Table 5-10: Design Year 2040 Mainline Analysis

Peak Period	Location	Partial Cloverleaf Interchange (PARCLO)				Diverging Diamond Interchange (DDI)				DDI vs PCI		
		DDHV	Density (pc/mi/ln)	Speed (mph)	LOS	DDHV	Density (pc/mi/ln)	Speed (mph)	LOS	Density Δ	Speed Δ	LOS Δ
AM	I-95 NB, South of SJHPSE	4,551	24.6	67.5	C	4,551	24.6	67.5	C	0.0%	0.0%	Same
	I-95 NB, North of SJHPSE	5,686	34.0	61.1	D	5,686	34.0	61.1	D	0.0%	0.0%	Same
	I-95 SB, North of SJHPSE	4,527	24.4	67.6	C	4,527	24.4	67.6	C	0.0%	0.0%	Same
	I-95 SB, South of SJHPSE	4,072	21.5	69.1	C	4,072	21.5	69.1	C	0.0%	0.0%	Same
PM	I-95 NB, South of SJHPSE	4,069	21.5	69.1	C	4,069	21.5	69.1	C	0.0%	0.0%	Same
	I-95 NB, North of SJHPSE	4,531	24.4	67.6	C	4,531	24.4	67.6	C	0.0%	0.0%	Same
	I-95 SB, North of SJHPSE	5,682	33.9	61.2	D	5,682	33.9	61.2	D	0.0%	0.0%	Same
	I-95 SB, South of SJHPSE	4,555	24.6	67.5	C	4,555	24.6	67.5	C	0.0%	0.0%	Same

As shown in **Table 5-7** and **Table 5-8**, the calculated mainline segment densities remain the same between the PARCLO concept to the DDI concept. This is due to no changes in I-95 geometry between the two configurations. Please note that the acceptable LOS for the I-95 mainline segments is LOS D.

5.7 Safety

Safety comparisons between the PARCLO and DDI configurations are critical to the overall interchange design analysis and help supplement the operational analysis. Crash reports were not part of the evaluation since the interchange does not yet exist. However, as discussed below, overall safety for all transportation modes (vehicles, pedestrians, and bicyclists) is improved with the DDI configuration versus the PARCLO concept.

Vehicular Safety

Federal Highway Administration Diverging Diamond Interchange Informational Guide, dated August 2014 (FHWA-SA-14-067), provides a comparison of various safety factors between a conventional diamond interchange and a DDI. A conventional diamond interchange provides 26 conflict points between ramps and movements on the arterial roadway, including 10 crossing (left-turn) movements. The previously proposed PARCLO concept modifies the conventional diamond interchange by removing one crossing conflict point and adding one diverge conflict point, maintaining the total of 26 conflict points. By eliminating the need for left-turn movements the number of crossing conflict points are reduced from 9 with a PARCLO to 2 with a DDI. The DDI concept also removes the proposed PARCLO's eastbound to northbound on-ramp diverge conflict point. The total number of conflict points is reduced from 26 for a PARCLO to 14 with a DDI. Reducing the number of conflict points reduces the potential for crashes.

The proposed DDI configuration includes the signalization of all off-ramp movements. Placing off-ramp movements under signal control reduces the potential for crashes at 4 of the remaining merge conflict points by operating the off-ramp signals as overlaps of the mainline phases.

Along with the removal of conflict points associated with left-turn movements, the geometry of the DDI configuration will decrease vehicular speeds on SJHPSE, further improving safety by lowering the potential for high-speed collisions.

The combination of the previously mentioned factors will result in a lower potential for crashes, and decrease in the severity of crashes that do occur.

Pedestrian & Bicyclist Safety

The previously proposed PARCLO concept has five (5) uncontrolled pedestrian conflict points at free-flow movements for the SJHPSE (WB) northbound on-ramp, the SJHPSE (EB) northbound loop on-ramp, the SJHPSE (EB) southbound on-ramp, the northbound off-ramp to SJHPSE (EB), and the southbound off-ramp SJHPSE (WB). The proposed DDI configuration eliminates all uncontrolled pedestrian conflict points by crossing pedestrians at the ramp terminal signals onto a shared-use path down the median of the bridge over I-95, and installing pedestrian signals across the free-flow on-ramps crossed by pedestrians.

The DDI configuration provides additional protection for pedestrian traffic by providing refuge islands, utilizing shorter cross walk distances, lowering vehicular speeds between the ramp signals, and by directing pedestrians onto the barrier protected shared-use path on the bridge median crossing I-95. The DDI configuration will also eliminate the pedestrian conflicts that would occur if right-turn-on-red movements were implemented in the future, as sometimes occurs when rural intersections develop into urban designs. Lastly, the DDI configuration reduces the number of bicyclist conflict points by keeping bicyclists on the inside shoulder area between the ramp terminal signals, eliminating the conflicts with the free-flow off-ramp movements that would exist with the PARCLO.

The DDI design will allow for safer and more efficient pedestrian crossings, as well as promote future pedestrian centered infrastructure design surrounding the area.

Crash Rates

As agreed upon in the MLOU, current crash data from 2012 to early 2017 has been utilized to calculate current crash rates. Crash data and summaries can be found in **Appendix H**.

I-95 mainline crash data was collected from the Fellsmere Road interchange in the southern limits to the Malabar Road (SR 514) in the northern limits. As reported, at total of 806 crashes were documented with off-road (31.9%) and rear-end (25.3%) crashes being the largest contributors. The resulting crash rate for the interstate segment was calculated as 0.612 (per Million Vehicle Miles Traveled, MVMT), which is higher than the most recent 2015 District 5 average of 0.407 for rural interstates. It is recognized that during the crash analysis years, work zone crashes due to capacity enhancing and rehabilitation projects contributed to this higher crash rate. Accordingly, an analysis with all work zone related crashes removed was conducted and resulted in 587 total number of reported crashes with a crash rate of 0.446. Off-road (30.3%) and rear-end (26.9%) remained as the largest contributors.

Crash data for the southern cross road interchange at Fellsmere Road was collected and yielded a 0.371 crash rate with 12 reported crashes. Rear-end crashes were the most common (33.3%). This crash rate is lower than the 0.618 district average crash rate for a rural 4-lane roadway with a raised median.

Crash data for the northern cross road interchange at SR 514/Malabar Road was also collected and yielded a 2.263 crash rate with 319 reported crashes. Rear-end crashes were the most common (50.5%). This crash rate is lower than the 2.509 district average crash rate for an urban 6-lane roadway with a raised median.