

# UPSCALE WORLD'S FAIR PARK HOTEL

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TRAFFIC IMPACT STUDY

1100 CLINCH AVENUE  
KNOXVILLE, TN

CCI PROJECT NO. 01490-0000

REV2.

PREPARED FOR:  
The 9 Group  
1619 Purple Martin Way  
Knoxville, TN 37922

SUBMITTED BY  
Cannon & Cannon, Inc.  
8550 Kingston Pike  
Knoxville, TN 37919  
865.670.8555



..... REVISED  
DECEMBER 12  
**2019**

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KNOXVILLE, TN

CCI PROJECT NO. 01490-0000



## REVISION 2 (12/12/19)

This report replaces the revised traffic impact study report dated 11/25/19, prepared for this project in its entirety. The associated changes are related to MPC comments received on 12/12/19 which are located in APPENDIX D.

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# TABLE OF CONTENTS

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<b>SECTION 1</b>	<b>EXECUTIVE SUMMARY</b>	<b>1</b>
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<b>SECTION 2</b>	<b>INTRODUCTION &amp; PURPOSE OF STUDY</b>	<b>2</b>
------------------	--	----------

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<b>SECTION 3</b>	<b>EXISTING CONDITIONS</b>	<b>4</b>
	EXISTING ROADWAY CONDITIONS	4
	EXISTING SITE CONDITIONS	4
	EXISTING TRAFFIC DATA	5
	EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE	5

---

<b>SECTION 4</b>	<b>BACKGROUND CONDITIONS</b>	<b>7</b>
	BACKGROUND TRAFFIC GROWTH	7
	BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE	7

---

<b>SECTION 5</b>	<b>FUTURE CONDITIONS</b>	<b>9</b>
	TRIP GENERATION	9
	TRIP DISTRIBUTION AND ASSIGNMENT	10
	FUTURE TRAFFIC VOLUMES	12
	FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE	12

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<b>SECTION 6</b>	<b>EVALUATIONS</b>	<b>14</b>
	INTERSECTION CAPACITY ANALYSES	14
	TURN LANE ASSESSMENT	14
	SIGHT DISTANCE ASSESSMENT	15
	CONSTRUCTION PHASING AND TRAFFIC CONTROL	15
	TRANSIT AVAILABILITY	15

---

<b>SECTION 7</b>	<b>CONCLUSIONS &amp; RECOMMENDATIONS</b>	<b>16</b>
------------------	--	-----------

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<b>SECTION 8</b>	<b>APPENDIX</b>	<b>17</b>
------------------	-----------------	-----------

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# TABLE OF CONTENTS

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## FIGURES

FIGURE 1	LOCATION MAP	2
FIGURE 2	CONCEPTUAL SITE PLAN	3
FIGURE 3	EXISTING SITE CONDITIONS	4
FIGURE 4	2019 EXISTING TRAFFIC VOLUMES	6
FIGURE 5	2021 BACKGROUND TRAFFIC VOLUMES	8
FIGURE 6	TRIP DISTRIBUTION PATTERNS	10
FIGURE 7	TRIP ASSIGNMENT	11
FIGURE 8	2021 COMBINED TRAFFIC VOLUMES	13

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## TABLES

TABLE 1	ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY	5
TABLE 2A	TRIP GENERATION SUMMARY (BASE)	9
TABLE 2B	TRIP GENERATION SUMMARY (ADJUSTED FOR ALL TRIPS)	9
TABLE 3	CAPACITY ANALYSES SUMMARY	14

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## APPENDICES

APPENDIX A	TRAFFIC DATA
APPENDIX B	TRIP GENERATION
APPENDIX C	ANALYSES
APPENDIX D	MPC COMMENTS

## **EXECUTIVE SUMMARY**

This report provides a summary of a traffic impact study that was performed for a proposed upscale hotel to be located on Clinch Avenue adjacent to the World's Fair Park in downtown Knoxville. The project site is located on the southwest quadrant of the intersection of Clinch Avenue and 11<sup>th</sup> Street. The conceptual development plan for this project proposes a 120 room hotel with a 125 space adjacent parking garage. The project proposes to have two site access driveways onto Clinch Avenue.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed hotel development upon roadways in the vicinity of the project site. Of particular interest were the intersection of Clinch Avenue and 11<sup>th</sup> Street and the two proposed site driveway entrances onto Clinch Avenue. Appropriate intersection evaluations were conducted at these locations for existing, background and future combined traffic conditions in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts. These evaluations included intersection capacity analyses, corner sight distance reviews and others as appropriate.

The primary conclusion of this study is that the traffic generated from the proposed hotel development will not have a significant impact on the study intersection of Clinch Avenue and Eleventh Street. Intersection levels-of-service should remain the same as existing and the levels-of-service for the proposed site driveways on Clinch Avenue should be more than adequate.

Other conclusions include the fact that intersection sight distances at the proposed main site driveway and other evaluated locations are attainable for the required distances along Clinch Avenue and Eleventh Street, ride-share vehicles have been adequately provided for, and several transit routes are located within walking distance. The ride-share conclusion is due to the fact that the project site plan includes a separate driveway turn-out for these vehicles and an area for them to store and wait for a short time on the site itself. Additionally, it was concluded that the existing traffic signal operation and timing will be adequate for vehicle and pedestrian traffic upon full build-out and occupancy of the project.

The following listing is a summary of the recommendations that have resulted from this study:

1. Although appearing adequate based on the traffic and pedestrian volume projections of this study, the City of Knoxville should review traffic signal and pedestrian timing after the project is open to ensure adequacy of all elements.
2. Maintain intersection corner sight distances of at least 250 feet along Clinch Avenue and 300 feet along Eleventh Street as discussed in the Sight Distance Assessment section of this report, by ensuring any site grading, landscaping, signage or other site features are properly placed such that sight distances are not restricted.
3. Provide a vehicle gate for traffic exiting the site from the main project entrance.

### INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact study that was performed for a proposed upscale hotel to be located on Clinch Avenue adjacent to the World's Fair Park in downtown Knoxville. The project site is located on the southwest quadrant of the intersection of Clinch Avenue and 11<sup>th</sup> Street. FIGURE 1 is a location map identifying the major roadways in the vicinity of the site.



**FIGURE 1  
LOCATION MAP**

The conceptual development plan for this project proposes a 120 room hotel with a 125 space adjacent parking garage. The project proposes to have two site access driveways onto Clinch Avenue. FIGURE 2 is a Conceptual Site Plan which details the proposed site configuration.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed hotel development upon roadways in the vicinity of the project site. Of particular interest were the intersection of Clinch Avenue and 11<sup>th</sup> Street and the proposed site driveway entrances onto Clinch Avenue. Appropriate intersection evaluations were conducted at these locations for existing, background and future combined traffic conditions in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts. These evaluations included intersection capacity analyses, corner sight distance reviews and others as appropriate.

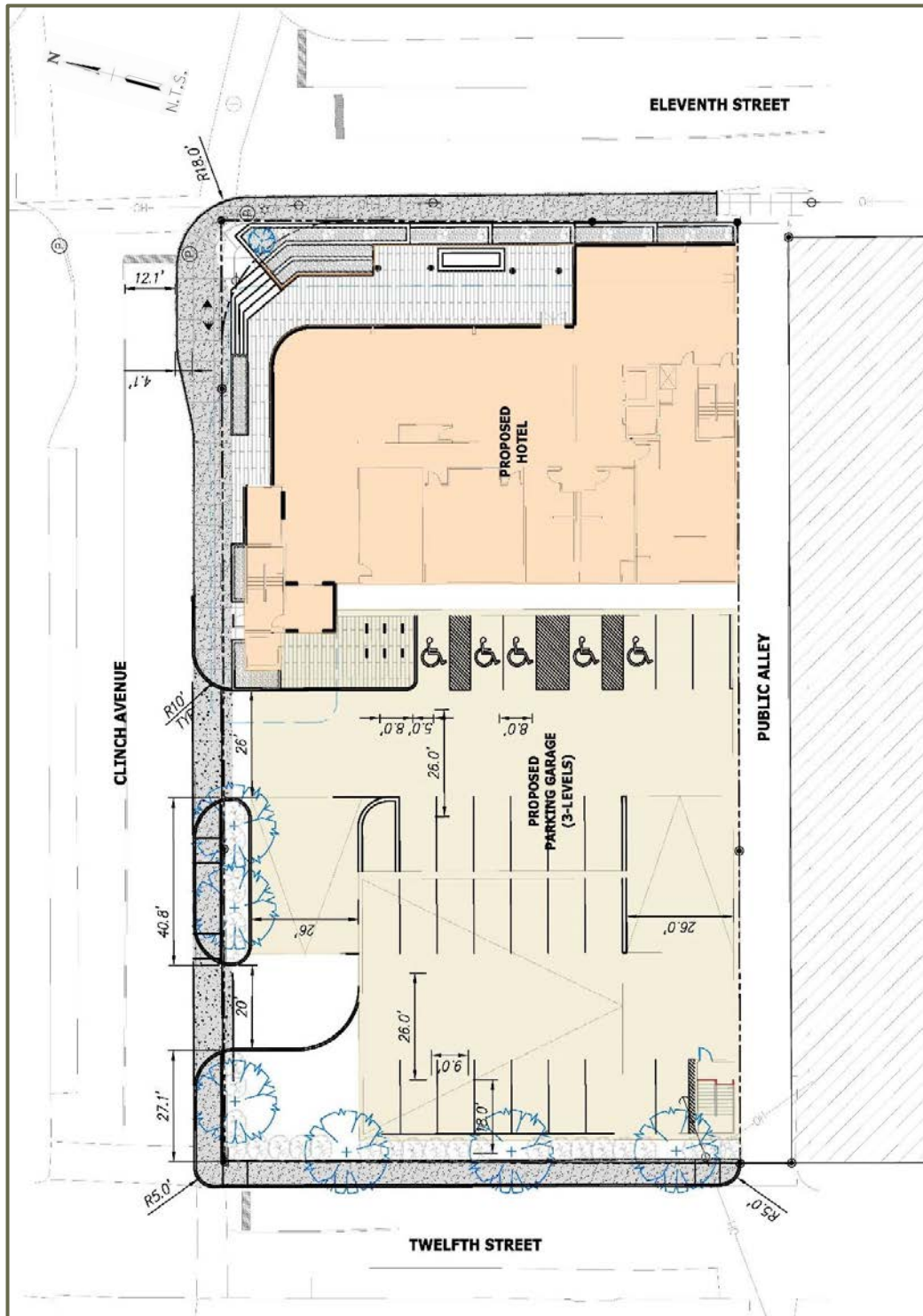


FIGURE 2  
CONCEPTUAL SITE PLAN

**EXISTING CONDITIONS**

**EXISTING ROADWAY CONDITIONS**

Clinch Avenue runs east-west in the study area and is classified as a Minor Collector roadway. Adjacent to the study site and continuing on to the west this roadway is approximately 35 feet wide, contains two equal width traffic lanes with parking allowed on both sides. Sidewalk is also present on both sides with concrete curb located at both edges of pavement. The speed limit on Clinch Avenue is posted as 25 mph.

Eleventh Street runs north-south in the study area and is also classified as a Minor Collector roadway. Adjacent to the study site and on to the south this roadway is approximately 36 feet wide, contains three traffic lanes, with the center one being a two-way left-turn lane. To the north of the study site and beyond its Clinch Avenue intersection, Eleventh Street narrows to two lanes and about 26 feet total width. Parking is not allowed along this roadway, but sidewalk is present on both sides. Concrete curb also exists on both sides, with sporadic concrete gutter mainly along the east side. The speed limit is posted as 30 mph.

The study intersection at Clinch Avenue and Eleventh Street contains many of the features discussed above, although left-turn lanes are located on the northbound, southbound and westbound approaches. The intersection is controlled by a traffic signal possessing protected-permitted left-turn phasing for the three above approaches, as well as pedestrian crosswalks and pedestrian signals across all four approaches.

**EXISTING SITE CONDITIONS**

The project site, which is shown on FIGURE 3, currently consists of two small office buildings and an older house size apartment building, along with some associated surface parking. The site sits on the east end of the Ft. Sanders community, which primarily consists of older residential homes and rental apartments housing mostly University of Tennessee students. Another hotel sits to the immediate south and the World’s Fair Park is across Eleventh Street to the east, which is adjacent to downtown Knoxville.



**FIGURE 3  
EXISTING SITE CONDITIONS**



**EXISTING TRAFFIC DATA**

Existing traffic data was gathered for this study. The Tennessee Department of Transportation (TDOT) collects annual average daily traffic data (AADT) annually on roadways in the study area. Two 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 count stations is contained in TABLE 1.

**TABLE 1: ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY**

COUNT YEAR	Station T396 11 <sup>th</sup> Street North of Clinch Avenue	Station T398 11 <sup>th</sup> Street South of Clinch Avenue
2017	6,118	5,515
2016	5,862	5,460
2015	6,585	5,537
2014	6,174	5,863
2013	6,073	5,750
2012	6,503	7,423
2011	6,314	7,385
2010	6,377	7,248
2009	7,281	7,063
2008	7,282	7,740
2007	7,048	7,152

In addition to the available AADT data, an intersection turning movement traffic count was conducted specifically for this project at the intersection of Clinch Avenue and 11<sup>th</sup> Street. This count took place on August 29, 2019, and was utilized to determine the existing AM and PM peak hour operating volumes. These volumes are summarized on FIGURE 4, and the raw data traffic count summary sheets are contained in APPENDIX A.

**EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE**

Capacity analyses of Existing conditions employing the methods of the Highway Capacity Manual (HCM2010) were conducted for the intersection of Clinch Avenue and 11th Street. These analyses were performed with the 2019 existing traffic volumes including motor vehicles, pedestrians and bicycles (FIGURE 4) and existing intersection traffic control, lane configurations and signal timing. The EVALUATIONS section of this report may be referenced for tabular summaries of the analyses results, 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.

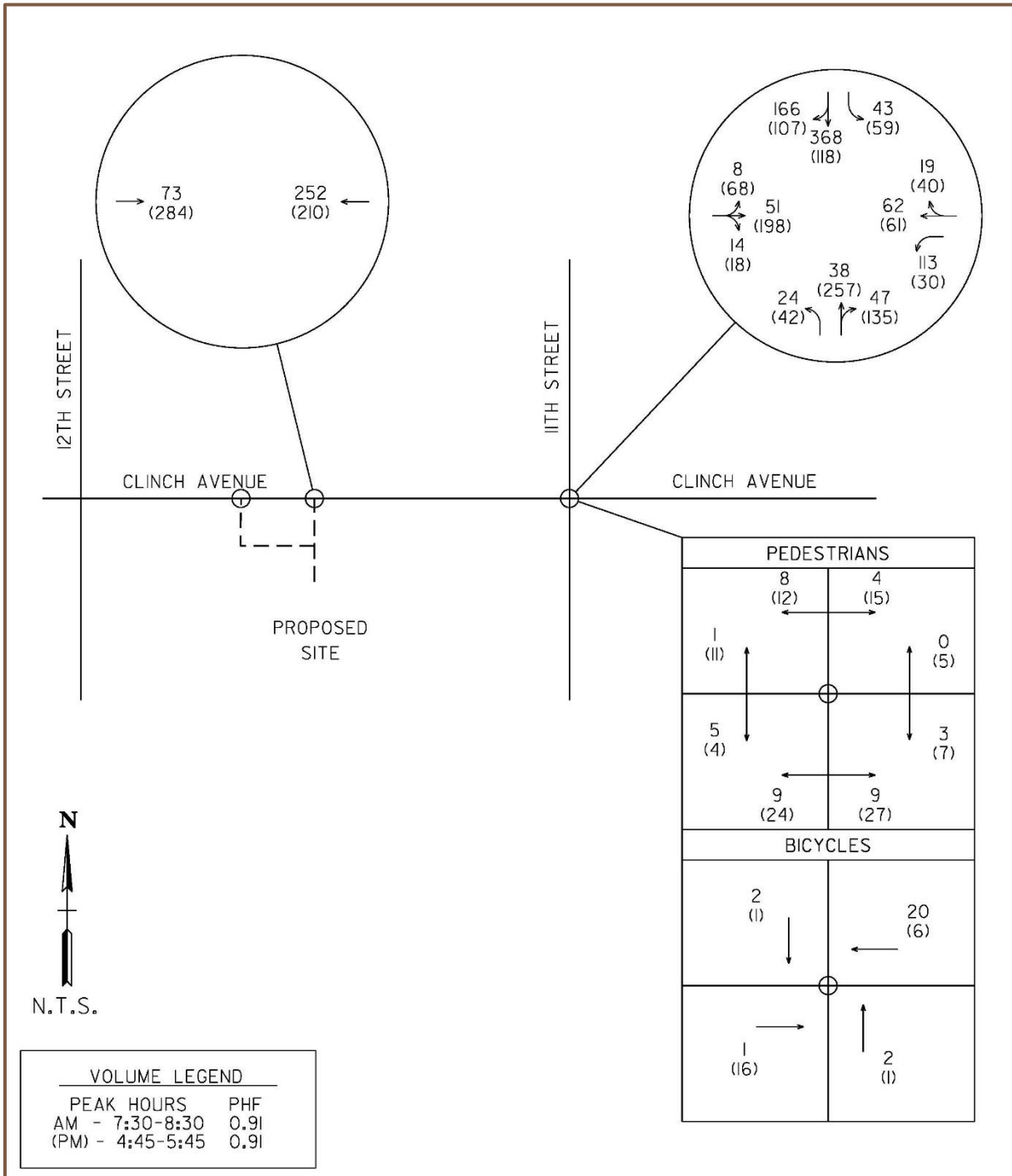


FIGURE 4  
2019 EXISTING TRAFFIC VOLUMES

### BACKGROUND CONDITIONS

#### BACKGROUND TRAFFIC GROWTH

The proposed development is anticipated to be constructed in one general phase with anticipated completion within approximately 2 years. Therefore, year 2021 was established as the appropriate evaluation year for this study. In order to determine traffic volumes resulting solely from background traffic growth to year 2021, it was necessary to establish an annual growth rate for existing traffic. Based on the TDOT AADT traffic counts, as well as knowledge of the area, a background annual traffic growth rate of 1.5% was established. FIGURE 5 contains the background traffic volumes that would result from a 1.5% annual growth rate from year 2019, when the counts were conducted, to year 2021. These volumes represent year 2021 background growth conditions without traffic related to the proposed development.

#### BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted utilizing the 2021 background traffic volumes including motor vehicles, pedestrians and bicycles (FIGURE 5) and existing intersection traffic control, existing lane configurations and existing signal timing. The EVALUATIONS section of this report may be referenced for tabular summaries of the analyses results, 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.

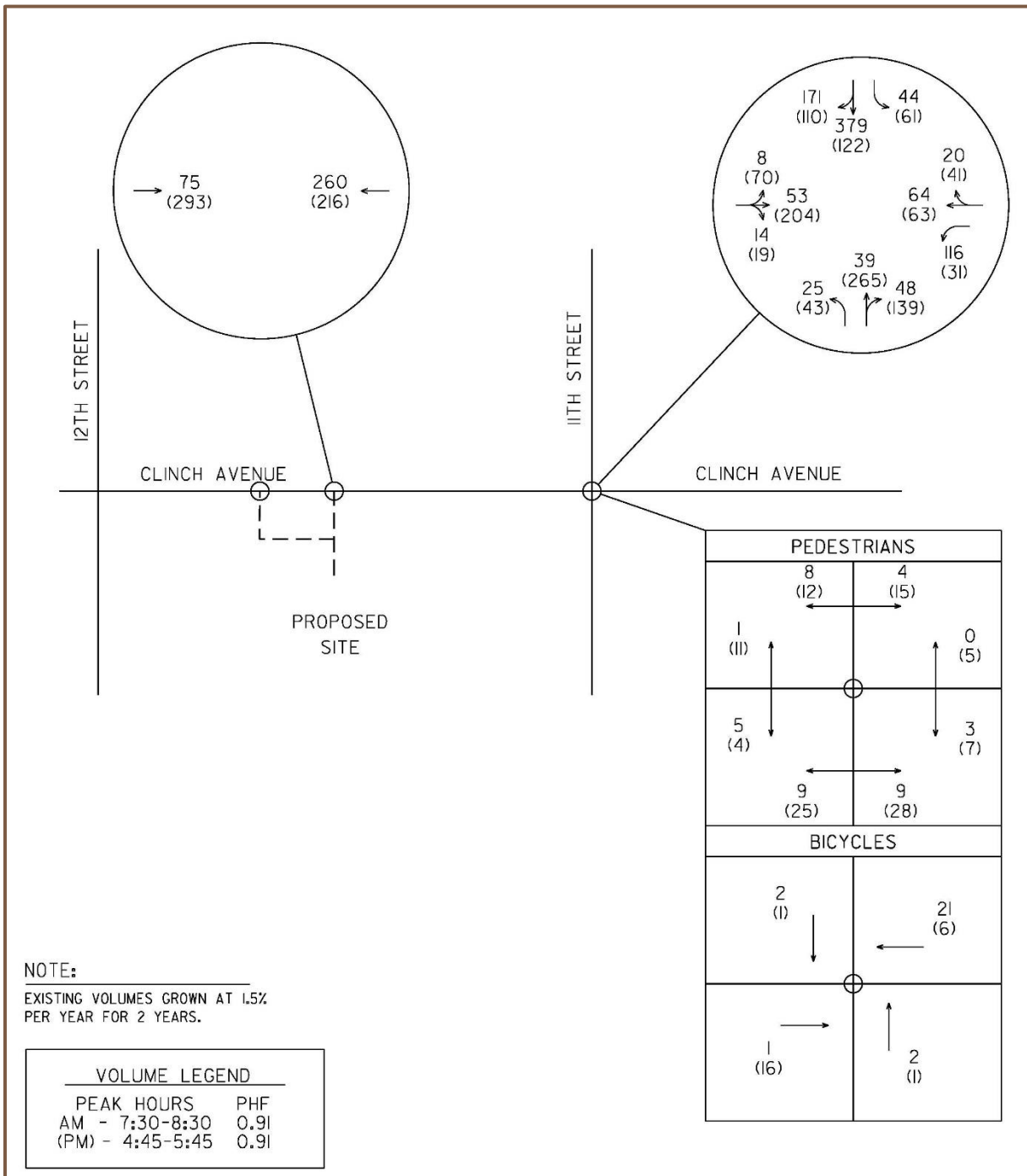


FIGURE 5  
2021 BACKGROUND TRAFFIC VOLUMES

**FUTURE CONDITIONS**

**TRIP GENERATION**

In order to estimate the expected vehicle trips to be generated by the proposed development, the procedures of *Trip Generation, Tenth Edition* (Institute of Transportation Engineers-ITE) were utilized. The generated trips were determined based on the weekday morning and evening peak hour of adjacent street traffic trip generation rates for Hotel (ITE Land Use Code 310), generating for 150 rooms in order to be conservative. See TABLE 2A for a summary of the base traffic generation for this project, which assumes all trips are vehicle trips. More detailed information is contained in APPENDIX B.

**TABLE 2A: TRIP GENERATION SUMMARY (BASE)**

LAND USE	TRIP TYPE	WEEKDAY (TRIPS/HR)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
<u>Hotel</u> ITE Land Use Code 310 Project Size – 150 Rooms	Vehicle Trips - Entering	633.5	41	44
	<u>Vehicle Trips - Exiting</u>	<u>633.5</u>	<u>29</u>	<u>42</u>
	Vehicle Trips - Total	1267	70	86

The project site is located within walking distance of the University of Tennessee, downtown Knoxville, and the Knoxville Convention Center, and is also in an area with transit service. Therefore, in order to account for likely trips by non-vehicular travel modes, adjustments were made to the Trip Generation to provide estimates for all trips. *The ITE Trip Generation Handbook (3<sup>rd</sup> Edition)* was consulted, which contains the beginning of a data base for these types of adjustments. Specific data was provided by Knoxville/Knox County MPC from this document in their review comments from the first submittal of this report, and this data was used, which included trip reductions of 10 percent for transit and 5 percent for pedestrians. A copy of a worksheet entitled *Application of Mode Share and Vehicle Occupancy* is provided in APPENDIX B which summarizes how this data was applied. TABLE 2B below summarizes the most pertinent resulting data.

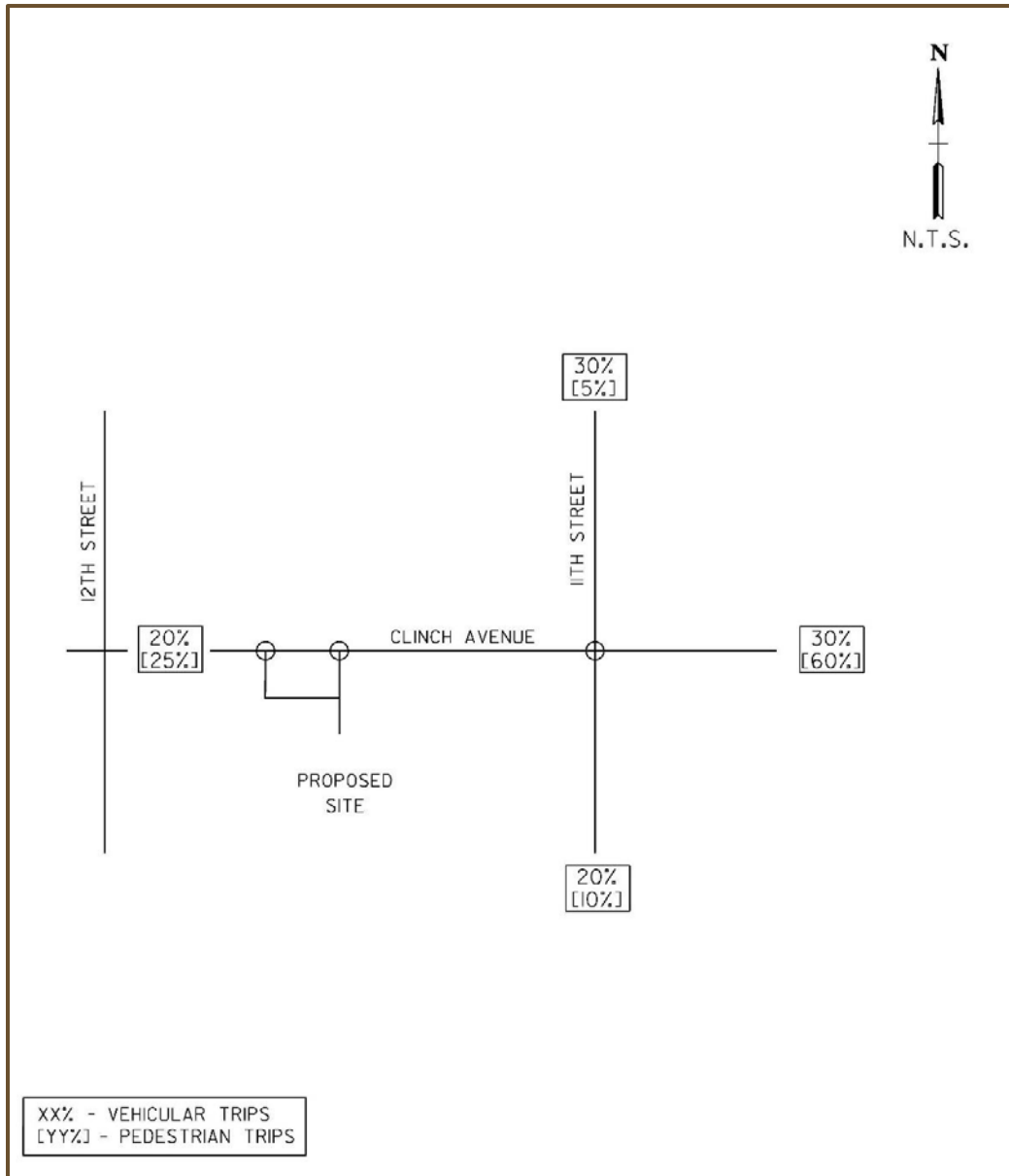
**TABLE 2B: TRIP GENERATION SUMMARY (ADJUSTED FOR ALL TRIPS\*)**

LAND USE INFORMATION	TRIP TYPE	WEEKDAY (TRIPS/HR)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
<u>Hotel</u> ITE Land Use Code 310 Project Size – 150 Rooms	Vehicle Trips - Entering	539	35	37
	<u>Vehicle Trips - Exiting</u>	<u>539</u>	<u>25</u>	<u>36</u>
	Vehicle Trips - Total	1078	60	73
	Pedestrian Trips - Entering	41	2	3
	<u>Pedestrian Trips - Exiting</u>	<u>41</u>	<u>2</u>	<u>2</u>
	Pedestrian Trips – Total	82	4	5
Vehicle Trips – 85 percent Ped. Trips – 5 percent Transit Trips – 10 percent	Transit Trips - Entering	64	4	5
	<u>Transit Trips - Exiting</u>	<u>64</u>	<u>3</u>	<u>4</u>
	Transit Trips - Total	128	7	9

\*Note: See APPENDIX B sheet entitled *Application of Mode Share and Vehicle Occupancy*

**TRIP DISTRIBUTION AND ASSIGNMENT**

FIGURE 6 provides a summary of the trip distribution patterns assumed for this study. These patterns were based on the existing traffic patterns and knowledge of the area, and resulted in separate patterns for vehicular and pedestrian trips. FIGURE 7 provides a summary of the anticipated trips as assigned to the study intersections utilizing the trip generation data in TABLE 2B and the trip distribution patterns shown in FIGURE 6.



**FIGURE 6  
TRIP DISTRIBUTION PATTERNS**



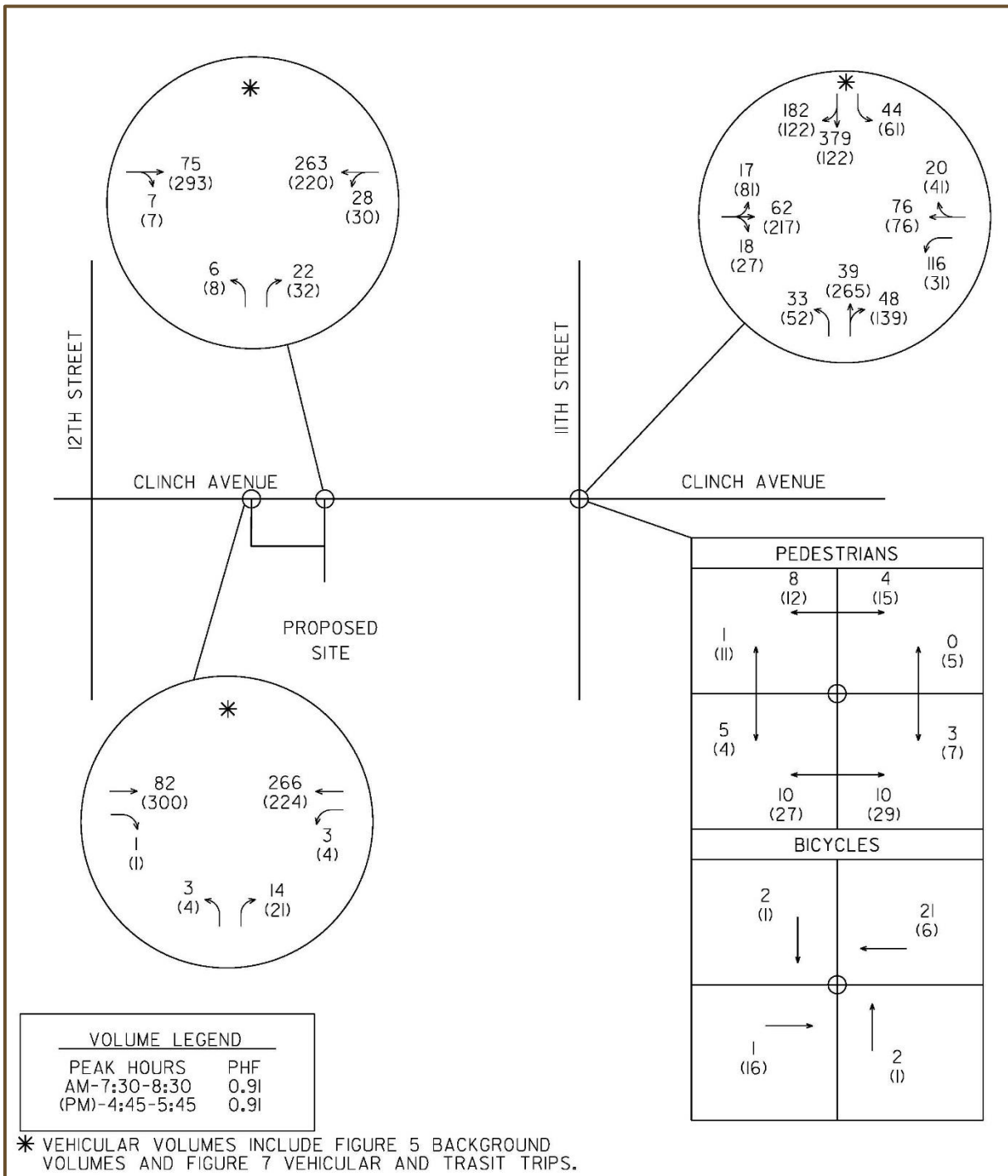
### **FUTURE TRAFFIC VOLUMES**

Future projected traffic volumes were developed by adding the generated trips shown in FIGURE 7 to the 2021 background traffic volumes developed in the previous section (FIGURE 5). These combined year 2021 volumes reflect the existing traffic, the background traffic growth, and the newly generated traffic from the proposed development. FIGURE 8 thus represents the 2021 combined traffic data, which includes all anticipated trips. The volumes shown in FIGURE 8 are the combined volumes used in the analysis of the future conditions.

### **FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE**

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted utilizing the 2021 combined traffic volumes including motor vehicles, pedestrians and bicycles (FIGURE 8) and existing intersection traffic control, existing lane configurations and existing signal timing. The EVALUATIONS section of this report may be referenced for tabular summaries of the analyses results, 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 8**  
**2021 COMBINED TRAFFIC VOLUMES**

## EVALUATIONS

### INTERSECTION CAPACITY ANALYSES:

As discussed in the preceding sections of this report, capacity analyses employing the methods of the Highway Capacity Manual (HCM) were conducted for the study intersections. Since the site access intersection on Clinch Avenue will not exist until construction of the proposed development, analyses were only conducted for the anticipated 2021 combined traffic conditions for this intersection. A summary of the capacity analysis results is shown in TABLE 3.

TABLE 3: CAPACITY ANALYSES SUMMARY

INTERSECTION	TIME	YEAR 2019 EXISTING (LOS/DELAY)	YEAR 2021 BACKGROUND (LOS/DELAY)	YEAR 2021 COMBINED (LOS/DELAY)
Clinch Avenue at 11 <sup>th</sup> Street (TRAFFIC SIGNAL CONTROL) <sup>1</sup>	A.M. P.M.	C / 22.0 sec. C / 28.6 sec.	C / 22.3 sec. C / 28.9 sec.	C / 24.5 sec. C / 29.3 sec.
Clinch Avenue at Main Site Access (SIDE-STREET STOP CONTROLLED) <sup>2</sup>	A.M. P.M.	n/a n/a	n/a n/a	A / 9.5 sec. B / 11.1 sec.

<sup>1</sup>TRAFFIC SIGNAL CONTROLLED – Level-of-Service (LOS) and Average Vehicular Delay (seconds) for full intersection with traffic signal utilizing HCM methodology.

<sup>2</sup>SIDE-STREET STOP CONTROLLED – Level-of-service and Average Vehicular Delay (seconds) for the stop controlled side-street approach utilizing HCM methodology.

See Appendix for detailed computer print-out summaries and discussion of Capacity and Level-of-Service concepts.

As shown in TABLE 3, it is anticipated that the study intersection of Clinch Avenue and Eleventh Street will operate at a level-of-service no worse than LOS "C", even under Year 2021 combined traffic conditions. In addition, it is also anticipated that the highest volume/main site driveway on Clinch Avenue will operate no worse than LOS "B" under these same conditions. These conclusions apply to both A.M. and P.M. peak traffic hours.

### TURN LANE ASSESSMENT

Left-turn and right-turn lane warrants were evaluated for the proposed main site driveway intersection on Clinch Avenue under Year 2021 combined traffic conditions. These analyses employed a spreadsheet from the Kentucky Transportation Cabinet, which uses the same warrant criteria as that developed by Harmelink, which is used by the Tennessee Department of Transportation, the City of Knoxville and Knox County. The results were that neither an eastbound right-turn lane nor a westbound left-turn lane are likely to be warranted, even under Year 2021 combined traffic conditions. The turn lane warrant spreadsheets are located in APPENDIX C.

### SIGHT DISTANCE ASSESSMENT

Intersection sight distance was assessed at several locations as requested by Knoxville/Knox County MPC in their review comments from the first submittal of this report. The speed limit along Clinch Avenue is posted as 25 mph, which resulted in a minimum recommended sight distance to oncoming traffic of 250 feet along Clinch. The speed limit along Eleventh Street is posted as 30 mph, which resulted in a minimum recommended sight distance to oncoming traffic of 300 feet along Eleventh. These distances are based on the Knoxville-Knox County Subdivision Regulations, and this assessment was also based on the driver eye position (15 ft.), driver eye height (3.5 feet) and oncoming object height (3.5 ft.) requirements from these regulations. The sight distance field assessment found that with the proposed clearing of the project site, sight distances in excess of these values are attainable as long as care is taken during the site development process to ensure that these sight distance requirements are met. This will include ensuring that site grading, landscaping, signage and other site features do not restrict intersection sight distance lines of sight. The following summarizes the sight distances that were assessed in relation to exiting roadway geometry and the proposed project site features:

1. Looking right from northbound Twelfth Street, 250 feet is attainable along Clinch Avenue as long as corner site landscaping is kept low. (See City Zoning Ordinance Sect. 3.20.04)
2. Looking left from northbound Eleventh Street for a right-turn-on-red, 250 is attainable along Clinch Avenue as long as the vehicle creeps forward as is typical of right-turn-on-red, and corner site features are kept low. (See City Zoning Ordinance Sect. 3.20.04)
3. Looking right from eastbound Clinch Avenue, 300 feet is attainable along Eleventh Street as long as corner site features are kept low. (See City Zoning Ordinance Sect. 3.20.04)
4. Visibility of Pedestrians along the Clinch Avenue sidewalk for vehicles exiting the garage is attainable as long as adjacent island landscape features are kept low. Also, the use of an exiting vehicle gate would also make this potential conflict much safer by reducing vehicle exiting speeds.

### CONSTRUCTION PHASING AND TRAFFIC CONTROL

Construction phasing, material storage, and traffic control plans shall be developed within the project site development plans to ensure construction traffic and phasing is coordinated with the City of Knoxville to minimize construction impacts upon traffic and pedestrian flow along Clinch Avenue and 11<sup>th</sup> Street. Any closures of traffic lanes or sidewalks will require a temporary traffic control permit issued by the City of Knoxville in accordance with the City's [Work Zone Traffic Control Policy](#).

### TRANSIT AVAILABILITY

Several Knoxville Area Transit (KAT) transit routes are located within walking distance of the project site. The free Orange Trolley route is adjacent to the east side of the site with trolley stops located a half block south of the site on 11<sup>th</sup> Street and one block east of the site on Clinch Avenue. KAT transit bus route 42 travels adjacent to the north side of the site with stops located one block east of the site on Clinch Avenue. Two additional KAT transit bus routes, 10 and 17, travel along Cumberland Avenue with stops located at the intersection with 11<sup>th</sup> Street, approximately two blocks south of the project site.

### CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated from the proposed hotel development will not have a significant impact on the study intersection of Clinch Avenue and Eleventh Street. Intersection levels-of-service should remain the same as existing and the levels-of-service for the proposed site driveways on Clinch Avenue should be more than adequate.

Other conclusions include the fact that intersection sight distances at the proposed main site driveway and other evaluated locations are attainable for the required distances along Clinch Avenue and Eleventh Street, ride-share vehicles have been adequately provided for, and several transit routes are located within walking distance. The ride-share conclusion is due to the fact that the project site plan includes a separate driveway turn-out for these vehicles and an area for them to store and wait for a short time on the site itself. Additionally, it was concluded that the existing traffic signal operation and timing will be adequate for vehicle and pedestrian traffic upon full build-out and occupancy of the project.

The following listing is a summary of the recommendations that have resulted from this study:

1. Although appearing adequate based on the traffic and pedestrian volume projections of this study, the City of Knoxville should review traffic signal and pedestrian timing after the project is open to ensure adequacy of all elements.
2. Maintain intersection corner sight distances of at least 250 feet along Clinch Avenue and 300 feet along Eleventh Street as discussed in the Sight Distance Assessment section of this report, by ensuring any site grading, landscaping, signage or other site features are properly placed such that sight distances are not restricted.
3. Provide a vehicle gate for traffic exiting the site from the main project entrance.

**APPENDIX**

**APPENDIX A | TRAFFIC DATA**

**APPENDIX B | TRIP GENERATION**

**APPENDIX C | ANALYSES**

**APPENDIX D | MPC COMMENTS**

APPENDIX A | TRAFFIC DATA

Station Number: 000396

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Knox County, 11TH ST. - BETWEEN SR-62 & CLINCH AVE. C.B.D  
Route: 05675

**AADT by year:**

2017 = 6,118  
2016 = 5,862  
2015 = 6,585  
2014 = 6,174  
2013 = 6,073  
2012 = 6,503  
2011 = 6,314  
2010 = 6,377  
2009 = 7,281  
2008 = 7,282  
2007 = 7,048  
2006 = 6,967  
2005 = 7,575  
2004 = 7,634  
2003 = 9,446  
2002 = 8,422  
2001 = 9,611  
2000 = 8,601  
1999 = 9,940  
1998 = 8,645  
1997 = 6,753  
1996 = 6,047  
1995 = 4,705  
1994 = 4,000  
1993 = 4,100  
1992 = 4,200  
1991 = 4,202  
1990 = 3,620  
1989 =  
1988 =  
1987 =  
1986 =  
1985 =  
1984 =  
1983 =

Station Number: 000398

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Knox County, 11TH ST. - BETWEEN CLINCH AVE. & SR-1 C.B.D  
Route: 05675

**AADT by year:**

2017 = 5,515  
2016 = 5,460  
2015 = 5,537  
2014 = 5,863  
2013 = 5,750  
2012 = 7,423  
2011 = 7,385  
2010 = 7,248  
2009 = 7,063  
2008 = 7,740  
2007 = 7,152  
2006 = 6,944  
2005 = 7,528  
2004 = 6,795  
2003 = 6,696  
2002 = 6,598  
2001 = 7,779  
2000 = 6,664  
1999 = 5,983  
1998 = 5,641  
1997 = 5,763  
1996 = 5,660  
1995 = 5,286  
1994 = 5,980  
1993 = 4,811  
1992 = 4,980  
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1983 =

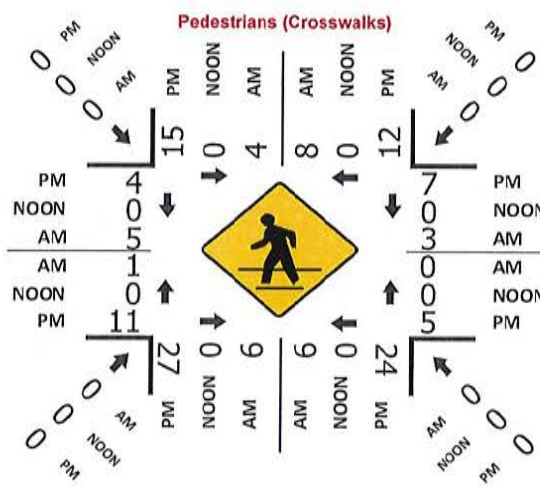
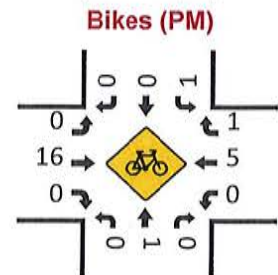
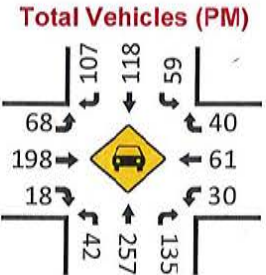
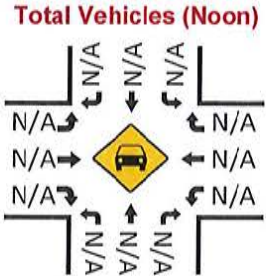
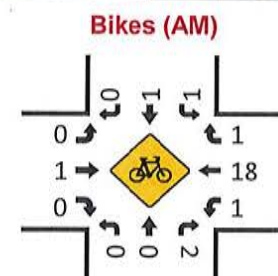
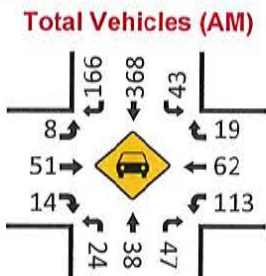
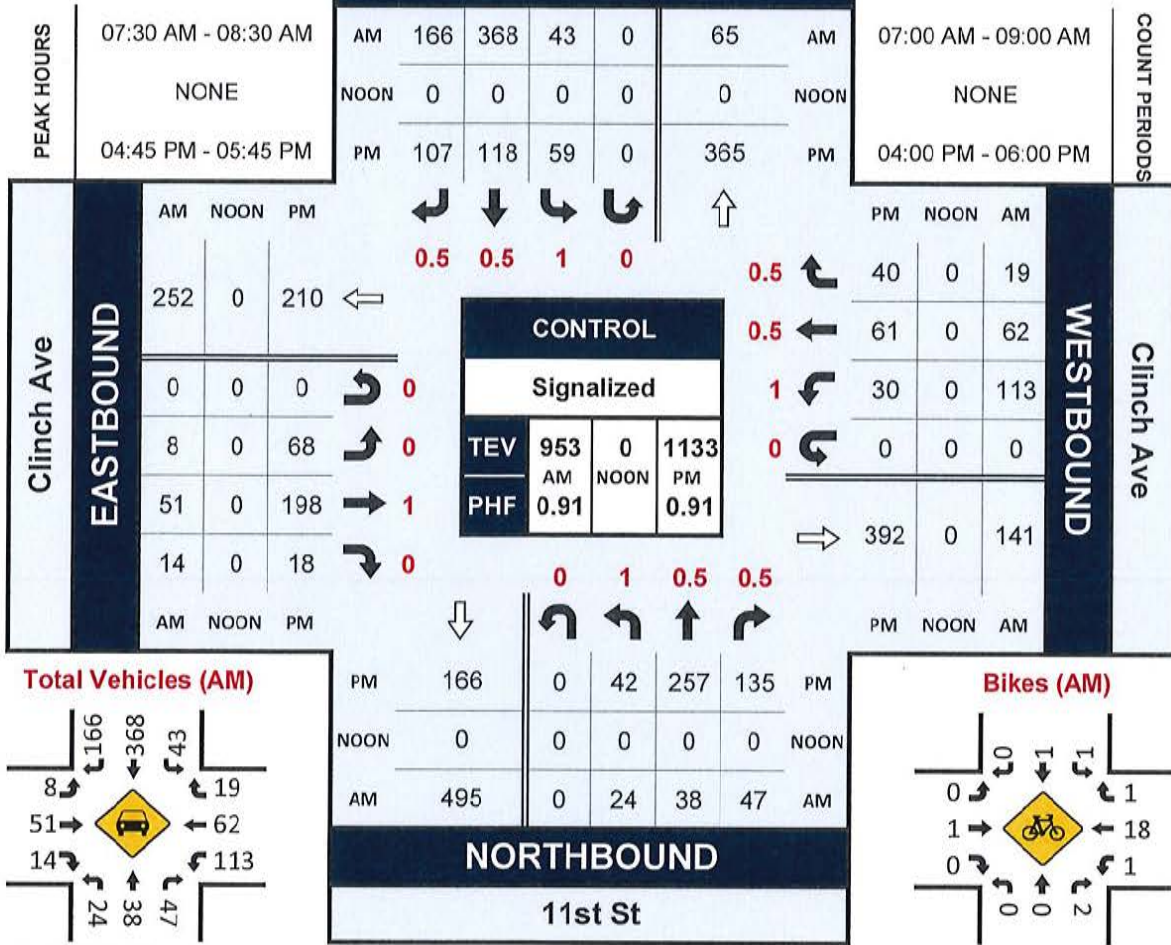


# 11st St & Clinch Ave

## Peak Hour Turning Movement Count

ID: 19-10025-001  
City: Knoxville

Day: Thursday  
Date: 08/29/2019



# National Data & Surveying Services

## Intersection Turning Movement Count

Location: 11st St & Clinch Ave  
City: Knoxville

Project ID: 19-10025-001  
Date: 8/29/2019

### Pedestrians (Crosswalks)

NS/EW Streets:	11st St		11st St		Clinch Ave		Clinch Ave		
<b>AM</b>	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		TOTAL
	EB	WB	EB	WB	NB	SB	NB	SB	
7:00 AM	0	1	2	1	0	1	0	0	5
7:15 AM	0	0	2	1	0	0	0	1	4
7:30 AM	1	0	0	2	0	1	0	2	6
7:45 AM	0	4	2	5	0	0	0	2	13
8:00 AM	3	1	4	2	0	1	1	0	12
8:15 AM	0	3	3	0	0	1	0	1	8
8:30 AM	0	0	3	4	0	0	0	0	7
8:45 AM	1	1	1	3	0	0	0	0	6
<b>TOTAL VOLUMES :</b>	5	10	17	18	0	4	1	6	61
<b>APPROACH %'s :</b>	33.33%	66.67%	48.57%	51.43%	0.00%	100.00%	14.29%	85.71%	
<b>PEAK HR :</b>	<b>07:30 AM - 08:30 AM</b>								<b>TOTAL</b>
<b>PEAK HR VOL :</b>	4	8	9	9	0	3	1	5	39
<b>PEAK HR FACTOR :</b>	0.333	0.500	0.563	0.450		0.750	0.250	0.625	0.750
	0.750		0.643		0.750		0.750		
<b>PM</b>	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		TOTAL
	EB	WB	EB	WB	NB	SB	NB	SB	
4:00 PM	1	0	6	6	0	0	3	0	16
4:15 PM	0	2	2	121	0	6	1	0	132
4:30 PM	2	0	4	5	1	0	0	0	12
4:45 PM	2	5	10	5	0	0	2	2	26
5:00 PM	6	3	6	8	3	0	4	0	30
5:15 PM	4	2	8	7	0	0	4	0	25
5:30 PM	3	2	3	4	2	7	1	2	24
5:45 PM	1	0	5	3	0	0	0	0	9
<b>TOTAL VOLUMES :</b>	19	14	44	159	6	13	15	4	274
<b>APPROACH %'s :</b>	57.58%	42.42%	21.67%	78.33%	31.58%	68.42%	78.95%	21.05%	
<b>PEAK HR :</b>	<b>04:45 PM - 05:45 PM</b>								<b>TOTAL</b>
<b>PEAK HR VOL :</b>	15	12	27	24	5	7	11	4	105
<b>PEAK HR FACTOR :</b>	0.625	0.600	0.675	0.750	0.417	0.250	0.688	0.500	0.875
	0.750		0.850		0.333		0.938		

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 Control: Signalized

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### Bikes

NS/EW Streets:	11st St				11st St				Clinch Ave				Clinch Ave				TOTAL
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	1 NL	0.5 NT	0.5 NR	0 NU	1 SL	0.5 ST	0.5 SR	0 SU	0 EL	1 ET	0 ER	0 EU	1 WL	0.5 WT	0.5 WR	0 WU	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	
7:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	1	6	0	0	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
8:15 AM	0	0	2	0	1	0	0	0	0	1	0	0	0	3	0	0	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
8:45 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	<b>TOTAL</b>
<b>APPROACH %'s :</b>	0	0	2	0	1	1	0	0	0	3	0	0	2	20	1	0	30
	0.00%	0.00%	100.00%	0.00%	50.00%	50.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	8.70%	86.96%	4.35%	0.00%	
<b>PEAK HR :</b>	<b>07:30 AM - 08:30 AM</b>																<b>TOTAL</b>
<b>PEAK HR VOL :</b>	0	0	2	0	1	1	0	0	0	1	0	0	1	18	1	0	25
<b>PEAK HR FACTOR :</b>	0.000	0.000	0.250	0.000	0.250	0.250	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.643	0.250	0.000	0.781
			0.250				0.500				0.250				0.625		
PM	1 NL	0.5 NT	0.5 NR	0 NU	1 SL	0.5 ST	0.5 SR	0 SU	0 EL	1 ET	0 ER	0 EU	1 WL	0.5 WT	0.5 WR	0 WU	
4:00 PM	0	0	0	0	0	0	2	0	0	3	0	0	0	0	1	0	
4:15 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	2	0	0	
4:45 PM	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	
5:15 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	
5:30 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	4	0	0	
5:45 PM	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0	
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	<b>TOTAL</b>
<b>APPROACH %'s :</b>	0	1	0	0	2	0	2	0	0	31	0	0	0	7	2	0	45
	0.00%	100.00%	0.00%	0.00%	50.00%	0.00%	50.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	77.78%	22.22%	0.00%	
<b>PEAK HR :</b>	<b>04:45 PM - 05:45 PM</b>																<b>TOTAL</b>
<b>PEAK HR VOL :</b>	0	1	0	0	1	0	0	0	0	16	0	0	0	5	1	0	24
<b>PEAK HR FACTOR :</b>	0.00	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.571	0.000	0.000	0.000	0.313	0.250	0.000	0.545
			0.250				0.250				0.571				0.375		

# National Data & Surveying Services

## Intersection Turning Movement Count

Location: 11st St & Clinch Ave  
 City: Knoxville  
 Control: Signalized

Project ID: 19-10025-001  
 Date: 8/29/2019

### Total

NS/EW Streets:	11st St				11st St				Clinch Ave				Clinch Ave				TOTAL
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	1	0.5	0.5	0	1	0.5	0.5	0	0	1	0	0	1	0.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
7:00 AM	1	6	13	0	7	43	25	0	4	3	0	0	16	7	6	0	131
7:15 AM	2	9	7	0	6	58	37	0	0	9	1	0	15	14	1	0	159
7:30 AM	5	4	14	0	14	89	46	0	1	9	3	0	27	21	6	0	240
7:45 AM	10	8	11	0	14	93	46	0	2	16	4	0	39	15	3	0	261
8:00 AM	3	15	10	0	7	102	29	0	2	18	2	0	27	13	7	0	235
8:15 AM	5	11	12	0	8	84	45	0	3	8	5	0	20	13	3	0	217
8:30 AM	6	2	13	0	11	82	25	0	2	5	3	0	22	16	6	0	193
8:45 AM	8	7	16	0	11	74	37	0	4	15	1	0	17	12	4	0	206
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	<b>TOTAL</b>
<b>APPROACH %'s :</b>	41	62	96	0	78	625	290	0	18	83	19	0	183	111	36	0	1642
	20.60%	31.16%	48.24%	0.00%	7.85%	62.94%	29.20%	0.00%	15.00%	69.17%	15.83%	0.00%	55.45%	33.64%	10.91%	0.00%	
<b>PEAK HR :</b>	<b>07:30 AM - 08:30 AM</b>																<b>TOTAL</b>
<b>PEAK HR VOL :</b>	24	38	47	0	43	358	166	0	8	51	14	0	113	62	19	0	953
<b>PEAK HR FACTOR :</b>	0.600	0.633	0.839	0.000	0.768	0.902	0.902	0.000	0.667	0.708	0.700	0.000	0.724	0.738	0.579	0.000	0.913
	0.940				0.943				0.830				0.851				
PM	1	0.5	0.5	0	1	0.5	0.5	0	0	1	0	0	1	0.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
4:00 PM	6	35	20	0	17	15	19	0	15	34	0	0	2	11	7	0	181
4:15 PM	2	32	22	0	23	23	20	0	10	41	1	0	5	17	7	0	203
4:30 PM	7	50	31	0	17	35	29	0	8	38	0	0	7	9	20	0	251
4:45 PM	9	56	32	0	12	44	24	0	12	41	6	0	7	19	2	0	264
5:00 PM	14	68	38	0	14	24	27	0	18	55	7	0	6	11	12	0	294
5:15 PM	10	77	40	0	21	21	27	0	23	53	2	0	6	14	16	0	310
5:30 PM	9	56	25	0	12	29	29	0	15	49	3	0	11	17	10	0	265
5:45 PM	8	35	24	0	19	21	16	0	18	41	0	0	2	12	12	0	208
<b>TOTAL VOLUMES :</b>	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	<b>TOTAL</b>
<b>APPROACH %'s :</b>	65	409	232	0	135	212	191	0	119	352	19	0	46	110	86	0	1976
	9.21%	57.93%	32.86%	0.00%	25.09%	39.41%	35.50%	0.00%	24.29%	71.84%	3.88%	0.00%	19.01%	45.45%	35.54%	0.00%	
<b>PEAK HR :</b>	<b>04:45 PM - 05:45 PM</b>																<b>TOTAL</b>
<b>PEAK HR VOL :</b>	42	257	135	0	59	118	107	0	68	198	18	0	30	61	40	0	1133
<b>PEAK HR FACTOR :</b>	0.750	0.834	0.844	0.000	0.702	0.570	0.922	0.000	0.739	0.900	0.643	0.000	0.682	0.803	0.625	0.000	0.914
	0.854				0.888				0.888				0.862				

**Intersection Name : Clinch Avenue and 11<sup>th</sup> Street (1880EL)**

Basic Timing (seconds)	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
Min Green	6	8	6	8	6	8		8
Gap / Extension	2	3	2	2	2	3		2
Max 1	20	30	20	25	10	30		25
Max 2	25	60	25	35	25	60		35
Yellow Clearance	4	4	4	4	4	4		4
Red Clearance	1	1	1	1	1	1		1
Walk		4		4		4		4
Pedestrian Clearance		12		12		12		12
Max Recall		X				X		
Active (Enable) Phases	X	X	X	X	X	X		X
Flashing Yellow Arrow								
Overlaps (1-4)								

**Coordination Timing/(seconds)**

Split #	Coord. Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
Split 1									
Split 2									
Split 3									
Split 4									
Split 5									
Split 6									

Pattern Table					Lead / Lag	Fixed / Floating
Pattern#	Cycle	Offset	Split	Seq. #	Phase #	End / Beginning
1						Intersection ID#
2						I/P Address
3						Hub Address
4						Radio Address
5						Comm. Type
6						Detection

**Day Plan Events**

Day Plan	HH:MM	Pattern	Day Plan	HH:MM	Pattern

**Year Plan Scheduler**

Plan	Month of Year: 01 - 12	Day of Month: 01 - 31	Plan
M - F			
SAT			
SUN			

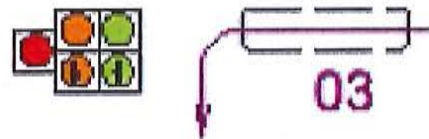
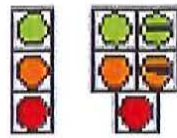
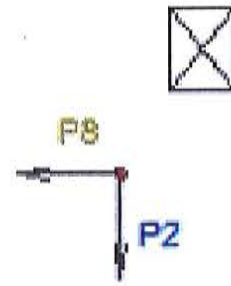
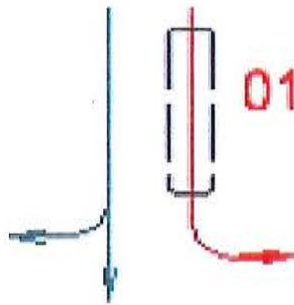
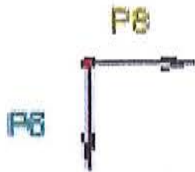
Notes : Phase 4 eastbound loop is out



11th

06

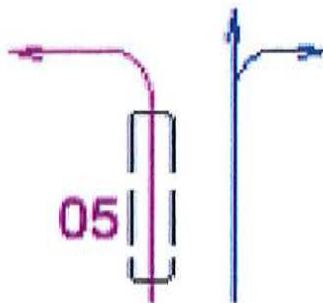
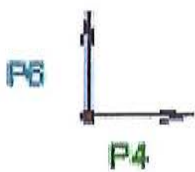
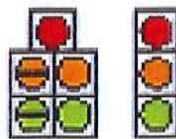
01



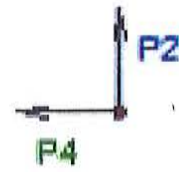
Clinch



Clinch



02



**APPENDIX B | TRIP GENERATION**

11/22/19

by Dee Application of Mode Share and Vehicle Occupancy

1. Trip Generation using ITE Rates (unreduced):

- Hotel (Code 310)

- Weekday - 1267 (50% enter / 50% exit)
- AM Peak - 70 (59% enter / 41% exit)
- PM Peak - 86 (51% enter / 49% exit)

2. Apply Trip Reduction for Transit and Pedestrians:

- |             |                        |                       |                          |
|-------------|------------------------|-----------------------|--------------------------|
|             | <u>Vehicles (85%)*</u> | <u>Transit (10%)*</u> | <u>Pedestrians (5%)*</u> |
| • Weekday - | 1077                   | 127                   | 63                       |
| • AM Peak - | 60                     | 7                     | 3                        |
| • PM Peak - | 73                     | 9                     | 4                        |

3. Apply Vehicle Occupancy to Pedestrian Trips:

- |             |                         |   |                          |   |                           |
|-------------|-------------------------|---|--------------------------|---|---------------------------|
|             | <u>Pedestrian Trips</u> | x | <u>Veh. Occupancy **</u> | = | <u>No. of Pedestrians</u> |
| • Weekday - | 63                      | x | 1.3                      | = | 82                        |
| • AM Peak - | 3                       | x | 1.3                      | = | 4                         |
| • PM Peak - | 4                       | x | 1.3                      | = | 5                         |

4. Trip Summary Table

Time Period	Motor Vehicle		Transit		Pedestrians	
	Total	Enter - Exit	Total	Enter - Exit	Total	Enter - Exit
Weekday	1078	539 - 539	128	64 - 64	82	41 - 41
AM Peak	60	35 - 25	7	4 - 3	4	2 - 2
PM Peak	73	37 - 36	9	5 - 4	5	3 - 2

\* Trip Reduction percents per MPC Review Comments

\*\* Data from Tables B.1 & B.2 Trip Generation Handbook 3<sup>rd</sup> Edition (P. 143-144)



# Hotel (310)

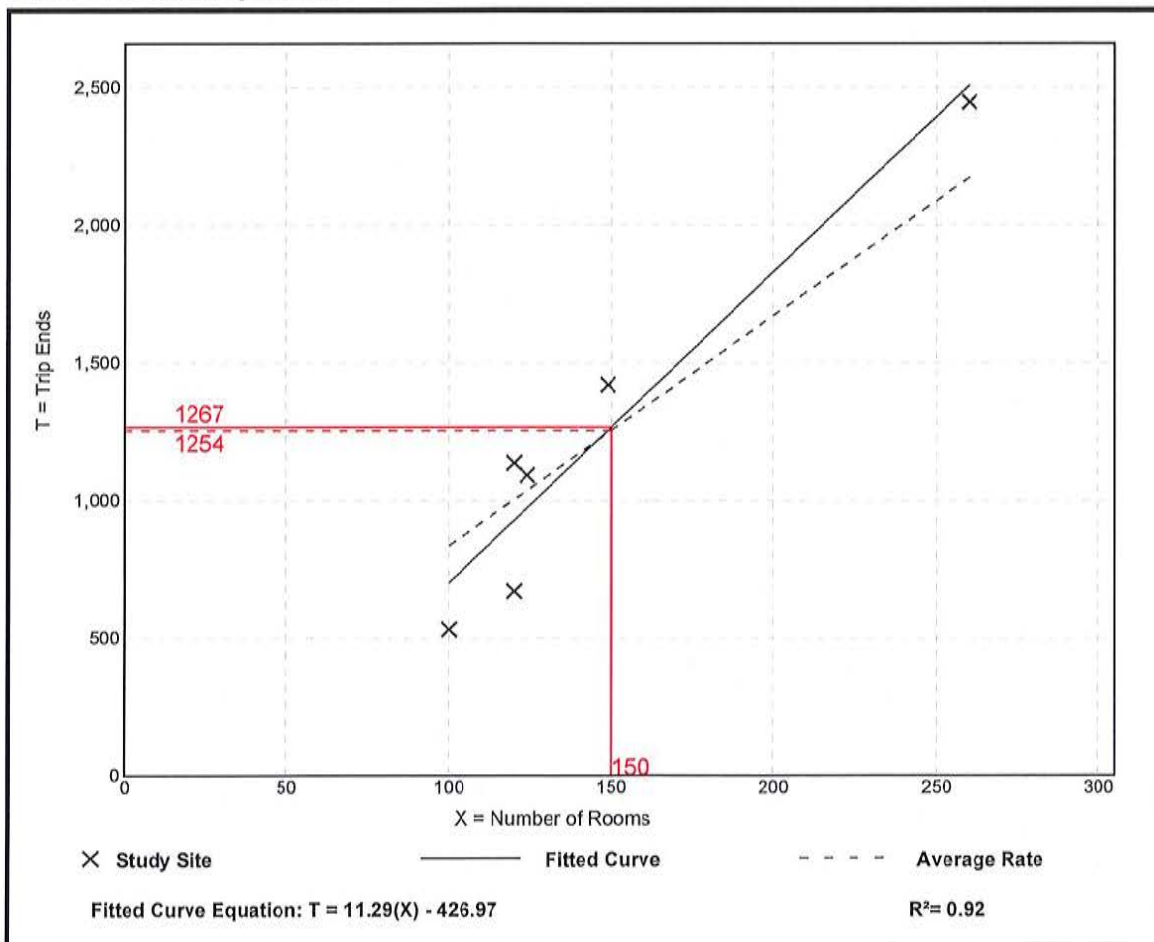
**Vehicle Trip Ends vs: Rooms**  
**On a: Weekday**

**Setting/Location: General Urban/Suburban**  
Number of Studies: 6  
Avg. Num. of Rooms: 146  
Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
8.36	5.31 - 9.53	1.86

## Data Plot and Equation



*Trip Generation Manual, 10th Edition • Institute of Transportation Engineers*

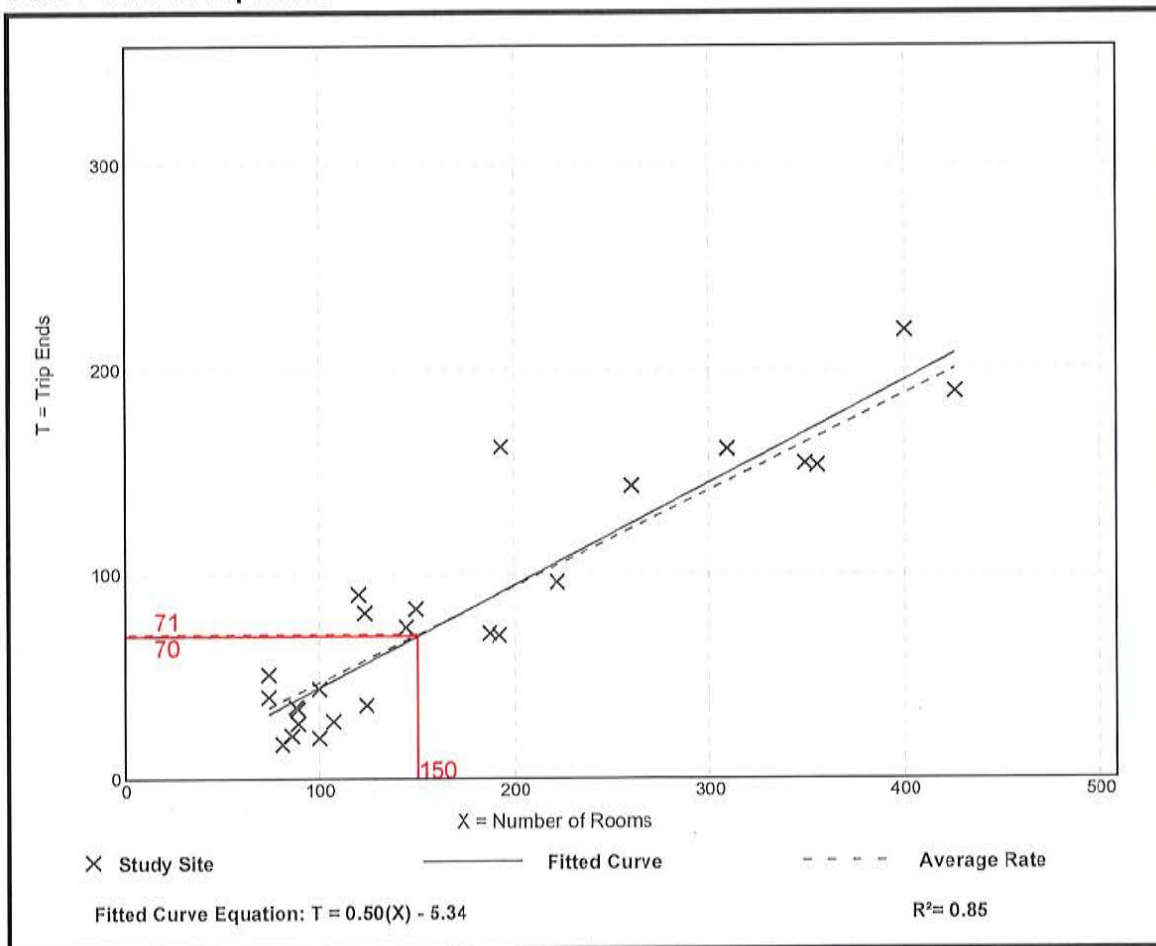
## Hotel (310)

**Vehicle Trip Ends vs:** Rooms  
**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: 25  
 Avg. Num. of Rooms: 178  
 Directional Distribution: 59% entering, 41% exiting

### Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.47	0.20 - 0.84	0.14

### Data Plot and Equation



*Trip Generation Manual, 10th Edition • Institute of Transportation Engineers*

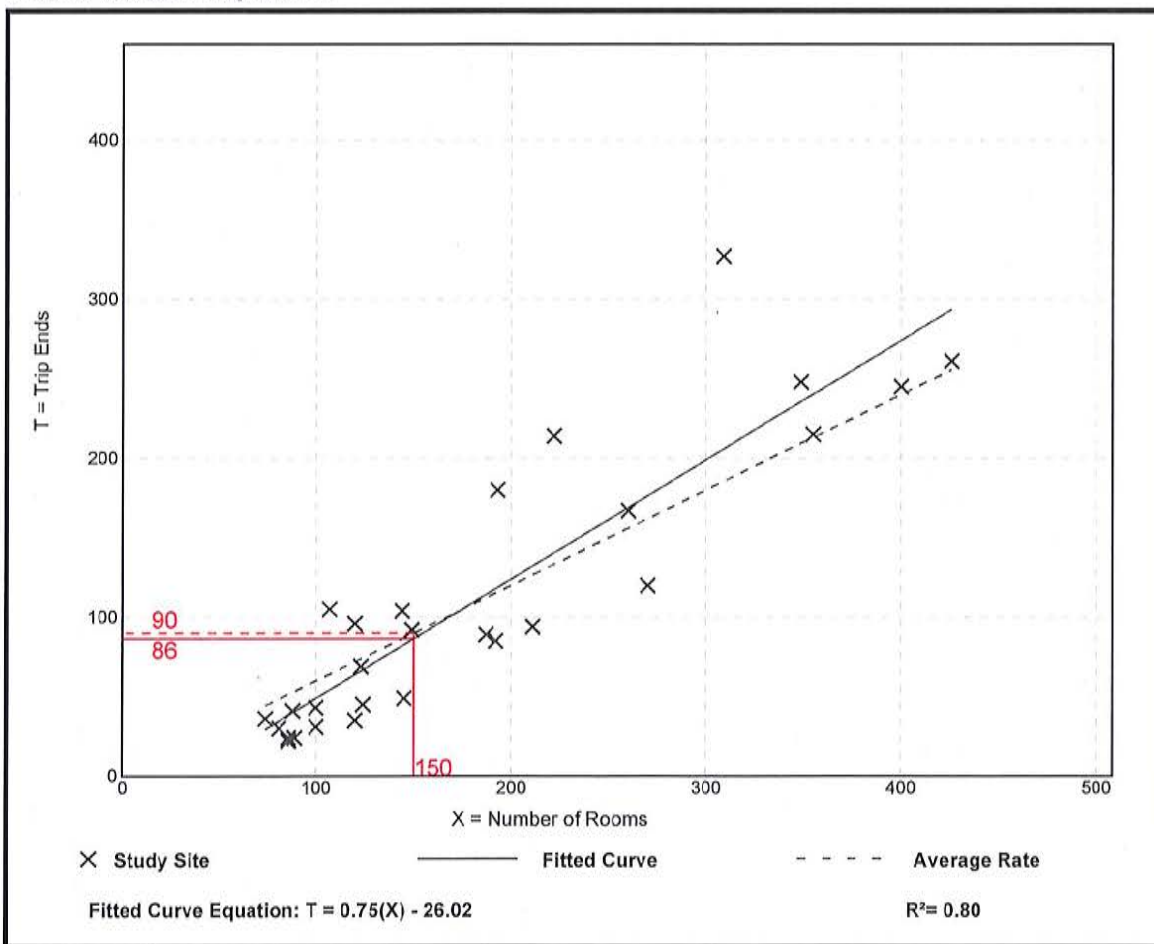
## Hotel (310)

**Vehicle Trip Ends vs: Rooms**  
**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: 28  
 Avg. Num. of Rooms: 183  
 Directional Distribution: 51% entering, 49% exiting

### Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.60	0.26 - 1.06	0.22

### Data Plot and Equation



*Trip Generation Manual, 10th Edition • Institute of Transportation Engineers*

**Table C.1 Infill Weekday AM and PM Non-Directional Peak Period Mode Share and Vehicle Occupancy Examples—Multi-Family Residential**

Land Use	Location	Area Type <sup>1</sup>	Occupied Dwelling Units	ITE LUC	AM					Sample Size <sup>2</sup>	Source
					Mode Shares				Vehicle Occupancy		
					Motor Vehicle <sup>2</sup>	Transit	Walk	Bike			
Apartment	Pasadena, CA	3	355 DU	220	82	4	13		1.19	177-198	Caltrans/UC Davis; TTI
Apartment	Los Angeles, CA	3	73 DU	220	65	31	0		1.12	83	Gibson Transp. Consult.
Apartment	Los Angeles, CA	3	72 DU	220	59	41	0		1.18	29	Gibson Transp. Consult.
Apartment	Brentwood, CA	6	178 DU	220	100	0	0		1.22	156	Fehr & Peers
High-Rise Apartment	Sacramento, CA	1Ta	192 DU	222	68	7	20	4	1.17	103	Caltrans/TTI
High-Rise Apartment	N. Hollywood, CA	4Ta	173 DU	222	72	4	20	4	1.15	11-110	Caltrans/TTI
High-Rise Apartment	San Francisco, CA	0a	178 DU	222	38	19	44		na	49	Caltrans/UC Davis
High-Rise Apartment	Los Angeles, CA	0a	308 DU	222	31	3	65		na	54	Caltrans/UC Davis; TTI
Mid-Rise Apartment	Sacramento, CA	3Ta	256 DU	223	77	4	12	7	1.08	95-171	Caltrans/TTI
Mid-Rise Apartment	Walnut Creek, CA	2Ta	370 DU	223	63	23	15	0	1.20	64-262	Caltrans/TTI
Mid-Rise Apartment	Walnut Creek, CA	2Ta	490 DU	223	50	36	13	1	1.28	271-260	Caltrans/TTI
Mid-Rise Apartment	Walnut Creek, CA	2Ta	856 DU	223	61	28	11	0	1.21	237-448	Caltrans/TTI
Mid-Rise Apartment	San Jose, CA	1Ta	190 DU	223	50	25	23	3	1.13	73-109	Caltrans/TTI
Mid-Rise Apartment	San Jose, CA	3	187 DU	223	63	16	15	6	1.19	106-128	Caltrans/TTI
Mid-Rise Apartment	Los Angeles, CA	4Ta	154 DU	223	68	4	29	0	1.19	20-168	Caltrans/TTI
Mid-Rise Apartment	Los Angeles, CA	4To	431 DU	223	42	33	24	1	1.08	98-159	Caltrans/TTI
Mid-Rise Apartment	Pasadena, CA	3	136 DU	223	78	5	15	2	1.06	36-106	Caltrans/TTI
Mid-Rise Apartment	Pasadena, CA	4Ta	128 DU	223	73	12	15	0	1.20	24-72	Caltrans/TTI
Mid-Rise Apartment	Pasadena, CA	4Ta	180 DU	223	87	5	7	1	1.17	23-152	Caltrans/TTI
Mid-Rise Apartment	N. Hollywood, CA	3Ta	420 DU	223	78	12	10	0	1.20	45-292	Caltrans/TTI
Mid-Rise Apartment	Woodland Hills, CA	6	491 DU	223	94	2	4	0	1.18	35-444	Caltrans/TTI
Mid-Rise Apartment	La Mesa, CA	3To	286 DU	223	63	23	13	0	1.14	60-157	Caltrans/TTI
Mid-Rise Apartment	La Mesa, CA	3To	226 DU	223	64	25	10	1	1.21	38-126	Caltrans/TTI
Mid-Rise Apartment	Los Angeles, CA	3	113 DU	223	66	0	34		1.14	48-115	Caltrans/UC Davis; TTI
Mid-Rise Apartment	Los Angeles, CA	3	221 DU	223	80	2	18		1.12	143-148	Caltrans/UC Davis; TTI
Mid-Rise Apartment	Culver City, CA	3	110 DU	223	84	0	15		1.17	93-128	Caltrans/UC Davis; TTI
Mid-Rise Apartment	Berkeley, CA	3C	44 DU	223	0	11	89		na	na	Caltrans/Kimley-Horn
Mid-Rise Apartment	Berkeley, CA	3C	98 DU	223	20	7	73		na	na	Caltrans/Kimley-Horn
Mid-Rise Apartment	Berkeley, CA	3CTa	34 DU	223	25	50	25		na	na	Caltrans/Kimley-Horn
Mid-Rise Apartment	Berkeley, CA	3CTa	36 DU	223	21	17	62		na	na	Caltrans/Kimley-Horn
Mid-Rise Apartment	Berkeley, CA	1TaC	100 DU	223	44	22	34		na	na	Caltrans/Kimley-Horn
Mid-Rise Apartment	Oakland, CA	3	107 DU	223	41	22	29		na	79	Caltrans/UC Davis
Mid-Rise Apartment	Oakland, CA	3	220 DU	223	61	22	17		na	111	Caltrans/UC Davis
Mid-Rise Apartment	Emeryville, CA	4M	101 DU	223	70	9	21		na	48	Caltrans/UC Davis
Mid-Rise Apartment	Sacramento, CA	3Ta	66 DU	223	62	4	34		na	40	Caltrans/UC Davis
Mid-Rise Apartment	Berkeley, CA	3	71 DU	223	57	29	14		na	na	Caltrans/Kimley-Horn
Mid-Rise Apartment	Pasadena, CA	4To	221 DU	223	68	15	17		1.11	142-205	Caltrans/UC Davis; TTI
Mid-Rise Apartment	Pasadena, CA	4M	259 DU	223	75	2	19		na	121	Caltrans/UC Davis; TTI
Resid Condo/TH	San Diego, CA	0a	149 DU	230	85	2	13		na	na	Caltrans/Kimley-Horn
Hi-Rise Condo/TH	San Diego, CA	1Ta	211 DU	232	77	3	20		na	na	Caltrans/Kimley-Horn
Simple average - all Area Type 0-4 (incl. Ta/To) for LUC 220-232					60	13	25		1.16		
Simple average - all Area Type 0a for LUC 220-232					51	8	41		na		
Simple average - all Area Type 1/1Ta for LUC 220-232					60	14	26		na		
Simple average - all Area Type 2/2Ta for LUC 220-232					58	29	13		1.23		
Simple average - all Area Type 3/3Ta/3To for LUC 220-232					58	16	26		1.15		
Simple average - all Area Type 4/4Ta/4To for LUC 220-232					70	11	20		1.15		

Notes: Simple averages are shown only where at least three sites are available for similar combinations of area type, context, and rail transit availability. Sums of average mode shares may not add to 100% due to rounding. "na" designates not available or insufficient sample size.

<sup>1</sup> Area types: (0a) regional CBD, (0b) outlying CBD, (1) urban core, (2) activity center, (3) general urban, (4) suburban business district, (5) suburban strip commercial, (6) general suburban, (7) special district, (8) rural town business district, (9) rural. Special context conditions noted are (C) adjacent to university campus, (M) within larger mixed-use development. Rail transit availability is (Ta) rail transit station within 1/4 mile or (To) rail station immediately adjacent or connected-TOD.

<sup>2</sup> Motor vehicle trips is the sum of person trips in personal passenger vehicles and trucks.

<sup>3</sup> Number of person trips covered by usable interviews; if two values are listed, the number of vehicles counted for vehicle occupancy is shown after the dash.

APPENDIX C | ANALYSES

## CAPACITY AND LEVEL-OF-SERVICE CONCEPTS

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

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

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

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

LOS CRITERIA: SIGNALIZED & UNSIGNALIZED INTERSECTIONS

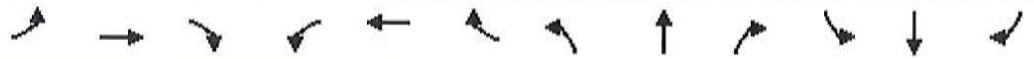
LOS	CONTROL DELAY (S/VEH)		
	SIGNALIZED	UNSIGNALIZED	ROUNDBABOUT
A	≤10	≤10	≤10
B	>10-20	>10-15	>10-15
C	>20-35	>15-25	>15-25
D	>35-55	>25-35	>25-35
E	>55-80	>35-50	>35-50
F	>80	>50	>50

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

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

Clinch Ave. & 11th Street  
AM Peak

Existing (2019)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	8	51	14	113	62	19	24	38	47	43	368	166
Future Volume (vph)	8	51	14	113	62	19	24	38	47	43	368	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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
Ped Bike Factor		0.99			0.99		1.00	0.98		0.99	0.99	
Frt		0.975			0.965			0.917			0.953	
Flt Protected		0.994		0.950			0.950			0.950		
Satd. Flow (prot)	0	1797	0	1770	1780	0	1652	1620	0	1652	1701	0
Flt Permitted		0.951		0.409			0.345			0.680		
Satd. Flow (perm)	0	1717	0	762	1780	0	598	1620	0	1174	1701	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			17			52			22	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		309			291			312			286	
Travel Time (s)		5.3			5.0			7.1			6.5	
Confl. Peds. (#/hr)	5		1			3	6		6	8		4
Confl. Bikes (#/hr)			1			20			2			2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	80	0	124	89	0	26	94	0	47	586	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	13.0	13.0		11.0	13.0		11.0	13.0		11.0	13.0	
Total Split (s)	30.0	30.0		25.0	30.0		15.0	35.0		25.0	35.0	
Total Split (%)	26.1%	26.1%		21.7%	26.1%		13.0%	30.4%		21.7%	30.4%	
Maximum Green (s)	25.0	25.0		20.0	25.0		10.0	30.0		20.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)		10.4		25.1	25.0		75.5	70.3		77.4	73.0	
Actuated g/C Ratio		0.09		0.22	0.22		0.66	0.61		0.67	0.63	
v/c Ratio		0.49		0.45	0.22		0.06	0.09		0.06	0.54	
Control Delay		53.7		40.6	27.8		8.2	7.1		8.0	16.9	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		53.7		40.6	27.8		8.2	7.1		8.0	16.9	



Clinch Ave. & 11th Street  
AM Peak

Existing (2019)  
Upscale World's Fair Park Hotel



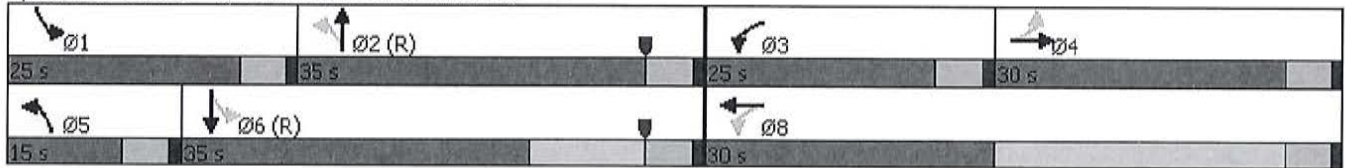
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		D	C		A	A		A	B	
Approach Delay		53.7			35.3			7.4			16.2	
Approach LOS		D			D			A			B	
Queue Length 50th (ft)		51		76	43		6	13		11	252	
Queue Length 95th (ft)		98		117	78		19	44		29	441	
Internal Link Dist (ft)		229			211			232			206	
Turn Bay Length (ft)												
Base Capacity (vph)		380		357	783		498	1010		899	1087	
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		0.21		0.35	0.11		0.05	0.09		0.05	0.54	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 115  
 Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.54  
 Intersection Signal Delay: 22.0  
 Intersection Capacity Utilization 50.9%  
 Analysis Period (min) 15

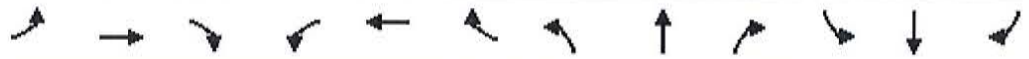
Intersection LOS: C  
 ICU Level of Service A

Splits and Phases: 3: 11th Street & Clinch Avenue



Clinch Ave. & 11th Street  
PM Peak

Existing (2019)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	68	198	18	30	61	40	42	257	135	59	118	107
Future Volume (vph)	68	198	18	30	61	40	42	257	135	59	118	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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
Ped Bike Factor		0.99		1.00	0.99		0.97	0.98		0.99	0.98	
Frt		0.991		0.941			0.948			0.929		
Flt Protected		0.988		0.950			0.950			0.950		
Satd. Flow (prot)	0	1816	0	1770	1730	0	1652	1668	0	1652	1639	0
Flt Permitted		0.890		0.370			0.564			0.382		
Satd. Flow (perm)	0	1632	0	687	1730	0	954	1668	0	661	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			36			22			44	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		309			291			312			286	
Travel Time (s)		8.4			7.9			7.1			6.5	
Confl. Peds. (#/hr)	4		11	5		7	27		24	12		15
Confl. Bikes (#/hr)			16			6			1			1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	313	0	33	111	0	46	430	0	65	248	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	13.0	13.0		11.0	13.0		11.0	13.0		11.0	13.0	
Total Split (s)	30.0	30.0		25.0	30.0		15.0	35.0		25.0	35.0	
Total Split (%)	26.1%	26.1%		21.7%	26.1%		13.0%	30.4%		21.7%	30.4%	
Maximum Green (s)	25.0	25.0		20.0	25.0		10.0	30.0		20.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)		28.4		35.9	35.9		64.5	58.6		65.7	59.1	
Actuated g/C Ratio		0.25		0.31	0.31		0.56	0.51		0.57	0.51	
v/c Ratio		0.77		0.12	0.20		0.08	0.50		0.15	0.29	
Control Delay		52.6		23.7	17.1		13.7	24.5		13.8	17.8	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		52.6		23.7	17.1		13.7	24.5		13.8	17.8	



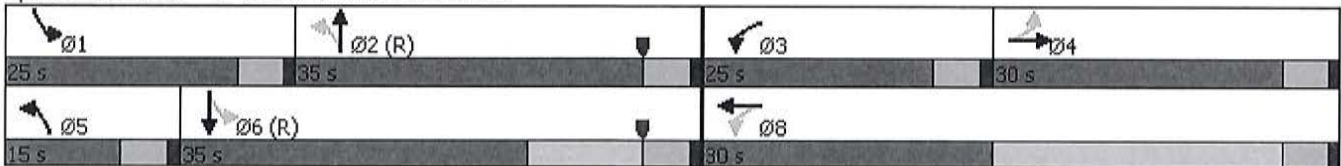
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		C	B		B	C		B	B	
Approach Delay		52.6			18.6			23.4			17.0	
Approach LOS		D			B			C			B	
Queue Length 50th (ft)		214		16	37		15	217		21	92	
Queue Length 95th (ft)		291		33	68		38	384		50	183	
Internal Link Dist (ft)		229			211			232			206	
Turn Bay Length (ft)												
Base Capacity (vph)		418		403	772		612	860		569	864	
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		0.75		0.08	0.14		0.08	0.50		0.11	0.29	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 115  
 Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay: 28.6  
 Intersection Capacity Utilization 62.0%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service B

Splits and Phases: 3: 11th Street & Clinch Avenue

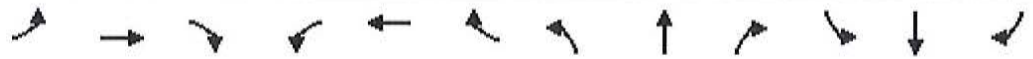


Clinch Ave. & 11th Street  
AM Peak

Background (2021)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	8	53	14	116	64	20	25	39	48	44	379	171
Future Volume (vph)	8	53	14	116	64	20	25	39	48	44	379	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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
Ped Bike Factor		0.99			0.99		1.00	0.98		0.99	0.99	
Frt		0.975			0.964			0.917			0.953	
Flt Protected		0.995		0.950			0.950			0.950		
Satd. Flow (prot)	0	1799	0	1770	1778	0	1652	1620	0	1652	1701	0
Flt Permitted		0.953		0.404			0.331			0.679		
Satd. Flow (perm)	0	1721	0	753	1778	0	574	1620	0	1172	1701	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			17			52			22	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		309			291			312			286	
Travel Time (s)		5.3			5.0			7.1			6.5	
Confl. Peds. (#/hr)	5		1			3	6		6	8		4
Confl. Bikes (#/hr)			1			21			2			2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	127	92	0	27	96	0	48	604	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	13.0	13.0		11.0	13.0		11.0	13.0		11.0	13.0	
Total Split (s)	30.0	30.0		25.0	30.0		15.0	35.0		25.0	35.0	
Total Split (%)	26.1%	26.1%		21.7%	26.1%		13.0%	30.4%		21.7%	30.4%	
Maximum Green (s)	25.0	25.0		20.0	25.0		10.0	30.0		20.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)		10.6		25.4	25.4		75.2	70.0		77.1	72.6	
Actuated g/C Ratio		0.09		0.22	0.22		0.65	0.61		0.67	0.63	
v/c Ratio		0.49		0.46	0.23		0.06	0.10		0.06	0.56	
Control Delay		53.7		40.5	28.0		8.4	7.3		8.1	17.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		53.7		40.5	28.0		8.4	7.3		8.1	17.6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		D	C		A	A		A	B	
Approach Delay		53.7			35.2			7.5			16.9	
Approach LOS		D			D			A			B	
Queue Length 50th (ft)		52		77	44		6	14		11	266	
Queue Length 95th (ft)		100		120	80		20	46		30	467	
Internal Link Dist (ft)		229			211			232			206	
Turn Bay Length (ft)												
Base Capacity (vph)		381		358	782		483	1006		894	1082	
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		0.22		0.35	0.12		0.06	0.10		0.05	0.56	

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 22.3

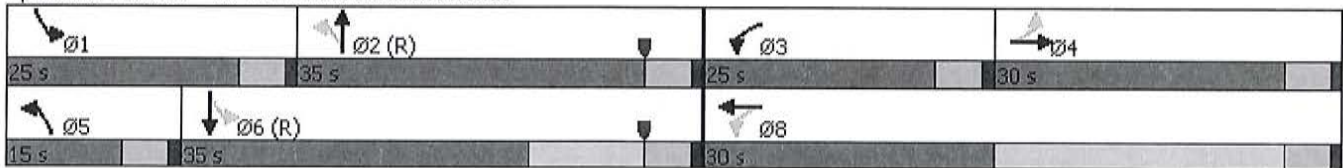
Intersection LOS: C

Intersection Capacity Utilization 51.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: 11th Street & Clinch Avenue



Clinch Ave. & 11th Street  
PM Peak

Background (2021)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	70	204	19	31	63	41	43	265	139	61	122	110
Future Volume (vph)	70	204	19	31	63	41	43	265	139	61	122	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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
Ped Bike Factor		0.99		1.00	0.99		0.97	0.98		0.99	0.98	
Frt		0.991			0.941			0.948			0.929	
Flt Protected		0.988		0.950			0.950			0.950		
Satd. Flow (prot)	0	1815	0	1770	1730	0	1652	1668	0	1652	1639	0
Flt Permitted		0.889		0.371			0.554			0.364		
Satd. Flow (perm)	0	1630	0	689	1730	0	937	1668	0	630	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			36			22			43	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		309			291			312			286	
Travel Time (s)		8.4			7.9			7.1			6.5	
Confl. Peds. (#/hr)	4		11	5		7	27		24	12		15
Confl. Bikes (#/hr)			16			6			1			1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	322	0	34	114	0	47	444	0	67	255	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	13.0	13.0		11.0	13.0		11.0	13.0		11.0	13.0	
Total Split (s)	30.0	30.0		25.0	30.0		15.0	35.0		25.0	35.0	
Total Split (%)	26.1%	26.1%		21.7%	26.1%		13.0%	30.4%		21.7%	30.4%	
Maximum Green (s)	25.0	25.0		20.0	25.0		10.0	30.0		20.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)		29.4		36.9	36.9		63.5	57.5		64.6	58.0	
Actuated g/C Ratio		0.26		0.32	0.32		0.55	0.50		0.56	0.50	
v/c Ratio		0.77		0.12	0.20		0.08	0.53		0.16	0.30	
Control Delay		51.5		23.2	16.9		14.1	25.7		14.3	18.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		51.5		23.2	16.9		14.1	25.7		14.3	18.6	



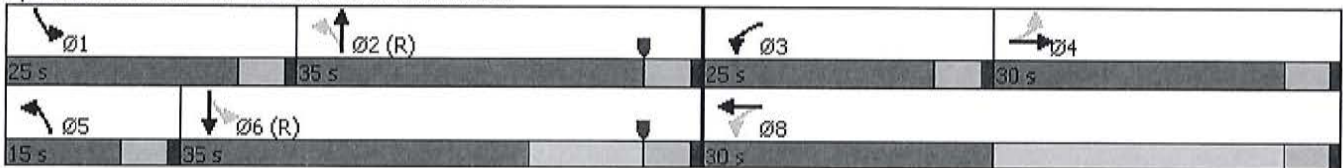
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		C	B		B	C		B	B	
Approach Delay		51.5			18.4			24.6			17.7	
Approach LOS		D			B			C			B	
Queue Length 50th (ft)		218		16	38		15	232		22	99	
Queue Length 95th (ft)		299		34	70		40	404		52	192	
Internal Link Dist (ft)		229			211			232			206	
Turn Bay Length (ft)												
Base Capacity (vph)		428		409	772		595	844		550	848	
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		0.75		0.08	0.15		0.08	0.53		0.12	0.30	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 115  
 Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay: 28.9  
 Intersection Capacity Utilization 63.2%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service B

Splits and Phases: 3: 11th Street & Clinch Avenue



Clinch Ave. & 11th Street  
AM Peak

Combined (2021)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	17	62	18	116	76	20	33	39	48	44	379	182
Future Volume (vph)	17	62	18	116	76	20	33	39	48	44	379	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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
Ped Bike Factor		0.99			0.99		1.00	0.98		0.99	0.99	
Frt		0.975			0.969			0.917			0.951	
Flt Protected		0.991		0.950			0.950			0.950		
Satd. Flow (prot)	0	1792	0	1770	1790	0	1652	1613	0	1652	1697	0
Flt Permitted		0.923		0.414			0.306			0.679		
Satd. Flow (perm)	0	1666	0	771	1790	0	530	1613	0	1172	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			15			52			23	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		309			291			312			286	
Travel Time (s)		5.3			5.0			7.1			6.5	
Confl. Peds. (#/hr)	5		1			3	10		10	8		4
Confl. Bikes (#/hr)			1			21			2			2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	107	0	127	106	0	36	96	0	48	616	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	13.0	13.0		11.0	13.0		11.0	13.0		11.0	13.0	
Total Split (s)	30.0	30.0		25.0	30.0		15.0	35.0		25.0	35.0	
Total Split (%)	26.1%	26.1%		21.7%	26.1%		13.0%	30.4%		21.7%	30.4%	
Maximum Green (s)	25.0	25.0		20.0	25.0		10.0	30.0		20.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)		12.2		29.4	29.4		71.3	65.9		72.9	68.4	
Actuated g/C Ratio		0.11		0.26	0.26		0.62	0.57		0.63	0.59	
v/c Ratio		0.58		0.42	0.23		0.09	0.10		0.06	0.61	
Control Delay		56.7		37.1	28.3		9.3	7.9		8.9	20.3	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		56.7		37.1	28.3		9.3	7.9		8.9	20.3	



Clinch Ave. & 11th Street  
AM Peak

Combined (2021)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E		D	C		A	A		A	C	
Approach Delay		56.7			33.1			8.3			19.5	
Approach LOS		E			C			A			B	
Queue Length 50th (ft)		70		76	53		9	14		11	287	
Queue Length 95th (ft)		124		116	90		25	48		31	508	
Internal Link Dist (ft)		229			211			232			206	
Turn Bay Length (ft)												
Base Capacity (vph)		369		370	786		438	946		854	1018	
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		0.29		0.34	0.13		0.08	0.10		0.06	0.61	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 115  
 Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 24.5  
 Intersection Capacity Utilization 52.6%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service A

Splits and Phases: 3: 11th Street & Clinch Avenue

Ø1 25 s	Ø2 (R) 35 s	Ø3 25 s	Ø4 30 s
Ø5 15 s	Ø6 (R) 35 s	Ø8 30 s	

Clinch Ave. & 11th Street  
PM Peak

Combined (2021)  
Upscale World's Fair Park Hotel



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↙	↘		↙	↘		↙	↘	
Traffic Volume (vph)	81	217	27	31	76	41	52	265	139	61	122	122
Future Volume (vph)	81	217	27	31	76	41	52	265	139	61	122	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		0	0		150
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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
Ped Bike Factor		0.99		1.00	0.99		0.97	0.98		0.99	0.98	
Fr <sub>t</sub>		0.989			0.948			0.948			0.925	
Flt Protected		0.988		0.950			0.950			0.950		
Satd. Flow (prot)	0	1809	0	1770	1746	0	1652	1665	0	1652	1630	0
Flt Permitted		0.880		0.392			0.519			0.333		
Satd. Flow (perm)	0	1608	0	728	1746	0	876	1665	0	576	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			30			22			48	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		309			291			312			286	
Travel Time (s)		8.4			7.9			7.1			6.5	
Confl. Peds. (#/hr)	4		11	5		7	29		27	12		15
Confl. Bikes (#/hr)			16			6			1			1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	357	0	34	129	0	57	444	0	67	268	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	13.0	13.0		11.0	13.0		11.0	13.0		11.0	13.0	
Total Split (s)	30.0	30.0		25.0	30.0		15.0	35.0		25.0	35.0	
Total Split (%)	26.1%	26.1%		21.7%	26.1%		13.0%	30.4%		21.7%	30.4%	
Maximum Green (s)	25.0	25.0		20.0	25.0		10.0	30.0		20.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	5.0		3.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)		34.7		42.2	42.2		58.5	52.1		59.1	52.4	
Actuated g/C Ratio		0.30		0.37	0.37		0.51	0.45		0.51	0.46	
v/c Ratio		0.73		0.10	0.20		0.11	0.58		0.18	0.35	
Control Delay		45.3		21.2	17.9		15.5	29.3		16.0	20.9	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		45.3		21.2	17.9		15.5	29.3		16.0	20.9	



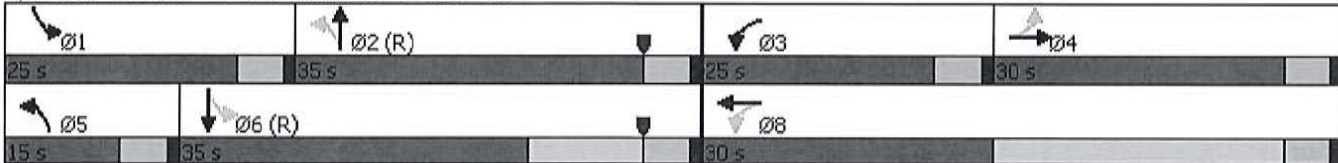
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		C	B		B	C		B	C	
Approach Delay		45.3			18.6			27.7			19.9	
Approach LOS		D			B			C			B	
Queue Length 50th (ft)		235		15	46		21	250		24	112	
Queue Length 95th (ft)		339		34	83		46	405		52	202	
Internal Link Dist (ft)		229			211			232			206	
Turn Bay Length (ft)												
Base Capacity (vph)		487		448	776		525	765		501	768	
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		0.73		0.08	0.17		0.11	0.58		0.13	0.35	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 115  
 Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 29.3  
 Intersection Capacity Utilization 65.1%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service C

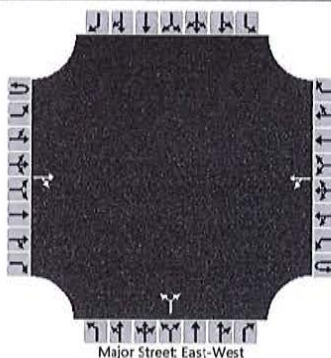
Splits and Phases: 3: 11th Street & Clinch Avenue



# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Clinch at Site Drive
Agency/Co.	CCI	Jurisdiction	City of Knoxville
Date Performed	11/22/2019	East/West Street	Clinch Avenue
Analysis Year	2019	North/South Street	Site Access Drive
Time Analyzed	AM Peak - Combined	Peak Hour Factor	0.91
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Upscale World's Fair Park Hotel		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			75	7		28	263			6		22				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)					4.1				7.1		6.2					
Critical Headway (sec)					4.13				6.43		6.23					
Base Follow-Up Headway (sec)					2.2				3.5		3.3					
Follow-Up Headway (sec)					2.23				3.53		3.33					

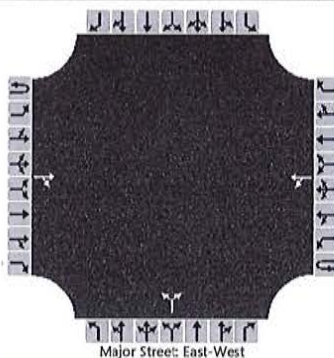
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)					31				31							
Capacity, c (veh/h)					1499				839							
v/c Ratio					0.02				0.04							
95% Queue Length, Q <sub>95</sub> (veh)					0.1				0.1							
Control Delay (s/veh)					7.5				9.5							
Level of Service (LOS)					A				A							
Approach Delay (s/veh)					0.9				9.5							
Approach LOS									A							

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Clinch at Site Drive
Agency/Co.	CCI	Jurisdiction	City of Knoxville
Date Performed	11/22/2019	East/West Street	Clinch Avenue
Analysis Year	2019	North/South Street	Site Access Drive
Time Analyzed	PM Peak - Combined	Peak Hour Factor	0.91
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Upscale World's Fair Park Hotel		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			293	7		30	220			8		32				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)					4.1					7.1		6.2				
Critical Headway (sec)					4.13					6.43		6.23				
Base Follow-Up Headway (sec)					2.2					3.5		3.3				
Follow-Up Headway (sec)					2.23					3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)					33					44						
Capacity, c (veh/h)					1224					629						
v/c Ratio					0.03					0.07						
95% Queue Length, Q <sub>95</sub> (veh)					0.1					0.2						
Control Delay (s/veh)					8.0					11.1						
Level of Service (LOS)					A					B						
Approach Delay (s/veh)					1.2				11.1							
Approach LOS					A				B							

## Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph) 7

Speed Limit (mph) 25

Advancing Volume (vph) 82



Upscale World's Fair Park Hotel Drive

2021 Combined Volumes

AM Peak

## Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	28	Speed Limit (mph)	25
Advancing Volume (vph)	291	No. of through lanes	1
Opposing Volume (vph)	82	Percent Heavy Vehicles (decimal percent)	0.03



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

Upscale World's Fair Park Hotel Drive

2021 Combined Volumes

AM Peak

## Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

7

Speed Limit (mph)

25

Advancing Volume (vph)

300



Upscale World's Fair Park Hotel Drive  
2021 Combined Volumes  
PM Peak



## Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	30	Speed Limit (mph)	25
Advancing Volume (vph)	250	No. of through lanes	1
Opposing Volume (vph)	300	Percent Heavy Vehicles (decimal percent)	0.03



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

Upscale World's Fair Park Hotel Drive

2021 Combined Volumes

PM Peak

**APPENDIX D | MPC COMMENTS**

**NOVEMBER 19, 2019**

Alan Childer's  
Cannon & Cannon Inc.  
8550 Kingston Pike  
Knoxville, TN 37919

## **RE: UPSCALE WORLD'S FAIR PARK HOTEL (12-H-19-UR)**

Dear Mr. Childer's,

The Traffic Impact Letter (TIL) received on October 28, 2019 was submitted for the above referenced development and has been reviewed by staff from the City of Knoxville and Knoxville-Knox County Planning. We have identified the following issues related to the TIL that need to be further addressed or corrected.

- 1 The site plan shows two access points, but the TIS was analyzed with one access point. Please address this throughout the study.
- 2 The site plan shows 120 rooms, but the TIS is more conservative by proposing 150 rooms. This is okay, but we just wanted to make sure you were aware.
- 3 On page 3 (Figure 2), please show an updated site plan.
- 4 Figure 4 (pg 6), Figure 5 (pg 8), and Figure 8 (pg 13) do not match their corresponding Appendix sheets.
- 5 With the high pedestrian activity within this area, you are allowed to add a transit reduction of 10% and a pedestrian reduction around 5%, in compliance with the ITE Trip Generation Handbook.
- 6 In Figure 6 (pg 10), it shows only vehicular trip distribution. Please show and discuss the pedestrian distribution for this area. How will high pedestrian movements be accommodated? Is the cycle

length long enough for the future condition? Or will certain movements need to be modified to accommodate the pedestrian movements?

- 7 How is transit being accommodated? With transit having a decent trip generator with the location of this site, this mode does not seem to be discussed a lot.
- 8 Please add sight distance evaluation for NB 12<sup>th</sup> Street, NB right-turn lane 11<sup>th</sup> St, & EB Clinch Avenue, and the visibility of pedestrians at the garage exit. A gate and extra signage will probably be required by City Engineering.
- 9 Please discuss the following: limiting lane closures as required by City of Knoxville Traffic Office for the construction of the proposed development, Construction delivery and routing plan, and a material staging plan. The City of Knoxville Traffic Office will need to be consulted as to what they will allow prior to submitting a revised TIS.

Please provide a **PDF** and **four (4) hard-copies** of the following: a **signed and sealed letter** addressing these concerns in a **comment response sheet** (with the indication of where/how the comments were addressed) attached to the back of a **fully revised TIS**. Revisions are due **no later than Monday, November 25, 2019**. If you have any questions, please contact me at 865-215-3826.

Sincerely,



Tarren Barrett, EIT  
Knoxville-Knox County Planning

C: Mike Reynolds, AICP, Knoxville-Knox County Planning  
Mike Conger, PE, Knoxville-Knox County Planning  
Curtis Williams, PE, City of Knoxville Engineering

Evan Hoffman, City of Knoxville Traffic Office  
Shawn Garner, City of Knoxville Traffic Office

November 25, 2019

Ms. Tarren Barrett, EIT  
Knoxville – Knox County Planning  
400 Main Street, Suite 403  
Knoxville, TN 37902

RE: UPSCALE WORLD'S FAIR PARK HOTEL (12-H-19-UR)

Dear Ms. Barrett:

This letter provides a summary of the changes made to the original traffic impact study dated October 3, 2019 in response to the comments received from the Knoxville-Knox County Planning dated November 19, 2019. The comments and our responses are noted below:

1. The site plan shows two access points, but the TIS was analyzed with one access point. Please address this throughout the study. [CCI Response: Report narrative and figures were updated to include the additional access point.]
2. The site plan shows 120 rooms, but the TIS is more conservative by proposing 150 rooms. This is okay, but we just wanted to make sure you were aware. [CCI Response: Since the time of the initial study the hotel development has continued to be refined. The initial room count was 150 rooms, since that time the room count has been reduced to 120, however the trip generation remains based on the more conservative number of 150 rooms.]
3. On page 3 (Figure 2), please show an updated site plan. [CCI Response: An updated site plan has been included in the revised report.]
4. Figure 4 (pg 6), Figure 5 (pg 8), and Figure 8 (pg 13) do not match their corresponding Appendix sheets. [CCI Response: In the initial version of the report updated figures were inadvertently not added to the report. The figures have been updated to reflect the correct existing and background traffic volumes.]
5. With the high pedestrian activity within this area, you are allowed to add a transit reduction of 10% and a pedestrian reduction around 5%, in compliance with the ITE Trip Generation Handbook. [CCI Response: These suggested values have been utilized and the report and figures have been modified accordingly.]
6. In Figure 6 (pg 10), it shows only vehicular trip distribution. Please show and discuss the pedestrian distribution for this area. How will high pedestrian movements be accommodated? Is the cycle length long enough for the future condition? Or will certain movements need to be modified to accommodate the pedestrian movements? [CCI Response: The requested information has been incorporated into the report.]

7. How is transit being accommodated? With transit having a decent trip generator with the location of this site, this mode does not seem to be discussed a lot. [CCI Response: The second site entrance is designed to be primarily used for entering transit vehicles (Uber, Lyft, etc.). Associated discussion included in the Conclusions and Recommendations section of the report.]
8. Please add sight distance evaluation for NB 12th Street, NB right-turn lane 11th St, & EB Clinch Avenue, and the visibility of pedestrians at the garage exit. A gate and extra signage will probably be required by City Engineering. [CCI Response: The requested evaluations were conducted and the sight distance report section was revised.]
9. Please discuss the following: limiting lane closures as required by City of Knoxville Traffic Office for the construction of the proposed development, Construction delivery and routing plan, and a material staging plan. The City of Knoxville Traffic Office will need to be consulted as to what they will allow prior to submitting a revised TIS. [CCI Response: The City of Knoxville Traffic Office was consulted and a discussion of construction phasing and traffic control has been added to Section 6 (Evaluations) of the report.]

Please do not hesitate to contact us if you have questions or comments.

Sincerely,



Alan L. Childers, PE  
Director Emeritus

**DECEMBER 10, 2019**

Alan Childer's  
Cannon & Cannon Inc.  
8550 Kingston Pike  
Knoxville, TN 37919

## **RE: UPSCALE WORLD'S FAIR PARK HOTEL (12-H-19-UR)**

Dear Mr. Childer's,

The Traffic Impact Letter (TIL) received on October 28, 2019 was submitted for the above referenced development and has been reviewed by staff from the City of Knoxville and Knoxville-Knox County Planning. We have identified the following issues related to the TIL that need to be further addressed or corrected.

- 1 The site plan shows two access points, but the TIS was analyzed with one access point. Please address this throughout the study.
- 2 The site plan shows 120 rooms, but the TIS is more conservative by proposing 150 rooms. This is okay, but we just wanted to make sure you were aware.
- 3 On page 3 (Figure 2), please show an updated site plan.
- 4 Figure 4 (pg 6), Figure 5 (pg 8), and Figure 8 (pg 13) do not match their corresponding Appendix sheets.
- 5 With the high pedestrian activity within this area, you are allowed to add a transit reduction of 10% and a pedestrian reduction around 5%, in compliance with the ITE Trip Generation Handbook.
- 6 In Figure 6 (pg 10), it shows only vehicular trip distribution. Please show and discuss the pedestrian distribution for this area. How will high pedestrian movements be accommodated? Is the cycle



length long enough for the future condition? Or will certain movements need to be modified to accommodate the pedestrian movements? [CCI Response: The requested information has been incorporated into the report.] Planning Response: Where is this located? Please list the page and paragraph.

- 7 How is transit being accommodated? With transit having a decent trip generator with the location of this site, this mode does not seem to be discussed a lot. [CCI Response: The second site entrance is designed to be primarily used for entering transit vehicles (Uber, Lyft, etc.). Associated discussion included in the Conclusion and Recommendations section of the report.] Planning Response: Please change the use of transit vehicles in this context throughout the report. Uber, Lyft, etc. are more like ride-share or shared mobility vehicles. Also, please state on the comment response sheet how the main entrance is set-up (i.e. exit only or entrance/exit). It is not clear in the report.
- 8 Please add sight distance evaluation for NB 12<sup>th</sup> Street, NB right-turn lane 11<sup>th</sup> St, & EB Clinch Avenue, and the visibility of pedestrians at the garage exit. A gate and extra signage will probably be required by City Engineering.
- 9 Please discuss the following: limiting lane closures as required by City of Knoxville Traffic Office for the construction of the proposed development, Construction delivery and routing plan, and a material staging plan. The City of Knoxville Traffic Office will need to be consulted as to what they will allow prior to submitting a revised TIS.
- 10 Look at renumbering the recommendations on page 16.

Please provide a **PDF** of the following: a **signed and sealed letter** addressing these concerns in a **comment response sheet** (with the indication of where/how the comments were addressed) attached to the back of a **fully revised TIS**. Revisions are due **no later than Thursday, December 12, 2019**. If you have any questions, please contact me at 865-215-3826.

Sincerely,



Tarren Barrett, EIT  
Knoxville-Knox County Planning

C: Mike Reynolds, AICP, Knoxville-Knox County Planning  
Mike Conger, PE, Knoxville-Knox County Planning  
Curtis Williams, PE, City of Knoxville Engineering  
Evan Hoffman, City of Knoxville Traffic Office  
Shawn Garner, City of Knoxville Traffic Office

December 12, 2019

Ms. Tarren Barrett, EIT  
Knoxville – Knox County Planning  
400 Main Street, Suite 403  
Knoxville, TN 37902

RE: UPSCALE WORLD'S FAIR PARK HOTEL (12-H-19-UR)

Dear Ms. Barrett:

This letter provides a summary of the changes made to the revised traffic impact study dated November 25, 2019 in response to the comments received from Knoxville-Knox County Planning dated December 10, 2019. As a reminder, comments numbers 1, 2, 3, 4, 5, 8 and 9 were previously addressed and accepted by your office. The most recent comments and our responses are noted below:

6. In Figure 6 (pg 10), it shows only vehicular trip distribution. Please show and discuss the pedestrian distribution for this area. How will high pedestrian movements be accommodated? Is the cycle length long enough for the future condition? Or will certain movements need to be modified to accommodate the pedestrian movements? [CCI Response: The requested information has been incorporated into the report.] Planning Response: Where is this located? Please list the page and paragraph. [CCI Response: The pedestrian distribution information is on report page 10, contained within FIGURE 6 (see legend). The commentary on traffic signal cycle length and pedestrian movement adequacy is on report page 16, in the last sentence of the second paragraph.]
7. How is transit being accommodated? With transit having a decent trip generator with the location of this site, this mode does not seem to be discussed a lot. [CCI Response: The second site entrance is designed to be primarily used for entering transit vehicles (Uber, Lyft, etc.). Associated discussion included in the Conclusions and Recommendations section of the report.] Planning Response: Please change the use of transit vehicles in this context throughout the report. Uber, Lyft, etc. are more like ride-share or shared mobility vehicles. Also, please state on the comment response sheet how the main entrance is set-up (i.e. exit only or entrance/exit). It is not clear in the report. [CCI Response: The report has been revised to include separate discussion for ride-share and transit. A section on Transit Availability was added at the bottom of page 15. Regarding entrance/exit set-up, the main driveway provides for both entering and exiting traffic, while the ride-share driveway is entrance only. Those vehicles will exit using the main driveway.]
10. Look at renumbering the recommendations on page 16. [CCI Response: Renumbering completed.]

Please do not hesitate to contact us if you have questions or comments.

Sincerely,

A handwritten signature in blue ink that reads "Alan L. Childers". The signature is fluid and cursive, with the first name "Alan" and last name "Childers" clearly legible.

Alan L. Childers, PE  
Director Emeritus