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**RAIL TRAIL & BICYCLE
H
BOULEVARD PROJECT**

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**HAVEN AVENUE
CORRIDOR REPORT**

June 2011

**Submitted to:
New Jersey
Department of Transportation**



Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

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APPENDICES (Separate Document)

- A. Steering Committee
- B. Annotated Presentation
- C. Funding Sources
- D. Community Outreach Material (Minutes, Handouts)
- E. Stakeholder Questionnaire Responses
- F. Trail Examples
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INTRODUCTION

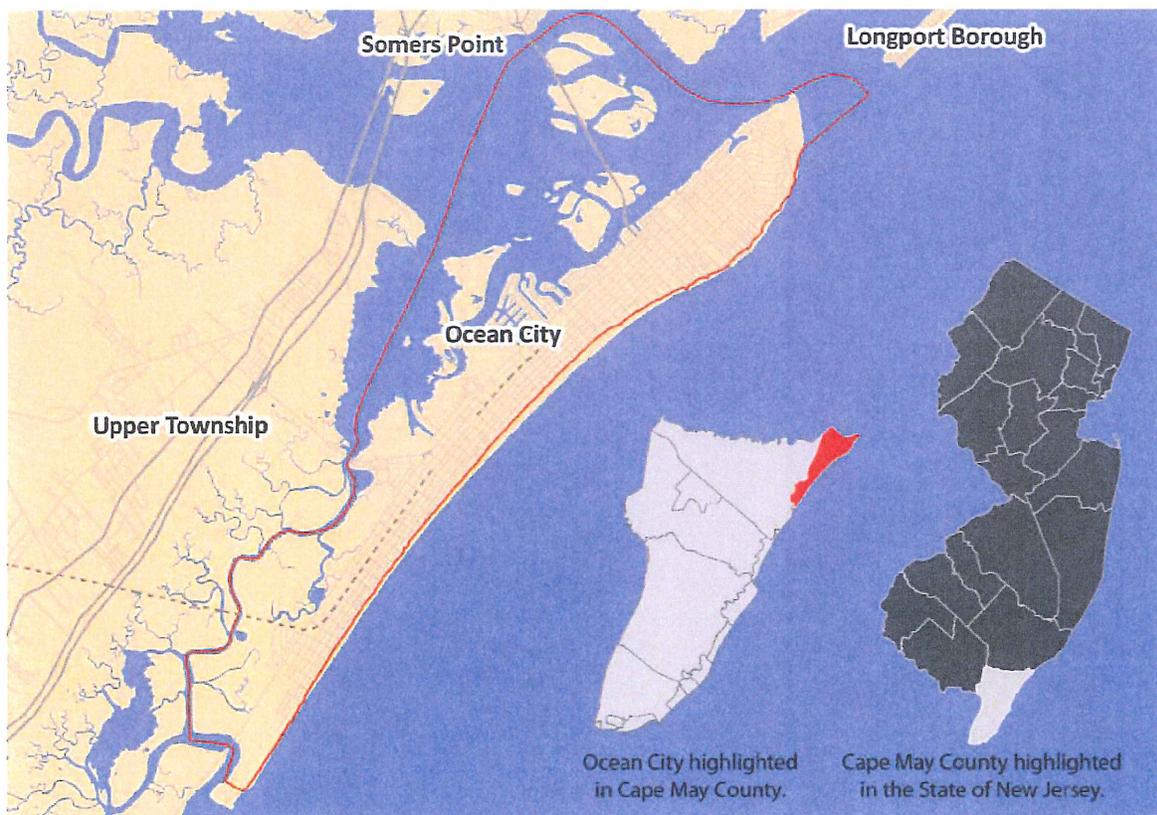
The Ocean City Rail Trail & Bicycle Boulevard project is being conducted under the New Jersey Department of Transportation's (NJDOT) Local Technical Assistance (LTA) Program for the purpose of investigating the potential and viability of providing access to the bay and safer bicycling across Ocean City through development of both rail trail and bicycle boulevard opportunities.

NJDOT provides the information contained in these Local Bicycle and Pedestrian Plans as a service to local communities. The Department and its consultants strive to provide quality planning studies that include a range of recommended improvements, but make no claims, promises, or guarantees about the availability of funding to complete the projects recommended.

The project is comprised of two main tasks: 1) Assess the unique opportunity for safe, multi-use access along the former Pennsylvania-Reading Seashore Line rail bed from 36th to 49th Streets to pedestrians, bicyclists, persons with disabilities, etc. and 2) Examine the existing Haven Avenue Bicycle Boulevard to determine a best-practice approach to improve and extend it as a bicycle-priority on-road facility from Corson's Inlet to the Longport Bridge.

The project covers approximately 7 miles of the island of Ocean City and primarily follows Haven Avenue and the Pennsylvania-Reading Seashore Line rail bed.

This Haven Avenue Corridor Report pulls together the findings from data collection efforts, field visits, in-house screenings and community input.



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PROCESS

The development of the Haven Avenue Corridor Report was a collaborative process facilitated by consultant team professionals from The RBA Group working closely with the client (NJDOT) and key representatives from the Ocean City community.

The process by which information for this report was gathered included the following primary steps:

- Project Administration and Team Development
- Investigation, System Evaluation and Options Matrix
- Conceptual Design Recommendations
- Public Outreach
- Summary Report

Project Administration and Team Development

The first step in the process was to develop a scope of work and to establish a team of local representatives to steer the project through its development and assist the project consultant team by serving as a clearinghouse for all information relevant to the project while also providing the local perspective. The Steering Committee was comprised of representatives from the New Jersey Department of Transportation, the City of Ocean City representatives (including Engineering, Fire, Police, Schools and City Council), Advisory Council on Physical Fitness, Ocean City Community Association, Chamber of Commerce, Environmental Commission, Main Street Ocean City, South Ocean City Improvement Association, Cape May County Emergency Management, NJDEP Green Acres, and Ocean City PTA.

Note: The environmental group, Friends of the Wetlands, was invited but declined to participate on the project steering committee.

Stakeholders participated in a questionnaire through which primary issues and concerns were established. Below are some of the key issues and concerns related to the Rail Trail and Bicycle Boulevard as identified by the stakeholders. A more detailed list can be found in [Appendix E: Stakeholder Questionnaire Responses](#).

Rail Trail Concerns

- Environmental
 - Wetlands, tidal, endangered species
- Drainage
 - Restoration Opportunity
 - Fill in wash-out areas: concern with flooding
 - Not filling in wash-out areas: concern with dyke protection
- Volume on Rail Trail
 - Concern with volume of cyclists on Rail Trail if it is used to connect the bike boulevard
 - Volume management – multiple route solutions
- Access to Bay/Nature
 - Consider “walking” trail with bicycle parking at either end
- Look/Functionality of Rail Trail
 - Vision: like Corson’s Inlet Trail
 - Natural Surface – hard packed (good for bikes), well drained

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- Explore crushed clamshells in same footprint in a way to benefit environment (eco-friendly)
- Explore boardwalk as possible surface-type
- Maintain existing vegetation to stabilize rail bed
- Maintain existing character
- No added features except interpretive signs
- Natural – no lights, benches, water fountains, etc. along trail
- Benches/trash receptacles at trail heads only
- Width of Trail
- FHWA, AASHTO, MUTCD etc Guidelines for trail width
 - Existing: Typical 12' rail bed, 9' rail ties, 62" rails
- Trail Heads
 - Accessibility & management
- Public Feedback
 - Public in favor of Rail Trail – wants to participate in the process
 - Friends of Wetlands group opposed
 - 4th Ward Councilman – open minded – bring “Friends” into discussion
- Littering, Drinking, etc.
- Ownership of Rails
 - Removing rails

Bike Boulevard Concerns

- Safety of novice/family cyclists on busy streets
- Need for bicycle-priority option
- Connectivity to Destinations and Bike Routes/Facilities
- Bicycling Network is Important
- Bikes on Sidewalk in the downtown

Investigation and System Evaluation

The Investigation and Evaluation step was comprised of data collection, in-house environmental research and field investigations resulting in a Rail Trail Investigation Summary and a Bicycle Boulevard Needs Assessment in the following two sections of this report.

Data Collection and Research

Available reports, resources and mapping provided by the City and others were examined as part of the data collection and document review effort. To ensure that the most accurate and current information is utilized for the project, Ocean City and Steering Committee members were asked to provide any documents, data, mapping, etc. that would pertain to this project. Beginning at a project kick-off meeting in December 2010, most data was received by January 2011. Additional information related to Haven Avenue striping dated spring 2010 was provided to the project team in March 2011. All information was reviewed and referenced in relation to this project.

See Appendix G: List of Documents Reviewed for a complete account of information that was made available for this project. The data reviewed for this project included the following:

- Circulation Element of the Master Plan
- Traffic Engineer Report: Haven Avenue Speed Limits and STOP Sign Control Study

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- Memo from Arthur Chew, PE, PP, Ocean City Engineer, in response to the ORA Traffic Engineer Report: Haven Avenue Speed Limits and STOP Sign Control Study
- NJDEP Permit to resurface Crook Horn Creek Access Road
- Traffic Mitigation Plan
- Accident Reports
- City Demographic Information
- City Tourism Recognition
- 2007 NJ High Resolution Orthoimagery
- Tax maps/Easements/ROW Information
- Field Survey: "PA-Reading Seashore Lines, Crook Horn Thorofare to 35th Street" prepared by Carl Totten Associates, October 2006
- Correspondence and documents provided by the City referencing information from other community groups such as Friends of the Wetlands related to wetland and flood-prone areas
- Ocean City Ordinances 07-55, 07-56, 10-05
- Letter from Peter A. Riscica, Supervising Highway Engineer, Traffic Engineering & Investigations, New Jersey Department of Transportation regarding Ordinance 07-55; February 8, 2008
- Bicycle Route Traffic Markings Citywide, Haven Avenue – City Bikeway, City Contract 10-035
- Plans of Reconstruction of Haven Avenue from 20th to 24th Street, Contract No. 06-19; Urban Engineers, Inc., March 2006

In-house Environmental Research

A preliminary, in-house environmental GIS data review was conducted to screen for endangered species, hazardous materials and open space along the existing Pennsylvania-Reading Seashore Line rail bed from 49th to 36th streets. The primary method for conducting the in-house research was by using NJDEP's Geology and Environmental iMap program in addition to information provided by Ocean City and others to assess the existing conditions and context of the rail bed on which a shared use path is envisioned.

Note: Environmental research for the Bicycle Boulevard task was not included as part of the scope of work for this project.

Field Investigation

A field investigation was conducted for both the Rail Trail segment as well as the Bike Boulevard alignment from Corson's Inlet to Longport Bridge to determine the condition of the Haven Avenue Corridor in its various stages of completion. Using the information and data collected in other tasks, the former Pennsylvania-Reading Seashore Line rail bed was assessed for opportunities for multi-use access between 49th and 36th Streets and a best-practice approach to improve and extend the Haven Avenue Corridor as a bicycle-priority "bicycle boulevard" from Corson's Inlet to the Longport Bridge was evaluated.

The overall assessment resulted in two summaries which are included in the following two sections of this report: **Rail Trail Investigation** and **Bicycle Boulevard Needs Assessment**.

The Rail Trail Investigation Summary includes a description of existing conditions, design guidance, environmental background and a Trail Scenarios Matrix for the segment of the former Pennsylvania-Reading Seashore Line rail bed between 49th and 36th Streets. The summary contains existing conditions mapping and photo documentation as well.

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The Bicycle Boulevard Needs Assessment divides the Haven Avenue Corridor (from Corson's Inlet to the Longport Bridge) into 4 segments describing existing conditions and opportunities to enhance on-road bicycle-priority operation for each. Mapping and photo documentation is provided for each segment.

Conceptual Design Recommendations

Best-practice on-road conceptual design recommendations are included in this report for the Haven Avenue corridor. Bicycle-priority design concepts were explored for each segment of the corridor extending from Corson's Inlet Park to the Longport Bridge.

Four Recommendations Maps and four Concept Sketches were also prepared for each segment of the corridor.

Summary Report

Finally, the results of the Ocean City Rail Trail and Bicycle Boulevard project were compiled into this final summary report.

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COMMUNITY PARTICIPATION

Community outreach is a key element in NJDOT's Local Technical Assistance programs and in order to build on Ocean City's recent efforts to improve bicycle and pedestrian accessibility throughout the city especially related to Stakeholder input and Public Outreach, a Steering Committee comprised of key representatives from Ocean City government and community groups was formed for the purpose of guiding the project direction and providing input and feedback throughout the project's duration (see Appendix A: Steering Committee for a full list of project stakeholders). Steering Committee meetings were held to kick-off the project (December 2010), to review the project process (June 1, 2011), and to wrap up the project.



In addition, a Public Information Center (PIC) was held on (June 17, 2011) to present the status of the Rail Trail and Bicycle Boulevard project to the community. The Public Information Center was an open-house-style format to allow for many members of the community with varying schedules to attend at their leisure. The project team and Steering Committee members were on hand to answer questions and collect public comment for the project.

Meeting agendas and minutes are included in Appendix D: Community outreach Material.

As part of this project, an annotated PowerPoint presentation illustrating the study results and conceptual recommendations was prepared for use in future public meetings by Ocean City officials. The PowerPoint presentation is included in Appendix B: Annotated Presentation.



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RAIL TRAIL INVESTIGATION SUMMARY

Overview

The purpose of this Rail Trail Investigation Summary is to assess the unique opportunity for safe, multi-use access along the former Pennsylvania-Reading Seashore Line rail bed from 36th to 49th Streets to pedestrians, bicyclists, persons with disabilities, etc. This summary outlines the findings of in-house environmental research and visual site inspection. No specific conclusions on the potential environmental impacts or permitting issues can be drawn as a part of this assessment without definitive design concepts. However, a table outlining estimated cost per mile for various trail types such as crushed stone, soil or boardwalk is provided. In addition, a “trail scenarios matrix” depicting three trail scenarios and potentially required permits and approvals is provided as a means to offer a big-picture view in determining the viability of utilizing the rail bed for trail access.

It is important to note that while developing concepts and designs for shared use paths, federal and state guidelines should be considered. Projects using federal or state funds are subject to environmental regulations and processes. A conclusive assessment as to the viability of a project based on its impacts to the environment can only be made in relationship to specific proposed designs. The process of environmental assessment also requires the development of design alternatives.

Stakeholders who have participated in this investigation have expressed interest in making use of the rail bed by developing a continuous shared use path between 36th and 49th Streets. Designs for pedestrian and/or bicycle paths vary widely and each design alternative would have different and specific impacts on the environment. The designs would also be dependent on the extent of access, the type of construction, the materials used, etc.

The federal and state processes for advancing projects from concept to construction are similar. Advancing a concept requires the development of alternative designs to the extent that detailed technical studies can be done to determine specific impacts and their extent. At that time, the feasibility and the permitting processes that would be necessary can be definitively determined. Unless and until intentions and concepts are developed to the extent that alternative designs can be proposed and explored, conjecture cannot lead to valid determinations of viability or cost.

This Rail Trail Investigation Summary concludes that it is possible to utilize the rail bed as a shared use path if the purpose and need is clearly expressed, if the proposed design has the least impact among possible designs, and if mitigation requirements are met. (See Environmental Regulatory Analysis Summary, p. 17)

Design Guidance

It is also important to consider the design guidelines of federal and state transportation agencies that pertain to shared use paths in order to qualify the types of uses and conditions of the proposed rail trail in relation to accepted standards. The planning and design of bicycle and pedestrian facilities should be appropriate to the anticipated user volumes. Otherwise, the potential for overcrowding and use conflicts is greater.

The American Association of State Highway and Transportation Officials (AASHTO) publish guidelines for the development of bicycle facilities. These guidelines are similar to those in the New Jersey Roadway Design Manual. These documents include guidance related to shared use paths. The points below are from the AASHTO Guide for the Development of Bicycle Facilities, 1999.

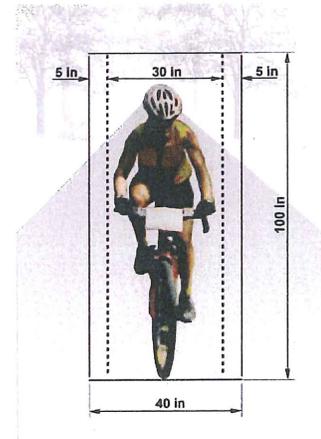
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- In order for a “trail” to be designated as a bicycle facility, it should meet all design criteria for shared use paths.
- Shared use paths should not preclude on-road bicycle facilities, as bicyclists may prefer and choose to ride on road, for example, to achieve higher speeds. A shared use path should be considered a complement to the roadway network.
- The recommended width of a two-direction shared use path is 10 feet. It can be reduced to 8 feet when traffic and pedestrian use is expected to be low.
- Adjacent to waterways or slopes that are greater than 1:3, a 5’ separation is desirable. Depending on the height of the embankment and conditions at the bottom, a physical barrier (railing, dense shrubbery, etc.) may need to be provided.

Some guidance to consider from the AASHTO Guide for the Planning, Design, And Operation of Pedestrian Facilities, July 2004:

- Two people walking side by side or passing one another generally require 4.67 feet of space. Two people in wheelchairs need a minimum of 5’ to pass one another.
- These guidelines are not regulations, but guiding principles. However, deviating from design guidelines will require reasonable justification during the conceptual and design phases.
- Use of the rail bed offers access to the natural environment and outstanding views of the bay and deserves further investigation whether for bicycle and/or pedestrian access. Concepts for future uses and types of facilities should be developed with careful consideration of anticipated uses and appropriate designs so as not to compromise the experience and safety of future users.



Bicycle Operating Space

Source: AASHTO

Existing Conditions

The project limits are between 49th and 36th Streets, a distance of about 1.37 miles. The observations in this section were made based on a visual assessment. An annotated selection of photographs taken during the field investigation is included on the Existing Conditions Maps 1-4.

A walk-through of the rail bed was completed with the exception of a segment between 46th and midblock between 44th and 43rd Streets. Although the rail bed can be accessed at 45th Street east of the dog park, the rail bed in either direction is inaccessible because of dense vegetation. The rail bed is impassable between 44th and 43 Streets because of an approximately 40’ break and intervening waterway midblock.

Ownership

The Ocean City Tax Maps indicate that the rail bed right-of-way occupies a portion of Block 7100, Lot 1 and is owned by the City of Ocean City. In addition, according to a deed provided by the City of Ocean City dated May 30, 2003 (filed with the County of Cape May), the Pennsylvania-Reading Seashore line right-of-way was conveyed to the City of Ocean City (grantee) by the New Jersey Transit Corporation (grantor) for public use (see Appendix J: Deed of Ownership).

However, according to the NJDEP Division of Land Use Regulations, Bureau of Tidelands Management, all lands now or formerly flowed by the mean high tide of a natural waterway are considered “tidelands” and are owned by the State of New Jersey unless use of these lands has been

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granted through a tidelands license or riparian grant. According to NJDEP Tidelands Claims Area Mapping, ownership of the “wash out” areas along the rail bed between 44th and 43rd Streets and between 40th and 39th Streets are “flowed by the mean high tide” and are therefore property of the State of New Jersey. The remaining rail bed is owned by the City of Ocean City. If the City were to pursue trail development at the “wash out” locations, a Tidelands conveyance application to lease the property for that use would be required.

Context

The alignment of the rail bed is straight and runs north/south parallel to West Avenue. The rail bed is adjacent to extensive wetlands to the west. On the east side, it is immediately adjacent to residential properties between 50th and 48th Streets and to wetlands between 48th and 36th Streets.

- The rail bed is immediately adjacent to the adjoining residential properties between 49th and 48th Streets and is approximately 30' from the houses. Adjacent property owners have landscaped the rail bed in this area.
- From 48th to 46th Street, the distance between the rail bed and the developed residential lots is approximately 200' with wetlands intervening.
- The rail bed is inaccessible from 45th to 44th Streets because of dense vegetation.
- From 45th to 36th Streets, the rail bed is approximately 200' from the developed residential lots with wetlands intervening.

The rail bed can be accessed from:

- On Haven Ave from 50th and 48th Streets
- 46th Street
- 45th Street
- Haven Ave and 36th Street

Condition

The width of the rail bed surface to embankment slope varies between an estimated 10' to 16' although most of the rail bed is 12' to 14'. The elevation varies between approximately 2' and 5'. Below are photographs of the rail embankment at high tide on a new moon. It should be noted that a significant storm event would have a greater effect on the embankment.

The condition of the rail bed varies. It is intact and is relatively stable between 49th and 46th Streets. Between 45th and 36th Street the rail bed has deteriorated and is more heavily vegetated both on the embankment and surface areas and most of the rails have been removed.

The rail bed is intact with the exception of two significant breaks between 44th and 43rd Streets and between 40th and 39th Streets. The rail bed has been washed away in these locations (see photographs on the Existing Conditions maps: #17 and #18, and #23). Each of these breaks is an estimated 40' with a 5 to 6 foot drop to the intervening open water. The rail bed has been partially eroded in other nearby locations, an example of which is shown in photograph #19 between 44th and 43rd Streets.

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There are cross drains throughout the rail bed along the length of the project area.



Photos taken during a high tide predicted at 4.4 feet over mean low water, showing top of rail approximately 30" above the water

Source: Ocean City Engineer

Opportunities for Shared Use Path

There are many opportunities and constraints associated with providing multi-use access along the rail bed for some or all of the length between 49th Street and 36th Street. It is important to note that regardless of which scenario (or combination of scenarios) is explored for future conceptual design, NJDEP permits would be required, public need outweighing potential environmental impacts would have to be demonstrated, and the concept would have to show the least overall environmental impact when taking all factors into consideration. Some of the concepts to explore include:

- **Multi-use access between 49th and 36th streets.** Develop an off-road shared use path for both bicyclists and pedestrians between 49th and 36th Street along the rail bed. This concept could be enhanced with informational kiosks and interpretive signage where appropriate. Surface type options vary according to the needs of anticipated future users. The selection of surfaces should be appropriate to the context. Many different surfaces have been applied to shared use paths such as asphalt, concrete, crushed stone/shells, hard packed dirt, boardwalk or a combination of treatments. A shared use path would restore the rail corridor to its original function as a public transportation corridor, this time for bicycle and/or pedestrian use. Off-road shared use paths are typically preferred by families, an idea reinforced by public outreach and project history. A shared use path would be greater than 6 feet wide.
- **Pedestrian-only access between 49th and 36th streets.** Develop a pedestrian-only path along the rail bed with lookouts and interpretive signage where appropriate. Provide trash receptacles and bicycle parking at trail heads. A pedestrian-only path would likely have a width of 6 feet or less.
- **Pedestrian-only access at selected points between 49th and 36th streets.** Construct pedestrian-only path segments to provide access to the natural areas along the bay side of Ocean City. This scenario would not provide continuous access between 49th and 36th Streets. Pedestrian-only segments would likely have a width of 6 feet or less.



1

Looking southwest from rail bed between 51st St and 50th St. Extensive views across the wetlands to the west can be seen among the length of the railbed.



3

The corner of 49th St, and Haven Ave. The rail bed is easily accessed from Haven Ave between 50th - 49th St. 49th St. is the southern terminus of the project area where Haven Ave. ends.



5

Landscaping between 49th and 48th St. is encroaching on the railbed right-of-way.



7

Looking east on 48th St, toward the ocean from the rail bed. The next access road to the railbed is 46th St.

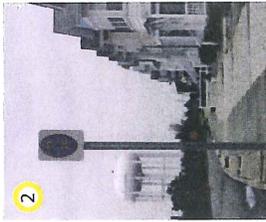
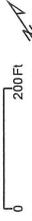
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Existing Conditions

Map 1: 51st St - 48th St



March 2011



2

Looking north from the corner of 50th and Haven Ave. Haven Ave is a signed bike route.



4

Walking north on the rail bed between 49th and 48th St. The rail bed is about 30 feet from the houses.



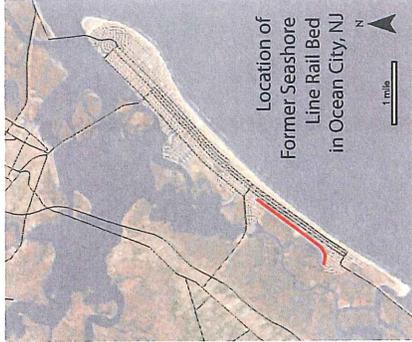
6

The elevation of the rail bed is approximately 2-3' near 49th St.



8

Looking west at wetlands from the rail bed near 48th St.



Location of Former Seashore Line Rail Bed in Ocean City, NJ

Ocean City Rail Trail &
Bicycle Boulevard Project
**Existing
Conditions**
Map 2: 48th St - 44th St



March 2011



Looking southwest from the dog park.



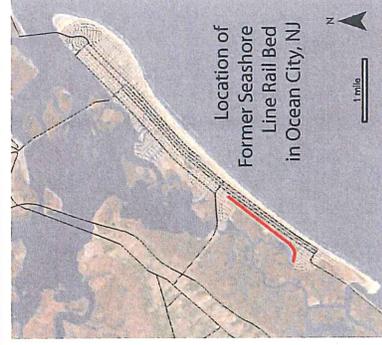
Looking west from 46th St. into the water treatment plant.



Looking northwest from rail bed at the water tower across a small creek. The rail bed is at its greatest elevation in this area.



Looking north on rail bed between 48th and 47th St. The distance between the rail bed and houses on West Ave is about 150'.



Bird's eye view of the rail bed near 44th St. Sources: bingmaps.com



Looking north across 45th St/entrance to the dog park. The rail bed becomes impossible north of this point due to vegetation.



Looking east from the rail bed south of 36th St. across wetlands at the back of houses located on West Ave.



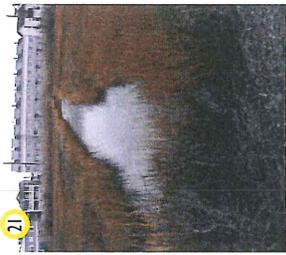
Looking south on rail bed between 47th and 46th Sts.



One of two locations where the rail bed has been washed away.



Evidence of rail bed erosion near 43rd St.

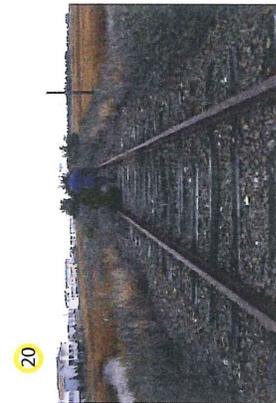


Looking west from rail bed over man-made waterways at houses located on the east side of West Ave.

Ocean City Rail Trail & Bicycle Boulevard Project
Existing Conditions
Map 3: 44th St - 40th St
 
 March 2011



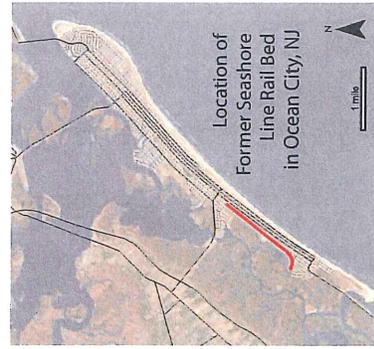
Looking south over the break in the rail bed between 44th and 43rd St.



Looking south on rail bed near 41st St.



Bird's eye view of the rail bed and wetlands near 40th St. The meandering waterways are natural, while the straight ones are man-made.



Ocean City Rail Trail & Bicycle Boulevard Project
Existing Conditions

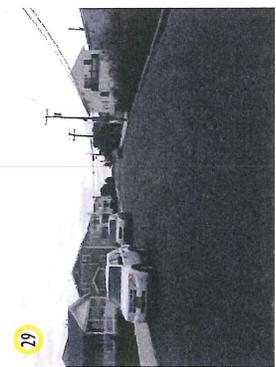
Map 4: 40th St - 36th St



March 2011



Looking north on Haven Ave from 36th St., the northern terminus of the project area. There are sharrow markings on this block of Haven Ave and it is a signed bike route.



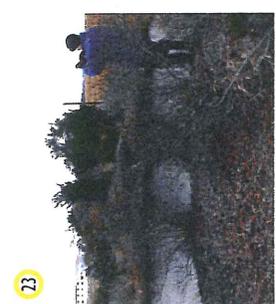
Looking east on 36th St. The rail bed can be accessed at 36th St.



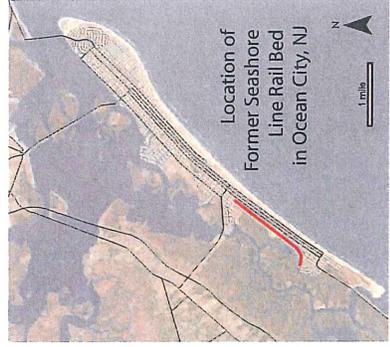
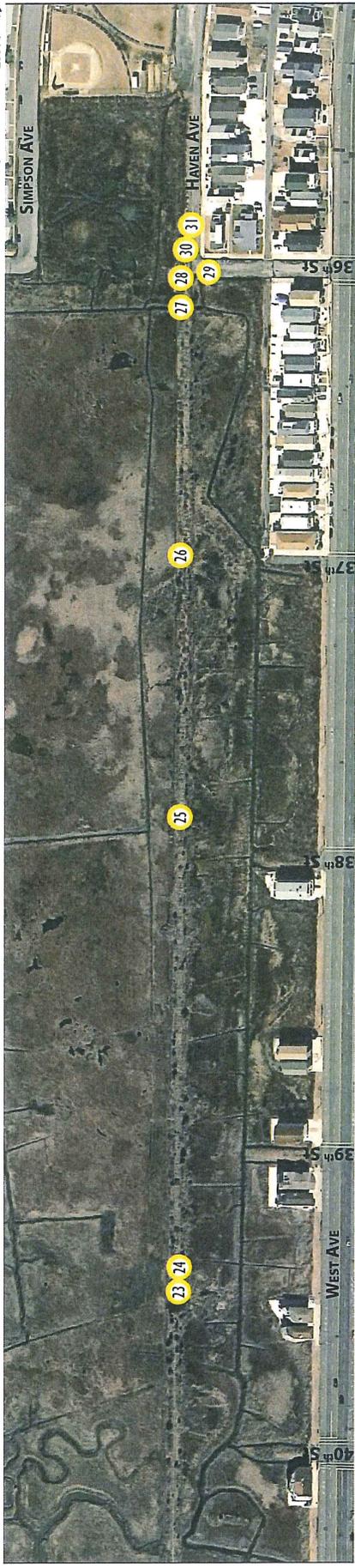
Looking west at man-made waterways through the wetlands.



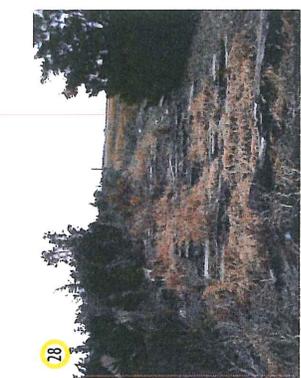
Looking west near 38th St over wetlands at houses on Somerset Lane.



The rail bed has been washed away between 40th and 38th St. It is one of two locations where there is a break in the rail bed.



Accessing the rail bed at the end of 36th Street. The rail bed is immediately parallel to Haven Ave. The northernmost roadway where the railbed can be accessed.



The rails have been removed and the ties have become displaced along much of the north of 46th St.



Looking east from rail bed over wetlands at 37th St.



Looking east over wash out at houses located on West Ave.

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Environmental Background

Project Goal

The goal of the Ocean City Rail Trail task is to examine the opportunity for multi-use trail access along the former Pennsylvania-Reading Seashore Line rail bed.

Project Area

The site is located along the railroad bed between 36th and 49th Streets in Ocean City within Cape May County, New Jersey. Haven Avenue was built along the railroad right-of-way. To the east is the Atlantic Ocean and ocean front property. To the west is Peck Bay and Great Egg Harbor Bay with associated lagoons and inlets connected to the bays. The former Pennsylvania-Reading Seashore Line in the southern portion of the island is bounded by wetland areas and residential properties. The entire project area lies within the CAFRA zone and will be subject to those regulations. Information was gathered through visual site inspection and using NJDEP's Geology and Environmental iMap program. Pertinent information has been included in this assessment.

Watershed

The project corridor spans two watersheds. The southern portion is located in the Cape May Watershed (16) and is in the Crook Horn Creek sub-watershed (16DA01). The northern portion of the project area is located in the Great Egg Harbor Watershed (15) and is in the Great Egg Harbor Bay/Lakes Bay/Skull Bay/Peck Bay subwatershed (15CA04).

Waterways

There are four mapped waterways in the vicinity of the proposed project area. They are all designated at FW2-NT/SE1 waterways. This means that the waterways do not support trout production; however, they are tidally influenced and are of high water quality that may be important to other aquatic activities. The waterways near the project area include; Weakfish Creek, tributary to Crook Horn Creek, tributary to Garret Thorofare, and Great Egg Harbor.

Vegetation

The primary community type in the area of the project is coastal salt marsh. Commonly found herbaceous vegetation includes salt marsh cordgrass (*Spartina alterniflora*), salt-meadow grass (*Spartina patens*), with spike grass (*Distichlis spicata*) and black grass (*Juncus gerardi*). Photos of the site show that along the edge there are marsh elder (*Iva frutescens*) and groundsel bush (*Baccharis halimifolia*). Growing in disturbed areas along the edge is phragmites (*Phragmites australis*).

Threatened and Endangered

The wetland and scrub areas provide Rank 4 habitat for state endangered and threatened species as listed below in Table 1. Most of the protected species are birds that require the wetland areas for nesting and foraging. (See Map 5: Protected Species Habitat.)

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Note:

According to NJDEP’s “Landscape Maps of Habitat for Endangered, Threatened and Other Priority Wildlife” (also known as “Landscape project Maps”). This ranking refers to contiguous habitat type valued according to presence of threatened, endangered or priority wildlife species.

Rank 5 – Presence of one or more wildlife species on the federal threatened and endangered species list.

Rank 4 – Has one or more occurrences of at least one State endangered species.

Rank 3 – Has one or more occurrences of at least one State threatened species.

Rank 2 – Has one or more occurrences of at least one State priority species.

Rank 1 – Meets habitat-specific suitability requirements.

Habitats ranks 3-5 require greater transition areas or “buffers” than do those ranked 1 or 2.

Table 1: Threatened and Endangered Species

Rank	Landscape Version	Species Common Name	Landscape Region	Acres
4	Version 2.1	Black Skimmer	Coastal	103.92357484
4	Version 2.1	Tricolored Heron	Coastal	103.92357484
4	Version 2.1	Glossy Ibis	Coastal	103.92357484
4	Version 2.1	American Oystercatcher	Coastal	103.92357484
4	Version 2.1	Least Tern	Coastal	103.92357484
4	Version 2.1	Northern Diamondback Terrapin	Coastal	103.92357484
4	Version 2.1	Emergent Suitable	Coastal	103.92357484
4	Version 2.1	Common Tern	Coastal	103.92357484
4	Version 2.1	Cattle Egret	Coastal	103.92357484
4	Version 2.1	Snowy Egret	Coastal	103.92357484
4	Version 2.1	Little Blue Heron	Coastal	103.92357484
4	Version 2.1	Black-crowned Night-heron	Coastal	103.92357484
4	Version 2.1	Osprey	Coastal	103.92357484

Wetlands

The bay side of the island between the barrier island and the mainland is lined with Rank 4 Emergent Wetlands. The wetlands contain emergent and scrub-shrub vegetation and are tidally influenced. These ecosystems are dependent upon a mixture of fresh and salt water. Several of the wetlands are mapped as being parkland. Wetlands also surround the existing Ocean City sewage treatment plant. The wetlands

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are protected by the Coastal Wetlands Act of 1970 and the Freshwater Wetlands Act of 1987. There are several types of wetlands found in the area as listed below in Table 2. (See Map 6: Wetlands.)

Table 2: Types of Wetlands

E2EM1P	Estuarine Emergent Saline marshes
MODD	Modified Disturbed Wetlands
MODL	Modified Managed Wetlands
PEM1B	Palustrine Emergent Salt marshes
PEM1B/PSS1B	Palustrine Scrub/Shrub and herbaceous wetlands
PEM1E	Palustrine Emergent Herbaceous Wetlands
PF04B	Palustrine Coniferous Wooded Wetlands
PSS1/4B	Palustrine mixed deciduous scrub/shrub wetlands

Soils

The site is underlain by five different soil types as noted below in Table 3. Most are considered acidic and would require appropriate precautions during construction and excavation activities. While they are all prone to seasonal flooding due to tide changes and storm events, Psammaquents, Pawcatuck-Transquaking, and Appoquinimink-Transquaking-Misspillion are listed on the New Jersey Hydric Soils List when they are found in flats and tidal marshes.

Table 3: Soil Types

USPSBR	Urban land-Psamments, wet substratum complex, 0 to 8 percent slopes, rarely flooded
USPSAS	Urban land-Psamments, sulfidic substratum complex, 0 to 2 percent slopes, occasionally flooded
PstAt*	Psammaquents, sulfidic substratum, 0 to 3 percent slopes, frequently flooded
PdwAv*	Pawcatuck-Transquaking complex, 0 to 1 percent slopes, very frequently flooded
AptAv*	Appoquinimink-Transquaking-Misspillion complex, 0 to 1 percent slopes, very frequently

**Listed hydric soil*

Known Contaminated Sites

Along the rail bed there is one Known Contaminated Site. It is located at the Ocean City Treatment Plant at 45th and Simpson Avenue. (See Map 7: Additional Environmental Constraints.)

Environmental Regulatory Analysis Summary

From a regulatory perspective, providing access along the former Pennsylvania Seashore Line rail bed between 49th and 36th Streets would potentially require various NJDEP permits depending on the type and extent of trail being proposed. No specific conclusions on the potential environmental impacts or permitting issues can be drawn without having definitive design concepts. Depending on the funding source, different environmental compliance documentation applies. This analysis does not address either

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National Environmental Policy Act (NEPA) or Executive Order (EO)-215 applicability as it is unknown at present what the final design concept or source and degree of project funding will be.

For the purpose of this report, this analysis is based on three conceptual scenarios: 1) providing multi-use access (bicycles, pedestrians, persons with disabilities, etc.) between 49th and 36th Streets (a “shared use path”) along the rail bed, 2) providing pedestrian-only access between 49th and 36th Streets along the rail bed, and 3) providing pedestrian-only access to the bayside waterfront at selected points between 49th and 36th Streets along the rail bed.

Regardless of which scenario (or combination of scenarios) is explored for future conceptual design, a NJDEP wetland permit application would have to demonstrate (a) there is a public need for the project that outweighs the potential environmental impacts and (b) that the proposed concept satisfies the project need(s), purpose and goals. Both NJDEP and the US Army Corps of Engineers require an alternatives analysis showing that the proposed concept has the least overall environmental impact when taking into consideration all project needs, purpose and goals. Any permits authorized by state and federal agencies would likely include extensive compensatory wetland mitigation requirements.

The information gathered during this investigation yields that it is possible for the existing rail bed to be utilized as a trail if:

- the project purpose and need is clearly expressed,
- the proposed facility design has the least impact among possible designs, and
- mitigation requirements are met.

The type of trail that would likely impose the least impact would be boardwalk. Because construction would likely have significant impacts to wetlands, threatened & endangered species, water quality, drainage, etc., the mitigation requirements would be extensive. Although it is possible to acquire permits if all the requirements are met, the expense to mitigate would likely cost more than construction. There is no way to identify which permits or mitigation would be required until a design scenario is proposed. At that time, if the design meets the purpose and need, permits and appropriate mitigation measures can be identified.

Examples of trails that were developed along former rail corridors with a similar context as Ocean City are included in Appendix I: Rail Trail Examples.

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Liberty State Park, Jersey City, NJ
Source: The RBA Group



Branford Trolley lane, CT
Source: Traillink.com



Rail Trail, Chautauqua County, NY
Source: Traillink.com

Table 4: Trail Scenarios Matrix outlines three conceptual trail scenarios and lists the NJDEP regulatory permits that would potentially be required.

Table 5: Estimated Cost by Trail Type outlines various types of trails in terms of surface material and what the estimated construction cost per mile would be.

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Table 4: Trail Scenarios Matrix

Potential Trail Scenarios	Location	Width	Potential Permits/Approvals
Shared Use Path	Between 49 th and 36 th streets along the rail bed	>6'	<ul style="list-style-type: none"> ▪ NJDEP CAFRA Permit ▪ NJDEP Waterfront Permit ▪ NJDEP Individual Wetland Permit and Compensatory Wetland Mitigation Approval ▪ NJDEP 401 Water Quality Certification ▪ NJDEP Stormwater Approval ▪ U.S. Army Corps of Engineers (COE) Section 10 Permit <ul style="list-style-type: none"> ▫ COE Commenting Agencies: <ul style="list-style-type: none"> ▪ NOAA National Marine Fisheries Essential Fish Habitat Assessment for Corp. Permit ▪ U.S. Fish and Wildlife Service Review for Federal T&E Species Impacts ▪ Federal Coastal Zone Management Consistency Determination
Pedestrian-Only Path	Between 49 th and 36 th streets along the rail bed	≤6'	Same as above but could potentially use <i>NJDEP General Wetland Permit</i> instead of <i>NJDEP Individual Wetland Permit</i>
Pedestrian-Only Access Segments	Select access points to bayside waterfront between 49 th and 36 th streets	≤6'	Same as above but could potentially use <i>NJDEP General Wetland Permit</i> instead of <i>NJDEP Individual Wetland Permit</i>

Note: If federal funds are used, the project will likely require approval of a National Environmental Policy Act (NEPA) Compliance Document issued by the U.S. Federal Highway authority (FHWA).

Note: Potentially required permits are determined in part by length and design of trail. If project limits (and associated potential impacts) are reduced, the need for certain permits may be lessened.

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Table 5: Estimated Cost by Trail Type

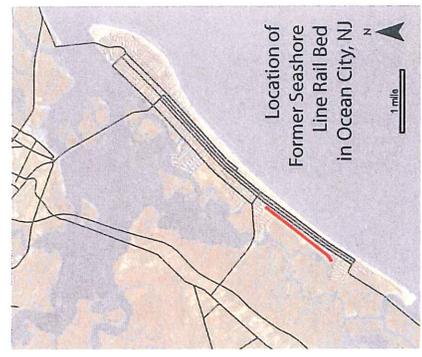
Surface Material	Cost per mile	Longevity	Advantages	Disadvantages
Soil cement	\$60,000-\$100,000	Medium	Uses natural materials, more durable than native soils, smoother surface, low cost, accommodates multiple use.	Surface wears unevenly, not a stable all-weather surface, erodes, difficult to achieve correct mix. Not recommended for clay type soils.
Granular stone	\$80,000-\$120,000	Medium-Long (7-10 yrs.)	Soft but firm surface, natural material, moderate cost, accommodates multiple uses. Granular stone should include fines like quarry process, which choke the voids and makes it more firm and stable; does not get displaced easily and is easier to ride on.	Surface can rut or erode with heavy rainfall, regular maintenance needed to keep consistent surface, replenishing stones may be a long-term expense, not for areas prone to flooding or steep slopes.
Asphalt	\$200,000-\$300,000	Medium-Long (7-15 yrs.)	Hard surface, supports most types of use, all-weather, accommodates most users simultaneously, smooth surface to comply with ADA guidelines, low maintenance.	High installation cost, costly to repair, not a natural surface, freeze/thaw can crack surface, heavy construction vehicles need access.
Concrete	\$300,000-\$500,000	Long-term (20 yrs. plus)	Hardest surface, easy to form to site conditions, supports multiple use, lowest maintenance, resists freeze/thaw, best cold weather surface, most resistant to flooding.	High installation cost, costly to repair, not a natural-looking surface, construction vehicles will need access to the trail corridor.
Boardwalk, (w/appropriate plank spacing)	\$1.5-\$2 million	Medium-Long	Necessary in wet or ecologically sensitive areas, natural-looking surface, low maintenance supports multiple use.	High installation cost, costly to repair, can be slippery when wet.
Resin-stabilized	Varies (depending on type of application)	Medium-Long (depending on type of application)	Aesthetics, and less environmental impact, possible cost savings if soil used, can be applied by volunteers.	Need to determine site suitability and durability, may be more costly in some cases.
Native soil	\$50,000-\$70,000	Short to Long (depending on local use and conditions)	Natural material, lowest cost, low maintenance, can be altered for future improvements, easiest for volunteers to build and maintain.	Dusty, ruts when wet, not an all-weather surface, can be uneven and bumpy, limited use, possibly not accessible.
Wood chips	\$65,000-\$85,000,	Short-Term (1-3 yrs.)	Soft, spongy surface good for walking, moderate cost, natural material.	Decomposes under high temperature and moisture, requires constant replenishment, not typically accessible, limited availability, not appropriate for flood prone areas.
Recycled materials	Varies	Varies	Good use of recyclable materials, surface can vary depending on materials.	Design appropriateness and availability vary.

Source: *Trails for the Twenty-First Century, second edition*

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**Protected Species
Habitat
Map 5**



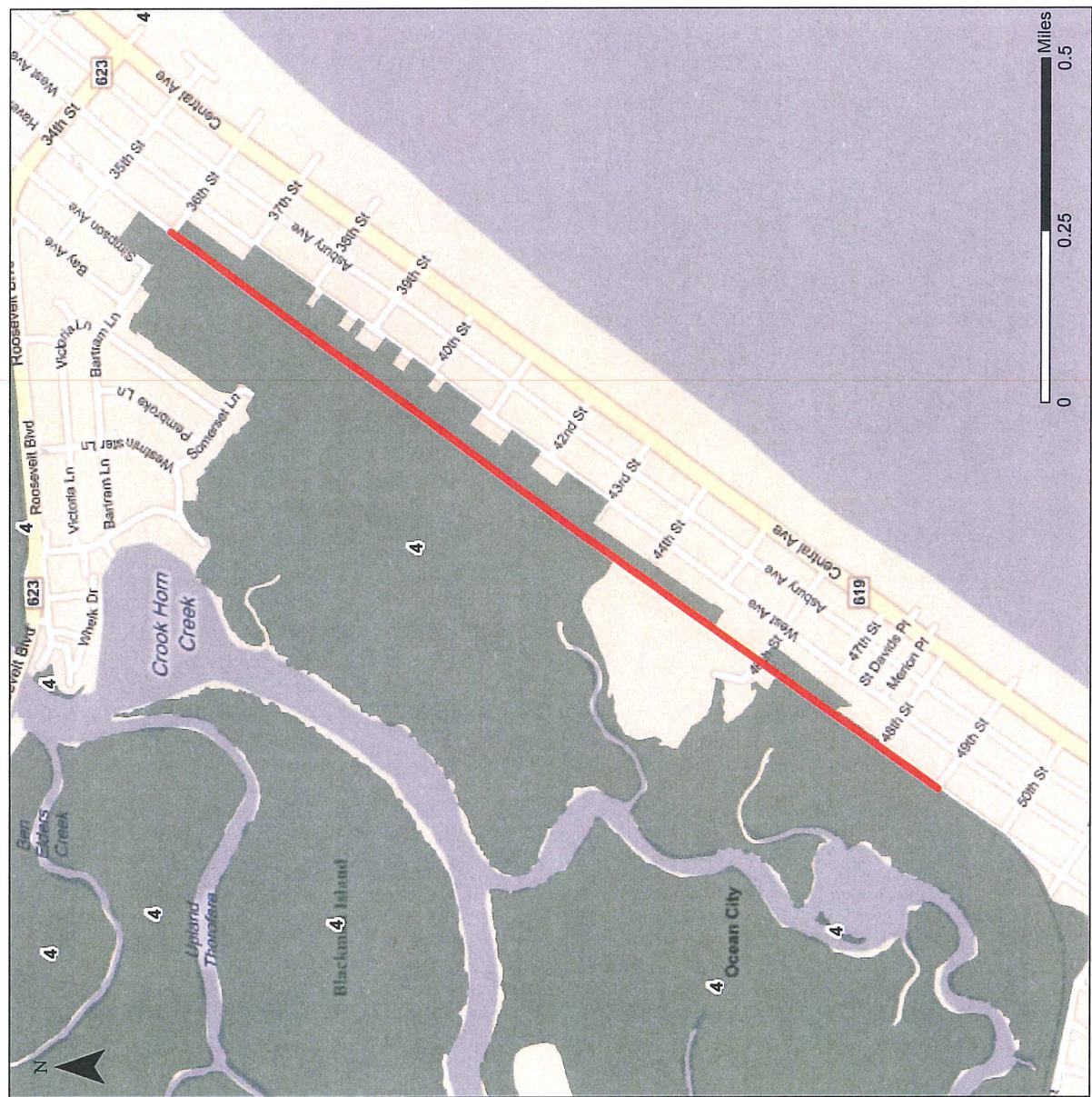
March 2011



Legend

- Rail Bed Alignment
- NJDEP Landscape Project 2.1**
- Emergent Wetland Rank
- Suitable Habitat (1)
- Priority Species (2)
- State Threatened (3)
- State Endangered (4)
- Federal T and E (5)
- Bing World Street Map

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP, and is not State-authorized.



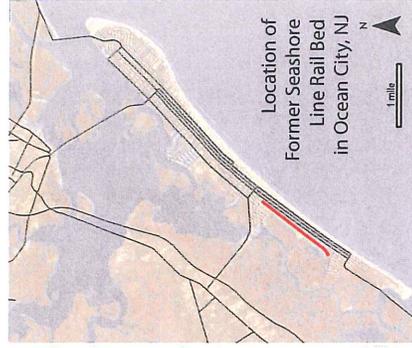
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Additional
Constraints

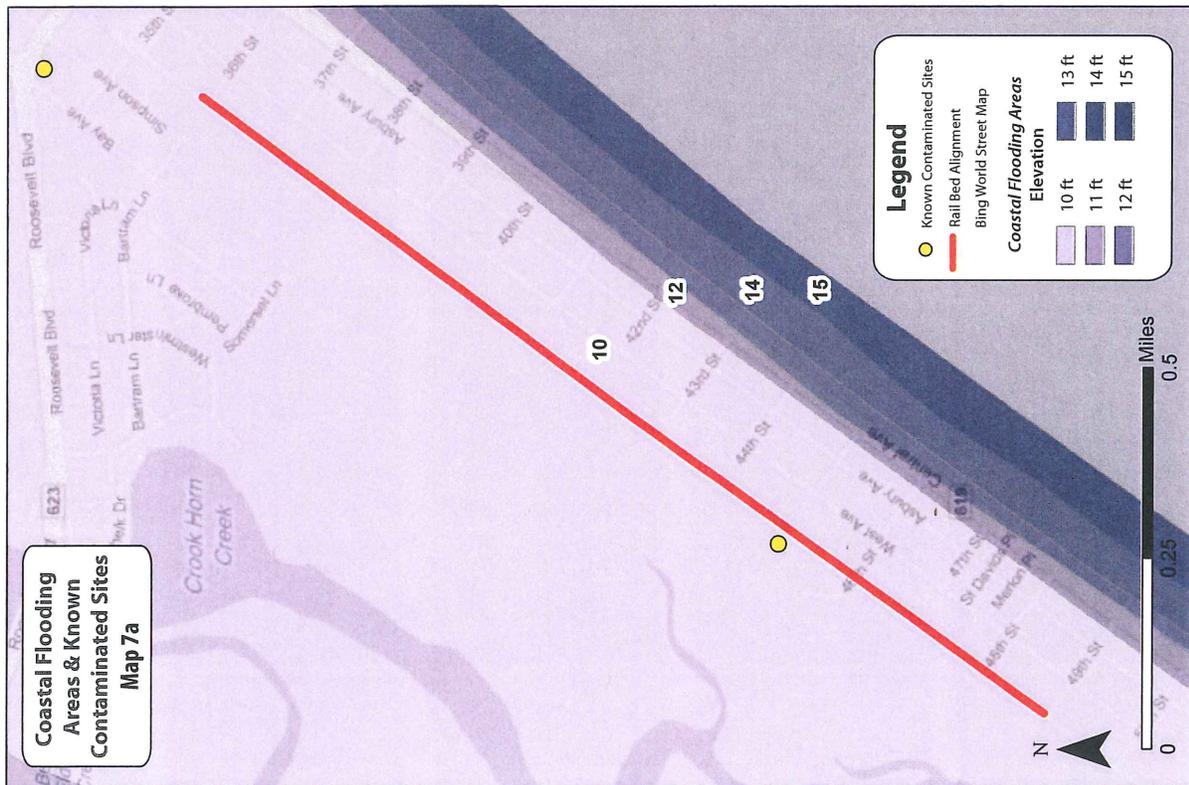
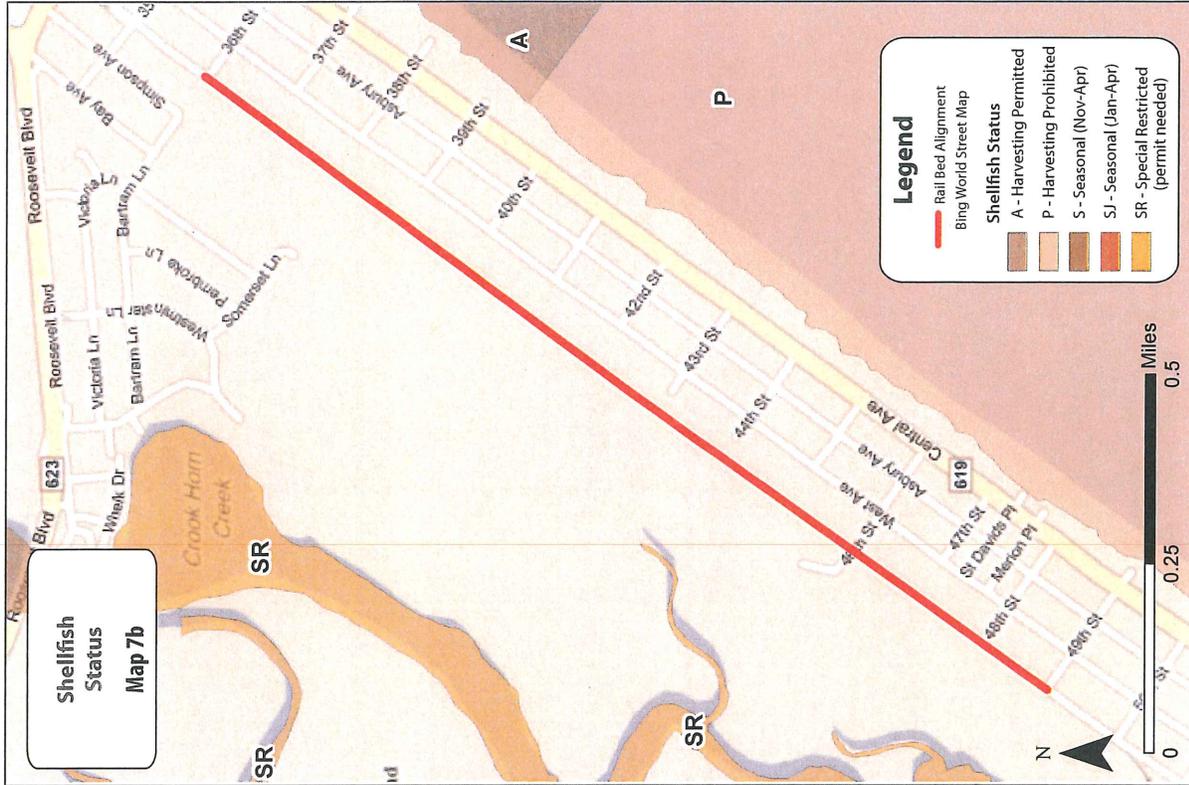
Map 7



March 2011



This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not State-authorized.



Ocean City Rail Trail & Bicycle Boulevard Project

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BICYCLE BOULEVARD NEEDS ASSESSMENT SUMMARY

Overview

The purpose of this Bicycle Boulevard Needs Assessment is to examine the existing Haven Avenue Bicycle Boulevard (OC1 Bike Route) in its various stages of completion between 56th and 1st Streets as well as connections to Corson’s Inlet Park to the south and the Longport Bridge to the north.

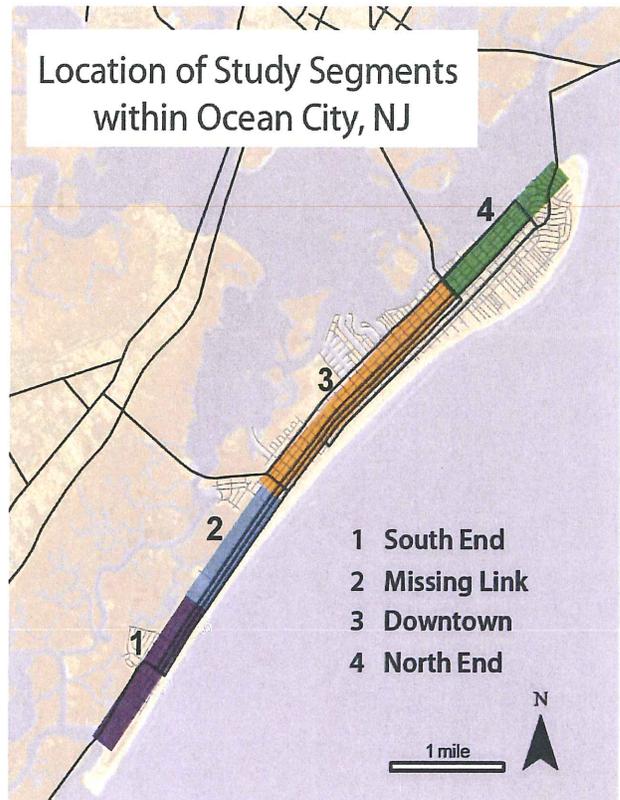
This assessment of the history, existing conditions and proposed future stages of development will lead to a best-practice approach for implementation of a “bicycle-priority” on-road corridor, primarily along Haven Avenue, for the length of the island (approximately 7 miles).

This evaluation identifies barriers, gaps in connectivity, substandard conditions, and assesses the opportunities and constraints associated with the corridor’s capability to safely accommodate prioritized bicycle and pedestrian travel.

The corridor is divided into four geographic areas:

- Segment 1 - South End (south of 49th Street)
- Segment 2 - Missing Link (between 49th Street & 36th Street)
- Segment 3 – Downtown (between 36th Street and 9th Street)
- Segment 4 - North End (north 9th Street)

For each of these segments, a summary of existing conditions and opportunities for enhancing the bicycle priority based on state and national design guidance is included.¹ Following each segment description, an Existing Conditions/Opportunities & Constraints Map is provided.



¹ Sources include the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, the Manual on Uniform Traffic Control Devices (MUTCD), the NJDOT Pedestrian and Bicycle Compatible Design Guidelines, the Institute of Transportation Engineers (ITE), State of the Practice Traffic Calming Guide, and the Federal Highway Administration (FHWA) Designing Sidewalks and Trails for Access, Best Practices Design Guide.

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Design Guidance

A bicycle boulevard is a type of shared roadway that provides a degree of bicycle primacy on selected roadways. Bicycle boulevards are usually collector or minor arterial streets. Some recommended guidance on the design elements of a bicycle boulevard include the following:

- Select a street that provides a direct and continuous connection for bicyclists. Bicycle boulevards work best on a street grid system.
- Turn stop signs towards intersecting traffic.
- Place motor vehicle traffic diverters at key intersections. The diverters must be designed to allow through bicycle movement. Include a cut-through wide enough to accommodate a bicycle with a trailer (4 feet wide).
- Alternatively, place traffic calming devices on the street. Include traffic circles, speed humps, curb extensions, neck down, chicanes, etc.
- Place directional signs to route bicyclists to key destinations, to guide bicyclists through difficult situations, and to alert motorists to the presence of bicyclists.
- Provide protection where the boulevard crosses higher volume arterial streets with traffic signals and/or median refuge islands where appropriate.



Bicycle Boulevard, Berkeley, CA
Source: Payton Chung on Flickr.com

Travel speeds along a bicycle boulevard are intended to be similar for all traffic, including motor vehicles and bicycles. This helps to diminish conflicts and create a peaceful travel experience for everyone using the roadway. One way to help ensure that motor vehicle traffic does not exceed the intended operating speed is to install a variety of traffic calming features along a roadway. This will help to make it intuitive for motorists to drive appropriately, and makes the roadway ‘self enforcing’ through its design.

Traffic calming measures that impact driver behavior can be categorized into volume control or speed control. Some measures that target cut-through traffic and minimize volume, include restricted turns, roadway closures or median barriers. Speed control measures include passive concepts such as gateways or streetscape that changes a driver’s perspective of a corridor, and active concepts that force a driver to physically alter their travel path. This can be accomplished with speed humps, curb extensions, mini traffic circles or any of numerous tested and proven techniques to help encourage motorists to drive at an intended speed.



Median island with a raised mid-block crosswalk
Source: Richard Drdul from Wikipedia.com

According to Ocean City Ordinance 10-05 (February 2010), the City Council voted to amend the Ocean City Traffic Ordinance, Chapter VII by designating multiple Four-Way Stop Intersections along Haven Avenue. Some research has shown that all-way stop control may reduce speeds in its immediate area, but in some cases, speeds increase between intersections. According to the Institute of Transportation Engineers publication “All-Way Stops Versus Speed Humps: Which is more effective at slowing traffic speeds?” David E. Clark, P.E states that traffic speeds along a roadway increase when a series of all-way stop are installed, but decrease when speed humps are installed.²

² www.ite.org/traffic/documents/AB00H1902.pdf

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Segment 1 – South End

The “South End” segment is comprised of OC1 Bike Route along Haven Avenue between 56th Street and 49th Street, West Avenue from 59th to 56th and connections to Corson’s Inlet Trail and the Ocean Drive Bridge to Strathmere.

Existing Conditions

- Ocean Drive, 56th Street and West Avenue are all designated as Cape May County Route 619. 56th Street east of West Avenue is designated as County Route 619 Spur.
- There is a 70 yard gap between the south end of West Avenue and the northeastern terminus of Corson’s Inlet Trail. The surrounding area is low lying, likely wetlands.
- There are no dedicated bicycle facilities within the South End except the Corson’s Inlet Rail Trail which does not connect to the surrounding roadway network. The trail dead ends just south west of the intersection of West Avenue and 59th Street, with access from the Corson’s Inlet State Park.
- Low speed, low motor vehicle traffic volume along Haven Avenue.
- Street quilts have been painted at the intersections of Haven Avenue and 53rd Street and 52nd Street at either end of the playground.
- There is all-way stop control at two intersections along this segment of Haven Avenue, at the intersections with:
 - 53rd Street
 - 52nd Street
- There is a parallel alley between Haven Avenue and West Avenue throughout this segment.
- The pavement width varies between 20 feet and 40 feet along Haven Avenue.
- On street parking is permitted but not striped along Haven Avenue.
- The OC1 Bike Route is signed between 56th and 49th Streets along Haven Avenue.
- West Avenue has head-in angled parking along each side between 55th Street and its southern terminus at 59th Street.

Note: Ocean City Ordinance 10-05 (February 2010) designates 51st and 53rd intersections as four-way-stops.

Opportunities for Enhancing Bike Boulevard

Opportunities for enhancing bicycle-priority travel in the South End include OC1 Bike Route as well as connections to Strathmere Bridge and/or connections to Corson’s Inlet. Some opportunities include:

- Construct a boardwalk style shared use path segment to connect the Corson’s Inlet Trail to the local roadway network at the south end of West Avenue at 59th Street.
- Bicyclists entering Ocean City from the south travel along County Route 619/Ocean Drive. Provide a visual gateway at 56th Street just south of Ocean Drive. This would provide guidance to Ocean City’s bicycle boulevard alignment.
- Extend OC1 Bike Route from the southern terminus of Haven Ave at 56th Street to the west along 56th Street to Ocean Drive. This extension is along County Route 619, and could be extended further south to Strathmere and points further south along a larger County bicycle route network. In the long term OC1 Bike Route could be further extended to include the Corson’s Inlet trail, once it is connected to the local roadway network at its northern terminus.
- Enhance bicycle accommodations along Ocean Drive from 56th Street to Strathmere Bridge. Pavement shoulder striping treatments could be enhanced to include signed and striped bike lanes.

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- If Corson's Inlet Trail is connected to West Avenue at 59th Street, enhance bicycle accommodations along West Avenue for 3 blocks between 59th Street and 56th Streets, and along 56th Street for 1 block between West Avenue and Haven Avenue. Provide wayfinding signs and pavement striping information - pavement striping treatments could include shared lane markings.
- There is existing angled parking along this segment of West Avenue. The parking could be reconfigured to back-in angled parking to minimize conflicts between bicyclists, pedestrians and auto traffic and maximize visibility.
- Eliminate the stop traffic control at 53rd Street and 51st Street intersections along Haven Avenue in this segment to be consistent with the Ocean City Circulation Element of the Master Plan. The proposed configuration would provide more uninterrupted traffic flow along Haven Avenue.
- As stop signs on Haven Avenue are removed and through-traffic is prioritized, consider other traffic calming elements to keep speeds down but maintain bicycle-priority operation of the roadway. This could include shared lane markings, painted chicanes, colored shoulders, painted or planted medians, curb extensions, speed humps, etc.
- Explore potential locations for parking along the bike boulevard where there is potential demand.
- Implement reduced residential speed limit to institutionalize appropriate travel speeds and traffic calming efforts.
- Remove double yellow centerline to minimize "runway" or "highway" feel of overchannelizing a shared roadway. Motor vehicles will tend to drive toward the center of the roadway, giving more space for bicycle use along each travel direction and yield or adjust position when there is oncoming motor vehicle traffic.



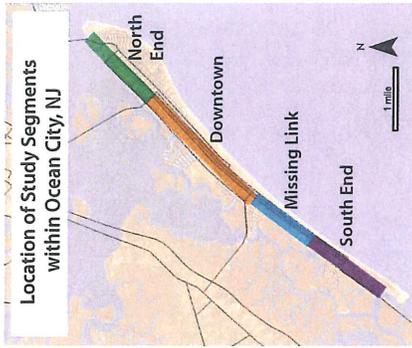
Back-in angled parking in Seattle, WA

Source: Carl Sundstrom
www.pedbikeimages.org

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Existing Conditions, Opportunities & Constraints

Map 8 - South End



Legend

- Wetlands
- Park/Open Space
- Transportation Center
- Off-road Path
- County Road
- OC1 / Haven Ave Bicycle Route
- City Identified Connector Route
- Potential Bicycle Enhancements
- Street Quilt
- Street Closure
- Gateway/Access Road
- Off-road Path
- County Road
- OC1 / Haven Ave Bicycle Route
- City Identified Connector Route
- Potential Bicycle Enhancements
- School
- Back-out Conflicts
- Stop Sign
- Traffic Signal
- Planted Median
- Angled Parking
- Potential OC1 Extension

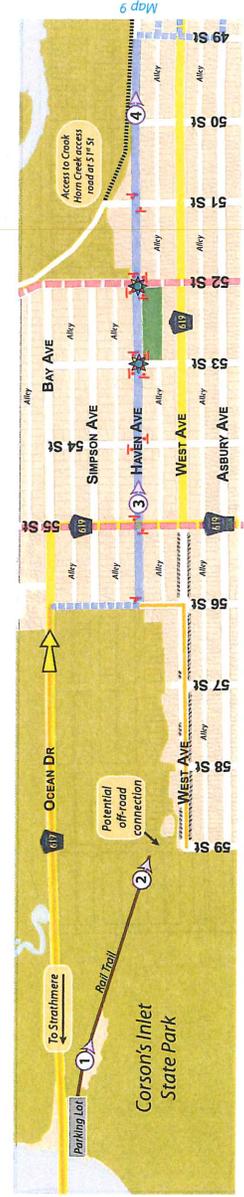


GIS Data Sources: Roads & Parcel Layer from Civil Solutions, a division of ARH, modified by the Cape May County Planning Department; Wetlands, NJDEP.

③ Haven Ave between 56th - 51st Streets

ROW = 51'

① Rail Trail in Corson's Inlet



④ Haven Ave between 50th - 49th Streets

ROW = 27-30'

② End of Rail Trail in Corson's Inlet

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Segment 2 – Missing Link

The “Missing Link” segment is described as such because the Haven Avenue corridor is discontinuous between 49th and 36th Streets. In terms of creating a continuous bicycle-priority on-road facility for the entire length of Ocean City, the gap in Haven Avenue is the primary constraint. However, various opportunities to connect the corridor exist. The potential opportunities to fill the gap in Ocean City’s bicycle boulevard are presented in this assessment as 3 separate alignment scenarios including:

- West Avenue alignment
- alleyway alignments
- Asbury Avenue alignment

A combination of alignment scenarios can also be considered for future concept design.

The existing conditions and opportunities for each of these alignments are listed below.

Existing Conditions (West Avenue)

- West Avenue is a 70 foot wide 4 lane arterial roadway, designated as County Route 619. There is on-street parking and sidewalks on each side of the road. The wide crossing distance combined with high traffic speeds and volume create a difficult crossing situation for pedestrians.
- There are existing bike lanes adjacent to parking in each direction. There is no buffer between the bike lanes and either the motor vehicle lanes or the on-street parking.
- The traffic volume is approximately 20,000 vehicles per day (Summer Season ADT, OC Circulation Element, 2005).
- The posted speed limit is 30 miles per hour; however, the 85 percentile speed is approximately 40 miles per hour.
- Casual, family and/or novice cyclists primarily choose to bicycle on the sidewalk where they are separated from high traffic speeds and volumes rather than using the existing bicycle lanes on West Avenue. Sidewalk bicycling is prohibited in Ocean City by ordinance.
- Several residential properties have driveway access directly along West Avenue. This contrasts with many of the areas of Ocean City that have alleys behind their homes. Having the only vehicle access along the major roadway and potential bicycle travel way poses potential conflicts when loading, unloading or access the cars if the bicycle facility is located between the auto parking and the houses.
- This segment of West Avenue is a Coastal Evacuation Route.

Opportunities for Enhancing Bike Boulevard (West Avenue)

There are multiple configuration options for enhancing bicycle accommodation along the West Avenue corridor. Each of these is described below. Any speed humps or traffic calming measures are subject to NJDOT approval along Coastal Evacuation Routes.³ The following configurations involve a redistribution of space by re-striping the roadway. No construction is included.

³ NJ Senate Bill 2482, NJ 214th Legislature, Introduced December 9, 2010 – Status: Pending

Amends NJ Motor Vehicles and Traffic Regulation Title 39:4-8.10

Eliminates DOT approval of municipal traffic calming measures on state or county roadways in business districts **except those roadways designated as a coastal evacuation route.**

Ocean City Rail Trail & Bicycle Boulevard Project

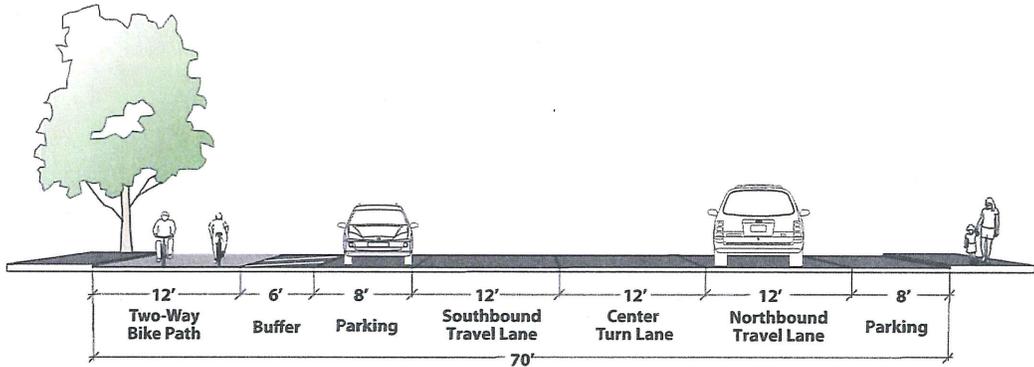
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- A bike path for two-way bicycle use could be developed along the west (southbound) side of West Avenue. This concept has the strong advantage of being in close proximity to Haven Avenue. It also has no major roadway crossings, greatly reducing potential conflicts with motor vehicle traffic. Providing a separated facility within the West Avenue right-of-way is completely compatible with the Ocean City vision for the overall Bicycle Boulevard concept. This path would need to be at least 8 feet wide to accommodate two-way bicycle traffic. This concept has a potential for conflicts at residential driveways located along the west (southbound) side of West Avenue. However, similar sidepaths have been constructed and successfully managed throughout the country and abroad. Three potential sidepath configurations are:



Two-way bike path, Washington, DC
 Source: The RBA Group

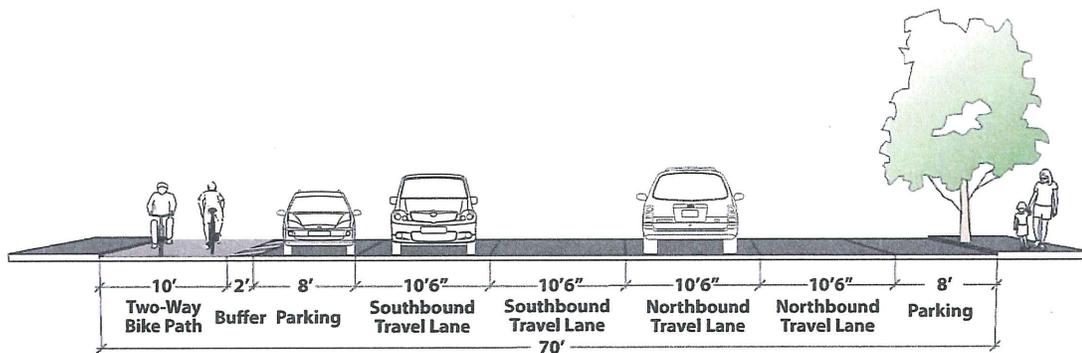
- **Road Diet and Two-Way Bike Path (Protected 2-way bike path)** This concept places West Avenue on a “Road Diet” to convert the existing four motor vehicle travel lanes to three, including a center turn lane. The “gained space” would be used in combination with the relocated bike lanes to create a buffer and two-way bike path within the existing roadway. This protected bike path would be located along the western (southbound) curb. On-street parking would be located between the bike path and travel lane. Due to the “road diet”, this concept has the advantage of including buffers between cyclists and motor vehicles.



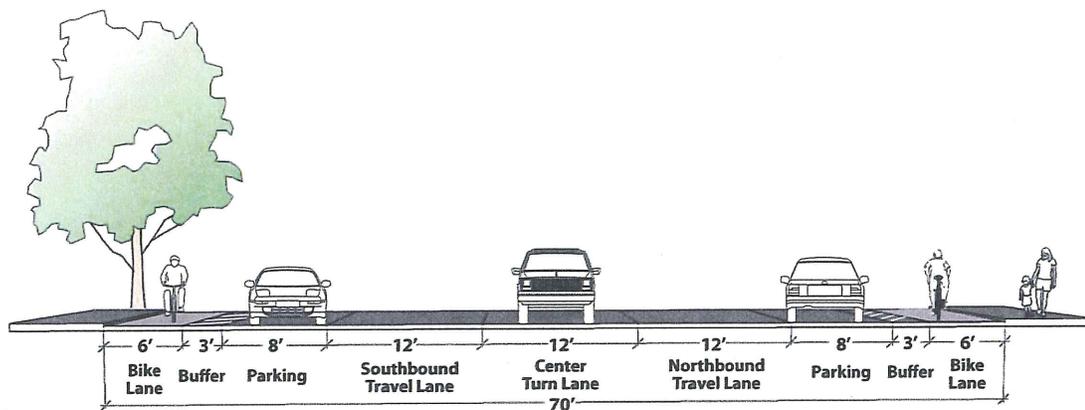
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- *No Road Diet and Two-way Bike Path* (Protected 2-way bike path). This concept maintains the current four lane roadway cross section and reallocates the existing bike lane space to a two-way bike path along the west (southbound) side of West Avenue within the existing roadway. This would only have minimal space for any buffer between parking and the bike path or the motor vehicle lanes. This concept is designed to the minimum width allowing for no buffer between bicyclists and motor vehicles.



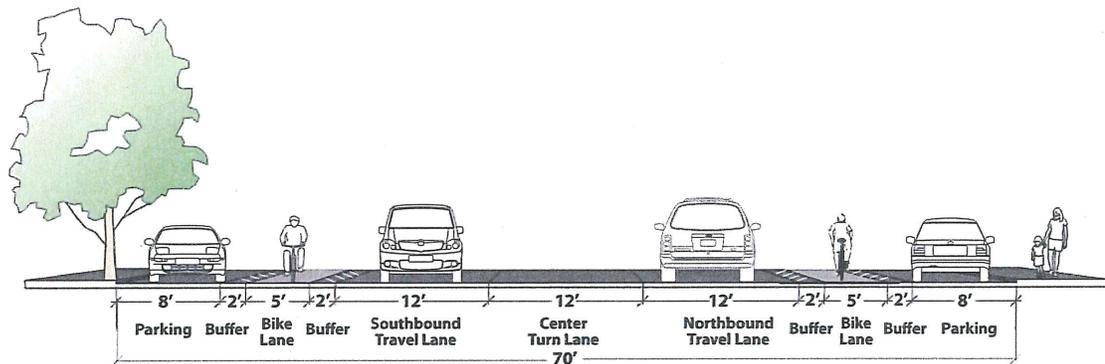
- Bike lanes along West Avenue could be reconfigured to provide buffers between cyclists and motor vehicles. These potential configurations are:
 - *Road Diet and Protected Bike Lanes* (Protected bike lanes) This concept switches the position of the existing on-street parking and the bike lanes and places West Avenue on a “Road Diet” to convert the existing four motor vehicle travel lanes to three, including a center turn lane. The “gained space” would be used to provide buffer areas between the on-street parking and the bike lanes. In the proposed configuration the bike lanes will be next to the curb, and will be separated from the motor vehicle travel lanes by the on-street parking. This restriping configuration can be implemented within the existing roadway width.



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- *Road Diet and Bike Lanes with Buffers* (Bike lanes with buffers) This concept will provide space for bike lanes with buffers by placing West Avenue on a “Road Diet” to convert the existing four motor vehicle travel lanes to three, including a center turn lane. The “gained space” would be used to provide buffer areas on both sides of the bike lanes. The bike lanes would be located between the on-street parking and the motor vehicle travel lanes, as they are currently located. The additional buffer areas will help to minimize ‘dooring’ conflicts between bicycle traffic and the on-street parking.



- Bike boxes should be considered at the approach to the traffic signals along West Avenue at 46th Street and 40th Street.
- Bicycle accommodation along 49th Street and 36th Street should also be enhanced to complete access between Haven Avenue and West Avenue. This could most easily be accomplished through installing signs and shared lane pavement symbols and/or bike lane striping. These two roadways each terminate at Haven Avenue, so traffic volume and speeds should not be a major concern. Turning to and from the northbound side of West Avenue will be a concern, especially if the bike lane concepts are selected, as this will require bicycle traffic to cross West Avenue. Colorized bike lanes or continuous bike chevron symbols could be striped along the intended bicycle travel path to help with both wayfinding and to advertise to motorists that they should anticipate turning bicycle traffic.
- “Bikes may use full lane” Manual on Uniform Traffic Control Devices sign R4-11 should be installed throughout the Bicycle Boulevard.
- Explore potential locations for bike parking along the bike boulevard where there is potential demand.

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Existing Conditions (Alleys)

- The existing alleyways between 49th and 36th Streets provide an option for bicycle travel on a low volume facility as compared to on-street riding.
- The alleys fall under City jurisdiction.
- There is very low traffic volume, most of which is very local traffic.
- High potential for conflicts at cross streets (13 blocks to cross). Alley traffic must stop at each cross street.
- There is not one continuous alleyway for the entire length of this segment. East of West Avenue, an alley runs between 47th Street and 36th Street and west of West Avenue, there is an alley between 49th Street and 47th Street. These two sections would have to be pieced together and utilize 47th Street in order for this option to span the entire gap. This would include crossing West Avenue along 47th Street.
- Bicycle and pedestrian traffic will have conflicts with parking cars, utilities and trash collection along the alleys.
- There is angled parking and open access head in parking between 41st Street and 40th Street.
- 47th Street and 36th Street have stop signs on the approaches to West Avenue. West Avenue traffic does not stop at the intersections with 47th Street and 36th Street.
- 49th, 47th, and 36th streets permit on-street parking.

Opportunities for Enhancing Bike Boulevard (Alleys)

Alleyways can be designed to be a natural extension of a bicycle-priority bicycle boulevard. There are opportunities to incorporate shared lane markings in each direction, and pavement stencils of bicycles centered along the narrow two-way travel lane. This is an element of the Woonerf concept (“living street”) that has been used successfully in many locations throughout the United States and abroad.

- Require stops on cross streets at the approach to the alley. This would require a change in stop control to be along the east/west cross streets on the approach to the 13 alley crossings.
- Vertical traffic calming measures such as raised intersections, crosswalks or speed tables could be installed at every alley crossing.
- Striped crosswalks, yield lines, continuous chevrons, and/or colorized bike lanes could be installed at every alley crossing.
- Zigzag edge lines should be installed on the approach to every alley crossing.
- Bicycle accommodation along 49th Street, 47th Street and 36th Street should also be enhanced to complete access between the Haven Avenue corridor and the alley alignment along the “Missing Link” segment. This could most easily be accomplished through installing signs and shared lane pavement symbols and/or bike lane striping.
- At 49th, 47th and 36th streets colorized bike lanes or continuous bike chevron symbols could be striped along the intended bicycle travel path across intersections to help with both wayfinding and to advertise to motorists that they should anticipate turning bicycle traffic.



Raised crossing, British Columbia
Source: John Lutton on Flickr.com

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- This routing does require crossing West Avenue along 47th Street and 36th Street. To accommodate families and all bicycle traffic a signalized traffic control such as a traditional traffic light or a HAWK signal, that operates only when actuated, should be installed along West Avenue at 47th Street and 36th Street.
 - Bike boxes should be considered to augment the existing bicycle lanes along West Avenue at the approaches to the potential signals at 47th Street and 36th Street.
 - Zigzag edge line treatments should be installed on the West Avenue approach to the major crossing locations, including 47th Street and 36th Street.
 - Install wayfinding signs to confirm and advertise the routing of the bicycle boulevard.
 - “Bikes may use full lane” Manual on Uniform Traffic Control Devices sign R4-11 should be installed throughout the Bicycle Boulevard.
 - Explore potential locations for bike parking along the bike boulevard where there is potential demand.



Zigzag lines
downtown Hilo, Hawaii Island
Source: County of Hawaii

Existing Conditions (Asbury Avenue)

- Ocean City has jurisdiction along Asbury Avenue.
- There is low traffic volume, and speed, along this 32 foot wide roadway.
- There are primarily residential land uses along the roadway.
- Asbury Avenue is three blocks away from Haven Avenue. Using this alignment will require two crossings of West Avenue.
- Ocean City has a concept to create a one-way couplet, with Central Avenue running southbound and Asbury Avenue running northbound. The viability of this concept is being determined by Ocean City. If traffic calming elements are not incorporated into this concept, travel speeds will likely increase.
- Existing stop control is along the east/west cross streets, traffic flow along Asbury Avenue is uninterrupted through the “Missing Link” corridor segment.

Opportunities for Enhancing Bike Boulevard (Asbury Avenue)

All parallel roadways pose an opportunity to connect the Haven Avenue Bike Boulevard in this section. Asbury Avenue, although three blocks east of Haven Avenue, could be considered as a potential link.

- Asbury Avenue could be enhanced with shared lane markings to reinforce the legitimate use and proper lane positioning of bicycle traffic.
- Wayfinding signs could be installed to confirm and advertise the routing of the bicycle boulevard.
- Bicycle accommodation along 49th Street and 36th Street should also be enhanced to complete access between Haven Avenue and the alignment along Asbury Avenue. This could



Mini Roundabout, Vista Street Bike Blvd,
Long Beach, CA
Source: Allan Crawford, bikelongbeach.org

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most easily be accomplished through installing signs and shared lane pavement symbols and/or bike lane striping.

- This routing does require crossing West Avenue along 49th Street and 36th Street. To accommodate families and all bicycle traffic, a signalized traffic control such as a traditional traffic light or a HAWK signal, that operates only when actuated, should be installed along West Avenue at 49th Street and 36th Street.
 - Bike boxes should be considered to augment the existing bicycle lanes along West Avenue at the approaches to the potential signals at 49th Street and 36th Street.
 - Zigzag edge line treatments should be installed on the West Avenue approach to the major crossing locations, including 49th Street and 36th Street.
- Install wayfinding signs to confirm and advertise the routing of the bicycle boulevard.
- If the one-way couplet concept is implemented along Asbury Avenue and Central Avenue, space within each roadway should be striped for dedicated use by bicycle traffic. This configuration should be refined further if this overall concept is advanced, but could include both traditional bike lanes and contra-flow bike lanes along Asbury Avenue.
- “Bikes may use full lane” Manual on Uniform Traffic Control Devices sign R4-11 should be installed throughout the Bicycle Boulevard.
- Explore potential locations for bike parking along the bike boulevard where there is potential demand.

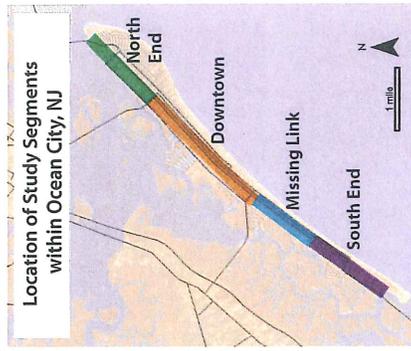
Ocean City Rail Trail & Bicycle Boulevard Project

Existing Conditions, Opportunities & Constraints

Map 9 - Missing Link



March 2011



5 Looking north on Haven Ave at 36th St



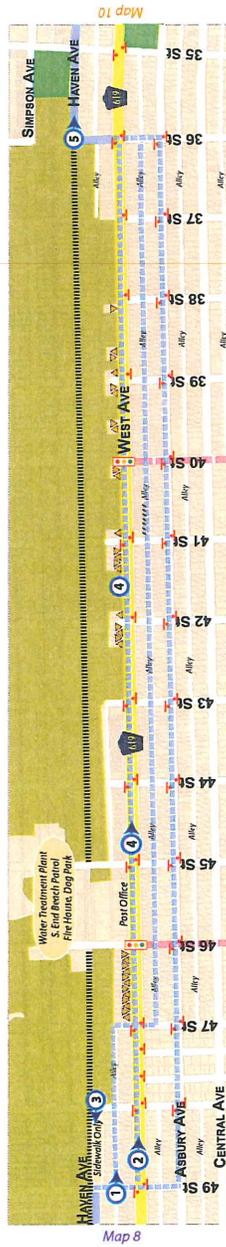
4 Aerial view of the 3 potential on-road extensions of OC1



3 Haven Ave between 49th - 48th St



1 Alley between Haven & West Ave at 49th St



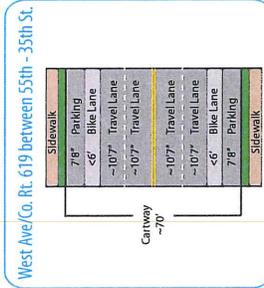
Map 8



2 Looking north on West Ave.



4 Bicycle Facilities on West Ave.



West Ave (Co. Rt. 619) between 55th - 35th St.

Legend

- Wetlands
- Park/Open Space
- Transportation Center
- Off-Road Path
- County Road
- OC1 / Haven Ave Bicycle Route
- City Identified Connector Route
- Potential Bicycle Enhancements
- Street Quilt
- Street Closure
- Gateway/Access Road
- Stop Sign
- Traffic Signal
- Planted Median
- Angled Parking
- Potential OC1 Extension



GIS Data Sources: Roads & Parcel Layer from Civil Solutions, a division of ARH, modified by the Cape May County Planning Department; Wetlands, NJDEP

Ocean City Rail Trail & Bicycle Boulevard Project

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Segment 3 – Downtown

This 27-block segment of Haven Avenue traverses the majority of the “downtown” area of Ocean City. Major bicycling and walking destinations are located along this segment, including the Ocean City Community Center and the Intermediate Middle School. This segment of Haven Ave was dedicated as OC1 Bike Route in 2008 and was the first Bicycle Boulevard in NJ.

Existing Conditions

- The Haven Avenue corridor between 36th Street and 9th Street is the backbone of the Bicycle Boulevard in Ocean City.
- Ocean City has jurisdiction of Haven Avenue.
- There are 15 different street configurations in this stretch of Haven Avenue, with varying types of bicycle facilities including:
 - Shared road
 - Side bike path, with or without a planted buffer
 - Planted median and shared travel lanes
 - Painted median and shared travel lanes
 - Center median bike path
 - OC1 Bike Route signage
- Pavement width varies between 20 feet and 53 feet wide.
- Right of Way varies between 29 feet and 71 feet wide.
- There is some forced traffic control, with roadway closures along the 30th Street, 32nd Street and 33rd Street approaches to Haven Avenue from the west.
- Transitions between various roadway segment configurations are not always smooth or intuitive for through bicycle and pedestrian traffic.
- County Route 623/34th Street is a major access to Marmora to the west, with heavy traffic volume. Motor vehicle traffic is reported to frequently cut through the local roadways, using Haven Avenue to avoid traffic signal at West Avenue.
- The posted speed limit is 20 mph.
- The planted median located between 24th Street and 20th Street has a break at the intersection with 22nd street, but is continuous through the intersections with 23rd Street and 21st Street. This forces traffic traveling along 21st Street and 23rd Street to turn right onto Haven Avenue.
- There is all-way stop control at 17 of the 28 intersections along this segment of Haven Avenue, including the intersections with the following roadways:
 - 33rd Street
 - 32nd Street
 - 31st Street
 - 29th Street
 - 24th Street
 - 23rd Street
 - 22nd Street
 - 21st Street
 - 20th Street
 - 19th Street
 - 18th Street
 - 17th Street
 - 14th Street
 - 13th Street
 - 12th Street
 - 11th Street
 - 10th Street.

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Note: Ocean City Ordinance 10-05 (February 2010) designates all intersections in the Downtown Segment as Four-Way-Stop control.

Opportunities for Enhancing Bike Boulevard

Opportunities to enhance this segment of Haven Avenue to become a bicycle-priority corridor could include the following:

- Where the existing bicycle accommodation works well, maintain the current treatments. This will minimize construction costs by utilizing existing bicycle facilities where appropriate.
- Enhance bicycle-priority by including treatments ranging from signs and pavement striping to constructing curb extensions and street closures.
- The boulevard treatment that is in place along Haven Avenue between 24th Street and 20th Street, with its planted center median, curb extensions and shared travel lanes, could be extended throughout the corridor. Segments of Haven Avenue that already have a shared use path along one side of the roadway, could also benefit from this treatment. Young children could continue to use the path; however, the shared travel lanes will be emphasized to give bicycle priority.
- “Bikes may use full lane” Manual on Uniform Traffic Control Devices sign R4-11 should be installed throughout the Bicycle Boulevard.
- The transitions between the various bicycle treatments along the corridor should be made clearer for all travelers. Providing signs, striping, and pavement treatments should make these transitions intuitive, especially between sidepath and shared lane configurations.
- Shared lane markings could be placed consistently along Haven Avenue.
- Wayfinding signs could be installed to confirm and advertise the routing of the bicycle boulevard.
- A new centerline median could be constructed along several of the roadways that cross Haven Avenue. This would require motor vehicle traffic to turn right; however, bicycle traffic would have a pass through along Haven Avenue. This is a major volume control traffic calming feature that should be studied further to confirm that there will not be unanticipated traffic flow issues throughout the local roadway network. These could be located at 13th Street, 22nd Street and on 31st Street. This should be used in combination with the following opportunities for all-way stops, listed below.
 - Remove stop control at two approaches of several of the all-way stop intersections in this segment. The configuration would be that east/west approaches to Haven Avenue intersections at 32nd, 23rd, 21st and 12th streets have stop control. This would limit through uninterrupted traffic to go no more than four blocks at a time along Haven Avenue before they encounter a stop sign or forced turn.
 - Restrict turns onto Haven Avenue from 34th Street with partial closures. Do not enter along each approach/departure; this concept will need to be refined during the design process.



OC Pavement marking with planted median
Source: The RBA Group



Partial closure, Vancouver, BC
Source: Payton Chung on Flickr.com

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- 34th Street should be emphasized as a major gateway to the Ocean City bikeway network. A large scale gateway, possibly signs or an arched structure over the roadway should be considered.
- Mini roundabouts should be considered for major intersections and connector routes along Haven Avenue, such as at the intersections with 29th Street, 24th Street, 18th Street, and 14th Street.
- Explore potential locations for bike parking along the bike boulevard where there is potential demand.
- Implement reduced residential speed limit to institutionalize appropriate travel speeds and traffic calming efforts.

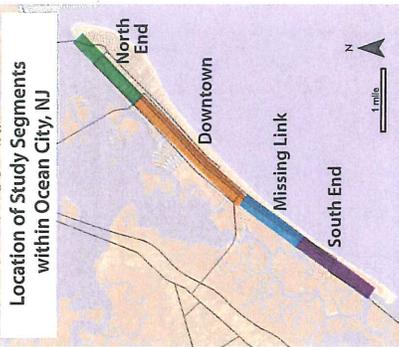
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Existing Conditions, Opportunities & Constraints

Map 10 - Downtown



March 2011



Legend

- Wetlands
- Park/Open Space
- Transportation Center
- Off-Road Path
- County Road
- OC1/Haven Ave Bicycle Route
- City Identified Connector Route
- Potential Bicycle Enhancements
- Street Quilt
- Street Closure
- Gateway/Access Road
- Stop Sign
- Traffic Signal
- Planted Median
- Angled Parking
- Potential OC1 Extension

0 0.25 0.5 mi.

GIS Data Sources: Roads & Parcel Layer from Civil Solutions, a division of ARIH, modified by the Cape May County Planning Department, Wetlands, NDEP.

3 Haven Ave from 29th - 26th St

2 Haven Ave between 34th - 29th St

1 Bike path on Haven Ave in the center of the roadway between 35th - 34th St



8 Haven Ave between 10th - 12th St

7 Haven Ave between 20th - 18th St

6 Haven Ave between 24th - 20th St

Ocean City Rail Trail & Bicycle Boulevard Project

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Segment 4 – North End

The “North End” segment extends between 9th Street and the Longport Bridge through multiple residential streets and an off-road path. There are currently no bicycle facilities located in this segment.

Existing Conditions

- The bicycle boulevard routing north of 9th Street follows a low traffic volume route between the Longport Bridge and the 9th Street corridor by the transportation center. This alignment includes 10 streets: Aldrich Road, 8th Street, Haven Avenue, a path segment across Memorial Park (adjacent to the Primary Elementary School), 5th Street, Simpson Avenue, Battersea Road, West Inlet Road, Atlantic Boulevard, Bridge Boulevard and Gardens Boulevard.
- Roadway widths vary greatly along these roadways.
- Streets tend to be wider in this area than in the other segments of the bicycle boulevard.
- ROW ranges between 39’ and 142’.
- Gardens Parkway has carriage roads parallel to the roadway along each side.
- West Inlet Road has a wide planted center median, making the roadway almost as wide (150 feet) as it is long (160 feet).
- There are crosswalks at the signalized intersections along 9th Street at Bay and West Avenues.
- There is no crossing facility at 9th Street and Haven Avenue.

Opportunities for Enhancing Bike Boulevard

Due to the routing along multiple streets, opportunities for enhancing bicycle-priority travel in this segment vary. Crossing 9th Street is also included in this segment.

- Opportunities for crossing 9th Street include:
 - A pedestrian activated in-roadway illuminated crosswalk could be located at Aldrich Road. This will take full advantage of the existing shared use path along 9th Avenue.
 - A pedestrian activated in-roadway illuminated crosswalk could be located at Haven Avenue. This would require shared use along a short segment of 9th Avenue.
 - A HAWK signal could also be installed at either of these locations, with similar routing issues, but have the additional benefit of a more traditional method of getting motor vehicle traffic to stop for pedestrian and bicycle crossing traffic.
- Similar to the boulevard treatment that is in place along Haven Avenue between 24th Street and 20th Street, install planted center median, curb extensions and shared travel lanes throughout this corridor.
- The bicycle boulevard will make numerous turns along the alignment in the North End of Ocean City. Stripe continuous bicycle chevrons or colorized bike lanes across the intersections where the routing turns. This will provide wayfinding and self advertising for the bicycle boulevard.
- Construct streetscape enhancements along Aldrich Road between 9th Street and 8th Street. This may include large scale murals or other public art.

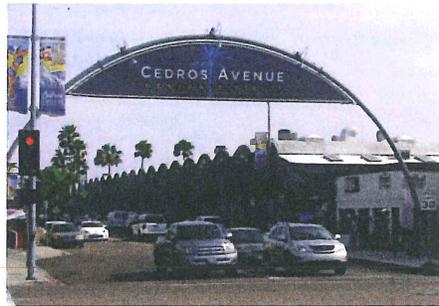


Roundabout, North Haven, NY
Source: The RBA Group

Ocean City Rail Trail & Bicycle Boulevard Project

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- Construct curb extensions and enhanced crosswalks along Haven Avenue between 8th Street and 6th Street and along Simpson Avenue between 5th Street and Battersea Road.
- Construct a center line median along 2nd Street across Simpson Avenue, including a bicycle pass through for bicyclists traveling on Simpson Avenue.
- Stripe bicycle lanes with buffered on-street parking on the east/west roads, including: 8th Street, 5th Street, and Battersea Road.
- Redefine roadways as bicycle-priority with traffic calming and shared lane markings along the entire bicycle boulevard.
- Reconfigure West Inlet Drive and Atlantic Avenue to provide dedicated bicycle facilities. Two major options for this are:
 - Cycle tracks or bike lanes along the outside curb line in each direction, buffered from motor vehicle traffic by on-street parking.
 - Convert the boulevard treatment to separate motor vehicle, and bicycle access corridors. Bicycle traffic could be accommodated along a new two-way bike path within the present day western (southbound) half of the roadway. Motor vehicle traffic and parking can be accommodated within the 42 foot wide eastern (northbound) half of the roadway.
- Atlantic Avenue could also be enhanced by constructing a centerline median, curb extensions and enhanced crosswalks between West Inlet Road and Bridge Boulevard.
- Install wayfinding signs to confirm and advertise the routing of the bicycle boulevard.
- Reconfigure the intersections of Atlantic Avenue with West Inlet Road and Bridge Boulevard by constructing modern roundabouts. There is adequate right of way to reconfigure these intersections within the existing paved area, and likely add a significant amount of landscaping to the surrounding area. This concept will need to be refined during the design process.
- Designate the carriage lanes along Gardens Parkway for non-motorized use priority, dual bike boulevards with permitted automobile parking/access. This could be accomplished with pavement markings, and signs.
- “Bikes may use full lane” Manual on Uniform Traffic Control Devices sign R4-11 should be installed throughout the Bicycle Boulevard.
- Explore potential locations for bike parking along the bike boulevard where there is potential demand.
- Implement reduced residential speed limit to institutionalize appropriate travel speeds and traffic calming efforts.
- Remove double yellow centerline to minimize “runway” or “highway” feel of overchannelizing a shared roadway. Motor vehicles will tend to drive toward the center of the roadway, giving more space for bicycle use along each travel direction and yield or adjust position when there is oncoming motor vehicle traffic.
- Wayfinding signs could be installed to confirm and advertise the routing of the bicycle boulevard.
- Designate Gardens Parkway as a gateway to the Ocean City bicycle network. A large scale gateway, possibly signs or an arched structure over the roadway should be considered.



Gateway, Cedros Avenue, Salano Beach, CA
Source: San Diego Daily photo, blogspot.com

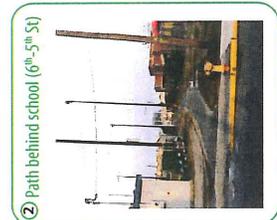
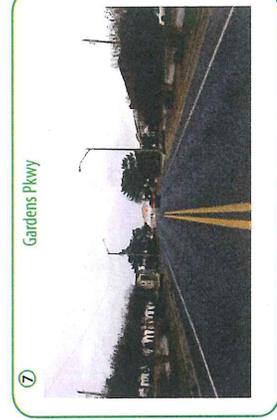
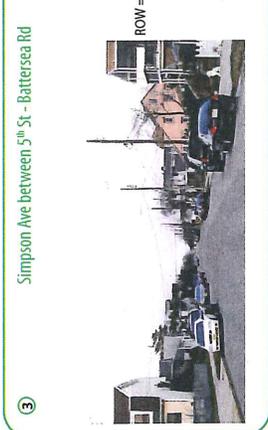
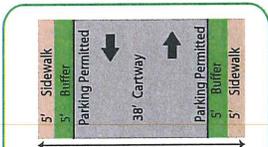
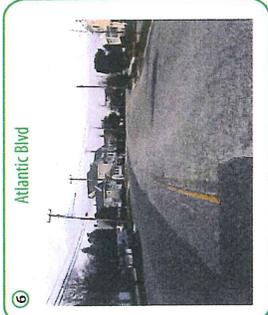
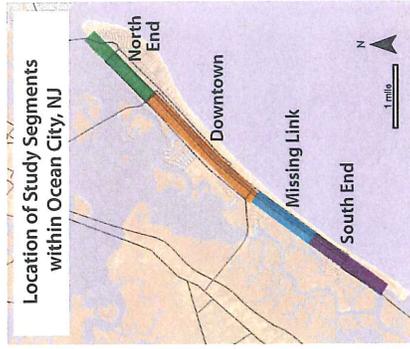
Ocean City Rail Trail & Bicycle Boulevard Project

Existing Conditions, Opportunities & Constraints

Map 11 - North End



March 2011



Legend

- Wetlands
- Park/Open Space
- Transportation Center
- Off-Road Path
- County Road
- OC1 / Haven Ave Bicycle Route
- City Identified Connector Route
- Potential Bicycle Enhancements
- Street Quilt
- Street Closure
- Gateway/Access Road
- School
- Back-out Conflicts
- Stop Sign
- Traffic Signal
- Planted Median
- Angled Parking
- Potential OC1 Extension

Scale: 0 to 0.5 mi.

GIS Data Sources: Roads & Parcel Layer from Civil Solutions, a division of ARH, modified by the Cape May County Planning Department; Wetlands, NJDEP

Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

BICYCLE BOULEVARD RECOMMENDATIONS OVERVIEW

Ocean City has made great strides in improving the bikeability of its roadway network. The existing “bike boulevard” on Haven Avenue between 36th and 9th streets is the backbone of the network connecting the city’s downtown, transportation center, community center and intermediate school. One of the two primary tasks in this Haven Avenue Corridor Report was to examine the existing bike boulevard and make recommendations to extend the on-road bicycle-priority corridor between Corson’s Inlet and the Longport Bridge.

Although many options to improve bicycle-priority throughout the corridor were discussed in the previous section of this report, this section narrows the focus to more specific conceptual design recommendations geared toward accommodating casual, family or novice cyclists, discouraging cut-through motor vehicle traffic, and establishing priority to through cycling traffic.

In many cases, treatments that have been implemented along the 4 block segment of Haven Avenue between 24th and 20th can be repeated. In other cases, innovative approaches are suggested to link the varying street configurations into one cohesive on-road cycling corridor. Overall, the concept recommendations are intended to clearly define the look and feel of the Haven Avenue corridor as one in which the shared space with a priority for bicycle travel is obvious.

The recommendations for improvement follow the same geographic areas that were used in the previous section:

- Segment 1 – South End (south of 49th Street)
- Segment 2 – Missing Link (between 49th and 36th Streets)
- Segment 3 – Downtown (between 36th and 9th Streets)
- Segment 4 – North End (north of 9th Street)

The suggested recommendations for each segment are included in **Table 7: Bicycle Boulevard Recommendations** and illustrated in the following maps:

- Map 12: South End Recommendations
- Map 13: Missing Link Recommendations
- Map 14: Downtown Recommendations
- Map 15: North End Recommendations

For each segment in the corridor, a concept sketch illustrating specific target areas is also included.

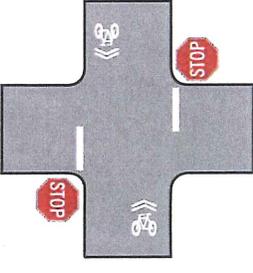
- Map 16: South End Concept
- Map 17: Missing Link Concept
- Map 18: Downtown Concept
- Map 19: North End Concept

Most design treatments suggested in this section are in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), the American Association of State Highway and Transportation Officials (AASHTO), and New Jersey Department of Transportation’s *Bicycle Compatible Roadways and Bikeways and Pedestrian Compatible Planning and Design Guidelines*. Several design treatments are suggested which are currently in widespread use but which are not included in the above-referenced guidelines such as “colored bike lanes”, “bike boxes” or “zigzag striping”. Their use is typically validated through their inclusion in the FHWA MUTCD experimental process (see Appendix H: MUTCD Request to Experiment). Where such improvements are recommended, they should be implemented through this experimentation process.

Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Table 6: Bicycle Boulevard Recommendations

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments			
		South End	Missing Link	Downtown	North End
 <p>Bicycle Boulevard Stencil Source: bicycling.com</p>	<p>Bicycle-Priority Shared Road</p> <p>Pavement Markings (bike symbols, shared lane markings, etc.)</p>	Entire Segment	Entire Segment	Entire Segment	Entire Segment
 <p>Source: RBA Group</p>	<p>Stop Signs (through-priority for Bicycle Boulevard, east-west streets have stop control)</p>	Haven Avenue at 53 rd , 51 st - 49 th Streets	West Avenue at existing unsignalized intersections	Haven Avenue at 35 th , 32 nd , 23 rd , 21 st , 19 th , 17 th , 15 th , 12 th , 11 th Streets	Existing on Haven, Simpson, Atlantic and Gardens Parkway
 <p>Source: County of Hawai'i</p>	<p>Zigzag Striping</p>	Approach to Haven Avenue on 56 th , 54 th , 53 rd , 51 st , 50 th , 49 th Streets	Approach to West Avenue on 48 th , 45 th , 44 th , 43 rd , 42 nd , 41 st , 39 th , 38 th , 37 th Streets	Approach to Haven Avenue on 35 th , 32 nd , 30 th , 28 th , 27 th , 26 th , 25 th , 23 rd , 21 st , 19 th , 17 th , 15 th , 12 th , 11 th Streets	Approach to Haven Avenue on 7 th . Approach to Simpson on 4 th , 3 rd , 1 st and North. Approach to Atlantic on Landing and Harbor. Approach to Gardens Parkway on Edinburg, Aberdeen and New Castle

Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments		
		South End	Missing Link	North End
 <p>Two-way Bike Path Source: RBA Group</p>	On-Road Dedicated Bicycle Facility Two-way Bike Path		West Avenue	West Inlet Road, Atlantic Boulevard
 <p>Bike Lane Source: RBA Group</p>	Bike Lanes	Ocean Drive	49 th , 36 th Streets	8 th , 5 th Streets, Battersea Road, Gardens Parkway and Longport Br.
 <p>Bike Lane Stencil Source: RBA Group</p>	Bike lane stencils	Ocean Drive	49 th , 36 th Streets	8 th , 5 th Streets, Battersea Road

Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments		
		South End	Missing Link	North End
<p>← Direction of Travel</p>	Bicycle Safe Drainage Grates	Entire Segment	Entire Segment	Entire Segment
<p>Bicycle Box Source: greatestman on flickr.com</p>	Intersection Treatments Bicycle Boxes/Advanced Stop Bar and Bicycle Actuation		West Avenue at 49 th , 46 th , 40 th and 36 th Streets	9 th Street at Aldrich Road
<p>Source: nacto.org</p>	Traffic Signal or other Actuated Signals such as High Intensity Activated CrossWalk beacon (HAWK) to allow for protected bicycle and pedestrian crossing by stopping road traffic only as needed		West Avenue at 49 th , 46 th , 40 th and 36 th Streets	9 th Street at Aldrich Road



Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments			
		South End Entire Segment	Missing Link Entire Segment	Downtown Entire Segment	North End Entire Segment
 <p>Source: <i>Alta Planning & Design</i></p>	High Visibility/Raised Crosswalk/Crossbike				
 <p>Source: <i>nacto.org</i></p>	Continuous Chevrons or Colorized Bike Lane through Intersection and at off-set Connections		Along West Avenue 2-way bike path entire segment		Aldrich and 8 th Haven and 8 th Path (Haven) and 5 th Simpson and 5 th W. Inlet and Battersea Atlantic and Bridge Bridge and Gardens Parkway
 <p>Source: <i>Allan Crawford, bikelongbeach.org</i></p>	Traffic Calming Mini Roundabouts			Haven Avenue at 29 th , 24 th , 18 th , 14 th Streets	

Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments			
		South End	Missing Link	Downtown	North End
 Source: The RBA Group	Roundabouts				Atlantic Boulevard at West Inlet Road and Bridge Boulevard
 Source: Clarence Eckerson Jr. from streetsblog.org	Speed Humps and Tables			Haven Avenue at 34 th , 32 nd , 30 th , 28 th , 27 th , 23 rd , 21 st , 19 th , 17 th , 15 th , 12 th , 11 th Streets	
 Source: FHWA	Painted and Patterned Surfaces (colored shoulders, decorative painted medians, or buffer)	Entire Segment	Entire Segment	Entire Segment	Entire Segment
 Source: RBA Group	Centerline Planted Median			Entire Segment*	Simpson Avenue* Atlantic Avenue*

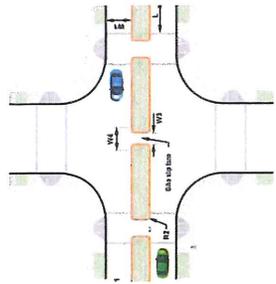
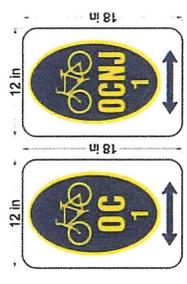
Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments		
		South End	Missing Link	North End
 <p>Source: www.flickr.com/photos/drdul</p>	Curb Extensions	Entire Segment	Entire Segment	Entire Segment
 <p>Source: RBA Group</p>	Residential Speed Limit	Entire Segment	Entire Segment	Entire Segment
 <p>Source: RBA Group</p>	Remove Painted Center Line	Entire Segment	Entire Segment*	Entire Segment*

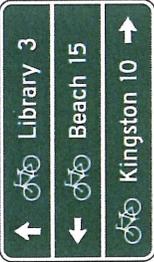
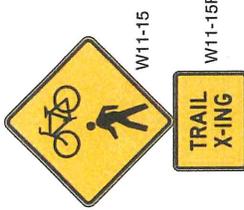
Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments			
		South End	Missing Link	Downtown	North End
 <p>Source: RBA Group</p>	<p>Non-Motorized Only Crossings (centerline median with pass through/refuge island)</p>			Haven Avenue at 31 st , 22 nd , 13 th Streets	2 nd Street at Simpson Avenue
 <p>Source: www.pedbikeimages.com/ Dan Burden</p>	<p>Partial or Full Closure (with pass through)</p>			Haven Avenue at 34 th Street	
 <p>Source: City of Ocean City</p>	<p>Signs Identification Signs (OC1 Bike Route)</p>	Entire Segment	Entire Segment	Entire Segment	Entire Segment

Ocean City Rail Trail & Bicycle Boulevard Project

HAVEN AVENUE CORRIDOR REPORT

Image	Bicycle Boulevard Recommendations	Bicycle Boulevard Segments			
		South End	Missing Link	Downtown	North End
 <p style="text-align: center;">D1-3c</p> <p>Source: MUTCD</p>	Wayfinding Signs	Entire Segment	Entire Segment	Entire Segment	Entire Segment
 <p style="text-align: center;">W11-15 W11-15P</p> <p>Source: MUTCD</p>	Warning Signs (Crossing/Share the Road/Bikes may use full lane)	Entire Segment	Entire Segment	Entire Segment	Entire Segment
 <p>Source: Maralinga in WA, flickr.com</p>	Gateways	Area of Ocean Drive and 56th Street		Area of 34th Street and Haven Avenue	Area of Longport Bridge/Gardens Parkway

* Where applicable

Recommendations Map 12 - South End



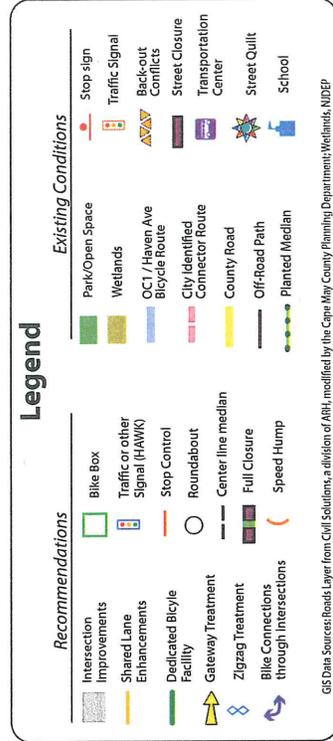
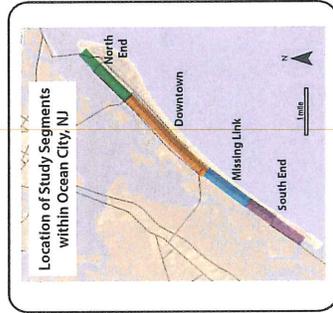
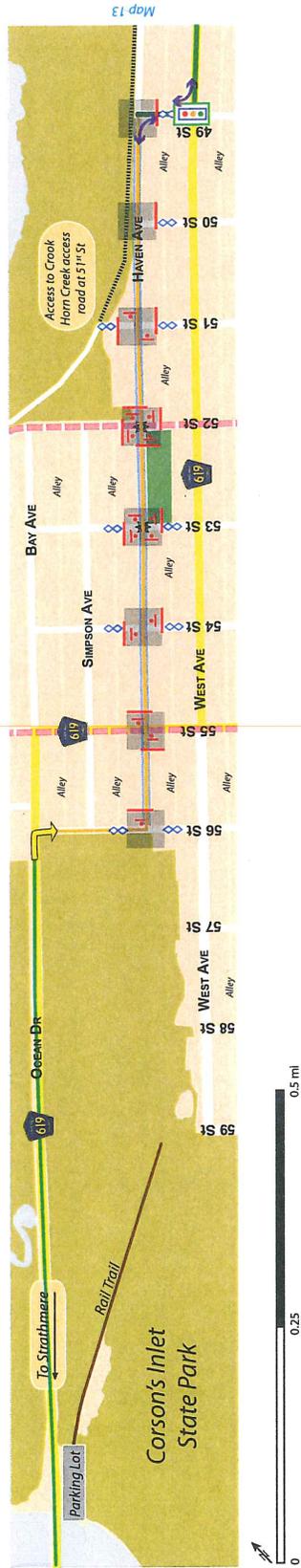
March 2011

Enhance Bicycle-Priority on Haven Avenue

- Pavement markings (shared lane markings, bike symbols) within travel lane to reinforce shared space.
- Predominantly through-priority on Haven Avenue.
- Stops and zigzag striping on east/west approaches to Haven Avenue.
- Intersection improvements including curb extensions and enhanced crosswalks.
- Traffic calming measures such as colored or serpentine shoulders, decorative painted medians or buffers, etc.
- Implement reduced residential speed limit.
- Install OC1 Bike Route, wayfinding and warning signs along the entire segment.
- Ensure all drainage grates are bicycle safe.

Enhance Bicycle Accommodations to Strathmere Bridge

- Shared lane markings on 56th Street.
- Gateway at 56th and Ocean Drive.
- Bike lanes along Ocean Drive and over bridge.
- Wayfinding signs.



GIS Data Sources: Roads: Layer from Civil Solutions, a division of AECI, modified by the Cape May County Planning Department; Wetlands: NJDEP

Ocean City Rail Trail & Bicycle Boulevard Project

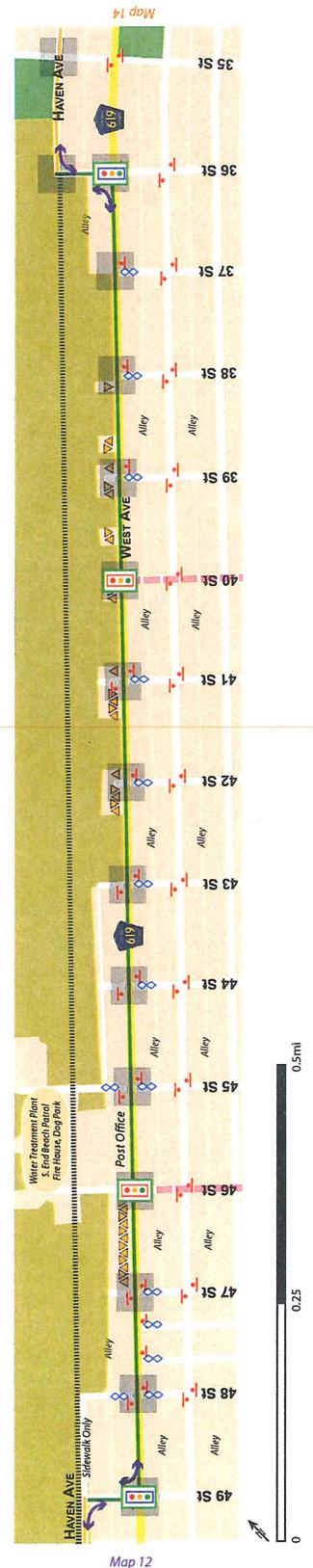
Recommendations

Map 13 - Missing Link



Road Diet and Two-way Bike Path on West Avenue

- Convert the existing 4 travel lanes on West Avenue to 3 including a center lane. Utilize the left over space to create a buffer and two-way bike path along the western curbline within the existing roadway.
- Pavement markings (bike symbols) on bike path, especially at potential conflict locations.
- Stops and zigzag striping on east/west approaches.
- Provide by painting continuous chevrons and/or colorized bike lanes – detailed intuitive wayfinding at all intersections.
- Bicycle boxes/advanced stop bar and bicycle actuation at signalized intersections.
- Install OC1 Bike Route, wayfinding and warning signs along the entire segment.
- Connect bike path to Haven Avenue at 49th and 36th Streets.
- Bike lanes on 49th and 36th Streets.
- New traffic signal or other actuated signal with bike boxes/advanced stop bar at 49th and 36th Streets.
- Ensure all drainage grates are bicycle safe.



Legend

Recommendations	Existing Conditions
Intersection Improvements	Park/Open Space
Shared Lane Enhancements	Wetlands
Dedicated Bicycle Facility	OC1 / Haven Ave Bicycle Route
Gateway Treatment	City Identified Connector Route
Zigzag Treatment through intersections	County Road
Bike Box	Off-Road Path
Traffic or other Signal (HAWK)	Planted Median
Stop Control	Stop sign
Roundabout	Traffic Signal
Center line median	Back-out Corners
Full Closure	Street Closure Center
Speed Hump	Transportation Center
	Street Cullit
	School

GIS Data Sources: Roads & Parcel Layer from Civil Solutions, a division of ARH, modified by the Cape May County Planning Department; Wetlands, NJDEP

Enhance Bicycle Priority on Haven Avenue

- Pavement markings shared lane markings, bike symbols) within the travel lane to reinforce shared space.
- Predominantly through-priority on Haven Avenue.
- Stop control & zigzag striping on east/west approaches to Haven Avenue.
- Intersection improvements including curb extensions & enhanced crosswalks.
- Ensure all drainage grates are bicycle safe.
- Reduce traffic with non-motorized only crossings (centerline median along cross street with bike blvd pass through) & road closures (with bike blvd pass through).
- Install OC1 Bike Route, wayfinding and warning signs along the entire segment.
- Traffic calming measures including mini-roundabouts, speed humps and painted and patterned surfaces.

- Implement reduced residential speed limit.
- Reduce channelization of shared roadway by removing painted centerline.
- Gateway along 34th Street.

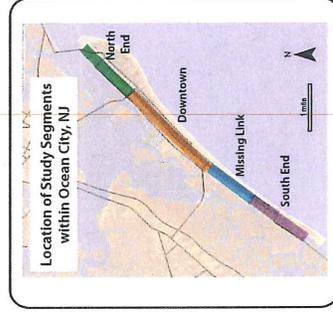
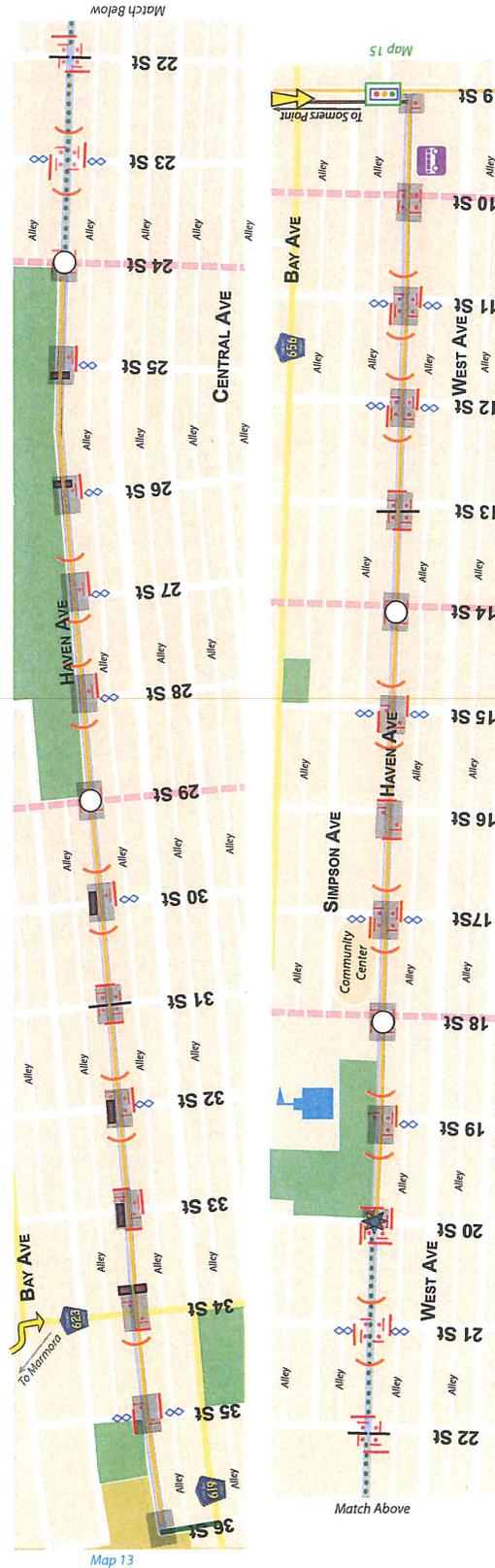
Ocean City Rail Trail & Bicycle Boulevard Project

Recommendations

Map 14 - Downtown



March 2011



Legend

Recommendations	Existing Conditions
Intersection Improvements	Park/Open Space
Shared Lane Enhancements	Wetlands
Dedicated Bicycle Facility	OC1 / Haven Ave Bicycle Route
Gateway Treatment	City Identified Connector Route
Zigzag Treatment	County Road
Bike Connections through Intersections	Off-Road Path
Bike Box	Planted Median
Traffic or other Signal (HAWK)	Stop sign
Stop Control	Traffic Signal
Roundabout	Back-out Conlicts
Center line median	Street Closure
Full Closure	Transportation Center
Speed Hump	Street Quilt
	School

GS Data Sources: Roads Layer from Civil Solutions, a division of ARH, modified by the Cape May County Planning Department; Wetlands, NDEP

Recommendations Map 15 - North End



March 2011

Enhance Bicycle-Priority on the streets comprising the bicycle boulevard in the North End of Ocean City including Aldrich Rd., Haven Ave., Simpson Ave., and Gardens Pkwy carriage roads

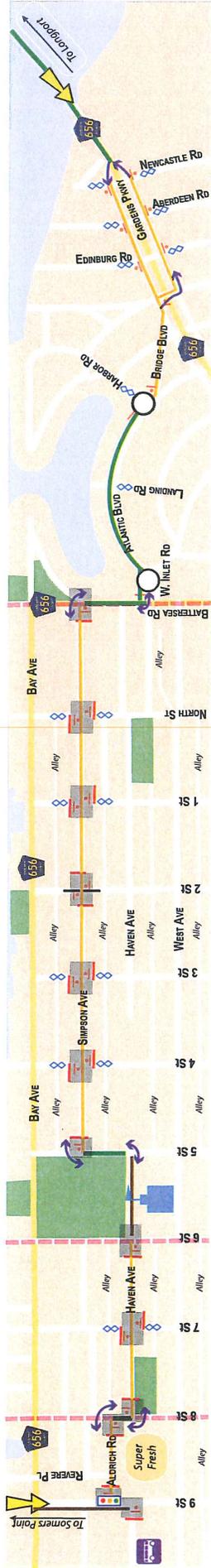
- Pavement markings (shared lane markings, bike symbols) within the travel lane to reinforce shared space.
- Predominantly through priority for bicycles.
- Intersection improvements including curb extensions and enhanced crosswalks.
- Traffic calming measures such as colored or serpentine shoulders, decorative, painted medians or buffers, etc.
- Implement reduced residential speed limit.
- Remove painted centerline to reduce channelization of shared roadway.
- Reduce traffic with non-motorized only crossings (centerline median along cross street with bike blvd pass through).
- Stops and zigzag striping on east/west approaches.

Enhance Bicycle-Priority throughout the North End Segment

- Provide OC1 Bike Route, wayfinding and warning signs.
- Stops and zigzag striping on east/west approaches.
- Gateway on Gardens Parkway at Longport Bridge.
- Ensure all drainage grates are bicycle safe.

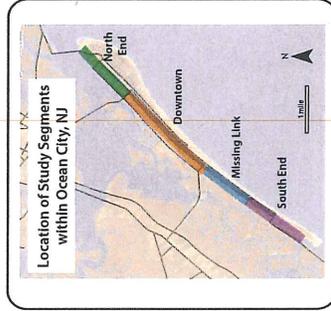
Dedicate On-road Separated Bike Facilities

- Reconfigure West Inlet Drive and Atlantic Avenue to provide a dedicated two-way bike path separated by parking and a painted buffer.
- Pavement markings (bike symbols) on path especially at potential conflict locations.
- Install roundabouts at Atlantic Ave. intersections with West Inlet Dr. and Bridge Blvd.
- Provide bike lanes along Gardens Parkway at its northernmost point extending over the Longport Bridge.
- Connect streets comprising bike boulevard with dedicated bicycle lanes on east/west streets (8th, 5th and Battersea).
- Provide detailed intuitive wayfinding at off-set intersections by painting continuous chevrons and/or colorized bike lanes to connect east/west street bike lanes to bicycle boulevard.



Map 14

0 0.25 0.5 mi



Legend

Recommendations	Existing Conditions
Intersection Improvements	Park/Open Space
Shared Lane Enhancements	Wetlands
Dedicated Bicycle Facility	OC1 / Haven Ave Bicycle Route
Gateway Treatment	City Identified Connector Route
Zigzag Treatment	County Road
Bike Connections through intersections	Off-Road Path
	Planted Median
Bike Box	Traffic Signal
Traffic or other Signal (HAWK)	Back-out Conflicts
Stop Control	Street Closure Center
Roundabout	Transportation Center
Center line median	Street Quilt
Full Closure	School
Speed Hump	

GIS Data Sources: Roads Layer from CMI Solutions, a division of AHI, modified by the Cape May County Planning Department, Wetlands, INDEP

Example of Colored Bike Lane through Intersection



Source: nacto.org

Examples of Kiosks



Source: flickr.com/photos/chasbot/



Source: flickr.com/tracktwentyline/



Source: thefridaycycloauniste.com/

Example of Curb Extension



Source: flickr.com/photos/dtrdrl/

Ocean City Rail Trail & Bicycle Boulevard Project

Conceptual Design Recommendation
Map 16 - South End Gateway Treatment



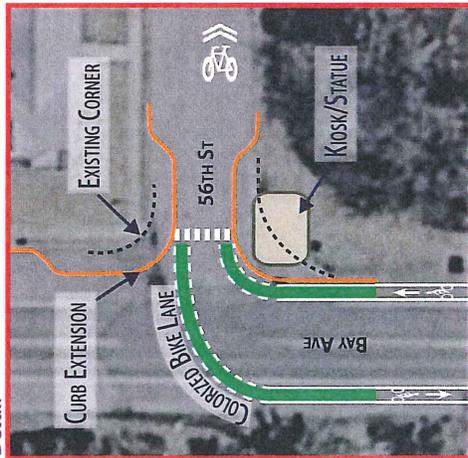
May 2011

- A gateway treatment should be constructed along 56th St. within view of the Bay Ave. intersection. This will guide bicycle traffic between Bay Ave. and the Haven Ave. Bicycle Boulevard.
- Colorized bicycle lanes should be striped through the Bay Ave. intersection with 56th St. to emphasize the intended bicycle routing.
- Curb extensions should be constructed to further emphasize bicycle priority and calm motor vehicle traffic.
- A kiosk and/or statue can be constructed to give a visual reinforcement to the Ocean City Bicycle Boulevard and provide information.

Concept Sketch



Detail



Example of Sharrow Flower



Source: J. Maus

Examples of Gateways



Source: SanDiegoDailyPhoto.blogspot.com

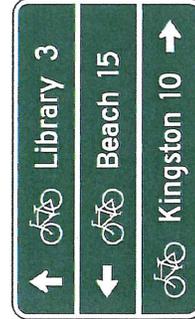


Source: City of Ocean City

Examples of Wayfinding Signs



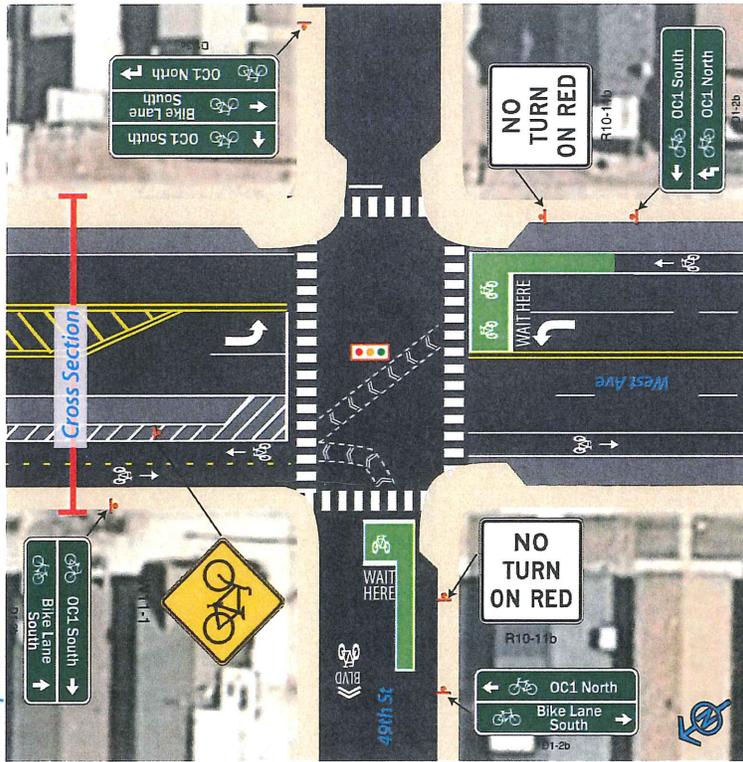
Source: flickr.com/photos/vinyinc/



D1-3c

Source: MUTCD

Concept Sketch



Example of a Bicycle Signal Head

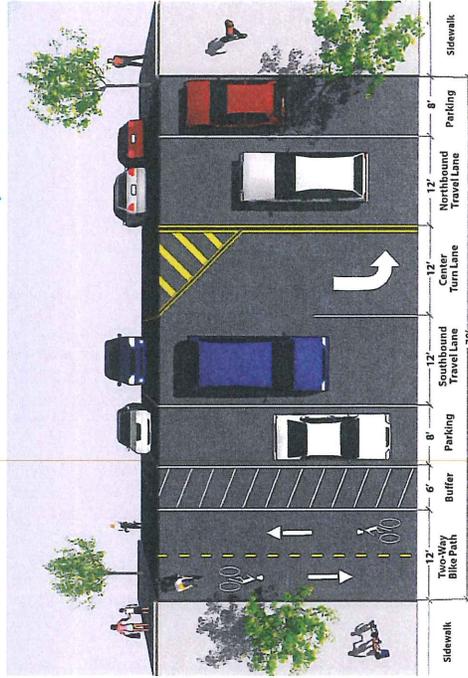


Source: Kyle Gadinger, NACTO Urban Bikeway Design Guide

Benefits

- Separates bicycle movements.
- Provides priority to bicycle movements.
- Improves operation.
- Protects bicyclists in the intersection.
- Provides appropriate information for bicyclists.

Cross Section of West Ave with Two-Way Bike Path



Ocean City Rail Trail & Bicycle Boulevard Project

Conceptual Design Recommendation

Map 17 - Missing Link
West Ave. Two-Way Bike Path



May 2011

- The intersection of 49th St. and West Ave. should be controlled by a new traffic light to manage potential conflicts between turning motor vehicle and bicycle traffic.
- The traffic signal phasing should include advance (lead) phasing for turning bicycle traffic before both the 49th St. green phase and the West Ave green phase of the traffic light sequence. This should include bicycle specific signal heads.
- To further accommodate the advance (lead) phase, a painted bicycle box should be striped ahead of the stop line for motor vehicle traffic. This will provide a space for bicyclists to take full advantage of the advance signal phasing.
- Bicycle crossing pavement striping should also be striped to provide clear wayfinding to the two-way bike path.

Example of a Two-Way Bike Path



Source: The RBA Group

Example of a Bike Box



Source: flickr.com/tracktwenty/nine/

Conceptual Design Recommendation

Map 18 - Downtown
13th St. Diverter

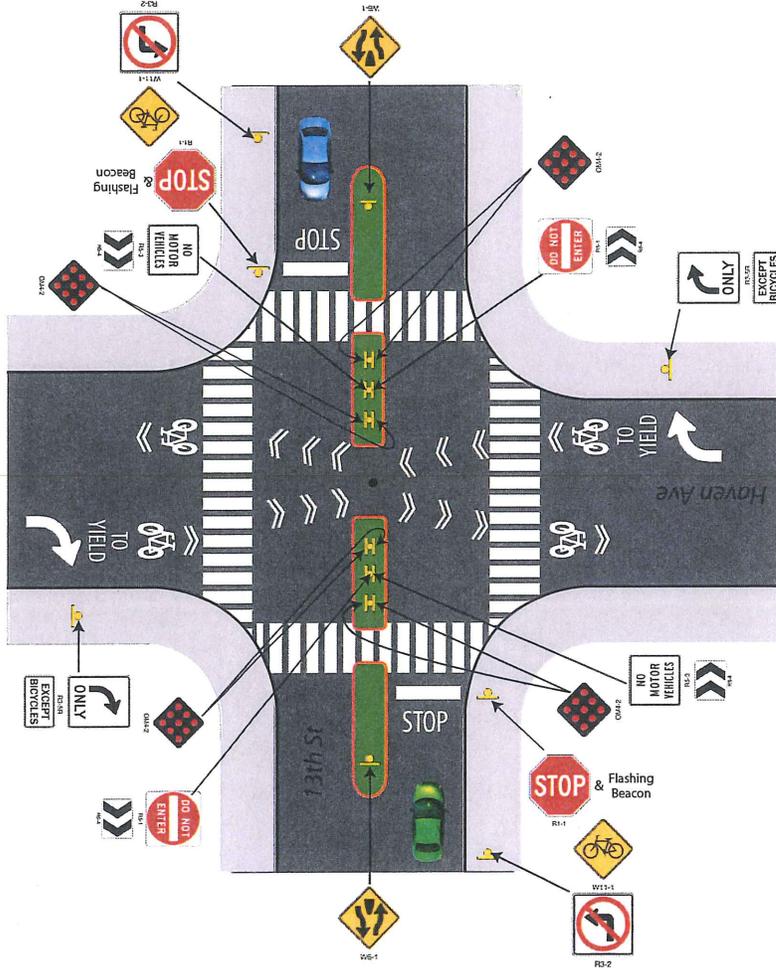


May 2011

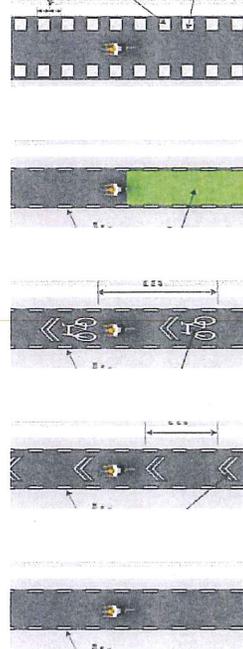
The intersection median island should be constructed along 13th St. to force motor vehicle traffic traveling along Haven Ave. to turn right. This volume control traffic calming measure will completely eliminate long distance motor vehicle traffic from using the Haven Ave. Bicycle Boulevard, and force motorists to use other parallel roadways for north – south travel, such as West Ave.

The through bicycle traffic along Haven Ave. should be provided a striped intersection crossing treatment to reinforce that they have priority along the bicycle boulevard and through the intersection with 13th St. Motor vehicle traffic traveling along 13th St. will have stop control and can either continue straight or turn right onto Haven Ave.

Concept Sketch

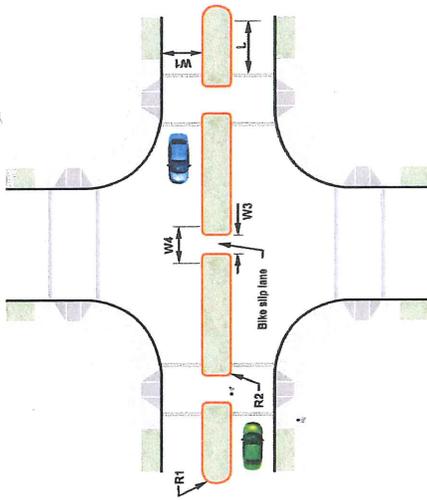


Intersection Crossing Pavement Striping Options



Source: NACTO Urban Bikeway Design Guide

Intersection Median Island



- The lane width (W1) should be sized according to the design vehicle, potentially 16 feet wide along each lane of 13th St.
- The median width (W2) is desirably 8' with a minimum of 6' to accommodate bicyclists, and people pushing strollers to have adequate refuge area between the travel lanes.
- The bike slip lane with (W3) is desirably 5' and can be combined with the EMS access width (W4) is a min. of 10' as shown in the concept.
- The intersection median island should extend past the crosswalks at least 15' (L) to discourage drivers circumnavigating the island, and may be lengthened to coordinate with pavement, streetscape, landscape or other urban design treatments, to a maximum of 25'.

Source: New Jersey Dept. of Transportation Roadway Design Manual

Example of a HAWK Treatment



Source: Federal Highway Administration

Ocean City Rail Trail & Bicycle Boulevard Project
Conceptual Design Recommendation

Map 19 - North End
 9th St. Crossing



May 2011

Example of a Phase Sequence for a HAWK

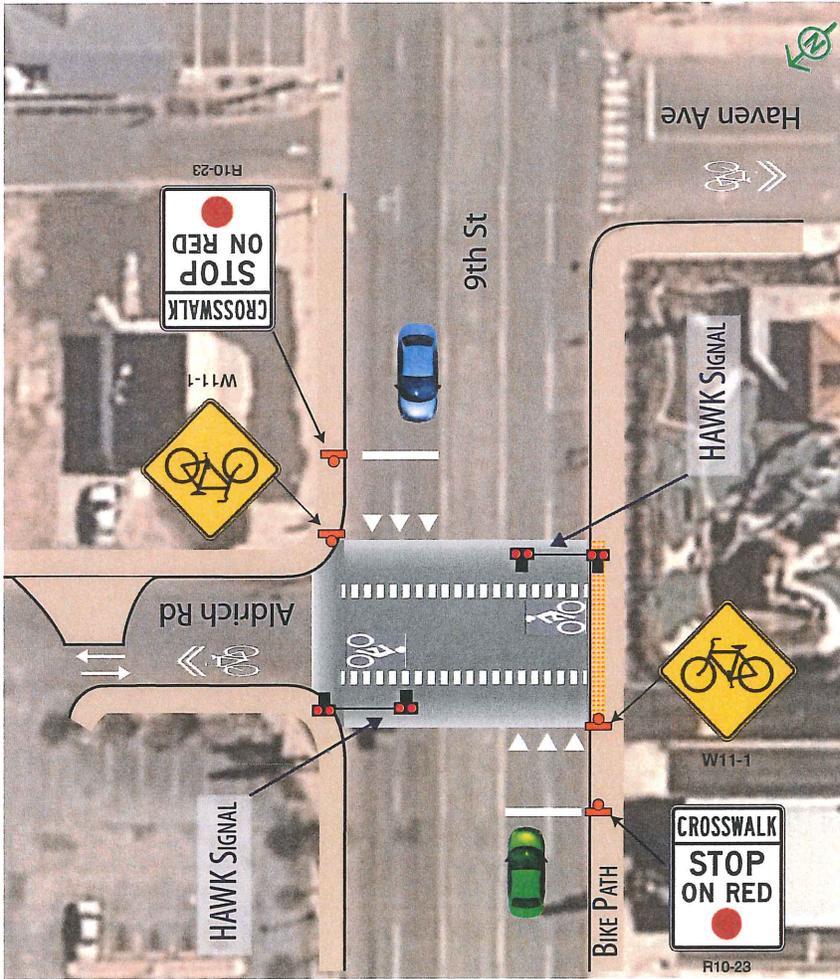
1. Dark until activated	2. Flashing yellow light for 3-6 s	3. Steady yellow light for 3-6 s	4. Steady red light during pedestrian interval
			5. Alternating flashing red lights during pedestrian clearance interval

Source: Improving Pedestrian Safety at Unsignalized Crossings, TCP/NCHRP Report 112/ 562

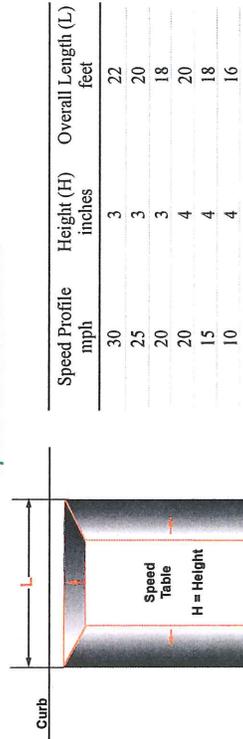
Example of a Crossbike



Source: Fundamentals of Bicycle Boulevard Planning & Design, IBP, Alta Planning & Design, Portland State Univ



Speed Table Dimensions



Source: New Jersey Department of Transportation Roadway Design Manual

- The Bicycle Boulevard should cross 9th Street at Aldrich Road, with a new crossing. The crossing should be constructed on a raised speed table to increase pedestrian and bicycle visibility, emphasize pedestrian and bicycle movement, and manage traffic speeds on 9th Street.
- To provide gaps in the 9th Street motor vehicle traffic, a **High Intensity Activated crossWalk (HAWK)** beacon should be located on the roadside and on mast arms.
- The HAWK operates only when activated (either by push button or passively by detection). This will minimize disruption to motor vehicle traffic when there are no bicyclists or pedestrians attempting to cross 9th Street.
- The HAWK signal head consists of two red lenses over a single yellow lens. It displays a red indication to drivers when activated, which creates a gap for pedestrians and bicyclists to use to cross a major roadway.