Traffic Impact Study

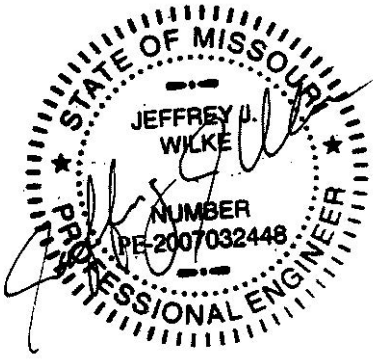
Colbern Road Senior Site

LEE'S SUMMIT, MISSOURI

DECEMBER 2022

Prepared By:

Kimley»Horn



12/09/2022

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TABLES

1.0 INTRODUCTION

This report serves as the traffic analysis for the Colbern Road Senior Site, located in the vicinity of the northeast corner of Colbern Road and Rice Road in Lee's Summit, Missouri. The location of the development site is shown on **Figure 1**.

FIGURE 1: LOCATION MAP

2.0 EXISTING CONDITIONS

2.1 STREET NETWORK

The existing street network within the study area includes Colbern Road, Rice Road, and Rice Drive. The following provides a summary of the existing street network within the study area:

Colbern Road is an east-west roadway that runs south of the proposed development site. Through the study area, Colbern Road is a four-lane divided roadway with curbs and gutters. There are sections of raised medians and striped medians near the site. There is a shared-use path along the south side of the road and a sidewalk along the north side. According to the Lee's Summit Thoroughfare Master Plan, Colbern Road is classified as a Major Arterial. The posted speed limit is 40 miles per hour (mph).

Colbern Road provides access to the regional highway system with partial diamond interchanges at both Interstate 470 and Route 291. The other half of the partial diamond interchange with I-470 is accessed from Douglas Street, farther to the west of the site.

Rice Road runs north-south to the west of the proposed development. The two-lane roadway has a varying width near the site with segments of curb and gutter and paved shoulders of varying widths. To the north of Rice Drive, the roadway narrows to a constant width of 22 feet with turf shoulders adjacent to the roadway. There are no sidewalks along either side of Rice Road. The roadway is classified as an Industrial/Commercial Collector with a posted speed limit of 45 mph.

Rice Drive is an east-west local street currently ends at the far northwest corner of the proposed development site. There are curbs and gutters along both sides of the roadway. The roadway is 36-feet wide, measured between the backs of curbs. There are no sidewalks along Rice Drive, and there is no posted speed limit.

2.2 SURROUNDING LAND USES

The development site currently consists of approximately 10.6 acres of undeveloped land that is zoned for "Planned Commercial Services". The site is surrounded by undeveloped land to the north and east. A 6-acre site directly to the east includes a pond. A walking trail is to be constructed around the pond, which will serve as stormwater detention for the development site. Directly to the south of the site along Colbern Road is the Mid-Continent Public Library's Colbern Road Branch. To the southwest of the site is undeveloped land between the Library and Rice Road. To the west of the site is a post office and a small commercial building for a home improvement supplier. Both of these properties are accessed from Rice Road.

2.2 FUTURE LAND USES

The City's future land use map indicates that the development site is planned for commercial uses. Most of the surrounding land is also planned for commercial uses. In general, commercial land uses have much higher trip generation potential than the senior living land uses that are proposed for the site. An excerpt from the future land use map is shown in **Figure 2**.

The undeveloped land to the north of the site is planned for industrial uses, which has potential to generate significant truck traffic.

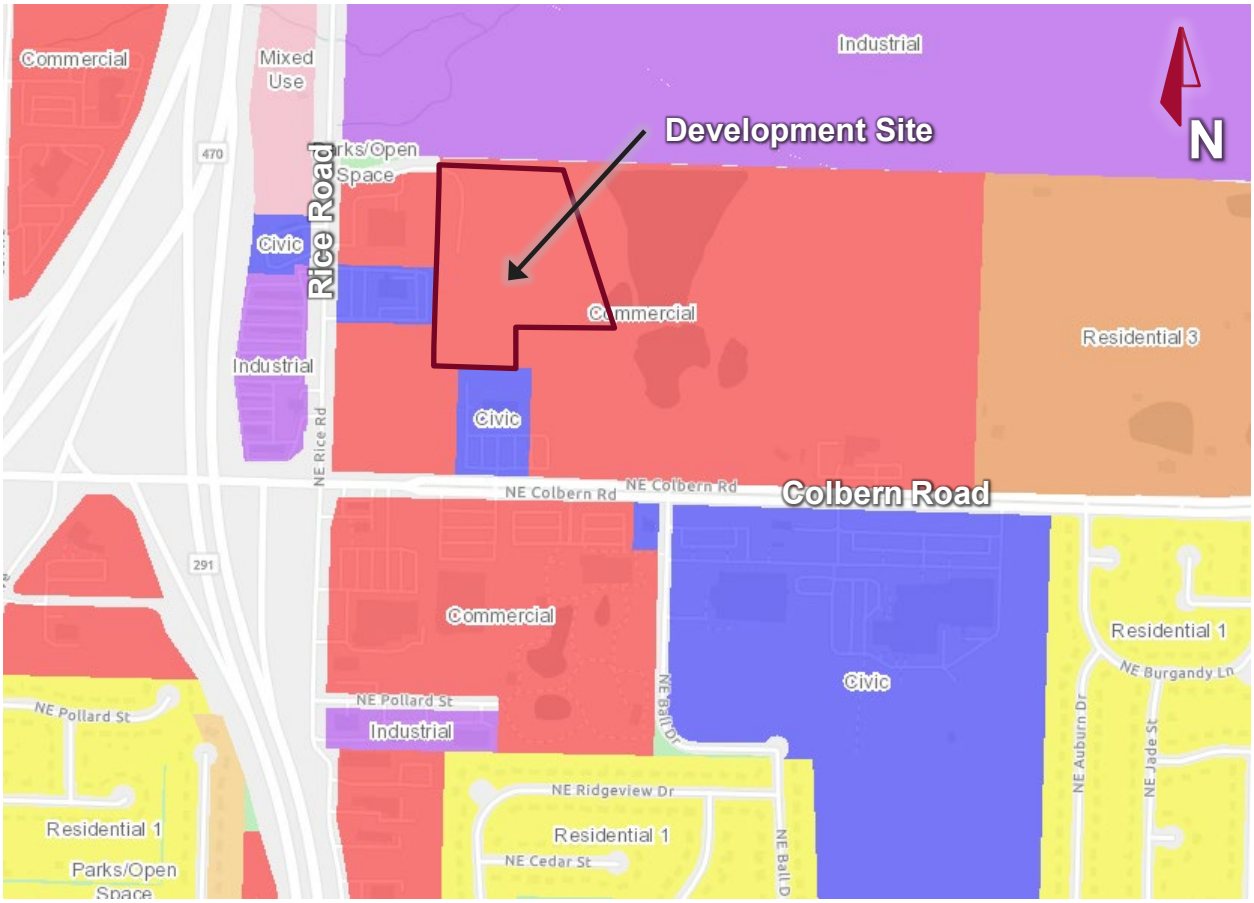


FIGURE 2: LEE'S SUMMIT FUTURE LAND USE MAP

2.3 PLANNED DEVELOPMENT

A gas station with 16 fueling positions and a 5,400 square foot convenience store development is currently being proposed by another developer on the undeveloped land adjacent to Colbern Road, to the southwest of the proposed development site. The site plan for the gas station includes constructing a new north/south collector roadway, called Lucky Road, along the west side of the library. Lucky Road will intersect Colbern Road and will be a full access intersection. In conjunction with this new roadway, a raised median is to be constructed on Colbern Road through the Rice Road intersection. This will result in the north leg of the Colbern Road & Rice Road intersection being restricted to right-in/right-out access only. To provide circulation around the gas station site, a new east/west road will be constructed between Rice Road and Lucky Road at the north side of the gas station site.

Gas station developments of this size are significant traffic generators. The site is expected to generate nearly 7,000 trips per day, and 400 to 500 trips during a weekday peak hour. At the time of this study, the improvements required to mitigate the impact of gas station's additional traffic have not been determined. Likewise, the improvements needed to construct the Colbern Road & Lucky Road intersection and modify access at the Colbern Road & Rice Road intersection have not been determined. The traffic impact study for the site is being reviewed by City and MoDOT staff.

3.0 PROPOSED DEVELOPMENT

3.1 SITE DESCRIPTION

The proposed development includes a 101,280 square foot building with corridors branching in several directions. The building will contain several types of senior living residences for different levels of care. There will be 32 beds for memory care, 78 beds for assisted living, and 110 units for independent living.

The site plan shows a new public street running north/south along the west edge of the site. This roadway will be the extension of Lucky Road to the north from the planned gas station development. The roadway will include curbs and gutters with sidewalks along each side of the street. The street will measure 40 feet between the backs of curbs, which is consistent with the City's standards for collector street. Lucky Road will end at Rice Drive and be stubbed for a future extension to the north.

The proposed site plan is included in **Appendix A** for reference.

3.2 SITE CIRCULATION

The development will be accessed from three driveways along Lucky Road. A driveway at the north end of the site will align with a new intersection that will be formed where Lucky Road will intersect Rice Drive. From this north site driveway, an internal drive aisle will wrap around the proposed building and intersect Lucky Road in the southern portion of the site. Several surface parking spaces, service drives, and a garage with 110 parking spaces will be accessed from the internal drive. A driveway is also proposed on Lucky Road near the middle of the building. This drive will provide access to a surface parking lot in the front of the building.

Drivers will primarily access the site from Colbern Road. Drivers will be able to use Lucky Road to travel to and from Colbern Road. Drivers on Colbern Road can also follow Rice Road to Rice Drive to access the site.

3.3 TRIP GENERATION

Trip generation estimates were prepared using the *ITE Trip Generation Manual, 11th Edition*. **Table 1** shows the expected trips to be generated by the proposed development. The total trip generation is anticipated to be 642 daily trips, 42 trips during the AM peak hour (19 entering and 23 exiting), and 54 trips during the PM peak hour (25 entering and 29 exiting). **Appendix B** provides the *Trip Generation Manual* calculations used to determine the trip generation of the proposed site.

TABLE 1: TRIP GENERATION

Land Use Description	ITE LUC	Intensity / Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Senior Adult Housing – Multifamily	252	110 beds	356	7	15	22	15	13	28
Assisted Living	254	110 beds	286	12	8	20	10	16	26
		Total Trips	642	19	23	42	25	29	54

The trip generation estimates in **Table 1** indicate that the proposed development will generate a low volume of traffic and have a minimal impact on the surrounding street network. During the peak hours, the site will generate less than one vehicle trip per minute. According to the City's *Access Management Code* a full traffic impact study with capacity analysis is not required since the total trip generation is less than 100 trips.

4.0 ACCESS MANAGEMENT

The City of Lee's Summit *Access Management Code* (AMC) provides guidance for the design of driveways, access spacing, and the need for turn lanes at intersections. These items are discussed in the following paragraphs.

4.1 ACCESS SPACING

The AMC includes requirements for minimum spacing between street connections, depending on street classification. Along Industrial/Commercial roadways such as Lucky Road, the minimum spacing is 300 feet, measured between centerlines. The middle driveway to the site is proposed to be located roughly 390 feet south of Rice Drive, and 380 feet north of the southern driveway. Therefore, the north and middle site driveways meet the minimum spacing criteria.

The southern driveway is spaced roughly 170 feet north of the east/west street that is planned to be constructed with the gas station and convenience store development. This is less than minimum access spacing per the AMC. These two intersections will form an offset tee configuration. The offset is such that left-turn movements from Lucky Road to these driveways will not overlap. Since traffic volumes at the proposed site driveways are anticipated to be low, no safety or operational concerns are anticipated at the south driveway location.

4.2 DRIVEWAY THROAT LENGTH

A driveway's throat length is the distance along a driveway from the intersecting roadway to the first location on site where a driver can make a turn. Adequate throat lengths minimize the potential for inbound traffic to queue onto the public street. The throat length also provides space for outbound traffic to queue without adversely impacting site circulation.

The throat length requirements in the AMC are based on the two-way traffic volume on the driveway and the adjacent street classification. All site access driveways are projected to have less than 50 vehicles during the peak hours. As such the minimum required throat length for collector roadways is 50 feet. The north driveway has a long throat in excess of 400 feet, the middle driveway has a throat length of 60 feet, and the south driveway has a throat length of 40 feet. Therefore, the north and middle drives exceed the minimum required throat lengths. One parking space would need to be removed along the south drive to meet the minimum throat length requirements for driveways along a collector street.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A traffic impact study for the Colbern Road Senior Site development has been prepared by Kimley-Horn. The proposed site is located in the vicinity of the northeast corner of Colbern Road and Rice Road in Lee's Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system. The following provides a summary of the analysis.

The proposed development includes one large building with several types of senior living residences for different levels of care. The site will be accessed from three new driveways along the east side of a new collector street, Lucky Road, that is to be constructed in the future.

The proposed development is projected to generate 642 daily trips, with 42 trips during the AM peak hour and 54 trips during the PM peak hour. The trip generation estimates indicate that the proposed development will generate a low volume of traffic and have a minimal impact on the surrounding street network. According to the City's *Access Management Code* a full traffic impact study with capacity analysis is not required for the proposed development since the total trip generation is less than 100 trips.

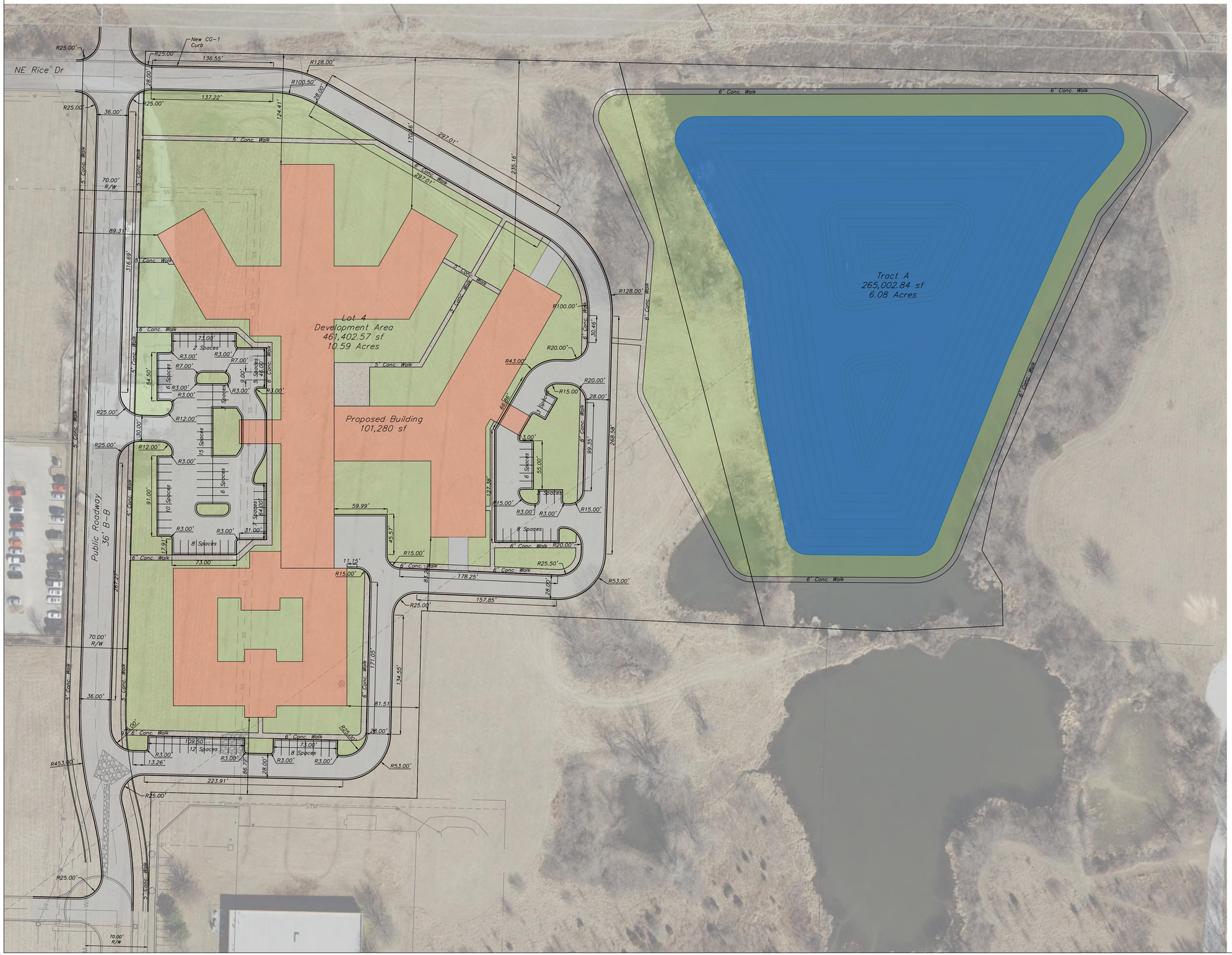
A review of the site plan determined that the north and middle driveways for the development satisfy the City of Lee's Summit *Access Management Code* (AMC) guidelines for driveway spacings and driveway throat length. The south driveway on Lucky Road is to be located 170 feet north of an intersection that is planned to be constructed with a gas station and convenience store development. Due to the low volume of traffic anticipated at the south driveway and the configuration of the intersections, no safety or operational concerns are anticipated at the south driveway location. The throat length at the south driveway is slightly less than the minimum throat length requirements of the AMC. One parking space would need to be removed along the south drive to meet the minimum throat length requirements for driveways along a collector street.

APPENDIX

Appendix A: SITE PLAN

Appendix B: ITE TRIP GENERATION MANUAL DATA

Appendix A: Site Plan



North

0 25' 50' 100'

SITE PLAN

SCALE: 1" = 50'

ENGINEERING SOLUTIONS
ENGINEERING & SURVEYING
50 SE 30TH STREET
LEE'S SUMMIT, MO 64082
P:(816) 623-9888 F:(816)623-9849

Professional Registration
Missouri
Engineering 2005002186-D
Surveying 2005000319-D
Kansas
Engineering E-1695
Surveying LS-218
Oklahoma
Engineering 6254
Nebraska
Engineering CA2821

Colbern Road Investments
Lee's Summit, Jackson County, Missouri

Project: COLBERN ROAD INVESTMENTS LSMO

Issue Date: September 12, 2022

Site Plan
Construction Plans for:
Colbern Road Senior Site
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
NUMBER
2006019708
PROFESSIONAL ENGINEER

Matthew J. Schlicht
MO PE 2006019708
KS PE 19071
OK PE 25226
NE PE E-14335

REVISIONS

C.100

Appendix B: ITE Trip Generation Manual Data

Land Use: 252
Senior Adult Housing—Multifamily

Description

Senior adult housing–multifamily sites are independent living developments that are called various names including retirement communities, age-restricted housing, and active adult communities. The development has a specific age restriction for its residents, typically a minimum of 55 years of age for at least one resident of the household.

Residents in these communities are typically considered active and requiring little to no medical supervision. The percentage of retired residents varies by development. The development may include amenities such as a golf course, swimming pool, 24-hour security, transportation, and common recreational facilities. They generally lack centralized dining and on-site health facilities.

The dwelling units share both floors and walls with other units in the residential building. Senior adult housing—single-family (Land Use 251), congregate care facility (Land Use 253), assisted living (Land Use 254), and continuing care retirement community (Land Use 255) are related land uses.

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/).

The sites were surveyed in the 1980s, the 1990s, and the 2000s in Alberta (CAN), California, Maryland, New Hampshire, New Jersey, Ontario (CAN), and Pennsylvania.

Source Numbers

237, 272, 576, 703, 734, 970, 1060

Senior Adult Housing - Multifamily (252)

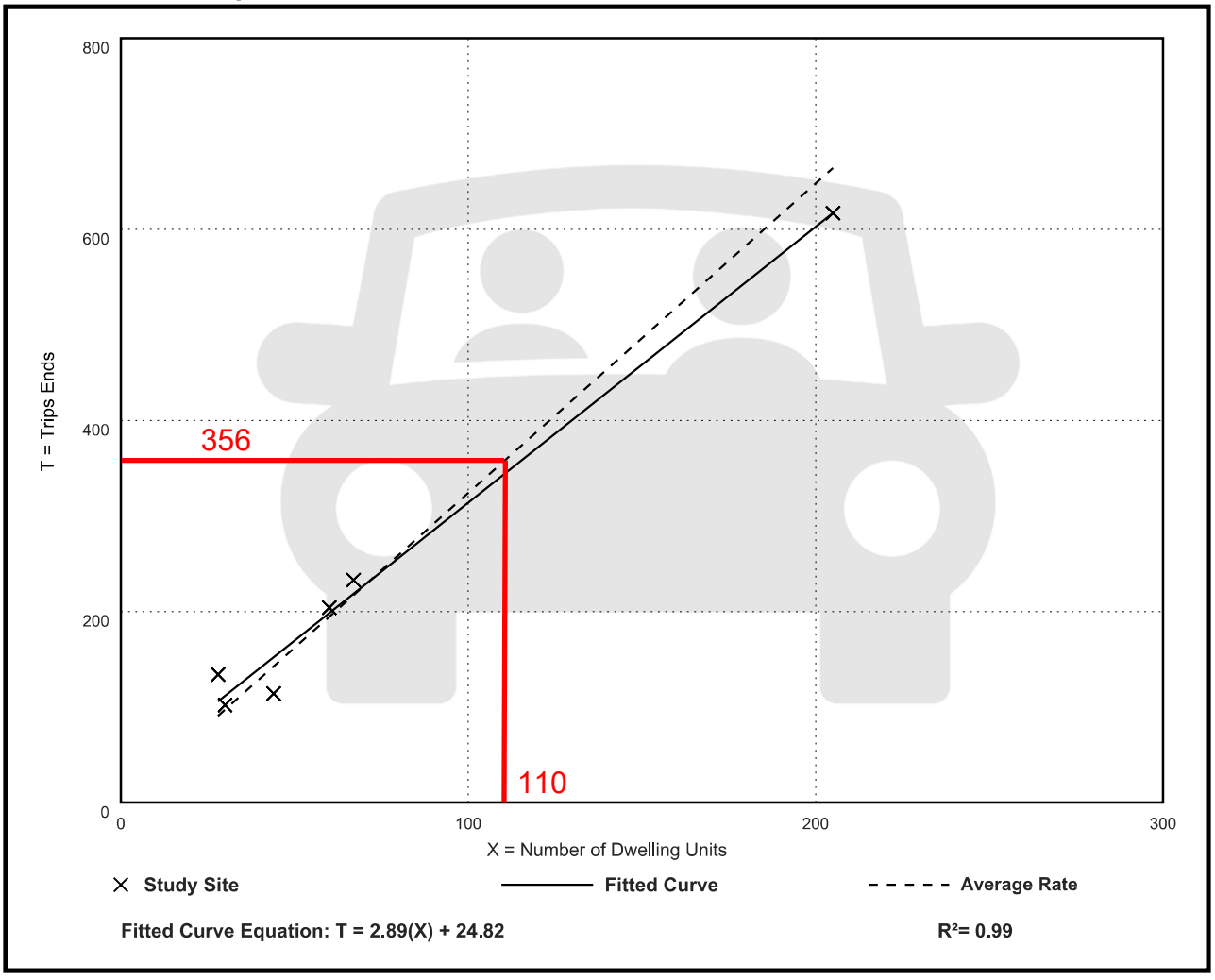
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. Num. of Dwelling Units: 72
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.24	2.59 - 4.79	0.53

Data Plot and Equation



Fitted Curve Equation: T = 2.89(X) + 24.82

R^2= 0.99

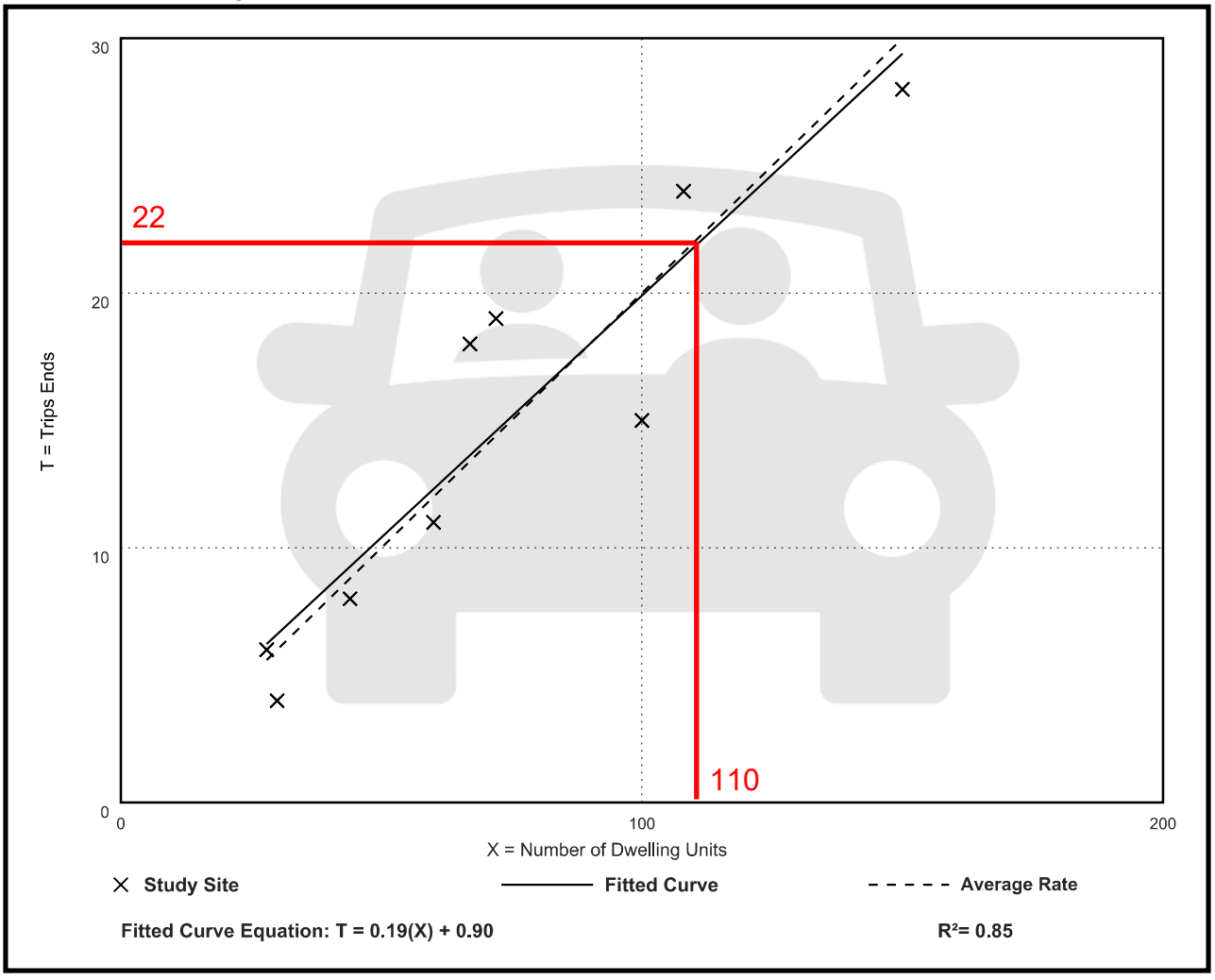
Senior Adult Housing - Multifamily
(252)

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: 9
Avg. Num. of Dwelling Units: 73
Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.20	0.13 - 0.27	0.04

Data Plot and Equation



Fitted Curve Equation: T = 0.19(X) + 0.90

R^2= 0.85

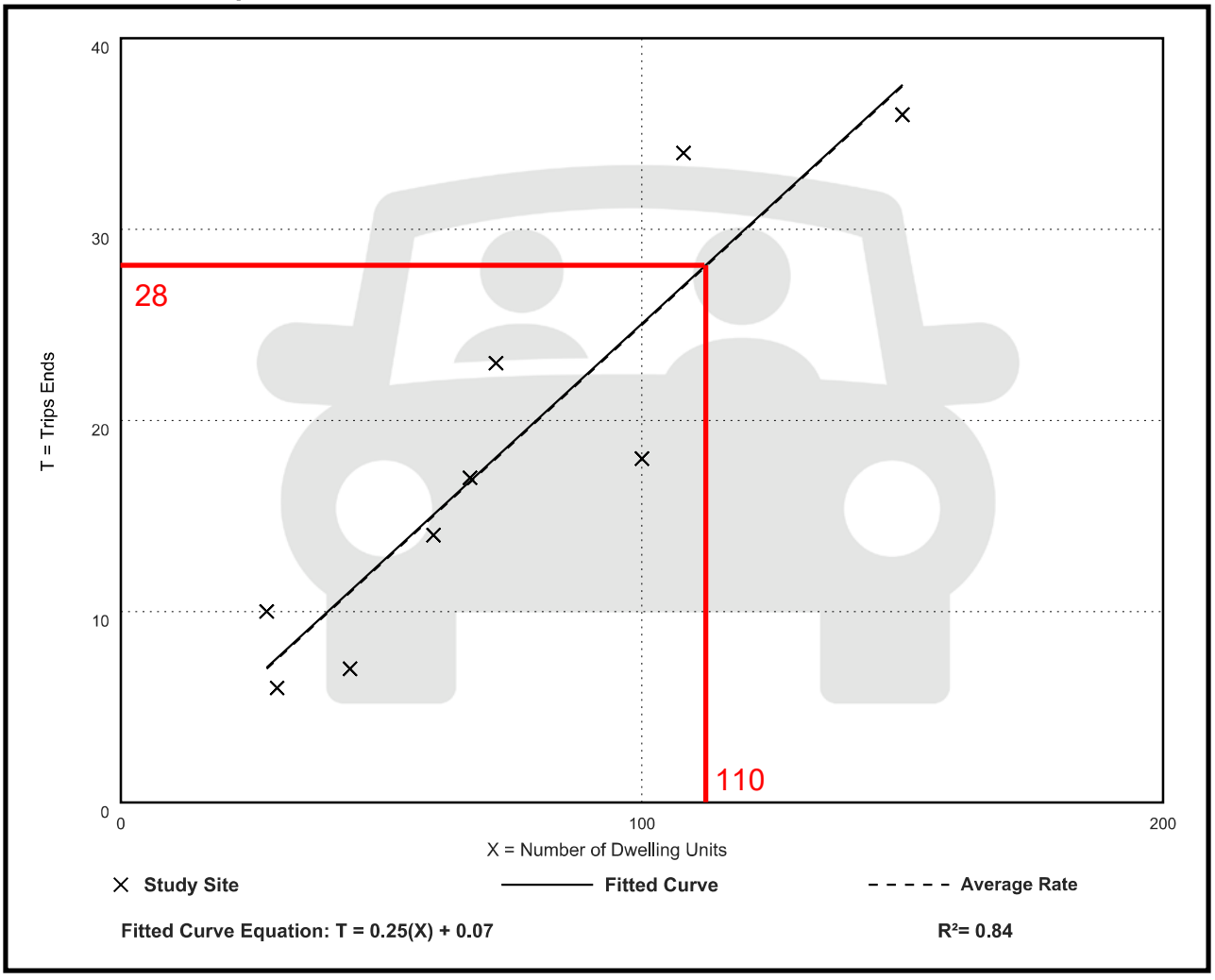
Senior Adult Housing - Multifamily
(252)

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: 9
Avg. Num. of Dwelling Units: 73
Directional Distribution: 56% entering, 44% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.25	0.16 - 0.36	0.06

Data Plot and Equation



Fitted Curve Equation: T = 0.25(X) + 0.07

R^2= 0.84

Land Use: 254
Assisted Living

Description

An assisted living complex is a residential setting that provides either routine general protective oversight or assistance with activities necessary for independent living to persons with mental or physical limitations. The typical resident has difficulty managing in an independent living arrangement but does not require nursing home care. Its centralized services typically include dining, housekeeping, social and physical activities, medication administration, and communal transportation.

The complex commonly provides separate living quarters for each resident. Alzheimer's and ALS care are commonly offered at an assisted living facility. Living quarters for these patients may be located separately from the other residents.

Assisted care commonly bridges the gap between independent living and a nursing home. In some areas of the country, an assisted living residence may be called personal care, residential care, or domiciliary care. Staff may be available at an assisted care facility 24 hours a day, but skilled medical care—which is limited in nature—is not required. Congregate care facility (Land Use 253), continuing care retirement community (Land Use 255), and nursing home (Land Use 620) are related uses.

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/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Connecticut, New Jersey, New York, Oregon, Pennsylvania, Tennessee, Texas, and Utah.

Source Numbers

244, 573, 581, 611, 725, 876, 877, 912, 1016, 1029

Assisted Living
(254)

Vehicle Trip Ends vs: Beds
On a: Weekday

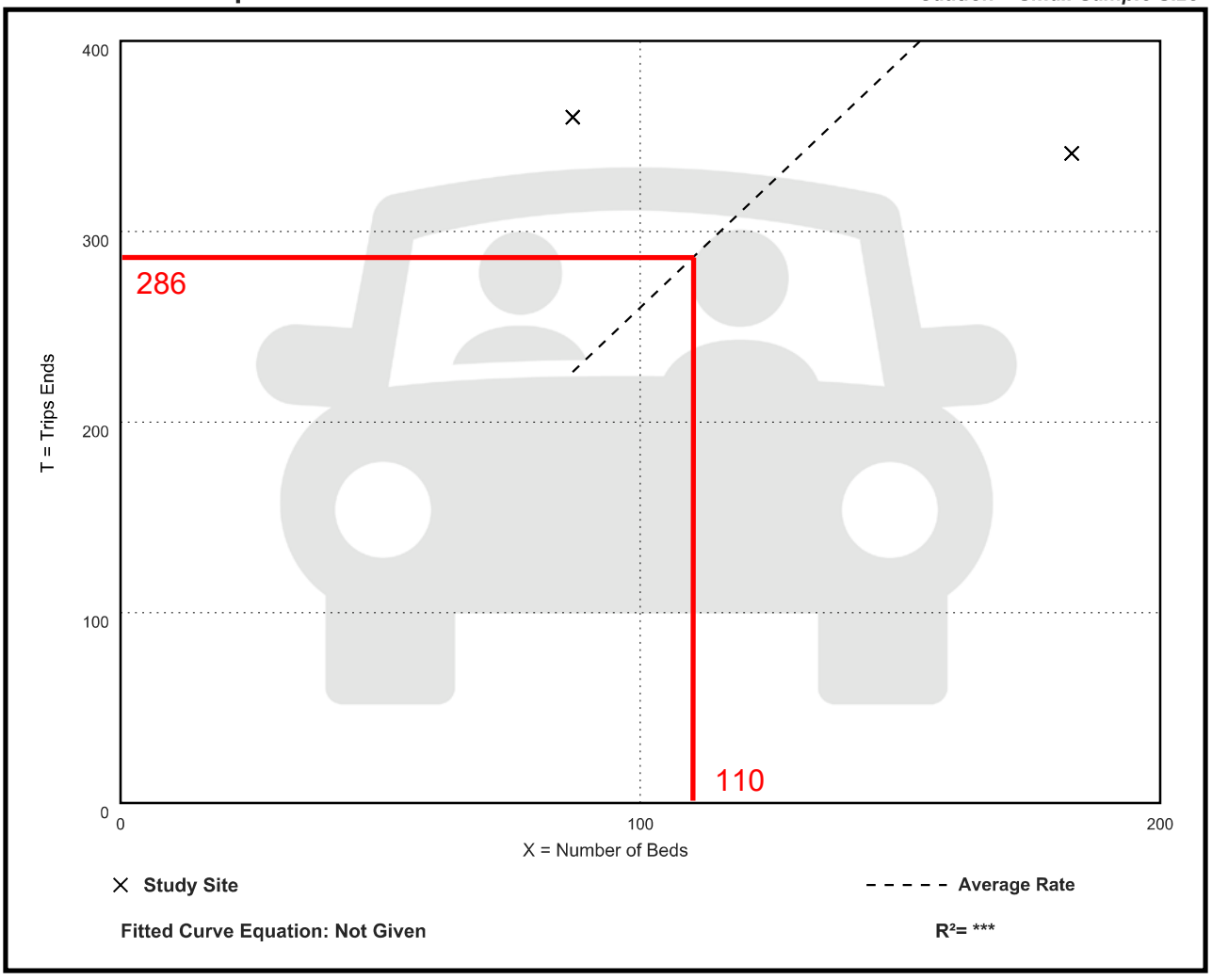
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Beds: 135
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
2.60	1.86 - 4.14	***

Data Plot and Equation

Caution – Small Sample Size



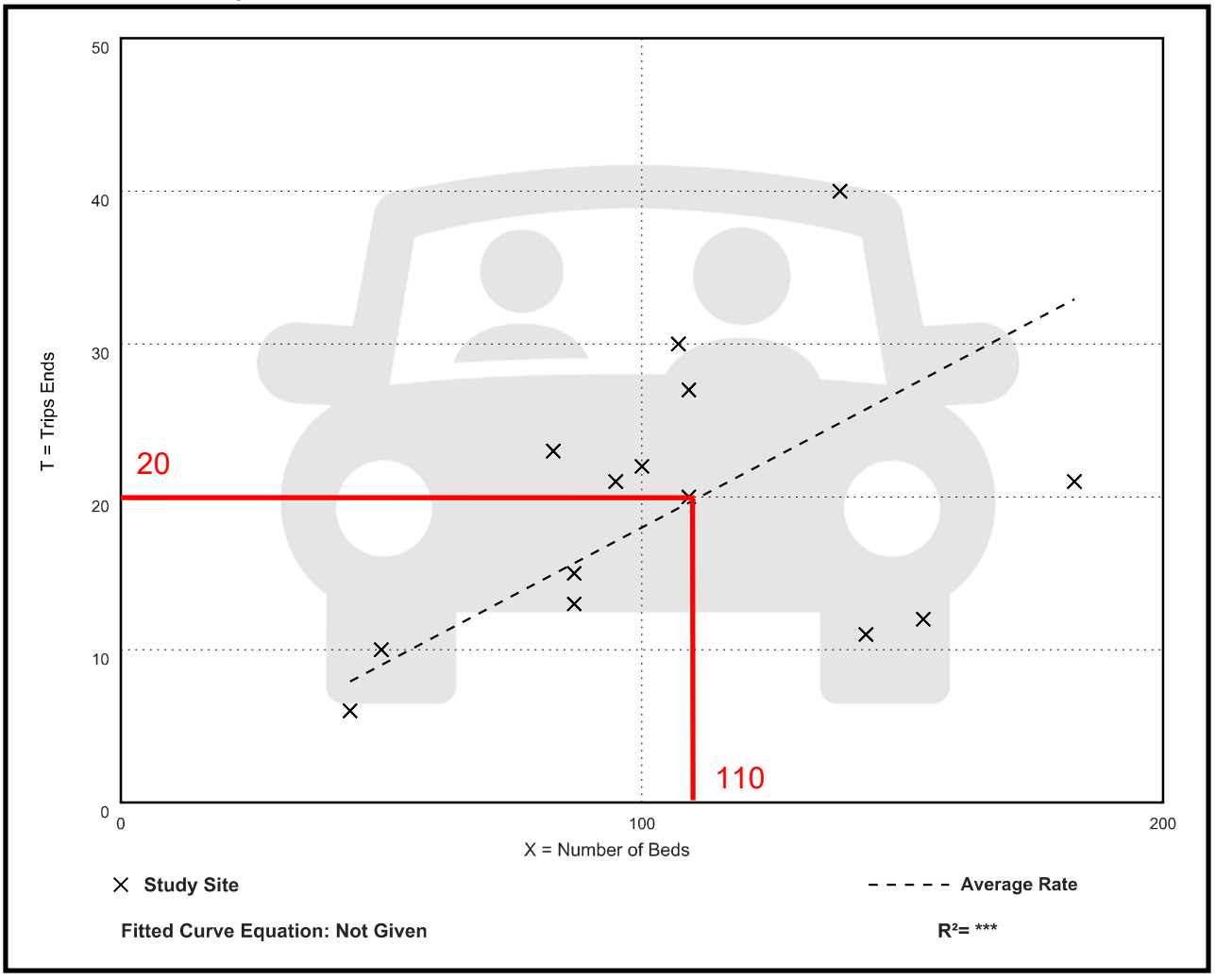
Assisted Living
(254)

Vehicle Trip Ends vs: Beds
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: 14
Avg. Num. of Beds: 106
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
0.18	0.08 - 0.29	0.08

Data Plot and Equation



Assisted Living
(254)

Vehicle Trip Ends vs: Beds
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: 14
Avg. Num. of Beds: 106
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
0.24	0.11 - 0.34	0.07

Data Plot and Equation