

4 TZB Replacement Options

This chapter describes possible options to replace the existing TZB. Three Replacement Options representative of possible crossing span arrangements have been developed.

See Appendix C for detailed drawings of the three Replacement Options.

4.1 Replacement Option 1

This chapter outlines the details of Replacement Option 1 for the TZB. The option assumes the same highway and transit arrangement as Rehabilitation Options 2 and 3, as defined by Alternative 3 of the Alternatives Analysis Report of January 2006, but with the existing structure replaced. The option consists of two new single-level bridges, each carrying four general purpose lanes, one BRT/HOT lane and full sized shoulders, plus paths for pedestrians and cyclists. See Figure 4-1.

4.1.1 Rockland Landing

The features of the landing are exactly the same as those for Rehabilitation Option 2.

4.1.2 Replacement Structure

The replacement TZB has the same structural form and arrangement as the Supplemental Bridge in Rehabilitation Option 3. It would be constructed to the north of the existing TZB. To avoid impacting the foundations of the existing TZB, the new bridge would be constructed at an offset of approximately 300 feet.

The new bridge would incorporate two decks, each 109 feet wide, with spans of 230 feet except at the Main Spans. The central channel crossing spans of the Main Spans would likely be 2,600 feet supported on 4 towers. The form or arrangement of the Main Spans is outside the scope of this report.

The new TZB and its foundations would be designed to resist seismic loading. Preliminary investigations indicate that the foundations would be comprised of 4-foot diameter steel piles founded 250-350 feet beneath the river bed. This is discussed further in Chapter 5.3.6 of this report.

4.1.3 Westchester Landing

The ROW at the Westchester Landing is approximately 260 feet wide at its narrowest point. Approximately 90 feet of the available space is on the north side and 80 feet is on the south side of the existing crossing. East of this constriction, the space available for the widening of the highway reduces because of the Toll Plaza and the on-ramp from Route 9 (Broadway). This available width compares to the 109 feet required to accommodate half of the replacement bridge in this arrangement option.

The northern edge of the 220-foot wide replacement arrangement option is placed coincident with the northern intersection of the NYSTA and Metro-North ROW boundaries. The bridge is orientated such that there is a straight alignment from the Route 9 overbridge onto the replacement bridge. In this position and orientation there are no permanent property impacts with the exception of the additional ROW required to the north of the constriction to account for the space required for an access ramp to the Pedestrian and Bicycle Path.

Given this positioning and orientation of the replacement TZB, the challenge at the Westchester Landing is to accommodate all the facilities required within the space available, while also ensuring that traffic operations can be maintained during the transition from the existing to the replacement TZB.

The provisions for the following are the same as Rehabilitation Option 3:

- Highway and BRT/HOT Lanes
- Toll Plaza
- Pedestrian and Bicycle Path
- BRT access to Tarrytown Station
- NYSTA Maintenance Facility and access
- Special landing structure



Replacement Option 1

Two New Parallel Structures to Provide Alternative 3 Components

**8 General Purpose lanes
2 BRT/HOT Lanes
2 Pedestrian and Bicycle Paths**

**Figure 4-1
Replacement Option 1**

4.2 Replacement Option 2

This chapter outlines the details of Replacement Option 2 for the TZB. The option has the same highway and transit arrangement as Rehabilitation Option 4, as defined for Alternative 4 (A, B, C & D). The option consists of three new single-level structures. Two carry four general purpose lanes, one BRT/HOT lane and full sized shoulders, plus a path for pedestrians and cyclists. The third carries two CRT tracks and a maintenance way along the central axis. See Figures 4-2 and 4-3 (Page 30).

To minimize the property impacts at the Rockland landing, the two highway structures are located above the CRT structure at the western end of the TZB.

4.2.1 Rockland Landing

The overall width of the possible replacement bridge at the Rockland Landing would be exactly the same as Replacement Option 1 and would have similar impacts.

A replacement TZB, in the form of Replacement Option 2, would require a width of up to 220 feet at the landing. The edge of pavement would be typically 30-35 feet closer to the adjacent properties than existing conditions. Outside this 220-foot roadway width, additional space would be required at the landing for the NYSTA maintenance access ramps, the maintenance area below, ramps for pedestrian access and the pedestrian/bicycle connections.

Details of the interchange ramps, South Broadway Bridge, Pedestrian and Bicycle Path, NYSTA dockside facility and access, and retaining and noise walls are the same as Rehabilitation Option 2.

As the CRT tracks are located below the highway at the Rockland shore, the overall elevation of the proposed highway is significantly higher (15-25 feet) than the existing. This higher roadway elevation is needed to maintain the required clearance over River Road and the Hudson River. See Figure 4-3 (Page 30).

CRT Configuration

At the Rockland shore, the CRT tracks are located below the Thruway on their own structure, with a provision for a central 10-foot wide maintenance way. The maintenance way ends at the Rockland Landing, where local access would be provided for maintenance and emergency vehicles. The two CRT tracks would enter a tunnel immediately at the landing and stay in tunnel for some distance under the Thruway.

4.2.2 Replacement Structure

The replacement TZB is the same structural form and arrangement as Replacement Option 1 and the supplemental bridge in Rehabilitation Option 3.

A new bridge would be constructed to the north of the existing TZB at an offset of approximately 300 feet to avoid impacts to the foundations of the existing structure.

The new TZB would incorporate two decks each 109 feet wide and one deck 62 feet wide with spans of 230 feet except at the Main Spans. The central channel crossing spans of the Main Spans would likely be 2,600 feet supported on four towers. The form or arrangement of the Main Spans is outside the scope of this report.

The new TZB and its foundations would be designed to resist seismic loading. Preliminary investigations suggest that the foundations would comprise 4-foot diameter steel piles founded 250-350 feet beneath the river bed. This is discussed further in Chapter 5.3.6 of this report.



Replacement Option 2

Three New Parallel Structures to Provide Alternative 4 Components

**8 General Purpose lanes
2 BRT/HOT Lanes
2 CRT Tracks
2 Pedestrian and Bicycle Paths**

Figure 4-2

Replacement Option 2

4.2.3 Highway and CRT Profiles

To pass over the shipping channel, it is necessary for the CRT tracks to start climbing from the Rockland shore. (Figures 4-4 and 4-5, pages 31 and 32)

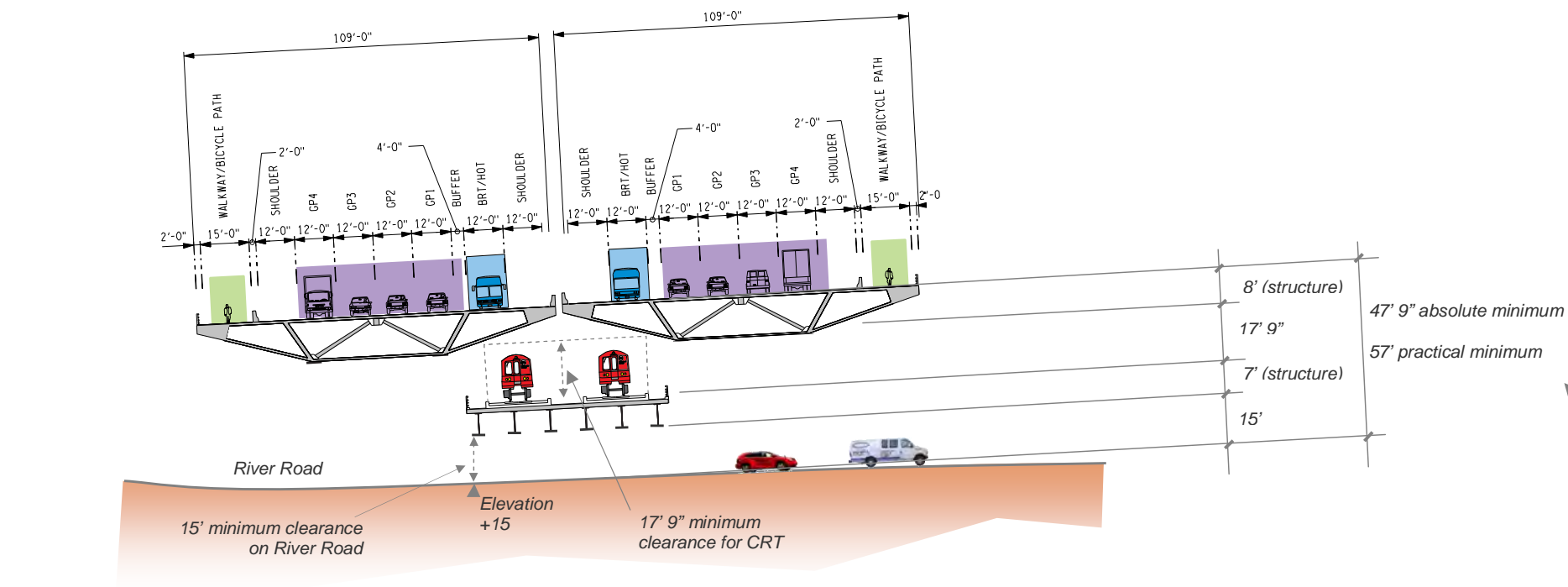
The transitioning of the CRT structure from below the highway structure to the point where the highway and CRT decks are at the same elevation takes a distance of almost 10,000 feet. From the Rockland shore to the Main Spans, the highway and CRT decks are always at different elevations. This transition is made up of two components:

- In the area of the horizontal curve near the Rockland shore, the highway structures above the CRT structure separate to make room for the CRT structure to climb up to their level. It is only at the end of the horizontal curvature that there is sufficient space between the two highway structures to fit the CRT structure between them.
- From the end of the horizontal curve to the start of the Main Spans over the channel, the grade of the CRT tracks (1.5%) is greater than that of the highway structures (1.08%) to allow the structures to reach the same elevation at the Main Spans.

The elevation of the highway at the end of the horizontal curve is +90 feet compared to +23 feet for the existing highway.

4.2.4 Westchester Landing

The provisions for the highway and BRT/HOT Lanes, a Toll Plaza, the Pedestrian and Bicycle Paths, a possible Tappan Zee Station, the NYSTA Maintenance Facility and its access, and the special landing structure are the same as for Rehabilitation Option 3.



For this report the minimum clearance is not adopted. Instead a height of 57 feet is used to allow for:

- Increased separation between the CRT clearance envelope and the highway structure to allow for maintenance
- Increase in structural depth of the CRT structure to facilitate the adoption of a standard bridge deck section over the river

A minimum clearance of 14' 6" is assumed in the NYSTA maintenance area.

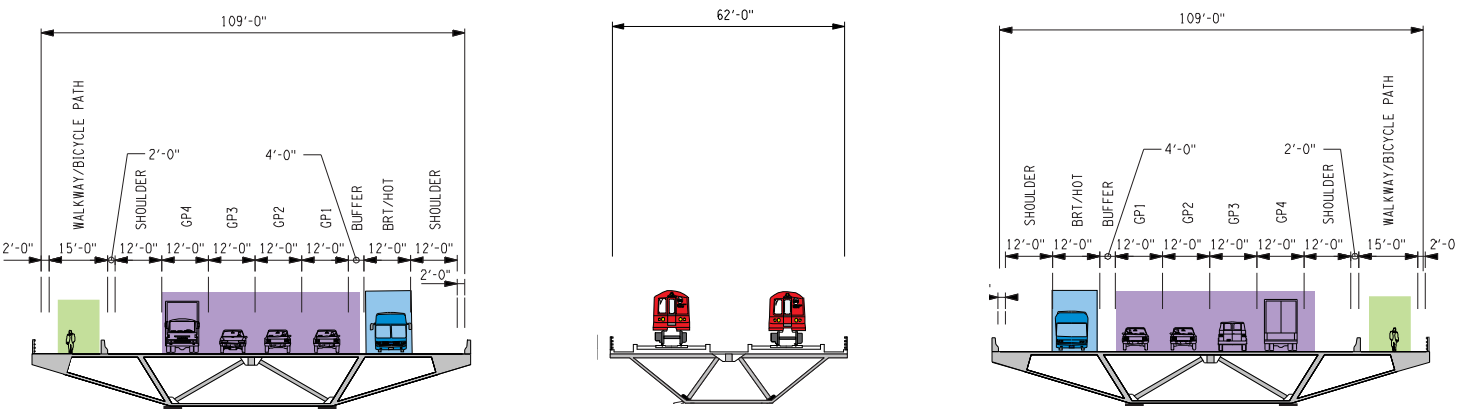
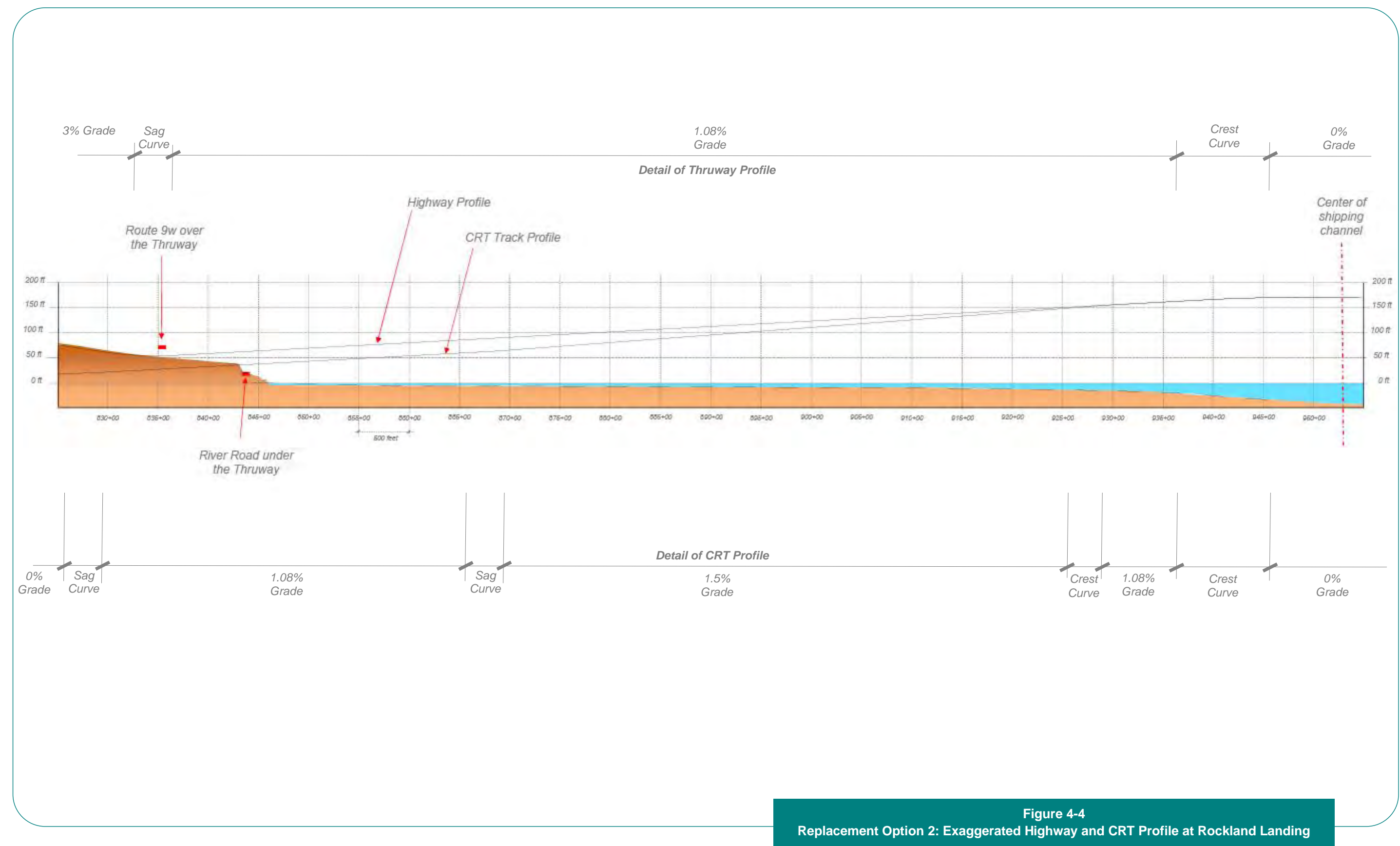


Figure 4-3
Replacement Option 2: Typical Cross Sections



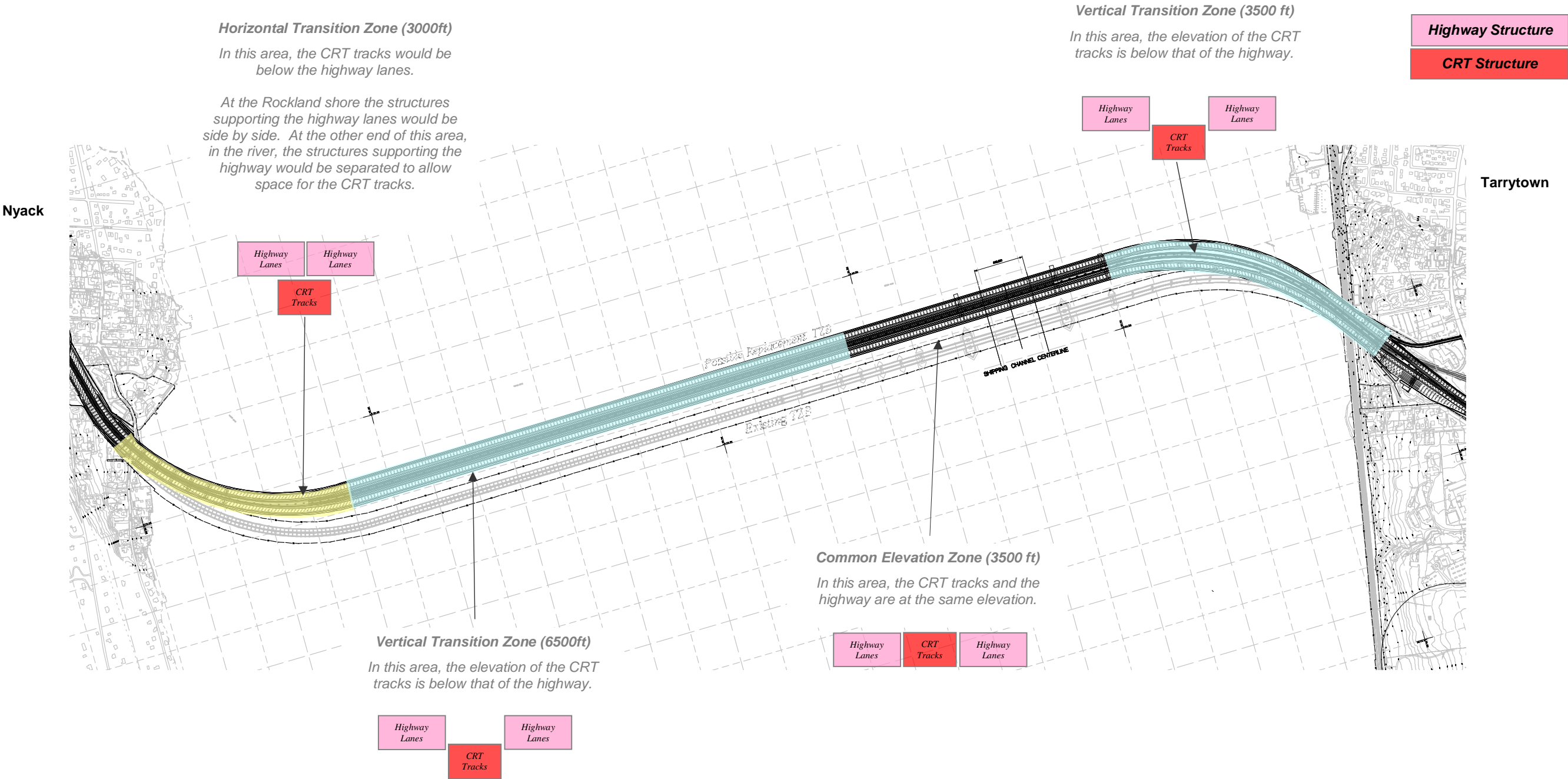


Figure 4-5
Replacement Option 2: Highway and CRT Separation

4.3 Replacement Option 3

This chapter outlines the details of Replacement Option 3 for the TZB. The option accommodates the same highway and transit facilities as Rehabilitation Options 4 and Replacement Option 2, as defined for Alternative 4 (A, B, C & D). The option consists of two dual-level structures, each carrying four general purpose lanes and one BRT/HOT lane. See Figures 4-6 and 4-7 (page 34). A double deck structure was chosen to reduce the width of the structure compared to Replacement Option 2.

The northern structure carries the westbound Thruway on its upper deck and two CRT tracks on the lower level. The southern structure carries the eastbound Thruway on its upper deck and nothing on its lower deck.

4.3.1 Rockland Landing

The overall width of the possible replacement bridge at the Rockland Landing would be the same as Replacement Option 1 and would have similar components and impacts. Similar to Rehabilitation Option 4, the westbound Causeway is a deeper structure than the existing TZB to accommodate CRT on the lower level. Consequently, the highway lanes are at a higher elevation in the landing area – up to 40 feet above the existing Thruway.

Details of the interchange ramps, South Broadway Bridge, Pedestrian and Bicycle Paths, NYSTA dockside facility and access, and retaining and noise walls are similar to Replacement Option 1.

Replacement Option 3 has a similar footprint at the Rockland landing to Rehabilitation Options 4. The only difference between this option and the other options is the maintenance and emergency access to the maintenance way, located between the CRT tracks. These access needs require local adjustment of the maintenance access ramps and realignment of the highway to make the best use of the existing ROW.

4.3.2 Replacement Structure

The replacement bridge is of the same structural form and arrangement as the Supplemental Bridge in Rehabilitation Option 4 (Figure 3-9, page 24), except that two structures are required instead of one.

A new TZB would be constructed to the north of the existing TZB at an offset of approximately 300 feet to avoid impacts to the foundations of the existing crossing.

The new TZB would incorporate two decks each 109 feet wide on spans up to 400 feet except at the Main Spans. The central channel crossing spans of the Main Spans would likely be 2,600 feet on four supporting towers.

The new TZB and its foundations would be designed to resist seismic loading. Preliminary investigations suggest that the foundations would be comprised of 4-foot diameter steel piles founded 250-350 feet beneath the river bed. This is discussed further in Chapter 5.3.6 of this report.

It is necessary to have a double deck southern structure in order that the superstructure is as structurally efficient as the northern structure so that the two structures' columns can be spaced identically. (Superstructure is the term used for all the components of a bridge above the top of the piers.) The design and construction of the southern structure has provided for only no live load on the lower deck.

4.3.3 Highway and CRT Profiles

The highway and CRT profiles are vertically parallel to each other for the entire TZB. The maximum grade is 2% at the Westchester shore approach. At the shipping channel, the highway elevation is approximately +195 feet assuming a shipping clearance of 155 feet.

4.3.4 Westchester Landing

The provisions for the highway and BRT/HOT Lanes, a Toll Plaza, the Pedestrian and Bicycle Paths, a possible Tappan Zee Station, the NYSTA Maintenance Facility and its access, and the special landing structure are the same as for Rehabilitation Option 4.



Replacement Option 3

Two New Parallel Structures to Provide Alternative 4 Components

8 General Purpose lanes
2 BRT/HOT Lanes
2 CRT Tracks
2 Pedestrian and Bicycle Paths

Figure 4-6
Replacement Option 3

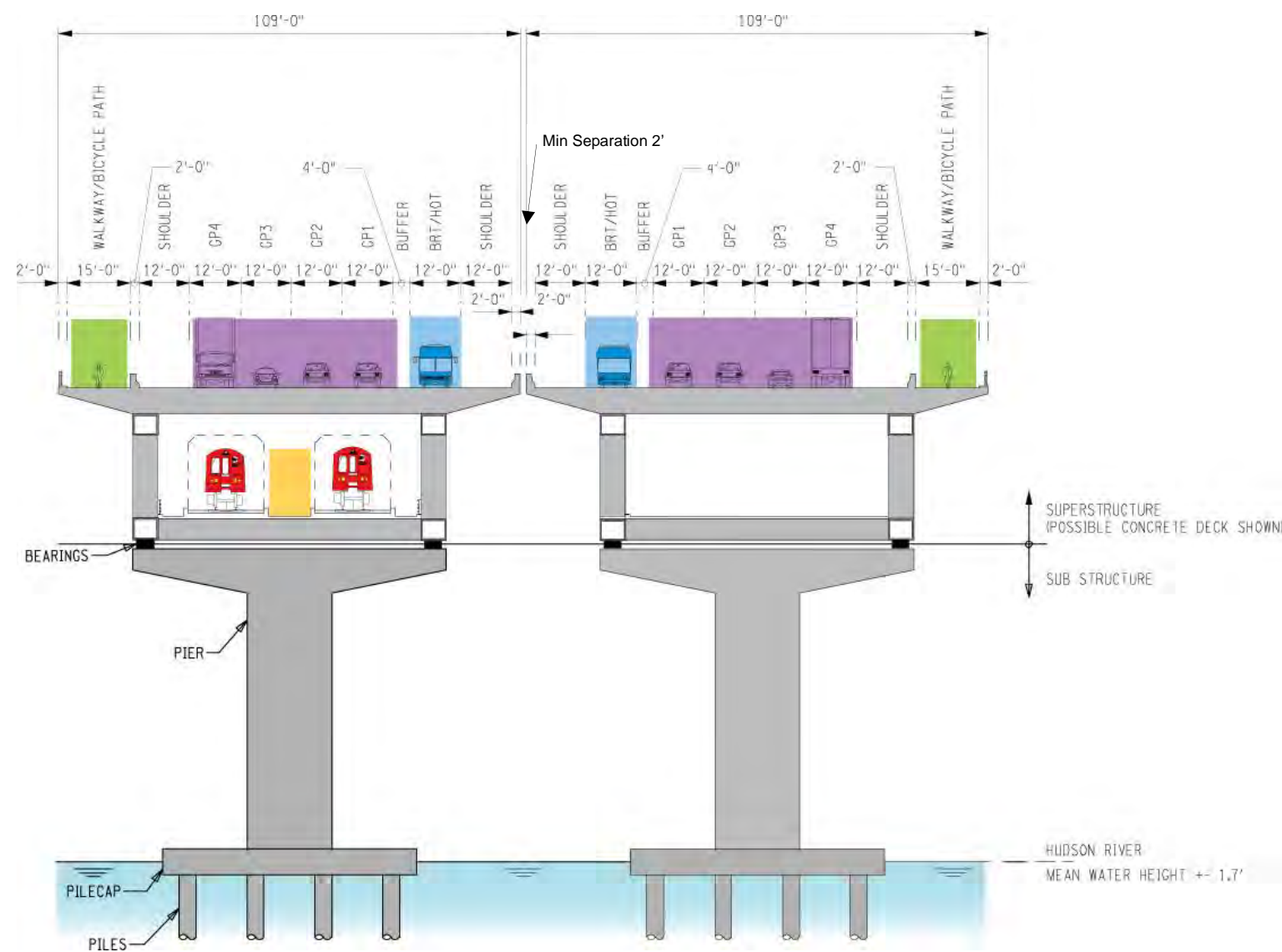


Figure 4-7
Replacement Option 3: Typical Cross Section