

Executive Summary

The Florida Department of Transportation (FDOT) District Seven prepared an Interchange Modification Report (IMR) to document the safety, operational, and engineering acceptability of improving southbound I-75 (SR 93A) from SR 56 to the I-275/I-75 Apex in Hillsborough County and Pasco County, Florida. The proposed improvements eliminate the need for southbound I-75 vehicles to weave in the project area. The proposed improvements are expected to enhance the overall safety and improve the operating conditions within the project limits. The impacts of implementing the proposed transportation improvements are being evaluated under an ongoing SR 56 Southbound Collector-Distributor (C-D) Road/Ramps to I-75/I-275 Project Development and Environment (PD&E) Study from County Line Road to SR 56 in Hillsborough and Pasco Counties [Work Program Identification (WPID): 430573-4]. The following summarizes the results of an evaluation of existing and future traffic operating and safety conditions with and without the proposed improvements.

A. Existing Conditions

The need for this project is based on mitigating identified operational and safety deficiencies. High speed vehicle weaving movements occur on southbound I-75 between the SR 56 on ramp and the major diverge area at the I-275/I-75 Apex, causing increased traffic congestion and reduced highway safety. During the AM peak hour, a heavy volume of traffic entering onto southbound I-75 from SR 56 is required to make up to two lane changes to access southbound I-75 before the exit to I-275, while crossing the paths of traffic traveling on southbound I-75 that desire to head southbound on I-275. The intense vehicle weaving maneuvers within this section of freeway leads to a high number of lane-changing related crashes on southbound I-75 between SR 56 and I-275. The existing vehicle weaving issue is anticipated to be further exacerbated with the onset of the I-75 at SR 56 Diverging Diamond Interchange (DDI). The I-75 at SR 56 interchange is being reconstructed from a diamond interchange to a DDI and has an anticipated construction completion date in 2022. The DDI will allow higher traffic volumes to enter onto southbound I-75 at a faster rate.

Historical crash data from FDOT Crash Analysis Reporting (CAR) Online for the five-year period from 2015 to 2019 reveals that there is a high number of lane-changing related crashes on southbound I-75 between SR 56 and the I-275/I-75 Apex. Of the 142 reported crashes on southbound I-75 from SR 56 to the I-275/I-75 Apex, 31 percent were sideswipe crashes. The economic loss due to crashes on southbound I-75 between SR 56 and the I-275/I-75 Apex is estimated to be \$16.6 million. The results of the operational analysis of existing year (2021) traffic conditions indicate that both the southbound and northbound I-75 ramp terminal intersections at SR 56 operate poorly (LOS F) during both the AM and PM peak hours with overall intersection delays exceeding 90 seconds/vehicle (sec/veh).

B. Future Conditions

FDOT District Seven proposes to modify southbound I-75 from SR 56 to the I-275/I-75 Apex to alleviate existing traffic congestion, improve safety, and provide the necessary roadway capacity to allow for future growth and economic development within the study area. The Build Alternative consists of modifying the lane geometry of southbound I-75 from SR 56 to the I-275/I-75 Apex to provide a three-lane C-D road parallel to southbound I-75 that is fed by the SR 56 southbound on ramp. The three-lane C-D road would run from SR 56 to south of the Hillsborough and Pasco County line, at which point two lanes would be provided in each direction to southbound I-75 and southbound I-275. The center lane of the three-lane C-D road would be a choice lane. The southbound I-275 on ramp, south of the C-D road diverge, would merge down to one lane before merging onto the southbound I-275 mainline. The southbound I-75 on ramp would remain two lanes through the gore on the southbound I-75 mainline, at which point both lanes would merge into

the mainline. The following summarizes the results of the operational and safety analysis conducted to evaluate the future conditions of southbound I-75 from SR 56 to I-275/I-75 Apex with (Build Alternative) and without (No Build Alternative) the proposed improvements under opening year (2030) and design year (2050) traffic conditions.

Opening Year (2030)

No Build Alternative – The No Build Alternative maintains the existing lane geometry on southbound I-75 from SR 56 to the I-275/I-75 Apex, but it includes the I-75 at SR 56 DDI. The benefit of this alternative is that there are no additional costs associated with implementing the proposed transportation improvements. However, it is anticipated that the operational and safety deficiencies identified under existing conditions will be further exacerbated with increasing levels of traffic; and the purpose and need of the project are not met. The following conclusions are derived from the opening year (2030) traffic analysis:

- Vehicle operating speeds on southbound I-75 between SR 56 and the I-275/I-75 Apex are projected to degrade to an estimated speed of 55.8 miles per hour (mph) and 63.0 mph during the AM and PM peak hours, respectively;
- A ramp capacity check using Highway Capacity Manual (HCM), 6th Edition volume thresholds reveals that the southbound I-75 on ramp at SR 56 is projected to operate at a volume-to-capacity ratio of 0.91 during the higher volume AM peak hour; and
- Due to increased traffic volumes by the opening year (2030), it is projected that even with the implementation of the I-75 at SR 56 DDI, the southbound I-75 and northbound I-75 ramp terminal intersections will operate at an overall poor LOS (LOS E or worse). However, most movements are expected to experience an average vehicle delay significantly less than the existing (2021) conditions, due to the implementation of the new DDI.

Build Alternative – The Build Alternative consists of adding a southbound I-75 C-D road from SR 56 to the I-275/I-75 Apex, and similar to the No Build Alternative, it also includes the I-75 at SR 56 DDI. The results of the operational analysis for the opening year (2030) traffic conditions are listed below:

- Vehicle operating speeds on southbound I-75 between SR 56 and the I-275/I-75 Apex are projected to increase to an estimated speed of 66.7 mph and 67.5 mph during the AM and PM peak hours, respectively;
- A ramp capacity check using HCM, 6th Edition volume thresholds reveals that the southbound I-75 on ramp at SR 56 is projected to operate at a volume-to-capacity ratio of 0.58 during the higher volume AM peak hour;
- Intersection vehicle delay results are expected to be the same as the No Build Alternative with both ramp terminal intersections operating at an overall poor LOS (LOS E or worse); and
- The Build Alternative will not impact the operations of the ramp terminal intersections at the I-75 at SR 56 DDI.

Design Year (2050)

No Build Alternative – The No Build Alternative maintains the existing lane geometry on southbound I-75 from SR 56 to the I-275/I-75 Apex, but it includes the I-75 at SR 56 DDI. The following conclusions are derived from the design year (2050) No Build traffic analysis:

- Vehicle operating speeds on southbound I-75 between SR 56 and the I-275/I-75 Apex are projected to degrade to an estimated speed of 36.3 mph and 57.8 mph during the AM and PM peak hours, respectively;
- A ramp capacity check using HCM, 6th Edition volume thresholds reveals that the southbound I-75 on ramp at SR 56 is projected to operate over capacity with a volume-to-capacity ratio of 1.12 during the higher volume AM peak hour; and

- Due to increased traffic volumes by the design year (2050), the southbound I-75 and northbound I-75 ramp terminal intersections at SR 56 will experience overall vehicle delays that exceed 80 sec/veh (LOS F) during both the AM and PM peak hours.

Build Alternative – The Build Alternative consists of adding a southbound I-75 C-D road from SR 56 to the I-275/I-75 Apex, and similar to the No Build Alternative, it also includes the I-75 at SR 56 DDI. The results of the operational analysis for design year (2050) traffic conditions are listed below:

- Vehicle operating speeds on southbound I-75 between SR 56 and the I-275/I-75 Apex are projected to increase when compared to the No Build Alternative, with estimated speeds of 65.0 mph and 66.2 mph during the AM and PM peak hours, respectively;
- A ramp capacity check using HCM, 6th Edition volume thresholds reveals that the southbound I-75 on ramp at SR 56 is projected to operate at a volume-to-capacity ratio of 0.72 during the higher volume AM peak hour;
- Intersection vehicle delay results are expected to be the same as the No Build Alternative with both ramp terminal intersections operating at an overall poor LOS (LOS F), with increased delays as compared to the opening year (2030); and
- The Build Alternative will not impact the operations of the ramp terminal intersections at the I-75 at SR 56 DDI.

Safety Analysis

A quantitative safety analysis, using procedures from the *Highway Safety Manual (HSM)*, was conducted to estimate the safety benefits of the proposed improvements. The quantitative safety analysis revealed that providing the southbound I-75 C-D road from SR 56 to the I-275/I-75 Apex is projected to reduce overall crashes by 13 percent, which equates to an annual cost savings of \$4.8 million. The Build Alternative improvements would provide a greater level of mobility and safety for all users in the southbound I-75 from SR 56 to I-275/I-75 Apex study area.

C. Federal Highway Administration (FHWA) Policy Points

It is in the national interest to preserve and enhance the Interstate System to meet the needs of the 21st Century by assuring that it provides the highest level of service in terms of safety and mobility. Full control of access along the Interstate mainline and ramps, along with control of access on the crossroad at interchanges, is critical to providing such service. Therefore, FHWA's decision to approve new or revise access points to the Interstate System under 23 United States Code (U.S.C.) 111 must be supported by substantiated information justifying and documenting that decision. The FHWA's decision to approve a request is dependent on the proposal satisfying and documenting the following requirements.

The following two FHWA Policy Criteria (dated May 22, 2017) are addressed in this IMR:

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(a) and 771.111(i)). 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(a)). 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(a)). 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(a) and 23 CFR 655.603(a)).

The Build Alternative improves safety and traffic operations on southbound I-75 between SR 56 and the southbound off ramp to I-275 (I-75/I-275 interchange) by eliminating the need for southbound vehicles to weave in the project area. The proposed improvements are expected to enhance the overall safety and improve the operating conditions within the project limits, as well as improve LOS for the southbound I-75 ramp junction with I-275. Providing a C-D road in the southbound direction of I-75 would place less safe/higher speed vehicle weaving movements occurring on the higher priority I-75 mainline, onto a lower priority C-D road. Removing the vehicle weaving on the southbound I-75 mainline would enhance safety and increase roadway capacity to support future growth and economic development.

A review of historical crash data from FDOT's CAR Online database for the five-year period from 2015 to 2019 revealed that there were 142 crashes that occurred on southbound I-75 between SR 56 and the I-275/I-75 Apex, with the majority (31% of the total number of crashes) of these crashes being of the sideswipe crash type. A quantitative safety analysis using methodologies from Part C of the HSM and the Enhanced Interchange Safety Analysis Tool (ISATe) was performed to estimate the number of crashes reduced by implementing the southbound I-75 C-D road between SR 56 and the I-275/I-75 Apex. The results of the quantitative safety analysis revealed that there is a projected 13% reduction in the overall number of crashes on southbound I-75 with the Build Alternative. Monetary estimates of property damage and economic loss due to injury or a fatality were calculated using average unit costs from the United States Department of Transportation (USDOT)/FHWA KABCO (K-Fatal; A-Incapacitating injury; B-Non incapacitating injury; C-Possible injury; and O-No injury) injury classification scale. Based on unit costs for property damage only and injury crashes, that are documented in Table 122.6.2 of the FDOT Design Manual (FDM), the Build Alternative is projected to provide a \$100 million (or \$4.8 million/year) cost savings during the analysis time period.

Microsimulation analyses using CORSIM/TISIS 6.3 software was performed to evaluate opening year (2030) and design year (2050) traffic operating conditions with and without the proposed southbound I-75 C-D road between SR 56 and the I-275/I-75 Apex. The results of the microsimulation analysis indicate that vehicle density on southbound I-75 between SR 56 and the I-275/I-75 Apex is projected to be reduced from 51.6 passenger cars per mile per lane (pcpmpl) [LOS F] in the No Build Alternative to a density of 19.1 pcpmpl [LOS C] in the Build Alternative during the more critical AM peak hour in the design year (2050). Moreover, a comparison of network-wide measures of effectiveness (MOEs) reveals that the Build Alternative provides a 4% increase in the amount of vehicle miles traveled, a 13% decrease in total travel time, an 18% increase in vehicle operating speeds, and a 31% reduction in total travel delay during the same critical AM peak period in the design year (2050).

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(a)). 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.

The proposed improvements documented in this IMR maintain the existing full interchange configurations and do not modify access at the I-75 at SR 56 and I-275/I-75 Apex interchanges. The highway safety and traffic operations of the southbound I-75 mainline is enhanced with the Build Alternative by placing existing higher-speed vehicle weaving movements on the southbound I-75 mainline onto a parallel southbound C-D road between SR 56 and the I-275/I-75 Apex. An underpass ramp from the SR 56 C-D road to southbound I-75 eliminates any vehicle conflicts between southbound I-75 mainline traffic exiting to I-275 and traffic entering from SR 56 to travel south on I-75.