

3.0 ALTERNATIVES TO THE PROPOSED PROJECT

In April 1999, Union County developed a Port Master Plan as a strategic plan for the economic development of the eastern portion of Union County, which includes Tremley Point. The Port Master Plan included a new connection to the New Jersey Turnpike. This connection was envisioned to provide the following benefits to Union County and the City of Linden:

- Direct access to the Tremley Point Area to allow for redevelopment of the extensive brownfields;
- Reduction of traffic on Routes 1 & 9 between Linden Airport and Interchange 13 to allow for future development along the corridor; and
- Restriction of truck traffic through the residential neighborhoods on South Wood Avenue between Routes 1 & 9 and the Tremley Point area.

A new connection to the Turnpike, Interchange 12A, was initially proposed between Interchanges 12 and 13 as a means to achieve these benefits. Interchange 12A was to provide direct access to the Turnpike close to the actual patrons in the Tremley Point area. The Turnpike mainline section through this area consists of two roadways in both the northbound and southbound direction. Under normal operating conditions, the inner roadways are designated for cars only and the outer lanes accommodate both cars and trucks. To provide a full Interchange 12A in this location requires exit and entrance ramps from both the inner and outer roadway in both directions and a new toll plaza.

There were two fundamental problems associated with providing a full Interchange 12A. The first, and most important, is the insufficient distance between the new interchange and the existing Interchanges 12 and 13. The high-speed design of a limited access facility, such as the Turnpike, requires long distances for acceleration lanes at the entrance ramps and deceleration lanes for the exits. In addition, a sufficient distance is required for vehicles approaching an exit to move to the right lane in advance of the exit ramp. Similarly, vehicles entering the Turnpike require a sufficient distance to accelerate and distribute themselves into the multiple lanes of the mainline. The distance on the Turnpike mainline between the existing and proposed interchanges is insufficient to safely accommodate the entrance, exit and weaving distances from both the inner and outer lanes.

If the safe operating conditions of the mainline were allowed to be compromised to accommodate Interchange 12A, the infrastructure requirements for a full interchange at this location are extensive from a monetary and environmental perspective. In order to construct the necessary ramps for Interchange 12A, the Authority would be required to widen the Turnpike mainline several thousand feet in either direction of the new interchange. This results in significant impacts to the wetland areas on both sides of the mainline and in the areas of the new ramps. In order to construct an interchange at this location, several existing bridges over the mainline have to be reconstructed and result in significant utility impacts to the numerous pipelines located throughout the area (i.e., Transco, Getty, Texas Eastern, PSE&G, Elizabethtown Water, Sohio Buckeye, BP and Sun).

A “truck only” interchange using electronic toll collection (ETC) was subsequently evaluated as an alternate to a full Interchange 12A. This proposed interchange would need to be combined with a new Lower Airport Road to be constructed by Union County. A total of five alternate designs/alignments were developed for the “truck only” Interchange 12A (see Appendix H) and reviewed for impacts and constructability. The partial Interchange 12A “truck only” concept was considered for ramp connections only to the outer roadways as the interchange was to be primarily used by trucks. The partial “truck only” concept was determined to be unacceptable due to operational and geometric traffic conflict issues related to the proximity of the proposed Interchange 12A deceleration/acceleration lanes relative to the existing deceleration/acceleration lanes for Interchanges 12 and 13.

After reaching the determination that the Interchange 12A alternative alignments were not viable (see Appendix H), a total of 10 alternative routes were developed and investigated for the TPCR. Alternate 10 was previously presented as the proposed Project Description in Sections 2.3 and 2.4. All of the proposed TPCR alternatives intersect with Industrial Highway in Carteret, Middlesex County, and bridge over the Rahway River to the north and connect with Tremley Point Road in Linden, Union County.

The goal of the TPCR is to intercept car and truck traffic on Tremley Point Road that would normally travel to U.S. Routes 1 & 9 via local roads in Linden and divert the traffic south to Industrial Highway for the direct connection to the Turnpike’s Interchange 12. Primary beneficial impacts of the TPCR will be the potential redevelopment of 400 acres of brownfield sites in the Tremley Point area for use as warehouse distribution centers. All of the TPCR alternatives were analyzed to determine if they could adequately address the projected traffic volumes with an acceptable level of service. A traffic model was used during development of the alternatives to ensure that the design included sufficient through and turning lanes to accommodate the projected traffic.

Also, during a site walk on April 4, 2005, the USEPA requested that an evaluation be conducted of constructing the TPCR immediately adjacent to the existing Turnpike. The alternate alignment requested by USEPA is provided as Alternate 8 and also addresses the USF&WS request to evaluate an alternate route that goes through the approved redevelopment of the Carteret Landfill. However, Alternate 8 would appear to be impracticable as the Titan PDC development on the former Carteret Landfill has been in construction since April 2005 and is nearing final completion. The Alternate 8 alignment would have to traverse through constructed buildings and facilities. Therefore, Alternate 8 is no longer considered a viable alternative.

An additional alternative alignment that was deemed impractical during the site walk was Alternate 1, which would traverse the chemical and petroleum tank farms managed by Kinder Morgan on the south side of the river and Citgo on the north side of the river. During the site walk, USCG representatives expressed objections to this alignment due to impacts to the numerous above-ground and under-ground utility pipelines, which would create operational complications and problems associated with plant security, port safety and Homeland Security concerns. This alternative is also opposed by Carteret officials due to its proximity to residential areas.

The No-Action Alternative was also analyzed as summarized in Section 3.1 below. Under this alternative, the TPCR will not be constructed and the existing traffic from Tremley Point Road will continue to access the regional major highways via only the local roads in Linden. In addition, without the TPCR, the Tremley Point brownfields will not be able to be rehabilitated and redeveloped to the extent feasible as the local roads in Linden could not support the additional traffic. Additionally, there would be no resulting economic benefits to the region and the State, and there would be no positive environmental benefits from the remediation and clean-up of the known contaminated sites at Tremley Point.

3.1 No-Action Alternative

Tremley Point Road is a privately maintained roadway that originates at the point where it crosses over the Turnpike at MP 97.2; west of this location, the road is known as South Wood Avenue. Currently, Tremley Point Road is considered a private road that is not maintained by Linden and it serves as the only access to Tremley Point. The predominant vehicles on the road are trucks transporting refined petroleum products. One of the shared goals of consideration for the construction of Interchange 12A and/or the TPCR is the redevelopment of several hundred acres of brownfields located north of Tremley Point Road for conversion into warehousing distribution facilities that would generate additional truck traffic. Commencement of all of the brownfield redevelopment projects would appear to have limited potential for the City of Linden unless certain portions of the redevelopment related truck and vehicle traffic is diverted away from downtown Linden.

Under the No-Action alternative, the proposed TPCR would not be constructed and there would be no relief from the impacts of the existing truck and vehicular traffic on the local streets of Linden. In addition, the proposed redevelopment of approximately 400 acres of brownfields at Tremley Point would be constrained as the local streets in Linden would have difficulty accommodating additional redevelopment related heavy truck and vehicular traffic. Without the full redevelopment of the Tremley Point brownfields, there would be no positive environmental benefits from the remediation and clean-up of known contaminated sites at Tremley Point, and the many economic benefits that would have resulted for the region and State from the beneficial reuse/redevelopment of the Tremley Point brownfields would not occur. The No-Action alternative was therefore not considered viable and is only being retained as a baseline by which environmental impacts can be compared.

3.2 Tremley Point Connector Road (TPCR) Alignment Alternatives

An integral and essential part of the TPCR project is the commitment by the Authority to provide upfront mitigation for anticipated wetlands impacts that would occur with completion of the TPCR project. Such mitigation would be through creation of wetlands from existing uplands at the Piles Creek Mitigation Site located on Tremley Point. A total of 10 alignment alternatives for the proposed TPCR have been generated. Generally, any alignment must cross the Rahway River and adjacent wetlands on both sides of the river, as well as a series of wetlands features and/or contaminated land areas.

In addition, an extensive array of utility lines (i.e., oil, gas, chemical and sanitary sewer) are located in the footprint of the various considered alignments. The alignment alternatives varied in the manner and location where the TPCR intersects with Tremley Point Road and Industrial Highway.

Other factors considered during the development and evaluation of the various alignment alternatives include wetlands, history of land use, proposed future development, known contamination, flood elevations, vertical clearance of the navigation channel of the Rahway River, and costs for: remediation; special soil handling procedures; specialized landfill disposal; and utility line relocation. The TPCR will be designed to accommodate projected vehicular traffic so a reduction in size, scope and configuration would not accomplish the basic project purpose.

Following is a discussion of each of the 10 alignment alternatives for the TPCR. (Alternate 10 is provided as the Project Description in Sections 2.3 and 2.4). A summary of this discussion is provided in Table 3-1.

3.3 Tremley Point Connector Road - Alternate 1

3.3.1 Description

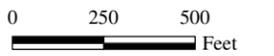
Alternate 1 is the most easterly of the alignment alternatives (Figure No. 5). Alternate 1 originates at Industrial Highway in the vicinity of the eastern side of the Kinder Morgan facility near the Arthur Kill and follows the abandoned Conrail South Shore Branch railroad alignment. This approximately 5,300-foot long roadway alternative would cross the Rahway River over an 800-foot long structure approximately 600 feet west of the confluence with the Arthur Kill, near the location of a former rail bridge crossing over the Rahway River. The TPCR would join at the eastern end of Tremley Point Road on the north side of the Rahway River at the end of a long, relatively steep downward grade in the northbound direction. A left turn movement at this intersection could create potential stopping or overturning problems for a high percentage of trucks making this turn, as such, the proposed alignment is to split at this intersection to provide a more favorable condition for truck traffic. Westbound traffic follows an alignment located approximately 1,000 feet to the north of Tremley Point Road. This alignment has a large radius curve and follows the railroad track that traverses the Citgo site. Eastbound traffic from Tremley Point remains on Tremley Point Road and intersects directly with the TPCR. Truck acceleration is affected by the steep upward grade heading southbound over the river; however, it does not create any safety problems nor adversely impact the capacity of the roadway. In addition to the new alignment portion of this alternative, an additional 9,000 feet of existing roadway would need to be upgraded along Tremley Point Road.



Legend

 Alternate Route 1

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
 ArcGIS Online – Aerials Express, 2006.



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**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 1**

Dm By: JFA	Scale: 1" = 500'	Project: 02595.003.004
Chkd By: IPD	Date: 8/15/08	Figure No. : 5

3.3.2 Geometry

The horizontal and vertical geometry for this TPCR alternative alignment is based on the criteria outlined for urban arterials from the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets.*” The alignment satisfies a design speed of 40 mph that will accommodate a posted speed of 30 to 35 mph. The horizontal curve radii varies from a minimum of 600 feet to a maximum of 1,000 feet. A maximum superelevation rate of 4% is utilized for the horizontal curvature with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 4% with minimum vertical curve lengths based on three times the design speed.

3.3.3 Environmental and Security Impacts

Environmental Impacts

This alignment traverses both tidally influenced and freshwater wetlands adjacent to Industrial Highway and Rum Creek with impacts to approximately 0.4 acres of wetlands with additional unquantified areas within the limits of the high security portion of the facilities along the route. Appropriate mitigation for wetlands impacts would be expected to be satisfied by the upfront commitment by the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands.

Based upon a review of files provided by the NJDEP, potential soil and groundwater contamination exists along this alignment. The Amoco Carteret Terminal (Lower Plant) has reported a liquid phase hydrocarbon plume (up to two feet in thickness) along the former railroad alignment that extends north onto the adjacent Phillips Petroleum operation.

In addition, a portion of the Kinder Morgan facility has reported both a gasoline and diesel plume at the terminal building (occupied by Gateway) to the north of Industrial Highway and west of the southern end of Alternate 1. Although not directly within the proposed alignment of this alternative, dewatering activities during construction may need to consider impacts from contaminated groundwater in the vicinity.

Security Impacts

There are extensive chemical and petroleum bulk storage tanks within the alignment for Alternate 1 on both sides of the Rahway River that process a large percentage of the petroleum products consumed in the eastern United States. In a letter dated August 18, 2008, the USCG expressed the opinion that construction of a roadway to provide public access through and over potentially explosive and

volatile chemical and petroleum bulk storage facilities poses a grave concern for security and would outweigh any benefits of lower wetlands impacts.

In Linden, Alternate 1 is located along the northern portion of the former American Cyanamid Warners Plant and through the existing and operational Citgo Marine Terminal. Groundwater impacted by organic and inorganic constituents of concern has been identified here. Sediments impacted by DDT and associated by-products DDD and DDE have been reported adjacent to the Rahway River at the Warners Plant. The impacted sediments have been remediated by installation of an armoring system (capping) over the sediments situated in the Rahway River. A site-wide deed restriction was proposed at the Warners Plant to address the presence of historic fill throughout the site. Alterations, improvements and disturbances cannot be performed on this site without consent from the owners and the NJDEP.

3.3.4 Construction Cost

The estimated construction cost for Alternate 1 is \$107,785,000. This cost includes the roadway construction, as well as anticipated costs associated with the relocation of numerous above-ground and under-ground utility lines situated throughout the Kinder Morgan and Citgo sites and the costs related to the known contamination conditions discussed above. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate are estimated to be approximately 13 acres. This area includes approximately 2.4 acres through industrial areas on both sides of the Rahway River. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$1,115,000. The resulting total cost estimate for Alternate 1 (i.e., including construction, property acquisition and mitigation costs) is \$108,900,000.

3.3.5 Advantages

Alternate 1 has the least impacts to wetlands (0.4 acres) as it utilizes current upland areas that mostly consist of existing maintenance roadways inside operational bulk chemical and petroleum storage facilities.

3.3.6 Disadvantages

This alternative is the most circuitous and adds approximately 1.5 miles of traveling distance. This alternative is opposed by Carteret officials due to its proximity to residential areas. In addition, Citgo is opposed to this alternative because of the impacts to numerous above-ground and under-ground utility pipelines that create operational concerns and problems associated with plant security. Similar issues will also result at the Kinder Morgan facility. In addition, as mentioned previously, the USCG and local, state and federal officials and agencies would likely object to this alignment due to port related security impacts.

Much of Tremley Point Road is not currently a public right-of-way and is used only for access to the existing industries in the area. This alternate requires the most expensive upgrade of Tremley Point Road, including a significant pavement upgrade and acquisition of large areas to establish a public right-of-way. In addition to improving the pavement conditions along Tremley Point Road, consideration also has to be given to raising the profile of the road. Most of the current alignment is significantly below the 100-year flood elevation and in several areas approximately six feet of fill will be required to raise the roadway above this flood elevation. This alternative is the most costly (\$108.9 million) of all the TPCR alternatives evaluated.

In addition to the cost and special construction methods that will be necessary to construct through or near the contamination areas noted above, this alignment requires the protection of numerous pipe crossings related to the intricate piping network within both the Kinder Morgan and Citgo facilities.

3.4 Tremley Point Connector Road - Alternate 2

3.4.1 Description

Alternate 2 intersects with Industrial Highway approximately 300 feet east of the Kinder Morgan security gate (Figure No. 6). This approximately 5,300-foot long alignment alternative runs through the wetland areas along the southeastern edge of the American Cyanamid sludge lagoons in the vicinity of Deep Creek where the roadway crosses the Rahway River via a 500-foot long bridge. This alignment meets Tremley Point Road at the C.M. Lacey Trucking property, about 1,800 feet west of Alternate 1. Due to the existing width of the cross section of Tremley Point Road at this location, the horizontal tie-in can take place within approximately 300 feet. In addition, the existing elevation of Tremley Point Road at this location is at approximately elevation 4.0 feet. The profile of the existing road can be raised approximately 6 feet within the 300-foot limit to achieve a minimum elevation of 10.0 feet at the intersection. Approximately 2,000 feet of Tremley Point Road would need to be upgraded for Alternate 2.

3.4.2 Geometry

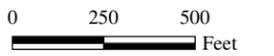
In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” the majority of this alignment satisfies a design speed of 35 mph with curve radii varying from a minimum of 976 feet to a maximum of 1,200 feet. The sag vertical curve of 150 feet at the approach to Tremley Point Road meets a design speed of 25 mph. A maximum superelevation rate of 4% is utilized for the horizontal alignment with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0% to a maximum of 5% with minimum vertical curve lengths based on three times the design speed.



Legend

 Alternate Route 2

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
 ArcGIS Online – Aerials Express, 2006.



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**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 2**

Dwn By: JFA	Scale: 1" = 500'	Project: 02595.003.004
Chkd By: IPD	Date: 8/15/08	Figure No. : 6

3.4.3 Environmental Impacts

This alignment traverses a large tidal wetland system between Industrial Highway and the Rahway River with impacts to approximately 8.9 acres of wetlands. Appropriate mitigation for wetlands impacts resulting from this alternative could possibly be satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands.

Based upon a review of available files, there is a potential for soil and groundwater contamination along this alignment. Contaminated soils and a layer of free product on the groundwater were encountered during construction of the Industrial Highway in the vicinity of the BP/Amoco wetlands.

Records of the soil sampling taken during construction indicate that petroleum hydrocarbons, cyanide, organic compounds and heavy metals were present in the soils. Contamination found at the BP/Amoco wetlands is related to the presence of coal ash, contaminated surface water and contaminated groundwater.

Alternate 2 crosses the southern portion of the 110-acre former American Cyanamid sludge lagoons. Results of analytical sampling demonstrated concentrations of total cyanide up to 125 ppm in aqueous samples and 3,600 ppm in sludge samples. A Declaration of Environmental Restriction (DER) has been established for the entire site. Alterations, improvements and disturbances will require the consent of the NJDEP.

In Linden, Alternate 2 connects to Tremley Point Road through the western portion of the Citgo site known as the Warners Tank Farm. Groundwater at this site has been impacted by gasoline constituents (BTEX), gasoline additives (MTBE & TBA), cyanide and arsenic. Alternate 2 crosses a portion of the Warners Tank Farm that was formerly utilized as a disposal area for tank bottom residuals. Citgo is in the process of establishing a deed notice for impacted soils at this location.

3.4.4 Construction Cost

The estimated construction cost for Alternate 2 is \$48,377,000. This cost includes the roadway construction, as well as anticipated costs associated with the known contamination conditions discussed above. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate alignment are estimated to be approximately 10.9 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$5,217,000. The resulting total cost estimate for Alternate 2 (i.e., including construction, property acquisition and mitigation costs) is \$53,584,000.

3.4.5 Advantages

Alternate 2 results in minimal impacts to the Kinder Morgan site and will require crossings of a relatively small number of stream channels.

3.4.6 Disadvantages

The Alternate 2 alignment crossing of the Rahway River is skewed and traverses the edge of a known American Cyanamid contaminated sludge area. The extensive length of this alignment that traverses this site adds a considerable construction cost due to the expense related to the anticipated disposal and cleanup of contaminated soils and groundwater. In addition, the profile requires the grade of Tremley Point Road to be raised by approximately six feet in order to satisfy a maximum 5% profile grade on the proposed TPCR and to raise the intersection above the 100-year flood elevation. The steep grade of the TPCR near the Tremley Point Intersection will potentially create a difficult stopping condition for the high percentage of trucks using the TPCR. To reduce this grade to a more desirable 3% requires approximately 14 feet of additional fill on Tremley Point Road. This alternative also does not meet the proposed design speeds for the TPCR. Construction related impacts to wetlands for Alternate 2 are more than twice as much as for the Preferred Alternative.

3.5 Tremley Point Connector Road - Alternate 3

3.5.1 Description

Alternate 3 (Figure No. 7) intersects with Industrial Highway at approximately the same location as Alternate 2. This approximately 6,700-foot long alignment follows a more westerly alignment through wetlands areas, traverses Cross Creek and follows the easterly edge of the upland area, upon which Titan PDC has recently constructed a warehouse distribution center. The roadway crosses the Rahway River just west of Cross Creek via a 600-foot long bridge and runs through a large wetland area where it crosses Marshes Creek. This alignment is composed of a series of viaducts and at-grade sections south of the Rahway River and entirely on viaduct on the north side. It will be placed on viaduct over the higher-grade wetland areas. This alignment intersects Tremley Point Road at the vicinity of the EFC Land Development Corporation property opposite the western end of the Tosco Terminal. As with Alternate 2, the existing width of Tremley Point Road at this location requires 300-feet to connect horizontally to meet the existing roadway. Vertically, the intersection area has to be raised approximately 1.5 feet to bring it above the 100-year flood elevation.



Legend

Alternate Route 3

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
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Chkd By: IPD	Date: 8/15/08	Figure No. : 7

3.5.2 Geometry

In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” this alignment satisfies a design speed of 40 mph with curve radii varying from a minimum of 900 feet to a maximum of 1,500 feet. A maximum superelevation rate of 4% is utilized for the horizontal alignment with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0% to a maximum of 5%, with minimum vertical curve lengths based on three times the design speed.

3.5.3 Environmental Impacts

This alignment traverses a large tidally influenced wetland area on both sides of the Rahway River with impacts to approximately 7.4 acres of wetlands. Appropriate mitigation for wetlands impacts could possibly be satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands.

The contaminated soils encountered during construction of the Industrial Highway, as discussed in Alternate 2, are also a concern with this alternative. This alignment runs through the eastern side of the Titan PDC warehouse distribution center. As contaminants contained within the landfill material may be encountered and landfill gases generated by the landfill may need to be addressed, a Landfill Disruption Permit could be required.

A review of NJDEP files provided no environmental quality data for soils, groundwater or sediments for the Linden portion of this alignment. The sampling and boring program to be implemented for the project will investigate contamination in soils and groundwater.

3.5.4 Construction Cost

The estimated construction cost for Alternate 3 is \$68,737,000. This cost includes the roadway construction, as well as anticipated costs associated with the known contamination conditions discussed above. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate are estimated to be approximately 10.1 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$4,583,000. The resulting total cost estimate for Alternate 3 (i.e., including construction, property acquisition and mitigation costs) is \$73,320,000.

3.5.5 Advantages

Alternate 3 crosses the Rahway River on a perpendicular alignment with a 600-foot long structure.

3.5.6 Disadvantages

This alignment cuts through the northeastern edge of the Titan PDC warehouse distribution center adjacent to Cross Creek. On the north side of the Rahway River, this alternative segments large areas of wetlands, whereas, it is environmentally preferable to maintain large tracts of continuous wetlands. In addition, this alignment requires four additional stream crossings when compared to the Preferred Alternative. The combination of high construction costs and moderately significant wetlands impacts (7.4 acres) results in this being one of the more expensive alternates considered.

3.6 Tremley Point Connector Road - Alternate 4

3.6.1 Description

Alternate 4 is approximately 6,400-feet long and intersects Industrial Highway at a point to the west of the Kinder Morgan security gate (Figure No. 8). Provisions have to be made for access to the Kinder Morgan property for this alignment. Alternate 4 proceeds through the Titan PDC warehouse distribution center property where it then follows an alignment similar to Alternate 2 before turning to the north and heading towards the Rahway River through the sludge lagoons on the former American Cyanamid site at the “horseshoe” bend in the river. It crosses the river over a 550-foot long bridge and meets Tremley Point Road at the same location as Alternate 3.

3.6.2 Geometry

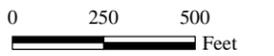
In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” the majority of this alignment satisfies a design speed of 40 mph with curve radii varying from a minimum of 600 feet to a maximum of 1,500 feet. The sag vertical curve of 125 feet at the approach to Tremley Point Road meets a design speed of 25 mph. A maximum superelevation rate of 4% is utilized for the horizontal alignment with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 4.8%, with minimum vertical curve lengths based on three times the design speed.



Legend

 Alternate Route 4

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
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 ALTERNATE 4**

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Chkd By: IPD	Date: 8/15/08	Figure No. : 8

3.6.3 Environmental Impacts

This alignment traverses large tidally influenced wetland areas on both sides of the Rahway River with impacts to approximately 10.2 acres of wetlands. Due to the extent of wetlands impacts for this alignment, appropriate mitigation for wetlands impacts would be marginally satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands. The purchase of wetland mitigation credits would be investigated as an additional remedy to meet the mitigation requirements.

The contaminated soils and groundwater that were encountered during construction of the Industrial Highway, as previously discussed in Alternate 2, would be a concern for this alternate alignment. There is no available data on the environmental quality of soils and groundwater between Industrial Highway and the eastern border of the former American Cyanamid sludge lagoons. Alternate 4 crosses the southern portion of the 110-acre former American Cyanamid sludge beds (see Alternate 2).

A review of NJDEP files provided no environmental quality data for soils, groundwater or sediments for the Linden portion of this alignment. The boring and sampling program that will be implemented for the project will investigate the presence of contamination in soils and groundwater.

3.6.4 Construction Cost

The estimated construction cost for Alternate 4 is \$51,063,000. This cost includes roadway construction, as well as anticipated costs associated with the known contamination conditions discussed above. The property acquisitions (uplands, wetlands and riparian) that are necessary for this alternate are estimated to be approximately 12.4 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$6,015,000. The resulting total cost estimate for Alternate 4 (i.e., including construction, property acquisition and mitigation costs) is \$57,078,000.

3.6.5 Advantages

Alternate 4 has the shortest crossing of the Rahway River.

3.6.6 Disadvantages

The alignment for Alternate 4 traverses contaminated soil areas through the American Cyanamid site. In addition, this alternate has the most significant wetlands impacts (10.2 acres) of all the TPCR alternatives considered, and it also

has the highest cost for property acquisitions and mitigation. Due to profile constraints and the short distance between the edge of the river and the intersection, the grade of Tremley Point Road has to be raised by approximately four feet to result in a profile grade of 4.8% at the northern end of the TPCR. The design speed of 40 mph for this alignment allows for a posted speed of 30-35 mph.

3.7 Tremley Point Connector Road - Alternate 5

3.7.1 Description

Of the alternative alignments that were reviewed, Alternate 5 provides one of the most direct connections between Industrial Highway and Tremley Point Road (Figure No. 9). This approximately 5,700-foot long alignment intersects Industrial Highway at a point located between the embankments for the Titan PDC warehouse distribution center and the Kinder Morgan Tracts. This alignment bends to the northwest with a 1,000-foot radius to avoid the lagoon of the former American Cyanamid site and crosses the Rahway River on a skewed alignment with a 2,000-foot radius to the east and a bridge length of approximately 750 feet. This alignment continues on a tangent for approximately 1,650 feet where it ties radially to the existing curve opposite the Tosco Terminal on Tremley Point Road.

3.7.2 Geometry

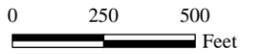
In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” this alignment satisfies a design speed of 50 mph with curve radii varying from a minimum of 1,000 feet to a maximum of 2,250 feet. A maximum superelevation rate of 4% is utilized for the horizontal curvature with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 3% with minimum vertical curve lengths based on three times the design speed. Both the horizontal and vertical geometry permit a posted speed of 45 mph along the TPCR for this alternative.



Legend

 Alternate Route 5

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
 ArcGIS Online – Aerials Express, 2006.



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 MIDDLESEX COUNTY,
 CITY OF LINDEN
 UNION COUNTY, NEW JERSEY**

**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 5**

Dwn By: JFA	Scale: 1" = 500'	Project: 02595.003.004
Chkd By: IPD	Date: 8/15/08	Figure No. : 9

3.7.3 Environmental Impacts

This alignment traverses large tidally influenced wetland areas on both sides of the Rahway River with impacts to approximately 6.1 acres of wetlands. Appropriate mitigation for wetlands impacts would be expected to be largely satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands. This alignment closely follows the western edge of the Rahway River on the Linden side of the project. This orientation maintains a large continuous wetland area to the west of the roadway. It is environmentally preferable to maintain the continuity of wetland areas as much as possible.

This alignment is located just to the west of the American Cyanamid sludge lagoons and it is intended to avoid, or at least minimize, the potential contamination problems associated with this site. The results of the soil borings data collected as part of the initial geotechnical boring program have indicated that the lagoon area soils and groundwater have elevated concentrations of lead and zinc in excess of NJDEP guidance levels. This alignment can be slightly altered and/or the type of structure used through the area will be selected to minimize contamination impacts. The contaminated soils and groundwater encountered during construction of the Industrial Highway, as discussed in Alternate 2, are a concern for this alternative.

The contaminated soils encountered during construction of the Industrial Highway, as previously discussed for Alternate 2, are also a concern with this alternative. Contamination found at the BP/Amoco site was related to the presence of coal ash, contaminated surface water and contaminated groundwater. A layer of free product floating on the groundwater was also encountered.

A review of NJDEP files provided no environmental quality data for soils, groundwater or sediments for the Linden portion of this alignment (wetlands).

3.7.4 Construction Cost

The estimated construction cost for Alternate 5 is \$46,000,000. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate are estimated to be approximately 7.6 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$3,730,000. The resulting total cost estimate for Alternate 5 (i.e., including construction, property acquisition and mitigation costs) is \$49,730,000.

3.7.5 Advantages

Alternate 5 has a fairly direct alignment with relatively flat horizontal curvature from Industrial Highway to Tremley Point Road. This results in minimum impacts to the Kinder Morgan site while maintaining large continuous wetland areas on the north side of the Rahway River. Also, the alignment on the south side of the river utilizes existing upland areas to minimize wetland impacts.

This alternative has one of the lower wetland impacts compared to the other TPCR alternates, and it has the second smallest property acquisition impact. Due to the direct nature of the alignment, the overall length of this alternative is one of the shortest of all the TPCR alternates considered. This reduces the overall time and vehicle-miles traveled for the vast majority of vehicles using the facility.

3.7.6 Disadvantages

The alignment for Alternate 5 requires crossing the Rahway River on a skew with the entire structure being both curved and superelevated. The vertical clearance over the wetlands adjacent to the river requires that the roadway be carried on a viaduct for several hundred feet on both sides of the river. The skewed alignment of the Alternate 5 crossing of the Rahway River does not result in a significant effect on the overall length of the alignment. However, it results in a longer span that must provide the necessary vertical clearance over the navigable portion of the Rahway River and a resulting higher cost of bridge construction.

3.8 Tremley Point Connector Road - Alternate 6

3.8.1 Description

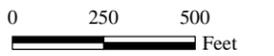
Alternate 6 intersects Industrial Highway at the same location as Alternate 5 (Figure No. 10). This approximately 5,750-foot long alignment bends to the north and continues straight for 2,100 feet with a fairly perpendicular crossing of the Rahway River and a structure length of approximately 600 feet. After crossing the Rahway River, this alignment bends 1,000 feet to the east with a 1,200-foot radius curve and then continues straight another 1,000 feet along a tangent that ties into Tremley Point Road on a skewed alignment utilizing the existing paper street ROW east of the Mobil site.



Legend

 Alternate Route 6

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
 ArcGIS Online – Aerials Express, 2006.



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**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 6**

Dwn By: JFA	Scale: 1" = 500'	Project: 02595.003.004
Chkd By: IPD	Date: 8/15/08	Figure No. : 10

3.8.2 Geometry

In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” this alignment satisfies a design speed of 50 mph with curve radii varying from a minimum of 1,000 feet to a maximum of 2,250 feet. A maximum superelevation rate of 4% is utilized for the horizontal curvature with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 2.5% with minimum vertical curve lengths based on three times the design speed.

3.8.3 Environmental Impacts

This alignment traverses large tidally influenced wetland areas on both sides of the Rahway River with impacts to approximately 6.4 acres of wetlands. Appropriate mitigation for wetlands impacts would be expected to be largely satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands. The location of this roadway alignment on the north side of the Rahway River partially bisects the wetlands area located between the Rahway River and Marshes Creek.

The other environmental impacts discussed for Alternate 5 also apply to Alternate 6.

3.8.4 Construction Cost

The estimated construction cost for Alternate 6 is \$45,394,000. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate alignment are estimated to be approximately 8.1 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$3,877,000. The resulting total cost estimate for Alternate 6 (i.e., including construction, property acquisition and mitigation costs) is \$49,271,000.

3.8.5 Advantages

Alternate 6 crosses the Rahway River on an alignment fairly close to perpendicular. In comparison to the skewed crossing in Alternate 5, Alternate 6 results in a shorter span over the navigable portion of the Rahway River. This alignment orientation is preferable from an initial construction standpoint, as well as from the long-term maintenance and operational perspective. The shorter river crossing for this alternate, combined with the shorter length of viaduct, results in this alternate having the lowest construction cost. As the overall length of this alternative is one of the shortest of all the TPCR alternates that were considered, there is a reduction in the overall vehicle travel time and vehicle-miles traveled

for the vast majority of vehicles using the TPCR. Also, the portion of the alignment on the south side of the river utilizes existing upland areas, where possible, to minimize wetland impacts. Alternate 6 also uses a portion of the existing paper street at Tremley Point Road that results in one of the smallest property acquisition requirements of all the TPCR alternates considered.

3.8.6 Disadvantages

Alternate 6 has higher wetlands impacts than the Preferred Alternate.

3.9 Tremley Point Connector Road - Alternate 7

3.9.1 Description

Alternate 7 intersects Industrial Highway at the same location as Alternates 5 and 6 (Figure No. 11). This 6,400-foot long alignment bends to the northwest with a radius of 960 feet and then to the north after a short tangent of 250 feet (minimum to satisfy superelevation transition). This alignment then crosses the Rahway River with a perpendicular tangent and a structure length of 450 feet. Immediately after crossing the Rahway River, this alignment bends to the east for 165 feet with a 1,000-foot radius curve over Marshes Creek and then into a short tangent of 266 feet and reverse again to the northeast for 550 feet with a 2,000-foot radius that ties into Tremley Point Road on a skewed alignment utilizing the existing paper street ROW east of the Mobil site.

3.9.2 Geometry

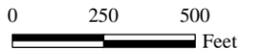
In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” this alignment satisfies a design speed of 50 mph with curve radii varying from a minimum of 960 feet to a maximum of 2,250 feet. A maximum superelevation rate of 4% is utilized for the horizontal curvature with the superelevation transition rate based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 1.8% with minimum vertical curve lengths based on three times the design speed.



Legend

 Alternate Route 7

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
 ArcGIS Online – Aerials Express, 2006.



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**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 7**

Dwn By: JFA	Scale: 1" = 500'	Project: 02595.003.004
Chkd By: IPD	Date: 8/15/08	Figure No. : 11

3.9.3 Environmental Impacts

This alignment traverses large tidally influenced wetland areas on both sides of the Rahway River with impacts to approximately 7.5 acres of wetlands. Appropriate mitigation for wetlands impacts would be expected to be largely satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands. In addition to bisecting the wetlands as described for Alternate 6, this alternate also impacts wetland areas to the west of Marshes Creek.

The other environmental impacts discussed for Alternate 5 also apply to Alternate 7.

3.9.4 Construction Cost

The estimated construction cost for Alternate 7 is \$53,353,000. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate are estimated to be approximately 8.8 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$4,582,000. The resulting total cost estimate for Alternate 7 (i.e., including construction, property acquisition and mitigation costs) is \$57,935,000.

3.9.5 Advantages

Alternate 7 crosses the Rahway River on a tangent alignment perpendicular to the river and has the least grades of almost all of the alternates.

3.9.6 Disadvantages

Alternate 7 has moderately high wetlands impacts, and the circuitous horizontal alignment results in a bifurcation of several wetlands complexes on both sides of the Rahway River. In addition, this alternate requires four additional creek crossings in comparison to Alternate 6 and the Preferred Alternate.

3.10 Tremley Point Connector Road – Alternate 8

3.10.1 Description

Alternate 8, an alignment requested for evaluation by the USEPA and USF&WS, intersects Industrial Highway at the same location as Alternates 5, 6 and 7 (Figure No. 12). This alternate alignment is no longer viable because a warehouse distribution facility managed by Titan PDC is nearing completion of construction activities in the area where this alignment would have traversed. This approximately 8,000-foot long alignment bends to the west and travels along the southern extent of the former Carteret Landfill that has been redeveloped by Titan PDC. After crossing the Slayton Tract, this alignment makes a turn to the north and travels parallel to the New Jersey Turnpike for approximately 3,000 feet. The parallel alignment to the Turnpike results in a crossing of the Rahway River with a perpendicular tangent and a structure length of approximately 400 feet. After the crossing of the Rahway River, this alignment travels parallel to the Turnpike for approximately 800 feet and then bends to the east due to the presence of extensive bulk petroleum storage tanks operated by Mobil Oil. This alignment next crosses over Marshes Creek and then into a short tangent before reversing again to the northeast before tying into Tremley Point Road just east of the Mobil Oil site and west of the Linden Bulk Transportation site.

3.10.2 Geometry

In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” this alignment satisfies a design speed of 50 mph with curve radii varying from a minimum of 450 feet near the intersection with Industrial Highway to a maximum of 1,200 feet. A maximum superelevation rate of 4% is utilized for the horizontal curvature with the superelevation transition rate based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 1.8% with minimum vertical curve lengths based on three times the design speed.

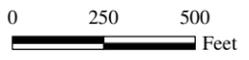
3.10.3 Environmental Impacts

This alignment traverses large tidally influenced wetland areas on both sides of the Rahway River with impacts to approximately 7.4 acres of wetlands. Appropriate mitigation for wetlands impacts would be expected to be largely satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands. In addition to bisecting the wetlands on the Linden side of the Rahway River, this alternate also impacts the wetland areas to the west of Marshes Creek.



Legend
 Alternate Route 8

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
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**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 8**

Drn By: JFA Scale: 1" = 500' Project: 02595.003.004

Chkd By: IPD Date: 8/15/08 Figure No. : 12

The contaminated soils encountered during construction of the Industrial Highway are a concern for this alternative. There is no available data on the environmental quality of soils and groundwater between Industrial Highway and the former American Cyanamid sludge lagoons. This alignment runs through the southern side of Titan PDC's warehouse distribution center. As contaminants contained within the landfill material may be encountered and landfill gases generated by the landfill may need to be addressed, a Landfill Disruption Permit could be required.

3.10.4 Construction Cost

The estimated construction cost for Alternate 8 is \$83,160,000. The property acquisitions (uplands, wetlands and riparian) necessary for this alternate are estimated to be approximately 11.6 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$5,172,500. The resulting total cost estimate for Alternate 8 (i.e., including construction, property acquisition and mitigation costs) is \$88,332,500. This estimate is based upon the former condition of the site (i.e., sanitary landfill) and not on the current situation, which is a warehouse distribution center.

3.10.5 Advantages

Alternate 8 crosses the Rahway River on an alignment that closely parallels the Turnpike and results in less bifurcation of the existing wetland complex on the Carteret side as compared to several of the other alternate alignments that have been investigated. The vast majority of this alignment south of the Rahway River incorporates upland areas dominated by former landfills and avoids the Cytec lagoon area.

3.10.6 Disadvantages

Alternate 8 is the longest and second most expensive of the TPCR alignments. It has significant wetlands impacts, especially on the north side of the Rahway River, and results in a bifurcation of a major wetlands complex. In addition, the implementation of this alignment: adversely impacts the petroleum storage facilities owned by Mobil Oil, has one of the highest costs for property acquisition and mitigation, and would traverse the recently constructed Titan PDC warehouse distribution center.

3.11 Tremley Point Connector Road – Alternate 9

3.11.1 Description

Of the alternative alignments that were reviewed, Alternate 9 provides the most direct connection between Industrial Highway and Tremley Point Road (Figure No. 13). This approximately 5,500-foot long alignment intersects Industrial Highway in a similar manner to Alternates 5, 6 and 7 at a point located between the embankments for the Titan PDC warehouse distribution center and the Kinder Morgan tract. This alignment bends slightly to the north with a 2,530 foot radius to travel through the western most lagoon of the former American Cyanamid site and crosses the Rahway River on a skewed alignment with a 2,530 foot radius to the northeast and a bridge length of approximately 1,200 feet. This alignment continues on a tangent for approximately 530 feet where it ties into Tremley Point Road.

3.11.2 Geometry

In accordance with the 2001 AASHTO Manual entitled “*A Policy on Geometric Design of Highways and Streets*” this alignment satisfies a design speed of 50 mph with curve radii varying from a minimum of 2,530 feet. A maximum superelevation rate of 4% is utilized for the horizontal curvature with superelevation transition rates based on 2% per second for the design speed. Vertical grades vary from a minimum of 0.5% to a maximum of 3% with minimum vertical curve lengths based on three times the design speed. Both the horizontal and vertical geometry permit a posted speed of 45 mph along the TPCR.

3.11.3 Environmental Impacts

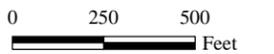
This alignment traverses large tidally influenced wetland areas on both sides of the Rahway River with impacts to approximately 4.9 acres of wetlands, the third smallest impact of the TPCR alternatives. Appropriate mitigation for wetlands impacts would be expected to be largely satisfied by the upfront commitment of the Authority to provide replacement wetlands at the Piles Creek Mitigation Site located on Tremley Point by creating additional tidally influenced wetlands from existing uplands. This alignment follows the western edge of the Rahway River on the Linden side of the project, more than the other alignments under review. This orientation maintains a large continuous wetland area to the west of the roadway. It is environmentally preferable to maintain the continuity of wetland areas as much as possible.



Legend

 Alternate Route 9

Source:
 Access Alternatives From New Jersey Turnpike
 To Tremley Point, Dated November 2006,
 Drawn by Edwards & Kelsey.
 ESRI StreetMap USA, 2007.
 Pictometry Online Imagery, 4/22/07.
 ArcGIS Online – Aerials Express, 2006.



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**TREMLEY POINT
 CONNECTOR ROAD
 ALTERNATE 9**

Dwn By: JFA	Scale: 1" = 500'	Project: 02595.003.004
Chkd By: IPD	Date: 8/15/08	Figure No. : 13

This alignment is located within the western-most portion of the American Cyanamid sludge lagoons and is intended to avoid, or at least minimize, impacts to current wetlands. The results of the soil borings data collected as part of the initial geotechnical boring program indicate that the lagoon area soils and groundwater have elevated concentrations of lead and zinc in excess of NJDEP guidance levels.

This alignment can be slightly altered and the type of structure used through the area will be selected to minimize contamination impacts. The contaminated soils encountered during construction of the Industrial Highway, as discussed for Alternate 2, is also a concern for this alternative.

The other environmental impacts discussed for Alternates 5 and 6 also apply to Alternate 9.

3.11.4 Construction Cost

The estimated construction cost for Alternate 9 is \$52,766,000 million. The property acquisitions (uplands, wetlands and riparian) necessary for the alternate are estimated to be approximately 7.6 acres. An order of magnitude combined cost for both the property acquisitions and mitigation needed for this alternate, based on local tax records and recent sales information, is estimated to be \$3,206,000. The resulting total cost estimate for Alternate 9 (i.e., including construction, property acquisition and mitigation costs) is \$55,972,000.

3.11.5 Advantages

The Alternate 9 alignment is the shortest route between Industrial Highway and Tremley Point Road. Also, on the south side of the river this alignment utilizes upland containment lagoons, including one of the Cytec lagoons, to minimize wetland impacts. The horizontal and vertical geometry permit a posted speed of 45 mph along the TPCR.

3.11.6 Disadvantages

This alternate has the longest river crossing, combined with a longer length of viaduct on a structure. In addition, using one of the Cytec lagoons as a means to minimize wetlands impacts reduces the potential for redevelopment of the Cytec lagoon for other purposes.

3.12 Location Alternatives

With respect to locating the northern terminus for the TPCR on Tremley Point Road, alternative locations that would have impacted existing industrial/commercial/terminal operations and pipeline routes were discounted due to the excessive costs associated with the impact to continued industrial use in the area. Several of the potential northern termini have existing bulk petroleum storage tanks and extensive under-ground and above-ground pipeline routes that are prohibitively expensive to relocate/replace.

With respect to locating the southern terminus on Industrial Highway, there are several industrial facilities in the area. Many of the facilities have extensive lagoon areas adjacent to the Rahway River, within which various levels of contaminants are managed (see Section 4.1.9-Hazardous Materials). Just north of Interchange 12 is Titan PDC's warehouse distribution center, which received NJDEP and USACE approvals and is currently nearing final construction. Some of the TPCR alternative alignments that were evaluated would have adversely impacted this approved redevelopment of the former Carteret Landfill. In addition, there are extensive tidal and freshwater wetlands, documented contaminated sites and existing development adjacent to the Rahway River that would have to be traversed to construct the proposed connector road.

The evaluation of potential location alternatives for the northern terminus at Tremley Point Road indicates that there are no exclusive upland areas that can be utilized to avoid potential impacts to wetlands that do not have other adverse environmental or economic impacts. The only significant upland areas are dominated by bulk petroleum storage and distribution operations, which present potentially significant environmental, remediation and relocation constraints. These constraints cause a dramatic increase in project costs due to the nature of bulk petroleum operations that tend to have extensive on-site contamination and above and below ground pipeline facilities.

Similar to the northern terminus, the evaluation of potential location alternatives for the southern terminus at Industrial Highway indicates that there are no exclusive upland areas that can be utilized to avoid potential impacts to wetlands, which do not have other adverse environmental impacts or other consequences, such as economic impacts to existing pipelines, industrial operations or other approved adjacent developments. The only significant upland areas for the southern terminus are dominated by Titan PDC's warehouse distribution center and with bulk petroleum and chemical storage and distribution operations that result in a dramatic increase in project costs due to the nature of bulk petroleum and chemical operations.

3.13 Alternative Constraints

Based upon the purpose and need for the project, any of the TPCR alignments considered must cross the Rahway River and adjacent wetlands on both sides of the river, as well as a series of wetlands features and/or contaminated land areas. In addition, an extensive array of utility lines (i.e., oil, gas, chemical and sanitary sewer) are located in the project area as a result of the long term industrial nature of the area. The key to the design

alternatives is limiting impacts to wetlands, existing and proposed industrial/commercial uses and contaminated areas. Two construction alternatives that were considered included: 2:1 Embankment Slope; and a combination of Retaining Walls and Pile/Pier Supported Structure to reduce the wetland impacts.

All of the alignment alternatives involve the same two major constructability issues, i.e., access and soil conditions. The design of the TPCR will minimize the footprint of the facility to mostly address wetland concerns. This will be achieved through the use of retaining walls and an elevated pile/pier supported viaduct. As the alignments of the various alternatives utilize the limited existing upland areas to the extent practicable in order to reduce the wetland impacts, the consequence is that the adjoining areas that will be used for construction access will primarily be in wetland areas. Construction vehicle access through the soft soil conditions in the wetlands can be provided by using temporary timber matting. The timber matting provides a means of traveling adjacent to the construction area to permit transport of materials and equipment and its subsequent removal does not adversely impact the wetland areas. The matting also provides working platform areas in the vicinity of viaduct pier areas. It is anticipated that obtaining the wetland permits for the construction the TPCR would require the restoration of any wetland vegetation damaged during the construction period.

The existing soil conditions involve two considerations. The natural soil conditions are anticipated to include a combination of soft, wet, compressible organic and inorganic materials. The man-made elements include landfills, storage lagoons, and soil contamination. Several of the proposed alignments traverse documented landfill areas or sites that contain contaminants released by previous industrial activities. These impacts are discussed in the narrative for each individual alternative alignment. However, beyond the documented evidence, there is a probability that the soil under any of the proposed alternative alignments contain materials that require special provisions during construction. The preliminary soil boring program that was performed as an element of the ongoing studies in the vicinity of the feasible alignments has yielded preliminary information related to the basic composition of the soils. Subsequent soils evaluations would also be performed during the final design phase of the project to provide more detailed information, particularly in final pier and retaining wall locations.

The soil boring information will be utilized to determine the location and limits of foundation options for the proposed structures. Pile foundations are anticipated to be used for the piers of the viaduct structure. Depending on the depth of the wet compressible material and any evidence of contamination that is found during the boring operation, the limits of the types of retaining wall and foundation will be adjusted. The retaining wall and pile foundation system will require some areas of pre-consolidation of the soil, in conjunction with the use of wick drains prior to the final construction. If evidence of contaminated groundwater is revealed, the retaining wall can be replaced with a system using displacement piles that greatly reduce the amount of contaminated material to be removed or require treatment. The final selection of wall types will consider the overall construction cost, as well as the constructability of the system.

Utility lines (e.g., petroleum/chemical pipelines, sanitary sewer trunk lines, etc.) are difficult to relocate due to costs and potential impacts to operation of the lines that can adversely affect local businesses. Therefore, it was determined early in the design process that utilities will be avoided to the maximum extent practicable. If any utility line can not be avoided, protective structures would be constructed over the utility line in order to not impact its integrity.

2:1 Embankment Slope Alternative - The embankment slope alternative consists of filling the route for the TPCR. This construction alternative results in the maximum impacts to wetlands as the width of the fill extends out from both sides of the alignment at the rate of two feet horizontally for every one foot above the existing grade. For example, a significant length of the roadway through the wetlands will be at least 15 feet above the adjacent ground elevation. The embankment extends 30 feet beyond the edge of the roadway on each side, resulting in more than doubling the area of wetland impacts.

Retaining Wall and Pile/Pier Supported Alternative – Use of a retaining wall and pile/pier supported structure was evaluated for each of the TPCR alignments. Wetland impacts were calculated based upon the entire 57-foot wide footprint. The wetland impacts do not distinguish between permanent wetland impacts or shading impacts.

In all alignment alternatives that were investigated, the retaining wall and pile/pier supported design would have the least impacts to wetlands. Shading of wetlands can constitute a relatively minor impact, depending upon the height of the structure and the amount of daylight that is available, as compared to filling impacts for the 2:1 slope embankment option. The use of retaining walls and pier/pile supported elevated structures greatly minimizes the amount of wetlands that will be filled. The use of concrete piles to support the proposed roadway is less environmentally destructive than the use of solid fill, as elevated structures allow for maintenance of wildlife passage corridors and the continuance of important wetland functions such as floodwater storage, water filtration and nutrient exchange.

3.14 Alternatives Evaluation Summary

The factors considered during the development and evaluation of the various alignment alternatives (see Figure ES-1 in the Executive Summary) included wetlands, history of land use and proposed future development. The vast majority of the area between Tremley Point Road and Industrial Highway consists of wetlands. Most of the TPCR alignment alternatives involve impacts to wetlands and associated wetland mitigation measures that contribute to a significant portion of the overall cost of the project. Review of records at the NJDEP reveal evidence that several locations were areas of landfills within the routes of the various alternatives. Other locations of the various alignment alternatives have a history of soil contamination related to the former industrial operations that once occupied the area. The disposal costs for contaminated soil, as well as landfill impacts, were considered for the various alternatives. The current land uses, as well as plans to develop current vacant parcels, were also considered in this alternatives evaluation.

Vertical constraints applied to the various alternative alignments include maintaining a minimum elevation of at least 10.0 feet to stay above the 100-year flood elevation of 9.0 feet. Vertical clearance over the navigable portion of the Rahway River was set using the same 36-foot clearance that was provided for the nearby existing river crossing of the Turnpike mainline. This clearance will be confirmed once the USCG permit review is completed. As discussed during a meeting with the USCG in June 2002, and reiterated during a meeting on March 2005, approval of the vertical clearance will be subject to approval under the authority of the General Bridge Act of 1946 and will include a Navigation Study.

In accordance with direction from Conrail, the railroad crossing adjacent to Industrial Highway will be accomplished using a grade separation. The TPCR and Industrial Highway will be raised to accommodate a bridge over the railroad crossing. To minimize wetland and right-of-way impacts along Industrial Highway, the elevated roadway will be constructed using retaining walls.

3.14.1 Non-Viable Alternative Alignments

All of the Interchange 12A alternative alignments that have been evaluated are deemed not viable due to the proximity of Interchanges 12 and 13, and the extensive wetland impacts and construction costs necessary to build a full interchange. Traffic entering and exiting Interchange 12A would have an adverse impact upon the adjacent travel lanes of the Turnpike, which results in unacceptable LOS on the Turnpike itself.

Alternates 1, 2, 3, 4, 7 and 8 are not viable alignments. The high costs associated with Alternate 1 for relocating the numerous existing utility lines and chemical/refined petroleum bulk storage facilities, combined with the port security concerns for this alternate, and the opposition of Carteret officials due to its proximity to residential areas, eliminate this alternate from further consideration. Alternate 2 was not preferred due to high wetlands impacts, the extensive length along the known American Cyanamid contaminated sludge area, and the need to raise Tremley Point Road by six feet for the TPCR to intersect on the north side of the Rahway River. Alternate 3 was not preferred as it has the third highest overall cost for construction, one of the more significant wetlands impacts, and requires four additional stream crossings when compared to Alternate 6. Alternate 4 was not preferred as it has the greatest wetlands impacts (10.2 acres), traverses contaminated soils areas through the American Cyanamid site, has the highest cost for property acquisitions and mitigation, and requires raising Tremley Point Road by seven feet to make the proper intersection with the TPCR. Alternate 7 was not preferred as it has one of the highest wetlands impacts, results in the bifurcation of several wetlands complexes on both sides of the Rahway River, requires four additional stream/creek crossings, and also has one of the highest construction costs. Alternate 8 was eliminated as it is no longer a viable option as the Titan PDC warehouse distribution facility on the former

Carteret Landfill is nearing completion. However even without construction of the warehousing facility, it has the second highest construction cost, significant wetlands impacts that also results in the bifurcation of a major wetland complex, severely impacts upon the approved redevelopment of the Carteret Landfill, adversely impacts the bulk petroleum storage facilities owned by Mobil Oil, and has one of the highest costs for property acquisitions and mitigation.

3.14.2 Viable Alternative Alignments

Alternates 5, 6, 9 and 10 share similar locations for end points on each side of the Rahway River and similar routes over the Rahway River. Operationally the horizontal and vertical alignments are compatible for the large volume of trucks anticipated to travel on the TPCR. These alignments permit a posted speed of 45 mph. This combined with the shorter length of the roadways, in comparison to other alternatives, results in overall shorter travel times and lower vehicle-miles traveled for the vast majority of vehicles anticipated to use the TPCR. By traversing an upland containment lagoon through the Cytec site, the wetlands impacts for Alternate 9 (4.9 acres) and Alternate 10 (4.3 acres) are less than Alternate 5 (6.1 acres) and Alternate 6 (6.4 acres). There are significantly higher costs associated with the construction of Alternates 9 and 10 due to the skewed crossing that results in a longer bridge span and viaduct over the Rahway River. Alternates 9 and 10 also limit potential future redevelopment of the Cytec lagoon that it would traverse over. Alternate 5 also has a longer skewed crossing over the Rahway River, which in turn increases the project costs by approximately \$500,000 as compared to Alternate 6.

Alternates 9 and 10 follow the same alignment for the majority of their length. In comparison to Alternate 9, the southern end of the alignment for Alternate 10 utilizes upland bermed areas located on the Kinder Morgan facility that are adjacent to Industrial Highway. Alternate 9 offered the advantage of minimizing impacts to the existing operations of the Kinder Morgan facility by traversing the land/wetlands to the west of the Kinder Morgan site. Alternate 9 would result in slightly greater impacts to wetlands, but at the same time minimize the extent of security measures that will be necessary to isolate the proposed construction activities from the existing operations at the site. It is also uncertain how the loss of this bermed upland area for Alternate 10 will impact current or future operations at Kinder Morgan. The advantage of Alternate 10 is that using the upland area on the Kinder Morgan site reduces the impacts to wetlands and also provides a location to construct a stormwater management basin in an upland area.

3.14.3 Conclusion

In conclusion, this alternatives analysis and EA demonstrates that Alternate 10 has been located, aligned and designed to avoid and minimize potential impacts to wetlands and contaminated sites to the maximum extent reasonably possible,

given the logistics, technology and economics of the various alternative routes considered. No significant areas of vacant uplands that are not contaminated are present between the northern terminus at Tremley Point Road in Linden and the southern terminus at Industrial Highway in Carteret that allows the project to be built upon an uncontaminated upland site. The location of the TPCR avoids potential impacts to the Rahway River, utility lines on both sides of the river, rail lines and existing commercial/industrial operations.

This alternatives analysis further indicates that the project purpose and need cannot reasonably be accomplished by any other alternative location, alignment or design that avoids or further minimizes impacts upon wetlands without having other significant adverse environmental impacts or other consequences. In conclusion, the TPCR project (i.e., Alternate 10), as proposed in Section 2.3, best meets the project's purpose, while minimizing potential adverse environmental or other impacts.

**TABLE 3-1
Tremley Point Connector Road Alternatives Summary**

ALTERNATIVE	WETLANDS/OPEN WATER/LAND IMPACTS	WETLANDS MITIGATION COST	CONSTRUCTION COST	PROPERTY ACQUISITION COST	TOTAL COST (\$million)	ADVANTAGES	DISADVANTAGES
Tremley Point Connector Road – Alternate 1	0.4 acres - Wetlands 0.9 acres - Open Water 11.7 acres - Uplands	\$210,000	\$107.8	\$905,000	\$108.9	<ul style="list-style-type: none"> Least wetland impacts; and Utilizes current roadway areas. 	<ul style="list-style-type: none"> Most circuitous and highest cost; Creates port security problems for the USCG; Opposed by Carteret due to proximity to residents; Opposed by Citgo due to plant security and existing utilities; and Requires extensive improvements to local roadways.
Tremley Point Connector Road – Alternate 2	8.9 acres - Wetlands 0.8 acres - Open Water 1.2 acres - Uplands	\$4,672,000	\$48.4	\$545,000	\$53.5	<ul style="list-style-type: none"> Minimal small stream crossings; and Minimal impacts at Kinder-Morgan. 	<ul style="list-style-type: none"> Skewed river crossing; Additional costs due to contaminated area; Requires grade of Tremley Point Road to be raised six feet; and Steep profile on North end.
Tremley Point Connector Road – Alternate 3	7.4 acres - Wetlands 0.8 acres - Open Water 1.2 acres - Uplands	\$3,885,000	\$68.7	\$698,500	\$73.3	<ul style="list-style-type: none"> Perpendicular river crossing. 	<ul style="list-style-type: none"> Four additional Stream Crossings compared to Alternate 6; Cuts through Titan PDC facility; and Third highest overall cost.
Tremley Point Connector Road – Alternate 4	10.2 acres - Wetlands 0.7 acres - Open Water 1.5 acres - Uplands	\$5,355,000	\$51.1	\$660,000	\$57.1	<ul style="list-style-type: none"> Shortest river crossing. 	<ul style="list-style-type: none"> Additional high costs due to highly contaminated soil area; Profile will require raising Tremley Point Road by several feet; and Steep profile at north end.
Tremley Point Connector Road – Alternate 5	6.1 acres - Wetlands 1.1 acres - Open Water 0.4 acres - Uplands	\$3,202,000	\$46.0	\$528,000	\$49.7	<ul style="list-style-type: none"> Flat horizontal curvature; and Minimal impacts to Kinder Morgan. 	<ul style="list-style-type: none"> Skewed river crossing; Longer span necessary to provide the required vertical clearance over the navigable portion of the river; and Curved structure over river is undesirable from maintenance and operational perspectives.
Tremley Point Connector Road – Alternate 6	6.4 acres - Wetlands 0.9 acres - Open Water 0.8 acres - Uplands	\$3,360,000	\$45.4	\$517,000	\$49.3	<ul style="list-style-type: none"> Close to perpendicular river crossing; Utilizes upland areas south of river; and Lowest construction costs and small property acquisitions costs. 	<ul style="list-style-type: none"> Slightly greater wetland impacts and overall travel distance compared to Alternate 5.

**TABLE 3-1
Tremley Point Connector Road Alternatives Summary**

ALTERNATIVE	WETLANDS/OPEN WATER/LAND IMPACTS	WETLANDS MITIGATION COST	CONSTRUCTION COST	PROPERTY ACQUISITION COST	TOTAL COST (\$Million)	ADVANTAGES	DISADVANTAGES
Tremley Point Connector Road – Alternate 7	7.5 acres - Wetlands 0.9 acres - Open Water 0.4 acres - Uplands	\$3,938,000	\$53.3	\$644,000	\$57.9	<ul style="list-style-type: none"> Perpendicular river crossing. 	<ul style="list-style-type: none"> Circuitous horizontal alignment; and Four additional stream crossings compared to Alternate 6.
Tremley Point Connector Road – Alternate 8	7.4 acres - Wetlands 0.6 acres - Open Water 3.6 acres - Uplands	\$4,042,500	\$83.2	\$1,130,000	\$88.3	<ul style="list-style-type: none"> River crossing near Turnpike and Conrail crossings; Avoids Cytec lagoons; and Majority of alignment south of river through upland area of former landfills. 	<ul style="list-style-type: none"> Alignment cuts through Titan PDC constructed buildings; Significant wetland impacts north of river; Impacts on Mobil Oil and Trucking Company at north end of alignment; Significant impact on approved redevelopment of former landfill site on south side of river; and Second highest construction costs.
Tremley Point Connector Road – Alternate 9	4.9 acres - Wetlands 1.2 acres - Open Water 1.5 acres - Uplands	\$2,572,000	\$52.8	\$634,000	\$56.0	<ul style="list-style-type: none"> Shortest overall travel length between Industrial Highway and Tremley Point Road; Traverses upland area of Cytec lagoon; and Lowest wetlands impacts of viable alternatives 	<ul style="list-style-type: none"> Long bridge span over river and long viaduct; Skewed river crossing; and Reduces potential for redevelopment of Cytec lagoon area.
Tremley Point Connector Road – Alternate 10	4.3 acres – Wetlands 1.4 acres – Open Water 2.4 acres – Uplands	\$2,257,500	\$59.6	\$798,000	\$62.6	<ul style="list-style-type: none"> Traverses areas of Kinder Morgan and Cytec Lagoon; Maximizes use of upland areas; and Possible additional area for stormwater management basin on Kinder Morgan site. 	<ul style="list-style-type: none"> Same as Alternate 9; Adds several hundred feet to trip length for each vehicle on Industrial Highway; and ROW acquisition required in high security area of Kinder Morgan.

**TABLE 3-1
Tremley Point Connector Road Alternatives Summary**

ALTERNATIVE	WETLANDS/OPEN WATER/LAND IMPACTS	WETLANDS MITIGATION COST	CONSTRUCTION COST	PROPERTY ACQUISITION COST	TOTAL COST (\$Million)	ADVANTAGES	DISADVANTAGES
Interchange 12A – Alternate A	13.2 acres - Wetlands 0.9 acres - Open Water 24 acres – Uplands	\$6,930,000	\$320.8	\$4,740,000	\$334.4	<ul style="list-style-type: none"> No major impacts to South Wood Avenue/Tremley point Road bridge structure; and No known contaminated sites in footprint of project, but additional investigation of the closed American Cyanamid Landfill would likely be required. 	<ul style="list-style-type: none"> Alternate A has one of the highest (i.e., most severe) wetlands impacts (13.2 acres) as compared to other 12A alternates; A number of pipelines and utility lines affected by construction and some need to be relocated; Queuing concerns with close proximity of ramps and mainline of Turnpike; Impacts upon wetlands preserved as part of USACE permit for Interchange 11 to 15E widening; Eight structures need to be constructed; Easements required from railroads; and Causes a significant adverse impact to traffic operations and safety of the Turnpike main line.
Interchange 12A – Alternate B	7.9 acres - Wetlands 0.2 acres - Open Water 19.8 acres – Uplands	\$4,147,500	\$293.4	\$3,470,000	\$301.0	<ul style="list-style-type: none"> The wetlands preserved as mitigation for Interchange 11 to 15 widening program will not be impacted. 	<ul style="list-style-type: none"> One of the proposed ramps to be constructed is next to an American Cyanamid hazardous waste site; A number of pipelines and other utilities affected by construction and some require relocation; The distance between the new intersections formed by the diamond interchange configurations may be insufficient, no matter how many turning lanes are provided; As the ramp movements and the Lower Airport Road are not in line, special intersection treatments will be required to prevent trucks from traveling on South Wood Avenue instead of using Lower Airport Road; and Causes a significant adverse impact to traffic operations and safety of the Turnpike main line.

**TABLE 3-1
Tremley Point Connector Road Alternatives Summary**

ALTERNATIVE	WETLANDS/OPEN WATER/LAND IMPACTS	WETLANDS MITIGATION COST	CONSTRUCTION COST	PROPERTY ACQUISITION COST	TOTAL COST (\$Million)	ADVANTAGES	DISADVANTAGES
Interchange 12A – Alternate C	7.2 acres - Wetlands 0.9 acres - Open Water 23.2 acres – Uplands	\$3,780,000	\$279.5	\$4,170,000	\$287.4	<ul style="list-style-type: none"> Lower Airport Road would be in line with the ramps; and The distances between the new intersections should provide sufficient storage length on South Wood Avenue for turning movements. 	<ul style="list-style-type: none"> One of the proposed ramps is next to an American Cyanamid hazardous waste site; A number of pipelines and other utilities affected by construction and some have to be relocated; Requires some ROW acquisitions and affects access to the Transco facility; The west abutment of South Wood Avenue would be shifted to make room of one of the new ramps; and Causes a significant adverse impact to traffic operations and safety of the Turnpike main line.
Interchange 12A – Alternate D	9.1 acres - Wetlands 0.5 acres - Open Water 35.4 acres – Uplands	\$4,777,500	\$429.9	\$4,370,000	\$439.0	<ul style="list-style-type: none"> No contaminated sites are impacted; and Most of the utilities are perpendicular crossings that will require extension of protective sleeves, with only one pipeline requiring relocation. 	<ul style="list-style-type: none"> Impacts up to 9.1 acres of wetlands; The existing U-turn structure will require removal; Will require ROW acquisitions for ramps in the southwest quadrant and intersection improvements to South Wood Avenue; Access to Transo facility is needed; Easement required from the railroad for bridge modifications; Intersection with Lower Airport Road will need to intersect directly with new ramps; and Causes a significant adverse impact to traffic operations and safety of the Turnpike main line.

**TABLE 3-1
Tremley Point Connector Road Alternatives Summary**

ALTERNATIVE	WETLANDS/OPEN WATER/LAND IMPACTS	WETLANDS MITIGATION COST	CONSTRUCTION COST	PROPERTY ACQUISITION COST	TOTAL COST (\$Million)	ADVANTAGES	DISADVANTAGES
Interchange 12A – Alternate E	14.2 acres - Wetlands 1.6 acres - Open Water 24.2 acres – Uplands	\$7,455,000	\$349.5	\$4,480,000	\$361.4	<ul style="list-style-type: none"> • Most efficient design from a traffic operations perspective. 	<ul style="list-style-type: none"> • Severely impacts up to 14.2 acres of wetlands; • A portion of Marshes Creek will have to be relocated; • Most of the utility lines are perpendicular crossings that will require an extension of the protective sleeves; • Transco pipeline will have to be relocated; • Several box culverts will be needed for the ramps; and • Causes a significant adverse impact to traffic operations and safety of the Turnpike main line.