

INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)

I-10 at S.R. 281 (Avalon Boulevard)
FPID: 413062-4-22-01 and 413062-5-22-01



EXECUTIVE SUMMARY

This Interchange Operational Analysis Report (IOAR) has been prepared to evaluate the impacts of widening the Interstate 10 (I-10) Eastbound (EB) off-ramp to S.R. 281 (Avalon Boulevard) from one to two lanes, as well as the signalization of Avalon Boulevard/I-10 Westbound (WB) off-ramp terminal intersection, and the geometric improvements at the I-10 EB ramp terminal intersection. The Florida Department of Transportation (FDOT) District 3 is the Requestor seeking approval of this IOAR that presents the necessary documentation for such improvements.

The I-10 at Avalon Boulevard interchange is located in Santa Rosa County at Milepost 5.152, Section number 58002000. I-10 at Avalon Boulevard is located between the I-10 at U.S. 90/S.R. 10 interchange to the west and the I-10 at Garcon Point Road interchange to the east. Avalon Boulevard is approximately 2.35 miles east of U.S. 90/S.R. 10 and 4.23 miles west of Garcon Point Road.

The purpose of this IOAR is to provide the required documentation for obtaining approval for improvements at the Interstate 10 (I-10) and S.R. 281 (Avalon Boulevard) interchange in Santa Rosa County. The current interchange is a full diamond interchange with stop-controlled operation at the I-10 WB ramp terminal intersection and signal-controlled operation at the I-10 EB ramp terminal intersection. The primary need of the project is to improve future traffic operations at the ramp terminals and the I-10 EB diverge segment, thereby improving safety at the interchange.

The primary basis for traffic projection in this IOAR is consistent with the Project Traffic Analysis Report (PTAR) dated May 2020, which incorporates the field traffic counts, Florida Traffic Online (FTO) and the Northwest Florida Regional Planning Model Version 2.1 (NWFRPM v2.1) with base year 2010 and horizon year 2040. The analysis years for the study include Existing Year 2019, Opening Year 2025, and Design Year 2045. The operational analysis for this study was performed using Highway Capacity Software (HCS) and Synchro 10. The delay and level of service (LOS) for the unsignalized intersection analyses were reported based on Highway Capacity Manual (HCM 6th Edition) Methodology.

If no improvements are made, traffic operations and safety within the study area will continue to deteriorate as traffic volumes increase.

Two alternatives were evaluated to address the purpose and needs identified in this IOAR. These include the No-Build Alternative and Build Alternative. The alternatives analyzed include:

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- No-Build Alternative – This alternative includes the existing configuration plus all programmed improvements with future traffic.
- Build Alternative – This alternative includes signaling the I-10 WB ramp terminal intersection, lengthening and widening the diverge segment to provide two deceleration lanes, providing multiple turn-lanes for the left-turn and right-turn movements at the ramp terminal intersections and lengthening the storage lengths for the left-turn movements at I-10 EB and WB ramp terminals.

From an operational perspective in the Design Year 2045 under the No-Build Alternative, operational and safety deficiencies exist. All the individual movements on the WB approach at the I-10 WB ramp terminal intersection will operate at LOS F in both AM and PM peak hours. The I-10 EB diverge segment to Avalon Boulevard will operate at LOS F with v/c of 1.17 in the PM peak hour. At the ramp terminal intersections, queues are longer than the available storage along the I-10 EB and WB off-ramps in 2045 under the No-Build Alternative.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the 2045 No-Build Alternative, the 2045 Build Alternative provides a reduction in delay at both study intersections. The queues observed in the 2045 No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at the I-10 WB ramp terminal intersection.

As part of this study, an existing crash analysis was performed. The data collected from the FDOT State Safety Office Map-Based Query Tool (SSOGis) shows that rear-end crashes and angle crashes are the most prominent crashes within the project area. The Recommended Build Alternative improves the traffic operations and enhances the safety within the project study area by signaling the I-10 WB ramp terminal intersection and widening the I-10 EB off-ramp.

A quantitative safety analysis was performed for the study area where improvements were implemented. Based on the safety analysis, it is predicted that a reduction in 0.3 Fatal/Injury crashes and 0.41 Property Damage Only (PDO) crashes will occur at the ramp terminal intersections.

Based on the evaluations of the No-Build and Build Alternatives, the recommended alternative for approval in this study is the Build Alternative.

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This IOAR has been developed in accordance with the FDOT Policy No. 000-525-015: Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS), FDOT Procedure No. 525-030-160: New or Modified Interchanges, FDOT Procedure No. 525-030-120: Project Traffic Forecasting, Interchange Access Request User's Guide (IARUG) and the FDOT Project Traffic Forecasting Handbook (Procedure No. 525-030-120).

E.1 Compliance with FHWA General Requirements

The following requirements serve as the primary decision criteria used in approval of an IOAR. Responses to each of the two FHWA policy points are provided to show that the proposed improvements at the I-10/Avalon Boulevard interchange are viable based on the conceptual analysis performed to date.

E.1.1 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, 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 (23 CFR 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)).

The in-depth operational and safety analysis conducted for this IOAR confirmed that the proposed improvements to the existing interchange will maintain or improve on the operations and safety of the project area. Several performance measures were used to compare the operations of the existing system

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under No-Build and Build conditions. Key measures included LOS, v/c delays, density, 95th percentile queue lengths, and safety under existing and proposed conditions.

From an operational perspective in the Design Year 2045 under the No-Build Alternative, operational and safety deficiencies exist. All the individual movements on the WB approach at the I-10 WB ramp terminal intersection will operate at LOS F in both AM and PM peak hours. The I-10 EB ramp terminal intersection will operate at LOS E or worse in the AM and PM peak hours and the I-10 EB diverge segment to Avalon Boulevard will operate at LOS F with v/c of 1.17 in the PM peak hour. These operational deficiencies are associated with high arterial volume at the ramp terminal intersection and insufficient capacity of the I-10 EB off-ramp. At the I-10 WB ramp terminal intersection, queues are longer than the available storage in the WB direction in 2045 under the No-Build Alternative. At the EB ramp terminal the queues observed in the 2045 No-Build Alternative are anticipated to be longer than the available storage in the EB direction.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the 2045 No-Build Alternative, the 2045 Build Alternative provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at the I-10 WB On/Off-ramp and Avalon Boulevard intersection. The delay for the WB left-turn movement at the I-10 WB ramp terminal is reduced by 43,137.9 seconds and 49,900.4 seconds during the AM and PM peak hours, respectively. Also, the LOS at the I-10 EB off-ramp to Avalon Boulevard changes from F to D in the PM peak hour. The queues observed in the 2045 No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at the I-10 WB ramp terminal intersection.

The safety analysis performed for this study indicated a total of 68 crashes occurred within the project area during the five study years (2014-2018). And a total of 64 crashes occurred at the I-10 ramp terminal intersections. The predominant crash types that occurred within the study area were rear-end and angle collisions. Crashes of these types are typically attributed to congestion along the arterials and interchange ramps.

The proposed improvements under the Build Alternative are anticipated to enhance safety within the study area. A quantitative safety analysis was performed for the study area where improvements were implemented. Based on the safety analysis, it is predicted that a reduction in 23.52 Fatal/Injury crashes will occur at the ramp terminal intersections.

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Overall, the Build Alternative provides significantly better traffic operations and enhanced safety when compared to the No-Build Alternative. All proposed improvements as part of this project will be constructed within the existing right-of-way.

In conclusion, the comparison of the No-Build and Build alternatives show that the proposed improvements provide enhanced operation and thereby enhancing safety.

E.1.2 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, HOVs, HOT 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.

The proposed improvements apply to the I-10 and Avalon Boulevard interchange in Santa Rosa County and no new access is requested. The improvements are designed to preserve all the existing connections between public roads and preserve existing traffic movements onto and off I-10. These improvements are designed to meet current standards for federal-aid projects on the interstate system and conform to American Association of State Highway and Transportation Officials (AASHTO) and the FDOT Design Manual.