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7.2.2.4 Intersection Vehicle Queue Lengths

The results of the evaluation of vehicle queue lengths for the I-75 ramp terminal intersections at SR 56 for the design year (2050) are shown in **Table 32**. The available storage length provided for each movement was determined as the distance between signalized intersections, the length of the turn lane(s), or the length of the off ramp, as applicable. Intersection vehicle queue length results are expected to be the same as the No Build Alternative (summarized in **Appendix K**) with vehicle queues between the ramp terminal intersections exceeding the available storage and spilling back into the upstream intersections/into the adjacent travel lanes. Additionally, the northbound right turn on the northbound I-75 off ramp is expected to exceed the available storage and spillback into the adjacent left turn lanes. This can be expected as demand through the interchange continues to increase by the design year (2050). The SIS Cost Feasible Plan FY 2029 to 2045 identifies a PD&E Study from north of Bruce B. Downs Boulevard to north of SR 52 that will evaluate the long-term transportation needs of the SR 56 interchange.

Table 32: Design Year (2050) Intersection Vehicle Queue Lengths – Build Alternative

Movement	Available Storage (ft)	95th Percentile Vehicle Queue Length (ft)	
		AM Peak	PM Peak
SR 56 at Southbound I-75 Ramp Terminal			
EBT	2,435	#1,983	#1,844
EBR	2,510***	-	-
WBL	925***	-	-
WBT	1,195	m#1,927	m#1,856
SBL	1,960*	655	297
SBR	1,050	#1,043	#972
SR 56 at Northbound I-75 Ramp Terminal			
EBL	880***	-	-
EBT	1,235	#1,755	#1,364
WBT	2,940	#1,658	#1,221
WBR	1,335***	-	-
NBL	9,800**	#1,229	#1,659
NBR	1,760	793	#2,202

*Storage length is measured as the length from the stop bar to the gore point of the I-75 mainline minus a deceleration length of 390 ft, as defined in Table 10-6 of the AASHTO A Policy on Geometric Design Highways and Streets.
**Storage length is measured as the length from the stop bar to the gore point of the I-75/I-275 merge along the C-D road.
***Represents a free-flow movement that does not incur control delay and vehicle queuing.
95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
Vehicle queue exceeding storage shown in red.

7.3 Alternatives Comparison of Network MOEs

In the preceding sections, MOEs were summarized for the southbound I-75 basic freeway segments, ramp merge/ diverge areas, and intersections at ramp terminals under both the No Build and Build Alternatives for the opening year (2030) and design year (2050) traffic conditions. This section provides a comparative basis for the alternatives to illustrate the operational benefits of the Build Alternative through comparison of CORSIM network wide MOEs, shown in **Table 33**. The benefits shown here are for the entire three-hour peak periods. Comparison of the No Build and Build Alternatives presented in this IMR indicate that the Build alternative shows benefits in the design year (2050).

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Table 33: Comparison of Networkwide CORSIM MOEs

Measures of Effectiveness (MOEs)	Analysis Time Period	Opening Year (2030)			Design Year (2050)		
		No Build Alternative	Build Alternative	Difference	No Build Alternative	Build Alternative	Difference
Vehicle Miles Traveled (miles)	AM	12,033	12,253	2%	15,143	15,744	4%
	PM	10,267	10,383	1%	12,945	13,125	1%
Travel Time Total (hours)	AM	276	274	-1%	513	444	-13%
	PM	259	263	2%	456	456	0%
Average Speed (mph)	AM	43.6	44.7	3%	30.6	36.0	18%
	PM	39.7	39.7	0%	28.4	28.8	1%
Total Travel Delay (hours)	AM	77	69	-10%	265	183	-31%
	PM	86	86	0%	242	238	-2%

During the opening year (2030) the total travel delay decreases by 10 percent, average speed increases by three percent, vehicle miles traveled increases by two percent, and total travel time decreases by one percent during the AM peak period which is the peak direction. During the PM peak hour (the off-peak), the No Build conditions of southbound I-75 are not anticipated to operate over capacity or with a failing LOS. Therefore, the difference between the No Build and Build operations are expected to be negligible, showing little difference in results. Under the Build condition, the southbound I-75 C-D roadway is coded with a 60 mph operating speed, which is lower than the 70 mph mainline speed. Therefore, it is reasonable that the total travel time would be slightly higher in the Build Alternative, compared to the No Build operations, when both alternatives are operating under free-flow conditions.

During the design year (2050) the average speed increases by 18 percent during the AM peak period and one percent during the PM peak hour. The vehicles serviced are benefited with an increase in vehicle miles traveled of four percent during the AM peak period and one percent during the PM peak hour. The total travel delay decreases by 31 percent during the AM peak period and two percent during the PM peak period. The total travel time decreases by 13 percent during the AM peak period.

This analysis indicates that more vehicles can be serviced with the improvements along southbound I-75 from SR 56 to the I-75/I-275 Apex, delay is reduced, and speed is increased. The freeway operations are significantly improved with an additional 457 vehicles (5,626 in the No-Build and 6,083 in the Build) being processed through the southern end of the I-75 mainline during the 2050 AM peak hour. Additionally, the southbound I-75 mainline is providing safer operating conditions, especially for freight movements, by not mixing local SR 56 traffic with regional freight and goods movements.