VI. ALTERNATIVES DEVELOPMENT

Alternatives have been developed and tested as part of the process to determine the best uses for the Bergen Arches right of way. Alternatives were developed for several different modes of transportation as well as various locations and means of connection to the existing transportation network. The focus of this section of the report is to identify and describe the various alternatives and to give the reader some insight into the considerations and obstacles which were overcome in the development of these alternatives.

Throughout this study various modes of transportation were each given equal footing during the alternatives development and analysis phases. These modes include;

- Rail Freight
- Passenger Transit
- Roadway
- Mixed Mode
- Bicycle/Pedestrian

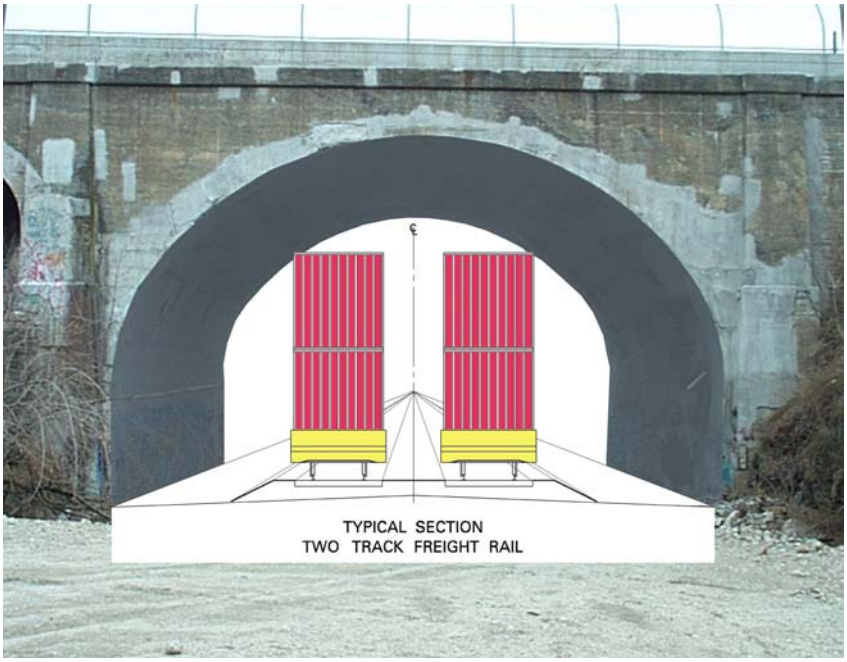
For some of the modes, including; Passenger Transit, Roadway, and Mixed Mode, several alternatives were developed to enable the analysis to test various cross section and connection opportunities. The following pages describe the alternatives developed during this study.

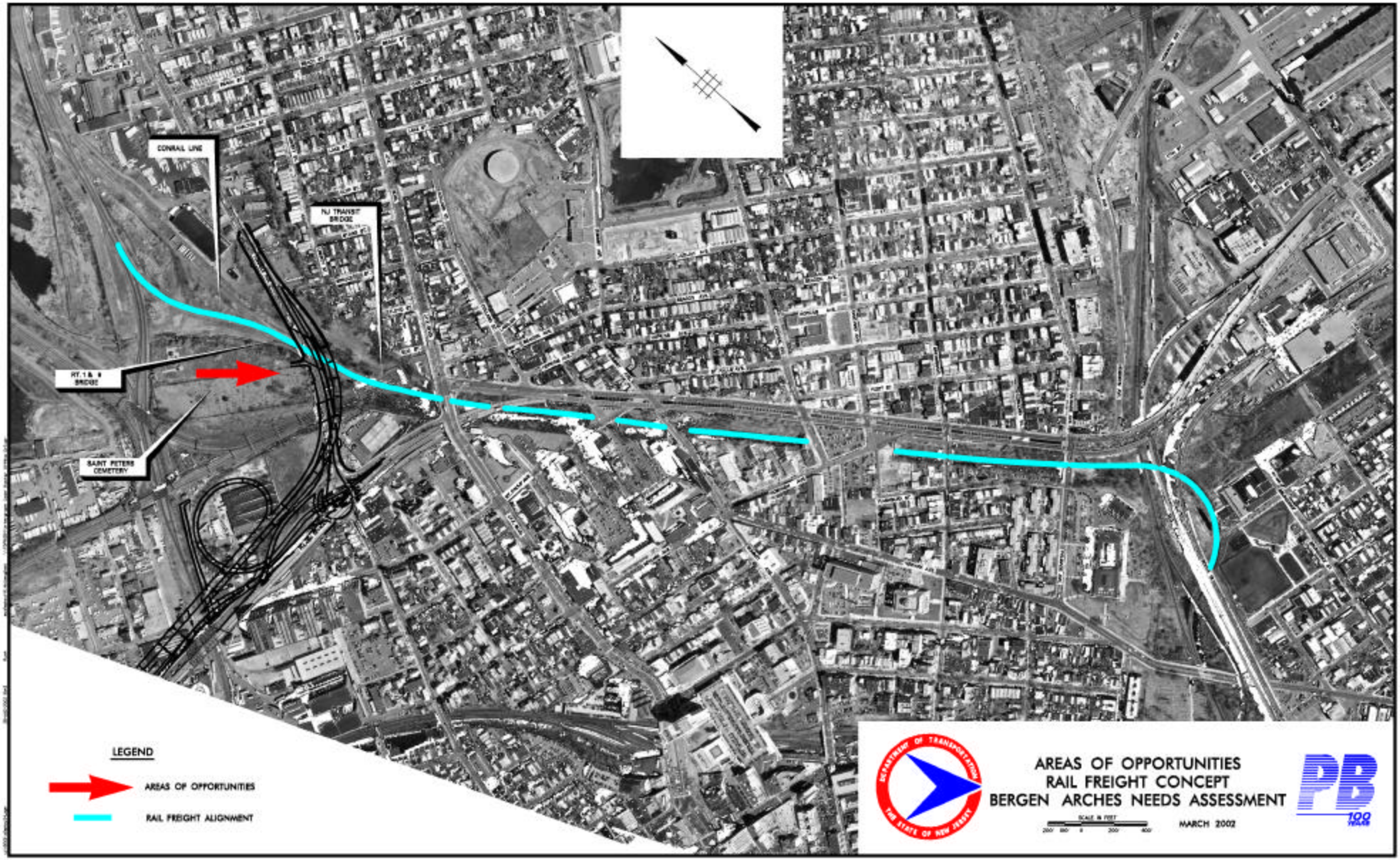
RAIL FREIGHT ALTERNATIVE

A rail freight alternative **(Alternative F1)** was developed for the Bergen Arches study. This alternative would connect the Northern Branch Line located west of the Palisades to the National Docks Secondary Line located at the eastern foot of the Palisades. This alignment would improve fail freight service to various port terminals and industrial facilities located along the Jersey City and Bayonne waterfronts.

It is envisioned that a Rail Freight alternative using the Bergen Arches alignment would be a two track facility with sufficient vertical clearance to accommodate domestic double stacked containers. The cross section below illustrates how this type of facility might look within the Bergen Arches alignment.

The plan on the following page illustrates one potential alignment of a rail freight alternative.




CONRAIL LINE
NJ TRANSIT BRIDGE
RT. 1 & 9 BRIDGE
SAINT PETERS CEMETERY
LEGEND
AREAS OF OPPORTUNITIES
RAIL FREIGHT ALIGNMENT
AREAS OF OPPORTUNITIES
RAIL FREIGHT CONCEPT
BERGEN ARCHES NEEDS ASSESSMENT
MARCH 2002
PB

Two rail freight operators have the potential to use this alternative. They are CSX Transportation and Norfolk Southern. In evaluating this alternative, discussions were held with both rail freight operators. Based on these discussions, two other alternatives were judged more important than use of the Bergen Arches. Construction of the Waverly Loop and double tracking and signaling the Passaic & Harsimus (P&H) Branch has a high priority.

Another set of improvements, including improving the Marion connection, increasing the clearance in the Bergen Hill Tunnel (from 19'-6" to 22") to handle domestic doublestack traffic, and adding capacity to the National Docks Secondary line also ranks higher than a Bergen Arches alternative.

The Bergen Arches alternative would utilize the same infrastructure as the Bergen Tunnel route and would add very little capacity or routing flexibility. Based on the more preferable alternatives, the Bergen Arches as a rail freight alternative is not the best use of this facility.

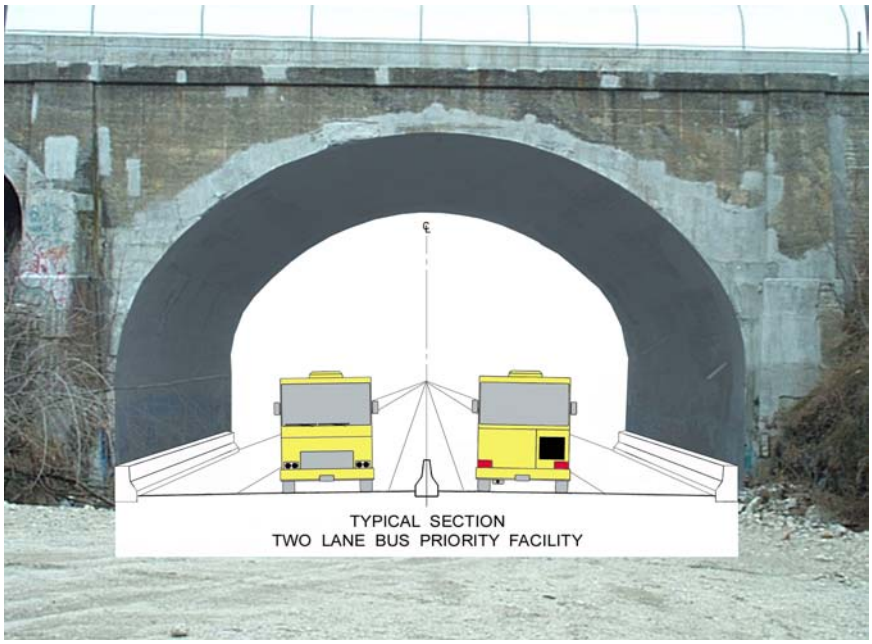
TRANSIT FACILITIES ALTERNATIVES

Several transit modes were considered feasible as possible uses of the Bergen Arches. The modes include Bus, Light Rail Transit, Commuter Rail and PATH. Based on discussions with NJ Transit it was determined that little regional benefit would be realized if the arches were used for Commuter Rail providing a parallel facility just a short distance to the south of the existing four-track Bergen Tunnel. Similarly, it was determined that limited benefit would be achieved by using the Bergen Arches as an expansion to the existing PATH facility. The existing Grove Street to Journal Square alignment of PATH runs parallel to the Bergen Arches just several thousand feet to the south. Based on this realization, only two of the four transit modes discussed above, Bus and Light Rail Transit, were developed further into alternatives.

As shown in the figure on the following page, the Priority Bus Facility Alternative **(Alternative T3)** would connect directly to the New Jersey Turnpike's proposed Secaucus Interchange, crossing over New Jersey Transit's Hoboken Division Rail Lines and the Northern Branch freight line, before passing below Tonnele Avenue and JFK Boulevard and into the Bergen Arches cut. East of the Palisades three potential alignments of the Priority Bus Facility were examined including 18th Street, 11th Street, and 6th Street. The most favorable of the inbound alignments was determined to be 11th Street. Along 11th Street the Priority Bus Facility would make use of existing retained fill embankments west of Jersey Avenue and the existing 11th Street viaduct proceeding eastward towards Washington Boulevard. The alignment was developed to accommodate buses destined to both the Jersey City waterfront and Manhattan via the Holland Tunnel. A ramp alignment was developed connecting the elevated facility to the 12th Street approach roadway to the Holland Tunnel via Erie Street. At its eastern terminus the bus priority facility would utilize the existing at grade intersection at Washington Boulevard providing access to the north and south.

TRANSIT ALTERNATIVE – PRIORITY BUS
SEGMENT A, B, C
BERGEN ARCHES STUDY
FEBRUARY 2000

It is envisioned that the Priority Bus Facility would provide one lane of travel in each direction as indicated in the proposed cross section below.

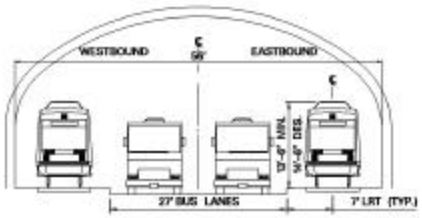


The Light Rail Transit Alternative **(Alternative T1)** follows much the same alignment as the Priority Bus Alternative discussed above with some minor exceptions. At its western terminus the LRT Alternative would make use of the Secaucus Transfer Station providing access for NJ Transit passengers on the (Amtrak's) North East Corridor as well as on NJ Transit Bergen and Main Line trains. As shown on the following pages in the alignment diagram and cross sectional alternatives, two possible alignments exist for the western terminus of the alignment, either at the southern end of the station adjacent to the Bergen/Main Line alignments, or on the north side of the station adjacent to the proposed Seaview Avenue alignment. The alignment would then proceed eastward, either immediately south or north of NJ Transit's consolidated Main and Bergen Line tracks, crossing under them if the southerly alignment is selected. The alignment then continues in an easterly direction to cross over the Northern Branch Rail Line and under Tonnele Avenue, the Hoboken Division rail lines and JFK Boulevard and into the Bergen Arches cut. A short segment of existing CSX freight track would have to be realigned and the bridge that carries NJ Transit's Hoboken Division trains over the proposed LRT alignment would have to be modified near the western entrance to the Arches cut.

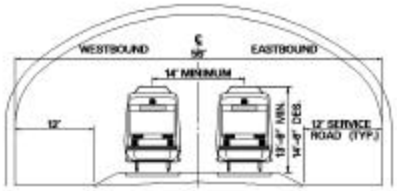
As the alignment exits the cut east of the Palisades two alternative alignments exist north and south. The northern alignment would make use of the soon to be abandoned River Line alignment traversing the foot of the Palisades to the vicinity of its crossing of Hoboken Avenue and join the existing HBLR alignment which is currently under construction. The southern alignment would turn south as it exits the cut traversing the foot of the Palisades to the vicinity of Newark Avenue running parallel to Newark Avenue as it passes under the New Jersey Turnpike. It would then turn eastward using the existing elevated retained-fill embankment just south of Sixth Street (the former Sixth Street Viaduct).

The alignment passes above Marin Boulevard and south of the Newport Mall to a junction with the existing Hudson-Bergen LRT System. The junction could be configured to accommodate service turning northerly, to the existing Newport/Pavonia LRT Station, or southerly, to access the Harsimus Cove LRT Station.

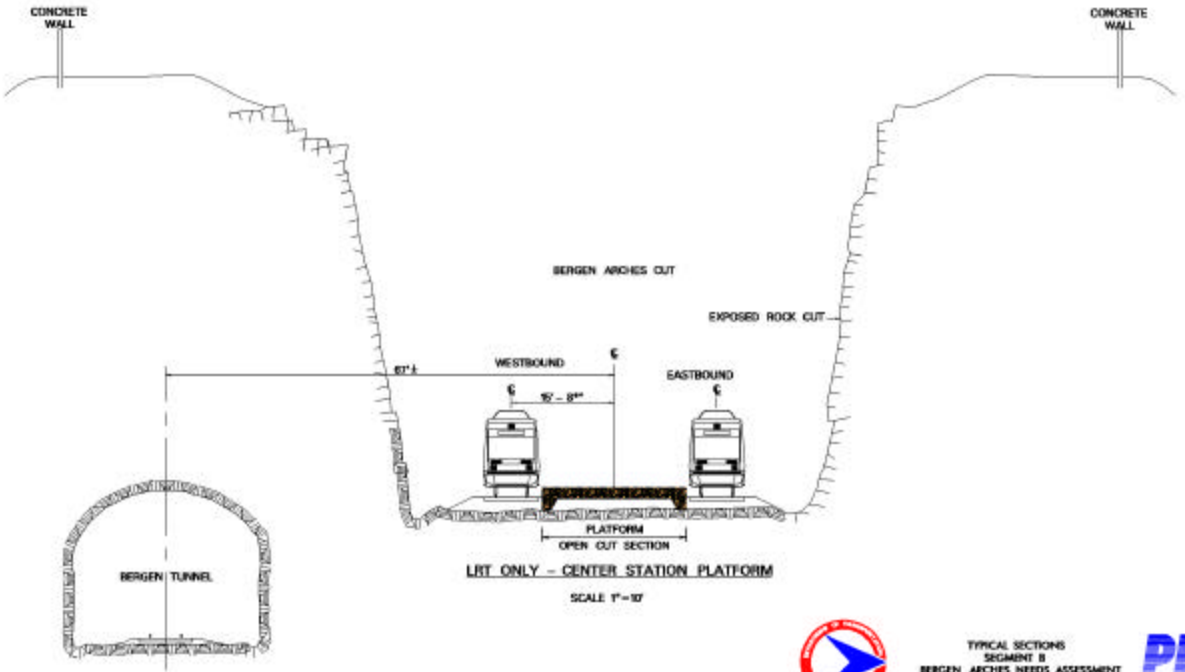

LEGEND
LRT
TRANSIT ALTERNATIVE – LRT
SEGMENT A, B, C
BERGEN ARCHES STUDY



TUNNEL SECTION
TWO TRACK LIGHT RAIL TRANSIT
SCALE 1"=10'



TUNNEL SECTION
TWO TRACK LIGHT RAIL TRANSIT
SCALE 1"=10'

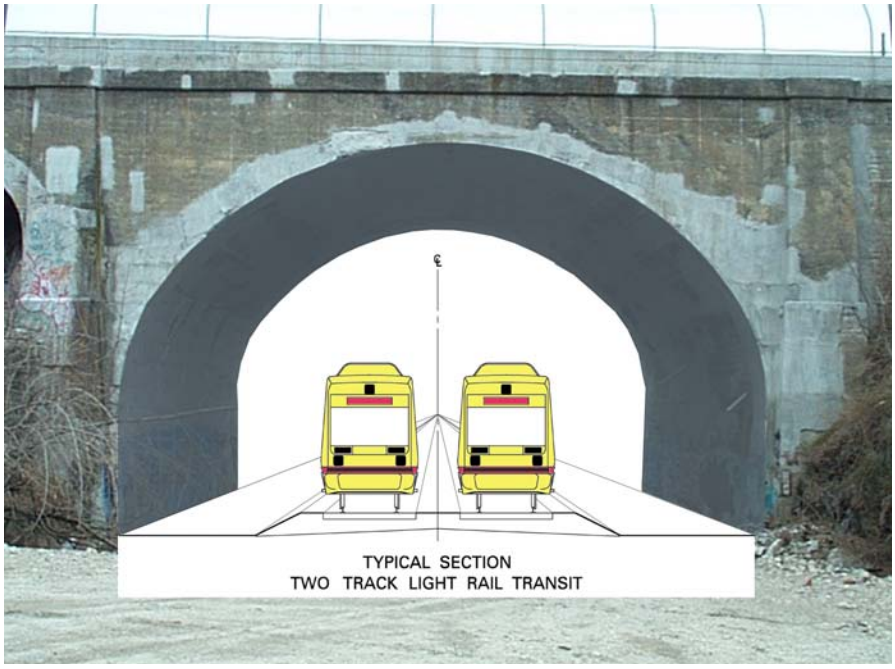


LRT ONLY - CENTER STATION PLATFORM
SCALE 1"=10'

TYPICAL SECTIONS
SEGMENT B
BERGEN ARCHES NEEDS ASSESSMENT
FEBRUARY 2002

A third alignment east of the Palisades, using 11th Street was reviewed but dismissed from further analysis due to a concern with interfacing the existing HBLR in the vicinity of Newport Parkway where the system is currently elevated.

Stations are envisioned along the alignment (from west to east) at Secaucus Transfer, east of Tonnele Avenue, in the cut at Baldwin Avenue, in the vicinity of Saint Francis Hospital and an eastern terminus at either the Pavonia/Newport or Harsimus Cove Station on the existing HBLRT system. The LRT cars would, of necessity, be similar to existing Hudson-Bergen fleet, and stations would be of the low platform type. Operation of two car trains on ten-minute headways during peak periods would require a fleet of seven LRT cars: six on the line and one in reserve.



In addition to the alignment discussed above, an extension of the LRT Alternative alignment farther west to Giant Stadium was examined **(Alternative T2)**. It was envisioned that three additional stations would be provided along the extension at Harmon Cove, along Meadowlands Parkway in the vicinity of Route 3 and at a Park and Ride facility at Giants Stadium.

ROADWAY FACILITIES ALTERNATIVES

Roadway alternatives were developed for the study area using the Bergen Arches as a means to bypass a very densely developed and congested area of Jersey City in the vicinity of Journal Square. Similar to State Route 139 the Bergen Arches allows for the ability to provide uninterrupted/grade separated traffic flow from connections west of Tonnele Avenue to the Downtown area east of the Palisades. The goal in developing the roadway alternative alignments was to provide a connection from the New Jersey Turnpike Secaucus Interchange (currently being constructed) to the Jersey City Waterfront area. To facilitate the concept development effort, the area was divided into three Segments A, B and C as shown in the illustration on the following page.

Segment A, shown in red, covers the area of interest west of JFK Boulevard. Segment B in blue is the Bergen Arches cut area between JFK Boulevard and just east of Palisades Avenue. Segment C in yellow is the area east of Palisades Avenue through to Washington Boulevard.

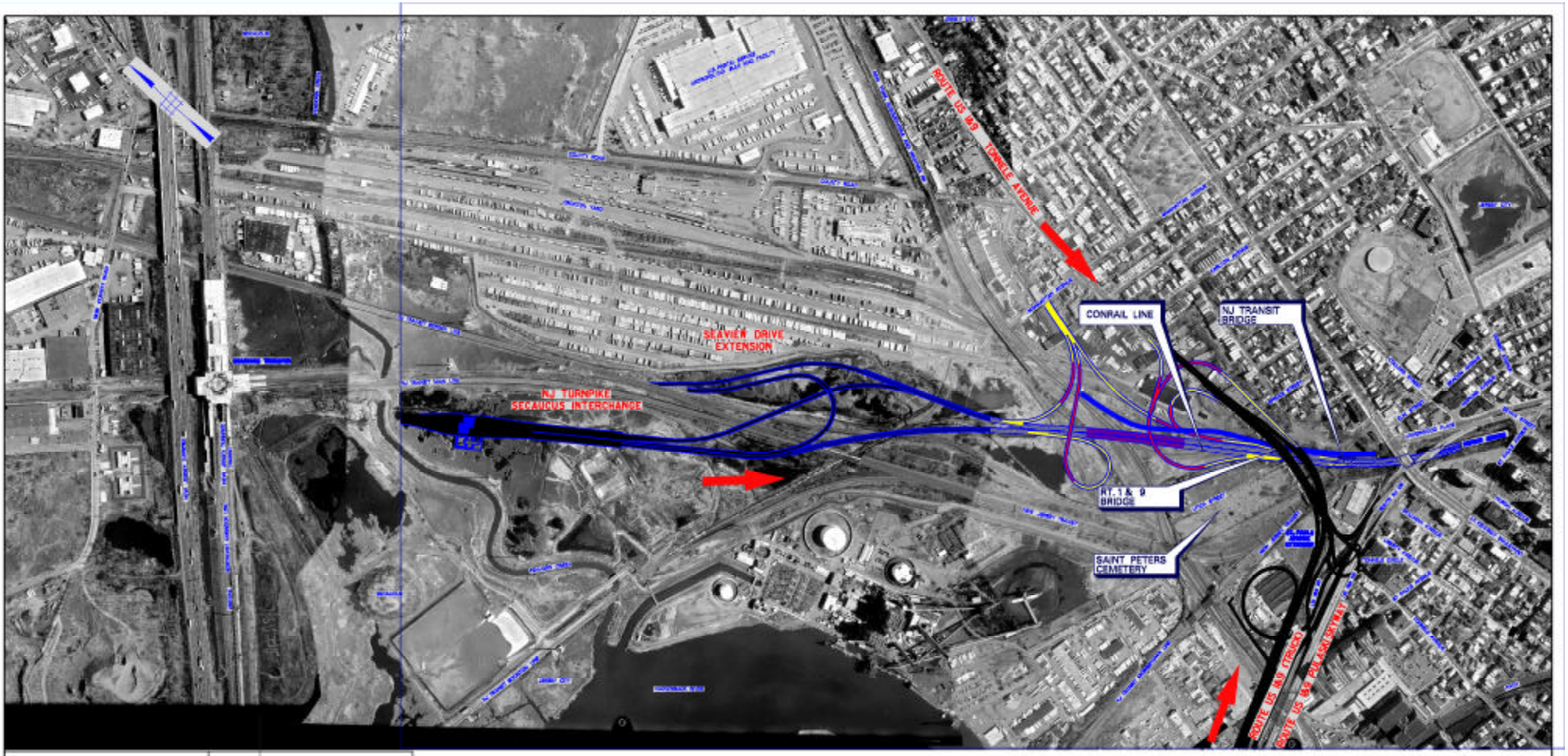
SEGMENT A ROADWAY ALTERNATIVES

Segment A extends from the NJ Turnpike east to the westerly end of the Bergen Arches cut. Proposed roadway alignments within this segment would connect the Bergen Arches to the NJ Turnpike via the NJ Turnpike Authority's proposed Secaucus Interchange and Seaview Drive Extension projects. The proposed alignment, shown on the following page, would provide a four-lane divided roadway with shoulders (two lanes EB and two lanes WB) beginning at the western end of the Secaucus Interchange and extending east to the Bergen Arches. The alignment would cross over the Northern Branch Rail Line and under Tonnele Avenue, the Hoboken Division rail lines and JFK Boulevard and into the Bergen Arches cut. A short segment of existing CSX freight track would have to be realigned so as to occupy the northerly spans under the two existing bridges carrying Tonnele Avenue and the NJ Transit Hoboken Division's rail lines over the CSX track where it enters the Bergen Hill tunnel on the north side of the Bergen Arches cut. This is required in order to allow the Bergen Arches roadway to pass under the southerly spans of the existing overpasses and into the Arches cut.

On the west side of the Arches, access between the Bergen Arches roadway alignment and Tonnele Avenue (Route US 1& 9) would be provided via new interchange ramps spanning the active rail lines and connecting to and from Tonnele Avenue and Manhattan Avenue. In addition to the active rail lines, other constraints existing within the Segment A area include the Saint Peters Cemetery property and freshwater wetland areas.

SEGMENT B ROADWAY ALTERNATIVES

Segment B is the Bergen Arches Cut itself, an approximately 4,400 foot long open cut passage through the Bergen Hill section of the Palisades. The existing Bergen Arches is comprised of three distinct cross sectional elements – concrete-lined arch-shaped tunnels, bridges (both arches and truss) and open cut sections. The physical constraints posed by these elements limit the proposed alternatives within this segment. The existing tunnels provide an approximately 56-foot horizontal width between tunnel walls and vertical clearances varying from approximately 10 feet at the walls to 26 feet at the center. Widening within the tunnels or under the existing arch bridges is not seen as a feasible option. Minor widening of the open cut sections between the tunnels and bridges is feasible. The open cut sections, approximately 60 feet wide at the base, vary in depth from approximately 40 to 75 feet. Each of the roadway



AREAS OF OPPORTUNITIES

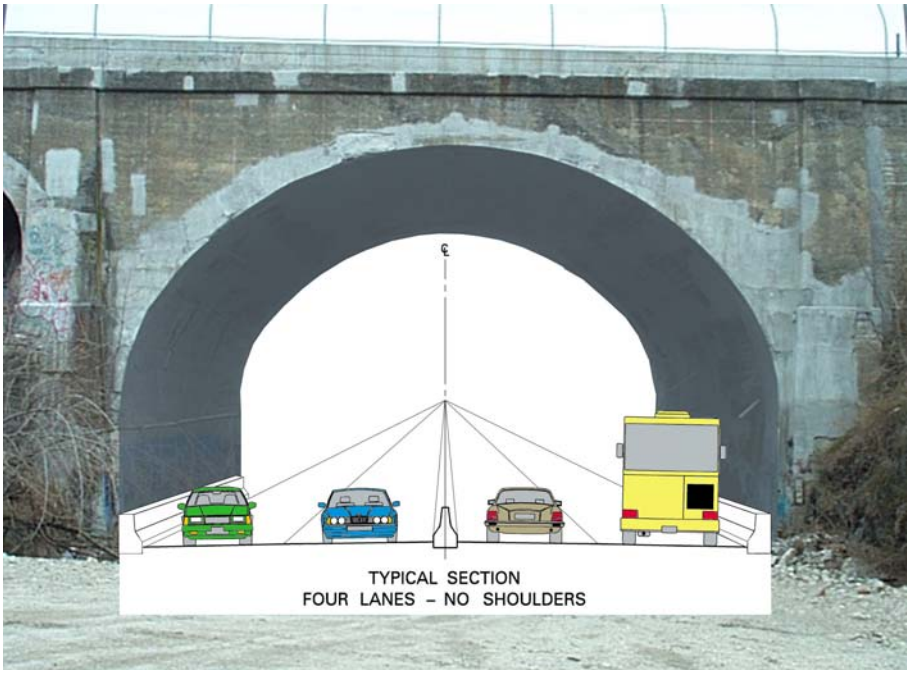
CONCEPT 1
SEGMENT A
BERGEN ARCHES NEED ASSESSMENT

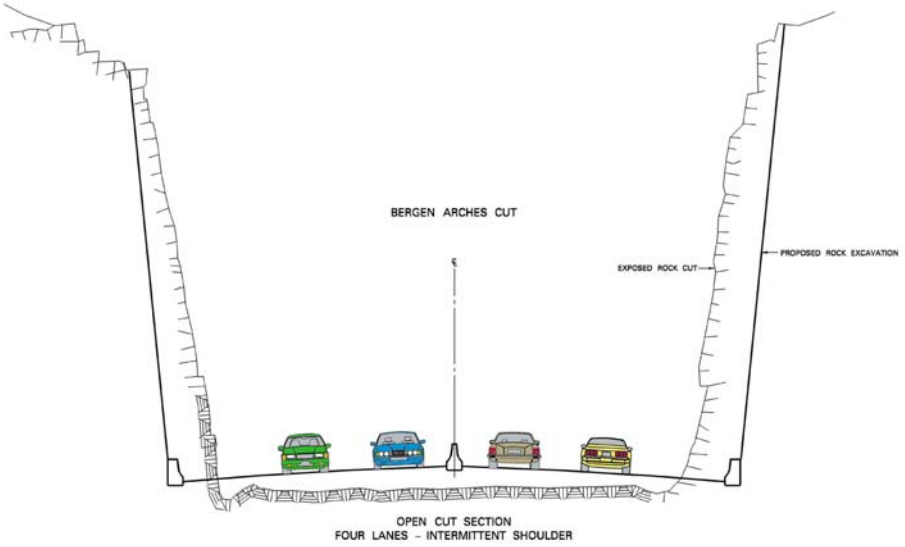
MARCH 2002

alternatives will require excavation along the length of Segment B to lower the elevation of the floor within the tunnels in order to achieve minimum desired vertical clearances above the roadway.

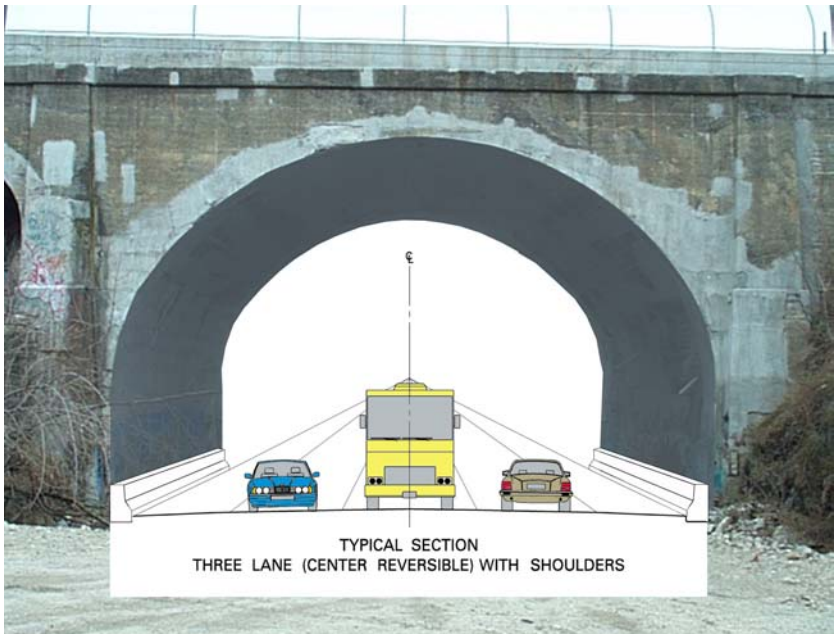
Within the constrained tunnel/arch sections there are two alternative roadway cross sections proposed:

Four-Lane Alternative. The four-lane section would consist of two lanes in each direction separated by a median barrier. No outer shoulders would be provided within the existing tunnel/arch segments. Intermittent (emergency breakdown) shoulders could be provided by widening three of the open cut sections between tunnels by excavating the existing rock side slopes.



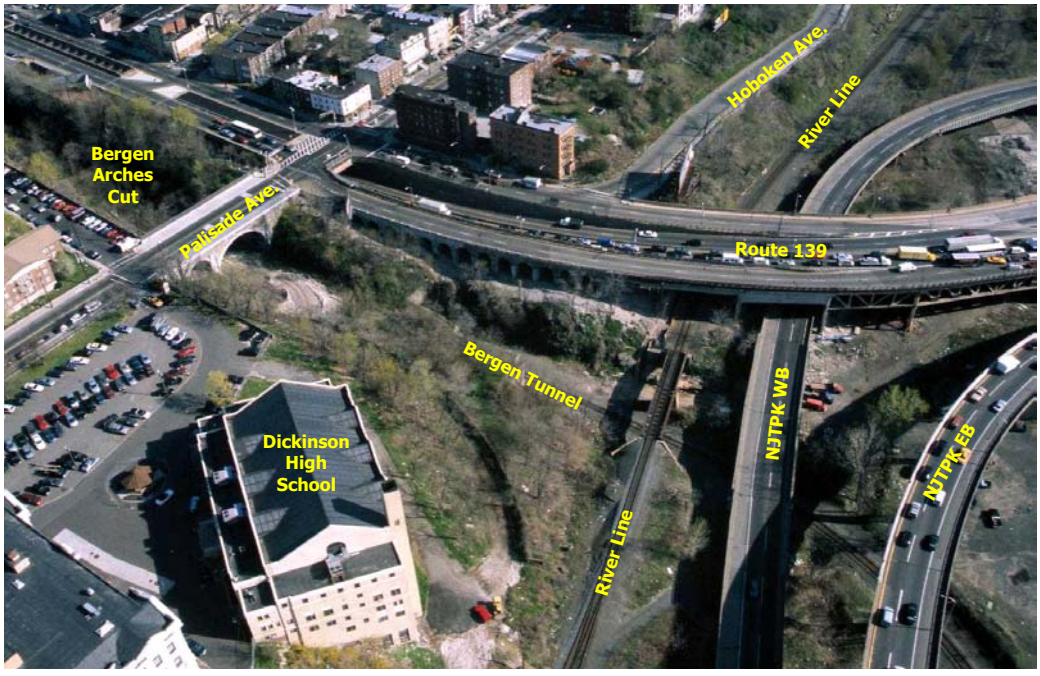


Three-Lane Alternative. The three-lane section, as shown below, would consist of a three lane undivided roadway. This section would allow provision of continuous outer shoulders along the entire length of Segment B.

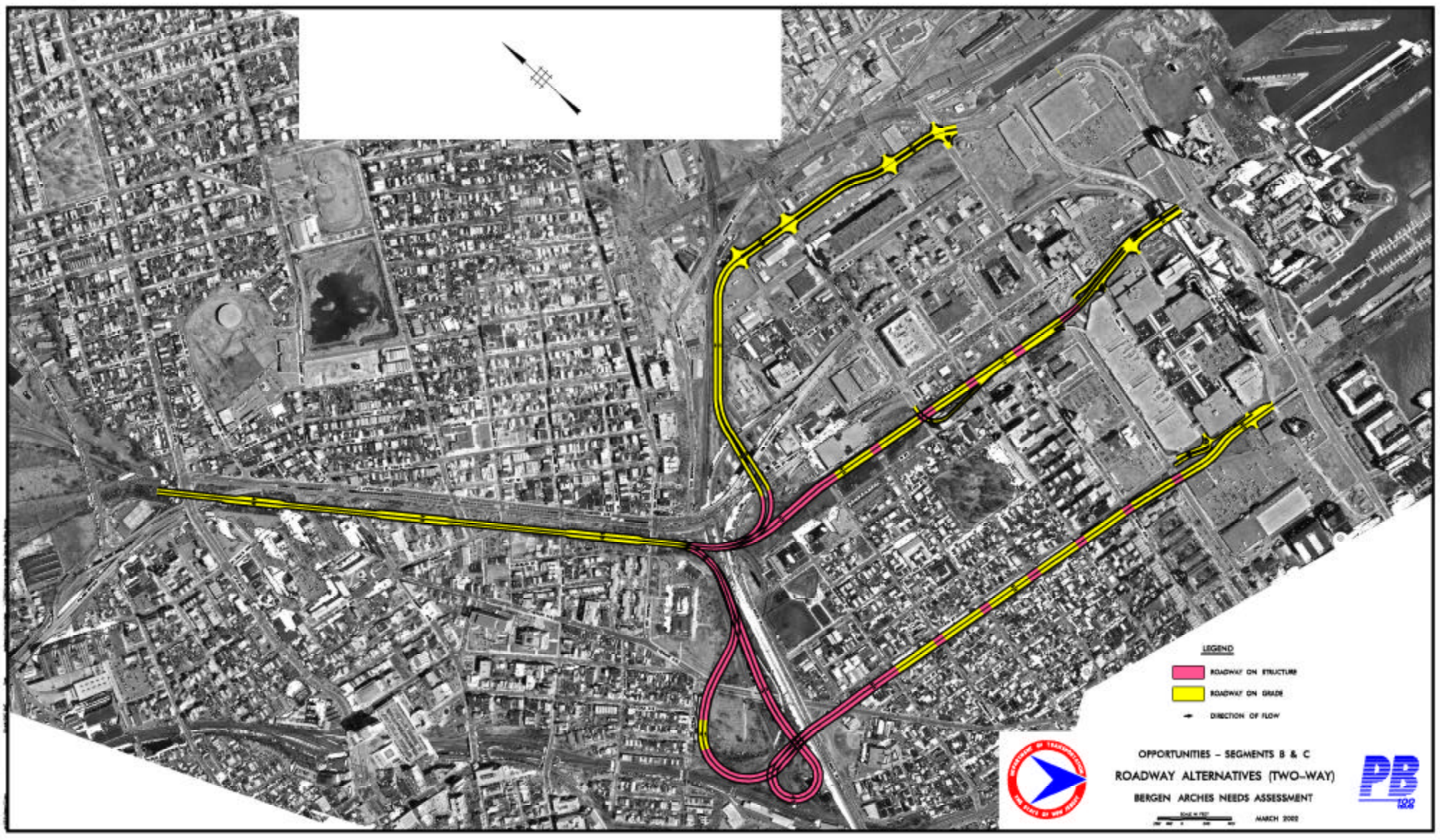


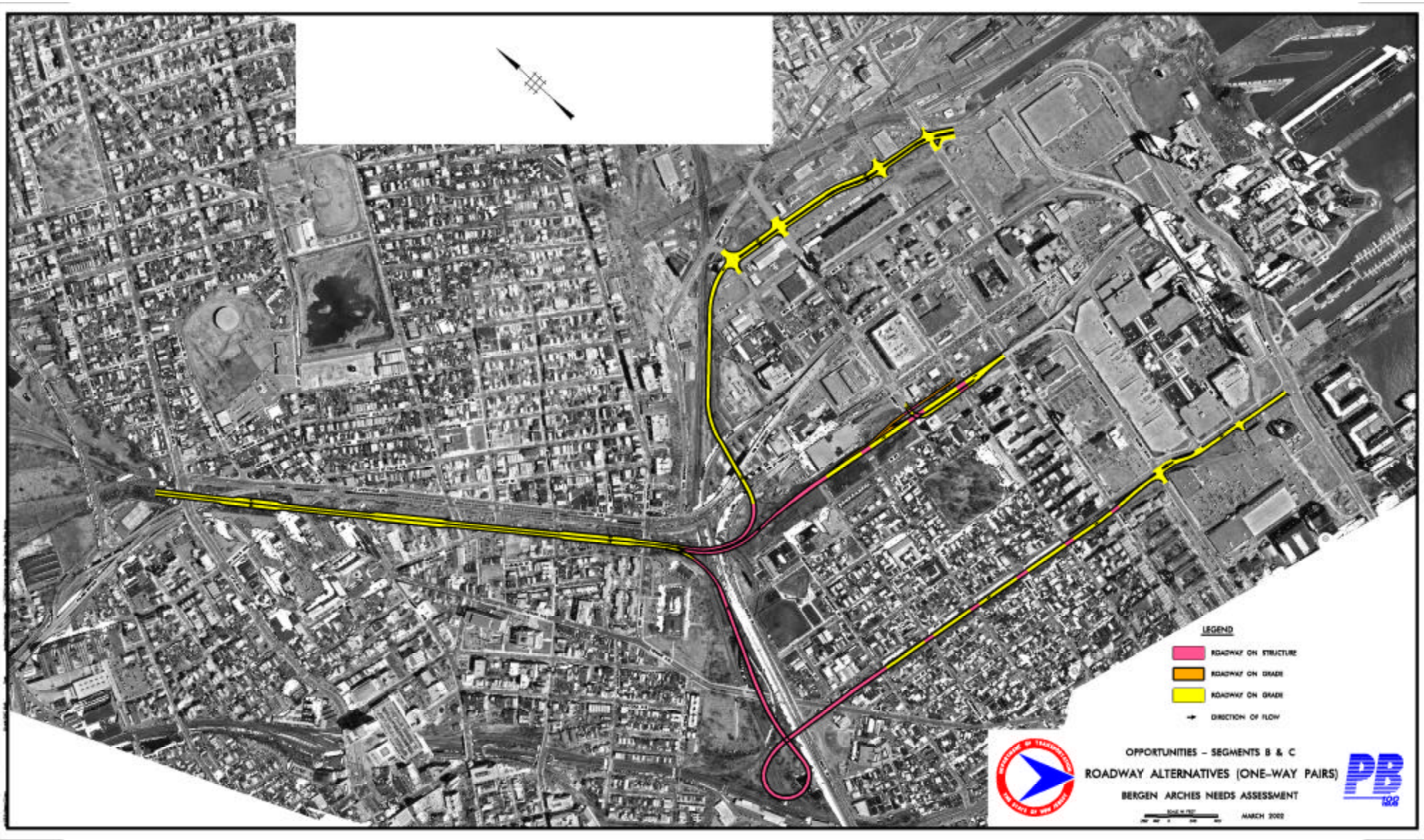
SEGMENT C ROADWAY ALTERNATIVES

Segment C includes roadway alternatives that would connect the east portal of the Bergen Arches (Segment B) to downtown Jersey City and Washington Boulevard. Three potential alignment corridors were identified for this segment – 6th Street Corridor, 11th Street Corridor and 18th Street Corridor. Among the three corridors, the potential exists to operate any one of these as a two-way roadway facility or to combine any two corridors in a one-way pair operation. These alternatives are shown on the following two pages.



The image above depicts the physical constraints existing at the western end of Segment C in the vicinity of the east portal of the Arches near Palisades Avenue. Roadway alignments exiting


LEGEND
ROADWAY ON STRUCTURE
ROADWAY ON GRADE
DIRECTION OF FLOW
OPPORTUNITIES – SEGMENTS B & C
ROADWAY ALTERNATIVES (TWO-WAY)
BERGEN ARCHES NEEDS ASSESSMENT
MARCH 2002


LEGEND
ROADWAY ON STRUCTURE
ROADWAY ON GRADE
ROADWAY ON GRADE
DIRECTION OF FLOW
OPPORTUNITIES – SEGMENTS B & C
ROADWAY ALTERNATIVES (ONE-WAY PAIRS)
BERGEN ARCHES NEEDS ASSESSMENT
MARCH 2002
PB

the Bergen Arches cut would pass between the Bergen Tunnel freight rail line and Route 139 to the north and the Dickinson High School property to the south and would head east on a new viaduct structure passing above the River Line and the NJ Turnpike WB Ramp viaduct and under the NJ Turnpike EB Ramp viaduct.

One roadway alternative **(Alternative R1)** would consist of a one-way roadway pair arrangement utilizing the 11th Street and 18th Street alignments. Beginning at the west end of the Arches, the 11th Street alignment would be operated as a two-lane roadway in a one-way EB direction to access the waterfront by connecting to the existing EB Newport Parkway. The 11th Street alignment would utilize existing retained fills from a former railway and new overpass structures would be constructed at Monmouth Street, Coles Street, Jersey Avenue and Erie Street. The return movement to the Arches and points west would be made via an extension of 18th Street on a new alignment in a one-way WB operation to return to the Arches. The 18th Street extension would parallel the River Line, skirt an existing PSE&G electrical substation and pass under the existing 12th and 14th Street viaducts and NJ Turnpike viaducts before turning west to connect to the Arches.

Another roadway alternative **(Alternative R2)** proposes a four-lane divided roadway (two lanes EB and WB) with shoulders that would connect to the waterfront via the 6th Street corridor utilizing a former elevated railway.

The 6th Street alignment is made up of two alternatives. The first alignment crosses Newark Avenue along Waldo Avenue thus avoiding an existing cemetery and proceeds to cross over two rail lines and then under the NJ Turnpike ramps. The second alternative crosses Newark Avenue closer to the NJ Turnpike ramps and then loops under itself as it aligns with the existing raised retained fill parallel to 6th Street.

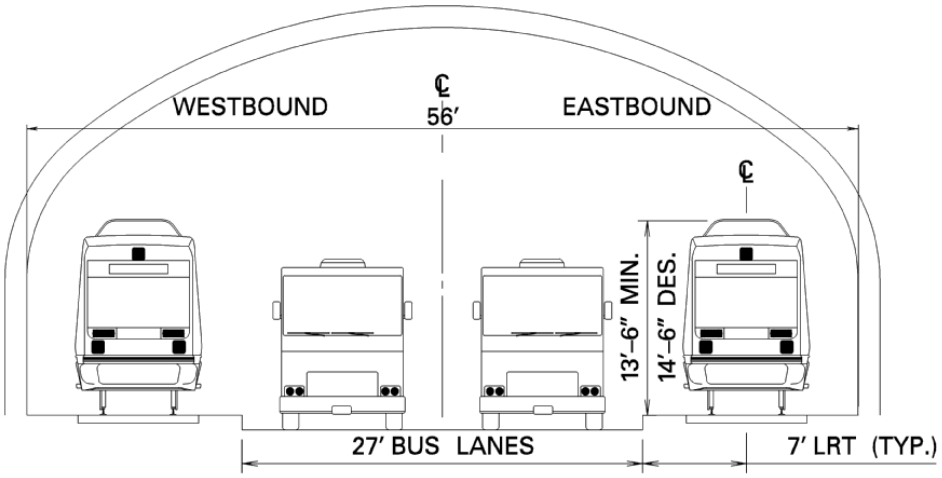
After exiting the Bergen Arches cut, the alignment fits in between the Dickinson High School property and the NJ Turnpike WB Ramp. This alignment has over 4,000 linear feet of viaduct and would cross over existing rail lines five times before approaching the NJ Turnpike ramps adjacent to existing 6th Street. East of the NJ Turnpike ramps this alignment takes advantage of the existing undeveloped right of way and railway embankment running along existing 6th Street. Along this portion of the alignment, from Monmouth Street to Manilla Avenue, five additional overpass bridges are proposed with approximate span lengths of 100 feet. The easterly end of the alignment descends to grade on the south side of the Newport City Mall allowing for WB traffic to continue along existing 6th Street while bringing vehicles from the arches to Washington Boulevard.

A final alternative **(Alternative R3)** proposes a four-lane divided roadway with shoulders (two lanes EB and two lanes WB) that would connect to the waterfront and Washington Boulevard via an extension of 18th Street. After exiting the Arches cut, the 18th Street alignment would pass between the Bergen Tunnel freight rail line and Route 139 to the north and the Dickinson High School property to the south and would head east on a new viaduct structure passing above the River Line and NJ Turnpike WB Ramp viaduct and then under the NJ Turnpike EB Ramp viaduct. The alignment would then descend and turn toward the north separating into dual alignments in order to pass under the existing 12th Street and 14th Street viaducts and NJ Turnpike EB and WB ramp viaducts while avoiding the existing piers and column bents supporting these viaduct structures. The dual alignment would then converge and head north paralleling the River Line and then turn east transitioning to a boulevard-type section near Coles Street. Existing 18th Street would then be widened from Coles Street to Marin Boulevard with a grassed median matching the existing typical section of 18th Street east of Marin Boulevard.

MIXED MODE ALTERNATIVES

Alternatives using various combinations of mode options were also investigated during this phase of the study. Three mixed mode alternatives were determined to be feasible and were further examined.

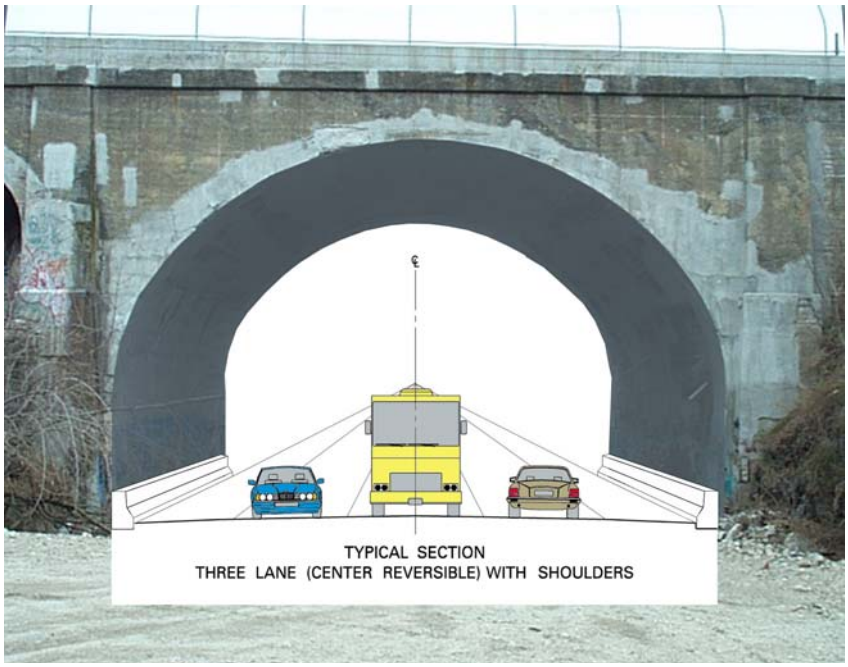
The first mixed mode alternative **(Alternative M1)**, shown below, would provide for a combination of light rail service and vehicular accommodation. The light rail alignment would provide a connection from the Secaucus Transfer Facility to the existing Newport/Pavonia LRT Station using the alignment previously discussed in Transit Alternative 1 **(Alternative T1)**. In addition, this alternative would allocate one inbound vehicular lane on 11th Street and one outbound lane located along 18th Street. Both roadways would provide unrestricted access to vehicular trips and would provide connections to Seaview Avenue / NJ Turnpike and Tonnele Avenue.



TUNNEL SECTION
TWO TRACK LIGHT RAIL TRANSIT

The second mixed mode alternative **(Alternative M2)** provides for a combination of vehicular and transit uses. Two inbound lanes would be located on 11th Street and would have one lane assigned for bus and HOV3 use and one lane for all vehicles. The outbound facilities would also provide for two lanes which would run on the 18th Street alignment. Both lanes would allow for unrestricted vehicular use and would also provide access to Seaview Avenue / NJ Turnpike and Tonnele Avenue (to Tonnele northbound via Manhattan Avenue).

The final mixed mode alternative **(Alternative M3)**, shown below, is designed to provide accommodation for bus and HOV3 usage. The alignment, illustrated below, would provide for two bus priority and HOV3 lanes inbound on 11th Street. A single outbound lanes would be located parallel to 18th Street alignment and would provide universal access to all vehicles.



BICYCLE/PEDESTRIAN ALTERNATIVE

This alternative examines using the available right of way to provide facilities for all non-motorized modes of transportation, including bicycling and walking. In addition to creating landscaped bikeways and walkways, this alternative would include the provision of vertical transportation elements at numerous points along the alignment.