Executive Summary

The Florida Department of Transportation (FDOT) District Three (Requestor) is preparing an Interchange Operational Analysis Report (IOAR) to document the traffic operational and highway safety benefits of improving the I-10 (SR 8) ramp terminals at US 90 (Mahan Drive) in Leon County, Florida. The proposed improvements are needed to alleviate future traffic operational and safety concerns for the I-10 (SR 8) ramp terminals at US 90 (Mahan Drive) due to widening of I-10 mainlines from four to six lanes.

Existing Conditions

Existing intersection operational analysis indicates that the I-10 (SR 8) ramp terminals and adjacent intersections at US 90 (Mahan Drive) currently meet the Level of Service (LOS) target D.

Most of the observed queue lengths at these intersections are within the given storage lengths except for the northbound shared through and left lane at Walden Street and US 90 (Mahan Drive) Intersection.

Based on the existing freeway merge and diverge analysis, each of the freeway merge and diverge segments are operating at LOS target D or better.

A five-year period crash data analysis (2013 to 2017) within the study area of influence found that 135 crashes were observed during that period. Of these crashes, there were two (2) fatalities, five (5) severe injury crashes, and nine (9) moderate injury crashes within the study area over the observed period. The crash analysis indicated that 'hit-fixed object' and 'rear-end' crashes are the most prominent crash types within the study area.

Future Conditions

Operational analyses were performed for three alternatives: the No-Build and two Build Alternatives. In the Design Year (2045), the No-Build alternative includes the widening of the I-10 (SR 8) segment from east of SR 261 (Capital Circle NE) to west of SR 59 (Gamble Road) from four to six lanes. The No-Build Alternative will serve as a baseline for comparison against the Build Alternatives.

No-Build 2045 Operational analysis indicates that each of the freeway merge and diverge segments will operate at LOS target D or better in the Design Year (2045). The results of No-Build 2045 intersection analysis indicate the following intersections will operate at LOS E or F in the Design Year (2045).

- US 90 (Mahan Drive) and Walden Road intersection during the PM peak hour
- US 90 (Mahan Drive) and Apex Drive intersection during the AM and PM peak hours
- US 90 (Mahan Drive) and Summit Lake Drive intersection during the AM peak hour

Additionally, the eastbound left turn movement at Westbound I-10 Ramp terminal will fail during the AM Peak Hour in the Design Year (2045).

The results of the No-Build 2045 queue analysis indicate that the 95th percentile queue lengths for several movements at the study intersections are expected to exceed the storage length in the Design Year (2045). Based on 2045 queue analysis, the Walden Road intersection is expected to spillback into the eastbound I-10 (SR 8) ramp terminal intersection and the eastbound left turn into westbound I-10 (SR 8) ramp terminal intersection and northbound left turn at Apex Drive intersection are expected to exceed the storage length. However, most importantly, the queue lengths on the eastbound and westbound off-ramps are not expected to spillback onto the I-10 (SR 8) mainline.

Overall, the same operational deficiencies that were observed within the existing (2019) condition are expected to worsen by the Design Year (2045) under No-Build Alternative.

In order to accommodate the future travel demand while enhancing safety within the interchange area, two Build Alternatives were developed.

- Build Alternative 1 is based on the No-Build Alternative lane geometry and proposes the following improvements:
    - Signalize each of study intersections at the US 90 (Mahan Drive) interchange
    - Add eastbound and westbound right turn lanes at the Walden Road intersection,
    - Add a second eastbound through lane at the Apex Drive intersection that would merge down to one lane before Summit Lake Drive.
- Build Alternative 2 is based on Build Alternative 1 and proposes additional improvement plans, in conjunction with Build Alternative 1 to accommodate future queues and improve operational performance:
    - Add a second westbound left lane at the I-10 westbound ramp terminal intersection
    - Restripe northbound and southbound approach to provide one exclusive left turn lane and one shared through/ right lane at the Walden Road and US 90 (Mahan Drive) intersection
    - Add a second westbound through lane at the US 90 (Mahan Drive) and Apex Drive
    - Add a second eastbound through lane at the US 90 (Mahan Drive) and Summit Lake Drive intersection, that would merge down to one lane before Plantation Forest Drive

Compared to No-Build Alternative, both Build Alternatives are projected to provide better operating conditions. Under the Build Alternatives, each of the freeway merge and diverge segments and study intersections at US 90 (Mahan Drive) will operate at LOS target D or better in the Design Year (2045). While the operational improvements under Build Alternative 1 and Build Alternative 2 are comparable, Build Alternative 2 better services the demand along US 90 (Mahan Drive) with additional turning storage at the westbound ramp terminal and minimizes queuing.

FHWA Policy Points

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)).

Satisfaction of Policy Point 1

An operational and safety analysis was conducted to evaluate the future alternatives. The measure of effectiveness, including vehicle delays for the intersections at I-10 (SR 8) and US 90 (Mahan Drive) Interchange, Walden Road at US 90 (Mahan Drive), Apex Drive at US 90 (Mahan Drive), and Summit Lake Drive at US 90 (Mahan Drive) were compared between No-Build and Build Alternatives.

Under No-Build Alternative, most of the study intersections will operate at LOS E or worse during both the AM and PM peak hours, with the exception of the I-10 Ramp terminal. However, the eastbound left turn movement at Westbound I-10 Ramp terminal will fail during the AM peak hour in the Design Year, the 2045 No-Build queue analysis indicates that queues on eastbound approach along US 90 (Mahan Drive) at the Westbound I-10 Ramp terminal could adversely affect the flow of traffic along I-10 (SR 8).

Under Build Alternative 1 and Build Alternative 2, each of the I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive) will operate at LOS target D or better in the Opening Year (2025) and Design Year (2045). Compared to the No-Build Alternative, the congestion and delay at the I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive) will be significantly improved under the Build Alternatives during both the AM and PM peak hours in the Design Year (2045).

Additional, when examining FDOT crash modification factors between the No Build and Build Alternatives the proposed improvements are expected to significantly improve safety along the corridor. With the proposed improvements under Build Alternative 1, collisions are expected to be reduced by up to 24 percent. With Build Alternative 2's focus on improving Build Alternative 1 by reducing queuing along the US 90 (Mahan Drive) corridor, collisions are expected to be reduced by up to 42 percent.

Based upon this analysis, the proposed improvements under Build Alternatives provide significant improvements to the network configuration to improve corridor operation, mitigate congestion, and enhance safety within the study Area of Influence.

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.

Satisfaction of Policy Point 2

The proposed Build Alternatives will provide full access to all the traffic movement on US 90 (Mahan Drive) to and from I-10. The design will meet current standards for the projects on the interstate system and comply with the American Association of State Highway and Transportation Officials (AASHTO) and FDOT design standards.