MEMORANDUM

To: Shereen Yee Fong
Transportation Planner IV
Planning and Environmental Management Office
Florida Department of Transportation, District 6

From: John J. McWilliams, P.E. Kimley-Horn and Associates, Inc.
Gabriela Ramirez, P.E. Kimley-Horn and Associates, Inc.

Date: April 1, 2024

Subject: SR 856/William Lehman Causeway (Roadway ID 87210000 - MP 0.00 to 13.048)
Shared Use Path Conceptual Design Study

The Florida Department of Transportation (FDOT) – District Six has retained Kimley-Horn and Associates, Inc., to (1) prepare a conceptual design study/feasibility analysis for both a north and south alignment of a shared use path over the Intracoastal Waterway; (2) identify potential alignment challenges; and (3) develop an opinion of probably cost for the alignment improvements (FM No. 421035-4). The following sections summarize the results of that analysis.

BACKGROUND

The William Lehman Causeway (SR 856) is a limited access facility connecting US 1/SR 5/ Biscayne Boulevard (west) in Aventura, FL to SR A1A/Collins Avenue (east) in Sunny Isles Beach, Florida. At the request of the City of Aventura and the City Sunny Isles Beach, the Florida Department of Transportation (FDOT) is investigating the potential of constructing a barrier-separated shared use path along this corridor. The FDOT Design Office previously prepared a white paper document (Attachment A) that included an initial review of design alternatives and challenges associated with constructing a shared use path on the north side of the Causeway. The document made initial recommendations on a design approach but did not complete a conceptual design/feasibility analysis. A meeting with the Design Office was held on May 30th, 2023, where it was agreed that a conceptual design study is necessary to further examine the feasibility of the project and develop a more detailed cost estimate for future work programming. The discussion also highlighted changes to the potential design approach near the City of Sunny Isles Parking Garage (east) and the Safra Synagogue (west) for the north alignment. Further review of the right-of-way maps confirmed that current right-of-way near the Safra Synagogue is limited to the support piers and aerial rights for the overhead structure. A preliminary review indicates that an alignment along the south side of the Causeway over the Intracoastal Waterway may have less constraints when compared to a north alignment. Therefore, this conceptual design study was expanded to review both a north and south alignment. Note that both alignments are proposed to utilize the existing Don Soffer Trail to extend the route to West Country Club Drive and a new at-grade shared use path alignment along the north side of the Causeway from West Country Club Drive to SR 5/US 1/Biscayne Boulevard.

Upon completion of preliminary south and north alignments, a meeting with the Planning and Design Offices was held on December 14th, 2023, where preliminary concepts were presented (Attachment B). A preferred alignment was not identified as both warranted further refinement and a right-of-way evaluation. In addition, the Design office suggested FDOT may consider acquiring the at-grade right-of-way underneath the causeway for maintenance access rights. FDOT also recommended a PD&E phase given the complexity of the project.

PRELIMINARY CONCEPT DESIGN

Kimley-Horn refined the conceptual design for the proposed path alignments and associated enhancements along SR 856/Lehman Causeway shown in Attachment C. The beginning portion of the shared use path is the identical for both alignments between SR 5/US 1/Biscayne Boulevard and West Country Club Drive. Given the steep slope adjacent to Canal, gravity wall with mounted guiderail is necessary from Sta. 502+00 to Sta. 512+00 for drop off hazard mitigation. FDOT Florida Design Manual Section 224: Shared Use Paths was the primary standard referenced throughout the preliminary design process. Right-of-way acquisition is required five (5) feet from the back of the proposed gravity wall at approximately Sta. 502+60 to Sta. 504+30. The designed sixteen (16) foot shared use path accounts for FDOT FDM criteria on path width and horizontal clearance. A design variation appears necessary to reduce the shared use path width from twelve (12) feet to ten (10 feet to avoid impacts to an existing overhead sign. Additional guardrail is proposed to connect existing overpass guardrail with the proposed concrete barrier wall adjacent to the shared use path near Sta. 520+84 to 524+00.

The north alignment connected the existing Don Soffer Trail along the Causeway's north Frontage Road to a proposed path following the north westbound side of Lehman Causeway including the bridge. A high emphasis crosswalk with rapid rectangular flashing beacon (RRFB) assemblies was assumed to connect the proposed path to the Don Soffer Trail west of East Country Club Drive. Up to 19 feet of concrete bridge widening is proposed including a concrete barrier-protected ten (10) foot wide shared use path with two (2) feet of horizontal clearance on each side. The designed path width reduces to eight (8) feet in areas identified in the concept to reduce right-of-way impacts near the The Parc at Turnberry Isle Condo Building. A preliminary list of required design variations is included in Attachment D. Additionally, 3,280 square feet of aerial right-of-way acquisition is necessary to maintain the shared use path alongside Ocean View Building shown in Attachment E. Conventional right-of-way acquisition is required for these subject properties as well as the Safra Synagogue to account for pier placement for the proposed bridge widening. Access roads for Safra Synagogue and Turnberry Isle Condo from Turnberry Way will be impacted and may require relocation if the north alignment is implemented. At STA 578+00 on the east approach to the Intracoastal Waterway crossing, the shared use path profile deviates from the existing roadway profile eastward to intersect the existing sidewalk near SR A1A/Collins Avenue.

Consistent with the north alignment, the south alignment is proposed to tie into the Don Soffer Trail in same location with similar a crossing treatment. In order to connect the south alignment to this crossing location, a ten (10) foot shared use path is proposed along the inside of the perimeter Frontage Road from south the north under the Causeway bridge. The design includes a 'switchback' ramp to bring the path from the south Frontage Road to the elevation of the bridge at the approach slab. Approximately twenty (20) feet of concrete bridge widening will provide for a twelve (12) foot shared use path adjacent to the south side of the Causeway bridge with concrete barrier protection and two (2) foot horizontal clearance. Aerial right-of-way acquisition was not necessary for this south alignment. However, conventional right-of-way acquisition is necessary for bridge widening pier placement along the south side of the existing Causeway bridge. This has impacts to Mystic Pointe at Aventura condominium's common area on the west side of the Causeway bridge and an FDOT owned maintenance yard on the east side of the Causeway bridge. The access road for Mystic Pointe at Aventura will need to be relocated because of the pier placement design. Within the FDOT maintenance yard, a second 'switchback' ramp connect the elevated path to the at grade path, leading to existing sidewalk at SR A1A/Collins Avenue. Note that the second 'switchback' ramp does not appear to impact private right-of-way, the facility will be in close proximity to the Golden Shores Community. This second 'switchback' ramp will be longer than the west ramp to meet FDM longitudinal grade requirements.

PRELIMINARY CONCEPT EVALUATION

Both alternatives were evaluated from a design variation, environmental/social-cultural impacts, constructability challenges, right-of-way acquisition areas and complexity and construction cost at equal category weights. The most significant difference between the north and south alignments is right-of-way acquisition and the potential impact to adjacent private landowners and synagogue, as other categories are very similar in impacts.

While a shorter and more direct path for users, the north alignment's associated bridge widening requires bridge piers to be constructed in private property possibly requiring complete relocation of the properties access. At the Parc at Turnberry Condo, the path was reduced to a minimum 8 ft. (plus additional 2 ft. horizontal clearance) in order to reduce constructability challenges for machinery staging with the existing condo building, additionally piers are in direct conflict with the garage access road at grade which would require realignment away from pier locations. At the Beit Edmond J Safra Synagogue, pier locations can be designed as to avoid the permanent relocation of the facility utilizing straddle bents over the access roadway, however, construction will require access to the facility to be relocated elsewhere, perhaps under the existing causeway, or the temporary relocation of the synagogue during construction. Furthermore, constructability is also made challenging by proximity of construction to the City of Aventura Ocean View Parking Garages, where path width was also reduced to a minimum. If right-of-way is acquired for only the necessary pier placement a total of approximately 4,000 s.f. is required. If right-of-way is acquired for the entirety of the proposed structure widening, approximately 77,500 s.f. will be necessary.

In comparison, the south alignment creates a longer path for users of approximately 1500 ft due to north to south crossings and 'switchback' ramps. Constructability is eased in comparison with north given the majority of the path is away from major building structures, while impact to common areas of Mystic Pointe at Aventura Condo Association is expected. The alignment requires a minimum right-of-way acquisition of approximately 1,000 s.f. for pier placement only and a maximum acquisition of 56,000 s.f. if the right-of-way for the entire widening/structure is obtained.

The bulk of the cost difference between the north and south alternative is the switchback ramps that are necessary in the design for the south alternative. The full opinion of probable Cost can be found in Attachment F and summarized in Table 1 below. This does not include quantities related to modification of private access roads impacted by R/W acquisition and pier placement as wells as cost of right-of way acquisitions, temporary or permanent relocations and construction easements. Table 2 summarizes the comparisons between the design alternatives.

Table 1: Opinion of Probable Costs Summary

Cost Component	North Alternative	South Alternative
Roadway	$6,535,623.37	$8,374,261.19
Structures	$11,066,256.00	$10,398,970.00
Construction Total	$28,310,578.00	$30,855,386.00
PE, CEI, Permitting (30%)	*$6,291,211.00*	*$6,856,807.00*
Contingency (30%)	*$6,291,211.00*	*$6,856,807.00*
Grand Total	$40,893,000.00	$44,569,000.00

In conclusion, the north alternative involves major R/W and access road impacts to private owners which will lead to significant public involvement and constructability challenges. There are clear drawbacks to the south alternative including that switchback ramps are not desirable for bicyclists, the overall path will be longer, and the path will be more expensive. Alternatively, the south alignment involves significantly less R/W acquisitions and less conflicts with private owners. The additional R/W on the south side of the bridge also allows for less frequent variations to shared use path width and horizontal clearance. Despite these conclusions, the south and north alignments should advance to further evaluation with other alternatives during PD&E phase.

Table 2: Alternative Matrix

CRITERIA / ALTERNATIVES	ENGINEERING			COST		RANKING
	DESIGN VARIATIONS/ EXCEPTIONS 10	ENVIRONMENTAL/SOCIO-CULTURAL IMPACTS 10	CONSTRUCTABILITY 10	RIGHT-OF-WAY 10	CONSTRUCTION 10	
NORTH SIDE	Known design variations: - SUP width reduced from 10 ft to 8ft in two areas (next to the parking garage and next to the Turnberry building). - Existing shoulder width thru WB bridge maintained, 10' required, 8' existing. - Horizontal clearance (4' required, 2' used for majority of segments, 1' provided for short constrained segments) 0.5	Public acceptance challenges due to impact, possible temporary relocation to privately owned synagogue and Condo building access road. 0.2	Major constructability issues expected as FDOT does not own the at-grade RW on the north side. Close proximity to existing condo building and parking garage will be challenging for pier placement. 0.2	R/W acquisition required for pier construction at grade. Minimum R/W = 3,920 sf. Maximum R/W = 77,390 sf. FDOT will also need to obtain construction easements throughout north side of causeway over water and Aerial R/W over City garage. 0.2	Similar construction cost. Planning level cost = $41 milion 0.4	2 49
SOUTH SIDE	Known Design variations: - SUP width (12' required reduced from 10 ft to 8ft) on switchback ramps - Horizontal clearance (4' required, 2' used for majority of segments, 1' provided on switch back ramps) 0.7	Increased pedestrian walk distance due to undercrossings and switchback ramps. Public acceptance of redevelopment of commom HOA areas impacted. Possible pushback of adjacent homeowners to the east switch back ramp. 0.8	Minor constructability issues are expected for bridge construction adjacent to Mistic Point HOA & Golden Shores Community. 0.8	R/W acquisition required for pier construction at grade. Minimum R/W = 960 sf. Maximum R/W = 55,450 sf 0.7	Similar construction cost. Planning level cost = $44 milion 0.4	1 34

ATTACHMENT A

FDOT White Paper

Feasibility Assessment Memorandum for the Implementation of a Shared Use Path along SR 856 / William Lehman Expressway from SR 5 / US-1 / Biscayne Boulevard to SR A1A / Collins Avenue

FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT 6

FDOT Design Group 1 (Christopher Bacallao)

May 2023

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Executive Summary

The purpose of this report is to determine the design feasibility of the current recommendation for a barrier-separated shared use path on the William Lehman Causeway and to determine if there is a better solution that has not yet been considered. The goal for the project is to provide a protected or separate bicyclist / pedestrian facility, while maintaining the existing causeway at an acceptable standard. The William Lehman Causeway runs from SR 5/US-1/Biscayne Boulevard (MP 0.000) to SR A1A/Collins Avenue (MP 1.704) and has one set of exits with dedicated auxiliary roads. The causeway has a design and posted speed ranging from 45 to 55 mph and has a minimum width of 52' 4" on the WB bridge crossing the Intercoastal. This area will be the focus of the analysis as it is the tightest point on the causeway and the limiting factor for lane widths, shoulder widths, and width of the shared use path. The typical section at the bridge (**Figure 2**) is six 12' wide general travel lanes (three in each direction), 10' wide westbound outside shoulders and 6.5' wide outside eastbound shoulders, 8' wide inside shoulders, and a 20' wide median with raised concrete barriers. The area around the causeway has a high density of residential buildings, religious institutions, and major commercial developments, including Aventra Mall and the soon to open Brightline Station. The causeway currently has bike lanes striped on the outside shoulder of both the eastbound and westbound causeways, originating from a pilot study conducted in 2012 to add bike lanes to three Limited Access Facilities in Miami-Dade. The bike lanes see peak traffic of about 25 users per hour on Saturday afternoons, a mix of pedestrians and bicyclists. There has been only one recorded fatality involving a bicyclist/pedestrian and the investigation determined the striped bike lane or any other roadway features were not a contributor to the crash. The addition of a dedicated pedestrian and bicyclist facility is being requested by the City of Aventura, City of Sunny isles Beach and various politicians.

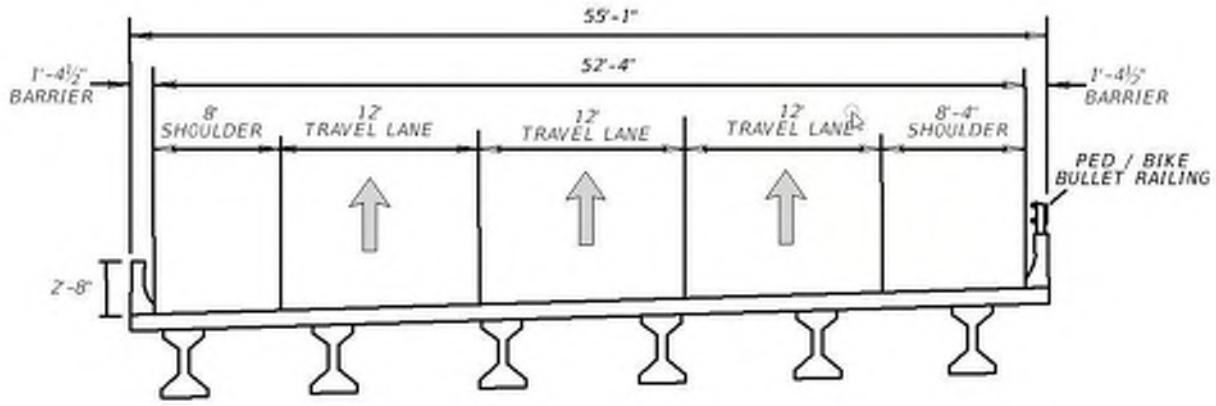


Figure 2: Existing Bridge Typical Section

The recommendation from the previous planning study was to construct two shared use paths, one on the outside westbound shoulder and the other on the eastbound inside shoulder. This design also required a tunnel to provide access to the path on the inside shoulder. Considering the majority of existing bike and ped traffic is recorded on the westbound causeway and most destinations are on the North side of the causeway, FDOT Design recommends for only one shared use path to be constructed on the north side of the causeway. This path can connect to the existing shared use path running on the North side of the project and provide the closest

possible access to both synagogues along the corridor. The FDOT Design team reviewed the following Design Alternatives for a shared use path: barrier separated, bridge widening, tubular marker separators, zipper delineators, curb separated, cantilever pathway, and a separate structure. Most of the design alternatives were rejected for requiring too many design exceptions, not providing sufficient protection for the pedestrians/bicyclists, or not being a standard separator used on high-speed roadways. The pros and cons, variations /exceptions required, and analysis for each alternative are fully discussed in the design decisions and design alternatives sections. The two design alternatives deeply analyzed were the concrete barrier separated shared-use path and the bridge widening design alternative, as they seemed to be the most fitting for the corridor. These designs are extremely similar as they both would run along the North side of the project, connect to the existing shared use path, and use concrete barriers as a separator between the roadway and path. These designs also have almost identical layouts on the West side of the project from Biscayne Blvd. to East Country Club Dr. This area can be easily widened as needed to accommodate the path and keep the roadway as close to the existing width as possible.

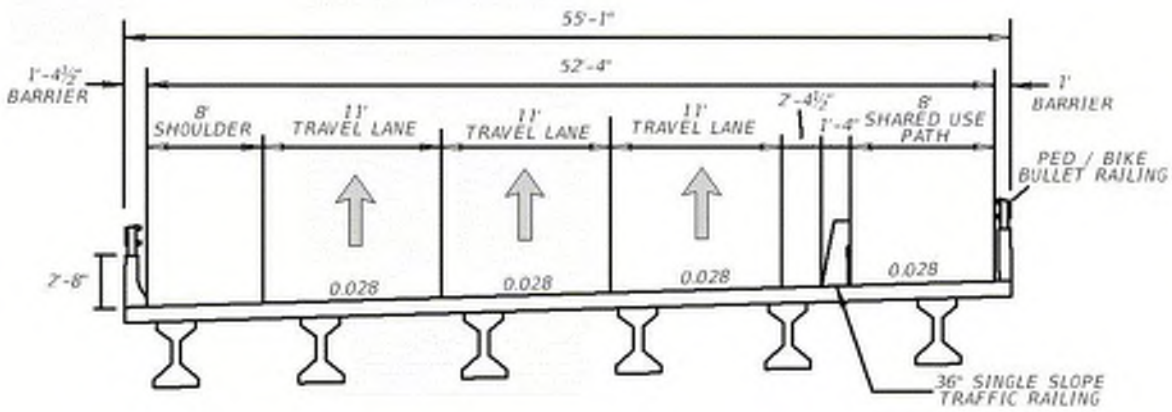


Figure 14: Barrier Separated Shared Use Path Typical

The **barrier separated alternative** **(Figure 14)** suggested in all previous studies leaves the causeway extremely substandard. This alternative requires eight design exceptions and two design variations. Most of these design exceptions are related to lane width and shoulder width and substantially below the AASHTO minimum standards. This alternative requires the travel lane widths to be reduced to 11', which is below standards for a limited access facility. The design also requires the outside shoulders be reduced from a total of 16' (8' each) to 9' (7' inside shoulder, 2' outside shoulder) minimum for the bridge segment. FDOT does not believe that these design exceptions will be approved as they leave the roadway significantly below Florida Design Manual standards. The addition of a shared-use path on the causeway is needed, but sacrificing the safety of motorists, to fit an 8' path is not something FDOT is comfortable doing.

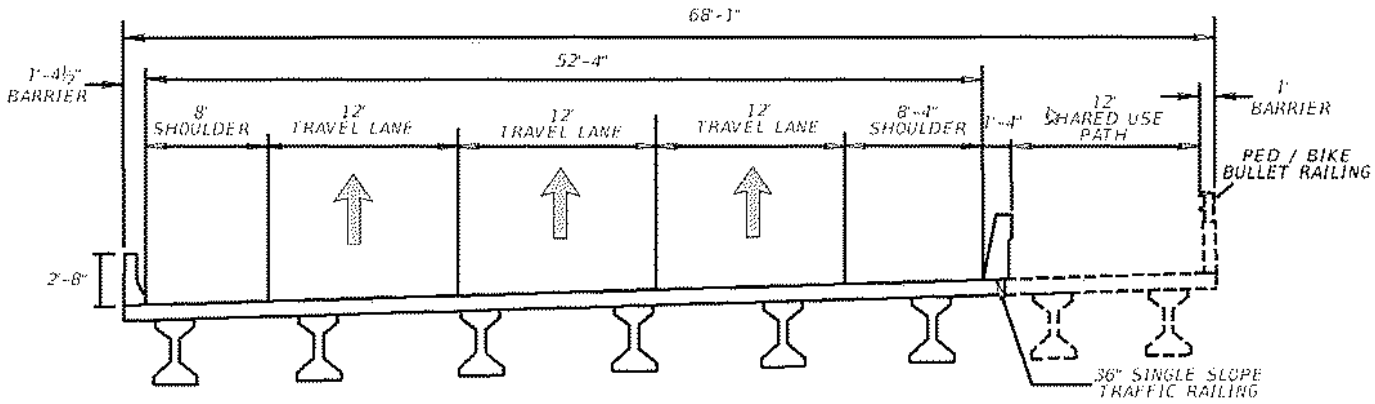


Figure 15: Bridge Widening Shared Use Path Typical

However, the **bridge widening alternative (Figure 15)** allows the width of the roadway to remain as existing by widening the causeway along the North side to accommodate a 12' shared-use path. This design alternative is extremely costly and timely but provides the best facilities for all users. The bridge widening will impact the neighboring facilities and require right of way acquisition to accommodate the path. A full design analysis needs to be performed for this alternative to pinpoint exactly what areas will be impacted by the bridge supports and foundation. Current right of way files show there is only one right of way impact, but these may only account for aerial rights in the area as Miami-Dade County property appraiser shows that multiple parcels under the causeway are privately owned. This bridge widening alternative is what FDOT Design recommends for the causeway as it provides the maximum amount of space for drivers, bicyclists, and pedestrians.

Other more **unconventional design alternatives** were reviewed, the first being to remove the Limited Access Facility classification of the corridor and lower the speed limit, which would allow lane reductions, shoulder reductions, and curbing without violating FDM standards. After a meeting with the FDOT executive team it was decided that FDOT is not interested in removing the limited access facility classification of the corridor as it would compromise the goal of the causeway if more exits or connections were to be added. The other unique design approach considered is to provide an at-grade shared use path facility that runs on the northside and under the causeway. The at-grade path would be extremely complex due to the path having to cross two separate waterways, cut through and around private property and possibly require Right of Way acquisition. This alternative does provide direct connections to large trip attractors in the area and could be favorable by some users as it would not have steep slopes like the other alternatives. Coordination with the cities, other municipalities, and property owners is necessary as this alternative would require at least one draw bridge and must weave through and around existing parking lot facilities. If this concept were to be considered it must be thoroughly reviewed and planned out, to understand all the impacts and commitments which will need to be made by FDOT and the cities to construct, maintain and operate such a complex and unique shared-use path. **FDOT Design's final recommendation is to move forward with a more in-depth analysis of the bridge widening alternative and to consider having an at-grade path if no other options appear to be tangible.**

Introduction

In August of 2020, the city of Sunny Isles Beach and the City of Aventura had requested that the Florida Department of Transportation (FDOT) conduct a lane elimination and repurposing analysis of the SR 856/William Lehman Causeway between SR 5/US-1/Biscayne Boulevard to SR A1A/Collins Avenue. The goal of the previous studies analysis was to determine a possible design to accommodate a shared use path along the travel lanes of the causeway. Both previous studies have recommended having a barrier-separated shared use path along the Eastbound or Westbound lanes of the causeway. The goal of our study will be to determine the feasibility of a barrier-separated shared-use path being added on SR 856/William Lehman Causeway (Section 02, Roadway ID 87210000) from SR 5/US-1/Biscayne Boulevard (MP 0.000) to SR A1A/Collins Avenue (MP 1.704) while maintaining all existing travel lanes and outside shoulders. FDOT's current lane repurposing guidance is not applicable to Limited Access (L/A) facilities, so the lane elimination previously suggested is not a feasible solution. ***Appendix A*** contains the initial "North-South Transportation Needs for the Coastal Communities Study" that generated the initial request to FDOT. In ***Appendix B*** the "Protected Shared Use Path on SR-856 / William Lehman Causeway" study done by FDOT, can be found which recommends the construction of two barrier protected shared use paths, one along the inside shoulder of the eastbound lanes and the other along the outside shoulder of the westbound lanes.

Background Information

Project Purpose

The purpose of this report is to determine the feasibility of the current recommendation for barrier-separated shared use paths on the eastbound and westbound roadway and to determine if there are better long-term or short-term solutions that have not yet been considered. This project would increase mobility in the area, encourage multi-modal transportation by providing a connection between the future Aventura Brightline station, the Northeast Corridor commuter rail, and the Sunny Isles beach area. This project would connect existing share use path already in the area and improve the safety of bicycles and pedestrians that already use the existing shoulder and bike lane of the high-speed roadway as a path. This whole area has a very limited roadway network due to the geography of the intercoastal waterway splitting the area. The Lehman causeway is one of only seven in Miami-Dade County that connect the mainland to the barrier islands. The closest connection to the south is NE 163 St. (2.1 miles) and to the north is Hallandale Beach Boulevard (2.2 miles). Of all 3 connections the Lehman Causeway is the only limited access facility, making it the most unsafe and unfriendly for pedestrians and bicyclists due to the lack of connections and high speeds.

Existing Conditions

SR856 / William Lehman Causeway expressway is a C5 Context roadway in Miami-Dade County that connects the city of Aventura on the west end to the City of Sunny Isles Beach on the east. The roadway has a design and posted speed of 55 mph within the study area. SR 856 is considered a principal arterial and is part of the National Highway System (NHS) and the State Highway System (SHS). A project Location map is shown in **Figure 1**.

Figure 1: Project Location Map

The existing typical section is six 12' wide general travel lanes (three in each direction), 10' wide outside shoulders, and 9' wide inside shoulders with a 20' wide median with raised concrete barrier. The typical section at the bridge (MP 1.34 – MP 1.41) six 12' wide general travel lanes (three in each direction), one 12' wide eastbound auxiliary lane, 10' wide westbound outside shoulders and 6.5' wide outside eastbound shoulders, 8' wide inside shoulders, and a 20' wide median with raised concrete barriers. The typical section for the north frontage road east of W Country Club Drive, has a 10' wide shared-use path, a 6' wide sidewalk, curb and gutter, 4' wide bicycle lane, two 10' wide westbound general travel lanes, and a 5' wide shoulder. The South frontage road is independent and has 4’ wide shoulders and two 10' wide eastbound general travel lanes. The typical section at the bridge and typical sections for the WB 1-lane and WB 2-lane ramps are shown in **Figure 2**.

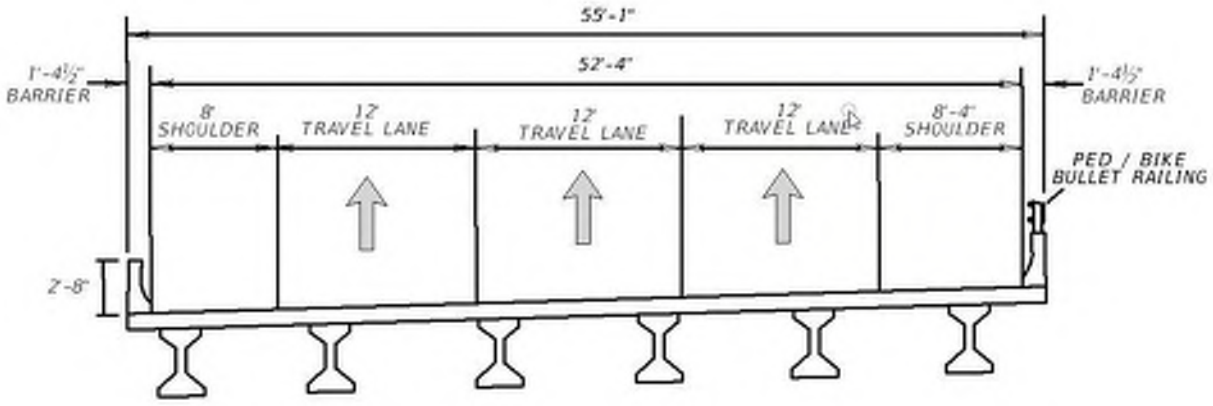


Figure 2: (1) Bridge Typical Section

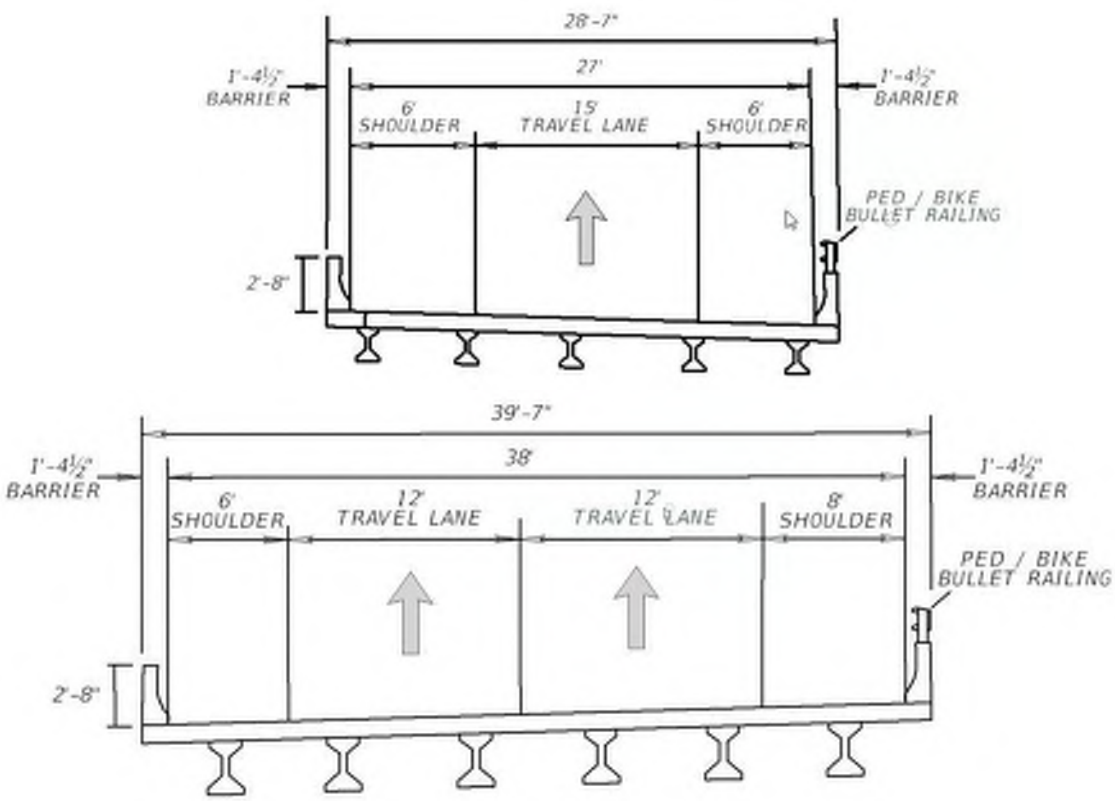


Figure 2: (1) Bridge Typical Section, (2) 1-Lane WB Ramp, (3) 2-Lane WB Ramp

The area around the causeway has a high density of residential buildings, religious institutions, and major commercial developments. On the NW corner of the causeway is Aventura Mall, North of the cause way is the Edmond J. Safra Synagogue and on the east end of the causeway is the Chabad of Golden Beach. There are also two public parks, Founders Park (south of causeway) and Heritage Park (northeast of causeway) and a city of Sunny Isles Beach playground (east of causeway). The City of Aventura Government Center, City Hall and Police Department are located just south of the causeway. This demonstrates that the causeway is centrally located between many desirable locations and currently acts as the main pedestrian, bike, and vehicular travel way for people in this area.

Pilot Program

In 2012 FDOT had a 2-year pilot project that allowed cyclists to travel on three Limited Access Facilities which included the William Lehman Causeway. In March 2013 FDOT marked the outside shoulders of the causeway and frontage roads as bicycle lanes. Then in 2014 they updated some conflict points from crosswalks to green colored pavement. The conclusion of the pilot program stated that during the pilot project, data shows that bicycle usage increased steadily over the pilot period for the William Lehman Causeway. It also stated that bike traffic was higher on weekends and that drivers reduced their speed by about 2.2 MPH on average when overtaking bicyclists on bridge segments. The study also noted that both drivers and bicyclists were found to actively search for conflicting traffic at all conflict points and yield appropriately. Overall, the number of bicycle accidents did not increase on the corridor even with the increase

in bike traffic which demonstrates some positive functionality to the project. The report recommended extending the pilot program for two additional years, while evaluating crash data to determine if the increase in bike traffic has any effect on crashes in the corridor. The pilot program final report is attached in ***Appendix C*** detailing these findings.

Bike and Pedestrian Usage

This shared use path would act as a connection between the sidewalks and bike paths on the west end, the Don Softer Exercise trail (shared use path) which wraps around the golf course to the North of the causeway, bike lanes and sidewalk along the south frontage road and the bike lanes and sidewalks along SR-A1A at the East end. This pathway would also provide connections between the Edmond J. Safra Synagogue and the Chabad of Golden Beach to the many residential buildings in the surrounding areas. A substantial portion of the people living in the area are Jewish and have been observed walking the corridor especially on Saturdays (the Jewish Sabbath). Under Certain Jewish laws, certain activities are prohibited on the Sabbath and other major holidays, which there usually are about 22 days of spread throughout the year. These laws include:

- Prohibition against travel by motor vehicle as either a driver or passenger,
- Prohibition against travel by bicycle or similar
- Prohibition against carrying objects from private to public property and vice versa outside of a demarcated area called an eruv.
- Closing of a circuit would occur for either a pedestrian activated signal push button or motion detector activation for a traffic signal.

All four synagogues closest to the causeway all strictly practice most of these restrictions which involve the observant population to travel to and from the synagogues on foot on certain days. Many of the people making these trips are elderly and children that travel accompanied by family members. It is important to note that travel to the synagogues is considered part of daily life and not a matter of choice, exercise, or recreation. These trips are mandatory for most who practice these beliefs and cannot be substituted for any other type of practice or worship. Other than the Jewish population many use these paths are used for recreational activities like jogging and biking in the area.

The “Protected Shared Use Path on SR-856 / William Lehman Causeway” study conducted two site visits and detailed all the observed trips at both the East End ramps and North Frontage Road. These reviews were done mostly at the ramp entrances to the causeway as observing pedestrians and cyclists on the causeway could cause a safety issue. The first field visit was conducted at the Edmond J Safra Synagogue up to the north frontage road on Saturday, April 17, 2021, from 7:30 AM to 9:10 AM. Their observations from Field Visit 1 and a photo of the ramp observed can be seen in **Figure 3**.

1. A pedestrian traveling eastbound on the westbound on-ramp to the causeway was headed to the Chabad of Golden Beach. Many other pedestrians were observed coming from north and south SR AIA/Collins Avenue.
2. No pedestrians were seen traveling westbound onto the causeway or eastbound from the causeway to the Edmond J. Safra Synagogue. Several pedestrians were observed arriving from the east and north to the synagogue.
3. Many joggers, runners, walkers, and cyclists were observed traveling in both directions on both shoulders (inside and outside including ramps) across the Intracoastal Waterway.
4. High speed bicycle riders were observed using the causeway ramps and traveling in platoons.
5. Many illegal street crossings were observed at the left-turn median opening to the Ocean Two Condominium on SR AIA/ Collins Avenue. Pedestrians making this illegal street crossing included Ramada Plaza hotel valet workers, hospitality workers, and beach attendees.
6. The existing public beach access path was observed being used by a diverse (i.e., age, type, and ability) mix of users.

Figure 3: Photo Location of Field Visit 1

The second field review conducted by the "Protected Shared Use Path on SR-856 / William Lehman Causeway" study occurred on the east end of the causeway on September 22, 2021 from 8:00 AM to 11:00 AM. This field visit was more detailed and distinct routes were found to be used by pedestrians and cyclists. The study outlined a detailed explanation of each route and a breakdown of the usage shown below.

- Route 1 showed pedestrians walking Southbound along SR A1A to Chabad of Golden Beach.

- Route 2 uses the westbound on-ramp to SR 856/William Lehman Causeway from southbound SR A1A/Collins Avenue.
- Route 3 shows the path of pedestrians going to Jewish religious institutions south of 191 Street along SR A1A/Collins Avenue.
- Routes 4 and 5 showed Pedestrians walking Northbound towards Chabad of Golden Beach on the East (Route 4) and West (Route 5) side of the roadway.
- Route 6 illustrates the activity of car valets for the Ramada Plaza by Wyndham Marco Polo Beach Resort (19201 Collins Ave, Sunny Isles Beach, FL 33160). The valets park vehicles at the P8 Municipal Parking Garage (19370 Collins Ave, Sunny Isles Beach, FL 33160) and pick-up the vehicles by walking across SR A1A/Collins Avenue. Since the nearest crosswalk is approximately 308 feet south of the hotel entrance, valet and other hotel staff prefer to cross approximately 100 feet north of the crosswalk at the southbound SR A1A/Collins Avenue left turn bay into the Ocean Two Condominium (19111 Collins Ave, Sunny Isles Beach, FL 33160).
- Routes 7 and 9 depict similar observed behavior by construction workers, tourists, and regular beach visitors that prefer to cross at the left-turn bay instead of using the marked crosswalks.
- Route 8 shows all pedestrian traffic coming from the Westbound ramp of the Lehman Causeway and crossing SR A1A to arrive at the Chabad of Golden Beach.
- Route 10 uses the westbound overpass from northbound SR A1A/Collins Avenue to westbound SR 856/William Lehman Causeway.

The routes map and field visit notes map can be found in **Figure 4**. Additional photos from the field visit can be found in ***Appendix B*** the "Protected Shared Use Path on SR-856 / William Lehman Causeway" study.

Route	Pedestrian Count
1	64 adults + 16 children headed to the Chabad of Golden Beach Other pedestrians used this crosswalk, especially transit users of Miami-Dade and Broward County Transit (BCT) routes 28, E, and S
2	2 adults assumed to be headed to the Edmond J. Safra Synagogue (i.e., westbound) 3 runners (2 headed westbound and one eastbound) 1 jogger (westbound) Multiple cyclists (westbound) and 1 motorized scooter (eastbound)
3	3 adults headed to Jewish religious institutions south of 191 Street along SR A1A/Collins Avenue Multiple other pedestrians and athletes 3 cyclists southbound on SR A1A/Collins Avenue outer travel lane
4	1 child headed to the Chabad of Golden Beach
5	20 adults + 2 children headed to the Chabad of Golden Beach
6	5 adults + 1 child parked at P8 Municipal Parking Garage and headed to the Chabad of Golden Beach. Multiple hotel car valet, maids, hotel staff, and other workers.
7	7 adults parked at the P2 Municipal Parking Lot and headed to the Chabad of Golden Beach. Early morning group of elderly women finishing exercise class and other pedestrians parked at the P2 Municipal Parking Lot.
8	1 adult headed to the Chabad of Golden Beach
9	Multiple construction workers and other beachgoers. Most leisure-oriented pedestrians used the marked crosswalk while those assumed to be regulars did not use the marked crosswalk.
10	1 runner on the westbound overpass from northbound SR A1A/Collins Avenue to westbound SR 856/ William Lehman Causeway

Figure 4: Routes Map and Field Notes from Field Visit 2

Safety and Crash Data

A Crash report analysis was done on the corridor and a total of 419 crashes (3 fatal) were recorded between January 1, 2012, and March 30, 2023 (shown in ***Appendix D***). This crash analysis included the William Lehman causeway from end to end, the entrance and exit ramps, the auxiliary roadways, and the intersections allowing access to the causeway. Of the 420 crashes only six were found to involve a bicycle and six were found to involve a pedestrian. Six of the accidents occurred on the shoulders or ramps of the causeway, while the other 6 occurred on the auxiliary roads or intersections leading to the entrances of the causeway. Of all 12 pedestrian and bicycle accidents only one resulted in the death of a pedestrian who was struck by a vehicle.

A pedestrian fatality crash occurred in December of 2013 on the west end of the corridor. According to the police report, a vehicle was traveling westbound on SR856 in the center lane, at approximately 560 feet east from the from the Biscayne Blvd intersection a pedestrian attempted to cross the causeway and walked into the path of the vehicle. The pedestrian was struck and taken to the hospital where he later passed from injuries. The roadway conditions were described as dark, wet, and it was actively raining at the time of the incident. The disposition of fatal crash report (***Appendix E***) was reviewed and stated that there was no action required as no roadway feature was found to contribute to the fatal crash. The marked bike lanes have existed on this project for almost 10 years and have not been found to contribute to any incapacitating injury for a pedestrian or bicyclist.

The data for crashes that occurred with the railings and concrete barriers on the edge of the causeway were also examined. Of the 419 accidents, 23 were found to have involved a driver striking the barriers, railing, guardrail, or another fixed object on the edges of the causeway. Of the 23 crashes two ended in a fatality and five had serious injury reported. These accidents were spread throughout the stretch of the causeway and seemed to be due to the drivers losing control of the vehicle or swerving and slamming into the sides of the concrete barrier. Looking at the more recent years it appears like the number of accidents has begun to decrease as there was only one crash in 2021 (vehicle struck the curb by the exit ramp on SR A1A) and one in 2022 (Vehicle struck a fixed object at the exit by SR A1A). The causeway also had a total of 68 sideswipe crashes on the corridor, but none resulted in a fatality or incapacitating injury. This data shows that reduction of lane widths and shoulder widths could cause even more accidents for motorists.

Design Considerations

The typical width of the westbound causeway is 55’ including travel lanes, shoulders, and bike lane and at the tightest point seems to pinch to 52’ which we will use as our limiting width for design. Identifying the minimum allowable widths for a shared use path to be 10’ allowable by the FDM and 8’ at pinch points. 4 of these 12 accidents occurred on the shoulders or roadway of the causeway, while the other 8 occurred at intersection or conflict points at the entrance or exits of the causeway.

There is limited Right of Way on both sides of the causeway. One of the pinch points being the ROW at the bridge extending 44’ south and 25’ north from the outside edges of the bridge. At the east side exit ramps there is a pinch point of only 4.5’ on the south side and 11’ on the north side of additional ROW limiting causeway widening or construction of a new structure. The west end of the causeway has more room for expansion as the average distance from the edge of the existing paved shoulder to the ROW line is 33’ on the south side and 21’ on the North side with some slightly tighter pinch points. However, the most restricting area for

expansion is the center spans on the edge of the auxiliary roads, the south road has 7’ of available ROW from BOS and pinch points leaving 0’ of available ROW. The North auxiliary road has an average available ROW of 0’, but no widening should be necessary here as a shared use path already exists in this stretch. An existing conditions and ROW map is shown below, along with a table of the properties needed to be purchased for widening or a separate bike / ped facility.

Possible Evacuation Route

The Lehman Causeway provides a connection between the City of Sunny Isles Beach and the mainland of south Florida. For this reason, during emergency situations or evacuations it may be the route that many people use to move further inland. The causeway is not specifically marked as an evacuation route on the Miami-Dade Storm Surge Planning Zones and Evacuation Routes Map, shown in **Figure 5**. Reducing lanes and shoulders to unusable widths can limit the capacity of the corridor in these situations. This will be considered when evaluating alternatives to ensure that the shoulders of the causeway can be used as travel lanes in a dire situation. The full Miami Dade Storm Surge Map is shown in ***Appendix F***.

Figure 5: Miami-Dade Storm Surge Planning Zones and Evacuation Routes Map

Florida Design Manual and AASHTO Conflicts

The table shown in **Figure 6** outlines the major FDM and AASHTO standards that need to be met in order to avoid a design variation (not following FDM standard) or design exception (not following FDM standard or AASHTO standard).

Design Constraint	FDM Standard	AASHTO Standard
Lane Width on LAF / High speed roadway	12’	12’
Inside Roadway Shoulder Width on LAF / High speed Roadway	12’	4’
Outside Roadway Shoulder Width on LAF / High speed Roadway	12’	10’
Median Width	26’	22’
1-Lane Ramp Travel Lane Width	15’	15’ typically (22’ to 25’ including shoulders)
1-Lane Ramp Inside Shoulder Width	6’	1’ to 6’ (Sum of both shoulders be 10’-14’)
1-Lane Ramp Outside Shoulder Width	6’	8’ to 10’ (Sum of both shoulders be 10’-14’)
2-Lane Ramp Travel Lane Width	24’	24’ typically (2 lanes) (37’ to 42’ including shoulders)
2-Lane Ramp Inside Shoulder Width	10’	1’ to 6’ (Sum of both shoulders be 10’-14’)
2-Lane Ramp Outside Shoulder Width	10’	8’ to 10’ (Sum of both shoulders be 10’-14’)
Shared Use Path Typical Width	12’	8’
Shared Use Path Pinch Point	8’	8’
Buffer Separation Width	5’ or barrier	5’ or barrier
Cross Slope Max	5%	5%
Slope / Grade Max	Matching Roadway	Matching Roadway
Sidewalk Width	10’ (recommended) 6’ (minimum)	5’ (recommended) 4’ (minimum)
Separated Bike Lane Width One-way	7’ (recommended) 6’ (minimum)	4’ (minimum in shoulder)
Separated Bike Lane Width Two-way	12’ (recommended) 10’ (minimum)	8’ (minimum)
Stopping Sight Distance	495’ No slope 433’ High Upgrade 593’ High Down grade	495’ No slope 433’ High Upgrade 593’ High Down grade

Figure 6: Design Constraints table for FDM and AASHTO

Design Decisions and Design Alternatives

Design Decisions

Looking at the existing pedestrian and bike facilities on the causeway, it appears that a bike lane exists on the westbound and eastbound outside shoulders ranging from 10' wide on the causeway to 5' wide on some ramps. The current recommendation is to add a shared use path on both the Eastbound and westbound causeways. However, after looking through the field visit pedestrian data and the existing geography of the area (connections to other shared use paths, both synagogues and Aventura Mall), it appears that a shared use path on the westbound causeway would get much more use than on the eastbound. Field visit data from the second visit conducted in the previous study showed that more than 75% of the bikers and pedestrians using the causeway were traveling on the westbound ramps. This path would be the closest possible to the synagogues, mall, and golf course. The path on the eastbound ramp would get very little use as people would not be willing to make the detour under or around the causeway to use that path when they could walk in the existing shoulder on the westbound causeway. The typical sections of both the eastbound and westbound causeways are very similar except it appears that the total width of the roadway may be about one foot wider on the eastbound causeway. Looking at the field visit data there is not enough pedestrian and bike traffic to warrant the construction of two shared use paths. However, more research should be done to truly throw out this alternative as the construction of a usable path may encourage much more use pedestrian and bicycle use. A breakdown / comparison of all the different decisions of where to construct the shared use path are shown below in **Figure 7**. This figure demonstrates that the recommended designs are to construct the shared use path on the outside shoulder of the westbound causeway or to widen the bridge to accommodate the shared use path. It also shows that constructing a separate share use path, using tubular markers and delineators, or leaving the bike lanes as existing should be considered as possible alternatives.

#	Decision	Pros	Cons
Using Existing Roadway: by reducing shoulder and travel lane width			
1	2 facilities for bikes / Peds	- Allows most mobility in area, - Provide connections to golf course, existing shared-use paths, mall, and synagogues.	- Need to leave both directions of causeway with substandard shoulders and travel lanes. - The more convenient walkway will get substantially more traffic, while the other is not as useful.
2	Eastbound Inside shoulder facility	- Slightly larger existing width of roadway. - Does not impact evacuation route side of roadway.	- No connection to existing shared-use path, mall, or synagogues. - Majority of current pedestrians use WB ramps and causeway. - If constructed people will continue to take their more convenient path rather than adjusting to this one. - Eastbound causeway facility would be longer and more costly. - Eastbound shared use path on inside shoulder has no access on

3	Westbound Outside shoulder facility	- Accommodates the majority of existing bike and ped traffic. - Closest connection to large trip producers (mall, synagogues, golf course).	- Reduces width of WB causeway which is an evacuation route.
4	Leave existing bike lanes as is	- Roadway travel lanes and shoulders remain up to standard. - No cost or very low-cost solution. - Allows shoulder to be usable for emergency situations.	- Leaves unprotected bike lanes as a safety issue. - Solves no issues brought up throughout the studies.
5	Removal of Pedestrian and bike facilities	- Reduces liability and discourages use of roadway by peds and bikes.	- Pedestrians and bikers will continue to use it in more dangerous conditions. - Removes bike lanes on a roadway where they already exist. - Removes only access for peds and bikes to cross causeway within 2 miles. - Striping still gives awareness to drivers that bikes are travelling in shoulder.
A Separate Pedestrian Facility			
6	Add a separate pedestrian facility running parallel to causeway	- Extremely Safe - Will remain even if roadway needs to be widened in the future - Allows maximum width of roadway for emergency evacuations	- Very High cost - Limited Right of Way - Not a short-term solution
Legend			
Recommended Approach		Possible Approach	Rejected Approach

Figure 7: Table Comparing Locations and Decision for Shared Use Path

Design Alternatives

Now specifically looking at the design approach to the pedestrian facility all the alternatives shown in **Figure 8** were considered. Alternatives like an "Urban Side Path" were looked at but were thrown out due to only being used next to low-speed roadways. Of the alternatives in **Figure 8**, the recommended design is to use a concrete barrier separated shared use path as it is relatively low cost compared to widening and still provides protection to the pedestrian and bicyclists on the roadway. The alternatives that were rejected were strictly worse

than other possible alternatives or seemed to introduce even more safety issues to the roadway for both motorists and cyclists. Of the alternatives below, the two that seems to address the scope best in terms of connectivity, reasonable wait for implementation, safety are the barrier separated shared use path on the outside shoulder of the westbound causeway or the bridge widening in the same area. Typical Sections were developed for each of the possible and recommended alternatives which can be found in ***Appendix G***.

#	Alternative Name	Configuration	Pros	Cons
1	Barrier separated shared use paths	A barrier separated shared use path on the designated eastbound/westbound causeway or both.	- Improve safety for peds and bikes. - Provides protection in an area already being used by pedestrians. - Relatively lowest cost solution for best safety improvement.	- Shoulders must be reduced (requires variation and exception). - Evacuation roadway has reduced capacity. - Reduces safety for motor vehicles. - Barriers cause additional load onto roadway.
2	Aluminum Cantilever walkways	A separate cantilever pedestrian facility extending from the north edge of the roadway.	- Provides increased amount of safety. - Allows dedicated space and can be wider. - No impact to shoulders or evacuation route. - No variations or exceptions.	- Very high cost. - Long wait period to be implemented. - People may continue to use the shoulders they are accustomed to if path is longer.
3	Bridge Widening	Widening the causeway along the North Side to accommodate a shared use path with no impacts to the roadway.	- Requires far less variations and exceptions than other alternatives. - Allows for a full-size shared use path and full-size lanes. - Provides a completely protected facility.	- Extremely costly. - Takes a very long time to construct. - Possible ROW acquisition needed. - Possible impacts or conflicts for new bridge supports.
4	Separate pedestrian / bicycle facility	Separate pedestrian / bicycle facility on the north side running parallel to causeway.	- Provides maximum safety for bikers and pedestrians - No impacts to shoulders, lane width or evacuation route.	- Limited ROW for expansion - Extremely high cost - Long construction time - If connection points are less convenient, people

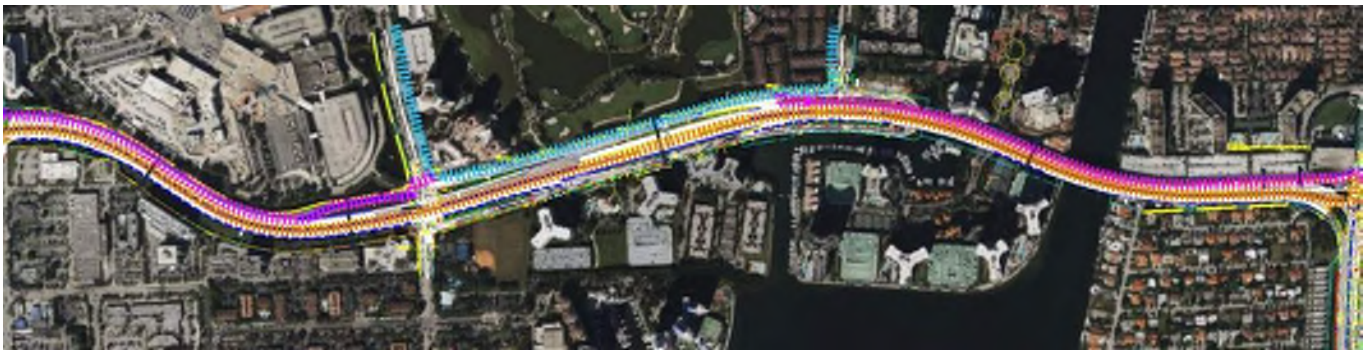
			- No travel way variations or exceptions.	will continue to use the shoulders of causeway. - Purchase of properties for ROW is needed. - Tie in locations and slopes / vertical curve will have conflicts.
5	Walkway with Curb	A curb separated shared use path on the designated eastbound/westbound causeway or both.	- Relatively low cost - Provides mild protection to peds and bikers. - Takes up minimal amount of width.	- May end up being more dangerous because of low-visibility barrier. - Not a standard separator for ped and motor vehicle facilities.
6	Sidewalk and Bike Lane Combo	Using a sidewalk next to a bike lane in shoulder rather than a shared use path.	- Separate facilities for bikes and peds. - Allows more space for bikers.	- Because of the now existing bike lanes, reducing shoulders to unmarked bike lanes cannot be done. - 6’ sidewalk plus, 10’ bike lane is wider than other alternatives.
7	Tubular marker separated shared use path	A tubular marker separated shared use path on the designated eastbound/westbound causeway or both.	- Makes drivers more aware of peds and bikes. - Allows for reduction of total width meaning larger shoulders. - Used effectively on other sites and for separation of managed lanes. - Can act as a temporary solution.	- Only design guidance for this is with managed lanes which does not apply to pedestrian facilities. - Not considered protection for bikes/peds. - Not a standard separator for ped and motor vehicle facilities.
8	Zipper Delineator separated shared use path	A zipper delineator separated shared use path on the designated eastbound/westbound causeway or both.	- Very similar to existing conditions, but spacer should alert drivers of bike/ped facility. - Low-cost. - Can act as a temporary solution.	- Zipper Delineators could become a hazard for cars or bikes who drift into them. - Provide no protection to the peds/bikes. - Not a standard separator.

Legend		
Recommended Alternative	Possible Alternative	Rejected Alternative

Figure 8: Table Comparing Design Decision or Approach for Pedestrian / Bike Facility

Rejected Design Decisions and Alternatives Breakdown

Rejected Design Locations



Pink = North Path (WB) **Orange = Eastbound Path** **Blue = Existing Shared Use Path**

Figure 9: Project Map and Legend showing Possible Location for Pedestrian / Bike Path

All the possible plan view design locations for the paths can be found in ***Appendix H***.

Two Pedestrian / Bike facilities (1 on EB and 1 on WB causeway)

Adding any type of pedestrian / bicyclist protected facility will require several design variations and exceptions for lane width, clearance zone, shoulder width, shared use path width and ramp lane widths. There is no need to leave both sides of the causeway substandard when one should address the problem. On field visits only one pedestrian was recorded traveling on the eastbound shoulder, while 8 were recorded traveling on the westbound outside shoulder. Constructing the eastbound facility would not convince people to use that side of the roadway as it is almost a 600' detour on the East end and a 2500' detour in the center entrance to the causeway. The design from previous study planned to include a tunnel that runs under the causeway through the existing ground to connect the center path. The tunnel is not something that FDOT believes is necessary or possible especially with the MSE walls needed to have a grade separated shared use path in that area. Pedestrians will continue to use the route they are comfortable with as there are already no pedestrian signs on the entrances to the causeway, which does not deter pedestrians from using the shoulders of the causeway. The cost estimation done in 2022 states that the pathway for the Eastern causeway would cost 5.4 million dollars, while the westbound causeway path would only cost 3.61 million dollars since it does not span the entire causeway (No construction for westbound path from West Country Club Dr. to East Country club Dr. because of existing shared use path). The additional cost for the eastbound causeway path is unnecessary and will not be as beneficial to the project. The map in **Figure 9** shows the two possible path locations considered in the analysis.

Eastbound inside shoulder facility only

The reason for the rejection to only construct the path on the eastbound causeway is because the majority of current bike and pedestrian traffic use the Westbound causeway shoulders as they are the closest option for the synagogues, the golf course, the nearby shared use path users and Aventura Mall. Construction of an Eastbound path will not attract users as it is about a 1100' detour (6 min. walk) at West Country Club Dr. and a 2000' detour (9 min. walk) at East Country Club Dr. For this reason, people will not be willing to extend their trip even if the eastbound ramp is constructed. The cost estimation for the shared use path facility on the eastbound causeway was estimated to cost 1.79 million dollars more than the Westbound path because it is continuous throughout the corridor and constructed in the inside shoulder. If the shared use path on the East is constructed on the inside shoulder, there is no possible access for pedestrians or bikers at the Country Club Dr. causeway entrance and exits unless the path is grade separated with a connecting tunnel.

Removal of current pedestrian and bike facilities

The removal of current facilities would reduce the safety of the roadway because the current pavement markings help alert drivers that pedestrians and cyclists are using the shoulders. While these markings do not provide protection, they give awareness to the motorists that pedestrians and bicycles may be on the shoulder. Data gathered through the pilot project showed that drivers reduced the speed by approximately 2.2 MPH when overtaking bicyclists on the causeway segments and at conflict points both drivers and bicyclists were found two reduce their speed and actively look for other traffic. This study came to fruition because bicyclists and pedestrians were using the causeway shoulders before a marked bike lane was even added to the corridor. The removal of this facility would not discourage pedestrians or bikers from continuing to use the shoulder as they still want to commute, and this is the only route in a reasonable distance. The nearest marked crossings are more than 2 miles north or south of this corridor which does not become a reasonable alternative for peds and bikes attempting to use the Lehman causeway to cross the intercoastal waterway.

Rejected Design Alternatives:

Shared use path separated by curb

A curb separated shared use path is not a standard separator used in Florida for pedestrian facilities on Limited Access Facilities. The installation of Type F curb on a 55-mph roadway is prohibited. Only Type E curb is allowed and does not act as a form of protection for pedestrians and cyclists. Also, a curb on a high-speed facility like this may act as a hazard, as any contact with it by a vehicle may cause the driver to lose control and cause more damage than leaving the area unobstructed. A curb is also extremely hard to see at times on a 55-mph roadway which can lead to collision by motorists or bikers. Curb separation would impair the roadway by reducing the overall roadway width and do very little to improve safety, which is why it should not be considered as a design alternative.

A combination of sidewalk and bike lane in the shoulder

The bike lanes added in the 2013 pilot project make it extremely difficult to attempt to remove a bike lane and replace it with a marked or unmarked shoulder. Because of this the minimum size for a bike lane would be 6' and for a sidewalk would be 10' on the corridor. This

option is worse than a shared use path as it requires a separator between the pedestrian and bike facility, while giving less space to bikers than is currently available or would be available with a shared use path option. This option is strictly inferior to a shared use path in total width and ease of use and should not be further considered as an acceptable alternative.

Adding a cantilever pedestrian facility

A cantilever facility running on the north side of the project would have the benefits of being wider to accommodate any type of barrier or protection system that is considered ideal to increase the safety of the causeway. After a discussion with FDOT structures, this alternative is infeasible as adding a cantilever to any existing bridge is extremely risky and not normal practice. A bridge of this length and age with a cantilever so wide is not a design that FDOT would consider for the safety of users and structural integrity of the bridge.

Possible Design Alternatives Breakdown

Leave existing bike lanes unprotected.

Leaving the existing bike lanes as existing provides no protection to the bikers and pedestrians on the shoulder, but allows the roadway to remain up to standard, by not having to make reductions to the lane width and shoulder size. Considering the crash history, since the bike lanes were installed, there have been 12 pedestrian and bicycle accidents in the limits of the causeway including the ramps, auxiliary roads, and intersections at causeway entrances. In this time there has only been 1 fatality or incapacitating injury involving a pedestrian or bicyclist on the causeway which occurred during dark, wet conditions where a pedestrian attempted to cross the road. There has not been a substantial increase of pedestrian or bicycle accidents since the bike lanes were installed on the causeway in 2013, so it is reasonable to have them remain as existing as a suitable option for the project. Even though there is no historical accident history of pedestrians and bicyclists, FDOT believes that the existing conditions of the causeway are unsafe for those users and a form of protection must be installed to improve the causeway.

Constructing an independent walkway running parallel to the causeway

A separate pedestrian facility would take much longer than the other solutions for the corridor and be extremely costly. A separate structure does not have appropriate tie in points without disturbing existing bike paths or acquiring Right of Way. The proposed supports for this structure would conflict with several existing parking, walkways, and structures. However, building a separate facility would maximize safety as it would allow for the maximum width of travel lanes and shoulders with almost zero chance of a motor vehicle impacting a pedestrian or bicyclist in the shared use path. Building a separate facility allows for the option of future travel lane widening if deemed necessary. Several prior studies deemed a separate pedestrian facility infeasible due to tie in points on both ends of the causeway, vertical clearance of the Intercoastal waterway, and desired slopes being high when not following the adjacent roadway. FDOT design decided that a separate elevated pedestrian facility is strictly inferior to widening, so this alternative will not be further considered.

A tubular marker separated shared use path

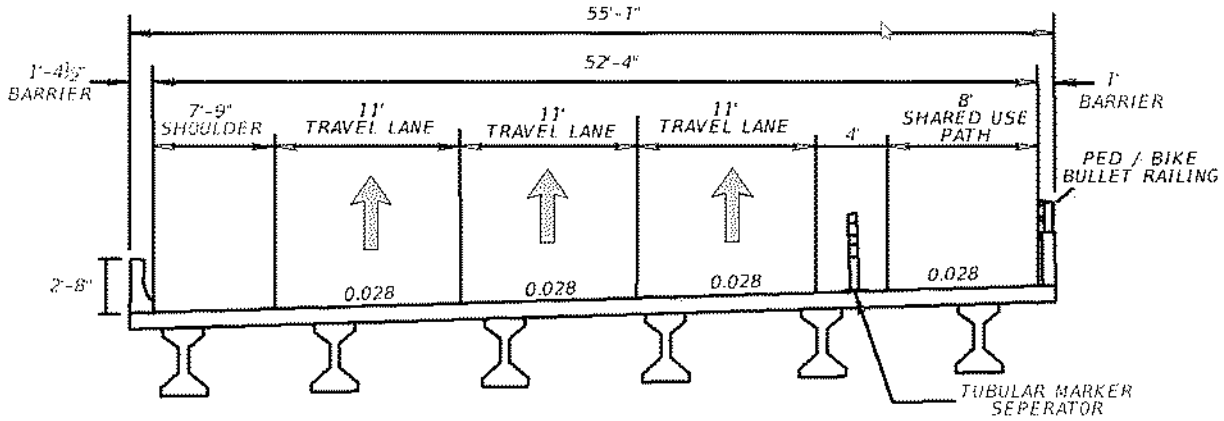


Figure 10: Typical Section of Tubular Marker Alternative

The tubular marker alternative provides very minimal safety to the biker and pedestrians but does make drivers very aware that the shared use path exists on the edge of the roadway. This should provide a clear separation of the share use path form the travel lanes and give both motorists and ped / bikes more comfort when using the corridor. This alternative takes slightly less space than the concrete barrier approach, allowing for wider shoulders on the causeway and the tubular markers can be trampled by a vehicle in case of an emergency. Tubular markers are not a standard separator for a shared use path as outlined by the FDM. This method is used to separate bike lanes in high-speed facilities frequently like on the Macarthur causeway. The main reason for this alternative not being recommended is it would require nine design exceptions and two design variations shown in **Figure 10**. The FDOT executive team decided that the use of tubular markers was not an option for the causeway as it provides no protection to the pedestrians and bikers while making the roadway conditions substandard for motorists.

Zipper delineator shared use path

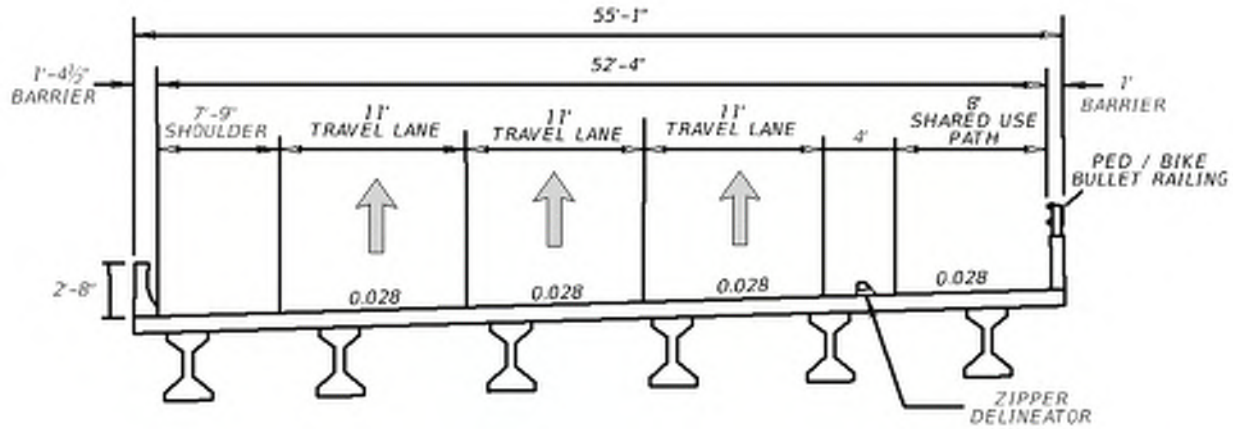


Figure 11: Typical Section of Zipper Delineator Alternative

Zipper delineators do not act as a complete form of protection, but they do alert drivers and attempt to provide a curb like barrier between the motor vehicles and the pedestrians / bicyclists. The zippers provide some protection by gently reminding cars of the neighboring bike lane, but

may become a signiifcant hazard on a high speed facility like the William Lehman Causeway. However, this type of barrier could act as a hazard and cause an inattentive biker or driver to lose control and swerve into the neighboring facility creating a more dangerous situation than the existing conditions especially on a high-speed roadway. This is not a standard separator for shared use paths in the FDM but has been used to separate bike lanes with minimal buffer width. Zippers are a low-cost solution that can allow cars to drive over them during emergency situations or during an evacuation if necessary. While zippers are effective, other solutions such as the concrete barrier and tubular markers provide either more protection or awareness making them a more desirable alternative than the zippers. **Figure 11** shows the potenital typical section of zipper deliniators were used and **Figure 12** shows zipper delineators in-use around the world.

Figure 12: Photos of Zipper Delineators in Use

Issues with Recommended and Remaining Possible Alternatives

To compare the remaining alternatives, the table below (**Figure 13**) was created which compares the proposed and existing roadway constraint with the FDM, and AASHTO minimums for each design alternative. The table shows that the concrete barrier alternative would require 8 design exceptions and 2 design variations. The concrete barrier alternative had a rough cost of $9.3 million and is anticipated to take 3-4 years for project completion. The Zipper delineator / tubular markers alternative would require 9 design exceptions and 2 design variations. This alternative has a rough estimated cost of $7.2 million and would have a completion time of 2-3 years. The bridge widening alternative is estimated to cost more than $30 million dollars and take 7-8 years until completion due to the complication of construction and the acquisition of Right of Way.

Legend		
Meets FDM and AASHTO	**Requires Variation** Does not meet FDM Standards	**Requires Exception** Does not meet AASHTO / ADA Standards

Design Alternatives Comparison Table (Includes Design Exceptions, Design Variations, Cost and Time Frame)			
Design Constraint	**Concrete Barrier**	**Zipper Delineator / Tubular Markers**	**Bridge Widening / Separate Walkway**
Lane Width on LAF / High speed roadway	Proposed = 11’ FDM = 12’ AASHTO = 12’ Existing = 12’	Proposed = 11’ FDM = 12’ AASHTO = 12’ Existing = 12’	Proposed = 12’ FDM = 12’ AASHTO = 12’ Existing = 12’
Inside Roadway Shoulder Width on LAF / High speed Roadway	Proposed = 7’ FDM = 12’ AASHTO = 4’ Existing = 8’	Proposed = 7’ FDM = 12’ AASHTO = 4’ Existing = 8’	Proposed = 6’ FDM = 12’ AASHTO = 4’ Existing = 8’
Outside Roadway Shoulder Width on LAF / High speed Roadway	Proposed = 2’ FDM = 12’ AASHTO = 10’ Existing = 8’ 4”	Proposed = 2’ FDM = 12’ AASHTO = 10’ Existing = 8’ 4”	Proposed = 10’ FDM = 12’ AASHTO = 10’ Existing = 8’ 4”
Median Width	Proposed = 21.5’ FDM = 26’ AASHTO = 22’ Existing = 21.5’	Proposed = 21.5’ FDM = 26’ AASHTO = 22’ Existing = 21.5’	Proposed = 21.5’ FDM = 26’ AASHTO = 22’ Existing = 21.5’
1-Lane Ramp Travel Lane Width	Proposed = 12’ FDM = 15’ AASHTO = 15’ (22’ to 25’ including shoulders) Existing = 15’	Proposed = 12’ FDM = 15’ AASHTO = 15’ (22’ to 25’ including shoulders) Existing = 15’	Proposed = 15’ FDM = 15’ AASHTO = 15’ (22’ to 25’ including shoulders) Existing = 15’
1-Lane Ramp Inside Shoulder Width	Proposed = 2’ FDM = 6’ AASHTO = 1’ – 6’ (Sum of both shoulders be 10’-14’) Existing = 6’	Proposed = 2’ FDM = 6’ AASHTO = 1’ – 6’ (Sum of both shoulders be 10’-14’) Existing = 6’	Proposed = 6’ FDM = 6’ AASHTO = 1’ – 6’ (Sum of both shoulders be 10’-14’) Existing = 6’
1-Lane Ramp Outside Shoulder Width	Proposed = 5’ FDM = 6’ AASHTO = 8’ – 10’ (Sum of both shoulders be 10’-14’) Existing = 6’	Proposed = 5’ FDM = 6’ AASHTO = 8’ – 10’ (Sum of both shoulders be 10’-14’) Existing = 6’	Proposed = 6’ FDM = 6’ AASHTO = 8’ – 10’ (Sum of both shoulders be 10’-14’) Existing = 6’
2-Lane Ramp	Proposed = 22’	Proposed = 22’	Proposed = 22’

Travel Lane Width	FDM = 24’ AASHTO = 24’ (37’ to 42’ including shoulders) Existing = 24’	FDM = 24’ AASHTO = 24’ (37’ to 42’ including shoulders) Existing = 24’	FDM = 24’ AASHTO = 24’ (37’ to 42’ including shoulders) Existing = 24’
2-Lane Ramp Inside Shoulder Width	Proposed = 2’ FDM = 8’ AASHTO = 1’ to 6’ (Sum of both shoulders be 13’-18’) Existing = 6’	Proposed = 2’ FDM = 8’ AASHTO = 1’ to 6’ (Sum of both shoulders be 13’-18’) Existing = 6’	Proposed = 6’ FDM = 8’ AASHTO = 5’ to 8’ (Sum of both shoulders be 13’-18’) Existing = 6’
2-Lane Ramp Outside Shoulder Width	Proposed = 5’ FDM = 10’ AASHTO = 8’ to 10’ (Sum of both shoulders be 10’-14’) Existing = 8’	Proposed = 3’ FDM = 10’ AASHTO = 8’ to 10’ (Sum of both shoulders be 10’-14’) Existing = 8’	Proposed = 5’ FDM = 10’ AASHTO = 8’ to 10’ (Sum of both shoulders be 10’-14’) Existing = 8’
Shared Use Path Typical Width	Proposed = 8’ FDM = 12’ AASHTO = 8’	Proposed = 8’ FDM = 12’ AASHTO = 8’	Proposed = 12’ FDM = 12’ AASHTO = 8’
Shared Use Path Pinch Point	Proposed = 8’ FDM = 8’ AASHTO = 8’	Proposed = 8’ FDM = 8’ AASHTO = 8’	Proposed = 12’ FDM = 8’ AASHTO = 8’
Buffer Separation Width	Proposed = Barrier FDM = 5’ or Barrier AASHTO = 5’ or Barrier	Proposed = 4’ FDM = 5’ or Barrier AASHTO = 5’ or Barrier	Proposed = Barrier FDM = 5’ or Barrier AASHTO = 5’ or Barrier
Cross Slope Max	Proposed = 2-3% FDM = 5% AASHTO = 5% Existing = Varies greatly	Proposed = 2-3% FDM = 5% AASHTO = 5% Existing = Varies greatly	Proposed = 2% FDM = 5% AASHTO = 5% Existing = Varies greatly
Slope / Grade Max	Matching Roadway	Matching Roadway	Matching Roadway
Stopping Sight Distance (SSD)	Proposed=450’ FDM=495’ (433’ High Upgrade) – 593’ (High Downgrade) AASHTO = Same Existing = 421’	Proposed=450’ FDM=495’ (433’ High Upgrade) – 593’ (High Downgrade) AASHTO = Same Existing = 421’	Proposed=450’ FDM=495’ (433’ High Upgrade) – 593’ (High Downgrade) AASHTO = Same Existing = 421’
Number of Variations	2 (Shared Use Path Width, Inside Shoulder Width)	2 (Shared Use Path Width, Inside Shoulder Width)	2 (Roadway Shoulder Width, 2-lane ramp shoulder width)
Number of Exceptions	8	9	2 (Median Width, SSD)

	(Lane Width, Outside Shoulder Width, Median Width, ramp lane width (1&2), ramp shoulder width (1&2), SSD)	(Lane Width, Outside Shoulder Width, Median Width, ramp lane width (1&2), ramp shoulder width (1&2), Buffer Width, SSD)	
Project Cost	$6.9 million (2016 Estimate) ~ 9.4 million (Current Rough Estimate)	~ 7.2 million (Current Rough Estimate)	More than 30 million (Current Rough Estimate and missing scope items) ***Appendix I***
Project Time Frame	3 – 4 years	2 – 3 years	7 – 8 years (R/W Acquisition)

Figure 13: Design Alternatives Comparison Table

Recommended Alternatives

Both the barrier separated shared use path and the bridge widening alternatives were identified to be the best options to accommodating pedestrians, bicyclists, and motorists safely on the corridor. This section discusses the typical section at the bridge which acts as the limiting point for the causeway and the various pros and cons for each alternative.

Barrier Separated Shared use path on the North side of causeway

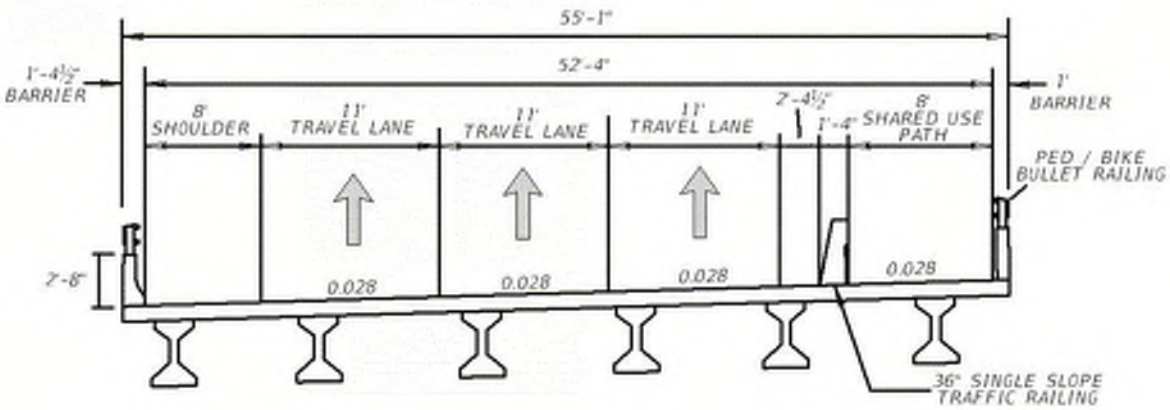


Figure 14: Barrier Separated Shared Use Path Typical

A barrier separated shared use path (Shown above in **Figure 14**) would provide protection to pedestrians and bikes using the causeway, while using minimal roadway space. This design would require several design exceptions for lane width, shoulder width, and stopping sight distance. It would also require variations for shared use path width, border width, shared use path offset (A full list and breakdown is shown in **Figure 13**). While this design increases safety for pedestrians and bikers it decreases safety for motor vehicles by reducing their lane width, shoulder widths and clearance zones. This design also affects the total usable roadway width, which is important when shoulders are to be used as a travel lane during emergency evacuation situations. The causeway also had 64 sideswipe crashes and 24 veer out of the travel lane crashes

striking the causeway edge. These crashes reinforce the notion that further reducing the usable roadway width would negatively impact the safety of the roadway for motorists.

Looking at the load capacity of the bridge and additional dead load of the concrete barriers, it does not seem the concrete barriers should impact the structural capacity of the bridge. A previous feasibility report discussed the addition of concrete barriers to the bridge with FDOT structures in which they stated, "The proposed concrete barrier will not have any adverse impact on the Load Capacity of the bridge. The proposed barrier and steel plate, over joints, will not impact the structural capacity of the subject bridges. The analysis was basic, utilizing the limited data provided and comparing the additional deadload proposed with the current bridge capacity. The consultant doing the study or preliminary design will have to perform the calculations" Mr. Ken Jeffries, March 22, 2015. Load rating in accordance with the Bridge Load Rating Manual, a qualitative condition analysis of the existing structure and any other geotechnical / structural analysis should be performed with the FDOT Structures department. Several modifications will be required to tie this new shared use path into the East end and West End connections. The East side ramps will either need to be significantly widened to accommodate the shared use path or the lane and shoulder width will need to be greatly reduced. On the west end several pull boxes, a TMS cabinet, and a traffic signal will need to be relocated to provide a connection between the sidewalk and shared use path within FDOT right of way. Also, safe crossing points and tie in points will need to be found along the North auxiliary road to link the shared use path with the existing path running along County Club Dr.

After a meeting with the FDOT District 6 executive team it was decided that the amount of design exceptions and variations would provide too great of a deficiency to the roadway and would not get further approval. The lane width and shoulder width exceptions are too drastic and would create a substantially more dangerous situation for motorists when other solutions are far safer.

Widening the bridge to accommodate a shared use path

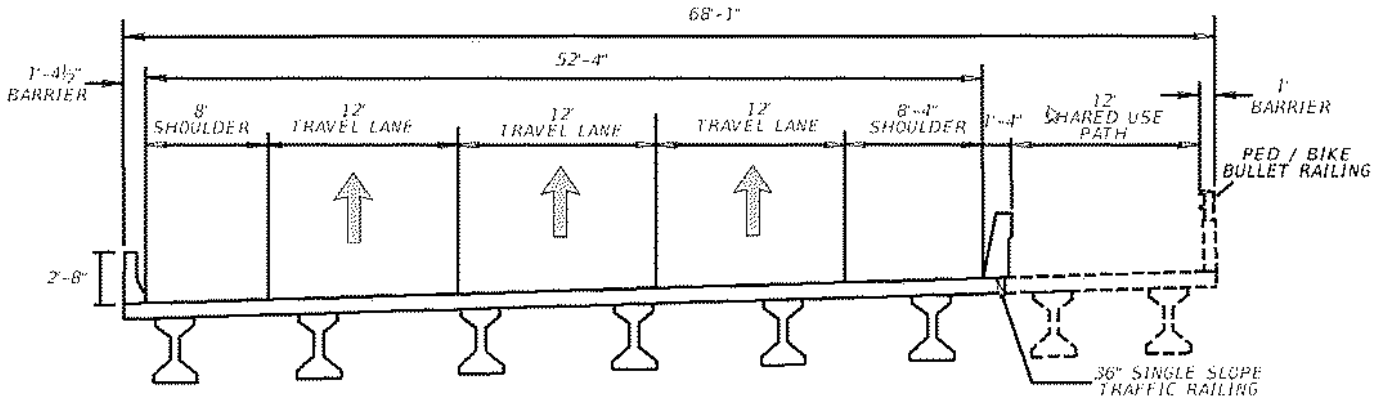


Figure 15: Bridge Widening Shared Use Path Typical

The Bridge widening alternative (Shown above in **Figure 15**) is currently the preferred alternative by FDOT Design as it does not negatively impact the existing roadway. Bridge widening is the safest alternative for both pedestrians / bicyclists and motorists as it provides the widest typical for travel in both facilities. It provides a protected facility for all users and can be on different grades / levels if necessary to account for grading / cross slope issues if necessary.

This alternative has by far the least amount of required variation and exceptions. The bridge widening would only require two design variations (roadway shoulder width, and 2-lane ramp roadway shoulder width) and two design exceptions (median width, Stopping Sight Distance), which are already existing today. Most of the other design variations and exceptions for other alternatives will not be approved by FDOT as they make the road extremely substandard for minimal benefit.

This alternative will be an extremely long and costly project, requiring intense MOT and structure maintenance. Several difficulties have been identified in getting access to the areas surrounding the roadway to drive piles and allow space for construction equipment. Modeling a rough layout for the area of the existing path 1 parcel will be impacted on the NE corner of the bridge. However, it does appear that it passes over the edge of an existing building so purchasing the aerial right of way may not be as costly. This encroachment appears to be very minor so a more in-depth and exact analysis should be done to ensure that this is all that would be needed for the structural / geotechnical work for the supports. Current ROW files show there is no other ROW impacts, but these may only account for aerial rights in the area. Out in the field it was clear that the bike path and trees on the northeast end of the causeway and several structures belonging to the Edmond J, Safra Synagogue and The Parc at Turnberry Isle will be impacted. These structures include fountains, a pergola, and multiple large machinery which are shown in **Figure 16**. Also, the property appraiser for Miami-Dade shows that several parcels under the causeway are privately owned, which needs to be confirmed with the FDOT Right of Way department. Further evaluation should be done to determine the amount of ROW needed for this alternative and the exact areas that will be impacted for support and construction.

Figure 16: Field Visit Photos of Potential Impacts due to Bridge Widening
(1-Top Left: Photo of Public Works Parking lot and Wall being impacted,
2-Top Right: Photo of trees and existing bike path being impacted at east end,
3-Bottom Left: Photo of fountain being impacted at Edmond J. Safra Synagogue,
4-Bottom Right: Photo of area being impacted at The Parc at Turnberry Isle
Full Gallery of Photos in ***Appendix J***)

Overall, both these designs seem to provide a good amount of protection for roadway users and bicyclists / pedestrians. The bridge widening project is much more expensive and will take much longer to design and construct than the concrete barrier alternative. However, the concrete barrier alternative has 8 design exceptions and 2 design variations, that will not get approved by the District Design Engineer as they greatly impact the safety of the roadway for all users. For this reason, the recommended alternative is the bridge widening design, because while being very costly and timely, it makes an overall improvement to the roadway rather than sacrificing the safety of motorists for the safety of pedestrians / bikers.

Other Possible Atypical Solutions

This section will review other possible design alternatives that are considered extremely unconventional or complex for the scope of this project. They do accomplish the goal but should only be considered and further investigated if other better alternatives are considered completely unfeasible.

Changing Roadway Classification

Discussing the existing layout and possible alternatives with DOT personnel, a few unique and atypical design approaches were proposed and considered. The first design approach proposed was to remove the Limited Access Facility characteristic for the corridor, to be able to adjust the classification of the corridor from a C-5 to possibly a C-3C. This reclassification would allow FDOT to lower the speed of the corridor, shrink the lane widths and even add curb to the corridor if necessary. Lowering the speed limit was proposed because only 1.14 miles of the 1.7-mile causeway is currently classified as a 55-mph zone (shown in **Figure 17**). The rest of the corridor has a speed limit of 45-mph, which we believe may be more fitting for the area. When discussing this idea with the FDOT executive team it was pointed out that FDOT desires to have this remain a Limited Access Facility to be able to keep the existing number of exits for the corridor the same. Removing this delineation from the corridor would lead to neighboring property owners requesting access ramps to the corridor and destroying the efficiency and speed of the corridor. This idea was concluded to be not viable for the situation and not a concept that FDOT is currently willing to consider for this corridor.

Figure 17: Map of Speed Zones for William Lehman Causeway

At-Grade Crossing Under the Causeway

Another possible design approach is to provide an at-grade shared use path facility that runs on the northside and under the causeway. This alternative would be extremely complex due to the path having to cross two separate waterways, cutting through and around private property

and acquiring Right of Way if necessary. The at-grade path shown in **Figure 18**, would begin at the East end of the project running where the existing bike path is located. The path will continue to run between the North side of the causeway and the parking garages. The path will then require a draw bridge or pedestrian lift bridge to cross over the intercoastal waterway. Once arriving on the West side of the intercoastal the path will have to cut through the parking lot of the Edmond J. Safra Synagogue and the Parc at Turnberry Isle Condo parking lot. After passing through these lots the path would require a bridge to cross the waterway. This bridge does not need to be a drawbridge as there is a bridge to the North and the Causeway to the south that travel at similar heights allowing the same height clearance for vessels. After the waterway the path would continue with a crossing at the auxiliary road and then crossing further down the street to connect to the existing shared use path. The path could also run along the outside edge of the roadway and simply have a crossing at East Country Club Dr. if that is considered more feasible.

Figure 18: At-Grade Shared Use Path Conceptualized Path

This alternative would require the crossing of two separate waterways which require coordination with multiple agencies and decisions on how a bridge like this would operate. The conceptualized path requires the use of several parking lots including portions of the public works parking lot, Edmond J. Safra Synagogue, and the Parc at Turnberry Isle parking lot. **Figure 19** shows the view from the East and West side of the Intercoastal, where the path connections and bridge would need to run and some. While this concept seems complex and far-fetched this may be preferred to other alternatives due to having different impacts on the surrounding property owners and being more appealing to the current land use. This at-grade crossing may also, be more convenient for the current users as a lot of the population consists of children and elderly persons who may have trouble walking on the steep grades on the causeway. This crossing would directly connect both main synagogues which are two of the parties whose patrons are actively walking on the causeway shoulder. If this concept were to be considered it must be thoroughly reviewed and planned out to fully understand all the impacts and commitments which will need to be made by FDOT and the cities to construct, maintain and operate such a complex and unique shared-use path.

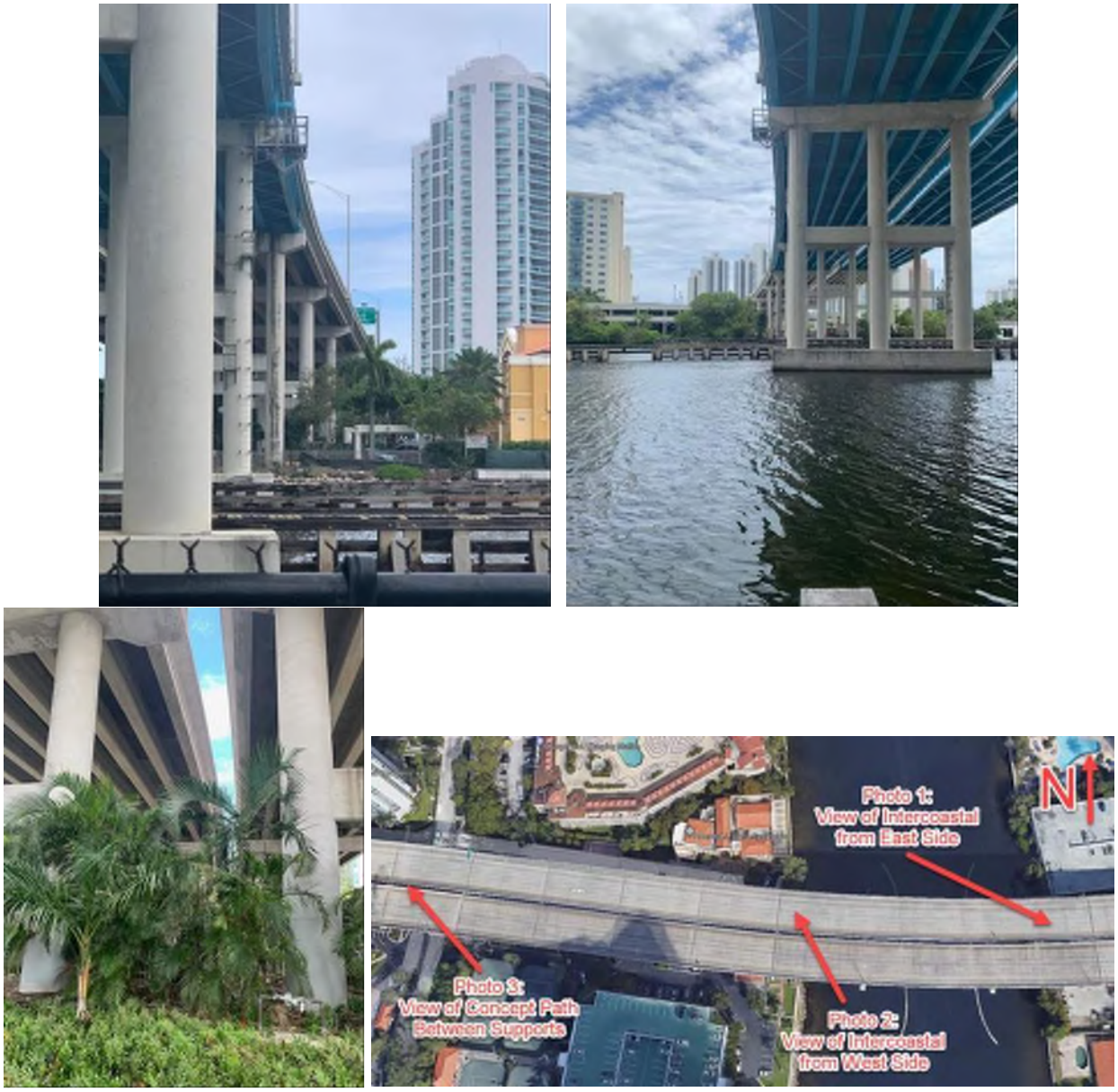


Figure 19: Field Visit Photos of Conceptualized Path Area and Map
(1-Top Left: View of Intercoastal from Public Works Parking Lot,
2-Top Right: View of Intercoastal from Edmond J. Safra Synagogue,
3-Bottom Left: Location for conceptualized path between pillars at the Parc parking lot,
4-Bottom Right: Map showing the location of conceptualized path locations
Full Gallery of Photos in ***Appendix J***)

Conclusion

After a meeting with the FDOT executive team it has been determined that the favored alternative is widening the bridge. This alternative, while costly, greatly improves the facility for pedestrians and bicyclists, and leaves the existing roadway typical section untouched for motorists. This alternative provides protection for bicyclists and pedestrians using the causeway but will impact the neighboring facilities below. Several gates, fountains, structures, and parking lots will be impacted for both construction and structural work. The bridge widening would only require two design variations (roadway shoulder width, and 2-lane ramp roadway shoulder width) and two design exceptions (median width, Stopping Sight Distance), which are already existing today. These design exceptions and variations are minor compared to the extensive amounts required for the other alternative designs. Several potential impacts have been identified to the facilities before including bike paths, trees, machinery, parking, a fountain, and greenery. There is also a small section outside the ROW, that will require at minimum aerial rights to be acquired from one parcel. However, Miami-Dade property appraiser shows that several parcels under the causeway are privately owned which needs to be further investigated by FDOT right of way. This project is going to be very costly and complex no matter the alternative if the goal of the project is to ensure and maintain the safety of all users on the corridor.

Reviewing the feasibility of this project, FDOT designs focus was on maintaining a safe amount of roadway especially on the bridge segment of the roadway. The section of roadway from W. Country Club Dr. to Biscayne Blvd. did not have many different alternatives. The recommendation in this area would be to meet all FDM criteria and widen the portions that are deemed necessary. The proposed path from the previous studies along the North side is identified as the best location with the major concerns being, extensive cut and fill work, possible MSE wall required, and impacts to pull boxes, utilities, and signals along the edge of the roadway. It is imperative that the exact impacts, geotechnical, work and structural work be outlined for both the bridge widening to understand the full impacts and scope that this project will entail. The alternative to have an at-grade shared use path winding through the existing parking lots, synagogues and using bridges to cross the water way is possible, but requires a discussion with the cities, property owners and other governing agencies to understand the impacts this would have to the area. FDOT is committed to finding a solution that will provide a dedicated pathway for bicyclists and pedestrians without diminishing the safety of the existing causeway for motorists.

Appendices

All Appendices Below Can be found Separately in the Project Folder

Appendix A: North-South Transportation Needs for the Coastal Communities Study

Appendix B: Protected Shared Use Path on SR-856 / William Lehman Causeway

Appendix C: FDOT Bicycles on Limited Access Facilities Pilot Project

Appendix D: Crash Data for Lehman Causeway from January 1, 2012, - March 20, 2023

Appendix E: Fatality Crash Disposition Report

Appendix F: Miami-Dade Storm Surge Planning Zones and Evacuation Routes Full Map

Appendix G: Typical Sections Alternatives Open Roads Designer File

Appendix H: Lehman Causeway Plan view alternatives paths Open Roads Designer File

Appendix I: FDOT Structures Bridge Widening Rough Cost Estimate

Appendix J: Design Field Visit Photos: Looking at Bridge Widening and At-grade Path

Appendix K: Meeting Minutes from FDOT Executive Team Meeting (4/21/23)

Appendix L: William Lehman Causeway Presentation for Executive Team

ATTACHMENT B

PLEMO Meeting Presentation

SR 856/William Lehman Causeway Shared Use Path

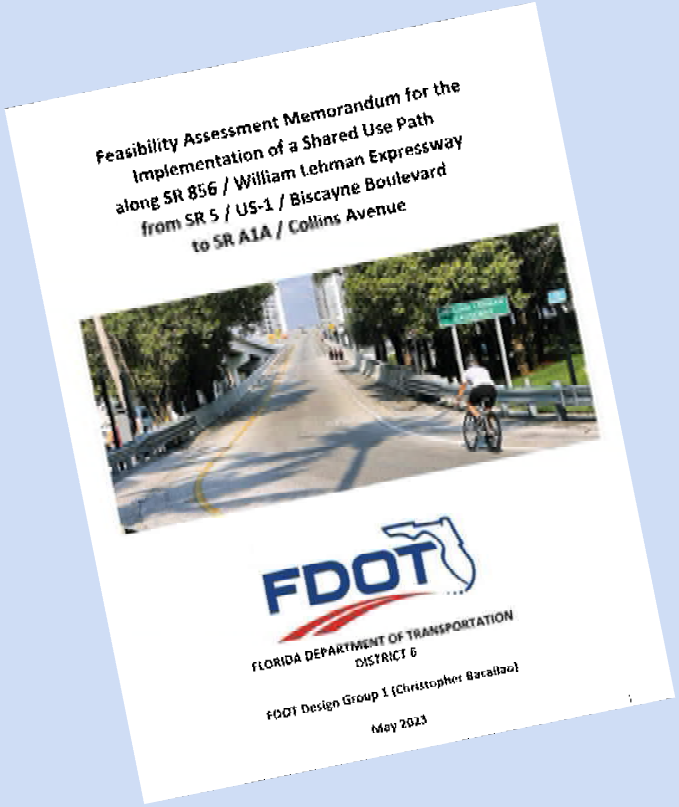
Preliminary Alignments Presentation
December 14th, 2023

Agenda

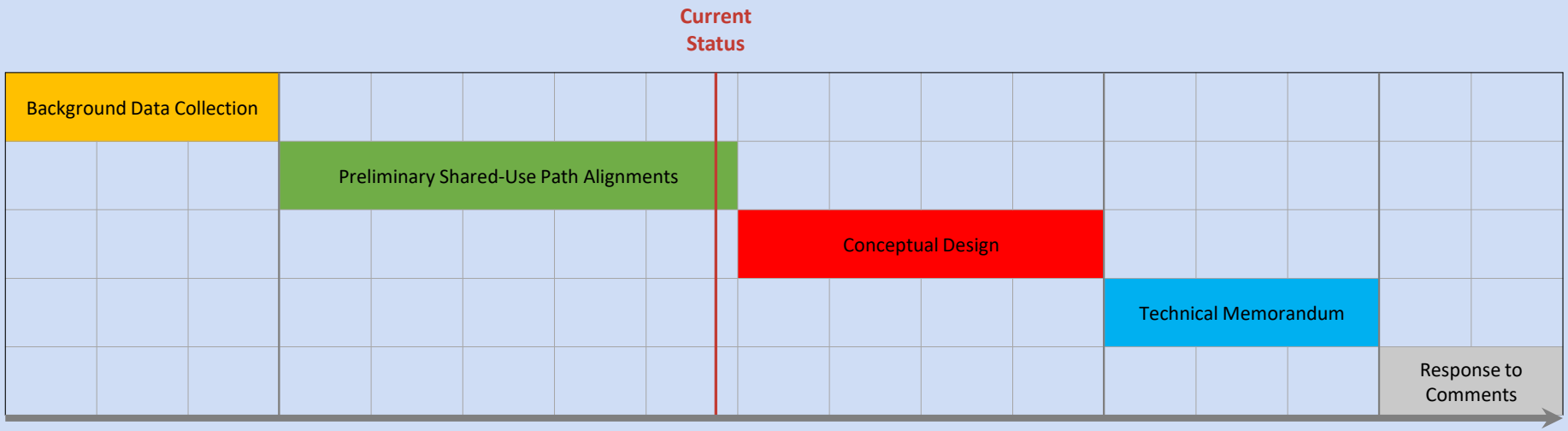
- Study Background and progress
- Alignment alternatives by segment
- Evaluation and Recommendations
- Next Steps

Study background

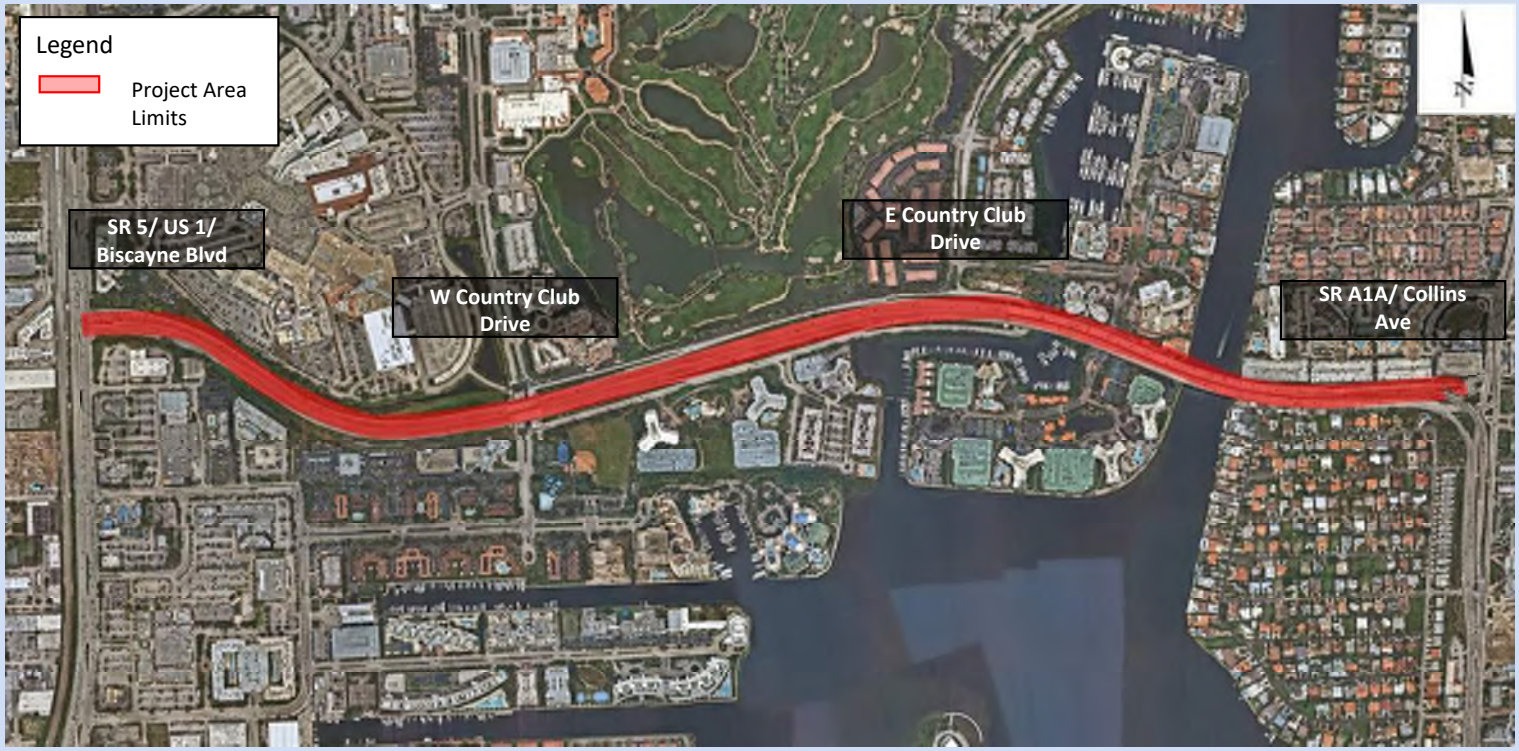
- Request from Aventura/Sunny Isles examine repurposing WB lane for ped/bike use
- Design office developed white paper suggesting additional analysis for a north widening alternative over the Causeway
- KH's review of white paper and recommendation of examining alternative alignment on south side of Causeway.



Study progress

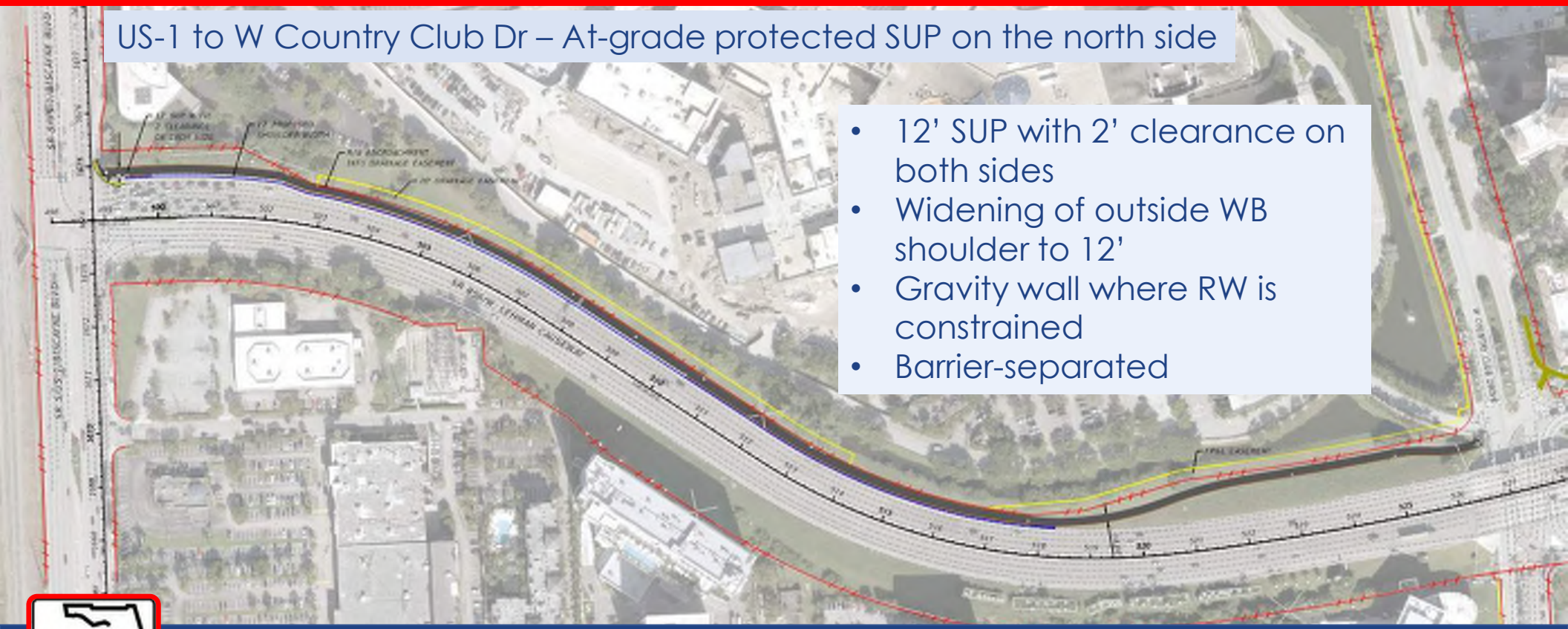


Project Limits



Preliminary Alignments by Segment

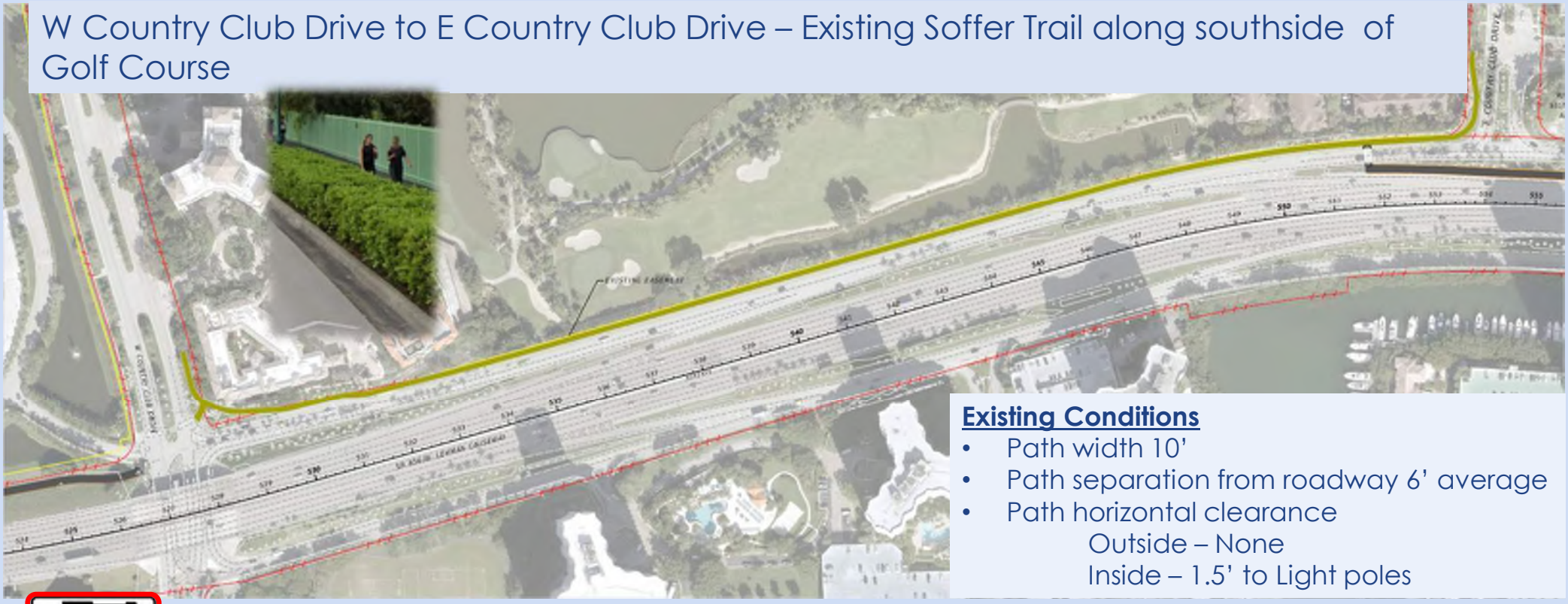
US-1 to W Country Club Dr – At-grade protected SUP on the north side



- 12’ SUP with 2’ clearance on both sides
- Widening of outside WB shoulder to 12’
- Gravity wall where RW is constrained
- Barrier-separated

Preliminary Alignments by Segment

W Country Club Drive to E Country Club Drive – Existing Soffer Trail along southside of Golf Course

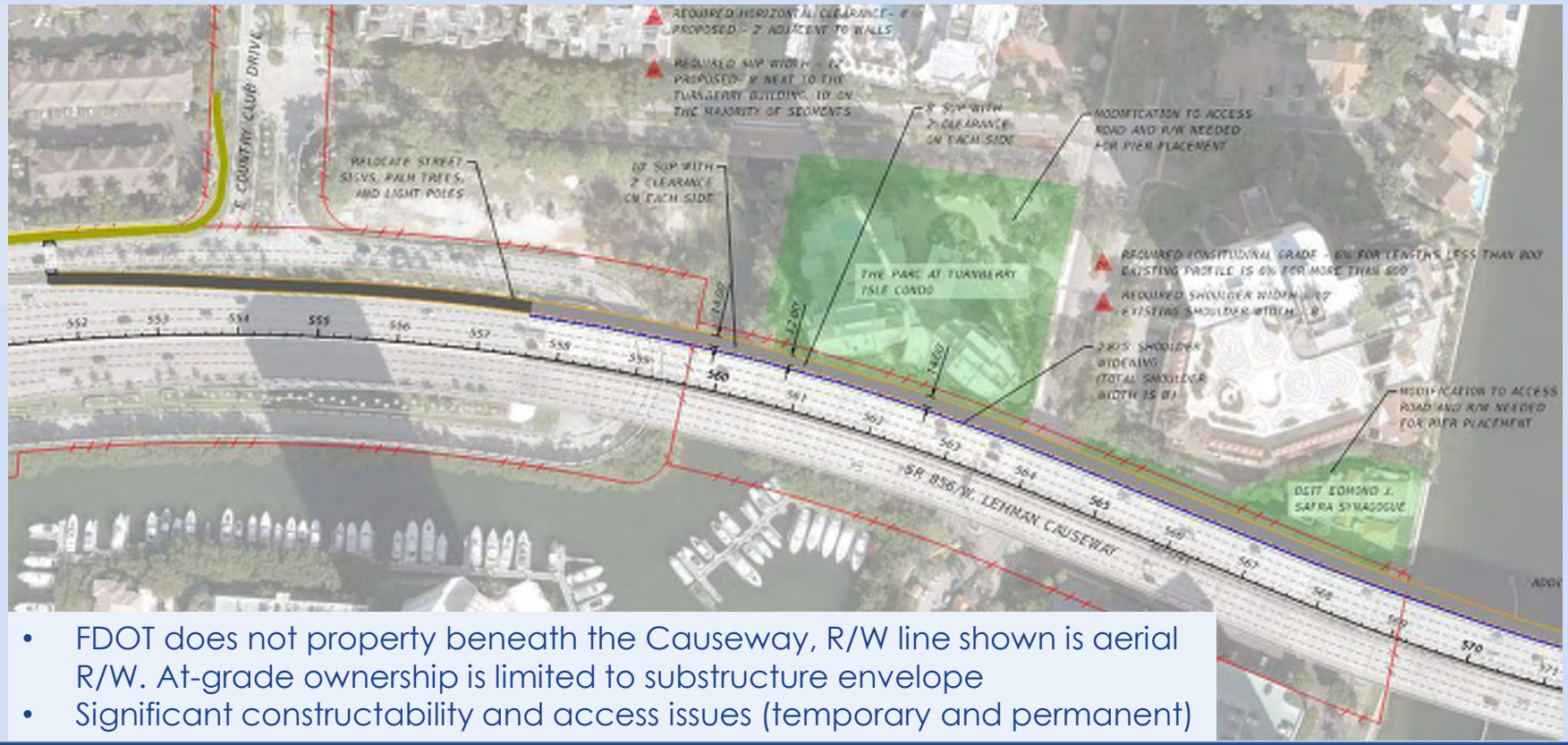


Existing Conditions

- Path width 10’
- Path separation from roadway 6’ average
- Path horizontal clearance
  - Outside – None
  - Inside – 1.5’ to Light poles

Preliminary Alignments by Segment

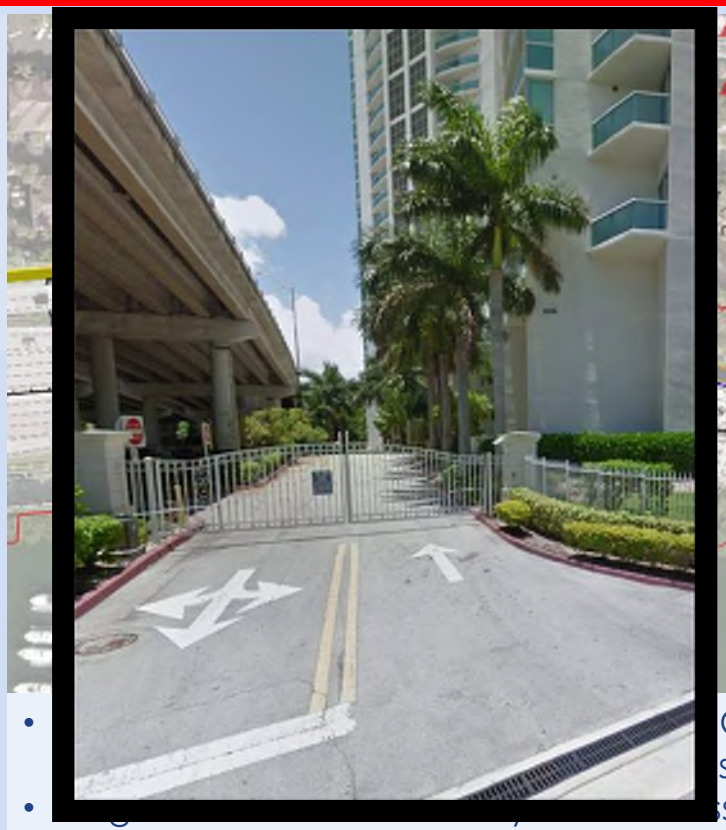
E Country Club Drive to Intracoastal Waterway – North widening alignment

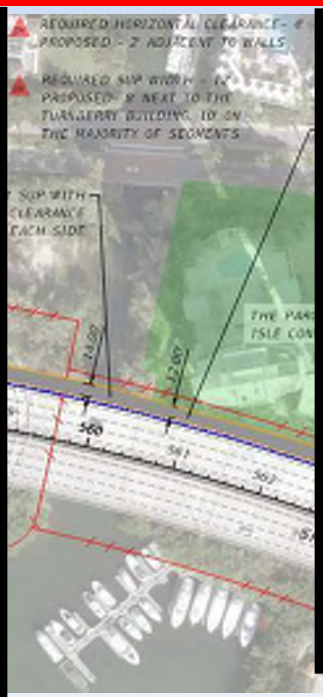


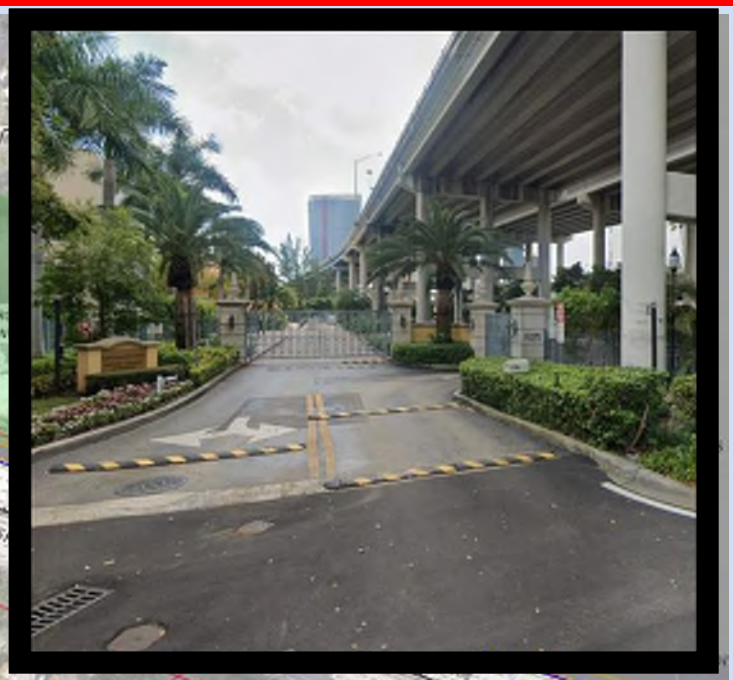
- FDOT does not property beneath the Causeway, R/W line shown is aerial R/W. At-grade ownership is limited to substructure envelope
- Significant constructability and access issues (temporary and permanent)

Preliminary Alignments by Segment

E Country Club Drive to Intracoastal Waterway – North widening alignment







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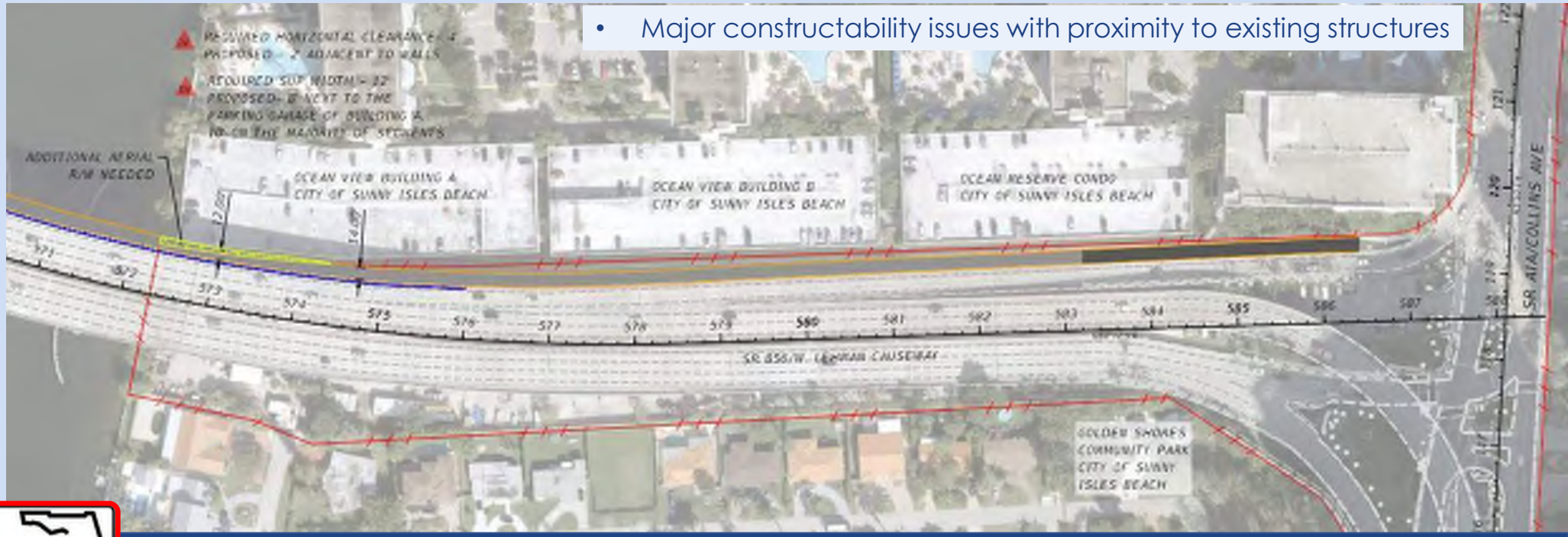
Causeway, R/W line shown is aerial substructure envelope

s issues (temporary and permanent)

Preliminary Alignments by Segment

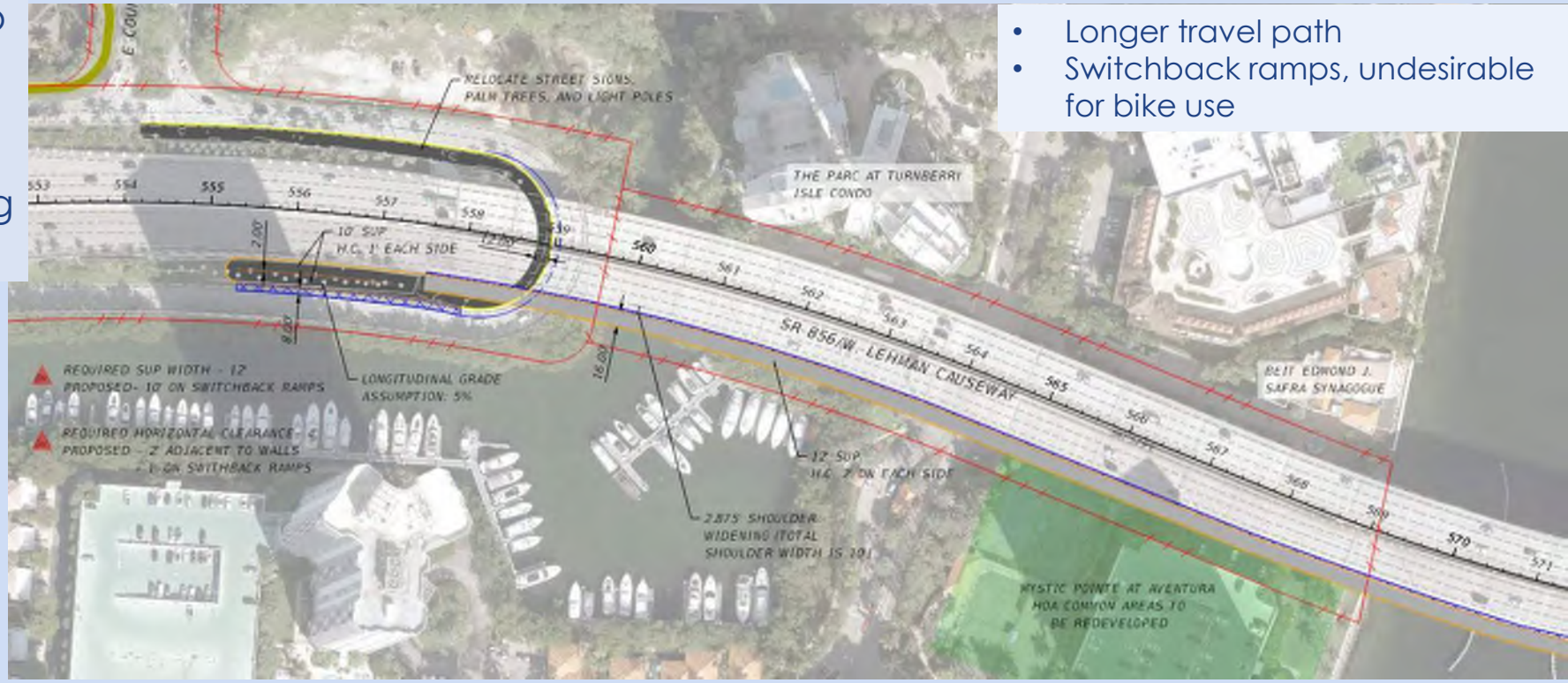
Intracoastal Waterway to Collins Avenue – North widening alignment



- Major constructability issues with proximity to existing structures

Preliminary Alignments by Segment

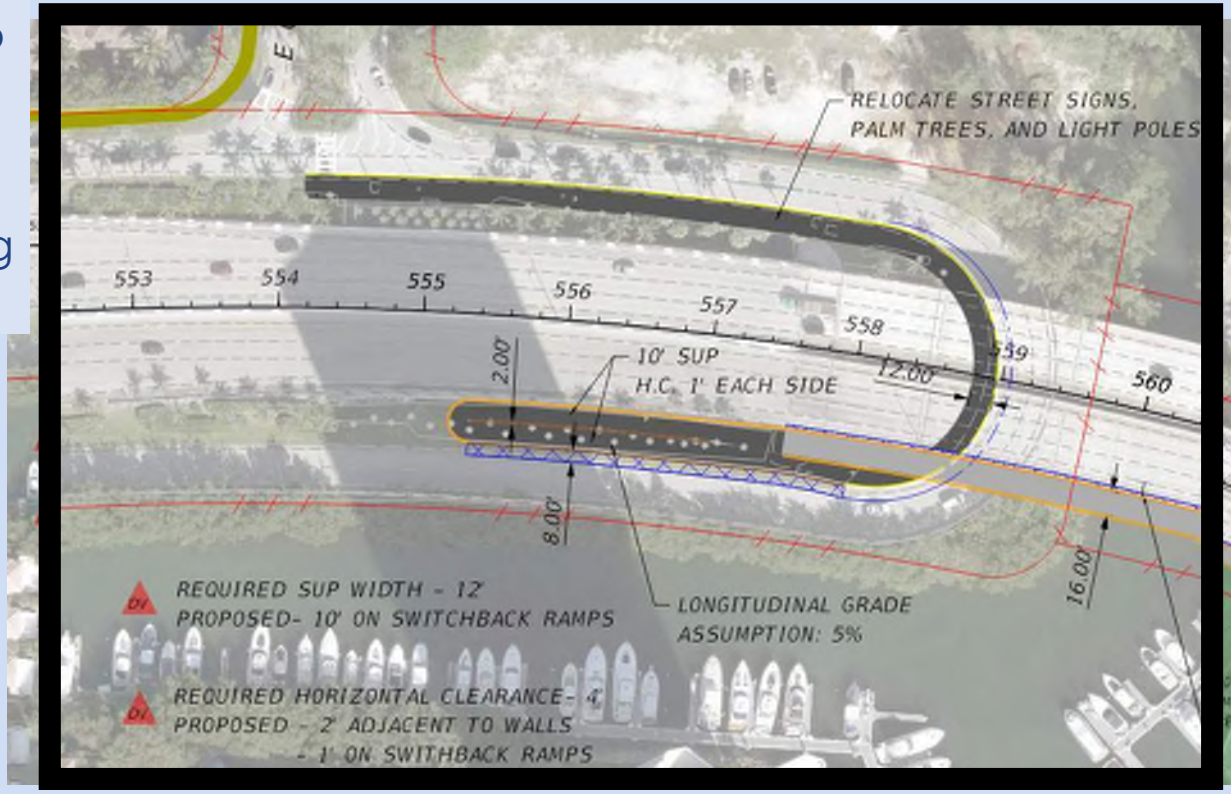
E Country Club Drive to Intracoastal Waterway – South widening alignment



- Longer travel path
- Switchback ramps, undesirable for bike use

Preliminary Alignments by Segment

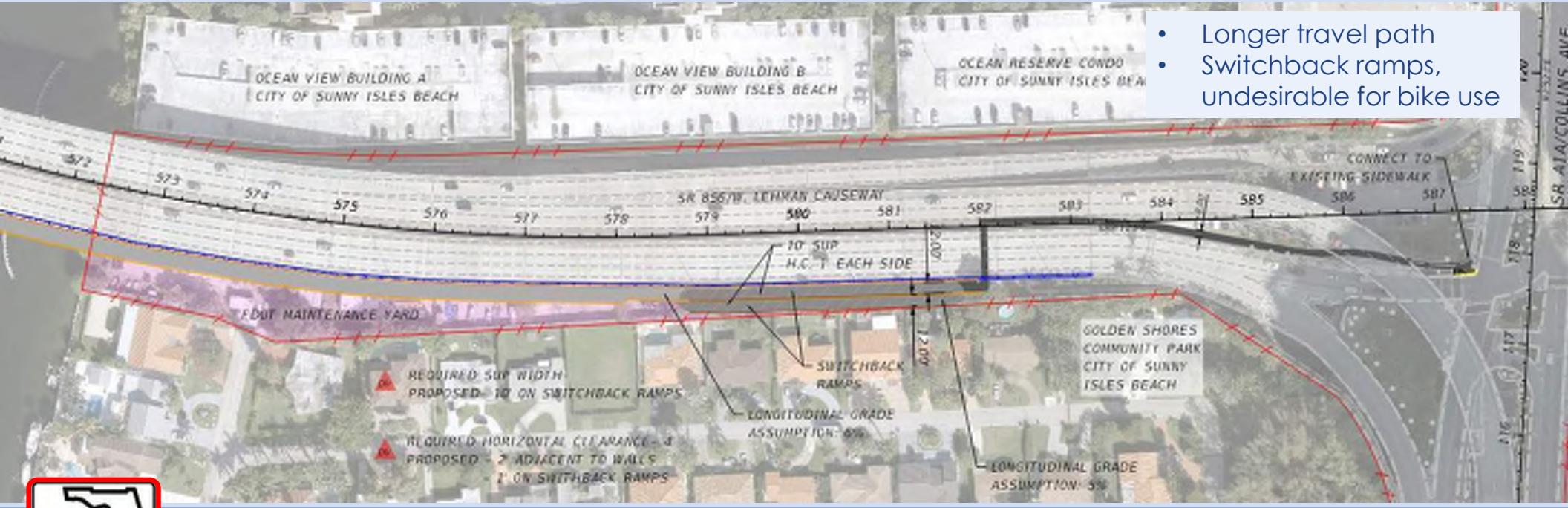
E Country Club Drive to Intracoastal Waterway – South widening alignment



- Longer travel path
- Switchback ramps, undesirable for bike use

Preliminary Alignments by Segment

Intracoastal Waterway to Collins Avenue –South widening alignment



- Longer travel path
- Switchback ramps, undesirable for bike use

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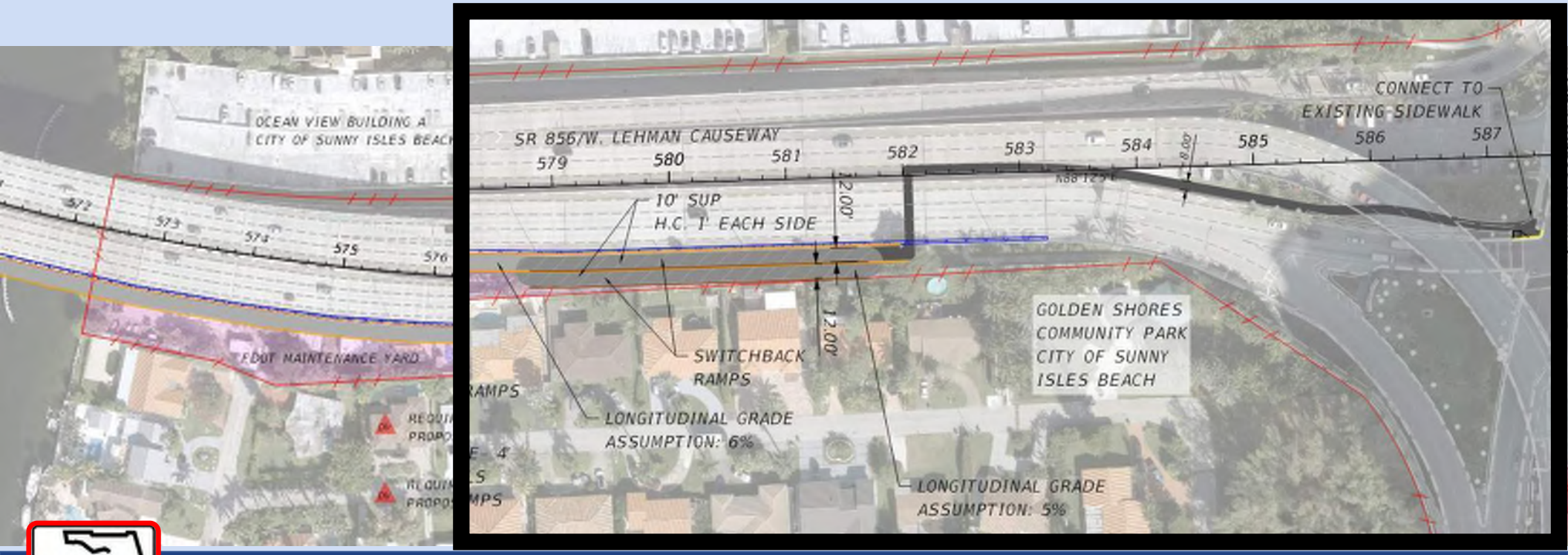
Preliminary Alignments by Segment

Intracoastal Waterway to Collins Avenue – South widening alignment



Alternatives Comparison

LEGEND
Substantially positive effect or best alternative
Generally positive effect or good alternative
Generally, no effect or moderate alternative
Generally negative effect or inferior alternative
Substantially negative effect or worst alternative

CRITERIA / ALTERNATIVE	ENGINEERING						COST				RANKING
	DESIGN VARIATIONS/ EXCEPTIONS	10	ENVIRONMENTAL IMPACTS	10	CONSTRUCTABILITY	10	RIGHT-OF-WAY	10	CONSTRUCTION	10	
NORTH SIDE ALIGNMENT	Known design variations: - SUP width reduced from 10 ft to 8ft in two areas (next to the parking garage and next to the Turnberry building). - Existing shoulder width thru WB bridge maintained, 10' required, 8' existing. - Horizontal clearance (4' required, 2' used for majority of segments, 1' provided for short constrained segments)	0.5	Public acceptance challenges due to impact, possible temporary relocation to privately owned synagogue and Condo building access road.	0.2	Major constructability issues expected as FDOT does not own the at-grade RW on the north side. Close proximity to existing condo building and parking garage will be challenging for pier placement.	0.2	R/W acquisition required for pier construction at grade. FDOT will also need to obtain construction easements throughout north side of causeway over water an AERIAL RW over City garage.	0.2	Similar construction cost. Planning level cost $31 Mill	0.6	17
SOUTH SIDE ALIGNMENT	Known Design variations: - SUP width (12' required reduced from 10 ft to 8ft) on switchback ramps - Horizontal clearance (4' required, 2' used for majority of segments, 1' provided on switch back ramps)	0.7	Increased pedestrian walk distance due to undercrossings and switchback ramps. Public acceptance of redevelopment of common HOA areas impacted.	0.8	Minor constructability issues are expected for bridge construction adjacent to Mistic Point HOA.	0.9	No RW impacts	1	Similar construction cost. Planning level cost $38 Mill	0.4	38

Next Steps

- Refine preferred alternative from roadway, structures and constructability perspective
- Develop detailed opinion of probable cost
- Submit Tech Memo for FDOT's review and concurrence

ATTACHMENT C

Alignment Concept Designs

LEGEND:

- EXISTING R/W
- PROPOSED R/W
- WIDENING
- PROPOSED GRAVITY WALL WITH RAILING
- PROPOSED WALL BARRIER
- PROPOSED SUP (CONCRETE)
- PROPOSED SUP (ASPHALT)
- EXISTING SUP (10' WIDTH)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			NORTH SUP ALIGNMENT	SHEET NO.
ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
SR 856	MIAMI-DADE	421053-4-12-03		2

LEGEND:

- EXISTING R/W
- PROPOSED R/W
- WIDENING
- PROPOSED GRAVITY WALL WITH RAILING
- PROPOSED WALL BARRIER
- PROPOSED SUP (CONCRETE)
- PROPOSED SUP (ASPHALT)
- EXISTING SUP (10' WIDTH)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SOUTH SUP ALIGNMENT	SHEET NO.
ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
SR 856	MIAMI-DADE	421053-4-12-03		1

ATTACHMENT D

List of Design Variations

List of Variations

North Alternative Variations:

1. Per FDM 224.4, required shared use path width = 12'. Proposed width next to the overhead gantry sign = 10'.

2. Per FDM 224.7, required horizontal clearance = 4'. Proposed horizontal clearance next to walls = 2'.

3. Per FDM 224.4, required shared use path width = 12'. Proposed width next to the Turnberry building = 8'. Proposed width along rest of segment = 10'.

4. Per FDM 224.6, required longitudinal grade = 6% for lengths less than 800'. Existing profile is 6% for longer than 800'.

5. Per FDM 211.4.1, limited access facility required paved shoulder width = 10'. Existing paved shoulder width = 8'.

6. Per FDM 224.4, required shared use path width = 12'. Proposed width next to Ocean View Building A = 8'. Proposed width along rest of segment = 10'.

South Alternative Variations:

1. Per FDM 224.4, required shared use path width = 12'. Proposed width next to the overhead gantry sign = 10'.

2. Per FDM 224.7, required horizontal clearance = 4'. Proposed horizontal clearance next to walls = 2'.

3. Per FDM 224.4, required shared use path width = 12'. Proposed width on switchback ramps = 10'.

4. Per FDM 224.7, required horizontal clearance = 4'. Proposed horizontal clearance on switchback ramps = 1'.

5. Per FDM 224.4, required shared use path width = 12'. Proposed width on path connection from switchback ramps to sidewalk on SR A1A/Collins Ave = 8'.

ATTACHMENT E

Right of Way Exhibits

LEGEND:

- EXISTING R/W
- PROPOSED R/W
- WIDENING
- PROPOSED GRAVITY WALL WITH RAILING
- PROPOSED WALL BARRIER
- PROPOSED SUP (CONCRETE)
- PROPOSED SUP (ASPHALT)
- PROPOSED MINIMUM GROUND ROW ACQUISITION
- PROPOSED MAXIMUM GROUND ROW ACQUISITION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			NORTH SUP ALIGNMENT R/W IMPACTS	SHEET NO.
ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
SR 856	MIAMI-DADE	421053-4-12-03		1

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SOUTH SUP ALIGNMENT R/W IMPACTS	SHEET NO.
ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
SR 856	MIAMI-DADE	421053-4-12-03		2

ATTACHMENT F

Opinion of Probable Costs

DATE: 3/20/2024

Kimley»Horn

OPINION OF PROBABLE COST - North Widening

William Lehman Causeway - Shared Use Path from Biscayne Blvd to W. Country Club Dr

DATE: 3/20/2024

FDOT PAY ITEM	DESCRIPTION	UNIT	QTY.	UNIT COST	ESTIMATED COST
	ROADWAY PAY ITEMS				
110-1-1	CLEARING AND GRUBBING	AC	2.52	$ 72,829.32	$ 183,529.89
110-4-10	REMOVAL OF EXISTING CONCRETE	SY	184.69	$ 34.09	$ 6,296.01
120-1	REGULAR EXCAVATION (SHARED USE PATH)	CY	2407	$ 24.64	$ 59,318.52
120-6	EMBANKMENT (SHARED USE PATH)	CY	426	$ 29.34	$ 12,496.67
160-4	TYPE B STABILIZATION (SHARED USE PATH)	SY	3853	$ 1.93	$ 7,435.48
285-701	OPTIONAL BASE, BASE GROUP 1 (SHARED USE PATH)	SY	3853	$ 13.66	$ 52,626.21
285-702	OPTIONAL BASE, BASE GROUP 02 (SHOULDER)	SY	484	$ 20.92	$ 10,122.07
285-709	OPTIONAL BASE, BASE GROUP 09 (ROADWAY)	SY	33	$ 88.76	$ 2,931.55
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C (SHARED USE PATH)	TN	318	$ 148.01	$ 47,043.15
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C (ROADWAY)	TN	3	$ 148.01	$ 403.30
337-7-82	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5, PG 76-22	TN	43	$ 214.76	$ 9,157.83
339-1	MISCELLANEOUS ASPHALT PAVEMENT	TN	8	$ 495.57	$ 3,802.07
400-0-11	CONCRETE CLASS NS, GRAVITY WALL INDEX 400-011 (ASSUMED 5' WITH 2' EMBEDMENT)	CY	882	$ 810.84	$ 715,507.51
515-1-2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	1038	$ 51.00	$ 52,945.65
520-1-10	CONCRETE CURB & GUTTER, TYPE F	LF	147	$ 40.92	$ 6,015.24
521-8-8	CONCRETE BARRIER, WITH JUNCTION SLAB, 42" SINGLE SLOPE (BRIDGE)	LF	6930	$ 470.00	$ 3,256,991.90
521-72-40	SHOULDER CONCRETE BARRIER, 38" OR 44" HEIGHT	LF	2146	$ 426.04	$ 914,256.28
522 -1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	45	$ 67.08	$ 3,016.51
522 -2	CONCRETE SIDEWALK AND DRIVEWAYS, 6" THICK	SY	29	$ 84.72	$ 2,483.61
527-2	DETECTABLE WARNINGS	SF	84	$ 38.70	$ 3,246.54
536-1-1	GUARDRAIL -ROADWAY, GENERAL TL-3	LF	312	$ 29.20	$ 9,117.70
536-73	GUARDRAIL REMOVAL	LF	1093	$ 3.03	$ 3,311.58
536-8113	GUARDRAIL TRANSITION CONNECTION TO RIGID BARRIER, F&I- INDEX 536-001, APPROACH TL-3	EA	1	$ 3,979.11	$ 3,979.11
548-12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	19700	$ 59.37	$ 1,169,589.00
		ROADWAY TOTAL			**$ 6,535,623.37**
	BRIDGE WIDENING				
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 1&2)	SF	3643	$ 220.00	$ 801,460.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 3-11)	SF	17341	$ 220.00	$ 3,815,020.00
BRIDGE #870606	STEEL PLATE GIRDER (BRIDGE SPAN 12-14)	SF	7284	$ 280.00	$ 2,039,520.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 15-20)	SF	11295	$ 220.00	$ 2,484,900.00
BRIDGE #870694	PRESTRESS CONCRETE (BRIDGE SPAN 21-24)	SF	7684	$ 220.00	$ 1,690,480.00
		BRIDGE WIDENING TOTAL			**$ 10,831,380.00**
	BRIDGE REMOVAL				
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 1&2)	SF	388	$ 46.00	$ 17,848.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 3-11)	SF	1878	$ 46.00	$ 86,388.00
BRIDGE #870606	STEEL PLATE GIRDER (BRIDGE SPAN 12-14)	SF	795	$ 46.00	$ 36,570.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 15-20)	SF	1225	$ 46.00	$ 56,350.00
BRIDGE #870694	PRESTRESS CONCRETE (BRIDGE SPAN 21-24)	SF	820	$ 46.00	$ 37,720.00
		BRIDGE REMOVAL TOTAL			**$ 234,876.00**
	SUBCOMPONENT PAY ITEMS				
	DRAINAGE				
		LS	20%	-	$ 1,307,125.00
		DRAINAGE SUBTOTAL			$ 1,307,125.00
	SIGNING AND PAVEMENT MARKINGS				
700-2-50	MULTI- POST SIGN, GROUND MOUNT, RELOCATE	AS	1	$ 3,635.25	$ 3,635.25
700-2-60	MULTI- POST SIGN, REMOVE	AS	1	$ 899.08	$ 899.08
700-3205	SIGN PANEL, FURNISH & INSTALL OVERHEAD MOUNT, 51-100 SF	EA	5	$ 5,488.31	$ 27,441.55
700-3507	SIGN PANEL, RELOCATE, 201-300 SF	EA	1	$ 2,737.00	$ 2,737.00
700-4114	OVERHEAD STATIC SIGN STRUCTURE, FURNISH & INSTALL, CANTILEVER, 41-50 FT	EA	1	$ 193,826.73	$ 193,826.73
700-22124	OVERHEAD TRUSS SPAN SIGN, FURNISH & INSTALL, TRUSS LENGTH 51-100', SIGN AREA >700 SF	AS	1	$ 450,000.00	$ 450,000.00
	CONTINGENCY	LS	5%	-	$ 326,782.00
		SIGNING AND PAVEMENT MARKINGS SUBTOTAL			$ 1,005,321.61
	SIGNALIZATION				
632-7-1	SIGNAL CABLE- NEW OR RECONSTRUCTED INTERSECTION, FURNISH & INSTALL	PI	1.00	$ 11,510.99	$ 11,510.99
632-7-6	SIGNAL CABLE, REMOVE- INTERSECTION	PI	1.00	$ 993.13	$ 993.13
649-21-3	STEEL MAST ARM ASSEMBLY, FURNISH AND INSTALL, SINGLE ARM 40'	EA	1.00	$ 71,003.33	$ 71,003.33
654-2-12	MIDBLOCK CROSSWALK: RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL- AC, COMPLETE SIGN ASSEMBLY- BACK TO BACK	AS	2.00	$ 17,975.92	$ 35,951.84
654-2-15	MIDBLOCK CROSSWALK: RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL- AC POWER, MAST ARM MOUNT RRFB SIGN ASSEMBLY	AS	1.00	$ 12,364.15	$ 12,364.15
670-5140	TRAFFIC CONTROLLER ASSEMBLY, FURNISH & INSTALL MODEL 2070	AS	1.00	$ 47,172.46	$ 47,172.46
670-5600	TRAFFIC CONTROLLER ASSEMBLY, REMOVE CONTROLLER WITH CABINET	AS	1.00	$ 1,173.11	$ 1,173.11
700-3-202	SIGN PANEL, FURNISH & INSTALL OVERHEAD MOUNT, 12-20 SF	EA	1.00	$ 992.41	$ 992.41
	CONTINGENCY	LS	5%	-	$ 326,782.00
		SIGNALIZATION SUBTOTAL			$ 507,943.42
	LIGHTING				
715-69000	LIGHT POLE COMPLETE, REMOVE POLE AND FOUNDATION	EA	11	$ 984.51	$ 10,829.61
	CONTINGENCY	LS	5%	-	$ 326,782.00
		LIGHTING SUBTOTAL			$ 337,611.61
	ITS				
	CONTINGENCY	LS	3%	-	$ 196,069.00
		ITS SUBTOTAL			$ 196,069.00
	LANDSCAPE				
	TREE REMOVAL (~$40/100 SF in MDC)	SF	36877	$ 0.40	$ 14,750.85
		LANDSCAPE SUBTOTAL			$ 14,750.85
		SUBCOMPONENTS TOTAL			**$ 3,368,821.49**
101-1	MOBILIZATION	LS	15%	-	$ 3,145,606.00
102-1	MAINTENANCE OF TRAFFIC	LS	20%	-	$ 4,194,141.00
	PE, CEI, AND PERMITTING	LS	30%	-	$ 6,291,211.00
	CONTINGENCY	LS	30%	-	$ 6,291,211.00
		GRAND TOTAL			**$ 40,893,000.00**

Roadway unit prices are per FDOT Item Average Unit for Florida Current & 6 Month Moving Market Area 13 Averages (2023/01/01 to 2023/12/31)

Kimley-Horn and Associates, Inc. has no control over the cost of labor, materials, equipment, or services furnished by others, or over methods of determining price, or over competitive bidding or market conditions. Any and all professional opinions as to costs reflected herein, including but not limited to professional opinions as to the costs of construction materials, are made on the basis of professional experience and available data. Kimley-Horn and Associates, Inc. cannot and does not guarantee or warrant that proposals, bids, or actual costs will not vary from the professional opinions of costs shown herein. This OPC does not include environmental permitting, utility adjustments, and fees.

Kimley»Horn

OPINION OF PROBABLE COST - South Widening

William Lehman Causeway - Shared Use Path from Biscayne Blvd to W. Country Club Dr

DATE: 3/20/2024

FDOT PAY ITEM	DESCRIPTION	UNIT	QTY.	UNIT COST	ESTIMATED COST
	ROADWAY PAY ITEMS				
110-1-1	CLEARING AND GRUBBING	AC	2.82	$ 72,829.32	$ 205,378.68
110-4-10	REMOVAL OF EXISTING CONCRETE	SY	189.39	$ 34.09	$ 6,456.31
120-1	REGULAR EXCAVATION (SHARED USE PATH)	CY	2407	$ 24.64	$ 59,318.52
120-6	EMBANKMENT (SHARED USE PATH)	CY	426	$ 29.34	$ 12,496.67
160-4	TYPE B STABILIZATION (SHARED USE PATH)	SY	5675	$ 1.93	$ 10,952.86
285-701	OPTIONAL BASE, BASE GROUP 1 (SHARED USE PATH)	SY	5675	$ 13.66	$ 77,521.24
285-702	OPTIONAL BASE, BASE GROUP 02 (SHOULDER)	SY	1098	$ 20.92	$ 22,969.49
285-709	OPTIONAL BASE, BASE GROUP 09 (ROADWAY)	SY	33	$ 88.76	$ 2,931.55
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C (SHARED USE PATH)	TN	468	$ 148.01	$ 69,297.10
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C (ROADWAY)	TN	3	$ 148.01	$ 403.30
337-7-82	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5, PG 76-22	TN	93	$ 214.76	$ 20,038.64
339-1	MISCELLANEOUS ASPHALT PAVEMENT	TN	8	$ 495.57	$ 3,802.07
400-0-11	CONCRETE CLASS NS, GRAVITY WALL INDEX 400-011 (ASSUMED 5' WITH 2' EMBEDMENT)	CY	882	$ 810.84	$ 715,507.51
515-1-2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	2103	$ 51.00	$ 107,250.96
520-1-10	CONCRETE CURB & GUTTER, TYPE F	LF	148	$ 40.92	$ 6,049.20
521-8-8	CONCRETE BARRIER, WITH JUNCTION SLAB, 42" SINGLE SLOPE (BRIDGE)	LF	5007	$ 470.00	$ 2,353,482.70
521-72-40	SHOULDER CONCRETE BARRIER, 38" OR 44" HEIGHT	LF	2354	$ 426.04	$ 1,003,021.71
522 -1	CONCRETE SIDEWALK AND DRIVEWAYS, 4" THICK	SY	178	$ 67.08	$ 11,936.29
522 -2	CONCRETE SIDEWALK AND DRIVEWAYS, 6" THICK	SY	105	$ 84.72	$ 8,922.24
527-2	DETECTABLE WARNINGS	SF	118	$ 38.70	$ 4,550.73
536-1-1	GUARDRAIL -ROADWAY, GENERAL TL-3	LF	312	$ 29.20	$ 9,117.70
536-73	GUARDRAIL REMOVAL	LF	1093	$ 3.03	$ 3,311.58
536-8113	GUARDRAIL TRANSITION CONNECTION TO RIGID BARRIER, F&I- INDEX 536-001, APPROACH TL-3	EA	1	$ 3,979.11	$ 3,979.11
548-12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	19865	$ 59.37	$ 1,179,385.05
FDOT BDR Cost Est.	CIP REINFORCED CONCRETE FLAT SLAB`	SF	10766	$ 230.00	$ 2,476,180.00
	ROADWAY TOTAL				**$ 8,374,261.19**
	BRIDGE WIDENING				
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 1&2)	SF	3865	$ 220.00	$ 850,300.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 3-11)	SF	19133	$ 220.00	$ 4,209,260.00
BRIDGE #870606	STEEL PLATE GIRDER (BRIDGE SPAN 12-14)	SF	8643	$ 280.00	$ 2,420,040.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 15-20)	SF	11372	$ 220.00	$ 2,501,840.00
BRIDGE #870694	PRESTRESS CONCRETE (BRIDGE SPAN 21-24)	SF	820	$ 220.00	$ 180,400.00
	BRIDGE WIDENING TOTAL				**$ 10,161,840.00**
	BRIDGE REMOVAL				
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 1&2)	SF	374	$ 46.00	$ 17,204.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 3-11)	SF	1848	$ 46.00	$ 85,008.00
BRIDGE #870606	STEEL PLATE GIRDER (BRIDGE SPAN 12-14)	SF	835	$ 46.00	$ 38,410.00
BRIDGE #870606	PRESTRESS CONCRETE (BRIDGE SPAN 15-20)	SF	1278	$ 46.00	$ 58,788.00
BRIDGE #870694	PRESTRESS CONCRETE (BRIDGE SPAN 21-24)	SF	820	$ 46.00	$ 37,720.00
	BRIDGE REMOVAL TOTAL				**$ 237,130.00**
	SUBCOMPONENT PAY ITEMS				
	DRAINAGE				
		LS	20%	-	$ 1,674,853.00
		DRAINAGE SUBTOTAL			$ 1,674,853.00
	SIGNING AND PAVEMENT MARKINGS				
700-2-50	MULTI- POST SIGN, GROUND MOUNT, RELOCATE	AS	1	$ 3,635.25	$ 3,635.25
700-2-60	MULTI- POST SIGN, REMOVE	AS	1	$ 899.08	$ 899.08
700-3205	SIGN PANEL, FURNISH & INSTALL OVERHEAD MOUNT, 51-100 SF	EA	5	$ 5,488.31	$ 27,441.55
700-3507	SIGN PANEL, RELOCATE, 201-300 SF	EA	1	$ 2,737.00	$ 2,737.00
700-4114	OVERHEAD STATIC SIGN STRUCTURE, FURNISH & INSTALL, CANTILEVER, 41-50 FT	EA	1	$ 193,826.73	$ 193,826.73
700-22124	OVERHEAD TRUSS SPAN SIGN, FURNISH & INSTALL, TRUSS LENGTH 51-100', SIGN AREA >700 SF	AS	1	$ 450,000.00	$ 450,000.00
	CONTINGENCY	LS	5%	-	$ 418,714.00
		SIGNING AND PAVEMENT MARKINGS SUBTOTAL			$ 1,097,253.61
	SIGNALIZATION				
632-7-1	SIGNAL CABLE- NEW OR RECONSTRUCTED INTERSECTION, FURNISH & INSTALL	PI	1.00	$ 11,510.99	$ 11,510.99
632-7-6	SIGNAL CABLE, REMOVE- INTERSECTION	PI	1.00	$ 993.13	$ 993.13
649-21-3	STEEL MAST ARM ASSEMBLY, FURNISH AND INSTALL, SINGLE ARM 40'	EA	1.00	$ 71,003.33	$ 71,003.33
654-2-12	MIDBLOCK CROSSWALK: RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL- AC, COMPLETE SIGN ASSEMBLY- BACK TO BACK	AS	2.00	$ 17,975.92	$ 35,951.84
654-2-15	MIDBLOCK CROSSWALK: RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL- AC POWER, MAST ARM MOUNT RRFB SIGN ASSEMBLY	AS	2.00	$ 12,364.15	$ 24,728.30
670-5140	TRAFFIC CONTROLLER ASSEMBLY, FURNISH & INSTALL MODEL 2070	AS	1.00	$ 47,172.46	$ 47,172.46
670-5600	TRAFFIC CONTROLLER ASSEMBLY, REMOVE CONTROLLER WITH CABINET	AS	1.00	$ 1,173.11	$ 1,173.11
700-3-202	SIGN PANEL, FURNISH & INSTALL OVERHEAD MOUNT, 12-20 SF	EA	1.00	$ 992.41	$ 992.41
	CONTINGENCY	LS	5%	-	$ 418,714.00
		SIGNALIZATION SUBTOTAL			$ 612,239.57
	LIGHTING				
715-69000	LIGHT POLE COMPLETE, REMOVE POLE AND FOUNDATION	EA	17	$ 984.51	$ 16,736.67
	CONTINGENCY	LS	5%	-	$ 418,714.00
		LIGHTING SUBTOTAL			$ 435,450.67
	ITS				
	CONTINGENCY	LS	3%	-	$ 251,228.00
		ITS SUBTOTAL			$ 251,228.00
	LANDSCAPE				
	TREE REMOVAL (~$40/100 SF in MDC)	SF	294	$ 40.00	$ 11,764.22
		LANDSCAPE SUBTOTAL			$ 11,764.22
		SUBCOMPONENTS TOTAL			**$ 4,082,789.07**
101-1	MOBILIZATION	LS	15%	-	$ 3,428,404.00
102-1	MAINTENANCE OF TRAFFIC	LS	20%	-	$ 4,571,205.00
	PE, CEI, AND PERMITTING	LS	30%	-	$ 6,856,807.00
	CONTINGENCY	LS	30%	-	$ 6,856,807.00
		GRAND TOTAL			**$ 44,569,000.00**

Roadway unit prices are per FDOT Item Average Unit for Florida Current & 6 Month Moving Market Area 13 Averages (2023/01/01 to 2023/12/31)

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