

MEMORANDUM

To:	Mike Love, P.E.
From:	Nick Brady, P.E.
	Kimley-Horn and Associates, Inc.
Date:	11/13/2023
Subject:	Southworth Property Traffic Memo

12/18/2023 Approved MALNotes1. Sight distance will need to be provided at the entrance during final engineering2. The approval of the TAS does not constitute approval of the site plan

The following memo summarizes the trip generation and turn lane warrant evaluation for the proposed development of the Southworth Property located on Concord Road in Delaware County, Ohio. Methodology, results, and conclusions are as follows.

Site Characteristics and Trip Generation

The subject site is located north of Glick Road in Delaware County and is proposed to consist of 54 patio homes with a single access on the west side of Concord Road. The roadway has a speed limit of 45 miles per hour in the vicinity of the subject site. A preliminary site plan is attached to this memo for reference.

Kimley-Horn utilized the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* to generate anticipated traffic volumes for the proposed site. Land Use Code (LUC) 210 – Single Family Detached Housing was utilized to generate traffic for the subject site. **Table 1** shows the trip generation equations taken from the ITE manual and **Table 2** shows the resulting calculated volumes.

ITE Land Use	Unit	Weekday		
		Daily	AM Peak Hour	PM Peak Hour
Single Family Detached Housing (LUC 210)	Per Dwelling Unit	0.92LN(DU) + 2.68 50% in/50% out	0.91LN(DU) + 0.12 25% in/75% out	0.94LN(DU) + 0.27 63% in/37% out

Table 1 – ITE Trip Generation Data

Table 2 – Site Traffic Projections

	l lucito	Weekday		
TTE Land Use Units	Daily	AM Peak Hour	PM Peak Hour	
Single Family Detached Housing (LUC 210)	54	572	43 Total 11 Entry, 32 Exit	56 Total 35 Entry, 21 Exit

The ITE trip generation graphs are attached to this memo for reference.

EXHIBIT H-1

614 696 5162

Kimley **»Horn**

Traffic Assignment

Kimley-Horn used knowledge of the surrounding area, traffic patterns, and locations of typical origins/destinations associated with a residential development to estimate a trip distribution for the subject site. Based on these factors, it is likely that at least 50% of the site traffic will be traveling to/from the south on Concord Road with the remaining percentage traveling to/from the north on Concord Road.

Based on the trip generation and characteristics of residential sites, the PM Peak hour is anticipated to have the largest entering volume. The site is anticipated to generate 35 entering vehicles in the PM Peak, resulting in an anticipated volume of at least 18 vehicles making the northbound left turn movement in the PM Peak period. The remaining volume would access the site from the north, resulting in an anticipated volume of 17 vehicles or fewer in the PM Peak period.

Turn Lane Warrant Evaluation

The Delaware County Engineer's Office (DECO) Standards Manual, Appendix I, was used to determine analysis criteria for the turn lane warrant evaluation. Appendix I gives criteria for turn lane warrants based on functional classification and anticipated traffic volumes entering the site.

Per the Delaware County Thoroughfare Plan, Concord Road is a Minor Arterial while the Ohio Department of Transportation (ODOT) Transportation Information Mapping System (TIMS) lists Concord Road as a Major Collector in the study area. Based on functional class and with the posted speed limit being 45 miles per hour, the DCEO standards require a left turn lane when more than 10 vehicles are making the left turn movement. Additionally, for right turn lane warrants the DCEO utilizes the ODOT standard turn lane warrant graphs.

Per the above requirements, it is anticipated that the site will generate more than 10 northbound left turning vehicles entering the site during the PM peak hour, which exceeds the threshold for a left turn lane. With the left turn lane warrant being satisfied, Kimley-Horn utilized the procedure in the ODOT *Location and Design Manual, Volume 1* (L&D) to calculate turn lane length. A turn lane of 175 feet, inclusive of a 50-foot diverging taper, is required as per the L&D calculation procedures.

As noted above, Kimley-Horn anticipates at least 18 vehicles making the northbound left turn movement into the site in the PM Peak hour. Based on the anticipated remaining volume accessing the site from the north, ODOT right turn lane warrants are not anticipated to be met by the development.

Kimley »Horn

Conclusions and Recommendations

Kimley-Horn generated traffic for a proposed 54-unit patio home residential development on Concord Road in Delaware County, Ohio. To conservatively evaluate the need for turn lanes it was assumed at least 50% of the site traffic would access the site from the south due to area characteristics and location of likely origins/destinations.

Based on the results of the turn lane warrant evaluation, a northbound left turn lane is warranted and is recommended at the site access. This turn lane should have a length of 175 feet inclusive of a 50-foot diverging taper based on ODOT L&D requirements. The southbound right turn lane warrant is not anticipated to be met at the site access, and no right turn lane is recommended.

If you have questions or need additional information to assist in your review, please feel free to contact me at <u>nick.brady@kimley-horn.com</u> at your convenience.

Sincerely,

, H

Nick Brady, P.E. Project Engineer

Page 3



50'

100'

4876 Cemetery p (614) 487-1964

300'

Hilliard, OH 43026 www.farisplanninganddesign.com

	17-38.471 ACKL3
TOTAL UNITS	54
DENSITY	+/- 1.48 D.U./AC.



Land Use: 210 Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077,1078, 1079

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13



Vehicle Trip Ends vs:	Dwelling Units
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:	192
Avg. Num. of Dwelling Units:	226
Directional Distribution:	26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24





Vehicle Trip Ends vs:	Dwelling Units
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:	208
Avg. Num. of Dwelling Units:	248
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31



Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

AM Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 169

Avg. Num. of Dwelling Units: 217

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.75	0.34 - 2.27	0.25





Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

PM Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 178

Avg. Num. of Dwelling Units: 203

Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.49 - 2.98	0.28



Vehicle Trip Ends vs: Dwelling Units

On a: Saturday

Setting/Location: General Urban/Suburban

Number of Studies: 63

Avg. Num. of Dwelling Units: 179

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.48	3.36 - 16.52	2.26





Vehicle Trip Ends vs: Dwelling Units

On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 42

Avg. Num. of Dwelling Units: 152

Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.92	0.41 - 1.78	0.27





Vehicle Trip Ends vs: Dwelling Units

On a: Sunday

Setting/Location: General Urban/Suburban

Number of Studies: 60

Avg. Num. of Dwelling Units: 186

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
8.48	2.61 - 16.44	1.74





Vehicle Trip Ends vs: Dwelling Units

On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 40

Avg. Num. of Dwelling Units: 162

Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.83	0.36 - 1.67	0.19





Vehicle Trip Ends vs: Residents

On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 30

Avg. Num. of Residents: 810

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
2.65	1.56 - 5.62	0.64





Vehicle Trip Ends vs: I	Residents
On a: V	Weekday,
I	Peak Hour of Adjacent Street Traffic,
(One Hour Between 7 and 9 a.m.
Setting/Location: 0	General Urban/Suburban
Number of Studies: 2	21
Avg. Num. of Residents: 7	1100
Directional Distribution: 3	31% entering, 69% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.21	0.12 - 0.42	0.08





Vehicle Trip Ends vs:	Residents
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:	21
Avg. Num. of Residents:	1083
Directional Distribution:	66% enterina. 34% exitina

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.28	0.12 - 0.60	0.08





Vehicle Trip Ends vs: Residents

On a: Weekday,

AM Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 22

Avg. Num. of Residents: 1073

Directional Distribution: 30% entering, 70% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.21	0.12 - 0.42	0.08



Vehicle Trip Ends vs: Residents

On a: Weekday,

PM Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 21

Avg. Num. of Residents: 1083

Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.28	0.12 - 0.60	0.08





Vehicle Trip Ends vs: Residents

On a: Saturday

Setting/Location: General Urban/Suburban

Number of Studies: 14

Avg. Num. of Residents: 1085

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
2.48	1.43 - 3.63	0.46



Vehicle Trip Ends vs: Residents

On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 11

Avg. Num. of Residents: 875

Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.27	0.19 - 0.41	0.08





Vehicle Trip Ends vs: Residents

On a: Sunday

Setting/Location: General Urban/Suburban

Number of Studies: 14

Avg. Num. of Residents: 1085

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
2.42	1.62 - 3.16	0.43





Vehicle Trip Ends vs: Residents

On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 12

Avg. Num. of Residents: 870

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.25	0.19 - 0.35	0.05



