CALLAHAN INDUSTRIAL DEVELOPMENT

KNOXVILLE, TENNESSEE

TRAFFIC IMPACT AND SITE ACCESS STUDY

CALLAHAN DRIVE
KNOXVILLE, TENNESSEE

CCI PROJECT NO. 01555-0000

REV 2

PREPARED FOR:

Phillips Infrastructure Holdings
10142 Parkside Drive, Suite 500
Knoxville, TN 37922

SUBMITTED BY:

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CONSULTING ENGINEERS
FIELD SURVEYORS

REVISED
April 05
2021

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REVISION 2 (04/05/21)
This report replaces the previous version of the traffic impact study dated 03/22/2021 prepared for this project in its entirety. The associated changes are related to comments received from the Knoxville-Knox County Planning, which are located in Appendix F.

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EXECUTIVE SUMMARY

This report provides a summary of a traffic impact and site access study that was performed for a proposed industrial development to be located along Callahan Drive in the City of Knoxville, Tennessee. The project site is located approximately one-half mile west of I-75 and south of Callahan Drive behind the existing UPS hub.

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. Discussion with City of Knoxville, Knox County, and Tennessee Department of Transportation officials resulted in six intersections being identified for detailed study. These are the Callahan Drive intersections with Old Callahan Drive, Yow Commercial Park Driveway, Viles Automotive Group Driveway, I-75 Southbound Ramps, I-75 Northbound Ramps, and Central Avenue Pike. Intersection evaluations such as capacity analyses and signal warrant analyses were conducted at the six 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 mitigation measures. Additionally, the proposed site access location was reviewed and recommendations made related to its location and turn lane related needs.

The primary conclusion of this study is that the traffic generated from the proposed development will not have significant impacts at four of the six study intersections. While two of the study intersections indicated unacceptable levels-of-service at full project build-out without improvements, logical improvements are available to address these concerns.

The following is a listing of recommendations that were developed to address concerns that resulted primarily from traffic generated from the project site, or are offered to accommodate development of the site.

1. Construct the site access intersection as indicated on the project site plan, which includes relocation of the access driveways to Yow Commercial / Viles Auto to utilize this new intersection.

2. Install a three-phase traffic signal at this new site access intersection, which would include a left-turn phase into the project site and advance detector loops on the Callahan Drive approaches. This intersection is about one-half mile from the existing traffic signal at the I-75 southbound ramps. The City of Knoxville / Knox County should determine if such spacing justifies signal coordination between these signals, considering the dilemma zone advantages of the advance loops would be lost during hours when coordination is active. One possibility would be to run coordination during peak traffic hours and allow the site signal to run free during other hours.

3. At the proposed new site access intersection,
    a. Construct the following turn lanes on Callahan Drive:
        i. Eastbound right-turn lane with 100 feet of storage and a 180-foot bay taper
        ii. Eastbound left-turn lane with 150 feet of storage and a 180-foot bay taper
        iii. Westbound left-turn lane with 150 feet of storage and a 180-foot bay taper

   b. Proposed site access (northbound approach) cross-section:
      i. Northbound left / through lane (12') and right lane (12')
      ii. Provide one (1) receiving lane (18') into the proposed site access within the boulevard section to allow for heavy trucks. Additionally, this recommended width will allow enough room to by-pass a stalled vehicle within the boulevard.
      iii. Median width of 10'
4. Place any site related landscaping and signage at the site access intersection in such a fashion as to maintain the existing intersection sight distances.

The following is a listing of concerns / recommendations that were identified at project study intersections that are primarily existing issues that can expect relatively minor impact from site traffic.

1. The intersection of Callahan Drive and I-75 Northbound ramps is expected to exhibit unacceptable levels-of-service during the PM peak hour for 2025 background and combined traffic conditions. The addition of a second northbound right-turn lane would address this issue.

2. The intersection of Callahan Drive and Central Avenue Pike is expected to exhibit marginal, but acceptable, level-of-service conditions during the PM peak hour for 2025 background and combined traffic conditions. Therefore, we are calling the City of Knoxville's attention to this issue that may require addressing in the near future.

INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact and site access study that was performed for a proposed industrial development to be located along Callahan Drive in the City of Knoxville, Tennessee. The project site is located approximately one-half mile west of I-75 and south of Callahan Drive behind the existing UPS hub. FIGURE 1 is a location map showing the major roadways in the project site vicinity.

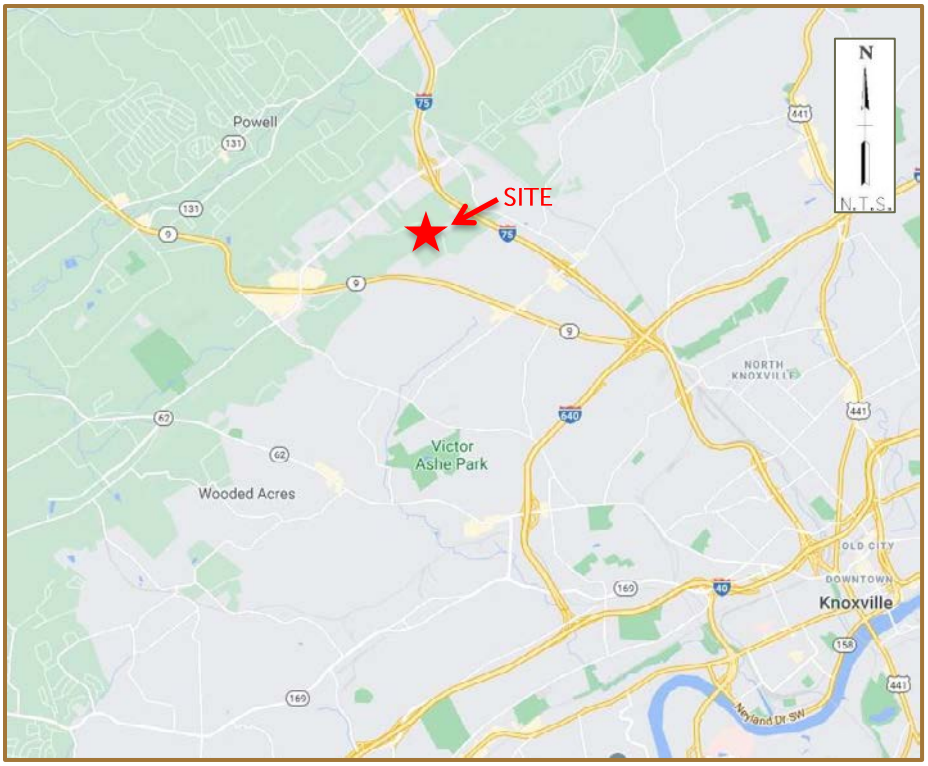

FIGURE 1
LOCATION MAP

The development plan for this project will consist of 575,000 square feet of warehousing and distribution development. The site proposes a single access point along Callahan Drive. 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. Discussion with City of Knoxville, Knox County, and Tennessee Department of Transportation officials resulted in six intersections being identified for detailed study. These are the Callahan Drive intersections with Old Callahan Drive, Yow Commercial Park Driveway, Viles Automotive Group Driveway, I-75 Southbound Ramps, I-75 Northbound Ramps, and Central Avenue Pike. Intersection evaluations such as capacity analyses and signal warrant analyses were conducted at the six 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 mitigation measures. Additionally, the proposed site access location was reviewed and recommendations made related to its location and turn lane related needs.

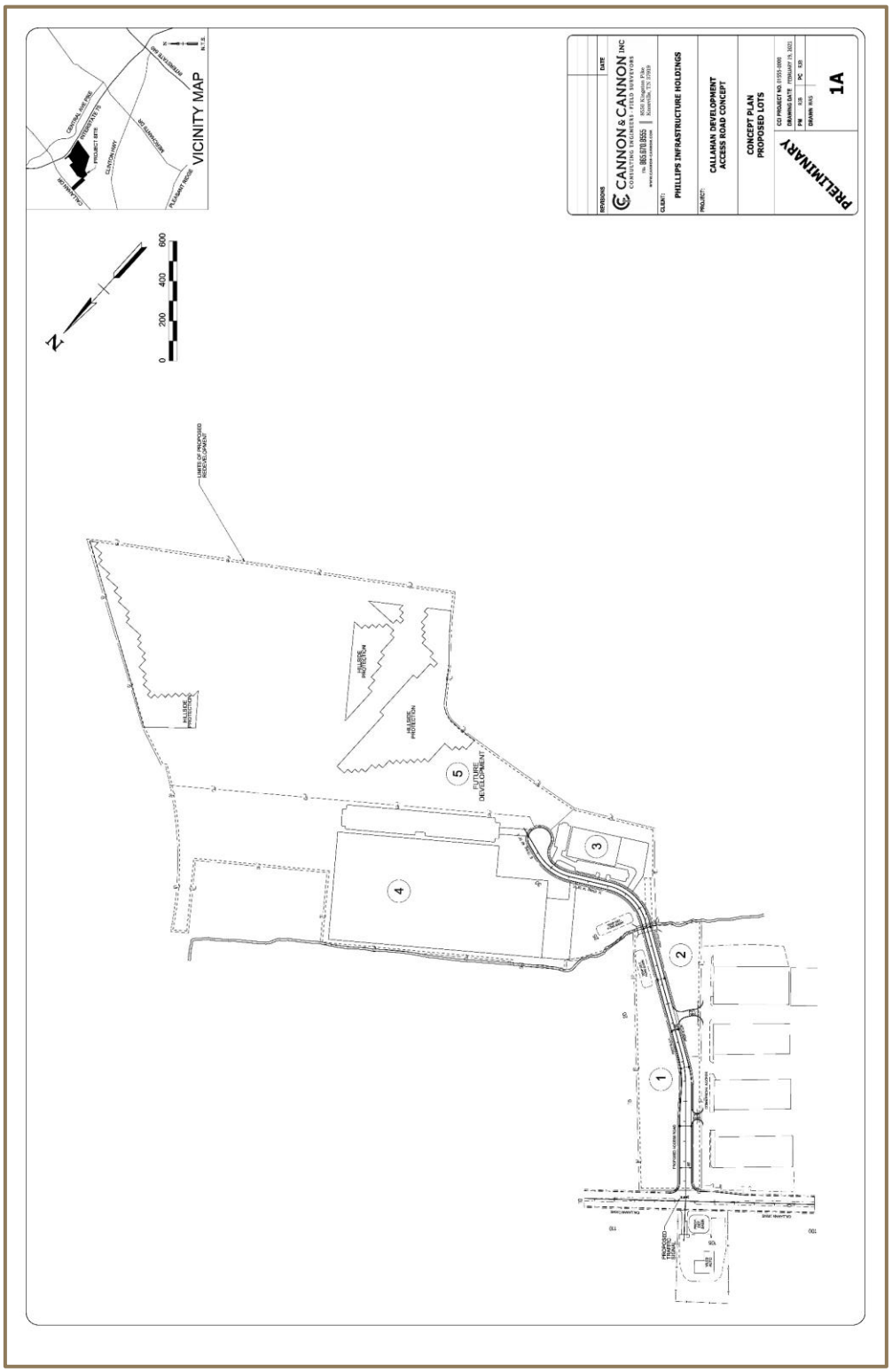

FIGURE 2
CONCEPTUAL SITE PLAN

EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

Roadway conditions for the study roadways are summarized as follows:

- Callahan Drive is a multi-lane city maintained divided highway with two lanes in each direction. It is classified as a Minor Arterial by TDOT. Lane widths vary from 11 to 12 feet within the study area. Turn lanes are in place at major intersections and the posted speed limit is 45 mph.
- Old Callahan Drive is a two-lane local street that connects Callahan Drive to Clinton Highway and bypasses significant commercial development along Clinton Highway. Lane widths are 11-feet and the posted speed limit is 30 mph.
- Central Avenue Pike is a two-lane minor arterial that connects Callahan Drive to many residential areas along I-75. Lane widths vary from 11 to 12 feet and the posted speed limit is 40 mph.

Traffic control for the study intersections is as follows:

- Old Callahan Drive at Callahan Drive, I-75 Northbound & Southbound Ramps at Callahan Drive, and Central Avenue Pike at Callahan Drive are signalized intersections.
- Yow Commercial Right-In / Right-out Driveway at Callahan Drive and Viles Automotive / Yow Commercial Driveway at Callahan Drive are currently side-street STOP controlled.

EXISTING SITE CONDITIONS

The project site is located in the southwest quadrant of the interchange of I-75 and Callahan Drive behind the UPS hub. The site is somewhat rolling and slopes upward towards the southern end of the property boundary. FIGURE 3 provides an aerial view of the project site and the surrounding area.

FIGURE 3
EXISTING SITE CONDITIONS

EXISTING TRAFFIC DATA

Three types of existing 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. Six count stations were found near the project site that were felt to have particular relevance for this study. The most currently available data from these stations are contained in Table 1.

TABLE 1: ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY

COUNT YEAR	TDOT COUNT STA. 47000393 CALLAHAN– WEST OF I-75	TDOT COUNT STA. 47000167R I-75 NB OFF-RAMP	TDOT COUNT STA. 47000170R I-75 NB ON-RAMP	TDOT COUNT STA. 47000169R I-75 SB OFF-RAMP	TDOT COUNT STA. 47000168R I-75 SB ON-RAMP	TDOT COUNT STA. 47000451 CALLAHAN – EAST OF I-75
2019	28,448	9,994	3,474	3,253	9,277	7,560
2018	26,487	9,371	3,253	3,239	8,921	7,485
2017	26,644	10,339	3,774	3,243	8,318	6,614
2016	26,989	9,799	3,473	3,152	8,229	7,119
2015	26,071	11,759	3,863	3,291	8,355	6,627

In addition to the available AADT data, intersection turning movement traffic counts were conducted at the existing study intersections to determine the current peak hour operating volumes. The traffic counts were conducted during the first week of November 2020. During this time, regional traffic volumes and patterns were recovering from COVID-19 pandemic restrictions including, business and school closures and widespread telecommuting or working from home practices. At the time of the counts, schools were conducting in-school instruction at a reduced student capacity. Due to concerns related to the validity of the intersection turning movement traffic counts, hourly volumes from the 2019 AADT data shown in TABLE 1 were obtained from TDOT in order to validate the results of the intersection turning movement counts conducted in November 2020.

After comparing the hourly volumes from the 2019 TDOT AADT's to the 2020 intersection turning movement counts, the 2020 volumes were found to be roughly 20% lower than the 2019 volumes in some movements. Adjustments were made to the 2020 raw traffic data to arrive at 2020 volumes to be utilized in this study. The 2020 base traffic data is summarized on FIGURE 4, and the raw data traffic count summary sheets, TDOT 2019 hourly volume data, and the raw data traffic count summary sheets are contained in APPENDIX A.

EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE

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 2020 existing traffic volumes and existing intersection traffic control and lane configurations. The EVALUATIONS section of this report may be referenced for 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 entitled "Capacity and Level of Service Concepts", which provides a description of the utilized procedures.

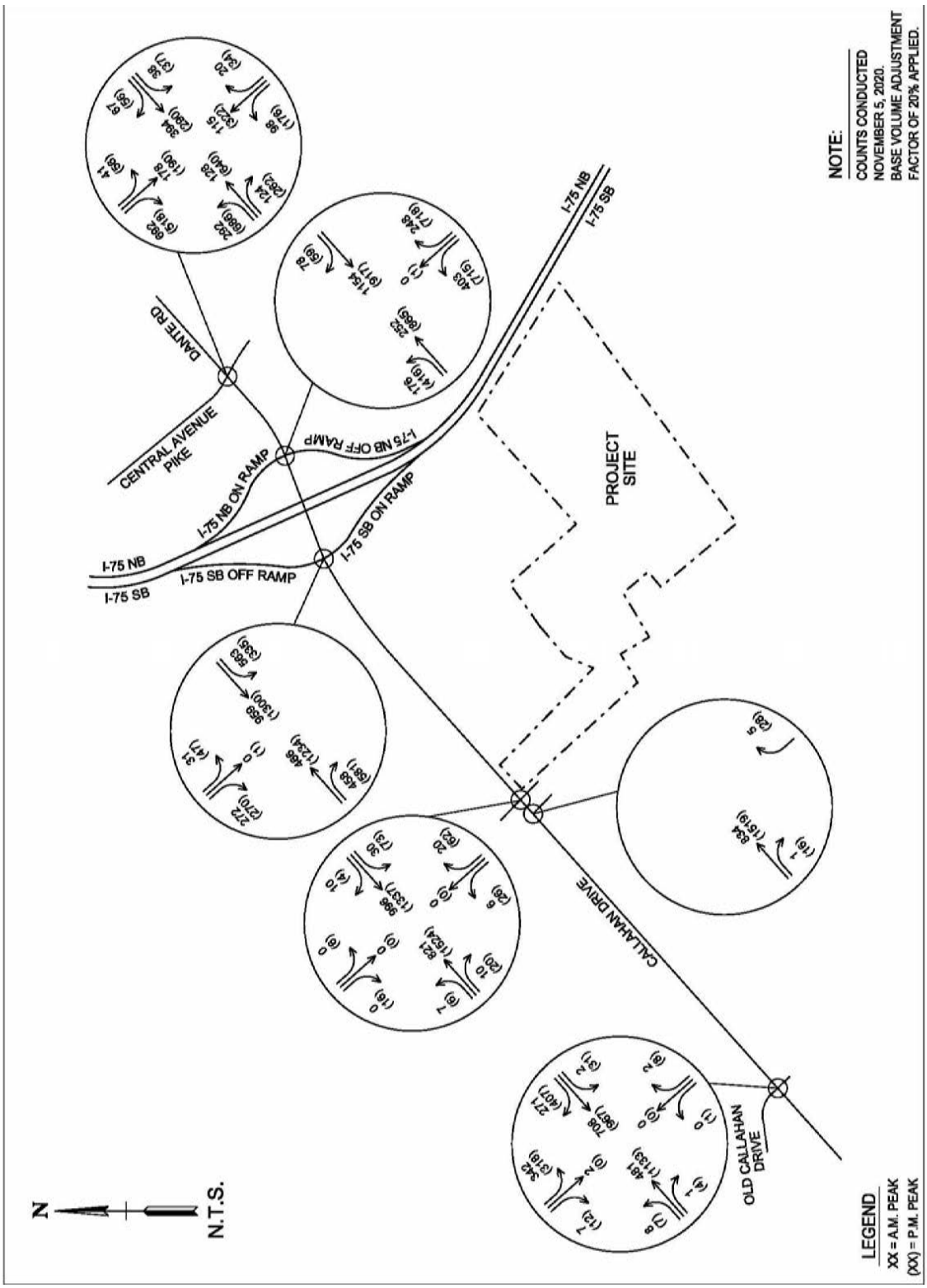

FIGURE 4
2020 EXISTING TRAFFIC VOLUMES

BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

The proposed development is anticipated to be constructed in one general phase with completion anticipated by 2025. Therefore, year 2025 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 2025, it was necessary to establish an annual growth rate for existing traffic. The TDOT ADT 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 two percent was assumed. FIGURE 5 contains the background traffic volumes that would result from this annual growth rate from year 2020, when the counts were conducted, to year 2025.

BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the Existing Conditions section of this report were conducted utilizing the Year 2025 background volumes shown in FIGURE 5 and existing intersection traffic control and lane configurations. The EVALUATIONS section of this report may be referenced for tabular summaries of these analyses, while more detailed summaries are presented on the computer printouts contained in the APPENDIX C.

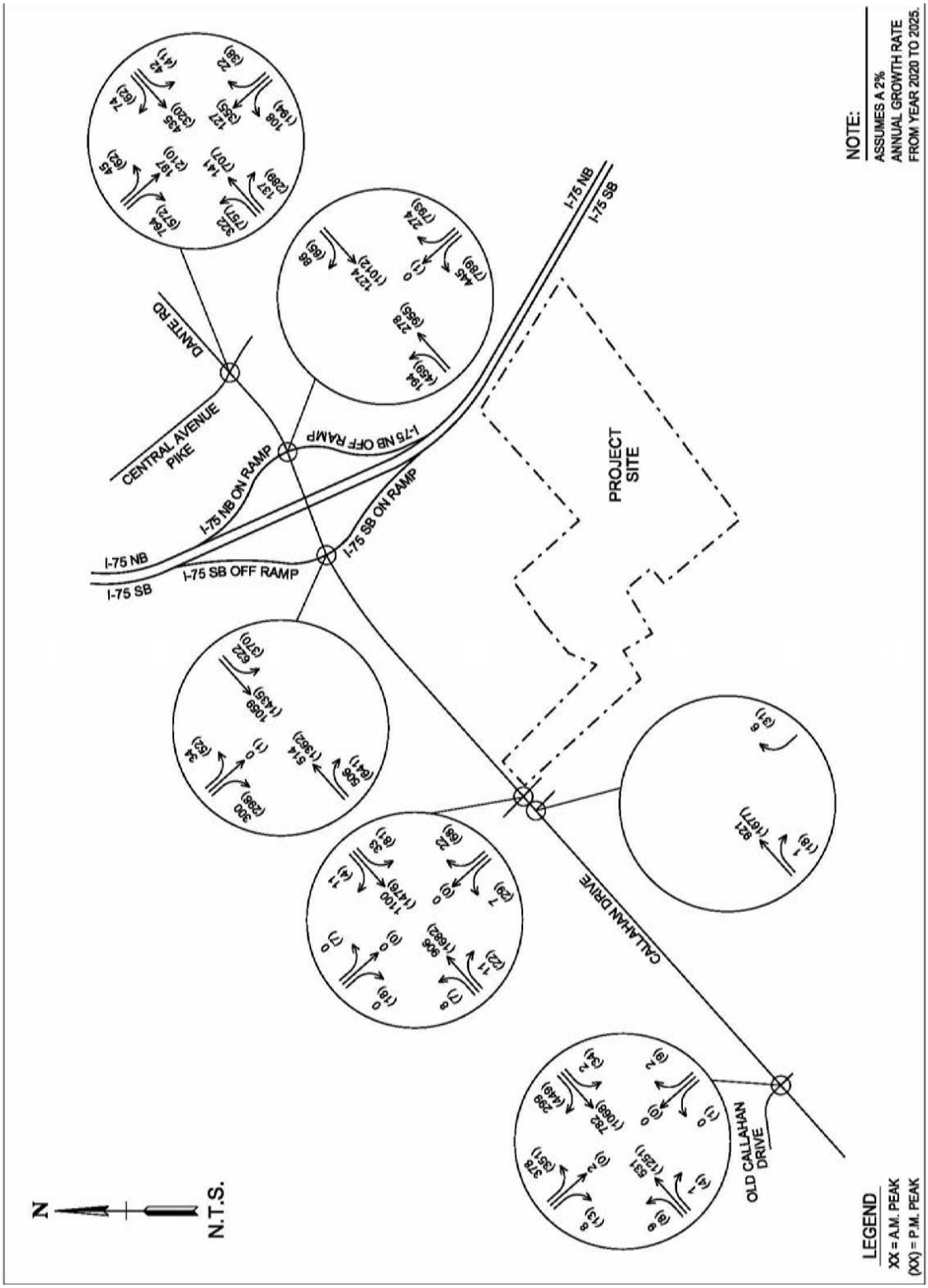

FIGURE 5
2025 BACKGROUND TRAFFIC VOLUMES

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 were utilized. 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 project. More detailed information is contained in APPENDIX B.

TABLE 2: TRIP GENERATION SUMMARY

LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HOUR)			PM PEAKHOUR (TRIPS/HOUR)		
				IN	OUT	TOTAL	IN	OUT	TOTAL
Industrial Park	130	575,000 SF	1,938	186	44	230	48	182	230

A.M. Peak Hour trip generation is based on Peak Hour of Adjacent Street Traffic, One Hour Between 7 & 9 a.m.
P.M. Peak Hour trip generation is based on Peak Hour of Adjacent Street Traffic, One Hour Between 4 & 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 surrounding roadway network, and engineering judgement. FIGURE 6 provides a summary of how the above site generated trips would be assigned to the study intersection. FIGURE 7 provides the proposed trip assignment volumes to the studied intersections.

FUTURE TRAFFIC VOLUMES

Future projected traffic volumes for the study intersection were developed by adding the generated and assigned trips shown in FIGURE 7 to the 2025 background traffic volumes developed in the previous section and shown in FIGURE 5. These combined 2025 volumes reflect the existing traffic, the background traffic growth, and the generated traffic from the proposed subdivision. 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 for all future conditions utilizing the traffic volumes shown in build-out scenarios above. These analyses employed appropriate modifications to the existing lane configurations and traffic control, as discussed in the EVALUATIONS section of this report. Tabular summaries of the analysis 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.

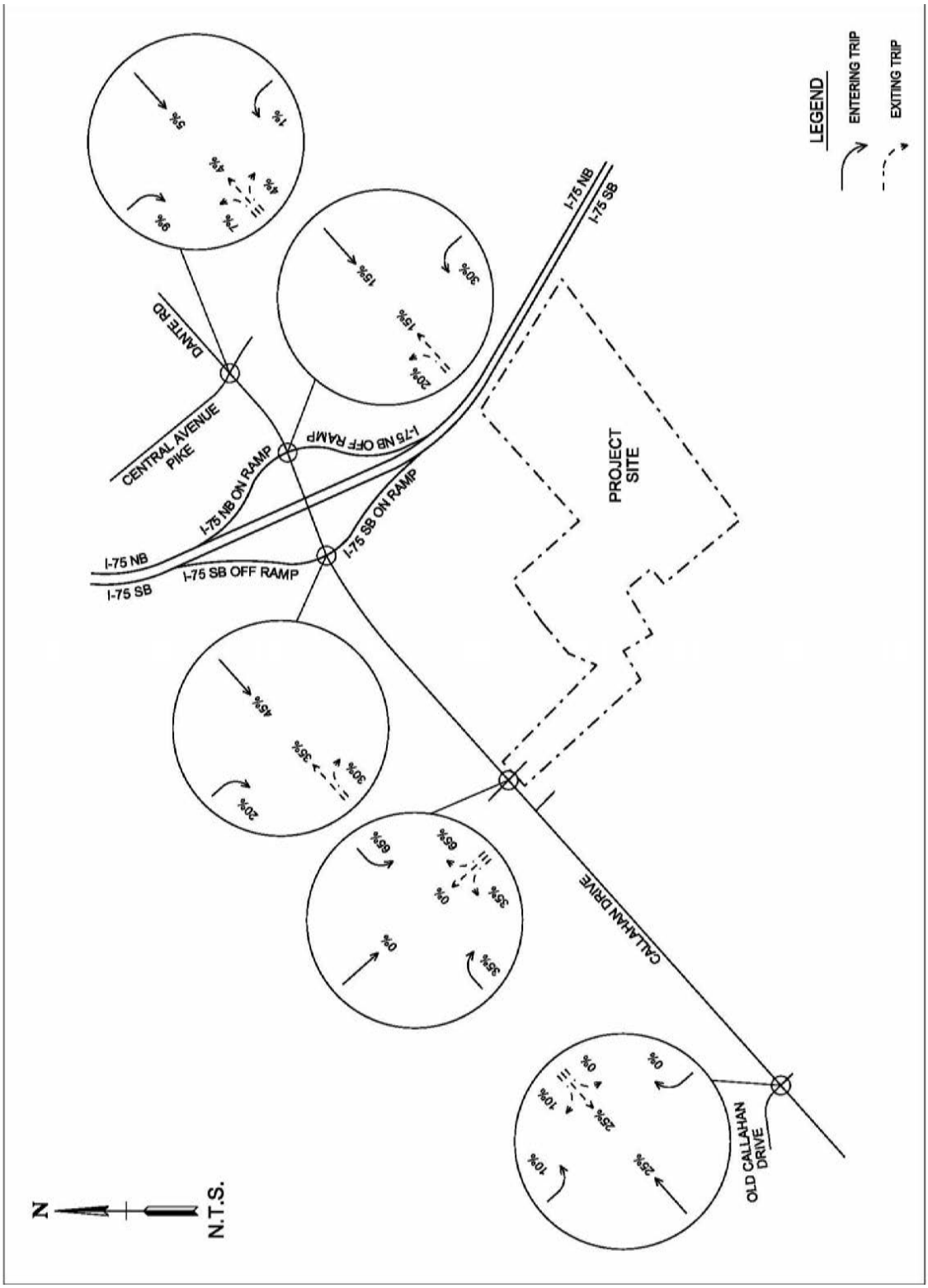

FIGURE 6
TRIP DISTRIBUTION

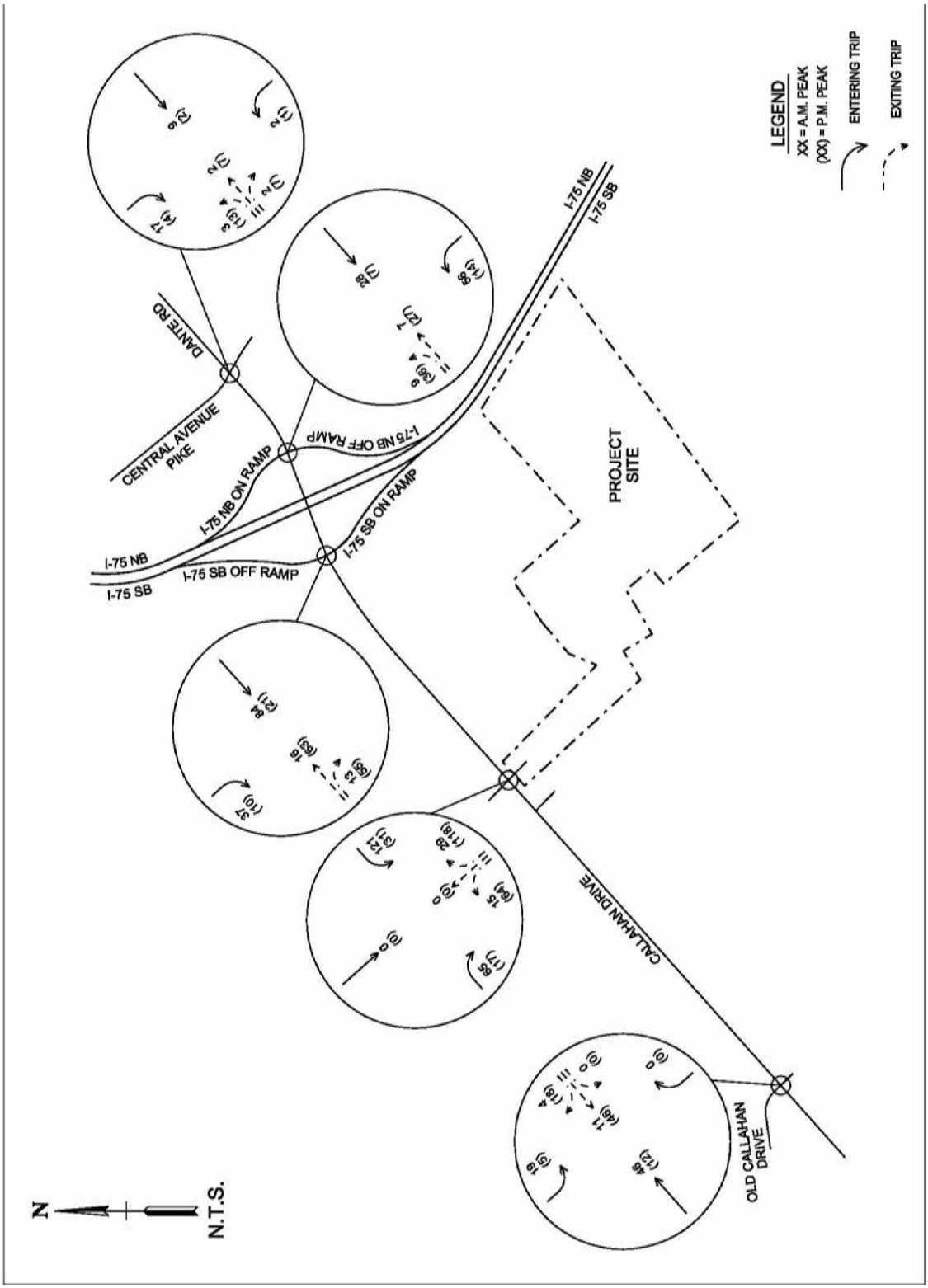

FIGURE 7
TRIP ASSIGNMENT

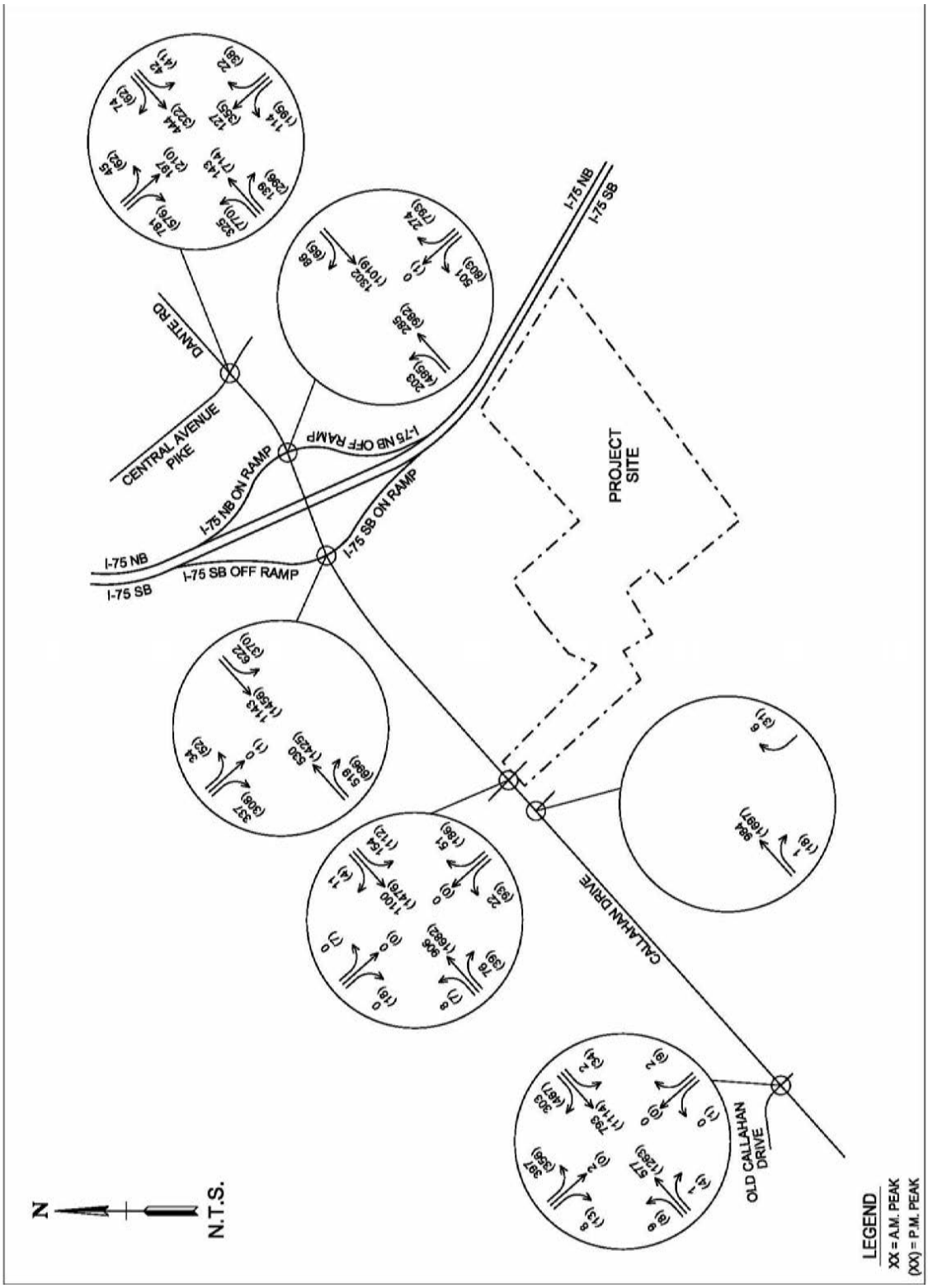

FIGURE 8
COMBINED TRAFFIC VOLUMES (2025)

EVALUATIONS

INTERSECTION CAPACITY ANALYSES

As discussed in the preceding sections of this report, capacity analyses employing the methods of the Highway Capacity Manual (HCM2010) were conducted for the study intersections, including the proposed project site access intersection. These analyses were performed for the previously discussed development scenarios. A summary of the capacity analyses results is shown in TABLE 3, while the resulting conclusions and recommendations are covered in the CONCLUSIONS and RECOMMENDATIONS section of this report.

TABLE 3: CAPACITY ANALYSES SUMMARY – EXISTING (2020), BACKGROUND (2025), & COMBINED (2025)

INTERSECTION	TIME PERIOD	YEAR 2020 EXISTING (LOS/DELAY)	YEAR 2025 BACKGROUND (LOS/DELAY)	YEAR 2025 COMBINED (LOS/DELAY)
Old Callahan Dr. at Callahan Dr. [2]TRAFFIC SIGNAL CONTROL	A.M. P.M.	B 19.3 C 20.2	C 21.1 C 23.6	C 21.8 C 24.5
Yow Commercial at Callahan Dr. [1]SIDE STREET STOP CONTROL	A.M. P.M.	B 11.6 C 17.9	B 12.1 C 20.2	B 12.9 C 20.7
Yow Commercial / Viles Auto at Callahan Drive (Existing Driveways) [1]SIDE STREET STOP CONTROL	NB A.M. NB P.M.	B 14.1 F 51.0	C 15.4 F N/A[3]	C 19.0 F N/A[3]
	SB A.M. SB P.M.	A 0.0 D 29.9	A 0.0 F N/A[3]	F N/A[3] F N/A[3]
Site / Yow Commercial / Viles Auto at Callahan Drive (Proposed Site Access)[4] [2]TRAFFIC SIGNAL CONTROL	A.M. P.M.	-	-	A 7.1 B 13.9
I-75 Southbound Ramps at Callahan Drive [2]TRAFFIC SIGNAL CONTROL	A.M. P.M.	B 12.0 B 18.2	B 14.1 C 20.4	B 15.0 C 21.9
I-75 Northbound Ramps at Callahan Drive [2]TRAFFIC SIGNAL CONTROL	A.M. P.M.	C 21.9 D 53.8	C 25.7 E 77.4	C 27.9 F 82.4
I-75 Northbound Ramps at Callahan Drive w/ Dual NB RTL [2]TRAFFIC SIGNAL CONTROL	A.M. P.M.	-	-	C 27.9 D 36.3
Central Avenue Pike at Callahan Drive [2]TRAFFIC SIGNAL CONTROL	A.M. P.M.	B 18.7 D 37.6	C 22.2 D 52.6	C 22.7 D 53.2

[1]SIDE STREET STOP CONTROL – Data shown are Level-of-Service and Average Vehicular Delay (seconds) for the critical side street approach utilizing HCM methodology.
[2]TRAFFIC SIGNAL CONTROL – Data shown are Level-of-Service and Average Vehicular Delay (seconds) for the complete intersection utilizing HCM methodology.
[3]Delay exceeds HCS calculation thresholds and is indeterminable.
[4]Proposed site access location includes relocation of east drive to Yow Commercial and drive to Viles Auto.

CAPACITY RESULTS SUMMARY

As provided in TABLE 3 above, capacity analyses of anticipated future conditions indicate all but two of the study intersections exhibit operational conditions that are acceptable (LOS of "D" or better). These two problem locations are the intersections on Callahan Drive with Yow Commercial / Viles Auto Drives and the I-75 Northbound ramps. Alternatives were evaluated for each of these which addressed the associated concerns. Specifics are discussed in later sections.

TRAFFIC SIGNAL WARRANT EVALUATION

As mentioned previously, the site access intersection is proposed to be located to the east of the existing Callahan Drive with Yow Commercial / Viles Auto drives intersection, with the associated existing driveways relocated to the site access intersection. In order to address the poor levels-of-service associated with the existing conditions, the installation of a traffic signal is proposed. A signal warrant evaluation was conducted for this location, utilizing the official traffic signal warrants from the *Manual on Uniform Traffic Control Devices*. This evaluation indicated that at least three traffic signal warrants are expected to be satisfied at full build-out of the project site. A spreadsheet summarizing this evaluation is contained in APPENDIX D.

TURN LANE EVALUATION

A turn lane evaluation was conducted for a potential eastbound right-turn lane to enter the project site at the proposed site access intersection. This evaluation, which utilized Knox County turn lane warrants, found that the right-turn lane is warranted. A spreadsheet summarizing this evaluation is contained in APPENDIX E.

Regarding a possible westbound left-turn lane at the project site intersection, such a lane is clearly necessary for both intersection operations and safety. Additionally, since an eastbound left-turn lane of 150 feet is present at the existing Yow commercial access location, it is recommended to keep the same 150 feet of storage at the new proposed site access intersection for the eastbound left movement.

SIGHT DISTANCE REVIEW

Callahan Drive is a relatively straight and flat roadway in the study area, which was constructed to very high geometric standards. Accordingly, sight distance to and from the proposed site access intersection is excellent and well in excess of minimum standards.

RELOCATED MEDIAN OPENING REVIEW

Since an existing median opening along Callahan Drive is proposed to be relocated to the proposed site access location, the TDOT Driveway Manual was reviewed to ensure the new median opening spacing along Callahan Drive still met TDOT design guidelines. The TDOT Driveway Manual recommends a median opening spacing of 660 feet (with a range of 440 feet – 880 feet being acceptable) between median openings along a roadway in an urban area such as Callahan Drive. The existing median opening spacing is roughly 700 feet between the existing Yow Commercial and the adjacent opening to the east. The proposed relocated median opening is anticipated to reduce the median opening spacing to 600 feet. This spacing falls within the acceptable spacing range referenced above.

CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated from the proposed development will not have significant impacts at four of the six study intersections. While two of the study intersections indicated unacceptable levels-of-service at full project build-out without improvements, logical improvements are available to address these concerns.

The following is a listing of recommendations that were developed to address concerns that resulted primarily from traffic generated from the project site, or are offered to accommodate development of the site.

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2. Install a three-phase traffic signal at this new site access intersection, which would include a left-turn phase into the project site and advance detector loops on the Callahan Drive approaches. This intersection is about one-half mile from the existing traffic signal at the I-75 southbound ramps. The City of Knoxville / Knox County should determine if such spacing justifies signal coordination between these signals, considering the dilemma zone advantages of the advance loops would be lost during hours when coordination is active. One possibility would be to run coordination during peak traffic hours and allow the site signal to run free during other hours.
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        ii. Eastbound left-turn lane with 150 feet of storage and a 180-foot bay taper
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        iii. Median width of 10'
4. Place any site related landscaping and signage at the site access intersection in such a fashion as to maintain the existing intersection sight distances.

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APPENDIX

APPENDIX ORDER:

A. TRAFFIC DATA

B. TRIP GENERATION INFORMATION

C. CAPACITY ANALYSES

D. SIGNAL WARRANT SPREADSHEETS

E. TURN LANE WARRANT SHEETS

F. MPC COMMENTS

APPENDIX A – TRAFFIC DATA

Prepared by National Data & Surveying Services

Old Callahan Dr/Discount Tire shop Dwy & Callahan Dr

Peak Hour Turning Movement Count

ID: 20-190015-001
City: Knoxville

Day: Thursday
Date: 11/05/2020

	PEAK HOURS	COUNT PERIODS
AM	07:30 AM - 08:30 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

SOUTHBOUND – Old Callahan Dr/Discount Tire shop Dwy

	Right	Thru	Left	U-Turn	Departing
AM	6	2	285	0	233
NOON	0	0	0	0	0
PM	10	0	265	0	345
Lanes	1	0	1	0	

EASTBOUND – Callahan Dr

	AM	NOON	PM	Lanes
Departing	596	0	818	
U-Turn	0	0	1	0
Left	7	0	6	1
Thru	401	0	944	2
Right	1	0	3	0

WESTBOUND – Callahan Dr

	Lanes	PM	NOON	AM
Right	0	339	0	226
Thru	2	806	0	590
Left	1	3	0	4
U-Turn	0	26	0	2
Departing		1242	0	690

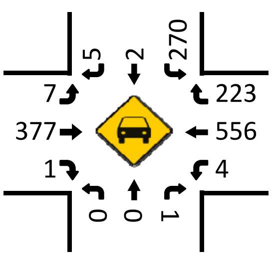
NORTHBOUND – Old Callahan Dr/Discount Tire shop Dwy

	Departing	U-Turn	Left	Thru	Right
Lanes		0	0	1	0
PM	6	0	1	0	7
NOON	0	0	0	0	0
AM	7	0	0	0	2

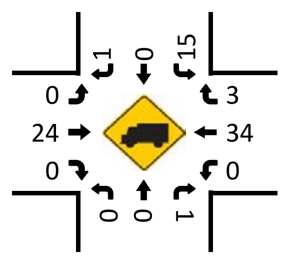
CONTROL: Signalized

	AM	NOON	PM
TEV	1526	0	2411
PHF	0.93		0.96

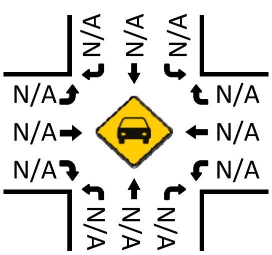
Cars (AM)



HT (AM)



Cars (NOON)



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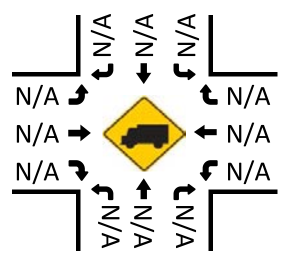
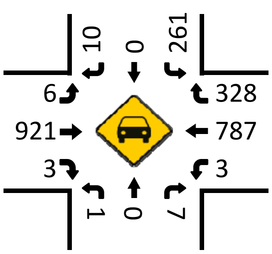
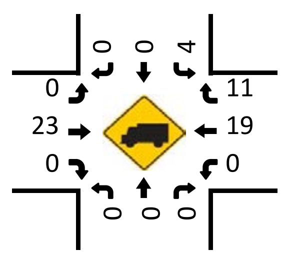


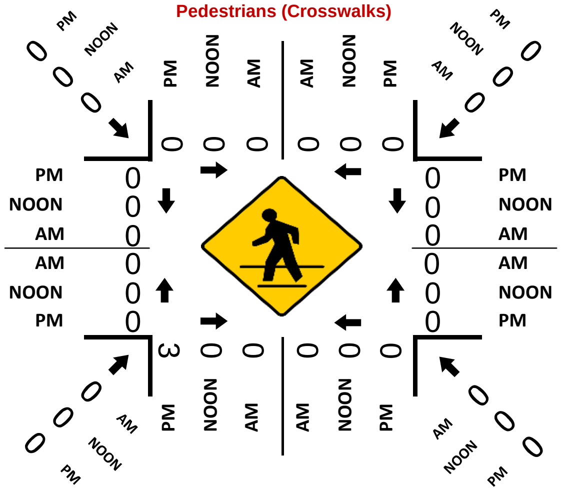
Cars (PM)



HT (PM)



Pedestrians (Crosswalks)



Project ID: 20-190015-001
Location: Old Callahan Dr/Discount Tire shop Dwy & Callahan Dr
City: Knoxville

Day: Thursday
Date: 11/05/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Old Callahan Dr/Discount Tire shop Dwy Northbound						Old Callahan Dr/Discount Tire shop Dwy Southbound						Callahan Dr Eastbound						Callahan Dr Westbound						
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total
7:00 AM	0	0	0	0	0	0	54	0	2	0	0	56	0	62	0	0	0	62	1	103	40	0	0	144	262
7:15 AM	0	0	0	0	0	0	58	0	0	0	0	58	0	66	0	0	0	66	0	130	42	0	0	172	296
7:30 AM	0	0	0	0	0	0	72	0	2	0	0	74	2	85	0	0	0	87	0	146	65	0	0	211	372
7:45 AM	0	0	0	0	0	0	70	1	1	0	0	72	2	100	0	0	0	102	1	159	71	2	0	233	407
Total	0	0	0	0	0	0	254	1	5	0	0	260	4	313	0	0	0	317	2	538	218	2	0	760	1337
8:00 AM	0	0	2	0	0	2	80	0	1	0	0	81	2	112	0	0	0	114	1	160	53	0	0	214	411
8:15 AM	0	0	0	0	0	0	63	1	2	0	0	66	1	104	1	0	0	106	2	125	37	0	0	164	336
8:30 AM	0	0	1	0	0	1	51	0	2	0	1	53	0	101	1	0	0	102	2	129	40	0	0	171	327
8:45 AM	0	0	2	0	1	2	46	0	4	0	0	50	1	110	1	0	0	112	1	132	33	1	0	167	331
Total	0	0	5	0	1	5	240	1	9	0	1	250	4	427	3	0	0	434	6	546	163	1	0	716	1405
BREAK																									
4:00 PM	0	0	1	0	0	1	55	0	5	0	0	60	2	203	1	0	0	206	1	186	69	4	0	260	527
4:15 PM	0	0	1	0	0	1	55	0	5	0	1	60	0	226	0	0	0	226	0	181	68	2	0	251	538
4:30 PM	0	0	0	0	0	0	64	0	3	0	0	67	2	233	0	0	0	235	0	188	64	7	0	259	561
4:45 PM	0	0	0	0	0	0	62	0	2	0	0	64	1	228	0	0	0	229	0	226	91	3	0	320	613
Total	0	0	2	0	0	2	236	0	15	0	1	251	5	890	1	0	0	896	1	781	292	16	0	1090	2239
5:00 PM	0	0	1	0	0	1	72	0	1	0	0	73	3	241	1	1	0	246	0	193	104	9	0	306	626
5:15 PM	1	0	3	0	0	4	64	0	4	0	0	68	0	227	2	0	0	229	2	198	77	6	0	283	584
5:30 PM	0	0	3	0	3	3	67	0	3	0	0	70	2	248	0	0	0	250	1	189	67	8	0	265	588
5:45 PM	0	0	1	0	0	1	43	0	1	0	0	44	2	233	0	0	0	235	0	186	71	6	0	263	543
Total	1	0	8	0	3	9	246	0	9	0	0	255	7	949	3	1	0	960	3	766	319	29	0	1117	2341
Grand Total	1	0	15	0	4	16	976	2	38	0	2	1016	20	2579	7	1	0	2607	12	2631	992	48	0	3683	7322
Apprch %	6.3	0.0	93.8	0.0	25.0		96.1	0.2	3.7	0.0	0.2		0.8	98.9	0.3	0.0	0.0		0.3	71.4	26.9	1.3	0.0		
Total %	0.0	0.0	0.2	0.0	0.1	0.2	13.3	0.0	0.5	0.0	0.0	13.9	0.3	35.2	0.1	0.0	0.0	35.6	0.2	35.9	13.5	0.7	0.0	50.3	
Cars, PU, Vans	1	0	14	0		15	945	2	37	0		984	20	2486	7	1		2514	12	2535	967	48		3562	7075
% Cars, PU, Vans	100.0	0.0	93.3	0.0		93.8	96.8	100.0	97.4	0.0		96.9	100.0	96.4	100.0	100.0		96.4	100.0	96.4	97.5	100.0		96.7	96.6
Heavy Trucks	0	0	1	0		1	31	0	1	0		32	0	93	0	0		93	0	96	25	0		121	247
%Heavy Trucks	0.0	0.0	6.7	0.0		6.3	3.2	0.0	2.6	0.0		3.1	0.0	3.6	0.0	0.0		3.6	0.0	3.6	2.5	0.0		3.3	3.4

Project ID: 20-190015-001
Location: Old Callahan Dr/Discount Tire shop Dwy & Callaha
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 11/05/2020

AM

	d Callahan Dr/Discount Tire shop D Northbound					d Callahan Dr/Discount Tire shop Dv Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	0	0	0	0	0	72	0	2	0	74	2	85	0	0	87	0	146	65	0	211	372
7:45 AM	0	0	0	0	0	70	1	1	0	72	2	100	0	0	102	1	159	71	2	233	407
8:00 AM	0	0	2	0	2	80	0	1	0	81	2	112	0	0	114	1	160	53	0	214	411
8:15 AM	0	0	0	0	0	63	1	2	0	66	1	104	1	0	106	2	125	37	0	164	336
Total Volume	0	0	2	0	2	285	2	6	0	293	7	401	1	0	409	4	590	226	2	822	1526
% App. Total	0.0	0.0	100.0	0.0	100	97.3	0.7	2.0	0.0	100	1.7	98.0	0.2	0.0	100	0.5	71.8	27.5	0.2	100	
PHF					0.250					0.904					0.897					0.882	0.928
Cars, PU, Vans	0	0	1	0	1	270	2	5	0	277	7	377	1	0	385	4	556	223	2	785	1448
% Cars, PU, Vans	0.0	0.0	50.0	0.0	50.0	94.7	100.0	83.3	0.0	94.5	100.0	94.0	100.0	0.0	94.1	100.0	94.2	98.7	100.0	95.5	94.9
Heavy Trucks	0	0	1	0	1	15	0	1	0	16	0	24	0	0	24	0	34	3	0	37	78
%Heavy Trucks	0.0	0.0	50.0	0.0	50.0	5.3	0.0	16.7	0.0	5.5	0.0	6.0	0.0	0.0	5.9	0.0	5.8	1.3	0.0	4.5	5.1

PM

	d Callahan Dr/Discount Tire shop D Northbound					d Callahan Dr/Discount Tire shop Dv Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM to 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	0	0	0	0	0	62	0	2	0	64	1	228	0	0	229	0	226	91	3	320	613
5:00 PM	0	0	1	0	1	72	0	1	0	73	3	241	1	1	246	0	193	104	9	306	626
5:15 PM	1	0	3	0	4	64	0	4	0	68	0	227	2	0	229	2	198	77	6	283	584
5:30 PM	0	0	3	0	3	67	0	3	0	70	2	248	0	0	250	1	189	67	8	265	588
Total Volume	1	0	7	0	8	265	0	10	0	275	6	944	3	1	954	3	806	339	26	1174	2411
% App. Total	12.5	0.0	87.5	0.0	100	96.4	0.0	3.6	0.0	100	0.6	99.0	0.3	0.1	100	0.3	68.7	28.9	2.2	100	
PHF					0.500					0.942					0.954					0.917	0.963
Cars, PU, Vans	1	0	7	0	8	261	0	10	0	271	6	921	3	1	931	3	787	328	26	1144	2354
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	98.5	0.0	100.0	0.0	98.5	100.0	97.6	100.0	100.0	97.6	100.0	97.6	96.8	100.0	97.4	97.6
Heavy Trucks	0	0	0	0	0	4	0	0	0	4	0	23	0	0	23	0	19	11	0	30	57
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.5	0.0	2.4	0.0	0.0	2.4	0.0	2.4	3.2	0.0	2.6	2.4

Prepared by National Data & Surveying Services

Yow Commercial Park Dwy & Callahan Dr

Peak Hour Turning Movement Count

ID: 20-190015-002
City: Knoxville

Day: Thursday
Date: 11/05/2020

PEAK HOURS		COUNT PERIODS
AM	07:30 AM - 08:30 AM	07:00 AM - 09:00 AM
NOON	12:00 PM - 01:00 PM	11:00 AM - 01:00 PM
PM	04:45 PM - 05:45 PM	02:00 PM - 06:00 PM

Yow Commercial Park Dwy – SOUTHBOUND

	Right	Through	Left	U-Turn	Outbound
AM	0	0	0	0	0
NOON	0	0	0	0	0
PM	0	0	0	0	0
HT (PM)	0	0	0	0	

Callahan Dr – EASTBOUND

	AM	NOON	PM	HT (PM)
Outbound	0	0	0	
U-Turn	0	0	0	0
Left	0	0	0	0
Through	695	889	1266	3
Right	1	7	13	0

Callahan Dr – WESTBOUND

	PM	NOON	AM	HT (PM)
Right	0	0	0	0
Through	0	0	0	0
Left	0	0	0	0
U-Turn	0	0	0	0
Outbound	1289	900	699	

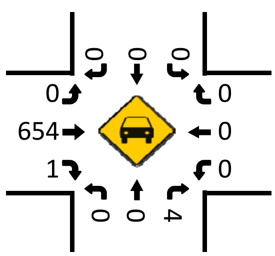
Yow Commercial Park Dwy – NORTHBOUND

	Outbound	U-Turn	Left	Through	Right
HT (PM)		0	0	1	0
PM	13	0	0	0	23
NOON	7	0	0	0	11
AM	1	0	0	0	4

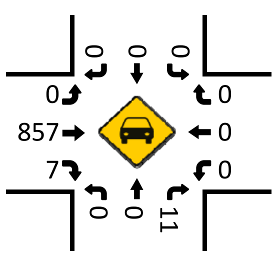
CONTROL: No Control

	AM	NOON	PM
TEV	700	907	1302
PHF	0.91	0.95	0.97

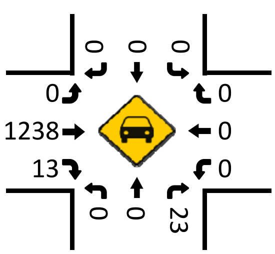
Cars (AM)



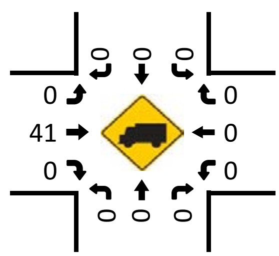
Cars (NOON)



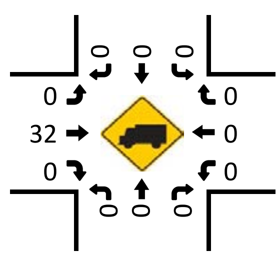
Cars (PM)



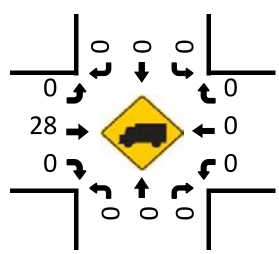
HT (AM)



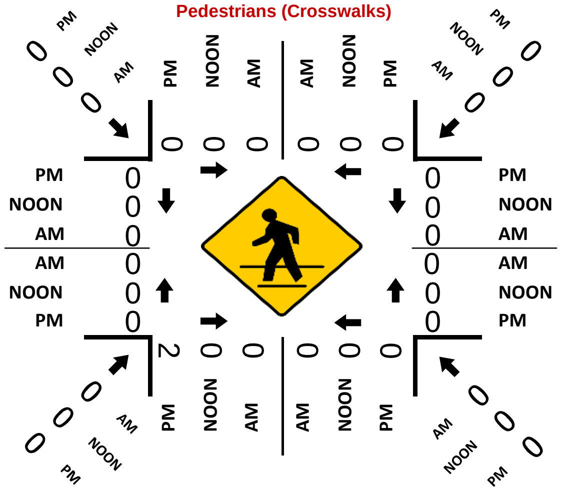
HT (NOON)



HT (PM)



Pedestrians (Crosswalks)



Project ID: 20-190015-002
Location: Yow Commercial Park Dwy & Callahan Dr
City: Knoxville

Day: Thursday
Date: 11/05/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Yow Commercial Park Dwy Northbound						Yow Commercial Park Dwy Southbound						Callahan Dr Eastbound						Callahan Dr Westbound						
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total
7:00 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	110	0	0	0	110	0	0	0	0	0	0	113
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	128	0	0	0	0	0	0	128
7:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	155	0	0	0	155	0	0	0	0	0	0	158
7:45 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	168	0	0	0	168	0	0	0	0	0	0	169
Total	0	0	7	0	0	7	0	0	0	0	0	0	0	561	0	0	0	561	0	0	0	0	0	0	568
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	192	0	0	0	192	0	0	0	0	0	0	192
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	180	1	0	0	181	0	0	0	0	0	0	181
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	146	0	0	0	146	0	0	0	0	0	0	146
8:45 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	151	0	0	0	151	0	0	0	0	0	0	152
Total	0	0	1	0	0	1	0	0	0	0	0	0	0	669	1	0	0	670	0	0	0	0	0	0	671
BREAK																									
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	180	0	0	0	180	0	0	0	0	0	0	180
11:15 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	162	0	0	0	162	0	0	0	0	0	0	163
11:30 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	191	0	0	0	191	0	0	0	0	0	0	193
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	199	1	0	0	200	0	0	0	0	0	0	200
Total	0	0	3	0	0	3	0	0	0	0	0	0	0	732	1	0	0	733	0	0	0	0	0	0	736
12:00 PM	0	0	3	0	0	3	0	0	0	0	0	0	0	211	1	0	0	212	0	0	0	0	0	0	215
12:15 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	232	3	0	0	235	0	0	0	0	0	0	237
12:30 PM	0	0	4	0	0	4	0	0	0	0	0	0	0	233	1	0	0	234	0	0	0	0	0	0	238
12:45 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	213	2	0	0	215	0	0	0	0	0	0	217
Total	0	0	11	0	0	11	0	0	0	0	0	0	0	889	7	0	0	896	0	0	0	0	0	0	907
BREAK																									
2:00 PM	0	0	2	0	2	2	0	0	0	0	0	0	0	218	1	0	0	219	0	0	0	0	0	0	221
2:15 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	237	0	0	0	237	0	0	0	0	0	0	238
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	232	0	0	0	232	0	0	0	0	0	0	232
2:45 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	224	0	0	0	224	0	0	0	0	0	0	225
Total	0	0	4	0	2	4	0	0	0	0	0	0	0	911	1	0	0	912	0	0	0	0	0	0	916
3:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	232	5	0	0	237	0	0	0	0	0	0	238
3:15 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	245	2	0	0	247	0	0	0	0	0	0	248
3:30 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	259	1	0	0	260	0	0	0	0	0	0	261
3:45 PM	0	0	2	0	1	2	0	0	0	0	0	0	0	260	4	0	0	264	0	0	0	0	0	0	266
Total	0	0	5	0	1	5	0	0	0	0	0	0	0	996	12	0	0	1008	0	0	0	0	0	0	1013
4:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	271	3	0	0	274	0	0	0	0	0	0	275
4:15 PM	0	0	5	0	0	5	0	0	0	0	0	0	0	295	4	0	0	299	0	0	0	0	0	0	304
4:30 PM	0	0	9	0	0	9	0	0	0	0	0	0	0	296	6	0	0	302	0	0	0	0	0	0	311
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	308	1	0	0	309	0	0	0	0	0	0	309
Total	0	0	15	0	0	15	0	0	0	0	0	0	0	1170	14	0	0	1184	0	0	0	0	0	0	1199
5:00 PM	0	0	11	0	0	11	0	0	0	0	0	0	0	321	3	0	0	324	0	0	0	0	0	0	335
5:15 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	313	6	0	0	319	0	0	0	0	0	0	327
5:30 PM	0	0	4	0	2	4	0	0	0	0	0	0	0	324	3	0	0	327	0	0	0	0	0	0	331
5:45 PM	0	0	3	0	1	3	0	0	0	0	0	0	0	280	2	0	0	282	0	0	0	0	0	0	285
Total	0	0	26	0	3	26	0	0	0	0	0	0	0	1238	14	0	0	1252	0	0	0	0	0	0	1278
Grand Total	0	0	72	0	6	72	0	0	0	0	0	0	0	7166	50	0	0	7216	0	0	0	0	0	0	7288
Apprch %	0.0	0.0	100.0	0.0	8.3		0.0	0.0	0.0	0.0	0.0		0.0	99.3	0.7	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	1.0	0.0	0.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	98.3	0.7	0.0	0.0	99.0	0.0	0.0	0.0	0.0	0.0	0.0	
Cars, PU, Vans	0	0	72	0		72	0	0	0	0		0	0	6912	50	0		6962	0	0	0	0		0	7034
% Cars, PU, Vans	0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0	0.0		0.0	0.0	96.5	100.0	0.0		96.5	0.0	0.0	0.0	0.0		0.0	96.5
Heavy Trucks	0	0	0	0		0	0	0	0	0		0	0	254	0	0		254	0	0	0	0		0	254
%Heavy Trucks	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	3.5	0.0	0.0		3.5	0.0	0.0	0.0	0.0		0.0	3.5

Project ID: 20-190015-002
Location: Yow Commercial Park Dwy & Callahan Dr
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 11/05/2020

AM

	Yow Commercial Park Dwy Northbound					Yow Commercial Park Dwy Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	0	0	3	0	3	0	0	0	0	0	0	155	0	0	155	0	0	0	0	0	158
7:45 AM	0	0	1	0	1	0	0	0	0	0	0	168	0	0	168	0	0	0	0	0	169
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	192	0	0	192	0	0	0	0	0	192
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	180	1	0	181	0	0	0	0	0	181
Total Volume	0	0	4	0	4	0	0	0	0	0	0	695	1	0	696	0	0	0	0	0	700
% App. Total	0.0	0.0	100.0	0.0	100	0.0	0.0	0.0	0.0	0	0.0	99.9	0.1	0.0	100	0.0	0.0	0.0	0.0	0	
PHF					0.333										0.906						0.911
Cars, PU, Vans	0	0	4	0	4	0	0	0	0	0	0	654	1	0	655	0	0	0	0	0	659
% Cars, PU, Vans	0.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	94.1	100.0	0.0	94.1	0.0	0.0	0.0	0.0	0.0	94.1
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	41	0	0	41	0	0	0	0	0	41
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	5.9

NOON

	Yow Commercial Park Dwy Northbound					Yow Commercial Park Dwy Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 11:00 AM to 01:00 PM																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	3	0	3	0	0	0	0	0	0	211	1	0	212	0	0	0	0	0	215
12:15 PM	0	0	2	0	2	0	0	0	0	0	0	232	3	0	235	0	0	0	0	0	237
12:30 PM	0	0	4	0	4	0	0	0	0	0	0	233	1	0	234	0	0	0	0	0	238
12:45 PM	0	0	2	0	2	0	0	0	0	0	0	213	2	0	215	0	0	0	0	0	217
Total Volume	0	0	11	0	11	0	0	0	0	0	0	889	7	0	896	0	0	0	0	0	907
% App. Total	0.0	0.0	100.0	0.0	100	0.0	0.0	0.0	0.0	0	0.0	99.2	0.8	0.0	100	0.0	0.0	0.0	0.0	0	
PHF					0.688										0.953						0.953
Cars, PU, Vans	0	0	11	0	11	0	0	0	0	0	0	857	7	0	864	0	0	0	0	0	875
% Cars, PU, Vans	0.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	96.4	100.0	0.0	96.4	0.0	0.0	0.0	0.0	0.0	96.5
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	32	0	0	32	0	0	0	0	0	32
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	3.5

PM

	Yow Commercial Park Dwy Northbound					Yow Commercial Park Dwy Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 02:00 PM to 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	308	1	0	309	0	0	0	0	0	309
5:00 PM	0	0	11	0	11	0	0	0	0	0	0	321	3	0	324	0	0	0	0	0	335
5:15 PM	0	0	8	0	8	0	0	0	0	0	0	313	6	0	319	0	0	0	0	0	327
5:30 PM	0	0	4	0	4	0	0	0	0	0	0	324	3	0	327	0	0	0	0	0	331
Total Volume	0	0	23	0	23	0	0	0	0	0	0	1266	13	0	1279	0	0	0	0	0	1302
% App. Total	0.0	0.0	100.0	0.0	100	0.0	0.0	0.0	0.0	0	0.0	99.0	1.0	0.0	100	0.0	0.0	0.0	0.0	0	
PHF					0.523										0.978						0.972
Cars, PU, Vans	0	0	23	0	23	0	0	0	0	0	0	1238	13	0	1251	0	0	0	0	0	1274
% Cars, PU, Vans	0.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	97.8	100.0	0.0	97.8	0.0	0.0	0.0	0.0	0.0	97.8
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	28	0	0	28	0	0	0	0	0	28
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	2.2

Prepared by National Data & Surveying Services

Viles Automotive Group Dwy & Callahan Dr

Peak Hour Turning Movement Count

ID: 20-190015-003
City: Knoxville

Day: Thursday
Date: 11/05/2020

PEAK HOURS

AM	07:30 AM - 08:30 AM
NOON	12:00 PM - 01:00 PM
PM	04:45 PM - 05:45 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	11:00 AM - 01:00 PM
PM	02:00 PM - 06:00 PM

Viles Automotive Group Dwy — SOUTHBOUND

AM	0	0	0	0	14	AM
NOON	15	0	4	0	17	NOON
PM	13	0	5	0	8	PM

Callahan Dr — EASTBOUND

AM	NOON	PM		
837	882	1149	⇦	
2	0	0	↶	0
6	11	5	↱	0
684	872	1270	→	2
8	19	17	↳	0
AM	NOON	PM		

CONTROL

2-Way Stop(NB/SB)

	AM	NOON	PM
TEV	1586	1827	2563
PHF	0.95	0.99	0.96

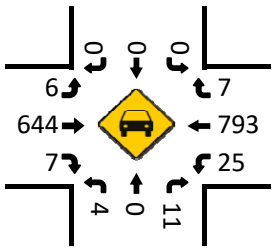
WESTBOUND — Callahan Dr

PM	NOON	AM		
3	6	8	↰	0
1114	853	830	←	2
61	14	25	↰	1
1	0	1	↰	0
1328	895	702	⇨	
PM	NOON	AM		

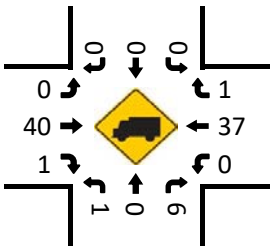
NORTHBOUND — Viles Automotive Group Dwy

PM	78	0	22	0	52	PM
NOON	33	0	14	0	19	NOON
AM	33	0	5	0	17	AM

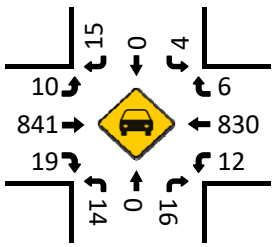
Cars (AM)



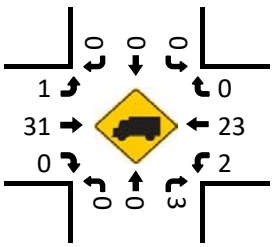
HT (AM)



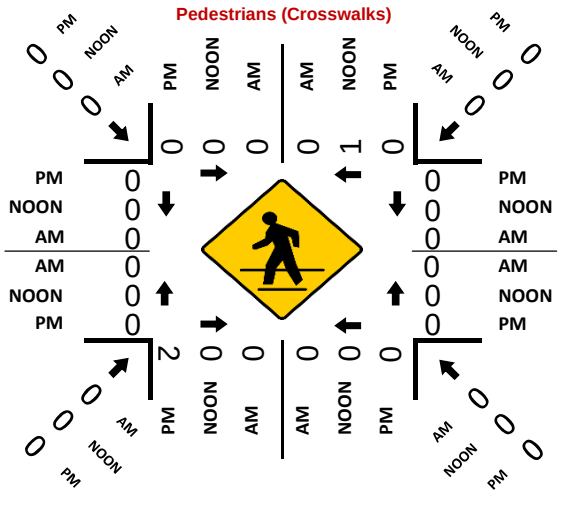
Cars (NOON)



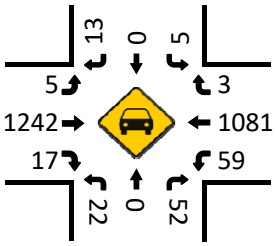
HT (NOON)



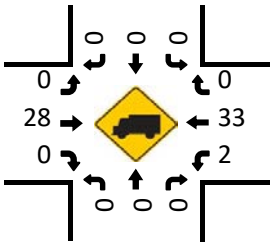
Pedestrians (Crosswalks)



Cars (PM)



HT (PM)



Project ID: 20-190015-003
Location: Viles Automotive Group Dwy & Callahan Dr
City: Knoxville

Day: Thursday
Date: 11/05/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Viles Automotive Group Dwy Northbound						Viles Automotive Group Dwy Southbound						Callahan Dr Eastbound						Callahan Dr Westbound						
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total
7:00 AM	1	0	3	0	0	4	0	0	0	0	0	0	1	108	4	0	0	113	8	147	0	0	0	155	272
7:15 AM	3	0	2	0	0	5	0	0	0	0	0	0	0	125	1	0	0	126	4	181	0	1	0	186	317
7:30 AM	2	0	10	0	0	12	0	0	0	0	0	0	2	156	2	0	0	160	2	223	2	0	0	227	399
7:45 AM	1	0	2	0	0	3	0	0	0	0	0	0	3	163	2	0	0	168	7	233	2	1	0	243	414
Total	7	0	17	0	0	24	0	0	0	0	0	0	6	552	9	0	0	567	21	784	4	2	0	811	1402
8:00 AM	2	0	3	0	0	5	0	0	0	0	0	0	0	192	1	1	0	194	9	208	3	0	0	220	419
8:15 AM	0	0	2	0	0	2	0	0	0	0	0	0	1	173	3	1	0	178	7	166	1	0	0	174	354
8:30 AM	2	0	8	0	0	10	0	1	4	0	0	5	2	146	3	0	0	151	6	174	2	0	0	182	348
8:45 AM	1	0	3	0	0	4	0	0	0	0	0	0	0	149	0	0	0	149	6	184	3	0	0	193	346
Total	5	0	16	0	0	21	0	1	4	0	0	5	3	660	7	2	0	672	28	732	9	0	0	769	1467
BREAK																									
11:00 AM	0	0	3	0	0	3	2	0	2	0	0	4	1	177	1	0	0	179	4	196	2	1	0	203	389
11:15 AM	1	0	3	0	0	4	0	1	2	0	0	3	0	162	0	0	0	162	8	191	3	2	0	204	373
11:30 AM	3	0	4	0	0	7	0	0	4	0	0	4	1	193	1	0	0	195	6	222	1	0	0	229	435
11:45 AM	1	0	3	0	0	4	0	0	1	0	0	1	2	192	2	0	0	196	5	236	2	0	0	243	444
Total	5	0	13	0	0	18	2	1	9	0	0	12	4	724	4	0	0	732	23	845	8	3	0	879	1641
12:00 PM	2	0	2	0	0	4	2	0	5	0	0	7	1	212	3	0	0	216	2	223	2	0	0	227	454
12:15 PM	7	0	3	0	0	10	1	0	1	0	0	2	2	227	4	0	0	233	4	205	1	0	0	210	455
12:30 PM	5	0	7	0	0	12	1	0	6	0	0	7	1	228	7	0	0	236	6	196	1	0	0	203	458
12:45 PM	0	0	7	0	0	7	0	0	3	0	1	3	7	205	5	0	0	217	2	229	2	0	0	233	460
Total	14	0	19	0	0	33	4	0	15	0	1	19	11	872	19	0	0	902	14	853	6	0	0	873	1827
BREAK																									
2:00 PM	3	0	7	0	2	10	1	0	4	0	0	5	2	216	3	0	0	221	6	221	1	2	0	230	466
2:15 PM	0	0	4	0	0	4	2	0	3	0	0	5	1	232	2	0	0	235	2	199	5	0	0	206	450
2:30 PM	2	0	4	0	0	6	0	0	2	0	0	2	1	231	1	0	0	233	2	206	2	1	0	211	452
2:45 PM	3	0	4	0	0	7	3	0	1	0	0	4	0	217	4	0	0	221	6	212	2	0	0	220	452
Total	8	0	19	0	2	27	6	0	10	0	0	16	4	896	10	0	0	910	16	838	10	3	0	867	1820
3:00 PM	2	0	12	0	0	14	0	0	1	0	0	1	0	233	4	0	0	237	10	190	1	0	0	201	453
3:15 PM	2	0	3	0	0	5	0	0	0	0	1	0	0	244	4	0	0	248	9	231	0	0	0	240	493
3:30 PM	5	0	7	0	0	12	1	0	1	0	0	2	0	255	2	0	0	257	6	249	2	0	0	257	528
3:45 PM	4	0	16	0	0	20	0	0	2	0	0	2	4	257	4	0	0	265	20	245	1	1	0	267	554
Total	13	0	38	0	0	51	1	0	4	0	1	5	4	989	14	0	0	1007	45	915	4	1	0	965	2028
4:00 PM	2	0	10	0	0	12	2	0	3	0	0	5	4	263	4	0	0	271	17	265	1	0	0	283	571
4:15 PM	5	0	11	0	0	16	1	0	5	0	0	6	1	297	7	0	0	305	15	250	0	1	0	266	593
4:30 PM	10	0	13	0	0	23	1	0	2	0	1	3	0	291	8	0	0	299	18	237	3	0	0	258	583
4:45 PM	5	0	16	0	0	21	2	0	8	0	0	10	3	302	11	0	0	316	17	305	0	1	0	323	670
Total	22	0	50	0	0	72	6	0	18	0	1	24	8	1153	30	0	0	1191	67	1057	4	2	0	1130	2417
5:00 PM	7	0	17	0	0	24	3	0	2	0	0	5	1	324	2	0	0	327	9	289	1	0	0	299	655
5:15 PM	4	0	7	0	0	11	0	0	0	0	0	0	0	321	2	0	0	323	16	275	0	0	0	291	625
5:30 PM	6	0	12	0	2	18	0	0	3	0	0	3	1	323	2	0	0	326	19	245	2	0	0	266	613
5:45 PM	6	0	4	0	0	10	3	0	2	0	1	5	0	275	4	0	0	279	17	266	1	2	0	286	580
Total	23	0	40	0	2	63	6	0	7	0	1	13	2	1243	10	0	0	1255	61	1075	4	2	0	1142	2473
Grand Total	97	0	212	0	4	309	25	2	67	0	4	94	42	7089	103	2	0	7236	275	7099	49	13	0	7436	15075
Apprch %	31.4	0.0	68.6	0.0	1.3		26.6	2.1	71.3	0.0	4.3		0.6	98.0	1.4	0.0	0.0		3.7	95.5	0.7	0.2	0.0		
Total %	0.6	0.0	1.4	0.0	0.0	2.0	0.2	0.0	0.4	0.0	0.0	0.6	0.3	47.0	0.7	0.0	0.0	48.0	1.8	47.1	0.3	0.1	0.0	49.3	
Cars, PU, Vans	89	0	194	0		283	25	1	66	0		92	41	6843	96	2		6982	255	6852	46	13		7166	14523
% Cars, PU, Vans	91.8	0.0	91.5	0.0		91.6	100.0	50.0	98.5	0.0		97.9	97.6	96.5	93.2	100.0		96.5	92.7	96.5	93.9	100.0		96.4	96.3
Heavy Trucks	8	0	18	0		26	0	1	1	0		2	1	246	7	0		254	20	247	3	0		270	552
%Heavy Trucks	8.2	0.0	8.5	0.0		8.4	0.0	50.0	1.5	0.0		2.1	2.4	3.5	6.8	0.0		3.5	7.3	3.5	6.1	0.0		3.6	3.7

Project ID: 20-190015-003
Location: Viles Automotive Group Dwy & Callahan Dr
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 11/05/2020

AM

	Viles Automotive Group Dwy Northbound					Viles Automotive Group Dwy Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	2	0	10	0	12	0	0	0	0	0	2	156	2	0	160	2	223	2	0	227	399
7:45 AM	1	0	2	0	3	0	0	0	0	0	3	163	2	0	168	7	233	2	1	243	414
8:00 AM	2	0	3	0	5	0	0	0	0	0	0	192	1	1	194	9	208	3	0	220	419
8:15 AM	0	0	2	0	2	0	0	0	0	0	1	173	3	1	178	7	166	1	0	174	354
Total Volume	5	0	17	0	22	0	0	0	0	0	6	684	8	2	700	25	830	8	1	864	1586
% App. Total	22.7	0.0	77.3	0.0	100	0.0	0.0	0.0	0.0	0	0.9	97.7	1.1	0.3	100	2.9	96.1	0.9	0.1	100	
PHF					0.458										0.902					0.889	0.946
Cars, PU, Vans	4	0	11	0	15	0	0	0	0	0	6	644	7	2	659	25	793	7	1	826	1500
% Cars, PU, Vans	80.0	0.0	64.7	0.0	68.2	0.0	0.0	0.0	0.0	0.0	100.0	94.2	87.5	100.0	94.1	100.0	95.5	87.5	100.0	95.6	94.6
Heavy Trucks	1	0	6	0	7	0	0	0	0	0	0	40	1	0	41	0	37	1	0	38	86
%Heavy Trucks	20.0	0.0	35.3	0.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0	5.8	12.5	0.0	5.9	0.0	4.5	12.5	0.0	4.4	5.4

NOON

	Viles Automotive Group Dwy Northbound					Viles Automotive Group Dwy Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 11:00 AM to 01:00 PM																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	2	0	2	0	4	2	0	5	0	7	1	212	3	0	216	2	223	2	0	227	454
12:15 PM	7	0	3	0	10	1	0	1	0	2	2	227	4	0	233	4	205	1	0	210	455
12:30 PM	5	0	7	0	12	1	0	6	0	7	1	228	7	0	236	6	196	1	0	203	458
12:45 PM	0	0	7	0	7	0	0	3	0	3	7	205	5	0	217	2	229	2	0	233	460
Total Volume	14	0	19	0	33	4	0	15	0	19	11	872	19	0	902	14	853	6	0	873	1827
% App. Total	42.4	0.0	57.6	0.0	100	21.1	0.0	78.9	0.0	100	1.2	96.7	2.1	0.0	100	1.6	97.7	0.7	0.0	100	
PHF					0.688					0.679					0.956					0.937	0.993
Cars, PU, Vans	14	0	16	0	30	4	0	15	0	19	10	841	19	0	870	12	830	6	0	848	1767
% Cars, PU, Vans	100.0	0.0	84.2	0.0	90.9	100.0	0.0	100.0	0.0	100.0	90.9	96.4	100.0	0.0	96.5	85.7	97.3	100.0	0.0	97.1	96.7
Heavy Trucks	0	0	3	0	3	0	0	0	0	0	1	31	0	0	32	2	23	0	0	25	60
%Heavy Trucks	0.0	0.0	15.8	0.0	9.1	0.0	0.0	0.0	0.0	0.0	9.1	3.6	0.0	0.0	3.5	14.3	2.7	0.0	0.0	2.9	3.3

PM

	Viles Automotive Group Dwy Northbound					Viles Automotive Group Dwy Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 02:00 PM to 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	5	0	16	0	21	2	0	8	0	10	3	302	11	0	316	17	305	0	1	323	670
5:00 PM	7	0	17	0	24	3	0	2	0	5	1	324	2	0	327	9	289	1	0	299	655
5:15 PM	4	0	7	0	11	0	0	0	0	0	0	321	2	0	323	16	275	0	0	291	625
5:30 PM	6	0	12	0	18	0	0	3	0	3	1	323	2	0	326	19	245	2	0	266	613
Total Volume	22	0	52	0	74	5	0	13	0	18	5	1270	17	0	1292	61	1114	3	1	1179	2563
% App. Total	29.7	0.0	70.3	0.0	100	27.8	0.0	72.2	0.0	100	0.4	98.3	1.3	0.0	100	5.2	94.5	0.3	0.1	100	
PHF					0.771					0.450					0.988					0.913	0.956
Cars, PU, Vans	22	0	52	0	74	5	0	13	0	18	5	1242	17	0	1264	59	1081	3	1	1144	2500
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	100.0	97.8	100.0	0.0	97.8	96.7	97.0	100.0	100.0	97.0	97.5
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	28	0	0	28	2	33	0	0	35	63
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	2.2	3.3	3.0	0.0	0.0	3.0	2.5

Prepared by National Data & Surveying Services

I -75 SB Ramps & Callahan Dr

Peak Hour Turning Movement Count

ID: 20-190015-004
City: Knoxville

Day: Thursday
Date: 11/05/2020

PEAK HOURS	
AM	07:30 AM - 08:30 AM
NOON	NONE
PM	04:45 PM - 05:45 PM

COUNT PERIODS	
AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

I -75 SB Ramps — SOUTHBOUND

AM	227	0	26	0	0	AM
NOON	0	0	0	0	0	NOON
PM	224	1	39	0	0	PM

Callahan Dr — EASTBOUND

AM	NOON	PM	
1026	0	1307	⇦
0	0	0	0
0	0	0	0
388	0	1028	2
382	0	484	1
AM	NOON	PM	

WESTBOUND — Callahan Dr

PM	NOON	AM	
0	0	0	0
1083	0	799	2
279	0	469	2
0	0	0	0
1067	0	414	⇨
PM	NOON	AM	

1	0	1	0	
0	0	0	0	

CONTROL

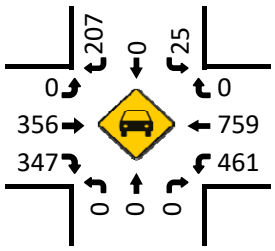
Signalized

TEV	2291 AM	0 NOON	3138 PM
PHF	0.95		0.93

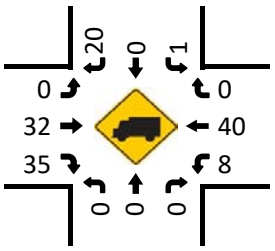
I -75 SB Ramps — NORTHBOUND

PM	764	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	851	0	0	0	0	AM

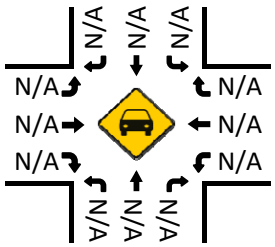
Cars (AM)



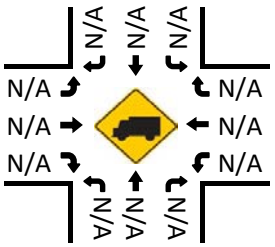
HT (AM)



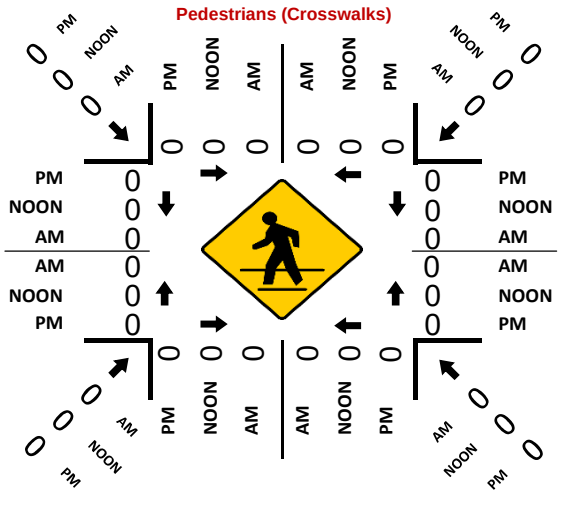
Cars (NOON)



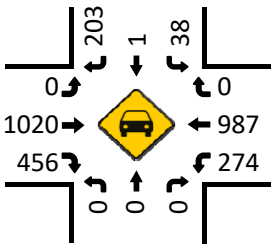
HT (NOON)



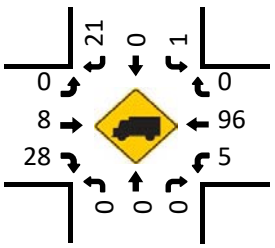
Pedestrians (Crosswalks)



Cars (PM)



HT (PM)



Project ID: 20-190015-004
Location: I -75 SB Ramps & Callahan Dr
City: Knoxville

Day: Thursday
Date: 11/05/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	I -75 SB Ramps Northbound						I -75 SB Ramps Southbound						Callahan Dr Eastbound						Callahan Dr Westbound						
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total
7:00 AM	0	0	0	0	0	0	3	2	40	0	0	45	0	62	68	0	0	130	114	158	0	0	0	272	447
7:15 AM	0	0	0	0	0	0	7	0	49	0	0	56	0	61	58	0	0	119	144	166	0	0	0	310	485
7:30 AM	0	0	0	0	0	0	5	0	58	0	0	63	0	82	92	0	0	174	119	207	0	0	0	326	563
7:45 AM	0	0	0	0	0	0	4	0	57	0	0	61	0	89	96	0	0	185	128	231	0	0	0	359	605
Total	0	0	0	0	0	0	19	2	204	0	0	225	0	294	314	0	0	608	505	762	0	0	0	1267	2100
8:00 AM	0	0	0	0	0	0	4	0	69	0	0	73	0	113	93	0	0	206	109	191	0	0	0	300	579
8:15 AM	0	0	0	0	0	0	13	0	43	0	0	56	0	104	101	0	0	205	113	170	0	0	0	283	544
8:30 AM	0	0	0	0	0	0	8	0	48	0	0	56	0	93	85	0	0	178	85	174	0	0	0	259	493
8:45 AM	0	0	0	0	0	0	10	0	50	0	0	60	0	90	66	0	0	156	61	214	0	0	0	275	491
Total	0	0	0	0	0	0	35	0	210	0	0	245	0	400	345	0	0	745	368	749	0	0	0	1117	2107
BREAK																									
4:00 PM	0	0	0	0	0	0	12	0	61	0	0	73	0	207	87	0	0	294	58	247	0	0	0	305	672
4:15 PM	0	0	0	0	0	0	5	0	51	0	0	56	0	214	106	0	0	320	63	240	0	0	0	303	679
4:30 PM	0	0	0	0	0	0	7	0	61	0	0	68	0	220	125	0	0	345	71	222	0	0	0	293	706
4:45 PM	0	0	0	0	0	0	5	0	48	0	0	53	0	252	126	0	0	378	49	298	0	0	0	347	778
Total	0	0	0	0	0	0	29	0	221	0	0	250	0	893	444	0	0	1337	241	1007	0	0	0	1248	2835
5:00 PM	0	0	0	0	0	0	12	0	61	0	0	73	0	275	134	0	0	409	94	272	0	0	0	366	848
5:15 PM	0	0	0	0	0	0	13	1	49	0	0	63	0	260	104	0	0	364	66	254	0	0	0	320	747
5:30 PM	0	0	0	0	0	0	9	0	66	0	0	75	0	241	120	0	0	361	70	259	0	0	0	329	765
5:45 PM	0	0	0	0	2	0	6	0	75	0	0	81	0	224	94	0	0	318	75	226	0	0	0	301	700
Total	0	0	0	0	2	0	40	1	251	0	0	292	0	1000	452	0	0	1452	305	1011	0	0	0	1316	3060
Grand Total	0	0	0	0	2	0	123	3	886	0	0	1012	0	2587	1555	0	0	4142	1419	3529	0	0	0	4948	10102
Apprch %	0.0	0.0	0.0	0.0	0.0		12.2	0.3	87.5	0.0	0.0		0.0	62.5	37.5	0.0	0.0		28.7	71.3	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	8.8	0.0	0.0	10.0	0.0	25.6	15.4	0.0	0.0	41.0	14.0	34.9	0.0	0.0	0.0	49.0	
Cars, PU, Vans	0	0	0	0		0	119	3	816	0		938	0	2509	1451	0		3960	1393	3289	0	0		4682	9580
% Cars, PU, Vans	0.0	0.0	0.0	0.0		0.0	96.7	100.0	92.1	0.0		92.7	0.0	97.0	93.3	0.0		95.6	98.2	93.2	0.0	0.0		94.6	94.8
Heavy Trucks	0	0	0	0		0	4	0	70	0		74	0	78	104	0		182	26	240	0	0		266	522
%Heavy Trucks	0.0	0.0	0.0	0.0		0.0	3.3	0.0	7.9	0.0		7.3	0.0	3.0	6.7	0.0		4.4	1.8	6.8	0.0	0.0		5.4	5.2

Project ID: 20-190015-004
Location: I -75 SB Ramps & Callahan Dr
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 11/05/2020

AM

	I -75 SB Ramps Northbound					I -75 SB Ramps Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	0	0	0	0	0	5	0	58	0	63	0	82	92	0	174	119	207	0	0	326	563
7:45 AM	0	0	0	0	0	4	0	57	0	61	0	89	96	0	185	128	231	0	0	359	605
8:00 AM	0	0	0	0	0	4	0	69	0	73	0	113	93	0	206	109	191	0	0	300	579
8:15 AM	0	0	0	0	0	13	0	43	0	56	0	104	101	0	205	113	170	0	0	283	544
Total Volume	0	0	0	0	0	26	0	227	0	253	0	388	382	0	770	469	799	0	0	1268	2291
% App. Total	0.0	0.0	0.0	0.0	0	10.3	0.0	89.7	0.0	100	0.0	50.4	49.6	0.0	100	37.0	63.0	0.0	0.0	100	
PHF										0.866					0.934					0.883	0.947
Cars, PU, Vans	0	0	0	0	0	25	0	207	0	232	0	356	347	0	703	461	759	0	0	1220	2155
% Cars, PU, Vans	0.0	0.0	0.0	0.0	0.0	96.2	0.0	91.2	0.0	91.7	0.0	91.8	90.8	0.0	91.3	98.3	95.0	0.0	0.0	96.2	94.1
Heavy Trucks	0	0	0	0	0	1	0	20	0	21	0	32	35	0	67	8	40	0	0	48	136
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	3.8	0.0	8.8	0.0	8.3	0.0	8.2	9.2	0.0	8.7	1.7	5.0	0.0	0.0	3.8	5.9

PM

	I -75 SB Ramps Northbound					I -75 SB Ramps Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM to 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	0	0	0	0	0	5	0	48	0	53	0	252	126	0	378	49	298	0	0	347	778
5:00 PM	0	0	0	0	0	12	0	61	0	73	0	275	134	0	409	94	272	0	0	366	848
5:15 PM	0	0	0	0	0	13	1	49	0	63	0	260	104	0	364	66	254	0	0	320	747
5:30 PM	0	0	0	0	0	9	0	66	0	75	0	241	120	0	361	70	259	0	0	329	765
Total Volume	0	0	0	0	0	39	1	224	0	264	0	1028	484	0	1512	279	1083	0	0	1362	3138
% App. Total	0.0	0.0	0.0	0.0	0	14.8	0.4	84.8	0.0	100	0.0	68.0	32.0	0.0	100	20.5	79.5	0.0	0.0	100	
PHF										0.880					0.924					0.930	0.925
Cars, PU, Vans	0	0	0	0	0	38	1	203	0	242	0	1020	456	0	1476	274	987	0	0	1261	2979
% Cars, PU, Vans	0.0	0.0	0.0	0.0	0.0	97.4	100.0	90.6	0.0	91.7	0.0	99.2	94.2	0.0	97.6	98.2	91.1	0.0	0.0	92.6	94.9
Heavy Trucks	0	0	0	0	0	1	0	21	0	22	0	8	28	0	36	5	96	0	0	101	159
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	2.6	0.0	9.4	0.0	8.3	0.0	0.8	5.8	0.0	2.4	1.8	8.9	0.0	0.0	7.4	5.1

Prepared by National Data & Surveying Services

I -75 NB Ramps & Callahan Dr

Peak Hour Turning Movement Count

ID: 20-190015-005
City: Knoxville

Day: Thursday
Date: 11/05/2020

PEAK HOURS	COUNT PERIODS
07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NONE	NONE
04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

I -75 NB Ramps — SOUTHBOUND

AM	0	0	0	0	212	AM
NOON	0	0	0	0	0	NOON
PM	0	0	0	0	397	PM

Callahan Dr — EASTBOUND

AM	NOON	PM	
1301	0	1362	⇦
0	0	2	0
147	0	347	1
210	0	721	2
0	0	0	0
AM	NOON	PM	

CONTROL

Signalized

TEV	1930 AM	0 NOON	3078 PM
PHF	0.95		0.98

WESTBOUND — Callahan Dr

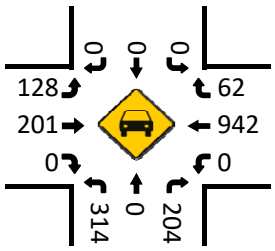
PM	NOON	AM	
49	0	65	0
764	0	962	2
0	0	0	0
0	0	0	0
1319	0	417	⇨
PM	NOON	AM	

I -75 NB Ramps — NORTHBOUND

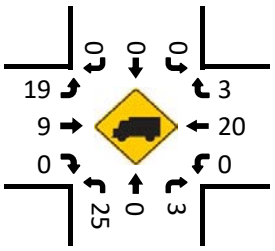
PM	0	0	596	1	598	PM
NOON	0	0	0	0	0	NOON
AM	0	0	339	0	207	AM

0 0 0 0 — 0 2 0 1

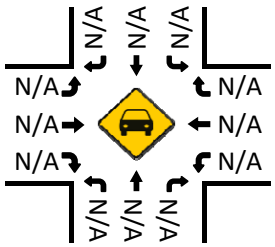
Cars (AM)



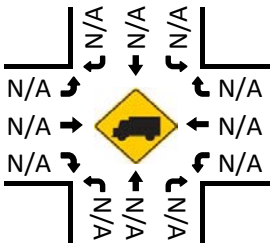
HT (AM)



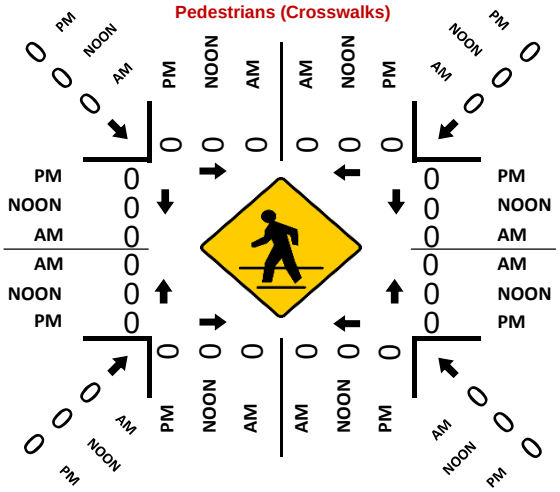
Cars (NOON)



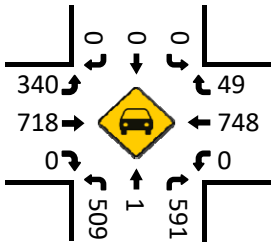
HT (NOON)



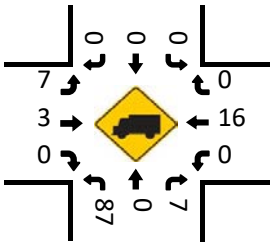
Pedestrians (Crosswalks)



Cars (PM)



HT (PM)



Project ID: 20-190015-005
Location: I -75 NB Ramps & Callahan Dr
City: Knoxville

Day: Thursday
Date: 11/05/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	I -75 NB Ramps Northbound						I -75 NB Ramps Southbound						Callahan Dr Eastbound						Callahan Dr Westbound						
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total
7:00 AM	65	0	30	0	0	95	0	0	0	0	0	0	25	42	0	0	0	67	0	203	10	0	0	213	375
7:15 AM	79	0	42	0	0	121	0	0	0	0	0	0	32	35	0	0	0	67	0	235	21	0	0	256	444
7:30 AM	75	0	55	0	0	130	0	0	0	0	0	0	35	47	0	0	0	82	0	257	17	0	0	274	486
7:45 AM	107	0	58	0	0	165	0	0	0	0	0	0	38	52	0	0	0	90	0	245	10	0	0	255	510
Total	326	0	185	0	0	511	0	0	0	0	0	0	130	176	0	0	0	306	0	940	58	0	0	998	1815
8:00 AM	78	0	52	0	0	130	0	0	0	0	0	0	42	76	0	0	0	118	0	225	17	0	0	242	490
8:15 AM	72	0	37	0	0	109	0	0	0	0	0	0	39	77	0	1	0	117	0	204	9	0	0	213	439
8:30 AM	92	0	51	0	0	143	0	0	0	0	0	0	42	65	0	0	0	107	0	172	9	0	0	181	431
8:45 AM	91	0	54	0	0	145	0	0	0	0	0	0	30	66	0	0	0	96	0	180	8	0	0	188	429
Total	333	0	194	0	0	527	0	0	0	0	0	0	153	284	0	1	0	438	0	781	43	0	0	824	1789
BREAK																									
4:00 PM	128	1	139	0	0	268	0	0	0	0	0	0	73	149	0	1	0	223	0	168	14	0	0	182	673
4:15 PM	136	0	132	0	0	268	0	0	0	0	0	0	70	142	0	0	0	212	0	174	16	0	0	190	670
4:30 PM	135	0	135	0	0	270	0	0	0	0	0	0	73	158	0	1	0	232	0	166	15	0	0	181	683
4:45 PM	158	0	166	0	0	324	0	0	0	0	0	0	93	163	0	0	0	256	0	183	17	0	0	200	780
Total	557	1	572	0	0	1130	0	0	0	0	0	0	309	612	0	2	0	923	0	691	62	0	0	753	2806
5:00 PM	154	1	130	0	0	285	0	0	0	0	0	0	81	196	0	1	0	278	0	213	12	0	0	225	788
5:15 PM	147	0	169	0	0	316	0	0	0	0	0	0	85	192	0	1	0	278	0	169	8	0	0	177	771
5:30 PM	137	0	133	0	0	270	0	0	0	0	0	0	88	170	0	0	0	258	0	199	12	0	0	211	739
5:45 PM	116	0	110	0	2	226	0	0	0	0	0	0	70	158	0	0	0	228	0	174	6	0	0	180	634
Total	554	1	542	0	2	1097	0	0	0	0	0	0	324	716	0	2	0	1042	0	755	38	0	0	793	2932
Grand Total	1770	2	1493	0	2	3265	0	0	0	0	0	0	916	1788	0	5	0	2709	0	3167	201	0	0	3368	9342
Apprch %	54.2	0.1	45.7	0.0	0.1		0.0	0.0	0.0	0.0	0.0		33.8	66.0	0.0	0.2	0.0		0.0	94.0	6.0	0.0	0.0		
Total %	18.9	0.0	16.0	0.0	0.0	34.9	0.0	0.0	0.0	0.0	0.0	0.0	9.8	19.1	0.0	0.1	0.0	29.0	0.0	33.9	2.2	0.0	0.0	36.1	
Cars, PU, Vans	1574	1	1469	0		3044	0	0	0	0		0	865	1757	0	5		2627	0	3097	197	0		3294	8965
% Cars, PU, Vans	88.9	50.0	98.4	0.0		93.2	0.0	0.0	0.0	0.0		0.0	94.4	98.3	0.0	100.0		97.0	0.0	97.8	98.0	0.0		97.8	96.0
Heavy Trucks	196	1	24	0		221	0	0	0	0		0	51	31	0	0		82	0	70	4	0		74	377
%Heavy Trucks	11.1	50.0	1.6	0.0		6.8	0.0	0.0	0.0	0.0		0.0	5.6	1.7	0.0	0.0		3.0	0.0	2.2	2.0	0.0		2.2	4.0

Project ID: 20-190015-005
Location: I -75 NB Ramps & Callahan Dr
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 11/05/2020

AM

	I-75 NB Ramps Northbound					I-75 NB Ramps Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
7:15 AM	79	0	42	0	121	0	0	0	0	0	32	35	0	0	67	0	235	21	0	256	444
7:30 AM	75	0	55	0	130	0	0	0	0	0	35	47	0	0	82	0	257	17	0	274	486
7:45 AM	107	0	58	0	165	0	0	0	0	0	38	52	0	0	90	0	245	10	0	255	510
8:00 AM	78	0	52	0	130	0	0	0	0	0	42	76	0	0	118	0	225	17	0	242	490
Total Volume	339	0	207	0	546	0	0	0	0	0	147	210	0	0	357	0	962	65	0	1027	1930
% App. Total	62.1	0.0	37.9	0.0	100	0.0	0.0	0.0	0.0	0	41.2	58.8	0.0	0.0	100	0.0	93.7	6.3	0.0	100	
PHF					0.827										0.756					0.937	0.946
Cars, PU, Vans	314	0	204	0	518	0	0	0	0	0	128	201	0	0	329	0	942	62	0	1004	1851
% Cars, PU, Vans	92.6	0.0	98.6	0.0	94.9	0.0	0.0	0.0	0.0	0.0	87.1	95.7	0.0	0.0	92.2	0.0	97.9	95.4	0.0	97.8	95.9
Heavy Trucks	25	0	3	0	28	0	0	0	0	0	19	9	0	0	28	0	20	3	0	23	79
%Heavy Trucks	7.4	0.0	1.4	0.0	5.1	0.0	0.0	0.0	0.0	0.0	12.9	4.3	0.0	0.0	7.8	0.0	2.1	4.6	0.0	2.2	4.1

PM

	I-75 NB Ramps Northbound					I-75 NB Ramps Southbound					Callahan Dr Eastbound					Callahan Dr Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM to 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	158	0	166	0	324	0	0	0	0	0	93	163	0	0	256	0	183	17	0	200	780
5:00 PM	154	1	130	0	285	0	0	0	0	0	81	196	0	1	278	0	213	12	0	225	788
5:15 PM	147	0	169	0	316	0	0	0	0	0	85	192	0	1	278	0	169	8	0	177	771
5:30 PM	137	0	133	0	270	0	0	0	0	0	88	170	0	0	258	0	199	12	0	211	739
Total Volume	596	1	598	0	1195	0	0	0	0	0	347	721	0	2	1070	0	764	49	0	813	3078
% App. Total	49.9	0.1	50.0	0.0	100	0.0	0.0	0.0	0.0	0	32.4	67.4	0.0	0.2	100	0.0	94.0	6.0	0.0	100	
PHF					0.922										0.962					0.903	0.977
Cars, PU, Vans	509	1	591	0	1101	0	0	0	0	0	340	718	0	2	1060	0	748	49	0	797	2958
% Cars, PU, Vans	85.4	100.0	98.8	0.0	92.1	0.0	0.0	0.0	0.0	0.0	98.0	99.6	0.0	100.0	99.1	0.0	97.9	100.0	0.0	98.0	96.1
Heavy Trucks	87	0	7	0	94	0	0	0	0	0	7	3	0	0	10	0	16	0	0	16	120
%Heavy Trucks	14.6	0.0	1.2	0.0	7.9	0.0	0.0	0.0	0.0	0.0	2.0	0.4	0.0	0.0	0.9	0.0	2.1	0.0	0.0	2.0	3.9

Prepared by National Data & Surveying Services

Central Ave Pike & Callahan Dr/Dante Rd

Peak Hour Turning Movement Count

ID: 20-190015-006
City: Knoxville

Day: Thursday
Date: 11/05/2020

PEAK HOURS

AM	07:30 AM - 08:30 AM
NOON	NONE
PM	04:45 PM - 05:45 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Central Ave Pike — SOUTHBOUND

AM	577	148	34	0	395	AM
NOON	0	0	0	0	0	NOON
PM	432	158	47	0	887	PM
	1	1	1	0		

Callahan Dr/Dante Rd — EASTBOUND

AM	NOON	PM	
987	0	821	
0	0	0	0
243	0	572	1
107	0	533	1
103	0	218	1

CONTROL

Signalized

	AM	NOON	PM
TEV	1823	0	2723
PHF	0.95		0.96

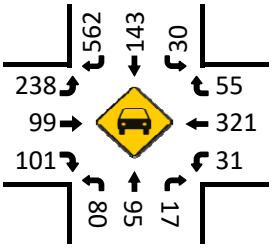
Callahan Dr/Dante Rd — WESTBOUND

PM	NOON	AM	
47	0	56	0
242	0	328	1
31	0	32	1
0	0	0	0
608	0	158	

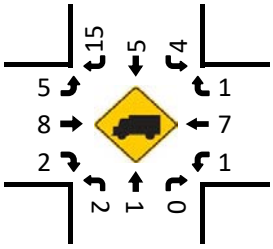
	0	1	1	0		
PM	407	0	147	268	28	PM
NOON	0	0	0	0	0	NOON
AM	283	0	82	96	17	AM

Central Ave Pike — NORTHBOUND

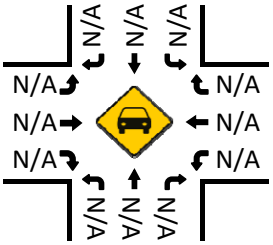
Cars (AM)



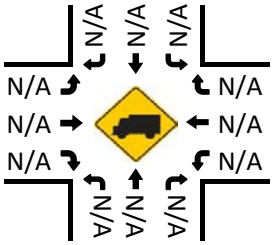
HT (AM)



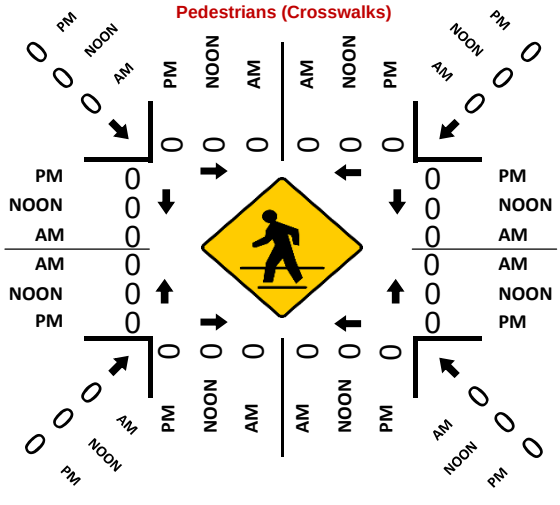
Cars (NOON)



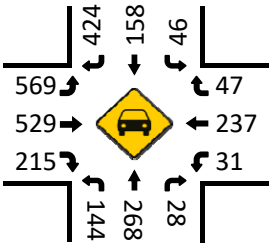
HT (NOON)



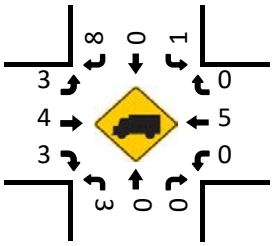
Pedestrians (Crosswalks)



Cars (PM)



HT (PM)



Project ID: 20-190015-006
Location: Central Ave Pike & Callahan Dr/Dante Rd
City: Knoxville

Day: Thursday
Date: 11/05/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Central Ave Pike Northbound						Central Ave Pike Southbound						Callahan Dr/Dante Rd Eastbound						Callahan Dr/Dante Rd Westbound						
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total
7:00 AM	33	13	3	0	0	49	4	20	122	0	0	146	40	21	13	0	0	74	6	65	9	0	0	80	349
7:15 AM	13	14	4	0	0	31	2	29	126	0	0	157	40	18	19	0	0	77	5	108	7	0	0	120	385
7:30 AM	20	27	3	0	0	50	2	37	165	0	0	204	63	13	24	0	0	100	11	96	19	0	0	126	480
7:45 AM	23	25	6	0	0	54	13	40	151	0	0	204	56	31	24	0	0	111	6	79	19	0	0	104	473
Total	89	79	16	0	0	184	21	126	564	0	0	711	199	83	80	0	0	362	28	348	54	0	0	430	1687
8:00 AM	21	27	5	0	0	53	7	32	135	0	0	174	59	40	27	0	0	126	6	90	6	0	0	102	455
8:15 AM	18	17	3	0	0	38	12	39	126	0	0	177	65	23	28	0	0	116	9	63	12	0	0	84	415
8:30 AM	25	18	1	0	0	44	1	28	103	0	0	132	55	34	30	0	0	119	7	57	3	0	0	67	362
8:45 AM	17	16	7	0	0	40	5	35	121	0	0	161	72	18	28	0	0	118	4	48	11	0	0	63	382
Total	81	78	16	0	0	175	25	134	485	0	0	644	251	115	113	0	0	479	26	258	32	0	0	316	1614
BREAK																									
4:00 PM	42	52	10	0	0	104	9	32	85	0	0	126	149	100	33	0	0	282	9	47	8	0	0	64	576
4:15 PM	39	47	5	0	0	91	18	42	109	0	0	169	146	95	38	0	0	279	7	44	11	0	0	62	601
4:30 PM	39	55	6	0	0	100	12	43	99	0	0	154	142	107	46	0	0	295	9	41	8	0	0	58	607
4:45 PM	36	65	9	0	0	110	9	42	117	0	0	168	147	129	44	0	0	320	8	59	11	0	0	78	676
Total	156	219	30	0	0	405	48	159	410	0	0	617	584	431	161	0	0	1176	33	191	38	0	0	262	2460
5:00 PM	41	68	5	0	0	114	15	35	110	0	0	160	139	131	49	0	0	319	5	57	12	0	0	74	667
5:15 PM	31	66	10	0	0	107	10	41	101	0	0	152	148	149	70	0	0	367	10	63	11	0	0	84	710
5:30 PM	39	69	4	0	0	112	13	40	104	0	0	157	138	124	55	0	0	317	8	63	13	0	0	84	670
5:45 PM	37	45	8	0	0	90	8	48	99	0	0	155	136	92	36	0	0	264	9	35	9	0	0	53	562
Total	148	248	27	0	0	423	46	164	414	0	0	624	561	496	210	0	0	1267	32	218	45	0	0	295	2609
Grand Total	474	624	89	0	0	1187	140	583	1873	0	0	2596	1595	1125	564	0	0	3284	119	1015	169	0	0	1303	8370
Apprch %	39.9	52.6	7.5	0.0	0.0		5.4	22.5	72.1	0.0	0.0		48.6	34.3	17.2	0.0	0.0		9.1	77.9	13.0	0.0	0.0		
Total %	5.7	7.5	1.1	0.0	0.0	14.2	1.7	7.0	22.4	0.0	0.0	31.0	19.1	13.4	6.7	0.0	0.0	39.2	1.4	12.1	2.0	0.0	0.0	15.6	
Cars, PU, Vans	464	622	85	0		1171	132	577	1829	0		2538	1576	1102	551	0		3229	117	995	167	0		1279	8217
% Cars, PU, Vans	97.9	99.7	95.5	0.0		98.7	94.3	99.0	97.7	0.0		97.8	98.8	98.0	97.7	0.0		98.3	98.3	98.0	98.8	0.0		98.2	98.2
Heavy Trucks	10	2	4	0		16	8	6	44	0		58	19	23	13	0		55	2	20	2	0		24	153
%Heavy Trucks	2.1	0.3	4.5	0.0		1.3	5.7	1.0	2.3	0.0		2.2	1.2	2.0	2.3	0.0		1.7	1.7	2.0	1.2	0.0		1.8	1.8

Project ID: 20-190015-006
Location: Central Ave Pike & Callahan Dr/Dante Rd
City: Knoxville

PEAK HOURS

Day: Thursday
Date: 11/05/2020

AM

	Central Ave Pike Northbound					Central Ave Pike Southbound					Callahan Dr/Dante Rd Eastbound					Callahan Dr/Dante Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
7:30 AM	20	27	3	0	50	2	37	165	0	204	63	13	24	0	100	11	96	19	0	126	480
7:45 AM	23	25	6	0	54	13	40	151	0	204	56	31	24	0	111	6	79	19	0	104	473
8:00 AM	21	27	5	0	53	7	32	135	0	174	59	40	27	0	126	6	90	6	0	102	455
8:15 AM	18	17	3	0	38	12	39	126	0	177	65	23	28	0	116	9	63	12	0	84	415
Total Volume	82	96	17	0	195	34	148	577	0	759	243	107	103	0	453	32	328	56	0	416	1823
% App. Total	42.1	49.2	8.7	0.0	100	4.5	19.5	76.0	0.0	100	53.6	23.6	22.7	0.0	100	7.7	78.8	13.5	0.0	100	
PHF					0.903					0.930					0.899					0.825	0.949
Cars, PU, Vans	80	95	17	0	192	30	143	562	0	735	238	99	101	0	438	31	321	55	0	407	1772
% Cars, PU, Vans	97.6	99.0	100.0	0.0	98.5	88.2	96.6	97.4	0.0	96.8	97.9	92.5	98.1	0.0	96.7	96.9	97.9	98.2	0.0	97.8	97.2
Heavy Trucks	2	1	0	0	3	4	5	15	0	24	5	8	2	0	15	1	7	1	0	9	51
%Heavy Trucks	2.4	1.0	0.0	0.0	1.5	11.8	3.4	2.6	0.0	3.2	2.1	7.5	1.9	0.0	3.3	3.1	2.1	1.8	0.0	2.2	2.8

PM

	Central Ave Pike Northbound					Central Ave Pike Southbound					Callahan Dr/Dante Rd Eastbound					Callahan Dr/Dante Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM to 06:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	36	65	9	0	110	9	42	117	0	168	147	129	44	0	320	8	59	11	0	78	676
5:00 PM	41	68	5	0	114	15	35	110	0	160	139	131	49	0	319	5	57	12	0	74	667
5:15 PM	31	66	10	0	107	10	41	101	0	152	148	149	70	0	367	10	63	11	0	84	710
5:30 PM	39	69	4	0	112	13	40	104	0	157	138	124	55	0	317	8	63	13	0	84	670
Total Volume	147	268	28	0	443	47	158	432	0	637	572	533	218	0	1323	31	242	47	0	320	2723
% App. Total	33.2	60.5	6.3	0.0	100	7.4	24.8	67.8	0.0	100	43.2	40.3	16.5	0.0	100	9.7	75.6	14.7	0.0	100	
PHF					0.971					0.948					0.901					0.952	0.959
Cars, PU, Vans	144	268	28	0	440	46	158	424	0	628	569	529	215	0	1313	31	237	47	0	315	2696
% Cars, PU, Vans	98.0	100.0	100.0	0.0	99.3	97.9	100.0	98.1	0.0	98.6	99.5	99.2	98.6	0.0	99.2	100.0	97.9	100.0	0.0	98.4	99.0
Heavy Trucks	3	0	0	0	3	1	0	8	0	9	3	4	3	0	10	0	5	0	0	5	27
%Heavy Trucks	2.0	0.0	0.0	0.0	0.7	2.1	0.0	1.9	0.0	1.4	0.5	0.8	1.4	0.0	0.8	0.0	2.1	0.0	0.0	1.6	1.0

APPENDIX B – TRIP GENERATION

Industrial Park
(130)

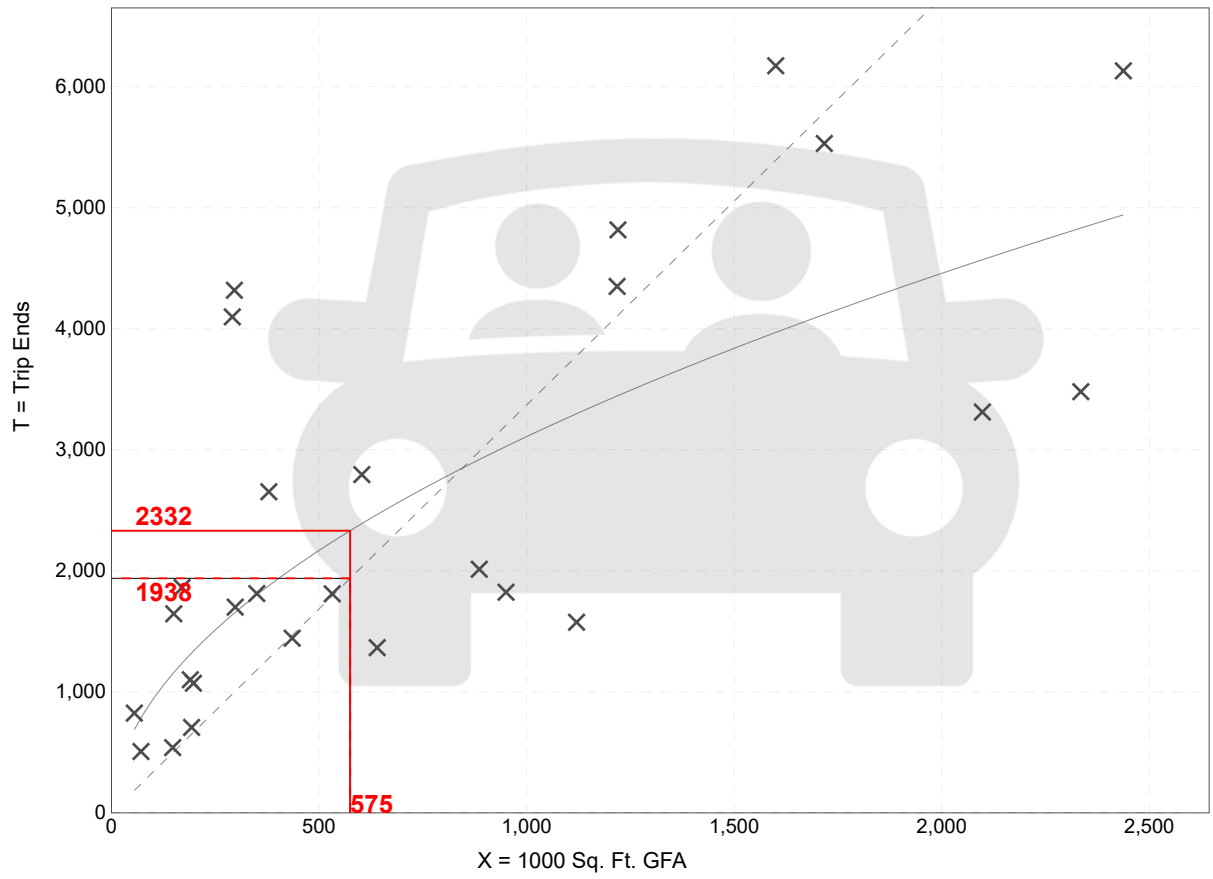
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 27
Avg. 1000 Sq. Ft. GFA: 762
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.37	1.41 - 14.98	2.60

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.52 Ln(X) + 4.45

R^2= 0.58

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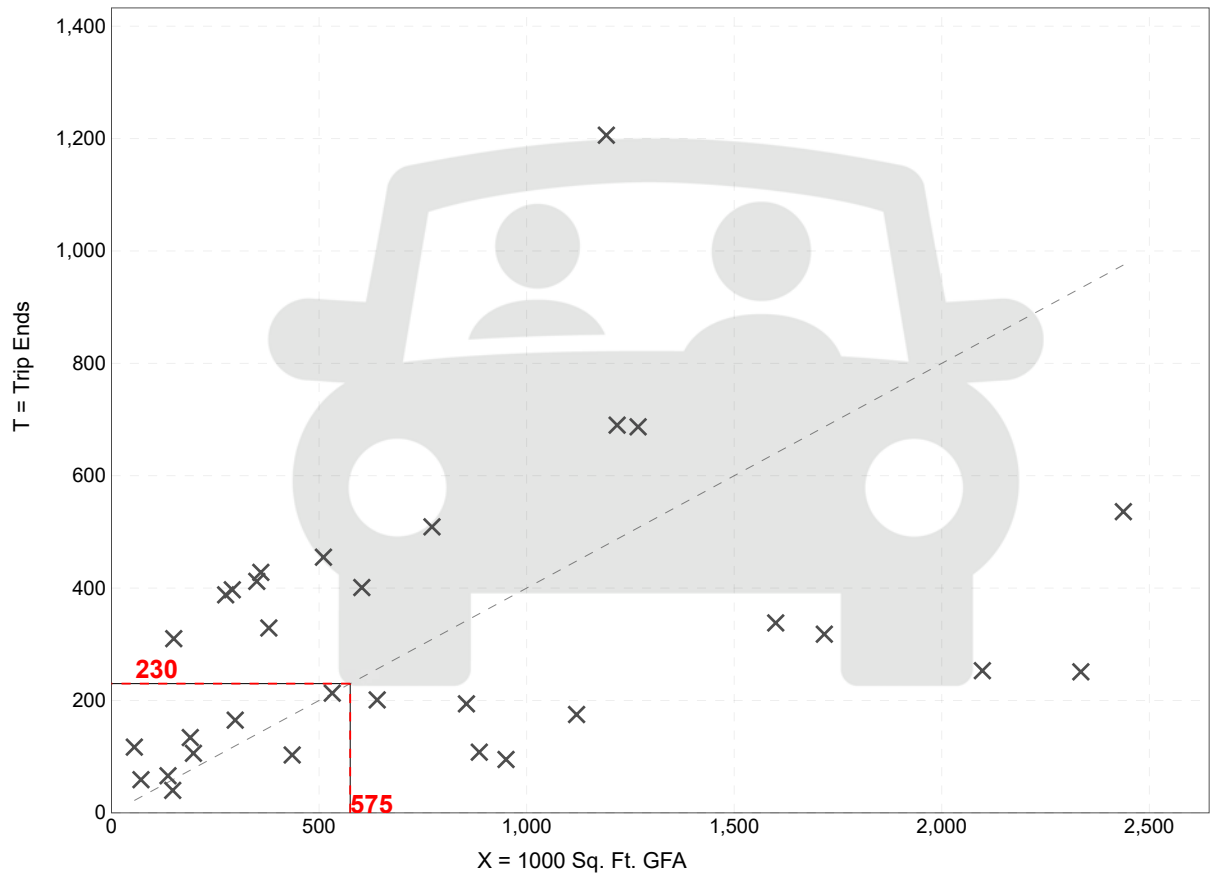
Industrial Park
(130)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 31
Avg. 1000 Sq. Ft. GFA: 776
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.40	0.10 - 2.13	0.37

Data Plot and Equation



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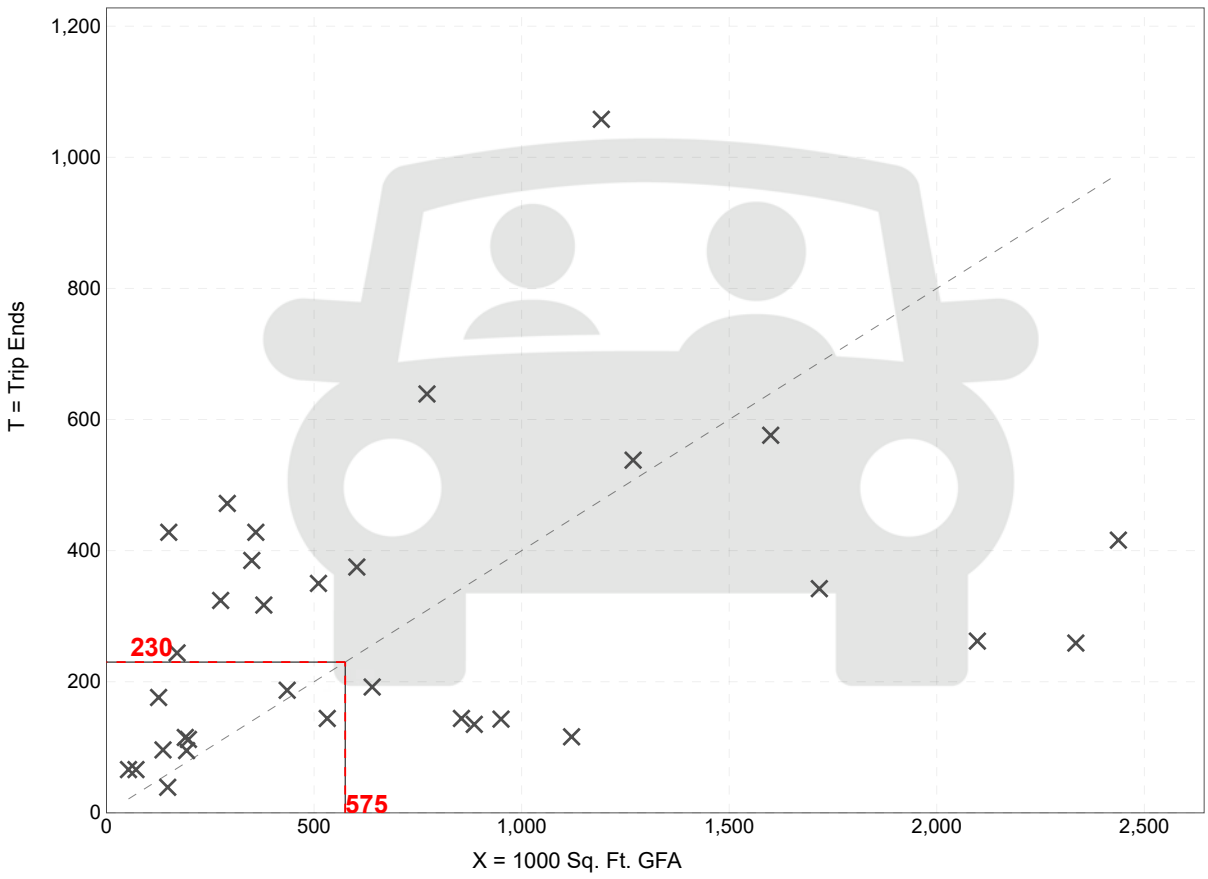
Industrial Park
(130)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 32
Avg. 1000 Sq. Ft. GFA: 720
Directional Distribution: 21% entering, 79% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.40	0.10 - 2.85	0.41

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

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APPENDIX C – CAPACITY ANALYSIS

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

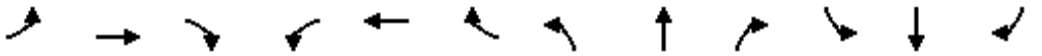
*Unstable flow is such that minor fluctuations or disruptions can result in rapid degradation to LOS F.

LOS CRITERIA: SIGNALIZED & UNSIGNALIZED INTERSECTIONS

LOS	CONTROL DELAY (S/VEH)		
	SIGNALIZED	UNSIGNALIZED	ROUNDABOUT
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.

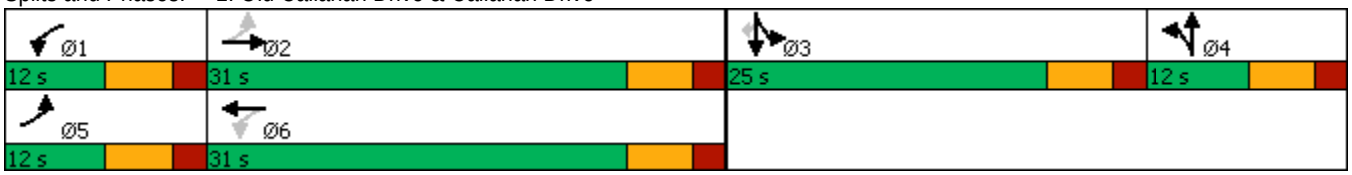


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	481	1	2	708	271	0	0	2	342	2	7
Future Volume (vph)	8	481	1	2	708	271	0	0	2	342	2	7
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.959			0.865				0.850
Flt Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1770	3539	0	1770	3394	0	0	1611	0	0	1775	1583
Flt Permitted	0.166			0.428							0.953	
Satd. Flow (perm)	309	3539	0	797	3394	0	0	1611	0	0	1775	1583
Satd. Flow (RTOR)					72			246				205
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 (%)												
Lane Group Flow (vph)	9	518	0	2	1052	0	0	2	0	0	370	8
Turn Type	pm+pt	NA		pm+pt	NA			NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								3
Detector Phase	5	2		1	6		4	4		3	3	3
Switch Phase												
Minimum Initial (s)	6.0	15.0		6.0	15.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.0	21.0		12.0	21.0		12.0	12.0		12.0	12.0	12.0
Total Split (s)	12.0	31.0		12.0	31.0		12.0	12.0		25.0	25.0	25.0
Total Split (%)	15.0%	38.8%		15.0%	38.8%		15.0%	15.0%		31.3%	31.3%	31.3%
Maximum Green (s)	6.0	25.0		6.0	25.0		6.0	6.0		19.0	19.0	19.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	25.0	24.1		25.0	24.1			6.2			17.3	17.3
Actuated g/C Ratio	0.44	0.42		0.44	0.42			0.11			0.30	0.30
v/c Ratio	0.03	0.35		0.00	0.72			0.01			0.69	0.01
Control Delay	10.6	14.1		10.5	18.8			0.0			28.9	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	10.6	14.1		10.5	18.8			0.0			28.9	0.0
LOS	B	B		B	B			A			C	A
Approach Delay		14.0			18.8						28.3	
Approach LOS		B			B						C	
Queue Length 50th (ft)	2	53		0	124			0			101	0
Queue Length 95th (ft)	10	154		4	#384			0			#331	0
Internal Link Dist (ft)		1332			2747			179			1202	
Turn Bay Length (ft)	125			110								45
Base Capacity (vph)	293	1604		453	1578			394			611	679
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.03	0.32		0.00	0.67			0.01			0.61	0.01

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 57.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 19.3	Intersection LOS: B
Intersection Capacity Utilization 64.0%	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: 1: Old Callahan Drive & Callahan Drive



HCS7 Two-Way Stop-Control Report

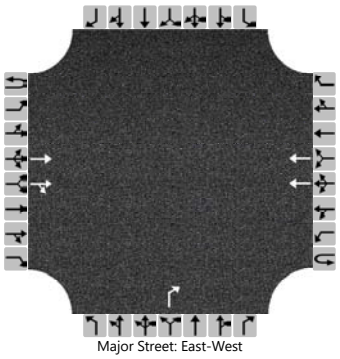
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2020
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2020 Existing AM

Site Information

Intersection	Yow West at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Commercial West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	1		0	0	0
Configuration			T	TR			T					R				
Volume (veh/h)			834	1			1002					5				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.96				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)												5				
Capacity, c (veh/h)												551				
v/c Ratio												0.01				
95% Queue Length, Q_{95} (veh)												0.0				
Control Delay (s/veh)												11.6				
Level of Service (LOS)												B				
Approach Delay (s/veh)										11.6						
Approach LOS										B						

HCS7 Two-Way Stop-Control Report

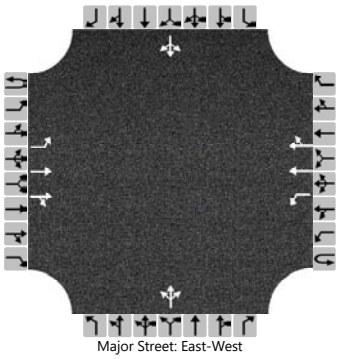
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2020
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2020 Existing AM

Site Information

Intersection	Yow East at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Comm. East / Viles
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

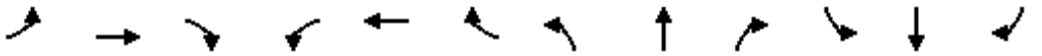
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	7	821	10	0	30	996	10		6	0	20		0	0	0
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								2						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

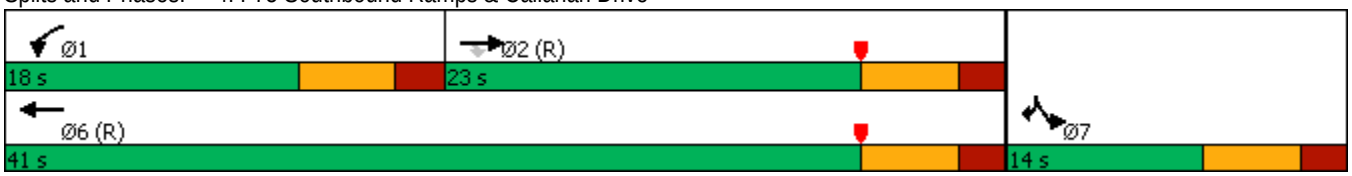
Flow Rate, v (veh/h)		8				33					28				0	
Capacity, c (veh/h)		628				742					422					
v/c Ratio		0.01				0.04					0.07					
95% Queue Length, Q_{95} (veh)		0.0				0.1					0.2					
Control Delay (s/veh)		10.8				10.1					14.1					
Level of Service (LOS)		B				B					B					
Approach Delay (s/veh)		0.1				0.3				14.1						
Approach LOS										B						



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	466	458	563	959	0	0	0	0	31	0	272
Future Volume (vph)	0	466	458	563	959	0	0	0	0	31	0	272
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Satd. Flow (RTOR)			453									179
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 (%)												
Lane Group Flow (vph)	0	491	482	593	1009	0	0	0	0	33	0	286
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		2		1	6					7		7
Permitted Phases			2									
Detector Phase		2	2	1	6					7		7
Switch Phase												
Minimum Initial (s)		15.0	15.0	6.0	15.0					8.0		8.0
Minimum Split (s)		21.0	21.0	12.0	21.0					14.0		14.0
Total Split (s)		23.0	23.0	18.0	41.0					14.0		14.0
Total Split (%)		41.8%	41.8%	32.7%	74.5%					25.5%		25.5%
Maximum Green (s)		17.0	17.0	12.0	35.0					8.0		8.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0	6.0					6.0		6.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					None		None
Act Effct Green (s)		17.2	17.2	11.8	35.0					8.0		8.0
Actuated g/C Ratio		0.31	0.31	0.21	0.64					0.15		0.15
v/c Ratio		0.44	0.60	0.81	0.45					0.13		0.75
Control Delay		16.7	6.0	23.4	2.2					21.9		24.1
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		16.7	6.0	23.4	2.2					21.9		24.1
LOS		B	A	C	A					C		C
Approach Delay		11.4			10.0						23.9	
Approach LOS		B			B						C	
Queue Length 50th (ft)		66	7	79	0					10		33
Queue Length 95th (ft)		103	64	m97	0					30		#134
Internal Link Dist (ft)		2461			901			890			1125	
Turn Bay Length (ft)			165	130								390
Base Capacity (vph)		1106	806	749	2252					257		383
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.44	0.60	0.79	0.45					0.13		0.75

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 36 (65%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 12.0	Intersection LOS: B
Intersection Capacity Utilization 70.6%	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.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: I-75 Southbound Ramps & Callahan Drive

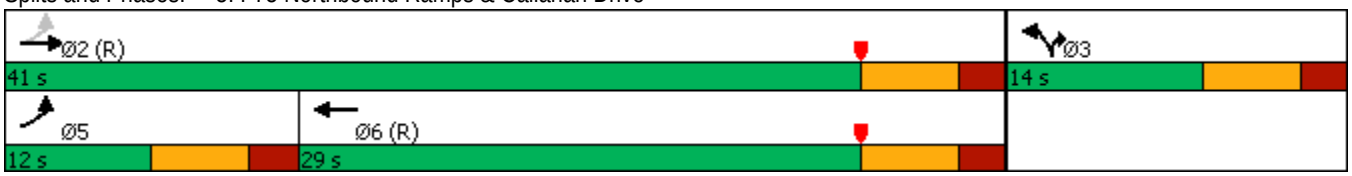


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	252	0	0	1154	78	403	0	248	0	0	0
Future Volume (vph)	176	252	0	0	1154	78	403	0	248	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	1583	0	0	0
Flt Permitted	0.132						0.950					
Satd. Flow (perm)	246	3539	0	0	3507	0	3433	0	1583	0	0	0
Satd. Flow (RTOR)					15				261			
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 (%)												
Lane Group Flow (vph)	185	265	0	0	1297	0	424	0	261	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	12.0	41.0			29.0		14.0		14.0			
Total Split (%)	21.8%	74.5%			52.7%		25.5%		25.5%			
Maximum Green (s)	6.0	35.0			23.0		8.0		8.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	35.0	35.0			25.4		8.0		8.0			
Actuated g/C Ratio	0.64	0.64			0.46		0.15		0.15			
v/c Ratio	0.57	0.12			0.80		0.85		0.58			
Control Delay	29.1	0.2			21.2		42.0		9.3			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	29.1	0.2			21.2		42.0		9.3			
LOS	C	A			C		D		A			
Approach Delay		12.1			21.2			29.5				
Approach LOS		B			C			C				
Queue Length 50th (ft)	26	0			280		71		0			
Queue Length 95th (ft)	#91	0			325		#138		53			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	322	2252			1627		499		453			
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	0.57	0.12			0.80		0.85		0.58			

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 5 (9%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 70.6%	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.

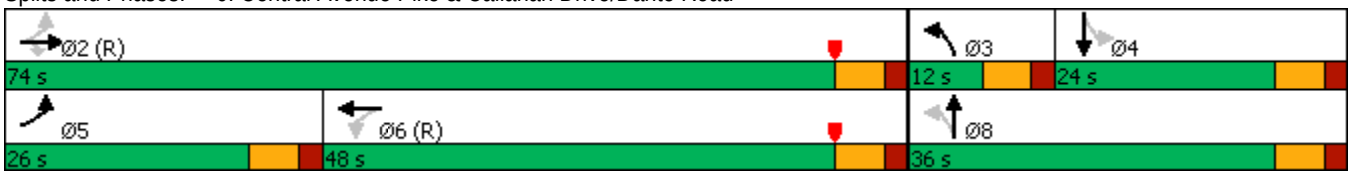
Splits and Phases: 5: I-75 Northbound Ramps & Callahan Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	128	124	38	394	67	98	115	20	41	178	692
Future Volume (vph)	292	128	124	38	394	67	98	115	20	41	178	692
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.978			0.978				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1822	0	1770	1822	0	1770	1863	1583
Flt Permitted	0.298			0.671			0.310			0.666		
Satd. Flow (perm)	555	1863	1583	1250	1822	0	577	1822	0	1241	1863	1583
Satd. Flow (RTOR)			131		9			8				572
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 (%)												
Lane Group Flow (vph)	307	135	131	40	486	0	103	142	0	43	187	728
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Free
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2		2	6			8			4		Free
Detector Phase	5	2	2	6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	12.0	21.0	21.0	21.0	21.0		12.0	14.0		14.0	14.0	
Total Split (s)	26.0	74.0	74.0	48.0	48.0		12.0	36.0		24.0	24.0	
Total Split (%)	23.6%	67.3%	67.3%	43.6%	43.6%		10.9%	32.7%		21.8%	21.8%	
Maximum Green (s)	20.0	68.0	68.0	42.0	42.0		6.0	30.0		18.0	18.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	70.7	70.7	70.7	50.6	50.6		27.3	27.3		15.3	15.3	110.0
Actuated g/C Ratio	0.64	0.64	0.64	0.46	0.46		0.25	0.25		0.14	0.14	1.00
v/c Ratio	0.60	0.11	0.12	0.07	0.58		0.50	0.31		0.25	0.72	0.46
Control Delay	16.8	7.4	1.6	19.8	26.4		41.0	33.0		44.8	61.1	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	16.8	7.4	1.6	19.8	26.4		41.0	33.0		44.8	61.1	1.0
LOS	B	A	A	B	C		D	C		D	E	A
Approach Delay		11.1			25.9			36.4			14.7	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)	85	24	1	16	244		58	76		27	127	0
Queue Length 95th (ft)	137	56	11	41	398		102	130		61	200	0
Internal Link Dist (ft)		779			937			888			996	
Turn Bay Length (ft)	570			90			110			155		155
Base Capacity (vph)	577	1197	1063	575	842		208	502		203	304	1583
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	0.53	0.11	0.12	0.07	0.58		0.50	0.28		0.21	0.62	0.46

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 108 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 75.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Central Avenue Pike & Callahan Drive/Dante Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1133	4	31	967	407	1	0	8	318	0	12
Future Volume (vph)	7	1133	4	31	967	407	1	0	8	318	0	12
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.956			0.880				0.850
Flt Protected	0.950			0.950				0.994			0.950	
Satd. Flow (prot)	1770	3536	0	1770	3383	0	0	1629	0	0	1770	1583
Flt Permitted	0.105			0.125				0.994			0.950	
Satd. Flow (perm)	196	3536	0	233	3383	0	0	1629	0	0	1770	1583
Satd. Flow (RTOR)					88			182				182
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	1184	0	32	1431	0	0	9	0	0	331	13
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								3
Detector Phase	5	2		1	6		4	4		3	3	3
Switch Phase												
Minimum Initial (s)	6.0	15.0		6.0	15.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.0	21.0		12.0	21.0		12.0	12.0		12.0	12.0	12.0
Total Split (s)	12.0	43.0		12.0	43.0		12.0	12.0		23.0	23.0	23.0
Total Split (%)	13.3%	47.8%		13.3%	47.8%		13.3%	13.3%		25.6%	25.6%	25.6%
Maximum Green (s)	6.0	37.0		6.0	37.0		6.0	6.0		17.0	17.0	17.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	38.9	36.8		40.0	39.1			6.1			17.3	17.3
Actuated g/C Ratio	0.54	0.51		0.55	0.54			0.08			0.24	0.24
v/c Ratio	0.03	0.66		0.12	0.77			0.03			0.78	0.03
Control Delay	8.1	17.3		8.8	17.8			0.2			43.7	0.1
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	8.1	17.3		8.8	17.8			0.2			43.7	0.1
LOS	A	B		A	B			A			D	A
Approach Delay		17.2			17.6			0.2			42.0	
Approach LOS		B			B			A			D	
Queue Length 50th (ft)	1	149		5	192			0			122	0
Queue Length 95th (ft)	8	393		21	#565			0			#360	0
Internal Link Dist (ft)		1332			2747			179			1202	
Turn Bay Length (ft)	125			110								45
Base Capacity (vph)	237	1837		258	1892			303			422	516
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.03	0.64		0.12	0.76			0.03			0.78	0.03

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 72.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 74.0%	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: Old Callahan Drive & Callahan Drive

HCS7 Two-Way Stop-Control Report

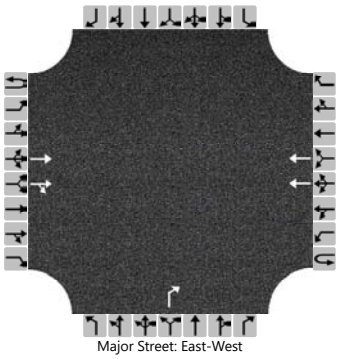
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2020
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2020 Existing PM

Site Information

Intersection	Yow West at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Commercial West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	1		0	0	0
Configuration			T	TR			T					R				
Volume (veh/h)			1519	16			1379					28				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.96				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)												30				
Capacity, c (veh/h)												309				
v/c Ratio												0.10				
95% Queue Length, Q_{95} (veh)												0.3				
Control Delay (s/veh)												17.9				
Level of Service (LOS)												C				
Approach Delay (s/veh)										17.9						
Approach LOS										C						

HCS7 Two-Way Stop-Control Report

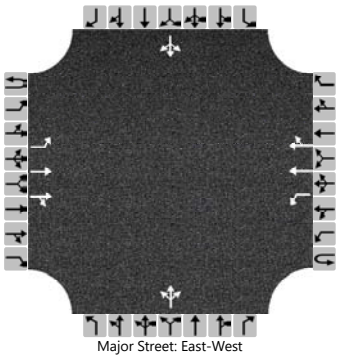
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2020
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2020 Existing PM

Site Information

Intersection	Yow East at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Comm. East / Viles
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	6	1524	20	0	73	1337	4		26	0	62		6	0	16
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								2						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7				79					96				24	
Capacity, c (veh/h)		455				373					169				168	
v/c Ratio		0.01				0.21					0.57				0.14	
95% Queue Length, Q_{95} (veh)		0.0				0.8					3.0				0.5	
Control Delay (s/veh)		13.0				17.2					51.0				29.9	
Level of Service (LOS)		B				C					F				D	
Approach Delay (s/veh)	0.1				0.9				51.0				29.9			
Approach LOS									F				D			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1234	581	335	1300	0	0	0	0	47	0	270
Future Volume (vph)	0	1234	581	335	1300	0	0	0	0	47	0	270
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Satd. Flow (RTOR)			471									98
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 (%)												
Lane Group Flow (vph)	0	1327	625	360	1398	0	0	0	0	51	0	290
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		2		1	6					7		7
Permitted Phases			2									
Detector Phase		2	2	1	6					7		7
Switch Phase												
Minimum Initial (s)		15.0	15.0	6.0	15.0					8.0		8.0
Minimum Split (s)		21.0	21.0	12.0	21.0					14.0		14.0
Total Split (s)		54.0	54.0	20.0	74.0					26.0		26.0
Total Split (%)		54.0%	54.0%	20.0%	74.0%					26.0%		26.0%
Maximum Green (s)		48.0	48.0	14.0	68.0					20.0		20.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0	6.0					6.0		6.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					None		None
Act Effct Green (s)		51.5	51.5	13.9	71.3					16.7		16.7
Actuated g/C Ratio		0.52	0.52	0.14	0.71					0.17		0.17
v/c Ratio		0.73	0.60	0.76	0.55					0.17		0.84
Control Delay		22.7	7.0	44.4	5.3					35.4		47.5
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		22.7	7.0	44.4	5.3					35.4		47.5
LOS		C	A	D	A					D		D
Approach Delay		17.7			13.3						45.7	
Approach LOS		B			B						D	
Queue Length 50th (ft)		356	55	92	260					28		118
Queue Length 95th (ft)		446	161	m117	m295					60		#232
Internal Link Dist (ft)		2461			901			890			1125	
Turn Bay Length (ft)			165	130								390
Base Capacity (vph)		1821	1043	491	2523					354		395
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.73	0.60	0.73	0.55					0.14		0.73

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 69 (69%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 85.7%	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.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: I-75 Southbound Ramps & Callahan Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	416	865	0	0	917	59	715	0	718	0	0	0
Future Volume (vph)	416	865	0	0	917	59	715	0	718	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	1583	0	0	0
Flt Permitted	0.121						0.950					
Satd. Flow (perm)	225	3539	0	0	3507	0	3433	0	1583	0	0	0
Satd. Flow (RTOR)					6				110			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	424	883	0	0	996	0	730	0	733	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	24.0	57.0			33.0		43.0		43.0			
Total Split (%)	24.0%	57.0%			33.0%		43.0%		43.0%			
Maximum Green (s)	18.0	51.0			27.0		37.0		37.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	51.0	51.0			27.0		37.0		37.0			
Actuated g/C Ratio	0.51	0.51			0.27		0.37		0.37			
v/c Ratio	1.08	0.49			1.05		0.57		1.12			
Control Delay	79.5	9.5			67.6		27.4		99.8			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	79.5	9.5			67.6		27.4		99.8			
LOS	E	A			E		C		F			
Approach Delay		32.2			67.6			63.7				
Approach LOS		C			E			E				
Queue Length 50th (ft)	~240	191			~346		189		~495			
Queue Length 95th (ft)	#427	186			m#462		247		#722			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	392	1804			951		1270		655			
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	1.08	0.49			1.05		0.57		1.12			

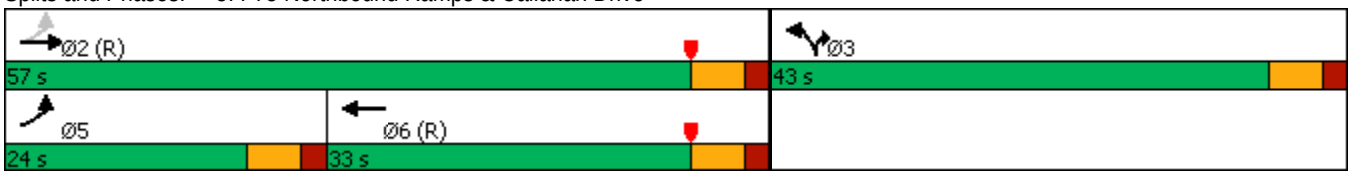
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 53.8	Intersection LOS: D
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

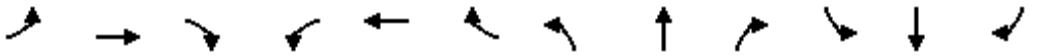
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: I-75 Northbound Ramps & Callahan Drive

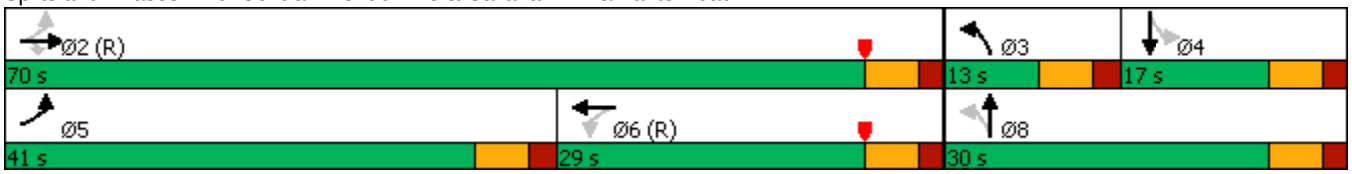




Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	686	640	262	37	290	56	176	322	34	56	190	518
Future Volume (vph)	686	640	262	37	290	56	176	322	34	56	190	518
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.976			0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1818	0	1770	1837	0	1770	1863	1583
Flt Permitted	0.184			0.411			0.235			0.509		
Satd. Flow (perm)	343	1863	1583	766	1818	0	438	1837	0	948	1863	1583
Satd. Flow (RTOR)			273		9			5				540
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	715	667	273	39	360	0	183	370	0	58	198	540
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Free
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2		2	6			8			4		Free
Detector Phase	5	2	2	6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	12.0	21.0	21.0	21.0	21.0		12.0	14.0		14.0	14.0	
Total Split (s)	41.0	70.0	70.0	29.0	29.0		13.0	30.0		17.0	17.0	
Total Split (%)	41.0%	70.0%	70.0%	29.0%	29.0%		13.0%	30.0%		17.0%	17.0%	
Maximum Green (s)	35.0	64.0	64.0	23.0	23.0		7.0	24.0		11.0	11.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	64.0	64.0	64.0	23.0	23.0		24.0	24.0		11.0	11.0	100.0
Actuated g/C Ratio	0.64	0.64	0.64	0.23	0.23		0.24	0.24		0.11	0.11	1.00
v/c Ratio	1.00	0.56	0.25	0.22	0.85		0.92	0.83		0.56	0.97	0.34
Control Delay	55.0	10.9	2.7	35.2	55.5		83.1	53.3		63.8	102.0	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	55.0	10.9	2.7	35.2	55.5		83.1	53.3		63.8	102.0	0.6
LOS	D	B	A	D	E		F	D		E	F	A
Approach Delay		28.6			53.5			63.2			30.4	
Approach LOS		C			D			E			C	
Queue Length 50th (ft)	368	137	6	20	215		99	222		36	128	0
Queue Length 95th (ft)	m#484	m180	m27	51	#370		#197	#375		#91	#268	0
Internal Link Dist (ft)		779			937			888			996	
Turn Bay Length (ft)	570			90			110			155		155
Base Capacity (vph)	718	1192	1111	176	425		198	444		104	204	1583
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	1.00	0.56	0.25	0.22	0.85		0.92	0.83		0.56	0.97	0.34

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 76 (76%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 37.6	Intersection LOS: D
Intersection Capacity Utilization 102.3%	ICU Level of Service G
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Central Avenue Pike & Callahan Drive/Dante Road

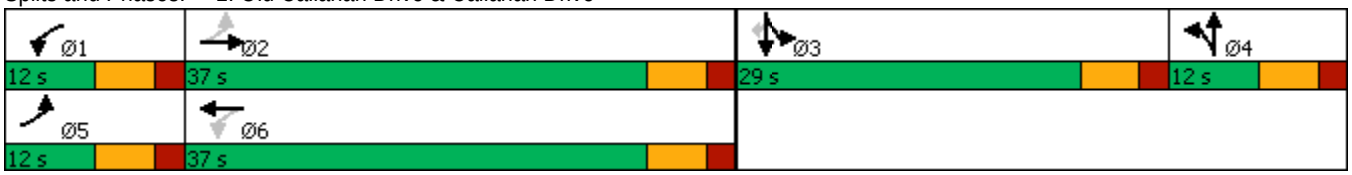


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	531	1	2	782	299	0	0	2	378	2	8
Future Volume (vph)	9	531	1	2	782	299	0	0	2	378	2	8
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.958			0.865				0.850
Flt Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1770	3539	0	1770	3391	0	0	1611	0	0	1775	1583
Flt Permitted	0.136			0.387							0.953	
Satd. Flow (perm)	253	3539	0	721	3391	0	0	1611	0	0	1775	1583
Satd. Flow (RTOR)					68			223				182
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 (%)												
Lane Group Flow (vph)	10	572	0	2	1163	0	0	2	0	0	408	9
Turn Type	pm+pt	NA		pm+pt	NA			NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								3
Detector Phase	5	2		1	6		4	4		3	3	3
Switch Phase												
Minimum Initial (s)	6.0	15.0		6.0	15.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.0	21.0		12.0	21.0		12.0	12.0		12.0	12.0	12.0
Total Split (s)	12.0	37.0		12.0	37.0		12.0	12.0		29.0	29.0	29.0
Total Split (%)	13.3%	41.1%		13.3%	41.1%		13.3%	13.3%		32.2%	32.2%	32.2%
Maximum Green (s)	6.0	31.0		6.0	31.0		6.0	6.0		23.0	23.0	23.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	30.4	29.5		30.4	29.5			6.2			20.8	20.8
Actuated g/C Ratio	0.46	0.44		0.46	0.44			0.09			0.31	0.31
v/c Ratio	0.04	0.36		0.00	0.75			0.01			0.73	0.01
Control Delay	11.3	14.8		11.0	20.5			0.0			32.1	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	11.3	14.8		11.0	20.5			0.0			32.1	0.0
LOS	B	B		B	C			A			C	A
Approach Delay		14.8			20.5						31.4	
Approach LOS		B			C						C	
Queue Length 50th (ft)	2	70		0	168			0			136	0
Queue Length 95th (ft)	11	181		4	#465			0			#393	0
Internal Link Dist (ft)		1332			2747			179			1202	
Turn Bay Length (ft)	125			110								45
Base Capacity (vph)	258	1713		428	1676			353			637	685
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.04	0.33		0.00	0.69			0.01			0.64	0.01

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 66.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 21.1	Intersection LOS: C
Intersection Capacity Utilization 68.9%	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: 1: Old Callahan Drive & Callahan Drive



HCS7 Two-Way Stop-Control Report

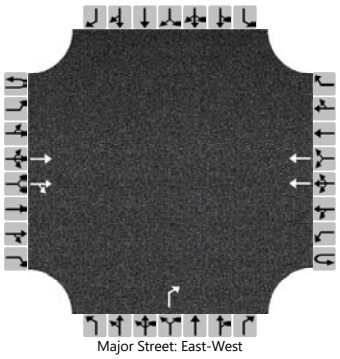
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2025
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2025 Background AM

Site Information

Intersection	Yow West at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Commercial West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	1		0	0	0
Configuration			T	TR			T					R				
Volume (veh/h)			921	1			1107					6				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.96				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)												7				
Capacity, c (veh/h)												513				
v/c Ratio												0.01				
95% Queue Length, Q_{95} (veh)												0.0				
Control Delay (s/veh)												12.1				
Level of Service (LOS)												B				
Approach Delay (s/veh)										12.1						
Approach LOS										B						

HCS7 Two-Way Stop-Control Report

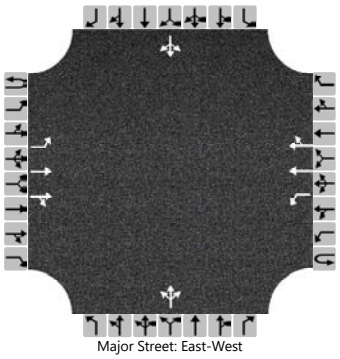
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2025
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2025 Background AM

Site Information

Intersection	Yow East at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Comm. East / Viles
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

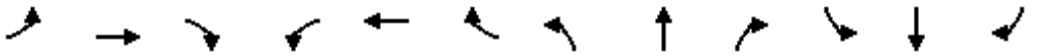
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	8	906	11	0	33	1100	11		7	0	22		0	0	0
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								2						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		9				36					32				0	
Capacity, c (veh/h)		568				684					377					
v/c Ratio		0.02				0.05					0.08					
95% Queue Length, Q_{95} (veh)		0.0				0.2					0.3					
Control Delay (s/veh)		11.4				10.6					15.4					
Level of Service (LOS)		B				B					C					
Approach Delay (s/veh)	0.1				0.3				15.4							
Approach LOS									C							



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	514	506	622	1059	0	0	0	0	34	0	300
Future Volume (vph)	0	514	506	622	1059	0	0	0	0	34	0	300
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Satd. Flow (RTOR)			521									140
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 (%)												
Lane Group Flow (vph)	0	541	533	655	1115	0	0	0	0	36	0	316
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		2		1	6					7		7
Permitted Phases			2									
Detector Phase		2	2	1	6					7		7
Switch Phase												
Minimum Initial (s)		15.0	15.0	6.0	15.0					8.0		8.0
Minimum Split (s)		21.0	21.0	12.0	21.0					14.0		14.0
Total Split (s)		28.0	28.0	22.0	50.0					20.0		20.0
Total Split (%)		40.0%	40.0%	31.4%	71.4%					28.6%		28.6%
Maximum Green (s)		22.0	22.0	16.0	44.0					14.0		14.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0	6.0					6.0		6.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					None		None
Act Effct Green (s)		23.9	23.9	15.8	45.8					12.2		12.2
Actuated g/C Ratio		0.34	0.34	0.23	0.65					0.17		0.17
v/c Ratio		0.45	0.60	0.85	0.48					0.12		0.81
Control Delay		20.0	5.5	28.6	1.2					24.2		32.3
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		20.0	5.5	28.6	1.2					24.2		32.3
LOS		C	A	C	A					C		C
Approach Delay		12.8			11.3						31.4	
Approach LOS		B			B						C	
Queue Length 50th (ft)		97	4	131	3					13		69
Queue Length 95th (ft)		142	70	m144	3					35		#184
Internal Link Dist (ft)		2461			901			890			1125	
Turn Bay Length (ft)			165	130								390
Base Capacity (vph)		1210	884	793	2313					354		428
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.45	0.60	0.83	0.48					0.10		0.74

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 35 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 76.4%	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.	
m Volume for 95th percentile queue is metered by upstream signal.	

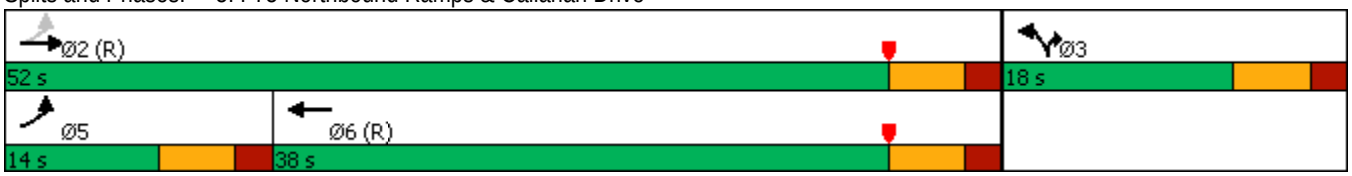
Splits and Phases: 4: I-75 Southbound Ramps & Callahan Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	194	278	0	0	1274	86	445	0	274	0	0	0
Future Volume (vph)	194	278	0	0	1274	86	445	0	274	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.990				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3504	0	3433	0	1583	0	0	0
Flt Permitted	0.104						0.950					
Satd. Flow (perm)	194	3539	0	0	3504	0	3433	0	1583	0	0	0
Satd. Flow (RTOR)					13				288			
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 (%)												
Lane Group Flow (vph)	204	293	0	0	1432	0	468	0	288	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	14.0	52.0			38.0		18.0		18.0			
Total Split (%)	20.0%	74.3%			54.3%		25.7%		25.7%			
Maximum Green (s)	8.0	46.0			32.0		12.0		12.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	46.2	46.2			32.4		11.8		11.8			
Actuated g/C Ratio	0.66	0.66			0.46		0.17		0.17			
v/c Ratio	0.68	0.13			0.88		0.81		0.57			
Control Delay	22.5	0.3			29.9		40.7		8.7			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	22.5	0.3			29.9		40.7		8.7			
LOS	C	A			C		D		A			
Approach Delay		9.4			29.9			28.5				
Approach LOS		A			C			C				
Queue Length 50th (ft)	0	0			420		101		0			
Queue Length 95th (ft)	#82	0			490		#168		60			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	308	2334			1630		588		510			
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	0.66	0.13			0.88		0.80		0.56			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 2 (3%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 25.7	Intersection LOS: C
Intersection Capacity Utilization 76.4%	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.

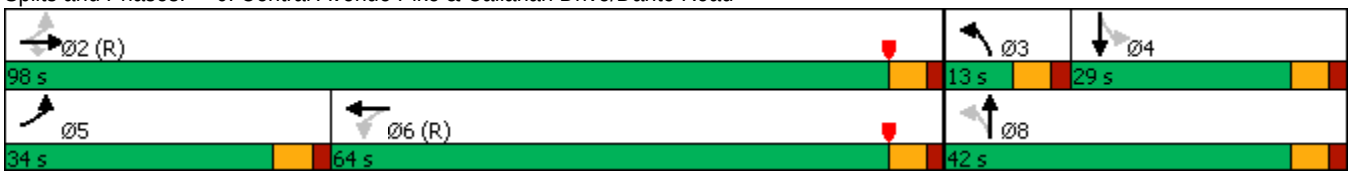
Splits and Phases: 5: I-75 Northbound Ramps & Callahan Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	141	137	42	435	74	108	127	22	45	197	764
Future Volume (vph)	322	141	137	42	435	74	108	127	22	45	197	764
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.978			0.978				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1822	0	1770	1822	0	1770	1863	1583
Flt Permitted	0.294			0.663			0.246			0.657		
Satd. Flow (perm)	548	1863	1583	1235	1822	0	458	1822	0	1224	1863	1583
Satd. Flow (RTOR)			144		7			6				558
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 (%)												
Lane Group Flow (vph)	339	148	144	44	536	0	114	157	0	47	207	804
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Free
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2		2	6			8			4		Free
Detector Phase	5	2	2	6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	12.0	21.0	21.0	21.0	21.0		12.0	14.0		14.0	14.0	
Total Split (s)	34.0	98.0	98.0	64.0	64.0		13.0	42.0		29.0	29.0	
Total Split (%)	24.3%	70.0%	70.0%	45.7%	45.7%		9.3%	30.0%		20.7%	20.7%	
Maximum Green (s)	28.0	92.0	92.0	58.0	58.0		7.0	36.0		23.0	23.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	95.3	95.3	95.3	72.2	72.2		32.7	32.7		19.7	19.7	140.0
Actuated g/C Ratio	0.68	0.68	0.68	0.52	0.52		0.23	0.23		0.14	0.14	1.00
v/c Ratio	0.65	0.12	0.13	0.07	0.57		0.66	0.37		0.27	0.79	0.51
Control Delay	16.3	5.1	0.6	20.6	27.7		63.1	45.1		56.6	79.1	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	16.3	5.1	0.6	20.6	27.7		63.1	45.1		56.6	79.1	1.2
LOS	B	A	A	C	C		E	D		E	E	A
Approach Delay		10.1			27.2			52.7			18.9	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)	79	25	0	20	322		85	115		39	183	0
Queue Length 95th (ft)	223	47	4	49	518		139	180		79	269	0
Internal Link Dist (ft)		779			937			888			996	
Turn Bay Length (ft)	570			90			110			155		155
Base Capacity (vph)	617	1268	1123	636	942		172	472		201	306	1583
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	0.55	0.12	0.13	0.07	0.57		0.66	0.33		0.23	0.68	0.51

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 63 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 22.2	Intersection LOS: C
Intersection Capacity Utilization 81.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Central Avenue Pike & Callahan Drive/Dante Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1251	4	34	1068	449	1	0	9	351	0	13
Future Volume (vph)	8	1251	4	34	1068	449	1	0	9	351	0	13
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.956			0.878				0.850
Flt Protected	0.950			0.950				0.995			0.950	
Satd. Flow (prot)	1770	3539	0	1770	3383	0	0	1627	0	0	1770	1583
Flt Permitted	0.087			0.095				0.995			0.950	
Satd. Flow (perm)	162	3539	0	177	3383	0	0	1627	0	0	1770	1583
Satd. Flow (RTOR)					83			164				164
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1307	0	35	1581	0	0	10	0	0	366	14
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								3
Detector Phase	5	2		1	6		4	4		3	3	3
Switch Phase												
Minimum Initial (s)	6.0	15.0		6.0	15.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.0	21.0		12.0	21.0		12.0	12.0		12.0	12.0	12.0
Total Split (s)	12.0	50.0		12.0	50.0		12.0	12.0		26.0	26.0	26.0
Total Split (%)	12.0%	50.0%		12.0%	50.0%		12.0%	12.0%		26.0%	26.0%	26.0%
Maximum Green (s)	6.0	44.0		6.0	44.0		6.0	6.0		20.0	20.0	20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	46.8	43.4		49.2	48.2			6.1			20.2	20.2
Actuated g/C Ratio	0.55	0.51		0.58	0.57			0.07			0.24	0.24
v/c Ratio	0.04	0.72		0.16	0.81			0.04			0.87	0.03
Control Delay	8.6	20.5		9.7	19.5			0.3			55.0	0.1
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	8.6	20.5		9.7	19.5			0.3			55.0	0.1
LOS	A	C		A	B			A			D	A
Approach Delay		20.4			19.3			0.3			53.0	
Approach LOS		C			B			A			D	
Queue Length 50th (ft)	2	287		6	264			0			183	0
Queue Length 95th (ft)	9	474		23	#694			0			#431	0
Internal Link Dist (ft)		1332			2747			179			1202	
Turn Bay Length (ft)	125			110								45
Base Capacity (vph)	204	1860		217	1963			268			422	502
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.04	0.70		0.16	0.81			0.04			0.87	0.03

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 84.6	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 23.6	Intersection LOS: C
Intersection Capacity Utilization 80.0%	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: Old Callahan Drive & Callahan Drive

HCS7 Two-Way Stop-Control Report

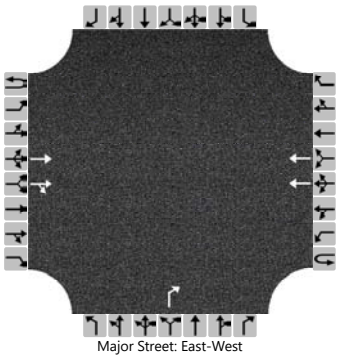
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2025
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2025 Background PM

Site Information

Intersection	Yow West at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Commercial West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	1		0	0	0
Configuration			T	TR			T					R				
Volume (veh/h)			1677	18			1507					31				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.96				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)												34				
Capacity, c (veh/h)												271				
v/c Ratio												0.12				
95% Queue Length, Q_{95} (veh)												0.4				
Control Delay (s/veh)												20.2				
Level of Service (LOS)												C				
Approach Delay (s/veh)										20.2						
Approach LOS										C						

HCS7 Two-Way Stop-Control Report

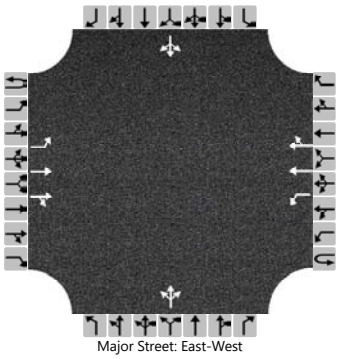
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2025
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2025 Background PM

Site Information

Intersection	Yow East at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Comm. East / Viles
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	7	1682	22	0	81	1478	4		29	0	68		7	0	18
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Left + Thru								2							

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

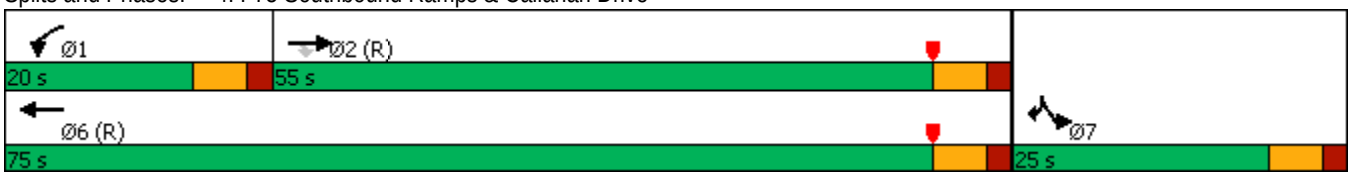
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8				88					105				27	
Capacity, c (veh/h)		397				319										
v/c Ratio		0.02				0.28										
95% Queue Length, Q_{95} (veh)		0.1				1.1										
Control Delay (s/veh)		14.3				20.5										
Level of Service (LOS)		B				C										
Approach Delay (s/veh)	0.1				1.1											
Approach LOS																

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1362	641	370	1435	0	0	0	0	52	0	298
Future Volume (vph)	0	1362	641	370	1435	0	0	0	0	52	0	298
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Satd. Flow (RTOR)			479									98
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 (%)												
Lane Group Flow (vph)	0	1465	689	398	1543	0	0	0	0	56	0	320
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		2		1	6					7		7
Permitted Phases			2									
Detector Phase		2	2	1	6					7		7
Switch Phase												
Minimum Initial (s)		15.0	15.0	6.0	15.0					8.0		8.0
Minimum Split (s)		21.0	21.0	12.0	21.0					14.0		14.0
Total Split (s)		55.0	55.0	20.0	75.0					25.0		25.0
Total Split (%)		55.0%	55.0%	20.0%	75.0%					25.0%		25.0%
Maximum Green (s)		49.0	49.0	14.0	69.0					19.0		19.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0	6.0					6.0		6.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					None		None
Act Effct Green (s)		50.5	50.5	14.0	70.5					17.5		17.5
Actuated g/C Ratio		0.50	0.50	0.14	0.70					0.18		0.18
v/c Ratio		0.82	0.67	0.83	0.62					0.18		0.89
Control Delay		26.2	8.9	49.4	4.7					35.8		55.5
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		26.2	8.9	49.4	4.7					35.8		55.5
LOS		C	A	D	A					D		E
Approach Delay		20.7			13.9						52.6	
Approach LOS		C			B						D	
Queue Length 50th (ft)		411	81	112	273					30		140
Queue Length 95th (ft)		513	211	m128	m281					65		#289
Internal Link Dist (ft)		2461			901			890			1125	
Turn Bay Length (ft)			165	130								390
Base Capacity (vph)		1787	1036	487	2494					336		380
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.82	0.67	0.82	0.62					0.17		0.84

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 66 (66%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 93.0%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: I-75 Southbound Ramps & Callahan Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	459	955	0	0	1012	65	789	0	793	0	0	0
Future Volume (vph)	459	955	0	0	1012	65	789	0	793	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	1583	0	0	0
Flt Permitted	0.118						0.950					
Satd. Flow (perm)	220	3539	0	0	3507	0	3433	0	1583	0	0	0
Satd. Flow (RTOR)					6				98			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	468	974	0	0	1099	0	805	0	809	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	24.0	58.0			34.0		42.0		42.0			
Total Split (%)	24.0%	58.0%			34.0%		42.0%		42.0%			
Maximum Green (s)	18.0	52.0			28.0		36.0		36.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	52.0	52.0			28.0		36.0		36.0			
Actuated g/C Ratio	0.52	0.52			0.28		0.36		0.36			
v/c Ratio	1.19	0.53			1.11		0.65		1.28			
Control Delay	118.5	10.6			89.5		29.8		164.8			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	118.5	10.6			89.5		29.8		164.8			
LOS	F	B			F		C		F			
Approach Delay		45.6			89.5			97.4				
Approach LOS		D			F			F				
Queue Length 50th (ft)	~296	258			~407		218		~619			
Queue Length 95th (ft)	m#440	260			m#478		283		#853			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	393	1840			986		1235		632			
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	1.19	0.53			1.11		0.65		1.28			

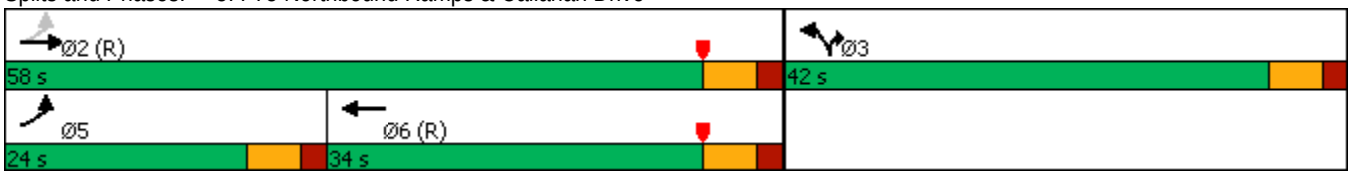
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.28	
Intersection Signal Delay: 77.4	Intersection LOS: E
Intersection Capacity Utilization 93.0%	ICU Level of Service F
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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: I-75 Northbound Ramps & Callahan Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	757	707	289	41	320	62	194	355	38	62	210	572
Future Volume (vph)	757	707	289	41	320	62	194	355	38	62	210	572
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.976			0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1818	0	1770	1835	0	1770	1863	1583
Flt Permitted	0.143			0.386			0.235			0.364		
Satd. Flow (perm)	266	1863	1583	719	1818	0	438	1835	0	678	1863	1583
Satd. Flow (RTOR)			301		9			5				596
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	789	736	301	43	398	0	202	410	0	65	219	596
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Free
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2		2	6			8			4		Free
Detector Phase	5	2	2	6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	12.0	21.0	21.0	21.0	21.0		12.0	14.0		14.0	14.0	
Total Split (s)	42.0	70.0	70.0	28.0	28.0		13.0	30.0		17.0	17.0	
Total Split (%)	42.0%	70.0%	70.0%	28.0%	28.0%		13.0%	30.0%		17.0%	17.0%	
Maximum Green (s)	36.0	64.0	64.0	22.0	22.0		7.0	24.0		11.0	11.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	64.0	64.0	64.0	22.0	22.0		24.0	24.0		11.0	11.0	100.0
Actuated g/C Ratio	0.64	0.64	0.64	0.22	0.22		0.24	0.24		0.11	0.11	1.00
v/c Ratio	1.11	0.62	0.27	0.27	0.98		1.02	0.92		0.88	1.07	0.38
Control Delay	89.5	11.5	2.7	37.8	79.4		106.1	65.3		121.7	127.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	89.5	11.5	2.7	37.8	79.4		106.1	65.3		121.7	127.7	0.7
LOS	F	B	A	D	E		F	E		F	F	A
Approach Delay		43.7			75.3			78.8			41.2	
Approach LOS		D			E			E			D	
Queue Length 50th (ft)	~527	154	12	23	248		~114	254		42	~155	0
Queue Length 95th (ft)	m#553	m193	m28	56	#442		#227	#436		#125	#302	0
Internal Link Dist (ft)		779			937			888			996	
Turn Bay Length (ft)	570			90			110			155		155
Base Capacity (vph)	711	1192	1121	158	406		198	444		74	204	1583
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	1.11	0.62	0.27	0.27	0.98		1.02	0.92		0.88	1.07	0.38

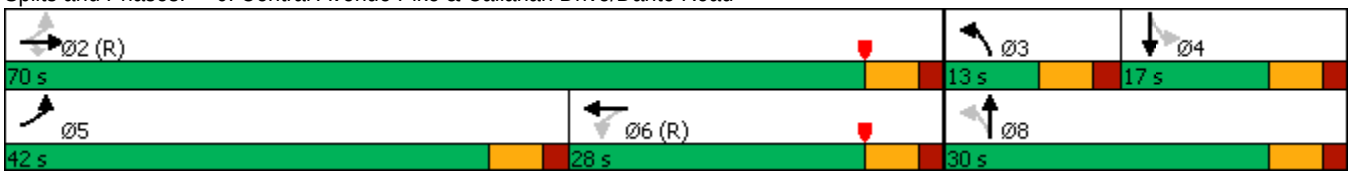
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 76 (76%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 52.6	Intersection LOS: D
Intersection Capacity Utilization 110.2%	ICU Level of Service H
Analysis Period (min) 15	

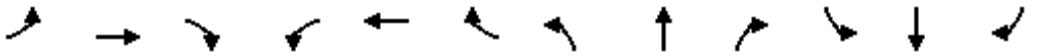
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Central Avenue Pike & Callahan Drive/Dante Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	527	1	2	793	303	0	0	2	397	2	8
Future Volume (vph)	9	527	1	2	793	303	0	0	2	397	2	8
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.959			0.865				0.850
Flt Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1770	3539	0	1770	3394	0	0	1611	0	0	1775	1583
Flt Permitted	0.136			0.385							0.953	
Satd. Flow (perm)	253	3539	0	717	3394	0	0	1611	0	0	1775	1583
Satd. Flow (RTOR)					69			220				182
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 (%)												
Lane Group Flow (vph)	10	568	0	2	1179	0	0	2	0	0	429	9
Turn Type	pm+pt	NA		pm+pt	NA			NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								3
Detector Phase	5	2		1	6		4	4		3	3	3
Switch Phase												
Minimum Initial (s)	6.0	15.0		6.0	15.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.0	21.0		12.0	21.0		12.0	12.0		12.0	12.0	12.0
Total Split (s)	12.0	38.0		12.0	38.0		12.0	12.0		28.0	28.0	28.0
Total Split (%)	13.3%	42.2%		13.3%	42.2%		13.3%	13.3%		31.1%	31.1%	31.1%
Maximum Green (s)	6.0	32.0		6.0	32.0		6.0	6.0		22.0	22.0	22.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	30.3	29.4		30.3	29.4			6.2			22.6	22.6
Actuated g/C Ratio	0.45	0.43		0.45	0.43			0.09			0.33	0.33
v/c Ratio	0.04	0.37		0.00	0.78			0.01			0.73	0.01
Control Delay	11.0	15.0		10.5	21.6			0.0			32.1	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	11.0	15.0		10.5	21.6			0.0			32.1	0.0
LOS	B	B		B	C			A			C	A
Approach Delay		15.0			21.5						31.4	
Approach LOS		B			C						C	
Queue Length 50th (ft)	2	69		0	172			0			146	0
Queue Length 95th (ft)	11	176		4	#463			0			#434	0
Internal Link Dist (ft)		1332			2747			179			1202	
Turn Bay Length (ft)	125			110								45
Base Capacity (vph)	250	1709		415	1675			345			589	647
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.04	0.33		0.00	0.70			0.01			0.73	0.01

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 67.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 21.8	Intersection LOS: C
Intersection Capacity Utilization 70.4%	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: 1: Old Callahan Drive & Callahan Drive

HCS7 Two-Way Stop-Control Report

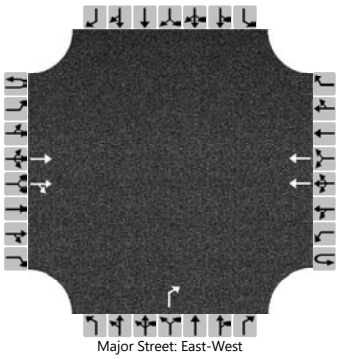
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	11/30/2020
Analysis Year	2025
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2025 Combined AM

Site Information

Intersection	Yow West at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Commercial West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	1		0	0	0
Configuration			T	TR			T					R				
Volume (veh/h)			1047	1			1136					6				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.96				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)												7				
Capacity, c (veh/h)												462				
v/c Ratio												0.01				
95% Queue Length, Q_{95} (veh)												0.0				
Control Delay (s/veh)												12.9				
Level of Service (LOS)												B				
Approach Delay (s/veh)										12.9						
Approach LOS										B						

HCS7 Two-Way Stop-Control Report

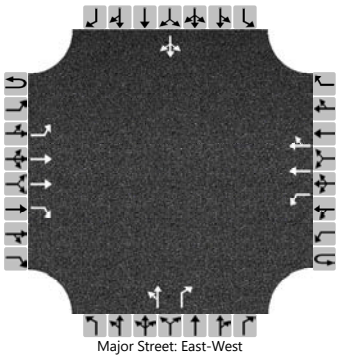
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	3/16/2021
Analysis Year	2025
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2025 Combined AM

Site Information

Intersection	Yow East at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Comm. East / Viles
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

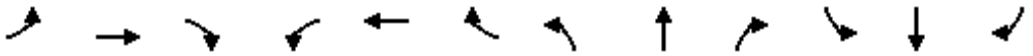
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	0		0	1	1		0	1	0
Configuration		L	T	R		L	T	TR		LT		R			LTR	
Volume (veh/h)	0	8	906	76	0	154	1100	11		22	0	51		0	0	0
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No								No						
Median Type | Storage		Left + Thru								2						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		9				167				24		55			0	
Capacity, c (veh/h)		568				643				150		519				
v/c Ratio		0.02				0.26				0.16		0.11				
95% Queue Length, Q_{95} (veh)		0.0				1.0				0.5		0.4				
Control Delay (s/veh)		11.4				12.6				33.5		12.8				
Level of Service (LOS)		B				B				D		B				
Approach Delay (s/veh)		0.1				1.5				19.0						
Approach LOS										C						

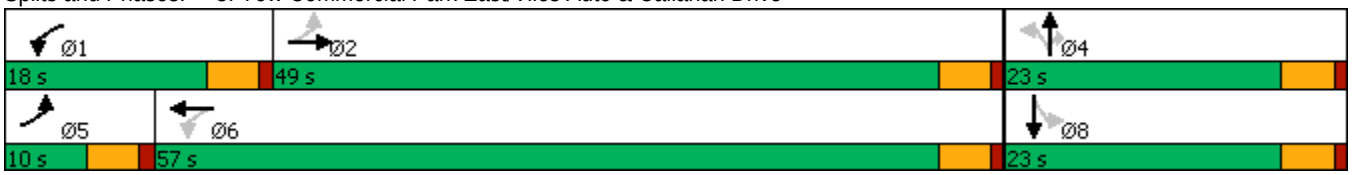


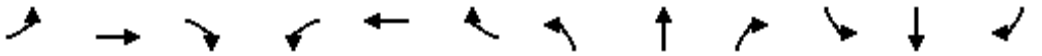
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	906	76	154	1100	11	22	0	51	0	0	0
Future Volume (vph)	8	906	76	154	1100	11	22	0	51	0	0	0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.998				0.850			
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	3497	0	1770	3532	0	0	1770	1583	0	1863	0
Flt Permitted	0.242			0.192								
Satd. Flow (perm)	451	3497	0	358	3532	0	0	1863	1583	0	1863	0
Satd. Flow (RTOR)		14			2				127			
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 (%)												
Lane Group Flow (vph)	8	1034	0	162	1170	0	0	23	54	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		
Detector Phase	5	2		1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		22.5	22.5	22.5	22.5	22.5	
Total Split (s)	10.0	49.0		18.0	57.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	11.1%	54.4%		20.0%	63.3%		25.6%	25.6%	25.6%	25.6%	25.6%	
Maximum Green (s)	5.5	44.5		13.5	52.5		18.5	18.5	18.5	18.5	18.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5	4.5		4.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0	0	0	0	
Act Effct Green (s)	31.6	25.9		37.4	38.2			6.6	6.6			
Actuated g/C Ratio	0.65	0.53		0.77	0.79			0.14	0.14			
v/c Ratio	0.02	0.55		0.34	0.42			0.09	0.17			
Control Delay	3.0	10.2		4.4	4.9			22.5	1.1			
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0			
Total Delay	3.0	10.2		4.4	4.9			22.5	1.1			
LOS	A	B		A	A			C	A			
Approach Delay		10.1			4.8			7.5				
Approach LOS		B			A			A				
Queue Length 50th (ft)	1	109		12	59			6	0			
Queue Length 95th (ft)	3	182		28	190			26	2			
Internal Link Dist (ft)		736			2461			639			452	
Turn Bay Length (ft)	160			150								
Base Capacity (vph)	446	3140		679	3420			728	696			
Starvation Cap Reductn	0	0		0	0			0	0			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0		0	0			0	0			
Storage Cap Reductn	0	0		0	0			0	0			
Reduced v/c Ratio	0.02	0.33		0.24	0.34			0.03	0.08			

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 48.6	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Yow Commercial Park East/Viles Auto & Callahan Drive

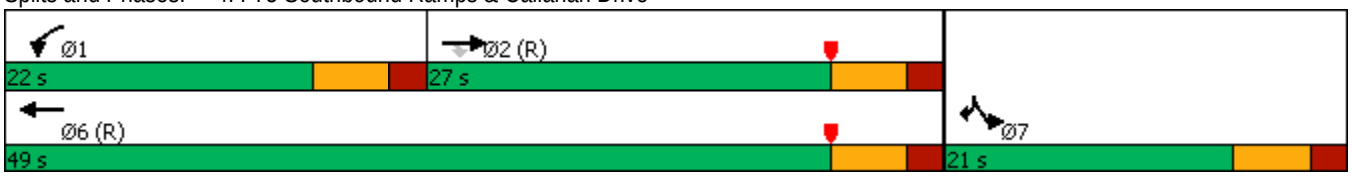




Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	530	519	622	1143	0	0	0	0	34	0	337
Future Volume (vph)	0	530	519	622	1143	0	0	0	0	34	0	337
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Satd. Flow (RTOR)			539									140
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 (%)												
Lane Group Flow (vph)	0	558	546	655	1203	0	0	0	0	36	0	355
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		2		1	6					7		7
Permitted Phases			2									
Detector Phase		2	2	1	6					7		7
Switch Phase												
Minimum Initial (s)		15.0	15.0	6.0	15.0					8.0		8.0
Minimum Split (s)		21.0	21.0	12.0	21.0					14.0		14.0
Total Split (s)		27.0	27.0	22.0	49.0					21.0		21.0
Total Split (%)		38.6%	38.6%	31.4%	70.0%					30.0%		30.0%
Maximum Green (s)		21.0	21.0	16.0	43.0					15.0		15.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0	6.0					6.0		6.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					None		None
Act Effct Green (s)		22.9	22.9	15.8	44.7					13.3		13.3
Actuated g/C Ratio		0.33	0.33	0.23	0.64					0.19		0.19
v/c Ratio		0.48	0.62	0.85	0.53					0.11		0.86
Control Delay		21.2	5.8	28.5	2.0					23.2		37.6
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		21.2	5.8	28.5	2.0					23.2		37.6
LOS		C	A	C	A					C		D
Approach Delay		13.6			11.3						36.2	
Approach LOS		B			B						D	
Queue Length 50th (ft)		104	2	136	25					13		87
Queue Length 95th (ft)		150	71	m143	38					35		#219
Internal Link Dist (ft)		2461			901			890			1125	
Turn Bay Length (ft)			165	130								390
Base Capacity (vph)		1156	880	793	2259					379		449
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.48	0.62	0.83	0.53					0.09		0.79

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 34 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 15.0	Intersection LOS: B
Intersection Capacity Utilization 79.3%	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.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: I-75 Southbound Ramps & Callahan Drive

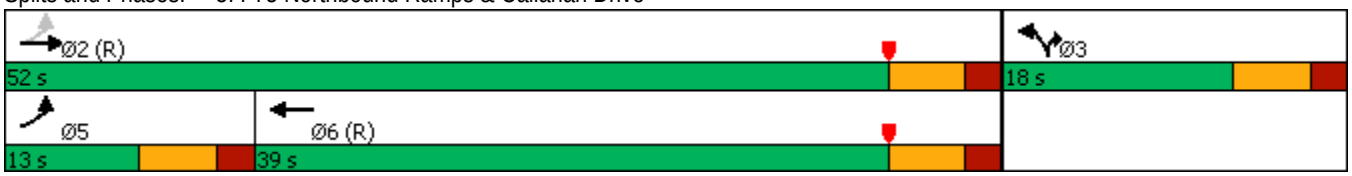


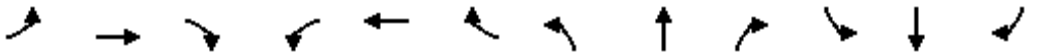
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	203	285	0	0	1302	86	501	0	274	0	0	0
Future Volume (vph)	203	285	0	0	1302	86	501	0	274	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	1583	0	0	0
Flt Permitted	0.103						0.950					
Satd. Flow (perm)	192	3539	0	0	3507	0	3433	0	1583	0	0	0
Satd. Flow (RTOR)					13				288			
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 (%)												
Lane Group Flow (vph)	214	300	0	0	1462	0	527	0	288	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	13.0	52.0			39.0		18.0		18.0			
Total Split (%)	18.6%	74.3%			55.7%		25.7%		25.7%			
Maximum Green (s)	7.0	46.0			33.0		12.0		12.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	46.0	46.0			33.0		12.0		12.0			
Actuated g/C Ratio	0.66	0.66			0.47		0.17		0.17			
v/c Ratio	0.76	0.13			0.88		0.90		0.56			
Control Delay	32.3	0.4			29.1		49.2		8.6			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	32.3	0.4			29.1		49.2		8.6			
LOS	C	A			C		D		A			
Approach Delay		13.7			29.1			34.8				
Approach LOS		B			C			C				
Queue Length 50th (ft)	31	0			424		115		0			
Queue Length 95th (ft)	#116	0			505		#200		60			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	283	2325			1660		588		510			
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	0.76	0.13			0.88		0.90		0.56			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 2 (3%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 27.9	Intersection LOS: C
Intersection Capacity Utilization 79.3%	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: 5: I-75 Northbound Ramps & Callahan Drive



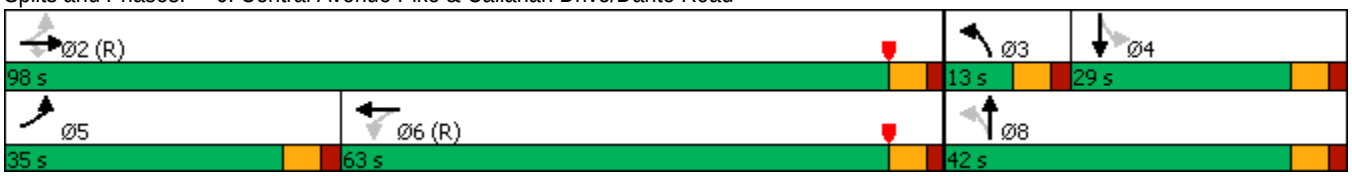


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	325	143	139	42	444	74	114	127	22	45	197	781
Future Volume (vph)	325	143	139	42	444	74	114	127	22	45	197	781
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.979			0.978				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1824	0	1770	1822	0	1770	1863	1583
Flt Permitted	0.284			0.661			0.246			0.657		
Satd. Flow (perm)	529	1863	1583	1231	1824	0	458	1822	0	1224	1863	1583
Satd. Flow (RTOR)			146		7			6				555
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 (%)												
Lane Group Flow (vph)	342	151	146	44	545	0	120	157	0	47	207	822
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Free
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2		2	6			8			4		Free
Detector Phase	5	2	2	6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	12.0	21.0	21.0	21.0	21.0		12.0	14.0		14.0	14.0	
Total Split (s)	35.0	98.0	98.0	63.0	63.0		13.0	42.0		29.0	29.0	
Total Split (%)	25.0%	70.0%	70.0%	45.0%	45.0%		9.3%	30.0%		20.7%	20.7%	
Maximum Green (s)	29.0	92.0	92.0	57.0	57.0		7.0	36.0		23.0	23.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	95.3	95.3	95.3	71.5	71.5		32.7	32.7		19.7	19.7	140.0
Actuated g/C Ratio	0.68	0.68	0.68	0.51	0.51		0.23	0.23		0.14	0.14	1.00
v/c Ratio	0.66	0.12	0.13	0.07	0.58		0.70	0.37		0.27	0.79	0.52
Control Delay	17.8	5.2	0.5	21.3	28.8		66.1	45.1		56.6	79.1	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	17.8	5.2	0.5	21.3	28.8		66.1	45.1		56.6	79.1	1.2
LOS	B	A	A	C	C		E	D		E	E	A
Approach Delay		10.9			28.2			54.2			18.6	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)	91	26	0	20	331		90	115		39	183	0
Queue Length 95th (ft)	205	49	4	50	543		#152	180		79	269	0
Internal Link Dist (ft)		779			937			888			996	
Turn Bay Length (ft)	570			90			110			155		155
Base Capacity (vph)	617	1268	1124	628	934		172	472		201	306	1583
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	0.55	0.12	0.13	0.07	0.58		0.70	0.33		0.23	0.68	0.52

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 60 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 22.7	Intersection LOS: C
Intersection Capacity Utilization 82.5%	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: 6: Central Avenue Pike & Callahan Drive/Dante Road

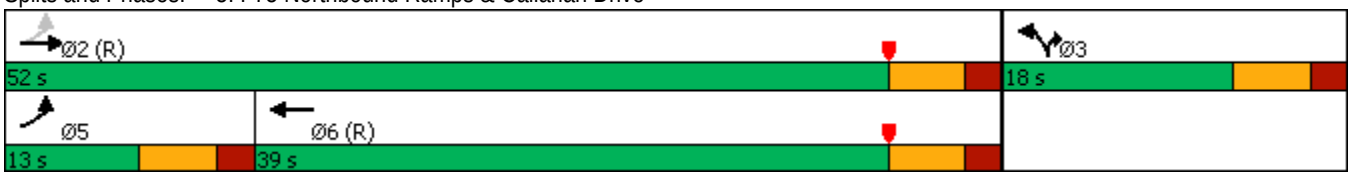


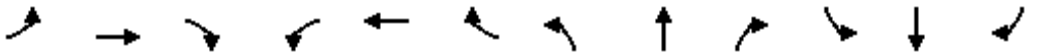
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	203	285	0	0	1302	86	501	0	274	0	0	0
Future Volume (vph)	203	285	0	0	1302	86	501	0	274	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	0.88	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	2787	0	0	0
Flt Permitted	0.103						0.950					
Satd. Flow (perm)	192	3539	0	0	3507	0	3433	0	2787	0	0	0
Satd. Flow (RTOR)					13				288			
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 (%)												
Lane Group Flow (vph)	214	300	0	0	1462	0	527	0	288	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	13.0	52.0			39.0		18.0		18.0			
Total Split (%)	18.6%	74.3%			55.7%		25.7%		25.7%			
Maximum Green (s)	7.0	46.0			33.0		12.0		12.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	46.0	46.0			33.0		12.0		12.0			
Actuated g/C Ratio	0.66	0.66			0.47		0.17		0.17			
v/c Ratio	0.76	0.13			0.88		0.90		0.40			
Control Delay	35.9	0.3			29.1		49.2		5.6			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	35.9	0.3			29.1		49.2		5.6			
LOS	D	A			C		D		A			
Approach Delay		15.1			29.1			33.8				
Approach LOS		B			C			C				
Queue Length 50th (ft)	41	0			437		115		0			
Queue Length 95th (ft)	#128	0			510		#200		32			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	283	2325			1660		588		716			
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	0.76	0.13			0.88		0.90		0.40			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 2 (3%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 27.9	Intersection LOS: C
Intersection Capacity Utilization 79.3%	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: 5: I-75 Northbound Ramps & Callahan Drive



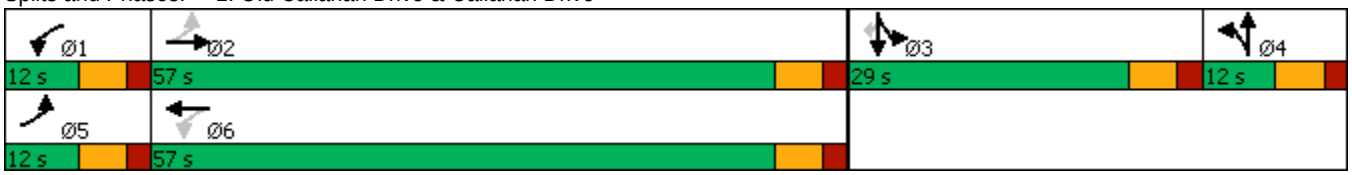


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1263	4	34	1114	467	1	0	9	356	0	13
Future Volume (vph)	8	1263	4	34	1114	467	1	0	9	356	0	13
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.956			0.878				0.850
Flt Protected	0.950			0.950				0.995			0.950	
Satd. Flow (prot)	1770	3539	0	1770	3383	0	0	1627	0	0	1770	1583
Flt Permitted	0.079			0.095				0.995			0.950	
Satd. Flow (perm)	147	3539	0	177	3383	0	0	1627	0	0	1770	1583
Satd. Flow (RTOR)					78			149				149
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1320	0	35	1646	0	0	10	0	0	371	14
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								3
Detector Phase	5	2		1	6		4	4		3	3	3
Switch Phase												
Minimum Initial (s)	6.0	15.0		6.0	15.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.0	21.0		12.0	21.0		12.0	12.0		12.0	12.0	12.0
Total Split (s)	12.0	57.0		12.0	57.0		12.0	12.0		29.0	29.0	29.0
Total Split (%)	10.9%	51.8%		10.9%	51.8%		10.9%	10.9%		26.4%	26.4%	26.4%
Maximum Green (s)	6.0	51.0		6.0	51.0		6.0	6.0		23.0	23.0	23.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	51.8	48.3		54.3	53.2			6.1			23.2	23.2
Actuated g/C Ratio	0.56	0.52		0.59	0.57			0.07			0.25	0.25
v/c Ratio	0.04	0.72		0.17	0.83			0.04			0.84	0.03
Control Delay	9.2	21.3		10.4	21.5			0.3			52.4	0.1
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	9.2	21.3		10.4	21.5			0.3			52.4	0.1
LOS	A	C		B	C			A			D	A
Approach Delay		21.2			21.3			0.3			50.5	
Approach LOS		C			C			A			D	
Queue Length 50th (ft)	2	315		7	320			0			192	0
Queue Length 95th (ft)	9	502		24	#776			0			#460	0
Internal Link Dist (ft)		1332			2747			179			1202	
Turn Bay Length (ft)	125			110								45
Base Capacity (vph)	188	1966		208	1978			245			443	508
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.04	0.67		0.17	0.83			0.04			0.84	0.03

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 92.6	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 24.5	Intersection LOS: C
Intersection Capacity Utilization 82.1%	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.

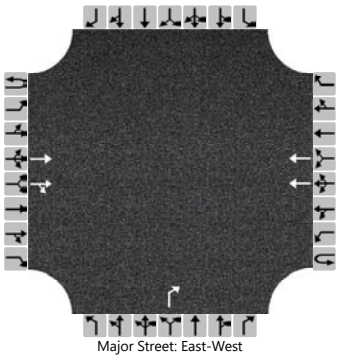
Splits and Phases: 1: Old Callahan Drive & Callahan Drive



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	WAS	Intersection	Yow West at Callahan Dr
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knoxville / Knox Co.
Date Performed	11/30/2020	East/West Street	Callahan Drive
Analysis Year	2025	North/South Street	Yow Commercial West
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	2025 Combined PM		

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	1		0	0	0
Configuration			T	TR			T					R				
Volume (veh/h)			1709	18			1648					31				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.96				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)												34				
Capacity, c (veh/h)												263				
v/c Ratio												0.13				
95% Queue Length, Q_{95} (veh)												0.4				
Control Delay (s/veh)												20.7				
Level of Service (LOS)												C				
Approach Delay (s/veh)										20.7						
Approach LOS										C						

HCS7 Two-Way Stop-Control Report

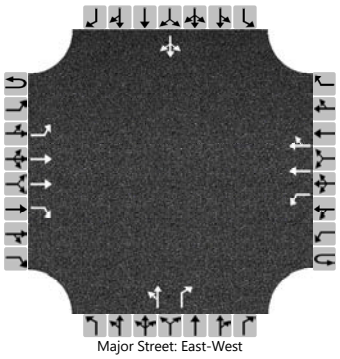
General Information

Analyst	WAS
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	3/16/2021
Analysis Year	2025
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2025 Combined PM

Site Information

Intersection	Yow East at Callahan Dr
Jurisdiction	Knoxville / Knox Co.
East/West Street	Callahan Drive
North/South Street	Yow Comm. East / Viles
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	0		0	1	1		0	1	0
Configuration		L	T	R		L	T	TR		LT		R			LTR	
Volume (veh/h)	0	7	1682	39	0	112	1476	4		93	0	186		7	0	18
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No								No						
Median Type | Storage		Left + Thru								2						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

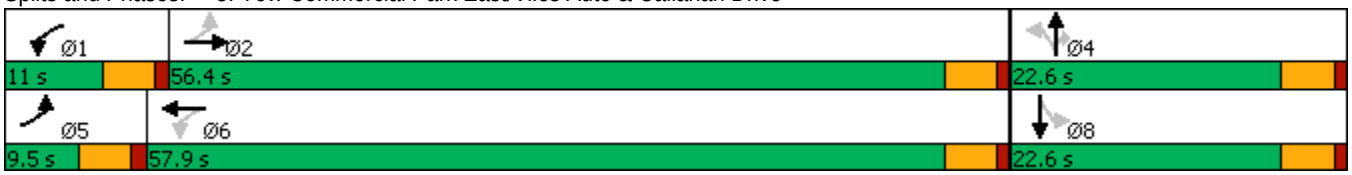
Flow Rate, v (veh/h)		8				122				101		202			27	
Capacity, c (veh/h)		397				314						274				
v/c Ratio		0.02				0.39						0.74				
95% Queue Length, Q_{95} (veh)		0.1				1.8						5.3				
Control Delay (s/veh)		14.2				23.6						47.9				
Level of Service (LOS)		B				C						E				
Approach Delay (s/veh)		0.1				1.7										
Approach LOS																

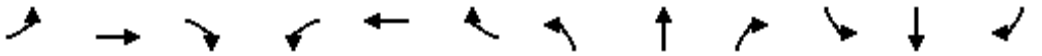
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1682	39	112	1476	4	93	0	186	7	0	18
Future Volume (vph)	7	1682	39	112	1476	4	93	0	186	7	0	18
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997							0.850		0.901	
Flt Protected	0.950			0.950				0.950			0.987	
Satd. Flow (prot)	1770	3529	0	1770	3539	0	0	1770	1583	0	1657	0
Flt Permitted	0.125			0.074				0.740			0.921	
Satd. Flow (perm)	233	3529	0	138	3539	0	0	1378	1583	0	1546	0
Satd. Flow (RTOR)		4							112		73	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	1793	0	117	1542	0	0	97	194	0	26	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		
Detector Phase	5	2		1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		22.5	22.5	22.5	22.5	22.5	
Total Split (s)	9.5	56.4		11.0	57.9		22.6	22.6	22.6	22.6	22.6	
Total Split (%)	10.6%	62.7%		12.2%	64.3%		25.1%	25.1%	25.1%	25.1%	25.1%	
Maximum Green (s)	5.0	51.9		6.5	53.4		18.1	18.1	18.1	18.1	18.1	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5	4.5		4.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0	0	0	0	
Act Effct Green (s)	51.5	47.8		55.4	54.3			11.2	11.2		11.2	
Actuated g/C Ratio	0.67	0.62		0.72	0.71			0.15	0.15		0.15	
v/c Ratio	0.03	0.81		0.49	0.61			0.48	0.59		0.09	
Control Delay	3.9	16.4		16.8	8.2			40.8	23.2		0.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	3.9	16.4		16.8	8.2			40.8	23.2		0.6	
LOS	A	B		B	A			D	C		A	
Approach Delay		16.4			8.8			29.1			0.6	
Approach LOS		B			A			C			A	
Queue Length 50th (ft)	1	334		12	141			48	40		0	
Queue Length 95th (ft)	5	542		68	386			95	104		0	
Internal Link Dist (ft)		736			2461			639			452	
Turn Bay Length (ft)	160			150								
Base Capacity (vph)	261	2486		244	2721			339	473		435	
Starvation Cap Reductn	0	0		0	0			0	0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.03	0.72		0.48	0.57			0.29	0.41		0.06	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 76.5	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 77.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Yow Commercial Park East/Viles Auto & Callahan Drive





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1425	696	370	1456	0	0	0	0	52	0	308
Future Volume (vph)	0	1425	696	370	1456	0	0	0	0	52	0	308
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3539	1583	3433	3539	0	0	0	0	1770	0	1583
Satd. Flow (RTOR)			488									98
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 (%)												
Lane Group Flow (vph)	0	1532	748	398	1566	0	0	0	0	56	0	331
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		2		1	6					7		7
Permitted Phases			2									
Detector Phase		2	2	1	6					7		7
Switch Phase												
Minimum Initial (s)		15.0	15.0	6.0	15.0					8.0		8.0
Minimum Split (s)		21.0	21.0	12.0	21.0					14.0		14.0
Total Split (s)		54.0	54.0	20.0	74.0					26.0		26.0
Total Split (%)		54.0%	54.0%	20.0%	74.0%					26.0%		26.0%
Maximum Green (s)		48.0	48.0	14.0	68.0					20.0		20.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0	6.0					6.0		6.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Recall Mode		C-Max	C-Max	None	C-Max					None		None
Act Effct Green (s)		49.6	49.6	14.1	69.7					18.3		18.3
Actuated g/C Ratio		0.50	0.50	0.14	0.70					0.18		0.18
v/c Ratio		0.87	0.73	0.83	0.64					0.17		0.89
Control Delay		29.9	11.4	49.0	4.8					34.9		55.1
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		29.9	11.4	49.0	4.8					34.9		55.1
LOS		C	B	D	A					C		E
Approach Delay		23.8			13.7						52.2	
Approach LOS		C			B						D	
Queue Length 50th (ft)		454	119	112	298					30		146
Queue Length 95th (ft)		#584	277	m128	m297					64		#298
Internal Link Dist (ft)		2461			901			890			1125	
Turn Bay Length (ft)			165	130								390
Base Capacity (vph)		1755	1031	490	2465					354		395
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.87	0.73	0.81	0.64					0.16		0.84

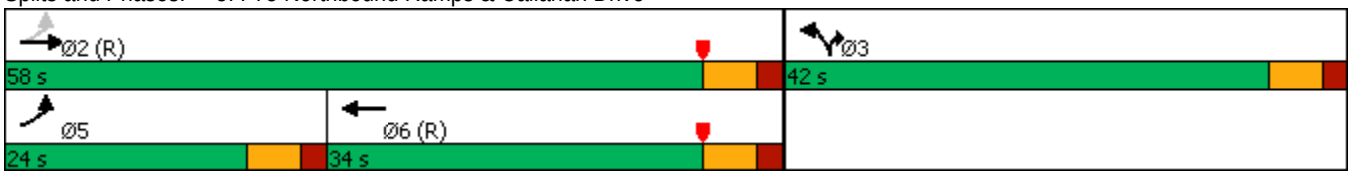
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 64 (64%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 95.6%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: I-75 Southbound Ramps & Callahan Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	495	982	0	0	1019	65	803	0	793	0	0	0
Future Volume (vph)	495	982	0	0	1019	65	803	0	793	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	1583	0	0	0
Flt Permitted	0.118						0.950					
Satd. Flow (perm)	220	3539	0	0	3507	0	3433	0	1583	0	0	0
Satd. Flow (RTOR)					6				98			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	505	1002	0	0	1106	0	819	0	809	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	24.0	58.0			34.0		42.0		42.0			
Total Split (%)	24.0%	58.0%			34.0%		42.0%		42.0%			
Maximum Green (s)	18.0	52.0			28.0		36.0		36.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	52.0	52.0			28.0		36.0		36.0			
Actuated g/C Ratio	0.52	0.52			0.28		0.36		0.36			
v/c Ratio	1.28	0.54			1.12		0.66		1.28			
Control Delay	157.1	10.7			91.9		30.1		164.8			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	157.1	10.7			91.9		30.1		164.8			
LOS	F	B			F		C		F			
Approach Delay		59.7			91.9			97.0				
Approach LOS		E			F			F				
Queue Length 50th (ft)	~346	248			~413		223		~619			
Queue Length 95th (ft)	m#450	m274			m#472		289		#853			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	393	1840			986		1235		632			
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	1.28	0.54			1.12		0.66		1.28			

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.28	
Intersection Signal Delay: 82.4	Intersection LOS: F
Intersection Capacity Utilization 95.6%	ICU Level of Service F
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.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 5: I-75 Northbound Ramps & Callahan Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	770	714	296	41	322	62	195	355	38	62	210	576
Future Volume (vph)	770	714	296	41	322	62	195	355	38	62	210	576
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.976			0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1818	0	1770	1835	0	1770	1863	1583
Flt Permitted	0.148			0.383			0.235			0.364		
Satd. Flow (perm)	276	1863	1583	713	1818	0	438	1835	0	678	1863	1583
Satd. Flow (RTOR)			308		9			5				600
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	802	744	308	43	400	0	203	410	0	65	219	600
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Free
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2		2	6			8			4		Free
Detector Phase	5	2	2	6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	12.0	21.0	21.0	21.0	21.0		12.0	14.0		14.0	14.0	
Total Split (s)	43.0	70.0	70.0	27.0	27.0		13.0	30.0		17.0	17.0	
Total Split (%)	43.0%	70.0%	70.0%	27.0%	27.0%		13.0%	30.0%		17.0%	17.0%	
Maximum Green (s)	37.0	64.0	64.0	21.0	21.0		7.0	24.0		11.0	11.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	64.0	64.0	64.0	21.0	21.0		24.0	24.0		11.0	11.0	100.0
Actuated g/C Ratio	0.64	0.64	0.64	0.21	0.21		0.24	0.24		0.11	0.11	1.00
v/c Ratio	1.10	0.62	0.27	0.29	1.03		1.03	0.92		0.88	1.07	0.38
Control Delay	85.3	12.0	2.8	39.3	93.2		107.4	65.3		121.7	127.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	85.3	12.0	2.8	39.3	93.2		107.4	65.3		121.7	127.7	0.7
LOS	F	B	A	D	F		F	E		F	F	A
Approach Delay		42.2			88.0			79.2			41.1	
Approach LOS		D			F			E			D	
Queue Length 50th (ft)	~532	161	16	23	~270		~115	254		42	~155	0
Queue Length 95th (ft)	m#560	m208	m30	57	#456		#230	#436		#125	#302	0
Internal Link Dist (ft)		779			937			888			996	
Turn Bay Length (ft)	570			90			110			155		155
Base Capacity (vph)	729	1192	1124	149	388		198	444		74	204	1583
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	1.10	0.62	0.27	0.29	1.03		1.03	0.92		0.88	1.07	0.38

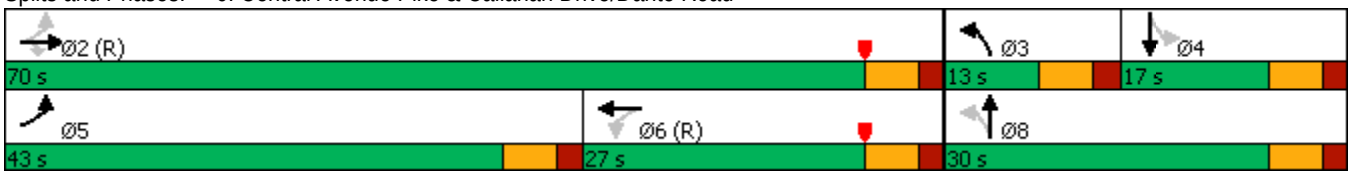
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 75 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 53.2	Intersection LOS: D
Intersection Capacity Utilization 111.0%	ICU Level of Service H
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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Central Avenue Pike & Callahan Drive/Dante Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	495	982	0	0	1019	65	803	0	793	0	0	0
Future Volume (vph)	495	982	0	0	1019	65	803	0	793	0	0	0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	0.88	1.00	1.00	1.00
Frt					0.991				0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	3507	0	3433	0	2787	0	0	0
Flt Permitted	0.103						0.950					
Satd. Flow (perm)	192	3539	0	0	3507	0	3433	0	2787	0	0	0
Satd. Flow (RTOR)					7				236			
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	505	1002	0	0	1106	0	819	0	809	0	0	0
Turn Type	pm+pt	NA			NA		Prot		Prot			
Protected Phases	5	2			6		3		3			
Permitted Phases	2											
Detector Phase	5	2			6		3		3			
Switch Phase												
Minimum Initial (s)	6.0	15.0			15.0		8.0		8.0			
Minimum Split (s)	12.0	21.0			21.0		14.0		14.0			
Total Split (s)	30.0	69.0			39.0		31.0		31.0			
Total Split (%)	30.0%	69.0%			39.0%		31.0%		31.0%			
Maximum Green (s)	24.0	63.0			33.0		25.0		25.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Recall Mode	None	C-Max			C-Max		None		None			
Act Effct Green (s)	63.0	63.0			33.0		25.0		25.0			
Actuated g/C Ratio	0.63	0.63			0.33		0.25		0.25			
v/c Ratio	1.01	0.45			0.95		0.95		0.93			
Control Delay	50.3	2.8			37.7		59.3		43.8			
Queue Delay	0.0	0.0			0.0		0.0		0.0			
Total Delay	50.3	2.8			37.7		59.3		43.8			
LOS	D	A			D		E		D			
Approach Delay		18.7			37.7			51.6				
Approach LOS		B			D			D				
Queue Length 50th (ft)	~200	64			328		265		211			
Queue Length 95th (ft)	m#372	m64			m#378		#386		#344			
Internal Link Dist (ft)		901			779			1037			999	
Turn Bay Length (ft)	155						800		1000			
Base Capacity (vph)	499	2229			1162		858		873			
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	1.01	0.45			0.95		0.95		0.93			

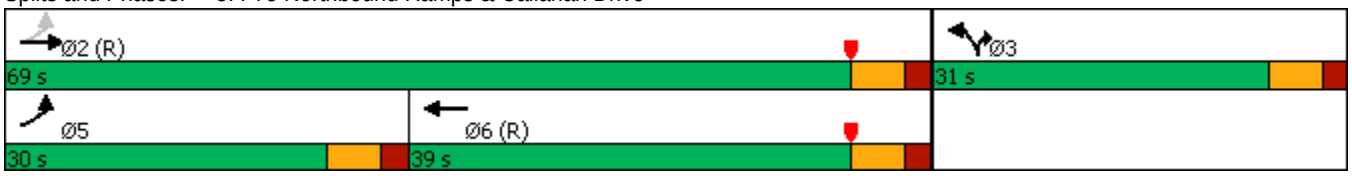
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 36.3	Intersection LOS: D
Intersection Capacity Utilization 95.6%	ICU Level of Service F
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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: I-75 Northbound Ramps & Callahan Drive



APPENDIX D – SIGNAL WARRANT SPREADSHEETS

TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

Intersection : Proposed Site Access / Viles Auto at Callahan Drive
City or County : City of Knoxville Date of Count: Year 2025 Projected
State : Tennessee Day of Week of Count: Average Weekday

Are warranting volumes to be adjusted for speeds or built up area? . . . . . Yes
Adjustment factor for day of week and month of year of count 1.00
Number of Lanes: Major Street . . 2 Minor Street . . . 1

Time Beginning	Major Street Actual Volume App #1	App #2	Total	Adjusted Total Volume	Minor Street Actual Volume –	Adjusted Total Volume ,
6:00 am	0	0	0	0	0	0
7:00	680	973	1653	1653	55	55
8:00	806	923	1729	1729	66	66
9:00 am	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	878	1055	1933	1933	103	103
12:00 noon	1082	1048	2130	2130	143	143
1:00	0	0	0	0	0	0
2:00	1092	1040	2132	2132	122	122
3:00 pm	1208	1158	2366	2366	185	185
4:00	1429	1356	2785	2785	184	184
5:00	1506	1370	2876	2876	223	223
6:00 pm	0	0	0	0	0	0
7:00	0	0	0	0	0	0
8:00	0	0	0	0	0	0

Note: , No adjustment made
– Where more than one minor approach exists use the higher approach volume
. Number of hours shown is the minimum meeting the MUTCD requirements. Additional hours outside of the count period may meet the MUTCD specified volume levels.

Warrant #1A (8 Hr. - Min. Vol.) Percent of Warrant Major	Minor
0	0
394	52
412	63
0	0
0	0
460	98
507	136
0	0
508	116
563	176
663	175
685	212
0	0
0	0
0	0
Warranting Volumes 420	105
Total Hours Meeting Warrant = 5 .	
Warrant Met No	

Warrant #1B (8 Hr. - Interruption) Percent of Warrant Major	Minor
0	0
262	104
274	125
0	0
0	0
307	194
338	270
0	0
338	230
376	349
442	347
457	421
0	0
0	0
0	0
Warranting Volumes 630	53
Total Hours Meeting Warrant = 8 .	
Warrant Met Yes	

Combination (Warrants 1A & 1B) Percent of Warrant Major	Minor
0	0
328	65
343	79
0	0
0	0
384	123
423	170
0	0
423	145
469	220
553	219
571	265
0	0
0	0
0	0
Warranting Volumes 504	84
Total Hours Meeting Warrant = 6 .	
Warrant Met No	

Warrant #2 (Four Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
60	92
60	110
0	*****
0	*****
60	172
60	238
0	*****
60	203
60	308
60	307
60	372
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-8	
Total Hours Meeting Warrant = 7 .	
Warrant Met Yes	

Warrant #3 (Peak Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
80	69
80	83
0	*****
0	*****
80	129
80	179
0	*****
80	153
80	231
80	230
80	279
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant = 6 .	
Warrant Met Yes	

***** Major Street volume is so low that no Minor Street warrant exists

Comments: (include any information which may be useful to the reviewer)

Minor Street Traffic Estimated from Hourly Distribution of Trips & Collected TMC Data

Analysis Prepared by: CANNON AND CANNON, INC.
Alan L. Childers, P.E.
Date: 03/17/21
Time: 15:10

Developed by: T. Darcy Sullivan, P.E. VC/R1
Distributed by: Tennessee Transportation Assistance Program (TTAP)

APPENDIX E – TURN LANE WARRANT SHEETS

TABLE 5B KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH	Project No: Project Name: Notes:

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						
100 - 149						
150 - 199						
200 - 249						Yes
250 - 299					Yes	Yes
300 - 349				Yes	Yes	Yes
350 - 399			Yes	Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599	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 - 599	= / > 600
Fewer Than 25						
25 - 49					Yes	Yes
50 - 99				Yes	Yes	Yes
100 - 149			Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	Yes
200 - 249	Yes	Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	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

Intersection	Time Period	Through Volume	Right-Turn Volume	Right-Turn Lane Warranted (Yes / No)
Site at Callahan	AM Peak	906 / 2 = 453	76	No
Site at Callahan	PM Peak	1682 / 2 = 841	39	Yes

Note: Callahan Drive has two lanes in eastbound direction so through volumes were divided by two for warrant calculation

Source: Knox County Department of Engineering and Public Works "Access Control and Driveway Design Policy"

APPENDIX F – MPC COMMENTS

Date: March 22, 2021

Project Name: Callahan Industrial Development

To: Knoxville-Knox County Planning

Subject: TIS Comment Response Document for Callahan Industrial Development
Review Comments Dated: March 12, 2021 (Knoxville-Knox County Planning)

Dear Knoxville-Knox County Planning staff,

The following comment response document is submitted to address comments dated March 12, 2021:

Knoxville-Knox County Planning (March 12, 2021)

1. **Reviewer Comment: Page 2, last sentence, and repeated on page 17, last sentence, Knox County is cited as being the responsible agency for the intersection of Callahan Drive at Central Avenue Pike. This should be changed to the City of Knoxville. All right-of-way and signal operation are City at this location.**

   Response: Requested correction made and reflected on page 2 & 17 of the Revised TIS.

2. **Reviewer Comment: Page 15, Table 3, a few results with footnote 3 mention that "Delay exceeds HCS calculation thresholds and is indeterminable." I was able to run HCS analyses for a few of these with the footnote 3 and received LOS and delay results. Please advise and revise if necessary.**

   Response: This comment was reviewed and the HCS analysis resulted in the same results when re-analyzed. The capacity analysis with footnote 3 was in relation to the proposed site access intersection modeled as an un-signalized intersection. The resulting combined volumes for the 2025 Combined scenario indicate a traffic signal is warranted so the intersection was analyzed as a signalized intersection for build-out conditions.

3. **Reviewer Comment: It is not clear whether any special considerations were made for potential significant heavy vehicle/tractor trailer traffic based on this being an industrial park. If any specific tenants or uses are known at this time in relation to a percent of trips generated being large trucks please provide this information, or if unknown then verify that recommendations regarding turn lane storage and so forth will still likely be adequate to accommodate the potential for such.**

   Response: The heavy vehicle traffic for this project was left as the default percentage for the analysis since a specific tenant is not know at this time. The recommended turn lane lengths are expected to accommodate site traffic adequately based on a review of the anticipated queue lengths Appendix C.

4. **Reviewer Comment: Please provide an assessment of the recommended internal roadway cross section and design with regard to the lane widths, need for turn lanes and geometry based on the least maneuverable vehicle that will routinely use the facility.**

Response: Comment addressed and provided in recommendation 3b on page 2 & 17 of the revised TIS

a. **Traffic calming may be necessary in order to validate vehicles will travel at the design speeds of the roadway. It was noted in the plan review that some of the vertical curvature is based on a 25mph design, however the gentle rolling nature of the roadway may not be sufficient to keep speeds at or below design. Please address.**

Response: The proposed access road has been shortened and horizontal curve radii have been reduced to allow vehicles to travel at the design speed of the roadway.

5. **Reviewer Comment: The TIS provided an analysis of a single, full build-out scenario however it seems unlikely that more than 1,000,000 sf in multiple buildings would be constructed and occupied all at once. This is especially relevant to the recommendation of installing a traffic signal which is preferred to be done only at such time that traffic volumes actually warrant it. Please provide additional information on a logical phasing of the development or at the minimum a threshold value of % build-out needed for the traffic signal to be warranted. This will also allow for reviewing agencies to account for inherent uncertainty of traffic counts feeding TIAs during the pandemic to determine if a signal is warranted based on more accurate data and volumes in the future as the site develops.**

Response: The overall concept site plan was modified to eliminate proposed development south of Keck Road and within the City's Hillside Protection area. This caused a reduction in size of the development for this study from 1,107,500 sf to 575,000 sf. The resulting capacity analysis, signal warrant analysis, and turn lane warrant analysis have been modified to reflect the proposed site plan size reduction.

The signal warrant was still performed for a single build-out scenario since 575,000 sf of development is feasible at one time. Additionally, the resulting capacity analysis indicates a signal is recommended to address the poor levels-of-service occurring under build-out conditions without a signal.

6. **Reviewer Comment: The TIS needs to elaborate further on the fact that an existing median opening is being closed and a new one proposed to be created with this new development access road.**

Response: Comment addressed in New TIS section "Relocated Median Opening Review"

a. **Please document and provide an assessment of the adequacy of the new resulting median opening spacing along Callahan Drive**.

Response: Comment addressed in New TIS section "Relocated Median Opening Review"

b. **Include a recommendation for the required storage length for the new eastbound left turn lane that will also need to be created at this median opening.**

Response: Comment addressed in "Turn Lane Evaluation" section of Revised TIS.

Sincerely,

Wesley Stokes, P.E.

CANNON & CANNON INC
CONSULTING ENGINEERS · FIELD SURVEYORS

Date: April 05, 2021

Project Name: Callahan Industrial Development

To: Knoxville-Knox County Planning

Subject: TIS Comment Response Document for Callahan Industrial Development
Review Comments Dated: April 01, 2021 (Knoxville-Knox County Planning)

Dear Knoxville-Knox County Planning staff,

The following comment response document is submitted to address comments dated April 01, 2021:

Knoxville-Knox County Planning (April 01, 2021)

1. **Reviewer Comment: Recommendation #3.b.i. stated to provide for a northbound left turn lane and shared through / right lane however it appears as though these two lanes were actually analyzed as a shared left / through lane and right turn lane according to the Synchro reports shown in the Appendix for this intersection. Please clarify and correct this mismatch as appropriate - both in the TIS and preliminary site plan. Unless there is a compelling reason otherwise, the reviewing agencies prefer the scenario of how it was analyzed in Synchro since this would eliminate the possibility of through vehicles impeding any right turns on red, which is the highest volume movement on this approach.**

   Response: Requested revisions made and reflected on page 2 & 17 of the Revised TIS.

2. **Reviewer Comment: Recommendation #3.b.ii stated to provide two receiving lanes into the proposed site access. The reviewing agencies do not see a need/justification for two receiving lanes since there is not a dual westbound left turn lane or other apparent need for such. Please provide a demonstrated need for two receiving lanes, otherwise the preference would be for one lane in order to reduce intersection width (pedestrian crossing distance) as well as eliminating the merge situation that is created within the horizontal curve of the roadway. Please state whether additional width beyond 12' might be needed within the intersection influence area to accommodate large trucks if one receiving lane is the final recommendation.**

   Response: Requested revisions made and reflected on page 2 & 17 of the Revised TIS.

Sincerely,

Wesley Stokes, P.E.

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