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

Agency Coordination Meeting

June 28, 2017

Florida Department of Transportation - District 6

Project Team

VENETIAN ISLANDS HISTORIC BRIDGES

FDOT

MIAMI-DADE COUNTY

Cooperating Agencies

US Army Corps of Engineers

United States Coast Guard

Project Team

- **What is a Cooperating Agency?**

  According to CEQ regulation (40 CFR 1508.5), "cooperating agency" means any Federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative……. pursuant to 40 CFR 1506.3, "a cooperating agency may adopt without recirculation of the environmental impact statement of a lead agency when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied."

- **What is a Participating Agency?**

  Participating agencies, as defined by SAFETEA-LU, are those with an interest in the project. The standard for participating agency status is more encompassing than the standard for cooperating agency status described above. Therefore, cooperating agencies are, by definition, participating agencies. But not all participating agencies are cooperating agencies.

  Source: https://www.environment.fhwa.dot.gov/strmlng/safe_faq.asp

Agenda

1. Purpose and Need for Project
2. Project Status
3. Alternatives Analysis
4. Viable Alternatives
   - No-Build
   - Build
4. Estimated Costs
5. Maintenance of Traffic
6. Anticipated Schedule
7. Environment
8. Evaluation Matrix
9. Next Steps

Purpose and Need for Project

The purpose of the proposed project is to address identified structural and functional deficiencies of the twelve existing bridges (ten low-level fixed spans and two movable bascules), through potential alternatives such as no build, replacement or rehabilitation.

Purpose and Need for Project

Posted on Monday, 04.14.14 | A A | Share | email | print | comment | reprints

VENETIAN CAUSEWAY

Bus service suspended on Venetian Causeway

Like 171

Housekeeper Sonia Gomez has to walk across the west end of the Venetian Causeway on Monday, April 14, 2014, to a catch a bus because the bus she would ordinarily take cannot cross the bridge. PATRICK FARRELL / MIAMI HERALD STAFF

Fullsize | Buy Photo | previous | next
Image 1 of 3

Related Content

- Smaller buses to serve a portion of Venetian Causeway

BY CHRISTINA VEIGA AND PATRICIA MAZZEI
CVEIGA@MIAMIHERALD.COM

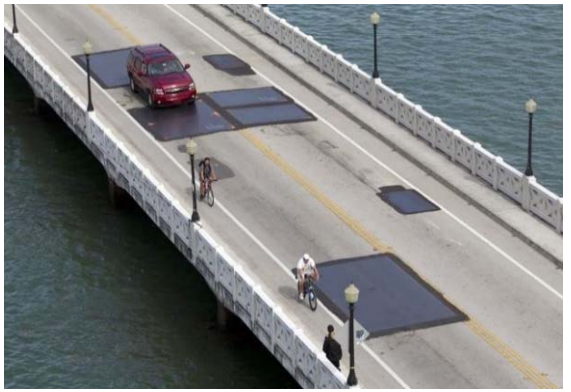
Metrobus service has been suspended on the Venetian Causeway after a bus opened a hole in a bridge deck, forcing county officials to impose stricter weight restrictions.

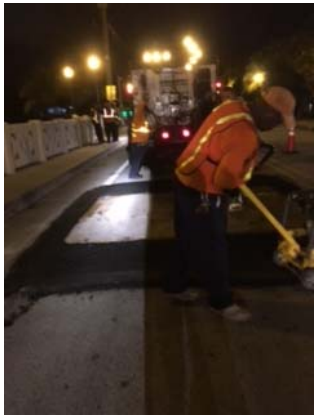
"The load restrictions are going to be in place for many years, in all likelihood," said Miami-Dade County Engineer Antonio Cotarelo.

The hole incident occurred last month, prompting special inspections of bridges on the Venetian, which in turn led to the suspension of bus service late Friday.

So far, emergency services are running as normal, said Miami Beach Fire Rescue Capt. Adonis Garcia. But bus service over the causeway has been suspended since the lightest county bus weighs 15 tons — well over the five-ton and 11-ton restrictions now placed on portions of the bridge.

Bus riders who take Miami-Dade Transit Route A or the South Beach Local are most impacted by the route changes.





Purpose and Need for Project

Structural and Functional Deficiencies

Bridge No.	DOT Bridge #	NBI Condition Rating							
		Sufficiency Rating							Deficiency FO/SD
		2011	*2012*	*2013*	*2014*	*2015*	*2016*	*2017**	*2017*
1	874459	32.6	32.6	32.6	19.0	-	-	64.0	-
2	874460	52.0	52.0	54.7	45.9	45.9	45.9	49.9	FO
3	874461	55.5	55.5	52.2	46.0	46.0	36.5	41.3	FO
4	874463	55.5	55.5	55.3	46.0	46.0	36.5	41.3	FO
5	874465	47.9	47.9	47.6	36.5	36.5	36.5	41.3	FO
6	874466	57.6	57.6	54.4	48.2	48.2	39.2	43.8	FO
7	874471	55.5	49.9	52.2	46.0	46.0	46.0	41.3	FO
8	874472	55.5	55.5	55.5	46.0	46.0	36.5	41.3	FO
9	874473	64.0	64.0	61.0	48.7	48.7	48.7	44.3	FO
10	874474	57.5	54.5	54.5	32.1	32.1	32.1	32.2	FO
11	874477	64.0	64.0	56.7	41.0	41.0	30.0	35.6	FO
12	874481	68.1	68.1	68.1	40.4	40.4	40.4	34.9	FO

*** Based on FDOT Bridge Information, April 3rd 2017**

FO= Functionally Obsolete **SD=** Structurally Deficient

Class of Action (COA) Determination

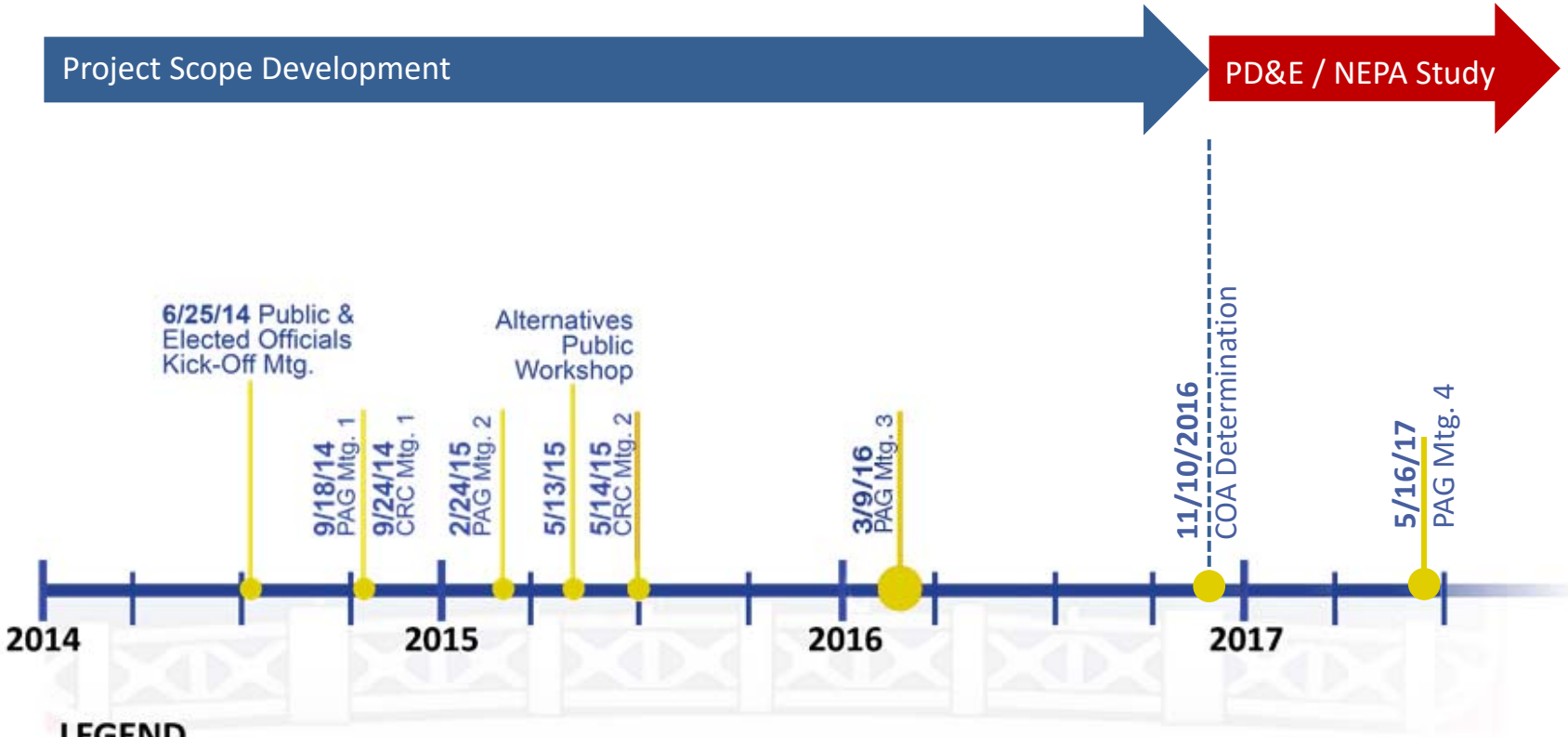
- In **October 2016**, the Federal Highway Administration (FHWA) agreed the Project Development & Environment (PD&E) Study would proceed under the National Environmental Policy Act (NEPA).

- Class of Action (COA) determination of **Environmental Assessment (EA)** was approved on **November 10, 2016**.

National Environmental Policy Act (NEPA) Assignment – Effective 12/14/2016

Pursuant to 23 United States Code (U.S.C.) 327, the Florida Department of Transportation (FDOT) has assumed Federal Highway Administration's (FHWA's) responsibilities under the National Environmental Policy Act (NEPA) for highway projects on the State Highway System (SHS) and Local Agency Program (LAP) projects off the SHS. In general, FDOT's assumption includes all highway and roadway projects in Florida whose sources of federal funding comes from FHWA or which constitute a federal action through FHWA. This includes responsibilities for environmental review, interagency consultation and other regulatory compliance-related actions pertaining to the review or approval of NEPA projects. Therefore, whereas FHWA was previously identified as the Lead Federal Agency, this function is now served by FDOT with approval authority resting in the Office of Environmental Management (OEM).

Project Status



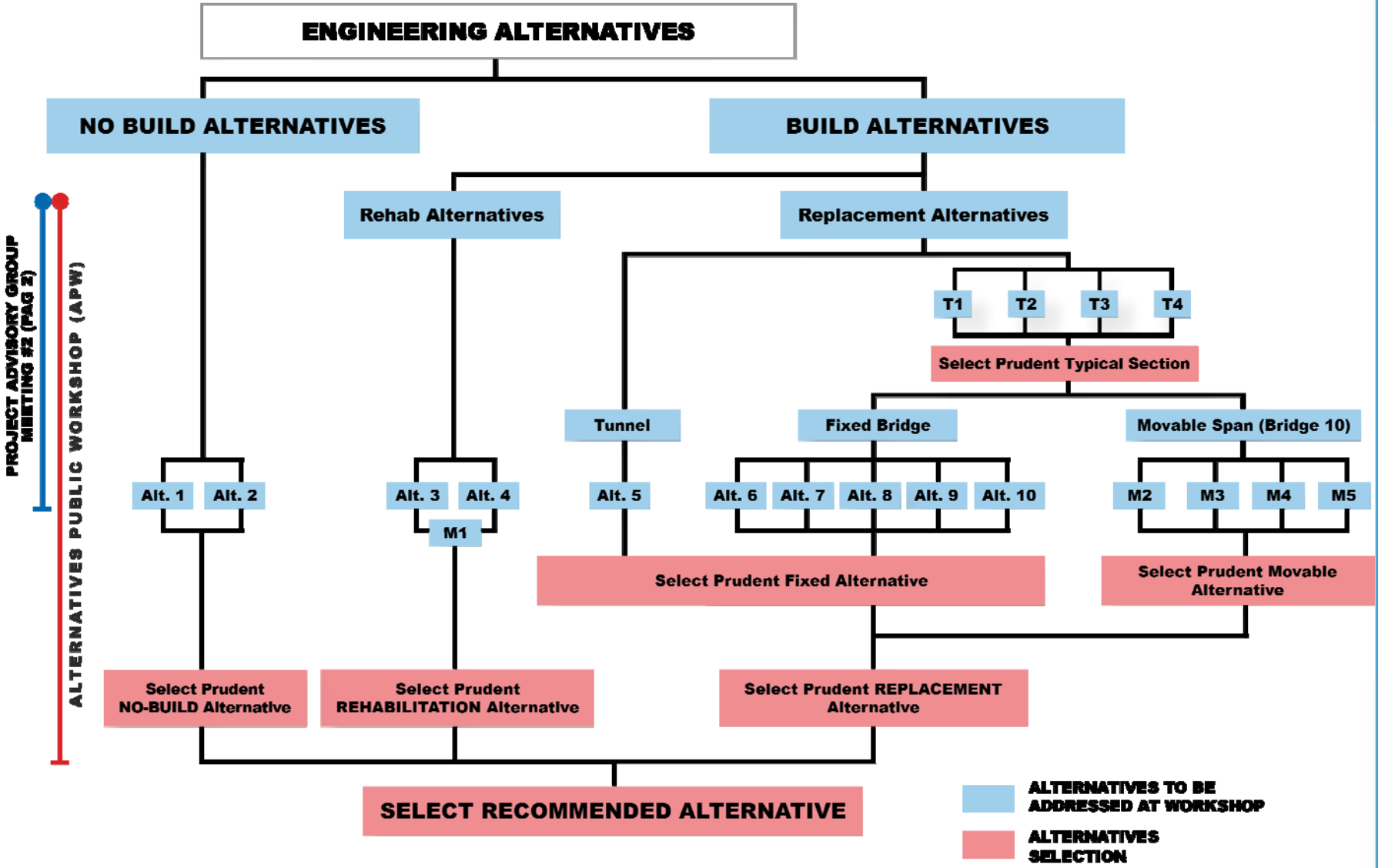
LEGEND

CRC: Cultural Resource Committee

MTG: Meeting

PAG: Project Advisory Group

Alternatives Analysis - Flowchart



Alternatives Analysis – Public Workshop Ranking Ballot

Name: Joe Sample
Address: 1234 Venetian Way, Miami, FL, 33139
Phone No.: (305) 765-4321
Email Address: jsample@email.com

Ranking Ballot

APW # 1

1. Select either No-Build, Rehabilitation or Replacement in the Option column by circling the option. **Select one option only.**
2. Rank the alternatives within the option you selected. Assign a "1" to the top ranked alternative for the selected option, "2" your second ranked alternative, etc.
3. Rank the Maintenance of Traffic Options, with "1" being the most preferred.
4. Please hand in the Ranking Ballot at the Alternatives Public Workshop, e-mail to Dat.Huynh@dot.state.fl.us by 5/20/2015 or mail (post marked by 5/20/2015) to: Dat Huynh, P.E., Florida Department of Transportation – District 6; Adam Leigh Cann Building 1000 NW 111 Avenue, Room 6251 Miami, Florida 33172

Option	Alternative	Description	Ranking
No-Build Alternative	1	Do Nothing	
	2	Transportation System Management	
Rehabilitation Alternatives			
Build Alternatives *Rehabilitation*	3	Fixed Bridge Rehab w/out Beam Strengthening	
	4	Fixed Bridge Rehab with Beam Strengthening	
	M1	Bascule Bridge Rehabilitation	
Replacement Alternatives			
Build Alternatives *Replacement*	**Typical Section Alternatives**		
	T1	Venetian Railing	
	T2	Wyoming Railing TL-4 at coping	
	T3	Wyoming Railing TL-3 at curb and Original Venetian Railing at Coping	
	T4	Wyoming Railing TL-3 at curb and Custom Railing at Coping	
	Fixed Alternatives		
	5	Tunnel	
	6	High Level Fixed Bridge	
	7	Arched Beams	
	8	FIB With Arched Fascia	
	9	FIB	
	10	Cast-in-Place Slab (Flat/Variable Depth)	
	Movable Bridge Alternatives		
	M2	Swing Bridge	
	M3	Vertical Lift Bridge	
	M4	Double Leaf Bascule Bridge	
	M5	Single Leaf Bascule Bridge	
Maintenance of Traffic			
	Option 1	Detours	
	Option 2	Phased Construction With Detour at East Bridge	
	Option 3	Phased Construction With Temporary Bridge at East Bascule	

Distributed at Alternatives Public Workshop ● Provided to Home Owner Associations ● Allowed for write-in Alternatives
Provided on project website with a deadline for return ● Number of respondents to the ballots: 31

Alternatives Analysis – No-Build

Alt. 1

Alt. 1 - Do Nothing

- Existing Deficiencies will Remain
- Continued Deterioration
- Extensive Periodic Repairs and Maintenance

Does not meet purpose and need for project

Alternatives Analysis – No-Build

Alt. 2 – Transportation System Management and Operations

Alt. 2

- Enhanced Bus service
- Facilitate Pedestrians and Bicyclists
- Existing Deficiencies will remain, but safe bridges required for effective TSM&O

Does not meet purpose and need for project

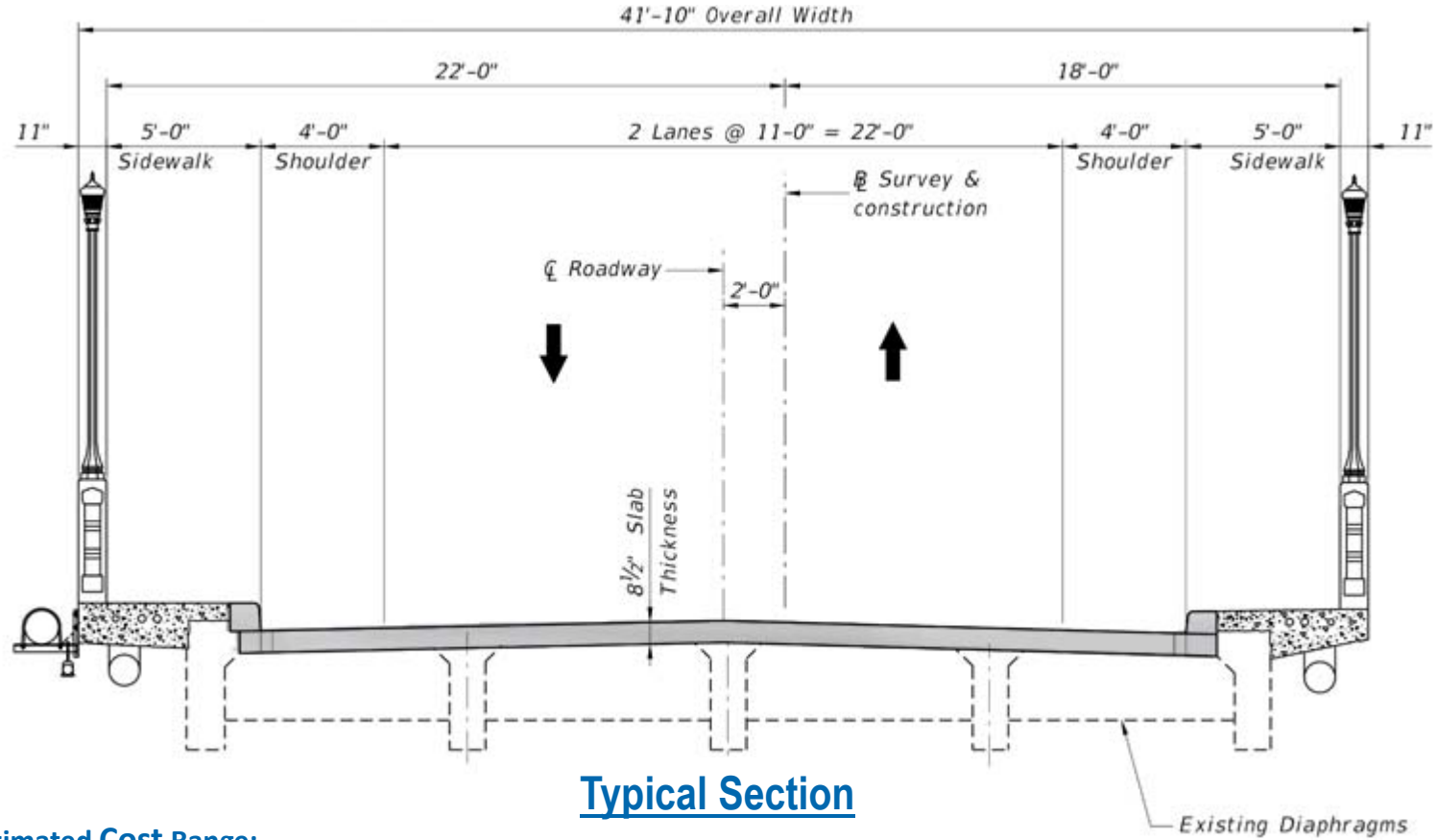
Alternatives Analysis - Ranking Ballot Results

Alternative	No Build	Votes
1	Do Nothing	0
2	Transportation System Management	0
	Rehabilitation	
3	Without Beam Strengthening	
4	With Beam Strengthening	
	Replacement - Typical Sections	
T1	Venetian Railing	
T2	Wyoming TL-4 at Coping	
T3	Wyoming TL-3 at curb and original Venetian at coping	
T4	Wyoming TL-3 at curb and Custom Railing at coping	
	Replacement - Fixed Alternatives	
5	Tunnel	
6	High Level Fixed Bridge	
7	Arched Beams	
8	FIB with Arched Fascia	
9	FIB	
10	Cast-in-Place Slab (Flat/ Variable Depth)	
	Infill of Spoil Islands -	
	Replacement - Movable Bridge Alternatives	
M2	Swing Bridge	
M3	Vertical Lift Bridge	
M4	Double Leaf Bascule Bridge	
M5	Single Leaf Bascule Bridge	
	Maintenance of Traffic	
Option 1	Detours	
Option 2	Phased Construction with Detour at East Bascule	
Option 3	Phased Construction with Temporary Bridge at East Bascule	

Rehabilitation Alternatives

Alt. 3

Alt. 3 - Fixed Bridge Rehab w/out Beam Strengthening



Typical Section

Estimated Cost Range:
$34 - $36 Million

- Expand Sidewalk to 5 feet to meet minimum requirement for ADA
- 4 ft Shoulder does not meet 5.5 ft shoulder bike lane requirement

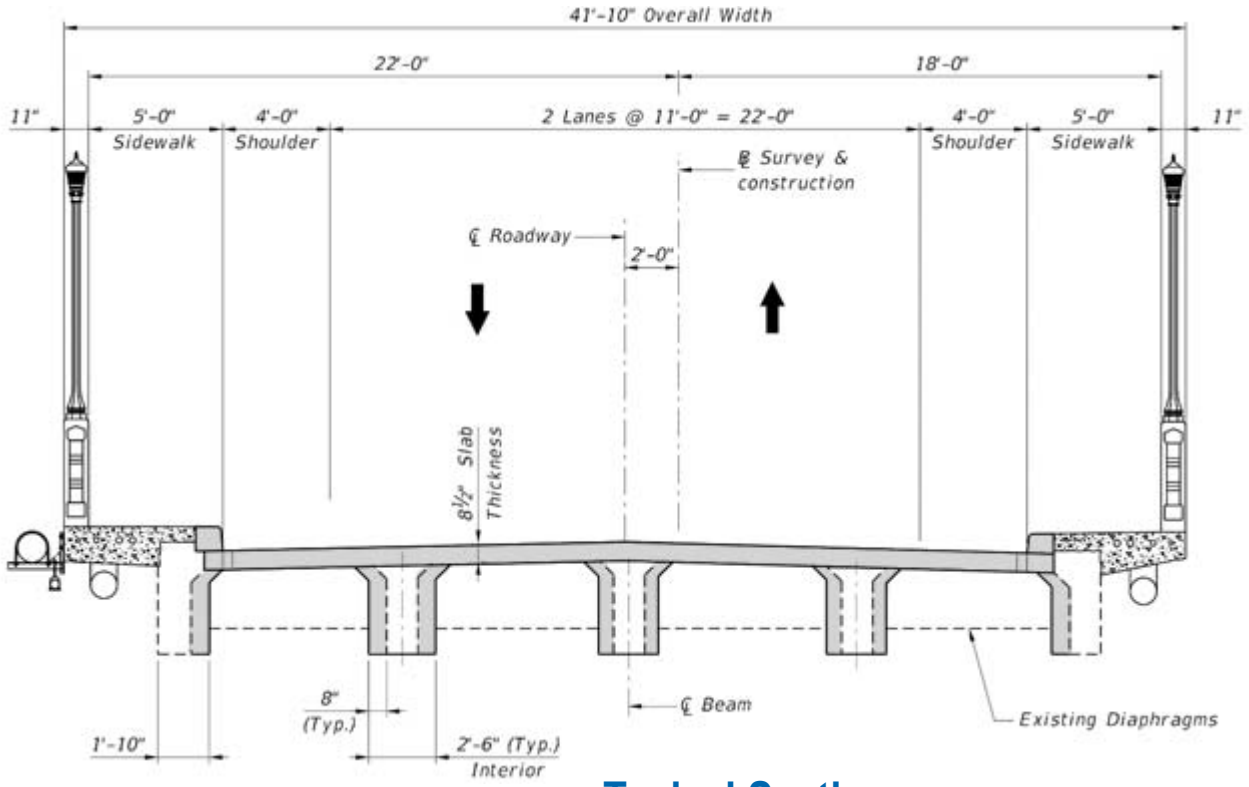
Rehabilitation includes:

- Deck Replacement and Foundation Strengthening
- 41'-10" Overall width to remain, Venetian Railing to remain

Rehabilitation Alternatives

Alt. 4

Alt. 4 - Fixed Bridge Rehab with Beam Strengthening



Typical Section

Estimated Cost Range:

$42 - $44 Million

- Expand Sidewalk to 5 feet to meet minimum requirement for ADA
- 4 foot Shoulder does not meet 5.5 foot shoulder requirement for bike lane

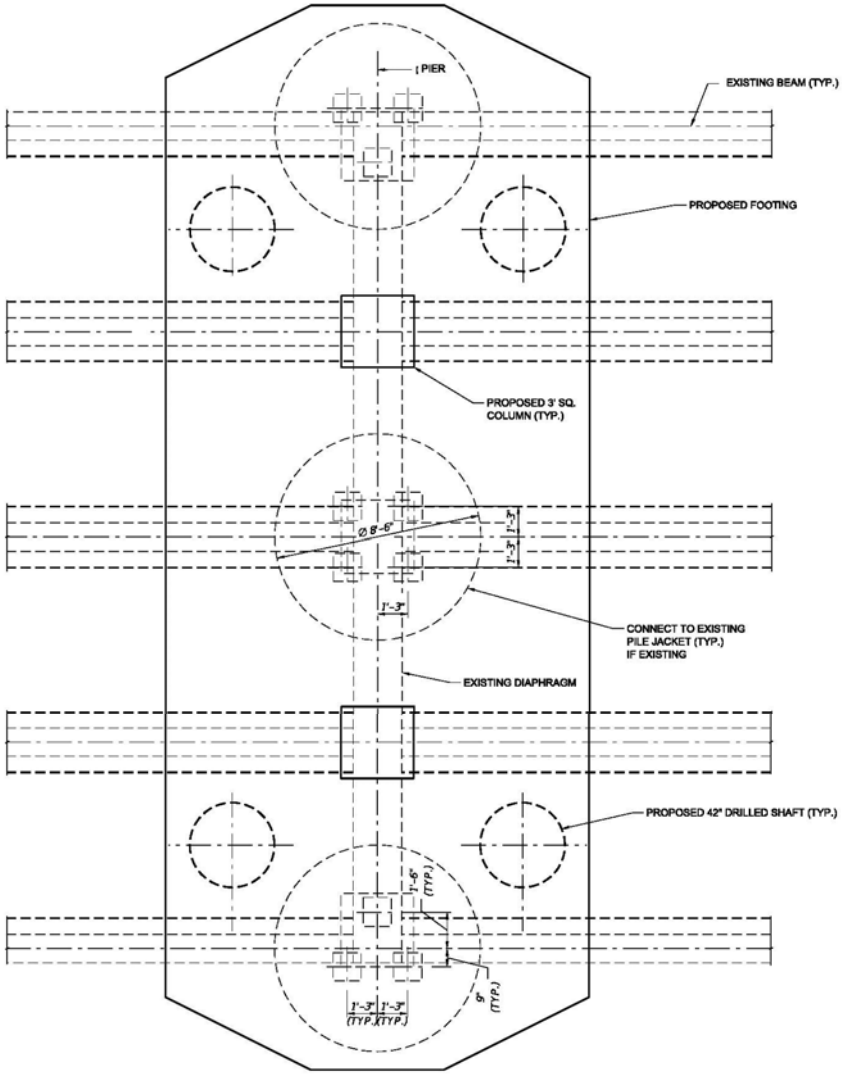
Rehabilitation includes:

- Deck Replacement Beam and Foundation Strengthening
- 41'-10" Overall width to remain, Venetian Railing to remain

Rehabilitation Alternatives

Alt. 3 & 4 –Foundation Strengthening

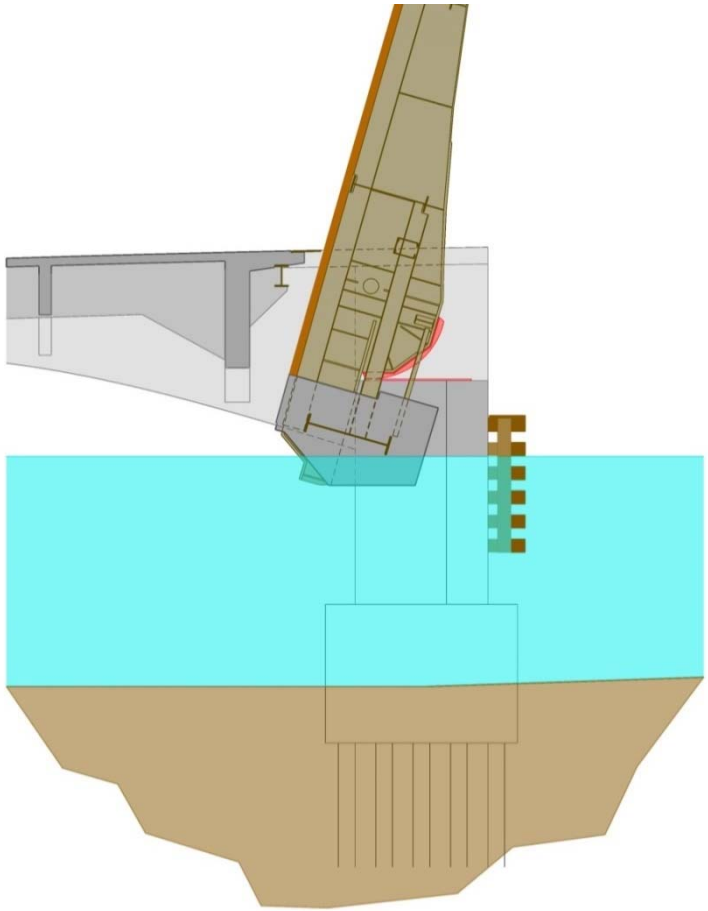
- Repair concrete spalls and cracks
- Extend Service Life
- Cathodic protection
- Footing Encasement
- Pier Strengthening for wave vulnerability
- Riprap placement at foundations for scour protection



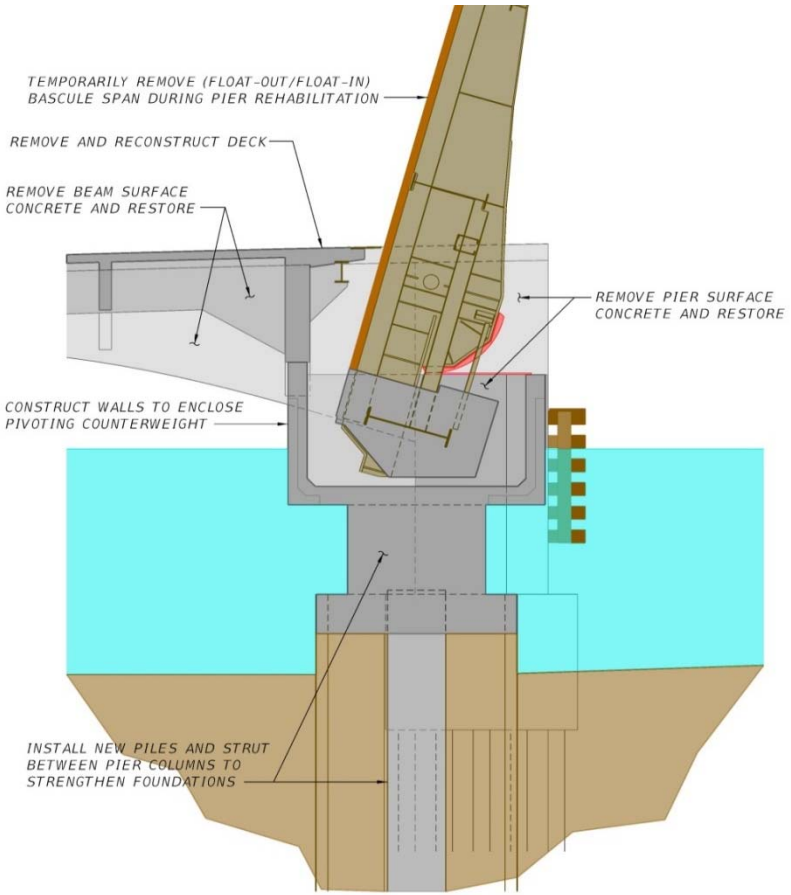
Rehabilitation Alternatives

M1

Alt. M1 - Bascule Bridge Rehabilitation



SECTION THRU EXISTING BASCULE SPAN



SECTION THRU REHABILITATED BASCULE SPAN

Estimated Cost Range: $8 - $9 Million

Alternatives Analysis - Ranking Ballot Results

Alternative	No Build	Votes
1	Do Nothing	0
2	Transportation System Management	0
	Rehabilitation	
3	Without Beam Strengthening	3
4	With Beam Strengthening	6
	Replacement - Typical Sections	
T1	Venetian Railing	
T2	Wyoming TL-4 at Coping	
T3	Wyoming TL-3 at curb and original Venetian at coping	
T4	Wyoming TL-3 at curb and Custom Railing at coping	
	Replacement - Fixed Alternatives	
5	Tunnel	
6	High Level Fixed Bridge	
7	Arched Beams	
8	FIB with Arched Fascia	
9	FIB	
10	Cast-in-Place Slab (Flat/ Variable Depth)	
	Infill of Spoil Islands -	
	Replacement - Movable Bridge Alternatives	
M2	Swing Bridge	
M3	Vertical Lift Bridge	
M4	Double Leaf Bascule Bridge	
M5	Single Leaf Bascule Bridge	
	Maintenance of Traffic	
Option 1	Detours	
Option 2	Phased Construction with Detour at East Bascule	
Option 3	Phased Construction with Temporary Bridge at East Bascule	

Replacement Alternatives – Typical Section/ Railing Selection

T1

T1 – Venetian Railing

- Functions as Traffic Barrier and Pedestrian Railing
- Matches Current Railings on Causeway but with addition of Inserts in Openings

Replacement Alternatives – Typical Section/ Railing Selection

T2

T2 – Wyoming Railing TL-4 at coping

- Functions as Traffic Barrier and Pedestrian Railing
- Steel Tube Railing with Intermediate Cables

Replacement Alternatives – Typical Section/ Railing Selection

T3

T3 – Wyoming Railing TL-3 at curb and Original Venetian Railing at Coping

- Traffic Barrier at Curb provides Separation from Traffic; Improves Safety and Functionality at Movable Span
- Matches Original Venetian Causeway Railing with larger openings, but with inserts in openings

Replacement Alternatives – Typical Section/ Railing Selection

T4

T4 – Wyoming Railing TL-3 at curb and Custom Railing at Coping

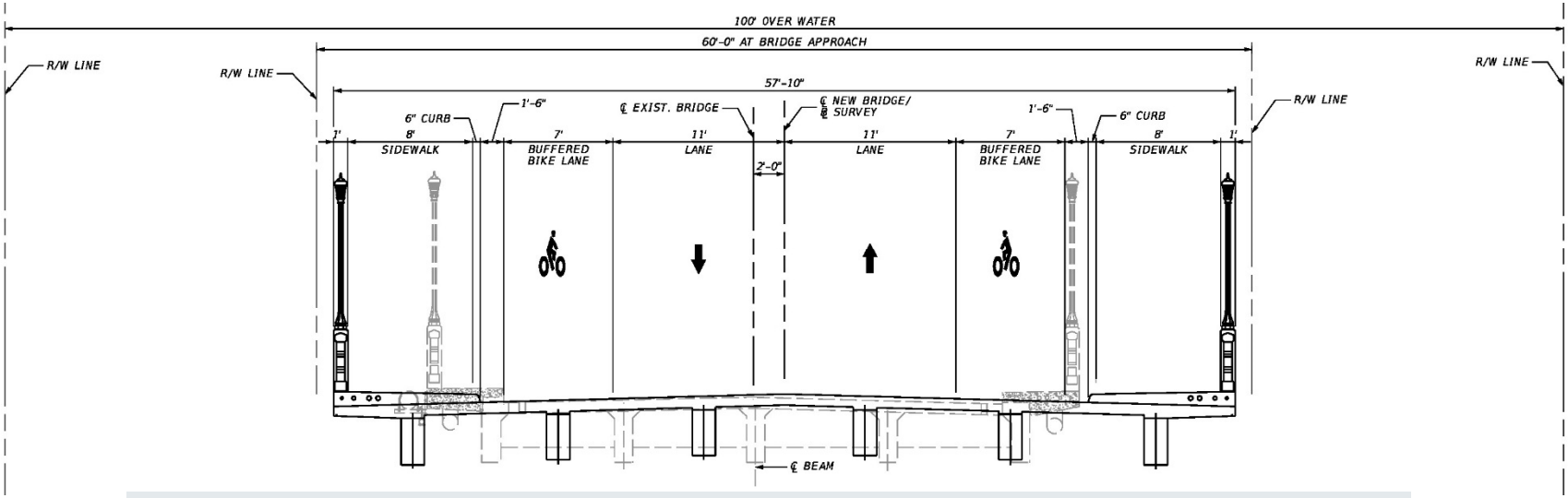
- Traffic Barrier at Curb provides Separation from Traffic; Improves Safety and Functionality at Movable Span
- Custom Metal Pedestrian Railing

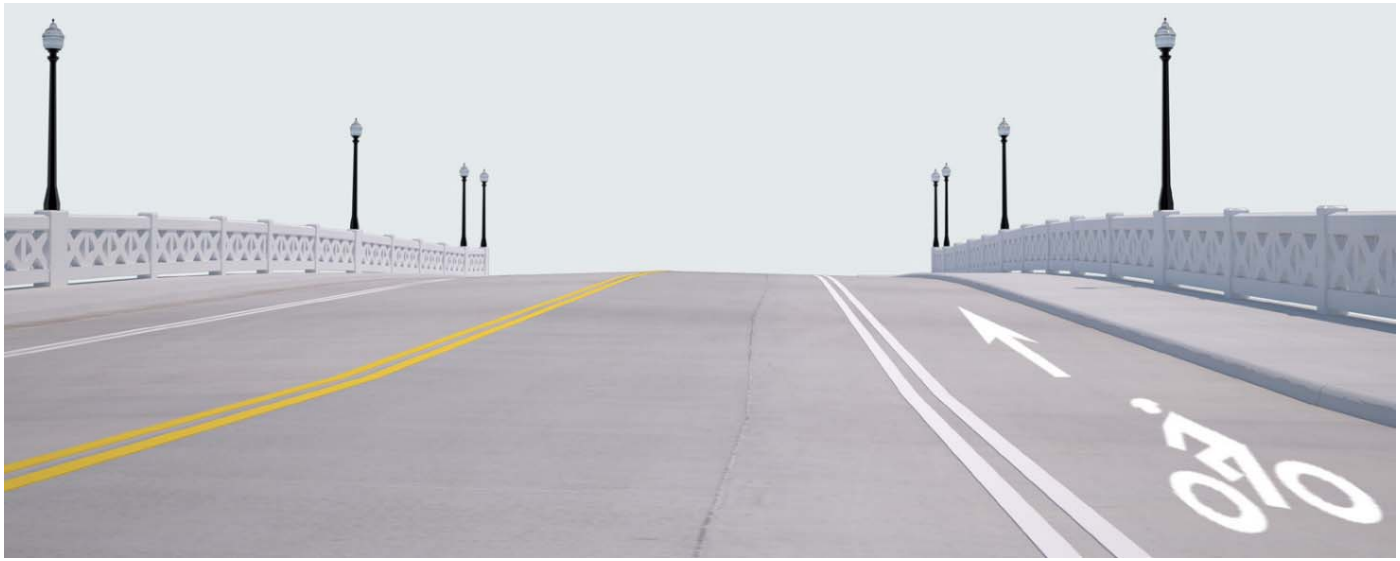
Alternatives Analysis - Ranking Ballot Results

Alternative	No Build	Votes
1	Do Nothing	0
2	Transportation System Management	0
	Rehabilitation	
3	Without Beam Strengthening	3
4	With Beam Strengthening	6
	Replacement - Typical Sections	
T1	Venetian Railing	9
T2	Wyoming TL-4 at Coping	6
T3	Wyoming TL-3 at curb and original Venetian at coping	1
T4	Wyoming TL-3 at curb and Custom Railing at coping	0
	Replacement - Fixed Alternatives	
5	Tunnel	
6	High Level Fixed Bridge	
7	Arched Beams	
8	FIB with Arched Fascia	
9	FIB	
10	Cast-in-Place Slab (Flat/ Variable Depth)	
	Infill of Spoil Islands -	
	Replacement - Movable Bridge Alternatives	
M2	Swing Bridge	
M3	Vertical Lift Bridge	
M4	Double Leaf Bascule Bridge	
M5	Single Leaf Bascule Bridge	
	Maintenance of Traffic	
Option 1	Detours	
Option 2	Phased Construction with Detour at East Bascule	
Option 3	Phased Construction with Temporary Bridge at East Bascule	

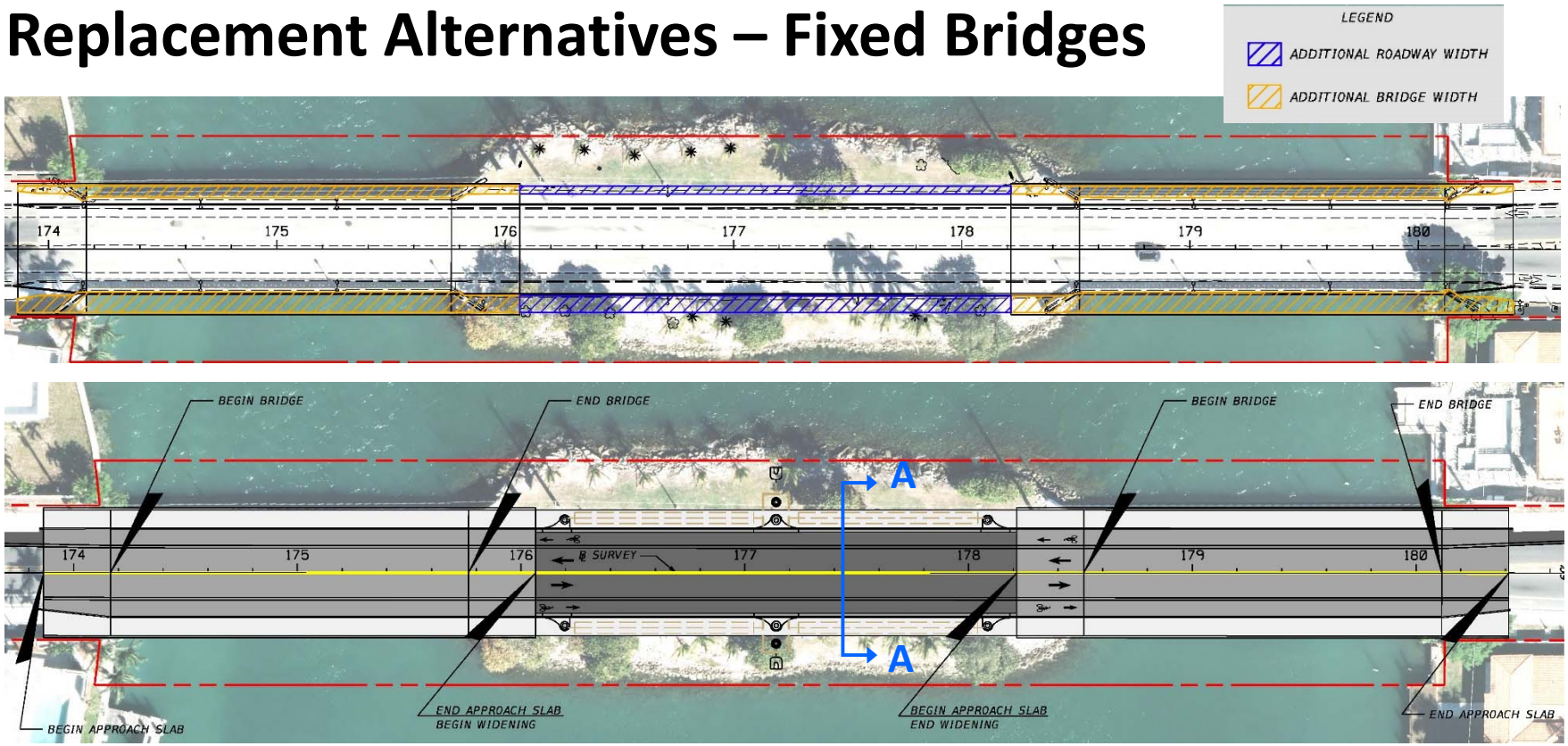
Alternatives Analysis – Build Alternatives

Replacement Alternatives – Typical Section Selection

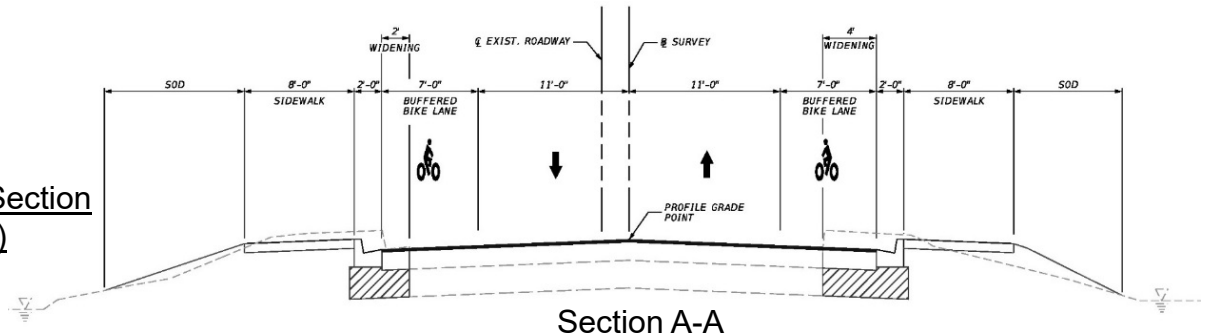




Replacement Alternatives – Fixed Bridges



Roadway Typical Section (Spoil Island)



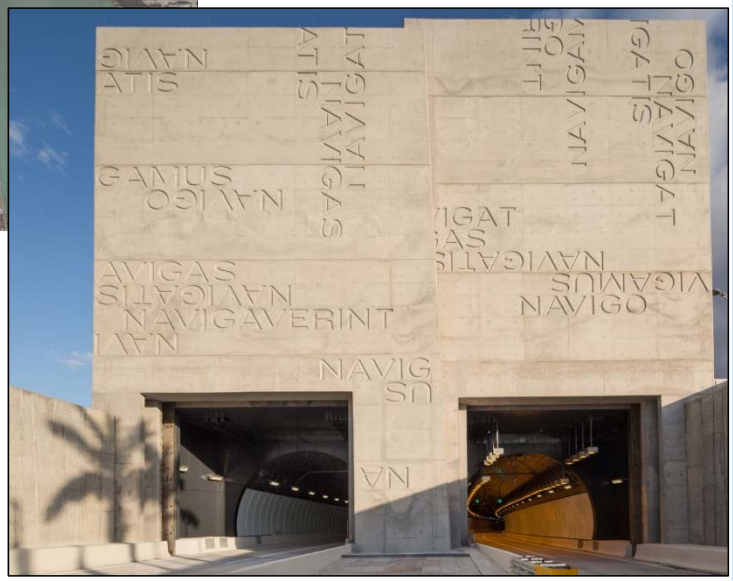
Section A-A

Replacement Alternatives

Alt. 5

Alt. 5 - Tunnel

PortMiami Tunnel



Tunnel Limits
Portal Limits

Estimated Cost Range: $160- $200 Million

Alternatives Analysis – Build Alternatives

Replacement Alternatives – Fixed Bridges

Alt. 6

Alt. 6 - High Level Bridge

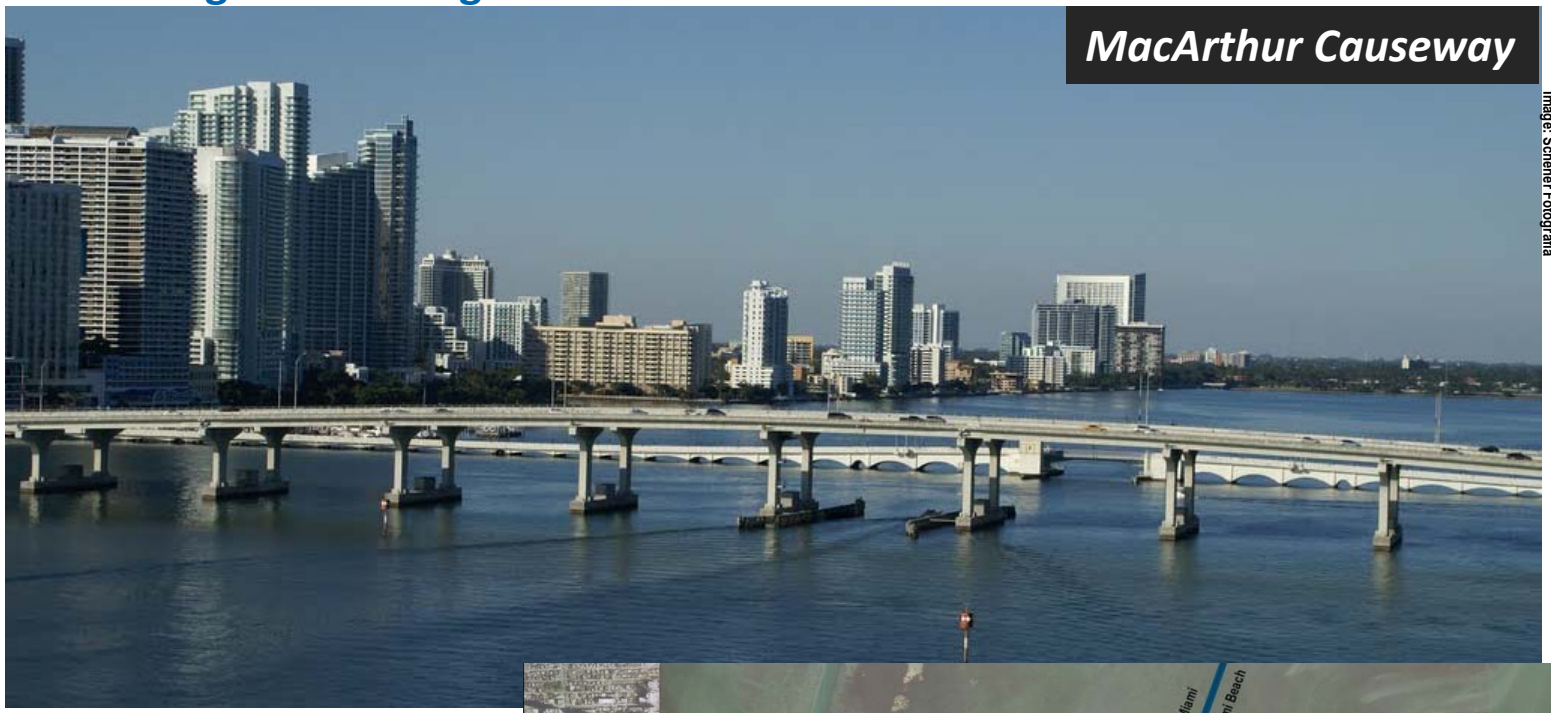
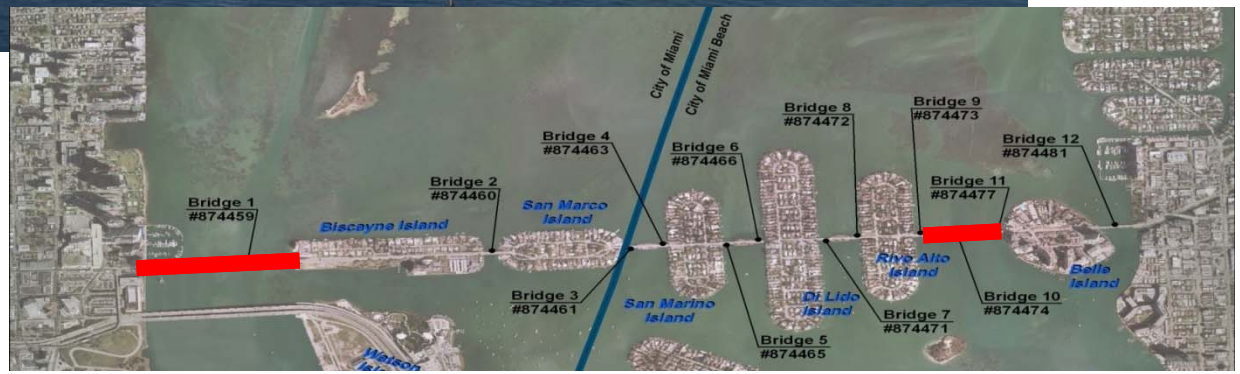


Image: Schener Fotografia



High Level Bridge Limits

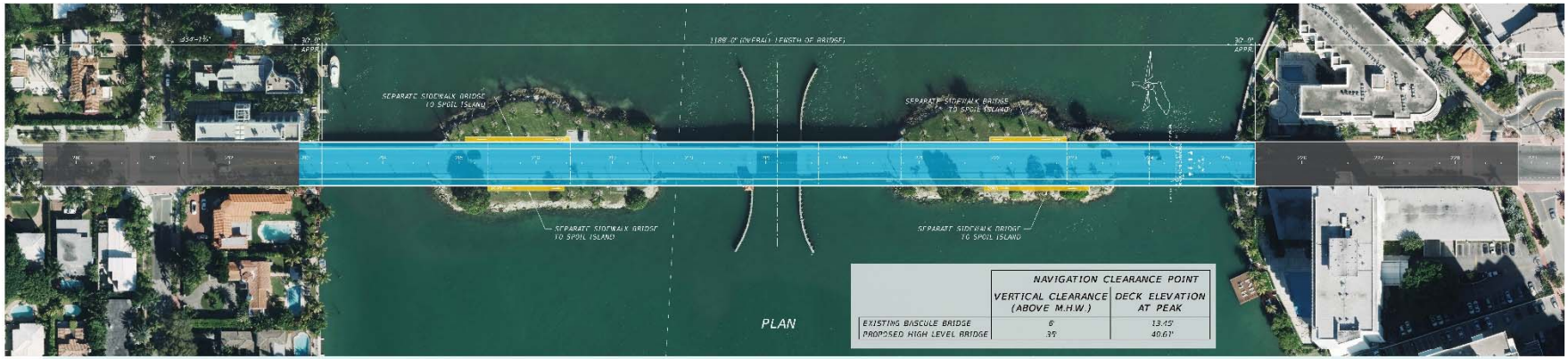
Estimated Cost Range:

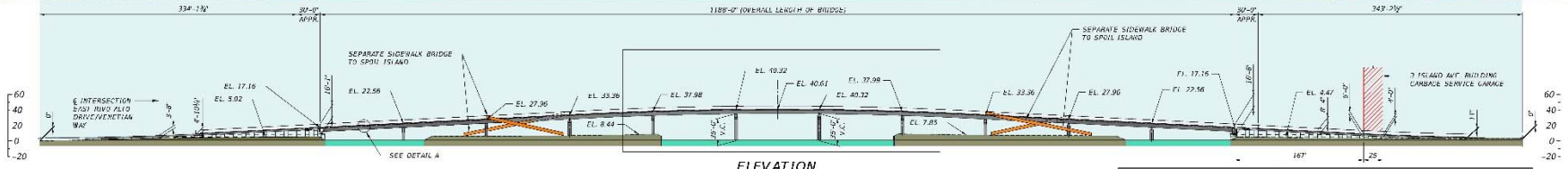
$78 - $86 Million

Alt. 6

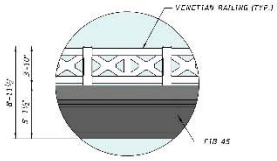
Replacement Alternative – Fixed Bridges

Alt. 6 – High Level Fixed Bridge

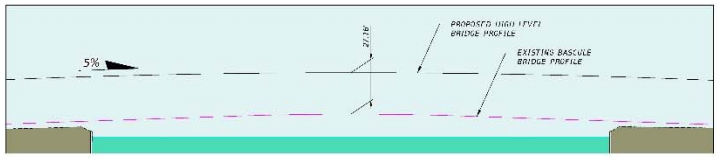




ELEVATION



DETAIL A



VERTICAL PROFILE

Alt. 6

Replacement Alternative – Fixed Bridges

Alt. 6 – High Level Fixed Bridge – Facing North

Alt. 6

Replacement Alternative – Fixed Bridges

Alt. 6 – High Level Fixed Bridge – Facing North

Alt. 6

Replacement Alternative – Fixed Bridges

Alt. 6 – High Level Fixed Bridge – Facing West

Alt. 6

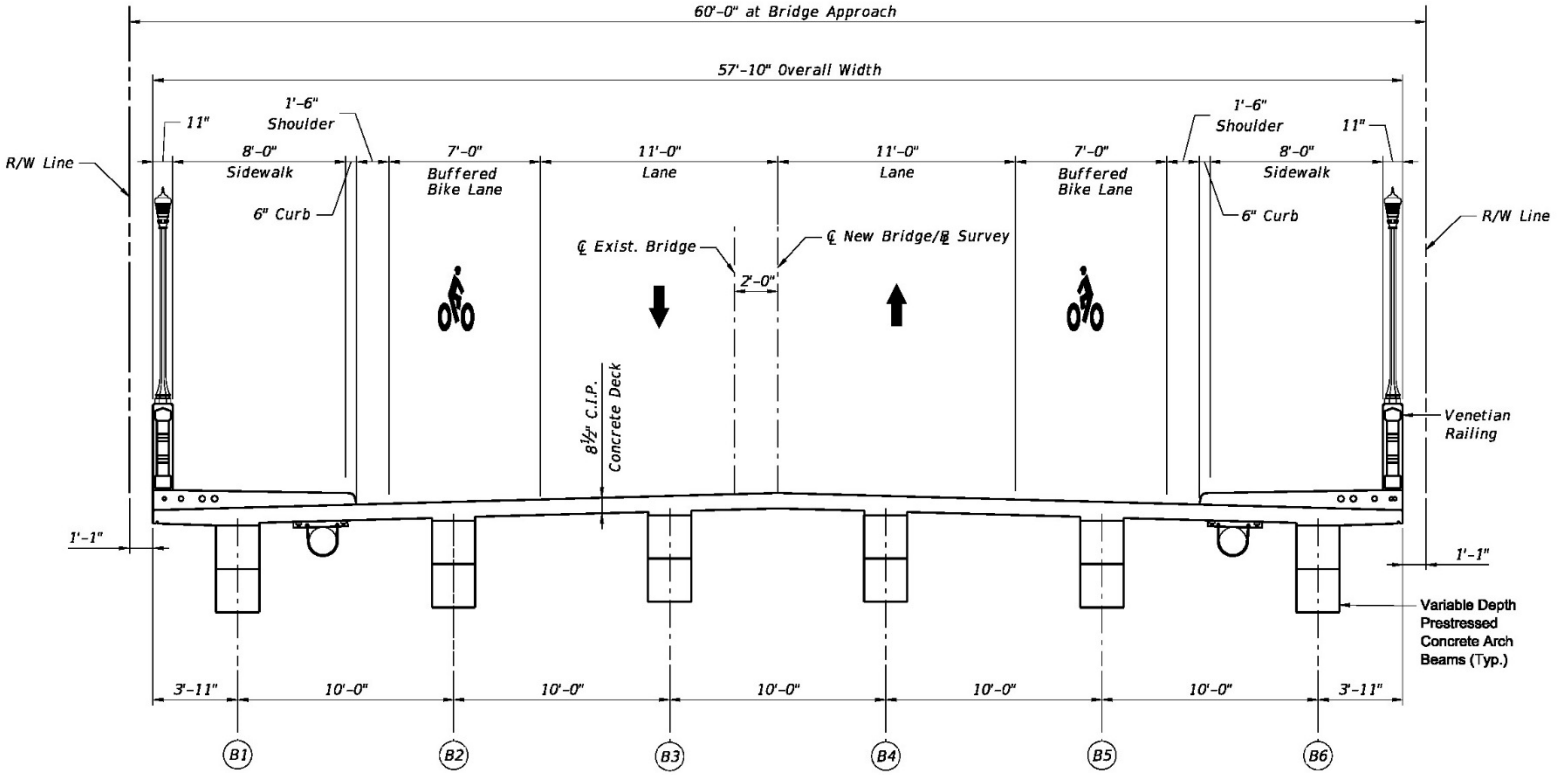
Replacement Alternative – Fixed Bridges

Alt. 6 – High Level Fixed Bridge – Facing East

Replacement Alternatives – Fixed Bridges

Alt. 7

Alt. 7 – Arched Beam

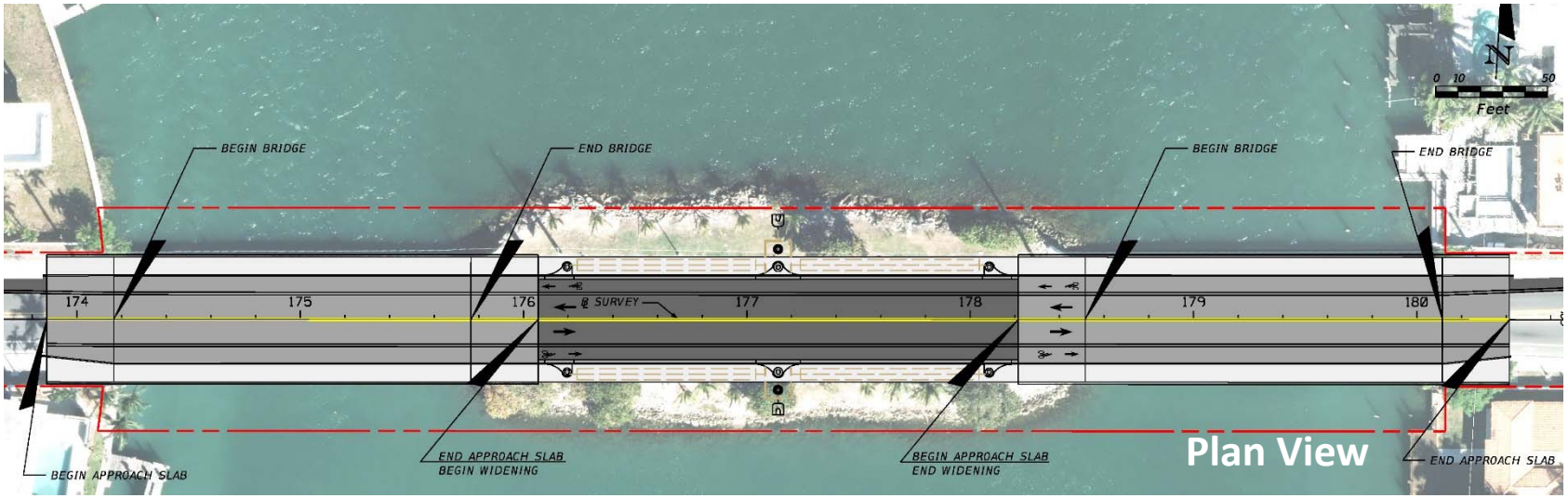


Typical Section

Replacement Alternatives – Fixed Bridges

Alt. 7

Alt. 7 –Arch Beam



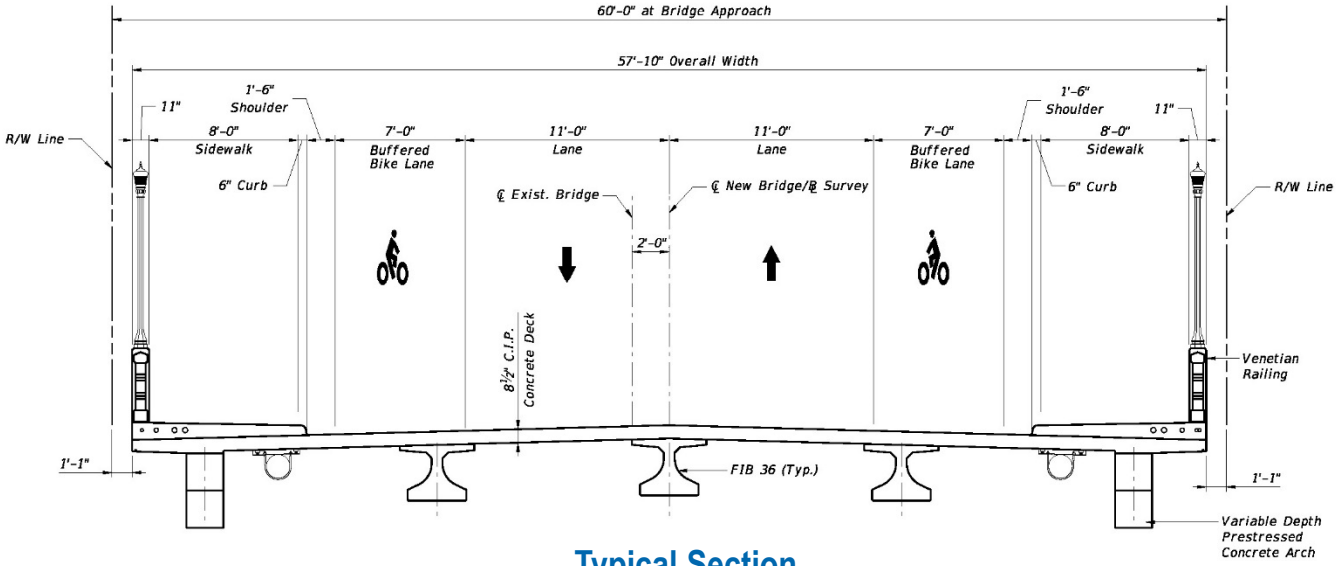
Estimated Cost Range:
$36 - $41 Million*

High Range for Phased Construction

Replacement Alternatives – Fixed Bridges

Alt. 8

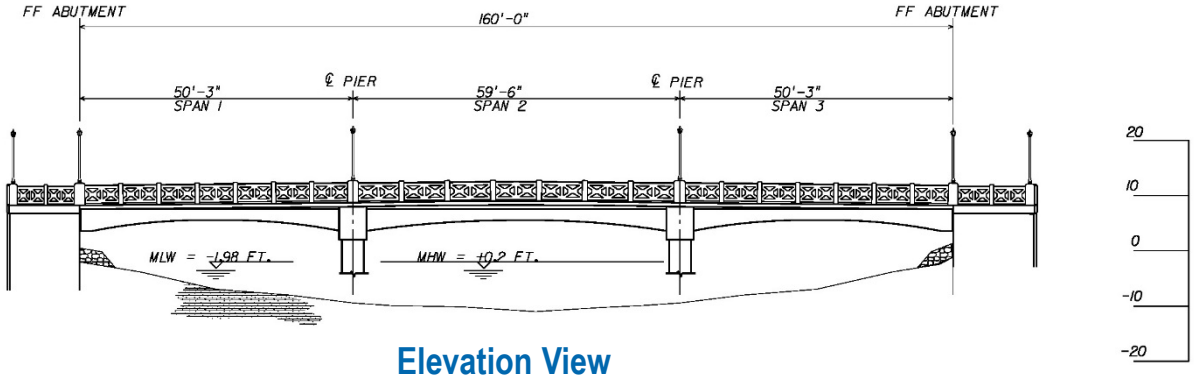
Alt. 8 – FIB with Arched Fascia (FA)



Typical Section

- **Estimated Cost Range:**
  $35 - $40 Million*

  High Range for Phased Construction

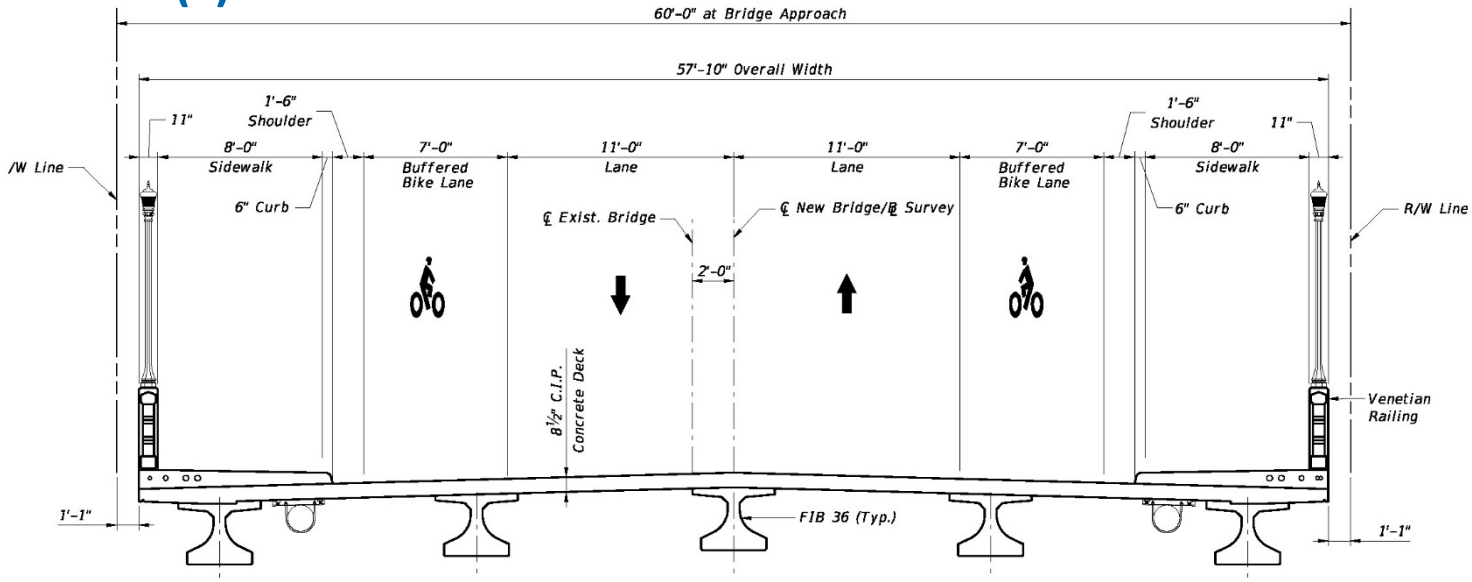


Elevation View

Replacement Alternatives – Fixed Bridges

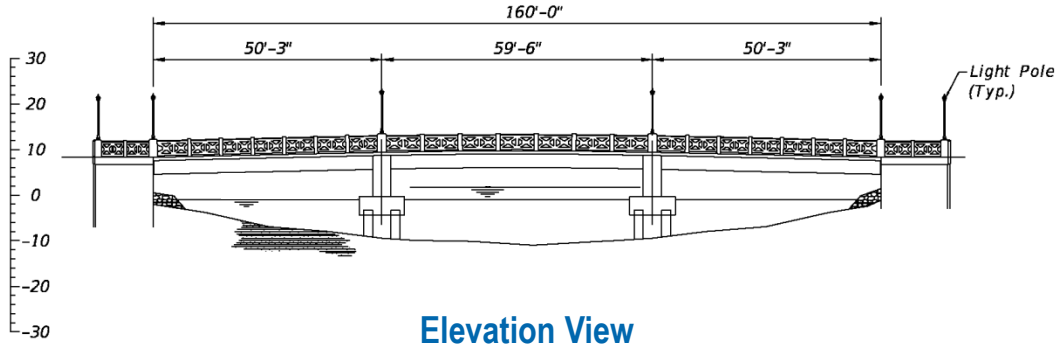
Alt. 9

Alt. 9 – FIB (F)



Typical Section

- **Estimated Cost Range:**
  $35 - $39 Million
  High Range for Phased Construction

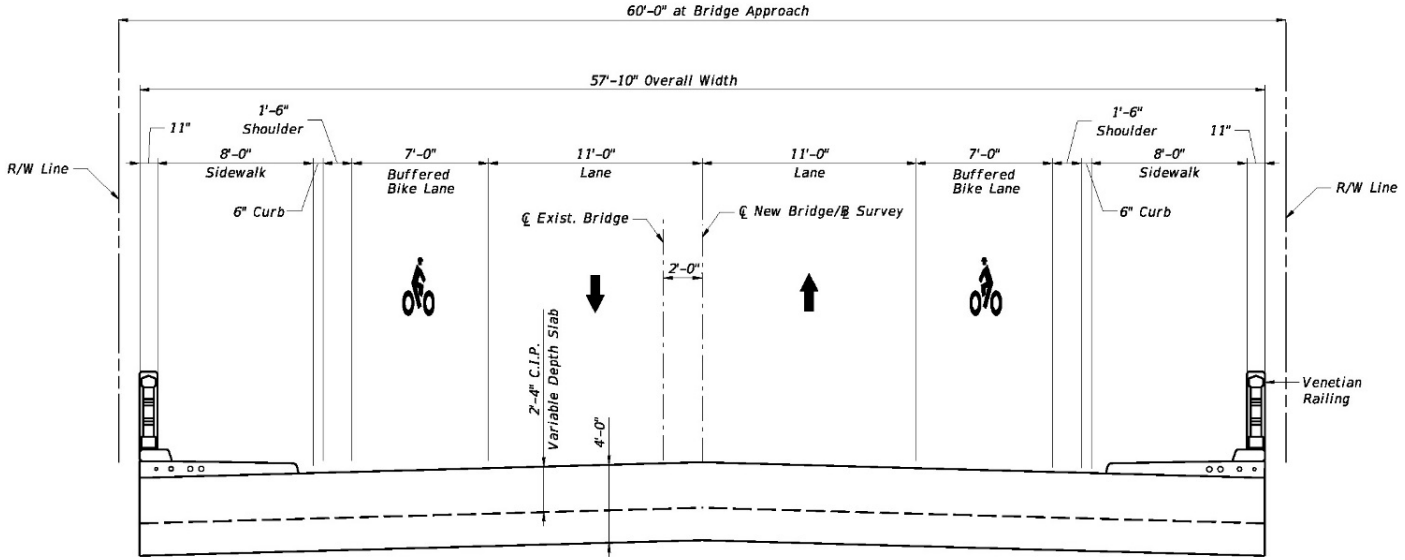


Elevation View

Replacement Alternatives – Fixed Bridges

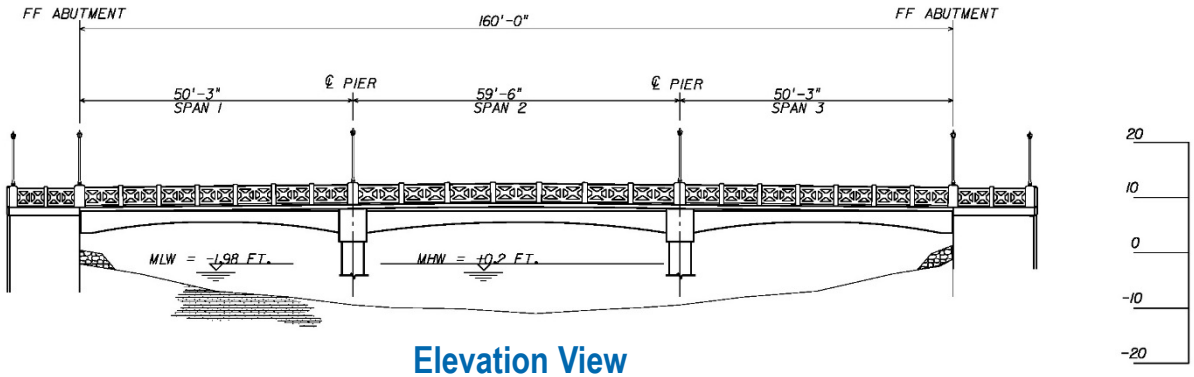
Alt. 10

Alt. 10 – Cast-in-Place Slab (Flat/Variable Depth)



Typical Section

- **Estimated Cost Range:**
  $47 - $52 Million*
  High Range for Phased Construction



Elevation View

Replacement Alternatives – Movable Bridges

M2

Alt. M2 – Swing Bridge/ Movable Span alternative

Advantages:

- Low Construction Cost
- Unlimited Vertical Clearance in Open Position
- Provides two Channels

Disadvantages:

- Hazard to Navigation
  - Pivots toward Approaching Vessels
  - Swing Span More Exposed to Vessel Collision
- No Direct Access to Swing Span in Open Position
- Non-Redundant for Maintenance

Estimated Cost Range: $28 - $30 Million

Replacement Alternatives – Movable Bridges

M3

Alt. M3 – Vertical Lift Bridge

Advantages:

- **Shallower Girders/More Vertical Clearance - Span Lowered**
- **Typically Spans Longer Distance**
  - Span Waterway with no Piers in Water
  - Greater Horizontal Clearance
  - Improved Navigation Safety

Disadvantages:

- **High Construction Cost**
- **Tall Towers (85 to 90 ft)**
- **Restricted Vertical Clearance with Span Raised (65 ft)**
- **Longer Operating Time**
- **Non-Redundant for Maintenance**

Estimated Cost Range: $32 - $35 Million

M4

Replacement Alternative – Movable Bridges

Alt. M4 – Movable Span Alternatives M4 – Double Leaf & M5 – Single Leaf Bascules

Advantages:

- Economical/Low Construction Cost
- Unlimited Vertical Clearance in Raised Position
- Shortest Operating Time
- Most Similar to Existing Bridge
- Good Maintenance Access

Disadvantages:

- Larger Pier(s) in Waterway

M4 - Double Leaf Bascule:

- Redundant for Maintenance
- Shallower Girders/More Clearance
- Two Smaller Piers
- Symmetric Arrangement

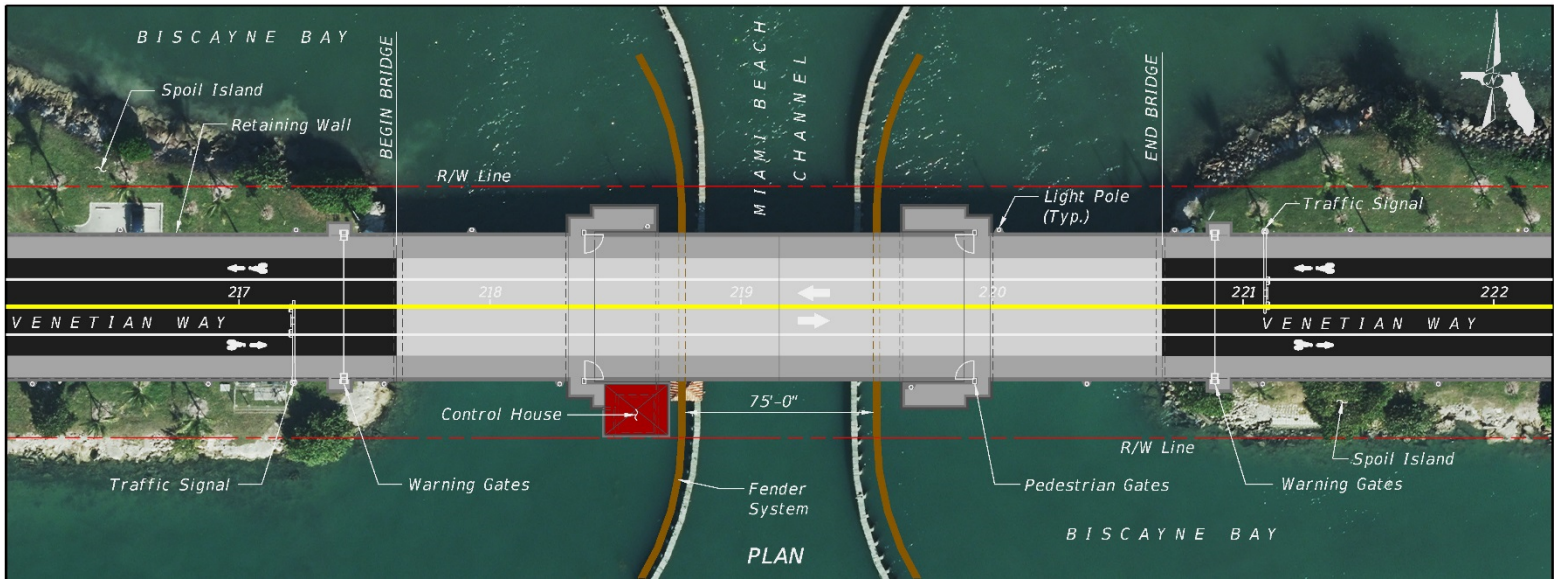
M5 -Single Leaf Bascule:

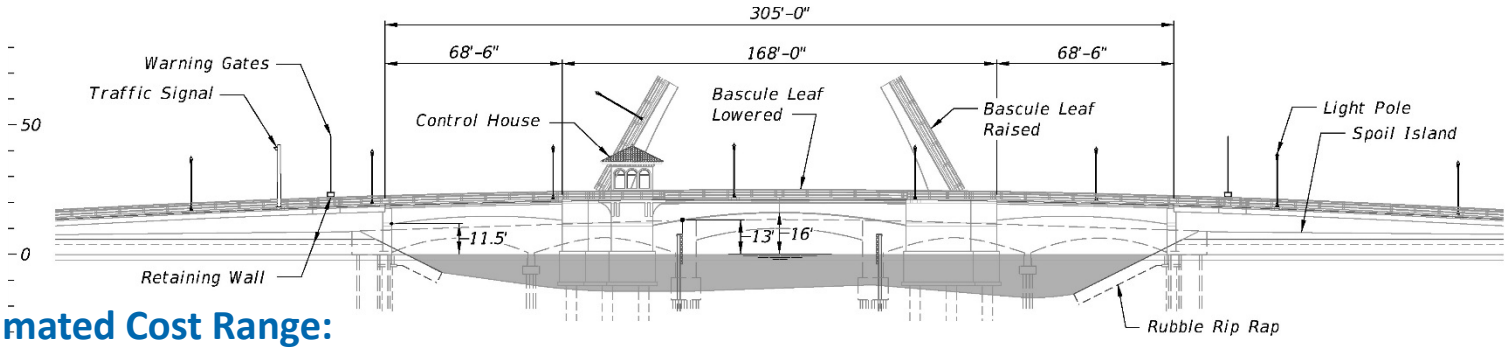
- Non-Redundant for Maintenance
- Deeper Girders/Less Clearance
- One Larger Pier/One Smaller Pier
- Asymmetric Arrangement

M4

Replacement Alternative – Movable Bridges

Alt. M4 – Double Leaf Bascule Bridge





Elevation

Estimated Cost Range:

$29- $33 Million

M4

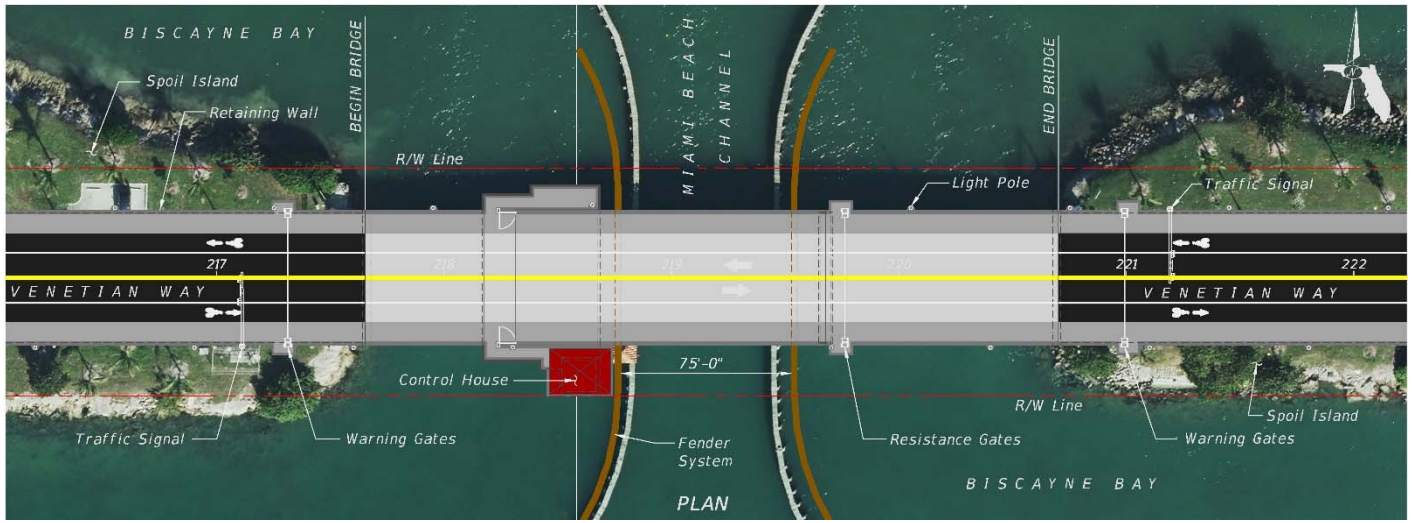
Replacement Alternative – Movable Bridges

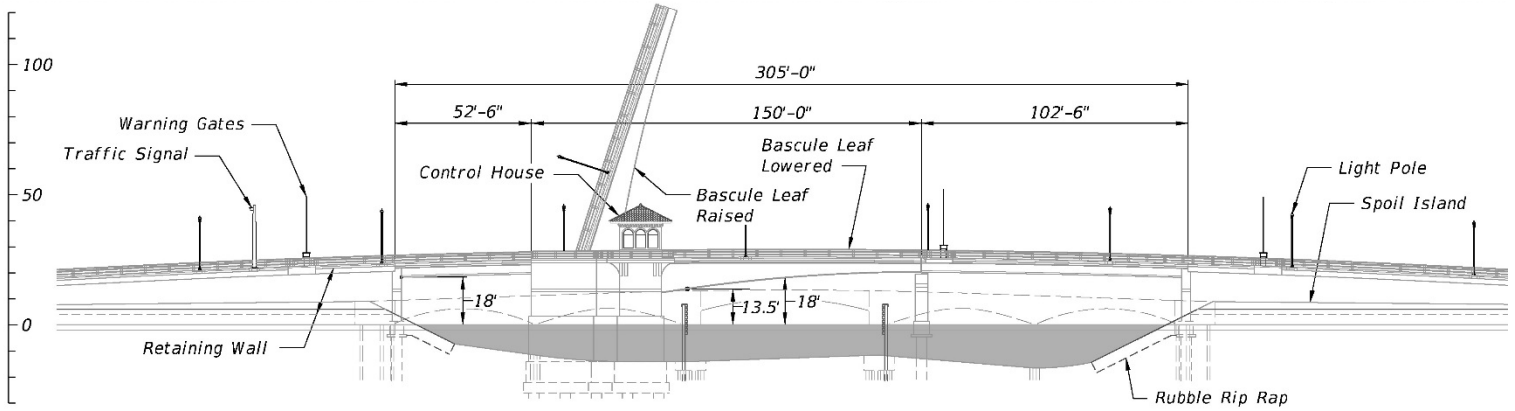
Alt. M4 – Double Leaf Bascule Bridge

M5

Replacement Alternative – Movable Bridges

Alt. M5 – Single Leaf Bascule





Elevation

Estimated Cost Range: $27- $30 Million

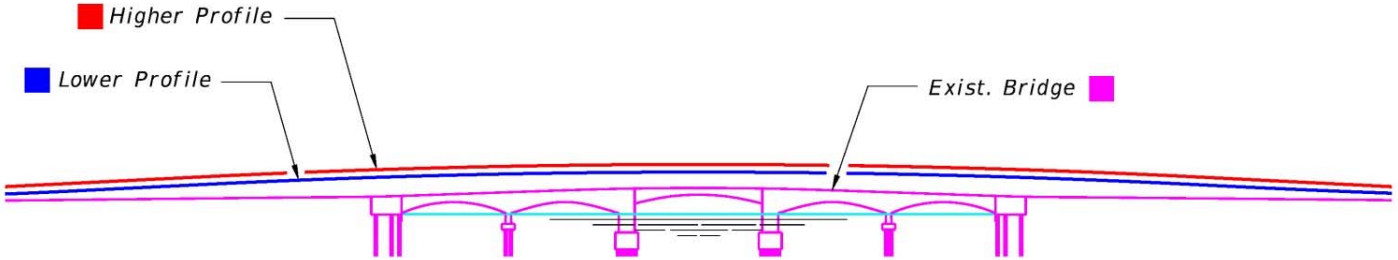
Replacement Alternative – Movable Bridges

Bridge Clearances (Replacement – East Bascule Bridge 10)

i. Navigational
   - Horizontal – increase for safety
   - Vertical – higher profile (Vessel study Diagram – Impacts of different heights)

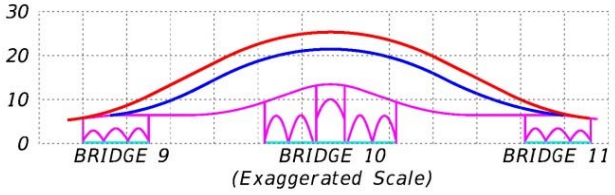
ii. Benefits of higher vertical profile

- **Lower Profile:**
  - Raises Peak Approx. 8 ft
  - 30% more Vessels can pass without an Opening
  - Lowest Recommended Height for Flooding during Coastal Storms
  - Requires Bridge 9 and 11 Modifications
- **Higher Profile:**
  - Raises Peak Approx. 12 ft
  - 50% more Vessels can pass without an Opening
  - Exceeds Recommended Height for Corrosion Protection and Flooding during Coastal Storms
  - Requires Bridge 9 and 11 Replacement



BRIDGE 10 (True Scale)

NAVIGATION CLEARANCE POINT	VERT. CLEAR. (ABOVE MEAN HIGH WATER)		
	EXISTING	HIGHER	LOWER
at Fender	6.0'	17.0'	13.0'
at Center	10.0'	20.0'	16.0'
DECK ELEVATION AT PEAK	13.45'	25.32'	21.45'



BRIDGE 10 - VERTICAL PROFILE ALTERNATIVES

Alternatives Analysis - Ranking Ballot Results

Alternative	No Build	Votes
1	Do Nothing	0
2	Transportation System Management	0
	Rehabilitation	
3	Without Beam Strengthening	3
4	With Beam Strengthening	6
	Replacement - Typical Sections	
T1	Venetian Railing	9
T2	Wyoming TL-4 at Coping	6
T3	Wyoming TL-3 at curb and original Venetian at coping	1
T4	Wyoming TL-3 at curb and Custom Railing at coping	0
	Replacement - Fixed Alternatives	
5	Tunnel	1
6	High Level Fixed Bridge	3
7	Arched Beams	5
8	FIB with Arched Fascia	2
9	FIB	0
10	Cast-in-Place Slab (Flat/ Variable Depth)	1
	Infill of Spoil Islands -	5
	Replacement - Movable Bridge Alternatives	
M2	Swing Bridge	1
M3	Vertical Lift Bridge	0
M4	Double Leaf Bascule Bridge	10
M5	Single Leaf Bascule Bridge	0
	Maintenance of Traffic	
Option 1	Detours	2
Option 2	Phased Construction with Detour at East Bascule	4
Option 3	Phased Construction with Temporary Bridge at East Bascule	9

Highest Ranked Alternatives shown in Red

Alternatives Analysis – Screening Matrix

Alternative	Description	Meets Purpose and Need	Sensitive to Historic Resource	Sensitive to Natural and Physical Environment	Meets Rehab or Replacement Parameters	Community Preference	Total
1	Do Nothing	0	3	3	0	0	6
2	Transportation Systems Management & Operations (TSM&O)	0	3	3	0	0	6
Rehabilitation Alternatives							
3	Fixed Bridge Rehab w/out Beam Strengthening	3	3	2	2	1	11
4	Fixed Bridge Rehab with Beam Strengthening	3	3	2	3	2	13
M1	Bascule Bridge Rehabilitation	3	3	2	3	2	13
Replacement Alternatives							
Typical Sections							
T1	Venetian Railing	3	3	3	3	3	15
T2	Wyoming Railing TL-4 at coping	3	0	3	2	1	9
T3	Wyoming Railing TL-3 at curb and Original Venetian Railing at Coping	3	1	3	2	1	10
T4	Wyoming Railing TL-3 at curb and Custom Railing at Coping	3	0	3	2	0	8
Fixed Alternatives							
5	Tunnel	3	0	1	1	1	6
6	High Level Fixed Bridge	3	0	1	1	2	7
7	Arched Beams	3	3	2	3	3	14
8	FIB With Arched Fascia	3	1	2	2	1	9
9	FIB	3	0	2	2	0	7
10	Cast-in-Place Slab (Flat/Variable Depth)	3	0	2	2	1	8
11	Infill Spoil Islands	3	0	0	1	3	7
Movable Bridge Alternatives							
M2	Swing Bridge	3	0	2	2	0	7
M3	Vertical Lift Bridge	3	0	2	2	0	7
M4	Double Leaf Bascule Bridge	3	3	2	3	3	14
M5	Single Leaf Bascule Bridge	3	0	2	2	0	7

Screening Matrix - Scoring Methodology	Score
High	3
Medium	2
Low	1
Not Applicable	0

Alternatives considered for additional study shown in Red

Viable Alternatives

The alternatives that were developed for the project have been evaluated based on the ability of each to meet the project needs.

ALTERNATIVE	DESCRIPTION
	NO-BUILD ALTERNATIVES
1	**Do Nothing –** The bridges remain as is with routine maintenance only.
2	**Transportation Systems Management & Operations (TSM&O)** – The bridges remain as is with routine maintenance only. Transit and other operational improvements would be made to facilitate transportation along the corridor.
	BUILD ALTERNATIVES - REHABILITATION
4	**Fixed Bridge Rehabilitation with Beam Strengthening** - Rehabilitation of the fixed bridges to improve safety and load carrying capacity. Includes beam strengthening to achieve a higher load carrying capacity.
M1	**Bascule Bridge Rehabilitation –** Rehabilitation of the eastern movable bridge to improve safety and achieve a higher load carrying capacity.
	BUILD ALTERNATIVES - REPLACEMENT
	Typical Sections – The replacement of the bridges would require that a new typical section be selected along with the railing type.
T1	**Venetian Railing** – This railing replicates the existing railing on the bridges, but may not satisfy the current standards for railings.
	FIXED ALTERNATIVES The replacement of the bridges would require that the structural system for the fixed bridges be selected.
7	**Arched Beams** – This alternative provides low-level bridges, replicates the arched beams and maintains the look of the existing bridges.
	Movable Bridge Alternatives – The replacement of the eastern movable bridge would require that the movable bridge type be selected.
M4	**Double Leaf Bascule Bridge** – The existing bridge would be replaced in kind.

Viable Alternatives: No-Build

Alt. 1

Alt. 1 - Do Nothing

- Existing Deficiencies will Remain
- Continued Deterioration
- Extensive Periodic Repairs and Maintenance

Does not meet purpose and need for project

Viable Alternatives: No-Build

Alt. 2 – Transportation System Management and Operations

Alt. 2

- Enhanced Bus service
- Facilitate Pedestrians and Bicyclists
- Existing Deficiencies will remain, but safe bridges required for effective TSM&O

Does not meet purpose and need for project

Rehabilitation Alternative

Alt. 4

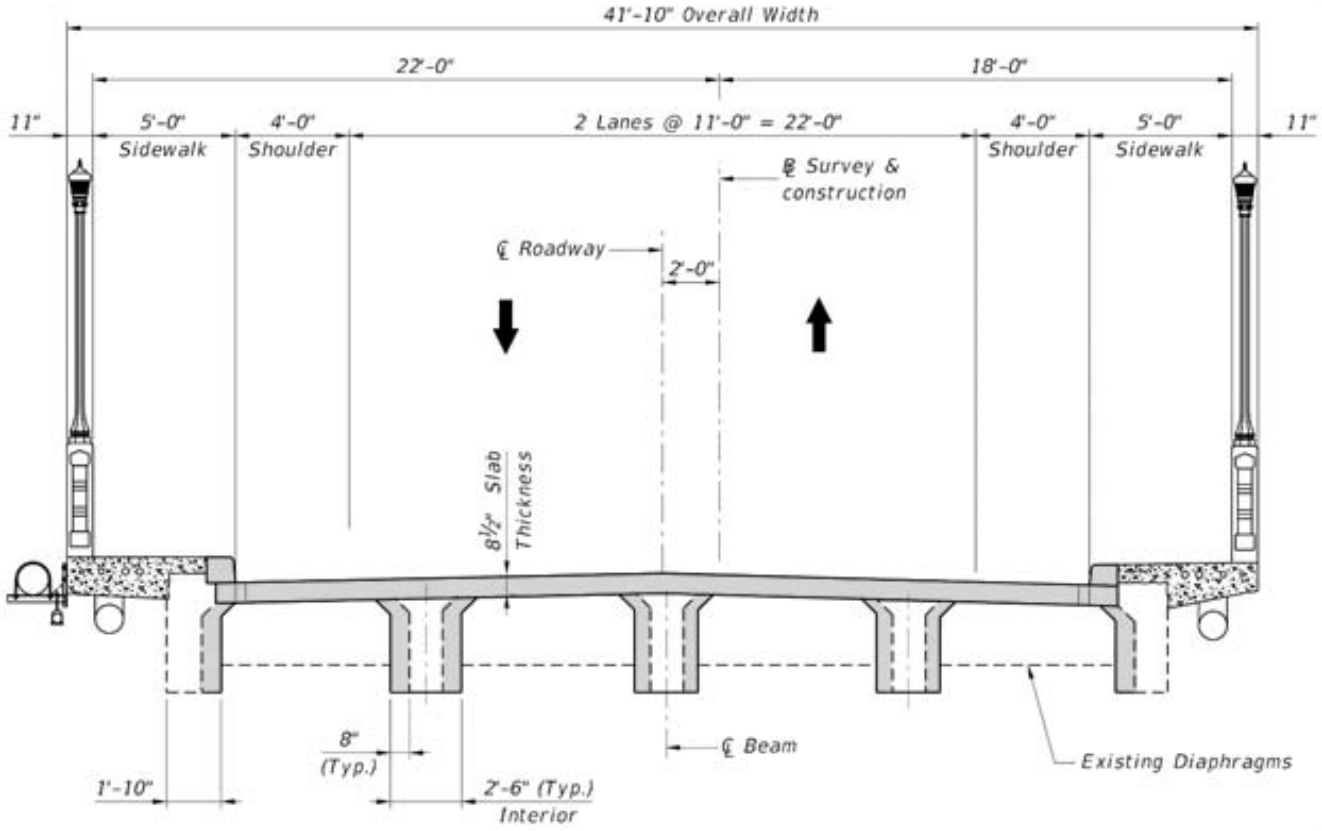
Alt. 4 - Fixed Bridge Rehab with Beam Strengthening

Typical Section

- Expand Sidewalk to 5 feet to meet minimum requirement for ADA
- 4 foot Shoulder does not meet 5.5 foot shoulder requirement for bike lane

Rehabilitation includes:

- Deck Replacement Beam and Foundation Strengthening
- 41'-10" Overall width to remain, Venetian Railing to remain

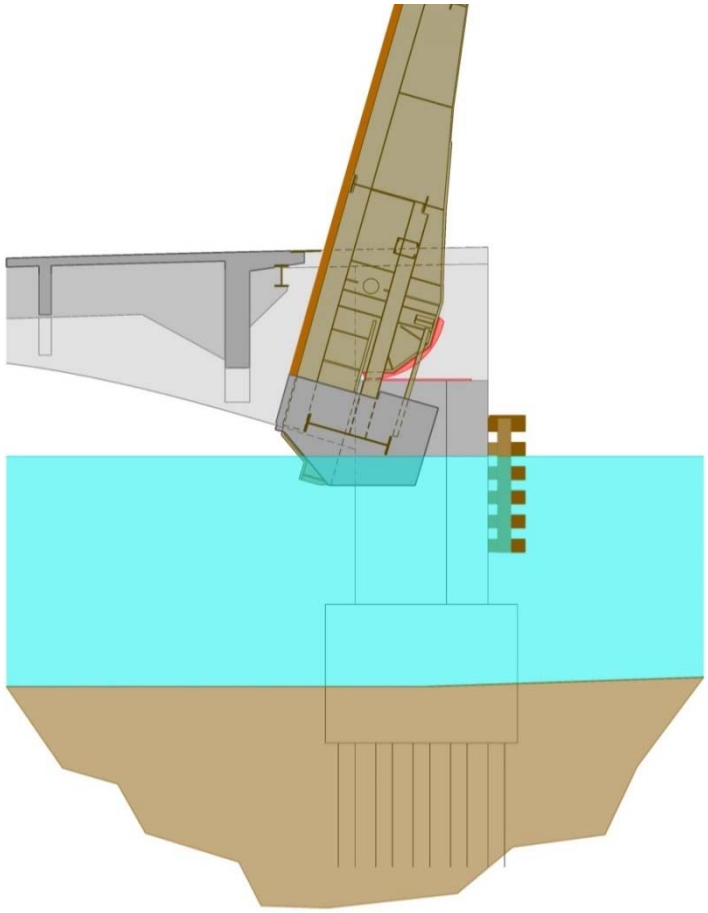


Estimated Cost Range: $42 - $44 Million

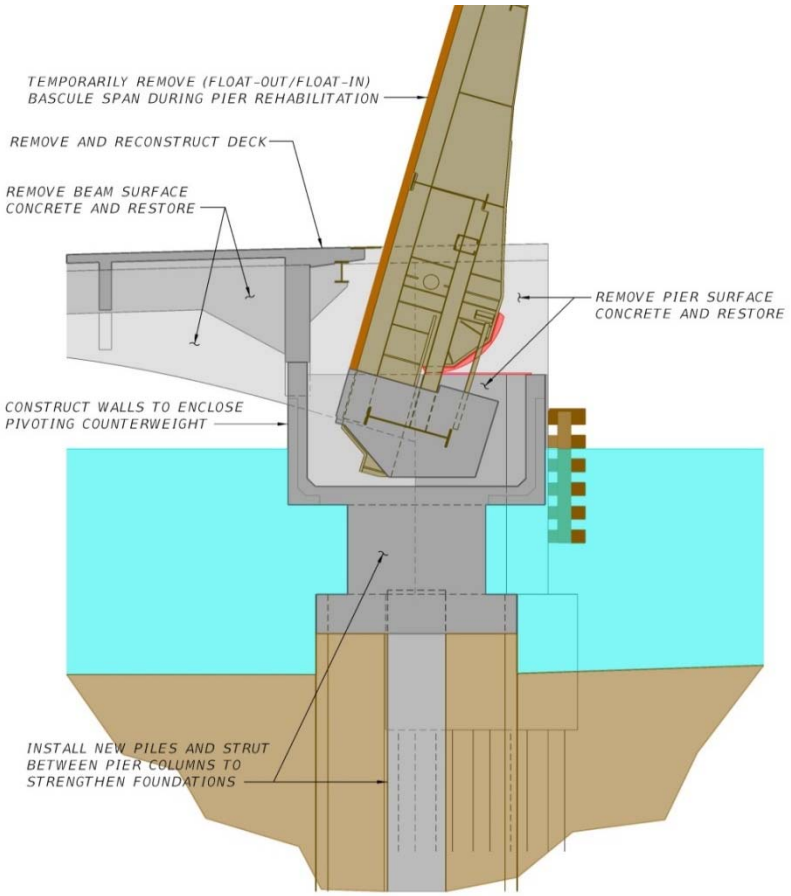
Rehabilitation Alternative

M1

Alt. M1 - Bascule Bridge Rehabilitation



SECTION THRU EXISTING BASCULE SPAN



SECTION THRU REHABILITATED BASCULE SPAN

Estimated Cost Range: $8 - $9 Million

Viable Alternatives: Build

Replacement Alternative – Typical Section Selection

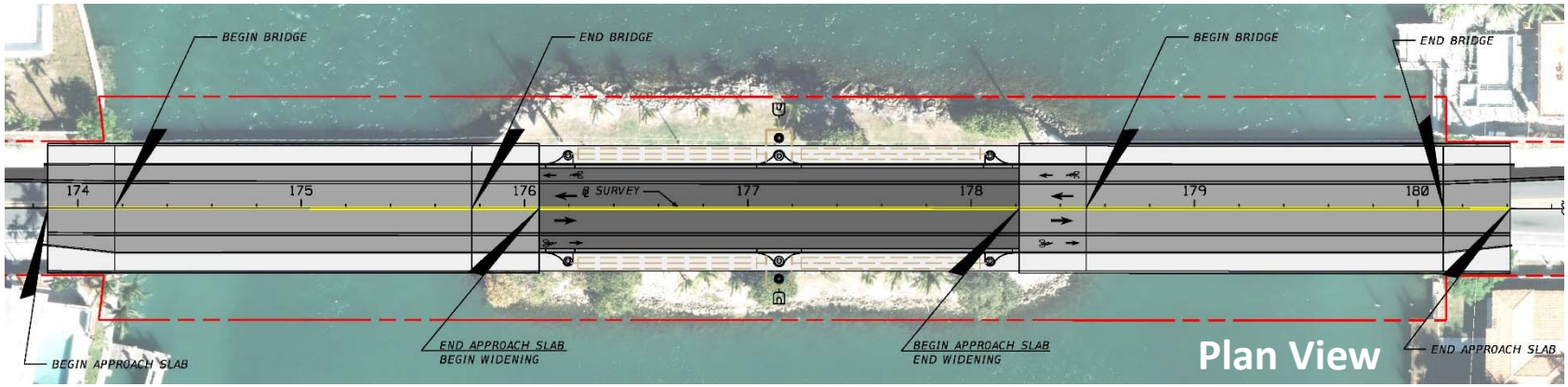
FIXED BRIDGE TYPICAL SECTION

Viable Alternatives: Build

Replacement Alternative – Fixed Bridges

Alt. 7

Alt. 7 –Arched Beam



Estimated Cost Range: $36 - $41 Million*

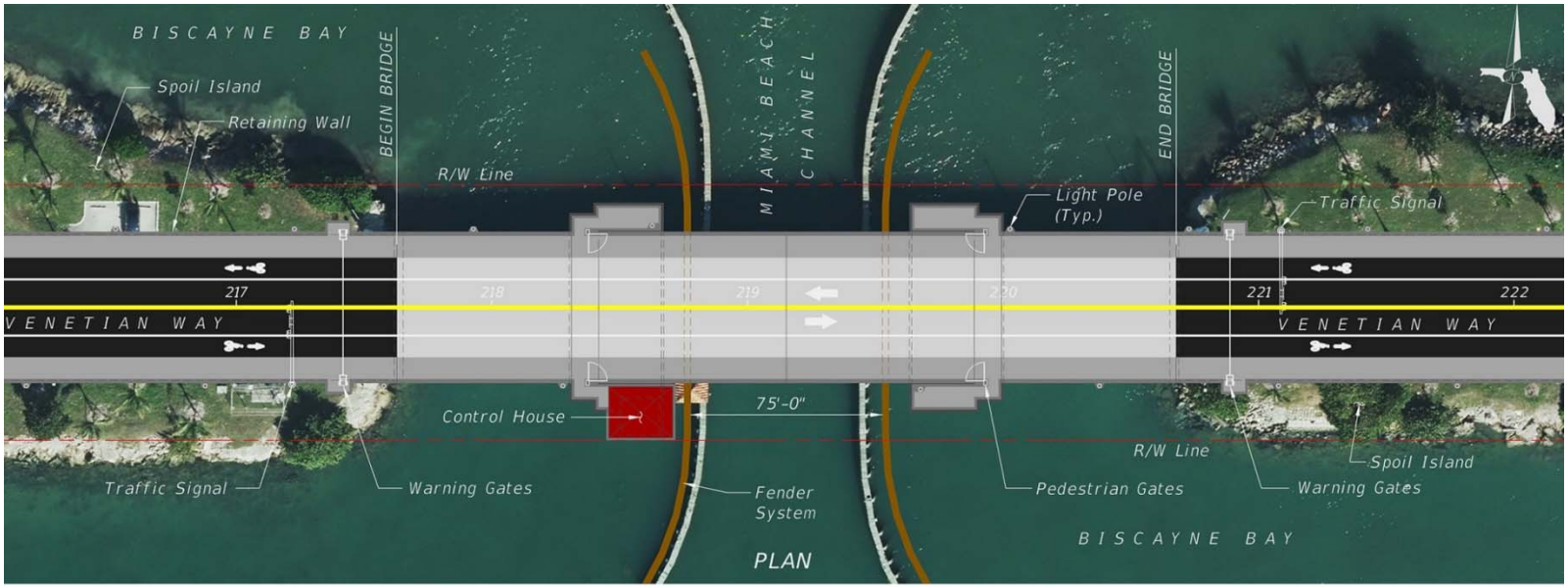
****High Range for Phased Construction***

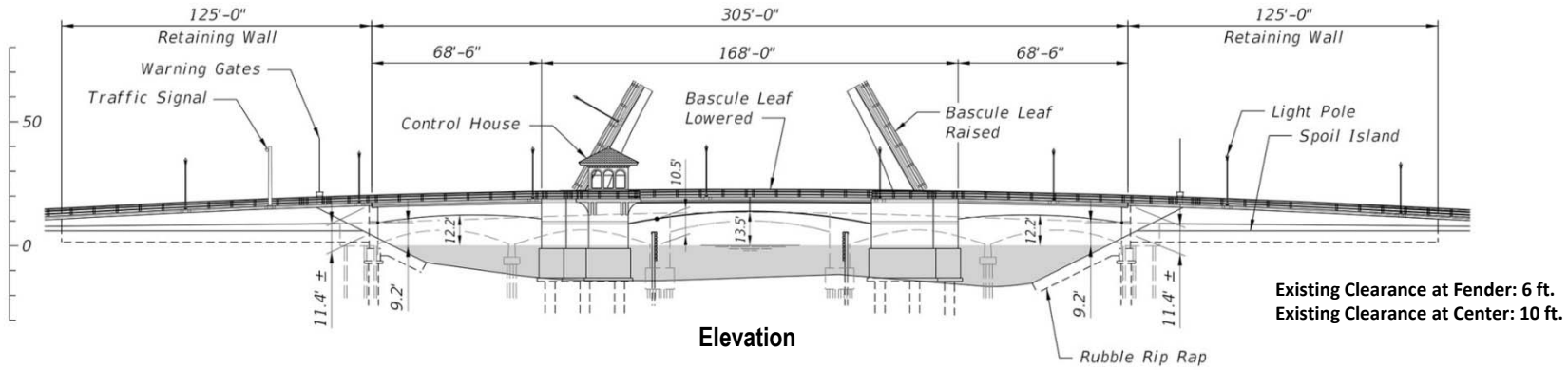
Viable Alternatives: Build

Replacement Alternative – Movable Bridge

M4

Alt. M4 – Double Leaf Bascule Bridge





Existing Clearance at Fender: 6 ft.
Existing Clearance at Center: 10 ft.

Estimated Cost Range: $29 - $33 Million

Viable Alternatives: Build

M4

Replacement Alternative – Movable Bridge

Alt. M4 – Double Leaf Bascule Bridge

MOVABLE BRIDGE 10 ELEVATION

Estimated Costs

Viable Build Alternatives

REHABILITATION (25-year Service Life)

ALT. 4: Fixed Bridge Rehab with Beam Strengthening	$42 - $44 Million
ALT. M1: Bascule Bridge Rehabilitation	$8 - $9 Million
Total	$50 - $53 Million

Life Cycle Cost - $159 M

REPLACEMENT (75-year Service Life)

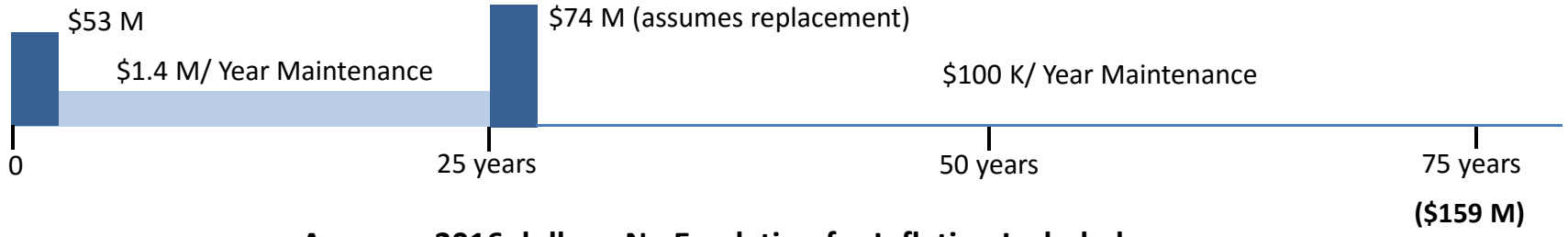
ALT. 7: Arched Beams Replacement	$36 - $41 Million
ALT. M4: Double Leaf Bascule Bridge	$29 - $33 Million
Total	$65 - $74 Million

Life Cycle Cost - $79 M

Estimated Costs– Life Cycle Cost

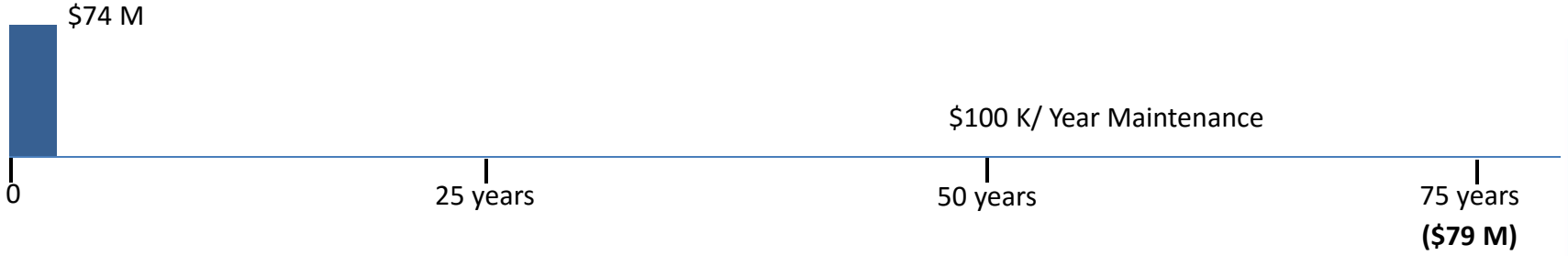
NO BUILD (Unknown Service Life)

REHABILITATION (25-year Service Life)



Assumes 2016 dollars. No Escalation for Inflation Included

REPLACEMENT (75-year Service Life)

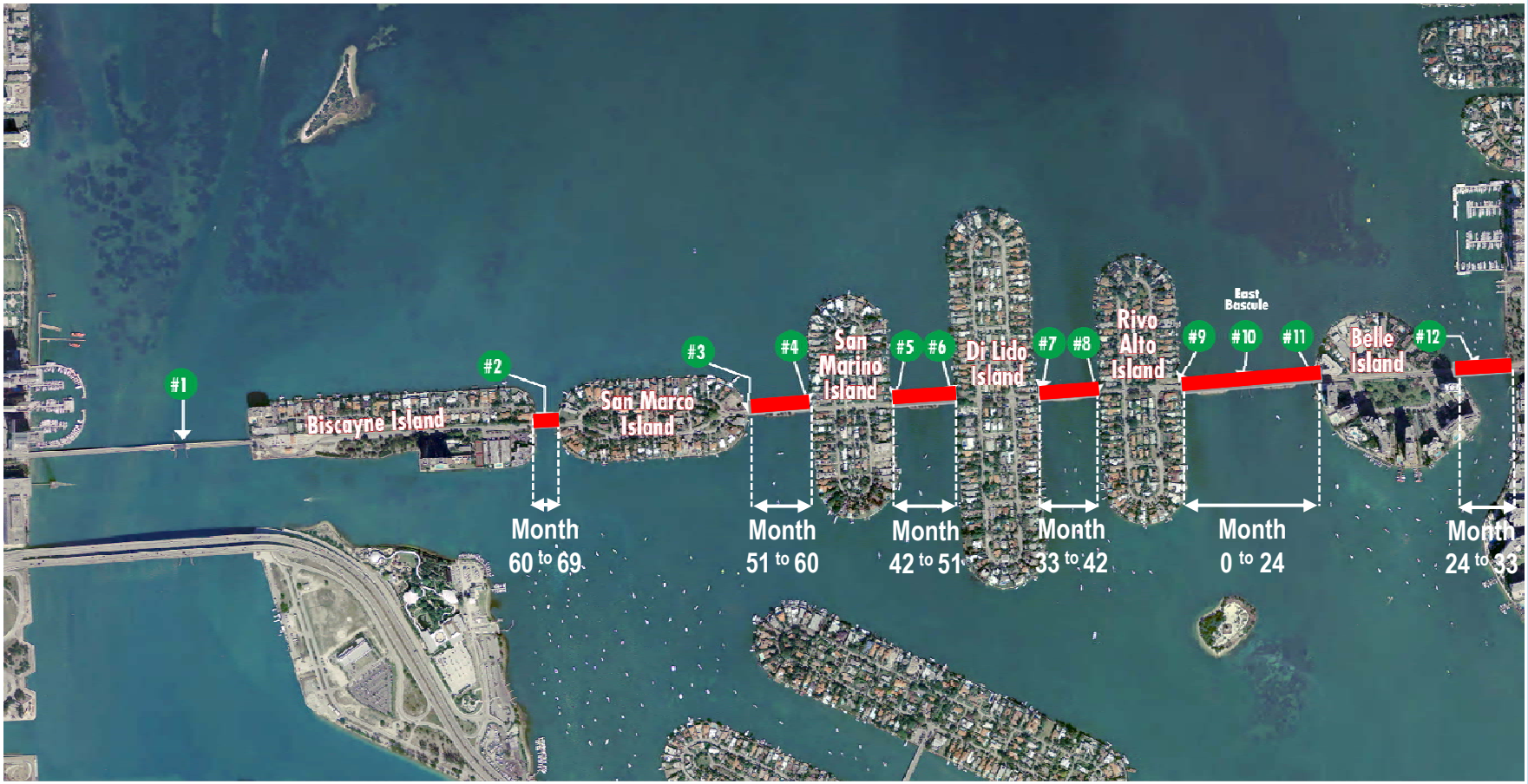


Maintenance of Traffic (MOT)

Individual Bridge Detours

- Same considerations for Rehabilitation or Replacement as both remove the deck
- Detours affect one bridge location at a time
- Construction Duration
- Public Safety
- Emergency Services
- Maintain Utility Services

MOT Option 1



Maintenance of Traffic Plan – Close one bridge at a time and detour traffic

OPTION 1	REHABILITATION	REPLACEMENT
	67 MONTHS without Beam Strengthening *82 MONTHS with Beam Strengthening*	*69 MONTHS*

Detour

Bridge Numbers

MOT Option 2

Maintenance of Traffic Plan – Detour Traffic at East Bascule, 1 Lane 2-Way Traffic, Limit Access Impacts to One Island at a Time

OPTION 2

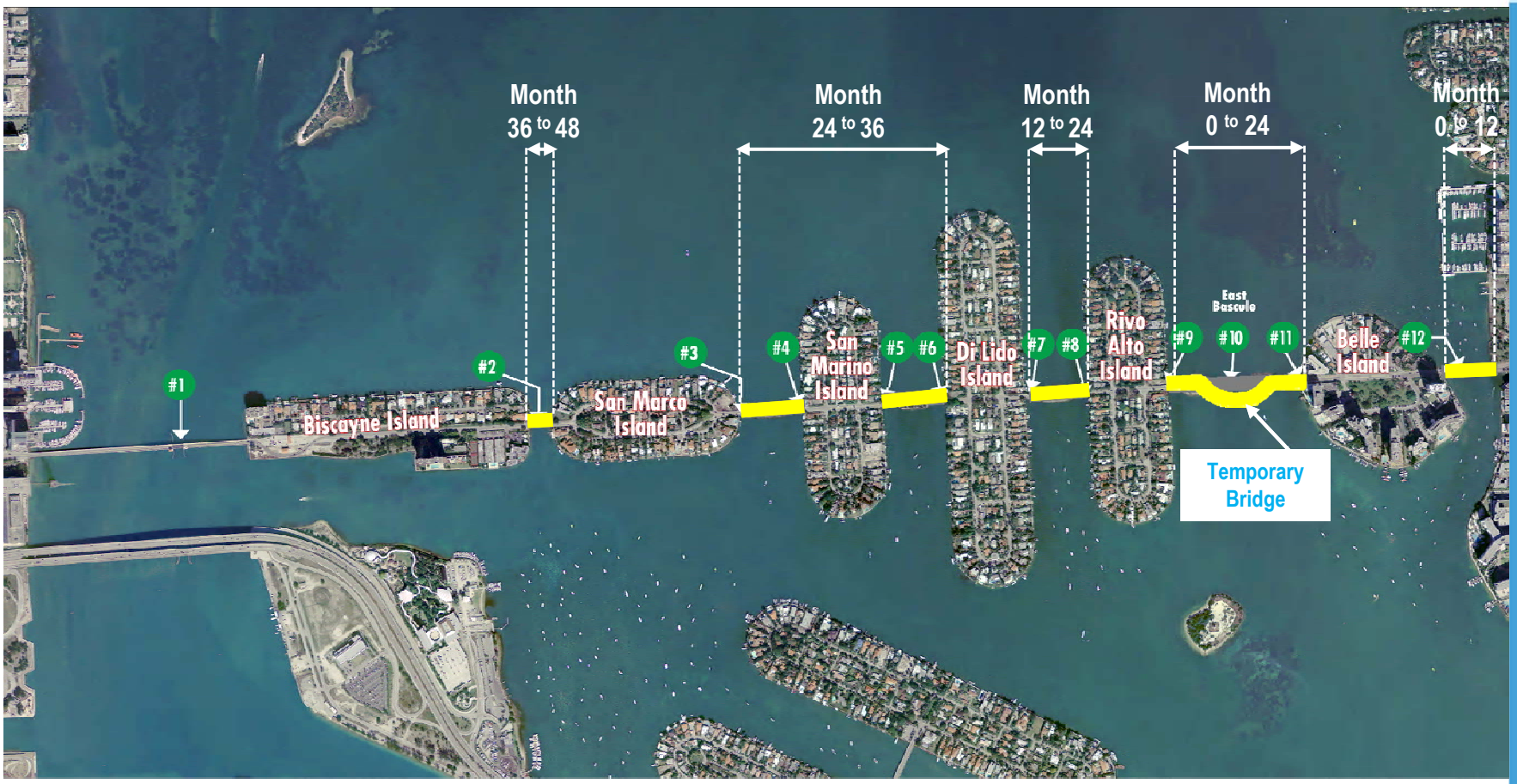
Replacement Phased Construction

48 MONTHS

(with 24 month detour at Bridge #10)

- Detour
- 1-Lane/2-Way
- ## Bridge Numbers

MOT Option 3



Maintenance of Traffic Plan – Temporary Bridge at East Bascule with 1 Lane 2-Way (Pedestrians & Bicycle Access). Limit Access Impacts to One Island at a Time

OPTION 3

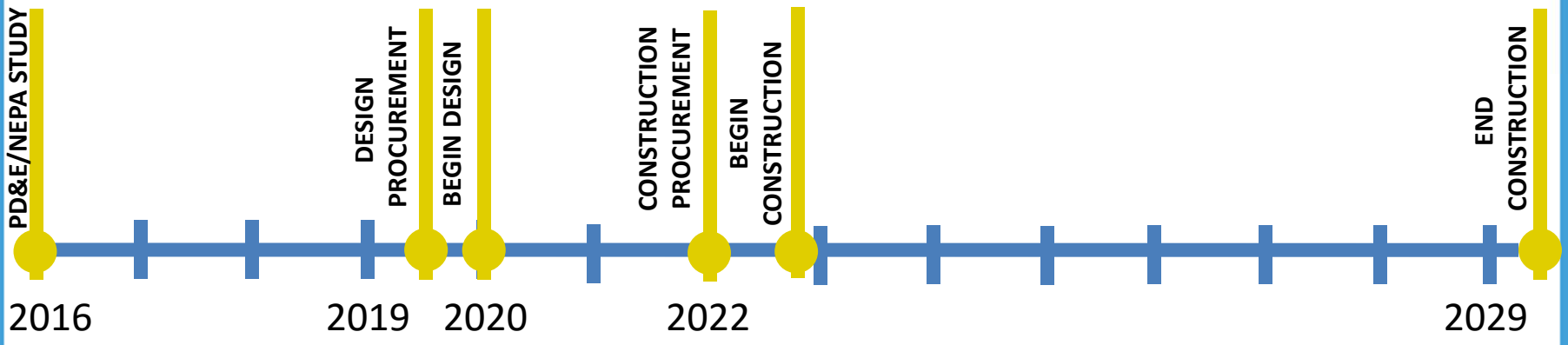
Replacement Phased Construction with Temporary Bridge
48 MONTHS

1-Lane/2-Way

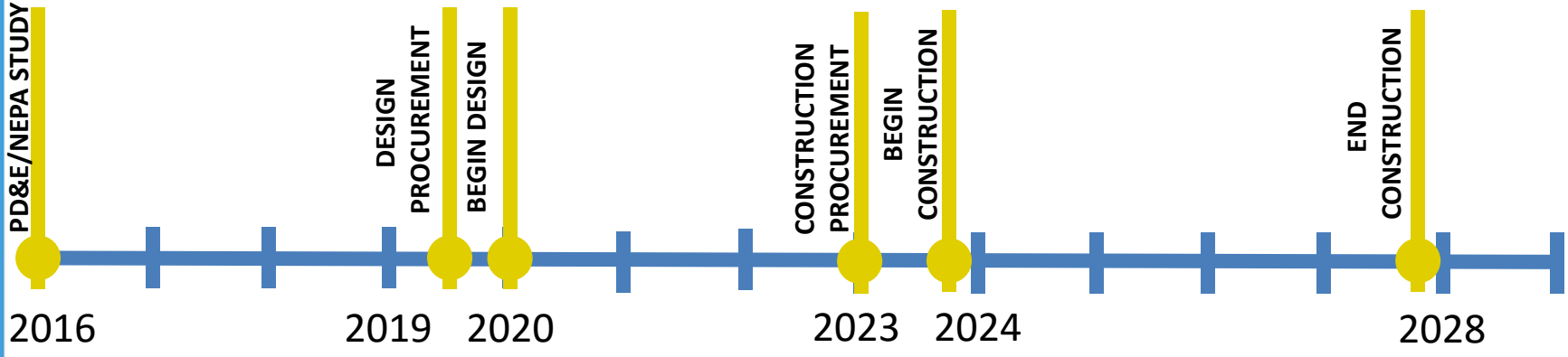
Bridge Numbers

Anticipated Schedule

REHABILITATION (25-year Service Life)



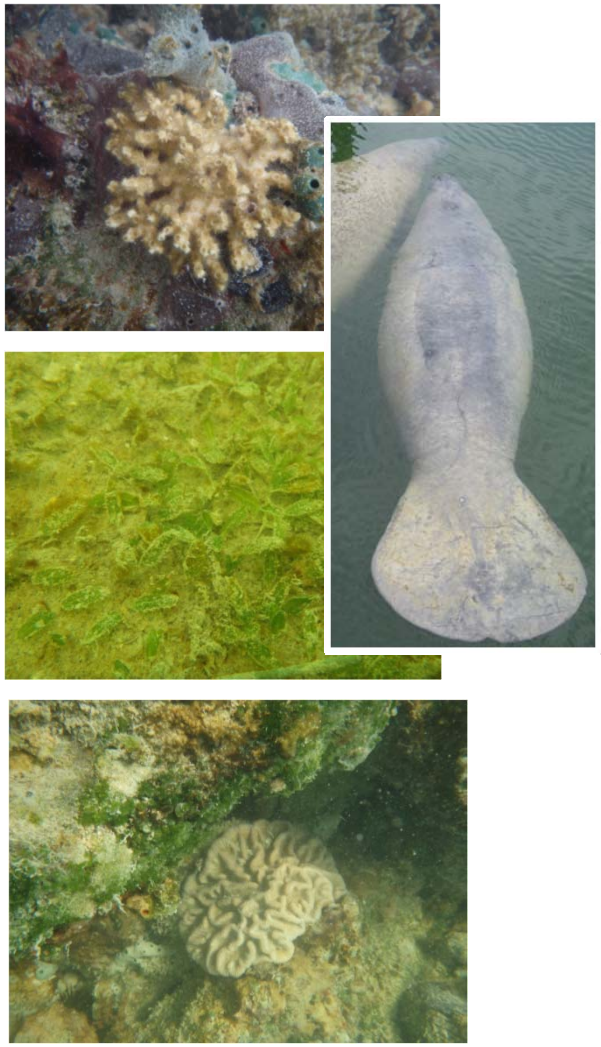
REPLACEMENT (75-year Service Life)



*** Assume 6 months for LDCA and 9 months for Construction Procurement**

Environmental Impacts of No-Build vs Build

- **No Build Alternatives result in no environmental impacts**
- **Build Alternatives (Rehab. or Replacement)**
  - Similar natural resource impacts for both rehabilitation and replacement.
  - Potential impact to corals on substructure & scour protection areas
  - Temporary impacts due to construction methods
    - Barge Use, water quality, noise, air quality
  - Minimal threatened & endangered species involvement
    - Informal Section 7 (of the Endangered Species Act) Consultation with USFWS & NMFS
  - Retain and improve bicycle and pedestrian access



Historic Resource Impacts of No-Build vs. Build

- **No Build Alternatives result in No Adverse Effects/Impacts to the historic resources**

- **Build Alternatives**
  - Rehabilitation - May likely result in Adverse Effects/Impacts to the historic resources
  - Replacement - Adverse Effects/Impacts to the historic Resources

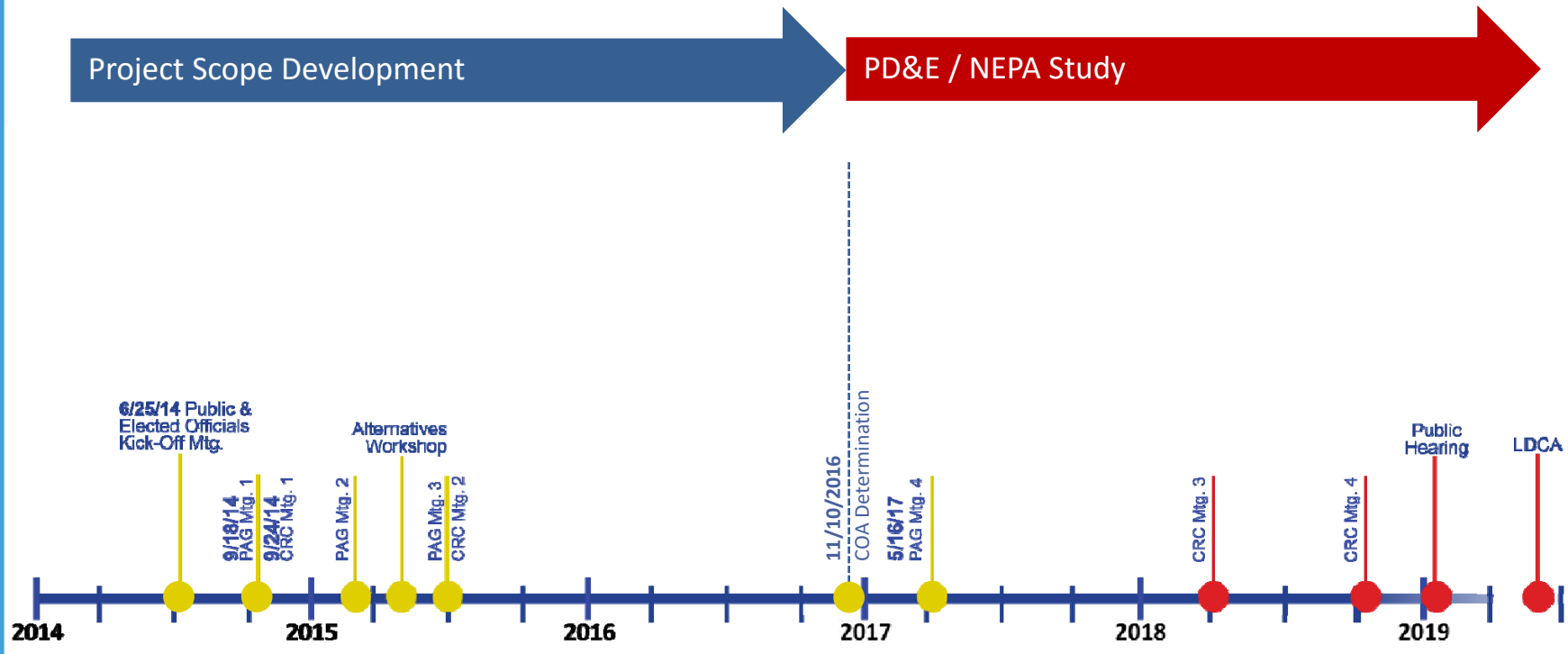
- **Adverse Effects**
  - Section 106 Effects Determination Case Study Report, Memorandum of Agreement, and further consultation with affected parties will be necessary.
  - Section 4(f) documentation also required.

Evaluation Matrix

EVALUATION CRITERIA	
Meets Purpose and Need	
Meets Current Safety Standards	
Service Life	
Typical Sectional Functionality	
Structural Capacity	
Hurricane Resistance	
Vessel Collision Resistance	
Bridge Clearances	
Maintenance of Traffic During Construction	
Utility Services	
Economic Impact	
Constructability	
Pedestrian and Bicycle Facilities	
Environmental Impacts	
NATURAL	Benthic Resources
	Essential Fish Habitat
	Threatened & Endangered Species
	Water Quality
PHYSICAL	Noise Impacts
	Air Quality
	Contamination Impacts
CULTURAL AND HISTORIC	
	Historic - Section 106/4(f)
SOCIAL AND ECONOMIC	Aesthetic/Visual Impacts
	Recreational Areas
	Community Cohesion
Engineering Costs	
Construction Costs	
Maintenance Costs	
Life Cycle Costs	

Score	Description
0	No Benefit or Not Applicable
1	Most impactful or least benefit
2	Very impactful or little benefit
3	Moderate impact or moderate benefit
4	Little impact or very beneficial
5	Least impactful or most benefit

Next Steps



LEGEND

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

Drive Safely

Stay Informed

FDOT Contact

Project Manager: Dat Huynh, PE

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

Phone: 305-470-5201

Miami-Dade County Contact

Public Information Officer: Karla Damian

Department of Transportation and Public Works

Email: kdamian@miamidade.gov

Phone: 786-469-5420

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**