

# AESTHETICS MANUAL

ELECTRONIC COPY

For SR-836/I-395 from West of I-95 to MacArthur Causeway Bridge and I-95 Pavement Reconstruction and I-95 Southbound to SR-836 Westbound and SR-836 from West of NW 17th Avenue to Midtown Interchange (SR-836/I-395/I-95)

## VOLUME 2: AESTHETICS MANUAL NARRATIVE, APPROVED SIGNATURE BRIDGE PACKAGE, AND APPROVED AESTHETIC PROJECT TECHNICAL ENHANCEMENTS (APTEs)

### Financial Project Number(s):

I-395 Reconstruction 251688-1-52-01 (F.A.P. 3951-501-I),  
I-95 Pavement Reconstruction 429300-2-52-01 (F.A.P. 0951-685-I),  
I-95 SB to SR 836 WB Connector 423126-2-52-01,  
MDX 423126-1-52-01,  
Miami Dade Water & Sewer 251688-1-56-02,  
MDX Work Program Number: 83611

Contract Number: E-6J53

Submitted to:  
Florida Department of Transportation, District 6

Submitted by:





## APPROVED SIGNATURE BRIDGE PACKAGE

## Meeting the Objectives and Requirements of the Project Described in the RFP | Option B - Sails

### B.1 EXPERIENCING THE SIGNATURE BRIDGE

The Sails cable-stayed bridge concept reflects the unique nautical, natural, and cultural history of Miami. The design of the main structural pylons and cable array provides a monumental urban icon that can proudly take its place on the city's skyline. Both pylons exceed the required minimum height; the small pylon is more than 250 feet tall, and the larger pylon is more than 300 feet tall. To create a more dynamic profile, the pylons are inclined at five degrees toward Biscayne Boulevard. The inclined pylons create asymmetrical cable arrays, providing a profile that will change when seen from different viewsheds in the city.

Unique and dynamic, the curvilinear profiles of the twin pylons suggest sailboats racing across Biscayne Bay, spinnakers billowing in the breeze. Or, when viewed in the long elevation, the pylon suggest a mast, and the cable stay arrays appear as sails propelling the ship forward. At the same time, the curving forms imply natural organic shapes, such as the broad leaves of tropical foliage. Or perhaps the forms suggest an Afro-Caribbean dancer with a flowing skirt. These are understandable metaphors that we believe will resonate with the citizens Miami, as well as visitors to the city.

The EB and WB pylons are different heights, but similar shapes; this provides a more dynamic and changing bridge profile than would pylons of the same height. The pylons step down in scale to the north, thereby acting as scaling device to transition between the tall condo pylons to the south and the Arsht Center to the north. Both structures may be built independently of one another, yet they work together to express the underlying themes and create a unified composition.

The pylons' shape and the profile of the cable array profile give the structure its iconic appearance from a distance. The stay cables are an expression of their structural function that can be appreciated by drivers, pedestrians, and air passengers as they fly out of Miami. Each of the four planes of cables is unique as they extend high above and across the curving bridge deck. This will provide the experience of passing through different portals when traveling in either direction on I-395. From the street view, the stay cables will provide a series of veils crossing Biscayne, almost like the scrim of the theater set.

The asymmetry of the two sails will be emphasized at night through a different lighting effect on the longer and shorter legs of each pylon, which will create a dynamic and engaging view from many viewpoints in the city. Along the entire height of the longer pylon legs, a direct-view, color-changing line of light washes the adjacent surface with light from one viewing angle, but creates a crisp line of light when viewed from Biscayne Boulevard. On the shorter pylon legs, narrow-beam floodlights illuminate the outside and inside faces of each of the cables, while putting a soft wash of light on those vertical components.

For the color of the structure, white was selected for a few reasons. First, white is nautical, the color of ships and boats. Second, white echoes many of the gleaming modern buildings in downtown Miami. Third, white will best reflect the changing colors of the sun and the aesthetic lighting. The tops of the sail pylons are capped with lanterns clad in translucent glass to create a glowing beacon of light at the pinnacle of each pylon, continuing and expanding the brightness of the direct-view luminaires below.

A smooth, tapered deck shape composes the roadway structure of the Signature Bridge. The tapered edge of the deck is quite thin, creating an elegant profile that will appear lightweight. It will also create the appearance of more height beneath the bridge and allow sunlight to

reach further beneath the bridge in the winter months. The smooth, shadowless soffit will maximize reflected sunlight and nighttime illumination to create the sense of a glowing ceiling above the plaza. Below deck, linear, color-changing luminaires will be mounted along the underside of the deck edge for the entire length of the main span to wash the sloping undersides of the slender decks.

The direct-view lighting on the pylon legs and the linear lighting on the superstructure will allow for tight control of color and movement, which will juxtapose with the soft wash of colored light on the cables and shorter pylon legs. Together with the beacons at the tops of the pylon legs, the lighting can be programmed for a wide array of lighting effects, both static and kinetic. On the flat underside of the box girders, continuous rows of linear, white LED luminaires will provide visual interest, as well as general illumination.

Four-channel, RGBW LED, color-changing luminaires, controlled by a programmable lighting control system, will provide all aesthetic lighting of the cables, pylon, and sloped superstructure. These luminaires are robust and have been proven to withstand installations in environments similar to Miami, including salt air and vibration. With a rated life of 100,000 hours or more, the need for maintenance access to the luminaires will be minimal for many years. Except for the control system processor itself (which will be in a climate-controlled cabinet at grade), the luminaire control components will be easily accessible from a snooper truck at the bridge deck, a lift/bucket truck below the deck, or within the legs of the pylons.

### B.2 CONFIGURATION

The Sails provides the viewer on Biscayne Boulevard and throughout the city with unique and changing views. The structural pylons are angled in relation to the roadway to give a dynamic appreciation of the curved shape as the user passes the bridge. The dynamic nature of the structure is further emphasized by the inclination of the pylon, similar to the way a sailboat heels under the pull of the wind.

The Sails cable-stayed bridge provides a structure where all elements work together to carry the structure weight, as well as the vehicles crossing the span. The designers have configured the structure to meet the requirements of vertical clearance over Biscayne Boulevard, Ramp D2, and the other local roadways in the vicinity and have taken particular care to ensure a minimum 45-foot distance between the EB and WB structures along NE 1st Avenue.

A total of 40 stay cables connect the superstructure of each bridge to its pylon. The cables anchor on the curved section of the pylon, providing a dramatic warped surface to the cable array. The uppermost cables anchor above the roadway at elevation 262 and 217 on the taller and smaller pylons, respectively. This provides the portal effect as the driver passes across the structure.

The Sails structure respects the defined Arsht Center buffer zone, including all elements, from the foundations to the roadway structural section. This is an important benefit that will minimize noise and vibration both during and after construction.

Consistent with the desire to make the Signature Bridge a complementary part of the urban landscape, the engineers have developed sections and details that provide smooth surfaces and eliminate any steps or offsets along the roadway structure. A single closed superstructure supports the roadway, gracefully inclined to capture the cable stays. This approach eliminates the repetitive and busy diaphragms and frames, while providing the viewer insight on how the structure functions. Furthermore, at the western end of the

Signature Bridge, the inclined surfaces gently transform over the length of the transition span to match the slope of the approach girders. All transitions occur gradually in this span and do not have any abrupt changes in depth or external surface planes.

The Sails structure enhances the aesthetic objectives stated in the RFP by providing a maximum structure height of 300 feet and anchoring the highest cables at 262 feet. This additional height above the required minimum enhances the interplay between the AACPA and the condominium pylons to the south.

It also provides the dynamic tension between the taller structure and the shorter one, while maintaining a minimum height of the shorter structure above 245 feet, as well. Both EB and WB structures have a suspended length of 500 feet spanning over Biscayne Boulevard.

### B.3 STRUCTURAL DETAILS

While the conceptual expression is critical to the overall experience of the structure, the details are important to the up-close aesthetics of the structure. Consistent details between the signature bridge and approach spans provide a unifying theme. These include surface textures and colors, traffic barriers, and pier shapes. The use of white for the superstructure and pylon provides a dramatic and bold statement, as well as a clean pallet for the expression of lighting concepts at night.

The details of the edge of the deck, where the cables anchor, provides a clean, continuous line along the edge of deck, punctuated subtly by the cable anchorages, at 25-foot spacing. The details of the clean, minimal anchors gently express the function of the cables, without an industrial appearance. The ends of the cables will be painted to match the color of the other parts of the structure.

In addition to all of the creative aesthetic themes in concept and detail, it is important to ensure that the structure meets all of the strength and durability requirements beyond its service life, which will exceed 75 years. This is accomplished through the use of appropriate materials, proper detailing, and redundant protective layers on critical structural components, such as the stay cables. The durability of the deck is particularly important, as it must serve without replacement for the life of the structure.

### B.4 REQUIRED ALIGNMENT DEVIATIONS

This option requires deviation of two of the RFP Concept alignments by more than the 5 feet allowed in the RFP. These deviations to the I-395 EB alignment and the I-395 EB Connector alignment result in an increase in the distance between the I-395 EB and WB bridges to accommodate the Sail's interior pylons. The I-395 EB alignment deviation occurs from Ramp B to the Existing Metro Rail Bridge and has moved to the south as much as 12 feet 6 inches. Measured along the centerline of the Signature Bridge's proposed pylons, the offset distance between the I-395 EB and I-395 WB alignments increases from 57 feet 7 inches to 65 feet 7 ½ inches, while ensuring no adverse impact to the Arsht Center buffer zone. The modifications made to the I-395 EB Connector require modifications from Ramp B to its tie-in with I-395 EB. The magnitude of the alignment shift varies between 0 feet and 11 feet 2½ inches to the south.

### B.5 CONCLUSION

The Sails cable-stayed bridge solution for the Signature Bridge meets or exceeds all of the RFP requirements. It provides an artistic expression of Miami, easily recognizable and uniquely identifiable. The concept and details have been developed to work together to provide a contemporary infrastructure icon that offers a high-quality open space below.





## OPTION B - SAILS

01\_BISCAYNE NORTH BOUND DAY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/1-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

01\_BISCAYNE NORTH BOUND NIGHT

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/1-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





# OPTION B - SAILS

02\_BISCAYNE SOUTH BOUND DAY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/7-305 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

02\_BISCAYNE SOUTH BOUND NIGHT

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL







## OPTION B - SAILS

03\_HIGHRISE DAY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

03\_HIGHRISE NIGHT

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

### 04\_I-395-EAST BOUND DAY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

### 04\_I-395 EAST BOUND NIGHT

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

05\_I-395 WEST BOUND DAY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL



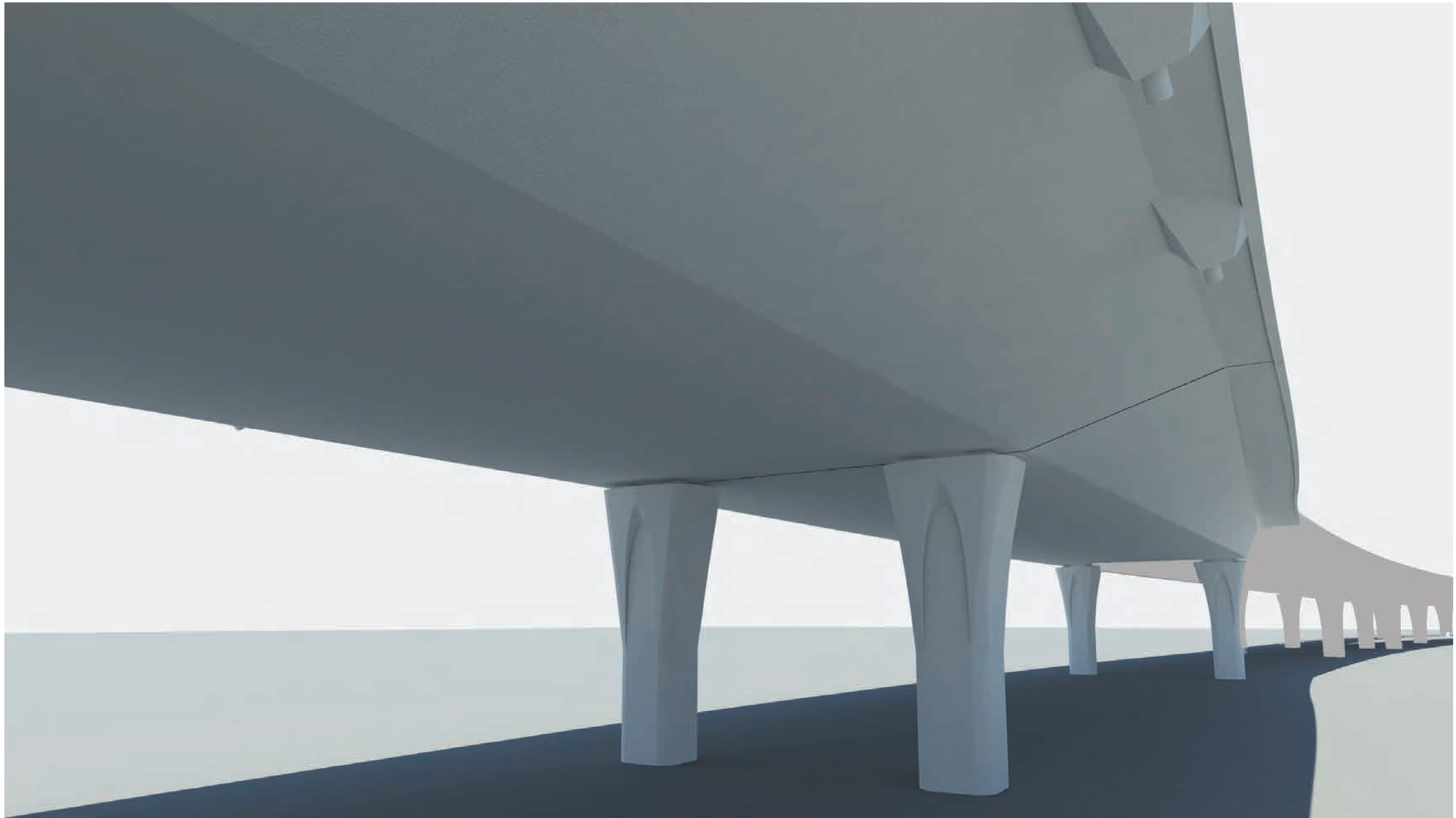


## OPTION B - SAILS

05\_I-395-WEST BOUND NIGHT

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

06\_EAST BOUND LOOKING WEST, ZONE3  
MAIN BLOCK

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/1-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

07\_WEST BOUND LOOKING WEST, ZONE 3  
MAIN BLOCK

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/1-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

08\_395-ARSHT CENTER DAY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836 / I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

08\_395-ARSHT CENTER NIGHT

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836 / I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL





## OPTION B - SAILS

09\_ EARLY MORNING FROM THE DECK  
OF A CRUISE SHIP DOCKED AT PORT  
OF MIAMI

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836 / I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL

TEAM TEMPLATE







## OPTION B - SAILS

10\_LOOKING SOUTHWEST ABOARD THE  
METRO MOVER

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/I-395 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL

TEAM TEMPLATE







# OPTION B - SAILS

11\_GAME NIGHT FOR THE MIAMI HEAT  
LOOKING WEST

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 6  
SR 836/1-396 FROM WEST OF I-95 TO MACARTHUR CAUSEWAY BRIDGE  
FINAL AESTHETIC SUBMITTAL