



SR A1A Multimodal Study

Draft Final Report

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Executive Summary

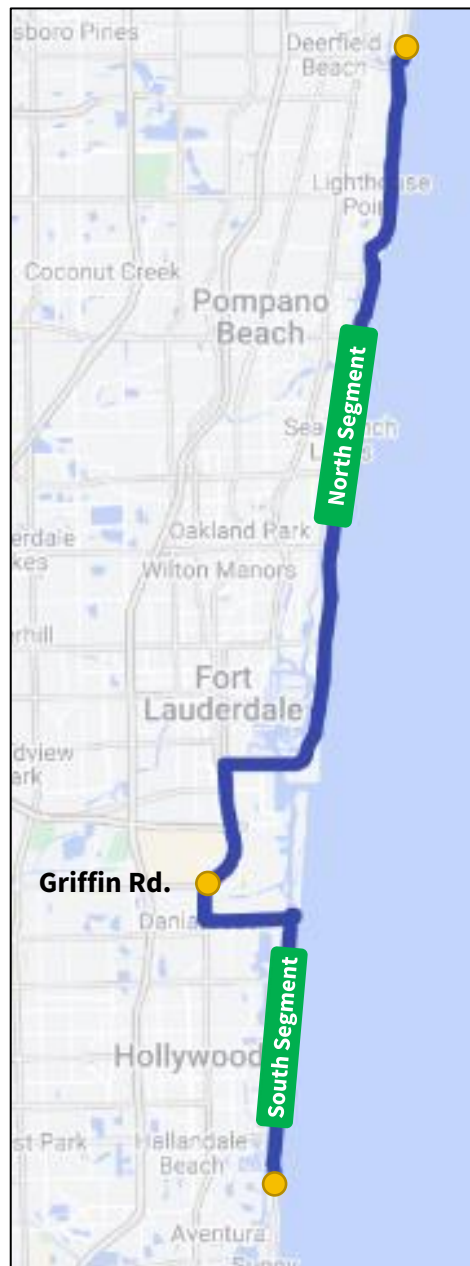
The Florida Department of Transportation (FDOT) District Four conducted a SR A1A Multimodal Study within Broward County to identify multimodal improvement concepts and opportunities based on complete and green streets principles and on input received from close coordination with local governments along State Road A1A and from agency coordination to obtain acceptance and support from municipal, Broward County, Broward Metropolitan Planning Organization (MPO), and state agencies.

The 28-mile SR A1A study corridor is divided into two segments, as shown in the right. The south segment consists of approximately eight miles between the Miami-Dade County Line and Griffin Road, while the north segment consists of approximately twenty miles between the Griffin Road and the Palm Beach County Line.

In the summer of 2023, the project team held a series of in person and virtual interviews with the municipalities and special users such as the Fort Lauderdale-Hollywood International Airport, Port Everglades, and the Broward County Convention Center who are located along the corridor. From these interviews, the team received needs related to speeding and traffic calming, safe crossing locations, safe and connected facilities for biking, walking, and transit, as well as for addressing flooding concerns which had become more pronounced in the past few years. Spot issues with intersections, deliveries, and parking were also pointed out by the various municipalities.

The project team has reviewed a library of studies and plans from various agencies for recent, ongoing, and future projects. The team also analyzed a large amount of data for current and future conditions of the A1A corridor regarding safety, especially for crashes involving people walking and biking along A1A, transportation resiliency, traffic capacity and operations, pedestrian and bicycle level of traffic stress, and transit quality of services. These analyses were applied for development and evaluation of improvement concepts.

The team developed two groups of improvement concepts. Group 1 is corridor-wide strategies for the entire 28-mile of A1A. The top two strategies are 1) establishing a corridor-wide target speed of 30 mph and 2) reinforcing the target speed with frequent and consistent speed management techniques such as horizontal and vertical deflection, enhanced crossings, and signal modifications. These are expected to harmonize traffic speeds and driving behavior and make them more consistent with different ways people are using this unique corridor and improve safety by reducing crash numbers and severity of



crashes especially those involving vulnerable users such as pedestrians and bicyclists. There are also opportunities to incorporate resilience strategies along the corridor such as raising the road profile and providing drainage improvements. The study has also discussed about opportunities to improve transit service and operations.

Group 2 of improvement concepts are thirty discrete measures considered at various locations to facilitate speed management, enhanced safety, better multimodal connectivity, and resilience. By setting the target speed at 30 mph, the toolbox of measures that could be used to address multimodal safety and mobility included raised pedestrian crossings and intersections, as well as roundabouts and various protected crossing treatments. Bicycle and pedestrian connectivity were proposed corridor-wide through a combination of sidewalk and crossing enhancements, use of separated bike facilities and bike boulevards along lower stress parallel routes, and lane repurposing in select locations to provide multimodal connectivity and stormwater and drainage best practice opportunities.

The initial set of planning-level concepts were presented to the municipalities in an in-person “open house” review session held in November 2023. From the feedback, a refined set of planning-level concepts were developed and reviewed by the municipalities during a second “open house” review session held in January 2024. While there were some items pointed out by the communities along the corridor that needed further refinement, the representatives who attended were positive with the ideas and concepts presented.

The study team has developed a plan of implementation organized by timeframe, municipality, and improvement type. Preliminary cost estimates and potential funding sources were also provided. In addition, the team developed sample fact sheets summarizing concept location, cost, relevant projects, and other considerations such as design and engineering requirements. The implementation plan is intended to facilitate transitioning the project from planning to implementation.

Brief discussions of key work tasks, as listed below, are provided in following chapters. Complete task documents are presented in the appendix.

- Interview and seek input from local municipalities and agencies along the study corridor.
- Conduct a review for recent, on-going, and planned projects and programs.
- Analyze historical crash data and summarize findings.
- Conduct field data collection and qualitative assessment for locations of concerns.
- Conduct multimodal corridor analysis for all users including auto, bus, bike, and pedestrian.
- Develop, evaluate, and prioritize multimodal improvement concepts.
- Complete a implementation plan for improvement concepts.

Planning level concepts identified by this study focused on opportunities and high-level feasibility. It is important to be aware that as this effort moves from planning to design, further evaluation will be required for concepts including, but not limited to lane repurposing, roundabout, raised intersection, RRFB and mid-block crossings.

In addition, we recommend establishing a technical advisory group with representatives from Broward County, Broward MPO, FDOT, as well as local agencies. This group would play a crucial role in guiding the implementation phase by identifying roles and responsibilities, facilitating coordination, and ensuring consistency in improvement techniques. This joint effort during the implementation stage would involve close collaboration among the County, MPO, FDOT, and local agencies.

1 Local Needs

Each of the nine municipalities on the corridor as well as Broward County, the Broward MPO, the Fort Lauderdale-Hollywood International Airport, Port Everglades, and the Broward County Convention Center were engaged to share their concerns, challenges, opportunities, desire and vision for A1A as it passes through their jurisdiction. Started from early Summer 2023, the project team has reached out to them and provided overview of the study goals and objectives, and a briefing of work completed to date to summarize current conditions (traffic, land use, transit, and safety) along the corridor. Representatives of the project study team facilitated the discussion and recorded responses, then summarized them into a set of local needs by community.

Stakeholders noted that their communities were rapidly evolving. Planning, engineering, and maintenance are confronted with an ever-increasing demand for efficient, accessible, and sustainable transportation along SR A1A and its shared portion of US 1. Top needs from the locals can be categorized into four broad areas as summarized below:

- **Sidewalks Continuity, Functionality and ADA Compliance.** Narrow sidewalks and sidewalk discontinuity create challenges for both cyclists and pedestrians to safely share the space. The integration of wider paths and wayfinding signage are desired to provide ample space for users to share, facilitate easy access to transit stops, and thus improve user experience.
- **Multimodality (Micromobility, Transit, Delivery Vehicles, and Bicycle Facilities).** All local agencies expressed a desire to have improved bicycle facilities that benefit all levels of riding. Many municipalities called for the increase of micromobility and transit to help close first and last mile gaps between parking and the beach. Notably in some municipalities, delivery drivers are forced to park in center turn lanes or take an outside lane to access the business, which highlights the issue of having safe and comfortable facilities when trucks must mount sidewalks or park in bicycle lanes.
- **Comfortable Crossings and Traffic Calming.** Another pressing need is creating safe and comfortable crossings between signalized intersections. While treatments like RRFBs and midblock crossings exist along the corridor, vehicles are often traveling too fast to notice that the crossing has been actuated, and there's a lack of consistency in crossing treatments along the corridor.
- **Ponding, Flooding, and Landscaping.** The need for green infrastructure was apparent across the whole corridor. Flooding and ponding are main concerns during major weather events like hurricanes and tropical storms. Normal rain events also leave debris and standing water at intersections and within driveways. Green infrastructure that enhances water infiltration would be desirable, such as improved drainage systems or drainage plans, and bioswales or rain gardens to capture stormwater.

Expanded local need summary is provided in **Appendix 1**.

2 Literature Review

A literature review for study corridor was conducted to review studies and plans, and other relevant information for all modes of transportation within the project study area including surface, transit, and non-motorized modes completed in the Broward County area and list any A1A-related transportation projects and general transportation and land use policies that may affect development along A1A. Documents reviewed include plans and studies developed by the following agencies:

- FDOT District Four
- Broward Metropolitan Planning Organization (MPO)
- Broward County
- Fort Lauderdale- Hollywood International Airport
- Port Everglades
- Broward County Convention Center
- South Florida Regional Planning Council (SFRPC)
- Local municipals along SR A1A in Broward County:
 - City of Hallandale Beach
 - City of Hollywood
 - City of Dania Beach
 - City of Fort Lauderdale
 - Town of Lauderdale-By-The-Sea
 - Village of Sea Ranch Lakes
 - City of Pompano Beach,
 - City of Hillsboro Beach
 - City of Deerfield Beach

Appendix 2 documented detailed findings from the literature review

3 Crash Summary

This crash summary memorandum, as shown in **Appendix 3**, provided a comprehensive analysis of the study area's traffic accidents, offering valuable insights into the dynamics of road safety. The study area encompassed various roads, intersections, and other transportation infrastructure within its boundaries. Through the examination of descriptive statistics, this section presents a summary of key findings, shedding light on the frequency and severity of crashes. Furthermore, the analysis explored the distribution of crashes by travel mode, categorizing incidents based on the types of users involved. By combining these crucial elements, this report aims to contribute to a better understanding of crash patterns and facilitate targeted interventions to enhance road safety within the study area.

Crash data from Signal4 Analytics was obtained for the most recent five-year period (2018-2022) and evaluated according to travel mode (vehicle, pedestrian, or cyclist) and severity (property damage only, injury, or fatality). GIS was then used to map “hot spots” on the corridor to highlight locations where patterns of crash frequency occurred; this mapping was used to inform field reviews of those locations to identify any contributing factors such as geometry, traffic operations, roadway users and human factors, and environmental factors.

The memorandum illustrates all crashes along the corridor, which is then organized by municipalities impacted by the study area. Also presented is a summary of a recent field visit, highlighting potential issues for further study. Finally, this memorandum concludes with anticipated next steps for the study.

4 Data Collection and Qualitative Assessment

From March to July of 2023, the study team conducted several field visit reviews of the study area and key intersections to understand and qualitatively and quantitatively document the existing traffic operations within the study area given the existing transportation network and roadway characteristics. The field observations included review and recording of traffic conditions such as traffic control devices, signal timing and phasing, vehicle delays, queuing and discharging, lane utilization, heavy vehicle operations, transit, pedestrian and bicycle activities, signage, pavement marking and ADA compliance. The study team utilized all the field data gathered and information collected to perform the existing condition analysis of the project. The Data Collection and Qualitative Assessment Report consisted of the following items:

- Traffic data including historical annual average daily traffic (AADT), historical traffic volume trend analysis, intersection turning movement counts, traffic signal timing and phasing plans, queue length data and analysis, and intersection geometry
- Multimodal data including midblock pedestrian and bicycle crossing activities, Broward County Transit (BCT) service and ridership data, micro-transit and micro-mobility data (B-Cycle),
- Resiliency data and the most recent aerial imagery, and
- Qualitative Assessment at ten (10) key intersections focusing on signal operations, access management, signing and pavement marking, multimodal activities and service, and preliminary recommendations.

The report is provided in **Appendix 4**.

5 Resilience Evaluation

A SR A1A resilience evaluation report was developed by Cambridge Systematics to identify risks and vulnerabilities along the A1A corridor due to extreme weather or climate stressors and provide recommendations of adaptation strategies to be considered in project development.

Hazards/stressors analyzed for this resilience evaluation include flooding, storm surge, sea level rise, groundwater elevation, and extreme heat. The report also considers whether the study corridor is within Broward County's Priority Planning Areas (PPAs) for Sea Level Rise.

For a clear representation of the evaluation results the study corridor is divided into three parts, with affecting stressors identified.

Part 1: SR A1A from SE 31st Street to Cypress Creek Road.

- 1% annual chance of flooding, 0.2% annual chance of flooding
- Category 1 through 5 storm surge zones
- 2070 and 2100 Sea Level Rise
- Storm Surge and Sea Level Rise
- Future groundwater elevation
- High average summer temperature

Part 2: SR A1A from Cypress Creek Road to SR 84.

- 1% annual chance of flooding, 0.2% annual chance of flooding, current and future flooding hotspots
- 100-Year Flood
- Category 1 through 5 storm surge zones
- 2070 and 2100 Sea Level Rise
- Storm Surge and Sea Level Rise
- High average summer temperature

Part 3: SR A1A from SR 84 to County Line Road.

- 1% annual chance of flooding, current and future flooding hotspots
- 100-Year Flood
- Category 1 through 5 storm surge zones
- 2050, 2070, and 2100 Sea Level Rise
- Storm Surge and Sea Level Rise
- Future groundwater elevation
- High average summer temperature

Recommended resilience strategies include coastal asset protection, drainage improvement, enhanced road surface and subbase, raise road profile, and etc.

The resilience evaluation report is provided in **Appendix 5**.

6 Multimodal Corridor Analysis

Roadway capacity, major intersection operations, transit quality of service, bicycle and pedestrian level of traffic stress are part of the analysis. The multimodal corridor analysis included 2023 existing conditions, 2030 and 2045 future no-build conditions, and 2030 and 2045 future build conditions along SR A1A corridor.

Multimodal Analysis Methodology

The study team conducted a segment-level Multimodal Quality/Level of Service (Q/LOS) analysis for the entire study corridor following the 2023 FDOT Q/LOS Handbook methodology and guidelines. The analysis focused on the following modes:

- Pedestrian Level of Traffic Stress considering inputs including existing sidewalk facility, traffic speed, separation from roadway, and vertical separation.
- Bike Level of Traffic Stress incorporating factors such as existing bicycle facilities, traffic volume, traffic speed, number of vehicular lanes, lane width, and parking.
- Transit Quality of Service incorporating Transit Capacity and Quality of Service Manual (TCQSM), or Highway Capacity Manual (HCM) methodology as suggested by the Q/LOS handbook. Transit evaluation will also incorporate performance measures consistent with BCT's Transit Development Plan (TDP), such as ridership and service day/span/frequency.

Traffic Analysis Methodology

The study team utilized data assembled, including roadway geometry, FDOT context classification, traffic volumes, multimodal activities, and traffic control strategies, to conduct the 2023 existing conditions traffic analysis. This analysis will involve the following components:

- Planning level capacity analysis using 2023 FDOT Q/LOS Handbook.
- Peak hour Intersection operations analysis using HCS or Synchro for major intersections.
- VISSIM microsimulation analysis applied for complex intersection geometry and operations during peak periods where HCS and Synchro are unable to provide sufficient analysis.

Selected performance measures include LOS, delay, and queue length.

The future horizon year is set to year 2045. Historical traffic growth trends and the latest adopted SERPM 8 model results will be utilized for traffic forecasting. Upon FDOT's approval, recommended traffic growth rates will be applied to develop future traffic volumes. The future year 2045 baseline conditions will incorporate traffic growth along the corridor. The same three levels of analysis (planning level Q/LOS, intersection operations using HCS or Synchro, and microsimulation for complex intersection geometries or operations) will be conducted to establish future year 2045 benchmarks. Planning level improvement projects as outlined in planning documents and other strategic plans will be evaluated in 2045 buildout analysis against the 2045 benchmarks.

The entire corridor is divided into two segments: the north segment covering about twenty miles from Griffin Road to the Palm Beach County line, and the south segment extending about eight miles from the Miami-Dade County line to Griffin Road. Corridor analysis for the north segment is provided in **Appendix 6**, and south segment in **Appendix 7**.

7 Concept Development and Evaluation

The study team utilized the project information, field data, multimodal corridor analysis, and agency/stakeholder input to develop, screen, and assess improvements, policy recommendations, and other strategies to plan a set of viable multimodal planning-level concepts for the study corridor. These concepts include facilities and services to enhance the functioning of A1A as a resilient complete street to equitably benefit all users of the roadway. The purpose of the Concept Development and Evaluation Report is to document the development, screening, and evaluation of planning-level concepts considered for implementation. Concepts are organized as:

- Corridor-wide Planning-Level Concepts – Overarching concepts that apply to the entire corridor, including suggestions on target speed, desired pattern of speed management devices, signal modifications, resilience strategies, transit improvement, and more.
- South Segment Planning-Level Concepts – Concepts such as lane repurposing, intersection enhancements, speed management, and bike/ped safety and mobility enhancements are included in this section which includes Hallandale Beach, Hollywood, and Dania Beach.
- North Segment Planning-Level Concepts - Specific planning-level concepts such as lane repurposing, speed management, and bike/ped safety and mobility enhancements are included in this section which includes Fort Lauderdale, Lauderdale By-the-Sea, Sea Ranch Lakes, Pompano Beach, Hillsboro Beach, and Deerfield Beach.

The study team performed a review of feasibility/major constraints for roundabouts based on Right-of-Way (R/W) and/or above-ground utility impacts. The effort focused on assessing the impact on R/W and above-ground utilities as the primary criteria for determining the project's viability. Planning-level concepts are evaluated based on key goals and objectives of the project (i.e., multimodal mobility, safety, and resiliency and sustainability), supplemented by stakeholder agency input. Detailed evaluation criteria were developed as a way to prioritize planning-level concepts and provide a framework for local agencies to develop implementation plans.

- Safety – There is an increased emphasis on concepts that (1) improve safety for non-motorized modes and (2) focus on speed management. Consistent with local agency feedback, these are considered proactive and best practices to drive down the potential of serious crashes.
- Resilience and Context Sensitive Solutions – The concepts that are context sensitive and address resilience receive higher weight in this category.
- Mobility and Multimodal Facilities – The concepts that expand non-automobile travel options such as walking, biking, and transit are prioritized over single-occupant automobile travel. These may include Complete Streets concepts and technology solutions.
- Feasibility, Stakeholder Support and Other Considerations – Given the constraint nature of the A1A corridor, the concepts that do not require ROW are prioritized. Stakeholder agency input is another emphasis in prioritization.

The criteria were used to assess the proposed improvements and identify priority concepts. Evaluation considerations are both quantitative and qualitative. The results of multiple data analysis memoranda, feasibility screening, and input provided by stakeholder agencies were used for scoring.

The Concept Development and Evaluation Report is provided in **Appendix 8**. Concept maps are provided in **Appendix 9**.

8 Implementation Plan

The implementation plan builds off the information developed in the previous study tasks, including the multimodal concepts, fatal flaw analysis, multimodal corridor analysis, safety analysis, and stakeholder agency coordination.

The implementation plan is organized by timeframe, municipality, assigned score/ranking based on evaluation criteria, and type of improvement. Preliminary cost estimates and potential funding sources are also provided. In addition, sample fact sheets summarizing concept location, cost, relevant projects, and other considerations such as design and engineering requirements are included in the implementation plan, shown in **Appendix 10**.