

EXECUTIVE SUMMARY

The purpose of the project is to improve the local and regional transportation network while simultaneously providing enhanced multimodal interrelationships at the I-95 and 10th Avenue North interchange. Further consideration for the need of this project includes improving capacity and transportation demand, improving safety through design year and also enhancing emergency evacuation and response times. The project aims at improving the capacity and mobility through the study interchange as traffic increases, thereby increasing the amount of congestion due to the anticipated increase in the population of Palm Beach County from 1,471,150 in 2017 (US Census) to 1,715,300 in 2040 (US Census), representing an increase of 17% approximately.

According to the Future Land Use Plan for the City of Lake Worth Beach, the area will mainly remain residential with mixed-used and high-density residential and pockets of public and public recreating open space. As the population of the City and the County continues to increase, traffic will continue to grow, thereby, increasing the amount of congestion.

The *Interchange Concept Development Report for I-95 (SR 9) Interchange at 10th Avenue North, Palm Beach County, dated June 2014*, shows that if no improvements are made in the study interchange, it is forecasted that by 2045, for AM and PM peak hour, the southbound and northbound ramps intersections will be operating at a level of service (LOS) of D and F respectively. Therefore, long-term interchange improvements are needed to maintain acceptable level of service through the study area, thereby, reduce delays, travel time and provide more mobility to the residents and commuters in this area along 10th Avenue North which provides east-west access in the City of Lake Worth Beach and Palm Beach County.

The proposed interchange improvements will also address pedestrian and bicycle modes and will ensure that the project corridor continues to meet mobility and safety goals as travel demands continue to grow.

The existing configuration of the existing study interchange is a tight-diamond urban interchange (TUDI), with 10th Avenue North carried on structure over I-95. In the vicinity of the 10th Avenue North interchange, I-95 is a ten-lane divided interstate freeway providing four general purpose lanes and one High Occupancy Vehicle (HOV) lane in each direction. There is one auxiliary (AUX) lane northbound and southbound between 10th Avenue North and Forest Hill Boulevard. There are two AUX lanes northbound and one AUX lane southbound between 6th Avenue South and 10th Avenue North.

The South Florida Rail Corridor (SFRC)/CSX runs parallel and immediately to the west of I-95. 10th Avenue also spans over the rail line on separate structure from the I-95 crossing. The 10th Avenue North roadway is a four-lane divided urban minor arterial near the I-95 interchange. The adjacent signalized intersections located east and west of the interchange are Barnett Drive (west), and at "A" Street (east). Barnett Drive, and A Street are all two-lane undivided city collectors that run north-

south adjacent to the interchange. A project location map which identifies the study limits and area of influence is provided in **Figure 1-1**.

A Methodology Letter of Understanding (MLOU) was prepared to document the methodology for the analysis and evaluation of this Interchange Modification Report (IMR). The MLOU was approved by the Florida Department of Transportation (FDOT) District 4 Interchange Review Coordinator (IRC), and FDOT Central Office in November 2019. The primary basis for traffic projections in this IMR are existing field traffic counts and the latest version of Southeast Regional Planning Model V7.062 (SERPM 7.062) with base year 2010 and horizon year 2040. The analysis years for this study include Existing Year 2019, Opening Year 2025, and Design Year 2045. The operational analysis for this study was performed using the Highway Capacity Software (HCS Version 7.7) and Synchro Version 10.0. All operational analysis followed the guidelines of the *Highway Capacity Manual 6th Edition* (HCM 6).

Several alternatives were evaluated to address the purpose and needs identified for this project. First level of screening eliminated some alternatives and second level screening and based on discussions with the FDOT only two build alternatives were considered for further evaluation. The two Build Alternatives evaluated in this IMR are Build Alternative 1 (TUDI) and Build Alternative 2 (Diverging Diamond Interchange (DDI)). The Build Alternative's primary proposed design improvements for evaluation include alternative interchange configurations, widening of ramps, and adding turn lanes along 10th Avenue North to improve signalized intersection operations. Multi-modal accommodations, including buffered bicycle lanes and six-foot sidewalks are provided for each direction of travel on the 10th Avenue North approaches to the interchange.

This IMR has been developed in accordance with the FDOT Policy Statement 000-525-015: Approval of New or Modified Access to Limited Access Highways on the State Highway System, FDOT Procedure Topic 525-030-160: New or Modified Interchanges adding or modifying interchange access to limited access facilities on Florida's SHS, Interchange Access Request User's Guide, and the FDOT Procedure Topic 525-030-120 Project Traffic Forecasting.

The findings of the overall engineering and environmental evaluation for this project will be documented in the *Type 2 Categorical Exclusion* and *Preliminary Engineering Report* for this Project Development and Environment (PD&E) study.

Compliance with Federal Highway Administration (FHWA) General Requirements

The following requirements serve as the primary decision criteria used in approval of interchange modification projects. Responses to each of the FHWA 2 policy points are provided to show that the proposed modification for the I-95 at 10th Avenue North interchange is viable based on the conceptual analysis performed to date.

FHWA Policy Point 1

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the

local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

An in-depth operational and safety analysis was conducted to study the impacts of the proposed improvements. Several performance measures were used to compare the operations of the existing system under No-Action and Build conditions. Key measures included freeway densities, ramp V/C ratios, intersection delays, level of service and 95th percentile queue lengths for existing and proposed conditions.

From an operational perspective, the traffic analysis performed for the signalized intersections indicated that the ramp terminal signalized intersections will operate at an overall LOS F during the peak periods by Design Year 2045 if no improvements are built. Adjacent intersections are also operating at a LOS F by the year 2045. A substantial number of failing movements at the ramp terminal and adjacent intersections will occur. Significant queuing will also be observed at the ramp terminal and adjacent intersections.

The safety analysis performed for this study indicated a total of 434 crashes occurred along I-95 and 198 crashes occurred along 10th Avenue North within the study area from 2014 to 2018. The predominant crash types that occurred within the study area were rear end collisions and sideswipe collisions. Crashes of these types are typically attributed to the congested conditions along the arterial and interchange ramps and terminals.

The Recommended Build Alternative 2 is a reconfiguration to a DDI. This alternative performs substantially better than the No-Action Alternative for all future year scenarios particularly for the 10th Avenue North interchange ramp terminals, which is the primary focus for this study. The ramp terminal intersections will operate at LOS D or better compared to the No-Action that will operate at a LOS F in the Design Year. The traffic analysis results also indicate that all the approaches for ramp terminal and adjacent intersections will operate at acceptable LOS during both the AM and PM peak periods for the 2045 design years.

With the improved operations under Build Alternative 2, it is anticipated to enhance safety along both I-95 and 10th Avenue North will improve due to the significant reduction in delays and improved

mobility. The DDI and adjacent intersection improvements proposed along 10th Avenue North will provide better signal operations reducing congestion and queue lengths, thereby improving safety. According to the *FHWA Diverging Diamond Interchange Informational Guide* from August 2014, DDIs not only reduced total number of crashes at the interchange but also left turn crashes and injury crashes.

Using the Highway Safety Manual (HSM) predictive crash methodology, the number of crashes expected for the segments and intersections under existing conditions was modeled at 46.170 and the number of crashes expected for the segments and intersections under the No-Action condition for 2045 was 48.539. Considering the 2045 Build Alternative 2, the expected number of crashes under proposed future conditions dropped from 48.539 to 47.696, a further decrease of 1.75%. While the expected crashes for Build Alternative 1 would be 48.991.

A cost comparison was performed for the two Build Alternatives by approximating construction and right-of-way cost for both alternatives. The cost comparison shown in Section 8.7.3 show that Alternative 2 is the more economical alternative. A benefit-cost analysis, also prepared as part of the study, indicated that Build Alternative 2 has a higher benefit-cost ratio (5.80) than Build Alternative 1 (1.71). The primary crash reduction factor of Build Alternative 2 is approximately two and half times more than Build Alternative 1 resulting in a much larger safety benefit for Build Alternative 2.

Overall, the Recommended Build Alternative 2 provides significantly better traffic operations and enhanced safety when compared to the No-Action Alternative.

A conceptual signing plan has been developed for the Recommended Build Alternative 2 showing signage requirements for the proposed improvements and the interchange.

In conclusion, the comparison of the No-Action and Build alternatives show that the proposed Interchange improvements would provide for better and safer operating conditions. The proposed capacity improvements in the build alternatives are not anticipated to have a negative impact on operations or safety of I-95 mainline or the adjacent interchanges. The proposed capacity improvements along 10th Avenue North, within the study area, would likely have positive impacts on the operation of the 10th Avenue North interchange, with no potential for spillbacks from the 10th Avenue North interchange ramps on to Interstate 95.

FHWA Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding

signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

As with the existing conditions, the proposed improvements to the I-95 at 10th Avenue North interchange and adjacent intersections will provide full access and cater to all traffic movements from 10th Avenue North to and from I-95. The proposed modifications are designed to meet current standards for federal-aid projects on the interstate system and conform to American Association of State and Transportation Officials (AASHTO) and the FDOT design standards. The 10th Avenue North roadway is a public road under the jurisdiction of Palm Beach County (west of I-95) and City of Lake Worth Beach (east of I-95).