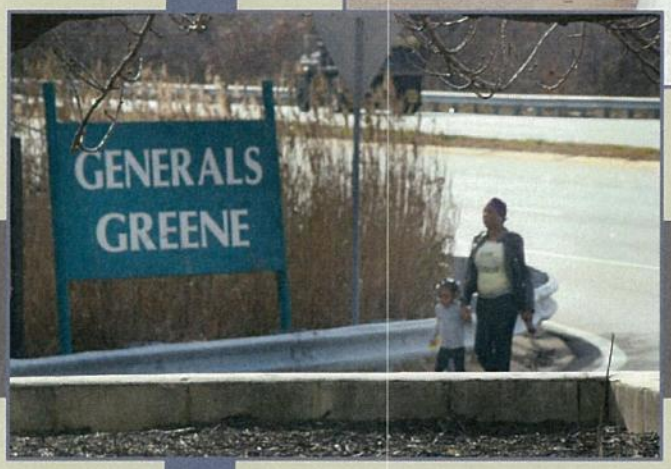
Route 10
Bicycle and Pedestrian Study

April 2012



Dover/Kent County MPO
Metropolitan Planning Organization

Prepared by Dover/Kent County MPO

INTRODUCTION

The Dover/Kent County Metropolitan Planning Organization (MPO), in cooperation with the Delaware Department of Transportation's Division of Planning (DelDOT) and the Delaware Department of Natural Resources and Environmental Control's Division of Parks and Recreation (DNREC), has prepared a report detailing existing transportation conditions, existing transportation needs, potential constraints, and potential solutions for bicycle and pedestrian improvements along Route 10 south of Dover.

As shown on *Figure 1*, this study evaluated the need for bicycle and pedestrian improvements along Route 10 from Pine Cabin Road in the Generals Greene community to the Gateway South Shopping Center, a distance of approximately 1,300 feet (0.25 mile).

HISTORY

This study was initiated as a result of the MPO's Regional Bicycle Plan, which was adopted in September 2011. The Bicycle Plan identified several objectives to improving bicycle conditions within Kent County:

- Create an effective and safe bicycle transportation system
- Increase the number of local trips made by bicycle
- Increase the number of people bicycling to work
- Increase recreational riding

Developed in conjunction with a multi-disciplinary Bicycle Working Group over a nearly two-year period, the Bicycle Plan identified both on-road bicycle projects and new off-road bicycle connections that should be pursued to meet the identified objectives. The Bicycle Plan identified Route 10, from just west of the Dover Air Force Base (DAFB) to U.S. Route 13 in Camden, as one of the seven off-road connections recommended for further evaluation. The Route 10 project ranked #4 in the prioritized listing of off-road bicycle connections.

The need for bicycle and pedestrian improvements along Route 10 has been studied in the past. As recently as 2009, DelDOT completed a study of this area as part of its Transportation Enhancement (TE) Program. The study, entitled *Initial Concept Study, St. Jones Greenway, Isaac Branch Trail – Phase III*, evaluated potential concepts for extending the existing Isaac Branch trail to the south, to Kent County's Hunn Property and DNREC's Lebanon Landing recreational facility. The overall concept from this previous study is shown on *Figure 2*.

Due primarily to the cost associated with the construction of a new bicycle/pedestrian bridge over the St. Jones River, design funding was not appropriated for the Isaac Branch Trail – Phase III project, and the planning study ended without a final plan for implementation.

Figure 1
Location Map

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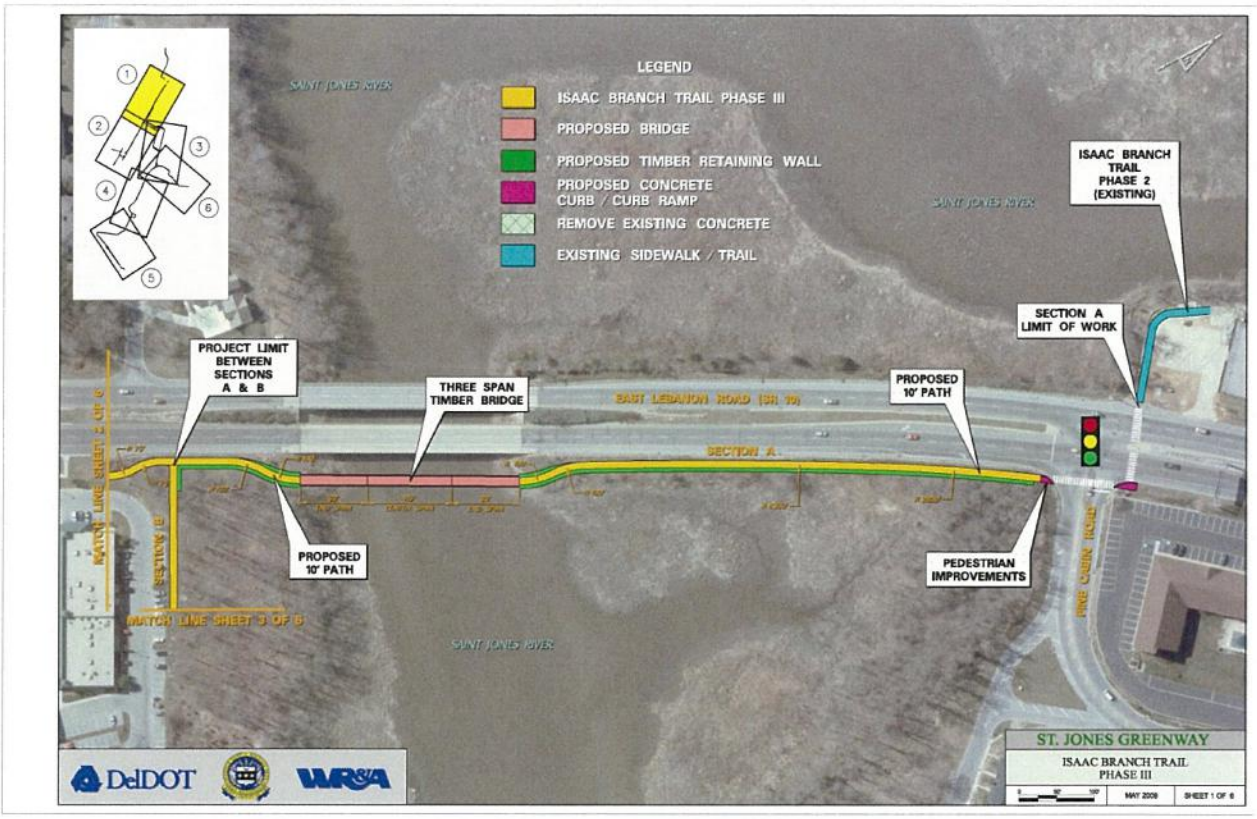
FIGURE 2
ST. JONES GREENWAY – PHASE III
PREVIOUSLY EVALUATED OPTIONS



Source: *Initial Concept Study, St. Jones Greenway, Isaac Branch Trail – Phase III*
Prepared by Whitman Requardt and Associates in May 2009
Prepared for the Delaware Department of Transportation

Despite the fiscal issues identified in the previous TE project, bicycle and pedestrian improvements along Route 10 have been identified as a high priority project from a variety of State and local agencies, including the following:

- Kent County Planning Department (2012) – In correspondence with the MPO, Kent County Planning listed the Route 10 trail from the St. Jones Greenway to U.S. Route 13 as one of the County's top 5 bicycle/pedestrian needs. In addition, the County is actively pursuing a bicycle trail connection from Route 10 to the Hunn Property.

- DNREC (2011) – As part of DNREC's Recreational Trails Projects List, there are five priority projects listed in Kent County. Again, Route 10 (from Pine Cabin Road to the Gateway South shopping center) is identified as one of DNREC's top priority projects.

- St. Jones Greenway Commission – The Greenway Commission, a collaborative effort of State, County, and local governments, has identified the need to extend the existing Isaac Branch trail to the south, as a means of ultimately connecting the City of Dover with the Delaware Bay through a system of trails. The *St. Jones River Greenway Plan*, published in 1998, specifically identifies the Route 10 corridor as an important link to help make this connection a reality.

- Metropolitan Planning Organization Technical Advisory Committee (TAC), Public Advisory Committee (PAC), and Council – Based on meetings held in February and March, 2012, each of the MPO's advisory committees, as well as the MPO Council, has expressed support for providing bicycle and pedestrian improvements along Route 10.

In the fall of 2011, Governor Jack Markell established a vision for creating a world-class network of interconnected, non-motorized trails and pathways throughout Delaware. The goals of the vision, as detailed in the *First State Trails and Pathways Plan*, are summarized below.

- Re-establish Delaware in the Top 10 of Bicycling Friendly States

- Support the creation of local jobs related to bicycling

- Link Delaware's communities internally, thus supporting the local economies

- Link neighborhoods, towns, and cities with a system of trails

- Expand outdoor recreational opportunities, supporting healthier communities

The Memorandum of Understanding that was established between DelDOT and DNREC indicated that the agencies will develop a Statewide Trails and Pathways Plan that outlines a network of bicycle and pedestrian systems that will:

- Serve both recreational and alternative transportation goals

- Build on today's existing trails and pathways

- Connect communities

EXISTING LAND USE

As shown on *Figure 1*, the land use within the study limits is a combination of open space, residential, and commercial. The County-owned Hunn Property is a 173-acre parcel on the south side of Route 10. Currently, the property is vacant, but the County ultimately has plans to develop recreational facilities on the property. The County also has plans to build a portion of the trail system on the property, tentatively scheduled for the fall of 2012.

There is one primary residential area located within the study limits, the Generals Greene community on the south side of Route 10. Generals Greene is a lower-income community consisting of more than 90 townhouse lots and 6 large apartment buildings. The adjacent community to the south, Dover Air Park, consists of nearly 100 mobile home lots. There are numerous single-family residential communities located along Route 10, west of the study limits.

There are two primary commercial areas within the study limits, a small strip shopping area at the southeast corner of Route 10/Pine Cabin Road and the larger Gateway South shopping center on the south side of Route 10. The Gateway South shopping center includes a grocery store, a dollar store, and traditional services such as a pizza shop, Chinese restaurant, and liquor store. In addition, there is a Wawa convenience store located on the north side of Route 10, across from Gateway South.

On the north side of Route 10, there is a hotel located at the east end of the study limits, and extensive open space associated with the St. Jones River. At the eastern limits of Route 10 lies the Dover Air Force Base, which generates significant amounts of traffic along Route 10.

Gateway South Shopping Center

EXISTING TRANSPORTATION CONDITIONS

Within the study limits, Route 10 is a 4-lane, divided highway. Listed in the table below are some of the pertinent transportation characteristics of Route 10.

Characteristic	Description
Functional Classification	Minor Arterial
Average Annual Daily Traffic Volume (2010)	23,187 vehicles per day
Speed Limit	50 MPH
Travel Lane Width	12 feet

As shown on *Figure 1*, Route 10 traverses the St. Jones River with separate 300-foot long bridges, one eastbound and one westbound. The existing lane and shoulder dimensions of eastbound Route 10 over the St. Jones River are shown on the photo below.

Existing Dimensions – Eastbound Route 10

Along eastbound Route 10, there is a continuous outside shoulder, ranging from 10 to 12 feet in width. At Pine Cabin Road, the shoulder converts into the right turn lane. The inside shoulder is 4 feet wide throughout the limits of the study.

With the exception of the bridge over the St. Jones River, westbound Route 10 has a continuous outside shoulder, ranging from 8 to 10 feet in width. The inside shoulder is also 4 to 5 feet wide (except across the river). Along westbound Route 10, the shoulder virtually disappears over the St. Jones River, as shown in the photo below.

Existing Dimensions – Westbound Route 10

On the DelDOT Bicycle Map (2011 edition), Route 10 is classified as a Regional Bicycle Route, which according to DelDOT "provide direct connections between major municipalities and activity centers." The Bicycle Map also indicates that Route 10 is considered "challenging" for cyclists.

One of Kent County's primary off-road trails, the Isaac Branch trail, terminates at Route 10 within the study limits. This 2 ½ mile trail provides a direct bicycle and pedestrian connection from U.S. Route 13 to Route 10. The MPO and DelDOT are currently evaluating extending the trail an additional 1.2 miles into downtown Dover (to the existing trail network at Silver Lake Park). This is DelDOT's top priority off-road trail connection for Kent County. Should funding be secured this fiscal year, construction on that segment could begin in fiscal year 2013. *Figure 3* shows the location of the existing Isaac Branch trail, as well as the proposed trail connections in the City of Dover.

Isaac Branch trail at Route 10 - Looking North

Figure 3
City Of Dover
Proposed Bicycle/Pedestrian Improvements

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DART First State provides transit service along Route 10 via two bus routes, Route 105 and Route 106. The routes are described below:

- Route 105 – provides service from downtown Dover via South State Street and Route 10, terminating at the Gateway South Shopping Center.

- Route 106 – provides service from Camden to Dover Air Force Base and downtown Dover via Route 10.

There are several designated bus stops along Route 10, as shown on *Figure 4*. Within the Gateway South Shopping Center, the bus stop is located at the Dollar General store.

Within the study limits, there is an existing 5-foot wide sidewalk along the length of the Gateway South frontage. There is no sidewalk providing access from Generals Greene to Route 10. Existing sidewalk locations are shown on *Figure 4*.

In addition to providing excellent access for motorists, the Gateway South shopping center is a prime destination for pedestrians in the area, as it is located only 1/4 mile from the entrance to Generals Greene. The MPO conducted bicycle and pedestrian counts along Route 10, between Generals Greene and the shopping center on February 28 and March 21, 2012. The counts were conducted in clear weather, during daytime hours (8:00 AM to 6:00 PM). The results of the counts are shown in *Table 1* and also on *Figure 4*.

TABLE 1
BICYCLE AND PEDESTRIAN COUNTS

	February 28		March 21		
	Pedestrians	Bicyclists	Pedestrians	Bicyclists	**Total**
Eastbound	9	0	11	4	**24**
Westbound	10	2	17	4	**33**
Total	**19**	**2**	**28**	**8**	**57**

February 28 weather: clear all day, 40° to 55°

March 21 weather: partly cloudy in the morning, sunny in the afternoon, 55° to 70°

General observations regarding the counts:

- The majority of the pedestrians (75%) were using Route 10 to access the Gateway South Shopping Center, from the Generals Greene community.

- The majority of the observed bicycle movements (80%) were through trips, passing beyond the shopping center or Generals Greene.

- Most of the pedestrian trips were made by solo individuals. However, there were at least 3 mothers observed pushing strollers to and from the shopping center.

Route 10/St. Jones River – Looking East

Figure 4
Existing Conditions

Bicycle/Pedestrian data based on counts taken February 28th and March 21st, 2012

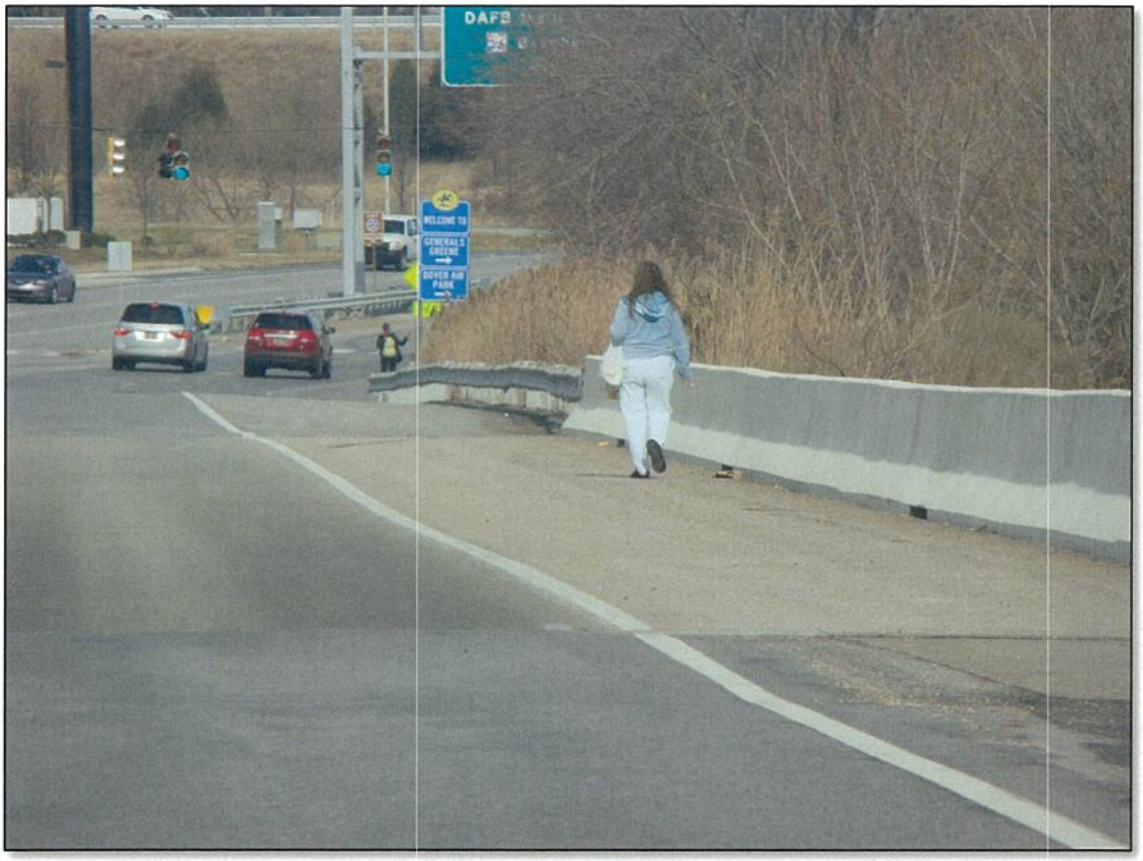
April 2012

EXISTING CONSTRAINTS

In addition to vehicular traffic, Route 10 serves a variety of multi-modal transportation uses, based on the following factors:

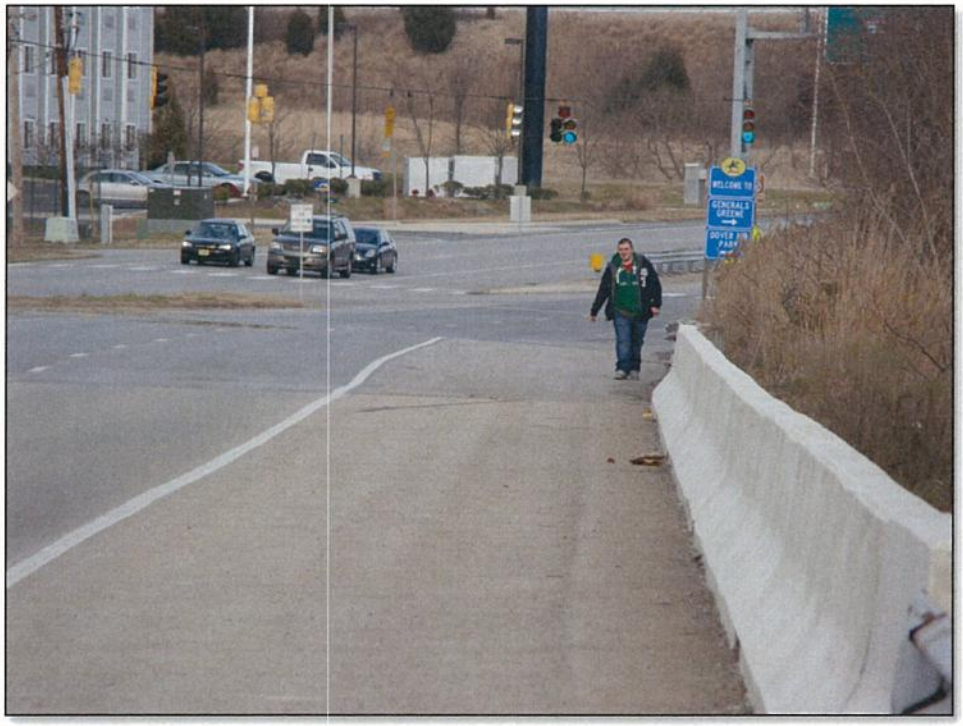
- Proximity of dense housing (Generals Greene) to major pedestrian attractors (1/4 mile)
- Terminus of Kent County's primary off-road bicycle trail, the Isaac Branch trail
- Commuter bicycle access from Route 10 communities to/from the Dover Air Force Base
- Potential increase in recreational bicycle traffic with new connection from Silver Lake Park to Isaac Branch

Even though pedestrians are currently using Route 10 to travel to and from their shopping destinations, conditions are not ideal for pedestrians. Guardrail exists throughout most of the area between Generals Greene and the Gateway South Shopping Center. As shown in the photo below, pedestrians have little choice but to walk along the shoulder, which is unprotected from potentially errant vehicles.



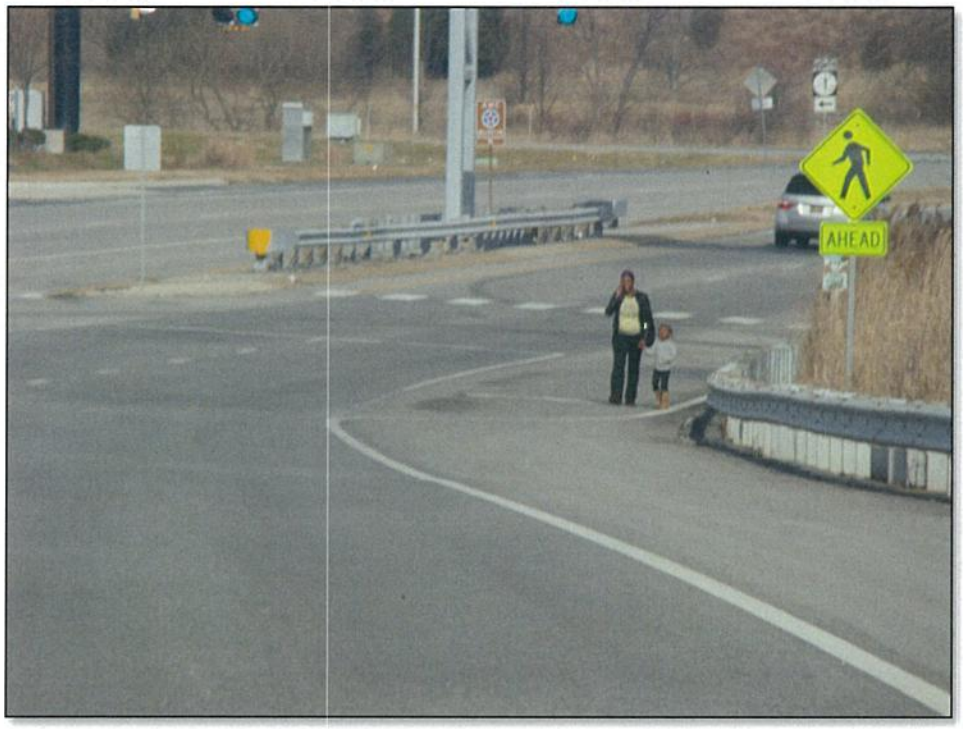
Route 10 – Looking East

Route 10 – Looking West



Route 10 – Looking East

As shown in the photo below, the shoulder along eastbound Route 10 converts into a striped right turn lane at Pine Cabin Road, creating potentially hazardous situations for pedestrians.



Route 10/Pine Cabin Road – Looking East

Route 10/Pine Cabin Road – Looking West

In addition to the potential hazards experienced by pedestrians, along westbound Route 10, the outside shoulder drops from 10 feet prior to the St. Jones River Bridge, to about 1 foot on the bridge itself. This section creates a very hazardous situation for bicyclists that are using Route 10 in the westbound direction, particularly bicyclists that are leaving the Isaac Branch trail or those that are traveling west from the Dover Air Force Base. Due to the lack of an adequate shoulder along the bridge, bicyclists must share a portion of the travel lane with motorists, most of who are traveling at speeds greater than 50 miles per hour. In addition, bicyclists traveling westbound are going in an uphill direction, further reducing their ability to travel quickly along the 300-foot long bridge.

Route 10 over St. Jones River – Looking West

POTENTIAL SOLUTIONS

In an effort to improve safety and address the needs of bicyclists and pedestrians along this important transportation facility, the MPO has presented several different improvement options to DelDOT Planning and DelDOT Bridge representatives. These options are listed below and described in more detail in the following paragraphs.

- Separate bridge for a multi-use path (new construction)
- Separate bridge for a multi-use path (attached to existing eastbound Route 10 bridge)
- Barrier-separated multi-use path on the existing eastbound Route 10 shoulder

Option 1 – Separate bridge for a multi-use path (new construction)

Initially, the concept of a new bicycle and pedestrian bridge was discussed with DelDOT. It was noted that there would be relatively significant environmental impacts associated with the construction of a new crossing of the St. Jones River, requiring environmental agency review and approvals. Combined with the conceptual cost estimates of over $2 million to build a new bridge, it was decided that it would be difficult to justify the construction of a new bridge at this time, given the fact that the Department is reducing its Capital Transportation Program budget during the continued economic downturn.

As shown on *Figure 2*, this option was previously evaluated by DelDOT as part of the *St. Jones Greenway, Isaac Branch Trail – Phase III* study. This study evaluated the feasibility of extending the trail from its termination point at Route 10 to the Lebanon Landing boating area. Due to the potential environmental impacts, and the estimated $3.6 million to complete the entire project, the project was not furthered into final design.

Route 10/St. Jones River – Looking West

Option 2 and Option 4 – Separate bridge for a multi-use path (attached to existing bridge)

Eastbound Route 10 (Bridge #2-356B)

DelDOT and the MPO discussed the idea of a new bicycle/pedestrian structure cantilevered off of the existing eastbound Route 10 bridge. While feasible from an engineering standpoint, the DelDOT Bridge Design section indicated that there are several potential issues associated with funding. Based on a conceptual cost estimate of $350 per square foot of widening, the bridge widening alone would likely cost over $1 million to build. Combined with the trail connections leading up to the bridge, the total estimated cost of this option is $1.2 million. This alternative is shown as Option 2 on *Figure 6.*

Because the eastbound Route 10 bridge is not considered structurally deficient or functionally obsolete, DelDOT would not be able to use Federal Bridge Funds for this widening project. DelDOT has very rigid requirements on the eligibility of a bridge for Federal Bridge Funds, and there are many more projects throughout the state where the funding could be used for bridges that meet the eligibility requirements.

Route 10/St. Jones River - Looking East

Westbound Route 10 (Bridge #2-356C)

DelDOT Bridge records indicate that the westbound Route 10 span is currently functionally obsolete. This means that the functionality of the structure does not meet current design standards. According to the National Bridge Inspection System Code, for a two-lane, one-way roadway like Route 10, the required barrier to barrier width is 30 feet. Currently, the barrier to barrier width along westbound Route 10 is about 27 feet, which causes the bridge to be considered functionally obsolete.

DelDOT Bridge Design engineers indicated that the functionality of the bridge would have to be addressed when the bridge ranks high enough on the Department's priority list. Route 10 is currently not listed within the DelDOT bridge improvement program. Based on correspondence from the DelDOT Bridge Design section, westbound Route 10 could potentially make the priority list within the next 10 years. As such, any potential bridge replacement or rehabilitation work would have to consider the incorporation of bicycle and pedestrian improvements. This is also consistent with the Department's Complete Streets Policy, which indicates that all projects within the State's right-of-way shall "consider all transportation modes and accommodate accordingly."

An alternative that would widen the bridge on westbound Route 10 is shown as Option 4 on *Figure 6*. The cost to widen the bridge would likely exceed $1 million, based on cost estimates provided by the DelDOT Bridge Section. As with Option 2, the cost of the entire alternative (including the trail approaches) would be approximately $1.2 million, based on a planning-level estimation of likely construction items and quantities.

Below is an example of a roadway (on structure) that accommodates bicycles and pedestrians through a path separated from the flow of vehicular traffic.

Route 2 (Kirkwood Highway) – East of Newark

Option 3 - Barrier-separated multi-use path on the existing eastbound Route 10 shoulder

As a means to enhance safety for pedestrians traveling along Route 10 from the residential areas to the Gateway South Shopping Center, the MPO developed an alternative that would provide a delineated area for bicyclists and pedestrians. Due to the desire to reduce the amount of fill material required (and subsequent adverse environmental impacts), this alternative consists of the construction of a wooden boardwalk that would be located behind the existing guardrail. There is guardrail along eastbound Route 10 throughout most of the study limits. This option would remove bicyclists and pedestrians from the Route 10 shoulder, providing them with a protected area. The photo below shows an artist's rendering of the proposed boardwalk concept, in front of the shopping center.

RENDERING OF BOARDWALK CONCEPT

Existing - Looking East

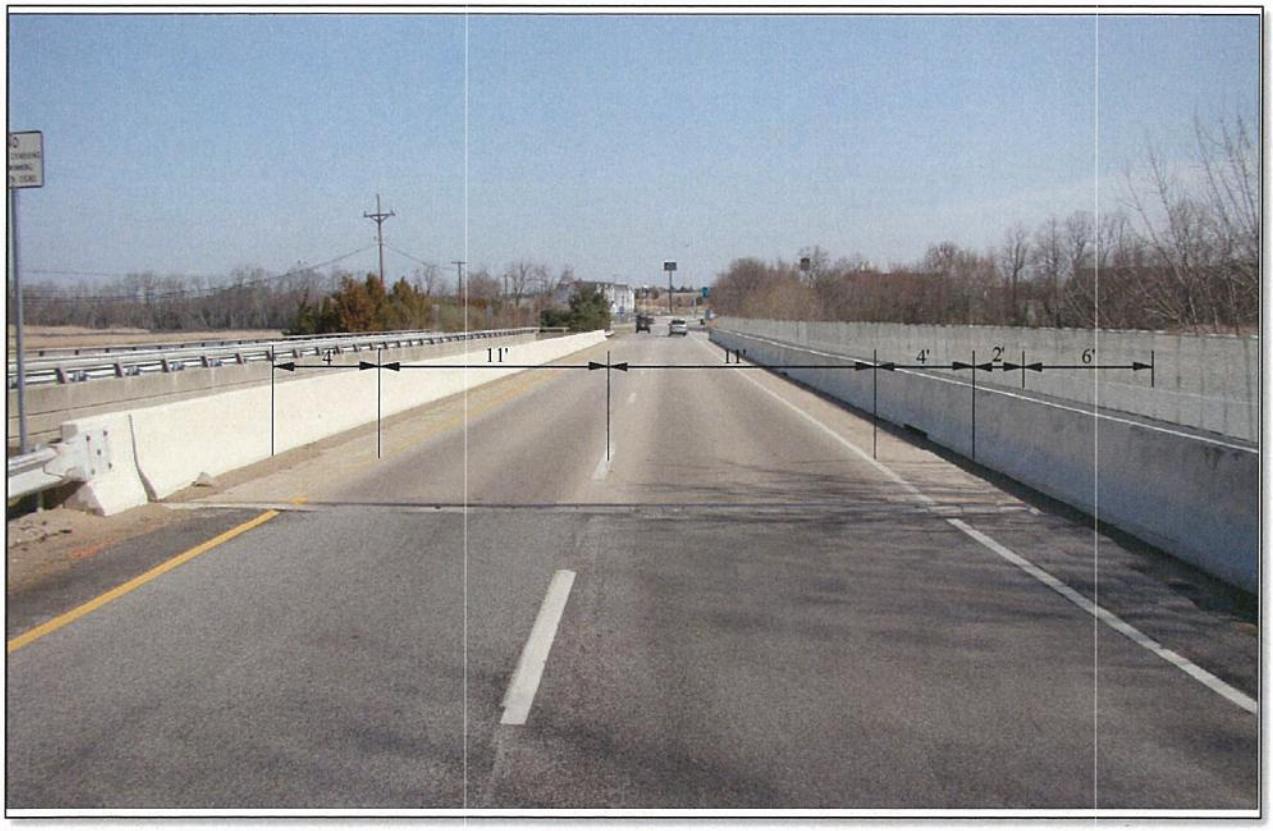
Proposed -Looking East

While the boardwalk option would provide a delineated area for bicyclists and pedestrians beyond the limits of the bridge, improvements would still need to be evaluated at the bridge itself.

The optimum solution that would address the needs of bicyclists and pedestrians traveling west on Route 10 is to provide a dedicated area for them on the St. Jones River Bridge, either through an adequate shoulder or a separate bicycle/pedestrian structure. As noted in Option 2, the Department would be required to evaluate the feasibility of incorporating bicycle and pedestrian facilities when the bridge makes the priority improvement list, which is still potentially years away.

As a potential interim improvement measure, the MPO and DelDOT Planning representatives evaluated an option that does not involve a new bridge structure, but rather a utilization of the existing shoulder. As shown on the artist's rendering on *Figure 5*, this option involves the installation of a concrete barrier on the existing shoulder, to provide a delineated area for bicyclists and pedestrians.

FIGURE 5
POTENTIAL DIMENSIONS – EASTBOUND ROUTE 10
CONCRETE BARRIER ADDED ON SHOULDER



This alternative would provide a protected area for bicyclists and pedestrians along the 300-foot length of the bridge. As shown on the artist's renderings below, the proposed boardwalk would tie into the existing shoulder, providing a dedicated facility for non-motorized uses along Route 10.

ARTIST RENDERINGS

Route 10 – Looking East

Route 10 – Looking West

This option would essentially extend the existing Isaac Branch trail further to the south and west, providing an off-road trail system that could easily connect to the future County park facilities planned for the Hunn Property. By providing an off-road trail connection, this alternative eliminates the need for bicyclists to travel on the shoulder-less bridge along westbound Route 10.

Despite the advantages associated with this option, there are several potential issues that must be further evaluated:

Structural

Based on correspondence from the DelDOT Bridge Design section, there are several items that would have to be evaluated from a structural engineering perspective:

- Additional design load from the placement of a barrier
- Introduction of a separate area for pedestrians (would have to be coded in the bridge rating)
- Vehicular collision loading on the existing deck

Design Exceptions

The DelDOT Road Design Manual states that "most projects are expected to meet at least the minimum standard design values established for the project level. For projects on higher functional classification roadways, it is more critical to strive to meet or exceed all of the applicable standards, primarily because the motorist expects a higher standard and will drive the facility accordingly."

For Option 3 to be furthered through the project development process, there is the need for at least three design exceptions from the DelDOT road design standards. The Department has a thorough process for reviewing and approving design exceptions, which ultimately requires the approval of the Chief Engineer. Listed below in *Table 2* are the standards that would require design exceptions, based on Route 10's functional classification as a minor arterial. The design exceptions would be applicable only for the 300-foot section on the St. Jones River Bridge, as the remainder of the proposed improvements would meet the current design standards.

TABLE 2
REQUIRED DESIGN EXCEPTIONS

Item	Minimum Standard	Requested
Lane Width	12 feet	11 feet
Barrier Offset	8 feet	4 feet
Multi-Use Path Width	8 feet	6 feet

Cost

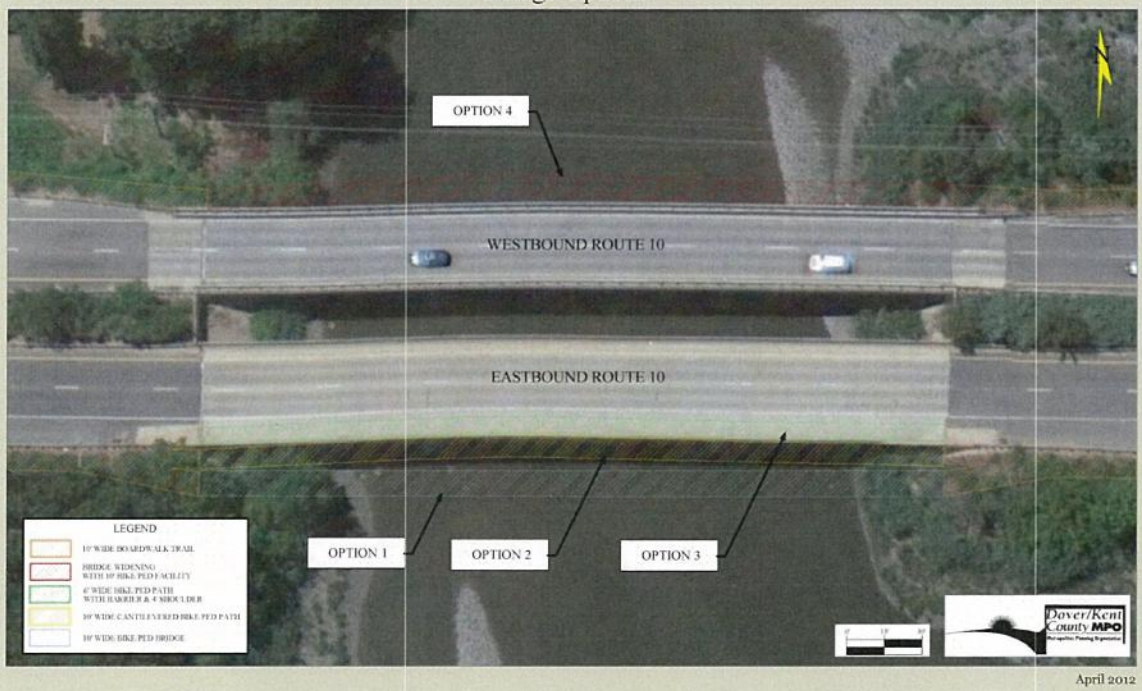
Due to the existing ground slope, it was determined that a traditional path built behind the guardrail would require extensive amounts of fill material and a retaining wall, increasing the cost substantially. As part of the feasibility analysis conducted for the *St. Jones Greenway, Isaac Branch Trail – Phase III* study, the path with retaining wall option was estimated to cost nearly $2.2 million. In addition, construction of a traditional path would have potentially adverse impacts on the surrounding environmentally-sensitive lands. Because of these factors, it was decided that a boardwalk path should be evaluated, as a possible means to reduce cost and minimize environmental impacts.

Route 10 – Looking East

Based on a review of DelDOT bid tab information from similar construction projects, the planning-level cost estimate of Option 3 is approximately $350,000. In addition to the placement of a concrete barrier on the bridge shoulder and the construction of a wooden boardwalk, this estimate includes the following:

- Construction of 300 feet of new sidewalk along a portion of Pine Cabin Road (from Generals Way to Route 10)
- Widening the existing 5 foot wide sidewalk in front of the Gateway South shopping center to 10 feet
- Design engineering and construction engineering

Figure 6
Bridge Options



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NEXT STEPS

Based on the transportation priorities established by Kent County Planning, DelDOT, DNREC, and the MPO, as well as the data and observations that were collected as part of this study, the MPO believes that the *Route 10 Bicycle and Pedestrian Study* demonstrates a need to enhance bicycle and pedestrian mobility along Route 10. Improvements to Route 10 would also be in accordance with the goals and vision set forth in the First State Trails and Pathways Plan:

- Builds upon existing trail plans (MPO Regional Bicycle Plan, St. Jones River Greenway Plan)
- Serves recreational transportation goals (Isaac Branch trail, future Hunn Park)
- Serves alternative transportation goals (DAFB commuters, Generals Greene residents)
- Connects communities (Provide an improved bike connection from DAFB to Camden)

As Route 10 is a State-maintained road, this report will be provided to the Department of Transportation for review, alternative selection, and potential implementation (funding, design, construction). As noted in this report, the primary obstacle to improved bicycle and pedestrian mobility is the Route 10 bridge over the St. Jones River. This is particularly true for westbound Route 10, where the shoulder essentially disappears over the river. This is a major impediment to the flow of bicycle traffic westbound, coming off of the Isaac Branch trail or from the Dover Air Force Base.

Listed in *Table 3* is a summary of the advantages and disadvantages associated with each bridge option.

TABLE 3
SUMMARY OF OPTIONS

Option	Description	Advantages	Disadvantages
1	New bike/ped. bridge	Separated facility Trail continuity	Significant cost Environmental impacts Many years out
2	Attached bike/ped. bridge (EB)	Separated facility Trail continuity	Costly Many years out
3	Barrier added to shoulder	Separated facility Quicker implementation Less costly	Design exceptions Reduced path width Structural evaluation
4	Attached bike/ped. bridge (WB)	Separated facility Trail continuity	Costly Many years out
5	No Build	No cost No environmental impacts	Non-separated facility Safety of WB bikers