community | safety | mobility | maintainability

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

Technical Volume 1: Technical Proposal

FDOT DISTRICT 6

Technical Volume 1: Technical Proposal

SR-836/I-395/I-95

Financial Projects Number(s): I-395 Reconstruction 251688-1-52-01 (F.A.P. 3951-501-1)
I-95 Pavement Reconstruction 429300-2-52-01 (F.A.P. 0951-685-1)
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

connecting miami
ARCHER WESTERN - DE MOYA JOINT VENTURE

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Transmittal Letter

Archer Western-de Moya Joint Venture
4343 Anchor Plaza, Suite 155
Tampa, FL 33634
(p) 813.849.7500 (f) 813.849.7582

February 28, 2017

Ms. Nadine Chinapoo
Procurement Office, District 6
1000 NW 111th Avenue, Room #6202
Miami, FL 33172

RE: SR-836/I-395 from West of I-95 to MacArthur Causeway Bridge, I-95 Pavement Reconstruction, 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), Contract Number E-6J53

Dear Ms. Chinapoo:

The **Archer Western-de Moya Joint Venture (AW-dMG team)** appreciates the opportunity to submit a technical proposal for the SR-836/I-395/I-95 design-build project. The AW-dMG team, including **Archer Western Contractors, LLC (AW)**, **The de Moya Group, Inc. (dMG)**, **HDR, Inc.**, **RS&H, Inc.**, and **Metric Engineering, Inc.** understands this project will bring significant changes and improvements to the surrounding community, fulfilling the needs and vision of the Florida Department of Transportation (FDOT), Miami-Dade Expressway Authority, and numerous stakeholders. Our team has carefully developed technical solutions to address the complex design and construction challenges not only presented with this project, but also future expansion projects.

The enclosed submittal includes one (1) original of each Volume of the Technical Proposal, marked "ORIGINAL," nine (9) copies of Volume 1, fourteen (14) copies of Volume 2, and two (2) electronic copies of each Volume. The AW-dMG team acknowledges receipt of addenda 1 through 15 and we are prepared to meet the RFP requirements.

Thank you for this opportunity to submit our technical proposal. Should you have questions about our submittal, please contact me at (813) 849-7500.

Sincerely,

Kevin McGlinchey
Project Executive
Archer Western-de Moya Joint Venture

Design and Construction Approach

INTRODUCTION

The SR-836/I-395/I-95 project presents a unique and extraordinary opportunity to transform Miami by reconnecting communities that were once divided, creating a safer environment for pedestrian and vehicular traffic, solving mobility challenges that have inhibited traffic for many years, and developing a cohesive maintenance plan that will preserve these community enhancements for years to come. This legacy project includes an iconic Signature Bridge over Biscayne Boulevard, community enhancements below I-395, and highway capacity improvements that will benefit residents and visitors far beyond the project limits.

A Comprehensive Solution

The Archer Western-de Moya Joint Venture team (AW-dMG team) is comprised of contractors Archer Western Contractors, LLC (AW) and The de Moya Group, Inc. (dMG) – two leading U.S. based, family-owned businesses that have been trusted to provide world class construction services for safe and on-time project delivery for complex highway and bridge construction projects in Miami, FL and across the U.S. The AW- dMG team is complemented by a robust group of professional engineers, including HDR, Inc. (HDR), RS&H, Inc. (RS&H), Metric Engineering, Inc. (Metric), and Corven Engineering, Inc. (Corven) who bring significant, recent and relevant design experience on projects with similar complexities.

The SR-836/I-395/I-95 project is not only about improving infrastructure – it is about partnering with the local community today, tomorrow, and for generations to come. Our team has been and will continue to be part of the fabric of this community. Our commitment is demonstrated through our continued support of the Urban Academy, a center focused on developing local young adults for a career in highway and bridge construction and Booker T. Washington High School, which offers engineering and construction programs for students, as well as volunteering at the Overtown Youth Center. We live here. We work here. We play here – and we will continue to invest our time and resources in this thriving community.

For nearly three years, the AW-dMG team has met with key stakeholders to achieve a comprehensive understanding of their objectives. As a result, we have elevated four fundamental objectives:

1. **Community** – Connect communities
2. **Safety** – Enhance safety
3. **Mobility** – Improve mobility
4. **Maintainability** – Deliver maintainable solutions

These four fundamental objectives served as our guiding principles as we developed a comprehensive project approach, Alternative Technical Concepts (ATCs), and Aesthetic Project Technical Enhancements (APTEs). In collaboration with FDOT, MDX, and other key stakeholders, we have refined many of the concepts to exceed the RFP requirements and provide significant value to you, your customers, and the surrounding communities. **Exhibit 1** summarizes the many benefits our team proposes, subdivided by the subjects stipulated in the technical proposal evaluation criteria.

UNDERSTANDING & APPROACH TO THE TOTAL PROJECT

We have worked diligently to gain a better understanding of the project goals, stakeholder concerns, and key factors to deliver a successful project for FDOT, MDX, and Miami-Dade County. We have attended public meetings, including Aesthetic Steering Committee (ASC) meetings, public workshops and industry forums, as well as participated in more than 100 meetings with key stakeholders, including FDOT, MDX, Miami-Dade County, City of Miami, local business, and residents. We identified the primary challenges and goals for an overall project solution as follows:

- The primary objective of the PD&E Studies was to improve mobility, traffic operations and safety;
- The Midtown interchange serves more than 450,000 daily trips making it the busiest artery in Miami-Dade County;
- Mobility and safety impacts affect SR-836 and I-395 as a result of I-95 ramp traffic back-ups;
- Major bridge work – more than 85% of the corridor is elevated;
- A Signature Bridge is required to help revitalize a community that was divided by the Interstate construction;
- Construction within a constrained right of way and congested urban environment;
- Accommodating future replacement of the Miami River Bridge;
- Reconstruction of concrete pavement under heavy I-95 traffic;
- Coordination with multiple jurisdictions to meet project needs/requirements, and understand maintenance responsibilities;
- Community connectivity and enhancements;
- Balancing the needs of diverse stakeholders; and
- Providing safe pedestrian mobility while achieving the complete streets vision.

Understanding and Approach to the Total Project

ATC 12C – The Viaduct – Comprehensive Project Solution

Mobility Enhancements (see also Exhibit 2)

- ◊ SR836 Viaduct that bypasses I-95 Traffic and I-395/downtown special events
- ◊ Additional 7th Lane along I-95 NB
- ◊ Widen EB to NB Ramp to 2 Lanes
  - » *Traffic Improvements*
    - *Reduced user delay for key routes by an average of 81%*
    - *36 MPH vs.16 MPH average system-wide, all movements*
    - *Reduced travel time for major routes from 11 to less than 3 minutes*
    - *Eliminated any special event traffic backup from the I-395 mainline*
    - *50 MPH vs. 17 MPH SR-836 EB during the morning peak hour*
    - *35 MPH vs. 8 MPH - I-395 WB avoids back-ups on the Signature Bridge*

Enhanced Safety

- ◊ Eliminated four I-395 Design Exceptions and four Design Variations
- ◊ Eliminated five significant weaves including SR-836/I-395 NW 17th Avenue to N. Miami Avenue
- ◊ Reduced likelihood of crashes with congestion relief
- ◊ Pedestrian safety – Providing a bridge over Biscayne Boulevard EB entrance ramp to Causeway
- ◊ Relocated parking from interior of the Heritage Trail outside pedestrian areas
- ◊ Provide enhanced pedestrian routes with "complete street" solutions, including special signage and lighting from PAMM to Overtown

Community

- ◊ Revitalization and reconnection of Overtown Community through our 55-Acre Heritage Trail
- ◊ Raised I-395 mainline profile in Overtown from 19 feet to 63 feet at NW 3rd Avenue
- ◊ Enhanced lighting along the Heritage Trail will "turn night into day", for community safety
- ◊ Restored community connectivity (North/South/East/West) by removing the fill barriers that separated Zones 1 from 3 at the earth plugs and integrate with the neighborhoods
- ◊ Heritage Trail has received universal support from all key civic/municipal stakeholders
- ◊ Optimized segmental pier shapes and reduced number of columns (107 to 98)
- ◊ Signature Bridge will be a true icon for Miami for the next 100 years and will be the largest precast segmental arch bridge in North America
- ◊ Added features: Children's playground, amphitheater, dog park, water fountains, historic art sculptures, and mixed use spaces

Team Staffing & Experience

- ◊ Archer Western is the largest bridge builder in the USA
- ◊ Archer Western and The de Moya Group are Florida's top design-build firms and have built many of its largest projects ($3 billion in FDOT Design Builds)
- ◊ Signature Bridge Superintendent and Program Manager just completed the Ohio River Bridge (ORB) projects 18 months early
  - » *ORB projects totaled $1.7 billion*
  - » *ORB included two signature cable stayed bridges and 90 other bridge structures*
- ◊ Nation's leading design firms - HDR (Hoover Dam Bridge), RS&H, Corven Engineering (Longest Segmental Arch Bridge – Natchez Trace) and Metric Engineering (prior PD&Es)

Design-Build Value Added

- ◊ 100-year design life for the Fountain Signature Bridge with enhanced materials
- ◊ Enhanced warranty items & durations for concrete pavement, asphalt pavement, ITS, structural concrete, and Fountain Signature Bridge
  - » *10 year warranty on Signature Bridge arches*
  - » *5 year warranty on landscaping*

Construction Methods

I-395 Signature Bridge

- ◊ Arch construction using support towers with precast segmental construction
- ◊ Arch construction with derrick similar to the St. Louis Arch Construction
- ◊ Cast-in-place boxes using California construction methods, including pipe supports for shoring

SR 836 Viaduct Bridge Accelerated Bridge Construction Methods

- ◊ Construction methods developed and presented in the ATC process
- ◊ Use of pipe piles in elevated bridge segments to allow splicing, reduces vibration
- ◊ Column pours from bottom up - avoids multiple mass concrete pours
- ◊ Beam shifter to set beams while maintaining traffic
- ◊ Pre-cast segmental concrete caps

I-95 Concrete Pavement

- ◊ Most experienced team in concrete paving – 300 lane miles in Florida
- ◊ ATCs presented to maximize weekend work - resulting in Addendum
- ◊ Extended weekend closures for improved quality - allows proper cure time

Maintenance of Traffic

Mobility Benefits / Minimizing Impacts

- ◊ Adding 7th lane on I-95 NB within one year of NTP
- ◊ Adding 2nd lane on the 836 EB ramp to I-95 NB within 18 months of NTP
  - » *Adding a lane to I-395 WB in Phase 2 vs. RFP – alleviates congestion sooner*
  - » *Early opening of WB I-395 in final configuration at completion of Phase 2, alleviating congestion*
- ◊ Investment in temporary bridges to reduce phases and expedite schedule allowing for continuous signature bridge and segmental construction
- ◊ Elimination of an entire MOT phase along I-395 and two phase along SR 836
- ◊ Maintaining a safe path for pedestrians and bicyclists (see critical routes in Roll Plots)

Innovative Aspects

- ◊ Comprehensive Project Solution provides enormous benefits to FDOT/MDX and dramatically improves Mobility, Safety, Community, and Maintainability
- ◊ Our team presented 51 ATC's through the ATC process - our solutions have improved nearly every aspect of the project
- ◊ Elimination of the vast majority of utility conflicts
- ◊ Elimination of extensive trunk line piping and deep wells
- ◊ New Viaduct can be used for MOT during reconstruction of the aging Miami River Bridge

Maintainability

- ◊ Inspection and maintenance manual for critical project features including the Signature Bridge and Heritage Trail
- ◊ 100-year design for Signature Bridge reduces maintenance costs
- ◊ Elimination of more than 90% of the steel bridge-provides $50M in long term savings
- ◊ Viaduct allows for replacement of the Miami River Bridge without impacting traffic
- ◊ Community Partners for our Heritage Trail will contribute to long-term maintenance

Conformance with MDX Aesthetics Manual

- ◊ Viaduct structure provides the signature MDX column enhancements
- ◊ Precast segmental inverted T's provide sleek look with integral beams
- ◊ Viaduct color scheme is consistent with the MDX corridor and fits well into the skyline



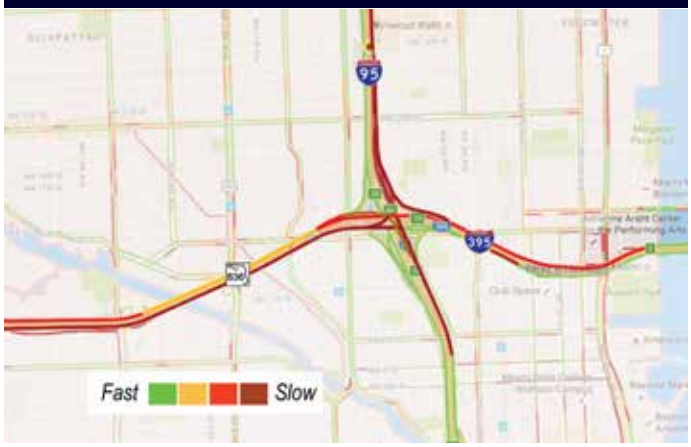


A Comprehensive Solution

The RFP concept was developed based on two separate NEPA studies that were completed at different times and for different clients (FDOT and MDX). The timing of the studies, coupled with the differing goals for each segment, resulted in a gap that did not address necessary capacity improvements along I-95. The AW-dMG team immediately acknowledged the project would require a holistic approach – one that not only addresses the challenges for each corridor individually, but also as a cohesive and interactive system that serves the entire community. Through extensive traffic modeling and our own experience as residents of Miami, we discovered that the connection from SR-836 and I-395 mainlines to I-95 through the Midtown interchange is the major source of traffic incidents throughout the corridor. We also determined that no amount of added capacity to SR-836 and I-395 would alleviate traffic congestion because it is a direct result of congestion along I-95, which causes traffic to back up on these two facilities (**Figure 1**).

During the past three years, our team analyzed alternatives for each corridor and the project as a whole. Throughout the process, we discarded numerous options, specifically those that would not effectively improve traffic and eliminate the negative interaction between SR-836, I-395, and I-95. Conforming to our overall goals for mobility, safety, community and maintainability, we developed a comprehensive solution that connects and complements the objectives of the NEPA studies – the Viaduct (ATC 12C).

Figure 1: Corridor Traffic Congestion



The Viaduct (ATC 12C)

This ATC provides two bypass lanes in each direction on an elevated freeway (Viaduct) along the center of the existing SR-836 freeway (**Exhibit 2**) and a third through-lane in each direction on the existing SR-836 roadway that will become the collector-distributor (C-D) system with connections to local roadways and I-95. The Viaduct capitalizes on the use of new technologies and innovative construction methods, providing one unifying solution that transforms the capacity of the Midtown interchange.

Throughout the ATC process, we worked closely with FDOT and MDX, vetted the concept, and made adjustments throughout the corridor to increase mobility while enhancing safety for the traveling public. The Viaduct (ATC 12C) includes three major components:

1. Creation of a bypass along SR-836 that eliminates interaction with I-95 and special events in downtown Miami.
2. Addition of a 7th lane along I-95 NB north of I-395/SR-836 that also serves SR-836 EB and I-395 WB traffic.
3. Widening of the single lane SR-836 EB to I-95 NB ramp to two lanes.

Major Traffic Operational/Mobility Improvements

During the ATC process, our team presented video simulations to illustrate the dramatic improvements our proposed solution will provide in comparison to the RFP concept. **Please take a moment to review the videos that were included with our ATC 12C submittal and refer to Roll Plot 3, which illustrates and contrasts the traffic improvements with the Viaduct concept versus the RFP concept**.

The RFP has five major routes with significant delays of up to 11 minutes resulting in backups onto the Signature Bridge. Our traffic analysis revealed dramatic improvements in all traffic performance measures - including average speed, density, and Level of Service (LOS) as follows:

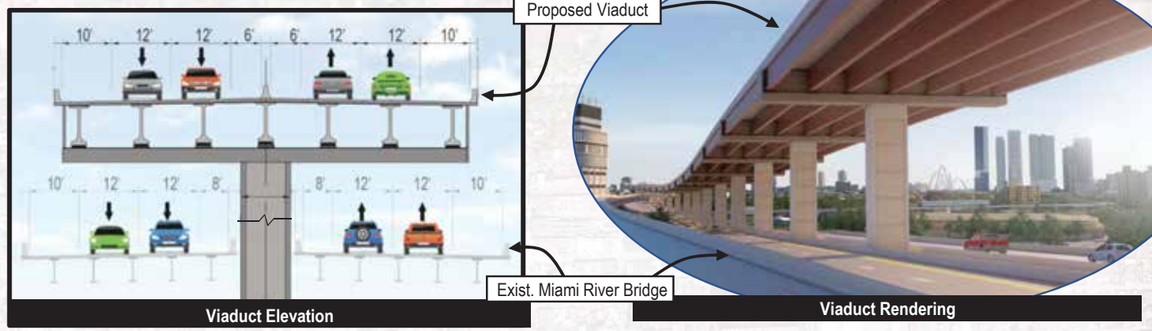
- 16 MPH to 36 MPH average speed system-wide inclusive of all movements;
- 17 MPH to 50 MPH along SR-836 EB reducing delays during early morning rush hour traffic;
- 8 MPH to 36 MPH along the I-395 WB connector avoiding back-ups onto the Signature Bridge;
- 81% reduction in user delay system-wide; and
- No single ATC 12C route exceeds three minutes in travel time!

Safety Enhancements

A review of a five-year crash history revealed that 41% of rear-end and sideswipe collisions at the EB SR-836 to NB I-95 collisions occur during the PM peak period, which is when traffic operates at a stop-and-go and with significant speed differentials between lanes. Our concept improves the speed differential during the peak hours and substantially eliminates the conflicts that generate these crashes. Studies show that improving a movement from heavily congested (overcapacity) flow to moderate flow can reduce crashes up to 60%.

Our design also eliminates the 250' taper on the EB Signature Bridge, significantly reducing the number of incidents that are commonly attributed to short merging maneuvers. In addition, it reduces long-term maintenance costs associated with repairs to

EXHIBIT 2 -ATC 12C (VIADUCT) SIGNIFICANT TRAFFIC IMPROVEMENTS



MOBILITY AND SAFETY ENHANCEMENTS

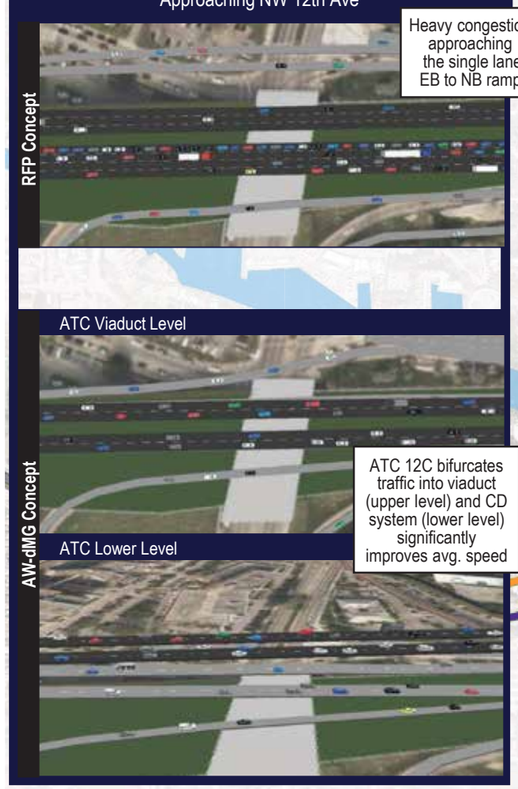
- Viaduct that bypasses I-95 Traffic and I-395 Special Events
- Additional 7th Lane along I-95 NB
- Widen SR 836 EB to I-95 NB Ramp to 2 Lanes

SYSTEM-WIDE BENEFITS

- 36 MPH (ATC 12C) vs 16 MPH (RFP) Avg. System-Wide Speed
- 81% Reduction in Driver Delay System-Wide
- 8 Design Exceptions & Variations Along I-395 Eliminated by ATC 12C

VIADUCT TRAFFIC SIMULATION VIDEO COMPARISON

Approaching NW 12th Ave



TRAFFIC COMPARISON – FIVE MAJOR ROUTES

Movement	Average Speed		
	RFP	ATC 12C	IMPROVEMENT
A	17 mph	50 mph	**33 mph increase**
B	32 mph	45 mph	**13 mph increase**
C	8 mph	36 mph	**28 mph increase**
D	10 mph	22 mph	**12 mph increase**
E	20 mph	51 mph	**31 mph increase**

a new Signature Bridge railing system.

Improved Access

The Viaduct provides direct access from I-95 SB to NW 12th Avenue (instead of from NW North River Drive as presented in the RFP concept). This enhancement to the RFP concept minimizes delays particularly for traffic (i.e. emergency vehicles) destined for the Health District, including Jackson Memorial Hospital.

Access to I-95 and SR-836 WB from North Miami Avenue SB, the new partial interchange, is improved by inclusion of a new right turn lane at the ramp intersection along North Miami Avenue eliminating the circuitous route proposed with the RFP concept.

Reduces Community Impacts

The Viaduct provides several benefits to the community by reducing proposed right-of-way acquisition, aerial easement and temporary construction easements. The RFP estimated approximately 43,390 SF with another 29,740 SF of aerial easement. The Viaduct will reduce the right-of-way needs to 6,538 SF, which is an 85% reduction. In addition, the concept reduces impacts to the Miami-Dade County Courthouse parking area.

Another major community benefit of the Viaduct is the reduction in impacts to the Grove Park historic neighborhood by concentrating the bridge construction efforts in the median of SR-836 as opposed to the outside, where they are closer to existing structures.

Long-Term Solutions for MDX

One of the biggest benefits that the Viaduct provides is flexibility for future system operational improvements especially as it relates to the bridge over the Miami River. The structures within this section of SR-836 were constructed in 1968 and are approaching their design service life. The Viaduct provides MDX with the opportunity to replace the Miami River Bridge in the future with minimal disruption to SR-836 traffic. Furthermore, it salvages all the proposed RFP widening, which would be demolished along with the original bridge within 20 years of opening the bridge to traffic.

Our project-wide Viaduct solution accommodates and improves key movements, significantly exceeds the RFP requirements, provides outstanding quality, addresses all unique issues, and provides significant operational enhancements.

Heritage Trail

In the late 1960s, the construction of I-95 and I-395 divided the Overtown community, which once served as the thriving heart of Miami's culture. This project will reconnect communities, provide an open space for residents and visitors to gather, and restore the once-divided Overtown community.

Our design includes a 55-acre Heritage Trail that will connect communities not only from north to south, but also east to west below I-395 from the Midtown Interchange to Biscayne Boulevard. Even more significant, our design will turn night into day by providing up to 63' of vertical clearance between the mainline and NW 3rd Avenue in Overtown, significantly exceeding the RFP requirement to provide a minimum of 19'.

Our Heritage Trail provides bicycle and pedestrian connectivity from the Midtown interchange to Biscayne Boulevard, and community enhancements throughout the entire corridor. As detailed in Aesthetic Volume 2, Heritage Trail is designed to provide a transformative experience for pedestrians, reflecting the continual change experienced in the area starting with the settling of the Tequesta Indians to the Caribbean influence of Miami today.

We have presented our Heritage Trail concepts to many prominent members of the community, including the Black Archives History and Research Foundation of South Florida, who had an overwhelmingly positive response as shown below.

> *"In writing this letter, the Black Archives History and Research Foundation of South Florida is fully supportive of the Heritage Trail design concepts as presented to us. In fact, the concept fits in well and is compatible to our Folk Life Village Project. Should the AW-dMG team be awarded a design-build contract for this project, we will commit to working with the AW-dMG team as they implement these concepts as part of their design and construction commitments to FDOT."*

The Fountain (Signature Bridge)

The Fountain, our iconic Signature Bridge, will extend high above Heritage Trail and represent Miami as the Center of the Americas. The Fountain is unique in form and function offering a singular, constructible design that can be preserved and maintained for generations to come. Enhanced by the use of integrated design elements, such as interactive fountains located at each end of Heritage Trail, the Fountain (shown below) will provide a cohesive, connected solution for the City of Miami.

The Fountain

The Fountain was inspired by Miami's world renowned status as the center of the Americas. As the Gateway City, Miami has been influenced in development and growth by various regions throughout the United States, Caribbean, and Central and South America. The Fountain mirrors our Project Theme - "Connecting Miami."

Once built, the Fountain will be the largest concrete segmental arch in North America and the 2nd largest concrete arch. Currently, the longest segmental arch, the 580' span Natchez Trace Parkway Bridge and the longest concrete arch, the Hoover Dam, were designed by team members Corven Engineering and HDR, respectively.

The scale of the Fountain significantly exceeds the minimum requirements stipulated in the RFP and provides massive proportions, yet complements the horizon with its sculptural and scenic 360-degree views from all elevations. We recognize the Fountain will be the primary focal point of Miami during special events for decades to come.

The Fountain is significant enough in stature to complement the surrounding area and adjacent buildings without being lost among the existing and future skyscrapers in downtown Miami and provides a dynamic and unique view for all of Miami-Dade County. Symbolizing a center for urban life, the Fountain will be a highly sought after destination during both day and night. During the day, the arches of the Fountain will be a striking image of art. At night, the iconic signature structure will become a fountain of light through the use of dynamic lighting that emits movement, energy, and creativity. To the contrary, a cable-stayed structure's most prominent views would appear only to a limited area of Miami.

Understanding of the Scope & Unique Issues

I-395 Specific

Roadway Design

The roadway design must balance the project goals with geometric constraints resulting from limited spacing between the ramps to/from downtown and the system interchange with I-95. Our comprehensive solution, ATC 12C, blends several ATCs that were developed to accommodate the Signature Bridge (EB and WB alignment shifts), and improve traffic operations (combining Ramps E and F) while meeting the geometric requirements.

Vertical Profile

The RFP requires a minimum of 19' of vertical clearance west of the FEC Railroad (Overtown) and 25' minimum to the east. Our team developed an optimized design that will significantly raise the mainline bridge and provide an open, safe, and inviting area below the bridge. This profile adjustment will significantly increase the amount of natural light that penetrates the area below the bridge. **Table 1** includes a comparison of the RFP concept design elevations and our design within the Overtown area.

Table 1: Vertical Profile Enhancements

Location	I-395 Vertical Profile Increase	
	EB I-395	WB I-395
300' W. of NW 3rd Avenue	+43.0'	+31.6'
NW 3rd Avenue	+44.0'	+35.8'
NW 2nd Avenue	+19.9'	+26.9'
NW 1st Place	+11.5'	+16.7'
NW 1st Court	+5.0'	+6.9'

ATC 12C

Our design combines Ramps E and F, providing direct access to I-95 and SR-836 from North Miami Avenue SB, utilizing a new right-turn lane at the intersection with Ramp E. Benefits include:

- **Improves Access from North Miami Avenue SB to SR-836 WB and I-95** – This new connection will reduce travel time and distance when compared to the RFP concept, which would route SB traffic onto North Miami Avenue through seven signalized intersections, including three left turns. Our design will require a single right-turn movement at one signalized intersection to gain to access SR-836 WB and/or I-95 as shown in **Figure 2**.
- **Improves Traffic Flow on the WB Connector** – Relocating traffic from Ramp F (access to I-95 from surface streets) to

Figure 2: Ramps E & F (RFP Concept)

Figure 2: Ramps E & F (AW-DMG Concept)

the south side of the WB Connector (as compared to the north side shown in the RFP concept), will improve LOS on the WB Connector by eliminating lane changes for I-95 NB traffic.

- **Optimizes the ES Connector** – Relocating Ramp F to the south side of the WB Connector will enable the use of a constant width for the entire length of the ES Connector. One-arrow-per-lane guide signs will be provided in advance and at the gore to enhance lane utilization.
- **Enhances Heritage Trail** – Relocating Ramp F, which is located on an average fill height of 15' and confined by retaining walls, will expand Zone 2 and create additional space that can be used for a variety of public functions. The proposed retaining wall depicted in the RFP concept and Aesthetic Manual will be a visual barrier and isolate Zone 2 from its surroundings.

With our ATC 12C design, our team eliminated four design exceptions and four design variations associated with the RFP concept, enhancing the Department's overall goals for the I-395 corridor (**Table 2**).

Table 2: Eliminated Design Exceptions and Variations

Exception or Variation	Element
1E Exception	Maximum Grade – WB I-395
4A Exception	Vertical Clearance EB Connector under EB I-395
4C Exception	Vertical Clearance EB I-395 under NB I-95
4D Exception	Vertical Clearance SB I-95 under EB I-395
2A Variation	Length of ramp horizontal curves on ramps less than 400' - Curve A1
2A Variation	Length of ramp horizontal curves on ramps less than 400' - Curve A2
5A Variation	Interstate Ramp Terminal Vertical Curve Length - Ramp B
8A Variation	Cross Slope of Existing EB I-395 Bridge 14

Pedestrian Safety

Our team understands the importance of pedestrian safety within the project corridor, particularly for the circulation of patrons between the Museum Park Metromover Station/ Museums and the Arsht Performing Arts Center/Knight Concert Hall. With the opening of the Heritage Trail, pedestrian volumes are projected to double creating even greater demand.

To enhance pedestrian safety, our team will provide a grade-separated crossing. This solution will significantly increase safety by separating pedestrians from motorists. The grade-separated crossing will not encroach into the future Beach Corridor (located south and parallel to D1).

Surface Streets

The improvements include reconstruction and rehabilitation of the local surface streets below the new I-395 bridge.

Improvements to the local streets will include upgrades to existing pedestrian facilities to meet ADA compliance requirements (sidewalk, curb ramps, etc.), as well as milling and resurfacing, and widening/reconstruction/new construction. Please review our Roll Plots.

Structures Design

The Fountain (Signature Bridge)

The Fountain is a unique, one-of-a-kind structure that features six arches springing from one central arch thrust block (**Figure 3**) – a first for bridge design. Three basic elements comprise the structure of the Fountain: the concrete arches, steel cable suspenders, and the concrete superstructures that will carry the EB and WB roadways. As shown in **Table 3**, the scale of the Fountain will significantly exceed the minimum requirements stipulated in the RFP. The Fountain is based on proven segmental arch designs by our key bridge design staff, included a peer review by members of our team, and is designed to offer a 100-year design life.

Figure 3: Central Arch Thrust Block

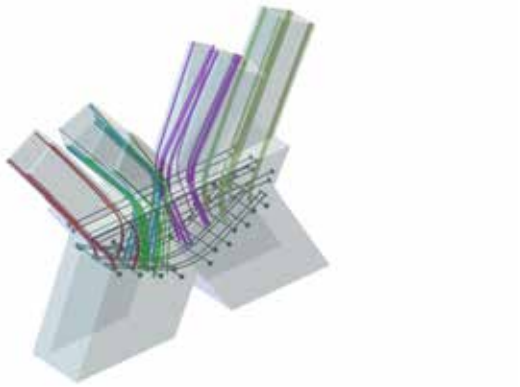


Table 3: Signature Bridge Criteria

RFP Page	Requirement	RFP	AW-dMG	Difference
74, 161	Minimum bridge apex elevation 245'	245'	330'	+35%
161	Minimum height of highest cable	236'	316'	+34%
161	Minimum Signature Bridge length	650'	1,025'	+58%
161	Minimum suspended spans length	500'	936'	+87%

The Arches

The six arches of the Fountain will be constructed using precast segments erected in one-direction cantilever, which was presented to FDOT during the ATC process. The cross-section of the arch ribs will be a trapezoidal box section with a constant depth of 14' and width that varies from 12' at the top to 14' at the

bottom. The same overall cross section dimensions will be used for each of the arches to provide a sleek, uniform aesthetic. The arches will consist of two segment types – typical arch segments and arch segments that contain anchorages for the suspenders. A total of 330 precast segments will be required to construct the six arches. The arch segments will use 10,000 psi concrete to provide strength and enhanced durability. Typical arch segments will weigh approximately 125 kips and the suspender anchorage segments will weigh approximately 165 kips.

The base of the arches begins with a cast-in-place starter segment extending from the thrust blocks. This starter segment accommodates the erection equipment assembly for the precast arch segments. The first precast element is then lifted into position and connected with a 1' closure pour. Post-tensioning bars are stressed to secure the segment to the arch.

The remaining precast arch segments are erected and attached to the arch using epoxied joints and permanent post-tensioned bars. These bars, along with internal post-tensioning strand tendons, provide the permanent prestressing for the arch. The location and number of permanent strand tendons will be based on their location along a given arch. The post-tensioning strand tendons will be anchored in anchorage blocks at the intersection of the webs at either top or bottom slabs. Strand tendons will be grouted with wax grout, and internal bar tendons will be grouted with a cement based grout.

Arch construction will be completed by "centering" the arch. The two arch halves will be jacked apart to a predetermined load and a central (keystone) arch segment is cast-in-place. Post-tensioning tendons will then be stressed to make the arch continuous (Roll Plot 17).

Suspenders

Steel cable suspenders, connecting the arches to the bridge deck, will be stressed to lift the superstructure off the falsework, loading the arches. The principle tensile element in the suspenders will be 270 ksi, seven-wire prestressing strands 0.6" in diameter. The strands are bundled together as suspenders in similar fashion to stay cables used in cable-stayed bridges. The number of strands in the suspenders will vary from a minimum of 12 to a maximum of 44.

The free length of the suspenders will be enclosed high density polyethylene (HDPE) or polypropylene (PP) pipes. The pipes will be manufactured in a bi-extrusion process that combines an interior black pipe core with good resistance to UV rays and an exterior layer of color selected for the project. The design of the cables will follow the state-of-the-art requirements of the Post-Tensioning Institute and AASHTO LRFD design specifications.

The ends of the suspender cables will be anchored along the arches and superstructures using anchorage similar to those used in cable-stayed bridges. The suspender anchor plates and guide pipes will be positioned geometrically with orientation to each suspender. The suspenders pass through the guide pipes and connect to transition pipes, which are designed to reduce local moments in the suspenders. Anchorage locking rings are used to provide for adjustments in suspender forces as required by the erection sequence.

Our team understands the significant importance of providing a robust and durable structure that can be efficiently maintained. Our design will include the following enhancements to increase the performance of the suspenders:

- **Multi-barrier Corrosion Protection** – Best practice is for the suspender strands to be individually sheathed over corrosion inhibitor wax. When placed within the suspender pipes, a three layer of protection is provided.
- **Fatigue Resistance, Angular Changes, and Wind Induced Vibrations** – Suspender anchorages will be designed with internal rings and dampers to minimize the angular deviation of the cable and the wind vibration to improve fatigue resistance. The outer surface of the HDPE duct may include beads or helical line to minimize wind- or rain-induced vibrations.
- **Suspender Replaceability** – The life expectation of this well-designed and manufactured suspender will exceed 100 years. All of the suspenders can be replaced for maintenance during the life of the bridge. The bridge will be designed for the "cable out" condition where each suspender can be replaced, one at a time, while maintaining all traffic on the bridge.

Superstructure

The Fountain superstructure is a two-span twin multi-cell concrete box girder structure with supports provided by the Transition Pier, Interior Pier, and the Abutment. Additional supports are provided at each arch rib, as well as the Center Pier. The width for the suspended portion of the bridge will be constant (ATC 12C). After the suspenders are terminated, the width will be reduced going into the Transition Pier and the Abutment. Transitions will be smoothly made with a combination of linear tapers and roundings in order to provide a smooth continuous visual experience for people viewing the bridge from below. The proposed design is a hybrid of post-tensioned and reinforced concrete as shown in our Component Plans.

The post-tensioned portions of the superstructure are for peak positive and negative moment conditions. Where resistance can be comfortably managed by reinforcing, well distributed reinforcing bars will be used. The design for the reinforced concrete will be such that the cracking moment is not exceeded.

Diaphragms will be used at each suspender location and provided at the ends of the Fountain Bridge (Transition Pier, Abutment) and at the Interior Pier. Diaphragms will be post-tensioned as will the deck of the box girders.

The bridge will be supported on disc bearings at the transition pier and abutment. They will be guided transversely but free in the longitudinal direction. Longitudinal resistance will be

provided by a fixed bearing at the Center Pier. Transverse restraint will be provided at the arch ribs, as well as the Center Pier. Deck joints will be sealed finger joints.

Transition Span

We have added a Transition Span to the Fountain Bridge in order to change from the Fountain cross-section to the cross-section of the approach segmental box girders. Over the length of the 150'. Transition Span, the suspender anchorage overhang will be eliminated, the webs rolled over to conform to the overhangs and slopes of the approach box girders (**Figure 4**).

Figure 4: Signature Bridge Transition Span

Foundations

The foundations for the arch and piers will be driven Precast Prestressed Concrete (PPC) piles. For the arch rib foundations, 30" PPC piles will be used except for Arch No. 4 (adjacent to the Arsht Center) where 24" PPC piles will be used to mitigate noise and vibration impacts. For the Interior Pier, Transition Pier and Abutment, 24" PPC piles will be used. For several arch footings, we have skewed the footing with respect to the longitudinal axis of the arch. This was done to accommodate either MOT alignments or property lines. All foundations have been designed using the FB-MultiPier software based on geotechnical parameters provided by our team's geotechnical engineer, **Universal Engineering Services**.

Final Design

The final design effort will utilize BIM software to produce 3D models of the entire bridge. From these models, 2D drawings will be produced. We have utilized BIM for the pre-bid design in areas of complexity to identify and correct areas of conflicts. The Center Pier is such a model, which has P/T tendons coming from the arch ribs passing through tendons for the pier.

Wind Engineering

Given the surroundings of the site and the hurricane hazards of Miami, we will perform a site-specific wind climate assessment for the bridge. This will be completed by specialty engineers, **RWDI**, an expert in wind effects on structural systems. The results of this assessment will be design wind speeds for wind loads and aerodynamic stability of the structure, as well as turbulence properties at the site. Below is a desktop assessment:

- **Section Model Testing** – We have experience on several recent projects where twin decks exhibit additional aerodynamic instabilities due to the presence of the other deck as opposed to a bridge deck in isolation. Therefore, sectional model testing will be required to verify the aerodynamic stability of the bridges and to extract static force and moment coefficients.
- **Aeroelastic Model Testing** – Strong vortex-induced oscillations or galloping during the construction stage of large arches have caused significant repairs to be undertaken (e.g., Alconetar Bridge in Spain). Therefore, we will perform tests of the erection stage of the arches.
- **Final Design Wind Loads** – Following the results of the wind tunnel tests, a final set of design loads for the completed bridge and two construction stages will be performed.

Segmental Structures

I-395 bridges crossing over NW 3rd Avenue and extending to the AW-dMG team's Signature Fountain Bridge will be constructed with precast segmental box girder superstructures. The AW-dMG team's design for the segmental bridges is based on our ATC 4, which optimizes span lengths, pier locations, and calls for constant depth segmental box girders for all bridges.

- Eliminates variable depth box girders (**Figure 5**) providing more openness below the bridges and uniform appearance between multiple, side-by-side bridges; and
- Removes the earthen plug so that Bridge 5 is one bridge from the west of NW 3rd Avenue to the beginning of our Signature Fountain Bridge, providing connectivity along the project.

Figure 5: Variable Depth Box Girders (RFP)

Figure 5: Constant Depth Box Girders (AW-DMG)

There are three primary roadway widths that will be carried by the I-395 segmental bridges: 40', 52', and 60'. The AW-dMG team proposes to use three different box girder types, shown in Roll Plot 15.

Substructures for the I-395 Segmental Bridges will consist of reinforced concrete piers, resting on reinforced concrete footings that are supported by 24" square precast prestressed piles. The AW-dMG team, through our ATC 35, modified the pier shapes shown in the RFP. Three pier types, shown in Roll Plot 15, are proposed, each one dimensioned to match the bottom slab width of the three box girder types. The piers maintain the arch shapes on the transverse faces shown in the Aesthetic Manual. The vertical faces have been made vertical, however, in order to display images and signing along our proposed Heritage Trail.

Other Structures & Enhancements

The I-395 portion of the project includes the following structures and improvements:

- The length of Bridge 1 was reduced and the superstructure was changed from steel box to FIB girders (ATCs 7 and 12C) – reduces maintenance requirements;
- The Bridge 2 superstructure changed from steel box girders to FIBs and the piers relocated to support the modified bridge length (ATCs 10 and 12C) – reduces maintenance;
- The Bridge 3 abutment skew was changed from 0 to 45 degrees at end of bridge to avoid potential inside bearing uplift – reduces maintenance;
- The Bridge 12 widened deck is constant width with no taper as compared to the RFP – improves constructability;
- The Bridge 13 widened deck at Piers 3 and 4 are supported at the same locations as the existing bridge – improves deck durability;
- The bridge widening for Bridge 14 was eliminated by constructing new bridges (Bridges 102 and 107) from proposed roadway (ATC 12C) – resets life of structure;
- The Bridge 15 and Metromover pier replacement follow the RFP concepts; and
- New I-395 EB viaduct extension on the east side of I-95 (ATC 12C) – resets life of structure.

Geotechnical Engineering

Based on a thorough review of the RFP, provided geotechnical data, and additional borings/lab testing we performed, we have developed a comprehensive geotechnical investigation plan, which includes:

- Potential petroleum impacted soils in the eastern limits of the project;
- Organic soils encountered east of Biscayne Boulevard;
- Variability of the strength of the underlying limestone formations;
- Potential noise, vibrations and environmental impacts; and
- Drilling fluid losses in the limestone formations.

Foundations (Geotechnical)

We have evaluated various foundations for the Signature Bridge, as well as all other bridges, considering multiple factors, including a proven foundation type, local experience, vibrations/noise, and soils/groundwater contamination. Proven by our local pile driving experience, driving steel piling will result in significantly less vibrations than concrete piling. Although drilled shafts were considered, our experience with the adjacent shafts for the MacArthur Causeway found the subsurface conditions in this area are not conducive for drilled shaft construction with some of the existing shafts taking an excess of 1,000 CY to construct. For areas in close proximity to existing structures, we will utilize low displacement steel piles. An example of locations where steel piles will be utilized is at the transition between Bridges 1 and 4, where two piers are within 50' of the existing retail/commercial structures

Protection of Structures

Our team is very sensitive to the impacts of pile driving noise and vibrations on adjacent neighbors, structures, and utilities. We will perform settlement, vibration, and noise monitoring during pile driving, roadway compaction, sheeting installation, excavations, and other vibration-inducing events. Our protection plan is further described in Construction Methods.

Settlement

Part of the I-395 construction will include high (up to 35') embankments and MSE wall fills. Our local experience in similar subsurface conditions (including Sections 2 & 5) indicate that post construction settlements of high fills can occur resulting in distress to the overlying pavement section. Therefore, we will monitor all fill construction to ensure detrimental settlements have occurred prior to placing any pavement or approach slabs.

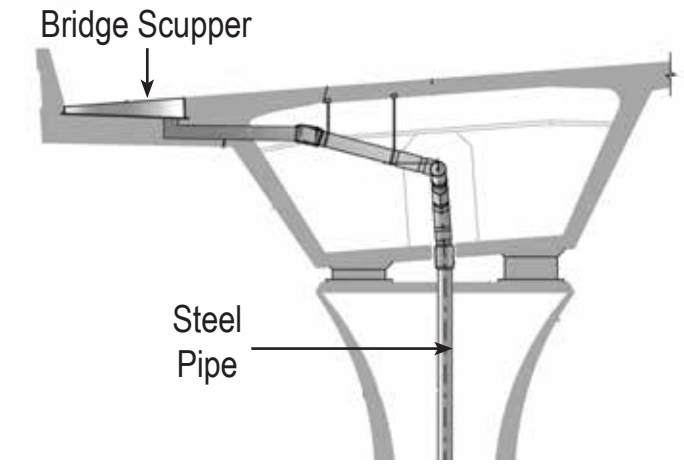
Drainage Design

The drainage system has been designed to account for climate change and anticipated sea level rise. The usage of pump station and injection wells will prevent flooding in and around the surface streets. Our general bridge deck drainage approach entails collecting deck runoff via deck drains, and piping it towards the bridge bents where vertical drains convey runoff below grade. Continuous Deflection Units (CDS) are being proposed to pre-treat the runoff prior to discharging into the drain wells. As shown in **Figure 6** on the following page, bridge conveyance systems will be hidden from view by placing the pipe runs within the box girders of the segmental bridge. Deck drainage inlets have been eliminated from the WB and EB sections of the Signature Bridge by adjusting the roadway profile and moving the super elevation transition outside of the approach slabs. This concept will provide expedited construction and reduced service life cost by (1) significantly reducing the number of deck drain units; (2) eliminating over half a mile of

drainage pipe and pipe hangers; and (3) eliminating drainage maintenance. In summary, our proposed design includes:

- Gravity drainage wells optimized to take advantage of higher discharge head;
- Optimal discharge points, such as trunk lines, in the Omni-Area Basin, we have optimized discharge points, trunk lines, and existing discharge points;
- Preparation of a design that will ensure the flooding issues in the parking area south of the Arsht Center are eliminated; and
- Elimination of 21 identified utility conflicts through strategic routing of proposed pipes to avoid existing facilities.

Figure 6: Drainage Conveyance Systems



Temporary Drainage

Our permanent drainage will be designed to comply with spread criteria in accordance with our MOT phasing. Our drainage design was analyzed during-construction and post-construction conditions and we have included a design that meets both conditions:

- Permanent condition of two travel lanes at 50 MPH with no spread on travel lane; and
- Temporary condition of three travel lanes at 45 MPH, flooding half a lane.

Landscaping Design

Landscaping will be designed in all zones to exceed the baseline requirements. Our enhancements along the Heritage Trail are fully described in Volume 2.

Permitting

The major permits that will be required are summarized in **Table 4**. The AW-dMG team has designated **Michael McCoy** as our environmental liaison to attend weekly progress meetings, provide accountability for environmental requirements, and ensure proactive environmental compliance. Michael was a project manager for the FDOT D6 Environmental Compliance contract for four years prior to 2015, and is expertly familiar with the District's procedures, standards, and expectations for effective management of environmental matters.

Table 4: Major Permits (I-395)

Agency	Permit
South Florida Water Management District	Environmental Resource Permit
Florida Department of Environmental Protection	Class V Injection Well Permit and National Pollutant Discharge Elimination System
Miami-Dade County Department of Regulatory and Economic Resource	Class V Dewatering Permit
United States Coast Guard	Bridge Permit
U.S. Army Corps of Engineers	Dredge and Fill Permit

Signing & Pavement Marking

Our team's signing plan was vetted through the ATC process. The combination of Ramps E and F into a single location improves signing on the surface streets through the reduction of signing and subtle differences in routes that can confuse drivers. All traffic entering the facility will be guided into the correct lane through the use of overhead sign structures and pavement shields.

Signalization

Traffic signals were modified along NE 1st Avenue, NE 13th Street, Ramp E, and North Miami Avenue to account for the relocation of Ramp F.

Lighting Design

The AW-dMG team has made a significant commitment to the lighting component on this project. Lighting will be installed in the following areas along I-395:

- **Heritage Trail** – Lighting of the trail from the bottom of the Signature Bridge and Segmental approaches will provide an open and inviting feeling to the space below the structures. Lights embedded into the trail path along its center will direct and provide guidance for users to follow the path through the various aesthetic zones. More specifically described and detailed in Volume 2, the commitment to lighting along the Trail will reinforce the facility as a nighttime destination.
- **Signature Bridge** – The lighting of the bridge includes two components: 1) fixtures mounted on the arches to provide surface illumination and 2) individual lights affixed to the suspension cables will provide a canvas of spectacular effects that can be programmed. This will provide an unprecedented level of flexibility to create and enhance the beauty of the structure in the night.
- **I-395 Roadway** – The more conventional roadway lighting is designed to work harmoniously with the aesthetic lighting, while delivering the appropriate lighting levels required for

Signature Bridge Lighting

safe roadway operations. Lights are only mounted on the outsides of the travel ways to ensure optimal viewing of the Signature Bridge.

- **Surface Streets** – Poles impacted by the project will be replaced with poles and LED fixtures with the exception of decorative fixtures, which will be replaced in kind.
- **Maintenance Lighting** – The proposed maintenance lighting will include LED lamps and receptacles in each cell of the Signature Bridge, as well as continuous lighting within the box girder bridges as shown in Roll Plot 23.

ITS Design

The ITS plan for this project includes an end-to-end fully redundant, fault tolerant scalable system. We have located the backbone of the system to be compatible with the features of the Heritage Trail minimizing disruptions due to maintenance activities. ITS components have been located outside the limits of the Signature Bridge in order to not detract from the bridge's aesthetic features.

The ITS system design provides a completely separate power and communication systems for I-395 and Port of Miami Tunnel (POMT). The POMT will be protected prior to relocation and activation. The design includes DMS video confirmation covered by both dedicated CCTV and IM-CCTV cameras.

There are six POMT notification dynamic signs on EB I-395 and connector ramps to alert motorists of tunnel closures. These signs will be controlled by the POMT operations through their ITS system. Spacing of the DMS locations is a challenge on I-395 due to the high density of guide signing and ramp/connector movements. Our design will locate one of the WB DMS signs to the west end of Watson Island to alleviate sign congestion.

Utility Design

There are several significant utilities located within the I-395 Corridor that will require design and construction coordination throughout the project. Relocation of the FPL 138 KV Overhead transmission line in the vicinity of the FEC Railroad will required extensive coordination.

Our team eliminated many of the MDWASD conflicts identified in the RFP and confirmed the proposed work within the FEC railroad right-of-way is not required. We have reviewed the utility conflicts from the RFP concept plan and have evaluated the effect of our design that eliminates more than $1.8M in utility relocation costs, as shown in **Table 5**.

Table 5: Utility Relocation Cost Savings

Utility/RFP Conflict	Cost Savings
FPL D12/BE 13 KV Distribution (Bridge Foundation)	$540,000
TECO TPG-2/2" Gas Main (Bridge Foundations)	$80,000
TECO TPG-4/4" Gas Main (Bridge Foundations)	$50,000
Level 3-1/BFO Cables (2) (Bridge Foundations)	$4,000
AT&T/10 OT Aerial Cable (Ramp F)	$65,000
TECO TPG-5/6" Gas Main (Embankment)	$30,000
TECO TPG-6/6" Gas Main (Pond/Embankment)	$90,000
AT&T 11 BT Cables (2) (Signature Bridge Foundation)	$65,000
FPL/D13 BE 13 KV Distribution (Signature Bridge Foundation)	$850,000
TECO TPG-9/8" Gas Main (Signature Bridge Foundation & Reflective Pond)	$40,000
Concast-3/BTV Cables (Signature Bridge Foundation)	$4,000
Level 3-2/BFO Cable (Signature Bridge Foundation)	$4,000

MDX Specific

Roadway Design

Our team's Viaduct significantly transforms the SR-836 corridor adding a 2nd level to carry traffic to Miami Beach and/or Downtown Miami while using the existing SR-836 roadway as a Collector-Distributor (C-D) system that will provide the entrance/exit movements between NW 12th Avenue and I-95/I-395. The following summarizes improvements to SR-836.

SR-836 EB

EB traffic can either use the Viaduct for access to Miami Beach/POMT or downtown Miami or the C-D for I-95 NB or U.S. 1/North Miami Avenue. Vehicles traveling from NW 12th Avenue or to U.S. 1 will gain access to I-395 EB via Ramp A (WE Connector).

The EB to NB ramp was built in the 1970s as a single-lane left-hand exit ramp servicing 12,000 average annual daily traffic (AADT). The 2040 AADT volumes are expected to triple the original design volumes! The ramp commonly backs up and is susceptible to I-95 congestion – creating extensive spill-back

onto the SR-836 EB mainline. The proposed ramp widening will eliminate the uneven volume distribution between the two proposed RFP concept ramps for which the existing inside ramp is overcapacity and the new RFP concept flyover underutilized. Our solution increases average speed from 32 MPH to 45 MPH.

> *Adding a second lane to the EB to NB ramp will substantially reduce traffic delays and accidents in this area.*

SR-836 WB

Our comprehensive solution will divide the WB SR-836 CD system into two parts whereby the SB I-95 to WB SR-836 will generate one CD system, the NB I-95/WB I-395 to WB SR-836 will generate the other CD system, and the WB Viaduct will provide a bypass of both systems. Traffic from SB I-95 will be isolated from traffic exiting to NW 12th Avenue, which addresses the existing weaving conditions. As noted in the Total Project summary, the modifications provide a direct connection from I-95 SB to NW 12th Avenue. The WB Viaduct is projected to operate at LOS B while weaving along the WB C-D is improved.

Improvements to the NE Quadrant of SR-836 and I-95

One of the most significant changes made with ATC 12C involves the NE quadrant of the interchange where we have added an extra lane, providing dramatic traffic benefits to the entire project. The additional lane was carried as a 7th lane along I-95 to the North end of the project. The new two-lane SR-836 EB to NB Ramp and the I-395 WB to NB Ramp were combined forming three lanes versus the two lanes proposed with the RFP configuration.

> *This approach resulted in the introduction of a 7th lane along I-95 NB that will significantly improve traffic in all directions.*

Improvements to the SW Quadrant of SR-836 and I-95

As with the northeast quadrant, the AW-dMG team evaluated various alternatives to channelize traffic to I-95 SB from the Viaduct and/or the SR-836 CD system. The new exit ramp to I-95 SB connects to the existing SR-836 EB to I-95 SB ramp south of the merge depicted in the RFP concept. Our design lengthens the distance from this tie-down point approaching the exit to NW 8th Street in order to provide sufficient distance between the two facilities.

Pavement Design

ATC 48 substitutes the rigid pavement proposed by the RFP concept with flexible pavement that includes Optional Base Group 11 with 4" of Superpave Traffic Level D and FC-5. The RFP concrete pavement alternative requires the slabs be cut at new joint lines making it virtually impossible to maintain the existing number of travel lanes during slab replacement. ATC 48 greatly simplifies MOT and construction sequencing required to replace the existing slabs.

Parking Lot Design

Our design significantly reduces the overall impacts to existing parking lots, providing 111 additional spaces in Lot 1 and seven additional spaces in Lot 2 versus the RFP concept.

Structures Design

The Viaduct

The Viaduct begins west of NW 17th Avenue and ends east of I-95 and carries a total of four lanes (two EB and two WB) on a single structure prior to separating into twin structures just west of I-95.

The Viaduct

The Viaduct will be supported on 30" piling (pipe and concrete) with the exception of drilled shafts in the Historic Grove Park District. The columns are typically a 10’ wide by 6’ long rectangular section. The pier caps are inverted tees to reduce vertical clearance and for improved aesthetics. The center portion of the pier cap will be cast in place. The precast cap segments will be erected in a balanced cantilever method using an erection beam mounted on top of the cap. Two segments will be erected on each side of the central cap and post-tensioning bars will attach segments during the intermediate steps. After all segments have been erected, the first phase of post-tensioning will be installed. Following beam erection and deck placement, the final phase of post-tensioning will be stressed. Temporary traffic patterns will divert traffic from underneath the active construction locations in accordance with FDOT standards as discussed in the ATC process.

The typical span length was set at 175'-0" to allow use of FIBs and conventional construction techniques optimizing the number of columns and maximizing efficiency of the 96" FIBs.

NW Quadrant

There are two bridge structures in the NW quadrant of the interchange. Bridge 118 connects I-95 SB traffic to SR-836 WB using a conventional FIB girder superstructure. The substructure will contain a mix of pier types, including standard hammerhead piers, C-Piers, and straddle bents to avoid impacts to the lower roadways, such as the NW 12th Avenue exit ramp. This bridge

spans over the Metrorail allowing direct access to NW 12th Avenue. Bridge 124 carries traffic from I-95 SB to NW 12th Avenue. We decided to design a new bridge over NW 10th Avenue and NW 14th Street with optimal span arrangements versus widening of the existing bridge that contains a variety of pier orientations and span lengths, which simplifies construction.

Bridge Widenings

Additional bridges will be widened with conventional methods using FIBs for concrete girder bridges and plate girders for existing steel bridges.

Geotechnical Engineering

Our team has reviewed the soil borings from the previous geotechnical exploration and our additional borings (including borings in the Miami River) performed within this project's limits. The proposed bridge foundation designs have considered the following factors:

- No driven pile foundations in the Grove Historic District (Sta.1428+00 to 1433+00);
- Minimum two static load tests required for resistance factors in Grove area;
- Variability of the strength of the underlying limestone formations;
- Minimize noise, vibrations and environmental impacts; and
- Proposed piers locations below existing bridges (low headroom foundation installation).

Foundations

A combination of drilled shafts and driven piles will be utilized for foundation support. In areas that are close to existing structures, such as the Springhill Suites, we will utilize low displacement steel H-piles to reduce vibrations as we did on our NW 25th Street Viaduct Project.

In the area of the Miami River, we will utilize closed-end steel pipe piles filled with concrete and reinforcement as successfully performed on our SR 826/I-75 project. The filled steel pipe pile advantages are: allows for verification of the capacity by use of PDA and driving criteria (not verified with drilled shafts), easily spliced for variable lengths to ensure capacity requirements, and prevents grout over-runs with closed ends due to losses in the limestone or river.

Due to the presence of existing bridges some foundations will need to be installed beneath existing structures. Our plan for these foundations include several options:

- Cutting holes and repairing (as needed) in the overlying bridges and installing foundations through the existing bridge deck;
- Steel piling, which can be installed in relatively short segments and easily spliced; and
- Micro-piles (ATC 38).

Protection of Structures/Grove Park Historic District

Our foundations in this area have been moved from the concept plan locations along the outside of SR-836 to the median resulting in a much greater distance between the proposed construction and the existing historic structures. In addition, our foundations in this area will consist of installing drilled shafts to further reduce the amount of noise and vibrations associated with foundation installation.

Our team is very sensitive to the impacts of pile driving noise and vibrations. Our protection plan is further described in Construction Methods.

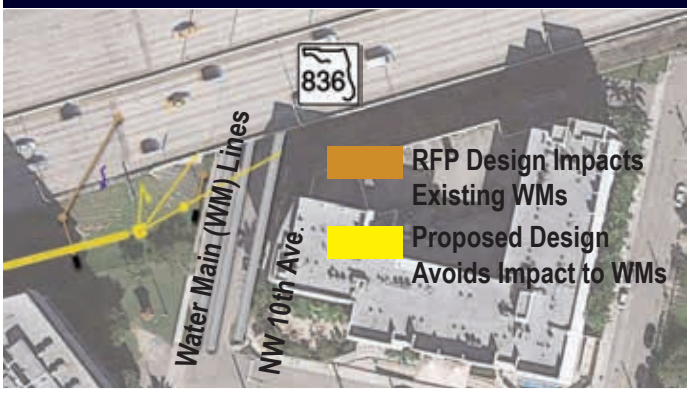
Drainage Design

The SR-836 roadway system consists of grate inlets, barrier wall inlets and storm sewer piping. Water quality is proposed through a combination of CDS, French drains, and stormwater ponds. Our team optimized the drainage design given the reduction in impervious areas resulting from the Viaduct concept, which serves as an umbrella over the existing roadway narrowing the footprint of the total widening required. The umbrella effect of the viaduct above SR-836 captures the stormwater and conveys it to the outfalls in the same manner as the existing drainage system. As a result, the total number of ponds/swales were reduced from 13 to four. The existing outfalls will remain, but will be upgraded to satisfy both State water quality and quantity requirements.

> *Our team reduced the length of French drains and reduced the total number of ponds/swales from 13 to four as compared to the RFP concept.*

Our team reduced utility conflicts by making modifications to the proposed drainage facilities. One example is located at the NW 10th Avenue crossing where we re-routed the conveyance system. See **Figure 7**.

Figure 7: Utility Conflict Avoidance



The bridge systems, including the Viaduct consist of bridge scuppers with gutter piping and down columns (vertical piping).

Viaduct Drainage

The series of drainage bridge scuppers were strategically placed near the viaduct pier locations in order to reduce the

amount of conveyance piping and associated clean-outs needed, which decreases the amount of long-term maintenance requirements along the bridge.

Existing Miami River Bridge Drainage

The reconstruction of the bridge railing will impact the existing system. We have developed a series of bridge deck drainage inlets to replace the existing system. The new drainage system for the bridge is being provided with a series of exterior pipes/ boxes to convey the water from the bridge to the infield areas below the bridge.

Environmental Design & Permitting

Federal approval of in-water support column construction and fender system replacement will be obtained through submittal of a pre-construction notice (PCN) to the USACE. A Section 404 Bridge permit application through the USCG will also be obtained concurrently.

Our team's Viaduct dramatically improves on the environmental permitting as compared to the RFP concept by eliminating widening to the north and south of the existing roadway. This critical improvement reduces the over-water footprint of the proposed project by 18% and completely avoids the potential for shading impacts to existing seagrass resources in the Miami River. The reduced footprint also eliminates seagrass monitoring currently required by the conceptual SFWMD ERP and assures that no seagrass mitigation is needed.

Our proposed design eliminates encroachments to the Grove Park Historic District that were included as part of the concept design.

Manatees are anticipated within the project. We will educate our workers and ensure construction observers are in place in accordance to satisfy regulatory requirements.

Signing & Pavement Marking

We have introduced advance guide signs and pavement messages for traffic on SR-836 traveling in the EB direction to position the drivers in the two inside lanes to go to I-95 SB, downtown, beaches and PortMiami. Our design includes placement of two overhead sign structures on the west end of the project to inform motorists of the EB traffic split between the Viaduct and the lower roadway CD system. These signs are located well in advance of the existing toll gantry located at approximately NW 20th Avenue.

We have designed the signing on the lower CD roadway to not conflict with the overhead Viaduct bridges. Sign visibility has been checked and confirmed throughout the corridor.

Our plan also includes implementation of ATC 25, which allows the use of Steel Monotubes for all the overhead sign structures.

Signalization

We have eliminated the signal at Ramp M and NW North River Drive with ATC 12C, avoiding impacts to this off-system road.

Lighting Design

Existing roadway lighting will be impacted by the construction activities and replaced with new poles and LED fixtures that meet the MDX Enhancements Manual. A preliminary review of FAA filing requirements has been performed and formal filing will be required for runway 9/27. Temporary lighting will be provided to ensure that all roadways remain illuminated. Navigation lighting for the Miami River Bridges will be replaced with new fixtures, conduits and conductors on the new fender system.

To minimize long-term maintenance costs for MDX, median lighting with LED fixtures for the Viaduct will be provided. LED fixtures will be placed 2' below the inverted T beam on the piers that support the viaduct to illuminate the CD roadways. Load centers will be designed to only carry the MDX lighting system and eliminate any overlap of maintenance responsibilities with District 6.

ITS Design

The ITS plan for SR-836 includes a new ITS trunk line located on the north side of SR-836 from the west project limits to just east of NW 12th Avenue. The main trunk line then crosses to the south side of the roadway and continues to I-95 where it connects to the existing hub just south of I-395. On the west end of the project, the new ITS trunk line connects to the Toll Administration building just west of NW 20th Avenue.

The plan includes cameras and MVDS sensors to monitor both the upper viaduct level and lower CD roadways. The design ensures uninterrupted operations of existing ITS and tolling systems communications.

Tolling

The RFP requires two new ORT toll zones within the Project Limits; SR-836 WB exit ramp to NW North River Drive and I-95 SB exit ramp to NW 14th Street.

The AW-dMG Viaduct has further simplified the design and impacts to the existing ORT toll zones within the project. The following benefits are directly linked to the ORT zones:

- Eliminates the proposed ramp to NW North River Drive and ORT toll zone, which will eliminate construction and infrastructure costs to MDX; and
- Eliminates reconstruction of the existing EB SR-836 Toll collection zones from NW 12 Avenue, thus eliminating toll collections operations and revenue loss.

We recognize the importance of maintaining toll collection throughout the construction phases. Special attention has been given to the design and layout of the toll zone sites with respect to maintenance of traffic and sequence of construction.

Utility Design

Critical utility issues for SR-836 include the avoidance of the NW 10th Avenue utility corridor, Miami-Dade Water and Sewer large volume Water and Sanitary lines, and the AT&T high capacity duct bank across the Miami River.

We have reviewed the utility conflicts from the RFP concept plan and have evaluated the effect of our design on the utilities. We have eliminated nearly $1 million in utility relocation costs. We have identified the savings in **Table 6**.

Table 6: Utility Relocation Cost Savings

Utility/RFP Conflict	Cost Savings
MDWAS 36" Sanitary FM (Bridge Foundation)	$38,000
AT&T Florida 42 - 4" PVC Conduits (Bridge Widening)	$525,000
MDWAS 20", 24" & 30" WM (RFP Drainage)	$125,000
Comcast, Level 3, TECO Gas Multiple BFO & Gas Lines (RFP Drainage), FPL Fibernet, Verizon/MCI and FP&L Distribution	$220,000
MDWAS 36" FM, 8" FM & 12" WM (RFP Drainage)	$70,000

I-95 Specific

Roadway Design

The I-95 Component of this project consists of 1.6 miles of concrete pavement from NW 8th Street to NW 29th Street, including the on- and off-ramps. It also includes the replacement of existing asphalt shoulders to rigid pavement. We have designed all of the I-95 lanes to be 11' wide, providing continuity in the corridor. The typical section for the shifted portion of I-95 is shown in **Figure 8**.

Rigid Pavement Design

The proposed concrete pavement reconstruction will be as per our approved ATCs 50 and 51. These ATCs significantly enhance the project schedule by reducing the time required for scarifying and reworking the base material to accommodate the increased pavement thickness. Our design will also ensure that the longitudinal joints are lined up with final lane configuration and not positioned within the wheel path especially at the proposed ramp connections.

Our design will provide dowels in all transverse joints using 1.25" diameter dowel bars per Index 305. Diamond grinding of pavement surface will be performed prior to sealing the joint to produce a smooth surface and a quieter pavement. In addition, expansion joints will be provided at each connection to bridge approach slabs.

Structures

The structures work along I-95 involves the SB widening over Metrorail and NW 11th Street, I-95 rail retrofits to four bridges, expansion joint and approach slab replacement, and widening over NW 20th Street.

I-95 Bridges over Metrorail and NW 11th Street

Our team is modifying the SB bridge by replacing the deck and girder lines to correct the new cross slope. FIB girders are proposed to maintain vertical clearance and drilled shafts are proposed to minimize vibrations adjacent to the Metrorail track.

I-95 Bridges over NW 20th Street

Existing NB and SB twin bridges along I-95 over NW 20th Street are proposed to be widened to accommodate an additional NB lane and associated median shift to the west.

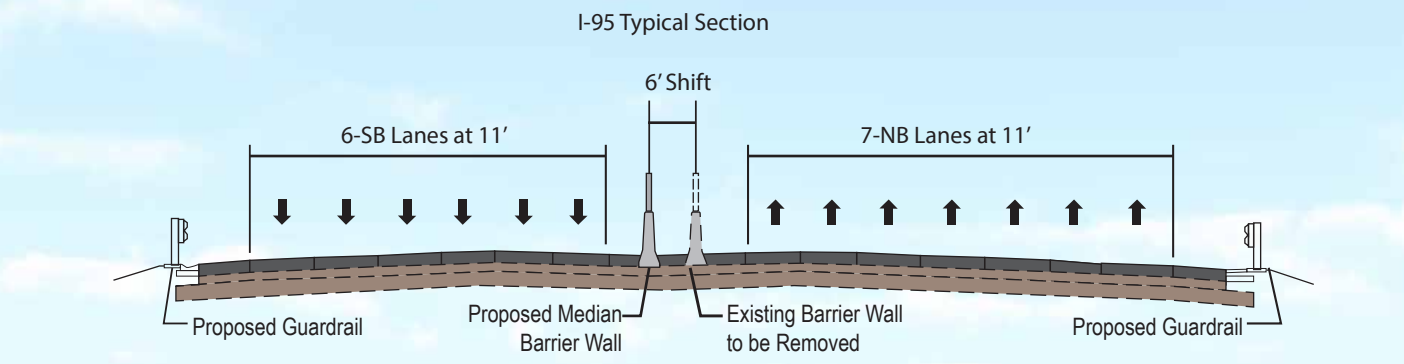
Rail Retrofit for I-95 Bridges

Existing bridges along I-95 have substandard post and beam barriers that require retrofit for compliance with current standards. The existing post and beam barriers will be retrofitted with thrie beam rails.

Drainage Design

The proposed drainage improvements will be confined to the modification of the existing median collection system as required by the roadway realignment and median modification as per ATC 12C. Outfall structures will remain per the existing conditions.

Figure 8: I-95 Typical Section



Signing & Pavement Marking

The alignment shift will affect five sign structures, including Express Lane signs with dynamic messaging that have recently been installed. To avoid shoulder reduction where the sign foundations are inside the median barrier walls, dual upright sign trusses are proposed.

ITS Design

Existing ITS affected by our design will be upgraded, including CCTV cameras, MVDS and DMS. In addition to two proposed DMS, our design includes additional CCTV cameras and VDS to cover all I-95 mainline lanes and ramps. The design replaces all existing ITS cabinets with new cabinets.

A new hub switch will be installed at the existing hub building south of I-395. The proposed fiber optic cables will be installed in existing spare conduits from an existing splice box located near NW 2nd Street to an existing splice box located near NW 29th Street. We will closely work with FDOT D6 to inventory the existing spare conduits to ensure there is sufficient capacity for the installation of proposed SMFOC backbones.

Design Management

The Organization Chart depicts the reporting and structure for efficient delivery of the project design and construction. This organization of the design team has been effective in the delivery of numerous major projects, including the I-4 Ultimate Project for FDOT ($2.3B) and the New NY Bridge (Tappan Zee $2B).

Effective & Efficient Design Management

We will prepare a Design Management Plan that will serve as a road map, providing the guide for all design activities in order to provide:

- Guidelines for consistency between multiple design firms/ teams;
- Tracking of design deliverables, directives and requests for information;
- Master listing of design packages that encompasses all elements of the work;
- A schedule that links the design packages to the sequence of construction;
- Detail of progress reporting of production status and planned review schedules; and
- Our Design Quality Management Plan.

This plan will serve as a road map, providing the “Who, What, When” of all design activities.

The design organization is divided to deliver the project Segments mirroring the construction organization. Segment Design Managers will be responsible for delivery of the design of their particular geographic area or element. They will interface with construction counterparts through the Design-Build Coordinator and track progress and schedule. The Segment Design Managers will each have a full team of multi-disciplinary designers to deliver their design plans.

Corridor-wide design disciplines will supplement the Segments. Support staff (providing scheduling, accounting, and business functions) will also assist the management team.

> *Each of our segment Design Managers and EORs are Florida-experienced professionals with specific knowledge of FDOT design standards, policies and procedures. This depth of Florida experience, coupled with our team’s national resources and experience will provide FDOT/MDX with a team ready and capable of producing high quality designs.*

Schedules will be resource loaded so that staff requirements can be planned for and supplemented as necessary to meet the schedule. Resources will be applied to meet the schedule demands and to produce high-quality documents. Both HDR and RS&H have additional national resources available to ensure timely completion of the design. Key personnel listed have worked together on this pursuit, establishing strong, committed partnerships.

We will hold weekly discipline task group meetings to coordinate deign, discuss challenges and solutions, and coordinate to provide consistency across the design Segments. Meeting schedules will be structured to facilitate an expedited decision making process and critical issues will be tracked and resolved quickly. Through the development of successful ATCs, our team has already melded together into a cohesive unit. Coordination of files, use of the ProjectWise system of collaboration and sharing of information is on-going. This will allow us to begin working immediately as a single team. This will ensure a smooth and expedited design process.

Approach to Segmenting the Total Project

Our project organization chart reflects our proposed segmenting of the project into manageable elements and geographic areas. We will also segment the design packages into work areas to expedite the project delivery following the construction sequence and MOT plans. Our Segments for delivery of the project design include:

- **Signature Bridge Segment** – This will encompass all design elements associated with the bridge design. This Segment will be led by **Joseph LoBuono, PE,** who has a distinguished career in delivery of large, complex bridges, including the Sunshine Skyway bridge replacement.
- **I-395 Segment** – This Segment includes the segmental approaches and all roadways on I-395. **David Gilbert, PE,** will lead this Segment and was the Roadway EOR on I-4 Ultimate.

- **SR-836/I-95 Segment** – All of the design associated with SR-836 and I-95 will be included in this segment led by **Sam Gonzalez, PE**. Sam will be supported by **Geoffrey Lamptey, PE**.

The bridges will be segmented into separate packages for foundations, substructure, and superstructure. Also, other design packages (MOT, demolition, grading, drainage, utilities, etc.) will be developed to allow for construction to begin early. In order to implement this type of segmenting, overall Master Plans will be prepared. The Line and Grade Master Plan (Approval of Geometrics) and Bridge Development Reports (Approval of Bridge Structure Type) will be documents that are critical to implementing the segmenting approach. Segmenting will allow for FDOT and other reviewers to streamline reviews as the packages will be more manageable to review. Our project schedule has been developed utilizing this approach so that project delivery is expedited. Our team will prepare an early works package for I-95 to expedite construction and provide early relief I-95 NB and the EB to NB ramp. Segmenting allows us to effectively leverage resources and construct segments independently and concurrently.

Efficient & Effective Interface

Stakeholder interface and management will be a priority and core responsibility of the most senior members of our team. We will fully collaborate with FDOT and MDX to ensure complete and accurate information is consistently provided and that outreach is coordinated in advance. As Miami residents, we take tremendous pride in our involvement in this project and it will be evident in our outstanding level of service to FDOT, MDX and the community.

Department, MDX, Miami-Dade County, & City of Miami

We will fully interface with FDOT/MDX through a series of structured meetings that will be held on a weekly basis. An Owners Project Status meeting will be held weekly with agenda items including overall status briefings from construction, safety, design, and quality. The weekly Design Status meeting will provide a summary of all design discipline meetings and design schedule updates. Discipline Task Group meetings will occur weekly during design and address all required coordination. As key stakeholders and approvers, Miami-Dade County and the City of Miami will be included in appropriate meetings to ensure all coordination issues are addressed. In addition to coordinating with FDOT/MDX and the municipalities in our regular meetings, we will also:

- **FDOT** – The coordination effort with FDOT will be a nonstop effort from NTP to completion. Coordination begins with kick-off meetings, continues through weekly project meetings for the life of the design and construction meetings for the life of the job. Our team will also provide support for public information as needed. We will implement a robust, continuous coordination effort with FDOT as partners on this project.
- **MDX** – The second Owner/Partner on the project is MDX. Like FDOT, component plans for MDX facilities will be provided at the design stages for review and comment. We will also coordinate the design and construction impacts associated with the parking facilities. Construction near the adjacent right-of-way will be coordinated as affected owners will most likely contact MDX directly.
- **Miami-Dade County** – Coordinate approvals for all surface street improvements. Obtain approvals for Miami-Dade County traffic signals. The MOT designs along surface streets will be submitted at stages for reviews. Traffic analysis will be provided as appropriate to predict traffic levels of services during the various stages.
- **City of Miami** – Coordinate approvals for all city surface street improvements. Provide plans for approval at appropriate stages. We will attend regular City of Miami MOT meetings to coordinate closures given the number and size of on-going development.

Regulatory/Permitting Agencies

Our team will meet early with all regulatory agencies, including the SFWMD, USACE, and USCG to define criteria and discuss our approach. We will communicate regularly to minimize review comments and secure permits in a timely manner.

Utility Agency Owners

Our team will continue coordination efforts with UAOs that commenced during the development of this proposal. We will develop a comprehensive utility conflict matrix, conduct utility meetings and field reviews to resolve conflicts and secure utility agreements ahead of all critical construction activities.

Other Stakeholders

We will coordinate with other stakeholders that will have a significant role in the design and long-term maintenance of our Heritage Trail facilities. Our urban planning team will work closely as design advances. Demonstrating our commitment to optimum solutions to the project, we have invested significant time and resources in an expansive stakeholder interface program. Our Heritage Trail has already received universal support from all key stakeholders including the Black Archives, Overtown CRA, Omni CRA, City of Miami Parking Authority, and FIU. Key stakeholders include:

- **Florida East Coast Railroad (FEC)** – AW is currently constructing the All Aboard Florida project for FEC. Our team understands all FEC requirements and has key contacts at FEC that will facilitate delivery of I-395.
- **Miami-Dade Transit** – Metromover is the most critical element of the project related to MDT. Plans will be closely coordinated and provided at milestones for

review (**Figure 9**). At other MDT crossings, there are no modifications proposed to MDT facilities so plans will be provided for review of the interface.

Figure 9: Metromover Pier Concept

Public Involvement

The AW-dMG team will support FDOT's public involvement efforts by providing information related to the design and construction, including approach to local lane closures, detours, and project aesthetics. FDOT and their Public Involvement Consultant (PIC, Media Relations Group) will lead the information campaign and we will fully support their effort.

QA/QC Program

The AW-dMG team understands and enforces that quality is everyone's responsibility. Our team members are vested in a total quality approach, which will be provided through our Quality Design and Quality Construction Plans. We will embrace quality in all of our activities from initial design to final construction acceptance with a goal of continuous process improvement. This assures the highest product delivery to FDOT, MDX, project stakeholders and the community.

Design QA/QC

The AW-dMG team will develop a project-specific Design Quality Management Plan (QMP) that will be **followed by all design team members to ensure compliance with the project quality** objectives and contract requirements. The Design QMP will be prepared by the Design Quality Assurance Manager (DQAM) for review and approval. We have designated **Larry Low, PE**, as our DQAM due to his deep knowledge of FDOT policies and procedures. The DQAM will be responsible for training all staff in the process and procedures contained in the QMP, will prepare Corrective Actions and Preventative Actions, and will audit all design packages prior to review. The DQAM will report to the JV Executive Committee to ensure independence from the design organization.

The design process will be guided by the QMP that will be prepared prior to the start of project design and will contain the procedures for documenting that the quality process is being properly carried out. The QMP will also require that the EOR certify the designs by signing a release stating:

- The design meets project requirements;
- All previous comments have been resolved; and
- The package is ready for review or RFC.

Construction QA/QC

Construction Quality Control (CQC) will be conducted through the CJV under the direction of the JV Construction Quality Control Manager and will adhere to the team's Construction Quality Control Plan (QC Plan). CQC personnel will perform their duties by obtaining samples and performing tests and inspections in accordance with the frequencies and methods designated by the contract documents. The QC Plan will address the production, delivery, placement, sampling, testing, and reporting of the construction materials.

Efficient & Effective Coordination of Firms

The AW-dMG Team has demonstrated firsthand to FDOT how our internal coordination and collaboration avoids design and construction issues on their multiple successful design-build projects around the State. The Keys to our Coordination Plan include:

- **Pre-Proposal and Proposal Workshops** – For three years, the AW-dMG team worked collaboratively conducting weekly intensive workshop sessions to develop optimized designs that improve traffic operations, significantly reduce right-of-way impacts and simplify structures and drainage systems.
- **Extensive Stakeholder Investigation** – We have reached out to critical project Stakeholders to verify that our plan complies with their expectations. We have received eight commitment letters from stakeholders.
- **Design Task Meetings with the District 6 Team** – We will maintain continuous interaction with our FDOT design partners throughout project plan development.
- **Constructability Reviews** – We will perform constructability reviews prior to submission of design submittals.
- **Component Plans married to Project Schedule** – Plan component submittals will be devised to support the actual construction schedule with focus on delivery of specific plan groups to maintain field progress.
- **Weekly Progress Meeting Participation** – Our design team will attend weekly progress meetings to maintain a full grasp of issues affecting the project throughout construction.

Approach to Correcting Quality Issues

We are committed to the vision of "Right First Time" delivery and the use of quality planning, control and continuous improvement methodologies. The QC Manager will have full authority to stop operations on the Project to assure quality requirements are

met. Sustainable improvement processes will be strengthened by QC audits, management reviews of quality system results, and implementation of Nonconformance/Corrective Action (NCR/CA) procedures.

Our construction team is accustomed to building to FDOT/MDX specifications and we will meet FDOT/MDX quality requirements through the vigilant application of our construction QC processes.

RFP Requirements

The AW-dMG team will adhere to the stipulations and requirements contained in the RFP. In addition, all elements included in our Technical Proposal shall be considered a commitment on the part of our team and will be constructed as part of the Department Contract.

FDOT Drainage Manual Criteria

Our team understands the drainage collection and conveyance system and will comply with the FDOT Drainage Manual criteria. Our understanding and approach to drainage is described throughout the Understanding and Approach to the Total Project section.

Construction Phase & MOT Relationship

Our team understands the critical relationship between construction phasing and MOT. This starts by having a clear understanding of the overall project objectives. With this project having been developed as three separate projects, our team united these projects to develop a comprehensive MOT solution that takes into account all components. This can be seen by our MOT Master Plan concept roll plots. In these roll plots we have designed a well-coordinated MOT and construction phasing plan that minimizes impacts and addresses all the requirements of the RFP and specifically address detours, lane closures and temporary drainage requirements. The evidence of the successful implementation of this understanding between construction and MOT phasing was accomplished by the reduction of one phase on I-395 and two phase on SR-836. Additionally, we were able to exceed the RFP by providing additional through lanes during construction and the early opening of the EB to NB Ramp, as well as the 7th NB I-95 GP lane which are commitments intended to lessen the overall impacts to the traveling public during construction. Please refer to the MOT section of this proposal.

Accommodates Movements & Minimizes Clear Zone Obstructions

Our comprehensive solution (ATC 12C) significantly improves mobility and traffic movements, reduces conflict points and unsafe weaving sections, and complies with PPM criteria for clear zone obstructions. One of the major advantages that our comprehensive solution (ATC 12C) provides is the ability to use the Viaduct during an MOT phase. This approach provides us with the ability to develop an MOT design solution that significantly improves mobility and simplifies traffic movements on the roadway below, therefore providing us with the ability to accommodate the necessary movements within the construction zone. Temporary barrier walls will be used throughout the project to not only protect the traveling public but also ensure the safety of our workers and equipment.

Preliminary Plans Quality & Suitability

The AW-dMG team is confident that our preliminary plans, Roll Plots, and Understanding and Approach to the Total Project demonstrate quality, suitability, and constructability for this project. Please reference our Technical Volume 1: Component Plan Sets and Roll Plots for additional information.

TEAM STAFFING & EXPERIENCE

AW (JV partner), a subsidiary of The Walsh Group (established in 1898), is a fourth generation family leadership company that is currently ranked as the nation's largest bridge builder and 2nd largest domestic heavy contractor (ENR 2016).They are a leader in alternative project delivery, with a portfolio of more than 200 D-B projects ranging from $1M to more than $3B. Their Florida Region operations has successfully completed nearly $3B in construction projects, including $1B in D-B contracts.

dMG (JV partner), established in 1986, is a family-owned and operated firm headquartered in Miami. They are one of the largest D-B contractors in Florida with a consistent record of exceptional performance. dMG has been responsible for some of the largest and most influential transportation projects in South Florida, including more than $2B in FDOT projects. Also, dMG is the largest prestressed producer in south Florida and the only contractor that produces its own Florida-I Beams (FIB), which will provide unique cost, schedule, and quality benefits to FDOT.

> *AW and dMG have unmatched experience having completed projects in the state of Florida with a combined construction value of $5B, including $2B using design-build delivery.*

The AW-dMG team is supported by industry-leading firms who bring significant design experience and expertise for signature bridges, complex urban environments, traffic operations, and safety improvements. **HDR** will be responsible for overall design project management, the I-395, and the Signature Bridge. HDR is currently ranked by ENR as the No. 9 Top 500 Design Firms, No. 5 in the Top 50 Transportation, and No. 2 in the Top 25 Bridges. They have more than $6B in signature bridge projects as the lead designer. **RS&H** will be responsible for design

of SR-836 improvements. RS&H has nearly 900 associates company-wide, with roughly 500 of those associates located in Florida. The firm has been successful in Florida and other states on nearly $1.3B in construction value, including 10 design-build projects for FDOT. **GOAL (DBE)** will lead the design work on I-95 improvements, including the roadway, drainage, and traffic elements. **Pevida Highway Designers (PHD)** will support the project with design-build coordination and perform the MOT design for the entire project. **Corven Engineering** will add significant resources and local knowledge for segmental bridge design. **Metric Engineering** will lead the design for surface streets, traffic signals, public involvement, and NEPA commitment compliance.

Key Personnel

Our team includes key personnel who have successfully completed similar complex structures and design-build projects in dense, urban environments, and with accelerated schedules. Many staff have previously worked together to successfully complete FDOT design-build, MDX, Signature Bridge, and traffic operations improvements projects. Our team will leverage the expertise of proven staff with recent, relevant experience who are supported with additional resources of two industry-leading bridge builders. Our key staff are highlighted in **Table 7**. Detailed resumes for our proposed staff begin on page R-1.

> *As an added value, our Construction Structures Superintendent (Signature Bridge) and Bridge Architect (Signature Bridge) were instrumental in completing the $1.7B Ohio River Bridge projects in 3.5 years and 18 months ahead of schedule.*

Effective Organization

The AW-dMG partnership combines two premier transportation contractors through an integrated Joint Venture (JV). This reflects a commitment and trust between two firms that share a similar culture and family ownership. This trust is manifested in a workshare that maximizes the best value and effectiveness of each builder for complex bridge, interstate bridges, and concrete pavement. The integrated JV merges the best parts of each firm, allowing us to focus in unity on successful project delivery. Similarly, our design leaders HDR and RS&H, are two of

Table 7: Key Personnel

Name, Role	Yrs. Exp.	Relevant Experience
Rami Nassar, PE, SECB Construction Project Manager	17	✓ Experience working on more than $3.5B in infrastructure projects ✓ Construction Project Manager for TxDOT's $1.04B Grand Parkway D-B, Segments F1, F2, and G; led a team of more than 350 personnel
Dave Singleton Construction Structures Superintendent (Signature Bridge)	38	✓ More than 30 years of cable-stay bridge experience ✓ Construction Superintendent for the $881M Ohio River Cable-Stay Bridge D-B
Patrick Goggin Signature Bridge Advisor	35	✓ More than $4B in project value on major projects ✓ Program Manager for the $860M Ohio River Bridge Downtown Crossing D-B and the $724M Dan Ryan Expressway
Brian Sparks, DBIA Construction D-B Coordinator	21	✓ D-B experience includes 10 projects in Florida with a combined value of more than $1B ✓ D-B Coordinator for FDOT District 2's $160M I-95 Overland Bridge Interchange and FDOT District 5's $205M I-95 Widening from SR 44 to U.S. 92
Bill Dehn, PE Design Project Manager	34	✓ Design Manager for six D-B projects totaling $1.7B in value ✓ Design Services During Construction Manager for the $2.3B I-4 Ultimate P3
David Gilbert, PE Design Roadway EOR	36	✓ Managed over 50 projects in more than 29 years of service to FDOT ✓ Roadway Design Lead for the $2.3B I-4 Ultimate P3 and the $450M I-75 D-B-F (iROX) and Roadway Lead on the $676M St. Croix River for MnDOT
Joseph Lobuono, PE Design Structures EOR (Signature Bridge)	48	✓ >35 years of FDOT bridge project experience as a designer and construction engineer; Project Manager for the $750M Bayonne Bridge ✓ Project Manager for the $244M Sunshine Skyway Bridge and the $54M Roosevelt Bridge
Jimin Huang, PhD, PE Design EOR (Segmental Bridge)	22	✓ Diverse bridge experience, including arch, segmental, truss, concrete, and steel ✓ Bridge Design Lead and EOR for the $2.3B I-4 Ultimate P3 and $3.1B Tappan Zee Hudson River Crossing D-B Segmental Approaches
John Corven, PE Design Specialist (Segmental Bridge)	38	✓ Provided design for more than 70 complex segmental bridges in the last 38 years, including the $350M I-4/Lee Roy Selmon Connector and the Cross Street Bridge ✓ Teamed with FDOT and FHWA to produce national guidelines for post-tensioned bridges
Walfry Pevida, PE Design Director	25	✓ EOR and Design Director for the $140M I-95 Express Lanes - the first in Florida ✓ Design Manager, Lead Technical Professional, and EOR for the $560M SR 826/ SR-836 Interchange

FDOT's most trusted consultants for major interstate/structures projects and are organized to effectively break the project into construction packages by segment per organization chart. The benefit to FDOT/MDX is a single entity to control the work with our best resources assigned to the project.

Staffing Quality & Availability

Our team is structured to provide two of the most critical elements necessary for a successful project: 1) A seasoned leadership team with strong technical team resources, and 2) A strong local presence. Our team includes many of the same key design and construction staff members from other successful FDOT D-B projects. These individuals have significant D-B and major bridge experience, as well as District 6 experience, and have demonstrated an excellent ability to work together to solve construction and design challenges.

The AW-dMG team's local and global resources provide depth and diversity to meet all project commitments. The combined resources of AW (#1 bridge builder per ENR 2016) and dMG (most highly regarded bridge builder in Miami) will bring tremendous value to FDOT. We will self-perform all major critical items of work, including the Signature Bridge, major and minor bridges, paving, and casting of prestressed concrete elements. Our construction and design personnel include 1,750 staff in Florida, and 24,000 staff total. Our current workload is such that we can provide immediate and uninterrupted service to the project. Our leadership, key staff, and resources are available to support this assignment, without conflicting with other projects, and provide fully qualified technical experts. Please refer to the organization chart and resumes for full staffing details.

Similar Project Experience

Please refer to **Exhibit 3** for a listing of similar projects that includes the $1.7 billion Ohio River Bridge P3 projects, which was completed in 3.5 years and 18 months ahead of schedule, and included two signature cable-stayed bridge crossings, 90 additional bridges, a four-level interchange, and traffic operations improvements.

Organization Chart

Our team's comprehensive organization chart is included on page O-1.

DESIGN-BUILD VALUE ADDED

The RFP and specifications designate specific Value Added features required for the project. **Exhibit 4** outlines those Value Added items for which our team has broadened the extent or exceeded the existing threshold requirements, provided additional Value Added features, and provided additional warranty periods above and beyond the Contract Documents. This extensive Added Value warranty coverage demonstrates our confidence in our ability to deliver a quality project to District 6 and MDX, designed and constructed to meet the highest standards. In addition, **Exhibit 4** outlines our teams specific commitment to the service life of the Signature Bridge, starting with a 100-year design life.

CONSTRUCTION METHODS

AW-dMG JV is the top bridge building team in Florida. AW is ranked as the #1 bridge builder in the USA by ENR and dMG is among the State's premier bridge builders, specializing in design-build delivery in South Florida. The AW-dMG team has constructed the most complex flyover and viaduct sections in Florida, including:

- SR 826/836 Interchange for FDOT D6, which received the 2016 American Segmental Bridge Institute Award of Excellence;
- I-4/Lee Roy Selmon Connector Interchange for FDOT District 7 which received the 2015 American Segmental Bridge Institute Award of Excellence; and
- NW 25th Street Viaduct in Miami which swept every major bridge award in 2012.

Furthermore, the AW-dMG team consistently provide quality construction services on our projects that translate directly to early issue resolution, timely completion of the work, and reduced impacts to motorists. We have tailored our design solutions, ATCs, and APTEs to complement the self-performance capabilities of our team and that simplify the construction techniques based on our proven methods. This will provide efficiencies in production, material availability, and construction equipment accessibility.

Construction Management Concept

AW-dMG JV has more than 150 years of heavy civil construction experience, with a significant amount of this experience in Florida. Our plan is to self-perform the majority of the critical work with an integrated staff supplemented by local specialty and DBE/SBE subcontractors. The AW-dMG JV will be a fully integrated enterprise where all members share the same responsibilities required to build the job. This integration provides synergy in the construction efforts, increases local and global resources and offers superior quality, safety, and scheduling.

AW and dMG's annual revenues in Florida are approximately $500 million per year for FDOT, far exceeding all shortlisted teams. In November 2016, AW key staff members completed two projects over the Ohio River. The two projects totaled $1.7 Billion and were completed in a 3 ½ year construction duration, 18 months of schedule. **Pat Goggin** (Program Manager/Technical Advisor) and Dave Singleton (Signature Bridge Superintendent) both lead construction of these extremely successful projects in the same roles as proposed for I-395. These projects included two signature cable stay bridge crossings and 90 other bridges including a four level

Ohio River Bridges (Construction: Archer Western)
The Downtown Crossing Design-Build included design, reconstruction, and operational improvements to the interchange junctures of I-65, I-64, and I-71. The Kentucky southern approaches included multiple phases of work to construct more than 40 new bridges, 24 retaining walls, 700,000 CY of earthwork, 500,000 LF of piling, and 300,000 tons of asphalt. The river bridge work included construction of the new I-65 northbound, a 2,114 foot, multi-tower cable-stay bridge with an additional 1,058 feet north approach. The Indiana northern approaches included multiple stages of work to construct 19 bridges, 40 retaining walls, 590,000 CY of earthwork, 38,000 LF of piling, and 142,000 tons of asphalt. All work was accomplished through multiple traffic shifts while maintaining a minimum of two lanes of traffic.

To minimize impacts to the public, AW optimized the project schedule to reduce maintenance of traffic (MOT) phases and the overall project duration. This allowed us to achieve substantial completion 18 months ahead of schedule. We minimized public impact by reducing long term closures by a total of 879 days. We also partnered with KYTC to implement a clear, consistent, and timely communication plan on the project. This plan was crucial to facilitating a project that minimized inconveniences and impacts to the community.

The East End Crossing Design-Build project includes the construction of the new Lewis and Clark cable-stay Bridge over the Ohio River, and twin bore tunnel under the Drummanard Estate. The contract for the East End Crossing includes financing, design, construction, and operation and maintenance for 35 years of a 2,510-foot main span, twin tower, cable-stayed bridge across the Ohio River linking Prospect, KY and Utica, IN. The project also includes a twin bore tunnel on the Kentucky approach to the bridge (approximately 1,800 LF in length) and 19 additional bridges, along with associated roadway improvements, and other related infrastructure work. The new East End Bridge will be located about 10 miles from downtown Louisville, connecting the Gene Snyder Freeway to the Lee Hamilton Highway. Walsh leads a JV construction team with Jacobs as lead engineer to design and build the East End Crossing for $763 million, which is 23% less than IFA's previous cost estimates. Walsh is also an equity partner in the financing of the project. The bridge opened to traffic in December 2016, six months prior to the original estimate of June 30, 2017.

WI East End, LLC, a subsidiary of Walsh Investors, LLC and affiliate of Walsh Construction, is also an equity partner in the development and operations and maintenance of the project. The proposal commits to opening the new bridge to traffic by October 31, 2016, compared to the original estimate of June 30, 2017. The financing structure for this 35-year term, DBFOM PPP project is a combination of Private Activity Bonds (PABs) and equity. The PABs will consist of a series of short-term bonds and a series of long-term bonds. The short-term bonds are structured to coincide with milestone payments which will be paid by the Indiana Finance Authority during the construction term. The long-term bonds will have a tenor of 35 years coinciding with the underlying concession term. Scotia Capital is serving as financial advisor and Bank of America Merrill Lynch is the bond underwriter. During the bid phase, both a short-term bank and bond solution were evaluated to finance the milestone payments but a bond solution was selected as the most efficient and economical structure. In March, 2013, WVB closed on $676.8 million in private activity bonds to finance the project.

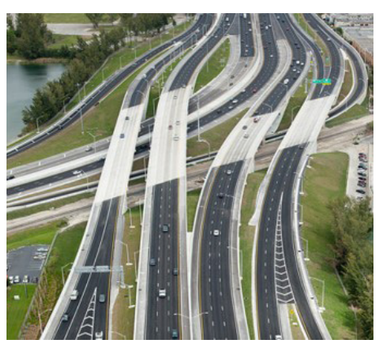
I-4/Lee Roy Selmon Connector Interchange Design-Build-Finance, FDOT D7, Hillsborough County, FL (Construction: Archer Western) The new construction of the connector portion was performed in one phase with complex, multi-phase tie-ins at I-4 and the Lee Roy Selmon interchanges. The state-of-the-art toll facility utilized an all-electronic toll collection system allowing for traffic to maintain highway speeds and for toll equipment to be maintained without disrupting traffic. This project contained extensive aesthetic enhancements, including an architectural toll gantry tower and trusses, MSE walls with panels cast and painted to resemble shipping containers, and the 7th Avenue Gateway. Detailed and colored up-lighting at the 26th Street and 22nd Street overpasses, as well as significant landscaping added to the overall aesthetic effect on the project.

The elevated roadway consisted of 35 bridge structures connecting I-4 to the Lee Roy Selmon Expressway using precast segmental construction (2,765 segments) and precast bulb tee beams for bridge decks founded on drilled shafts. All of the bridge substructure and superstructure work was self-performed. A casting yard was set up adjacent to the project site where all of the segments were cast for the project. This allowed for increased production, improved quality control and improved logistics for managing the transportation of the segments through urban areas.

Archer Western-de Moya Joint Venture
SR-836/I-395/I-95

SR 826/SR 836 (Palmetto Section 5) Design-Build-Finance, FDOT D6, Miami, FL (Construction: de Moya Group)
SR 826/SR 836 (Palmetto Section 5) Design-Build-Finance, FDOT D6, Miami, FL (Construction: de Moya Group) This $559M project for District 6 involves reconstruction and widening the SR 826 and SR 836 interchange, including construction of 47 bridges. Key solutions include use of a 460-foot self-launching overhead gantry to build the precast segmental bridges in balanced cantilever over the core of the interchange. Overall aesthetics features include a bridge design with haunched segments, aesthetically pleasing pier caps, a highly-aesthetic segmental design, patterned columns for all bridges, patterned and colored mechanically stabilized earth walls and multi-color, and Energy Star LED lighting.

- Level 3 Aesthetics
- Dense Urban Environment
- Award Winning



SR 825, South of Miller Drive to North of Bird Road (Palmetto Section 2), Design-Build, FDOT D6, Miami, FL (Construction: de Moya Group)
$190M project included the reconstruction of three urban interchanges, the SR 826/SR 874 system to system interchange, and the service interchanges at Miller Drive and Bird Road. Key solutions were implemented to meet the demands of the congested environment including a reduction in the number of MOT phases and MOT refinements throughout the life of the project to advance construction and reduce community impacts. For bridges over traffic, beams were staged off-site and prepared with bracing and safety lines, then, during off-peak hours, traffic was be detoured or paced to allow the beams to be set on the piers.

- Level 3 Aesthetics
- Dense Urban Environment
- Award Winning

Project Name	Construction Value
Ohio River Bridges - Downtown Crossing	$881M
Ohio River Bridges - East End Crossing P3	$763M
I-95 "Q" Bridge Crossing DB	$418M
Bayonne Bridge	$743
SR 826/SR 836 Palmentto Section 5 DBF	$559M
The New NY Bridgn (Tappan See) DB	$3.14B
I-4 Ultimate P3	$2.3B
Hoover Dam Bypass Bridge	$240M
Blennerhasset Bridge	$120
Memorial Causeway Bridge	$50M
SR 826 Palmetto Section 2 DB	$190M
I-95 Overland Bridge DB	$160M
Veterans Memorial Bridge	$66M
I-4 Lee Toy Selmon connector DBF	$420M
St Croix River Bridge	$670M
NW 25th Street Viaduct	$124M
Total	**$10B+**

EXHIBIT 4 - **AW-DMG VALUE ADDED**

BROADENING EXTENT OF REQ. VALUE ADDED FEATURES		WARRANTY DURATION		ADDITIONAL VALUE ADDED WARRANTY	THRESHOLD LEVEL	REMEDIAL WORK
		STANDARD	AW-DMG			
VALUE ADDED BRIDGE COMPONENTS						
Value Added Bridge Components	Bridge Drainage Systems	5 yrs	7 yrs	2	DEV 475	DEV 475
	Bridge Coatings	5 yrs	7 yrs	2	DEV 475	DEV 475
	Bridge Deck Expansion Joint Devices and Hardware: Armor, Hardware, Seals	5 yrs	7 yrs	2	DEV 475	DEV 475
	Bearing Devices	5 yrs	7 yrs	2	DEV 475	DEV 475
	Bridge Lighting/ Electrical Systems	5 yrs	7 yrs	2	DEV 475	DEV 475

Signature Bridge - Valued Added

The Fountain is a unique, one-of-a-kind structure that features six arches springing from one central arch thrust block – a first for bridge design. Three basic elements comprise the structure of the Signature Bridge: the concrete arches, steel cable suspenders, and the concrete superstructures that carry EB and WB roadways. The Fountain is based on proven segmental arch designs by our key bridge design staff, including a peer review by members of our team, and will be designed to offer 100-year design life, far exceeding the 75-year RFP requirement. This 100-year bridge design will be monitored extensively by an integrated Structural Health Monitor System (SHMS) and include an Inspection and Maintenance Manual to ensure this iconic structure exceeds the expectations of the community for years to come.

To provide FDOT with added confidence beyond the 100-year design life, as HDR did on the iconic cable-stayed Tappen Zee Bridge, NY, our team offers the following long term maintenance benefit features:

- 10,000 psi concrete in precast segmental units to provide greater durability and longer life
- Multi-barrier Corrosion Protection providing a three layer protection
- Fatigue Resistance by useage of internal rings and dampers
- Utilization of an integrated Structural Health Monitor System
- Development of a detailed Inspection and Maintenance Manual
- Adequate ventilation provided to allow proper air circulation
- Installation of an internal system of stairs, platforms, and lighting for maintenance activities
- Installation of 24-inch diameter stainless steel access hatches
- Strategically located anchorage points for maintenance inspection useage

To further confirm our design, we have selected Janssen and Spaans as our Independent Peer Reviewer for the Category 2 Bridges and RWDI Consulting Engineers and Scientists for the site-specific wind analysis.

SIGNATURE BRIDGE	
DESIGN CONCEPT	**BENEFIT TO SERVICE LIFE**
100-year design life for main span unit	• Minimizes future maintenance costs • Improves durability by limiting maximum crack widths in the design
Structural Health Monitor System (SHMS)	• Allows continual monitoring of stay forces • Allows removal and inspection of individual strands using standard equipment with no impact to traffic • Uses internal dampeners to prevent stay vibrations due to wind/rain effects • Provides a sacrificial stay strand for each plane of stays
Inspection and Maintenance Manual	• Provides guidlines and procedures for inspecting and maintaining both main span and approaches
Suspender Replaceability	• 100-year design life of suspenders • “Cable-Out” design allows for suspender replacement, one at a time, while maintaining all traffic on the bridge

BROADENING EXTENT OF REQ. VALUE ADDED FEATURES		WARRANTY DURATION		ADDITIONAL VALUE ADDED WARRANTY	THRESHOLD LEVEL	REMEDIAL WORK
		STANDARD	AW-DMG			
ADDITIONAL VALUE ADDED BY AW-DMG						
Roadway Features	Guardrail	N/A	3 yrs	3	Spec. 536	*1, *2
	Retaining Walls	N/A	7 yrs	7	Diff. Settlement >4”	*1, *4
	Drainage – Storm Sewer and Pipe	N/A	7 yrs	7	Spalls >1” depth	*1, *5
	Structural Concrete not on Bridge/ Approach Slabs	N/A	7 yrs	7	Per Spec 400	*1, *2
Structures – Foundation, Concrete and Steel Features	Bridge Foundations (Drill Shafts and Piles)	N/A	7 yrs	7	Per Spec 400	*1
	Concrete defects - approach slabs (substructure, superstructure)	N/A	7 yrs	7	Spalls >1” depth	*1, *3
Signature Bridge	Signature Bridge Arches	N/A	10 yrs	10	Per RFP	Per RFP
	Stay Cables	N/A	10 yrs	10	PTI DC45.1-12	PTI DC45.1-12
Landscaping	Landscaping and Trees	2	5	3	RFP ATT A-36	RFP ATT A-36
Signing	Internally Illuminated Signs	5 yrs	6 yrs	1	Per Spec. 700	Per Spec. 700
	Highlighted Signs	3 yrs	4 yrs	1	Per Spec. 700	Per Spec. 700
Highway Lighting Systems	Highway Lighting Components	Varies	Manufacturer + 1 yr	1	Per Spec 608, 620, 633, 635, 650, 654, 663, 665, 676	Per Spec 608, 620, 633, 635, 650, 654, 663, 665, 676
	Luminaire	5 yrs	6 yrs	1	Per Spec 715	Per Spec 715
Traffic Signals Systems & Components	Traffic Signals Systems & Components	Varies	Manufacturer +1 year	1	Per Spec 608, 620, 633, 635, 650, 654, 663, 665, 676	Per Spec 608, 620, 633, 635, 650, 654, 663, 665, 676
	Steel Poles, Mast Arms, Monotube Assemblies	5	6	1	Per Spec 659	Per Spec 659
ITS	All Components	Varies	Manufacturer +1 year	1	Per Spec 620, 633, 635, 660, 677, 680, 682, 684, 685, 687, 695	Per Spec 620, 633, 635, 660, 677, 680, 682, 684, 685, 687, 695
Tolling	All Components	Varies	Manufacturer +1 year	1	Per GTR	Per GTR
Value Added Asphalt		3 yrs	5yrs	2	Per Spec. 338	Per Spec. 338
Value Added Concrete Pavement		5 yrs	8 yrs	3	Per Spec. 355	Per Spec. 355

** Providing 8 yr. warranty from completion of concrete pavement construction and min. 5 yr from Final Acceptance.*

**1 - Work plans will be on a case-by-case basis | *2 - Repair/Replace element failing to function properly | *3 - Potential repairs: Patch spall with approved grout, epoxy inject cracks | *4 - Potential repairs: Remove, repair and/or replace panels | *5 – Potential repairs: Sealing joints and desilting | *6 - Potential repairs: Replace structure, repair welds | *7 - Any other warranty criteria not specifically included herein is being provided in accordance with the contract documents*

interchange.

As a fully integrated Joint Venture, AW-dMG provides FDOT D6 and MDX the following advantages:

- Our full commitment to the project's success over individual firm goals, with an atmosphere of safety and quality at the forefront;
- The elimination of challenges through a collaborative effort with all stakeholders; and
- The best leadership and control of the project schedule through joined resources of 1,750 local, Florida-based construction personnel.

Our team has determined that the best results will be achieved by dividing the work into three construction segments: SIGNATURE BRIDGE, SEGMENTAL CONSTRUCTION, and SR-836/I-95. These segments were developed considering:

- Schedule requirements and critical path;
- Work scope, type and characteristics;
- Work volume;
- Familiarity with existing traffic patterns and efficiency of MOT operations; and
- Flexibility to progress work independently in the segments.

Our Project Construction Manager, **Rami Nassar, PE, SECB**, is responsible for all construction aspects of the project and is accountable for Construction Delivery. He will lead the collaborative efforts of the JV and will interface with the Design Project Manager, and Department staff to ensure timely project delivery. To address the specific demands of a project of this magnitude, field operations will be managed by our three Construction Segment Managers as well as Work-type Discipline Managers who will lead project wide responsibilities. These include:

- Maintenance of Traffic Manager;
- Quality Control Manager;
- ITS Manager; and
- Safety Manager.

Our proposed management structure promotes constant communication between the JV Project Management Team, Construction Segment Managers, and Discipline Managers to achieve the optimum utilization of crews, materials, and equipment. This team based construction management approach fosters an ingrained pro-active problem solving and problem avoidance mentality, that will be evident in both construction and design.

The final component of our proven successful construction management approach resolves around the control of materials and the supply chain needed for construction of this project. The AW-dMG JV has considerable resources in South Florida and has a proven history of producing the materials for their projects. We intend to supply the vast amount of materials to the project, including:

- Prestressed Piling and Beams
- Precast Segments
- Precast Segmental Caps (Viaduct)
- Precast Arch Segments
- Ready Mix Concrete - Bridges and Concrete Pavement
- MSE Wall Panels
- Type K Barrier Wall
- Asphalt
- Recycling of Embankment Materials

Self-performance provides better quality control, accelerates the overall schedule, and supports the local community and Miami's economy. Most of the materials will be produced in our Miami yard within 15 miles of the site.

Precast Yard

Coordination to Minimize Construction Changes

The AW-dMG Team brings a wealth of experience in managing the design services portion of major Design-Build projects. Our team began its design and construction coordination process in the proposal phase and we have been working together continuously for the past three years designing our superior solutions for this complex project. This interaction is not just a Contractor-Design Firm interaction, it is a personal interaction.

Our Design-Build Coordinator (**Brian Sparks**), Construction Project Manager (**Rami Nassar**), Design Project Manager (**Bill Dehn**) and key staff have worked closely since before the project was advertised to develop our comprehensive approach, evaluating alternatives not just for optimal design, but for constructability as well.

In the early phases of the project, our design and construction teams will conduct internal weekly meetings. These meetings will be scheduled a few days in advance of the weekly meeting with FDOT/MDX This allows our team to internally address issues, comments, and provide QA audits to ensure that documents are ready for submittal.

Further, our design quality management plan includes contractor input. As part of the review process, AW-dMG JV Managers and Superintendents are required to provide plan reviews and sign-off on drawings before submittal to the FDOT/MDX. This

does not guarantee that there will be no changes to the plans, but changes will be minimal and if they are required, they will be because a better solution was found in the field once construction commenced.

Construction Quality and Suitability

Our construction approach to structures, roadway, drainage, ITS, lighting, tolling, and landscaping is described in the following project specific sections for I-395, MDX, I-95, and the Total Project.

I-395 Specific

Signature Bridge Construction (Exhibit 5)

Foundation Construction

At each foundation, a sheet pile cofferdam will be installed and the ground will be excavated below the footing bottom elevation. The 30" typical piles will be driven and a seal will be poured to prevent underground water intrusion. Dewatering will be contained on-site.

Footing and Pedestal Construction

After the seal is constructed, the reinforcing steel will be installed. The footings are massive and require continuous flow of materials. Work will be performed over a weekend with concrete produced at our team's high capacity concrete plant fully dedicated to the project. Our plant produces 300 CY per hour. We expect the center pier pour to take approximately 14 hours to perform with 60 CY/Hour for each of the pump trucks. An extensive mass concrete system will be employed that includes ice to reduce pour temperatures and an extensive radiator system.

The main center pedestal includes a hollow access core that will house electrical and ITS devices. The construction sequence as shown on the attached graphic includes four pours: (1) Pour East leg, (2) Pour West leg, (3) Pour Support Slab to integrate the legs, (4) Tie in all 6 arches into the pedestal and make the upper pour.

Arch Construction

Our proposed construction methods for the Signature Arch Bridge were presented and vetted with FDOT in the ATC Process. The support system for the arch was one of the more innovative aspects of the project that enabled our team to provide a concrete arch solution vs. a steel arch. This method influenced our design by limiting the weight of the segmented arches to the capacity of our cranes. The arch segments were then all designed to have the same size, shape and weight. The method we proposed is similar to what was used to build the St. Louis Arch and involves use of multiple cranes that "climb" the arches until the centerpiece is completed.

The Westbound Signature Bridge will be constructed in Phase I followed by the Eastbound Signature Bridge in Phase II. Construction will begin at the center pier foundation. A cofferdam will be installed for each signature bridge foundation after 30-inch prestressed concrete piles have been driven, followed by the footing construction. Once the center pier foundation is complete, construction will begin on the center pier substructure along with the remaining arch foundations.

The arches will be built one at a time in the following order: Arch 5, 4, 2, and 1 in Phase I. Arches 3 and 6 will be constructed in Phase II. Each arch will be built with two fronts meeting in the center with a cast-in-place closure pour. The arch leg bases, which tie into the center pier and outside footings, will be cast-in-place concrete constructed on falsework.

The majority of the arch is made up of precast segments. These segments will be erected using a lifting device. We have evaluated two solutions for erection equipment:

- Solution 1: Stiff-leg derrick
- Solution 2: Beam and winch system.

Based on our construction schedule, we will need two lifting devices which will be erected on the arch leg bases. A cast in place closure pour will be utilized to connect the bases with the first precast segment placed. The precast concrete arch segments will be trucked from the casting yard located near the site. The segments will be aligned under the leading edge of the arch. The erection equipment will raise the segment into place using a lifting frame, mounted with an access platform, to ensure the segment is aligned.

Temporary guyed towers will be installed to support the arch during construction. These towers will be designed by our Specialty Engineer to accommodate hurricane wind loadings. Arches 1 and 3 require two temporary towers, Arch 2 requires four temporary towers, and Arches 4, 5 and 6 require six temporary towers. Upon completion, a cast in place closure pour will complete the arch. The temporary towers can be removed after the closure pour is complete. While the precast segments are erected, ladders, stairs and handrail will be installed inside the arch with a crane from below. As the arch grows taller and flattens at the top, only handrail is required and can be preinstalled in the precast segments. The handrail between segments can be spliced inside the arch. This will serve as permanent access to the arch for future inspections and maintenance.

Cast-in-Place Boxes and Suspenders

The Signature Bridge superstructure will be cast in place twin multi-cell box girders. The falsework bents will be placed approximately every 40 feet with attention to avoid placing a bent at NE 2nd Avenue and one bent in the median of Biscayne Boulevard. The superstructure concrete placement for the multi cell box will be done in three pours:

- Base slab

EXHIBIT # 6 - **SIGNATURE BRIDGE ARCH CONSTRUCTION SEQUENCE**

Natchez Trace Bridge Parkway (Franklin, TN)

Step 1

1. Construct center pier foundation and arch base
2. Erect initial precast segment

The Horseshoe Project (Dallas, TX)

Step 2

1. Install two derricks on the east and west end of the arch structure
2. Install and support arch on temporary towers to continue erection of precast segments

The Horseshoe Project (Dallas, TX)

Step 3

1. Continue erection of precast segments
2. Install and support arch on additional temporary towers

Gateway Arch (St Louis, MO)

Step 4

1. Continue erection of precast segments
2. Install and support arch on additional temporary towers

Gateway Arch (St Louis, MO)

Step 5 & 6

1. Jack ends apart to specified load per design
2. Cast-in-place closure pour
3. Remove derrick and post tension tendons
4. Remove shoring towers and all temporary falsework

Completed Fountain Signature Bridge

- Web walls
- Soffit

Our design accommodates construction joints to allow for 100 CY average concrete pours.

In order to install the arch suspenders, a hoisting system will be installed inside the arch. The system consists of a double drum winch installed at the top of each arch along with snatch blocks installed at each stay location.

Segmental Bridge Construction (Exhibit 6)

The I-395 Segmental Bridges will be constructed using conventional foundations and construction methods, just like our 826/836 Interchange construction. The precast segments will be erected by the balanced cantilever method of construction.

Segment Casting

The short-line method of casting will use three dimensional coordinate data unique to each segment. The segments will be transversely post-tensioned in the casting yard. Where box girders are joined transversely to make a wider bridge deck, some of the tendons will be stressed in the casting yard and the remainder cast on site after the segments are erected and longitudinal closure pours are made.

Segment Erection and Phasing

The balanced cantilever method of erecting precast segments features symmetrical placement of segments at a supporting pier. Each segment will be lifted into position and joining faces will be coated with epoxy. Temporary post-tensioning bars will be stressed, fixing the segment to the cantilever. When both balancing segments are in place, post-tensioning tendons are stressed across the cantilever. When all of the segments of adjacent cantilevers are erected, mid-span closure joints will be poured and continuity post-tensioning tendons stressed.

Segment Erection & Phasing

The AW-dMG team has evaluated the combined influences of bridge layouts, maintenance of traffic (MOT), and the project schedule. Our MOT concept has reduced the segmental bridge phasing. There are 3 major MOT phases for the project and both ground based and overhead gantry equipment will be used to construct the I-395 Segmental Bridges.

A critical issue in Phase 1 involves segment erection that requires specialized segment lifters and cranes for erection over the FEC Railroad tracks. AW is currently constructing a 67 mile segment for All Aboard Florida (AAF) and clearly understands the FEC requirements. AAF will require work at night due to the 32 AAF daily trips through the project.

In the least five years, AW-dMG have erected more than 3500 segments in Florida for FDOT, more than double the required segments for this project.

Drainage Construction

The I-395 segment of the project utilizes a deep well based drainage system. Our team has constructed projects including more than 100 deep wells along the coastline in South Florida. We intend to precast all deep well structures in our Miami based precast facility in order to control material procurement scheduling. In addition, Jaffer Well Drilling has performed the deep wells for our Team in Miami Dade County. Jaffer has installed thousands of large diameter deep wells and understands the geotechnical conditions in this area. This experience will insure a successful deep well that will be tested to guarantee performance.

Landscaping Construction

The I-395 segment of the project includes substantial bold landscaping. The selected tree types have been carefully placed in areas where they will thrive. Irrigation is provided to establish the plants. Arazoza Brothers has successfully installed landscaping for our team on all recent major projects including: 826/836 (S5), 826/874 (S2), and the NW 25th Street Viaduct. Arazoza Brothers has committed to a 5 year warranty on landscaping.

I-395 Metromover Pier Relocation

In accordance with the RFP, our team will perform a Structural Condition Survey of the Metromover bridge. Based on the Survey findings, we will submit for approval a Settlement Monitoring Action Plan to be implemented prior to beginning construction. Construction planning and scheduling will be done with close coordination between us and MDT to ensure minimal construction impacts to the ridership.

The Metromover Pier Removal and Replacement Proposed Construction sequence is included in our plans. The temporary tower scheme is presented in the following graphic

AW is currently building two automated people movers for Orlando and Tampa airports, are familiar with all safety and construction requirements, and have the expertise and experience needed to successfully complete this work.

EXHIBIT 6 - **SEGMENTAL BRIDGE CONSTRUCTION METHODS**

I-395 Segmental Bridge Construction

- Segment Precasting at Project Specific Casting Yard
- Balanced Cantilever Erection – 1894 Segments (670, 700 sf)
- Sequence Follows the 3 Major MOT Phases
- Multiple Construction Fronts within Each Phase
- Ground-based Cranes and/or Overhead Erection Gantries
- Specialized Segment Lifters for Erection over CSX RR
- Faslework Supports for Segments at Expansion Joints
- Cast-in-Place Box Girders at 3 Locations (31,100 sf)

NIGHT WORK TO ACHIEVE SCHEDULE

COMPLEX SEGMENTAL URBAN VIADUCTS (I-4 CONNECTOR)

CRANE & SPECIALIZED SEGMENT LIFTERS TO ERECT OVER CSX RR

Ground-Base Crane — Overhead Gantry

BALANCED CANTILEVER CONSTRUCTION

I-4 CONNECTOR (FDOT DISTRICT 7); TAMPA, FL $411M, 2765 SEGMENTS BY ARCHER WESTERN & CORVEN

PRECAST SEGMENT FABRICATION
- Casting Yard Layout
- Project Specific Forms
- 3D Geometry Control
- Handling and Storage

ERECTION ON ADJACENT BOX GIRDERS WITH TRANSVERSE POST-TENSIONING

SEGMENTS ON FALSEWORK AT ABUTMENTS AND EJ PIERS

Projects shown on this page were performed by member firms of the AW/dMG Team. Projects featured are:

- SR 826 / SR 836 Interchange Reconstruction Section 5 ($559M Design/Build)
- Dulles Corridor Metrorail Phase 1 ($1.6B Design/Build)
- I-4 / Lee Roy Selmon Expressway Connector Interchange ($411M Design/Build)

*** JV HAS ERECTED 3,500 SEGMENTS IN THE LAST 5 YEARS IN FLORIDA. (DOUBLE THE I-395 PROJECT)**

Lighting

Maintaining the existing lighting levels will be a primary focus throughout the life of the project. Prior to any existing lighting being impacted, we will construct a temporary lighting system in its place. We will also take extra precautions when replacing poles around locations such as the Performing Arts Center to minimize construction durations and expedite restoration around our work.

MDX Specific

The AW-dMG team spent months evaluating how to best construct the series of C-Piers that the RFP concept presented. These C-Piers created many challenges including the size of the foundations, close proximity to the existing right-of-way, the number of piles it will physically take to construct them under existing bridges, and developing a realistic traffic control plan to reduce impact to traffic and the adjacent community.

Another challenge with the RFP concept is the widening of the Miami River Bridge and its close proximity to the historic houses at the Grove Park Historic District. The RFP proposes the construction of cantilever beams above the front yards of existing houses. Temporary shoring towers will be required during the construction and will be blocking the entrance to the houses. Our Team evaluated all of these challenges and developed a comprehensive solution to these challenges, the Viaduct, that provides a multitude of benefits to traffic operations, local access, and community perspective.

> *The Viaduct not only simplifies the constructability of the project, it also provides MDX with a solution for reconstructing the Miami River Bridge (MRB).*

The Viaduct (Exhibit 7)

By building an elevated structure along the centerline of the existing SR-836, AW-dMG:

- Eliminated the widening of MRB
- Eliminated the EB and WB elevated CD structures
- Eliminated widening of the I-95 NB braided ramp structure
- Minimized community impacts
- Eliminated the construction of Level 5 EB to NB connect and
- Simplified construction

Precast Seal Slab for Sisters Creek Bridge

Maintaining traffic flow, access of emergency vehicle to the hospital district, and pedestrian safety is our primary goal during construction.

Foundation Construction

At each pier, a sheet pile cofferdam system will be installed and the ground will be excavated below the footing bottom elevation. The piles will be driven and a seal slab will be installed to prevent underground water intrusion. The footing will then be placed, and the cofferdam will be removed after completion.

At the Miami River, all footings will be constructed as waterline footings using a precast seal slab. Structural side forms will be attached to the precast slab to allow dewatering. Once the slab is placed on the foundations, we will seal the annulus between the slab and the deep foundation to create a watertight tub. We will then dewater the tub to allow for placement

of reinforcing steel and concrete in the dry. This method has been successfully used by AW-dMG on several projects; Ohio River Bridges Downtown, I-75 Caloosahatchee Bridge, and Sisters Creek Bridge.

Column Construction

After the foundation is complete, column construction will commence by tying in all rings around and into the vertical rebars per design followed by formwork installation. Special forms will be

used in order to pump concrete from the bottom up through ports spaced equally along the form height. External concrete formwork vibrators will be utilized for better consolidation, to provide a safe work environment and for a high quality concrete finish. This method was utilized by Archer Western on the I-4/ Lee Roy Selmon Expressway Interchange Project in Tampa. At the Miami River Bridge area, the columns will be constructed from below SR 836 to minimize impact to traffic.

The benefits of our construction approach are:

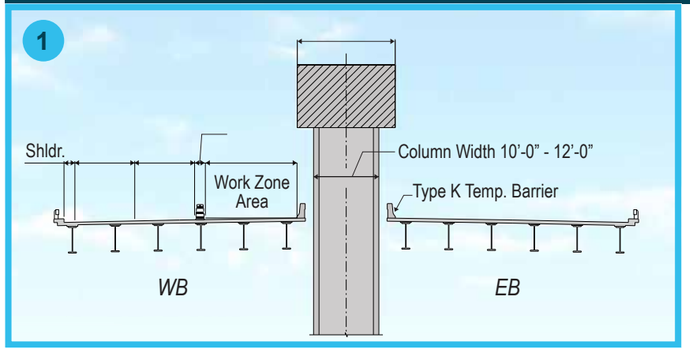
- Eliminates impacts to local traffic
- Improves worker safety
- Provides a high quality finish
- Proven column concrete consolidation
- Good solution for congested pours

Cap Construction

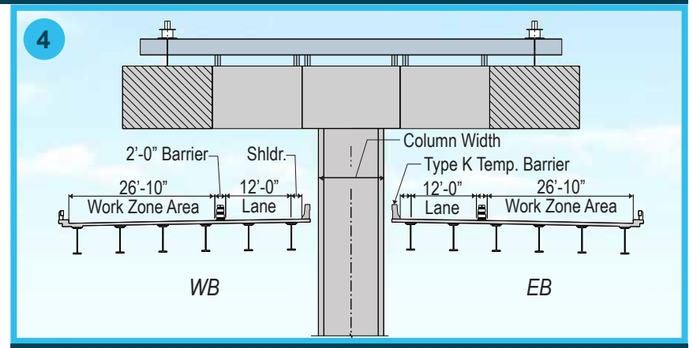
In order to minimize traffic disruption on SR-836, especially in the vicinity of the existing Miami River Bridge, we will segmentally construct the column pier cap as shown in **Exhibit 7** and our Roll Plots.

The cap erection will be performed under traffic control during night time lane closures. The first segments on each side will be erected under a single lane closure operation. The final segments on each side will require a two-lane closure. With this operation, we will eliminate full road closures and negate the

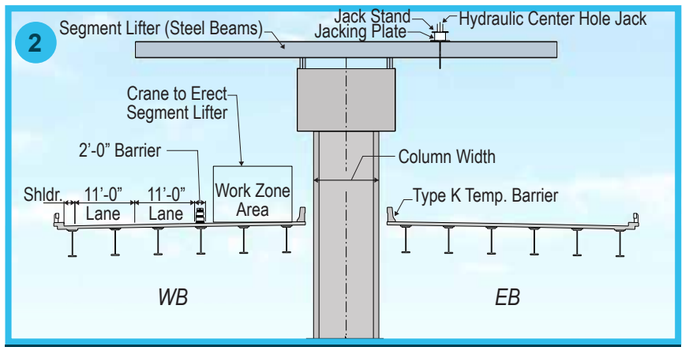
CAP CONSTRUCTION AND BEAM ERECTION METHOD



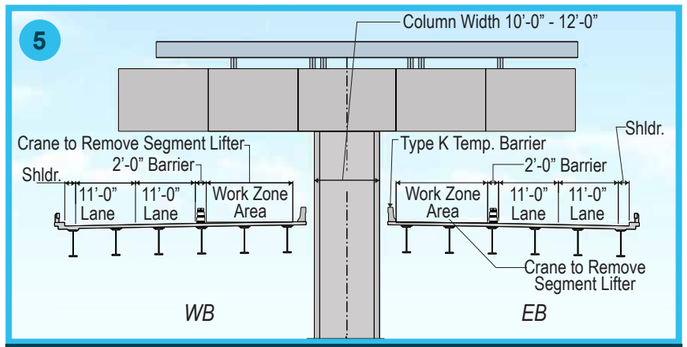
Stage 1
- Cast-in-place middle section
- No impacts to eastbound (EB) direction
- Partial lane closure in the westbound (WB) direction
- No full WB closures of all lanes



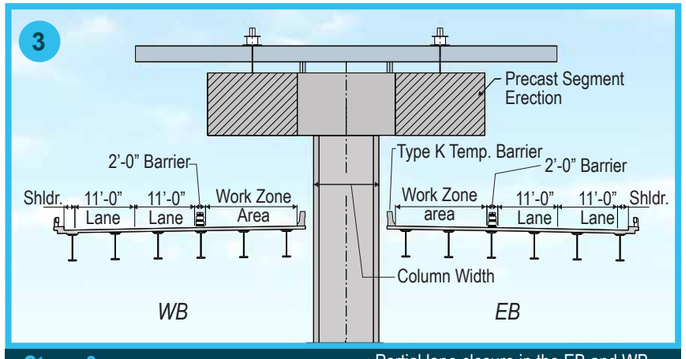
Stage 4
- Erect second pair of pre-cast segments and install temporary post-tensioning
- Partial lane closure in the EB and WB direction
- No full EB or WB closures of all lanes



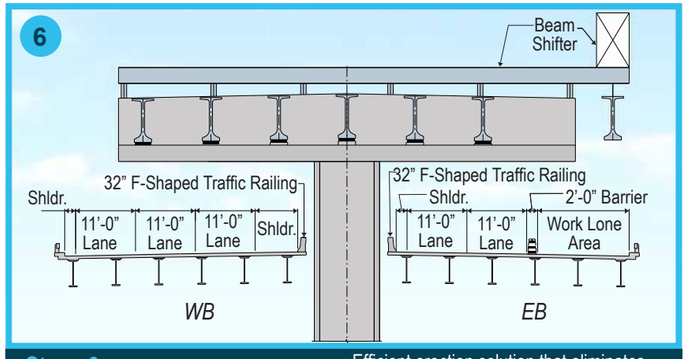
Stage 2
- Segment lifter erection
- Partial lane closure in the WB direction
- Minimal impacts to EB direction



Stage 5
- Remove segment lifter
- Install permanent post-tensioning
- Partial lane closure in the EB and WB direction
- No full EB or WB closures of all lanes



Stage 3
- Erect first pair of pre-cast segments and install temporary post-tensioning
- Partial lane closure in the EB and WB direction
- No full EB or WB closures of all lanes



Stage 6
- Top down construction with beam shifter
- Beam will be installed laterally
- Efficient erection solution that eliminates need for large cranes
- Eliminate the need for full lane closure and minimize impact to local traffic

LATERAL BEAM SHIFTER

Lateral beam shifter will be utilized to set girders into their final position without the need for dual cranes on the deck. This system was used by Archer Western on FDOT D4's Award Winning Veterans Memorial project.

COLUMN CONSTRUCTION

Column Construction
- Concrete will be pumped from bottom-up through ports located on the forms
- Utilize external concrete form vibrators

Benefit
- Eliminates impact to local traffic
- Increases workers safety
- Provides superior finish
- Excellent consolidation
- Allows monolithic pour
- Good solution for congested column/cap pours

need for large cranes during construction.

Superstructure Construction

For the Viaduct construction, we will use FIBs, an effective, conventional and tested structural solution for bridges in Florida. AW- dMG will have their own precast plant dedicated for this project to precast their own beams. The use of FIBs was initially introduced via our Team's ATC12A and was incorporated into the RFP by Addendum 9 to allow the use of FIB superstructure along the SR 836 corridor.

The FIB beam system for the viaduct is ideal for a lateral beam shifter application. Our beam shifter will aid in MOT, eliminate the need for large cranes and falsework during erection, provide an efficient erection solution, and eliminate the need for full lane closures. Archer Western currently owns this equipment and used this method on the multiple award-winning Veteran's Memorial Bridge D-B project in District 4.

Once the beams are in place, deck construction will follow with support from a small service crane. The bridge deck will be placed using mechanical distributors (Spiders) hooked up to a truck mounted pump and stationary placement boom.

Drainage Construction

SR-836 includes a combination of bridge drainage, french drains, and outfalls. The Viaduct lies above the existing 836 limiting additional stormwater based on the umbrella effect. We will install the drains in the bridge deck near the piers. In addition, pipe will be limited and embedded in the columns. Use of the full height forming system will improve consolidation around the piping due to head pressure.

Construction over Metrorail

Construction scheduling and planning will be coordinated with MDT to minimize potential impacts to the Metrorail schedule prior to construction commencing. All construction activities will be done in accordance with MDT safety and security certification program plan and Miami Dade Transit Adjacent Construction manual.

AW-dMG is planning to construct the WB Connector and Viaduct over the MDT Metrorail. Both AW and dMG have constructed and built many facilities near existing rail infrastructure. Currently AW is building the passenger rail facilities for AAF between Miami and West Palm Beach, which involves the construction of 185 grade crossings and a new running repair facility in West Palm Beach. We know what it takes to work on and around active rail lines. During construction our team will coordinate daily with MDT to minimize impacts to the ridership and revenue.

Construction of the Fender System

We understand the critical nature of maintaining marine traffic on the Miami River Bridge. We will use barges in and around the channel spans, which will be limited to short-term channel closures (such as during pile installation). These activities will be coordinated closely with FDOT and the Coast Guard to ensure minimal disruptions. During construction, all floating equipment will have warning lights, and we will place buoys to block the work zone outside the channel, which has proven extremely successful on recent marine projects. Additionally, manatee observers will be provided during all in-water construction. Mooring dolphins will be installed away from the bridge to secure the barges in the event of a storm.

Lighting

Installation of light poles and their activation will occur as soon as the location is clear of conflicting work to help re-establish a permanent lighting system as quickly as possible.

During the replacement of the fender system, temporary means such as solar power will be used if necessary to insure the navigation system operates without disruption.

Tolling

Our Team's recent experience constructing non-accessible toll gantries will help streamline the design, shop drawing, and fabrication process. Once released for fabrication, delivery of the toll gantry should occur within 16 weeks. Drilled shafts will be constructed following the latest General Tolling Requirements (GTR).

Gantry fabrication will not occur until as-built information is acquired. The uprights will be delivered in advance of the structure for early installation. This supports our installation method where the gantry span will be delivered in one piece "fully assembled" for immediate installation. Throughout the project, we will continue to communicate with the tolling contractor to update them on progress along with upcoming activities, confirm their schedule, and provide assistance where possible. We recognize that the tolling contractor is our partner on this project and equally important to the timely completion of the project.

Toll Gantry

I-95 Specific

Pavement Construction

The AW-dMG JV team has completed over 300 lane miles of concrete pavement construction in Florida. We are the most experienced team in this scope of work in the state. Many of these past projects have significant traffic volumes and complex MOT efforts including continuous weekend lane closures similar to this segment of I-95. Our team knows what it takes to schedule, plan, and manage resources in order to deliver the 20 lane miles of quality concrete pavement for this project. In addition, AW is currently working on the I-95 concrete paving project from NW 29th Street to NW 131 Street, which connects to the north end of this project. This gives our team further advantages by providing experienced crews on day one, with a seamless transition between the two projects.

Concrete Paving

The majority of the concrete pavement will be constructed by the slip-form method, although areas with unusual shapes or small quantities will be “hand-placed” with steel forms. With the slipform method, concrete is batched into dump trucks, and then placed on the prepared subbase. The paving train will consist of a placer/spreader and a tine/cure machine. The reinforcing will be in-place and inspected prior to the placement of the concrete. Concrete will be placed in front of the placer/spreader, with grade control being achieved through the use of a string line and sensor.

The tine/cure machine will follow, applying curing compound. No tinning will occur, as we will be performing a full diamond grind to improve smoothness and reduce noise. Weekend work activities will be scheduled to maximize production, while at the same time allowing for improved quality of construction by completing larger sections of work area. The typical construction sequence is detailed below:

- **MOT Setup** – Close lanes and stage equipment
- **Remove Slabs** – Assumes precut and core prior to removal.
- **Excavation** – Remove 1.5” of existing subgrade and Proof Roll
- **Drill and Epoxy** – Install tie-bars on a minimum 1 side
- **Concrete** – Pour concrete pavement at a rate of up to 150 CY/Hour.
- **Concrete Cure** – For weekend lane closes, we are able to increase the average cure time before traffic loads from 3 hours to more than 12 hours. This will substantially reduce cracking and enhance quality.
- **Open for Traffic** – Open all lanes to traffic

To minimize impacts to traffic, our team will prioritize the I-95 slab replacement work along I-95 NB north of SR-836. This will provide additional capacity from the RFP concept by adding a lane (7th lane introduced with ATC 12C) within a year of NTP, greatly increasing traffic flow and mobility during the remaining construction.

Bridge Approach Slabs

Approach slab construction will be done over the weekends as permitted in the RFP. We will take advantage of the continuous lane closures in Zone1 and Zone 2 in order to maximize production of slab removals together with the bridge expansion joints.

Bridge Approach Slab

Drainage

ATC 12C added a lane in the NB direction resulting in a shift in the median barrier and reconstruction of the drainage new uprights. This work lies in Zone 2 and will be completed during Phase I of the MOT.

Lighting

We will maintain the existing lighting while any new lighting is installed to eliminate the need for temporary wall mounted light poles which will increase work zone safety. New light pole assemblies will be constructed adjacent to the existing poles and pilasters will be re-utilized requiring complete pole replacements to occur in one work period.

Total Project

Safety

Safety is a core value of our culture. The AW-dMG team is dedicated to protecting the safety and health of our employees, the project team, and all persons affected by the project activities. We emphasize safety in our daily, weekly, and

monthly meetings and will provide a dedicated Safety Manager to the project. To preserve and improve safety throughout the project, our design and standard certified procedures provide a safe work-site and safe travel for motorists, bicyclists, and pedestrians during all MOT phases. Our team's commitment to safety is reflected in our experience modification rates (EMR), which are well below the national average: AW's 2016 EMR is 0.79 and dMG's 2016 EMR is 0.78. AW and dMG have not been fined for OSHA violations in the past five years in Florida.

Our Safety Manager will inspect the worksite, develop and implement the project specific safety plan, and comply with OSHA regulations. Crews will be actively involved in the work planning, safety awareness, and environmental requirements using processes that include:

- Initial orientation
- Site specific safety plans
- Pre-activity work plans
- Weekly tool box meetings

Many of our design and construction methods were developed with the safety of our workers and motorists as the top priority.

Public Safety

Specific safety considerations will be incorporated by our team into our design/construction approach to enhance public safety. Our Safety Plan will include the following:

- Ingress/egress locations will be located on highly-visible tangent sections of the roadway to minimize visual obstructions. This approach will improve line of sight and visibility throughout the project.
- Material delivery and removal will take place at designated construction access points, clearly signed, and at locations with adequate sight and acceleration/deceleration distances.
- Our Traffic Control Plan (TCP) maximizes the bridge phasing and work areas
- Temporary lighting and drainage will be provided until the new lighting and drainage systems have been installed.
- Off-duty officers will be used during all major traffic shifts and MOT setups.
- Temporary concrete barrier walls will be used to enhance both worker and public safety.
- Daily inspections of the work zones at the end of a day's operations
- Nighttime work to be performed only as necessary and with proper illumination
- Pedestrian channelizing devices will be utilized in all areas of heavy foot traffic
- False work and overhead screens will be utilized to contain debris from overhead work in pedestrian areas.

Local Material Resources

Our team will cast the piling, precast segment caps, Florida I-Beams (FIB), arch segments, and MSE wall panels for the project at our nearby 30-acre facility. This will allow our team to control the source of materials and the material schedule. This approach has been a key element to our success on other D-6 projects and assures that we will not fall subject to third party quality or schedule problems.

For the last 5 years, dMG has been the largest prestressed producer in South Florida and the only contractor that produces its own FIB's. Our resources include twin MJ70 Mijack Straddle Carriers, FIB forms, removable stressing abutments, twin self-stressing 24" pile beds, Type K temporary barrier wall forms, MSE wall panel forms, and stressing equipment. In addition to the schedule and delivery benefits associated with casting our own pre-stressed products, the project will also benefit from our history in quality product production. dMG has produced 27,679 prestressed/precast elements at our current facility with 99.7% material acceptance rate by the FDOT.

Concrete Production

AW-dMG have a history of supplying quality concrete materials on their major projects. dMG is currently relocating our high-production FDOT-certified concrete plant from our I-4 widening project to Miami. On I-4, we produced more than 190,000 CY of concrete for the 72 lane-miles of concrete pavement on the project with very high quality and very low deficiency rate (Only 0.17%). The plant has the capacity to produce more than 3,000 CY of concrete per day and will be used for many of the concrete elements. In addition, AW is setting up a dry batch concrete plant in the vicinity of the project for the construction of the I-95 Concrete Pavement Project NW 29th Street to NW 131 Street.

Our team will have two concrete plants within 15 miles of the project site. By having complete control of the entire concrete process, our team is able to ensure timely delivery of products and schedule all material deliveries during non-peak hours to minimize traffic disruption.

Asphalt Production & Paving

All asphalt will be produced at dMG's asphalt plant located near the US 27/HEFT interchange. We use clean burning natural gas in lieu of recycled crude oil for asphalt production. Our local plant produces Warm Mix Asphalt (WMA), which

Asphalt Production & Paving

provides significant quality benefits, reduces environmental impacts, and provides enhanced durability of the final pavement. WMA has been heralded by FWA for its benefits including longevity and ride. dMG remains the only South Florida Asphalt Contractor producing Warm Mix Asphalt Florida - offering an environmentally friendly material with enhanced durability.

ITS Construction

Maintaining continuous operation of the ITS system throughout each corridor during the life of this project is vital and will be accomplished per the Maintenance of Communication (MOC) plan illustrated in the Traffic Control Plots. Additional steps that will be taken to ensure continuous operation include:

- Field verification and pre-construction GIS Mapping of existing ITS infrastructure.
- Pre-construction inspection, inventory & reporting of existing ITS equipment to be removed, replaced, or impacted by the project
- Internal ITS utility location to confirm running existing lines and documentation of new burial depths to avoid future grading conflicts.
- Routine operational maintenance

The existing Over Height Vehicle Detector will remain operational until the new Over Height Vehicle Detector has been tested and confirmed operational by the POMT Project Manager.

Close agency coordination will occur for the installation of the layer 3 hub switches located at the SR-836 Toll Administration building, the SR-836/I-95 ITS communication hub building and the D6 SunGuide TMC. Our approach is to have all devices pre-configured for a “plug and play” deployment. These devices will be pre-configured for installation at a specific location, with appropriate IP addresses, firmware, etc. All information will be logged and documented. This process eliminates much of the need for field integration and allows for a prompt start of the testing phase. All layer 2 and 3 integration will be closely coordinated with each agency including early development of the required network architecture and naming conventions.

Implementation of Environmental Design & Erosion/ Sediment Control Plan

The AW-dMG team is committed to ensuring that our construction activities comply with all required permits and are conducted in a responsible manner. Best Management Practices will be implemented for all erosion and sediment control. We will implement a detailed and comprehensive Stormwater Pollution Prevention Plan (SWPPP), which identifies the critical issues for ensuring the integrity of adjacent sites and how they are affected by the project’s construction operations. All environmental commitments an requirements in the RFP and permit documents will be included in a Project Commitment Tracker and updated for continuous compliance throughout the project. Key features of our approach to ensuring environmental compliance include:

- Providing erosion control measures along the ROW line, canal banks and at drainage outfalls before construction activities begin.
- Providing staked silt fence and/or floating turbidity barriers to isolate all erodible or suspended material.
- Placement of mats under all stationary equipment with absorbent materials on-hand
- Milling “rap” and paving-train leftovers will be contained in identified, protected areas and/or hauled off site.
- Establishment of specific concrete washout stations, visqueen protected areas and “washout tanks”, where concrete trucks can clean their chutes prior to leaving the project site.
- Use of double rows of turbidity curtains, dust suppression BMPs, and tarp covered stockpiles.
- Providing sodding/ stabilization within 48 hours of final grading to avoid off site erosion.
- Routine 3rd party QC reviews of all sediment/pollution control devices and maintenance practices to ensure compliance.
- Identifying/marking environmentally sensitive areas and educating workers.
- Closely monitoring potential existing ground contamination during excavation.
- Closely monitoring turbidity/ water quality pursuant to the conditions of the permits.
- Adhering to all requirements to protect endangered/ protected species such as manatee protection measures.

Implementation of the Incident Management Plan

Our team’s approach to the development and implementation of the project MOT Plan focuses on providing a safe corridor throughout all phases of the work, minimizing traffic delays and motorist impacts, and maintaining access to adjacent properties.

Our team is further committed to providing timely response to emergencies and our comprehensive Incident Management Plan addresses:

- Responding to traffic incidents such as debris in the roadway, vehicle crashes, obstructions to traffic and other potential hazards
- A means for clearing disabled vehicles from travel lanes, assisting disabled motorists, removing minor non-hazardous spill
- Providing Road Rangers We will provide Road Ranger services from 60 days after Notice to Proceed
- Assisting the FDOT and local emergency responders as may be needed (FHP, EMS, local law enforcement, etc.)
- Measures which allow for the roadway to be restored to full capacity within a short time in the event of an emergency.

- In the event of an emergency, we will closely coordinate with local emergency service authorities to remove nonessential traffic control measures and secure equipment in anticipation of potential evacuations, localized flooding, and high winds.

Effective Noise Mitigation

Our team will minimize noise impacts to adjacent businesses and residents. A Noise Monitoring and Control Plan (NMCP) will be submitted for acceptance prior to the start of work. As a prt of the plan, we will implement means and methods that minimize noise throughout all phases of the project such as:

- Locating equipment in a manner that provides the least disruption
- Meet with local residents and business owners prior commencing specific operations in their proximity
- Ensuring equipment has functional noise suppression devices
- Scheduling of construction operations per local noise ordinances

Minimizing Vibration & Settlement Impacts

Our team is sensitive to the impacts of construction vibrations on adjacent neighbors, structures, and utilities. We will perform settlement and vibration monitoring during pile driving, roadway compaction, sheeting installation, excavations, and other vibration-inducing events. The project limits contain churches, concert halls, museums, and medical facilities that will require careful monitoring during construction. We will take measures to ensure vibrations are minimized near adjacent structures, including:

- Pre-drilling for pile holes ranging from -15 to -20 feet.
- Use of low hammer stroke and energy to minimize unwanted vibrations and settlements.
- Controlling vibratory sheet pile installations near utilities and adjacent properties.
- Using static compaction mode when operations are located near buildings.
- Adhering to all work restrictions as noted in the RFP.
- Use of hydraulically “pushed” sheet piling to avoid the vibrations generated by vibratory hammers.

A Settlement and Vibration Monitoring Plan (SVMP) will be submitted with the 90 percent plans identify areas requiring pre- and post-construction surveys and monitoring. Methods to be implemented to reduce settlement and vibrations include:

- **Low Displacement Steel H-Piles** – Our team evaluated various foundations for the signature bridge, as well as all other bridges and we will utilize low displacement steel H-piles in areas within 50-ft of existing structures/utilities. As proven by our local pile driving experience on our NW 25th Street Viaduct project, driving steel H-piling results in significantly less vibrations than concrete piling,
- **Preforming for Foundations** – Foundations in close proximity to the railroad, utilities and existing structures will be preformed to limit vibrations. Specifically, pre-drilling will be performed for the foundations for the Signature Bridge Arch 4 due to its proximity to the Adrienne Arsht Center for the Performing Arts.
- **Viaduct Solution** – By founding the viaduct in the median of existing SR-836, impacts will be reduced as the construction equipment will be working further away from the existing, which include hotels and condominiums.
- **Grove Park Historic District** – Our foundations in this area have been moved from the concept plan locations along the outside of SR-836 to the median resulting in a much greater distance between the proposed construction and the existing historic structures. Our foundations in this area consist of drilled shafts which further reduce vibrations.
- **Miami Dade Transit Authority** – A Settlement Monitoring & Action Plan (SMAP) will be submitted to MDT prior to construction. The SMAP will include the equipment, monitoring marks, tabulation/ frequency of readings, reporting, and actions to be taken. Continuous monitoring will be performed during critical operations where movement of the guideway could potentially occur and construction operations will be halted if the readings are not acceptable by MDT.

Pile Driving Operations

Utility Coordination & Construction

We understand the critical nature of utility relocation issues and have a clear understanding of how to work with utility owners to develop mutually beneficial solutions. Continuing the coordination that developed during this proposal, we will hold a utility kick-off prior to the start of construction, as well as regular utility meetings during construction. These meetings will apprise the UAOs of imminent and future construction work so that UAOs have sufficient advance notice to perform relocations. We are very familiar with the time-frames utility relocations can take, and our coordination approach during construction will minimize utility-driven delays during construction. We will also contact Sunshine One Call at least 48 hours in advance of any digging so that all existing utilities can be marked in the field. Specific utility challenges on the project and our approach to resolution

include:

- We will verify locations where pile driving operations are in close proximity to utilities,
- Temporary support of existing pole structures by UAOs will be identified and any required arrangements made prior to construction.
- We will locate and mark the existing ITS fiber optic, lighting and signal underground facilities throughout the project to avoid impacts and to assure they remain operational at all times.
- We will coordinate with FPL Distribution for all switch overs from old risers to new ones at service point locations.
- We have eliminated approximately $3M in utility relocation costs. These adjustments reduce coordination and potential delays during construction.
- In preparation of the Department's future concessions along Heritage Trail, we have committed to build water, sewer, and electric infrastructure to serve these future buildings as APTE 23, 36, and 56. This will allow the concessions to simply "tie in" to distribution lines with minimal construction and disruption to the community.

MAINTENANCE OF TRAFFIC

Maintenance of Traffic (MOT) is critical to this project, as we need to keep Miami moving during construction. Our multi-faceted approach to MOT was developed through collaboration between the designers and construction personnel that is integral to design-build projects. We have held regular task force meetings throughout the technical proposal phase and will continue to coordinate MOT during final design and throughout construction. Our team's goals of benefiting Community, Safety, Mobility, and Maintainability are reflected in our MOT approach. Refer to our detailed MOT Roll Plots that contain traffic control phasing for all modes of transportation affected by the project, including vehicular, pedestrian, bicycle and boat traffic and depict major construction elements, including conventional, segmental, signature and viaduct bridge construction, roadway, concrete pavement, signing and ITS.

Project Narrative, Segmentation, Phasing, Timing, Duration of Construction Elements

We have approached MOT for this project from a global project perspective. In fact, our team has developed a Master Plan that has been submitted within our corridor-wide Roll Plots depicting project milestones that coincide with major traffic shifts.

- **Stage 1** – Open New 7th Lane on I-95 Northbound and the 2nd Lane on the SR-836 EB to NB ramp, which dramatically alleviates traffic congestion and enhances safety.
- **Stage 2** – Open the EB and WB Connectors, including the I-395 WB Signature Bridge.
- **Stage 3** – Open the Viaduct to Traffic, including the I-395 EB Signature Bridge.
- **Stage 4** – Complete the Project.

The milestones were developed to address the variable construction durations associated with the phasing of each corridor segment. **Table 9** depicts estimated durations associated with the primary phases of each segment.

Table 9: Estimated Durations of Primary Phases

Corridor Segment	Phase Durations by Segment (months)		
	Phase I	Phase II	Phase III
SR-836	18	26	14
I-395	28	16	14
I-95 NB Zone 2	8	2	2
I-95 SB Zone 1	12	6	6

I-395 Specific Traffic Control Phasing

The I-395 section presents MOT challenges due to the proximity of the American Airlines Arena, the AAPAC, the Perez Art Museum, and Bayside, which generate special event traffic throughout the year. The Department's ROW acquisition along I-395 facilitates the MOT by enabling use of the existing mainline during construction of new improvements. The following is a summary of the major I-395 traffic control phasing:

- **Phase I** – Build WB and EB Connectors and WB Signature Bridge, maintaining traffic on existing infrastructure.
- **Phase II** – Shift traffic to new WB and EB Connectors, build WB and EB I-395, including EB Signature Bridge.
- **Phase III** – Shift traffic to new I-395 mainline and complete the project.

During Phase I, we will convert NE 1st Avenue to a two-way facility, similar to current NE 2nd Avenue operations. NE 2nd Avenue will continue to operate as a two-way road, while access to the ramp facilities will be diverted to NE 1st Avenue. This will enhance traffic operations along NE 2nd Avenue in anticipation for the planned opening of All Aboard Florida that will generate additional traffic demand. This adjustment will generate space for constructing the Arch 2 foundation of our Fountain Signature Bridge.

During Phase II, we will build the I-395 mainline, while traffic is on the connector roadways. Construction operations will be confined within the footprint, currently occupied by the existing highway, providing ample space to build all the necessary improvements. Once Phase II is completed, 95% of the I-395 segmental bridge work will have been constructed.

During Phase III, traffic will be maintained on the final alignments except for a portion of the EB connector. This phase will include multiple steps in order to finalize construction of the EB Connector, portions of the mainline, and Ramps D-1 and D-2 east of Biscayne Boulevard.

Pedestrian and bicycle traffic will be a key MOT factor as most of the aesthetic improvements and surface street crossings below I-395 will be constructed in this phase.

> *We will maintain a safe path for bicyclists and pedestrians at all times. We have identified special routes in our Roll Plots, including ones along NW 14th Street that abuts Booker T. Washington High School, Gibson Park, and the Overtown Youth Center.*

MDX Specific Traffic Control Phasing

The MDX section is home to the thriving Health District that includes Jackson Memorial Hospital, the Miami VA Medical Center, and the University of Miami's Miller School of Medicine. Our MOT will maintain vehicular and pedestrian access to NW 12th Avenue and NW 14th Street, which is critical for emergency vehicles and hospital patrons. Additionally, pedestrian activity is high in this area due to the courthouse, the Marlins stadium, and the nearby Metro-Rail Culmer and Civic Center stations. The SR-836 MOT plan consists of three phases that includes the following construction challenges:

- Construction of the Viaduct;
- Widening of the EB to NB ramp; and
- Replacement of the existing concrete pavement.

SR-836 construction is broken into three phases of construction.

- **Phase I** – Maintain traffic on existing infrastructure, build EB widening to the south. Widen MRB approaches to the outside shifting traffic to the inside.
- **Phase II** – Shift EB traffic to newly widened area, maintain WB traffic on existing infrastructure, build Viaduct in median.
- **Phase III** – Shift traffic to Viaduct, replace WB and EB SR-836 pavement.

The overall duration of Phase I will be controlled by the widening of the EB to NB ramp (WN connector) and the construction of Ramp A (WE connector) at the Midtown Interchange. We will sequence the work in the interchange to allow relocation of the existing pier and widening of the WN connector.

Phase II will be the longest phase of SR-836 since it requires completion of the Viaduct. In order to accelerate construction, we will use precast elements to construct the pier caps using a top-down method, with approved nighttime lane closures to erect pier segments, and use AW's company-owned beam shifter (as shown in the video included within our ATC 12C submittal) to erect beams.

Phase III will include multiple steps needed to replace the existing pavement for EB and WB SR-836 in Section 1. Our Viaduct will provide a place to shift traffic thereby minimizing the number of lanes required along SR-836. ATC 48, that modified the pavement type from concrete to asphalt, greatly simplifies MOT phasing that no longer needs to abide by longitudinal joint lines in the concrete pavement. Use of the Viaduct, coupled with the asphaltic pavement, enables more efficient replacement of the existing concrete slabs, increases the amount of work that can be done at one time and reducing traffic impacts. We have shown a step-by-step approach to replace the concrete pavement slabs in Phase III of our MOT Roll Plots.

Safe access through the work zones will be provided for pedestrians and bicyclists. A few activities that will affect pedestrians along SR-836 include construction of the Viaduct within Miami-Dade County Parking Facility Lots 1 and 2, and bridge construction over NW 12th Street and over NW 14th Street. ATC 12C significantly improves parking conditions adjacent to the courthouse during construction. Our approach involves reconstruction of Lots 1 and 2 during Phase I, as well as construction of a new facility within the infield area of the loop ramp for NW 12th Avenue to SR-836 EB. This approach increases the number of existing parking spaces during construction, which contrasts with the reduction required by the RFP approach.

I-95 Specific Traffic Control Phasing

The I-95 MOT design consists of three phases. The primary goal of the phasing is to build capacity, as soon as possible to improve mobility and increase safety along the corridor. Capacity along I-95 will have positive impacts to SR-836, I-395, and I-95. Therefore, our team is committed to building the 7th lane NB within one year of NTP. The overall phasing has been established accordingly using the permissible lane closures. Our construction approach will use three basic types of lane closures:

- **Weekend Closures** – We will work continuously during weekend closures for greater efficiency and improved pavement quality.
- **Nighttime Closures** – We will use nighttime lane closures predominantly in Zone 1 since only one lane can be closed at a time during the weekends.
- **Detours** – We will use detours as a last resort, but for some of the ramps there is inadequate space to maintain traffic, while replacing the existing pavement.

The I-95 pavement replacement will be completed in three phases for each of the two zones. In general, Zone 1 work will be completed using nighttime lane closures, while Zone 2 work will be used for weekend closures.

Zone 1 (NW 8th Street to NW 19th Street)

- **Phase I** – Replace outside shoulders and overbuild SB I-95 outside shoulders.
- **Phase II** – Replace mainline pavement using nighttime lane closures (two lanes each direction) and replace ramp pavement.
- **Phase III** – Replace remaining pavement using nighttime

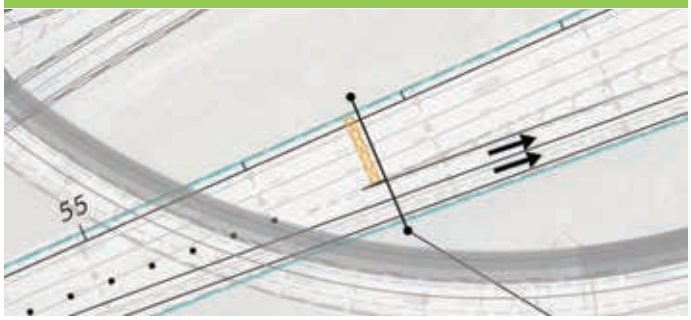
lane closures.

Zone 2 (NW 19th Street to NW 29th Street)

- **Phase I** – Reconstruct the median, including drainage and new uprights. Overbuild outside shoulders using nighttime closures.
- **Phase II** – Replace mainline pavement using weekend closures starting in the median and working towards the outside.
- **Phase III** – After completion of I-95 NB north of SR-836, we will complete the SB pavement reconstruction using weekend closures.

Our MOT approach includes an innovative NB diversion that will isolate a large portion of the I-95 mainline, between I-395 and NW 19th Street from live traffic (See **Figure 10**), providing an efficient and safe construction operation during the weekends in Phase II. The approach involves closing one lane during the weekend in Zone 1 and diverting MOT mainline traffic (two lanes) onto the NB braided ramp connector. This enables wider work areas and reduces the number of closures required along I-95.

Figure 10: Northbound Diversion

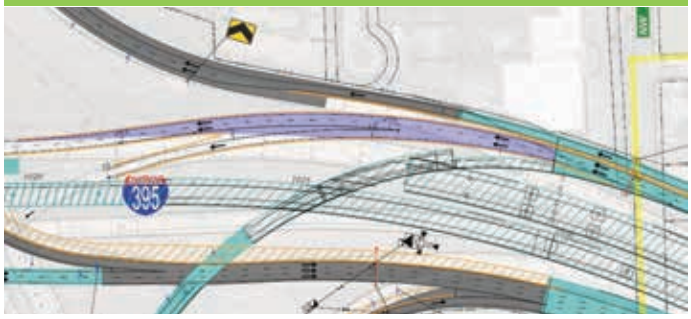


Construction Phasing/Sequencing Plan that Alleviates Traffic Congestion

The MOT significantly exceeds the traffic operational benefits depicted in the concept plans. We have significantly increased capacity and average speed along I-395 while minimizing delays to the public. These results were accomplished in a number of ways:

- Opening additional 7th lane along I-95 NB within one year of NTP, dramatically improving flow along SR-836 EB and I-395 WB.
- Opening 2nd lane along the SR-836 EB to I-95 NB ramp, doubling the rate of flow along SR-836 EB during Phase I.
- Investment in temporary bridges that:
  - Eliminates an entire phase along I-395, enabling full capacity along I-395 WB one year earlier than the RFP concept.
  - Enables additional lane along I-395 WB and EB.
  - Allows for sequential construction of the WB and EB Signature Bridges.

Figure 11: Temporary Bridges



We performed traffic analysis along I-395 during Phases II and III to evaluate the effect of implementing new capacity from ATC 12C after Stage 1. In Phase II, we will provide an additional lane in the EB and WB directions and improved weaving conditions with traffic entering from NE 1st Avenue. The Phase III comparison was made to reflect benefits produced by our MOT that enables early completion of the entire I-395 WB improvements in comparison with the RFP concept. This is achieved by combining the mainline reconstruction, including the EB Signature Bridge (which is on the critical path) construction into a single phase thereby eliminating a major phase required by the RFP concept.

Our comprehensive phasing approach provides dramatic improvements along I-395 WB during construction as shown in **Exhibit 8**, which significantly exceeds the RFP MOT concept design. Our Phase II concept adds a lane, and improves the problematic weave condition in the RFP concept.

There are also major improvements in the EB direction of I-395 particularly during Phase II where we have provided an extra lane using our new temporary bridges.

Along SR-836 and I-95, we will provide major capacity benefits since we are doubling the capacity of the existing EB to NB ramp and adding a lane along I-95 NB with our Stage 1 milestone. Other major benefits along SR-836 will be realized once the Viaduct is open to traffic. During this time, the Viaduct will serve as a bypass to I-95 thereby isolating SR-836 EB traffic to Miami Beach or Downtown from spillbacks on I-95.

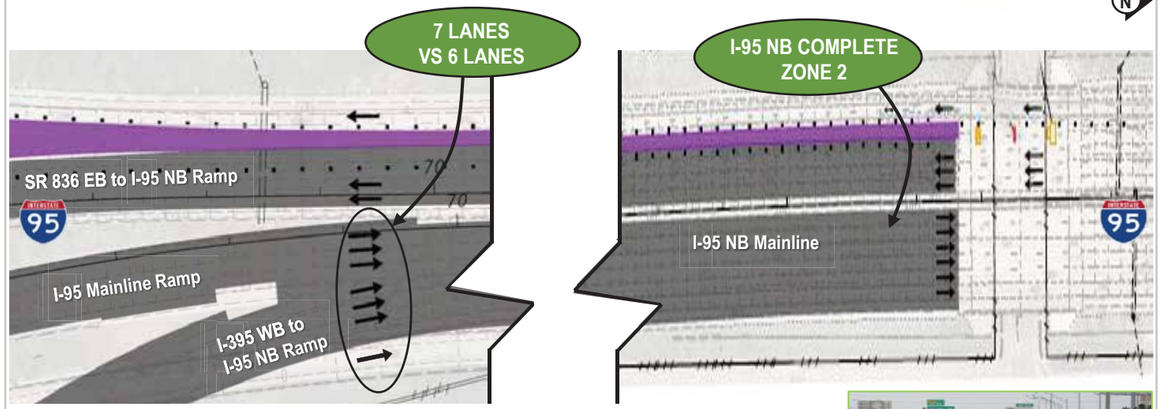
Minimizes Number of Traffic Phase Changes

Our MOT design has significantly reduced the number of traffic phases and traffic shifts required by the RFP.

- **I-395** –We eliminated the MOT RFP concept Phase III and combined the EB and WB mainline reconstruction along with the EB Signature Bridge into a single phase. Elimination of Phase III will provide dramatic traffic benefits as we will be able to complete the EB Signature Bridge ahead of schedule.
- **SR-836** – We have eliminated three phases required by the RFP concept, as well as major mainline shifts and closures.

EXHIBIT 8 - **MAINTENANCE OF TRAFFIC IMPROVEMENTS**

STAGE 1 • Open 7-lanes I-95 NB



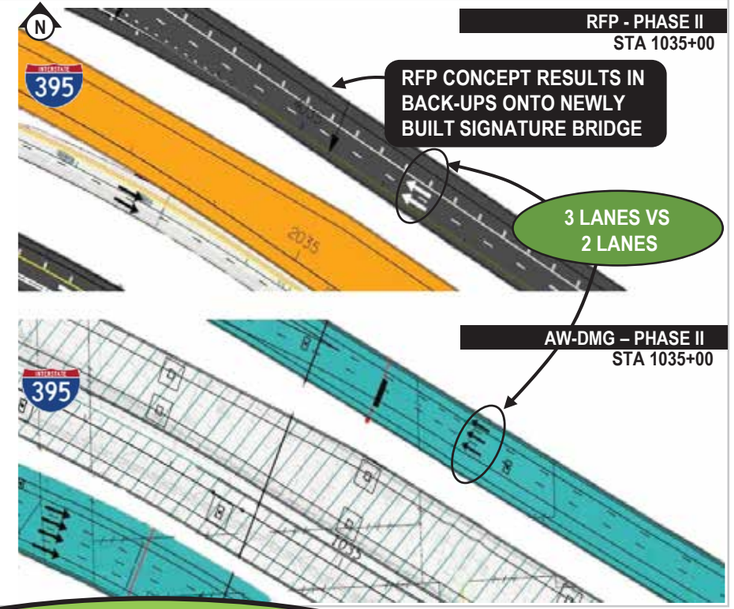
**MORE LANES =
MORE CAPACITY**

STAGE 2 • Open I-395 WB and EB Connectors including WB Signature Bridge

**14 MPH (RFP) VS
52 MPH (AW-DMG)**

WB I-395 (MACARTHUR TO NE 1 AVE ON-RAMP)		
PERFORMANCE MEASURE	RFP	ATC 12C
Avg. Speed	14	52
Density	121	22
Level of Service	F	C
Capacity	2 Lanes	3 Lanes

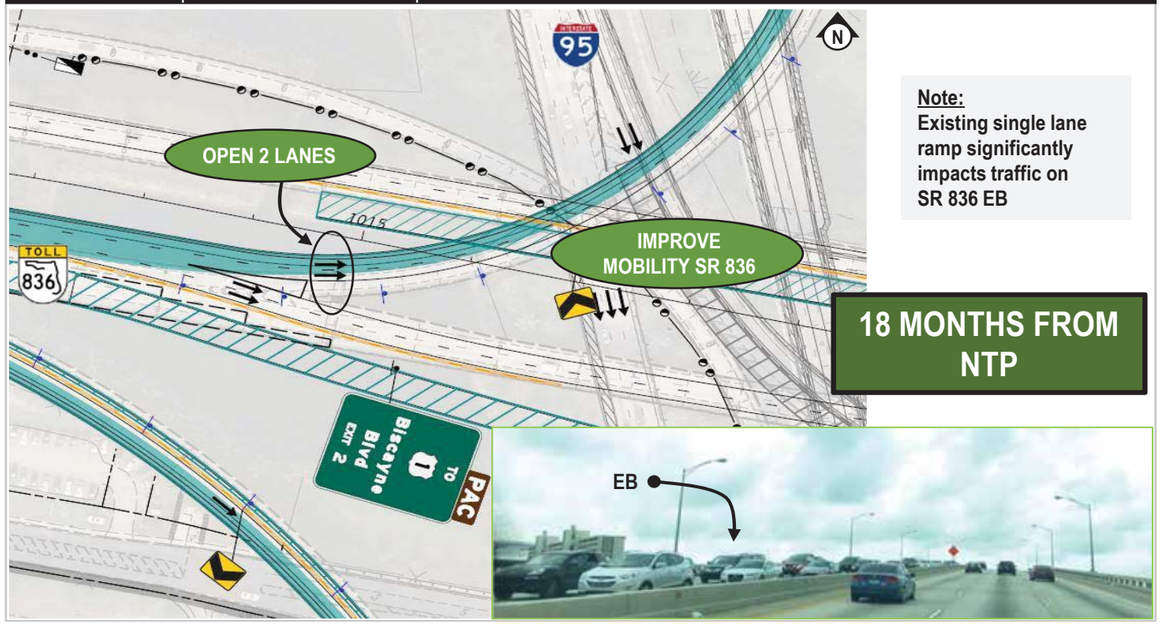
WB I-395 (NE 1 AVE ON-RAMP TO I-95)		
PERFORMANCE MEASURE	RFP	ATC 12C
Avg. Speed	33	43
Density	71	35
Level of Service	F	C
Capacity	2 Lanes	3 Lanes



**PROVIDE IMMEDIATE
TRAFFIC RELIEF**

**SIGNIFICANT TRAFFIC
IMPROVEMENTS**

STAGE 1 • Open 2 Lanes EB to NB Ramp



Note:
Existing single lane ramp significantly impacts traffic on SR 836 EB

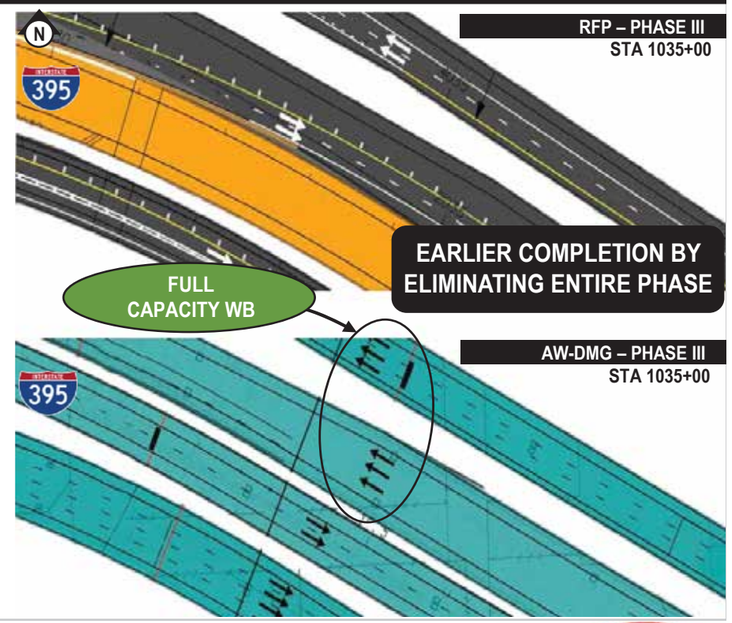
**18 MONTHS FROM
NTP**

STAGE 3 • Open Viaduct

**12 MPH (RFP) VS
52 MPH (AW-DMG)**

WB I-395 (MACARTHUR TO NE 1 AVE ON-RAMP)		
PERFORMANCE MEASURE	RFP	ATC 12C
Avg. Speed	12	52
Density	137	19
Level of Service	F	C
Capacity	2 Lanes	Completed

WB I-395 (NE 1 AVE ON-RAMP TO I-95)		
PERFORMANCE MEASURE	RFP	ATC 12C
Avg. Speed	34	50
Density	70	17
Level of Service	F	B
Capacity	2 Lanes	Completed



The phasing reduction is accomplished by confining the work zone within the median areas and having one mainline Viaduct as opposed to two separate elevated C-D structures that require shifting traffic from one side to another. Our MOT for SR-836 does not require mainline traffic to cross the centerline, minimizing lateral shifting of high speed traffic. Further, we have greatly simplified the MOT required to replace the concrete pavement slabs by placing traffic on the Viaduct, reducing the number of lanes required on the lower roadway, and by modifying the pavement type from asphalt to concrete. We have depicted the MOT sequencing for this work in Phase III. The RFP MOT plans do not provide a concept to accomplish this work. Our team has evaluated MOT options assuming we were building the RFP concept plans and have not identified a viable option that does not require a combination of extensive closures, additional phases or numerous shifts. The Viaduct design represents the best way to manage traffic while reconstructing the SR-836 pavement.

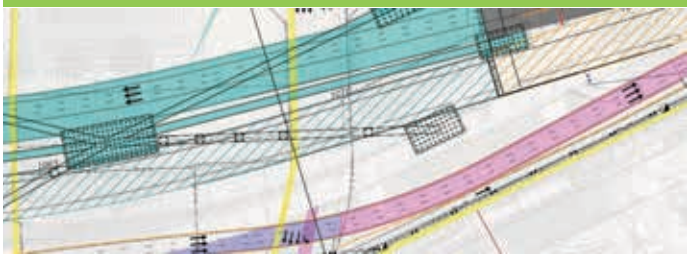
- **I-95** – During the ATC process, our team proposed to extend the closure hours depicted in the RFP. One suggestion was to include extended weekend closures that would support continuous paving operations, while minimizing the number of closures required. The Department subsequently issued an Addendum permitting weekend closures. We have opted to use the weekend closures (in both directions), which significantly reduces the number of closures and shifts required along I-95.

MOT Coordination with Bridge Construction Sequencing

MOT team members attended regular structures task force meetings and worked side-by-side to develop traffic solutions supporting construction of the Viaduct, the segmental bridges, and the Fountain Signature Bridge.

- **Viaduct Bridge** – In our MOT and Construction Methods Roll Plots, we depict the step-by-step approach used to erect the Viaduct pier caps, which extend over the footprint of the existing SR-836 mainline. The MOT required to build the concepts influenced our approach to use precast segmental concrete caps, which can be erected in sections minimizing impacts to traffic. As shown in our Roll Plots, we will use total of five segments per cap and will shift traffic according to the particular segment being erected, thus never placing live traffic below overhead work. Our team presented this construction sequence in detail during the ATC Meeting #3 with FDOT/MDX.
- **Segmental Bridges** – As noted under construction methods, our team is using a balanced cantilever/top down construction method to erect the segmental concrete box girders along I-395. This approach reduces the number of shoring towers, which minimizes impacts to traffic. Further, through our extensive coordination, we were careful to avoid placing piers and associated foundations near major surface streets to ensure mobility of both vehicular and pedestrian traffic during construction. The concrete segments were also designed with consideration of our MOT design.
- **Signature Bridge** – We developed several MOT concepts to support the construction of the Signature Bridge. For construction of the foundations of the Signature Bridge Arches 3 and 6, we have designed diversions that maintain a minimum of three EB lanes. This requires temporary widening of five bridge spans adjacent to Arch 3 that will enable the removal of the existing bridge deck and pier conflicts. Moreover, a new temporary bridge (over Biscayne Boulevard) and wire wall embankment section will be required adjacent to the Foundation Arch 6 to allow adequate space for excavation of the footing, shown in **Figure 12**. To support construction of the Arch 2 foundation, we have diverted traffic along NE 12th Street destined to the WB entrance ramps to NE 1st Avenue. Our team performed traffic analysis verifying the revised traffic patterns and presented them to Miami-Dade County who provided input.

Figure 12: MOT Signature Bridge Foundations



Minimizing Impacts through Construction to the Environment, Public, Adjacent Properties, and Structures

We will minimize impacts to the public by employing a Smart Work Zone System (SWZS) as part of our MOT plan to gather real-time data, allowing for more immediate incident response times. The SWZS will inform motorists of current conditions and provide alternate routes, reducing congestion and improving traffic flow, while making work zones safer. We will use traffic modeling to analyze performance measures. Metric, our key subconsultant, is currently performing travel time monitoring for the Palmetto Expressway, which uniquely positions the AW-dMG team to deliver a SWZS that provides real-time traffic data and video monitoring from the Palmetto Expressway, through the work zone, to Miami Beach. This expansive network will provide the ability to monitor real-time traffic operations from detour routes in downtown Miami to regional trips and major truck routes. Our MOT Roll Plots depict the approach to maintain ITS communications providing continuous real-time data to the

EXHIBIT 9 - **AW-DMG SUMMARY OF ATC'S PROPOSED**

12C COMPREHENSIVE SOLUTION SR 836/I-395/I-95

ATC SUMMARY TABLE		
NO.	DESCRIPTION / COMMENTS	BENEFITS
4	**Span Arrangements**	Reduces Columns / Optimizes Span Lengths
7	**Bridge 1 Changes**	Modifies Steel Boxes to FIB Girders
10	**Bridge 2 FIB Girders**	Modifies Steel Boxes to FIB Girders
12C	**Viaduct Section**	Comprehensive Solution
13	**Single Slope Barriers**	Using New Test Level 4 Barriers
18	**ITS - VDS**	Mounting VDS on Sign Structures
19	**ITS – CCTV and CLO**	CCTV Mounting HT and CLD Min. Height 40' to 25'
20	**ITS – DMS and CLO**	DMS Confirmation CCTV on Sign Structures
22	**ADMS Verification Camera**	Allows Installation of CCTV on Mast Arms
24	**MOT Lane and Shoulder Widths**	Allows all 11' Lanes on I-95 / Reduced Shoulder Widths
25	**Overhead Sign Structures SR 836**	Uses Monotube Signs on SR 836 / MDX
26	**Modified Shoulder Pavement I-95**	Keeps Existing Narrow Shoulders on I-95
28	**Signature Bridge Modifications**	Modified Signature Bridge to Meet New Geometrics
33	**Pier Soil Cover**	Uses 2' Soil Cover for Proposed Widening
34	**AAPAC Buffer**	Allows Minor Encroachment into Buffer
35	**Segmental Bridge Piers**	Modified Shape of the Segmental Bridge Piers
36	**Shared-Use Path Bridge**	Proposed New Pedestrian Bridge Connecting All Zones
37	**DMS Cabinet/MSG Verification**	Mount DMS on Proposed ITS Poles
38	**Microplile for Bridges**	Reserved for Possible Use in Confined Spaces
39	**Future Urban Utilities**	Installs Water, Sewer, Electric for Future Buildings
43	**Biscayne Boulevard Base**	Uses Shallower Base Clearance
46	**Right-of-Way Usage**	Reserved for Potential Alignment Changes
48	**Asphalt Pavement on SR 836**	Replaces Concrete with Asphalt Pavement on SR 836
50	**Concrete Pavement (7th-lane) I-95**	Provides Concrete Pavement for 11'x14' Wide Slabs
51	**Concrete Pavement (10.5") I-95**	Reduces Excavation for Pavement on I-95

PROPOSED VIADUCT

PROJECT WIDE ATC'S	
13	Single Slope Barriers
18 20 19 22	VDS, CCTV, DMS, ADMS Mounting
33	Minimum Soil Cover for Land Pier Footings
37	DMS Cabinet / MSG Verification
38	Micropiles for Bridges
46	Right-of-Way Usage

public alerting them of traffic conditions.

Approved ATC 24 (MOT Lane and Shoulder Widths) maximizes the construction work zones on I-395 and I-95. By maximizing work zones, we will be able to minimize phase and lane shifts, improve driver expectancy and safety, reduce construction fatigue that often led to accidents, and ultimately reduce the construction duration.

Our Incident Management Plan (IMP) will be implemented in the event of an accident within the project limits. The AW-dMG crews are experienced in major highway construction projects and will provide road ranger services, move to clear roadways of debris, provide safe access to first responders, and re-open closed lanes once the incident is cleared.

Materials will be locally sourced to reduce environmental impacts, including reduced truck traffic, air pollution, and noise. Our design minimizes impacts to the environment by concentrating construction of the Viaduct in the median of SR-836 and I-395, away from the right-of-way (ROW), reducing construction noise, vibration, and visual impacts to adjacent properties and structures. Deliveries of all construction materials will be through designated ingress and egress points with proper acceleration or deceleration zones. All work within the Miami River will abide by USCG special conditions, including manatee protection. We will strictly control and monitor turbidity within the Miami River during all construction operations.

Our Temporary Drainage Plan will account for reduced shoulders that may affect spread conditions during MOT. Our final drainage design will be coordinated with the MOT to establish the proposed bridge inlets are compatible with the MOT traffic patterns. We will construct new lighting and signing while maintaining existing infrastructure (where possible), and install temporary systems as needed.

INNOVATIVE ASPECTS

Our team has invested considerable effort in developing innovative solutions for the project. These innovations were developed based on collaboration between our design and construction teams and ultimately vetted and approved by the Department through the ATC process. These innovations have greatly improved the project as follows:

- Improved quality versus the RFP baseline design, including eliminating design exceptions;
- Improved mobility for the traveling public by reducing delays while improving access;
- Enhanced safety by eliminating and/or improving weaving and merging conditions;
- Reduced impacts to third parties, including utility agency owners and adjacent properties;
- Reduced future long-term maintenance costs to the Department/MDX; and
- Improved quality through the use of high quality materials enhancing durability of the project components.

Our team is incorporating 25 approved ATCs into our technical proposal. Refer to **Exhibit 9** – Summary of Innovative Aspects for a detailed listing of each one. Our ATCs support our overall objectives of enhancing mobility, safety, community and maintainability.

Demonstrating Unique Concepts & Cost Savings Suggestions

ATC 12C

Our comprehensive project solution, The Viaduct, provides major benefits to the entire project, including all three major corridors – I-395, SR-836, and I-95. This ATC was developed based on our efforts to satisfy the original intent and primary objective of the NEPA studies, which involve traffic, safety and operational improvements. Early in the process, we realized that no matter how much additional capacity was added to SR-836 and I-395, traffic flow did not improve dramatically due to constraints along the I-95 NB corridor.

ATC 12C provides dramatic traffic and safety improvements based on the following three significant capacity enhancements;

1. Construction of the SR-836 Viaduct that bypasses I-95 NB and avoids the negative interaction with I-95 traffic;
2. Adding a new lane on I-95 NB for a total of seven lanes; and
3. Widening the existing EB to NB ramp from one to two lanes.

The Viaduct

These improvements result in significant operational benefits, increasing system-wide average speed from 16-MPH to 36-MPH versus the RFP in the peak hour. In addition, the reduced traffic congestion dramatically improves safety. Please review the ATC 12C traffic model videos, which are included on the CD in the ATC binder. In addition, Roll Plot 3 provides snap shots that show congestion and lane balance issues that create accidents.

Overall, ATC 12C provides tremendous benefits to Miami-Dade commuters providing not only outstanding quality but significant long-term cost reductions to the Department and MDX.

Segmental Bridge Span Arrangement (ATC 4)

Our team optimized the RFP span arrangement for the segmental bridges standardizing span lengths and box types. In addition, we reduce the number of columns in the RFP from 107 to 98 and also eliminated the fill plug, which provides significantly greater open spaces below the new bridge.

ATCs 7 & 10

These ATCs provided approval to use FIB girders in lieu of curved steel for the EN (Bridge 1) and ES (Bridge 2) Connector ramp bridges. In the RFP concept, the ES Connector was a 5th level flyover ramp that spanned over all three major highways, SR-836, I-395 and I-95. Our design lowers the profile of the ES Connector below SR-836/I-395 but continues to span over I-95. The lower profile enables use of MSE walls (<40' tall) at the bridge approaches. The overall length of the EN Connector Ramp was reduced from 1106'-9" to 192'-3" while the length of the ES Connector Ramp was reduced from 1648'-8" to 1222'-0". Both bridges use simple FIBs versus the Category 2 curved steel box girders. This ATC provides significant reductions in construction cost, as well as the long-term maintenance savings by the reduced bridge area and elimination of steel bridges.

Minimizing or Eliminating Utility Relocations

We approached our design with an emphasis on minimizing utility relocations, to reduce construction costs and potential delays. In the I-395 segment alone, we eliminated 21 utility relocations through modifications to the drainage pipe routing layout. We also reduced utility relocations through adjustments to bridge spans and foundation designs. We have eliminated more than $2M in utility relocations in the I-395 section, including the jack-and-bore underneath the FEC Railroad that was needed with the RFP concept design and the FPL/D13 BE 13 KV Distribution relocation that was estimated to cost $850,000.

Our strategic pier locations (ATC 4), combining Ramps E and F (ATC 12C) and Signature Bridge design all contributed to minimizing utility relocations. We also eliminated major utility relocations in the MDX section totaling nearly $1 million in utility savings, which includes drainage pipe rerouting at NW 10th Avenue, avoiding impacts to 20", 24" and 30" water mains. Additional details of utility relocation reductions are provided in the Understanding and Approach section. We will continue to actively minimize utility relocations through final design and construction.

Materials

Our team is the only team that produces the majority of materials needed for the project locally in Miami-Dade County, including: Prestressed Piling, Prestressed Beams, Precast Segments, Precast Segmental Caps (Viaduct), Precast Segmental Arch, MSE Wall Panels, Type K Barrier Wall, Concrete, Asphalt, Subgrade, and Embankment. Self-performance provides better quality control, accelerates the overall schedule, and supports the local community and Miami economy. Most of the materials will be produced in our Miami yard, which is located only 15 miles from the project site.

The 90% reduction in steel bridge area provides an estimated $50M in savings over the life of the structures (Savings calculated based on Florida Turnpike study of bridge maintenance costs). Additionally, pre-stressed concrete bridges are very durable and structurally-sound with a very low rate of structurally-deficient structures nationwide. Our concrete bridges will both improve long-term durability and also reduce long-term maintenance cost for FDOT/MDX.

Workmanship

AW and dMG have delivered numerous successful projects for the Department during the past 30 years. We have a proven track record on similar projects and have built more than $500 million per year on FDOT projects while earning very high performance grades. One reason for our success has been our utmost dedication to providing quality workmanship. This approach involves proven methods designed to obtain consistent quality on every project.

Key team members have significant experience on complex signature bridge projects. Signature Bridge Superintendent, **Dave Singleton**, has constructed four cable-stay bridges, including the Ohio River Bridge (ORB) project that was completed in November 2016. **Pat Goggin** is the proposed Technical Advisor matching his experience on the ORB project. They are the most experienced team that AW (Walsh) has as the nation's top bridge builder. The ORB project was a very successful project with quality results. Highlights include the following:

- $1.7B value with two signature bridges;
- 92 total bridges; and
- Project completed 18 months ahead of schedule with a 3.5-year construction schedule.

Signature Bridge

Our proposed methods supporting the Signature Bridge construction is one of the more innovative aspects of the project that enabled our team to provide a concrete arch solution versus a steel arch. The method we are proposing is similar to what was used to build the St. Louis Arch and involves use of multiple cranes that "climb" the arches until the centerpiece is completed. We will build one arch at a time repeating the same process for each arch. The repetition will augment our workmanship and improve quality of the construction.

Segmental Bridge

Our approach to deliver quality workmanship also influenced

the design and construction of the segmental bridges. Given the number of surface street crossings, we have opted to use a balanced cantilever construction approach that minimizes the need for cast-in-place segments and shoring towers. The segment shapes and pier types were limited to three alternatives that are used depending on the width of the roadway sections. We have a total of 1,728 segments that include 782,537 and 409 Type 1, 2 and 3 girders, respectively. The uniformity of the elements coupled with the redundant design provide better quality.

Viaduct Bridge

The viaduct was designed with precast post-tensioned pier caps to reduce impacts to the lower roadway. We developed a method that involves repetition in the design and construction. From a design standpoint, the pier cap segments were all designed to contain the same size, shape and weight. This results in consistent quality, workmanship and accelerates construction.

Concrete Pavement

Our team intends to replace all of the existing concrete slabs in Zone 2 using weekend closures. During the ATC process, our team presented options to expand the RFP work hour restrictions. The Department accepted our proposed modifications and issued an Addendum allowing teams to use weekend closures and expanded the night time closures for Zones 1 and 2. These modifications will result in improved quality of the concrete pavement due to allowing for additional cure duration, which will reduce cracking. In addition, this change will dramatically reduce the construction schedule.

Enhancing Design & Construction Aspects Related to Future Expansion

One of the most valuable benefits of ATC 12C is the construction of a new Viaduct that can be used to carry traffic during replacement of the aging Miami River Bridge (MRB) that is due to reach its design service life approximately 20 years after completion of this project. Our team thoroughly vetted MOT concepts supporting replacement of the MRB and determined it would be impossible to carry four lanes of traffic in each direction during replacement unless MDX purchased additional Right of Way allowing for realignment of SR-836. In our estimation, the reduction in the number of travel lanes would be a fatal flaw creating serious mobility consequences to Miami-Dade commuters.

> *Our team will provide a new Viaduct that can be used to carry traffic during replacement of the aging Miami River Bridge.*

In contrast, the Viaduct concept greatly simplifies future replacement of the MRB since there are only two lanes on the MRB that have to be maintained. There is also extra room on the north and south sides of the MRB to shift the mainline alignments allowing for complete replacement maintaining the existing number of lanes.

Exceeds Minimum Material Requirements to Enhance Durability

Our team's quality goals and objectives include providing materials and design features, which exceed standard requirements. We have evaluated every component and have proposed significant improvements in durability extending the service life of the project components.

Signature Bridge

Our team understands the significant importance of providing a durable structure that can be efficiently maintained. Our design will include the following enhancements to increase the durability and provide added value;

- We have designed our Signature Fountain Bridge for a 100-Year Design Life versus the 75-year requirement;
- The Signature Bridge arches will be constructed with 10,000 psi concrete construction;
- We will implement the latest technology and best practices for the cable strands. They will be individually sheathed over corrosion inhibitor wax, all within the HDPE duct, providing three barriers of protection;
- Cable anchorages will be designed with internal rings and dampers to minimize the angular deviation of the cable and the wind vibration to improve fatigue resistance;
- Redundant cables for the signature bridge will be designed to allow replacement without shutting the bridge down; and
- The use of concrete segmental boxes versus steel structures will greatly reduce noise levels.

Lighting

Miami is a City that is known for its night life. Our team has made a significant investment in lighting to complement the future use of the proposed infrastructure improvements. All of the proposed lighting will be LED, which provides numerous benefits;

- **Lifespan** – LED lights can last up to 80,000 hours versus halogen light bulbs that last between 2,000 and 6,000 hours;
- **Efficiency** – LED lights are much more efficient than Halogen bulbs, which emits only 10% of the energy into light;
- **Maintenance** – With LED lighting there is no need to constantly change bulbs; and
- **Low Power Consumption** – LED lighting requires less power consumption, which ultimately results in long-term benefits to the environment.

MAINTAINABILITY

The AW-dMG team's design capabilities, coupled with Walsh Infrastructure Group's (WIG) many years of performance-based asset management, will optimize the asset whole life cycle and provide ease of maintenance and inspection to the total project corridor. The Walsh Infrastructure Group (WIG) has played an active role during the preparation of this proposal and will continue in this role during the design and into construction. This maintenance-informed design provides you with the most durable and maintainable infrastructure system-wide project. With this coupled design/construction/maintenance approach, our team understands the importance of providing a design that is easily inspected and maintainable and we developed our designs of this complex project with consideration of the end-user perspective. Our design and construction will minimize routine activities and long-term maintenance costs through the use of materials and fabrication practices that exceed minimum requirements. We have considered the many facets of maintenance operations that will be required for years to come, and our designs will make maintenance easier, more cost-effective, and better manageable for FDOT and MDX. Our team's design includes:

- **Elimination of Steel Bridges** – In the preliminary design process, our team focused on eliminating the maintenance intensive steel plate girder and box girder bridges. The result of our effort is a design that contains only a single new steel bridge. By constructing durable, high strength concrete instead of steel bridges we have eliminated the need for painting and other requirements for steel structure maintenance, saving the Department approximately $50 million over the life of the structures.
- **Concrete Arch Signature Bridge** – When preparing our preliminary design, we considered both concrete and steel arch types. The concrete option was selected due to its durability, longevity and reduced maintenance costs – our structure provides a 100-year service life and will require significantly less maintenance. The arch ribs will be precast using 10,000 psi concrete. The arch ribs will be post-tensioned for flexural, tension (anchorages) and torsional demands that will provide for a crack-free arch structure. For the longitudinal design, the superstructure will be a mix of post-tensioned concrete and reinforced concrete. To maximize serviceability and durability requirements, our team will design the reinforced concrete portion by limiting moment demands to less than the cracking moment.
- **Viaduct Bridges** – Reduce maintenance through the use of FIB girders with high quality finishes and fabrication. Our design facilitates future replacement of the existing bridge.
- **Segmental Structures** – Includes strategically-placed access locations at 400' intervals, LED lighting within the boxes, and outlets at 100' spacing. Joints openings will include screened mesh (Vermin Guards) to keep inside of boxes clean. Disc bearings will be provides due to excellent longevity and performance. Pier caps and diaphragms will be proportioned to allow for bearing replacement without temporary support frames or towers. Post-tensioning will be proportioned to provide required access for tendon inspection and replacement. We will also provide finger joints with self-cleaning membranes below the fingers.
- **Conventional Bridges** – Our design includes FIB bridges for all new conventional bridges, with the exception of Bridge 3. Concrete structures have superior maintenance benefits over other structures eliminate requirements for bearing replacement and future painting, and are simple to widen in the future. We have avoided complex bridge structures, such as C-piers, straddle piers, steel box girders, post-tensioned spliced girders, etc. which are generally more difficult to construct and maintain.
- **Signature Bridge** – Details provided later within this section.
- **Roadway** – Our preliminary designs were analyzed by experienced maintenance personnel, leading to the optimization of features such as: access gates locations, leveling of areas adjacent to walls and structures to provide ease of weed control and graffiti removal activities, and ensuring slopes do not exceed 1:3 to minimize erosion. In addition, our Viaduct solution, which reduces the project footprint and right-of-way (ROW) impacts, results in a significant decrease in overall areas to be maintained along the corridor.
- **Pavement** – By increasing the cure time of the I-95 concrete pavement through extended weekend closures as presented by our team (ATC 29), the superior product we build will reduce the future maintenance requirements. In addition, our team modified the pavement design for SR-836 (ATC 48) to asphalt pavement which is easier to maintain than complex concrete rehabilitation.
- **Drainage** – Our design eliminates all inlets, pipes and hangars on the Signature Bridge. Proposed wells and treatment boxes are strategically placed to avoid utility conflicts and landscape roots. Due to the salty environment, all inlet grades are galvanized steel grade to avoid corrosion. The drainage system for the Viaduct (SR-836) places the discharge/scupper within the bridge piers reducing maintenance through reduction of piping and cleanouts. Our viaduct reduces the impervious area footprint vs. RFP so length of exfiltration trench for water quality volume is reduced by 791' resulting in decreased long-term

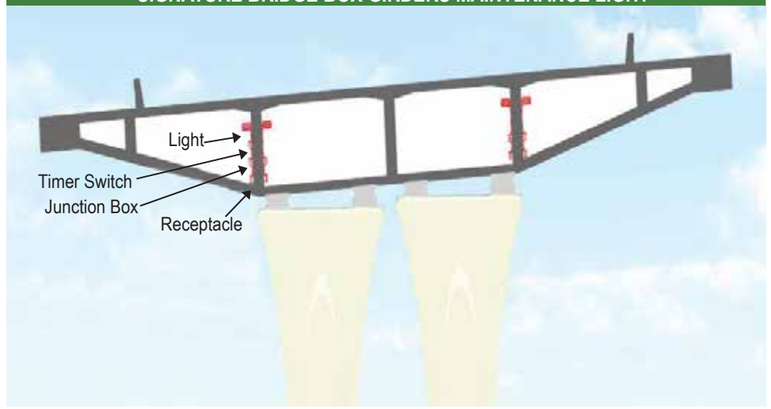
Total Project Maintainability

As you have seen throughout this proposal, our approach to this project includes specific considerations to designs and construction methods that increase durability and service life and reduce maintenance needs and associated long-term maintenance costs. Highlights include:

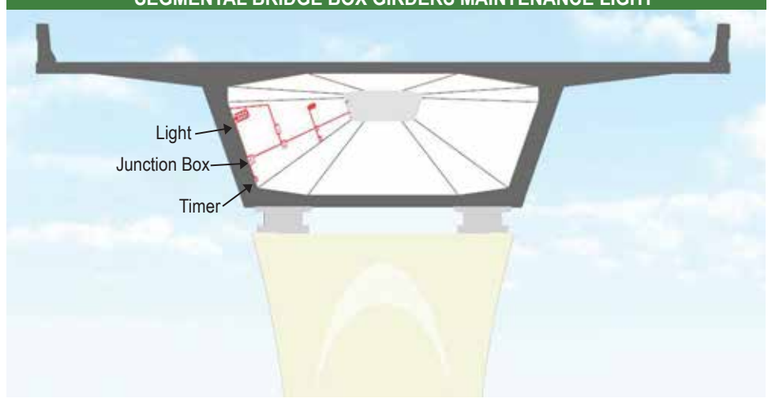
EXHIBIT 10 - **MAINTAINABILITY**

BRIDGE BOX GIRDERS

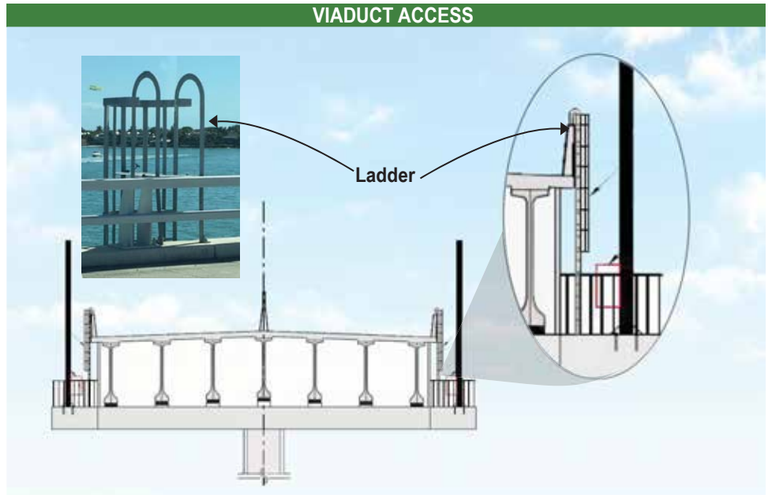
SIGNATURE BRIDGE BOX GIRDERS MAINTENANCE LIGHT



SEGMENTAL BRIDGE BOX GIRDERS MAINTENANCE LIGHT

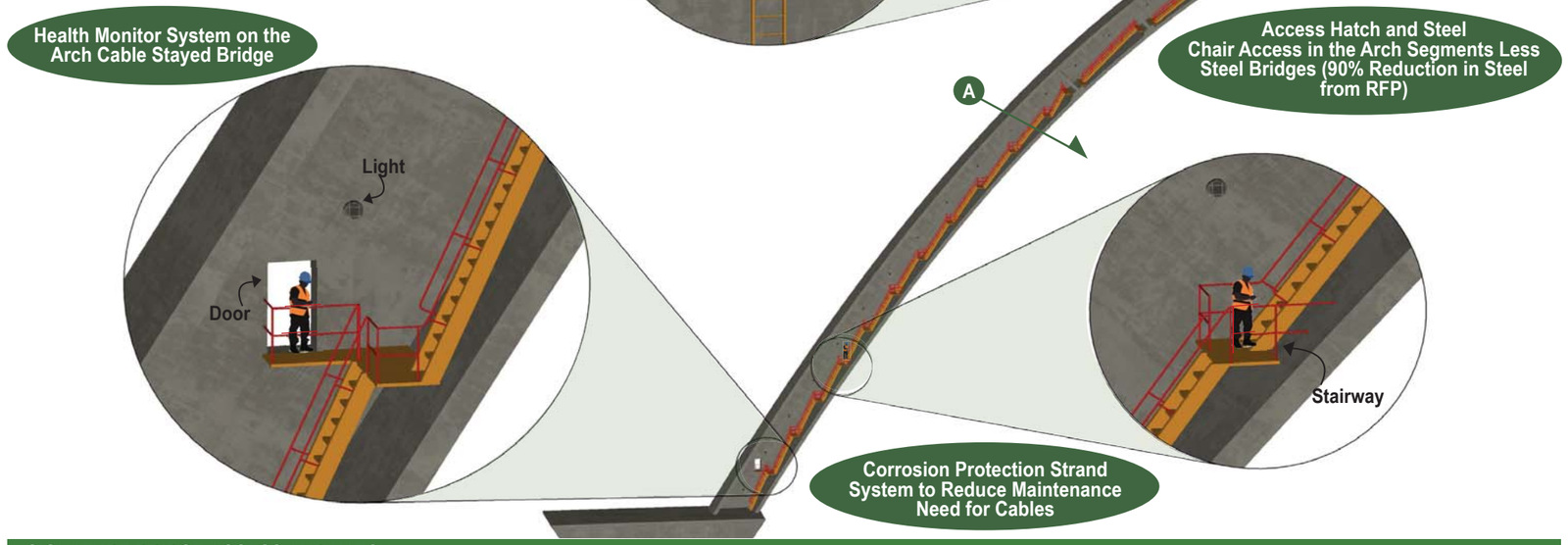


VIADUCT ACCESS

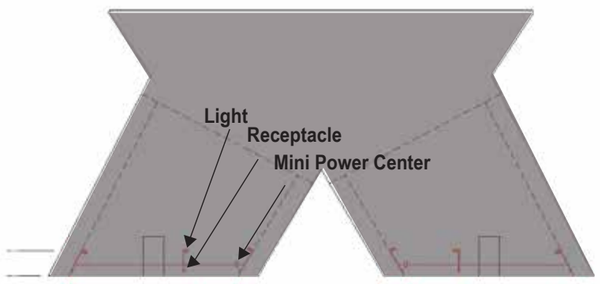


SIGNATURE BRIDGE MAINTENANCE

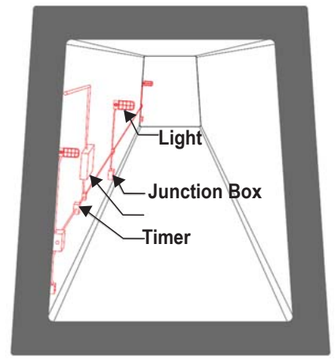
SIGNATURE BRIDGE ACCESS AND HATCH



SIGNATURE BRIDGE ACCESS AND HATCH



SIGNATURE BRIDGE CENTER PIER



A SIGNATURE BRIDGE CROSS SECTION

maintenance requirements.

- **Landscaping** – We have implemented the "right plant in the right place" strategy to help sustain the landscaping far into the future. Our design includes Florida-friendly, native and drought-tolerant landscape plant materials. Irrigation coverage is provided to ensure plant survivability and maintainability. Curbs around the planters will keep mulch and other groundcover materials within their limits, retain the water and allow adequate time for infiltration to take place which will enhance moisture retention and efficient use of the irrigation.
- **Lighting** – I-95 and I-395 will utilize 100,000-hour light engine and rugged fixtures to extend life to approximately 27 years. The pole-top mounted fixtures will also provide easy access for inspection and maintenance. On SR-836, median lighting with LED fixtures will be provided for the viaduct to minimize long-term maintenance. Signature bridge lighting is discussed later within this section
- **ITS and Tolling** – Closed Circuit Television (CCTV) will be mounted onto the ADMS. By eliminating the separate CCTV pole and other equipment from the RFP concept, the maintenance needs/requirements are reduced. The viaduct will simplify the design and impacts to the existing ORT toll zones. The benefits to the ORT zones include the elimination of the proposed ramp to NW North River Drive and its proposed ORT toll zone. This eliminates infrastructure costs to MDX, and long-term maintenance associated with maintaining generators, cameras, loops, and vehicle detection systems at this tolling zone.

Effective Life Cycle Cost Analysis of Project Elements

Our team, with the support of the Walsh Infrastructure Group, performed conceptual Life-cycle Cost Analyses in developing our solutions and designs for this project. The procedure taken for the conceptual analyses includes the following steps:

1. Layout Bridge and Itemize Bridge Elements (superstructure, joints, bearings, etc.)
2. Define Element Planning Horizons (age to significant maintenance)
3. Identify Management Strategies (means and methods)
4. Establish Degradation Parameters (special exterior factors, climate, fatigue, etc.)
5. Estimate Element Maintenance Costs
6. Compute Present Value of Costs
7. Review Results and Modify Bridge Layout, Element Details, and/or Strategies to Optimize Service Live

The results of our conceptual LCCA led to the bridge layouts and details presented in our proposal. We are confident that our proposal will significantly exceed the service life requirements of the project, including 100-years for the signature bridge as compared to the RFP 75 years.

Signature Bridge Health Monitoring System

Our team has identified a specific set of structural performance criteria composed of hazards and vulnerabilities paired with a monitoring approach to mitigate the uncertainty or overall risk for the Signature Bridge. Hazards include Corrosion, Wind, Tendon Rupture, Cable Loss, Bearing Lockup, Vehicle Impact, Moisture Ingress and Sequencing. We will design a Structural Health Monitoring System (SHMS) that ties relevant hazards and vulnerabilities to input/output responses related to performance criteria as being ideal for monitoring components. Typical monitoring will include: Strain, Rotation, Relative Displacement, Global Translation, Acceleration, Ambient Weather, Local Internal Temperature, Local Internal Relative Humidity, Corrosion and Acoustic.

The SHMS will be utilized to monitor critical features and performances of the structure including: corrosion, wind, tendon rupture, suspender loss, bearing lockup, vehicle impact, and moisture ingress. The end goal of the SHMS is to support decision-making, and not to simply collect data. The SHMS supports the objective of providing a 100-year service life at a cost for maintenance that is the most effective, yet the least possible. Data acquisition will be the key to monitoring performance and determining maintenance demands.

Inspection and Maintenance Manual

Maintenance will be the key to meeting the project's service life objectives. Our Inspection & Maintenance Manual will provide insight into the functionality of the structure and identify tell-tale signs of maintenance needs. Corrosion is the precursor to damage/loss of section for structures. Our Manual will detail specific areas of focus in order to eliminate corrosion at its earliest stage of formation. The Manual will include anticipated service lives for various elements, which will serve as guidance for increased vigilance in the inspection process.

Inspections will lead to a determination of maintenance needs both in the present and future conditions. The first step for the signature bridge will be a thorough inspection of the bridge prior to final acceptance - this will serve as the baseline for future inspections. Key elements of the Manual are listed below.

- Structure Access including emergency entry and egress
- Inspection forms
- Concrete durability (principally observance of cracks and spalls
- Internal water-tightness integrity of hollow concrete box sections; precast joint integrity
- Drainage functionality
- Bearing and joint performance including over-travel and movement induced stress (lateral and vertical)
- Post-tensioning anchorage zone functionality
- Suspenders and suspender anchorages including integrity of corrosion protection systems
- Lighting fixtures including luminosity checks

- Interface with real time SHMS results to identify areas of concern for detailed inspection

Signature Bridge

Access design for openings, catwalks, ladders and platforms will be in accordance with applicable OSHA requirements and access openings for the signature bridge have been shown on the drawings for the signature bridge arch ribs and superstructure (hollow concrete box shapes). Electrical outlets (110V) are provided at a maximum spacing of 100 feet within the tower and arch ribs and at 200 feet along the length of the superstructures. Permanent lighting is provided for access routes and access chambers. Inspection and maintenance access is designed to permit full traffic flow for replacement of replaceable components with exception to the following tasks:

- Replacement of suspender cables
- Replacement of expansion joints

For streamlined inspection and maintenance of the signature bridge's rib arches, each of the arch ribs has been equipped with an internal system of stairs, platforms, and lighting for maintenance and inspection activities. At the apex of each of the arches, a 24-inch diameter stainless steel access hatch will be installed. It will be watertight and similar in construction to a ship deck hatch (i.e., coaming). A ladder will be used to access the hatch from the interior. On the outside of the hatch, threaded stainless steel inserts will be located at appropriately spaced intervals allowing for safe access to the exterior of the arch. Hands-on inspection of the suspender anchorages will be accomplished from inside the arch ribs. At the deck level, anchorage inspection will be made by a snooper truck providing over the side access or by man-lifts from the ground level.

Future life-cycle costs associated with maintenance and inspection access have been reduced by including features such as strategically-located anchor points that facilitate the use of industrial rope access (RA). Once a maintenance or inspection team has accessed the arch apex, conventional methods of industrial RA will be used. This will allow access to the rib surfaces and suspension cables using various techniques to place inspectors or maintenance personnel within arm's reach of all components.

Four eyebolts, each rated to 5,000 pound mean breaking strength, will be installed in the top face of the arch coincident with each suspender anchorage. The anchors will be stainless steel to prevent corrosion staining of the arch exterior. The top surface of the arch will be roughened (within the tolerances of the Class V Finish) to enhance traction on sloped surfaces.

The location and details of the vertical face lighting are provided in the signature bridge plans and will consist of tray (or ledge) fixture projecting horizontally from the rib segment corners. We will use permanent bump guards or other items to help shield these assemblies from the ropes. As the maintenance or inspection team descends down the cables, the rope will project away from the rib face. Canvas rope protection will be installed at the top edges to protect sensitive components.

Crack scan technology will be used (for distances up to 500 feet) to scan, locate, and map any cracking of the rib arches. The exterior bridge deck will be within the distance limits for crack scanning.

To facilitate a safe environment for inspection and maintenance personnel inside of box sections (rib and deck), we are providing adequate ventilation within the hollow concrete arch ribs to allow air circulation and prevent moisture build-up.

Inspection and maintenance access for the bearings at the Center Pier and arch ribs will be from the ground using man-lifts and/or snooper trucks in combination with access from the interior of the hollow boxes. Full 360-degree access will be provided.

Access for the concrete box girder superstructure of the Fountain Bridge will be as presented previously for segmental structures.

Signature Bridge Aesthetic Lighting

Utilizing an entirely solid state (LED) aesthetic lighting system on the signature bridge serves to assure that required maintenance of the lighting system will be minimal. The proposed fixtures will have a projected life of 155,000 hours. This exceeds the minimum life of 50,000 hours/approximately 13 years, by more than two times its useful life. Additionally the fixtures will bear an Ingress Protection Rating of IP66, which exceeds the expectations for the harsh environment where the project is located.

The ability to utilize such long-life luminaires assures that needed maintenance over the lifespan of the luminaires will be minimal, removing the need for annual re-lamping that would have been found in HID based lighting systems.

The luminaires utilized for the arch lighting are capable of utilizing an emerging technology known as Remote Device Management (RDM), which allows the control system and the luminaire to be in continuous contact and for the luminaire to

Signature Bridge Lighting

report back any discrepancies or failures. The control system can then alert maintenance personal that a particular luminaire is experiencing an issue, thereby increasing response time and reducing the time required to monitor the system.

During those times when the luminaires do need to be serviced, luminaires located at lower elevations will be accessed via bucket trucks, while luminaires located at higher elevations will be accessed via the maintenance access points located throughout the bridge arch. The bridge's aesthetic lighting control system is located within a climate controlled room in the bridge's base, again allowing for simple walkup access and service when needed.

Our proposed design allows the system to blend with the character and reflect the cultural and environmental values of the communities they serve. The proposed aesthetic lighting applications will complement the surrounding area. By utilization of LED fixtures and appropriate color temperatures, a significant reduction in energy consumption will be realized.

COMPLIANCE WITH MDX ENHANCEMENTS MANUAL

The AW-dMG team is well aware of the RFP requirements related to compliance with the MDX Enhancements Manual. By having been involved in the design and construction of the SR 826/836 Interchange, our team has the experience and understanding of how important enhancements are to MDX. We have carefully reviewed the MDX Enhancement Manual and developed our concepts and improvements to meet the requirements in the Manual. Our technical proposal, Roll Plots and renderings are evidence of the careful attention to detail given to all the elements, including the bridge columns and retaining walls to incorporate the accent panels and finishes. We will provide Class 5 finish to all exterior concrete surfaces which will comply with the color pallet developed for the SR-836 corridor. This color pallet will be carried through the I-95 interchange to connect with the segmental bridges for I-395.

Bridge Columns With Accent Panels and Finishes

Other elements that were included in our design of our viaduct alternative not only meet the requirements of the enhancements manual but ensure continuity with the existing MDX system to the east of NW 17 Avenue. These elements include the MDX lighting fixtures, black vinyl fencing and the proposed ORT gantry for the NW 14th Street off-ramp and DMS sign structures. Additionally, an ATC was submitted and approved for the use of monotubes for overhead sign structures.

CLOSING

Our team has invested significant effort in this proposal developing innovative solutions, an iconic Signature Bridge, and the Heritage Trail. Our comprehensive solution will provide significant traffic benefits by providing mobility to help grow the economy and revitalize our community. We thank the Department and MDX for shortlisting us, and we hope to earn your trust to embark upon a long-term partnership with you to deliver this historic project.

A Comprehensive Solution