Florida's Turnpike Enterprise (FTE) conducted a Project Development and Environment (PD&E) study (FPID: 446164-1-22-01) to increase capacity on the SR 429 mainline, from four to eight lanes, and at the interchanges within the study limits to accommodate existing and future traffic demand, enhance safety, improve travel time reliability, and enhance emergency evacuation. The project is located within Osceola and Orange Counties in Central Florida. This Systems Interchange Justification Report (SIJR) documents traffic forecasts, lane requirement evaluations, traffic operations analysis, and a safety evaluation for the proposed preferred Build Alternative.

Existing Year (2020) Traffic Conditions:

The existing (2020) conditions Synchro traffic analysis indicated that several intersections within the Area of Influence (AOI) are operating at Level of Service (LOS) E or F in one or both AM and PM peak hours. Several turning movements at the intersections along US 192 exhibit LOS F condition due to the heavy through traffic on the arterial during the peak hours. The results of an existing conditions Vissim analysis showed that the southbound SR 429 diverge area upstream of the off-ramp to US 192 operates at a speed of 30 mile per hour (mph) during the PM peak hour. This operating speed is consistent with field observations and is substantially lower than the posted speed limit. During the PM peak hour, the queue at the southbound SR 429 off-ramp at US 192 frequently spills back to the mainline and causes severe congestion on the mainline.

Existing Crash Data

Five years of crash data (2014 – 2018) was used for the safety evaluation for each facility within the Area of Influence (AOI). The data was obtained from the FDOT's Crash Analysis Reporting (CAR) Online system database for state roads. Crash data for non-state roads was obtained from the Signal Four Analytics tool, for the same analysis period. A total of 156 crashes were reported along the SR 429 mainline from I-4 (Mile Post 1) to Seidel Road (Mile Post 11) during the five-year analysis period from 2014 through 2018. The mainline crashes were mostly off-road (49 percent) and rear-end (25 percent). A total number of seven fatal crashes were reported within the study limits: two occurred along the SR 429 mainline between Sinclair Road and US 192 interchanges, three along the SR 429 ramps (I-4 westbound on-ramp, Northbound off-ramp to Sinclair Road and Southbound off-ramp to US 192), and two at the US 192 intersections (one of at East Orange Lake Boulevard and Blake Lake Road/Inspiration Drive). Four out of the seven fatal crashes were run off the road crashes. The US 192 intersections at Inspiration Drive and Formosa Gardens Boulevard are considered high crash locations, which exhibit crash rates that are significantly higher than the statewide average crash rate for similar roadways.

No-Build Conditions:

The future No-Build network was updated to include the following planned and programmed improvements within the study area that were considered in developing the traffic forecast and the interchange concepts and were included in the future traffic analysis:

- Florida's Turnpike/SR 91 mainline widening (FPID: 435784-1) from four to eight lanes. This project extends from SR 50 in Clermont to the Orange County/Lake Countyline. The project is expected to be completed by year 2023.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435785-1) from four to eight lanes. The limits for this project are from the Orange County/Lake County line to Hancock Road in Minneola. It is expected to be completed by year 2024.
- Florida's Turnpike/SR 91 mainline widening (FPID: 435786-1,-2,-3) from four to eight lanes. The limits for this project are from Hancock Road in Minneola to Obrien Road and from Obrien Road to US 27/SR 19 (North). It is expected to be completed by year 2026.

- Western Beltway/SR 429 widening from four to six lanes by CFX from Tilden Road to John Land Apopka Expressway/SR 414. It is expected to be completed by year 2024.
- Poinciana Parkway from Ronald Reagan Parkway to south of US 17/92 and from south of US 17/92 to County Road 532/Osceola Polk County Line Road. It is expected to be completed by year 2025.
- Poinciana Parkway from Ronald Reagan Parkway to Cypress Parkway/CR 580, widening from an undivided two-lane roadway to a divided four lane expressway. It is expected to be completed by year 2023.
- I-4 from County Line Road to west of US 27 and from west of US 27 to west of Kirkman Road/SR 435, widening to 10 lanes (including managed lanes).
- Lake/Orange Expressway (SR 516), a new four lane limited access expressway from US 27 to Western Beltway/SR 429. It is expected to be completed by year 2023.
- Southport Connector Expressway, a divided four lane tolled expressway from Poinciana Parkway to Canoe Creek Road with a full interchange at the Florida's Turnpike/SR 91. PD&E Study completion date 2023
- Avalon Road from US 192 to McKinney Road, widening from two to four lanes.

Transportation System Management and Operations (TSM&O) measures have been implemented at the southbound SR 429 off-ramp to US 192. The TSM&O considerations included geometric improvements at the ramp terminal and two-lanes southbound off-ramp from SR 429. These TSM&O improvements are not expected to satisfy the need for additional capacity on SR 429, improved access to the surface streets, and relief of traffic congestion within the interchanges. Most of the freeway segments along SR 429 are expected to operate over capacity under the No-Build Alternative. Therefore, this PD&E study and the SIJR did not consider a standalone TSM&O Alternative. Note that the Southbound off-ramp improvements at US 192 are part of this PD&E study and have been advanced as the TSM&O alternative. The TSM&O improvements are within FTE's system and will be included in the work program.

Build Conditions:

The Livingston Road interchange is a proposed new interchange with an extension of Livingston Road. The proposed interchange would relieve the US 192 interchange, approximately 1.5 miles north, as well as provide more access to SR 429 for the project area. The extension of Livingston Road would require improvements at the intersection with Formosa Gardens Boulevard. The improvements include signalizing the intersection along with adding turn lanes, and crosswalks. The section of Formosa Gardens Boulevard from north of Livingston Road to just south of Funie Steed Road would be widened to four lanes.

The Vissim microsimulation software was used to evaluate traffic operations for the US 192 corridor with and without the proposed SR 429 at Livingston Road interchange. Networkwide performance measures for the Build Alternative without SR 429 at Livingston Road interchange shows that demand on the US 192 would be high enough to cause queue back-ups approximately 1.2 miles onto the southbound SR 429 mainline from the southbound SR 429 off-ramp terminal intersection at US 192. The queues are fully eliminated with the new SR 429 reliever interchange at Livingston Road. Additionally, up to an 18 percent reduction in network travel time and 40 percent reduction in average delay per vehicle is estimated with the proposed new SR 429 at Livingston Road interchange.

A user benefit over a 21-year project life span for the Build Alternative with and without Livingston Road interchange was estimated for US 192 study area using projected reduction in network travel time. Fuel consumption and emissions as well as a potential reduced number of crashes at US 192 interchange were not included. Based on 2022 dollars, the estimated user benefit is $72 Million for travel time from year 2030 to 2050.

Therefore, inclusion of the new full reliever interchange improves the operations at US 192 interchange by rerouting traffic to Livingston Road interchange.

The preferred Build Alternative was selected with the new interchange at Livingston Road (referred to as Build or preferred Build herein). The mainline widening of SR 429 has been proposed from four lanes to eight lanes for the length of the project. An Auxiliary Lane will be provided between the US 192 and the new Livingston Road interchange on both directions. Under Build conditions, performance along SR 429 improved compared to No-Build conditions and anticipated to operate at an acceptable LOS D or better.

Under Build conditions, it is estimated that the reduction in delay based on Synchro analysis results for the study area including 18 intersections (11 signalized and 7 unsignalized) will range between 71 and 77 percent during 2050 peak periods. This reduction for the study area network is due to the anticipated diversion of traffic from US 192 to the proposed new interchange on SR 429 at Livingston Road, added capacity and new traffic signals at unsignalized ramp terminals. The following is a list of improvements provided under the Build Alternative:

- Sinclair Road and SR 429 both ramp terminals (added a traffic signal at the southbound ramp terminal and provided capacity improvements)
- Connector Road and SR 429 northbound ramp terminal (added a traffic signal and provided capacity improvements)
- Livingston Road ramp terminal (added a new T-ramp interchange)
- Livingston Road and Formosa Gardens Boulevard intersection (added a traffic signal and provided capacity improvements)
- US 192 and West Orange Lake Boulevard intersection (a traffic reduction is expected due to the new SR 429 at Livingston Road interchange)
- US 192 and SR 429 southbound ramp terminal (provided capacity improvements)
- US 192 and SR 429 northbound ramp terminal (provided capacity improvements)
- US 192 and East Orange Lake Boulevard (provided capacity improvements)
- US 192 and Inspiration Drive a traffic reduction is expected due to the new SR 429 at Livingston Road interchange rerouting traffic)
- Formosa Gardens Boulevard (a traffic reduction is expected due to the new SR 429 Livingston Road interchange)
- Western Way and SR 429 both ramp terminals (added traffic signals at both ramp terminals and provided capacity improvements)
- Seidel Road and Avalon Road (provided capacity improvements)
- Seidel Road and SR 429 both ramp terminals (added traffic signals and provided capacity improvements)

Future Safety Evaluation:

A quantitative safety analysis was performed based on the Highway Safety Manual (HSM) and Interchange Access Request User's Guide Safety Analysis Guidance 2020. The analysis was conducted using the predictive methods in Chapters 12 and 19 of the HSM, where available, and the Enhanced Interchange Safety Analysis Tool (ISATe), which apply a combination of Safety Performance Functions (SPFs), and crash modification factors (CMFs) to estimate frequency and cost of crashes for each segment and intersection. The cost of crashes was based on the KABCO distribution and crash values from the Florida Design Manual 2022. The Build Alternative is predicted to have a 21-year crash cost savings of approximately $10 million compared to the No-Build Alternative, in 2022 present value for the entire AOI.

Future Conditions:

The analysis showed that the proposed new interchange at Livingston Road meet the requirements for the Federal Highway Administration's (FHWA) two policy points. First, the operational and safety analysis conducted for this SIJR confirmed that the proposed improvements under the Build Alternative do not have an adverse impact on the operations and safety of SR 429 or the local street network while improving traffic operations through the design year. Second, the proposed accesses connect to public roads only and will provide for all traffic movements.

The widening of the Western Beltway (SR 429) PD&E Study (FPID No. 446164-1) is expected to be completed by Spring 2023. Design, Right of Way (ROW), and Construction phases are not funded in the Turnpike Five Year Work Program (2023 thru 2027).