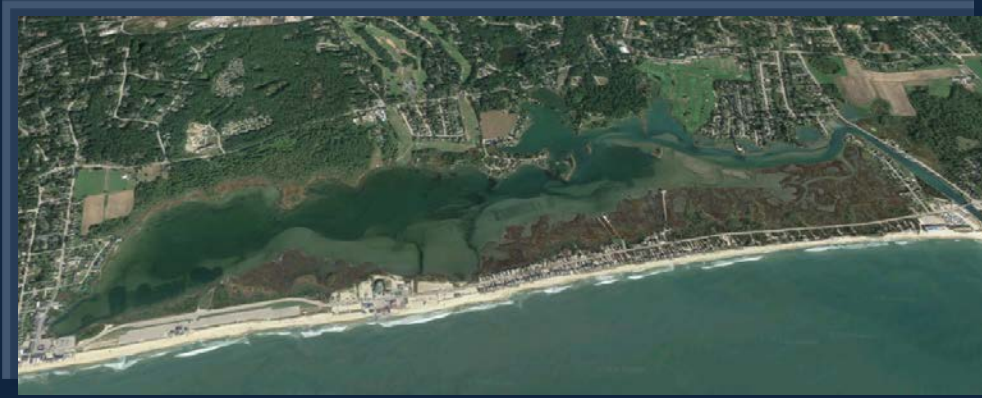


Feasibility Study for The Misquamicut Bike Path



Submitted to:
The Town of Westerly, RI



Prepared May 2018 by



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INTRODUCTION

The Town of Westerly, having desire to enhance and expand bicycle and pedestrian accommodations within Town, has sought funding for such projects. The Town was successful in acquiring funds from the State, with the requirement to match 10% of the funds locally. The Misquamicut Bike Path Feasibility study has been funded by the Town's contribution to match the State funds being provided for construction of bicycle facilities. The money allotted to the Town is dedicated for use on Shore Road primarily with remaining funds eligible for the other roadways identified within the study area of the project.

The study area defined for the limits of the Misquamicut Bike Path Feasibility Study included an approximately seven-mile loop route around Winnapaug Pond on Shore Road, Weekapaug Road, Atlantic Avenue and Winnapaug Road. It was intended that this loop would capture and better accommodate the existing users along Shore Road, provide access to the Misquamicut Beach area and the associated businesses and connect to work already underway by the Town to extend the Eco Trails along the northwest side of Atlantic Avenue.



PURPOSE

The purpose of the Misquamicut Bike Path Feasibility Study was to recommend a preferred alternative for a non-motorized (bike) path through the Misquamicut area of Westerly that could balance the desires of the Town and its residents with the costs and impacts of construction. Therefore, the level of effort designated for the study was conceptual design to produce various typical sections that could be implemented for each of the roadways and in turn generate planning level cost estimates based

on these typical sections and assess the impacts to adjacent parcels from a topographic and wetland perspective. More specifically, the efforts included in the scope of the study were intended to:

- develop and evaluate potential alternatives for each of the study area roadways;
- assess potential parking accommodations and access;
- determine the need for structures such as retaining walls or guardrails;
- ensure that future extensions were not precluded;
- evaluate, to the extent possible, impacts to public and private and/or historical properties as well as environmental features such as wetlands and species;
- consider overall construction costs as well as potential phasing; and
- finally, advise and recommend to the Town of Westerly a path forward.

PROCESS

The feasibility study for the Misquamicut Bike Path included several important phases, namely: public engagement; site understanding; best practices review; alternatives development; assessment of costs and impacts; and recommendations. The phases were not exclusive and frequently overlapped.

The first phase of the Misquamicut Bike Path Feasibility Study, which spanned the entirety of the study, was **public engagement**. With some outreach initiated by the Town prior to the official award of the study to Pare Corporation, combined with public meetings held by Pare Corporation and the Westerly Bike Path and Cycling Advisory Committee at key stages within the study, this feasibility study approached, acknowledged and addressed the concerns of the public.

The **site understanding** phase consisted of extensive field walks, a compilation of information from GIS databases, and the assessment of existing conditions from both an engineering and environmental perspective as well as coordination with the Town regarding the Eco Trail expansion project located within the Misquamicut Bike Path study area loop.

The **best practices review** phase was the most reasonable way to kick-off the project in conjunction with the site understanding. Various existing facilities studied and designed by Pare as well as from around the country were reviewed and those with characteristics or attributes similar to Westerly were compiled as a sample set of potential facility types and/or treatments that could be implemented in the Misquamicut area.

The **alternatives development** phase focused on the advantages and constraints of each roadway to determine an array of alternatives that could feasibly be implemented within each location. This phase took into account the presence and type of wetlands and their proximity adjacent to each roadway, the types and density of properties adjacent to each roadway and considered, to the extent possible, the potential for connectivity between the roadways.

The **assessment of costs and impacts** followed the alternatives development. In order to balance the Town's desires with the costs and impacts of each alternative, these elements needed to be computed to allow for a transparent evaluation.

The evaluation of work performed in all the previous phases led to **recommendations** and **next steps**.



The Misquamicut Bike Path Feasibility Study sought input from the public at various stages. With ongoing public outreach efforts from the Town starting prior to this specific study, public engagement was identified as an important component of the advancement of bicycle and pedestrian accommodations within Town. To continue to advance the development of such facilities with the public's interests in mind, the Town has formalized the Westerly Bike Path and Cycling Advisory Committee.

Specific to this feasibility study, three meetings were established to engage with the public including:

1. Public Kick-Off
2. Public Meeting #2 – to present and obtain feedback on the alternatives developed as well as their costs and impacts
3. Council Meeting – to present recommendations to Town Council with opportunities for the public to provide any final input in a forum designated for decision on the topic.

The public kick-off meeting, held on November 29, 2017, was structured primarily as an informational meeting to present the site understanding and sample facilities. This meeting also included guided discussion about the types of users that should be accommodated by the proposed facilities and well as the level of importance of various elements associated with construction of a bicycle and/or pedestrian facility including safety, impacts and cost.

Public Meeting #2 was held months later on April 24, 2018, following the development of alternatives specific to each roadway and the assessment of costs and impacts. This meeting was intended to serve as the primary opportunity to obtain feedback related to the potential alternatives. Following the presentation, there was much discussion about the pros and cons the Town's residents saw in the various alternatives.

The final recommendations will be presented to the Town Council, allowing the public to provide final input regarding the study in a forum designated for decision on the topic.

Input from the public at the kick-off meeting indicated that facilities to be developed in Westerly should be designed to accommodate the residents first and should assume that users of all types and ages would like to use such facilities. More specifically, many voiced that facilities should be off road and separated from traffic to the extent feasible. When queried about which element was most important within the study, there was an even representation for safety, cost and impact.

Generally, comments received during the second public meeting were focused on safety. There was concern about narrowing lanes widths on Winnapaug Road and Weekapaug Road as well as concern about the speed of vehicles on Shore Road. There seemed to be consensus that construction of a facility on Shore Road should precede any other improvements.



At the outset of the study, four roadways were identified for consideration of bicycle and/or pedestrian accommodations and improvements. These roadways included:

- Shore Road from Winnapaug Road to Weekapaug Road
- Weekapaug Road from Shore Road to Atlantic Avenue
- Atlantic Avenue from Weekapaug Road to Winnapaug Road
- Winnapaug Road from Atlantic Avenue to Shore Road

To begin the study, a thorough field investigation was completed to determine the existing conditions of each of the four roadways included in the study area. Field work assessed utility locations, stormwater management or ponding issues, roadway widths and the presence and widths of sidewalks. An extensive photo log was compiled to document the existing conditions. In addition to the observations and measurements recorded in the field, a GIS investigation was undertaken to obtain the parcel lines, roadway right-of-way lines and approximate 2-foot contours from lidar data, as well as the wetland boundaries. It was noted early on by wetland scientists at Pare Corporation that the wetland boundaries were not consistent with the topography and aerial imagery; therefore, a follow-up field investigation was conducted to identify the approximate existing boundaries and types of wetland features within the vicinity of the study area.

EXISTING CONDITIONS

Shore Road

Shore Road spans nearly 2.5 miles from Winnapaug Road to Weekapaug Road to the north of Winnapaug Pond. Though it extends a great length, it does carry a consistent typical cross section with one 11-foot travel lane and a 5-foot shoulder in each direction. There are no sidewalks present along Shore Road within the study area. Utility poles run predominantly along the south side of the roadway. Shore Road is located within a wider right-of-way, generally 50+ feet in width. This roadway is under state jurisdiction, designated as Route 1A, and currently has a posted speed limit of 35 miles per hour, lowered fairly recently from 40 miles per hour.



SHORE ROAD EXISTING CROSS SECTION

Due to its overall length, Shore Road was reviewed in three sections of semi-equal distance. The west section of Shore Road has preservation land on the north and south sides in some locations as well as views across Winnapaug Farm preserve on the south side of the road. The southeast quadrant of the intersection of Shore Road and Winnapaug Road could be considered for the development of a small parking area. Near the central area of the Shore Road stretch, there are areas of somewhat narrower right-of-way, pinching as low as 42 feet. There is an increase in the density of commercial driveways



CLOSE WETLANDS AND OVERLOOK VIEWS : SOUTH SIDE
widening on the north side of Shore Road.

along the south side of the road and there is an overlook opportunity of Winnapaug Pond on the south side of the roadway east of Littlebrook Road. Continuing east to the last section of Shore Road, there are steep slopes and guardrails present on the south side of the roadway. There is a historic cemetery on the south side of the roadway and there is another opportunity for an overlook and potentially parking on the south side of the roadway approaching Weekapaug Road. In all sections, there is generally more opportunity for

Weekapaug Road

One of the shorter roadways within the study area, Weekapaug Road stretches approximately 0.85 miles from Shore Road to Atlantic Avenue on the east side of Winnapaug Pond. This roadway carries a typical cross section with an 11-foot travel lane and 3-foot shoulder in each direction. There is one 4-foot wide sidewalk located along the west side of the road. The roadway has an approximately 40-foot right-of-way for its entire length. This roadway is flanked on both sides for much of its length by the breachway and the pond. Close proximity to these wetlands limits the ability to widen along Weekapaug Road. The northern end of the roadway is characterized by scenic coastal farm views. Weekapaug Road is under town jurisdiction and has a posted speed limit of 25 miles per hour.



WEEKAPAUG ROAD EXISTING CROSS SECTION

Atlantic Avenue



ATLANTIC AVENUE EXISTING CROSS SECTION

Atlantic Avenue, like Shore Road, stretches approximately 2.55 miles between Winnapaug Road and Weekapaug Road. This roadway, similarly, has varying characteristics segmented along its length, though it does have a consistent typical cross section within a 50+ foot right-of-way. The roadway carries a 12.5- foot travel lane and a 3.5- to 5-foot shoulder in each direction. There is one 5-foot wide sidewalk along the south side of the roadway. On the east end of Atlantic Avenue, the existing bridge structure is only 22 feet curb to curb. There is an existing parking

lot located at the Weekapaug bridge on the south side of the roadway. Atlantic Avenue is under town jurisdiction and has a posted speed limit of 25 miles per hour.

Along the eastern section of Atlantic Avenue and heading west towards the central area there are drainage issues and ponding onto the roadway which sometimes extends towards the existing centerline. Continuing west towards the central region of the roadway there is preservation land on the north side of Atlantic Avenue, public beach access provided at multiple points along the south side of Atlantic Avenue and many small separated or localized wetlands at the roadside of the dense private properties. Extensive ponding has resulted in



WETLAND OVERTOPPING ROADWAY: NORTH SIDE

relatively poor pavement conditions within this area as well. Finally, the western section of Atlantic Avenue continues to have drainage concerns, has back out driveways particularly on the north side of the roadway that would make it difficult for motorists to see bicyclists and has the opportunity to connect to the Eco Trail plans currently underway by the town on the north side of the roadway.

Winnapaug Road



WINNAPAUg ROAD EXISTING CROSS SECTION

feet. This roadway also has several locations with back-out driveways which make it difficult for drivers to see oncoming bicyclists. Towards the northern end of Winnapaug Road, stone walls line the east side of the roadway and limit the extent of potential widening. It was also observed, primarily near the southern end of the road segment, that the adjacent Winnapaug Pond overflows into parking lots along the east side of the road and in some locations onto the roadway shoulder.

Winnapaug Road, stretching approximately 0.7 miles from Atlantic Avenue to Shore Road along the west side of the study area, typically has a 40-foot right-of-way. The roadway consists of an 11-foot travel lane and 3-foot shoulder in each direction. Winnapaug Road has sidewalks on both side of the road that are generally four feet in width with some isolated sections measuring five



STONE WALL LIMITATIONS: EAST SIDE

GIS AND WETLANDS REVIEW

As a feasibility effort intended to develop conceptual level designs for comparative analysis, survey was not included in the scope of this study. However, steep terrain, extensive wetlands and the multitude of abutting parcels required an assessment that was informed by the various physical elements of the study area that could not be gathered exclusively from the field review. These attributes included parcel lines and parcel owner information, right-of-way lines, topography (2' contours based on lidar data) and wetland boundaries. These attributes were extracted using GIS and reviewed for accuracy compared to the Town's assessor's database, aerial imagery and knowledge from the field review regarding the location of slopes. The data obtained was deemed accurate within the degree necessary for the study, with the exception of the wetland boundaries. This GIS layer was noted to be outdated compared to the topography and aerial imagery. Pare's wetland scientists performed a follow-up field visit to document and adjust the mapping for the wetland boundaries. A sample of the final mapping used as a base for alternative development is shown below.



With so many successful bicycle and pedestrian facilities within the state and around the country, the next step in this study was to understand how such facilities are generally implemented elsewhere, and to assess whether these approaches make sense or need to be modified to better suit the Misquamicut area. This was also the appropriate phase to establish a set of design criteria for the study area alternatives.

SAMPLE FACILITIES

After assessing the existing conditions of each of the study area roadways, much thought was given to the types of facilities that may be accommodated within each location. Types of facilities considered included on-road facilities, off-road facilities and facilities on structures. Accommodations at intersections was also a major consideration in assessing the potential loop route.

On-road facilities include: shared lanes, also known as “sharrows”, which designate a travel lane for the use of bicyclists and vehicles; dedicated bike lanes, which designate a shoulder space for the use of bicyclists only; and separated bike lanes, which are similar to designated shoulders but have an additional buffer separation between the vehicular travel and the bicycle travel. Buffer separated bike lanes are sometimes bi-directional. Another treatment for on-road facilities is the consideration to adjust adjacent parking from being head-in to back-in, allowing all vehicles exiting a parking space to face oncoming bicycle traffic.



SHARED LANES AKA SHARROWS



DEDICATED BIKE LANES



BUFFERED BIKE LANES



BACK-IN PARKING

Off-road facilities range from curb separation to natural separation, with distances generally varying from a 3- to 4-foot offset to as much as 10- to 25-foot offsets from the edge of roadway pavement, as space allows.



CURB SEPARATION



NATURAL SEPARATION

Elements that need to be considered when determining the appropriate on- or off-road facility type include: vehicular speed and volume of vehicles per day; weather and climate, which relate to the maintenance and care of the facility type; and adjacent property uses and density, which generally guide the allowable level of impact.

Facilities on structures can range from cantilevered segments attached to existing structures, as loads can withstand, to new facilities, such as boardwalks, adjacent to existing roadways or causeways.



CANTILEVERED STRUCTURES



BOARDWALK STRUCTURES

Intersection treatments include visual cues, such as colored crosswalks and lighted signage, or physical separation, such as raised crosswalks, bike boxes and protected crossings. The intersection treatments are generally guided by whether or not the bicycle facility continues along the road, crosses the intersection or simply turns at the intersection along the same quadrant of the intersection.



COLORED CROSSWALK



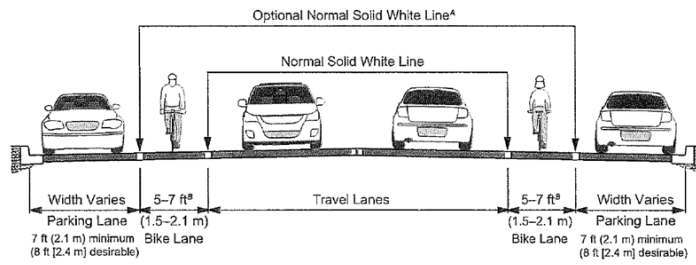
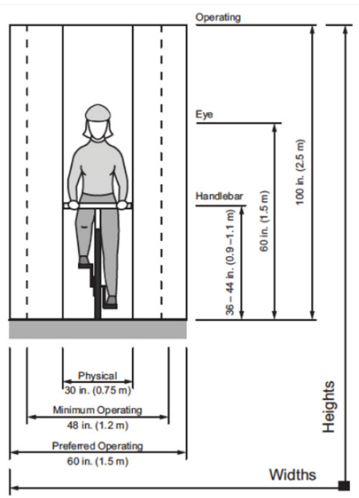
PROTECTED CROSSING

DESIGN CRITERIA

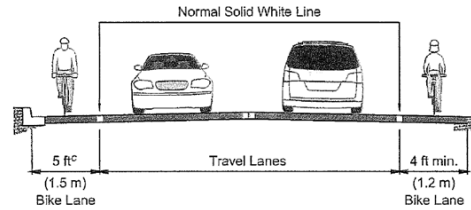
With funding being provided by the State, and with Shore Road designated as a state facility, the design criteria being used for the study are based on State standards, AASHTO and federal standards. These sources guide the requirements for the width, alignment, slope, design speed and offsets to adjacent objects for bikeways and pedestrian accommodations. One-way widths apply to on-road accommodations, while two-way widths are applicable to both on- and off-road accommodations. The design speed and corresponding minimum curve radius are based on anticipated cyclist activities. A summary of the design criteria being adhered to can be seen in the table below.

Elements of Design	Standard Value
Width – One-way	4' – 8' (5' preferred min.)
Width – Two-way	8' – 14' (11' for passing)
Object Offset	3' minimum
Vertical Clearance	8' minimum (10' recommended)
Design Speed	18 mph
Curve Radius	60' minimum
Cross Slope	2% maximum (1% recommended)
Running Grade	5% recommended maximum (ADA)

Criteria is also established for the minimum width needed for a cyclist both on a roadway setting without adjacent parking and with adjacent parking. Adjacent to parallel parking, a minimum 5-foot wide space is recommended. A 5-foot width is also recommended adjacent to a curb, with a minimum 4-foot width being acceptable adjacent to a level road edge with no curb. However, the guidelines note that a 4-foot width adjacent to a curb can be implemented with low roadway speeds.



On Street Parking



Parking Prohibited

WETLAND CONSIDERATIONS

As design for the various roadway alternatives began to develop, it became extremely clear that no alternative could move forward without immediate consideration of the impact it would have on wetlands. Therefore, the alternatives development phase and the environmental impacts assessment were run concurrently, with feasible alternatives being driven by the extent of wetland impacts that could likely be recommended and approved.

The study area contains three kinds of wetlands including:

1. isolated freshwater wetlands;
2. coastal wetlands associated with type 2 waters; and
3. coastal wetlands associated with type 1 waters.

Isolated freshwater wetlands are defined as wetlands that are no longer contiguous to coastal waters. This means that a portion of a larger wetland was at some time permanently separated. This is the case with the small wetlands present near the south side of Atlantic Avenue. These small remnants appear to at one time have been connected to or part of Winnapaug Pond, but over time, mainly from the construction of the roadway itself, have been disconnected and are now isolated. Impacts to isolated freshwater wetlands do require a significant alteration permit but do not always require replication. It was assumed that impacts to these types of wetlands could be incorporated within the alternatives.

Winnapaug Pond itself is classified as coastal wetlands associated with type 2 waters. Impacts to coastal waters associated with type 2 waters are categorized as prohibiting fill and impacts require special exceptions. To attain a special exception, one must justify lack of any reasonable alternative and impacts to these types of wetlands always require creation or replication of the area impacted. It was assumed for this study that impacts to these types of wetlands would be extremely difficult and costly to have approved and therefore no alternatives have moved forward that would impact these wetlands.

Coastal wetlands associated with type 1 waters are continuous to coastal waters and have even stricter requirements than coastal wetlands associated with type 2 waters. This wetland category includes the breachway waters on either side of Weekapaug Road. It was also assumed for the purposes of this study that these types of wetlands could not be impacted, and the design alternatives were developed accordingly.

DESIGN ALTERNATIVES

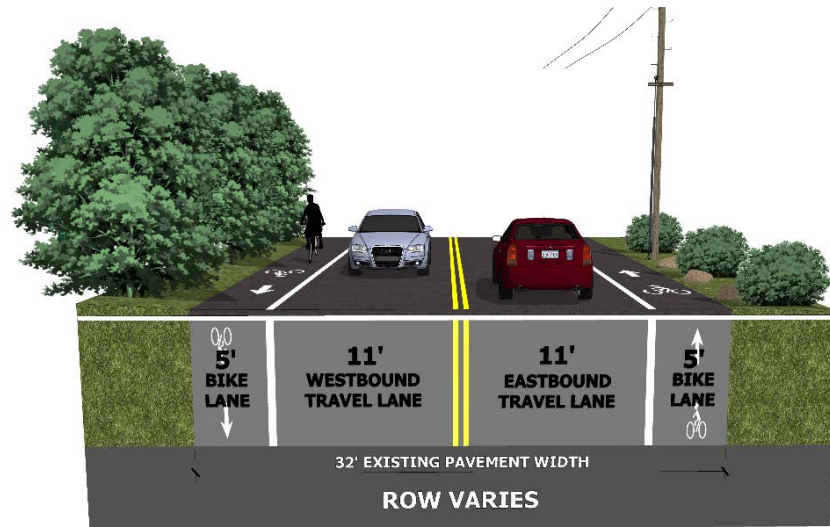
Shore Road

Characteristics of Shore Road generally consist of existing shoulders, higher terrain and right-of-way widths that provide an array of alternatives. However, there is guardrail along the south side of the



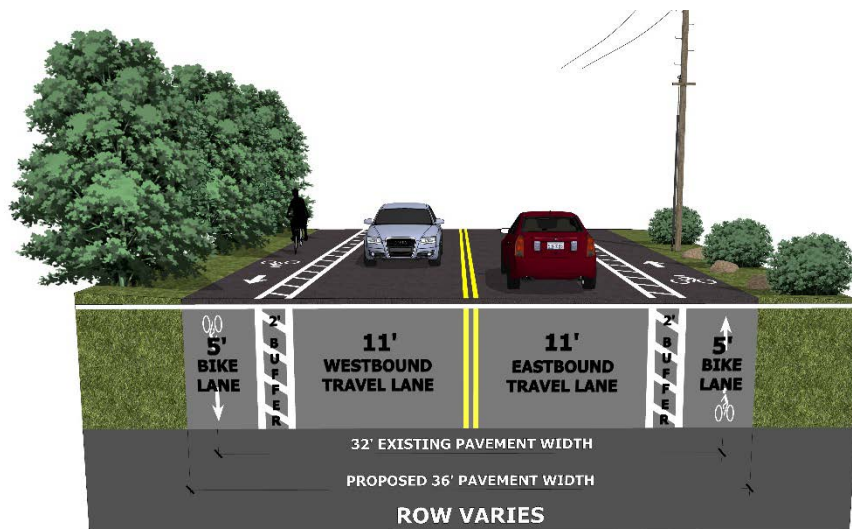
road in areas due to steep slopes and the roadway is in relatively close proximity of wetlands on the south side. These are deemed the limiting factors for the possibility of alternatives along this roadway.

Alternative A proposes the formal designation of existing shoulder space as bike lanes. This would require restriping and signing only, and would maintain the existing pavement width. Shore Road, which currently does not have sidewalks, would still not have sidewalks under this alternative.



SHORE ROAD – ALTERNATIVE A

Alternative B would be the implementation of buffered bike lanes. This would require restriping, widening of the roadway approximately two feet on either side, the development of a stormwater management system due to the increase of impervious pavement and would still not provide the benefit of sidewalks.

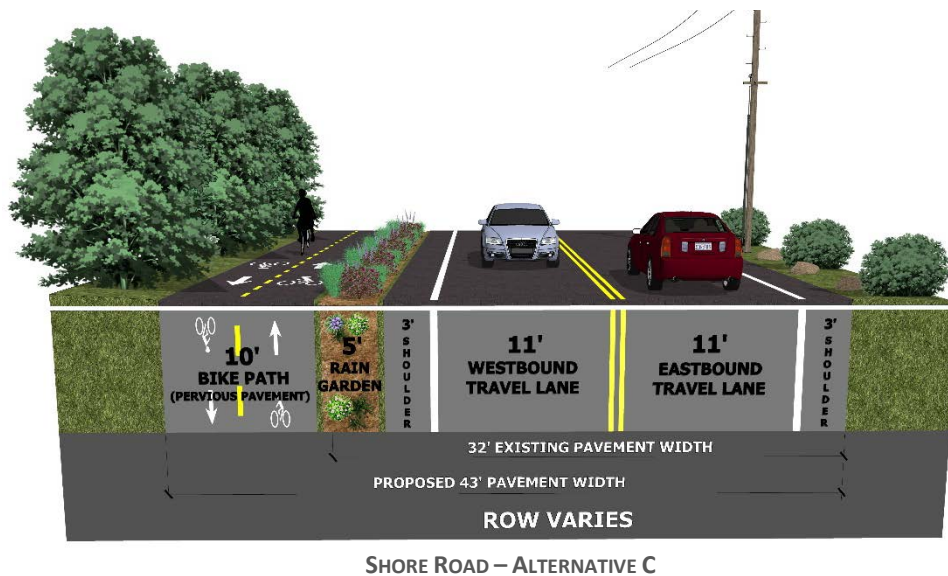


SHORE ROAD – ALTERNATIVE B

Alternative C includes the installation of a two-way path on the north side of Shore Road, separated from the vehicular travel way by a grass strip or potential rain garden. This would require restriping

and removal of pavement along the existing roadbed, as well as the installation of new pavement for the path. However, due to the higher terrain of Shore Road, pervious pavement could be considered for the path, which would fulfill the requirement for stormwater management. This alternative would provide pedestrian accommodations along Shore Road.

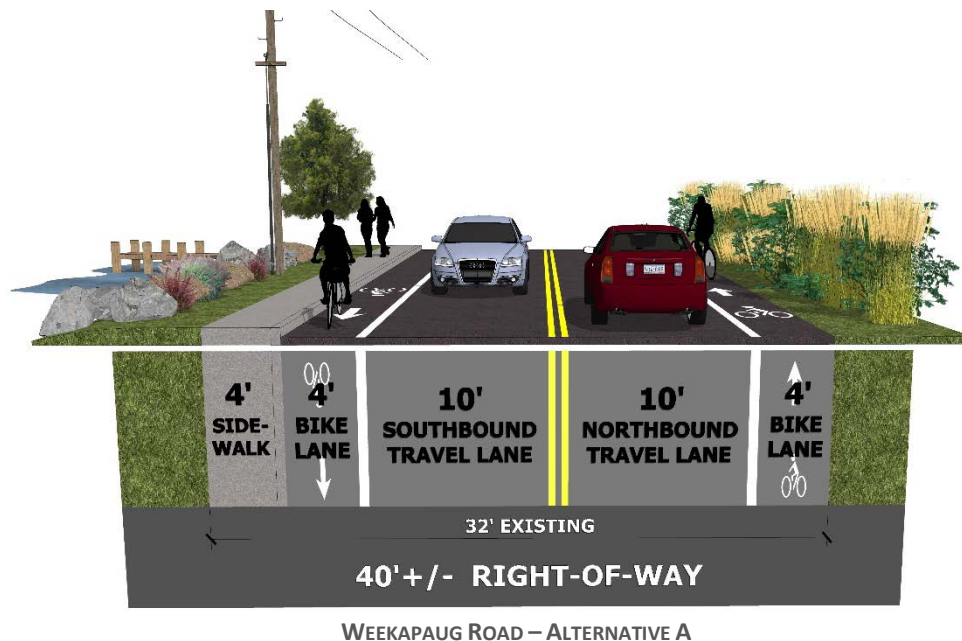
Under this alternative, two edge treatments were considered for impact abatement including guardrail and retaining walls. Impacts were assessed with a general shoulder adjacent to a 3 to 1 slope as well as a wider shoulder to accommodate guardrail adjacent to a 2 to 1 slope. Where a 2 to 1 slope could reduce impacts to private and or historic property to a minimal extent, guardrail was assumed within the cost for the identified length. In areas where even 2 to 1 slopes resulted in significant impact to private and or historic property, retaining walls were assumed as the appropriate impact abatement measure and included within the cost for the Shore Road Alternative C.



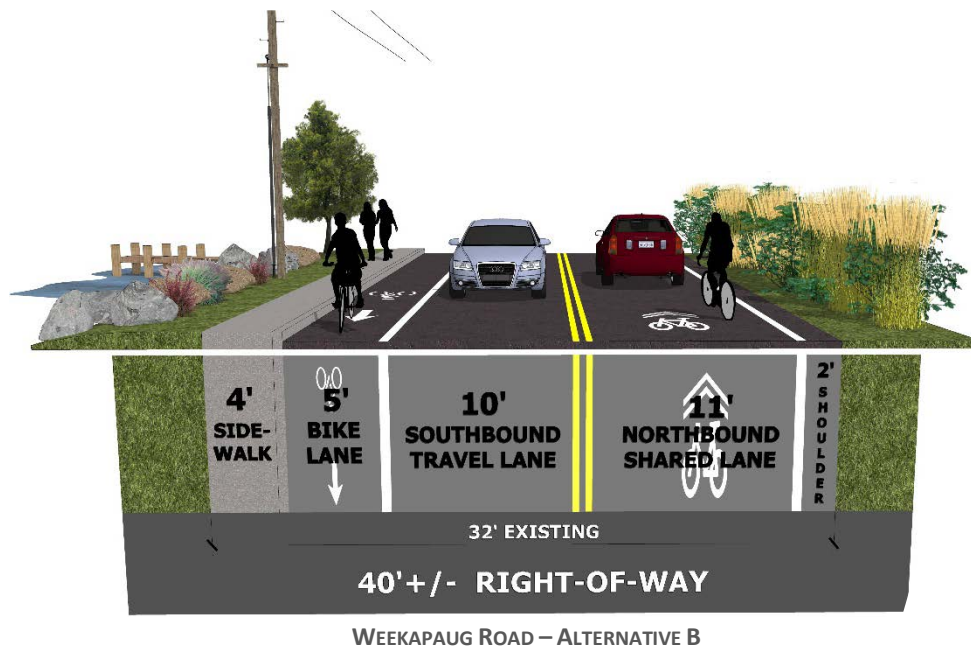
Weekapaug Road

Weekapaug Road has close wetland proximity on both sides of the road and a narrow right-of-way that significantly limit the alternatives that can be implemented. Only two feasible alternatives were derived based on these limitations.

Alternative A would entail the formalization of bike lanes within the roadway shoulder. This would be accomplished by reducing the existing travel lanes to 10-foot widths to accommodate a 4-foot bike lane in each direction. This would require restriping and would maintain the existing pavement width as well as maintain the sidewalk along the west side of the roadway.



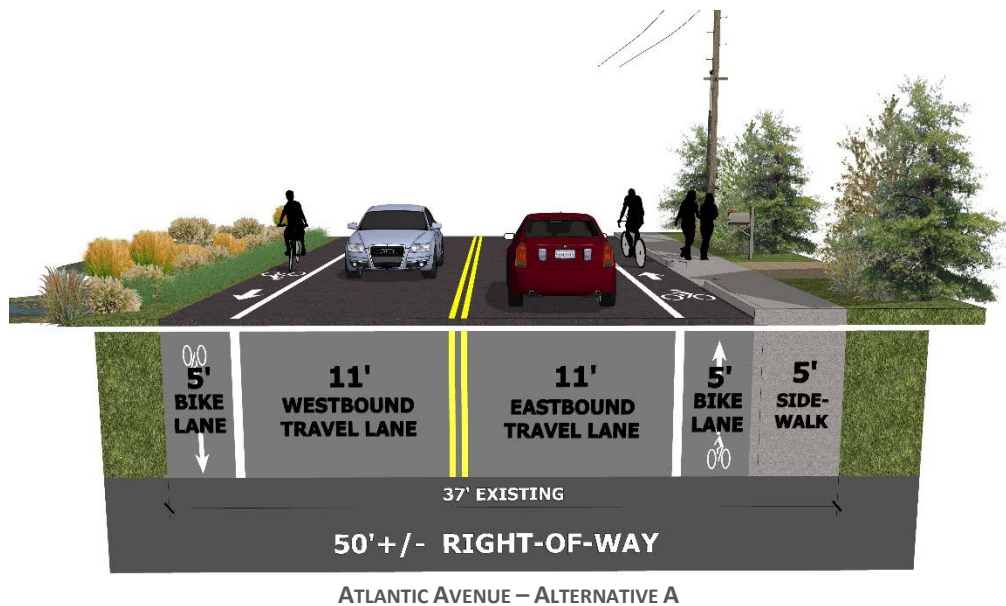
A 4-foot bike lane width is considered acceptable for the roadway speed; however, some users prefer a minimum 5-foot bike lane, particularly adjacent to a curbed sidewalk. Therefore, **Alternative B** for Weekapaug Road includes the formalization of a single bike lane on one side of the roadway, which results in a sharrow lane on the other side of the roadway. Similar to Alternative A, this would require restriping, but would also maintain the existing pavement width and maintain the sidewalk along the west side of the roadway. If this alternative were selected as part of a proposed loop, the bike lane would be recommended on the west side of the roadway to minimize the need for roadway crossings.



Atlantic Avenue

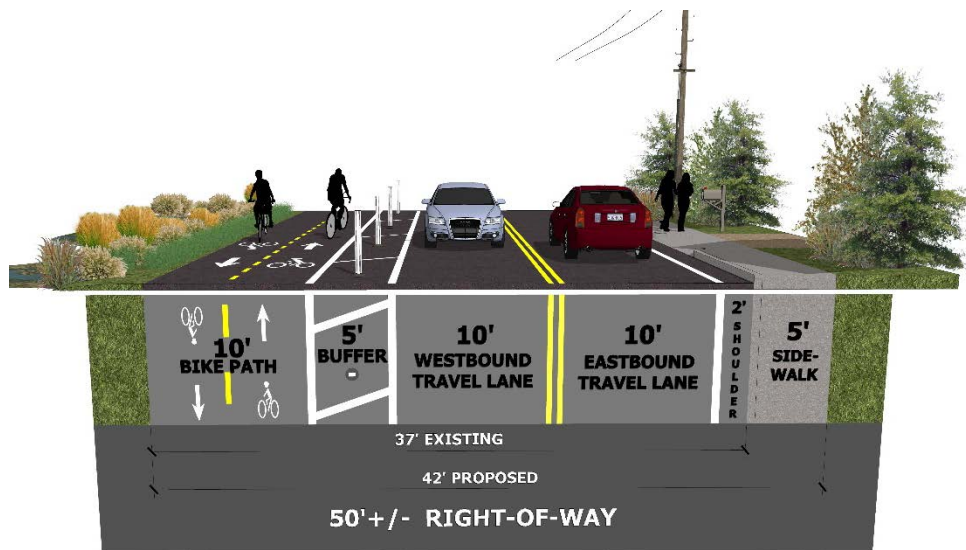
The wetland proximity along the north side of Atlantic Avenue serves as the limiting factor for alternatives along this roadway. All alternatives therefore assume no widening or widening to the south of the roadway to hold the northern edge of the existing pavement. As noted previously, widening to the south would have some impacts to isolated freshwater wetlands, but these should not be substantial and would be the least extensive of the potential permitting processes required.

Alternative A, similar to the other roadways within the study area, would be the formalization of bike lanes utilizing the existing shoulder space. This alternative would require restriping, would maintain the existing pavement width and would maintain the existing sidewalk on the south side of the roadway.



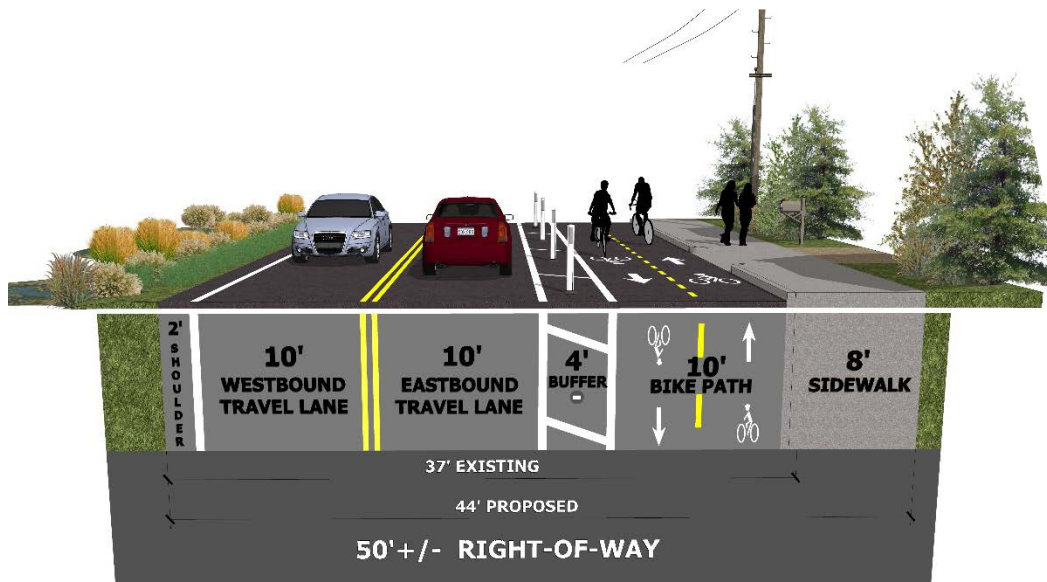
Alternative B would construct a two-way path along the north side of the roadway with buffer separation to the travel lanes. Vegetated separation cannot be attained as shown on Shore Road because the buffer space with flexible delineators would be needed as usable shoulder space in the event of a stalled vehicle. This alternative would require restriping, would require widening to the south to reconstruct the existing sidewalk and would require stormwater management to be implemented, as Atlantic Avenue is also plagued with low terrain and a high groundwater level and therefore pervious pavement should not be considered.

This alternative was considered for two primary reasons: construction of a stormwater management system along this roadway could alleviate some of the existing ponding that is currently experienced in the area; and this alternative would keep the path on the interior of the proposed loop, which would connect most easily to the Eco Trail extension work underway by the Town as well as to the bike lane proposed on the west side of Weekapaug Road and to the path proposed on the east side of Winnapaug Road (see next section).



ATLANTIC AVENUE – ALTERNATIVE B

Alternative C for Atlantic Avenue would implement a two-way path on the south side of the roadway with buffered separation to the adjacent travel lane. Similar to Alternative B, this alternative would require restriping, widening, reconstruction of the sidewalk on the south side of the roadway and would require a stormwater management system. While this would require additional roadway crossings compared to Alternative B to continue along the path loop, it would provide greater access to the beach area in Westerly and would create a more cohesive bike/pedestrian space on the south side of the roadway. In conjunction with a shared bike/pedestrian space, Alternative C includes widening the sidewalk on the south side of the roadway to an 8-foot width to accommodate very high summer pedestrian volumes, as described by many residents at the public meetings.

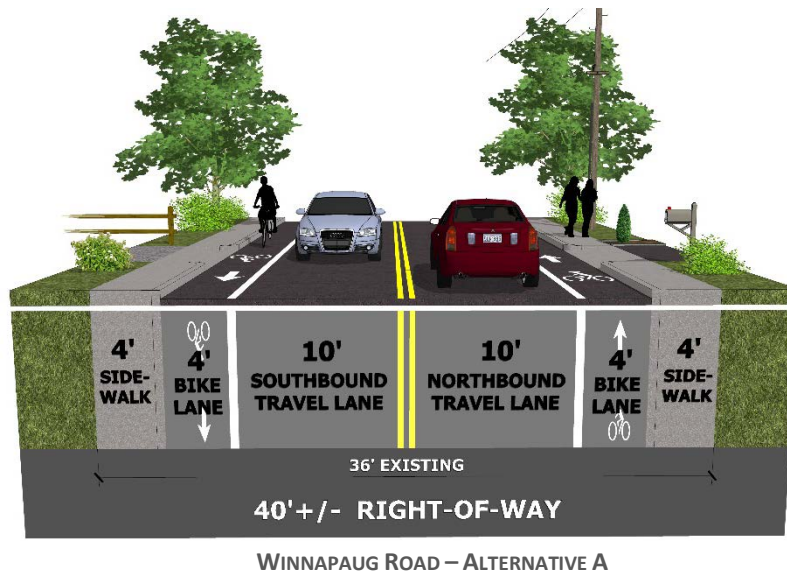


ATLANTIC AVENUE – ALTERNATIVE C

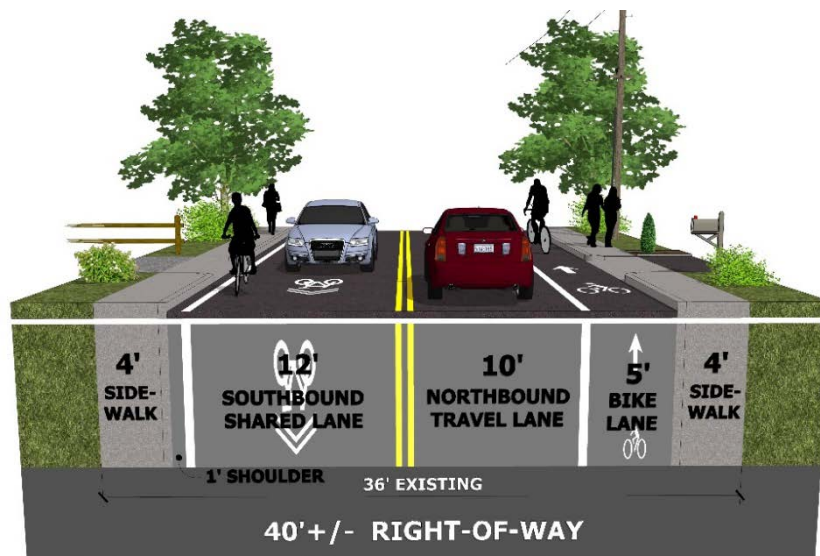
Winnapaug Road

Winnapaug Road, being characterized by close wetland proximity and stone walls on the east side combined with a narrow right-of-way, has limited potential alternatives, but is not as restrictive as Weekapaug Road.

Alternative A, similar to Weekapaug Road, would be the installation of formal bike lanes by narrowing travel lane widths to 10 feet and having 4-foot striped bike lanes on either side. This would require restriping, would maintain the existing pavement width and would maintain the sidewalks along both sides of the roadway.



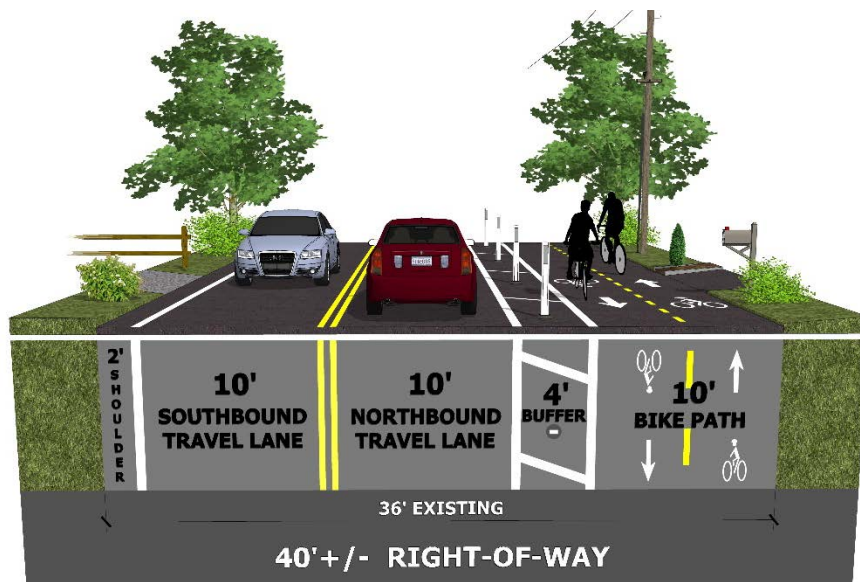
Again, though 4-foot bike lanes are acceptable for the roadway speed, it may not be as comfortable for all intended users. Therefore, **Alternative B** is the formalization of a bike lane along one side of the road at a 5-foot width and designation of a sharrow lane in the opposite direction. This alternative would require restriping, would maintain the existing pavement width and would maintain the sidewalks on either side of the roadway. If this alternative were selected as part of a proposed loop, the bike lane would be recommended on the east side of the roadway to minimize the need for roadway crossings.



WINNAPAug ROAD – ALTERNATIVE B

Alternative C for Winnapaug Road would be the implementation of a two-way path. It is recommended that the path be placed on the east side of the roadway to minimize crossings required to continue the proposed loop. This alternative would require restriping, widening and would replace the existing sidewalks with the two-way path to remain within the existing right-of-way.

Similar to the path alternatives along Atlantic Avenue, this path under this alternative would be buffer separated to maintain a usable shoulder space for emergency situations. Due to the low terrain and high groundwater level, this roadway could not be considered for pervious pavement and therefore would require the development of a stormwater management system to handle the added impervious area.



WINNAPAug ROAD – ALTERNATIVE C

INTERSECTION CROSSINGS

Since bike lanes do not currently exist beyond the study area, treatments at intersections were considered with a primary focus on safe accommodation within the study area and a secondary focus on ensuring that future extensions of the proposed facilities are not precluded.

With the array of potential alternatives outlined above, bicyclists and pedestrians may need to cross up to two legs at each of the four intersections along the study area loop including the intersections of Shore Road with Winnapaug Road, Shore Road with Weekapaug Road, Atlantic Avenue with Weekapaug Road and Atlantic Avenue with Winnapaug Road.

The intersections of Shore Road with Winnapaug Road and Shore Road with Weekapaug Road are currently signalized. Signal modifications would be needed at these two intersections. Modifications would include the addition of crosswalks as needed depending on the alternatives selected for the adjacent roadways, the installation of pushbutton actuated pedestrian crossing systems and the implementation of timing adjustments to accommodate pedestrian movements either as concurrent to existing vehicular phases or as an exclusive pedestrian phase.

The intersections of Atlantic Avenue with Weekapaug Road and Atlantic Avenue with Winnapaug Road are currently unsignalized, though crosswalks are present across all legs of both intersections. Following the upcoming decision by the Town Council, as the study roadways move towards design, the proposed treatments at these two intersections will be dependent on the alternatives selected for each roadway combined with the volume of vehicular traffic and the projected volume of path users. If the combination of alternatives selected for the roadways requires users to cross, it is likely either rectangular rapid flashing beacons (RRFBs) or high-intensity activated crosswalk beacons (HAWKs) will be warranted.



Conceptual costs for all alternatives described above were developed inclusive of full-depth pavement, pervious pavement, removal of flexible pavement, sidewalks, loam and seed, guardrail, retaining walls and signing and striping, as well as erosion control, traffic management and mobilization as contingencies. Additionally, an overall project contingency and engineering design fees were added. The costs for the alternatives range from as low as \$18,000 to a high of over \$3 million. The costs for each roadway alternative can be seen in the following table.

Shore Road

Alt A - Bike Lanes	\$25,000
Alt B - Buffered Bike Lanes	\$1,260,000*
Alt C - Two-Way Path	\$3,111,000

Weekapaug Road

Alt A – 4' Bike Lanes	\$22,000
Alt B – 5' Bike Lane	\$35,000

Winnapaug Road

Alt A – 4' Bike Lanes	\$18,000
Alt B – 5' Bike Lane	\$29,000
Alt C – Two-Way Path	\$705,000*

Atlantic Avenue

Alt A - Bike Lanes	\$64,000
Alt B - Two-Way Path (North)	\$2,648,000*
Alt C - Two-Way Path (South)	\$2,976,000*

It must be noted that none of the costs include right-of-way and all costs presented with an asterisk are costs not inclusive of stormwater management, which would be required for implementation. These costs would need to be determined through a design and permitting process, inclusive of coordination with the Town's Conservation Commission and the RI Coastal Resources Management Council (CRMC).

The costs clearly indicate that there is significant difference between the formalization of bike lanes and the development of a path that could be used by bicyclists and pedestrians of all ages and abilities, though the latter also has an evident benefit over the former. Additionally, the cost of buffered bike



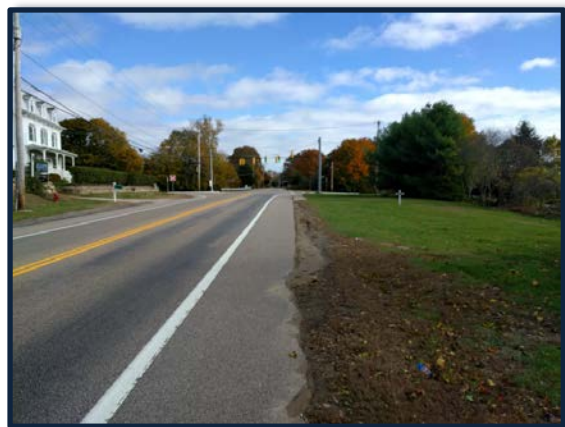
lanes on Shore Road, once the cost of a stormwater management system is considered, does not provide much added benefit over formalized bike lanes and approaches the cost of a separated path.

While the implementation of potential alternatives along any of the roadways would serve as a benefit to both residents and visitors alike, it is a combination of the improvements that starts to provide a complete loop, which could be used as an alternate mode of transportation as well as provide a greater facility for exercise and recreation. Therefore, costs were totaled for formalizing bike lanes as well as the creation of a two-way path, to the extent possible, for all four study area roadways. Formalization of bike lanes is the sum of the Alternative A costs, which totals \$129,000. The creation of a two-way path to the extent possible, which includes all roadways except Weekapaug Road, is the combination of the Alternative C costs and has a sum of \$6,792,000.

One additional cost was assessed and that was for the development of potential parking lots. Included as part of the scope of the feasibility study, two locations had been identified early on as potential for use as parking lots. These two locations are the southeast corner of the intersection of Shore Road and Winnapaug Road and the southwest corner of the intersection of Shore Road and Weekapaug Road. The former could accommodate up to 9 spaces and would cost approximately \$41,000, and the latter could accommodate approximately 17 spaces with a cost of around \$80,000. These costs also do not reflect any right-of-way or stormwater management that may be needed. As the study progressed, input from the public indicated that parking for the path did not seem necessary, and that additional parking lots would be overcome with beach parking which was not desired. However, these locations could be used as potential stormwater management areas if needed based on the alternative selected for each roadway.



POTENTIAL PARKING - SHORE ROAD AT WINNAPAUG ROAD



POTENTIAL PARKING - SHORE ROAD AT WEEKAPAUG ROAD

RECOMMENDATIONS

After assessing all potential alternatives, along with their costs and impacts, it is recommended that the Town consider phased construction. The Town could first utilize the funds that have been granted to implement the formalization of bike lanes on all four roadways. The town could then seek additional funding to convert to a two-way path where possible, with preferential order to Shore Road first, followed by Atlantic Avenue and finally Winnapaug Road if and when it becomes necessary. This phased approach would allow for the use of the loop facility as soon as possible.

It is recommended that the Town defer the development of any parking associated with the path until a need presents itself. The locations identified for potential parking may be more appropriately used as stormwater management areas and roadways advance towards a second phase of improvements.

NEXT STEPS FOR WESTERLY

There are three remaining steps in the effort to enhance and expand bicycle and pedestrian accommodations in the Misquamicut area of Westerly. These include approval by the Town Council, design and construction. Based on the findings and recommendations of this report, the Westerly Town Council will determine how the path should move forward. In accordance with the Council's decision, the Town and/or the recently formalized Westerly Bike Path and Cycling Advisory Committee can seek consultant services for the design of the chosen alternatives. As noted previously, the design phase would incorporate any and all necessary permitting. Construction of the improvements would commence, mostly likely through a bid process, following the design.

