VENETIAN CAUSEWAY
(Venetian Way)
Project Development & Environment (PD&E) Study
FROM NORTH BAYSHORE DRIVE TO PURDY AVENUE

FM No. 422713-2-22-01

Efficient Transportation Decision Making (ETDM): 12756

Cultural Resources Committee (CRC)

Meeting No. 1

September 24, 2014

Florida Department of Transportation - District 6

Project Team

PROJECT MANAGER
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CONSULTANT PROJECT MANAGER:
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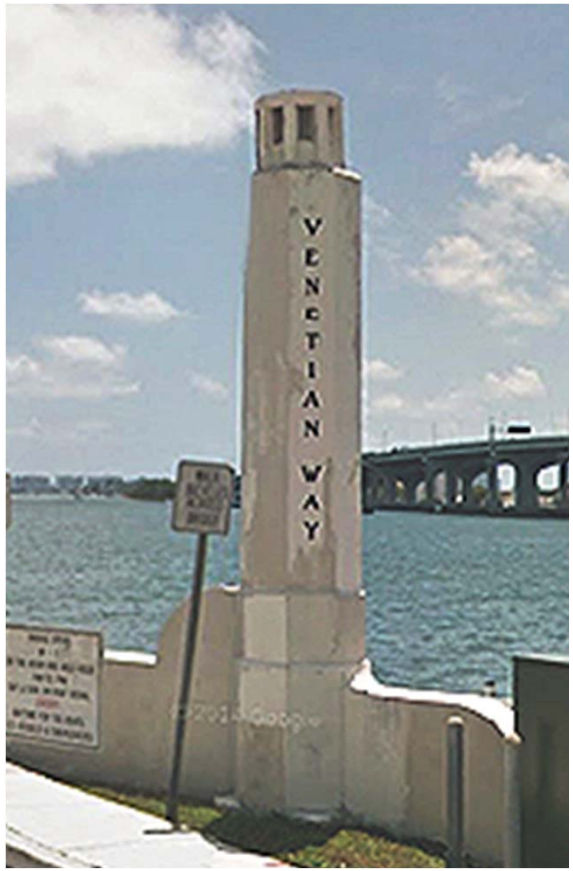
EAC Consulting, Inc.

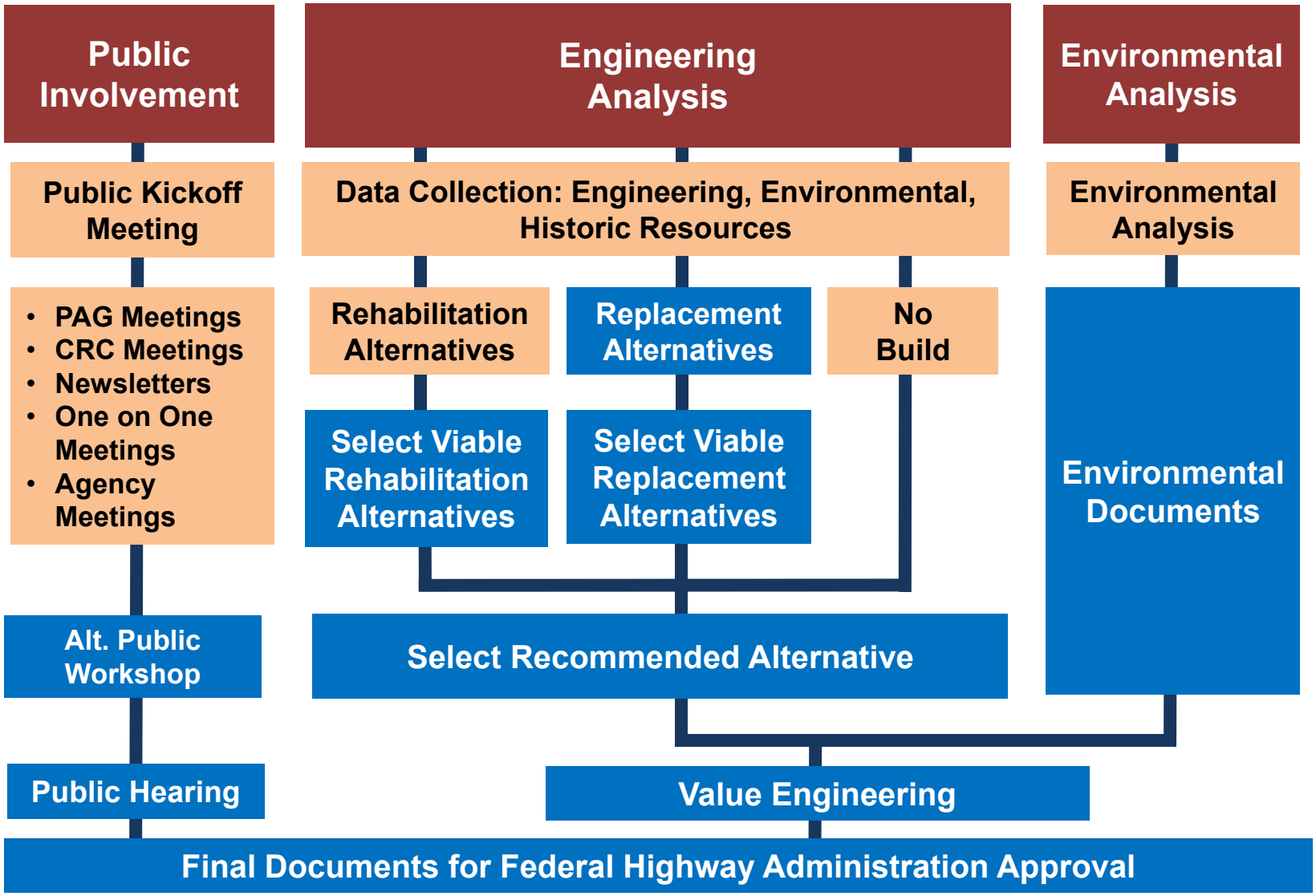
U.S. Department of Transportation
Federal Highway Administration

Agenda

- PD&E Process
- Purpose of the CRC
- Existing Condition
- Rehabilitation Parameters
- Section 106 Process
- Historic Significance
- Next Steps



PD&E Process


Public Involvement
Engineering Analysis
Environmental Analysis
Public Kickoff Meeting
Data Collection: Engineering, Environmental, Historic Resources
Environmental Analysis
• PAG Meetings
• CRC Meetings
• Newsletters
• One on One Meetings
• Agency Meetings
Rehabilitation Alternatives
Replacement Alternatives
No Build
Select Viable Rehabilitation Alternatives
Select Viable Replacement Alternatives
Environmental Documents
Alt. Public Workshop
Select Recommended Alternative
Public Hearing
Value Engineering
Final Documents for Federal Highway Administration Approval

Purpose of the CRC

To conduct and document good faith consultation with affected parties in compliance with Section 106 of the National Historic Preservation Act.

Existing Condition

Venetian Causeway Bridge Inventory

FO= Functionally Obsolete
SD= Structural Deficient
EST.= Estimated

Bridge No.	DOT Bridge #	NBI Condition Rating			Appraisal /Present Posted	Scour/Storm Evaluation		Bridge
		Sufficiency Rating		Deficiency FO/SD		Scour Depth		Exist Est. pile
		2011	*2014**	*2011/2014*	*2014*	*Year 1998*		*1927 and Renovation*
						100 Year	Category 5	
1	874459	32.6	19	FO/SD	5 Tons	26.9 ft	26.9 ft	40-54 ft
2	874460	52	45.9	FO	11 Tons	19.6 ft	29.1 ft	20-28 ft
3	874461	55.5	46	FO	11 Tons	25.0 ft	31 ft	20-28 ft
4	874463	55.5	46	FO	11 Tons	25.0 ft	31 ft	20-28 ft
5	874465	47.9	36.5	FO	11 Tons	19.6 ft	25.9 ft	20-28 ft
6	874466	57.6	48.2	FO	11 Tons	22.6 ft	28.2 ft	20-28 ft
7	874471	55.5	46	FO	11 Tons	22.0 ft	27.3 ft	20-28 ft
8	874472	55.5	46	FO	11 Tons	22.6 ft	28.9 ft	20-28 ft
9	874473	64	48.7	FO	11 Tons	24.2 ft	35.5 ft	20-28 ft
10	874474	57.5	32.1		11 Tons	25.0 ft	30.1 ft	20-28 ft
11	874477	64	41	FO	11 Tons	25.3 ft	31.6 ft	20-28 ft
12	874481	68.1	43.6		16 Tons	15.8 ft	19.4 ft	20-28 ft

*Based on FDOT Bridge Information July 1st 2014

Existing Condition

History of Continuous Repair and Maintenance

- **1970s:** Over one half of the 201 pile caps were repaired
- **1998:** Bridge Rehabilitations
  - 40%-90% of girders and deck repaired
  - One pile cap repair & Riprap placement at all foundations
- **2011:** 50%-75% of girders and deck repaired
- Much of original resource lost due to repairs and replacement
  - New light poles (1998)
  - New railings (1998)
  - 60% of West Bridge replaced in 1997 (including drawbridge)
  - East drawbridge superstructure replaced in 1998

Existing Condition

Fixed Bridges

Summary of Typical Deficiencies

- Unsound concrete in Beam & Slabs
- Failed Repairs
- Significant corrosive deterioration

Existing Condition

Fixed Bridges

Summary of Typical Deficiencies

- Utilities- Supporting Hangers broken & hanging loose & uneven pipes

Existing Condition

Fixed Bridges

Summary of Typical Deficiencies

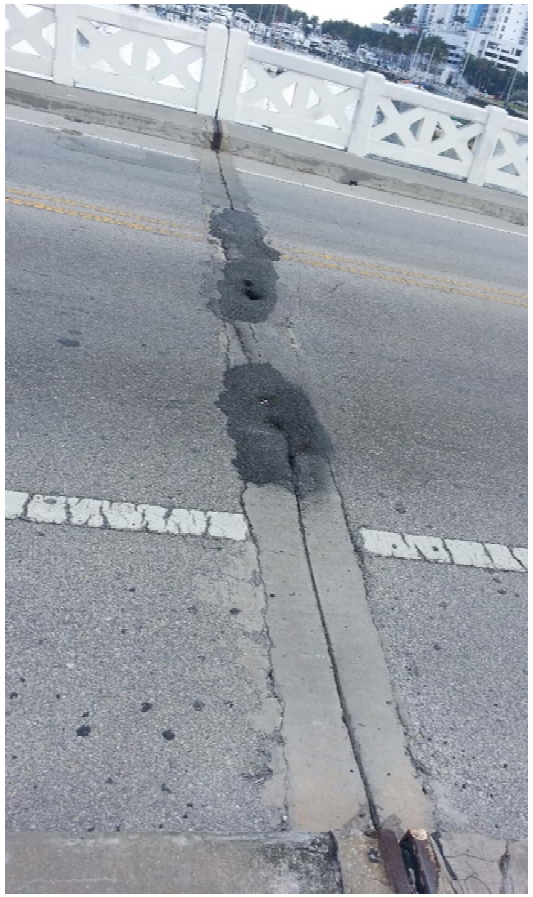
- Cracks – minor in Beams & Substructures
- Surface Corrosion- in exposed Reinforcing steel bars

Existing Condition

Fixed Bridges

Summary of Typical Deficiencies

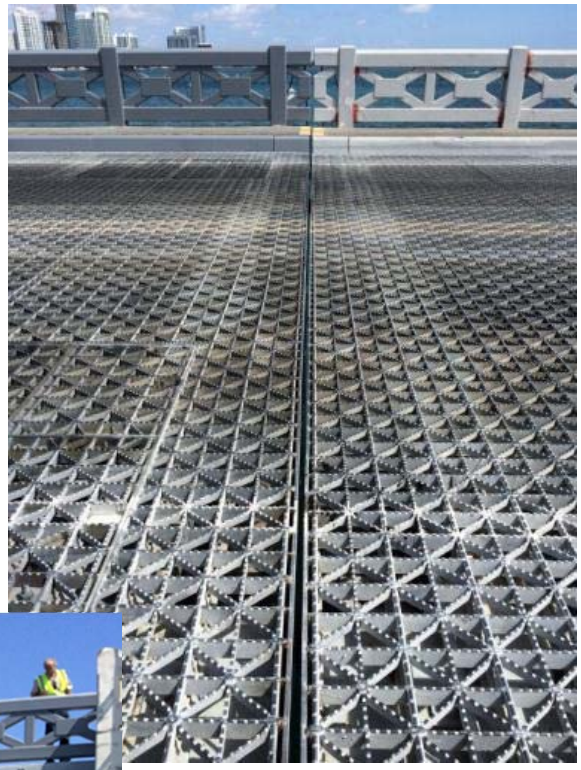
- Transverse Cracks through asphalt in structural member Joints
- Exposed reinforcing bars in slabs



Existing Condition

West Bascule (874459) – Main Span

- **Overall in Good Condition**
  - Bascule Span Replaced 1999
  - 12-ft Vert. Clearance at Fender
  - 16-ft Vert. Clearance at Center



Existing Condition

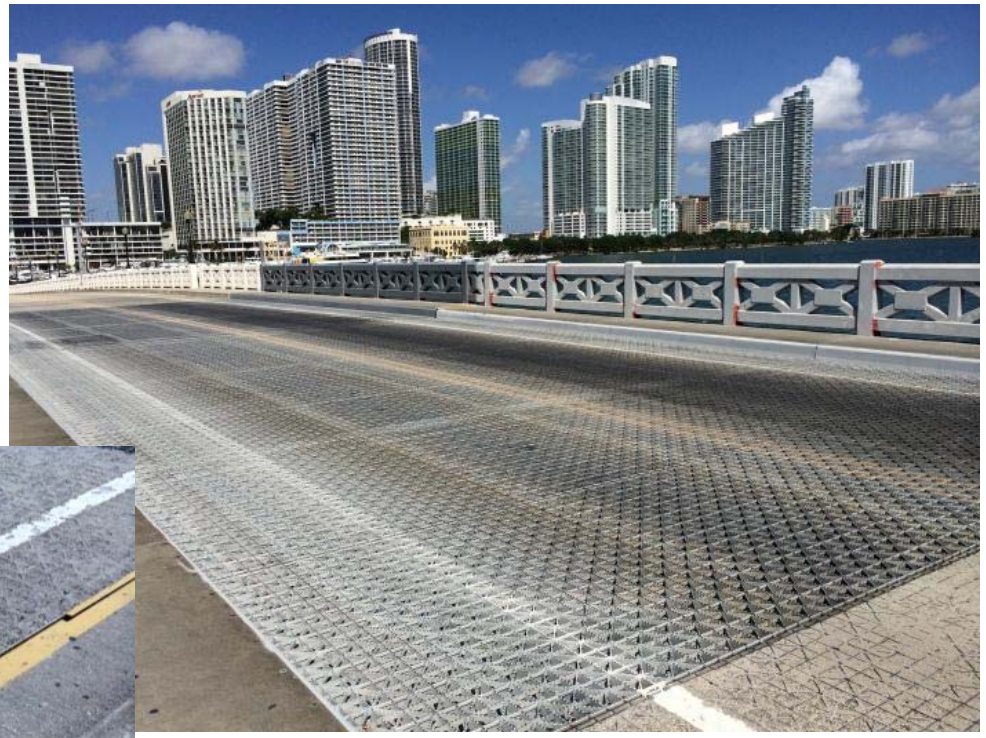
West Bascule (874459) – Main Span

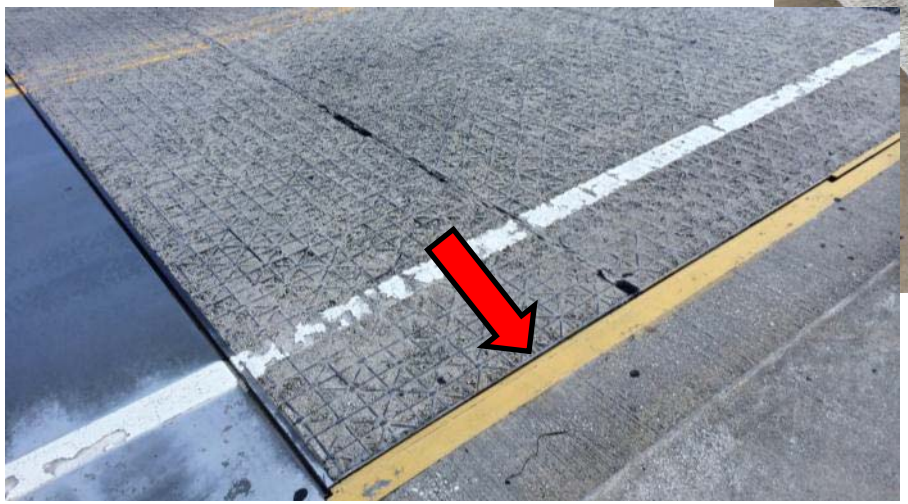
- **Steel Bascule Leaf**
  - Minor Steel Corrosion
  - Protective Coatings/Paint Needs Replacement

Existing Condition

West Bascule (874459) – Main Span

- **Undesirable Roadway Features**
  - Steel Open Grid Deck
    - **Poor Skid Resistance**
    - **Not Bicycle Friendly**
    - **Noisy**
    - **Maintenance Concerns**
  - Deck Joints in Shoulder
    - **Potential Bicycle Hazard**





Existing Condition

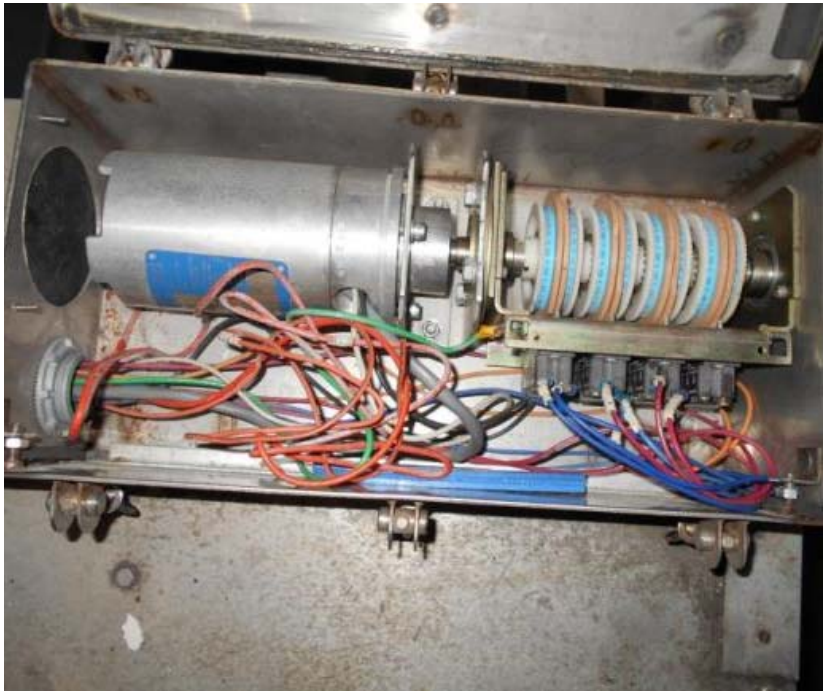
West Bascule (874459) – Main Span

- **Concrete Bascule Piers**
  - Concrete Cracking
  - Flaking Decorative Coatings
  - Openings in Pier Below 100-yr Storm Surge Elevation/Potential for Flooding

Existing Condition

West Bascule (874459) – Main Span

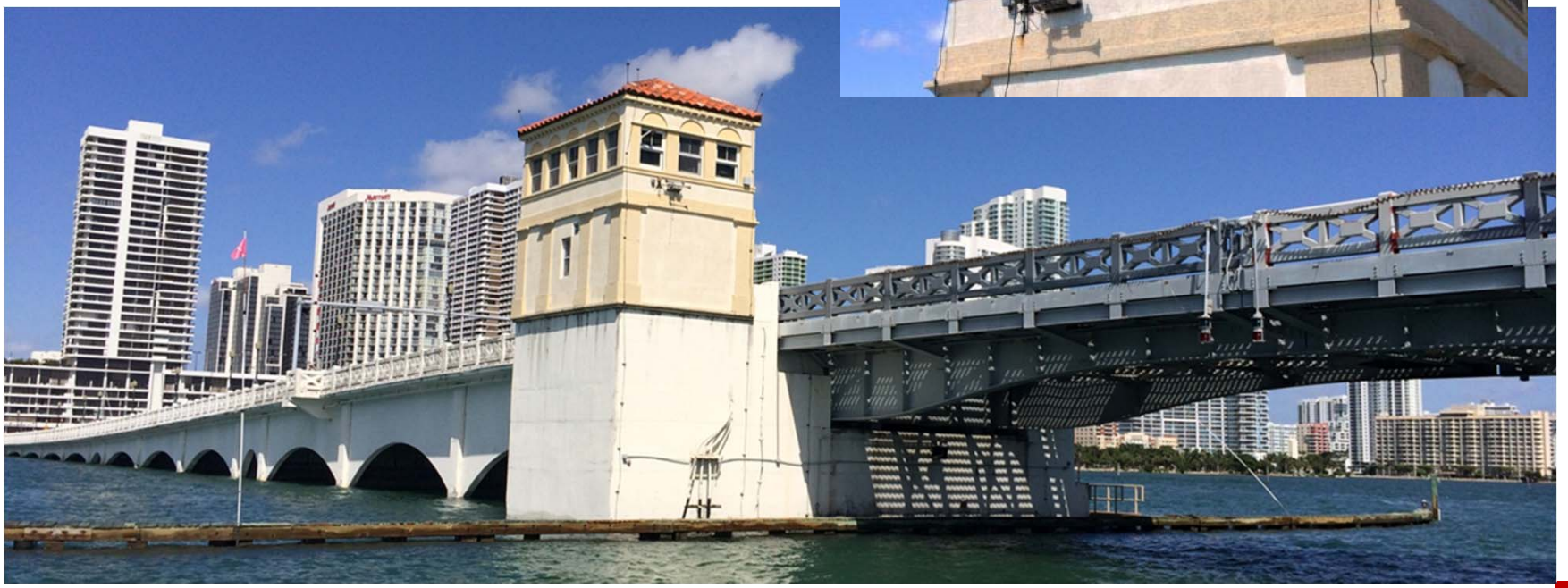
- **Electrical-Mechanical**
  - Minor Conduit and Wiring Issues
  - Minor Hydraulic Fluid Leaks
  - Moderate Wear of Span Lock Shoes



Existing Condition

West Bascule (874459) – Main Span

- **Control House**
  - Windows Need Replacement



Existing Condition

East Bascule (874474) – Main Span

- **Fair Overall Condition**
  - Bascule Leaf Replaced 1998
  - 8-ft Vert. Clearance at Fender
  - 12-ft Vert. Clearance at Center
  - Frequent Openings
  - Exposure to Splashing

Existing Condition

East Bascule (874474) – Main Span

- **Steel Bascule Leaf**
  - Minor Corrosive Deterioration
  - Protective Coatings/Paint System Failure (Repainted 2012)

Existing Condition

East Bascule (874474) – Main Span

- **Undesirable Roadway Features**
  - Steel Open Grid Deck
    - Poor Skid Resistance
    - Not Bicycle Friendly
    - Noisy
    - Maintenance Concerns
  - Deck Joints in Shoulder
    - Potential Bicycle Hazard

Existing Condition

East Bascule (874474) – Main Span

- **Concrete Bascule Piers (87+ Years Old)**
  - Concrete Cracking
  - Flaking Decorative Coatings
  - Open Piers with Extreme Exposure
  - Entire Piers/Leaves Below 100-yr Storm
  - Surge Elevation/Potential for Flooding

Existing Condition

East Bascule (874474) – Main Span

- **Electrical-Mechanical (Replaced 1998)**
  - Extensive Corrosion of Electrical Conduit
  - Minor Conduit and Wiring Issues
  - Slow Operation (2 Minutes to Raise or Lower Span)
  - Poor Machinery Alignment
  - Moderate Wear of Rolling Tracks and Treads
  - Moderate Wear of Span Lock Shoes

Rehabilitation Parameters

Determine Parameters for:

- Safety
- National Register of Historic Places Listing
- Environmental Impacts
- Service Life
- Typical Section
- Structural Capacity
- Bridge Railings and End Treatments
- Bridge Clearances
- Traffic Control during Construction
- Utility Service during Construction

Rehabilitation Parameters

Safety

- **The preserved bridge shall meet current safety standards**
  - Structural Capacity
    - Load carrying Capacity
    - Foundation Stability
    - Hurricane Resistance
    - Vessel Collision Resistance
  - Minimize exceptions and/or variations to Design Standards
  - Clearances
  - Maintain Traffic during construction
    - Hurricane evacuation
    - Emergency service
    - Residential and Business Access

Rehabilitation Parameters

Maintain National Register of Historic Places (NRHP) Listing

- Constructed in 1926
- Oldest causeway in Florida
- Listed as Historic in the Cities of Miami & Miami Beach

Maintain National Register of Historic Places (NRHP) Listing – Cont'd

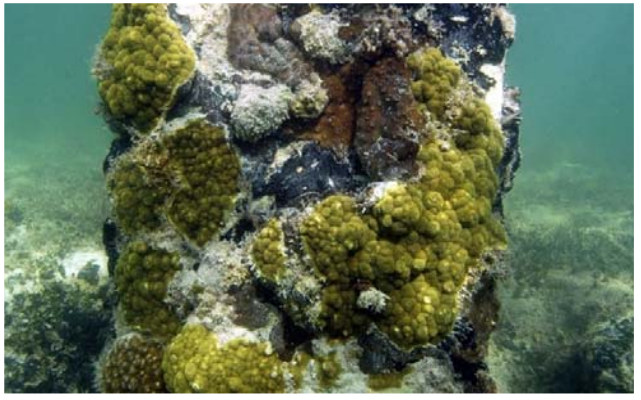
Maintain the historic character

- Bridge railings
- Light poles
- Arched form of the concrete superstructure

Rehabilitation Parameters

Environmental Analysis

- Avoid Impacts to marine resources
  - Seagrasses and Corals
  - Manatees/Sea Turtles/Smalltooth
  - Sawfish
  - Essential Fish Habitat
- Minimize impacts to Noise/Air Quality including vibration impacts
- Minimize Contamination Concerns
- Minimize Socio-cultural Impacts



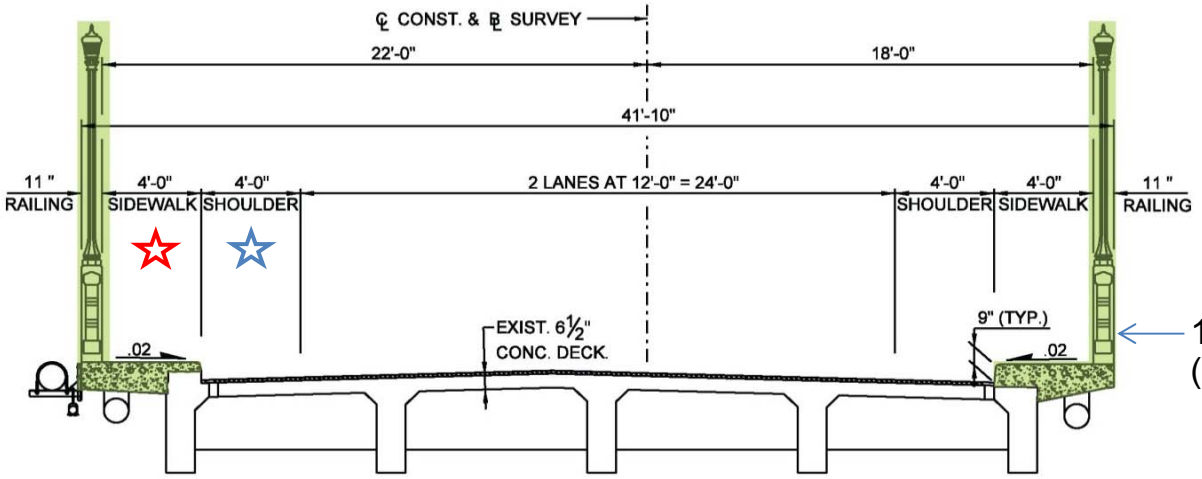
Rehabilitation Parameters

Service Life

- Indefinite (Goal)
- Presently a Major Rehabilitation is undertaken every 10 +/- years
- Proposed Rehabilitation will be for minimum of **25** years
  - Normal bridge inspection and maintenance
  - Movable bridge operating equipment requires – Periodic repair or replacement
- Achieve Sufficiency Ratings above **80**

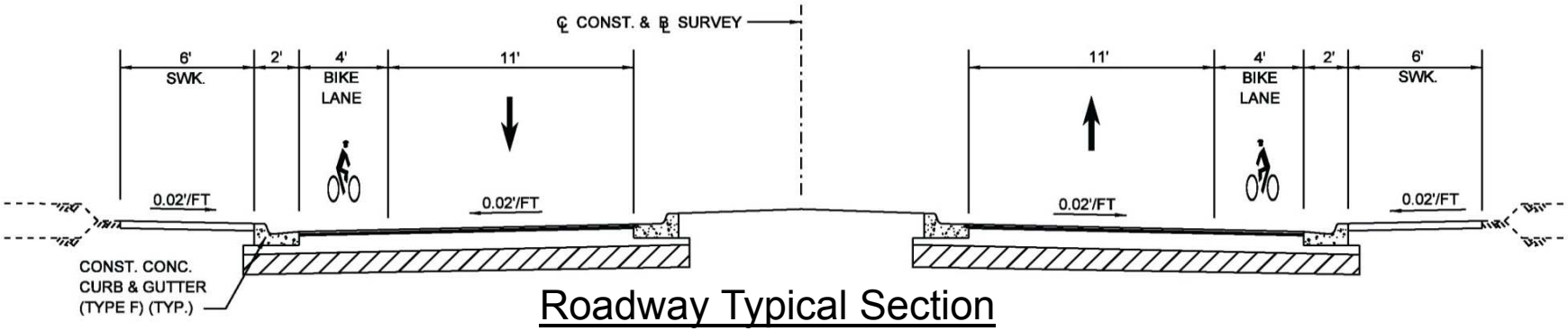
Rehabilitation Parameters

Typical Section



1998 Construction (Typ.)

Bridge Typical Section



Roadway Typical Section

Design Speed = 35 MPH (Posted at 30 MPH)

☆ 6 ft sidewalk required for FDOT, 5 ft minimum. (4 ft existing)

☆ 5.5 ft shoulder required for bike lane (4 ft existing)

- Existing bridge typical section does not meet standards and is not compatible with proposed master plan roadway typical section
- Drainage: Direct discharge through bridge scuppers into the environmentally sensitive Biscayne Bay

Rehabilitation Parameters

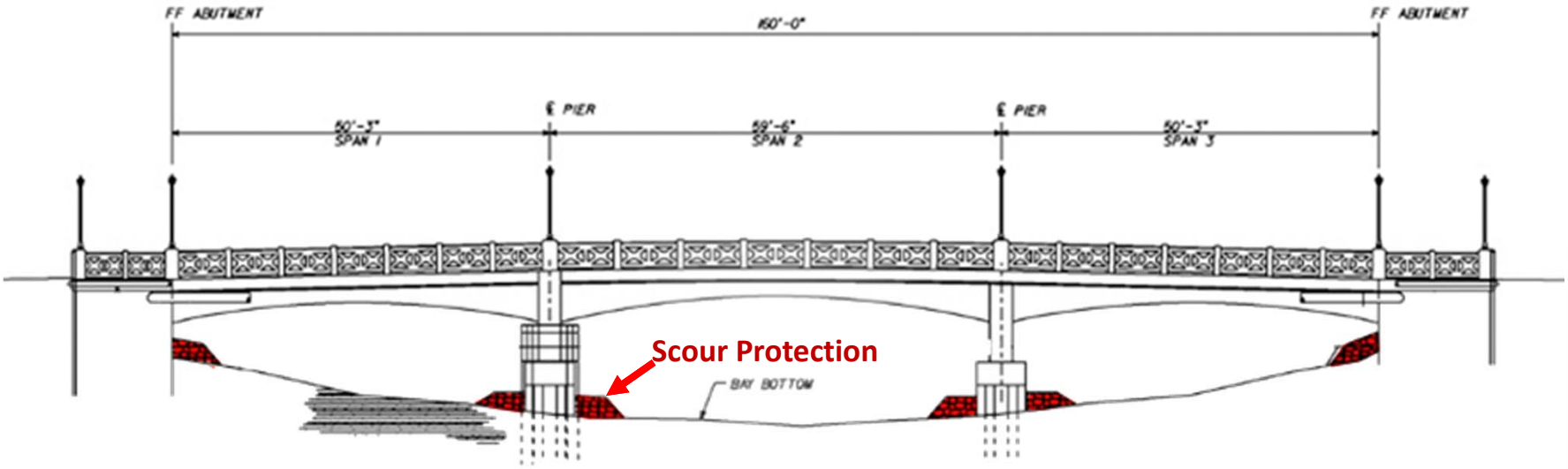
Structural Capacity – Load Carrying Capacity

- Venetian Causeway Bridges
  - Original Design Criteria – 15 ton truck (H-15)
  - Current Design Criteria – 36 ton truck (HL-93)
- Rehabilitate for current load carrying capacity requirements (HL-93)
  - Avoid load restriction
  - Extend service life

Rehabilitation Parameters

Structural Capacity – Foundation Stability

- Erosion (scour) protection (rip rap) provided in 1990's rehabilitation.
- Evaluate for current standards
- Enhance erosion protection measures as required



Structural Capacity – Hurricane Resistance

- Classification - Critical due to the cost and time to repair/replace, emergency access and the detour length
- Bridges which do not meet the wave crest clearance shall be rehabilitated to meet the capacity requirements
- Where coastal bridges are not elevated at least 1 ft. above the design wave crest elevation (DWC), a qualified coastal engineer with experience in wave mechanics shall provide 100-year design wave height, wave period and wave crest elevation along with accompanying horizontal and vertical surge and wave forces. Wave forces shall be computed according to The Guide Specifications for Bridges Vulnerable to Coastal Storms. *(FDOT Drainage Manual (2014), Section 4.9.5)*
- Coastal Bridges - The District Drainage Engineer should review tidal projects to determine if coastal hydraulics play significant role in a roadway or bridge project's design. If coastal hydraulics might be significant, a qualified coastal engineer should review the complexity of the tidal conditions to determine the appropriate level of coastal engineering expertise needed in design. *(PD&E Manual, Chapter 4)*

Structural Capacity – Hurricane Resistance - Cont'd

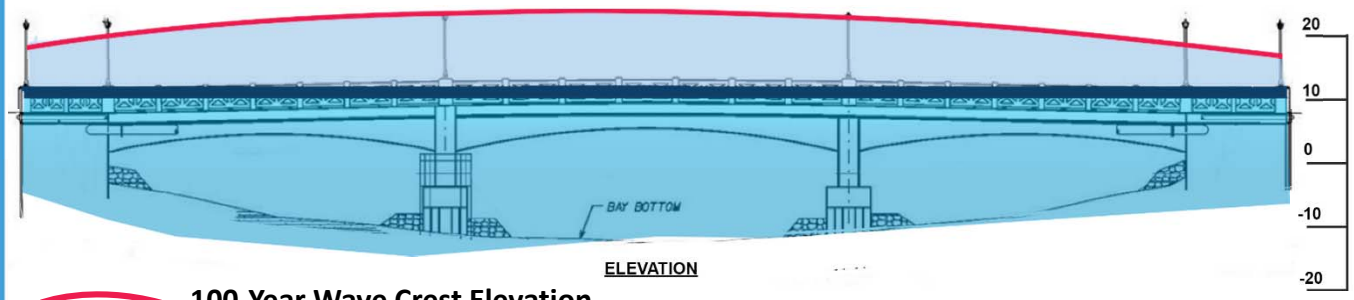
- Storm Surge (Water Level Rise)
- Wind Driven Waves
  - Large Forces
  - Potential for Significant Damage or Failure
- Current Standards
  - Raise Bridges above Maximum Wave Crest or
  - Design Bridges to Resist Large Forces from Waves

Structural Capacity – Hurricane Resistance - Cont'd

- Determine Desired Level of Performance
  - Use of Bridges Immediately after Storm or
  - Repairable Damage with Limited Delay after Storm
- Depends on Causeway Importance
  - Non-critical, Critical or Extremely Critical
  - Bridge Owner Decision
  - Numerous Factors Considered:
    - Evacuation Route
    - Emergency Response/Life Safety
    - Mobility/Traffic Impacts
    - Economic Impacts to Businesses/Residents
    - Bridge Strengthening Costs

Structural Capacity – Hurricane Resistance - Cont'd

- **100 year Peak Storm Surge Heights**
  - 7.7' (FEMA) to 11.6' (Current Study)
  - Wave crest is storm surge plus 70% of the maximum wave height. Causeway bridges are mostly below this elevation.
- **Wave Forces**
  - Vertical will be in the 10 to 12 kip/ft range or 500 to 600 kips (250 to 300 tons) per 50 ft span!
  - Horizontal wave forces will be in the 4 to 5 kip/ft range or 200 to 250 kips (100 to 125 tons) per 50 ft span! (Equivalent to a collision with a barge drifting at approximately half a knot)



Location	Design Wave Height (ft)	Wave Crest Elevation (ft-NAVD)
End Bent 1	9.3	18.1
Pier 2	13.7	21.2
Pier 3	12.9	20.6
End Bent 4	7.5	16.8

100-Year Water Surface Elevation (storm surge) and the 100-Year Wave Crest Elevations.

Structural Capacity – Hurricane Resistance - Cont'd

- Low Causeway Bridges
  - Below Anticipated Storm Surge
    - 100 Year Storm Surge – Elevation 8 ft to 12 ft
    - Wave Crests – 7 to 8 ft above Storm Surge

I-I0 Escambia Bay, FL. - Hurricane Ivan - 2005

Structural Capacity - Vessel Collision Resistance

- Prevent Collapse from Vessel Collision
- West Bascule Bridge – over Intracoastal Waterway
  - 80 Tug & Barges per Year (each direction)
  - 500 to 600 Other Larger Vessels (each direction)
- East Bascule Bridge – over Tide Relief Channel
  - Mostly Recreational and Smaller Commercial Craft Only
- All Causeway Bridges must consider Risk of Collision from Loose (Free-Floating) Barge

Structural Capacity - Vessel Collision Resistance - Cont'd

FDOT Structures Design Guidelines (2014)

- "The design of all bridges over navigable waters must include consideration for possible Vessel Collision (usually from barges or ocean going ships).
- Conduct a vessel collision risk analysis to determine the most economical method for protecting the bridge."
- Vessel Collision Risk Analysis
  - Evaluates the probability that an errant vessel could strike the bridge
  - Evaluates the risk that the bridge will collapse if hit by an errant vessel.

Structural Capacity - Vessel Collision Resistance - Cont'd

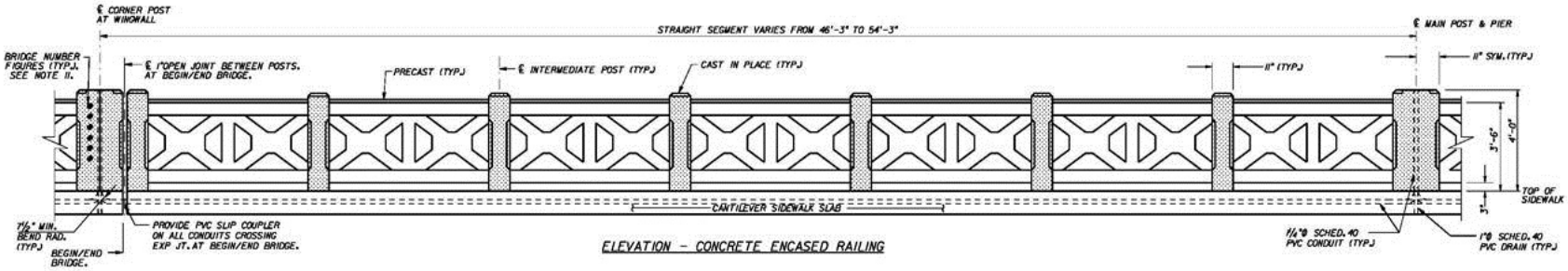
- Current Design Standards – Risk Analysis
  - Probability that vessel will veer off course
  - Probability that vessel will collide with bridge
  - Probability that bridge will collapse after collision
- Acceptable Levels of Risk
- Depends on Importance of Causeway
  - Regular (Non-critical) or Critical
  - Bridge Owner Decision
  - Numerous Factors Considered:
    - Evacuation Route
    - Emergency Response/Life Safety
    - Mobility/Traffic Impacts
    - Economic Impacts to Businesses/Residents
    - Bridge Strengthening Costs
- West Bascule Bridge does not meet Current Standards

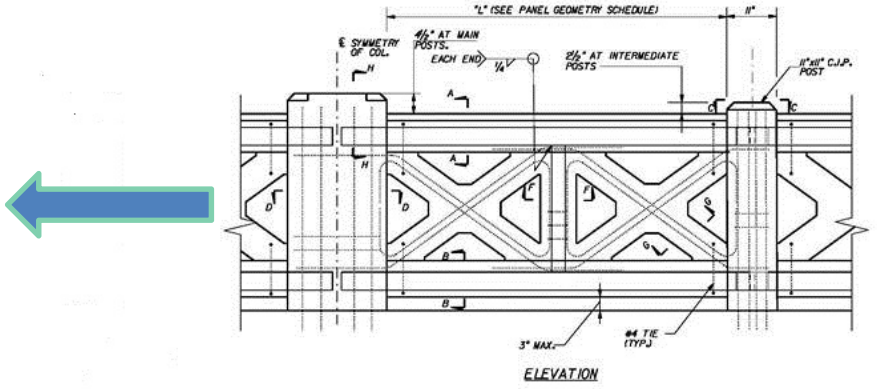
Structural Capacity – Vessel Impact Resistance

- Causeway Bridges Classified by Local Government
  - Detour Available if One Bridge Damaged
  - Design Accepts Greater Level of Risk for Collapse than “Critical” Bridges
- East Bridge over Tide Relief Channel
  - Limited to Smaller Vessels
- West Bridge over Intracoastal Waterway
  - Larger Vessels Pass Under Bridge
  - Does not Meet Current Design Criteria
- Impact to Fixed Causeway Bridges also Considered

Bridge Railings & End Treatments

- Meet Design Standards for height and strength
- Preserve historic character
- End Treatments





Rehabilitation Parameters

Bridge Clearances

- Navigational
  - Horizontal – Existing at a minimum
  - Vertical – Existing at a minimum
- Hydraulic channel below the bridge shall not be less than existing

Rehabilitation Parameters

Maintenance of Traffic - During Construction

- Rehabilitation while maintaining reasonable access
  - Venetian Isles Residents
  - Service Vehicles (Lawn Maintenance, Delivery Vehicles, etc.)
  - Mass Transit
  - Public Safety Access
  - Hurricane/Emergency evacuation
  - Pedestrians & Bicycles
  - Eliminate or minimize openings of the East Bascule Bridge if any bridge is closed to vehicular traffic

Utility services – During Construction

- Maintain Utility Services
  - Water and Sewer
  - Telephone/Data
  - Electric
  - Cable/Data

Rehabilitation Parameters

Summary

- Safety – meet current safety standards
- Maintain National Register of Historic Places Listing
- Environmental – Minimize Impacts
- Service Life – 25 year Rehabilitation
- Typical Section – Improve Functionality
- Structural Capacity – meet current standards for:
  - Load Carrying Capacity
  - Foundation Stability
  - Hurricane Resistance
  - Vessel Collision Resistance
- Bridge Railings and End Treatments
  - Preserve Historic Character
  - Meet current standards
- Bridge Clearances – existing as minimum
- Maintain Traffic during Construction
- Maintain Utilities during Construction

Section I06 Process

Initiate Section 106 Process
Establish undertaking
Identify appropriate SHPO/THPO *
Plan to involve the public
Identify other consulting parties

► *No undertaking/no potential to cause effects*

▼

Undertaking is type that might affect historic properties

▼

Identify Historic Properties
Determine scope of efforts
Identify historic properties
Evaluate historic significance

► *No historic properties affected*

▼

Historic properties are affected

▼

Assess Adverse Effects
Apply criteria of adverse effect

► *No historic properties adversely affected*

▼

Historic properties are adversely affected

▼

Resolve Adverse Effects
Continue consultation

► *Memorandum of Agreement*

▼

FAILURE TO AGREE

► **COUNCIL COMMENT**

Historic Significance

- Listed in the National Register of Historic Places and locally listed by the Cities of Miami and Miami Beach
- Notable structural features include the arched beams, geometrically designed guardrails and octagonal concrete entrance towers - additional significant features will be determined as part of CRAS
- Twelve bridges containing two bascule spans connected by a two lane road
- Extends cross six islands of which the four central islands were created from material dredged from the bay bottom
  for a residential development

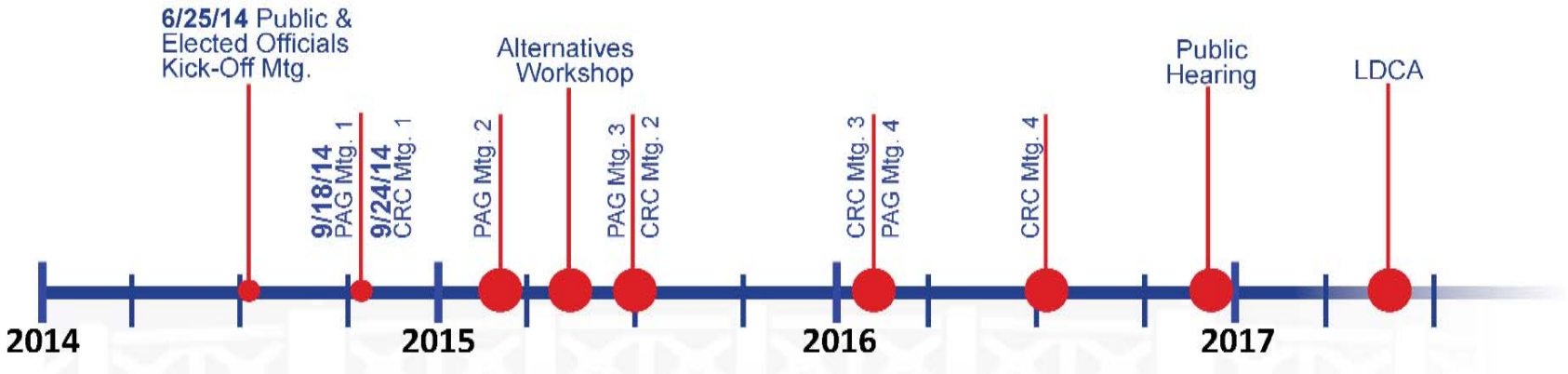
Next Steps in 106 Process

- Cultural Resources Assessment Survey
  - Establish Area of Potential Effect
  - Identify and Document Resources
  - Evaluate Significance according to NRHP Criteria
- Evaluation of Effects -Determination of Effects Case Study
- Apply Section 106 Criteria of Effects
- All Alternatives assessed in terms of their effects to resources
- Finding of No Adverse Effect—Processes Concluded
- Finding of Adverse Effect—Develop MOA and Section 4(f) Programmatic or Individual Statement Documentation

Next Steps in PD&E Process

- Rehabilitation Alternatives
- Replacement Parameters and Alternatives

Anticipated schedule



LEGEND:

CRC: Cultural Resource Committee
MTG: Meeting
PAG: Project Advisory Group
LDCA: Location Design Concept Acceptance

FDOT Contact

Project Manager: Dat Huynh, PE

Email: Dat.Huynh@dot.state.fl.us

Phone: 305-470-5217

ONLINE

- Project webpage - Updates posted weekly

  http://www.fdotmiamidade.com/venetianbridgestudy

- Efficient Transportation Decision Making (ETDM)

  https://etdmpub.fla-etat.org/est/

  - **Click on Project Number on left hand menu**
  - **Type in 12756**
  - **Click "Go" or press Enter**