

SCHAEFFER ROAD APARTMENTS

KNOX COUNTY, TENNESSEE

TRAFFIC IMPACT STUDY

SCHAEFFER ROAD
KNOX COUNTY, TENNESSEE

CCI PROJECT NO. 01681-0000.001

PREPARED FOR:

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Phenix City, AL 36868

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EXECUTIVE SUMMARY

This report provides a summary of a traffic impact study that was performed for a proposed multi-family residential development to be located at 2212 Schaeffer Road in west Knox County, Tennessee. The project site is located on the east side of Schaeffer Road just south of Hardin Valley Road. The development plan for this site proposes a multi-family residential development with up to 252 units. The proposed development will have one full access on Schaeffer Road approximately 850 feet south of Hardin Valley Road.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed development upon roadways in the vicinity of the project site. Comments received from Knox County Engineering and Knoxville-Knox County Planning resulted in the existing intersections of Hardin Valley Road at Solway Road / Pellissippi Parkway Southbound Ramps, Hardin Valley Road at Pellissippi Parkway Northbound Ramps, and Hardin Valley Road at Schaeffer Road / Cherahala Boulevard being identified for detailed study. Appropriate intersection evaluations such as capacity analyses were conducted at the study intersections for existing and future conditions, both with and without site generated traffic, in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts.

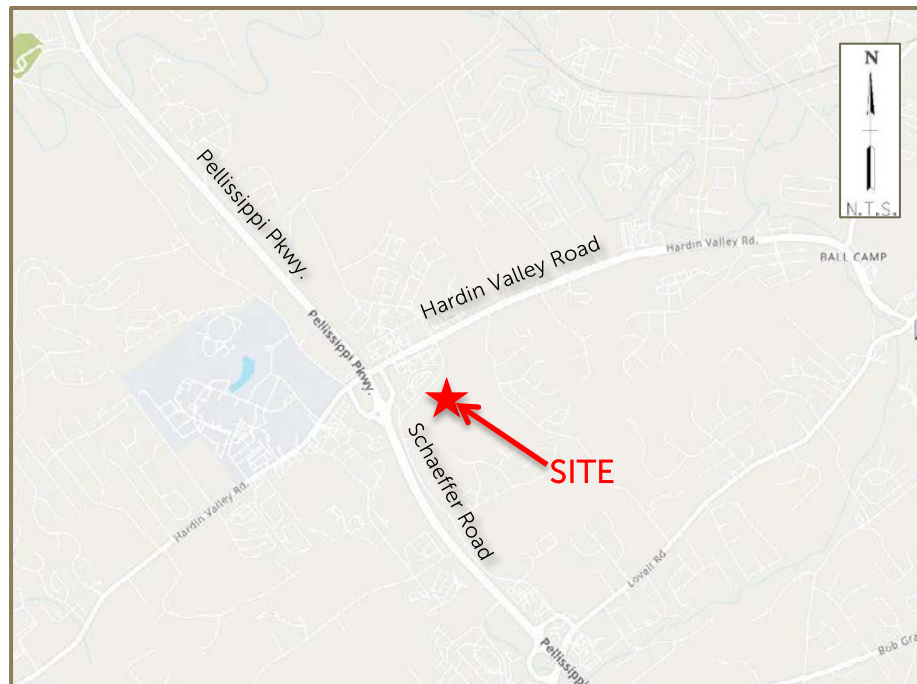
The primary conclusion of this study is that the traffic generated from the proposed development will have minimal impacts at the study intersections. Major congestion issues during peak hours do currently exist at the intersection of Hardin Valley at Solway Road / Pellissippi Parkway Southbound Ramps, but the additional development impacts to this intersection would be marginal. The largest operational impacts would occur at the intersection of Hardin Valley Road at Schaeffer Road / Cherahala Boulevard. Sufficient capacity exists at this intersection to easily handle the additional traffic from the proposed development, but moderate increases queue lengths for certain movements are likely. These queue lengths can be mitigated by updated signal timing, and extension of some turn lane storages would also provide a benefit.

The following is a list of recommendations developed with this traffic impact study:

- 1) Upon full buildout of the development, update the traffic signal timing at the intersections within the coordinated signal system adjacent to the development. Currently, this system consists of the three study intersections presented in this report.
- 2) Extend the westbound left turn lane storage length at the intersection of Hardin Valley Road at Schaeffer Road / Cherahala Boulevard. The storage should be extended by 100 feet and should include a bay taper with a length of 160 feet.
- 3) Ensure that grading, landscaping, signing, and other site features do not restrict lines of sight exiting the development along Schaeffer Road.

INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact study that was performed for a proposed multi-family residential development to be located at 2212 Schaeffer Road in west Knox County, Tennessee. The project site is located on the east side of Schaeffer Road just south of Hardin Valley Road. FIGURE 1 is a location map showing the major roadways in the project site vicinity.



**FIGURE 1
LOCATION MAP**

The development plan for this site proposes a multi-family residential development with up to 252 units. The proposed development will have one full access on Schaeffer Road approximately 850 feet south of Hardin Valley Road. FIGURE 2 is a Conceptual Site Plan detailing the proposed site.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed development upon roadways in the vicinity of the project site. Comments received from Knox County Engineering and Knoxville-Knox County Planning resulted in the existing intersections of Hardin Valley Road at Solway Road / Pellissippi Parkway Southbound Ramps, Hardin Valley Road at Pellissippi Parkway Northbound Ramps, and Hardin Valley Road at Schaeffer Road / Cherahala Boulevard being identified for detailed study. Appropriate intersection evaluations such as capacity analyses were conducted at the study intersections for existing and future conditions, both with and without site generated traffic, in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts. Additionally, the proposed site access on Schaeffer Road was evaluated for turn lane warrants and sight distance.

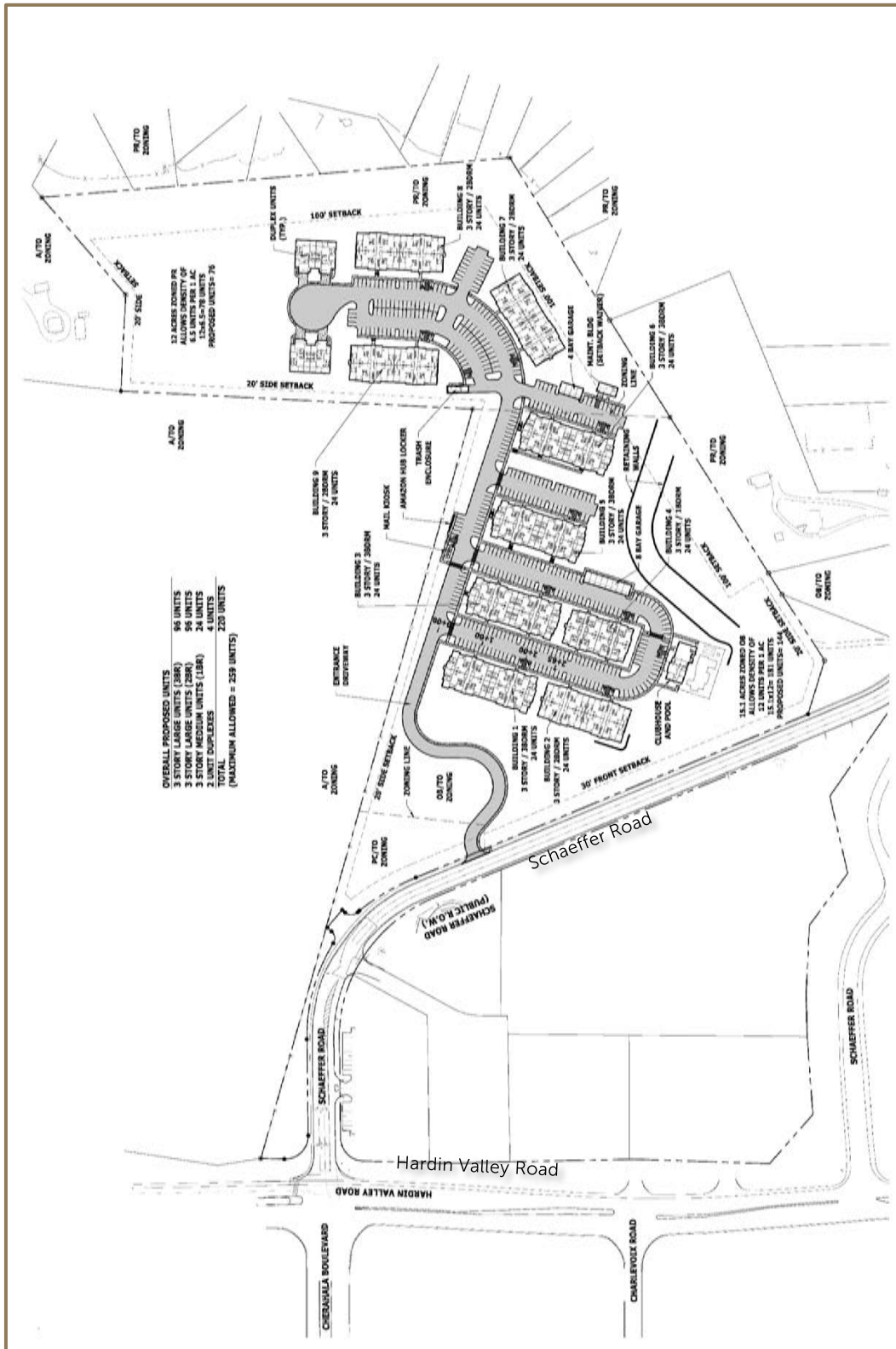


FIGURE 2
CONCEPTUAL SITE PLAN

EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

Schaeffer Road is classified as a Major Collector per the Knoxville-Knox County Major Road Plan and runs south to north from Lovell Road to Hardin Valley Road. Within the study limits, Schaeffer Road is an undivided three-lane roadway with one travel lane in each direction and a center two-way left turn lane. In front of the proposed site, Schaeffer Road has 12-foot travel lanes and a posted speed limit of 30 mph. Schaeffer Road has curb and gutter on both sides of the roadway and sidewalk on its east side.

Hardin Valley Road is classified as a Major Arterial per the Knoxville-Knox County Major Road Plan and runs west to east connecting the Hardin Valley and Karns communities in northwest Knox County. Hardin Valley Road contains an interchange with Pellissippi Parkway in the vicinity of the proposed development. Within the study limits, Hardin Valley Road is a four-lane divided roadway with two travel lanes in each direction and a raised median. In the vicinity of the proposed site, Hardin Valley has 12-foot lanes with some sections containing an outside paved shoulder. The speed limit on Hardin Valley Road is 40 mph. Apart from a few isolated sections of roadway, Hardin Valley Road does not generally contain sidewalk within the study limits.

The existing intersection of Hardin Valley Road at Solway Road / Pellissippi Parkway Southbound Ramps is a four-legged signalized intersection. Hardin Valley Road is considered the east-west street, and Solway Road / Pellissippi Parkway Southbound Ramps are considered the north-south street. The eastbound Hardin Valley Road approach contains one exclusive left turn lane, two exclusive through lanes, and one exclusive right turn lane. The left turn lane has a storage length of approximately 85 feet, and the right turn lane has a storage length of approximately 130 feet. The westbound Hardin Valley Road approach contains two exclusive left turn lanes, one exclusive through lane, and one shared through / right turn lane. The leftmost left turn lane has a storage length of approximately 185 feet, and the rightmost left turn lane has a storage length of approximately 425 feet. The northbound Pellissippi Parkway Southbound Off-Ramp approach contains one exclusive left turn lane, one shared through / right turn lane, and one exclusive right turn lane. The left turn lane has a storage length of approximately 270 feet, and the right turn lane has a storage length of approximately 250 feet. The southbound Solway Road approach contains one exclusive left turn lane and one shared through / right turn lane. The left turn lane has a storage length of approximately 120 feet. The traffic signal phasing includes a protected only left turn phase for the eastbound approach and protected-permissive left turn phases for the westbound, northbound, and southbound approaches. Additionally, the eastbound and northbound approaches contain right turn overlap phasing. Marked crosswalks and protected pedestrian signal phases exist crossing the west and north legs.

The existing intersection of Hardin Valley Road at Pellissippi Parkway Northbound Ramps is a four-legged signalized intersection; however, the north leg contains departure lanes only. Hardin Valley Road is considered the east-west street, and Pellissippi Parkway Northbound Ramps are considered the north-south street. The eastbound Hardin Valley Road approach contains one exclusive through lane and one shared through / right turn lane. The westbound Hardin Valley Road approach contains two exclusive through lanes and one exclusive right turn lane. The right turn lane has a storage length of approximately 390 feet. The Pellissippi Parkway Northbound Off-Ramp approach contains two

exclusive left turn lanes and two exclusive right turn lanes. The leftmost left turn lane has a storage length of approximately 385 feet, the rightmost left turn lane has a storage length of approximately 610 feet, and the rightmost right turn lane has a storage length of approximately 385 feet. The traffic signal phasing includes a protected only left turn phase for the northbound approach. Additionally, the westbound right turn movement contains a continuous free flowing green signal indication.

The existing intersection of Hardin Valley Road at Schaeffer Road / Cherahala Boulevard is a four-legged signalized intersection. Hardin Valley Road is considered the east-west street, and Schaeffer Road / Cherahala Boulevard is considered the north-south street. The eastbound Hardin Valley Road approach contains two exclusive left turn lanes, two exclusive through lanes, and one exclusive right turn lane. The leftmost left turn lane has a storage length of approximately 215 feet, the rightmost left turn lane has a storage length of approximately 330 feet, and the right turn lane has a storage length of approximately 100 feet. The westbound Hardin Valley Road approach contains one exclusive left turn lane, two exclusive through lanes, and one exclusive right turn lane. The left turn lane has a storage length of approximately 90 feet, and the right turn lane has a storage length of approximately 180 feet. The northbound Schaeffer Road approach contains one exclusive left turn lane, one shared left turn / through lane, and one exclusive right turn lane. The exclusive left turn lane has a storage length of approximately 255 feet, and the shared left turn / through lane has a storage length of approximately 300 feet. The southbound Cherahala Boulevard approach contains one exclusive left turn lane, one shared left turn / through lane, and one exclusive right turn lane. The right turn lane has a storage length of approximately 420 feet. The traffic signal phasing includes protected-permissive left turn phases for the eastbound and westbound approaches and split phasing for the northbound and southbound approaches. Additionally, the northbound and southbound approaches contain right turn overlap phasing. Marked crosswalks and protected pedestrian signal phases exist crossing the east and north legs.

EXISTING SITE CONDITIONS

The project site is located along the east side of Schaeffer Road just south of Hardin Valley Road. The area of the site is approximately 29.5 acres, and it is currently zoned Office and Planned Residential. The site has a steep slope up from Schaeffer Road. Approximately half of the site is forested with the remaining portions being graded and meadowed. FIGURE 3 provides an aerial view of the project site and the surrounding area.

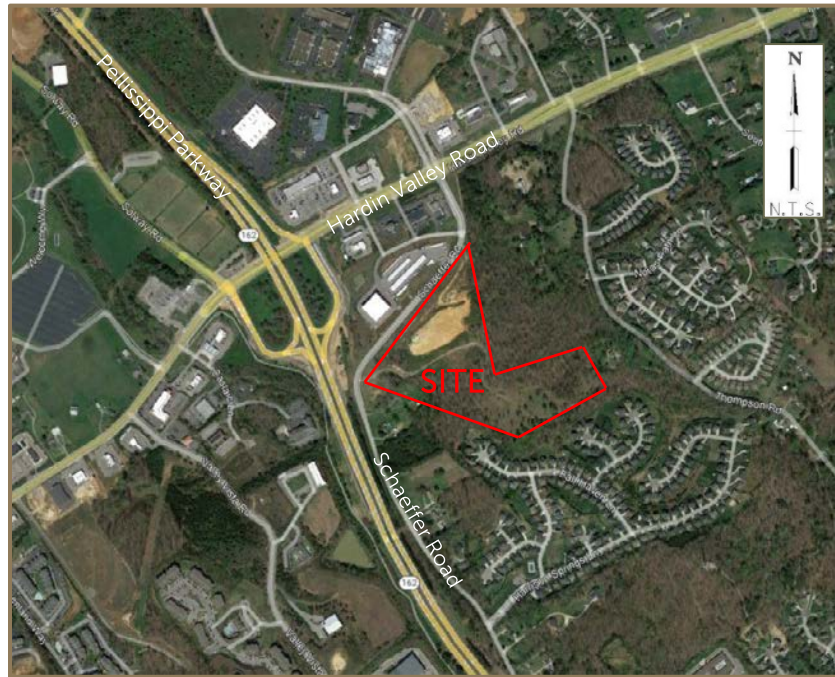


FIGURE 3
EXISTING SITE CONDITIONS

EXISTING TRAFFIC DATA

Two types of traffic data were gathered for this study. The Tennessee Department of Transportation (TDOT) collects annual average daily traffic (AADT) data on roadways in the study area. One count station, located on Hardin Valley Road, was found near the project site that was felt to have particular relevance for this study. The most currently available data from this station can be found in TABLE 1.

TABLE 1: ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY

COUNT YEAR	TDOT COUNT STATION 47000084 HARDIN VALLEY ROAD WEST OF PELLISSIPPI PARKWAY
2017	17,969
2018	18,120
2019	16,739
2020	14,864
2021	16,495
2022	17,402

In addition to the available AADT data, intersection turning movement counts (TMC) were conducted at the existing study intersections to determine the current morning (AM) and evening (PM) peak hour operating volumes. These peak hour volumes are the traffic volumes with which the study’s capacity analyses are based. The intersection TMC data were collected on January 12, 2023. Additionally, an

average daily traffic count was conducted along Schaeffer Road in front of the proposed development access point. The 2023 existing peak hour traffic volumes are summarized in FIGURE 4, and the raw data traffic count summary sheets are contained in APPENDIX A.

EXISTING CAPACITY ANALYSES

Capacity analyses employing the methods of the *Highway Capacity Manual* were conducted for the existing conditions at the study intersections. These analyses were performed with the 2023 existing traffic volumes, shown in FIGURE 4, and existing intersection geometry, traffic control, and signal timing. *Synchro 11* software was utilized for the capacity analyses for all intersections. The EVALUATIONS section of this report may be referenced for discussion and tabular summaries of these analyses, while more detailed summaries are presented on the computer printouts contained in APPENDIX C. Also contained in APPENDIX C is a section titled "Capacity and Level of Service Concepts," which provides a description of the utilized procedures.

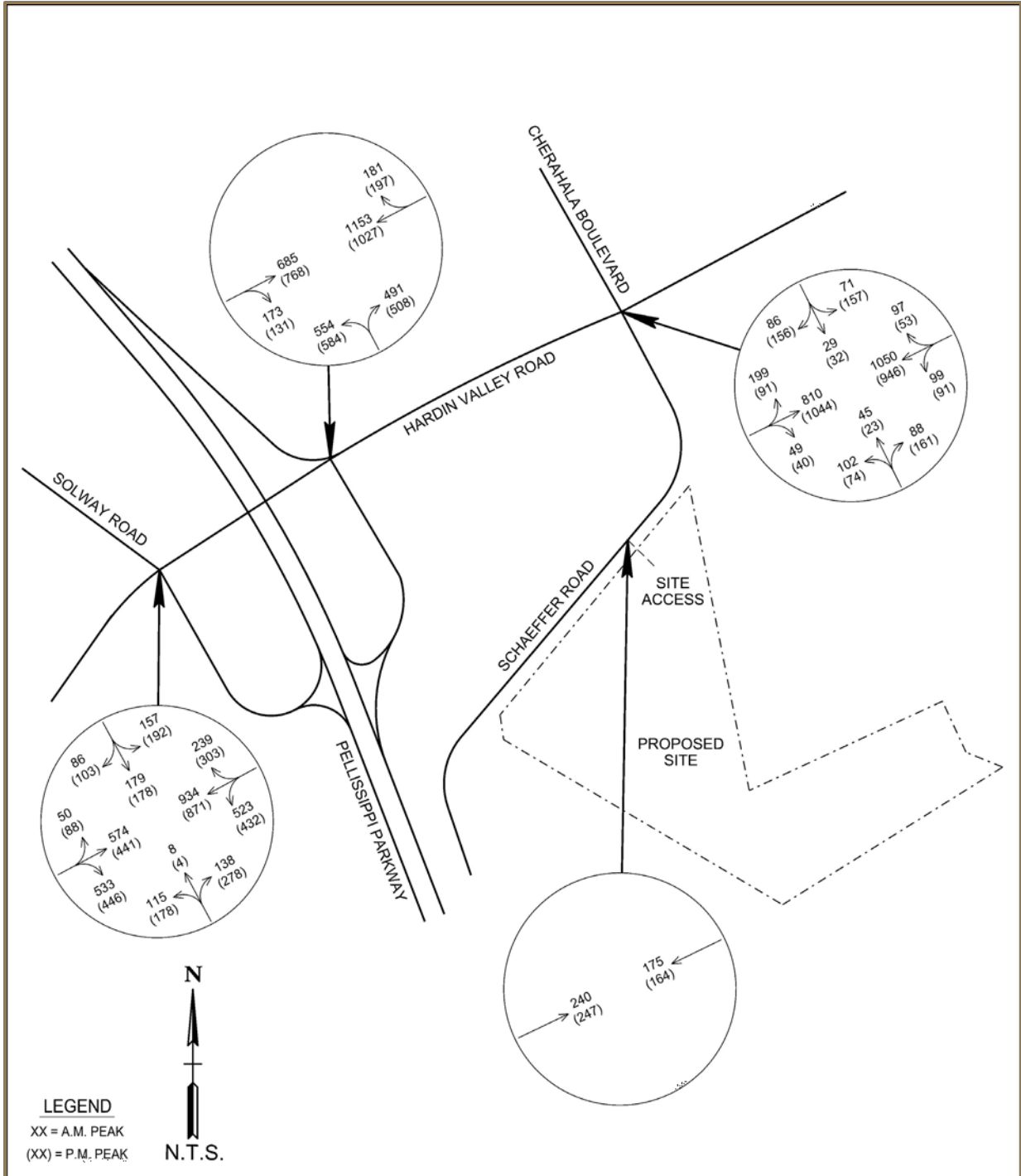


FIGURE 4
2023 EXISTING TRAFFIC VOLUMES

BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

The proposed development is anticipated to be constructed in one general phase with completion anticipated by 2024. Therefore, Year 2024 was established as the appropriate design / analysis year for the study. In order to determine traffic volumes resulting solely from background traffic growth to Year 2024, it was necessary to establish an annual growth rate for existing traffic. The TDOT AADT values previously discussed, as well as knowledge of the area, were used to determine an approximate annual growth rate. Based on the available data, a background annual growth rate of 2.0% was assumed. FIGURE 5 contains the background traffic volumes that would result from this annual growth rate from Year 2023, when the counts were conducted, to Year 2024.

BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted utilizing the Year 2024 background volumes shown in FIGURE 5 and existing intersection geometry, traffic control, and signal timing. The EVALUATIONS section of this report may be referenced for discussion and tabular summaries of these analyses, while more detailed summaries are presented on the computer printouts contained in APPENDIX C.

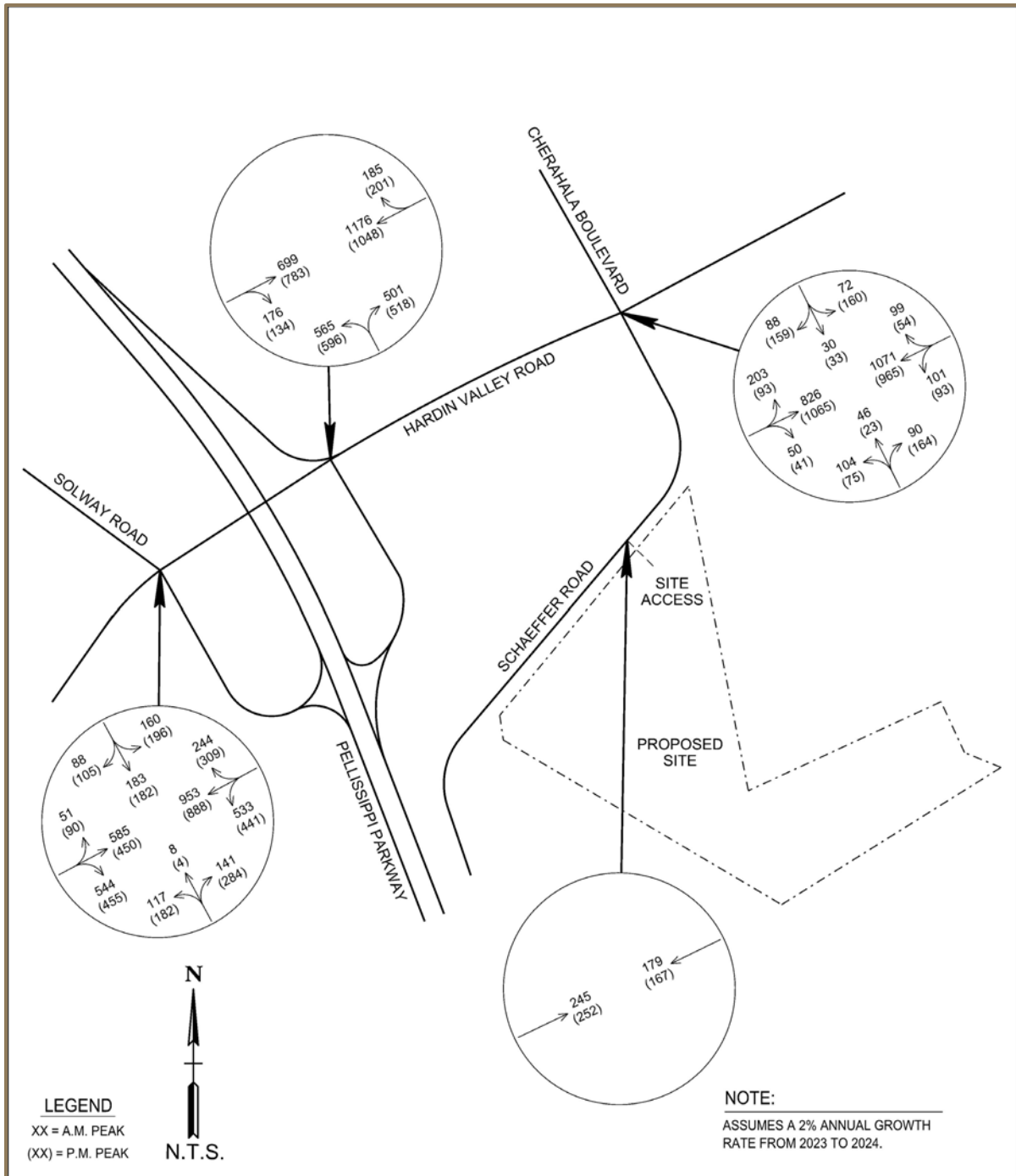


FIGURE 5
 2024 BACKGROUND TRAFFIC VOLUMES

FUTURE CONDITIONS

TRIP GENERATION

In order to estimate the expected traffic volumes to be generated by the proposed development, the procedures recommended by the Institute of Transportation Engineers (ITE) were utilized. The proposed development will include up to 252 multi-family residential apartment units, although the final site plan may specify a fewer number. This development is proposed as multi-family within Knox County; therefore, Knox County's *Local Apartment Trip Generation Study* was used to estimate development-generated traffic. The generated traffic volumes were determined based on the data for the peak hours of adjacent street traffic. See TABLE 2 for a summary of the traffic generated for this development. More detailed information is contained in APPENDIX B.

TABLE 2: TRIP GENERATION SUMMARY

LAND USE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HOUR)	PM PEAK HOUR (TRIPS/HOUR)
Local Apartment	252 Dwelling Units	2,190	126	179
Entering Trips		1,095 (50%)	28 (22%)	98 (55%)
Exiting Trips		1,095 (50%)	98 (78%)	81 (45%)

A.M. Peak Hour trip generation is based on Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
P.M. Peak Hour trip generation is based on Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.

TRIP DISTRIBUTION AND ASSIGNMENT

The proposed trip distribution for this development was determined through a review of existing travel patterns, local knowledge of the study area, proposed site location in relation to the surrounding roadway network, and engineering judgment. FIGURE 6 provides a summary of how the above site generated trips would be assigned to the study intersections. FIGURE 7 provides the proposed trip assignment volumes to the study intersections.

FUTURE TRAFFIC VOLUMES

Future projected traffic volumes for the study intersections were developed by adding the generated and assigned trips shown in FIGURE 7 to the 2024 background traffic volumes developed in the previous section and shown in FIGURE 5. These combined 2024 volumes reflect the existing traffic, the background traffic growth, and the generated traffic from the proposed development. These future volumes are shown on FIGURE 8 and are the combined volumes used in the analyses of future conditions with the proposed development.

FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted utilizing the Year 2024 combined volumes shown in FIGURE 8 and existing intersection geometry, traffic control, and signal timing. Tabular summaries of the analyses results and associated discussion are also contained in the EVALUATIONS section. In addition, detailed computer printout summaries of the analyses are contained in APPENDIX C.

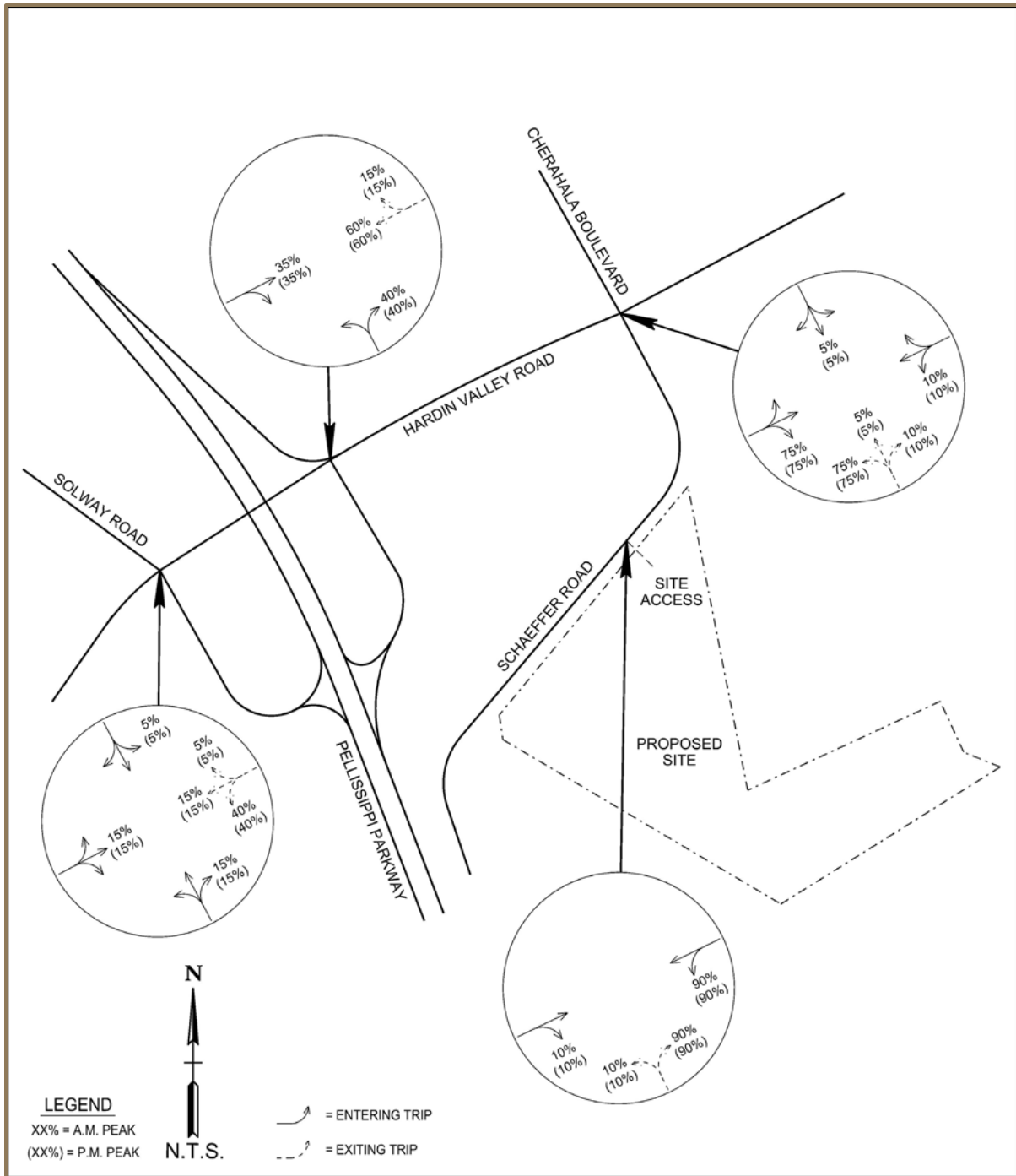


FIGURE 6
TRIP DISTRIBUTION

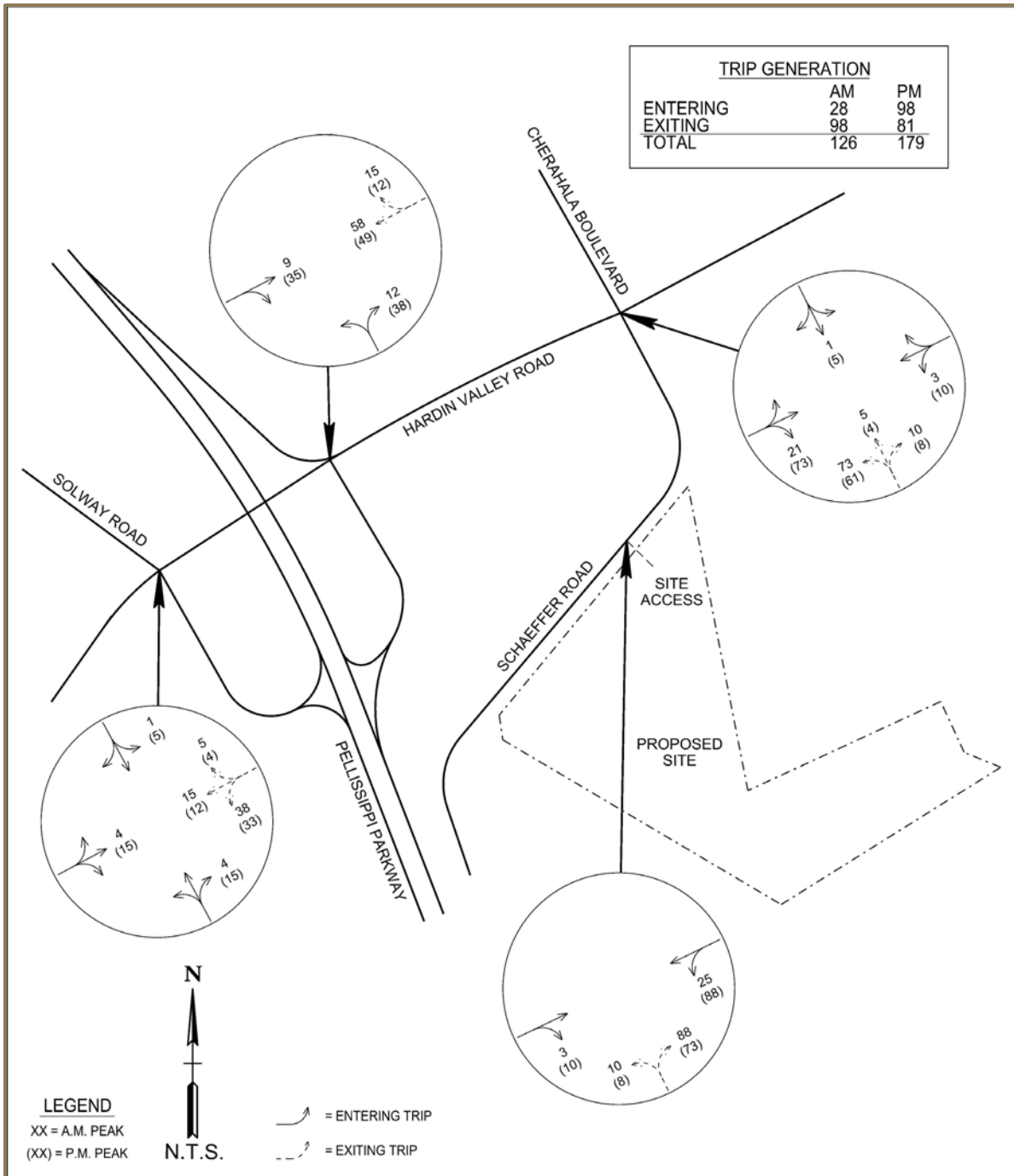


FIGURE 7
TRIP ASSIGNMENT

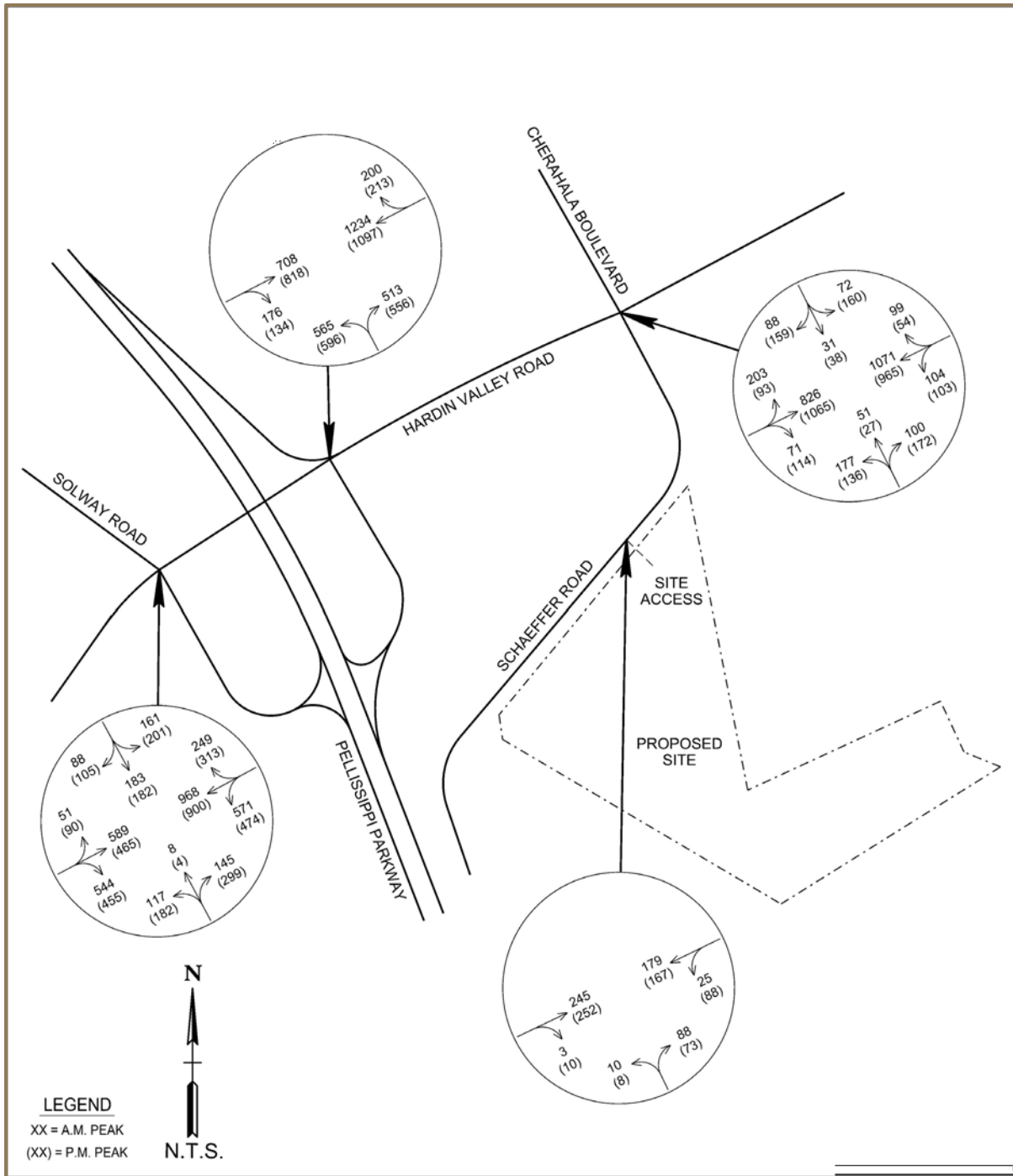


FIGURE 8
2024 COMBINED TRAFFIC VOLUMES

EVALUATIONS

INTERSECTION CAPACITY ANALYSES

Intersection capacity analyses were performed for the study intersections. The capacity analyses employed the procedures of the *Highway Capacity Manual* utilizing *Synchro 11* software. A description of the fundamentals of these procedures is contained in the APPENDIX C section titled "Capacity and Level-of-Service Concepts." The results of these analyses for the existing, background and combined future traffic conditions are presented and discussed by individual intersection in the subsections below. Capacity analyses summaries are presented for each intersection in these individual subsections, which are accompanied by tables showing level-of-service (LOS) and queuing results. More detailed information is contained on the capacity software output summaries contained in APPENDIX C.

Potential mitigation measures were identified at intersections experiencing poor LOS or where vehicle queuing may become an issue. These mitigation strategies, where applicable, are described for each intersection in their respective subsections. The accompanying LOS and queue length tables show comparisons between the intersections under existing geometry, traffic control, and signal timing to these mitigation strategies in order to provide a quantitative measure of effectiveness of the mitigation.

Intersection #1: Hardin Valley Road at Solway Road / Pellissippi Parkway Southbound Ramps

As shown in TABLE 3, this intersection currently operates at overall LOS "C" during the AM peak hour and "D" during the PM peak hour. The intersection is expected to continue to operate at the same LOS under combined traffic conditions upon construction and full buildout of the proposed development. Based on these analyses, the development will have only minimal impacts on intersection operations.

Although no significant traffic operational impacts from the development are anticipated, this intersection does experience heavy congestion issues during the peak hours. The rightmost westbound through lane drops as a right turn only lane approximately 700 feet downstream of the intersection. Because of this lane drop, a disproportionately high number of westbound through vehicles utilize the leftmost through lane, which causes a significant lane imbalance that is not represented in the capacity analyses. Although not apparent from the *Synchro 11* software model, this lane imbalance causes westbound queuing that oftentimes extends beyond the Pellissippi Parkway overpass and blocks adjacent intersections. The upstream intersection blocking creates additional congestion at adjacent intersections that is also not apparent from the capacity analyses.

The mitigation strategy analyzed at this intersection was optimized signal timing, which was developed utilizing *Synchro 11's* signal timing optimization tool. Although final signal timings are not suggested through use of this optimization tool, the tool does provide a general gauge on what benefit might be expected from re-timing the traffic signal. TABLE 3 indicates that updating the traffic signal timing upon full buildout of the development could improve intersection operations and decrease average vehicle delays by up to 10 seconds during the peak hours.

TABLE 3: CAPACITY ANALYSES SUMMARY – HARDIN VALLEY ROAD AT SOLWAY ROAD / PELLISSIPPI PARKWAY SB RAMPS

SCENARIO		MOVEMENT/ APPROACH	AM PEAK (LOS/DELAY)	PM PEAK (LOS/DELAY)
2023 Existing	Existing Geometry, Traffic Control & Signal Timing	EB	C 33.8	C 30.5
		WB	C 21.4	D 37.8
		NB	C 26.6	C 26.9
		SB	E 78.7	F 81.7
		Overall	C 32.6	D 40.3
2024 Background	Existing Geometry, Traffic Control & Signal Timing	EB	C 34.4	C 31.7
		WB	C 21.5	D 39.6
		NB	C 26.6	C 26.8
		SB	F 82.6	F 82.5
		Overall	C 33.4	D 41.5
2024 Combined	Existing Geometry, Traffic Control & Signal Timing	EB	C 34.4	C 32.3
		WB	C 21.6	D 40.4
		NB	C 26.2	C 26.2
		SB	F 82.6	F 82.8
		Overall	C 33.3	D 41.9
2024 Combined	With Mitigation	EB	C 25.4	C 26.6
		WB	C 23.2	C 28.2
		NB	C 21.0	C 23.6
		SB	D 54.1	E 60.8
		Overall	C 27.4	C 31.5

TABLE 4: 95TH PERCENTIAL QUEUE SUMMARY – HARDIN VALLEY ROAD AT SOLWAY ROAD / PELLISSIPPI PARKWAY SB RAMPS

SCENARIO		MOVEMENT/ APPROACH	AM PEAK	PM PEAK
2023 Existing	Existing Geometry, Traffic Control & Signal Timing	EBL	77'	191'
		EBT	258'	211'
		EBR	381'	238'
		WBL	127'	180'
		WBT/R	463'	611'
		NBL	139'	220'
		NBT	50'	63'
		NBR	0'	29'
		SBL	181'	268'
SBT/R	361'	409'		
2024 Background	Existing Geometry, Traffic Control & Signal Timing	EBL	78'	196'
		EBT	264'	215'
		EBR	396'	253'
		WBL	129'	180'
		WBT/R	477'	647'
		NBL	139'	226'
		NBT	51'	64'
		NBR	0'	29'
		SBL	184'	278'
SBT/R	374'	423'		
2024 Combined	Existing Geometry, Traffic Control & Signal Timing	EBL	78'	196'
		EBT	265'	222'
		EBR	396'	260'
		WBL	135'	192'
		WBT/R	465'	683'
		NBL	139'	226'
		NBT	51'	65'
		NBR	0'	35'
		SBL	185'	287'
SBT/R	374'	423'		
2024 Combined	With Mitigation	EBL	115'	169'
		EBT	275'	185'
		EBR	351'	202'
		WBL	185'	130'
		WBT/R	531'	574'
		NBL	106'	185'
		NBT	50'	64'
		NBR	25'	48'
		SBL	141'	177'
SBT/R	300'	373'		

Intersection #2: Hardin Valley Road at Pellissippi Parkway Northbound Ramps

TABLE 3A indicates that this intersection currently operates at overall LOS “B” during the peak hours. The intersection is anticipated to continue to operate at LOS “B” during the AM peak hour upon full buildout of the development. Both the background and combined conditions analyses indicate the PM peak LOS will worsen to LOS “C”. However, the existing LOS “B” is on the very upper threshold of that range, and the jump from “B” with existing traffic to “C” with combined traffic is done with only a one second increase in average vehicle delay. An interchange improvement project was recently completed by the Tennessee Department of Transportation (TDOT) at this intersection that has improved operations, and no new issues are expected upon completion of the development. The mitigation strategy of optimized signal timing shows that modest improvements in operations can be expected.

TABLE 3A: CAPACITY ANALYSES SUMMARY – HARDIN VALLEY ROAD AT PELLISSIPPI PARKWAY NB RAMPS

SCENARIO		MOVEMENT/ APPROACH	AM PEAK (LOS/DELAY)	PM PEAK (LOS/DELAY)
2023 Existing	Existing Geometry, Traffic Control & Signal Timing	EB WB NB Overall	A 7.9 A 9.1 C 34.7 B 17.1	A 9.0 A 8.4 D 41.0 B 19.7
2024 Background	Existing Geometry, Traffic Control & Signal Timing	EB WB NB Overall	A 8.2 A 9.5 D 35.3 B 17.5	A 9.2 A 8.7 D 41.6 C 20.0
2024 Combined	Existing Geometry, Traffic Control & Signal Timing	EB WB NB Overall	A 8.2 A 9.7 D 35.9 B 17.6	A 9.2 A 8.9 D 43.6 C 20.7
2024 Combined	With Mitigation	EB WB NB Overall	A 6.3 B 10.8 C 21.9 B 13.1	A 5.6 B 10.1 C 22.3 B 13.0

TABLE 4A: 95TH PERCENTIAL QUEUE SUMMARY – HARDIN VALLEY ROAD AT PELLISSIPPI PARKWAY NB RAMPS

SCENARIO		MOVEMENT/ APPROACH	AM PEAK	PM PEAK
2023 Existing	Existing Geometry, Traffic Control & Signal Timing	EBT/R	108'	178'
		WBT	303'	265'
		WBR	0'	0'
		NBL	253'	292'
		NBR	106'	137'
2024 Background	Existing Geometry, Traffic Control & Signal Timing	EBT/R	156'	182'
		WBT	316'	275'
		WBR	0'	0'
		NBL	258'	297'
		NBR	115'	147'
2024 Combined	Existing Geometry, Traffic Control & Signal Timing	EBT/R	190'	190'
		WBT	340'	294'
		WBR	0'	0'
		NBL	258'	297'
		NBR	125'	182'
2024 Combined	With Mitigation	EBT/R	125'	83'
		WBT	256'	208'
		WBR	0'	0'
		NBL	144'	131'
		NBR	92'	109'

Intersection #3: Hardin Valley Road at Schaeffer Road / Cheralala Boulevard

As shown in TABLES 3B and 4B, the development will have minor traffic operational impacts at this intersection. The overall intersection LOS is expected to increase from “B” to “C” between existing and background conditions and remain at “C” under combined conditions. The PM peak LOS is expected to remain at “C” through development buildout.

The northbound approach to this intersection will see the bulk of the study area impacts, particularly during the AM peak when the majority of traffic exits the development towards Hardin Valley Road. The existing storage length for the northbound left turn movement may be exceeded at times during the AM peak period, although updating the signal timing should mitigate that as shown in the tables. Northbound queuing in the left lane will likely extend beyond the existing access to First Horizon Bank in the AM peak hour. A recommendation of a “do not block the box” type of pavement marking and signing was considered; however, this may pose more of a safety risk for left turning vehicles exiting this driveway with the likelihood that the northbound right lane will be more free flowing beside stacked vehicles in the left lane. Further, this access driveway likely gets very little use for exiting vehicles during the AM peak due to the nature of the businesses on the property.

Beyond updated signal timing, an extended westbound left turn lane was also programmed as a mitigation strategy at this intersection. This extended storage length does not affect the capacity analyses results, but it would minimize the likelihood of vehicles queuing into the westbound through lanes. The existing storage is a relatively short 90 feet, and sufficient space within the existing grass median would make extension of the storage very feasible. Although the analyses indicate that traffic would not often spill back past the existing storage, the storage extension would easily enhance intersection safety for the occasional occurrence that traffic would spill back.

TABLE 3B: CAPACITY ANALYSES SUMMARY – HARDIN VALLEY ROAD AT SCHAEFFER ROAD / CHERAHALA BOULEVARD

SCENARIO		MOVEMENT/ APPROACH	AM PEAK (LOS/DELAY)	PM PEAK (LOS/DELAY)
2023 Existing	Existing Geometry, Traffic Control & Signal Timing	EB	B 13.8	B 17.6
		WB	B 16.2	B 16.3
		NB	D 50.4	D 39.4
		SB	D 39.5	D 50.6
		Overall	B 19.8	C 23.1
2024 Background	Existing Geometry, Traffic Control & Signal Timing	EB	B 14.0	B 17.9
		WB	B 16.4	B 16.6
		NB	D 51.2	D 39.7
		SB	D 39.8	D 51.4
		Overall	C 20.1	C 23.4
2024 Combined	Existing Geometry, Traffic Control & Signal Timing	EB	B 14.2	B 19.1
		WB	B 16.9	B 18.7
		NB	E 73.5	D 48.8
		SB	D 40.1	D 54.1
		Overall	C 23.8	C 26.2
2024 Combined	With Mitigation	EB	B 16.8	C 21.4
		WB	B 19.6	C 20.5
		NB	D 51.8	D 39.6
		SB	D 40.7	D 44.7
		Overall	C 23.6	C 25.7

**TABLE 4B: 95TH PERCENTIAL QUEUE SUMMARY – HARDIN VALLEY ROAD AT
SCHAEFFER ROAD / CHERAHALA BLVD**

SCENARIO		MOVEMENT/ APPROACH	AM PEAK	PM PEAK
2023 Existing	Existing Geometry, Traffic Control & Signal Timing	EBL	40'	25'
		EBT	254'	403'
		EBR	0'	0'
		WBL	45'	51'
		WBT	358'	344'
		WBR	0'	0'
		NBL	133'	86'
		NBT	133'	86'
		NBR	29'	109'
		SBL	89'	156'
		SBT	88'	156'
SBR	22'	70'		
2024 Background	Existing Geometry, Traffic Control & Signal Timing	EBL	41'	25'
		EBT	261'	414'
		EBR	0'	0'
		WBL	46'	52'
		WBT	369'	355'
		WBR	0'	0'
		NBL	134'	86'
		NBT	137'	87'
		NBR	30'	112'
		SBL	92'	162'
		SBT	88'	162'
SBR	23'	75'		
2024 Combined	Existing Geometry, Traffic Control & Signal Timing	EBL	41'	25'
		EBT	261'	414'
		EBR	0'	8'
		WBL	47'	57'
		WBT	369'	359'
		WBR	0'	0'
		NBL	221'	130'
		NBT	222'	130'
		NBR	39'	121'
		SBL	92'	167'
		SBT	92'	167'
SBR	23'	84'		
2024 Combined	With Mitigation	EBL	53'	26'
		EBT	317'	425'
		EBR	0'	4'
		WBL	61'	58'
		WBT	440'	356'
		WBR	0'	0'
		NBL	163'	118'
		NBT	164'	117'
		NBR	43'	68'
		SBL	90'	135'
		SBT	92'	137'
SBR	27'	86'		

TURN LANE WARRANT EVALUATIONS

Turn lane evaluations were conducted for a potential right turn lane entering the site's access point from Schaeffer Road under combined volume scenarios. The methods employed for the turn lane evaluations were those developed by M.D. Harmelink, as provided by in a series of tables from the Knox County publication "Access Control and Driveway Design Policy". The results of these evaluations were that a right turn lane is not warranted on Schaeffer Road entering the proposed development's access. Additional information can be found on the turn lane evaluation worksheets contained in APPENDIX D. Because a center two-way left turn lane exists along Schaeffer Road at the development's proposed access, left turn lane warrants were not analyzed.

SIGHT DISTANCE ASSESSMENT

Intersection sight distance was assessed via field measurements at the proposed intersection of Schaeffer Road at the proposed site access. The measurements were taken looking right and left from the proposed site access approach. Based on Knox County sight distance requirements for 30 mph roadways, 300 feet of sight distance is required looking left and right from the proposed site access onto Schaeffer Road. The field measurements indicated that sight distance looking left is approximately 360 feet, and sight distance looking right is approximately 430 feet. Sight distance looking left is restricted by a crest vertical curve, and sight distance looking right is restricted by horizontal curve features such as private property signage, vegetation, and buildings. Sight distance was measured at an elevation equal to the Schaeffer Road surface. However, the access road to the development will have an upgrade from Schaeffer Road that should improve sight distance beyond what was measured looking left towards the vertical crest curve.

CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated from the proposed development will have minimal impacts at the study intersections. Major congestion issues during peak hours do currently exist at the intersection of Hardin Valley at Solway Road / Pellissippi Parkway Southbound Ramps, but the additional development impacts to this intersection would be marginal. The largest operational impacts would occur at the intersection of Hardin Valley Road at Schaeffer Road / Cherahala Boulevard. Sufficient capacity exists at this intersection to easily handle the additional traffic from the proposed development, but moderate increases queue lengths for certain movements are likely. These queue lengths can be mitigated by updated signal timing, and extension of some turn lane storages would also provide a benefit.

Based on the above conclusions and other discussions throughout the report, the following is a list of recommendations developed with this traffic impact study:

- 1) Upon full buildout of the development, update the traffic signal timing at the intersections within the coordinated signal system adjacent to the development. Currently, this system consists of the three study intersections presented in this report.
- 2) Extend the westbound left turn lane storage length at the intersection of Hardin Valley Road at Schaeffer Road / Cherahala Boulevard. The storage should be extended by 100 feet and should include a bay taper with a length of 160 feet.
- 3) Ensure that grading, landscaping, signing, and other site features do not restrict lines of sight exiting the development along Schaeffer Road.

APPENDIX

A. TRAFFIC DATA

B. TRIP GENERATION INFORMATION

C. CAPACITY ANALYSES

D. TURN LANE WARRANT EVALUATIONS

APPENDIX A – TRAFFIC DATA

TRAFFIC GROWTH

Source:	TDOT
Location:	HARDIN VALLEY RD. W OF PELLISSIPPI
Route #:	
Route Type:	
Station:	47000084
Capacity:	

Source:	
Location:	
Route #:	
Route Type:	
Station:	
Capacity:	

Count Year	Volume	Growth Rate
2002	7179	
2003	7533	4.93
2004	7761	3.03
2005	8457	8.97
2006	8804	4.10
2007	9379	6.53
2008	9660	3.00
2009	9950	3.00
2010	10492	5.45
2011	17696	68.66
2012	17809	0.64
2013	15642	-12.17
2014	17441	11.50
2015	17615	1.00
2016	17791	1.00
2017	17969	1.00
2018	18120	0.84
2019	16739	-7.62
2020	14864	-11.20
2021	16495	10.97
2022	17402	5.50

Count Year	Volume	Growth Rate
2002		
2003		
2004		
2005		
2006		
2007		
2008		
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		
2020		
2021		
2022		

Avg. 1 Year Rate 2002-2022	5.46
Avg. 1 Year Rate 2012-2022	0.08
Avg. 1 Year Rate 2017-2022	-0.30

VOLUME

Schaeffer Rd S/O Hardin Valley Rd

Day: Thursday
Date: 1/12/2023

City: Rancho Cucamonga/San Marino
Project #: TN23_190004_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					1,958	1,511	0	0	3,469		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	0	4			4	12:00	47	30			77
00:15	2	1			3	12:15	35	22			57
00:30	1	1			2	12:30	36	22			58
00:45	2	5	1	7	3	12:45	25	143	18	92	235
01:00	1	2			3	13:00	24	16			40
01:15	1	1			2	13:15	22	23			45
01:30	1	1			2	13:30	31	10			41
01:45	0	3	0	4	0	13:45	26	103	21	70	173
02:00	0	0			0	14:00	20	15			35
02:15	2	3			5	14:15	31	18			49
02:30	0	0			0	14:30	27	16			43
02:45	1	3	2	5	3	14:45	40	118	22	71	189
03:00	0	2			2	15:00	37	23			60
03:15	0	0			0	15:15	31	27			58
03:30	0	1			1	15:30	32	42			74
03:45	0	1	4		1	15:45	31	131	41	133	264
04:00	1	0			1	16:00	37	36			73
04:15	0	0			0	16:15	47	31			78
04:30	0	0			0	16:30	48	47			95
04:45	2	3	2	2	4	16:45	48	180	42	156	336
05:00	4	2			6	17:00	81	37			118
05:15	1	1			2	17:15	70	38			108
05:30	2	1			3	17:30	42	41			83
05:45	7	14	7	11	14	17:45	40	233	20	136	369
06:00	2	2			4	18:00	45	34			79
06:15	8	13			21	18:15	35	21			56
06:30	13	16			29	18:30	30	16			46
06:45	32	55	22	53	54	18:45	26	136	20	91	227
07:00	30	23			53	19:00	25	20			45
07:15	47	32			79	19:15	21	12			33
07:30	41	34			75	19:30	16	19			35
07:45	62	180	71	160	133	19:45	15	77	11	62	139
08:00	90	38			128	20:00	16	15			31
08:15	40	35			75	20:15	13	15			28
08:30	32	19			51	20:30	11	4			15
08:45	22	184	24	116	46	20:45	16	56	9	43	99
09:00	20	25			45	21:00	16	7			23
09:15	27	24			51	21:15	8	5			13
09:30	17	17			34	21:30	7	4			11
09:45	13	77	22	88	35	21:45	7	38	2	18	56
10:00	13	19			32	22:00	6	3			9
10:15	17	12			29	22:15	6	3			9
10:30	20	13			33	22:30	3	0			3
10:45	22	72	18	62	40	22:45	1	16	5	11	27
11:00	23	16			39	23:00	2	0			2
11:15	32	27			59	23:15	3	0			3
11:30	29	32			61	23:30	1	1			2
11:45	40	124	40	115	80	23:45	1	7	0	1	8
TOTALS	720	627			1347	TOTALS	1238	884			2122
SPLIT %	53.5%	46.5%			38.8%	SPLIT %	58.3%	41.7%			61.2%

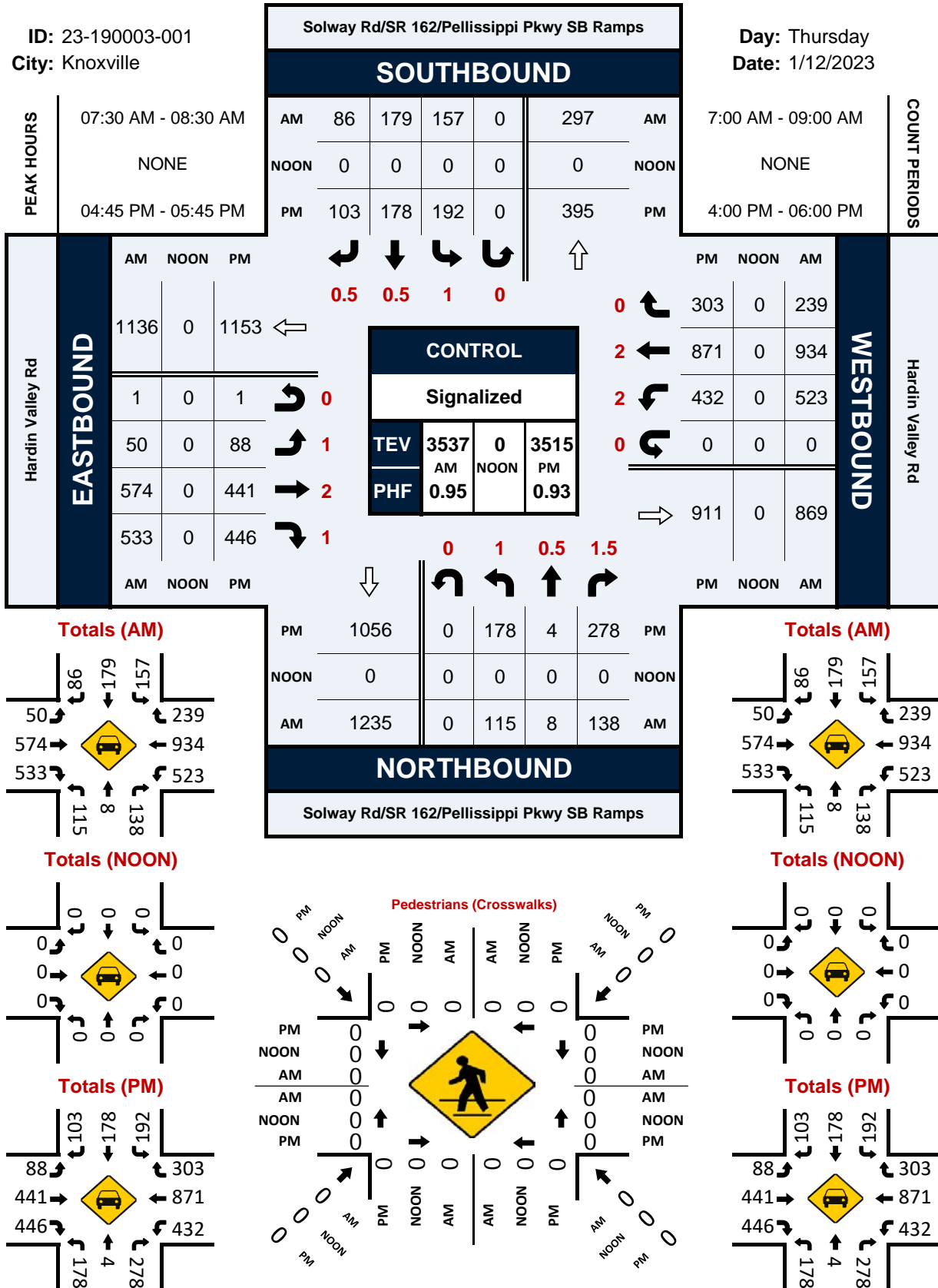
DAILY TOTALS					NB	SB	EB	WB	Total	
					1,958	1,511	0	0	3,469	
AM Peak Hour	07:15	07:30			07:15	PM Peak Hour	16:30	16:30	16:30	
AM Pk Volume	240	178			415	PM Pk Volume	247	164	411	
Pk Hr Factor	0.667	0.627			0.780	Pk Hr Factor	0.762	0.872	0.871	
7 - 9 Volume	364	276	0	0	640	4 - 6 Volume	413	292	0	705
7 - 9 Peak Hour	07:15	07:30			07:15	4 - 6 Peak Hour	16:30	16:30		16:30
7 - 9 Pk Volume	240	178	0	0	415	4 - 6 Pk Volume	247	164	0	411
Pk Hr Factor	0.667	0.627	0.000	0.000	0.780	Pk Hr Factor	0.762	0.872	0.000	0.871

Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Hardin Valley Rd

Peak Hour Turning Movement Count

ID: 23-190003-001
City: Knoxville

Day: Thursday
Date: 1/12/2023



Project ID: 23-190003-001

Location: Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Hardin Valley Rd
 City: Knoxville

Day: Thursday
 Date: 1/12/2023

Groups Printed - Cars, PU, Vans - Heavy Trucks

Start Time	Solway Rd/SR 162/Pellissippi Pkwy SB Ramp Northbound						Solway Rd/SR 162/Pellissippi Pkwy SB Ramp Southbound						Hardin Valley Rd Eastbound						Hardin Valley Rd Westbound						Int. Total	
	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total		
7:00 AM	15	1	20	0	0	36	17	23	32	0	0	72	6	101	108	0	0	215	110	144	18	0	0	272	595	
7:15 AM	29	1	26	0	0	56	26	38	23	0	0	87	9	134	127	0	0	270	128	190	31	0	0	349	762	
7:30 AM	27	2	25	0	0	54	33	57	15	0	0	105	9	146	173	1	0	329	132	257	44	0	0	433	921	
7:45 AM	28	4	40	0	0	72	54	41	21	0	0	116	14	150	128	0	0	292	126	267	60	0	0	453	933	
Total	99	8	111	0	0	218	130	159	91	0	0	380	38	531	536	1	0	1106	496	858	153	0	0	1507	3211	
8:00 AM	31	1	39	0	0	71	27	50	30	0	0	107	9	155	117	0	0	281	129	199	64	0	0	392	851	
8:15 AM	29	1	34	0	0	64	43	31	20	0	0	94	18	123	115	0	0	256	136	211	71	0	0	418	832	
8:30 AM	18	3	23	0	0	44	27	30	14	0	0	71	10	143	139	0	0	292	112	121	67	0	0	300	707	
8:45 AM	35	2	27	0	0	64	23	30	16	0	0	69	19	91	95	0	0	205	101	102	68	0	0	271	609	
Total	113	7	123	0	0	243	120	141	80	0	0	341	56	512	466	0	0	1034	478	633	270	0	0	1381	2999	
BREAK																										
4:00 PM	36	0	66	0	0	102	54	43	19	0	0	116	17	163	118	0	0	298	124	183	59	0	0	366	882	
4:15 PM	36	0	71	0	0	107	32	35	13	0	0	80	15	128	104	0	0	247	112	160	68	0	0	340	774	
4:30 PM	37	2	51	0	0	90	42	51	15	0	0	108	11	115	115	0	0	241	115	209	64	0	0	388	827	
4:45 PM	30	1	68	0	0	99	44	40	29	0	0	113	13	109	118	0	0	240	122	208	79	0	0	409	861	
Total	139	3	256	0	0	398	172	169	76	0	0	417	56	515	455	0	0	1026	473	760	270	0	0	1503	3344	
5:00 PM	51	0	72	0	0	123	63	42	28	0	0	133	24	100	125	0	0	249	111	250	74	0	0	435	940	
5:15 PM	46	0	65	0	0	111	42	50	22	0	0	114	29	128	105	0	0	262	101	198	83	0	0	382	869	
5:30 PM	51	3	73	0	0	127	43	46	24	0	0	113	22	104	98	1	0	225	98	215	67	0	0	380	845	
5:45 PM	42	0	75	0	0	117	39	34	33	0	0	106	26	117	99	1	0	243	95	193	83	0	0	371	837	
Total	190	3	285	0	0	478	187	172	107	0	0	466	101	449	427	2	0	979	405	856	307	0	0	1568	3491	
Grand Total	541	21	775	0	0	1337	609	641	354	0	0	1604	251	2007	1884	3	0	4145	1852	3107	1000	0	0	5959	13045	
Apprch %	40.5	1.6	58.0	0.0	0.0		38.0	40.0	22.1	0.0	0.0		6.1	48.4	45.5	0.1	0.0		31.1	52.1	16.8	0.0	0.0			
Total %	4.1	0.2	5.9	0.0	0.0	10.2	4.7	4.9	2.7	0.0	0.0	12.3	1.9	15.4	14.4	0.0	0.0	31.8	14.2	23.8	7.7	0.0	0.0	45.7		
Cars, PU, Vans	541	21	775	0	0	1337	609	641	354	0	0	1604	251	2007	1884	3	0	4145	1852	3107	1000	0	0	5959	13045	
% Cars, PU, Vans	100.0	100.0	100.0	0.0	0.0	100.0	100.0	100.0	100.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	100.0	100.0	100.0	0.0	0.0	100.0	100.0	

Project ID: 23-190003-001

Location: Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Ha
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 1/12/2023

AM

Start Time	Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Ha Northbound					Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Ha Southbound					Hardin Valley Rd Eastbound					Hardin Valley Rd Westbound					Int. Total
	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	
Peak Hour Analysis from 07:00 AM - 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	27	2	25	0	54	33	57	15	0	105	9	146	173	1	329	132	257	44	0	433	921
7:45 AM	28	4	40	0	72	54	41	21	0	116	14	150	128	0	292	126	267	60	0	453	933
8:00 AM	31	1	39	0	71	27	50	30	0	107	9	155	117	0	281	129	199	64	0	392	851
8:15 AM	29	1	34	0	64	43	31	20	0	94	18	123	115	0	256	136	211	71	0	418	832
Total Volume	115	8	138	0	261	157	179	86	0	422	50	574	533	1	1158	523	934	239	0	1696	3537
% App. Total	44.1	3.1	52.9	0.0	100	37.2	42.4	20.4	0.0	100	4.3	49.6	46.0	0.1	100	30.8	55.1	14.1	0.0	100	
PHF	0.906					0.909					0.880					0.936					0.948
Cars, PU, Vans	115	8	138	0	261	157	179	86	0	422	50	574	533	1	1158	523	934	239	0	1696	3537
% Cars, PU, Vans	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0

PM

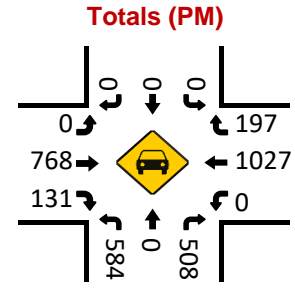
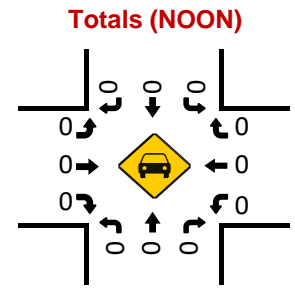
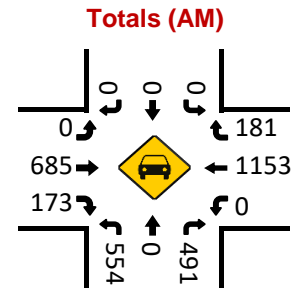
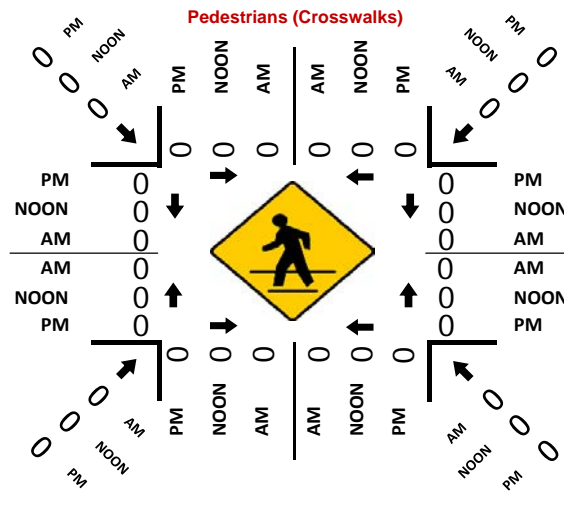
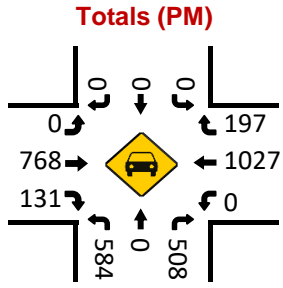
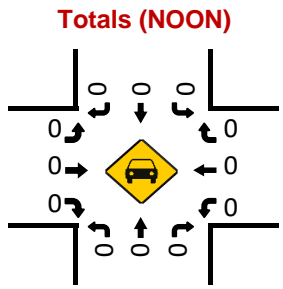
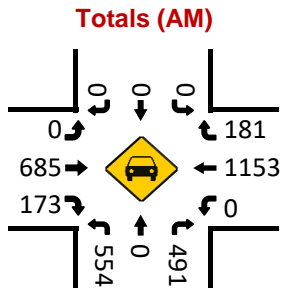
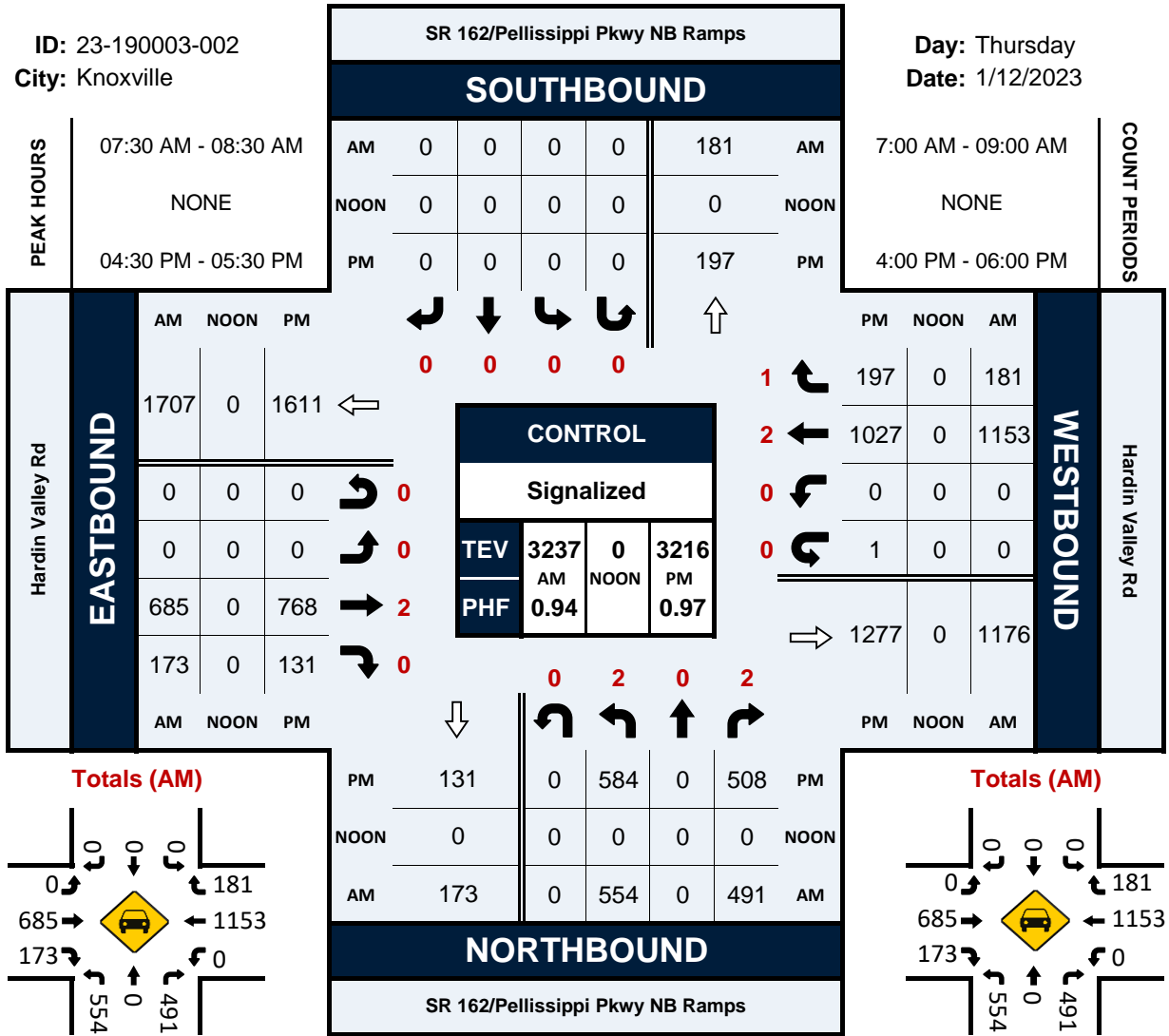
Start Time	Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Ha Northbound					Solway Rd/SR 162/Pellissippi Pkwy SB Ramps & Ha Southbound					Hardin Valley Rd Eastbound					Hardin Valley Rd Westbound					Int. Total
	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	
Peak Hour Analysis from 04:00 PM - 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	30	1	68	0	99	44	40	29	0	113	13	109	118	0	240	122	208	79	0	409	861
5:00 PM	51	0	72	0	123	63	42	28	0	133	24	100	125	0	249	111	250	74	0	435	940
5:15 PM	46	0	65	0	111	42	50	22	0	114	29	128	105	0	262	101	198	83	0	382	869
5:30 PM	51	3	73	0	127	43	46	24	0	113	22	104	98	1	225	98	215	67	0	380	845
Total Volume	178	4	278	0	460	192	178	103	0	473	88	441	446	1	976	432	871	303	0	1606	3515
% App. Total	38.7	0.9	60.4	0.0	100	40.6	37.6	21.8	0.0	100	9.0	45.2	45.7	0.1	100	26.9	54.2	18.9	0.0	100	
PHF	0.906					0.889					0.931					0.923					0.935
Cars, PU, Vans	178	4	278	0	460	192	178	103	0	473	88	441	446	1	976	432	871	303	0	1606	3515
% Cars, PU, Vans	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0

SR 162/Pellissippi Pkwy NB Ramps & Hardin Valley Rd

Peak Hour Turning Movement Count

ID: 23-190003-002
City: Knoxville

Day: Thursday
Date: 1/12/2023



Project ID: 23-190003-002
 Location: SR 162/Pellissippi Pkwy NB Ramps & Hardin Valley Rd
 City: Knoxville

Day: Thursday
 Date: 1/12/2023

Groups Printed - Cars, PU, Vans - Heavy Trucks

Start Time	SR 162/Pellissippi Pkwy NB Ramps Northbound						SR 162/Pellissippi Pkwy NB Ramps Southbound						Hardin Valley Rd Eastbound						Hardin Valley Rd Westbound						Int. Total	
	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total		
7:00 AM	65	0	86	0	0	151	0	0	0	0	0	0	0	95	29	0	0	124	0	212	50	0	0	262	537	
7:15 AM	95	0	125	0	0	220	0	0	0	0	0	0	0	131	67	0	0	198	0	249	67	0	0	316	734	
7:30 AM	121	0	145	0	0	266	0	0	0	0	0	0	0	156	45	0	0	201	0	320	64	0	0	384	851	
7:45 AM	168	0	136	0	0	304	0	0	0	0	0	0	0	190	45	0	0	235	0	277	42	0	0	319	858	
Total	449	0	492	0	0	941	0	0	0	0	0	0	0	572	186	0	0	758	0	1058	223	0	0	1281	2980	
8:00 AM	177	0	119	0	0	296	0	0	0	0	0	0	0	186	46	0	0	232	0	222	25	0	0	247	775	
8:15 AM	88	0	91	0	0	179	0	0	0	0	0	0	0	153	37	0	0	190	0	334	50	0	0	384	753	
8:30 AM	90	0	85	0	0	175	0	0	0	0	0	0	0	164	42	0	0	206	0	198	53	0	0	251	632	
8:45 AM	89	0	81	0	0	170	0	0	0	0	0	0	0	101	33	0	0	134	0	192	63	1	0	256	560	
Total	444	0	376	0	0	820	0	0	0	0	0	0	0	604	158	0	0	762	0	946	191	1	0	1138	2720	
BREAK																										
4:00 PM	118	0	112	0	0	230	0	0	0	0	0	0	0	255	36	0	0	291	0	241	46	0	0	287	808	
4:15 PM	131	0	119	0	0	250	0	0	0	0	0	0	0	196	28	0	0	224	0	219	32	0	0	251	725	
4:30 PM	133	0	121	0	0	254	0	0	0	0	0	0	0	189	26	0	0	215	0	245	61	0	0	306	775	
4:45 PM	158	0	150	0	0	308	0	0	0	0	0	0	0	186	29	0	0	215	0	256	44	0	0	300	823	
Total	540	0	502	0	0	1042	0	0	0	0	0	0	0	826	119	0	0	945	0	961	183	0	0	1144	3131	
5:00 PM	134	0	111	0	0	245	0	0	0	0	0	0	0	196	44	0	0	240	0	296	51	0	0	347	832	
5:15 PM	159	0	126	0	0	285	0	0	0	0	0	0	0	197	32	0	0	229	0	230	41	1	0	272	786	
5:30 PM	161	0	128	0	0	289	0	0	0	0	0	0	0	205	22	0	0	227	0	211	42	0	0	253	769	
5:45 PM	134	0	134	0	0	268	0	0	0	0	0	0	0	203	24	0	0	227	0	239	49	0	0	288	783	
Total	588	0	499	0	0	1087	0	0	0	0	0	0	0	801	122	0	0	923	0	976	183	1	0	1160	3170	
Grand Total	2021	0	1869	0	0	3890	0	0	0	0	0	0	0	2803	585	0	0	3388	0	3941	780	2	0	4723	12001	
Apprch %	52.0	0.0	48.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.7	17.3	0.0	0.0		0.0	83.4	16.5	0.0	0.0			
Total %	16.8	0.0	15.6	0.0	0.0	32.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.4	4.9	0.0	0.0	28.2	0.0	32.8	6.5	0.0	0.0	39.4		
Cars, PU, Vans	2021	0	1869	0	0	3890	0	0	0	0	0	0	0	2803	585	0	0	3388	0	3941	780	2	0	4723	12001	
% Cars, PU, Vans	100.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0	0.0	100.0	100.0	100.0	0.0	100.0	100.0	

Project ID: 23-190003-002
 Location: SR 162/Pellissippi Pkwy NB Ramps & Hardin Valley
 City: Knoxville

PEAK HOURS

Day: Thursday
 Date: 1/12/2023

AM

Start Time	SR 162/Pellissippi Pkwy NB Ramps Northbound					SR 162/Pellissippi Pkwy NB Ramps Southbound					Hardin Valley Rd Eastbound					Hardin Valley Rd Westbound					Int. Total
	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	
Peak Hour Analysis from 07:00 AM - 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	121	0	145	0	266	0	0	0	0	0	0	156	45	0	201	0	320	64	0	384	851
7:45 AM	168	0	136	0	304	0	0	0	0	0	0	190	45	0	235	0	277	42	0	319	858
8:00 AM	177	0	119	0	296	0	0	0	0	0	0	186	46	0	232	0	222	25	0	247	775
8:15 AM	88	0	91	0	179	0	0	0	0	0	0	153	37	0	190	0	334	50	0	384	753
Total Volume	554	0	491	0	1045	0	0	0	0	0	0	685	173	0	858	0	1153	181	0	1334	3237
% App. Total	53.0	0.0	47.0	0.0	100	0.0	0.0	0.0	0.0	0.0	0.0	79.8	20.2	0.0	100	0.0	86.4	13.6	0.0	100	
PHF	0.859										0.913					0.868					0.943
Cars, PU, Vans	554	0	491	0	1045	0	0	0	0	0	0	685	173	0	858	0	1153	181	0	1334	3237
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	100.0	0.0	100.0	100.0

PM

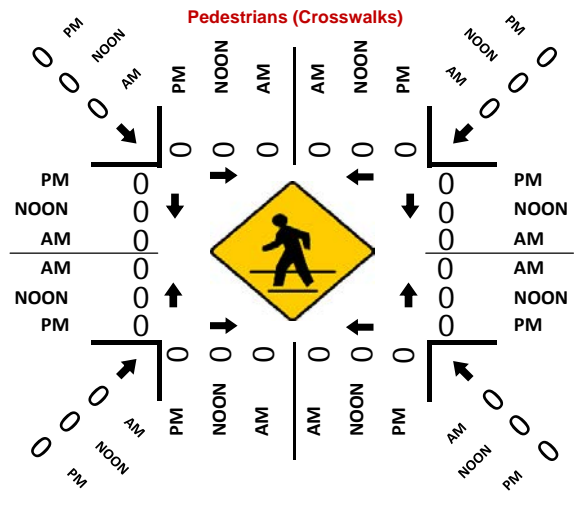
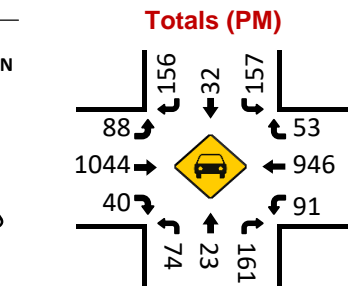
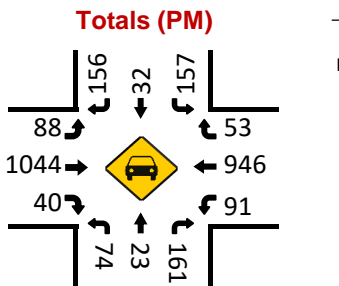
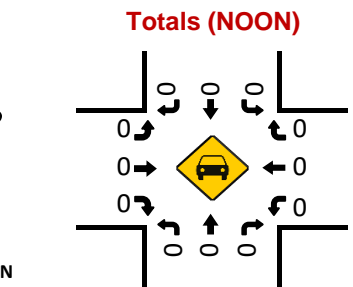
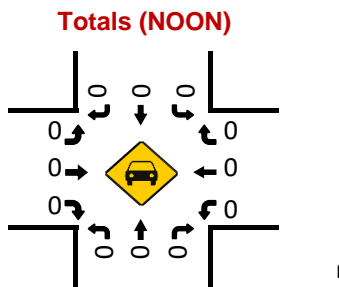
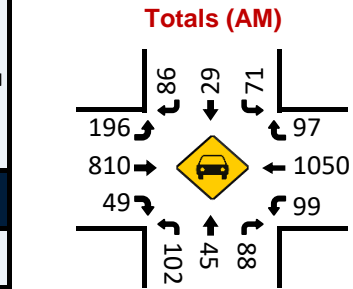
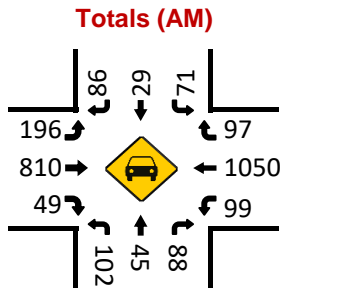
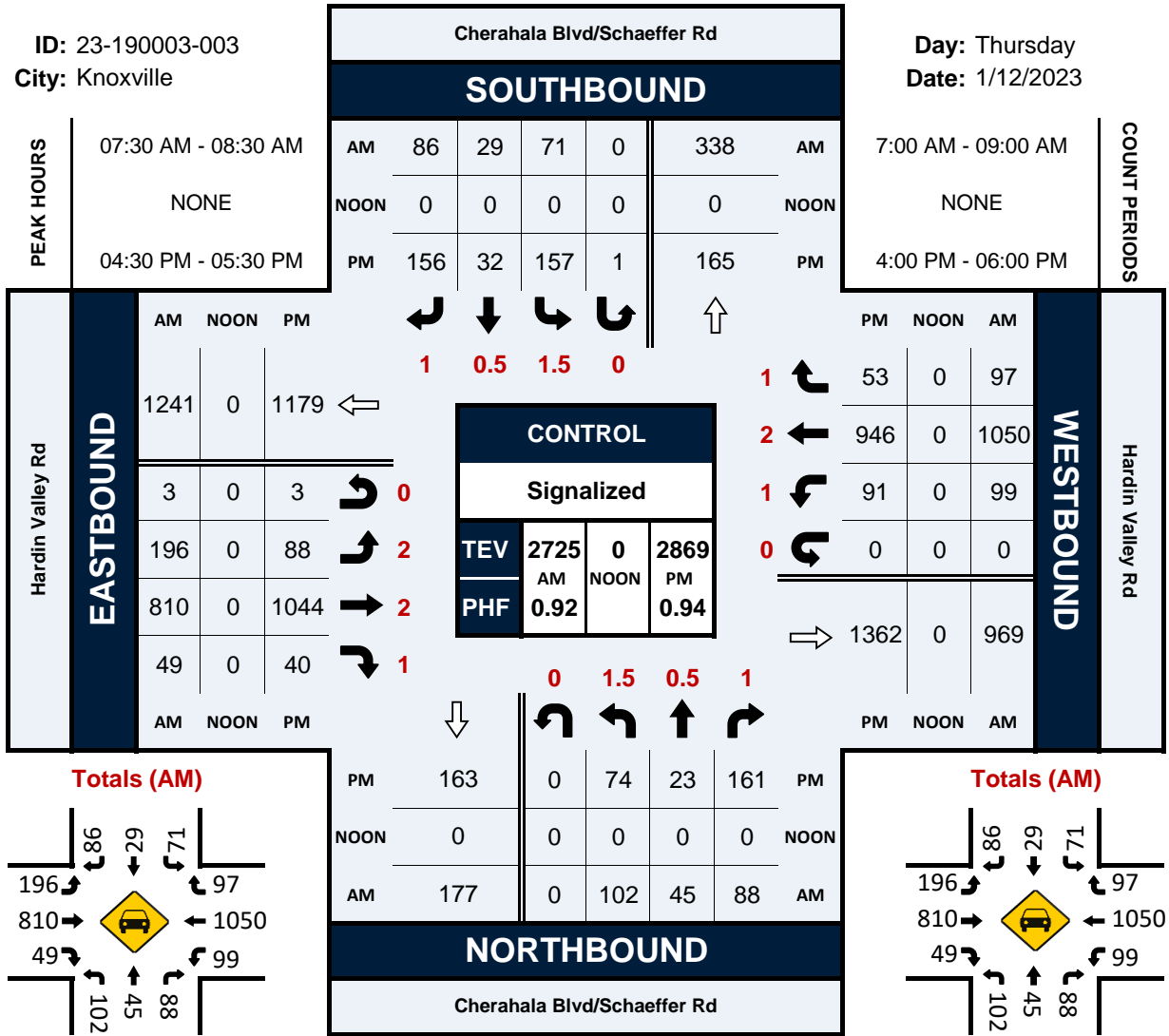
Start Time	SR 162/Pellissippi Pkwy NB Ramps Northbound					SR 162/Pellissippi Pkwy NB Ramps Southbound					Hardin Valley Rd Eastbound					Hardin Valley Rd Westbound					Int. Total
	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	
Peak Hour Analysis from 04:00 PM - 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
4:30 PM	133	0	121	0	254	0	0	0	0	0	0	189	26	0	215	0	245	61	0	306	775
4:45 PM	158	0	150	0	308	0	0	0	0	0	0	186	29	0	215	0	256	44	0	300	823
5:00 PM	134	0	111	0	245	0	0	0	0	0	0	196	44	0	240	0	296	51	0	347	832
5:15 PM	159	0	126	0	285	0	0	0	0	0	0	197	32	0	229	0	230	41	1	272	786
Total Volume	584	0	508	0	1092	0	0	0	0	0	0	768	131	0	899	0	1027	197	1	1225	3216
% App. Total	53.5	0.0	46.5	0.0	100	0.0	0.0	0.0	0.0	0.0	0.0	85.4	14.6	0.0	100	0.0	83.8	16.1	0.1	100	
PHF	0.886										0.936					0.883					0.966
Cars, PU, Vans	584	0	508	0	1092	0	0	0	0	0	0	768	131	0	899	0	1027	197	1	1225	3216
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0

Cherahala Blvd/Schaeffer Rd & Hardin Valley Rd

Peak Hour Turning Movement Count

ID: 23-190003-003
City: Knoxville

Day: Thursday
Date: 1/12/2023



Project ID: 23-190003-003

Location: Cherahala Blvd/Schaeffer Rd & Hardin Valley Rd
 City: Knoxville

Day: Thursday
 Date: 1/12/2023

Groups Printed - Cars, PU, Vans - Heavy Trucks

Start Time	Cherahala Blvd/Schaeffer Rd Northbound						Cherahala Blvd/Schaeffer Rd Southbound						Hardin Valley Rd Eastbound						Hardin Valley Rd Westbound						Int. Total
	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	Left	Thru	Rgt	Utum	Peds	App. Total	
7:00 AM	16	2	10	0	0	28	11	4	10	0	0	25	17	119	8	0	0	144	11	248	13	0	0	272	469
7:15 AM	23	6	18	0	0	47	8	5	22	0	0	35	26	185	6	1	0	218	21	250	10	0	0	281	581
7:30 AM	17	5	21	0	0	43	16	6	25	0	0	47	51	200	6	0	0	257	22	346	22	0	0	390	737
7:45 AM	30	12	19	0	0	61	16	10	23	0	0	49	57	221	21	1	0	300	39	273	21	0	0	333	743
Total	86	25	68	0	0	179	51	25	80	0	0	156	151	725	41	2	0	919	93	1117	66	0	0	1276	2530
8:00 AM	36	19	36	0	0	91	21	9	9	0	0	39	42	222	12	0	0	276	17	158	25	0	0	200	606
8:15 AM	19	9	12	0	0	40	18	4	29	0	0	51	46	167	10	2	0	225	21	273	29	0	0	323	639
8:30 AM	8	6	18	0	0	32	15	1	16	0	0	32	24	191	6	2	0	223	12	203	19	0	0	234	521
8:45 AM	7	6	9	0	0	22	12	4	9	0	0	25	25	125	3	0	0	153	17	247	13	0	0	277	477
Total	70	40	75	0	0	185	66	18	63	0	0	147	137	705	31	4	0	877	67	881	86	0	0	1034	2243
BREAK																									
4:00 PM	12	4	24	0	0	40	25	5	28	0	0	58	21	316	14	0	0	351	16	246	14	0	0	276	725
4:15 PM	19	0	29	0	0	48	31	9	23	1	0	64	13	252	7	1	0	273	15	205	13	0	0	233	618
4:30 PM	17	3	30	0	0	50	31	8	39	0	0	78	21	252	11	1	0	285	27	239	12	0	0	278	691
4:45 PM	10	3	39	0	0	52	30	8	38	0	0	76	20	271	14	1	0	306	21	228	13	0	0	262	696
Total	58	10	122	0	0	190	117	30	128	1	0	276	75	1091	46	3	0	1215	79	918	52	0	0	1049	2730
5:00 PM	26	13	46	0	0	85	57	5	40	0	0	102	23	244	7	1	0	275	24	261	18	0	0	303	765
5:15 PM	21	4	46	0	0	71	39	11	39	1	0	90	24	277	8	0	0	309	19	218	10	0	0	247	717
5:30 PM	8	3	33	0	0	44	28	11	33	0	0	72	20	262	12	2	0	296	18	200	12	0	0	230	642
5:45 PM	21	4	24	0	0	49	39	3	41	3	0	86	24	258	7	0	0	289	9	188	10	0	0	207	631
Total	76	24	149	0	0	249	163	30	153	4	0	350	91	1041	34	3	0	1169	70	867	50	0	0	987	2755
Grand Total	290	99	414	0	0	803	397	103	424	5	0	929	454	3562	152	12	0	4180	309	3783	254	0	0	4346	10258
Apprch %	36.1	12.3	51.6	0.0	0.0		42.7	11.1	45.6	0.5	0.0		10.9	85.2	3.6	0.3	0.0		7.1	87.0	5.8	0.0	0.0		
Total %	2.8	1.0	4.0	0.0	0.0	7.8	3.9	1.0	4.1	0.0	0.0	9.1	4.4	34.7	1.5	0.1	0.0	40.7	3.0	36.9	2.5	0.0	0.0	42.4	
Cars, PU, Vans	290	99	414	0		803	397	103	424	5		929	454	3562	152	12		4180	309	3783	254	0		4346	10258
% Cars, PU, Vans	100.0	100.0	100.0	0.0		100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	0.0		100.0	100.0

Project ID: 23-190003-003

Location: Cherahala Blvd/Schaeffer Rd & Hardin Valley Rd
 City: Knoxville

PEAK HOURS

Day: Thursday
 Date: 1/12/2023

AM

Start Time	Cherahala Blvd/Schaeffer Rd Northbound					Cherahala Blvd/Schaeffer Rd Southbound					Hardin Valley Rd Eastbound					Hardin Valley Rd Westbound					Int. Total
	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	
Peak Hour Analysis from 07:00 AM - 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	17	5	21	0	43	16	6	25	0	47	51	200	6	0	257	22	346	22	0	390	737
7:45 AM	30	12	19	0	61	16	10	23	0	49	57	221	21	1	300	39	273	21	0	333	743
8:00 AM	36	19	36	0	91	21	9	9	0	39	42	222	12	0	276	17	158	25	0	200	606
8:15 AM	19	9	12	0	40	18	4	29	0	51	46	167	10	2	225	21	273	29	0	323	639
Total Volume	102	45	88	0	235	71	29	86	0	186	196	810	49	3	1058	99	1050	97	0	1246	2725
% App. Total	43.4	19.1	37.4	0.0	100	38.2	15.6	46.2	0.0	100	18.5	76.6	4.6	0.3	100	7.9	84.3	7.8	0.0	100	
PHF	0.646					0.912					0.882					0.799					0.917
Cars, PU, Vans	102	45	88	0	235	71	29	86	0	186	196	810	49	3	1058	99	1050	97	0	1246	2725
% Cars, PU, Vans	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0

PM

Start Time	Cherahala Blvd/Schaeffer Rd Northbound					Cherahala Blvd/Schaeffer Rd Southbound					Hardin Valley Rd Eastbound					Hardin Valley Rd Westbound					Int. Total
	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	Left	Thru	Rgt	Utum	App. Total	
Peak Hour Analysis from 04:00 PM - 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
4:30 PM	17	3	30	0	50	31	8	39	0	78	21	252	11	1	285	27	239	12	0	278	691
4:45 PM	10	3	39	0	52	30	8	38	0	76	20	271	14	1	306	21	228	13	0	262	696
5:00 PM	26	13	46	0	85	57	5	40	0	102	23	244	7	1	275	24	261	18	0	303	765
5:15 PM	21	4	46	0	71	39	11	39	1	90	24	277	8	0	309	19	218	10	0	247	717
Total Volume	74	23	161	0	258	157	32	156	1	346	88	1044	40	3	1175	91	946	53	0	1090	2869
% App. Total	28.7	8.9	62.4	0.0	100	45.4	9.2	45.1	0.3	100	7.5	88.9	3.4	0.3	100	8.3	86.8	4.9	0.0	100	
PHF	0.759					0.848					0.951					0.899					0.938
Cars, PU, Vans	74	23	161	0	258	157	32	156	1	346	88	1044	40	3	1175	91	946	53	0	1090	2869
% Cars, PU, Vans	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0

APPENDIX B – TRIP GENERATION INFORMATION

KNOX COUNTY
LOCAL APARTMENT TRIP GENERATION STUDY

PURPOSE

A Traffic Impact Study (TIS) is currently required in Knox County when a proposed development is projected to generate in excess of 750 trips per day. The determinations of when the threshold is met as well as all subsequent analyses in the TIS are performed using the rates and equations given in the Institute of Transportation Engineers (ITE) Trip Generation Manual. Local governmental agencies rely heavily on the accuracy of these trip generation rates in order to correctly predict the impacts of a proposed development on the transportation system. Therefore, in certain instances, it is logical to verify whether the "national" rates and equations given in the ITE Trip Generation Manual are appropriate for use in a specific local area or region.

The decision was made to study the local trip-making characteristics of apartments because of the discrepancy between the trip generation rates for apartments and single family residential land uses as given in the ITE Trip Generation Manual. While these two land uses are similar in nature, the Trip Generation Manual predicts about three less trips per dwelling unit generated by apartments for the average weekday. Additionally the Trip Generation Manual points out that due to the age of their database, which dates back to the 1960's, "the rates for apartments probably had changed over time". It is also assumed that some of the ITE data had come from larger metropolitan areas with denser development and greater transit use than Knox County, which would contribute to lower trip generation rates. Therefore, this study will be used to either verify the rates given in the Trip Generation Manual or generate new ones that can be applied to locally proposed apartment developments.

PROCEDURE

The procedures recommended by ITE in conducting local trip generation studies were generally followed for this study, along with some important assumptions that have made. ITE has published a proposed recommended practice entitled "Trip Generation Handbook" which specifically outlines procedures for conducting local trip generation studies and establishing new rates and equations.

The first step in the study was to define the number and location of the sites to be studied, as well as the counting methodology. Initially 14 sites were selected, although one apartment complex – the College Park Apartments – was later omitted due to uncharacteristically high traffic generation numbers. The number of sites used in this study far exceeds the recommended minimum amount suggested by ITE, which is five sites. Traffic counts were taken for week-long periods at 15-minute intervals between July 22, 1996 and August 9, 1996 at the access points to the apartment complexes. A Technical Appendix to this report contains the traffic count data collected at each apartment complex.

RESULTS

The traffic count data was analyzed using spreadsheets in order to determine the weighted average rates and regression equations. In order to be considered valid, the local rates and equations for each time period of analysis that were generated must meet certain statistical criteria. First, the standard deviation of the independent variable (dwelling units) should be no more than 110 percent of the weighted average rate; and secondly, the regression equations require a computed coefficient of determination (R^2) value of at least 0.75 before good data fit is indicated. This statistical criteria is met by the local data results, and in fact it often exceeds the level of data fit given by their counterparts in the ITE Trip Generation Manual. Finally, in order to simplify the use of the local data, plots were generated that appear identical to the actual ones in the ITE Trip Generation Manual.

The resulting rates and equations calculated from the local data indicate that the average weekday trip generation of apartments in this area is well above the national rates reported in the ITE manual. For example, the locally computed average rate for number of trips generated during a weekday is 35% higher than the rate given by ITE (increase from 6.63 trips per dwelling unit to 9.03 trips per dwelling unit). The trip generation rates do not increase as much for the AM and PM peak hours however. The local rate is roughly 8% higher for the AM peak, and 16% higher for the PM peak. The plots from the ITE Trip Generation Manual are included in the Technical Appendix for comparison purposes.

ASSUMPTIONS MADE

Some important assumptions have been made which may affect the results of the local data that was collected:

- It is important to note that the local trip generation rates were computed for the *total* number of dwelling units in the apartment complex, and not necessarily for the number of *occupied* dwelling units. There are several reasons why this was done, chiefly because of the need for comparability with the rates given in ITE Trip Generation Manual, as it does not specify whether the dwelling units are occupied. According to ITE procedures the selected sites must only be of "reasonably full occupancy (i.e. at least 85%)". The Apartment Association of Greater Knoxville (AAGK) publishes quarterly reports on occupancy levels of apartment complexes, and the report covering the period of the data collection was reviewed to determine occupancy levels. According to the AAGK report from July 1, 1996 – September 30, 1996 all of the apartment complexes surveyed in this study met the minimum 85% occupancy level, with an average occupancy rate for all sites studied of 94%.
- The count data that was collected at each apartment complex was used "raw" meaning that it was not factored for possible daily or seasonal variations. Once again, according to an ITE representative it is not known whether the data used in the Trip Generation Manual was factored or not, so therefore in order to be able to compare

local rates to those in the manual you must assume that count data should not be factored. Additionally, it was felt that apartment complexes would generally not be as susceptible to major seasonal fluctuations as other land uses might be. The local rates were also developed using count data that was collected and averaged over an entire week, which should limit some of the daily variations. Finally, reliable local daily and seasonal variation factors do not truly exist.

CONCLUSION

The local apartment study methodology and results were distributed for comment to a group of local transportation professionals who are directly responsible for either preparing or reviewing traffic impact studies. A meeting was held between this group on February 16, 2000 in order to gather comments and discuss the study in greater detail. The following conclusions are based on the discussion and consensus reached at this meeting:

1. The trip generation rates and equations meet statistical requirements and resulted from a study that followed accepted procedures; therefore they should be adopted for future use. Furthermore, the rates and equations are recommended for use in reviewing the traffic impact of any development termed as "multi-family", such as townhouse and condominium developments due to their similarity to apartment complexes.
2. The Traffic Access and Impact Study Guidelines and Procedures adopted by MPC should be amended with the language that local data should be used when available, which will allow the implementation of these new multi-family trip generation rates.
3. The following suggestions were made for future consideration:
 - This study should be updated with data collected from local townhouse and condominium developments in order to further justify the use of the new trip generation rates.
 - A statistical comparison should be made between any newly developed rates and the ITE single family trip generation rates to determine if there is a significant difference. If there is no difference then perhaps ITE single-family rates could be used for any residential development proposed in Knox County.

Local Apartment Trip Generation Study

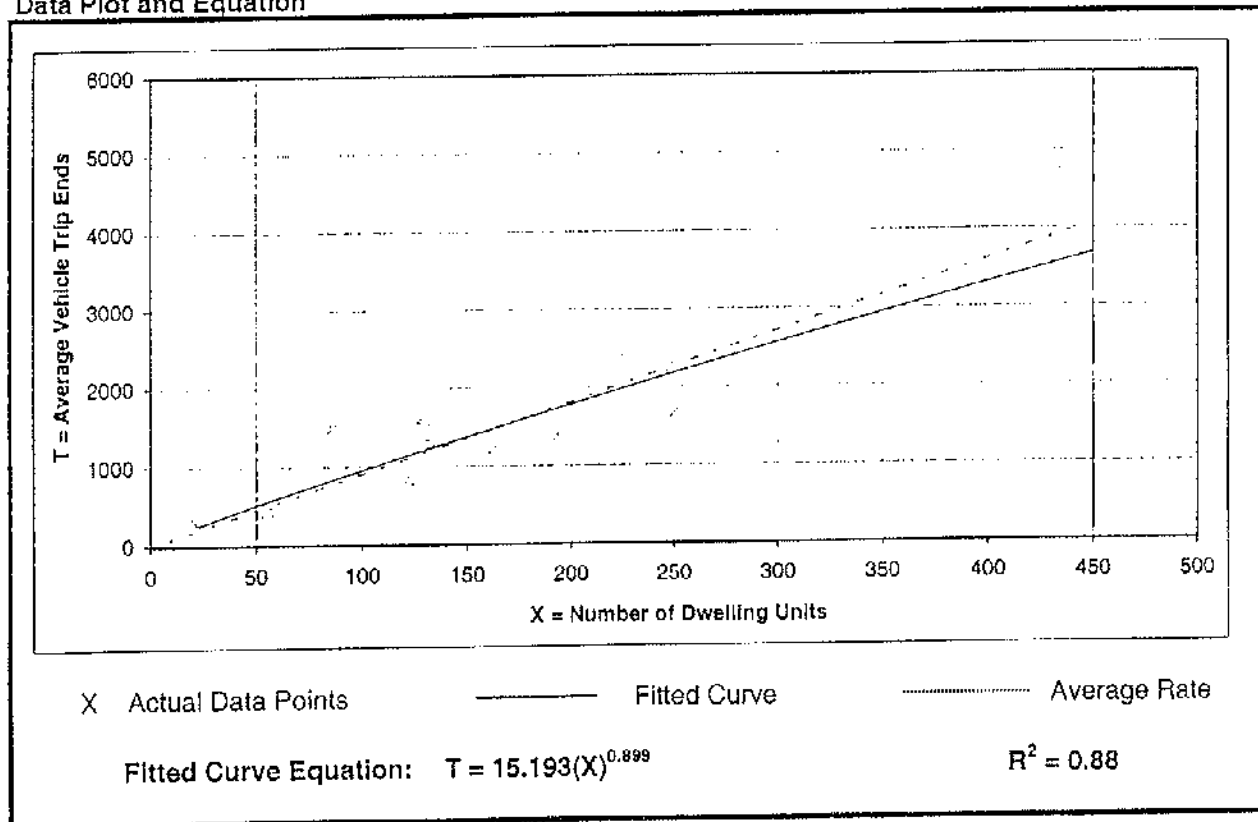
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 50% entering, 50% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
9.03	6.59 - 17.41	2.47

Data Plot and Equation



Local Apartment Trip Generation Study

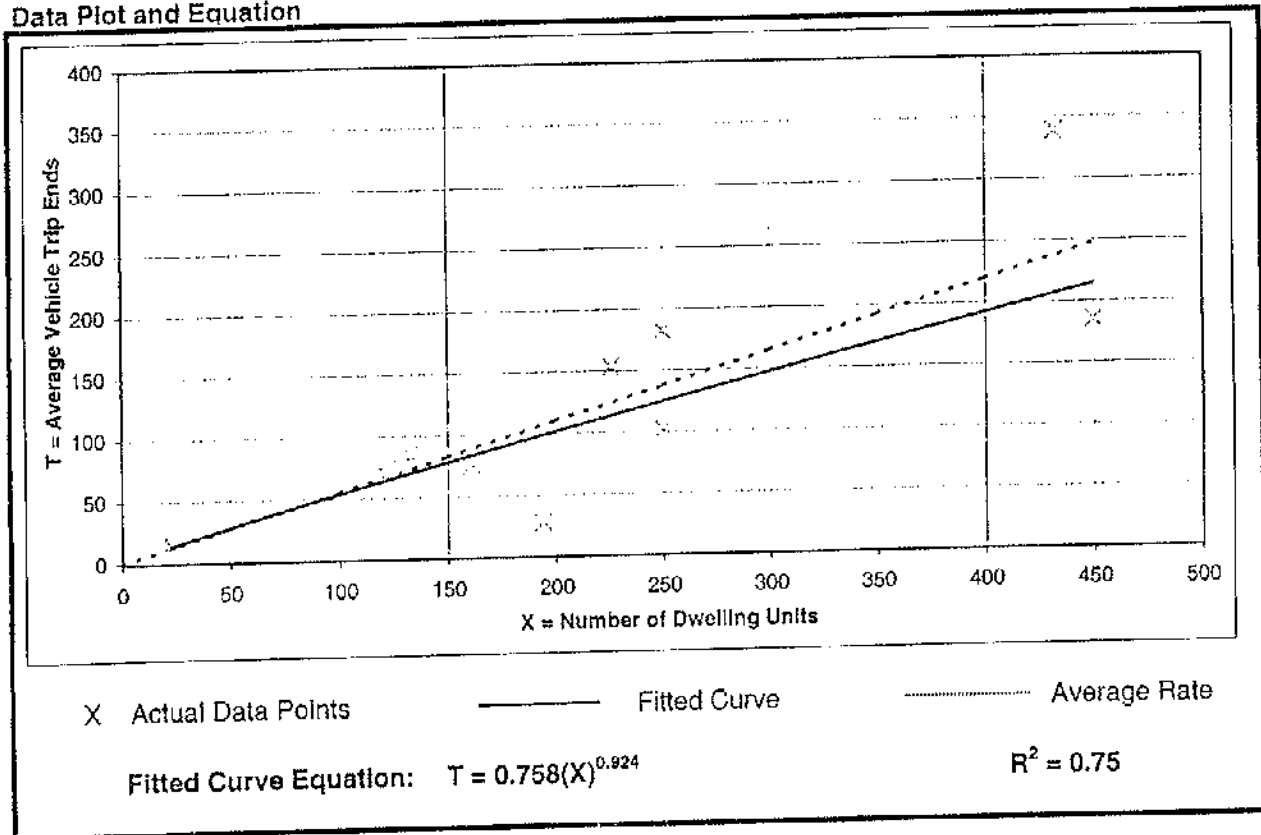
Average Vehicle Trip Ends vs: Dwelling Units
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.

Number of Studies: 13
 Average Number of Dwelling Units: 193
 Directional Distribution: 22% entering, 78% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.55	0.14 - 0.78	0.18

Data Plot and Equation



Local Apartment Trip Generation Study

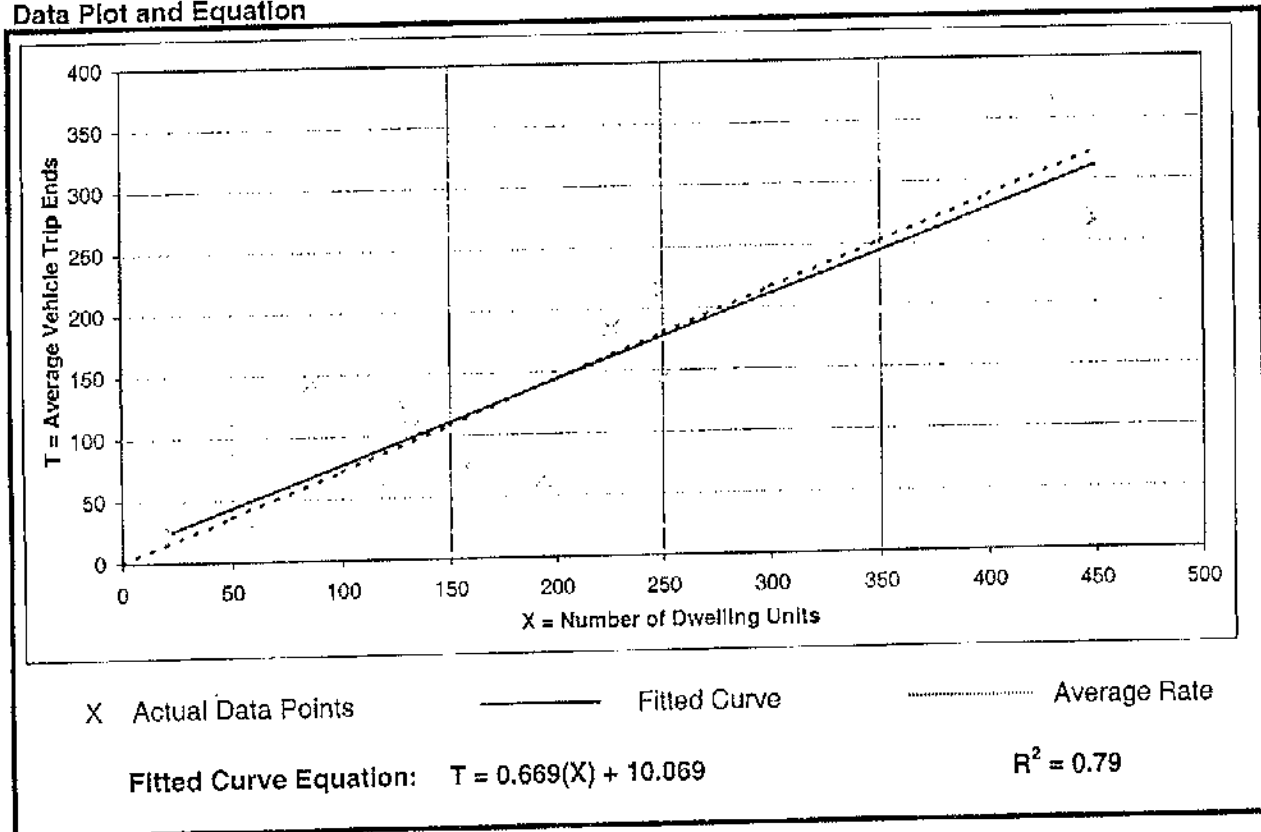
Average Vehicle Trip Ends vs: Dwelling Units
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.

Number of Studies: 13
 Average Number of Dwelling Units: 193
 Directional Distribution: 55% entering, 45% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.72	0.32 - 1.66	0.25

Data Plot and Equation



APPENDIX C – CAPACITY ANALYSES

CAPACITY AND LEVEL-OF-SERVICE CONCEPTS

In a general sense, a roadway is similar to a pipeline or other material carrying conduit in that it has a certain capacity for the amount of material (vehicles) that it can efficiently carry. As the number of vehicles in a given time period gradually increases, the quality of traffic flow gradually decreases. On roadway sections this results in increasing turbulence in the traffic stream, and at intersections it results in increasing stops and delay. As the volumes begin to approach the capacity of the facility, these problems rapidly magnify, with resulting serious levels of congestion, stops, delay, excess fuel consumption, pollutant emissions, etc.

The Transportation Research Board has published the Year 2010 Highway Capacity Manual (HCM2010), which establishes theoretical techniques to quantify the capacity conditions on all types of roadways, intersections, ramps, pedestrian facilities, etc. A basic concept that is applicable to most of these techniques is the idea of level of service (LOS). This concept establishes a rating system that quantifies the quality of traffic flow, as perceived by motorists and/or passengers. The general system is similar to a school grade scale, and is outlined as follows:

Level of Service (LOS)	General Quality of Traffic Flow	Description of Corresponding Conditions
A	Excellent	Roadways – Free flow, high maneuverability Intersections – Very few stops, very low delay
B	Very Good	Roadways – Free flow, slightly lower maneuverability Intersections – Minor stops, low delay
C	Good	Roadways – Stable flow, restricted maneuverability Intersections – Significant stops, significant delay
D	Fair	Roadways – Marginally stable flow, congestion seriously restricts maneuverability Intersections – High stops, long but tolerable delay
E	Poor	Roadways – Unstable flow*, lower operating speeds, congestion severely restricts maneuverability Intersections – All vehicles stop, very long queues and very long intolerable delay
F	Very Poor	Roadways – Forced flow, stoppages may be lengthy, congestion severely restricts maneuverability Intersections – All vehicles stop, extensive queues and extremely long intolerable delay

*Unstable flow is such that minor fluctuations or disruptions can result in rapid degradation to LOS F.

LOS CRITERIA: SIGNALIZED & UNSIGNALIZED INTERSECTIONS

LOS	CONTROL DELAY (S/VEH)		
	SIGNALIZED	UNSIGNALIZED	ROUNDBABOUT
A	≤10	≤10	≤10
B	>10-20	>10-15	>10-15
C	>20-35	>15-25	>15-25
D	>35-55	>25-35	>25-35
E	>55-80	>35-50	>35-50
F	>80	>50	>50

Another measure of intersection capacity that is often used in the evaluation of intersection operations is the volume to capacity (V/C) ratio. This ratio is defined as “the ratio of flow rate to capacity”, and is a good measure of how much of an intersection’s available capacity has been used up by the analysis volumes. Conversely, it also provides an indication of the reserve capacity available for future growth in traffic volumes.

The Intersection Capacity Utilization (ICU) is another measure that expresses a value similar to the V/C ratio. Specifically, the ICU method “sums the amount of the time required to serve all movements at saturation for a given cycle length and divides by that reference cycle length.” The ICU is considered a more accurate measure of volume to capacity conditions for a signalized intersection, primarily because it accounts for the effects of the signal timing on intersection capacity.

Lanes, Volumes, Timings
 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2023 Existing AM Peak
 2023 Existing



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	574	533	523	934	239	115	8	138	157	179	86
Future Volume (vph)	50	574	533	523	934	239	115	8	138	157	179	86
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.969			0.865	0.850		0.951	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3429	0	1770	1531	1504	1770	1771	0
Flt Permitted	0.950			0.423								
Satd. Flow (perm)	1770	3539	1583	1529	3429	0	1863	1531	1504	1863	1771	0
Satd. Flow (RTOR)			169		38			70	164		19	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)									48%			
Lane Group Flow (vph)	53	604	561	551	1235	0	121	78	75	165	279	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	15.0	37.0	15.0	35.0	57.0		15.0	23.0	35.0	15.0	23.0	
Total Split (%)	13.6%	33.6%	13.6%	31.8%	51.8%		13.6%	20.9%	31.8%	13.6%	20.9%	
Maximum Green (s)	9.0	30.0	8.5	29.0	50.0		8.5	16.5	29.0	8.5	16.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	6.8	30.0	45.5	55.4	54.4		14.9	14.4	42.6	19.5	16.5	
Actuated g/C Ratio	0.06	0.27	0.41	0.50	0.49		0.14	0.13	0.39	0.18	0.15	
v/c Ratio	0.49	0.63	0.75	0.43	0.72		0.48	0.30	0.11	0.50	0.99	
Control Delay	64.1	38.5	25.8	20.1	21.9		50.2	15.2	0.3	48.7	96.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	64.1	38.5	25.8	20.1	21.9		50.2	15.2	0.3	48.7	96.4	
LOS	E	D	C	C	C		D	B	A	D	F	
Approach Delay		33.8			21.4			26.6			78.7	
Approach LOS		C			C			C			E	
Queue Length 50th (ft)	37	196	236	101	395		79	5	0	110	187	
Queue Length 95th (ft)	77	258	381	127	463		139	50	0	181	#361	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	144	965	753	1271	1713		250	289	683	327	281	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.37	0.63	0.75	0.43	0.72		0.48	0.27	0.11	0.50	0.99	

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 51 (46%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 32.6	Intersection LOS: C
Intersection Capacity Utilization 80.3%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2023 Existing AM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road

2023 Existing



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	685	173	0	1153	181	554	0	491	0	0	0
Future Volume (vph)	0	685	173	0	1153	181	554	0	491	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Frt		0.970				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		47				162			363			
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	913	0	0	1227	193	589	0	522	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		70.0			70.0		40.0		40.0			
Total Split (%)		63.6%			63.6%		36.4%		36.4%			
Maximum Green (s)		63.0			63.0		33.5		33.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		73.9			73.9	110.0	22.6		22.6			
Actuated g/C Ratio		0.67			0.67	1.00	0.21		0.21			
v/c Ratio		0.39			0.52	0.12	0.84		0.61			
Control Delay		7.9			10.6	0.2	52.7		14.3			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		7.9			10.6	0.2	52.7		14.3			
LOS		A			B	A	D		B			
Approach Delay		7.9			9.1			34.7				
Approach LOS		A			A			C				
Queue Length 50th (ft)		81			206	0	207		53			
Queue Length 95th (ft)		108			303	0	253		106			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		2321			2377	1583	1045		1101			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			0	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.39			0.52	0.12	0.56		0.47			

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 98 (89%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 17.1

Intersection LOS: B

Intersection Capacity Utilization 56.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings
3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2023 Existing AM Peak
2023 Existing



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↕	↖	↗	↕	↖	↗	↕	↖	↗	↕	↖
Traffic Volume (vph)	199	810	49	99	1050	97	102	45	88	71	29	86
Future Volume (vph)	199	810	49	99	1050	97	102	45	88	71	29	86
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.981		0.950	0.980	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1736	1583	1681	1734	1583
Flt Permitted	0.172			0.271			0.950	0.981		0.950	0.980	
Satd. Flow (perm)	622	3539	1583	505	3539	1583	1681	1736	1583	1681	1734	1583
Satd. Flow (RTOR)			198			198			119			119
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							29%			30%		
Lane Group Flow (vph)	216	880	53	108	1141	105	79	81	96	54	55	93
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	64.0	64.0	15.0	64.0	64.0	16.0	16.0	15.0	15.0	15.0	15.0
Total Split (%)	13.6%	58.2%	58.2%	13.6%	58.2%	58.2%	14.5%	14.5%	13.6%	13.6%	13.6%	13.6%
Maximum Green (s)	8.0	57.0	57.0	8.5	57.0	57.0	8.0	8.0	8.5	7.0	7.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	68.9	61.9	61.9	69.0	61.5	61.5	7.6	7.6	22.7	6.7	6.7	13.3
Actuated g/C Ratio	0.63	0.56	0.56	0.63	0.56	0.56	0.07	0.07	0.21	0.06	0.06	0.12
v/c Ratio	0.38	0.44	0.05	0.27	0.58	0.11	0.68	0.68	0.23	0.53	0.52	0.32
Control Delay	8.8	15.9	0.1	8.6	18.4	0.2	78.1	76.9	5.2	69.2	67.9	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	15.9	0.1	8.6	18.4	0.2	78.1	76.9	5.2	69.2	67.9	5.5
LOS	A	B	A	A	B	A	E	E	A	E	E	A
Approach Delay		13.8			16.2			50.4			39.5	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	26	194	0	25	283	0	57	60	0	40	40	0
Queue Length 95th (ft)	40	254	0	45	358	0	#133	#133	29	#89	#88	22
Internal Link Dist (ft)		572			1009			394			520	
Turn Bay Length (ft)	210		100	90		185	255					420
Base Capacity (vph)	600	1992	977	421	1977	971	123	127	440	106	110	309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.44	0.05	0.26	0.58	0.11	0.64	0.64	0.22	0.51	0.50	0.30

Lanes, Volumes, Timings
3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2023 Existing AM Peak
 2023 Existing

Intersection Summary

Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 91 (83%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 19.8 Intersection LOS: B
 Intersection Capacity Utilization 63.7% ICU Level of Service B
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

 Ø1 15 s	 Ø2 (R) 64 s	 Ø4 15 s	 Ø3 16 s
 Ø5 15 s	 Ø6 (R) 64 s		

Lanes, Volumes, Timings

2023 Existing PM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2023 Existing

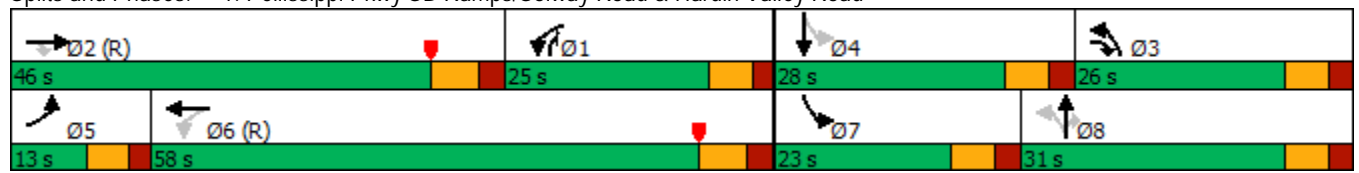


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	441	446	432	871	303	178	4	278	192	178	103
Future Volume (vph)	88	441	446	432	871	303	178	4	278	192	178	103
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.961			0.854	0.850		0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3401	0	1770	1511	1504	1770	1760	0
Flt Permitted	0.950			0.481			0.645			0.645		
Satd. Flow (perm)	1770	3539	1583	1738	3401	0	1201	1511	1504	1201	1760	0
Satd. Flow (RTOR)			189		47			147	152		20	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	95	474	480	465	1263	0	191	151	152	206	302	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	13.0	46.0	26.0	25.0	58.0		26.0	31.0	25.0	23.0	28.0	
Total Split (%)	10.4%	36.8%	20.8%	20.0%	46.4%		20.8%	24.8%	20.0%	18.4%	22.4%	
Maximum Green (s)	7.0	39.0	19.5	19.0	51.0		19.5	24.5	19.0	16.5	21.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	8.3	42.3	65.9	54.0	53.0		22.8	22.8	42.3	21.1	21.1	
Actuated g/C Ratio	0.07	0.34	0.53	0.43	0.42		0.18	0.18	0.34	0.17	0.17	
v/c Ratio	0.81	0.40	0.52	0.46	0.86		0.65	0.38	0.25	0.76	0.96	
Control Delay	101.6	33.6	13.3	31.4	40.2		58.9	10.2	3.3	67.9	91.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	101.6	33.6	13.3	31.4	40.2		58.9	10.2	3.3	67.9	91.1	
LOS	F	C	B	C	D		E	B	A	E	F	
Approach Delay		30.5			37.8			26.9			81.7	
Approach LOS		C			D			C			F	
Queue Length 50th (ft)	78	159	144	159	518		141	3	0	158	230	
Queue Length 95th (ft)	#191	211	238	180	#611		220	63	29	#268	#409	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	117	1198	906	1008	1470		335	414	609	277	319	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.81	0.40	0.53	0.46	0.86		0.57	0.36	0.25	0.74	0.95	

Intersection Summary

Cycle Length: 125	
Actuated Cycle Length: 125	
Offset: 32 (26%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 40.3	Intersection LOS: D
Intersection Capacity Utilization 85.8%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2023 Existing PM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road

2023 Existing



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	768	131	0	1027	197	584	0	508	0	0	0
Future Volume (vph)	0	768	131	0	1027	197	584	0	508	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Frt		0.978				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3461	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3461	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		26				174			325			
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	927	0	0	1059	203	602	0	524	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		80.0			80.0		45.0		45.0			
Total Split (%)		64.0%			64.0%		36.0%		36.0%			
Maximum Green (s)		73.0			73.0		38.5		38.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		85.8			85.8	125.0	25.7		25.7			
Actuated g/C Ratio		0.69			0.69	1.00	0.21		0.21			
v/c Ratio		0.39			0.44	0.13	0.85		0.63			
Control Delay		9.0			10.0	0.2	59.7		19.6			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		9.0			10.0	0.2	59.7		19.6			
LOS		A			A	A	E		B			
Approach Delay		9.0			8.4			41.0				
Approach LOS		A			A			D				
Queue Length 50th (ft)		131			184	0	243		80			
Queue Length 95th (ft)		178			265	0	292		137			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		2382			2427	1583	1057		1083			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			68	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.39			0.45	0.13	0.57		0.48			

Intersection Summary

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 67 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 19.7

Intersection LOS: B

Intersection Capacity Utilization 54.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings
 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2023 Existing PM Peak
 2023 Existing



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↗↗	↖	↖	↗↗	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	91	1044	40	91	946	53	74	23	161	157	32	156
Future Volume (vph)	91	1044	40	91	946	53	74	23	161	157	32	156
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.974		0.950	0.968	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1724	1583	1681	1713	1583
Flt Permitted	0.224			0.186			0.950	0.974		0.950	0.968	
Satd. Flow (perm)	809	3539	1583	346	3539	1583	1681	1724	1583	1681	1713	1583
Satd. Flow (RTOR)			175			175			105			124
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)							36%			40%		
Lane Group Flow (vph)	97	1111	43	97	1006	56	51	52	171	100	101	166
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	70.0	70.0	15.0	70.0	70.0	20.0	20.0	15.0	20.0	20.0	15.0
Total Split (%)	12.0%	56.0%	56.0%	12.0%	56.0%	56.0%	16.0%	16.0%	12.0%	16.0%	16.0%	12.0%
Maximum Green (s)	8.0	63.0	63.0	8.5	63.0	63.0	12.0	12.0	8.5	12.0	12.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	78.4	72.2	72.2	80.1	72.5	72.5	8.5	8.5	20.8	10.5	10.5	19.2
Actuated g/C Ratio	0.63	0.58	0.58	0.64	0.58	0.58	0.07	0.07	0.17	0.08	0.08	0.15
v/c Ratio	0.15	0.54	0.04	0.32	0.49	0.06	0.45	0.45	0.49	0.71	0.70	0.48
Control Delay	8.6	19.1	0.1	10.9	17.8	0.1	67.7	67.3	22.4	81.4	80.4	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	19.1	0.1	10.9	17.8	0.1	67.7	67.3	22.4	81.4	80.4	14.0
LOS	A	B	A	B	B	A	E	E	C	F	F	B
Approach Delay		17.6			16.3			39.4				50.6
Approach LOS		B			B			D				D
Queue Length 50th (ft)	13	298	0	26	257	0	42	43	46	83	84	23
Queue Length 95th (ft)	25	403	0	51	344	0	86	86	109	#156	#156	70
Internal Link Dist (ft)		572			1009			394				520
Turn Bay Length (ft)	210		100	90		185	255					420
Base Capacity (vph)	687	2044	988	323	2053	992	161	165	367	161	164	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.54	0.04	0.30	0.49	0.06	0.32	0.32	0.47	0.62	0.62	0.45

Lanes, Volumes, Timings

2024 Background AM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2024 Background

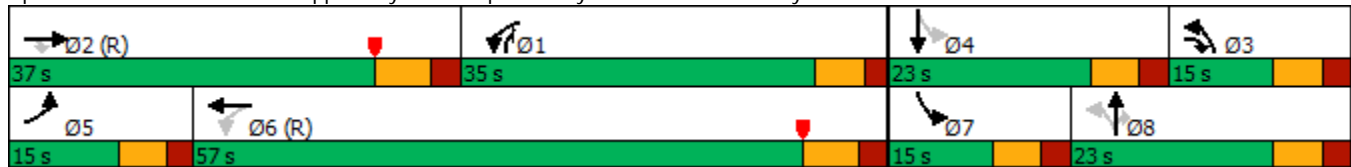


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	585	544	533	953	244	117	8	141	160	183	88
Future Volume (vph)	51	585	544	533	953	244	117	8	141	160	183	88
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.969			0.865	0.850		0.951	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3429	0	1770	1531	1504	1770	1771	0
Flt Permitted	0.950			0.419								
Satd. Flow (perm)	1770	3539	1583	1514	3429	0	1863	1531	1504	1863	1771	0
Satd. Flow (RTOR)			169		38			71	164		19	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)									48%			
Lane Group Flow (vph)	54	616	573	561	1260	0	123	79	77	168	286	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	15.0	37.0	15.0	35.0	57.0		15.0	23.0	35.0	15.0	23.0	
Total Split (%)	13.6%	33.6%	13.6%	31.8%	51.8%		13.6%	20.9%	31.8%	13.6%	20.9%	
Maximum Green (s)	9.0	30.0	8.5	29.0	50.0		8.5	16.5	29.0	8.5	16.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	6.9	30.0	45.5	55.3	54.3		14.9	14.4	42.6	19.5	16.5	
Actuated g/C Ratio	0.06	0.27	0.41	0.50	0.49		0.14	0.13	0.39	0.18	0.15	
v/c Ratio	0.49	0.64	0.76	0.44	0.74		0.49	0.30	0.11	0.51	1.02	
Control Delay	64.5	38.8	26.7	20.2	22.1		50.4	15.1	0.3	49.0	102.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	64.5	38.8	26.7	20.2	22.1		50.4	15.1	0.3	49.0	102.3	
LOS	E	D	C	C	C		D	B	A	D	F	
Approach Delay		34.4			21.5			26.6			82.6	
Approach LOS		C			C			C			F	
Queue Length 50th (ft)	38	201	246	103	407		80	5	0	112	~197	
Queue Length 95th (ft)	78	264	396	129	477		139	51	0	184	#374	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	144	965	753	1267	1713		250	290	683	327	281	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.38	0.64	0.76	0.44	0.74		0.49	0.27	0.11	0.51	1.02	

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 51 (46%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 33.4	Intersection LOS: C
Intersection Capacity Utilization 81.4%	ICU Level of Service D
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2024 Background AM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road

2024 Background

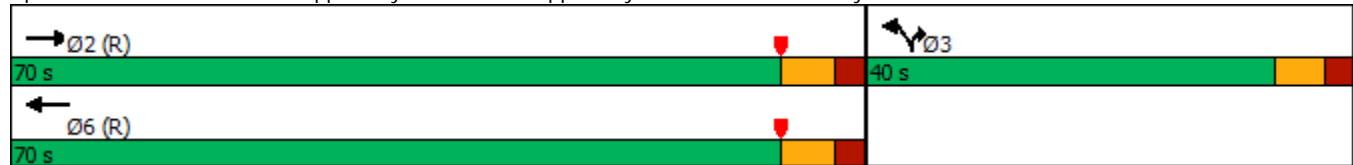


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	699	176	0	1176	185	565	0	501	0	0	0
Future Volume (vph)	0	699	176	0	1176	185	565	0	501	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Frt		0.970				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		47				163			351			
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	931	0	0	1251	197	601	0	533	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		70.0			70.0		40.0		40.0			
Total Split (%)		63.6%			63.6%		36.4%		36.4%			
Maximum Green (s)		63.0			63.0		33.5		33.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		73.5			73.5	110.0	23.0		23.0			
Actuated g/C Ratio		0.67			0.67	1.00	0.21		0.21			
v/c Ratio		0.40			0.53	0.12	0.84		0.62			
Control Delay		8.2			10.9	0.2	52.7		15.7			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		8.2			10.9	0.2	52.7		15.7			
LOS		A			B	A	D		B			
Approach Delay		8.2			9.5			35.3				
Approach LOS		A			A			D				
Queue Length 50th (ft)		83			216	0	211		62			
Queue Length 95th (ft)		156			316	0	258		115			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		2310			2365	1583	1045		1092			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			0	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.40			0.53	0.12	0.58		0.49			

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 98 (89%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 17.5	Intersection LOS: B
Intersection Capacity Utilization 57.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings
 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2024 Background AM Peak
 2024 Background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗↗	↗↗	↗	↗	↗↗	↗	↗	↗	↗	↗	↗	↗
Traffic Volume (vph)	203	826	50	101	1071	99	104	46	90	72	30	88
Future Volume (vph)	203	826	50	101	1071	99	104	46	90	72	30	88
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.981		0.950	0.980	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1736	1583	1681	1734	1583
Flt Permitted	0.165			0.262			0.950	0.981		0.950	0.980	
Satd. Flow (perm)	596	3539	1583	488	3539	1583	1681	1736	1583	1681	1734	1583
Satd. Flow (RTOR)			198			198			119			119
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							29%			30%		
Lane Group Flow (vph)	221	898	54	110	1164	108	80	83	98	55	56	96
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	64.0	64.0	15.0	64.0	64.0	16.0	16.0	15.0	15.0	15.0	15.0
Total Split (%)	13.6%	58.2%	58.2%	13.6%	58.2%	58.2%	14.5%	14.5%	13.6%	13.6%	13.6%	13.6%
Maximum Green (s)	8.0	57.0	57.0	8.5	57.0	57.0	8.0	8.0	8.5	7.0	7.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	68.9	61.9	61.9	68.9	61.4	61.4	7.7	7.7	22.7	6.7	6.7	13.4
Actuated g/C Ratio	0.63	0.56	0.56	0.63	0.56	0.56	0.07	0.07	0.21	0.06	0.06	0.12
v/c Ratio	0.40	0.45	0.06	0.28	0.59	0.11	0.68	0.69	0.23	0.54	0.53	0.32
Control Delay	9.1	16.0	0.1	8.8	18.6	0.2	78.9	78.4	5.6	69.7	68.4	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.1	16.0	0.1	8.8	18.6	0.2	78.9	78.4	5.6	69.7	68.4	5.9
LOS	A	B	A	A	B	A	E	E	A	E	E	A
Approach Delay		14.0			16.4			51.2			39.8	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	27	200	0	26	292	0	58	61	0	40	41	0
Queue Length 95th (ft)	41	261	0	46	369	0	#134	#137	30	#92	#88	23
Internal Link Dist (ft)		572			1009			394			520	
Turn Bay Length (ft)	210		100	90		185	255					420
Base Capacity (vph)	584	1990	976	411	1974	970	123	127	440	106	110	309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.45	0.06	0.27	0.59	0.11	0.65	0.65	0.22	0.52	0.51	0.31

Intersection Summary

Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 91 (83%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 20.1
 Intersection LOS: C
 Intersection Capacity Utilization 64.5%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

 Ø1 15 s	 Ø2 (R) 64 s	 Ø4 15 s	 Ø3 16 s
 Ø5 15 s	 Ø6 (R) 64 s		

Lanes, Volumes, Timings

2024 Background PM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2024 Background

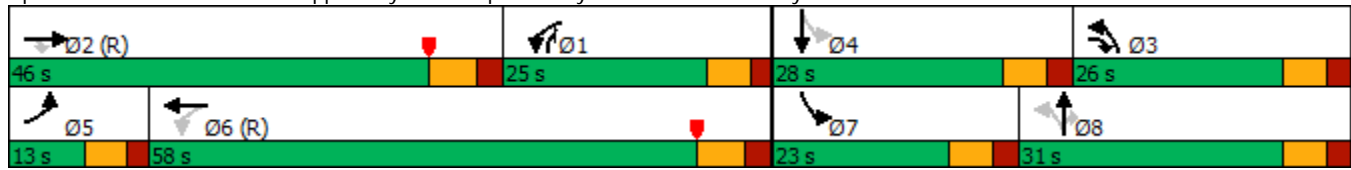


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	450	455	441	888	309	182	4	284	196	182	105
Future Volume (vph)	90	450	455	441	888	309	182	4	284	196	182	105
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.961			0.854	0.850		0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3401	0	1770	1511	1504	1770	1760	0
Flt Permitted	0.950			0.476			0.615			0.615		
Satd. Flow (perm)	1770	3539	1583	1720	3401	0	1146	1511	1504	1146	1760	0
Satd. Flow (RTOR)			180		47			149	156		20	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	97	484	489	474	1287	0	196	153	156	211	309	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	13.0	46.0	26.0	25.0	58.0		26.0	31.0	25.0	23.0	28.0	
Total Split (%)	10.4%	36.8%	20.8%	20.0%	46.4%		20.8%	24.8%	20.0%	18.4%	22.4%	
Maximum Green (s)	7.0	39.0	19.5	19.0	51.0		19.5	24.5	19.0	16.5	21.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	8.2	41.4	65.5	53.2	52.2		23.6	23.6	43.1	21.5	21.5	
Actuated g/C Ratio	0.07	0.33	0.52	0.43	0.42		0.19	0.19	0.34	0.17	0.17	
v/c Ratio	0.84	0.41	0.53	0.48	0.89		0.65	0.38	0.25	0.78	0.97	
Control Delay	106.5	34.3	14.2	32.0	42.4		58.6	10.0	3.3	69.0	91.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	106.5	34.3	14.2	32.0	42.4		58.6	10.0	3.3	69.0	91.8	
LOS	F	C	B	C	D		E	B	A	E	F	
Approach Delay		31.7			39.6			26.8			82.5	
Approach LOS		C			D			C			F	
Queue Length 50th (ft)	80	164	155	162	532		145	3	0	162	236	
Queue Length 95th (ft)	#196	215	253	180	#647		226	64	29	#278	#423	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	116	1172	908	992	1448		335	415	620	279	319	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.84	0.41	0.54	0.48	0.89		0.59	0.37	0.25	0.76	0.97	

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 32 (26%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.5
 Intersection LOS: D
 Intersection Capacity Utilization 87.1%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	783	134	0	1048	201	596	0	518	0	0	0
Future Volume (vph)	0	783	134	0	1048	201	596	0	518	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Frt		0.978				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3461	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3461	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		27				174			313			
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	945	0	0	1080	207	614	0	534	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		80.0			80.0		45.0		45.0			
Total Split (%)		64.0%			64.0%		36.0%		36.0%			
Maximum Green (s)		73.0			73.0		38.5		38.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		85.3			85.3	125.0	26.2		26.2			
Actuated g/C Ratio		0.68			0.68	1.00	0.21		0.21			
v/c Ratio		0.40			0.45	0.13	0.85		0.64			
Control Delay		9.2			10.3	0.2	59.4		21.2			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		9.2			10.3	0.2	59.4		21.2			
LOS		A			B	A	E		C			
Approach Delay		9.2			8.7			41.6				
Approach LOS		A			A			D				
Queue Length 50th (ft)		135			192	0	247		90			
Queue Length 95th (ft)		182			275	0	297		147			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		2369			2414	1583	1057		1074			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			97	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.40			0.47	0.13	0.58		0.50			

Intersection Summary

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 67 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 20.0

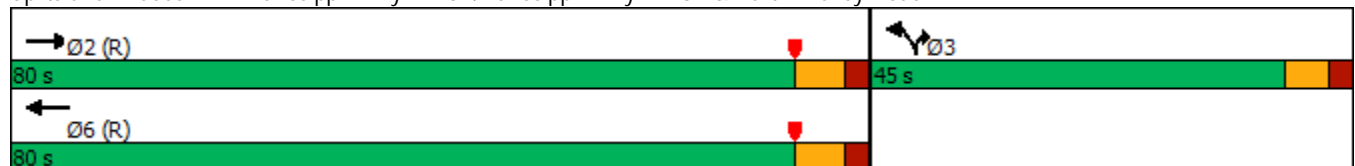
Intersection LOS: C

Intersection Capacity Utilization 55.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings
 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2024 Background PM Peak
 2024 Background





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↗↗	↖	↖	↗↗	↖	↖	↗	↖	↖	↗	↖
Traffic Volume (vph)	93	1065	41	93	965	54	75	23	164	160	33	159
Future Volume (vph)	93	1065	41	93	965	54	75	23	164	160	33	159
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.973		0.950	0.968	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1722	1583	1681	1713	1583
Flt Permitted	0.216			0.179			0.950	0.973		0.950	0.968	
Satd. Flow (perm)	781	3539	1583	333	3539	1583	1681	1722	1583	1681	1713	1583
Satd. Flow (RTOR)			175			175			105			120
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)							36%			40%		
Lane Group Flow (vph)	99	1133	44	99	1027	57	51	53	174	102	103	169
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	70.0	70.0	15.0	70.0	70.0	20.0	20.0	15.0	20.0	20.0	15.0
Total Split (%)	12.0%	56.0%	56.0%	12.0%	56.0%	56.0%	16.0%	16.0%	12.0%	16.0%	16.0%	12.0%
Maximum Green (s)	8.0	63.0	63.0	8.5	63.0	63.0	12.0	12.0	8.5	12.0	12.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	78.3	72.0	72.0	80.0	72.4	72.4	8.5	8.5	20.8	10.6	10.6	19.3
Actuated g/C Ratio	0.63	0.58	0.58	0.64	0.58	0.58	0.07	0.07	0.17	0.08	0.08	0.15
v/c Ratio	0.16	0.56	0.04	0.34	0.50	0.06	0.45	0.46	0.50	0.71	0.71	0.49
Control Delay	8.6	19.4	0.1	11.2	18.0	0.1	67.7	67.8	22.9	82.0	80.9	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	19.4	0.1	11.2	18.0	0.1	67.7	67.8	22.9	82.0	80.9	15.1
LOS	A	B	A	B	B	A	E	E	C	F	F	B
Approach Delay		17.9			16.6			39.7			51.4	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	13	308	0	27	265	0	42	44	48	85	85	27
Queue Length 95th (ft)	25	414	0	52	355	0	86	87	112	#162	#162	75
Internal Link Dist (ft)		572			1009			394			520	
Turn Bay Length (ft)	210		100	90		185	255					420
Base Capacity (vph)	669	2039	986	315	2049	990	161	165	367	161	164	366
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.56	0.04	0.31	0.50	0.06	0.32	0.32	0.47	0.63	0.63	0.46

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 53 (42%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 23.4 Intersection LOS: C
 Intersection Capacity Utilization 64.5% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

 Ø1	 Ø2 (R)	 Ø4	 Ø3
15 s	70 s	20 s	20 s
 Ø5	 Ø6 (R)		
15 s	70 s		

Lanes, Volumes, Timings

2024 Combined AM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2024 Combined

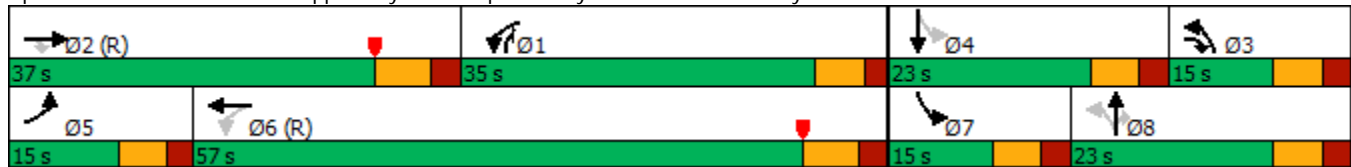


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	589	544	571	968	249	117	8	145	161	183	88
Future Volume (vph)	51	589	544	571	968	249	117	8	145	161	183	88
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.969			0.865	0.850		0.951	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3429	0	1770	1531	1504	1770	1771	0
Flt Permitted	0.950			0.417								
Satd. Flow (perm)	1770	3539	1583	1507	3429	0	1863	1531	1504	1863	1771	0
Satd. Flow (RTOR)			169		38			73	164		19	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)									48%			
Lane Group Flow (vph)	54	620	573	601	1281	0	123	81	80	169	286	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	15.0	37.0	15.0	35.0	57.0		15.0	23.0	35.0	15.0	23.0	
Total Split (%)	13.6%	33.6%	13.6%	31.8%	51.8%		13.6%	20.9%	31.8%	13.6%	20.9%	
Maximum Green (s)	9.0	30.0	8.5	29.0	50.0		8.5	16.5	29.0	8.5	16.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	6.9	30.0	45.5	55.3	54.3		14.9	14.4	42.6	19.5	16.5	
Actuated g/C Ratio	0.06	0.27	0.41	0.50	0.49		0.14	0.13	0.39	0.18	0.15	
v/c Ratio	0.49	0.64	0.76	0.48	0.75		0.49	0.31	0.12	0.52	1.02	
Control Delay	64.5	38.9	26.7	20.6	22.1		50.4	15.0	0.4	49.1	102.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	64.5	38.9	26.7	20.6	22.1		50.4	15.0	0.4	49.1	102.3	
LOS	E	D	C	C	C		D	B	A	D	F	
Approach Delay		34.4			21.6			26.2			82.6	
Approach LOS		C			C			C			F	
Queue Length 50th (ft)	38	203	246	108	399		80	5	0	113	~197	
Queue Length 95th (ft)	78	265	396	135	465		139	51	0	185	#374	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	144	965	753	1265	1713		250	291	683	327	281	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.38	0.64	0.76	0.48	0.75		0.49	0.28	0.12	0.52	1.02	

Intersection Summary

Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 51 (46%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 33.3 Intersection LOS: C
 Intersection Capacity Utilization 82.0% ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2024 Combined AM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road

2024 Combined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	708	176	0	1234	200	565	0	513	0	0	0
Future Volume (vph)	0	708	176	0	1234	200	565	0	513	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Frt		0.970				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		47				167			343			
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	940	0	0	1313	213	601	0	546	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		70.0			70.0		40.0		40.0			
Total Split (%)		63.6%			63.6%		36.4%		36.4%			
Maximum Green (s)		63.0			63.0		33.5		33.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		73.5			73.5	110.0	23.0		23.0			
Actuated g/C Ratio		0.67			0.67	1.00	0.21		0.21			
v/c Ratio		0.41			0.56	0.13	0.84		0.64			
Control Delay		8.2			11.3	0.2	52.7		17.3			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		8.2			11.3	0.2	52.7		17.3			
LOS		A			B	A	D		B			
Approach Delay		8.2			9.7			35.9				
Approach LOS		A			A			D				
Queue Length 50th (ft)		84			233	0	211		70			
Queue Length 95th (ft)		190			340	0	258		125			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		2310			2365	1583	1045		1087			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			0	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.41			0.56	0.13	0.58		0.50			

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 98 (89%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 17.6

Intersection LOS: B

Intersection Capacity Utilization 59.4%

ICU Level of Service B

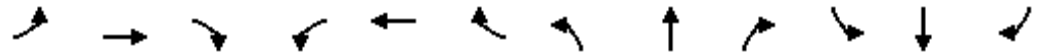
Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings
 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2024 Combined AM Peak
 2024 Combined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	203	826	71	104	1071	99	177	51	100	72	31	88
Future Volume (vph)	203	826	71	104	1071	99	177	51	100	72	31	88
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.973		0.950	0.980	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1722	1583	1681	1734	1583
Flt Permitted	0.161			0.259			0.950	0.973		0.950	0.980	
Satd. Flow (perm)	582	3539	1583	482	3539	1583	1681	1722	1583	1681	1734	1583
Satd. Flow (RTOR)			198			198			119			119
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							36%			29%		
Lane Group Flow (vph)	221	898	77	113	1164	108	123	124	109	55	57	96
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	64.0	64.0	15.0	64.0	64.0	16.0	16.0	15.0	15.0	15.0	15.0
Total Split (%)	13.6%	58.2%	58.2%	13.6%	58.2%	58.2%	14.5%	14.5%	13.6%	13.6%	13.6%	13.6%
Maximum Green (s)	8.0	57.0	57.0	8.5	57.0	57.0	8.0	8.0	8.5	7.0	7.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	67.5	60.5	60.5	67.6	60.0	60.0	9.0	9.0	24.1	6.7	6.7	13.4
Actuated g/C Ratio	0.61	0.55	0.55	0.61	0.55	0.55	0.08	0.08	0.22	0.06	0.06	0.12
v/c Ratio	0.41	0.46	0.08	0.30	0.60	0.11	0.89	0.88	0.25	0.54	0.54	0.32
Control Delay	9.4	16.6	0.2	9.0	19.2	0.2	104.5	101.1	6.9	69.7	69.0	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	16.6	0.2	9.0	19.2	0.2	104.5	101.1	6.9	69.7	69.0	5.9
LOS	A	B	A	A	B	A	F	F	A	E	E	A
Approach Delay		14.2			16.9			73.5				40.1
Approach LOS		B			B			E				D
Queue Length 50th (ft)	27	200	0	26	292	0	-93	93	0	40	42	0
Queue Length 95th (ft)	41	261	0	47	369	0	#221	#222	39	#92	#92	23
Internal Link Dist (ft)		572			1009			394				520
Turn Bay Length (ft)	210		100	90		185	255					420
Base Capacity (vph)	569	1945	959	401	1930	953	138	141	458	106	110	309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.46	0.08	0.28	0.60	0.11	0.89	0.88	0.24	0.52	0.52	0.31

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 91 (83%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 66.6%	ICU Level of Service C
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

 Ø1 15 s	 Ø2 (R) 64 s	 Ø4 15 s	 Ø3 16 s
 Ø5 15 s	 Ø6 (R) 64 s		

Lanes, Volumes, Timings

2024 Combined PM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2024 Combined

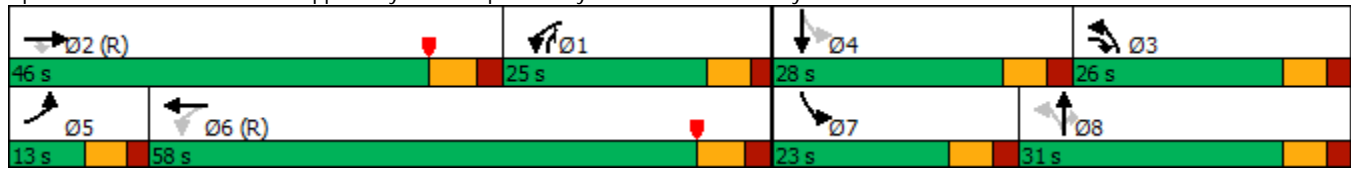


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	465	455	474	900	313	182	4	299	201	182	105
Future Volume (vph)	90	465	455	474	900	313	182	4	299	201	182	105
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.961			0.854	0.850		0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3401	0	1770	1511	1504	1770	1760	0
Flt Permitted	0.950			0.469			0.635			0.635		
Satd. Flow (perm)	1770	3539	1583	1695	3401	0	1183	1511	1504	1183	1760	0
Satd. Flow (RTOR)			170		47			158	149		20	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Shared Lane Traffic (%)								49%				
Lane Group Flow (vph)	97	500	489	510	1305	0	196	162	164	216	309	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	13.0	46.0	26.0	25.0	58.0		26.0	31.0	25.0	23.0	28.0	
Total Split (%)	10.4%	36.8%	20.8%	20.0%	46.4%		20.8%	24.8%	20.0%	18.4%	22.4%	
Maximum Green (s)	7.0	39.0	19.5	19.0	51.0		19.5	24.5	19.0	16.5	21.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	8.1	41.2	65.5	53.1	52.1		23.6	23.6	43.1	21.5	21.5	
Actuated g/C Ratio	0.06	0.33	0.52	0.42	0.42		0.19	0.19	0.34	0.17	0.17	
v/c Ratio	0.85	0.43	0.54	0.52	0.90		0.64	0.39	0.27	0.79	0.97	
Control Delay	108.8	34.7	14.7	33.0	43.2		58.1	10.0	4.2	69.9	91.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	108.8	34.7	14.7	33.0	43.2		58.1	10.0	4.2	69.9	91.8	
LOS	F	C	B	C	D		E	A	A	E	F	
Approach Delay		32.3			40.4			26.2			82.8	
Approach LOS		C			D			C			F	
Queue Length 50th (ft)	80	170	162	175	541		145	3	5	167	236	
Queue Length 95th (ft)	#196	222	260	192	#663		226	65	35	#287	#423	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	114	1167	902	984	1445		335	423	615	280	319	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.85	0.43	0.54	0.52	0.90		0.59	0.38	0.27	0.77	0.97	

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 32 (26%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.9
 Intersection LOS: D
 Intersection Capacity Utilization 87.6%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2024 Combined PM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road

2024 Combined

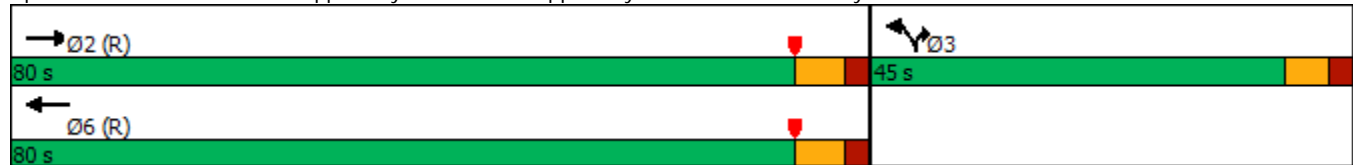


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	818	134	0	1097	213	596	0	556	0	0	0
Future Volume (vph)	0	818	134	0	1097	213	596	0	556	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Frt		0.979				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3465	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3465	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		25				177			288			
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	981	0	0	1131	220	614	0	573	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		80.0			80.0		45.0		45.0			
Total Split (%)		64.0%			64.0%		36.0%		36.0%			
Maximum Green (s)		73.0			73.0		38.5		38.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		85.3			85.3	125.0	26.2		26.2			
Actuated g/C Ratio		0.68			0.68	1.00	0.21		0.21			
v/c Ratio		0.41			0.47	0.14	0.85		0.71			
Control Delay		9.2			10.6	0.2	59.4		26.7			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		9.2			10.6	0.2	59.4		26.7			
LOS		A			B	A	E		C			
Approach Delay		9.2			8.9			43.6				
Approach LOS		A			A			D				
Queue Length 50th (ft)		141			205	0	247		122			
Queue Length 95th (ft)		190			294	0	297		182			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		2371			2414	1583	1057		1057			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			118	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.41			0.49	0.14	0.58		0.54			

Intersection Summary

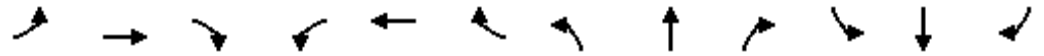
Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 67 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 20.7
 Intersection LOS: C
 Intersection Capacity Utilization 57.6%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings
 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2024 Combined PM Peak
 2024 Combined





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗↗	↗↗	↗	↖	↖↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	93	1065	114	103	965	54	136	27	172	160	38	159
Future Volume (vph)	93	1065	114	103	965	54	136	27	172	160	38	159
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950	0.970	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1713	1583	1681	1717	1583
Flt Permitted	0.209			0.170			0.950	0.968		0.950	0.970	
Satd. Flow (perm)	755	3539	1583	317	3539	1583	1681	1713	1583	1681	1717	1583
Satd. Flow (RTOR)			175			175			105			105
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)							40%			39%		
Lane Group Flow (vph)	99	1133	121	110	1027	57	87	87	183	104	106	169
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	70.0	70.0	15.0	70.0	70.0	20.0	20.0	15.0	20.0	20.0	15.0
Total Split (%)	12.0%	56.0%	56.0%	12.0%	56.0%	56.0%	16.0%	16.0%	12.0%	16.0%	16.0%	12.0%
Maximum Green (s)	8.0	63.0	63.0	8.5	63.0	63.0	12.0	12.0	8.5	12.0	12.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	73.9	67.5	67.5	75.8	68.0	68.0	10.0	10.0	25.3	10.7	10.7	18.1
Actuated g/C Ratio	0.59	0.54	0.54	0.61	0.54	0.54	0.08	0.08	0.20	0.09	0.09	0.14
v/c Ratio	0.17	0.59	0.13	0.40	0.53	0.06	0.65	0.64	0.45	0.73	0.73	0.53
Control Delay	9.5	21.8	0.9	13.2	20.3	0.1	77.6	76.3	22.0	83.0	82.5	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.5	21.8	0.9	13.2	20.3	0.1	77.6	76.3	22.0	83.0	82.5	18.4
LOS	A	C	A	B	C	A	E	E	C	F	F	B
Approach Delay		19.1			18.7			48.8				54.1
Approach LOS		B			B			D				D
Queue Length 50th (ft)	14	327	0	32	279	0	72	72	53	86	88	34
Queue Length 95th (ft)	25	414	8	57	359	0	130	130	121	#167	#167	84
Internal Link Dist (ft)		572			1009			394				520
Turn Bay Length (ft)	210		100	90		185	255					420
Base Capacity (vph)	627	1910	935	293	1924	940	161	164	417	161	164	337
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.59	0.13	0.38	0.53	0.06	0.54	0.53	0.44	0.65	0.65	0.50

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 53 (42%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 26.2 Intersection LOS: C
 Intersection Capacity Utilization 65.2% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

 Ø1 15 s	 Ø2 (R) 70 s	 Ø4 20 s	 Ø3 20 s
 Ø5 15 s	 Ø6 (R) 70 s		

Lanes, Volumes, Timings

2024 Combined with Mitigation AM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2024 Combined with Mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	589	544	571	968	249	117	8	145	161	183	88
Future Volume (vph)	51	589	544	571	968	249	117	8	145	161	183	88
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Fr _t			0.850		0.969			0.865	0.850		0.951	
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3429	0	1770	1531	1504	1770	1771	0
Fl _t Permitted	0.950			0.297			0.392			0.514		
Satd. Flow (perm)	1770	3539	1583	1073	3429	0	730	1531	1504	957	1771	0
Satd. Flow (RTOR)			196		32			73	95		18	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)									48%			
Lane Group Flow (vph)	54	620	573	601	1281	0	123	81	80	169	286	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	11.0	43.1	24.5	24.0	56.1		24.5	30.2	24.0	22.7	28.4	
Total Split (%)	9.2%	35.9%	20.4%	20.0%	46.8%		20.4%	25.2%	20.0%	18.9%	23.7%	
Maximum Green (s)	5.0	36.1	18.0	18.0	49.1		18.0	23.7	18.0	16.2	21.9	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	6.5	48.1	65.0	69.2	57.9		26.9	18.2	36.3	34.9	21.9	
Actuated g/C Ratio	0.05	0.40	0.54	0.58	0.48		0.22	0.15	0.30	0.29	0.18	
v/c Ratio	0.56	0.44	0.61	0.67	0.77		0.50	0.28	0.15	0.44	0.85	
Control Delay	77.7	29.4	16.2	15.6	26.7		37.1	13.6	3.9	33.1	66.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	77.7	29.4	16.2	15.6	26.7		37.1	13.6	3.9	33.1	66.4	
LOS	E	C	B	B	C		D	B	A	C	E	
Approach Delay		25.4			23.2			21.0			54.1	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	41	184	194	122	394		69	5	0	97	201	
Queue Length 95th (ft)	#115	275	351	185	#531		106	50	25	141	#300	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	96	1419	1041	973	1671		367	360	567	421	363	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.56	0.44	0.55	0.62	0.77		0.34	0.23	0.14	0.40	0.79	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 2 (2%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 27.4	Intersection LOS: C
Intersection Capacity Utilization 82.0%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	













Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2024 Combined with Mitigation AM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road 2024 Combined with Mitigation

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	708	176	0	1234	200	565	0	513	0	0	0
Future Volume (vph)	0	708	176	0	1234	200	565	0	513	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Fr't		0.970				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3433	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		73				213			265			
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	940	0	0	1313	213	601	0	546	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		37.0			37.0		23.0		23.0			
Total Split (%)		61.7%			61.7%		38.3%		38.3%			
Maximum Green (s)		30.0			30.0		16.5		16.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effect Green (s)		32.9			32.9	60.0	13.6		13.6			
Actuated g/C Ratio		0.55			0.55	1.00	0.23		0.23			
v/c Ratio		0.49			0.68	0.13	0.77		0.65			
Control Delay		6.3			12.5	0.2	28.9		14.2			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		6.3			12.5	0.2	28.9		14.2			
LOS		A			B	A	C		B			
Approach Delay		6.3			10.8			21.9				
Approach LOS		A			B			C				
Queue Length 50th (ft)		86			163	0	104		49			
Queue Length 95th (ft)		125			256	0	144		92			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		1916			1941	1583	944		958			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			0	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.49			0.68	0.13	0.64		0.57			

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 13.1

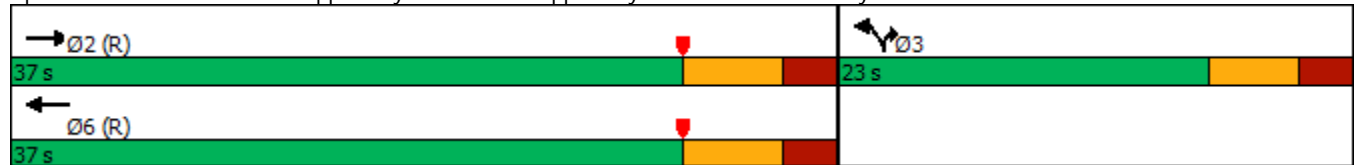
Intersection LOS: B

Intersection Capacity Utilization 59.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings

2024 Combined with Mitigation AM Peak

3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2024 Combined with Mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↗↗	↖	↖	↗↗	↖	↖	↗	↖	↖	↗	↖
Traffic Volume (vph)	203	826	71	104	1071	99	177	51	100	72	31	88
Future Volume (vph)	203	826	71	104	1071	99	177	51	100	72	31	88
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.973		0.950	0.980	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1722	1583	1681	1734	1583
Flt Permitted	0.158			0.253			0.950	0.973		0.950	0.980	
Satd. Flow (perm)	571	3539	1583	471	3539	1583	1681	1722	1583	1681	1734	1583
Satd. Flow (RTOR)			182			182			109			109
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							36%			29%		
Lane Group Flow (vph)	221	898	77	113	1164	108	123	124	109	55	57	96
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	15.0	63.0	63.0	16.0	64.0	64.0	24.0	24.0	16.0	17.0	17.0	15.0
Total Split (%)	12.5%	52.5%	52.5%	13.3%	53.3%	53.3%	20.0%	20.0%	13.3%	14.2%	14.2%	12.5%
Maximum Green (s)	8.0	56.0	56.0	9.5	57.0	57.0	16.0	16.0	9.5	9.0	9.0	8.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	72.6	65.3	65.3	73.2	65.1	65.1	12.6	12.6	28.2	7.8	7.8	14.7
Actuated g/C Ratio	0.60	0.54	0.54	0.61	0.54	0.54	0.10	0.10	0.24	0.06	0.06	0.12
v/c Ratio	0.42	0.47	0.08	0.31	0.61	0.11	0.70	0.69	0.24	0.50	0.50	0.33
Control Delay	11.6	19.4	0.2	11.3	22.2	0.3	72.1	70.7	7.5	69.8	69.6	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.6	19.4	0.2	11.3	22.2	0.3	72.1	70.7	7.5	69.8	69.6	6.9
LOS	B	B	A	B	C	A	E	E	A	E	E	A
Approach Delay		16.8			19.6			51.8			40.7	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	32	230	0	32	335	0	97	98	0	44	45	0
Queue Length 95th (ft)	53	317	0	61	440	0	163	164	43	90	92	27
Internal Link Dist (ft)		572			1009			394			520	
Turn Bay Length (ft)	210		100	190		185	255					420
Base Capacity (vph)	541	1926	944	397	1919	941	224	229	478	126	130	299
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.47	0.08	0.28	0.61	0.11	0.55	0.54	0.23	0.44	0.44	0.32

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 23.6







Intersection LOS: C

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

 Ø1 15 s	 Ø2 (R) 64 s	 Ø4 17 s	 Ø3 24 s
 Ø5 16 s	 Ø6 (R) 63 s		

Lanes, Volumes, Timings

2024 Combined with Mitigation PM Peak

1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road

2024 Combined with Mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	465	455	474	900	313	182	4	299	201	182	105
Future Volume (vph)	90	465	455	474	900	313	182	4	299	201	182	105
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850		0.961			0.854	0.850		0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3401	0	1770	1511	1504	1770	1760	0
Flt Permitted	0.950			0.376			0.220			0.516		
Satd. Flow (perm)	1770	3539	1583	1359	3401	0	410	1511	1504	961	1760	0
Satd. Flow (RTOR)			214		53			158	164		23	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Shared Lane Traffic (%)								49%				
Lane Group Flow (vph)	97	500	489	510	1305	0	196	162	164	216	309	0
Turn Type	Prot	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2	6			8		8	4		
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0	5.0	5.0	15.0		5.0	6.0	5.0	5.0	6.0	
Minimum Split (s)	11.0	22.0	11.5	11.0	22.0		11.5	12.5	11.0	11.5	12.5	
Total Split (s)	13.0	46.0	19.0	19.0	52.0		19.0	24.6	19.0	20.4	26.0	
Total Split (%)	11.8%	41.8%	17.3%	17.3%	47.3%		17.3%	22.4%	17.3%	18.5%	23.6%	
Maximum Green (s)	7.0	39.0	12.5	13.0	45.0		12.5	18.1	13.0	13.9	19.5	
Yellow Time (s)	4.0	4.5	4.0	4.0	4.5		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.5	2.5	2.0	2.5		2.5	2.5	2.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	6.5	6.0	7.0		6.5	6.5	6.0	6.5	6.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	2.0	1.0	1.0	2.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None	None	None	None	
Act Effect Green (s)	7.0	41.8	60.1	58.9	46.4		29.8	18.5	36.6	31.5	19.4	
Actuated g/C Ratio	0.06	0.38	0.55	0.54	0.42		0.27	0.17	0.33	0.29	0.18	
v/c Ratio	0.87	0.37	0.51	0.54	0.89		0.78	0.42	0.27	0.59	0.94	
Control Delay	108.0	26.4	10.6	14.0	33.7		49.8	10.5	5.2	34.8	78.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	108.0	26.4	10.6	14.0	33.7		49.8	10.5	5.2	34.8	78.9	
LOS	F	C	B	B	C		D	B	A	C	E	
Approach Delay		26.6			28.2			23.6			60.8	
Approach LOS		C			C			C			E	
Queue Length 50th (ft)	69	136	111	97	363		100	2	0	112	202	
Queue Length 95th (ft)	#169	185	202	130	#574		#185	64	48	177	#373	
Internal Link Dist (ft)		972			628			436			569	
Turn Bay Length (ft)	85		130	475			270		250	120		
Base Capacity (vph)	112	1344	976	990	1463		270	388	627	393	336	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.87	0.37	0.50	0.52	0.89		0.73	0.42	0.26	0.55	0.92	

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 6 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 31.5	Intersection LOS: C
Intersection Capacity Utilization 87.6%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	













Splits and Phases: 1: Pellissippi Pkwy SB Ramps/Solway Road & Hardin Valley Road



Lanes, Volumes, Timings

2024 Combined with Mitigation PM Peak

2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road 2024 Combined with Mitigation

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑	↑↑		↑↑			
Traffic Volume (vph)	0	818	134	0	1097	213	596	0	556	0	0	0
Future Volume (vph)	0	818	134	0	1097	213	596	0	556	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	1.00	0.88	1.00	1.00	1.00
Fr't		0.979				0.850			0.850			
Flt Protected							0.950					
Satd. Flow (prot)	0	3465	0	0	3539	1583	3433	0	2787	0	0	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	3465	0	0	3539	1583	3433	0	2787	0	0	0
Satd. Flow (RTOR)		44				220			164			
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	981	0	0	1131	220	614	0	573	0	0	0
Turn Type		NA			NA	Free	Prot		Prot			
Protected Phases		2			6		3		3			
Permitted Phases						Free						
Detector Phase		2			6		3		3			
Switch Phase												
Minimum Initial (s)		15.0			15.0		8.0		8.0			
Minimum Split (s)		22.0			22.0		14.5		14.5			
Total Split (s)		32.0			32.0		23.0		23.0			
Total Split (%)		58.2%			58.2%		41.8%		41.8%			
Maximum Green (s)		25.0			25.0		16.5		16.5			
Yellow Time (s)		4.5			4.5		4.0		4.0			
All-Red Time (s)		2.5			2.5		2.5		2.5			
Lost Time Adjust (s)		0.0			0.0		0.0		0.0			
Total Lost Time (s)		7.0			7.0		6.5		6.5			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0			2.0		1.0		1.0			
Recall Mode		C-Max			C-Max		None		None			
Act Effct Green (s)		28.4			28.4	55.0	13.1		13.1			
Actuated g/C Ratio		0.52			0.52	1.00	0.24		0.24			
v/c Ratio		0.54			0.62	0.14	0.75		0.73			
Control Delay		5.6			12.0	0.2	25.4		19.1			
Queue Delay		0.0			0.0	0.0	0.0		0.0			
Total Delay		5.6			12.0	0.2	25.4		19.1			
LOS		A			B	A	C		B			
Approach Delay		5.6			10.1			22.3				
Approach LOS		A			B			C				
Queue Length 50th (ft)		56			126	0	95		67			
Queue Length 95th (ft)		83			208	0	131		109			
Internal Link Dist (ft)		628			430			686			596	
Turn Bay Length (ft)						390	385		385			
Base Capacity (vph)		1810			1827	1583	1029		950			
Starvation Cap Reductn		0			0	0	0		0			
Spillback Cap Reductn		0			0	0	0		0			
Storage Cap Reductn		0			0	0	0		0			
Reduced v/c Ratio		0.54			0.62	0.14	0.60		0.60			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 13.0

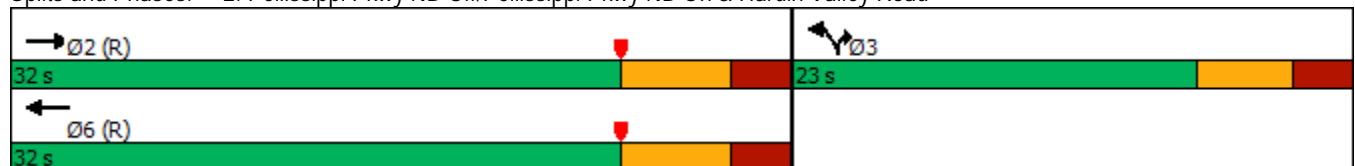
Intersection LOS: B

Intersection Capacity Utilization 57.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Pellissippi Pkwy NB Off/Pellissippi Pkwy NB On & Hardin Valley Road



Lanes, Volumes, Timings

2024 Combined with Mitigation PM Peak

3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

2024 Combined with Mitigation



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	1065	114	103	965	54	136	27	172	160	38	159
Future Volume (vph)	93	1065	114	103	965	54	136	27	172	160	38	159
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950	0.970	
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1681	1713	1583	1681	1717	1583
Flt Permitted	0.196			0.150			0.950	0.968		0.950	0.970	
Satd. Flow (perm)	708	3539	1583	279	3539	1583	1681	1713	1583	1681	1717	1583
Satd. Flow (RTOR)			193			193			119			119
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)							40%			39%		
Lane Group Flow (vph)	99	1133	121	110	1027	57	87	87	183	104	106	169
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3	5	4	4	1
Permitted Phases	6		6	2		2			3			4
Detector Phase	1	6	6	5	2	2	3	3	5	4	4	1
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	17.0	17.0	12.5	17.0	17.0	14.0	14.0	12.5	14.0	14.0	13.0
Total Split (s)	17.0	54.4	54.4	16.6	54.0	54.0	19.0	19.0	16.6	20.0	20.0	17.0
Total Split (%)	15.5%	49.5%	49.5%	15.1%	49.1%	49.1%	17.3%	17.3%	15.1%	18.2%	18.2%	15.5%
Maximum Green (s)	10.0	47.4	47.4	10.1	47.0	47.0	11.0	11.0	10.1	12.0	12.0	10.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	4.0	4.0	4.5
All-Red Time (s)	2.5	2.5	2.5	2.0	2.5	2.5	4.0	4.0	2.0	4.0	4.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	6.5	7.0	7.0	8.0	8.0	6.5	8.0	8.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	59.8	53.6	53.6	62.5	54.4	54.4	9.2	9.2	18.3	10.1	10.1	24.3
Actuated g/C Ratio	0.54	0.49	0.49	0.57	0.49	0.49	0.08	0.08	0.17	0.09	0.09	0.22
v/c Ratio	0.18	0.66	0.14	0.42	0.59	0.06	0.62	0.61	0.51	0.68	0.67	0.38
Control Delay	10.4	24.6	0.6	14.6	22.2	0.1	67.1	66.0	13.9	69.3	68.7	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	24.6	0.6	14.6	22.2	0.1	67.1	66.0	13.9	69.3	68.7	14.5
LOS	B	C	A	B	C	A	E	E	B	E	E	B
Approach Delay		21.4			20.5			39.6				44.7
Approach LOS		C			C			D				D
Queue Length 50th (ft)	13	316	0	31	270	0	63	63	28	75	76	28
Queue Length 95th (ft)	26	425	4	58	356	0	118	117	68	135	137	86
Internal Link Dist (ft)		572			1009			394				520
Turn Bay Length (ft)	210		100	190		185	255					420
Base Capacity (vph)	657	1723	869	301	1750	880	168	171	396	183	187	493
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.66	0.14	0.37	0.59	0.06	0.52	0.51	0.46	0.57	0.57	0.34

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 25.7	Intersection LOS: C
Intersection Capacity Utilization 65.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Schaeffer Road/Cherahala Boulevard & Hardin Valley Road

Ø1 17 s	Ø2 (R) 54 s	Ø3 19 s	Ø4 20 s
Ø5 16.6 s	Ø6 (R) 54.4 s		

APPENDIX D – TURN LANE WARRANT EVALUATIONS

Schaeffer Road at Site Access
 2024 Combined AM Peak
 Right Turn Lane NOT Warranted

TABLE 4B
 RIGHT-TURN LANE VOLUME THRESHOLDS
 FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99			NO			
100 - 149 150 - 199						
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes	Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

* Or through volume only if a left-turn lane exists.

Eastbound Right Volume = 3
 Eastbound Through Volume = 245

Schaeffer Road at Site Access
 2024 Combined PM Peak
 Right Turn Lane NOT Warranted

TABLE 4B
 RIGHT-TURN LANE VOLUME THRESHOLDS
 FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99				NO		
100 - 149 150 - 199						
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

* Or through volume only if a left-turn lane exists.

Eastbound Right Volume = 10
 Eastbound Through Volume = 252