

III. ALTERNATIVES

A range of alternatives was developed for constructing a new bridge over the Christina River. This section summarizes the assessment and decision-making process which resulted in the selection of the Preferred Alternative.

Currently along the southern Wilmington Riverfront, there is not a direct, bi-directional connection crossing the Christina River. Vehicles, cyclists, and pedestrians wishing to access the west side Riverfront from east of the River must travel along congested Second Street and MLK Boulevard to West Street or Justison Street, which intersect MLK Boulevard within a distance of 1,000 feet, effectively concentrating all access to and from the west side Riverfront at a single point. A new bridge crossing would expand the roadway network and provide a safe and more direct crossing for cyclists, pedestrians and vehicles to travel to, from, and within the Wilmington Riverfront.

Five alternatives, a no-build and four build alternatives have been analyzed by DelDOT for a new bridge crossing the Christina River. A summary of the alternatives analysis is presented in this chapter.

A. No-Build Alternative

The No-Build Alternative assumes a new bridge will not be constructed over the Christina River. The No-Build Alternative does not meet the purpose and need for this project. The No-Build Alternative would not improve the mobility or the system linkage of the roadway network. The No-Build Alternative would not provide congestion relief to MLK Boulevard and for the additional traffic generated by special events on the Riverfront. However, the No-Build Alternative does provide a baseline condition with which to compare the other considered alternatives. Therefore, the No-Build Alternative is retained for evaluation purposes.

B. Build Alternatives

1. Transportation Systems Management

Transportation Systems Management (TSM) activities maximize the efficiency of the present transportation system or reduce the demand for travel on the system through the implementation of low-cost improvements. Examples of TSM activities include ride sharing, van and carpooling, installation of park and ride facilities, encouragement of telecommuting, introduction or enhancement of bike and pedestrian facilities, and addition of turn lanes. TSM Alternatives, by their nature, do not include the addition of single occupancy vehicle (SOV) lanes and involve only minor work outside existing rights-of-way.

Therefore, because of their limited scope, the different types of TSM improvements would not address the purpose and needs of the project as a standalone alternative. The TSM Alternative does not meet the purpose and need for this project because it would not improve the system linkage or community mobility along the Riverfront.

2. Bridge Elements Considered

The following sections detail the process to determine the primary elements of the proposed bridge structure. These elements include navigational vertical clearance, bridge span, bridge type, and typical section.

a. Navigational Vertical Clearance

There are ten bridges over the Christina River between Newport and its confluence with the Delaware River. Their type, vertical, and horizontal clearances are detailed in **Table 3**, and shown on **Figure 4**.

Table 3: Bridges over the Christina River- South to North

Bridge Name	Type	Clearance (in Feet)		Channel Depth (in Feet)
		Vertical	Horizontal	
James Street	Bascule	4*	49	5.5
SR 141	Fixed	22	100	5.5
I-95	Fixed	22	80	5.5
Defunct Railroad	Swing	n/a ¹	60	5.5
Upper Shellpot Branch Rail	Swing	6 ²	62	5.5
Market Street	Bascule	8*	175	11
Walnut Street	Bascule	13*	175	11
Third Street	Bascule	20*	175	11
Lower Shellpot Branch Rail (CR-1888)	Swing	8*	80	11
I-495	Fixed	60	200	11

* *Swing and Bascule Bridges have infinite vertical clearances when open.*

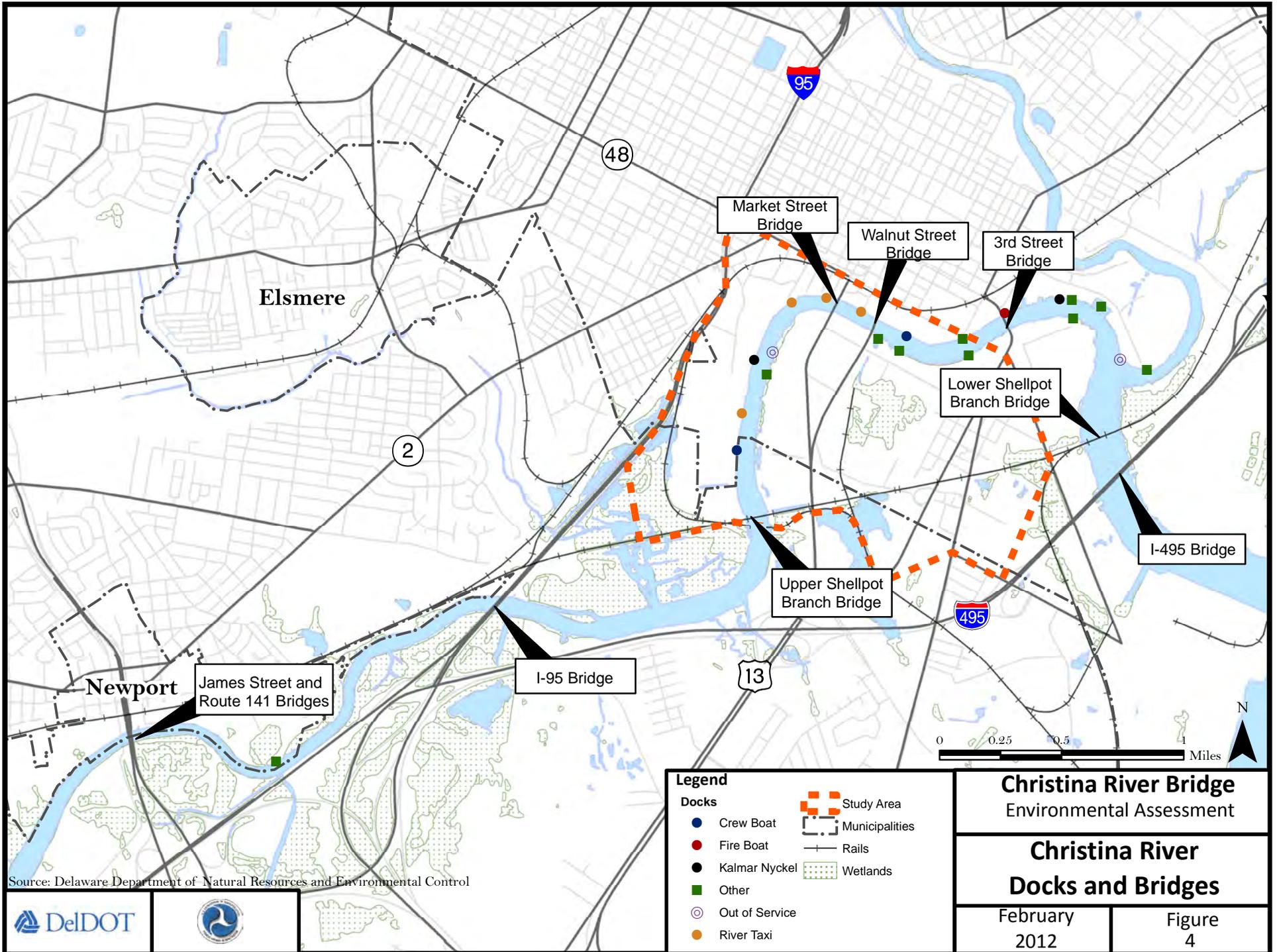
1. *This Bridge has been unusable and open for over 20 years, with no approach spans remaining.*

2. *This bridge is bolted in the closed position and the opening mechanism has been removed. The bridge may be opened to river traffic with the aid of a tugboat and coordination with Norfolk Southern.*

The primary users of the Christina River and the docks are boaters including: the River Taxi; a historic tall-ship the Kalmar Nyckel; crew rowers; and private recreational boaters. The Wilmington River Taxi is a 36-passenger boat operated by the RDC. The River Taxi makes stops at six locations along a 1.6 mile route on the north/left bank of the Christina River, between Dravo Plaza near the Frawley Stadium and the Kalmar Nyckel Shipyard. The tall-ship Kalmar Nyckel travels on the Christina River between the mouth of the Delaware River to the dock at the Shipyard Shops where the ship turns around. The ship berths at the Kalmar Nyckel Dock downstream of the Third Street Bridge. The main operating season for the Kalmar Nyckel is between mid-April and the end of July.

Because the Christina River is now used primarily for recreational uses, the land uses and zoning do not support new industrial uses that would require use of large vessels. The mixed use developments are not projected to generate freight or large recreational traffic. Using the existing vertical clearances of the bridges across the Christina River, DeIDOT recommends a 12-foot minimum vertical clearance for the new bridge. A vertical clearance of 12 feet would enable current users to pass safely under a new bridge and would not restrict current recreational users. Refer to **Appendix A** for the Navigation on the Christina River Technical Memorandum for additional information.

The US Coast Guard will provide the final determination on the vertical clearance for the new bridge through the Section 9 Bridge Permit process. In informal discussions to date, the US Coast Guard has indicated no objection to the recommended 14-foot vertical clearance for the new bridge.



Source: Delaware Department of Natural Resources and Environmental Control



Christina River Bridge Environmental Assessment	
Christina River Docks and Bridges	
February 2012	Figure 4

b. Bridge Span

The width of the Christina River at the proposed crossing is approximately 390 feet (mean high water to mean high water). A bridge that would span the River was considered, but would require extremely deep beams and therefore a higher profile, resulting in compromising views of the City's skyline and higher construction costs. The current configuration places two piers in the water, one on each side of the navigation channel, and the abutments as close to the shore line as possible. The proposed bridge spans are 145'-180'-145', with the center span spanning the navigation channel. This option would not hinder navigation on the Christina River as there will be a 150-foot navigation channel maintained. DelDOT has received verbal approval from the USACE, who maintains the navigational channel in the River, to reduce the navigation channel from 200 to 150 feet. (Refer to Section II.E for additional information.)

c. Bridge Type

For this project, two classifications of bridges were investigated: movable and fixed. The movable bridge types considered included a swing bridge and a single-leaf, bascule bridge. Although movable bridges have the advantage of unlimited vertical clearance, there was not a demonstrated need for a moveable bridge, and the cost of construction, operation and maintenance was determined to be prohibitive. The movable bridge option was therefore eliminated from further consideration.

The second type of structure studied was the fixed bridge. A variety of fixed bridge types were considered, including: steel arch; closed spandrel concrete arch; and open spandrel concrete arch. Each of these options requires a higher profile, impacts the roadway network, impedes mobility and circulation, and impacts developable land, and therefore were not recommended.

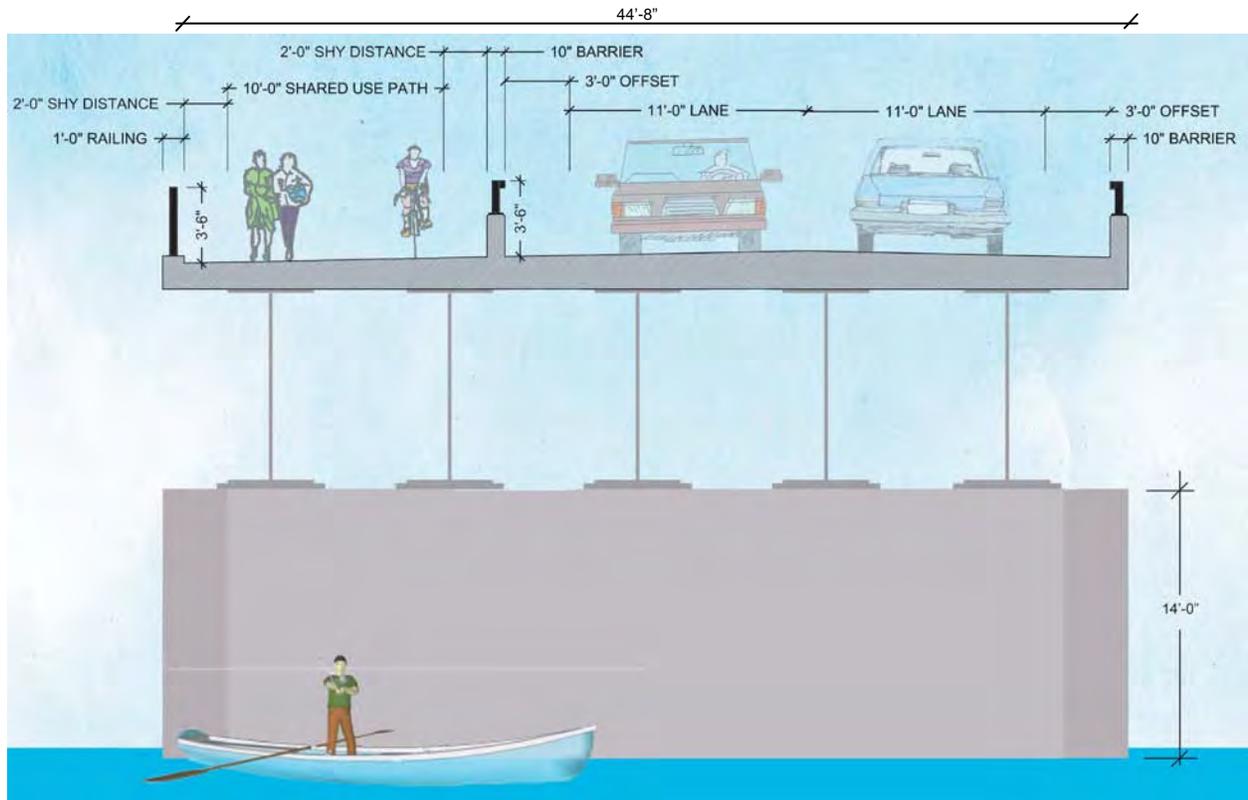
The remaining fixed bridge types investigated were all lower profile structures: steel girder; steel box girder; concrete girder; and concrete box girder. The steel girder bridge option has a lower profile, and consequently has less of a visual impact compared to a concrete girder bridge. Steel girders can achieve greater distance between supports, resulting in smaller and fewer piers. Steel structures are generally lighter than concrete and result in smaller foundations and smaller crane requirements. The steel box girder bridge was found to be the more expensive of the two steel options because of large equipment requirements to lift and set the box girders, but overall the two concrete bridge options were determined to be the most costly of the four low level bridge options.

Based on a combination of a lower profile, smaller piers, and economic considerations, the fixed steel girder bridge was selected as the best bridge type for this location.

d. Typical Section

The proposed bridge includes two, eleven-foot lanes east and westbound (one lane in each direction), with a three-foot offset to a barrier on each side. On the north side of the bridge, a ten-foot wide pedestrian/bicycle shared use path will be provided with a two-foot offset on each side, and separated from the vehicular lanes by a 44-inch high concrete barrier. This provides an overall bridge width of 44'-8" feet and the typical section for the bridge is shown in **Figure 5**.

Figure 5. Proposed Bridge Typical Section Facing East



3. Horizontal Alignment Alternatives Considered

A new bridge crossing the Christina River was evaluated between the existing Market Street Bridge and the existing Upper Shellpot Branch Railroad Bridge. Four crossing locations were considered: Purple, Green, Orange, and Red Alternatives. The Purple, Green, and Orange Alternatives were carried forward for detailed study (refer to **Figure 6**). The Red Alternative alignment was eliminated from further consideration.

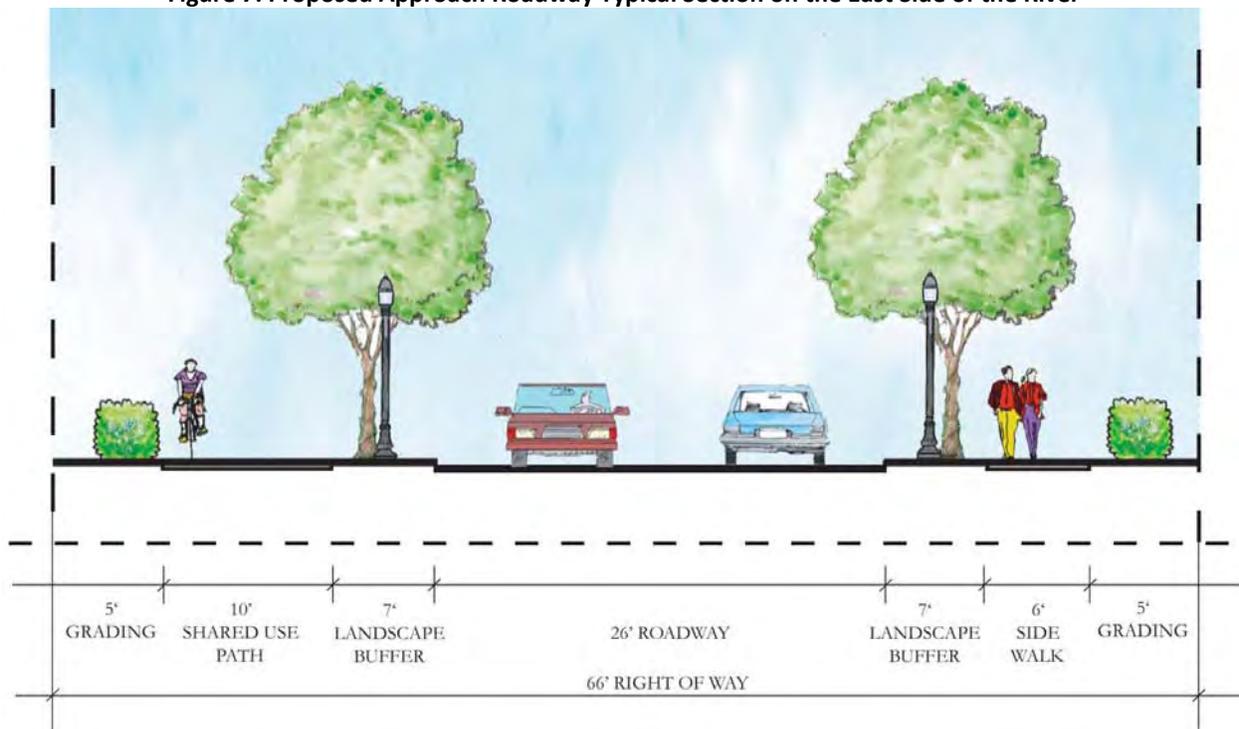
The Red Alternative alignment crossing was located at the southern most edge of the west side Riverfront development adjacent to the northern boundary of the Russell W. Peterson Wildlife Refuge. The Red Alternative was dropped following the February 6, 2008 Resource Agency meeting for the following reasons. The horizontal alignment was within Delmarva Power's 935-foot radius Denial of Public Access Line for the Liquefied Natural Gas (LNG) tank, and could not be modified to be outside of this Denial of Public Access Line and still meet safety and roadway design criteria. Also, due to the proximity of the Red Alternative alignment to the Russell W. Peterson Wildlife Refuge, the Delaware Coastal Zone Management Program and Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Fish and Wildlife, Natural Heritage and Endangered Species Program did not support the Red Alternative alignment.

An additional Orange alignment, the Orange B Alternative, was developed because the State acquired a parcel on the east side of the River just north of James Court. Compared to the Orange A Alternative, the Orange B Alternative reduces the impacts to right-of-way and would

also maintain access to businesses along James Court. The Orange alignments are described later in this section.

As shown in Figure 6, any of the preliminary alignments would expand the street grid on the east side of the River with the east bank approach road to the new bridge (meeting one of the needs for the project). The project, where practical, would include architectural, landscaping and roadway considerations or Green Highways Principles. As illustrated in **Figure 7**, the project would improve the appearance of the commercial and industrial areas on the east bank, as well improve pedestrian accessibility, mobility, and overall safety for residents and roadway users.

Figure 7. Proposed Approach Roadway Typical Section on the East Side of the River



C. Description of the Build Alternatives

The following discussion describes the four horizontal alignments considered and the evaluation of the alternatives in meeting the purpose and needs for the project. The analysis of the Preliminary Alternatives was presented to the regulatory agencies at a meeting on March 4, 2011 and to the public at a meeting on May 16, 2011.

1. Purple Alternative

The Purple Alternative alignment is the northern most potential crossing evaluated and would be an extension of Beech Street on the west side of the River. The location of the Purple Alternative was identified by the DNREC Coastal Zone Management Program through their involvement with the South Wilmington Neighborhood Plan. The Purple Alternative would span over the Riverwalk and tie into Justison Street at-grade on the west side. On the east side of the River, the Purple Alternative would connect to South Market Street at a relocated signalized intersection. In order to provide full and direct access to and from Walnut Street, a

connector road would be constructed between South Market Street and Walnut Street, just north of the ShopRite development. The Walnut Street intersection would be located at an existing signalized intersection.

Advantages:

- Provides the shortest route between the existing development
- Preserves the continuous Riverwalk along the water in the existing location
- Expands the urban street grid providing congestion relief and improving mobility
- Provides a perpendicular crossing of the River
- Maintains current access to and from James Court businesses and those to south
- Maintains current parking spaces for the Stadium and Shipyard Shops
- Provides a direct connection to the East Coast Greenway

Disadvantages:

- Due to the close proximity of the Purple Alternative crossing to the Market and Walnut Street bridges, the traffic diversion from MLK Boulevard and improvements to regional circulation and mobility are minimized
- Deteriorates the operation of Justison/Beech Street intersection resulting in more congestion on the roadway network
- Does not provide congestion relief for event traffic because the alignment is north of the stadium and Chase Center
- Minimizes redevelopment opportunities by bisecting the existing redevelopment properties
- Impacts current redevelopment:
 - The recently opened Children’s Museum would be displaced due to impacting the fire/ emergency access and bus drop off area
 - One business on Market Street would be displaced
 - Impacts restaurant parking
 - Impacts two recently constructed floating docks
- Impacts the dock, operations and upstream access of the Water Taxi and Kalmar Nyckel tall ship

The Purple Alternative does not meet the Purpose and Need for the project. The Purple Alternative would hinder redevelopment opportunities along the Wilmington Riverfront by bisecting the existing redevelopment and directly impacting recently constructed buildings. It would not accommodate the transportation demands or improve mobility along the Riverfront as efficiently as the other alignments to the south. Therefore, the Purple Alternative was dropped from further consideration.

2. Green Alternative

The Green Alternative alignment would connect the boulevard at the Shipyard Shops to South Market Street and Walnut Street. The Green Alternative would span over the Riverwalk; however, the required vertical profile would result in a roadway at-grade tie-in point west of Justison Street, cutting off Justison Street at the boulevard due to the grade difference. The Green Alternative would continue west through the existing stadium parking lot to tie into

Delmarva Lane, which connects to Beech Street and provides vehicular access back to Madison Street and Justison Street.

On the east side of the River, the Green Alternative would intersect South Market Street at a new signalized intersection. Bridge access from northbound Walnut Street would be provided by a left turn lane at the traffic signal. Eastbound access from the bridge to Walnut Street will be provided by an unsignalized added fourth lane. The existing right in/right out connection at Walnut Street to Garasches Lane would be moved south to allow Garasches Lane traffic to access the bridge crossing via the aforementioned left turn lane.

Advantages:

- Preserves the continuous Riverwalk along the water in the existing location
- Improves regional circulation by locating crossing more to the south than the Purple Alternative
- Provides a perpendicular crossing of the River
- Improves traffic operations and provides congestion relief during events by providing a southern ingress/egress route via US 13 and I-495
- Utilizes existing Walnut Street pavement
- Maintains current access to and from James Court businesses and those to south
- Provides a direct connection to the East Coast Greenway

Disadvantages:

- Minimizes redevelopment opportunities by bisecting the existing redevelopment properties
- Has the greatest property impacts of any of the alternatives (5.5 acres of right-of-way required)
- Two businesses on Market Street would be displaced
- Impacts Dravo Plaza and the dock there used by the Water Taxi and Kalmar Nyckel tall ship
- Removes the intersection at Justison Street – thus compromising the existing urban street grid and reducing mobility
- Impacts the stadium parking (approximately 233 parking spaces eliminated)
- Impacts through US 13 traffic by introducing signalized intersection just north of US 13 bridge over the railroad

The Green Alternative does not meet the Purpose and Need for the project. This alternative would result in the removal of the intersection at Justison Street, thus affecting the connectivity of the entire street grid on the west bank of the river. Traffic would be funneled to Beech Street and Delmarva Lane, resulting in an overall degradation of the regional mobility. The Green Alignment could hinder redevelopment opportunities along the Wilmington Riverfront by bisecting the existing redevelopment and directly impacting the dock and Dravo Plaza. Therefore, the Green Alternative was dropped from further consideration.

3. Orange Alternatives

The Orange A and Orange B Alternative alignments are similar in design west of the River. The Orange Alternatives are located just south of the Shipyard Shops and connect to Delmarva Lane

via the Shipyard Shops parking lot. Modifications would be required to both the Shipyard Shops and Stadium parking lots in order to limit access points along the alignment. Both Orange Alternatives would follow the existing Delmarva Lane alignment, which connects to Beech Street and provides vehicular access back to Madison Street and Justison Street. The crossing location west of the River presents the opportunity to provide a transition from the urban development to the natural wildlife refuge to the south.

The existing Riverwalk would be interrupted by either orange crossing and turn inland roughly 300 feet to an at-grade crossing of the alignment. This ped/bike crossing location would coincide with the T-intersection of a new access road to the Russell W. Peterson Wildlife Refuge, beyond the Delmarva Power Denial of Public Access Line. On the south side of the Orange alignments, the shared use path would reconnect back to the existing Riverwalk, providing full access to the Wildlife Refuge.

a. Orange A Alternative

The Orange A Alternative would provide a perpendicular crossing of the Christina River and follow the existing James Court alignment to a new signalized intersection at US 13 on the east side of the River. The existing James Court businesses would have direct access via driveway entrances to the Orange A Alternative. Bridge access from northbound US 13 would be provided by a left turn lane at the new traffic signal. The existing right in/right out connection at Walnut Street to Garasches Lane would be moved south to allow Garasches Lane traffic to access the bridge crossing via the new signalized intersection. The access road for the businesses south of James Court would be terminated at a cul-de-sac, thereby eliminating the existing direct access to southbound US 13 for these businesses (though access would still be provided via the new intersection and the loop road under the US 13 bridge over the railroad).

Advantages:

- Improves regional circulation by locating the river crossing more to the south
- Provides a perpendicular crossing of the River
- There are no dock or water taxi/Kalmar Nyckel tall ship operation impacts
- Maximizes redevelopment opportunities by locating roadway at the urban development/wildlife refuge transition on the west side of the River, and the potential urban redevelopment/existing light industrial transition on the east side of the River
- Improves traffic operations during events by providing a southern ingress/egress route via US 13 and I-495
- Expands the urban street grid
- Provides a direct connection to the East Coast Greenway
- Utilizes existing Walnut Street pavement

Disadvantages:

- Impacts the stadium parking (approximately 70 parking spaces eliminated)
- Impacts the Shipyard Shops parking (approximately 100 parking spaces eliminated)
- Impacts current redevelopment:
 - Three businesses on Market Street would be displaced
 - Three total parcel takes
 - Six business entrances on James Court would be impacted

- Direct driveway access to James Court businesses would be undesirable but necessary for the existing businesses
- Impacts through US 13 traffic by introducing signalized intersection just north of US 13 bridge over the railroad
- Removes direct access of businesses south of James Court to or from southbound US 13

The Orange A Alternative meets the Purpose and Need for the project. However, when compared to the Orange B Alternative, Orange A has greater property impacts (4.1 acres of right-of-way), affects access to businesses and affects access management along US 13. Orange A Alternative also would have a greater overall cost, due to higher property acquisition costs.

b. Orange B Alternative

The Orange B Alternative alignment would provide a skewed crossing of the River to take advantage of the state-owned parcel on the east side just north of the James Court businesses, and continue on this parcel to a new signalized intersection at South Market Street. In order to provide alignment access to and from Walnut Street at this single signalized intersection, existing Walnut Street would be shifted slightly west to remain parallel to Market Street through the new intersection. Bridge access from northbound US 13 would be provided by a left turn lane at the new traffic signal. The existing right in/right out connection at Walnut Street to Garasches Lane would be slightly relocated to allow Garasches Lane traffic to access the bridge crossing via the new signalized intersection. Due to the close proximity of the new intersection to James Court, direct access to businesses on and south of James Court from South Market Street would be eliminated (though access still provided via a left turn at the new intersection and the loop road under the US 13 bridge over the railroad).

Advantages:

- Takes advantage of state-owned right-of-way on the east side of the River
- Improves regional circulation by locating a river crossing more to the south
- There are no dock or water taxi/Kalmar Nyckel tall ship operation impacts
- Maximizes redevelopment opportunities by locating roadway at the urban development/wildlife refuge transition on the west side of the River, and the potential urban redevelopment/existing light industrial transition on the east side of the River
- Improves traffic operations during events by providing a southern ingress/egress route
- Expands the urban street grid
- Provides a direct connection to the East Coast Greenway
- There are no total property takes or business displacements

Disadvantages:

- Impacts the stadium parking (approximately 70 parking spaces eliminated)
- Impacts the Shipyard Shops parking (approximately 100 parking spaces eliminated)
- Does not provide a perpendicular crossing – thus a longer skewed bridge span
- Partially relocates Walnut Street alignment to provide a single signalized intersection
- Removes direct access to businesses on and south of James Court from southbound US 13

The Orange B Alternative meets the Purpose and Need for the project. This alternative utilizes state-owned parcel on the east bank, avoiding business impacts along James Court. The Orange

B Alternative maximizes the redevelopment opportunities, expands the urban street grid, improves regional circulation and community mobility, and improves traffic congestion during Riverfront events.

D. Comparison of Alternatives

Table 4 presents a qualitative comparison of the Preliminary Alternatives, as presented at the Agency Meeting on March 4, 2011 and the public meeting on May 16, 2011. The criteria used to assess the alternatives included meeting the purpose and need, right-of-way and displacements, and impacts to natural resources and cultural resources.

E. Preferred Alternative

The Preferred Alternative for a new bridge crossing the Christina River is essentially the Orange B Alternative. Since the screening of the preliminary alternatives in March 2011 and following comments received at the public meeting in May 2011 and subsequent coordination with DelDOT, additional design work has occurred to refine the alignment. The changes are summarized below.

- In a meeting on April 27, 2011 DelDOT requested and received verbal approval from the USACE for a 150-foot navigable channel because the existing bridges along the Christina River do not provide a 200-foot channel. This change resulted in the bridge piers being closer together and a shorter span over the River, which reduces the bridge costs.
- The bridge piers and abutments were realigned to be parallel to the channel rather than perpendicular to the bridge in order to improve hydraulics and reduce river current forces acting on the structure.
- The 14-foot vertical clearance of the bridge provides additional clearance to account for the potential sea level rise.
- Added shared use path on the east side of Walnut Street from the project study area to just south of A Street, in order to provide ped/bike connectivity for communities and businesses to the new bridge crossing and an existing DART bus stop. A pedestrian signal and crosswalk were also added to provide pedestrian access from the east side Walnut Street shared use path to the ShopRite development. This addition was requested by DelDOT Planning in a meeting on December 20, 2011.
- Also requested by DelDOT Planning on December 20, 2011 was the removal of the south side redundant sidewalk from the bridge and bridge approaches, since there is no planned south side development to attract pedestrians to this side. Eliminating this sidewalk also created significant project cost savings by reducing the bridge structure width.
- Due to its close proximity to the new signalized intersection on Market Street, the existing vehicular access to the Medori property on the west side of Market Street was relocated via a new access road stub west of the property. This stub will also provide DelDOT access for stormwater management and bridge maintenance activities to the west, and could be extended to the north at some point to provide a future access road for development.
- Updated totals for impacted parking spaces (at the Stadium from 71 to 94; at the Shipyard Shops from 97 to 155) in order to reduce the number of access points along

the new roadway, therefore improving safety and circulation along Delmarva Lane. This refinement required the addition of internal circulation roads to channelize traffic within the parking lots prior to accessing Delmarva Lane, which displaced more parking.

- In response to comments received from the public, the project added a boardwalk over the River to provide a continuous alignment for the Riverwalk along the water. The boardwalk would be approximately 440 linear feet and enable Riverwalk users to walk or bike on a boardwalk over the River and under the proposed bridge. An additional at-grade ped/bike crossing will be provided approximately 300 linear feet west of the existing Riverwalk and coincide with the T-intersection of the new access road to the wildlife refuge. On the south side of the bridge, approximately 930 linear feet of shared use pathways would connect either option back to the existing Riverwalk.

The alignment for the Preferred Alternative and bridge plan elevation is shown on **Figure 8**.

F. Construction Impacts

The anticipated temporary construction impacts are identified for each environmental resource in the impact discussions in Chapter IV. However, there are additional temporary construction impacts anticipated during the construction of the bridge and approach roadways that are not attributed to a specific resource. While the construction methods could likely change during the design phase for the project, preliminary assumptions have been made at this stage to determine the likely construction impacts from the project.

- River traffic will be restricted (except emergency vessels) – unable to cross construction zone at times
- Intermittent closures of the channel while setting steel for the bridge above channel. These closures could be restricted to times without significant channel traffic
- Possibly narrowing the channel during pier construction (while setting up cofferdams)
- Construction barges left in river (out of channel) during construction
- If an existing suitable docking area is not available dredging and additional bulkhead construction will be required to support the marine operations
- Temporary staging areas for construction equipment and the berthing pier will need to be identified. These areas will be identified and the temporary impacts quantified for the various permit applications required for the project.

As the project continues into the final design phase, further avoidance and minimization of impacts will be considered and more details on the construction methods will be determined.

Table 4: Preliminary Alternatives Matrix

Alternatives	Bridge Clearances		Right-of-way and Displacements						Supports Economic Development		Livability ^A	Congestion Relief		System Linkage & Mobility			Natural Resources				Cultural Resources	
	vertical clearance(ft)	horizontal clearance (ft)	ROW required (acres) permanent	# of total parcel takes	# of business displacements	# of Docks Impacted	# of parking spaces taken- Stadium Shops	# of parking spaces taken - Shipyard	Maximizes redevelopment opportunity (Y/N)	Consistency with Master Plans (Y/N)		Promotes Livability (Y/N/partial)	Improves Regional Circulation (Y/N/partial)	Improves Event Congestion (Y/N/partial)	Develops Street Grid (Y/N)	Improves community connections (Y/N)	Connection to Greenway	% of alignment in 100-year floodplain	# of Structures in Wetlands & WUS	Waters of the US - Traditional Navigable Water (ft)	Total Wetland Impacts (acres)	Potential Impact to Known Historic Structures (Y/N/E)
No Build	0	0	0	0	0	0	0	0	N	N	N	N	N	N	N/A	0	0	0	0	N	N	
Orange A	12	200	4.1	3	3	0	71	97	Y	Y	Y	Y	Y	Y	Direct	73% ^D	3	0.4	0.8	N	N	
Orange B	12	200	3.4 ^B	0	0	0	71	97	Y	Y	Y	Y	Y	Y	Direct	76% ^D	2	0.4	0.8	N	N	
Green	12	200	5.5 ^C	0	2	1	233	0	N	N	partial	Y	partial	N	Y	Indirect	82% ^D	3	0.4	0.8	N	N
Purple	12	200	5.2	2	2	2	0	0	N	N	partial	partial	N	Y	Y	Indirect	98% ^D	2	0.4	0.7	N	N

NOTES: A- Livability as defined by FHWA includes tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safe streets.

B- Total acres of ROW required does not include the State-owned RDC property

C- Assumes an easement will be acquired for the cul-de-sac on Justison Street

D- Does not include US 13 median crossover improvements

E- Based on known historic properties listed on the National Register of Historic Places

The Red Alignment was dropped from further consideration prior to the preliminary analysis for the following reasons:

- The original horizontal alignment was within Delmarva Power's 935-foot Denial of Public Access Line (DPAL), and the alignment could not be modified to be out of this DPAL and still meet safety and roadway design criteria
- Due to the proximity of the red alignment to the Russell W. Peterson Wildlife Refuge, the Delaware Coastal Zone Management Programs and the Delaware Department of Natural Resources and Environmental Control, Division of Fish and Wildlife, Natural Heritage and Endangered Species Program did not support the red alignment.

