

## 1.5 PROJECT ALTERNATIVES

### 1.5.1 BUILD ALTERNATIVES

The following build alternatives would impede the ability of individuals to jump from the Bridge, as well as generally satisfy additional criteria established by the District. During the screening process, these alternatives were evaluated for their ability to meet the project's purpose and need, which included the District's criteria. These alternatives include:

- Alternative 1A – Add Vertical System to Outside Handrail
- Alternative 1B – Add Horizontal System to Outside Handrail
- Alternative 2A – Replace Outside Handrail with Vertical System
- Alternative 2B – Replace Outside Handrail with Horizontal System
- Alternative 3 – Add Net System that Extends Horizontally from Bridge (Add Net System)

As described below, Alternatives 1A, 2A and 3 were evaluated utilizing a fairing, while Alternatives 1B and 2B were evaluated utilizing a winglet.

#### **Common Design Features of the Build Alternatives**

The build alternatives were developed after the first phase of the project, wind tunnel testing, was completed. Wind tunnel testing was performed on various designs to determine which design features would not render the Bridge unstable during high winds. The wind tunnel testing determined that physical suicide barriers affected the aerodynamic stability of the Bridge. Testing also determined that wind devices could be installed to mitigate the adverse effects associated with the additions of such barriers.

All of the build alternatives developed and included in this document require the addition of one of two different types of wind devices. The first type of wind device is called a fairing and consists of a curved element placed at two locations below the sidewalk on the top chord of the west stiffening truss. The second type of wind device is called a winglet and consists of a curved element placed above the sidewalk at the top of the proposed barrier system. During the screening process, the build alternatives were evaluated for their ability to meet the project's purpose and need, which included the District's criteria. All of the build alternatives generally satisfy the District's criteria (see Section 1.5, Comparison of Alternatives). Additionally, each build alternative has been developed to maintain the symmetry of the Bridge. The outside handrail

posts, light posts, suspender ropes, and belvederes would all remain at the current locations. There would be no changes to the stiffening trusses.

The five build alternatives would all be constructed of steel that would be painted International Orange to match the material and color of the Bridge. Wind devices, such as fairings and winglets, would be incorporated on all build alternatives. During the construction phase, all build alternatives would use the same construction staging areas.

### **Unique Features of Build Alternatives**

#### **Alternative 1A – Add Vertical System to Outside Handrail**

Alternative 1A would construct a new barrier on top of the outside handrail (and concrete rail at the north anchorage housing and north pylon). The barrier would extend 8 feet vertically from the top of the 4-foot high outside handrail for a total height of 12 feet. The barrier's vertical members would be comprised of 1/2-inch diameter vertical rods spaced at 6 1/2 inches on center, leaving a 6-inch clear space between rods. Transparent panels to preserve views would be installed at the belvederes and towers on both sides of the Bridge. Transparency would be preserved through ongoing maintenance of the panels. The existing rail posts would be replaced with new 12-foot-high outside rail posts at the same locations and of the same cross-section, size, material, and color of the original posts. The top horizontal header would consist of a chevron-shaped member matching the top element of the outside handrail. The vertical rods would be attached to the horizontal header and outside handrail.

This alternative assumes that the modification to the outside handrail on the west side of the Bridge between the two main towers and the installation of the wind fairings have been completed as part of the previously approved Seismic Retrofit Project. Figures 1-3 and 1-4 illustrate Alternative 1A from several directions and Figures 1-5 through 1-7 represent architectural sketches of the proposed alternative. Special provisions for viewing areas are made at the mid-span of the Bridge. Figures 1-26 through 1-28 illustrate the plans for the physical suicide barrier at those locations.

Because maintenance workers would no longer be able to climb over the outside handrail to reach the below-deck maintenance traveler, gates would be located at a spacing of 150 feet on center to generally match the locations of the existing light posts and gates on the public safety railing. The gates would be 8 feet wide and 8 feet high (two 4-foot-wide by 8-foot-high panels), and match the appearance of the vertical system. The frame for each gate door would be constructed of 2-inch by 2-inch steel members.