

1. EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) District Five has prepared an Interchange Operational Analysis Report (IOAR) for the proposed improvements at the I-4 (SR 400) and SR 528 (locally known as Beachline Expressway) interchange. The proposed improvement includes the widening of the existing single lane off-ramp from I-4 westbound to eastbound SR 528 to two-lanes. The interchange improvements are funded for construction in fiscal year 2023 (FM #448915-1).

The purpose of this IOAR is to document the potential safety and operational impacts of the proposed interchange modification being proposed as part of the I-4 and SR 528 improvements. The findings of the operational and safety analysis and the FHWA Policy Point discussion are summarized as follows:

Purpose and Need

- **Purpose:** The purpose of this project is to improve safety and traffic operations at the I-4 and SR 528 interchange. Improvements to the operation and safety of the I-4 and SR 528 interchange will better accommodate future population increases, improve mobility, and support economic growth.
- **Need:** The need for the project has been documented in previous analyses of the interchange (described in detail in the Introduction) which showed failing operations of the westbound I-4 off ramp to SR 528. The need for the project is also demonstrated by the projections of future population and employment growth in the region indicating that travel demand will continue to increase well into the future. Without the improvements, congestion is expected to occur on the westbound I-4 off ramp resulting in failing conditions which will impact the operations of I-4. The 2026 peak hour projections indicate that capacity of the single lane ramp will be exceeded (v/c ratio greater than 1.0) during both peak hours. Queue spillback onto the mainline I-4 is expected to occur in the future without widening the ramp to two lanes, resulting in a significant safety risk along the westbound I-4 mainline lanes.

Future Traffic Operations

- The microsimulation analysis shows an improvement in travel time along I-4 westbound:
 - The end-to-end travel time along I-4 westbound is expected to improve by approximately 3 to 6 percent during the future year peak hours.
 - The travel time along I-4 westbound to the end of the AOI along eastbound SR 528 is expected to improve by up to 9 percent with the proposed ramp widening at the I-4 westbound off-ramp to eastbound SR 528 during the future year peak hours.
- The microsimulation analysis of the Build scenario shows that the eastbound segment of SR 528 between I-4 and International Drive is not expected to be congested based on the speed and density results in the future year peak hours and therefore, will not negatively impact the I-4 eastbound or westbound mainline lanes.
- Network-wide performance metrics such as average delay, average speed, and total delay are better in the Build when compared to the No-Build for each analysis year analyzed.

Future Safety Performance

- The projected traffic volume along the I-4 westbound off-ramp to eastbound SR 528 is expected to exceed the capacity of a single lane ramp. In an unconstrained network, it would be expected that there would be queue spillback onto the I-4 westbound mainline lanes due to this ramp capacity issue. It is known through observation that having slow moving or stopped vehicles on the mainline creates significant speed differentials and increases the occurrence of crashes. This was found to be true in the I-4 westbound crash data east of the SR 528 off-ramp, where 375 of the 406 crashes were either rear-end, sideswipe, or run off the road related (92 percent).
- The widening of the I-4 westbound off-ramp to eastbound SR 528 will provide adequate capacity to accommodate the project traffic demand along the ramp which would mitigate the potential for queue spillback onto the I-4 mainlines and minimize the high-speed differential crash potential along I-4 westbound. The proposed ramp widening would mitigate the potential for high-speed differential rear end, sideswipe, and run off the road crashes due to eliminated spillback onto the I-4 westbound mainline lanes.

FHWA Policy Points

The proposed improvements satisfy FHWA's Two Policy Point Requirements included in the May 22, 2017, update to "Policy on Access to the Interstate System".

- 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)).
 - Policy Point 1: The safety and operational analyses conducted as part of this IOAR have concluded that the proposed interchange improvements improve traffic operations and mitigate the potential for high-speed differential rear end, sideswipe, and run off the road crashes due to eliminated spillback onto the I-4 westbound mainline lanes.

- The microsimulation analysis of the Build scenario shows that the eastbound segment of SR 528 between I-4 and International Drive is not expected to be congested based on the speed and density results in the future year peak hours and therefore, will not negatively impact the I-4 eastbound or westbound mainline lanes.
 - As described in this IOAR, the proposed action of widening of the I-4 westbound off-ramp to eastbound SR 528 from a single lane ramp to a dual lane ramp safely and efficiently collects, distributes, and accommodates the traffic anticipated to use the improvements.
 - It is known through observation that having slow moving or stopped vehicles on the mainline creates significant speed differentials and increases the occurrence of crashes. This was found to be true in the I-4 westbound crash data east of the SR 528 off-ramp, where 375 of the 406 crashes were either rear-end, sideswipe, or run off the road related (92 percent). The proposed ramp widening would mitigate the potential for high-speed differential rear end, sideswipe, and run off the road crashes due to eliminated spillback onto the I-4 westbound mainline lanes.
 - As noted in the Future Operational Analysis sections, the analyses confirmed that capacity improvements such as those identified in the I-4 BtU South Section SAMR and PD&E Study, are needed along I-4 to address mainline bottlenecks within the AOI. These improvements will be evaluated as funding becomes available. At this time, the FDOT is using a phased approach to implement improvement projects as construction funding is identified.
- 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.
 - Policy Point 2: The proposed improvements will maintain full access between I-4 and SR 528. All traffic movements are being provided.

The interchange improvements evaluated as part of the Build scenario fulfill the project's purpose and need and satisfy the FHWA Policy Points.