Delaware Department of Transportation

FEASIBILITY STUDY

to Facilitate the Creation of a Road Connection from State Route One to New Road, Lewes.

House Resolution No. 47

Technical Memorandum

FINAL
JANUARY 2011

JMT

Table of Contents

1. Introduction

At the request of the Delaware Department of Transportation (DelDOT), Johnson, Mirmiran and Thompson (JMT) conducted a study to determine the feasibility of creating a road connection from SR 1 southbound (Coastal Highway) to New Road in Lewes, Delaware. The purpose of the new roadway connection is to provide a safer and easier way for vehicles, especially vehicles pulling boat trailers to access New Road. The scenarios under consideration include keeping the current rail line under the SR 1 Nassau overpass in active use as well as eliminating the current rail line, leaving the entire underpass available for other transportation uses.

As part of the planning and coordination efforts for this Study, JMT researched DelDOT's Capital Transportation Program and the Sussex County Master Plan, as well as contacted DelDOT and Sussex County staff to identify any planned and proposed projects in the vicinity. The only project that would appear to be impacted by the proposed New Road Extension project is DelDOT's Western Parkway project. However, according to DelDOT the Western Parkway project is currently not an active project and is currently not scheduled to be pursued further. No other planned or proposed projects in the vicinity were identified that would be effected by or would affect the New Road Extension project.

Other coordination efforts undertaken for this Study involved environmental and historical resource agencies and utility providers. Environmental and historical resource agencies including the United States Department of the Interior, Fish and Wildlife Service; the Delaware Natural Heritage Program, Division of Fish and Wildlife; and the Delaware State Historic Preservation Office have been contacted regarding potential resources. A response was received from the U.S. Fish and Wildlife Service stating that there are "no proposed or federally listed endangered or threatened species known to exist within the project impact area." Upon coordination with Delaware Natural Heritage & Endangered Species Program, they have requested to review the design plans once they become available. JMT is awaiting a response from the remaining agencies. Environmental resources (forest, wetlands) appear to be present in the study area and impacts are anticipated. Utilities above and below ground (water, sewer, electric, and communications) currently exist within the study area. Other utilities may be present that have currently not been identified. Based on the information present, no known utilities exist under the SR 1 Nassau Bridge. The roadway connecting SR 1 to New Road is anticipated to have impacts to utilities and minor utility relocation or service modifications are expected as part of the New Road Extension project.

Location map:

2. Traffic Circulation

The recent relocation of the Lewes Boat Ramp resulted in an increase in traffic towing boats along New Road to access the new boat ramp. Access from New Road to SR 1 northbound is currently provided via a right turn from Nassau Road and access to SR 1 southbound is provided via a left turn from Nassau Road. Access to New Road from SR 1 northbound is currently provided at the Nassau Road exit via a right side deceleration lane onto Nassau Road. Access to New Road from SR 1 southbound is currently provided by a left turn lane median crossing. Crossing two lanes of SR 1 northbound traffic can be difficult when traffic is heavy, especially while pulling a boat on a trailer. Similar safety concerns exist for the left turn from Minos Conaway Road (SR 265), which crosses two lanes of SR 1 southbound traffic to access SR 1 northbound. The current posted speed limit on SR 1 within the project area is 50 miles per hour. This Study evaluates the feasibility of providing an exit from the right lane of southbound SR 1 and utilizing the existing Nassau Bridge Overpass for a grade separated crossing of SR 1.

3. Existing SR 1 Nassau Overpass Bridge

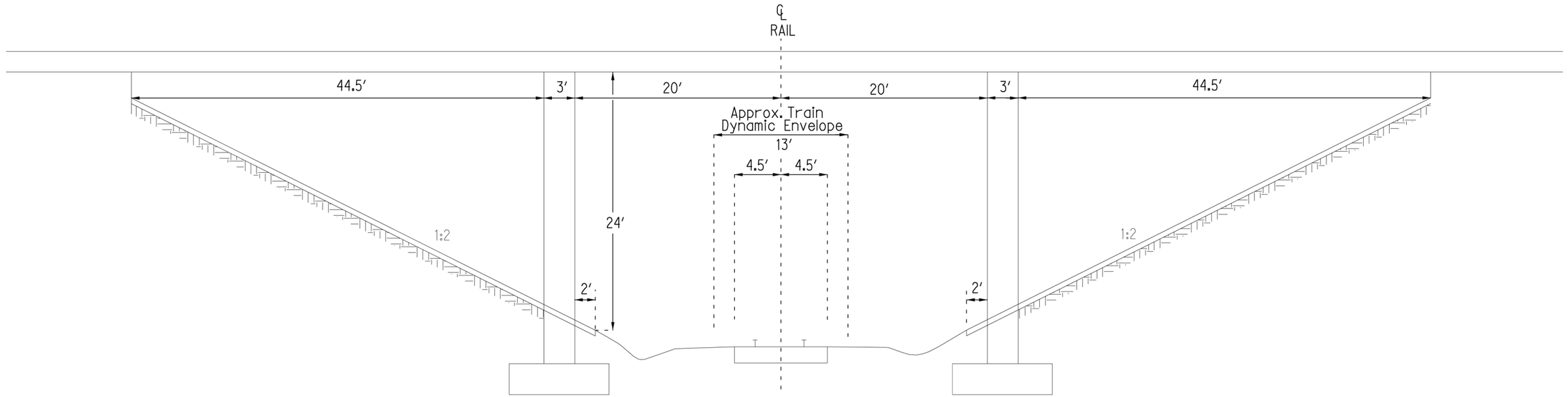
The existing SR 1 Nassau Overpass Bridge, Delaware Bridge No. 725, was constructed in 1966 and is a dual structure carrying SR 1 over the Delaware Coast Line Railroad (DCLR) (Georgetown to Lewes Running Tracks). The west span carries SR 1 southbound, while the east span carries SR 1 northbound. Both superstructures consist of three simple rolled steel multi-beam spans of approximately 46-foot span lengths. The substructure consists of two multi-column reinforced concrete piers on spread footings and two reinforced concrete cantilever stub abutments. The slopes adjacent to the stub abutments have reinforced concrete slope paving.

The existing rail track runs perpendicular to the spans of the bridges and is centered under both center spans. A horizontal clearance of 40 feet from the northern bridge pier to the southern bridge pier is provided under the center span. A horizontal clearance of 15.5 feet from the edge of the rail road ties to the bridge piers and a vertical clearance of approximately 24 feet to the bridge low chords are provided. The railroad track passes under both SR 1 bridge structures over a length of approximately 120 feet. See the existing bridge typical section on the following page.

NEW ROAD EXTENSION FEASIBILITY STUDY

EXISTING CONDITIONS

CAPE MAY FERRY



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Depending on the selection of the proposed typical section, the existing span lengths and bridge openings may not be sufficient to accommodate the desired typical section under the SR 1 Nassau Bridge. Therefore, JMT analyzed three potential structural bridge modification alternatives to accommodate the potential typical sections:

Alternative A – *Modifying the Existing End Spans:*

This alternative proposes providing additional opening widths under the end spans. It requires the partial removal of the existing abutment slope paving and the construction of a retaining wall in its place. This alternative is a common modification for existing bridges with "shoulder" piers and stub abutments. Provided that the retaining wall is properly designed and constructed, the existing slope adjacent to the stub abutments can be modified with no negative effect on the load capacity or serviceability of the existing structure.

Several different retaining wall types are feasible for this alternative, depending on the desired opening width and the corresponding retaining wall height. Crib walls, soldier pile walls, and sheet pile walls have commonly been used for this application.

Preliminary engineering indicates the proposed modification can be completed at either the north or south abutment, or both and it is feasible to provide an opening width of up to 30 feet. From a structural standpoint, the abutments are very similar and there is no advantage to modifying one abutment over the other. No significant construction difficulties are anticipated.

A major benefit of this alternative is the maintenance of SR 1 traffic during construction. Traffic staging is not required while modifying the end spans of the SR 1 Nassau Bridge. Traffic on the bridge would not be affected by the proposed construction and SR 1 traffic would remain uninterrupted during construction.

The cost for this alternative is moderately expensive. It is more cost effective than Alternatives B and C and requires the least amount of maintenance of traffic. Alternative A is the recommended bridge modification alternative.

Alternative B – *Modifying the Existing Main Spans:*

This alternative proposes providing a wider center span opening width. It involves increasing the length of the existing center span, demolishing the existing piers, and building new piers. The existing abutments would be re-used. Relocating the existing piers also requires the complete replacement of the superstructure. There is no practical, cost effective way to re-use the existing superstructure for the new span configuration.

Traffic staging and maintenance of traffic during construction can be done in one of two ways. One way is to utilize one half of the bridge width at a time, meaning utilizing half of the northbound bridge for northbound traffic and half of the southbound bridge for southbound traffic while the other half of each bridge is constructed. A quicker and less expensive construction staging option is to divert all traffic to either the northbound or southbound bridge and completely reconstruct the remaining bridge in one construction stage.

Alternative B is the most expensive, surpassing the cost to completely replacing the SR 1 Bridges (Alternative C). This alternative is therefore not recommended.

Alternative C – *Complete Bridge Replacement:*

Alternative C proposes replacing the existing bridge with a single span bridge with a span length of approximately 75 feet. The construction and traffic staging for this alternative are similar to Alternative B, while the cost is significantly lower. Because the bridge would be entirely new, it also has the benefit of a much longer useful service life than Alternative B. Alternative C is a better option as compared to Alternative B.

Based on our preliminary analysis of the bridge modification alternatives, Alternative A – *Modifying the Existing End Spans* is recommended. This preference is supported by the lower estimated construction cost, lower environmental impacts, and shorter construction duration as compared to the other two alternatives. All three alternatives require maintenance of rail road traffic during construction. Alternative A also has the added benefit of being the least interruptive to SR 1 traffic.

4. Existing Georgetown-Lewes Rail Tracks

The Georgetown-Lewes Railroad Running Tracks are owned by the State of Delaware and operated by the DCLR for the purposes of moving freight. The Georgetown-Lewes Rail Line begins in Georgetown at its' junction with the Norfolk Southern rail tracks and proceeds northeast for approximately 16 miles, basically paralleling US Route 9 between Georgetown and Lewes. The line terminates at the SPI Pharma Barcroft plant abutting the Cape Henlopen State Park entrance.

Currently freight rail operations near the SR 1 Bridge are low speed (less than 10 miles per hour) and low frequency (approximately three carloads every two weeks, servicing SPI Pharma Barcroft). SPI Pharma Barcroft has indicated that they are not anticipating any major increases in volume or

usage of freight rail operations. They also stated that a potential discontinuation of rail service would not affect their operations or sustainability. For the discontinuation of the rail service, the removal of the tracks is anticipated; potential locations are the Gravel Hill or Cool Springs Road areas. A track removal cost of $1,820,000 is anticipated. In addition, a trans-shipment station for SPI Pharma Barcroft will need to be arranged. The construction cost for the site preparation for the trans-shipment area is anticipated to be $300,000 (this does not include any mechanical or electrical equipment used by SPI Pharma for their operations). The anticipated cost for right-of-way is $30,000 (assuming a purchase of only the required area and the remaining area stays with farming).

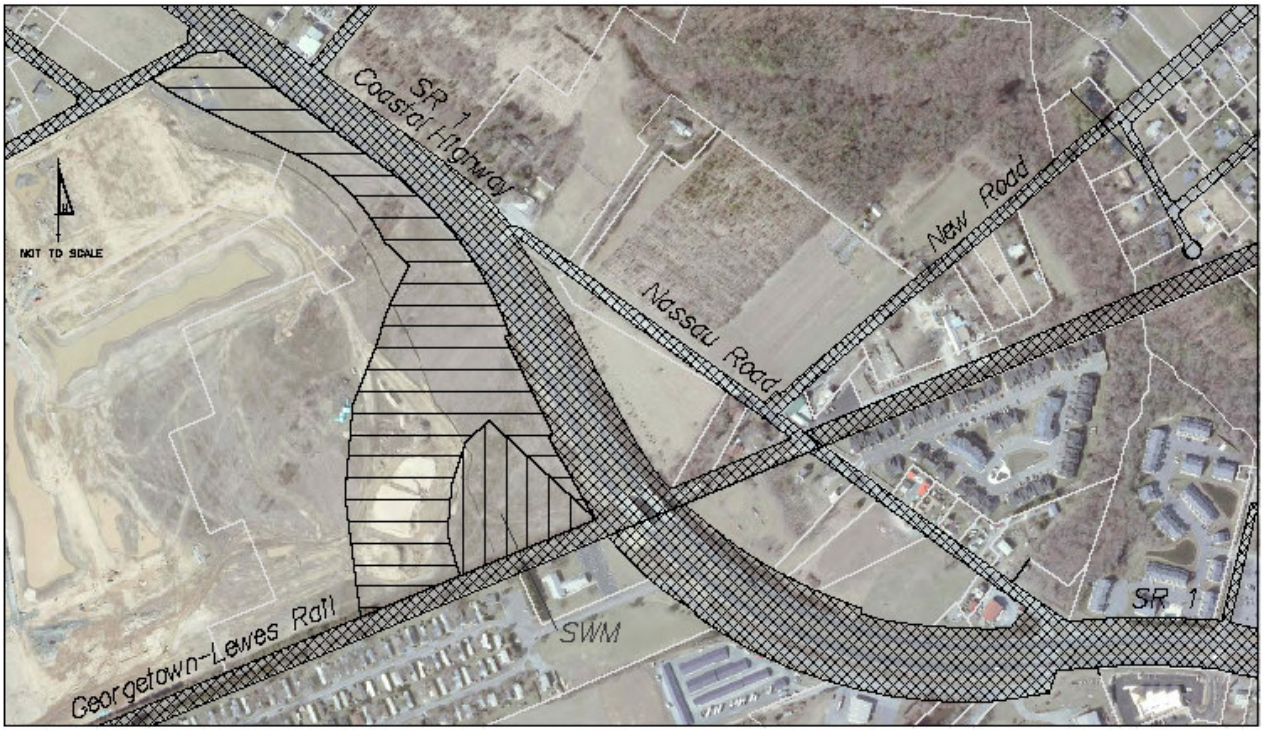
A Train Dynamic Envelope defines the maximum height and width for railway vehicles and its cargo overhang due to any combination of loading, lateral motion, or suspension failure to ensure safe passage through bridges, tunnels and other structures. Coordination with the Federal Railroad Administration (Region 2 Office), the Delaware Transit Corporation (David Campbell), and DCLR (Dan Herhold) did not lead to a conclusive determination of the Train Dynamic Envelope for the Georgetown-Lewes Rail Line. For the purpose of this feasibility study, a 13-foot wide train dynamic envelope has been assumed. This is based on the current operating locomotive, which is 11 feet wide and which is larger than any other currently used cargo car. A one-foot overhang due to train movement is added on both sides.

Before proceeding into further planning or design and depending upon the option chosen, the assumed train dynamic envelope will need to be confirmed.

5. Right-of-Way

All transportation routes within the project study area shown below are publicly owned (cross hatched areas); namely SR 1 (Coastal Highway), New Road (Rd 266), Nassau Road (Rd 266B), and the Georgetown-Lewes rail corridor (approximately 60 feet wide). In addition, DelDOT has ownership of the two parcels west of SR 1 and north of the rail road (hatched areas). The triangular shaped parcel is set aside for a joint use with the adjacent developer for stormwater management.

It is anticipated that a potential roadway connection can stay within the existing DelDOT owned right-of-way west of SR 1; however additional right-of-way acquisition/transfers and easement agreements may be required east of SR 1.



6. Typical Section Options

At the request of DelDOT, JMT considered two typical sections for a road connection from southbound SR 1 to New Road utilizing the SR 1 Nassau overpass. Scenario one, the Rails-With-Trails (RWT) Option, keeps the active Georgetown-Lewes Rail Line in use and a roadway and multi-use path is provided under the bridge. Scenario two, the Rails-To-Trails (RTT) Option, eliminates the rail line and provides a multi-use path and a roadway under the bridge. Under both scenarios the proposed roadway is a one-lane, one-way facility that serves only the southbound SR 1 traffic heading east towards New Road. Per DelDOT direction, a two-way roadway was not proposed. The multi-use path proposed under both scenarios will serve as the planned multi-use hiker/biker trail. The trail will be approximately 17 miles long, from the Georgetown Railroad Station to Cape Henlopen State Park in Lewes, utilizing the DelDOT owned Georgetown-Lewes rail track right-of-way. This off-road facility is anticipated to connect to other existing and planned trails in the vicinity and provide an opportunity for bicyclists, pedestrians and other non-motorized recreational trail users. To facilitate a roadway, a multi-use path, and the rail line (RWT Option) or to facilitate a roadway and a multi-use path (no railroad – RTT Option) various typical section options have been evaluated. All typical sections propose the roadway to be north of the tracks or north of the multi-use path. This configuration avoids the roadway crossing the rail tracks and the multi-use path; creating less conflict points and increasing safety and cost savings.

a. Design Criteria

Design criteria were established prior to developing concept alignments and typical section options. All design criteria are based on design guidelines from DelDOT and AASHTO (American Association of State and Highway Transportation Officials).

The design criteria are based on the following (see the Appendix for the design criteria details):

- The existing posted speed on SR 1 is 50 mph, 40 mph on New Road (rural minor collector, local road) and 35 mph on Nassau Road (rural minor collector, local road).
- The design requirements for horizontal and vertical curve design will safely accommodate trucks and cars pulling a boat trailer.

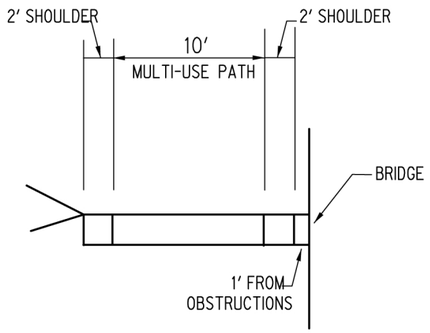
For the one-way, one-lane roadway two design standards are evaluated, a ramp and an urban collector. The design speed for a ramp is 40 mph. The travel way width is 15 feet with a minimum of 2 feet of shoulder on both sides. The design speed for an urban collector is 30 mph; while the travel way width is 10 to 12 feet with a closed drainage section. The typical section requirements

past the shoulders change for the length of the underpass due to the clearance requirement near obstructions. The design criteria for the multi-use path consist of a 10-foot paved travel width with 2-foot shoulders (3 feet near obstructions) on both sides.

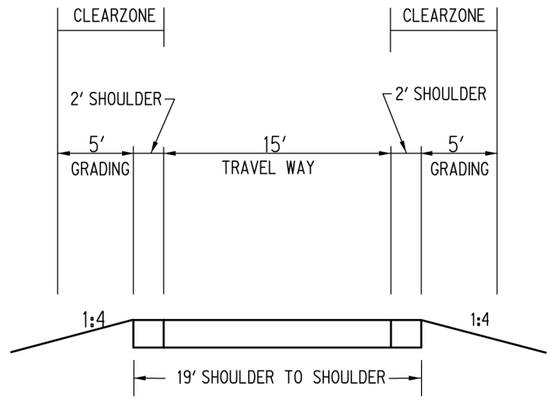
NEW ROAD EXTENSION FEASIBILITY STUDY

ROADWAY AND MULTI-USE PATH TYPICAL SECTIONS

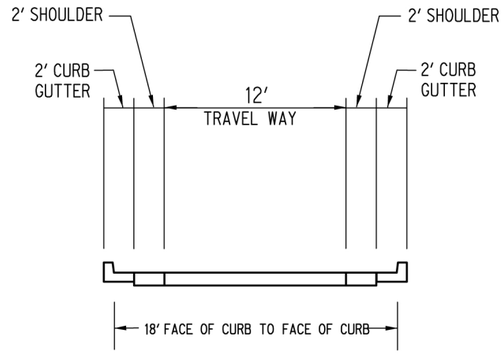
MULTI-USE PATH



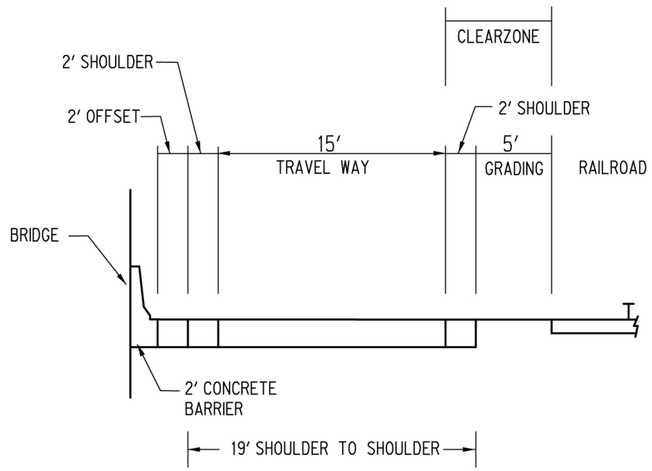
RAMP



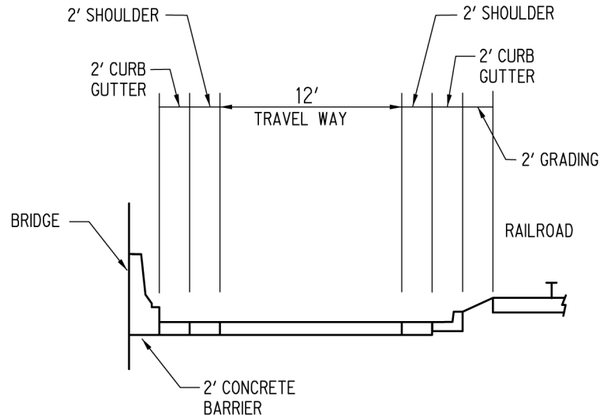
URBAN COLLECTOR



RAMP AT UNDERPASS



URBAN COLLECTOR AT UNDERPASS



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b. Rails-With-Trails (RWT) Option

The Rails-With-Trails Option keeps the current Georgetown to Lewes railroad tracks open for active use and provides in addition to the rail tracks a roadway and a multi-use path under the SR 1 Nassau Bridge.

i. Rails-With-Trails Option 1

Option 1 is not recommended. It was developed to demonstrate how the existing underpass opening can be utilized with only minor bridge modifications. This option requires multiple design exceptions for the multi-use path and the roadway. **It is our opinion that this is not desirable and potentially unsafe and this option is therefore not recommended.**

ii. Rails-With-Trails Option 2

Option 2 utilizes the ramp type roadway which is proposed to be located between the bridge pier and the bridge abutment and a multi-use path located adjacent to the rail tracks. The total ramp roadway width is proposed to be 27 feet and supported by a new retaining wall placed 27 feet away from the existing bridge piers. The cost for the proposed retaining wall and other structural bridge modifications is estimated to be approximately $315,000. This cost is for the retaining wall and bridge modification only and does not include the cost for the roadway, multi-use path, or associated drainage.

A design exception will be required for the multi-use path; the required clearance from the edge of the multi-use path to the centerline is 7 feet and not 14 feet as recommended.

iii. Rails-With-Trails Option 3

Option 3 utilizes the urban collector type roadway which is proposed to be located between the bridge pier and the bridge abutment. The total urban collector roadway width is proposed to be 24 feet and supported by a new retaining wall placed 24 feet away from the existing bridge piers. The cost for the proposed retaining wall and other structural bridge modifications is estimated to be approximately $290,000. This cost is for the retaining wall and bridge modification only and does not include the cost for the roadway, multi-use path, or associated drainage.

Option 3 proposes that the multi-use path be located adjacent to the rail tracks on the south side. This requires a retaining wall to be placed 16 feet south of the southern pier, the cost associated with the retaining wall and structural bridge modifications is

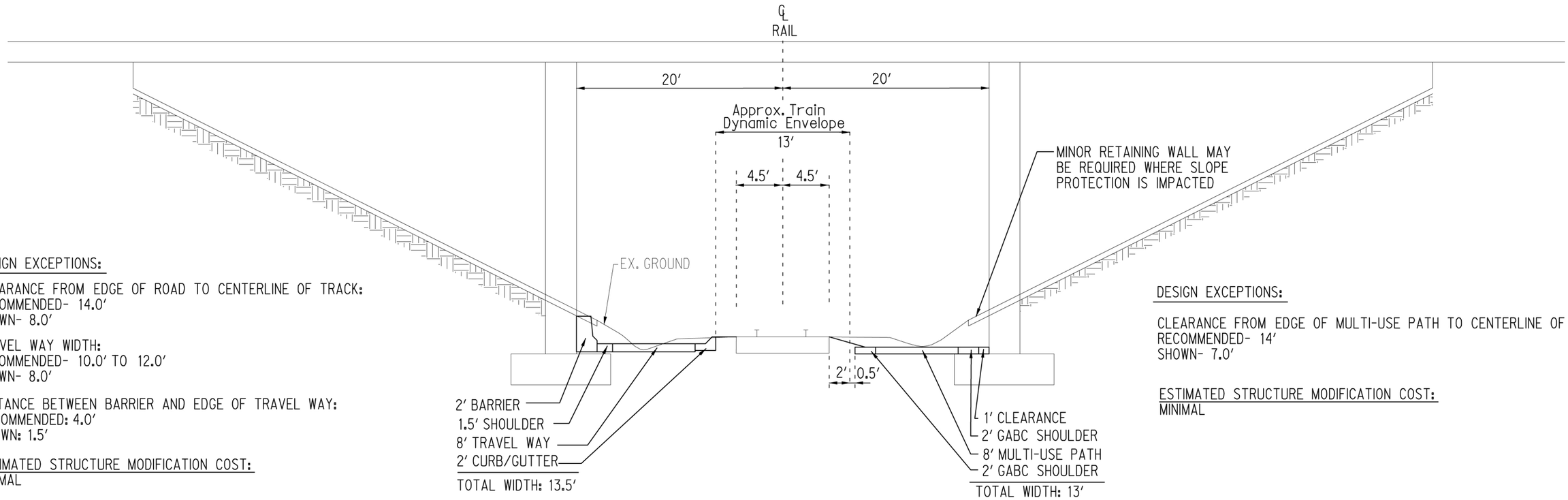
approximately $195,000. No design exceptions will be required for the roadway or the multi-use path.

NEW ROAD EXTENSION FEASIBILITY STUDY

Rails-With-Trails Option 1
(UTILIZATION OF EXISTING UNDERPASS, MINOR BRIDGE MODIFICATION ONLY)

(NOT RECOMMENDED)

CAPE MAY FERRY



DESIGN EXCEPTIONS:

CLEARANCE FROM EDGE OF ROAD TO CENTERLINE OF TRACK:
RECOMMENDED- 14.0′
SHOWN- 8.0′

TRAVEL WAY WIDTH:
RECOMMENDED- 10.0′ TO 12.0′
SHOWN- 8.0′

DISTANCE BETWEEN BARRIER AND EDGE OF TRAVEL WAY:
RECOMMENDED: 4.0′
SHOWN: 1.5′

ESTIMATED STRUCTURE MODIFICATION COST:
MINIMAL

DESIGN EXCEPTIONS:

CLEARANCE FROM EDGE OF MULTI-USE PATH TO CENTERLINE OF TRACK:
RECOMMENDED- 14′
SHOWN- 7.0′

ESTIMATED STRUCTURE MODIFICATION COST:
MINIMAL

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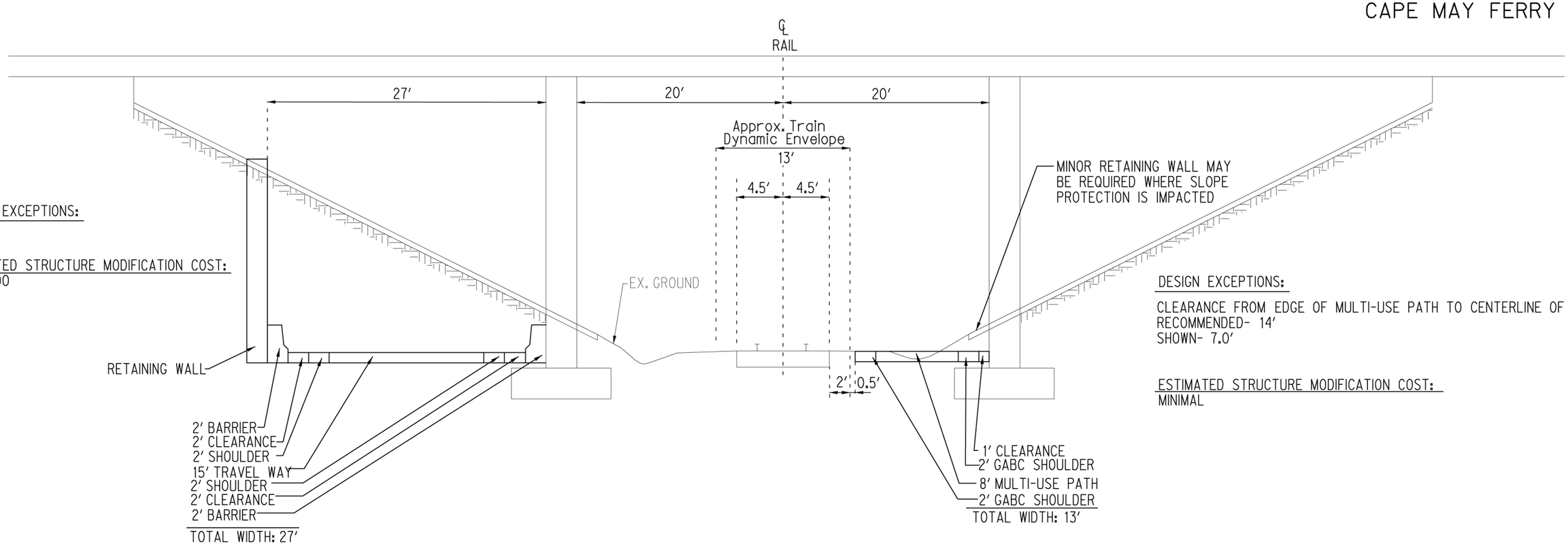
NEW ROAD EXTENSION FEASIBILITY STUDY

Rails-With-Trails Option 2
(RAMP)

CAPE MAY FERRY



DESIGN EXCEPTIONS:

NONE

ESTIMATED STRUCTURE MODIFICATION COST:

$315,000

DESIGN EXCEPTIONS:

CLEARANCE FROM EDGE OF MULTI-USE PATH TO CENTERLINE OF TRACK:
RECOMMENDED- 14′
SHOWN- 7.0′

ESTIMATED STRUCTURE MODIFICATION COST:

MINIMAL

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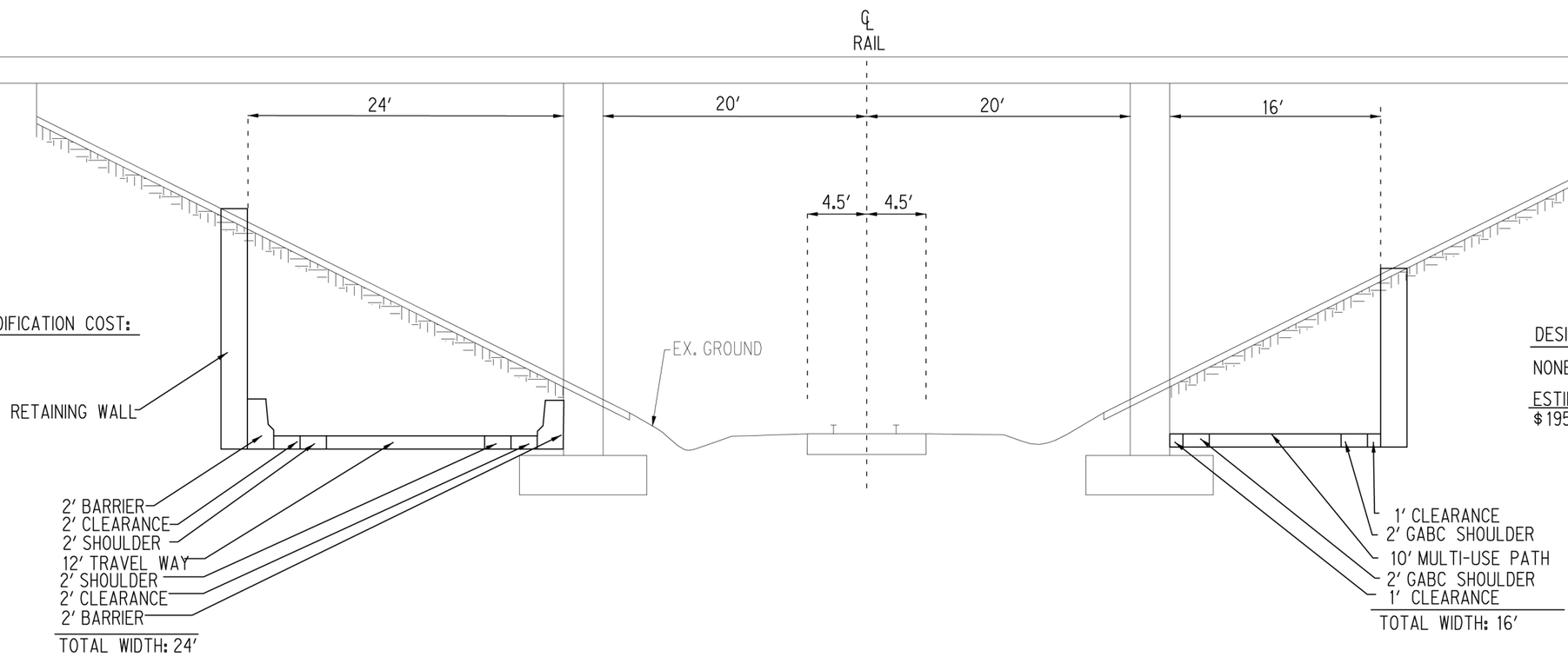
NEW ROAD EXTENSION FEASIBILITY STUDY

Rails-With-Trails Option 3
(URBAN COLLECTOR)

CAPE MAY FERRY



DESIGN EXCEPTIONS:
NONE

ESTIMATED STRUCTURE MODIFICATION COST:
$290,000

TOTAL WIDTH: 24′

DESIGN EXCEPTIONS:
NONE

ESTIMATED STRUCTURE MODIFICATION COST:
$195,000

TOTAL WIDTH: 16′

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c. Rails-To-Trails (RTT) Option

The Rails-To-Trails Option eliminates the current Georgetown to Lewes railroad tracks and provides only a roadway and a multi-use path under the SR 1 Nassau Bridge (see Appendix). With the removal of the rails, an alternative arrangement for shipment to SPI Pharma will need to be developed.

i. Rails-To-Trails Option 1

Option 1 utilizes the ramp type roadway and a multi-use path; both are located under the center spans of the bridge. The total ramp roadway width including a traffic barrier on both sides is proposed to be 27 feet. The multi-use path total width is 13 feet. A traffic barrier separates the multi-use path from the roadway. The multi-use path is proposed to be 8 feet wide and meets the minimum requirement for trail width. The total center span width under the bridge is utilized by this configuration and no major bridge structure modifications are required. The anticipated cost for the required minor bridge modifications is estimated to be minimal.

However a design exception will be required for the multi-use path. As described above, to avoid major structural bridge modifications, the required clearance of one foot from the edge of the multi-use path shoulder to the traffic barrier is not provided.

ii. Rails-To-Trails Option 2

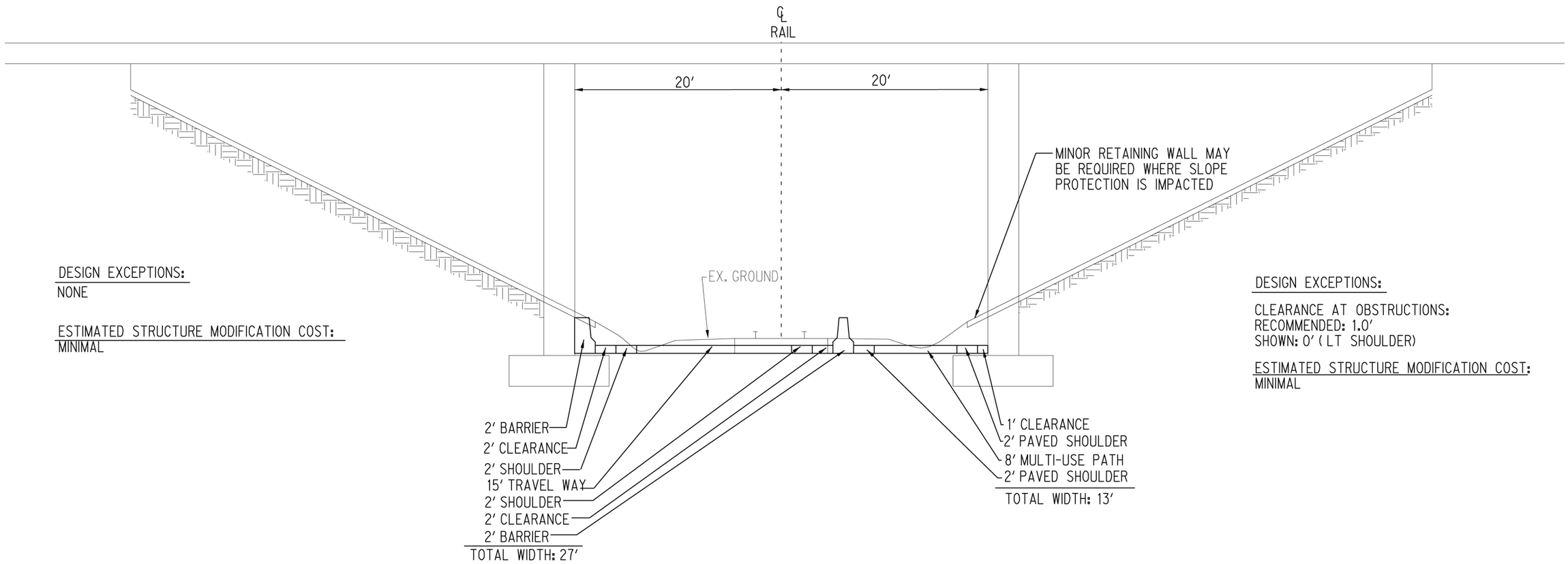
Option 2 utilizes the urban collector type roadway and a multi-use path; both are located under the center spans of the bridge. The total urban collector roadway width including a traffic barrier on both sides is proposed to be 24 feet. The multi-use path total width is 16 feet. A traffic barrier separates the multi-use path from the roadway. The total center span width under the bridge is utilized by this configuration and no major bridge structure modifications are required. The anticipated cost for the required minor bridge modifications is estimated to be minimal.

No design exceptions will be required for the roadway or the multi-use path.

NEW ROAD EXTENSION FEASIBILITY STUDY

Rails-To-Trails Option 1
(RAMP & MULTI-USE PATH)

CAPE MAY FERRY



DESIGN EXCEPTIONS:
NONE

ESTIMATED STRUCTURE MODIFICATION COST:
MINIMAL

TOTAL WIDTH: 27′

TOTAL WIDTH: 13′

DESIGN EXCEPTIONS:

CLEARANCE AT OBSTRUCTIONS:
RECOMMENDED: 1.0′
SHOWN: 0′ (LT SHOULDER)

ESTIMATED STRUCTURE MODIFICATION COST:
MINIMAL

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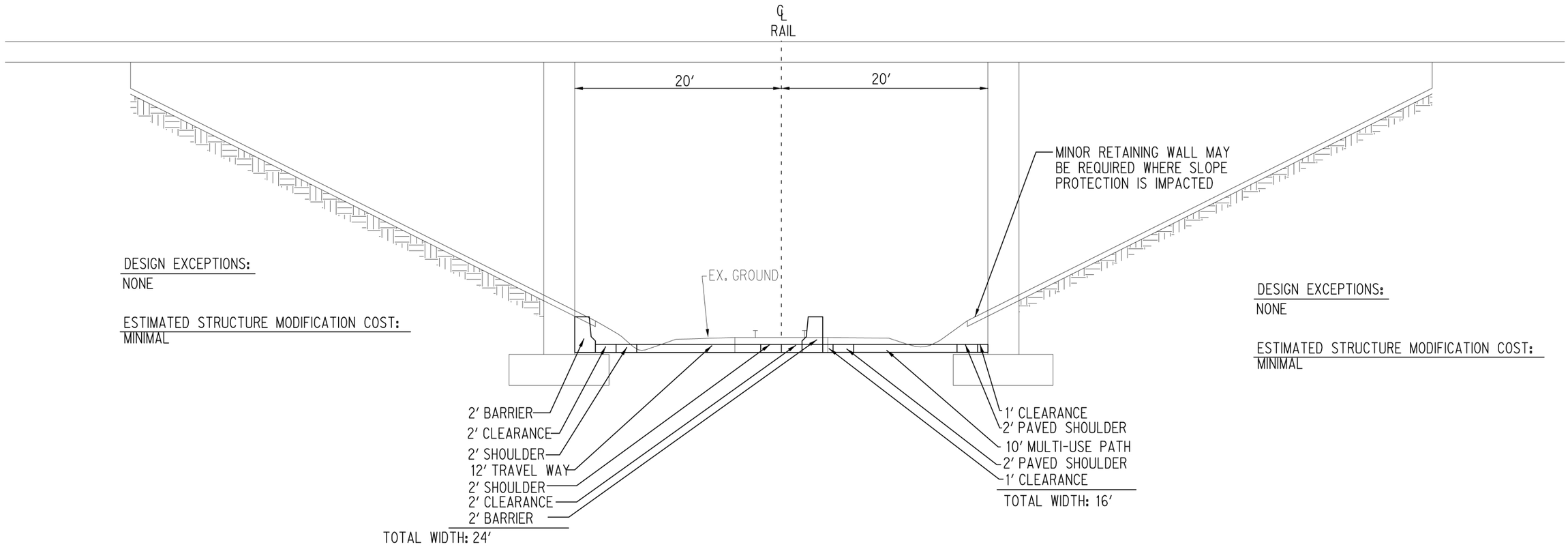
NEW ROAD EXTENSION FEASIBILITY STUDY

Rails-To-Trails Option 2
(URBAN COLLECTOR & MULTI-USE PATH)

CAPE MAY FERRY



DESIGN EXCEPTIONS:
NONE

ESTIMATED STRUCTURE MODIFICATION COST:
MINIMAL

TOTAL WIDTH: 24′

DESIGN EXCEPTIONS:
NONE

ESTIMATED STRUCTURE MODIFICATION COST:
MINIMAL

TOTAL WIDTH: 16′

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7. Horizontal Alignment Concept

Shown on the following map is one possible horizontal alignment for the southbound SR 1 traffic traveling east towards New Road utilizing the SR 1 bridge underpass. The yellow and brown alignments indicate the proposed roadway connecting SR 1 to the Georgetown-Lewes rail corridor and to New Road while the green alignment indicates one potential alignment for an off road multi-use path facility.

Our preliminary analysis indicates that horizontal alignments can be developed that will provide a feasible connection for vehicles with boat trailers and for bicyclists and pedestrians from southbound SR 1 to New Road. It also addresses safety concerns at the intersection of SR 265 and SR 1. The alignment details are as follows:

a. Roadway Alignment

The roadway alignment shown is one of several possible alignments and is represented by a generalized centerline alignment. The yellow alignment depicts a *ramp*-type roadway alignment connecting SR 1 to the Georgetown-Lewes rail corridor and the brown alignment depicts an *urban collector* alignment running along the rail right-of-way corridor connecting the SR 1 ramp to Nassau Road and New Road. The horizontal and vertical design parameters the design criteria previously outlined.

A deceleration lane off-ramp facility is suggested for the ramp-type roadway. This off-ramp would be an extension to the existing southbound SR 1 acceleration lane from SR 265. The alignment runs along the east side of the DelDOT owned right-of-way and follows the SR 1 slope embankment. This alignment location was chosen to minimize costs and impacts to the DelDOT owned property, not to dissect the property, and to leave one large and accessible area for potential development or mitigation opportunities.

The *ramp* alignment tee-intersects the rail track corridor and continues as an *urban collector* type roadway within the rail corridor right-of-way. It passes under the SR 1 bridge structure as described and dimensioned in the **Rails-To-Trails Option 2**. The roadway continues east intersecting Nassau Road directly across from New Road. This section of the alignment and the new intersection is located outside of the rail track right-of-way to meet the design criteria for intersecting roadways. This alignment will require the displacement of one residential home. Other items to be considered are grading and tie-in slopes, vertical slopes, and sight distance.

b. Trail Alignment

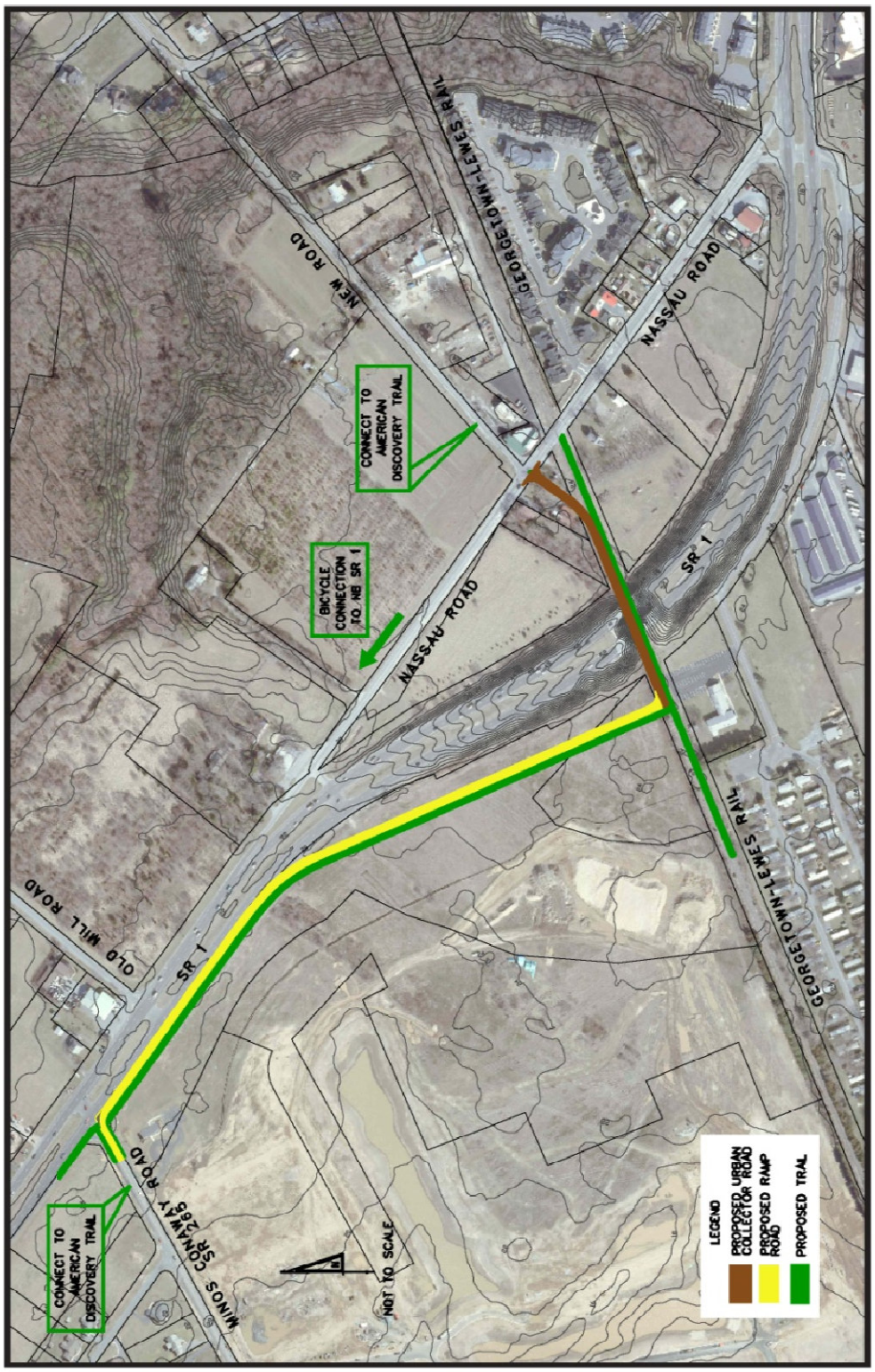
The green alignment indicates one potential trail alignment for an off road multi-use path facility. It is located west of and adjacent to the new roadway alignment. This trail facility utilizes the SR 1 bridge underpass to provide bicyclists and pedestrians traveling towards Lewes along SR 1 southbound a safe crossing of SR 1. It also provides a safer connection of the American Discovery Trail from SR 265 to New Road without an at-grade crossing of SR 1. In addition, the multi-use path will provide access from the American Discovery Trail to the Delaware trail network (such as the Junction Breakwater Trail) via the proposed Georgetown to Lewes Trail.

c. SR 265 Intersection

The intersection of SR 265 and SR 1 is reportedly known for frequent accident occurrences, specifically for SR 265 eastbound traffic making a left turn onto northbound SR 1. SR 265 at SR 1 currently has one left turn lane and one right turn lane.

As part of the New Road interchange connection it is suggested to eliminate the left turn lane at the Minos Conaway intersection; channelize traffic to a single right turn lane; and only allow for a right-out only movement for traffic. The current southbound acceleration lane would be extended and serve as a merge lane for the new SR 1 off-ramp. Northbound traffic will access SR 1 northbound using the new connection to New Road via the SR 1 bridge underpass and safely proceed onto SR 1 northbound via Nassau Road. Southbound SR 1 traffic and access will remain unchanged. Northbound SR 1 to SR 265 will also remain unchanged.

By accessing northbound SR 1 via the SR 1 underpass and eliminating the left turn onto SR 1 safer traffic conditions will be provided at this location.


NEW ROAD
GEORGETOWN-LEWES RAIL
NASSAU ROAD
CONNECT TO AMERICAN DISCOVERY TRAIL
BICYCLE CONNECTION TO NB SR 1
NASSAU ROAD
SR 1
OLD MILL ROAD
SR 1
GEORGETOWN-LEWES RAIL
MINOS CONAWAY ROAD SR 285
CONNECT TO AMERICAN DISCOVERY TRAIL
NOT TO SCALE
LEGEND
PROPOSED URBAN COLLECTOR ROAD
PROPOSED RAMP ROAD
PROPOSED TRAIL

8. Conceptual Cost Estimate

JMT developed a conceptual cost estimate based on the horizontal alignment shown in Section 7, Horizontal Alignment Concept. It is based on a *ramp* type roadway from SR 1 to the Georgetown-Lewes rail corridor, an *urban collector* road along the rail corridor with a Rails-To-Trails Option 2 at the SR 1 bridge underpass. The cost includes modifications to the SR 265 intersection to allow for a right-out only. It also includes the multi-use path from SR 265 to the Nassau Road intersection and the track removal from Cool Springs Road to the Cape Henlopen State Park. The total cost for New Road Extension approximately $3.71 million. To facilitate the extension project, the rail tracks have to be removed and a trans-shipment area be provided for SPI Barcroft; costs for these two related projects can be found under a separate memorandum. The following table summarizes the costs associated with the New Road Extension safety improvements:

Construction Cost	$ 2,485,000
Right-of-Way Cost	$ 485,000
Engineering Cost	$ 445,000
Construction Inspection	$ 297,000
New Road Extension TOTAL	**$ 3,712,000**
Track removal*	$ 1,490,000
Trans-shipment area	$ 330,000
TOTAL	**$ 5,532,000**

*Track Removal from Cool Springs Road to the Cape Henlopen State Park

The conceptual construction cost estimate was developed using itemized quantities from plan sheet take offs, as well as percentages and lump sum items where itemized quantities are not available. Unit costs are based on historic DelDOT bid prices for similar contracted construction work.

Itemized quantities from plan sheet take offs were used for items such as excavation/borrow of earth fill, new roadway and trail pavement, new curb & gutter, barriers, and the track removal. Percentage costs based on industry standards were used for items such as preliminary construction, drainage, and landscaping. Lump sum items include storm water management, bridge modification, utility modification, and signing and pavement marking. A 40 percent contingency factor was also included to account for the conceptual/planning level of detail of this concept alignment, as well as for any unknown or unforeseen site conditions and changes to the concept. Should this alignment or any other alignment layouts be considered for further study or construction, a detailed construction cost estimate based on detailed planning and refined design, updated survey information, utility information, and comprehensive DelDOT and AASHTO standards is recommended.

Cost for Right-of-way utilizing fair market values (plus a 10% contingency) has been included in the estimate as the proposed alignment is outside of DelDOT right-of-way near the Nassau Road intersection. Percentage factors were used for other industry standards such as Engineering and Construction Inspection. Please refer to the Appendix for a more detailed cost estimate breakdown.

9. Conclusion

Based on the preliminary technical engineering analysis described above, we conclude that a roadway connection from SR 1 southbound to New Road can be accomplished and that such a roadway connection will provide a safer and easier way for vehicles, especially pulling boat trailers to access New Road in Lewes. This connection will also provide the opportunity for vehicles from SR 265 eastbound to make a safer connection to SR 1 northbound and New Road. Neither scenario will provide a two-way roadway connection. The roadway intersection at Nassau Road and New Road will result in the displacement of one residential home.

Two scenarios for the rail track corridor were evaluated, a Rails-With-Trails Option (RWT - rail, roadway, and multi-use path) and the Rails-To-Trails Option (RTT - roadway and multi-use path only). We conclude that both scenarios are viable and feasible options. Both scenarios are anticipated to be similar in terms of impacts to utilities, traffic, right-of-way, and environmental resources. The Rails-To-Trails is shown at this time. This will require the coordination with SPI Pharma for alternative delivery service. We also concluded that this multi-use path will provide a safer route for pedestrians and bicyclists crossing SR 1. It will increase the opportunities for recreational activities in the area and will also improve trail connectivity for Delaware's trail system by providing access from existing trails (American Discovery Trail and Junction Breakwater Trail) to the future Georgetown to Lewes Trail.

A feasibility level cost estimate has been completed for these improvements as described above. An estimated cost of $3,712,000 is anticipated for the New Road Extension. To facilitate this project, an additional cost of $1,820,000 is anticipated for the rail track removal and trans-shipment area.

A traffic impact study and a detailed preliminary engineering study has not been performed as part of this Feasibility Study but is recommended before proceeding into design and construction.

10. Appendix

Design Criteria

Conceptual Cost Estimate

Property Impact

Appendix

Design Criteria

NEW ROAD INTERCHANGE FEASIBILITY STUDY

DESIGN CRITERIA

October 2010

Design Vehicle: Passenger car pulling a boat trailer (42 ft length)

Study area:

Existing Posted Speed:

at SR 1:	50 mph
at New Road:	40 mph (rural minor collector, local road)
at Nassau Road:	35 mph (rural minor collector, local road)

MULTI USE HIKER/BIKER TRAIL

Trail Parameters:	consistent with the Georgetown-Lewes Rail Trail Study
Trail Width:	10 feet (typical) and 8 feet trail at pinch points
Trail Shoulders:	2 feet minimum (typical) on both sides 3 feet minimum near obstructions (AASHTO Bike Book, page 36)
Clearance from Center of Rail (RWT)	14 feet from centerline of tack to trail shoulder (typical) and 8 feet at pinch points

RAMP

Off-Ramp Design Speed:	40 MPH (middle range, AASHTO page 826)
Superelevation (emax):	6%
Min. Tangent Between Reverse Curves:	200 feet
Minimum Radius on Inside Edge of Pavement:	485 feet (AASHTO page 168)
Maximum Vertical Slope:	4-6% (AASHTO page 829)
Traveled way/roadway width:	15 ft (AASHTO page 839, Case I: One-lane, one-way operation, **no** provision for passing stalled vehicles, Type B: sufficient SU vehicles)
Paved Shoulder:	Left side: 2 ft Right side: 2 ft Total shoulder widths: 10-12 ft maximum (AASHTO page 838)

Ramps at Underpass:

- Roadway width and shoulder width should be carried through the structure (AASHTO page 840)

Clear Zone:	7-10 feet (AASHTO Roadside Design Guide, Table 3.1, ADT under 750)

- Structural supports should be located beyond clear zone.
- As a minimum, structural supports should be at least 4 feet beyond the edge of paved shoulder (AASHTO, page 840)

Clearance From Center of Rail to Edge of Roadway:	14 feet (Dan Herholdt, DCLR and David Campbell, DART)
Dynamic Trail Envelope	13 ft, approx. (Dan Herholdt, DCLR and David Campbell, DART)
Roadway barrier:	2 ft concrete barrier placed 2 ft off the edge of shoulder Generally required for shielding of bridge piers and abutments May be required for retaining wall for bridge (AASHTO Roadside Design Guide, Table 5.1)

Deceleration Lane:

Deceleration Lane Length for Exit Terminal:	285 feet, parallel type (AASHTO page 851)
Taper:	250 ft (no taper needed: ties in existing acceleration lane)

ONE-LANE ROAD - Urban Collector

AASHTO: Urban Collector, two lane two way operation
Requires design exception for:

- **only providing one travel lane for one way operation**

However: provisions are made for passing stalled vehicles – based on 18 ft pavement width (Case II, Type B on tangent section)

Design Speed:	30 MPH
Superelevation (emax):	6%
Min. Tangent Between Reverse Curves:	235 feet
Minimum Radius on Inside Edge of Pavement:	231 feet (AASHTO page 168)
Maximum Vertical Slope:	9% (AASHTO page 432)
Traveled way/roadway width:	10-12 ft (AASHTO page 433)
Curb:	Full height curb on both sides Face of curb should be offset from edge of travelled way by 1-2 ft (AASHTO page 435)

One-lane road at Underpass:

- Roadway width and shoulder width should be carried through the structure (AASHTO page 436)

Clear Zone:	7-10 feet (AASHTO Roadside Design Guide, Table 3.1, ADT under 750) No clear zone needed in curbed section

- Structural supports should be located beyond clear zone.
- As a minimum, structural supports should be at least 4 feet beyond the edge of paved shoulder (AASHTO, page 840)
- Roadside obstructions should have a clearance of 1.5 ft or more beyond the face of curb (AASHTO page 437)

Clearance From Center of Rail to Edge of Roadway:	14 feet (Dan Herholdt, DCLR and David Campbell, DART)
Dynamic Trail Envelope	13 ft, approx. (Dan Herholdt, DCLR and David Campbell, DART)
Roadway barrier:	2 ft concrete barrier placed 2 ft off the edge of shoulder Generally required for shielding of bridge piers and abutments May be required for retaining wall for bridge (AASHTO Roadside Design Guide, Table 5.1)

VERTICAL CLEARANCE

Vertical Clearance:	16.5 ft (Road Design Manual, page 3-18) Available existing clearance 23'-2" from low chord of bridge to abutment near tracks

References:

DelDOT "Road Design Manual", July 2004
AASHTO "Guide for the Development of Bicycle Facilities", 1999
AASHTO "A Policy on Geometric Design of Highways and Streets", 2004
AASHTO "Roadside Design Guide", 3rd Edition, 2006

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Appendix

Conceptual Cost Estimate

JMT
72 Loveton Circle, Sparks, MD 21152 Telephone 410 - 329-3100

New Road Extension Feasibility Study

CONCEPTUAL COST ESTIMATE

January 2011

ITEM DESCRIPTION	UNIT	UNIT PRICE	QTY	TOTAL COST
1. PRELIMINARY				
Preliminary (35% of 2, 5, 6 & 9 and 8% of 4)	%			$348,703
2. GRADING				
Borrow	CY	$12	6,100	$73,200
Excavation and Embankment	CY	$10	18,300	$183,000
3. DRAINAGE				
Drainage (25% of 2, 5 & 6 and 10% of 4)	%			$239,650
Stormwater management modifications	LS	$50,000	1	$50,000
4. STRUCTURES				
Modifications to SR 1 Bridge	LS	$22,000	1	$22,000
House demolition	LS	$25,000	1	$25,000
5. PAVING				
HMA-Roadway	TONS	$75	4,640	$348,000
HMA-Trail	TONS	$60	1,210	$72,600
GABC	CY	$50	4,090	$204,500
6. SHOULDERS				
Curb & Gutter	LF	$22	250	$5,500
Concrete Barrier	LF	$100	320	$32,000
Concrete Islands	SF	$20	1,050	$21,000
7. LANDSCAPING				
Landscape (2% of 2, 4, 5 & 6)	%			$19,736
8. TRAFFIC AND UTILITIES				
Utility modification	LS	$40,000	1	$40,000
Pavement marking and striping	LS	$30,000	1	$30,000
Signing	LS	$9,000	1	$9,000
Trail wayfinding	LS	$3,000	1	$3,000
9. MISCELLANEOUS				
Removal of railroad tracks and ballast	LF	$17	1,000	$17,000
Removal of bituminous road crossing	LF	$115	50	$5,750
Removal of rail road signs and cross bucks	LS	$3,000	1	$3,000
Environmental Mitigation	LS	$20,000	1	$20,000
CONSTRUCTION COST SUBTOTAL				**$ 1,772,639**
Concept Level Contingency	40 %			$709,055
CONSTRUCTION COST TOTAL				**$ 2,481,694**
Right-of-Way (includes 10% contingency)				$482,900
Engineering	15 %			$444,689
Construction Inspection	10 %			$296,459
	CONSTRUCTION COST TOTAL			**$ 3,705,742**

Appendix

Property Impact

Property Detail Report

For Property Located At

CoreLogic RealQuest Professional

32182 NASSAU RD, LEWES DE 19958

Owner Information:

Owner Name:	**BEST THOMAS & SONS INC**		
Mailing Address:	**PO BOX 130, NASSAU DE 19969-0130 B002**		
Phone Number:		Vesting Codes:	/ /

Location Information:

Legal Description:	**SW/S NASSAU RD NW/S PENN CENTRAL RR**		
County:	**SUSSEX, DE**	APN:	**3-34-05.00-0074.00**
Census Tract / Block:	**509.00 / 1**	Alternate APN:	
Township-Range-Sect:		Subdivision:	
Legal Book/Page:		Map Reference:	/
Legal Lot:		Tract #:	
Legal Block:		School District:	**6**
Market Area:	**1**	Munic/Township:	**DEWEY TO LEWES EAST OF CANAL**
Neighbor Code:			

Owner Transfer Information:

Recording/Sale Date:	/	Deed Type:	
Sale Price:		1st Mtg Document #:	
Document #:			

Last Market Sale Information:

Recording/Sale Date:	/	1st Mtg Amount/Type:	/
Sale Price:		1st Mtg Int. Rate/Type:	/
Sale Type:		1st Mtg Document #:	
Document #:		2nd Mtg Amount/Type:	/
Deed Type:		2nd Mtg Int. Rate/Type:	/
Transfer Document #:		Price Per SqFt:	
New Construction:		Multi/Split Sale:	
Title Company:			
Lender:			
Seller Name:			

Prior Sale Information:

Prior Rec/Sale Date:	/	Prior Lender:	
Prior Sale Price:		Prior 1st Mtg Amt/Type:	/
Prior Doc Number:		Prior 1st Mtg Rate/Type:	/
Prior Deed Type:			

Property Characteristics:

Year Built / Eff:	/	Total Rooms/Offices:		Garage Area:	
Gross Area:		Total Restrooms:		Garage Capacity:	
Building Area:		Roof Type:		Parking Spaces:	
Tot Adj Area:		Roof Material:		Heat Type:	
Above Grade:		Construction:		Air Cond:	
# of Stories:		Foundation:		Pool:	
Other Improvements:		Exterior wall:		Quality:	
		Basement Area:		Condition:	

Site Information:

Zoning:	**AR1**	Acres:	**1.23**	County Use:	**COMMERCIAL (CO)**
Flood Zone:		Lot Area:	**53,400**	State Use:	
Flood Panel:		Lot Width/Depth:	**178 x 300**	Site Influence:	
Flood Panel Date:		Commercial Units:		Sewer Type:	
Land Use:	**COMMERCIAL (NEC)**	Building Class:		Water Type:	

Tax Information:

Total Value:	**$46,200**	Assessed Year:	**2009**	Property Tax:	**$780.47**
Land Value:	**$7,500**	Improved %:	**84%**	Tax Area:	**6**
Improvement Value:	**$38,700**	Tax Year:	**2009**	Tax Exemption:	
Total Taxable Value:					

32182 NASSAU ROAD Lewes, DE 19958

$439,000

3 Beds 1 Baths

Presented by
KATHY FORD
Office: (302)645-6661

Brokered by
Prudential Gallo, REALTORS
Making Beach Dreams Come True!
Type: (302) 645-6661
Toll Free: (800) 321-3839
Type: (302) 645-7609

Property Details

Beds	3 beds	Baths	1 baths
House Size		Lot Size	
Price	$439,000	Price/sqft	
Property Type	Single Family Home	Year Built	1890
Neighborhood		Style	Farm House
Stories	2	Garage	

Property Features

- Status: Active
- Area: LEWES AND REHOBOTH HUNDRED
- Approximate lot is 178X300
- Utilities present: Public Central Sewer, Well
- Cooling features: Window A/C Unit(S)
- County: SUSSEX
- 1 total full bath
- 2 stories
- Parking features: Driveway/Off Street
- Lot features: Irregular Shape, Partially Wooded
- School District: Cape Henlopen
- Hardwood floors

Fireplace Features	
Heating Features	Baseboard Electric, Hot Water/Steam, Radiator
Exterior Construction	Crawl Space, Concrete Block Foundation, Vinyl Siding, Stick/Frame
Roofing	Metal
Interior Features	Laundry/Utility Room 1St Fl, Country Kitchen, Dishwasher, Dryer, Refrigerator, Stove, Washer, Ceiling Fan(S), Storm Door(S), Storm Window(S), Carpet, Vinyl Flooring
Exterior Features	Front Patio, Full Fencing

Agent's Other Listings

See all listings

16578 SAVANNAH RD, LEWES...
$399,900
3 Bed, 2 Bath,

114 W CANAL ST, LEWES...
$699,900
2 Bed, 1 Bath,

Listing Details

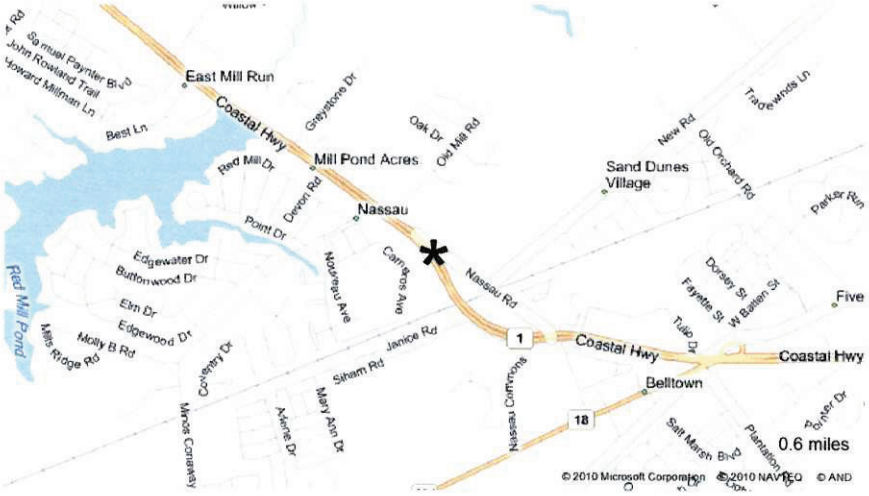
Last refreshed	19 minutes ago	MLS ID	539949
Days on site	1550 days		
Direct access URL	http://www.realtor.com/realestateandhomes-detail/32182-Nassau-Road_Lewes_DE_19958_M57156-34347		

Sales History

No sales history available.

Tax History

No tax history available.



Nearby Schools 32182 Nassau Road

School Name	Distance	Type	Grades	GreatSchools Rating	Parent Rating
Shields (Richard A.) Elementary School	2.5 mi	Public	K - 5		

33213 WOODLAND WAY, Lewes...
$229,900
3 Bed, 2 Bath, 1235 Sq Ft

72 Loveton Circle
Sparks, MD 21152
P: (410) 329-3100
F: (410) 472-3289