrier separating the rail bed from the trail, and general concerns involving maintenance of the trail and liability. EOTC has stressed that the corridor should be looked at as a last resort only if other alignments are not possible. Ms. Bonsignore stressed that the solutions to these issues are possible, however the next phase of the project will need to work out an agreement with EOTC before the design is finalized.

Ms. Bonsignore highlighted certain possible alignments that would not follow the railroad right-of-way. These include a combination of on-road and off-road bicycle facilities through Cummaquid Heights and along Old Townhouse Road in Yarmouth. After summarizing the project, questions from the general public were fielded by VHB and the Cape Cod Commission.

Mr. Spieker questioned the source of funding of the project, wondered if the consultant walked the entire corridor, and was the Rail with Trails Conservatory contacted. Ms. Bonsignore explained the EPA funding source and that the parts of the corridor was walked several times and the use of a Hyline vehicle was used to look at environmental and engineering constraints of the project. Ms. Bonsignore also discussed her contacts with the Rails with Trails Conservatory and the results of a survey highlighting shared uses of railroad right-of way.

Mr. Worell wondered what effect increased rail service would have on the project. Ms. Bonsignore explained that EOTC is also concerned with future expansion of rail travel however rail usage east of Willow Street is extremely light and future expansion or continues use would require significant infrastructure improvements to the rail bed.

Mr. Lynch asked if EOTC would abandon the little used rail bed. Ms. Bonsignore said that it is probably highly unlikely.

Mr. Millar asked if EOTC is interested in rail banking. Ms. Bonsignore said that this has not come up with their conversations with EOTC.

Mr. Mumford questioned the usage and condition of the tracks east of Station Ave. Ms. Bonsignore said that the usage is under debate however it is estimated that it is around once a month and that the tracks need extensive improvements. Ms. Standley clarified that trains run to the Yarmouth Transfer Station daily.

Mr. Mumford commented that it may possible for EOTC and Bay Colony to abandon the rail bed if they were properly compensated and it was proven to be more economically feasible to use the existing bridge rather than construct a new bridge over the Bass River.

Mr. Lynch commented on Falmouth's experience with EOTC on a similar problem concerning the Shining Sea Bike Path.

Mr. Worell questioned if the cost estimates were performed on the Old Townhouse alternative and compared to the cost of using the railroad right-of-way. Ms. Bonsignore said that they were comparable.

Mr. Bahr commented that this path should not be looked at as an alternative for serious riders who prefer to ride in the street. Mainly because bike paths generally do not go to places where roads go.

Ms. Bonsignore commented on general concerns about the fence that would separate the path from the rail line. Ms. Standley explained that the fence is designed to allow most small animals to pass underneath. However, deer may have to follow the fence to an opening in order to cross.

Mr. Mumford concluded the meeting by briefing outlining the next steps that the Commission and VHB will undertake in completing this project.

Appendix C

Correspondence



Bay Colony Railroad Corporation

420 WASHINGTON STREET BRAintree, MASSACHUSETTS 02184

Tel. No. (617) 380-3556 Fax (617) 380-4820

Reply to: Reid H. Potter Associates, Inc.

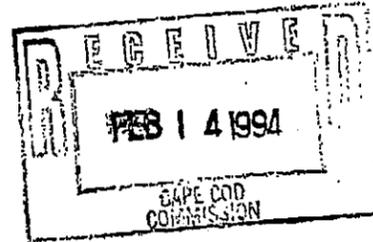
103 South Freeport Road

Freeport, Maine 04032

Tel. (207) 865 4222

February 11, 1994

Jeffrey R. Lacy
Cape Cod Commission
3225 Main Street
P.O. Box 226
Barnstable, MA 02630



Subject: Bikeway - Bourne and Dennis

Dear Mr. Lacy:

I have been asked by George Bartholomew to respond to your letter of January 21, 1994.

The Bay Colony Railroad has no objection to sharing its right-of-way with the Cape Cod Commission for a regional bikeway. Agreements would have to be drawn up between the Commission, the Executive Office of Transportation & Construction of the Commonwealth of Massachusetts (the land owner) and the Bay Colony Railroad.

The following are some of the items that must be considered:

1. Save harmless agreements must be drawn up protecting the Commonwealth, Bay Colony Railroad, Amtrak, Cape Cod Railroad and other users of the railroad right of way.
2. Side lights and bells must be installed at grade crossings to protect bike riders.
3. Brush cutting must be done to railroad standards by the Commission along the right-of-way on the side utilized for the bikeway.
4. The railroad would have the right to close the bikeway for railroad maintenance purposes at the Commission's expense.
5. The bikeway must be moved out at crossings to put it outside of the crossing gates and signals.
6. The railroad will retain the right to move, alter, or cross the bikeway for the purpose of railroad construction and maintenance activities or the installation of new tracks or railroad facilities. The Commission will be responsible for any expenses as a result thereof.
7. Any crossing of sidetracks shall be at the Commission's expense and in a manner approved by the railroad.

Jeffrey R. Lacy

-2-

February 11, 1994

8. Protective insurance to be provided for the Commonwealth and railroads.

9. The path must be kept to a minimum of 15 feet from the end of the ties and separated from the track by fencing to protect all parties.

10. The railroad will provide flag protection and hysrail service to the consultant at a day rate of \$425.00 per day with advance notice and letter of agreement.

11. The railroad will provide engineering services as required for the plans at the attached rates. These would include checking plans, preparing plans, checking agreements, and checking construction.

12. All agreements and plans must be approved by the Commonwealth and operating railroads.

Please call me if you have any questions at (207) 865-4222.

Sincerely,



Reid H. Potter
Chief Engineer

RHP/pc/bc1r/c/021194.2

cc G. Bartholomew
D. Coffey



Bay Colony Railroad Corporation

420 WASHINGTON STREET BRAINTREE, MASSACHUSETTS 02184

Tel. No. (617) 380-3556 Fax (617) 380-4820

Reply to: Reid H. Potter Associates, Inc.
103 South Freeport Road
Freeport, Maine 04032
Tel. (207) 865 4222

April 30, 1993

George R. Allaire, P.E.
Town of Yarmouth
Department of Public Works
South Yarmouth, MA 02664

Subject: Bicycle Path, Milepost 80.49

Dear Mr. Allaire:

The Bay Colony Railroad has no objection to sharing its right of way with the Town of Yarmouth. Agreements would have to be drawn up between the Town of Yarmouth, the Executive Office of Transportation and Construction of the Commonwealth of Massachusetts (the land owner), and the Bay Colony Railroad.

The Town would have to save harmless by agreement the Commonwealth and the Railroad for any claims brought against them. The path must be kept a minimum of 15 feet from the end of ties and separated from the right of way by fencing to protect all parties. We will be pleased to discuss this matter further with you at any time. Please call me at 207-865-4222.

Sincerely,

Reid H. Potter
Chief Engineer

RHP\pc\bc sd 0430#

cc Thorn Mead
B. Reihl
G. Bartholomew
B. Reagan



Commonwealth of Massachusetts
Division of Fisheries and Wildlife
100 Cambridge Street
Boston, MA 02202

3914
Natural Heritage and
Endangered Species Program

tel (617) 727-9194
fax (617) 727-7288

24 June 1994

Craig Tumer
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
Watertown, MA 02172

Re: Cape Cod Bikeway
Sandwich, Barnstable, Yarmouth, MA
NHESP File No. 94-257

Dear Mr. Tumer:

Thank you for contacting the Natural Heritage and Endangered Species Program regarding the project referred to above. We have reviewed the letter and helpful maps which you sent, and we have the following comments.

At the present time we have record of the rare species listed below in the vicinity of the railroad right-of-ways which you marked:

Species/State Rank*

Yarmouth station, Dennis Pond:

Pondshore Knotweed (*Polygonum puritanorum*)/Special Concern
Plymouth Gentian (*Sabatia kennedyana*)/Special Concern
Terete Arrowhead (*Sagittaria teres*)/Special Concern
Water-willow Stem Borer (*Papaipema sulphurata*)/Threatened*

Between Dennis Pond and Elishas Pond

Terete Arrowhead - see above
Plymouth Gentian - see above
Water-willow Stem Borer - see above
Redroot (*Lachnanthes caroliniana*)/Special Concern
Long-beaked Bald-sedge (*Psilocarya scirpoides*)/Special Concern
Wright's Panic-grass (*Dichanthelium wrightianum*)/Special Concern

* State ranks are pursuant to the Massachusetts Endangered Species Act (MGL c.131A) and its implementing regulations (321 CMR 10.00). The Water-willow Stem Borer is also a candidate for listing with the U.S. Fish & Wildlife Service.

Coastal plain ponds are considered a rare and significant natural community; the state-listed species occurring there fall under protection of the Massachusetts Endangered Species Act (MGL c.131A). Coastal plain pond communities are very fragile. Foot traffic and bicycles taken to the shores of these ponds will adversely impact them. We strongly recommend that a strategy be developed which will discourage pedestrian and bicycle traffic from visiting these shorelines. Enclosed are available fact sheets for these species, for your information. Please feel free to further discuss these species and coastal plain ponds with our plant community ecologist Dr. Patricia Swain, here in this office, or with our state botanist Dr. Paul Somers, at 508-792-7270.

