# Feasibility Study

# Sanibel Causeway Lane Expansion

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City of Sanibel

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# SANIBEL CAUSEWAY EXPANSION FEASIBILITY STUDY

## INTRODUCTION

### Overview

This feasibility study evaluates the potential for striping the existing Sanibel Causeway, with one inbound lane and two outbound lanes of travel, to improve traffic flow and alleviate peak-hour congestion for vehicles exiting Sanibel Island. The proposed concept involves expanding the current two-lane configuration to a three-lane cross-section, consisting of one westbound lane (toward Sanibel Island) and two eastbound lanes (off Sanibel Island toward the mainland).

### Purpose and Need

The Sanibel Causeway serves as the sole vehicular access point to and from Sanibel Island and Captiva Island. During peak travel periods, particularly weekday afternoons and weekends, significant traffic congestion occurs in the eastbound direction as residents, workers, and visitors leave the island. These delays impact emergency response times, quality of life, and regional mobility.

## EXISTING CONDITIONS

The current Sanibel Causeway consists of a two-lane undivided roadway that spans a series of low-level bridges and causeway islands connecting Sanibel Island to the mainland via McGregor Blvd. The typical existing bridge cross section includes:

- One 12’ eastbound lane (toward the mainland)
- One 12’ westbound lane (toward Sanibel Island)
- 6’ shoulder on eastbound lane (toward the mainland)
- 10’ shoulder on westbound lane (toward Sanibel Island)
- No dedicated pedestrian/bicycle accommodations on bridge spans
- 2’ Wyoming Railing systems or concrete barriers along the edges for safety
- 44’ average bridge deck width (40’ pavement width + 2’ barrier on each side)

The limited existing bridge two-lane capacity contributes to operational and safety challenges, especially during peak evacuation or daily peak periods. On Sanibel Island, this existing condition has been the accepted level of service standard for decades, as stated in the Sanibel Plan (pg.107). Objective 2, Policy 2.1 states “...reduced peak hour and daily (peak season and off season) levels of service will be accepted on these constrained roadways and roadway segments as a tradeoff for the preservation of the scenic, historical, environmental and aesthetic character of the city.”

## DESIGN CRITERIA

### Design Criteria

Sanibel causeway is a Lee County Department of Transportation owned and maintained bridge, despite this fact, primary criteria should comply with the 2025 FDOT Design Manual (FDM). Since it is county owned and maintained criteria can be reduced to meet standards outlined in the 2023 Florida Greenbook and the AASHTO Green Book where clarification is needed. Pertinent chapters from the Florida Design Manual include FDM 210 which covers arterials and collectors and FDM 260 which

concerns bridge structures. The pertinent chapter from the Florida Greenbook is Chapter 3 – Geometric Design, which speaks to cross sectional elements and other horizontal design parameters. The pertinent chapter in the AASHTO Green Book is chapter 4, which talks about cross sectional design elements such as lane width and shoulder width. The criteria for each feature are outlined in the table below:

Design Speed

The posted speed of the existing Sanibel Causeway is 35 mph. It is assumed that the design speed will be equal to the posted speed for this study.

Lane Widths

*FDM*

Per FDM Table 210.2.1 the minimum allowable travel lane width is 12 feet for a 2-lane undivided roadway.

*Florida Greenbook*

Per Florida Greenbook Table 3-20, the criteria for arterials with a design speed of less than 45 mph allow for 11’ lanes in constrained conditions.

*AASHTO Green Book*

the AASHTO Green Book Chapter 4 recommends 12 feet per lane as the standard for most rural and arterial applications but 11 feet per lane may be used in constrained or reconstructed conditions, especially in urban or suburban settings, provided safety is not compromised.

Shoulder Width

*FDM*

Per FDM Figure 260.1.2 (See Figure 1 below), the typical bridge section for a normal volume undivided highway has a minimum shoulder width requirement of 10 feet.

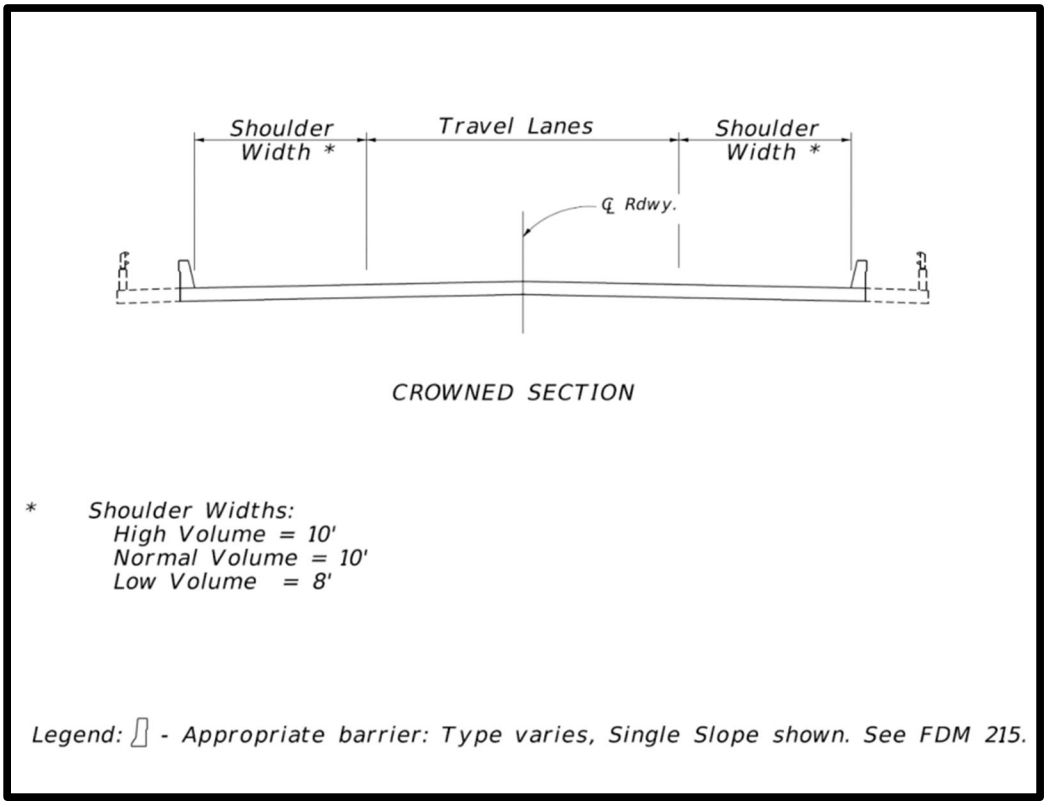
*Florida Greenbook*

Per Florida Greenbook Table 3-21, the minimum shoulder width for an undivided roadway with an ADT greater than 750 is 8’.

*AASHTO Green Book*

The AASHTO Green Book Chapter 4 states that “shoulders on structures should normally have the same width as usable shoulders on the approach roadway.” In the same chapter, the absolute bare minimum shoulder width on a low volume roadway is 2 feet. However, this chapter also talks about the minimum clearance to a barrier wall, which is 4 feet. The Sanibel Causeway has a barrier wall that runs the entire span of each bridge; therefore, the minimum paved shoulder width must be 4 feet. The Sanibel causeway is far from a low volume facility, however, and the recommended minimum preferred shoulder width would be 6 feet for a road of its context.

***Figure 1**: Bridge Shoulder Width per FDM **Figure 260.1.2***




The below table summarizes the possible recommended and minimum criteria for the Sanibel causeway:

**Table 1:** Design Criteria Summary

| Feature | Bare Minimum Criteria (AASHTO)[See Note] | Preferred Minimum Criteria (AASHTO) | Reduced Criteria (FL Greenbook) | Optimal Criteria (FDM and FL Greenbook) |
|---|---|---|---|---|
| **Travel Lane Width** | 11’ | 11’ | 11’ | 12’ |
| **Shoulder Width** | 4’ | 6’ | 10’ | 10’ |
| **Total Width Required** | 41’ | 45’ | 53’ | 56’ |

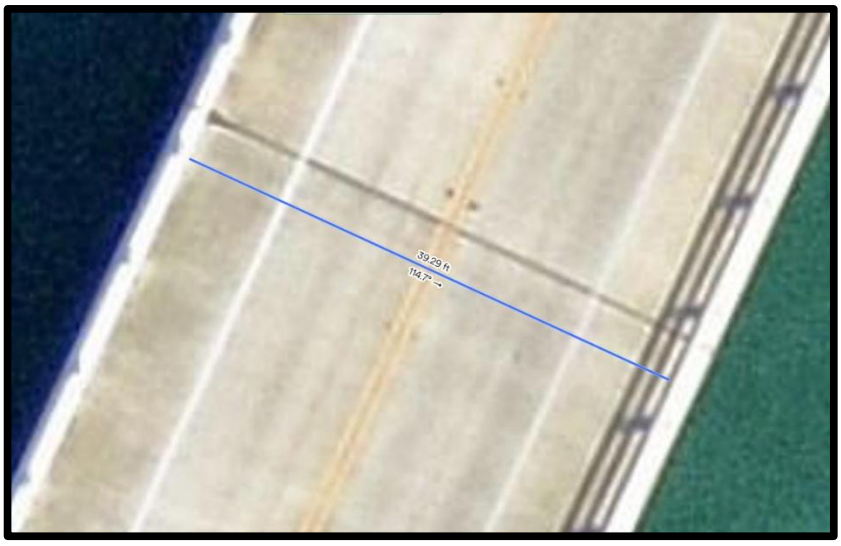
**Note:** While the AASHTO Standards technically allow for 11’ lanes and 4’ shoulders, they include provisos such as “if safety is not compromised” and “for low volume roadways.” Using these bare minimum criteria for the Sanibel Causeway would be risky from a liability perspective as the causeway is a heavily trafficked road and reduction of these criteria would inherently cause safety concern, and it would worsen the existing condition from a safety perspective.

## POTENTIAL EXPANSION ALTERNATIVES

Overview

The existing bridges have only at most 40 feet of available pavement; to determine this several measurements were taken from a high quality Nearmap aerial along the causeway, Figure 2 below shows a representative sample of the measurements taken, at this and most locations the width was measured at 39 feet and change, the widest section measured showed a width of 40 feet. This fact constricts options for expanding the causeway to a 3-lane facility. To meet even current bare minimum requirements, the bridge would have to provide a minimum of 41 continuous feet of available pavement. This leaves only two options for a 3-lane facility. The first would be violating all current standards (even bare minimum ones) to have 3 travel lanes and substandard shoulder width. The second would be to expand the existing bridge deck to meet current requirements, which is not feasible to meet the immediate needs of Sanibel.

**Figure 2:** Existing Available Pavement Width




Alternative I: Maintaining Existing Bridge Width with Design Exceptions

This option utilizes the current 40-foot bridge width to create three 12-foot travel lanes or three 11-foot travel lanes, leaving only minimal space for shoulders (2 feet for 12-foot lanes or 3.5 feet for 11-foot lanes). While this approach avoids costly widening, it introduces several challenges:

- Safety Concerns: The absence of standard shoulders eliminates refuge areas for disabled vehicles and emergency responders, increasing the risk of traffic blockages and secondary crashes. Furthermore, moving traffic closer to the guardrail increases the likelihood of an errant vehicle striking the railing systems because the recoverable area has been reduced.
- Design Exceptions Required: FDOT Standards clearly require 10’ minimum shoulder width on new bridge construction per FDM 260. Florida Greenbook standards would defer to FDM 260 since they do not specifically speak to shoulders on bridges. AASHTO Standards state that shoulders on bridges should match those of adjacent roadways, and state that the minimum shoulder is 2’ but the minimum lateral offset from the travel way to a barrier is 4 feet. Lane reapportionment would allow only for 2’ from the traveled way to the barrier wall which would

require a design exception. A reduction of lane widths to 11 feet could increase shoulder width by 1.5 feet on each side to 3.5 feet total, but this would still require an exception.

- Operational Limitations: Any incident or maintenance activity, especially for westbound traffic, would significantly disrupt traffic flow due to the lack of usable shoulder width.
- Bicycle Access/Safety: The minimum shoulder width for bicycles to use the shoulder is 4 feet, per FDOT Standards. Reduction of the shoulder width to 1.5 feet or 3.5 feet would not meet this criteria and would likely result in prohibiting bicycles from utilizing the shoulder. Additionally, per the AASHTO “Bike Guide”, roadways with a volume of more than 6,000 vehicles per day and a speed limit greater than 30 mph should have separated facilities and bicycles should not be permitted to share the road. Therefore, for the safety of the bicycle rider a separate facility should be provided; however, the 1.5 foot to 3.5 foot shoulder would not meet this requirement.

Alternative II: Expanding Causeway Bridge to Meet Current Criteria

The second option involves widening the bridge to accommodate three 12-foot lanes with full 10-foot shoulders. If expanding the bridge were to be done, it would be prudent to bring it up to modern FDOT standards. This design would align with FDM requirements and provide the following benefits:

- Enhanced Safety and Reliability: Full shoulders allow for emergency stops, breakdown recovery, and safer incident management.
- Future Resilience: The expanded cross-section supports higher traffic volumes and emergency evacuation needs during storms.
- Compliance with Standards: This alternative meets the stringent FDOT standards, reducing liability and improving long-term performance.

However, this option requires significant structural modifications, higher construction costs, and potential permitting challenges.

**FEASIBILITY ANAYLSIS:**

Alternative I: Maintain Existing 40-Foot Width with Three Lanes

**Feasibility:** Not feasible

**Key Issues:**

- Safety Concerns: Using substandard shoulders creates significant hazards for disabled vehicles, emergency response, and incident management. This increases crash risk and liability exposure.
- Regulatory Approval: State and AASHTO standards require shoulders for safety and operational efficiency. This design would require multiple design exceptions, which Lee County DOT is unlikely to approve due to the inherent safety risks.
- Operational Risk: Any breakdown or crash would block lanes, causing severe congestion and emergency access issues.

**Conclusion:** This alternative is not viable because it compromises safety to an unacceptable level, exposes the agency to liability, and is unlikely to receive approval from Lee County DOT.

Alternative 2: Expand Bridge to Provide Three 12-Foot Lanes with 10-Foot Shoulders

**Feasibility:** Feasible long-term, but likely cost-prohibitive

**Key Issues:**

- High Construction Cost: Widening the bridge requires significant structural modifications and expensive materials that will lead to high construction costs.
- Environmental and Permitting Challenges: Expansion impacts the surrounding environment and requires additional permits, adding complexity and potential delays.
- Budget Constraints: Current funding allocations may not support the scale of investment required for this alternative. Estimated costs of $36-$50+ million.

**Conclusion:** While this option meets safety and design standards, the cost and permitting challenges may make it financially impractical under current conditions.

**Overall Assessment**

Alternative I: Not feasible due to safety, liability, and regulatory approval issues.

Alternative II: Feasible long-term, but likely not financially viable without additional funding sources.

## COMPARABLE BRIDGES DISCUSSION

Cape Coral Bridge

### History

The Cape Coral Bridge was originally constructed and opened to traffic on March 14, 1964. At that time, it featured one lane in each direction. Later, in 1989, a second parallel span was added to the south of the original bridge. This expansion created a four-lane facility, with the new span handling eastbound traffic and the original span handling westbound traffic. The newer parallel span of the Cape Coral Bridge features adequate shoulder widths based on 1989 design standards. The original span handles only westbound traffic and has inadequate shoulder width (approximately 2' based on an aerial measurement). This bridge is also owned and operated by Lee County DOT.

### Discussion

The Cape Coral Bridge can have reduced design standards due to the following reasons:

- No reduction in existing conditions
    - While the original span does not meet current standards, the existing conditions were not worsened by adding the parallel span. The new parallel span has adequate shoulder widths, and while the old span does not, it is an improved condition to what was originally there (two lanes in one direction instead of two lanes in opposite directions). The additional lane provides a contingency measure for maintenance, accidents and emergency vehicles.
- Older Design Legacy
    - The original span was built in the 1960s, when design standards were less stringent.
    - Shoulder widths, lane sizes, and safety features were not prioritized to the extent they are today.

Midpoint Memorial Bridge

### History

The midpoint memorial bridge was constructed in 1997 and is a four-lane divided bridge with 2 lanes in each direction. This bridge does have adequate shoulder widths and meets modern design standards. This bridge is also owned and maintained by Lee County.

### Discussion

The midpoint memorial bridge can fit four lanes due to the following reasons:

- It is much wider, with an average width of 88 feet. This width allows it to fit the required shoulder width.
- This bridge was built more recently and therefore adheres to modern standards.

The Caloosahatchee Bridge

**History**

The Caloosahatchee Bridge, commonly referred to as the US 41 / Cleveland Avenue Bridge, is a concrete girder bridge in Fort Myers, Florida, that spans the Caloosahatchee River. It was constructed in 1962 and officially opened in 1964, replacing the older Edison Bridge route and rerouting US 41 to bypass downtown Fort Myers. The bridge is maintained by the Florida Department of Transportation (FDOT) and features four lanes with a clearance of 55 feet (16.8 meters) below and a width of approximately 66 feet. It has minimal shoulder width but features pedestrian connectivity. It connects Fort Myers to North Fort Myers and includes a historically significant interchange known as Five Points, where US 41 intersects with McGregor Boulevard, SR 80, and SR 82. In 2024, FDOT initiated a major pedestrian improvement project, adding an 8-foot-wide sidewalk on the bridge, installing a single median barrier to connect the two old spans, and restriping lanes to enhance safety and accessibility.

**Discussion**

The Caloosahatchee Bridge may have reduced shoulders for the following reasons

- Criteria are sometimes compromised for pedestrian safety improvements if there is heavy pedestrian traffic on the corridor. Since this bridge has the width required for wider shoulders, this may have been the reason that they chose to add an 8’ sidewalk in lieu of wider shoulders.
- Having two lanes in each direction reduces the concern of having no shoulder because stopped vehicles will not completely block traffic off in one direction. This facility is also median separated which adds to safety to reduce head on collisions.

Edison Bridge

**History**

The Edison Bridge in Fort Myers, Florida consists of two separate three-lane concrete girder bridges, each carrying one-way traffic for U.S. Highway 41 Business across the Caloosahatchee River. Built in the early 1990s to replace a historic draw bridge from 1931, the spans are each 55 feet tall and provide uninterrupted passage for boats. The bridge is approximately 56 feet wide, as determined by aerial measurement. Each span accommodates three lanes of vehicular traffic plus shoulders. The bridge is named after Thomas Edison, who had a winter home in Fort Myers and personally dedicated the original bridge.

**Discussion**

The Edison Bridge can fit three lanes due to the following reasons:

- It is the exact minimum width necessary of 56 feet to accommodate the recommended shoulder and lane widths required by criteria.

Matanzas Pass Bridge (Fort Myers Beach)

**History**

The Matanzas pass bridge was built in its current form in 1979. The bridge is roughly 50 feet wide and is a high-rise concrete girder bridge. The original bridge features 2 travel lanes and a bus-only lane, as well as a pedestrian facility. Currently, the FDOT is undertaking a $13 million project aimed at easing congestion on the bridge, which is a critical link between Fort Myers Beach and the mainland. The project includes the addition of a seasonal second southbound travel lane, created by converting the former bus-only lane into a general-use lane during the off-season (April through December). During peak tourist season (January through April), the lane will revert to bus and bicycle use only.

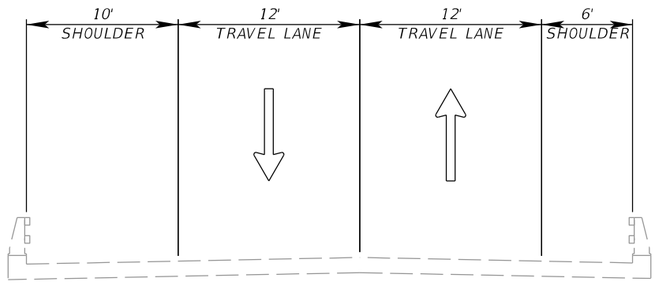
**Discussion**

The Matanzas pass bridge can fit three lanes due to the following reasons:

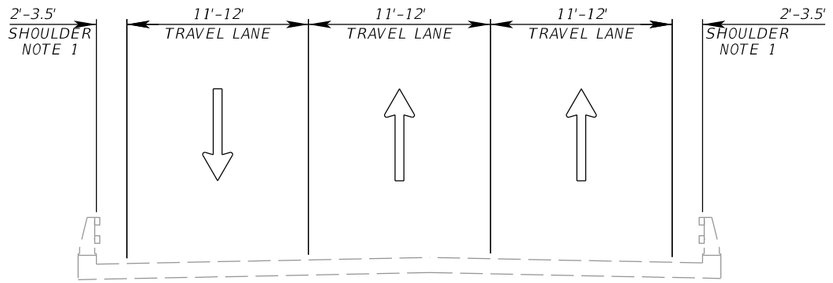
- The addition of the third lane is just a modification to the existing conditions
- The improvement does not worsen the existing condition
- The bridge is much shorter than the Sanibel Causeway which makes the ability not to pass on the bridge more acceptable for a shorter span.

# APPENDIX A

## Bridge Typical Sections



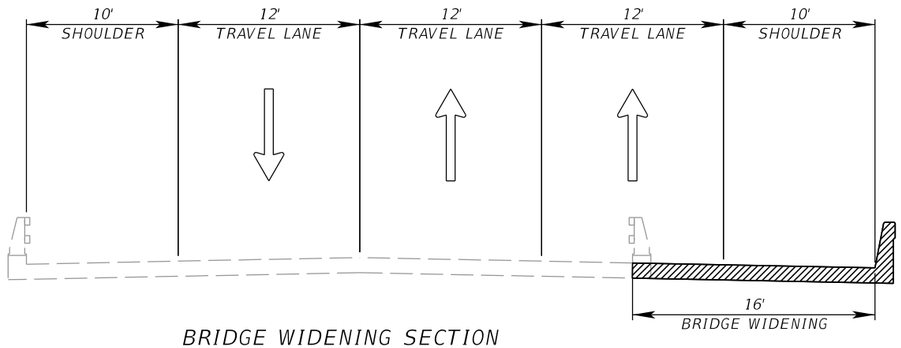

EXISTING BRIDGE SECTION
SANIBEL CAUSEWAY




LANE RE-APPORTIONMENT BRIDGE SECTION
SANIBEL CAUSEWAY

NOTES:

1. SHOULDER VIOLATES FDOT CRITERIA OUTLINED IN FDM 260. MINIMUM BRIDGE SHOULDER WIDTH IS 10' PER FDM 260.1.2.




BRIDGE WIDENING SECTION
SANIBEL CAUSEWAY

| REVISIONS | | | | ENGINEER OF RECORD | STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION | | | BRIDGE SECTIONS | SHEET NO. |
|---|---|---|---|---|---|---|---|---|---|
| DATE | DESCRIPTION | DATE | DESCRIPTION | JORDAN E. LEEP, P.E.<br>LICENSE NUMBER: 76102<br>KIMLEY-HORN AND ASSOCIATES, INC.<br>1800 SECOND STREET, SUITE 900<br>SARASOTA, FL 34236 | ROAD NO. | COUNTY | FINANCIAL PROJECT ID | | |
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