

EXECUTIVE SUMMARY

Located in northwest Seminole County, Florida, Wekiva Parkway (SR 429)/Interstate 4 (I-4) interchange lies within unincorporated Seminole County and the City of Sanford. The Wekiva Parkway (SR 429) is a proposed 4-lane divided limited access toll facility that will connect to SR 417 at I-4, completing the Western Beltway (SR 429) around the Orlando metropolitan area.

The purpose of this Interchange Modification Report (IMR) is to demonstrate that the Alternative Technical Concept #32 (ATC #32) is performing equal to or better than the RFP concept and has satisfied the FHWA policy points. This IMR is consistent with the Environmental Impact Statement (EIS) for the I-4 Beyond the Ultimate (BtU) Segment 3 in the design year.

A Methodology Letter of Understanding (MLOU) was prepared to document the methodology for the analysis and evaluation of this IMR. The MLOU was approved by the Florida Department of Transportation (FDOT) District 5 Interchange Review Coordinator (IRC), Florida's Turnpike Enterprise IRC, FDOT Central Office System Management Administrator, and Federal Highway Administration (FHWA) in August 2019. The primary basis for traffic projections in this IMR is the Central Florida Regional Planning Model (CFRPM) Version 6.2.

The study area was analyzed for an Opening Year 2023 and Design Year 2043. The operational analysis for this study was performed using the Highway Capacity Software (HCS 7), Synchro 10, and VISSIM 7.0. All operational analysis followed the guidelines of the Highway Capacity Manual (HCM) 6th Edition. The safety analysis was performed using the Enhanced Interchange Safety Analysis Tool (ISATe).

Consistent with FDOT Interchange Access Request User Guide (IARUG), two alternatives were analyzed for this IMR:

- RFP Concept – The interchange concept represented in the RFP.
- ATC #32 – The modified “Wekiva Parkway” alternative proposed by Lane Construction/DRMP during the Design-Build process will serve as the Proposed Design-Build Alternative.

This IMR 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, Interchange Access Request User's Guide (IARUG), and the FDOT Project Traffic Forecasting Handbook (Procedure No. 525-030-120).

A detailed operations analysis for the ATC #32 and the RFP Concept was performed. The results can be summarized in the following categories:

Freeway Analysis (HCS): The number of segments with acceptable Level of Service (LOS) (A through D) are higher for the ATC #32 than the RFP Concept for all analysis years. The ATC #32 showed a major improvement in weaving segments. 5 out of 30 weaving segments improved from

an unacceptable LOS (E and F) in the RFP Concept to an acceptable LOS (A through D) in the ATC #32, the rest being equal.

Intersection Analysis (Synchro): The changes proposed by ATC #32 were primarily limited to I-4, system-to-system ramps, location of merge/diverge segments, and weaving segments. The location of where the ramp terminals intersected crossroads remained unchanged except for one intersection. Therefore, 14 intersections out of the 15 intersections show equal delay values in all analysis periods. The delay at the 15th intersection, International Parkway and Wekiva Parkway (SR 429), cannot be compared directly as it accommodates different movements for the RFP Concept and ATC #32.

Microsimulation Analysis (VISSIM)

The network-wide statistics produced by the VISSIM models provide additional insight into operational conditions. For the AM period, the 2043 ATC VISSIM model is performing 1% to 2% better than the 2043 RFP VISSIM model. For the PM period, the 2043 ATC VISSIM model is performing at the same level as the 2043 RFP VISSIM model.

A safety analysis for the RFP Concept and ATC #32 was performed using ISATe. The results are summarized below:

The analysis showed a reduction of 7% in the total number of expected crashes when comparing the ATC #32 to the RFP Concept. This results in 19-million-dollar economic saving. The ATC #32 showed a reduction in crashes in each severity distribution (fatal, severity injury, moderate injury, minor injury, and property damage) when compared with the RFP Concept.

The comparison of the RFP Concept and the ATC #32 shows that the ATC #32 provides better operational conditions and enhances safety. Therefore, the IMR demonstrates that ATC #32 is performing equal or better than the RFP Concept.

Compliance with FHWA Policy Points

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 document the impacts of the proposed project. Several performance measures were used to compare the operations of the RFP Concept and ATC #32. Key measures included freeway densities, v/c ratios, intersection delays, level of service and 95th percentile queue lengths.

Operational Analysis

Freeway Analysis using Highway Capacity Software (HCS)

A comparison of the level of service (LOS) by segments was performed and shows the ATC #32 has a higher percentage of segments within LOS range A-D and a smaller percentage of segments at LOS E and F.

Concept (Year Time Period)	% of segments within LOS A-D	% of segments at LOS E	% of segments at LOS F
RFP Concept (2023 AM)	80	9	11
ATC #32 (2023 AM)	85	9	6
RFP Concept (2023 PM)	85	4	11
ATC #32 (2023 PM)	87	4	9
RFP Concept (2043 AM)	76	7	17
ATC #32 (2043 AM)	77	8	15
RFP Concept (2043 PM)	80	2	19
ATC #32 (2043 PM)	82	2	17

HCS analysis showed that:

- The number of segments with acceptable LOS (A through D) are higher for the ATC #32 than the RFP Concept for all analysis years.
- There is a major improvement in weaving segments. 5 out of 30 segments improved from an unacceptable LOS (E and F) in the RFP Concept to an acceptable LOS (A through D) in the ATC #32.
- Overall, there are 15 segments with a better LOS in ATC #32 while there are only two segments with a better LOS in the RFP concept. The two segments in which the RFP Concept performs better are located on the C-D system and not on I-4, SR 429, or SR 417. And both segments are operating at an acceptable LOS (LOS C) in ATC #32.

Therefore, the analysis of freeway segments using HCS7 shows the ATC #32 design performs significantly better than the RFP Concept design.

Intersection Analysis using Synchro

Fifteen intersections were identified within the Area of Influence (AOI). Fourteen out of the fifteen intersections showed equal delay values in all analysis periods. The intersection at International Parkway and Wekiva Parkway (SR 429) for the RFP Concept and ATC #32 cannot be compared directly as it accommodates different movements.

Microsimulation Analysis using VISSIM

The network-wide output produced by the VISSIM models provide additional insight into operational conditions. For the AM period, the 2043 ATC VISSIM model is performing 1% to 2% better than the 2043 RFP VISSIM model. For the PM period, the 2043 ATC VISSIM model is performing equally as the 2043 RFP VISSIM model.

2043 AM Network Wide Summary

Parameter	RFP AM Peak Hour	ATC AM Peak Hour	% Change
Total Travel Time (hr)	4,100	4,067	-1%
Total Delay Time (hr)	1,184	1,158	-2%
Average Delay Time (sec/veh)	90	88	-2%
Latent Delay Time (hr)	1	1	0%
Number of Arrived Vehicles	43,070	43,070	0%
Percentage of Latent Vehicles	0%	0%	0%
Total Delay + Latent Delay (hr)	1,185	1,159	-2%
Average Speed (miles/hr)	43	43	0%

2043 PM Network Wide Summary

Parameter	RFP PM Peak Hour	ATC PM Peak Hour	% Change
Total Travel Time (hr)	4,672	4,675	0%
Total Delay Time (hr)	1,619	1,624	0%
Average Delay Time (sec/veh)	115	115	0%
Latent Delay Time (hr)	654	657	0%
Number of Arrived Vehicles	46,015	46,017	0%
Percentage of Latent Vehicles	3%	3%	0%
Total Delay + Latent Delay (hr)	2,272	2,282	0%
Average Speed (miles/hr)	39	39	0%

Safety Analysis

A detailed safety analysis was conducted using ISATe. The analysis showed a reduction of 7% in the total number of expected crashes when comparing the ATC #32 to the RFP Concept. This results in a 19-million-dollar economic saving. The ATC #32 showed a reduction in crashes in each severity distribution (fatal, severity injury, moderate injury, minor injury, and property damage) when compared with the RFP Concept.

Type of Crash	Cost Associated	Crashes		Cost of Crashes (\$)	
		RFP	ATC	RFP	ATC
Fatal (K)	10,670,000	12.5	11.7	133,789,294	125,090,633
Severe Injury (A)	872,612	41.0	39.2	35,790,647	34,159,246
Moderate Injury (B)	174,018	249.1	237.7	43,350,373	41,371,351
Minor Injury (C)	106,215	724.2	667.9	76,918,285	70,942,012
Property Damage Only (O)	7,700	1381.1	1293.3	10,634,360	9,958,076
Total		2407.9	2249.8	300,482,958	281,521,318

Overall, the ATC #32 provides significantly better traffic operations and enhanced safety when compared to the RFP Concept.

A conceptual signing plan has been developed for the ATC #32 showing signage requirements for the proposed improvements and the interchange.

In conclusion, the comparison of the ATC #32 and the RFP Concept show that the ATC #32 will provide better LOS and safer operating conditions. The proposed ATC #32 modifications are not anticipated to have a negative impact on operations or safety on the I-4 mainline or adjacent interchange when compared with the RFP Concept.

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.

The proposed Wekiva Parkway (SR 429)/I-4 interchange will provide full access to Wekiva Parkway (SR 429), SR 417 and I-4. There will be no missing movements.

The proposed Wekiva Parkway (SR 429)/I-4 interchange is designed to meet current standards for federal-aid projects on the interstate system and conforms to FDOT design standards and American Association of State and Transportation Officials (AASHTO) standards.