MEMORANDUM

TO: Mr. Dante Angelucci
Senior Vice President - Development
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Cambridge MA, 02139

FROM: Mr. Jeffrey S. Dirk, P.E., PTOE, FITE
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Professional Engineer in CT, MA, ME, NH, RI and VA

DATE: January 25, 2022

RE: 9141

SUBJECT: Transportation Impact Assessment
3000 Minuteman Road – Phase I Redevelopment
Andover, Massachusetts

Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the phased redevelopment of the former Philips Healthcare campus located at 3000 Minuteman Road in Andover, Massachusetts, as a life sciences/cGMP campus (hereafter referred to as the "Project"). This assessment provides a general overview of the Project and provides a detailed assessment of the following areas as they relate to the initial phase of the Project (the "Phase 1 Project"): i) existing conditions context of the transportation infrastructure serving the Phase 1 Project site; ii) a qualitative evaluation of the potential impact of the Phase 1 Project along River Road, 1776 Drive and Minuteman Road; and iii) an evaluation of safety at the River Road/1776 Drive and River Road/Minutemen Road/Shattuck Road intersections. Redevelopment of the campus beyond the Phase 1 Project will be the subject of a separate TIA.

Based on this assessment it has been concluded that the Phase 1 Project will result in a significant reduction in both daily and peak-hour trips (up to 80 percent) when compared to the fully occupied Philips Healthcare campus that included approximately 3,000 employees and, as such, will be significantly less impactful on the transportation infrastructure.

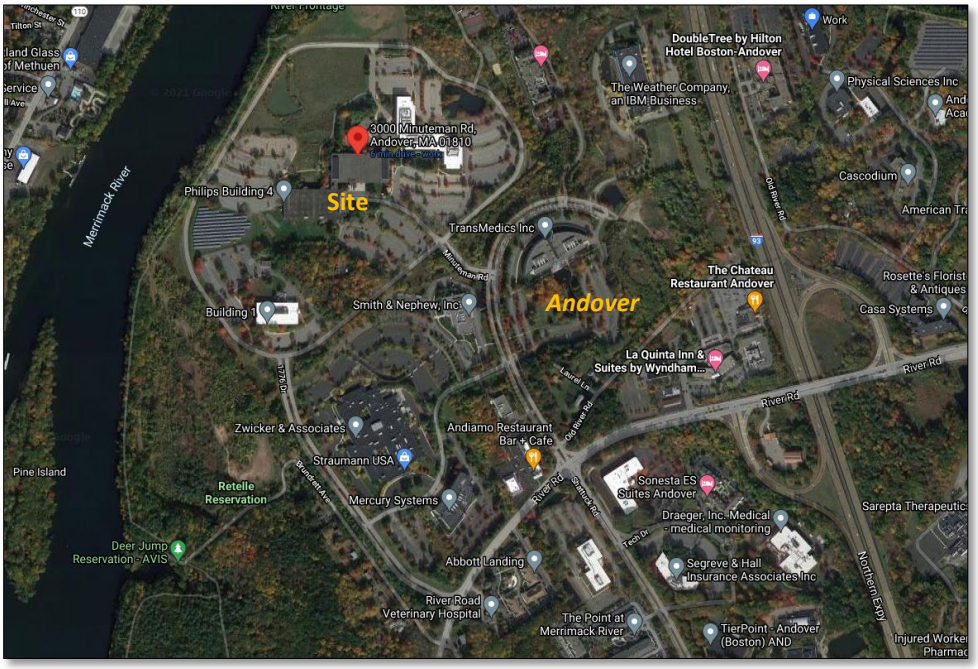
The following details our assessment of the Phase 1 Project.

PHASE 1 PROJECT DESCRIPTION AND EXISTING CONDITION CONTEXT

Phase 1 Project Description

The Project will entail the phased redevelopment of the former Phillip Healthcare campus that is located at 3000 Minuteman Road in Andover, Massachusetts. The campus currently contains four (4) buildings that encompass approximately 726,000± square foot (sf) of office/manufacturing space. The redevelopment plan will transform the former office/manufacturing campus into a life sciences campus consisting of a mix of laboratory, research and development, office, current Good Manufacturing Practice (cGMP)

manufacturing and warehouse space, and will include an expansion of two (2) of the existing buildings and the addition of one (1) new building. When complete, the campus will contain approximately 1.126± million sf of space. The Phase 1 Project represents the initial phase of the redevelopment program and will consist of: i) the renovation and expansion of Building 1 within the campus, which contains 86,000± sf; and ii) the construction of a 100,000± sf addition to Building 1; resulting in 186,000± sf of space that would be allocated to lab, office, cGMP and warehouse space. The overall Project site is bounded by areas of open and wooded space and the Merrimack River to the north and west, and commercial properties to the south and east.



Imagery ©2021 Google

Access to the Project site will continue to be provided by way of the existing driveways that serve the campus and connected to 1776 Drive and Minuteman Road, both of which provide access to River Road.

Existing Condition Context

In order to establish the existing conditions context of the Project with respect to the transportation infrastructure, a comprehensive field inventory of existing conditions within the study area was conducted in May and December 2021. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; public transportation services; as well as posted speed limits and land use information along River Road, 1776 Drive and Minutemen Road in the vicinity of the Project site. The following provides a description of the transportation infrastructure serving the Project site.

Roadways

River Road

- Two to four-lane urban minor arterial roadway under Town jurisdiction, with the exception of the segment of roadway between the I-93 north and southbound ramps, which is under MassDOT jurisdiction
- Traverses the study area in a general east-west direction
- Provides four 11 to 12-foot-wide travel lanes separated by a raised median with variable width marked shoulders provided between Shattuck Road and North Street; west of Shattuck Road, River Road provides two 11 to 12-foot wide travel lanes separated by a double-yellow center with variable width marked shoulders provided
- Sidewalks are generally provided along one or both sides of the roadway within the study area
- Illumination is provided by way of street lights mounted on wood poles
- Posted speed limit along River Road within the study area is 35 miles per hour (mph) west of the I-93 northbound ramps and 30 mph to the east
- Bicycle lanes are provided along both sides of the roadway between 1776 Drive and Minuteman Road
- Land use within the study area consists of the Project site, commercial properties and areas of open and wooded space

1776 Drive

- Four-lane private roadway
- Traverses a general north-south direction between River Road and the Project site (approximately 2,200 lf)
- Provides two 12-foot wide travel lanes per direction separated by a raised median with 1-foot wide marked shoulders provided
- Sidewalks are not provided
- Land use within the study area consists of the Project site, commercial properties, and areas of open and wooded space

Minuteman Road

- Four-lane private road
- Traverses a general north-south direction between River Road and the Project site (approximately 2,500 lf)
- Provides two 12-foot wide travel lanes per direction separated by a raised median with 1 to 2-foot wide marked shoulders provided
- Posted speed limit is 25 mph
- A sidewalk is provided along the east side of the roadway
- Land use within the study area consists of the Project site, commercial properties, and areas of open and wooded space

Pedestrian and Bicycle Accommodations

Sidewalks are provided along both sides of River Road west of Minuteman Road and Shattuck Road; along the north side of River Road between the I-93 southbound ramps and Minuteman Road; along the east side of Minuteman Road; and along the west side of Shattuck Road. Marked crosswalks are provided for crossing Minuteman Road and the River Road west leg of the River Road/Minuteman Road/Shattuck Road intersection, with pedestrian traffic signal equipment and phasing provided for crossing River Road. Bicycle lanes are provided along both sides of River Road between Brundrett Avenue and Minuteman Road, with the remaining portions of River Road and both Minuteman Road and Shattuck Road providing sufficient width (combined travel lane and shoulder)[1] to support bicycle travel in a shared travelled-way configuration.

Public Transportation Services

The Project site is served by public transportation services that are provided by the Merrimack Valley Regional Transit Authority (MVRTA). The MVRTA operates bus Route 37, *Beacon Street*, which travels along River Road to Minuteman Road, with a stop located at Springhill Suites by Marriot (north of the Project site), and thereafter to the Buckley Transportation Center in Lawrence where connections can be made to other bus lines. From the Buckley Transportation Center, bus service is provided to Lawrence Station on the Haverhill Line of the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail system with service to North Station in Boston. MVRTA buses operate in a passenger demand service mode and will stop anywhere along the service route where it is safe to pick-up or discharge a passenger.

Motor Vehicle Crash Data

Motor vehicle crash information for the River Road/1776 Drive and River Road/Minuteman Road/ Shattuck Road intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent five-year period available (2015 through 2019, inclusive) in order to examine motor vehicle crash trends occurring within the study area. A review of this data indicates a total of three (3) motor vehicle crashes were reported to have occurred at the River Road/1776 Drive intersection and a total of two (2) motor vehicle crashes were reported to have occurred at the River Road/ Minuteman Road/Shattuck Road intersection over the five-year review period, or an average of less than one (1) crash per year at both locations. The crash data indicated that the majority of the reported crashes occurred on a weekday, during daylight, under clear weather conditions and involved rear-end type collisions that resulted in property damage only.

A review of the MassDOT statewide High Crash Location List indicated that there were no locations within the study area that were included on MassDOT's Highway Safety Improvement Program (HSIP) listing. ***Based on a review of the MassDOT motor vehicle crash data, no discernible safety deficiencies were apparent within the Project study area.***

[1] A minimum combined travel lane and paved shoulder width of 14-feet is required to support bicycle travel in a shared traveled-way condition.

PROJECT-GENERATED TRAFFIC

In order to determine the traffic characteristics of the Phase 1 Project, trip-generation methodologies established by the Institute of Transportation Engineers (ITE)[2] were used. The ITE provides trip-generation information for various types of land uses developed as a result of scientific studies that have been conducted over the past 50 plus years, the most recent update of which was published in 2021. This data includes trip estimates for similar functional areas to those that will be associated with the campus redevelopment (functionally classified as research and development (R&D) and manufacturing for trip-generation purposes). ITE Land Use Codes (LUCs) 140, *Manufacturing* and 760, *Research and Development Center*, were used to establish the traffic characteristics of the Phase 1 Project, the results of which are summarized in Table 1.

Table 1
PHASE 1 TRIP GENERATION SUMMARY

	Vehicle Trips		
Time Period/Direction	(A) Proposed Research/Laboratory/ Office Space (86,000 sf)[a]	(B) Proposed Manufacturing/ Warehouse Space (cGMP) (100,000 sf)[b]	(A + B) Total trips
Average Weekday Daily:			
Entering	541	290	831
Exiting	541	290	831
Total	1,082	580	1,662
Weekday Morning Peak Hour:			
Entering	83	54	137
Exiting	18	17	35
Total	101	71	172
Weekday Evening Peak Hour:			
Entering	15	22	37
Exiting	82	48	130
Total	97	70	167

[a]Based on ITE LUC 760, *Research and Development Center*.
[b]Based on ITE LUC 140, *Manufacturing.*

Project-Generated Traffic Volume Summary

As can be seen in Table 1, the Phase 1 Project is expected to generate approximately 1,662 vehicle trips on an average weekday (two-way, 24-hour volume, or 831 vehicles entering and 831 exiting), with approximately 172 vehicle trips (137 vehicles entering and 35 exiting) expected during the weekday morning peak-hour and 167 vehicle trips (37 vehicles entering and 130 exiting) expected during the weekday evening peak-hour.

[2]*Trip Generation*, 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.

Table 2 compares the traffic characteristics of the Phase 1 Project to those of the former Philips Health Care campus at full occupancy (approximately 3,000 employees)

Table 2
TRIP GENERATION SUMMARY COMPARISON

	Vehicle Trips		
Time Period/Direction	(A) Phase 1 Project (186,000 sf)	(B) Former Philips Healthcare Campus (726,000 sf)[a]	(A - B) Difference
Average Weekday Daily:	1,662	4,936	-3,274
Weekday Morning Peak Hour:	172	874	-702
Weekday Evening Peak Hour:	167	873	-706

[a]Based on ITE LUC 714, *Corporate Headquarter Building.*

As can be seen in Table 2, the Phase 1 Project is expected to generate 3,274 fewer vehicle trips on an average weekday (an approximate 66 percent reduction) when compared to the former Philips Health Care campus at full occupancy, with 702 fewer vehicle trips expected during the weekday morning peak-hour and 706 fewer vehicle trips during the weekday evening peak-hour, or an approximate 80 percent reduction in peak-hour traffic.

Based on this comparative assessment, it is clear that the Phase 1 Project will be significantly less impactful on the transportation infrastructure when compared to the former Philips Health Care campus at full occupancy.

For context, Table 3 summarizes the traffic characteristics of the Project at full-build-out (1.126± million sf of lab/cGMP space, inclusive of the Phase 1 Project) and compares the expected traffic volumes to those of the former Philips Health Care campus at full occupancy.

Table 3
TRIP GENERATION SUMMARY COMPARISON – PROJECT SITE

Time Period/Direction	Vehicle Trips (A) Proposed Lab/ cGMP Campus (1,126,000 sf)[a]	(B) Former Phillip Healthcare Campus (726,000 sf)[b]	(A - B) Difference
Average Weekday Daily:	7,014	4,936	+2,078
Weekday Morning Peak Hour:	830	874	-44
Weekday Evening Peak Hour:	975	873	+102

[a]Based on ITE LUC 760, *Research and Development Center* (390,900 sf) and LUC 140, *Manufacturing* (735,100 sf).
[b]Based on ITE LUC 714, *Corporate Headquarter Building.*

As can be seen in Table 3, the full build-out of the Project is expected to generate approximately 2,078 additional vehicle trips on an average weekday when compared to the former Philips Health Care campus at full occupancy, with 44 fewer vehicle trips expected during the weekday morning peak-hour and 102 additional vehicle trips during the weekday evening peak-hour.

This comparative assessment has indicated that the full build-out of the campus will result in an increase in traffic on a daily basis that will be spread over the course of a weekday resulting in a reduction in traffic during the weekday morning peak-hour (44 vehicle trips) and an increase of traffic during the weekday evening peak-hour (102 vehicle trips). As discussed previously, redevelopment of the campus beyond the Phase 1 Project will be the subject of a separate TIA that will assess the impact of the added traffic and define appropriate measures that will be undertaken as a part of the Project to address the identified impact on the transportation infrastructure.

SUMMARY

VAI has completed an assessment of the potential impacts on the transportation infrastructure associated with the phased redevelopment of the former Philips Healthcare campus located at 3000 Minuteman Road in Andover, Massachusetts, as a life sciences/cGMP campus. This assessment specifically focuses on the Phase 1 Project and includes a general overview of the traffic characteristics of the full build-out of the Project and a comparative assessment of the traffic volumes for both the Phase 1 Project and the Project at full build-out to those of the former Philips Heath Care campus at full occupancy. Redevelopment of the campus beyond the Phase 1 Project will be the subject of a separate TIA.

Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the ITE[3] for similar functional areas to those that will be associated with the campus redevelopment (R&D and manufacturing space for trip-generation purposes), the Phase 1 Project is predicted to generate approximately 1,662 vehicle trips on an average weekday (two-way volume over the operational day of the Project), with 172 vehicle trips expected during the weekday morning peak-hour and 167 vehicle trips expected during the weekday evening peak-hour;

2. In comparison to the former Philips Health Care campus at full occupancy, the Phase 1 Project is expected to generate approximately 3,274 fewer vehicle trips on an average weekday, with 702 fewer vehicle trips expected during the weekday morning peak-hour and 706 fewer vehicle trips expected during the weekday evening peak-hour, or a reduction in traffic on a daily and peak-hour basis of up to 80 percent; and

3. No apparent safety deficiencies were noted in the proximity of the Project site based on a review of available data.

Given the significant reduction in both daily and peak-hour trips (up to 80 percent) that the Phase 1 Project represents when compared to the former Philips Health Care campus at full occupancy, it can be concluded that the Phase 1 Project will be significantly less impactful on the transportation infrastructure when compared to the former use. As such and in consideration of the above, we have concluded that the Phase 1 Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner.

cc: File

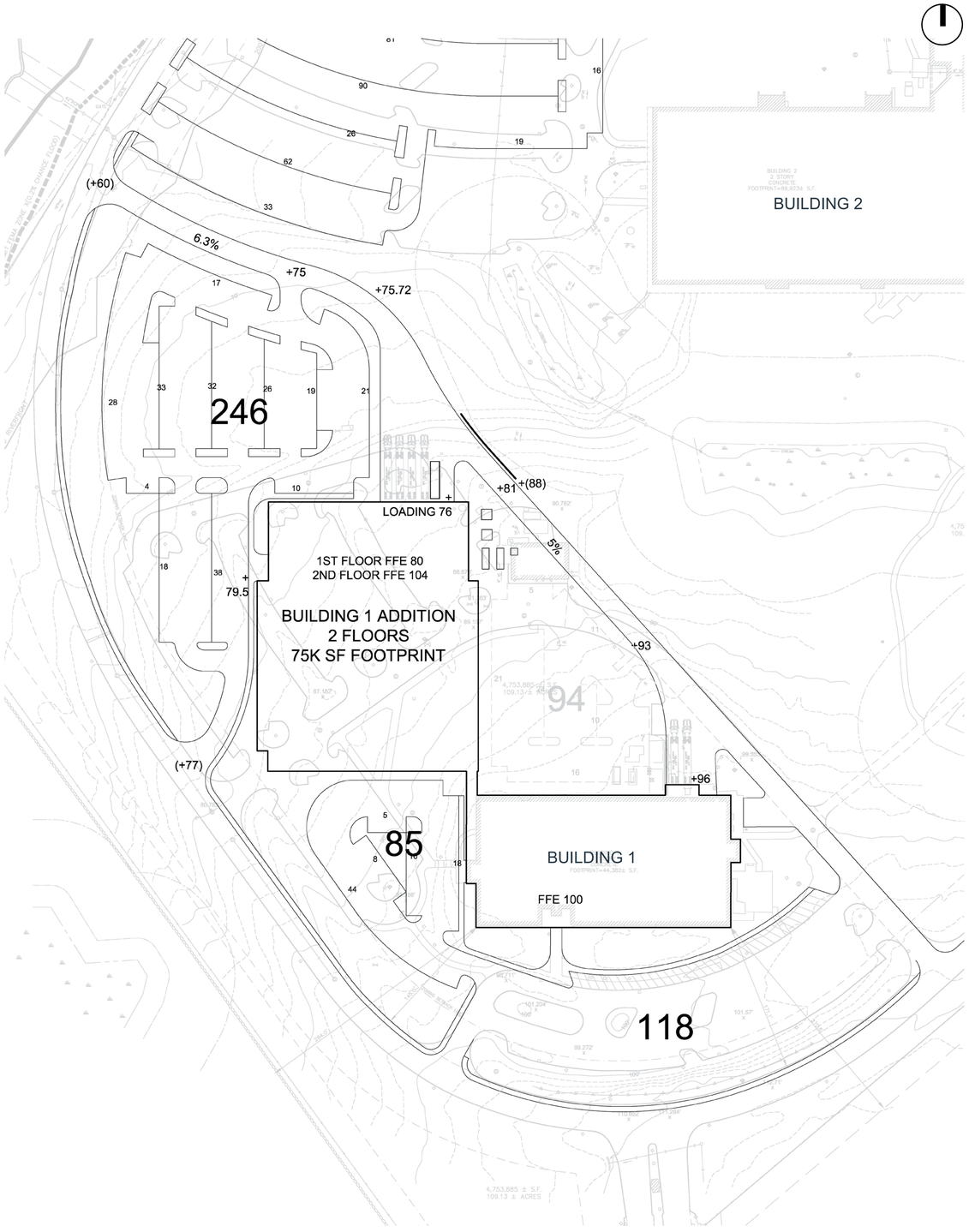
Attachments: Trip-Generation Calculations

[3]Ibid 2.

ATTACHMENTS

PROJECT SITE PLAN
PUBLIC TRANSPORTATION INFORMATION
MASSDOT CRASH REPORTS AND HIGH CRASH LOCATION MAPPING
TRIP-GENERATION WORKSHEETS

PROJECT SITE PLAN



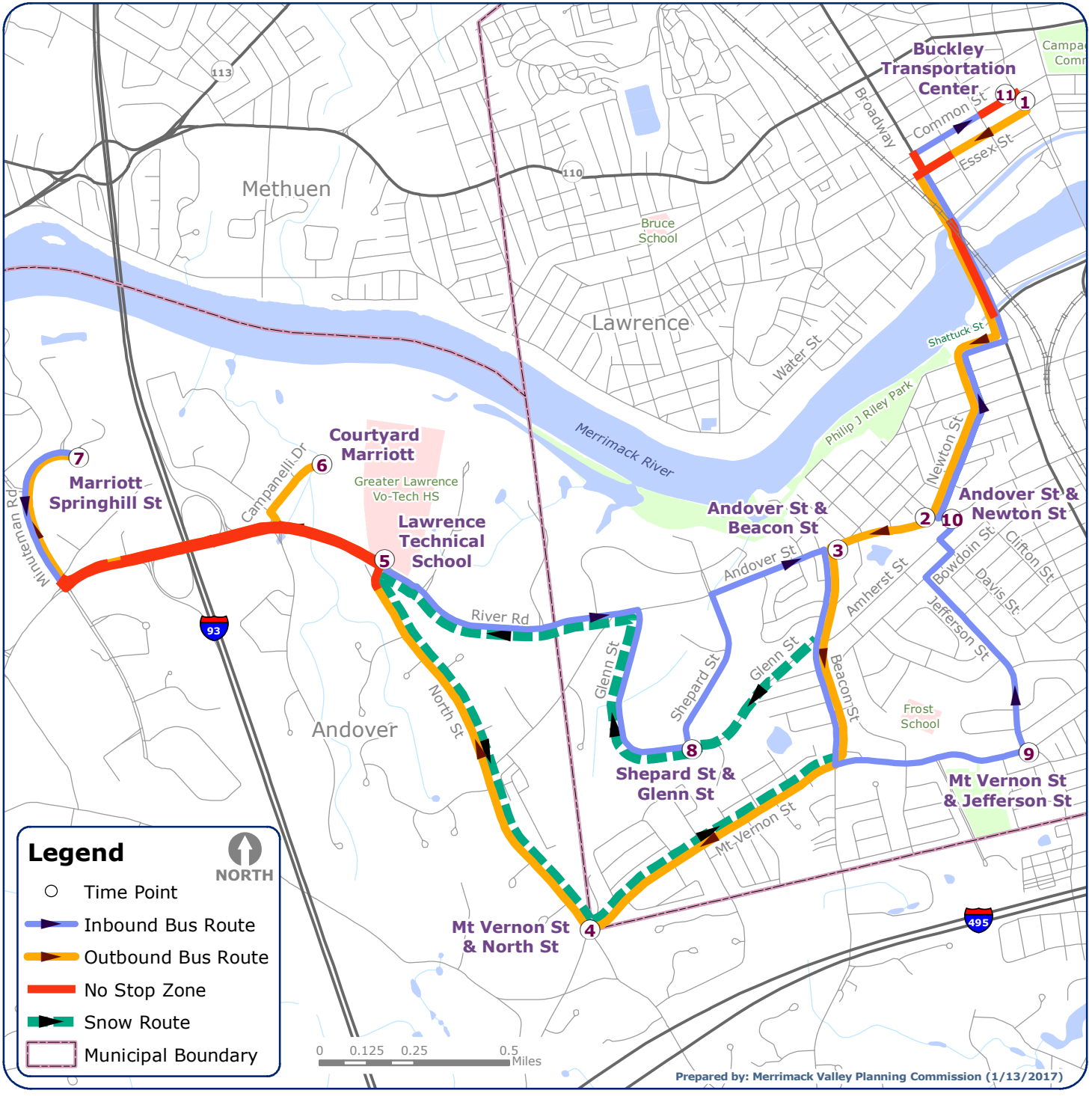
Building 1 Conceptual Site Plan

The Campus at Minuteman, Andover, MA

60 30 0 60
SCALE IN FEET

ALEXANDRIA. SASAKI GENESIS ARCHITECTS • ENGINEERS • CONSTRUCTORS SMMA

PUBLIC TRANSPORTATION INFORMATION


Buckley Transportation Center
Common St
Essex St
Broadway
Methuen
Lawrence
Bruce School
Water St
Shattuck St
Philip J Riley Park
Merrimack River
Newton St
Andover St & Newton St
Andover St & Beacon St
Courtyard Marriott
Greater Lawrence Vo-Tech HS
Lawrence Technical School
Marriott Springhill St
Campanelli Dr
Minuteman Rd
River Rd
Andover St
Amherst St
Bowdoin St
Clifton St
Davis St
Jefferson St
Glenn St
Shepard St
Beacon St
Frost School
Shepard St & Glenn St
Mt Vernon St & Jefferson St
Mt Vernon St
North St
Mt Vernon St & North St
Andover
113
110
93
495
1
2
3
4
5
6
7
8
9
10
11
Legend
NORTH
Time Point
Inbound Bus Route
Outbound Bus Route
No Stop Zone
Snow Route
Municipal Boundary
0 0.125 0.25 0.5 Miles
Prepared by: Merrimack Valley Planning Commission (1/13/2017)

Fares

Fares
Statewide Access Pass
How to Ride
More

All fares are one-way. All-Day and 31-Day Passes are available.

The MBTA Charlie Card is also accepted at these fares. Learn more about the CharlieCard here.

Click here to learn how to use the MVRTA Charlie Card.

Si necesita esta información en español, contacte a la Coordinadora del Título VI de la MVRTA al 978- 469- 6878 x134 o por correo electrónico a: mchester@mvrta.com.

Nếu quý vị cần thông tin này bằng tiếng Việt, vui lòng liên hệ với Điều phối viên Luật VI của MVRTA theo số 978- 469- 6878 x134 hoặc địa chỉ email: mchester@mvrta.com.

如果需要简体中文信息，请联系MVRTA Title VI协调员，电话：978- 469- 6878 x134，电子邮件：mchester@mvrta.com。

Fixed Route Fares

FIXED ROUTE FARE	CASH	CHARLIE CARD
Full Fare	$1.25	$1.00
Reduced Fare*	$.60	$.50
Children 5 & under (with adult)	Free	Free
Transfers	Free	Free

*Reduced fare available to:
- Senior Citizens (60+)
- Passengers with disabilities
- Passengers with valid Medicare Card
- Students (13-17)
- Children (6-12)
- Passengers with Statewide Access Pass

Any state-issued ID with your date of birth may be used as proof of age for reduced fare

Beach Bus Fares

BEACH BUS FARE	CASH / CHARLIE CARD	REDUCED FARE
To/From Salisbury Beach	$2.00	$1.00
To/From Hampton Beach	$3.00	$1.50

- No transfers
- Day passes not accepted
- Monthly passes can only be used up to Salisbury Beach

Passes

TYPE	PRICE

TYPE	PRICE
31-Day Pass Full Fare	$30.00
31-Day Pass, Reduced Fare*	$15.00
All-Day Pass Full Fare	$3.00
All-Day Pass, Reduced Fare*	$1.50

*Reduced fare available to:
- Senior Citizens (60+)
- Passengers with disabilities
- Passengers with valid Medicare Card
- Students (13-17)
- Children (6-12)
- Passengers with Statewide Access Pass

Any state-issued ID with your date of birth may be used as proof of age for reduced fare

All Day Passes allow one passenger unlimited rides for an entire day. When boarding the MVRTA bus, simply advise the bus operator that you would like to purchase an All-Day Pass. The All-Day Pass will then be issued directly from the farebox once you deposit the appropriate fare. To use the pass, simply swipe it through the farebox each time you board the bus.

Haga clic aquí para tarifas.

点击这里查看票价。

Bấm vào đây để giá vé.

Pass Purchase Locations:

Washington Square Transit Station
12 Washington Sq.
Haverhill, Ma. 01830
(978) 372-3900

Buckley Transportation Center
295 Common St.
Lawrence, Ma. 01840
(978) 688-8903

Lost & Damaged Tickets

Tickets are not refundable and lost, stolen, or damaged tickets cannot be replaced.

Lost & Damaged Charlie Cards

Lost, stolen, and damaged Charlie Cards should be reported immediately to preserve as much value as possible. Riders are responsible for fares while lost, stolen, or damaged Charlie Cards issues are resolved.

Contact Us

MVRTA Administrative Offices

Monday - Friday
8:00AM - 5:00PM

85 Railroad Avenue
Haverhill, MA 01835

(978) 469-6878

(978) 521-5956

marketing@mvrta.com

Administration

Advisory Board Meeting
Careers
Contact Us

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About MVRTA

The MVRTA serves the northeast corner of Massachusetts with over 1 million miles of scheduled bus routes, and elderly and disabled transportation.

MASSDOT CRASH REPORTS AND HIGH CRASH LOCATION MAPPING

MassDOT Crash Report for ANDOVER 2017, report created: 5/6/2021 **created: 5/6/2021**

RMV Crash Number	City Town Name	Crash Date	Crash Time	Crash Severity	Maximum Injury Severity Reported	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance From Nearest Roadway Intersection	Distance From Nearest Milemarker	Distance From Nearest Exit	Distance From Nearest Landmark	Non Motorist Type	X Cooordinate	Y Cooordinate
4478902	ANDOVER	26-Jul-2017	3:42 PM	Property damage only (none injured)	No injury	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))	Dry	Daylight	Clear/Clear		159 RIVER RD					223563.45857919	937656.98680236

MassDOT Crash Report for ANDOVER 2018, report created: 5/6/2021 created: 5/6/2021

RMV Crash Number	City Town Name	Crash Date	Crash Time	Crash Severity	Maximum Injury Severity Reported	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance From Nearest Roadway Intersection	Distance From Nearest Milemarker	Distance From Nearest Exit	Distance From Nearest Landmark	Non Motorist Type	X Cooordinate	Y Cooordinate
4578198	ANDOVER	27-Jul-2018	4:23 PM	Property damage only (none injured)	No injury	1	0	0	Single vehicle crash	V1: Turning right	V1: E	V1:(Collision with other movable object)	V1:(Tractor/semi-trailer)	Dry	Daylight	Clear		159 RIVER RD					223557.67220752	937667.8729787

MassDOT Crash Report for ANDOVER 2017, report created: 12/28/2021 **created: 12/28/2021**

RMV Crash Number	City Town Name	Crash Date	Crash Time	Crash Severity	Maximum Injury Severity Reported	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance From Nearest Roadway Intersection	Distance From Nearest Milemarker	Distance From Nearest Exit	Distance From Nearest Landmark	Non Motorist Type	X Cooordinate	Y Cooordinate
4331536	ANDOVER	24-Feb-2017	12:13 PM	Property damage only (none injured)	No injury	2	0	0	Sideswipe, same direction	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))	Dry	Daylight	Clear		150 feet W from Intersection 170 RIVER RD					223366.21619822	937457.14264178

MassDOT Crash Report for ANDOVER 2018, report created: 12/28/2021 **created: 12/28/2021**

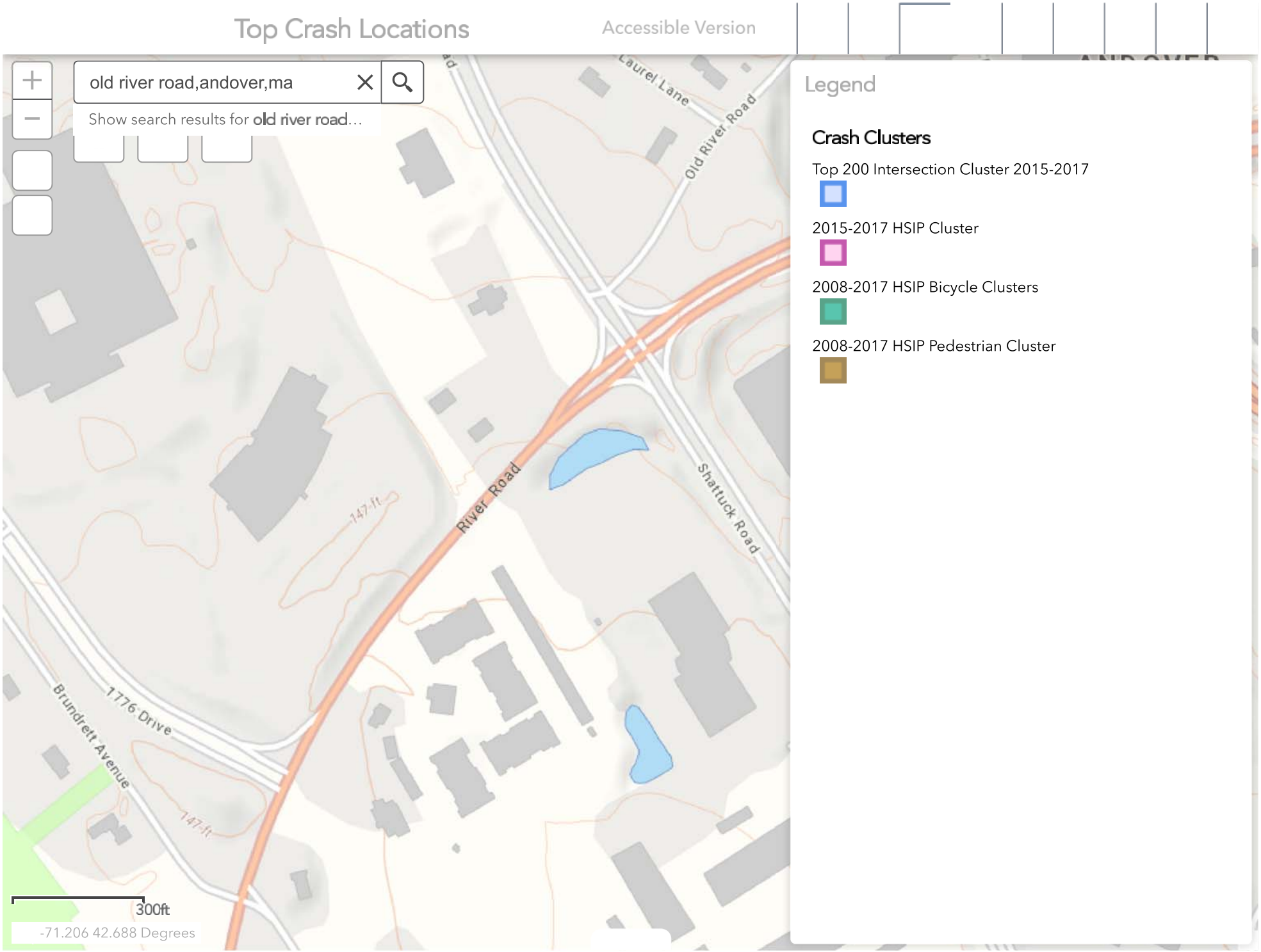
RMV Crash Number	City Town Name	Crash Date	Crash Time	Crash Severity	Maximum Injury Severity Reported	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance From Nearest Roadway Intersection	Distance From Nearest Milemarker	Distance From Nearest Exit	Distance From Nearest Landmark	Non Motorist Type	X Cooordinate	Y Cooordinate
4578344	ANDOVER	02-Aug-2018	7:04 PM	Property damage only (none injured)	No injury	2	0	0	Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Wet	Daylight	Rain		176 RIVER RD					223320.05370126	937383.48630961

MassDOT Crash Report for ANDOVER 2019, report created: 12/28/2021 **created: 12/28/2021**

RMV Crash Number	City Town Name	Crash Date	Crash Time	Crash Severity	Maximum Injury Severity Reported	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance From Nearest Roadway Intersection	Distance From Nearest Milemarker	Distance From Nearest Exit	Distance From Nearest Landmark	Non Motorist Type	X Cooordinate	Y Cooordinate
4786339	ANDOVER	03-Dec-2019	9:19 AM	Property damage only (none injured)	No Apparent Injury (O)	2	0	0	Rear-end	V1: Turning right / V2: Travelling straight ahead	V1: W / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Snow	Daylight	Snow/Snow		176 RIVER RD					223320.05365992	937383.48632673

Top Crash Locations

Accessible Version



TRIP-GENERATION CALCULATIONS

Phase I and Former Use
Full Build

Phase I and Former Use

Research and Development Center
(760)

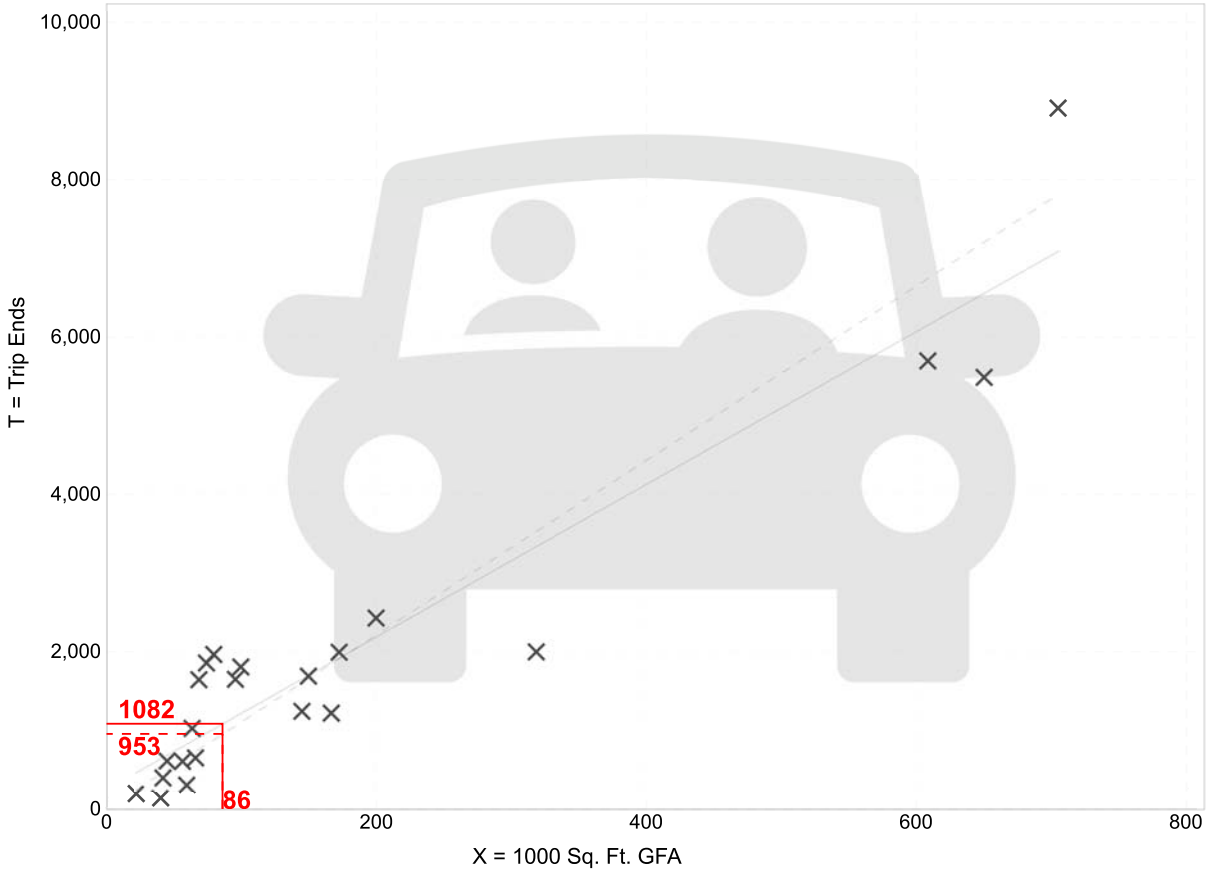
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 22
Avg. 1000 Sq. Ft. GFA: 179
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.08	3.48 - 24.95	4.45

Data Plot and Equation



Fitted Curve Equation: T = 9.70(X) + 247.71

R^2= 0.89

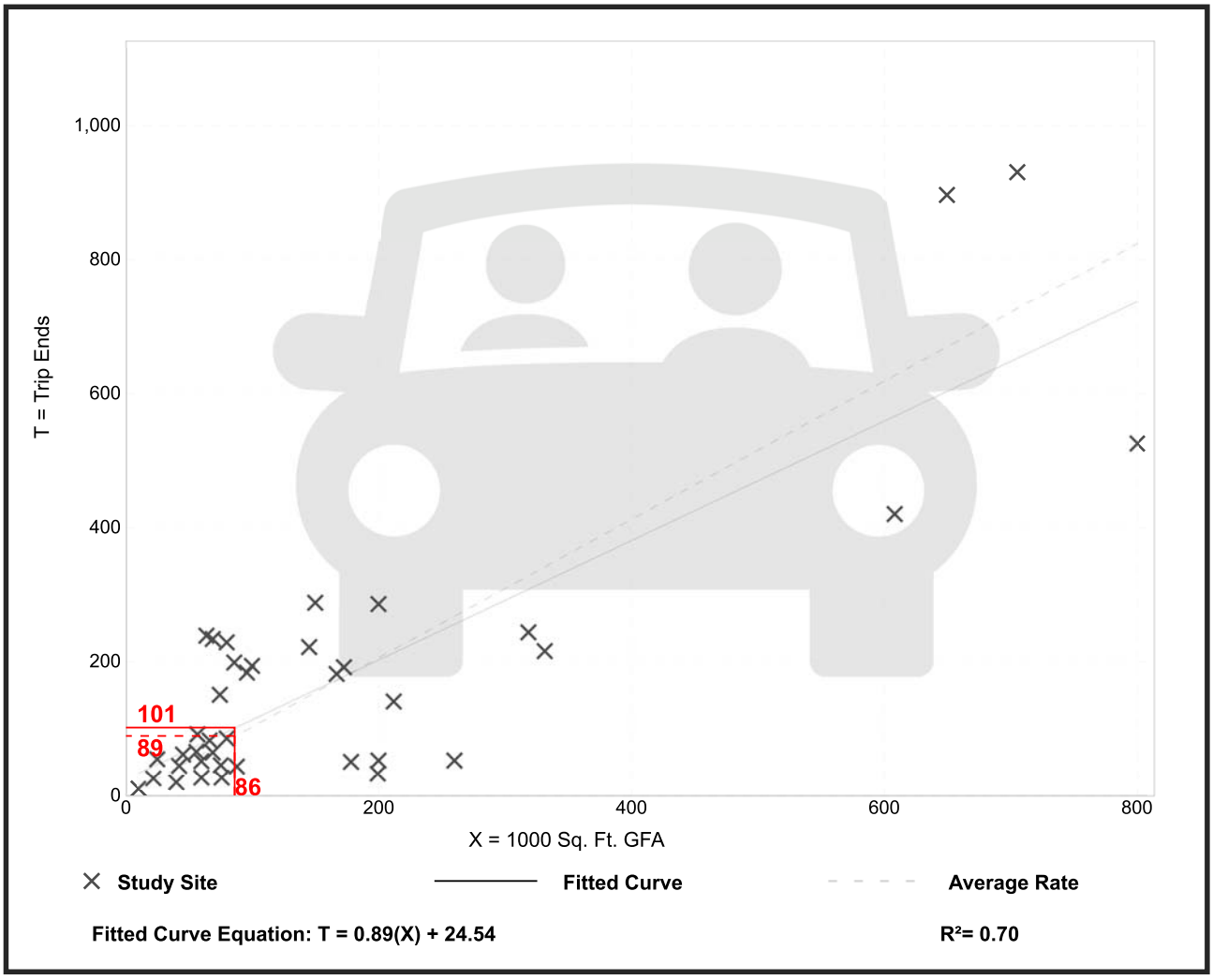
Research and Development Center
(760)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	39
Avg. 1000 Sq. Ft. GFA:	173
Directional Distribution:	82% entering, 18% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.03	0.17 - 3.73	0.65

Data Plot and Equation



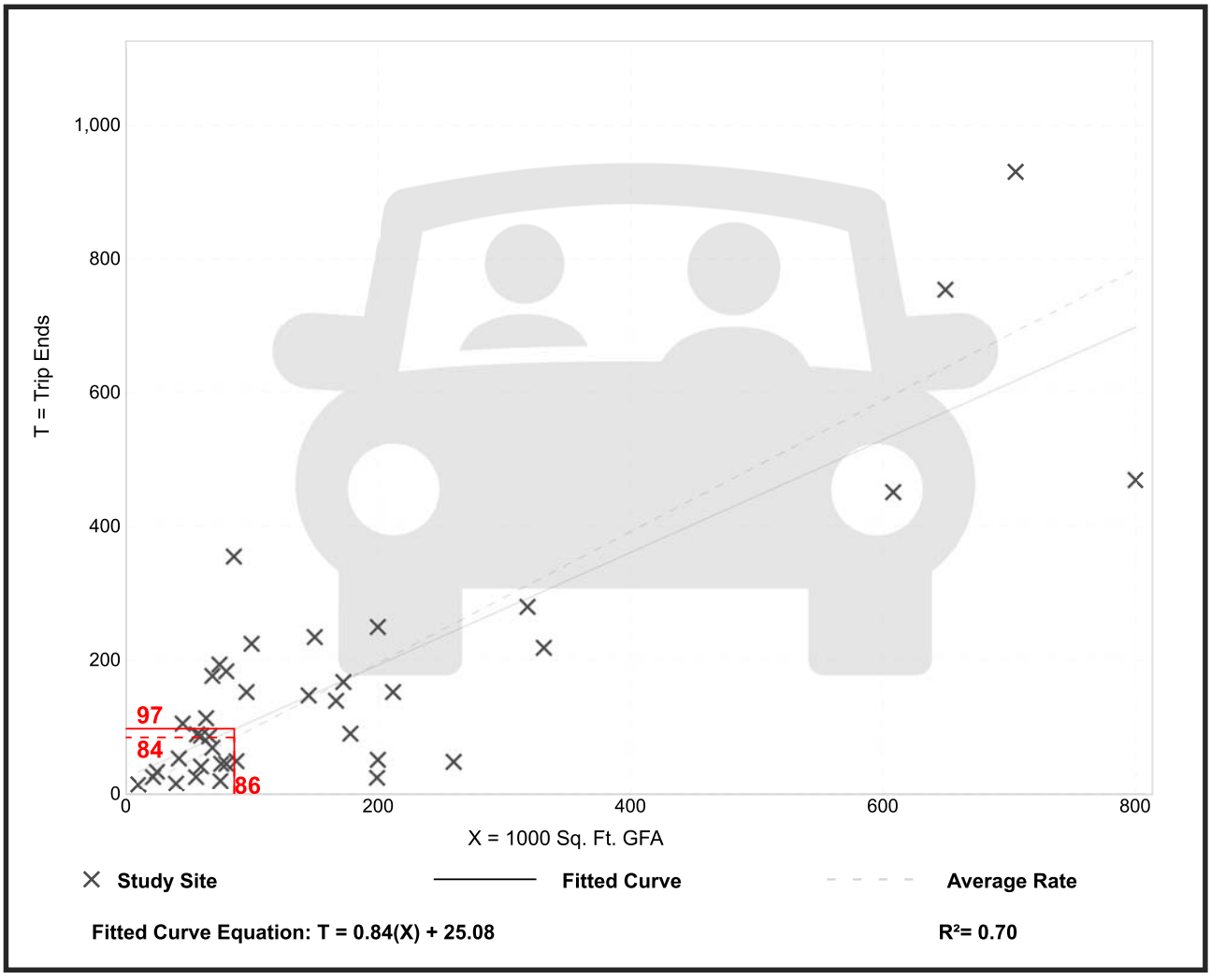
Research and Development Center
(760)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 39
Avg. 1000 Sq. Ft. GFA: 173
Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.98	0.13 - 4.13	0.64

Data Plot and Equation



Manufacturing
(140)

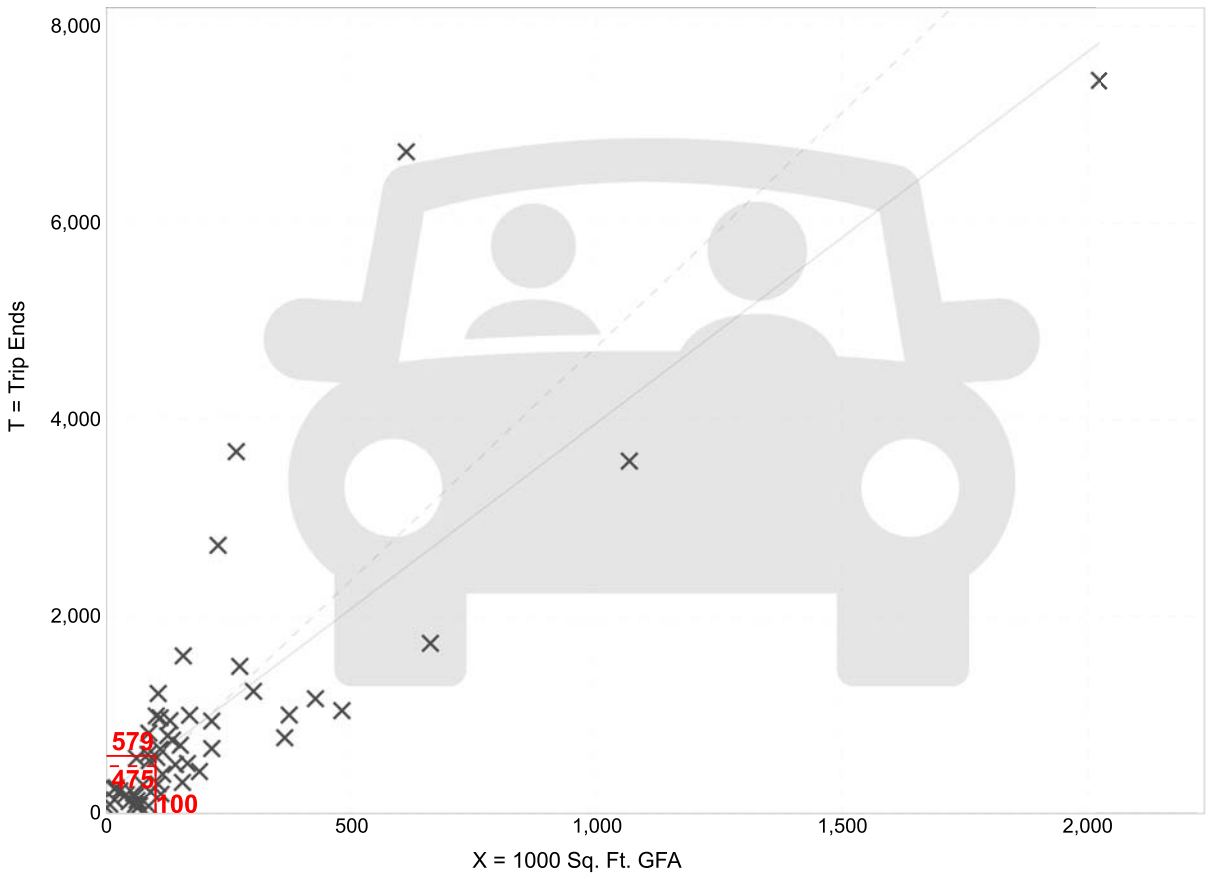
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 53
Avg. 1000 Sq. Ft. GFA: 208
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.75	0.83 - 49.50	3.20

Data Plot and Equation



Fitted Curve Equation: T = 3.77(X) + 201.98

R^2= 0.68

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Manufacturing
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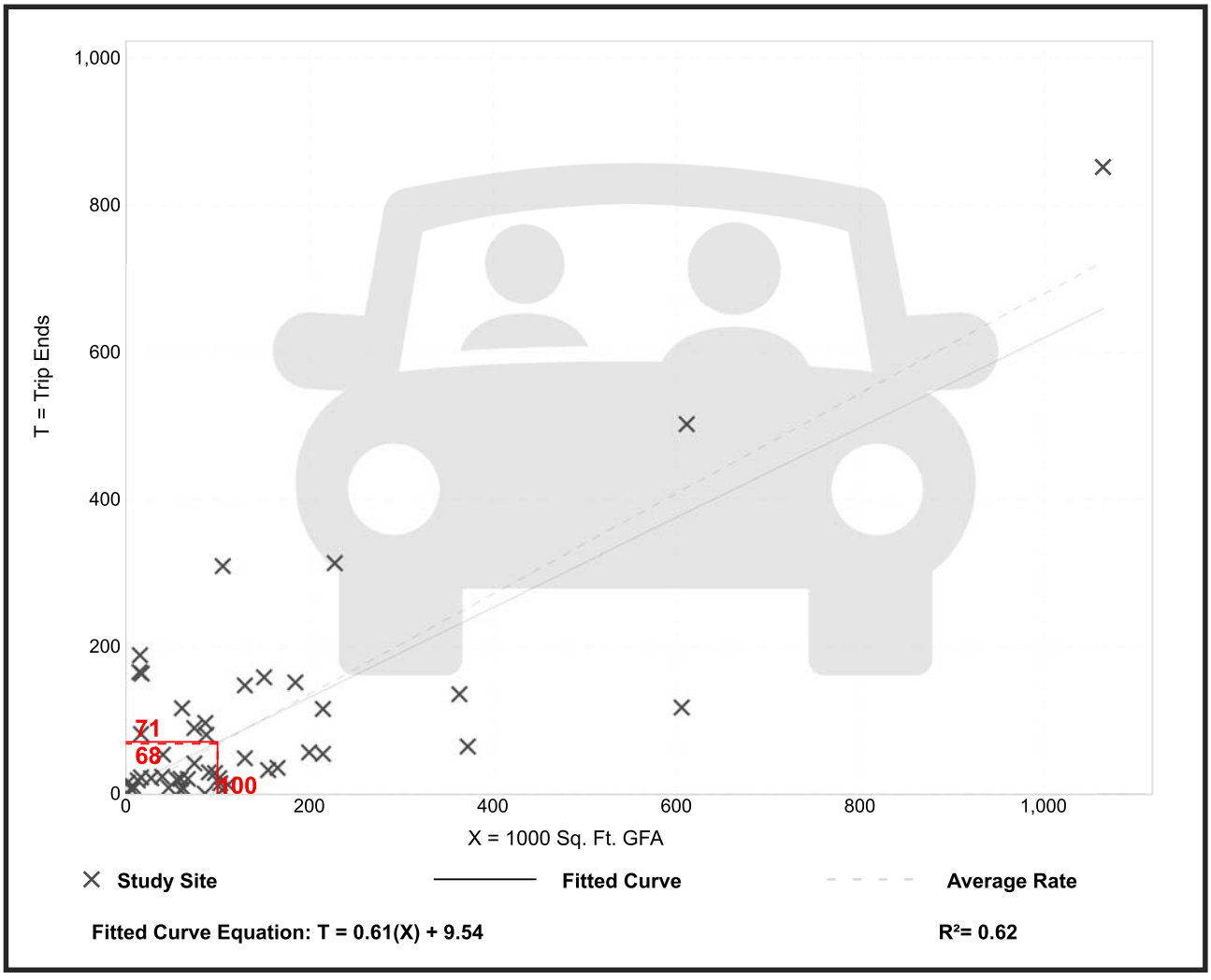
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 48
Avg. 1000 Sq. Ft. GFA: 138
Directional Distribution: 76% entering, 24% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.68	0.01 - 11.93	1.03

Data Plot and Equation



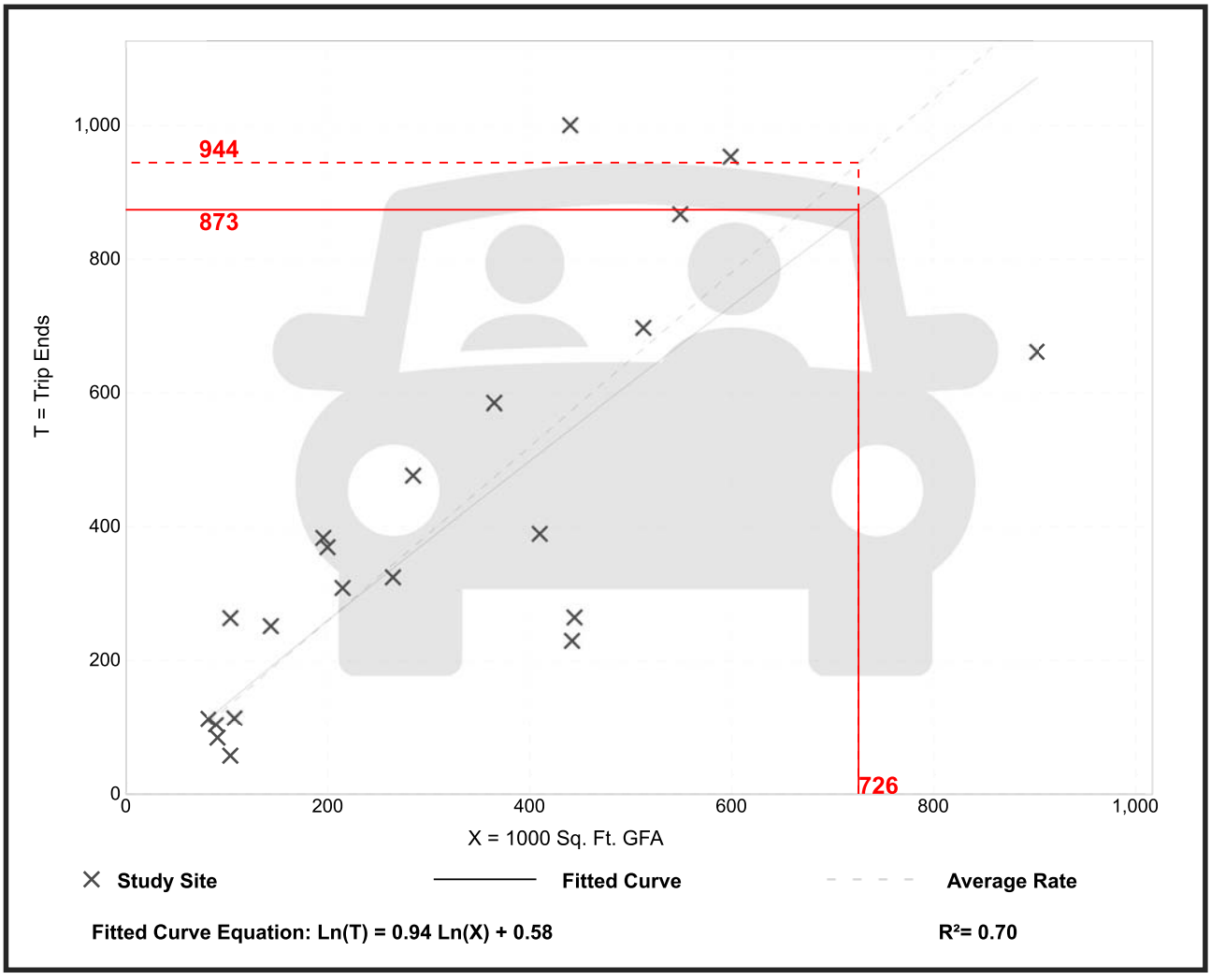
Corporate Headquarters Building
(714)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 312
Directional Distribution: 9% entering, 91% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.30	0.52 - 2.54	0.54

Data Plot and Equation



Corporate Headquarters Building
(714)

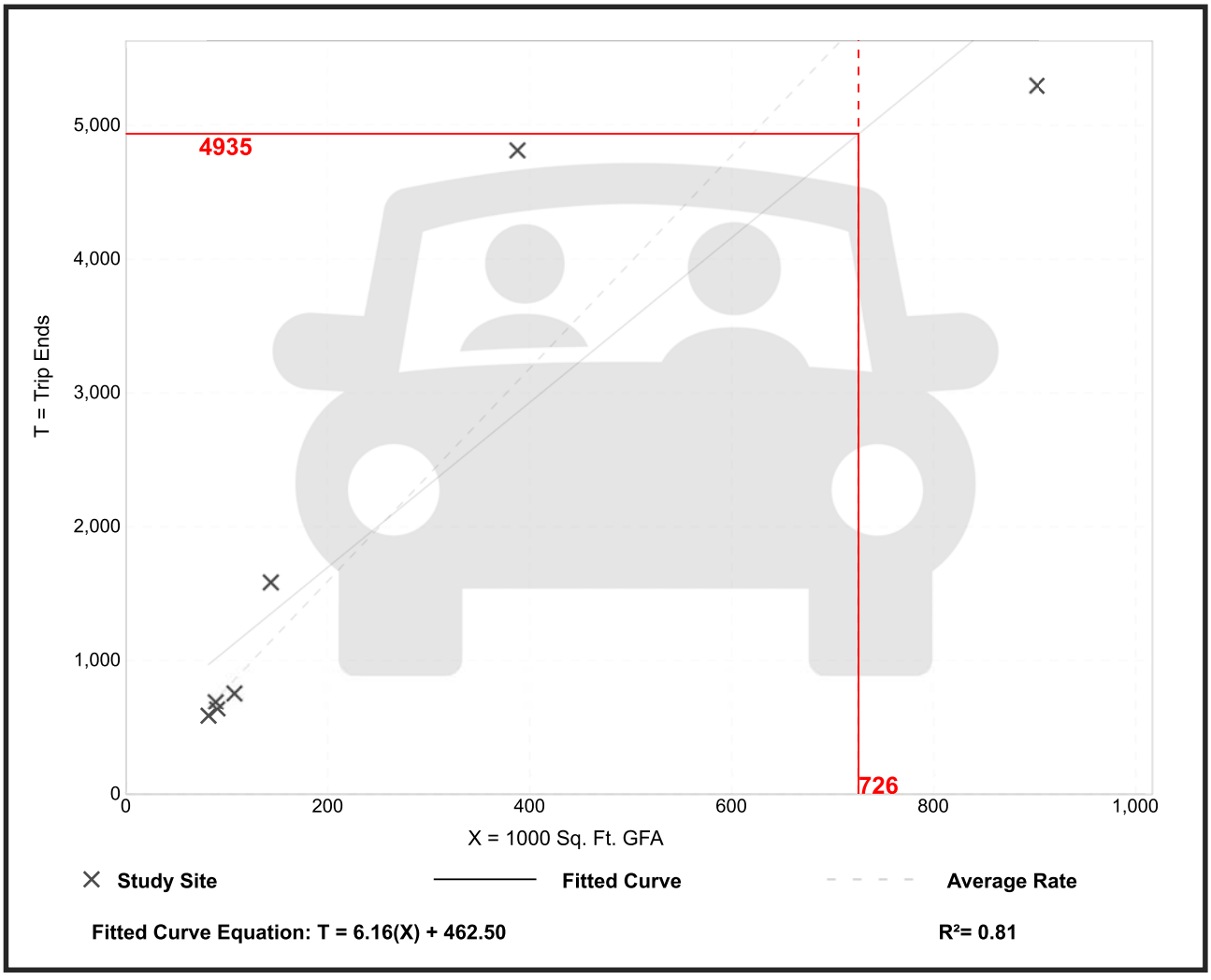
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 7
Avg. 1000 Sq. Ft. GFA: 258
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
7.95	5.87 - 12.39	2.92

Data Plot and Equation



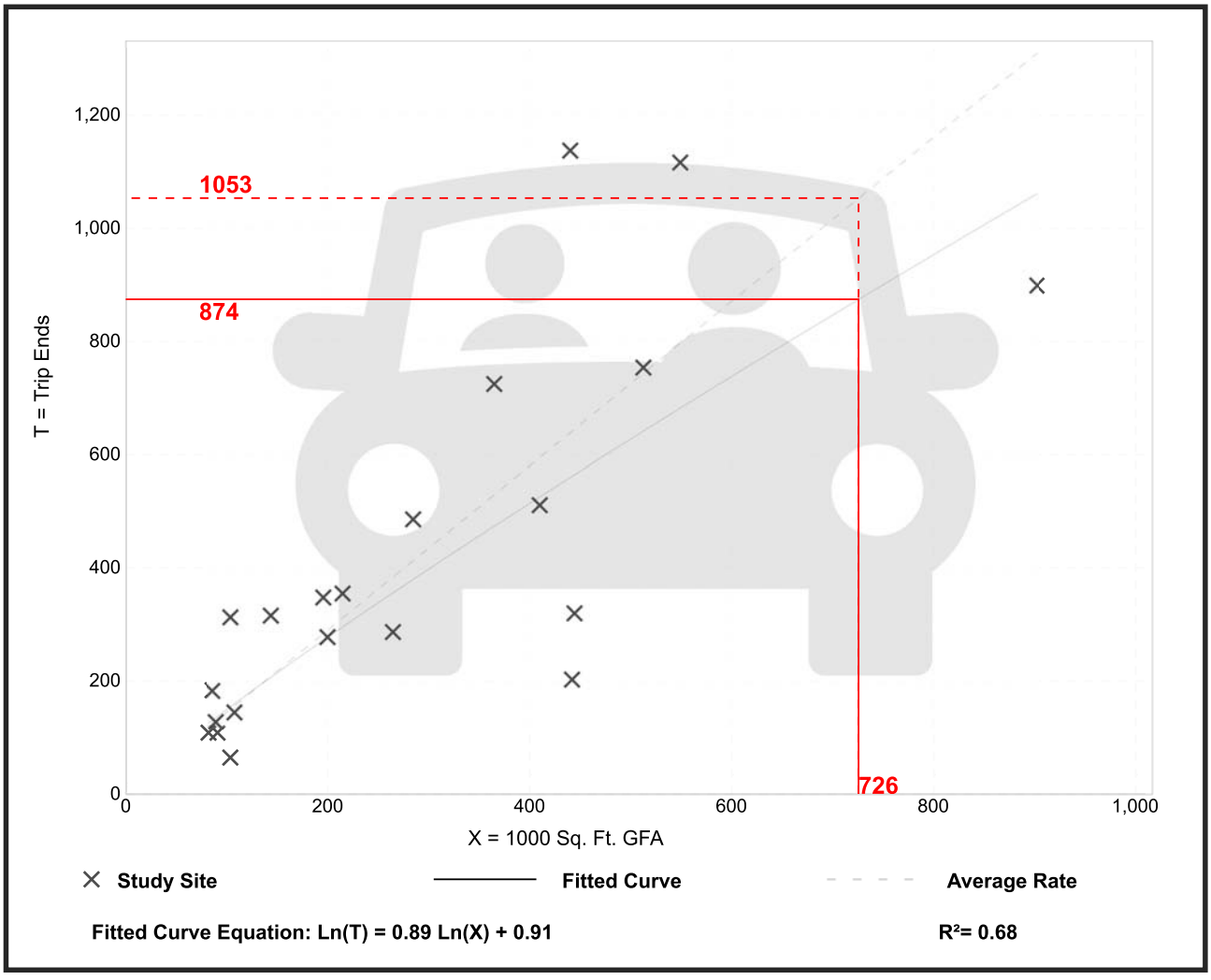
Corporate Headquarters Building
(714)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 287
Directional Distribution: 93% entering, 7% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.45	0.46 - 3.01	0.63

Data Plot and Equation



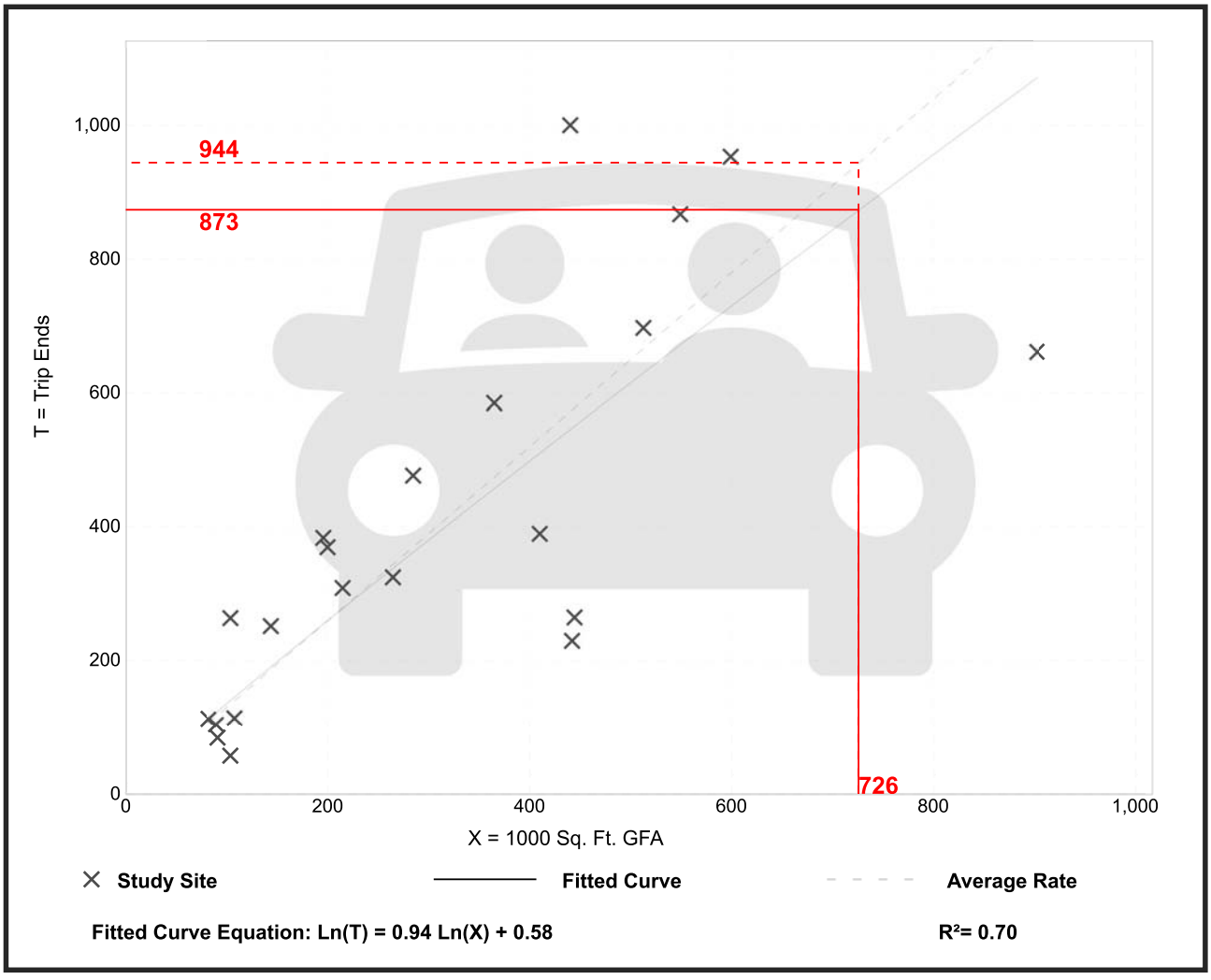
Corporate Headquarters Building
(714)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 312
Directional Distribution: 9% entering, 91% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.30	0.52 - 2.54	0.54

Data Plot and Equation



Full Build

Research and Development Center
(760)

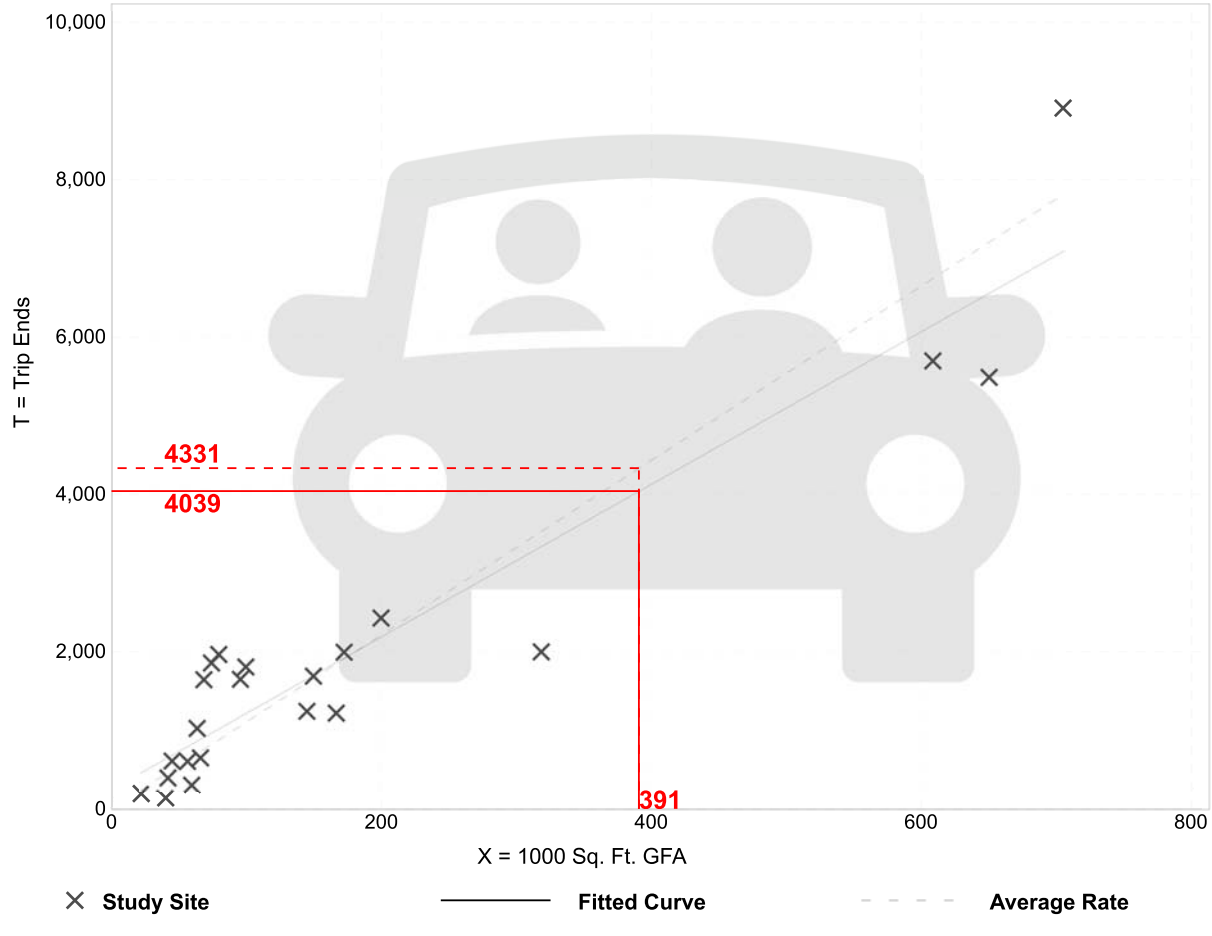
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 22
Avg. 1000 Sq. Ft. GFA: 179
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.08	3.48 - 24.95	4.45

Data Plot and Equation



Fitted Curve Equation: T = 9.70(X) + 247.71

R^2= 0.89

Research and Development Center
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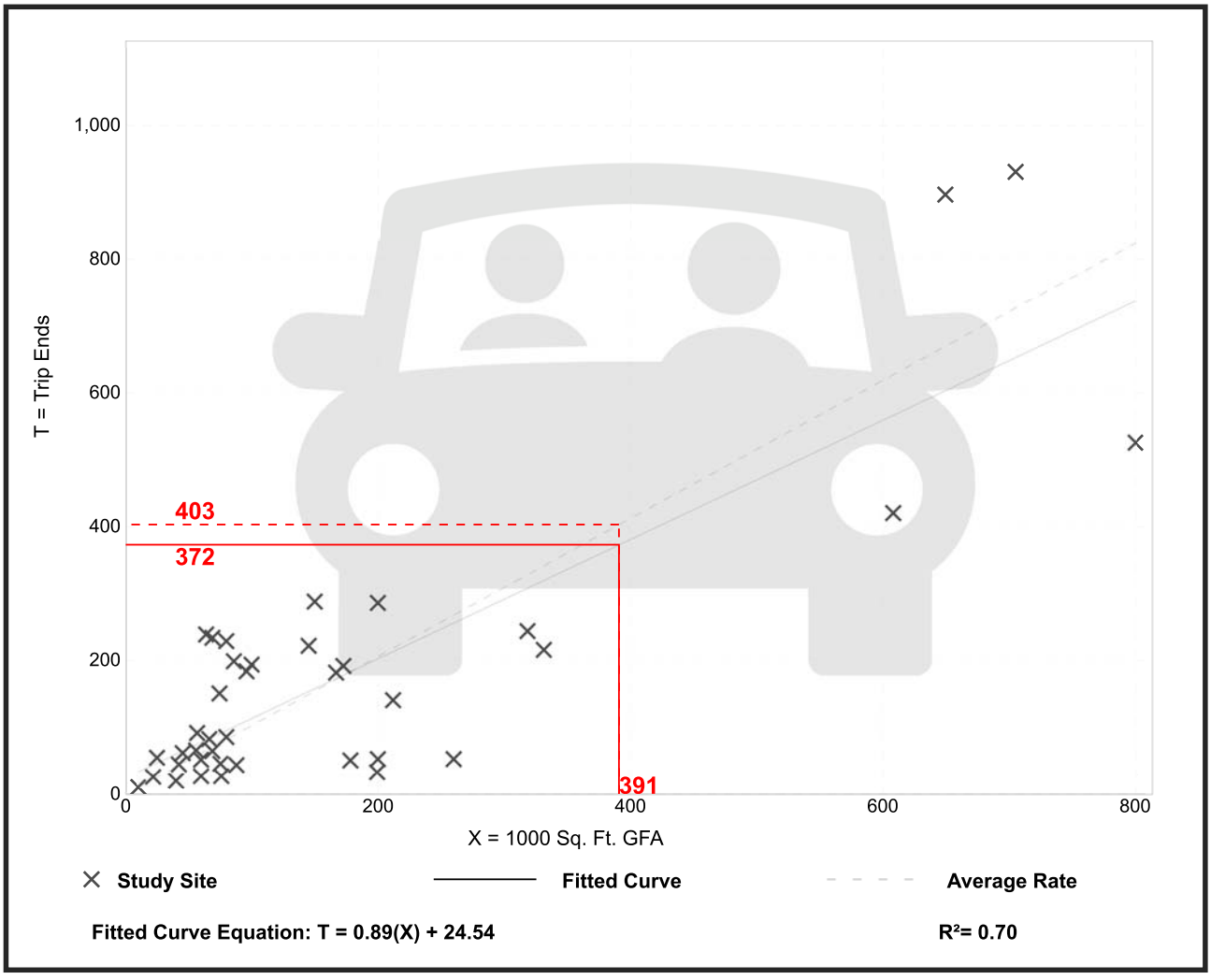
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 39
Avg. 1000 Sq. Ft. GFA: 173
Directional Distribution: 82% entering, 18% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.03	0.17 - 3.73	0.65

Data Plot and Equation



Research and Development Center
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Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
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Setting/Location: **General Urban/Suburban**
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Avg. 1000 Sq. Ft. GFA: 173
Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
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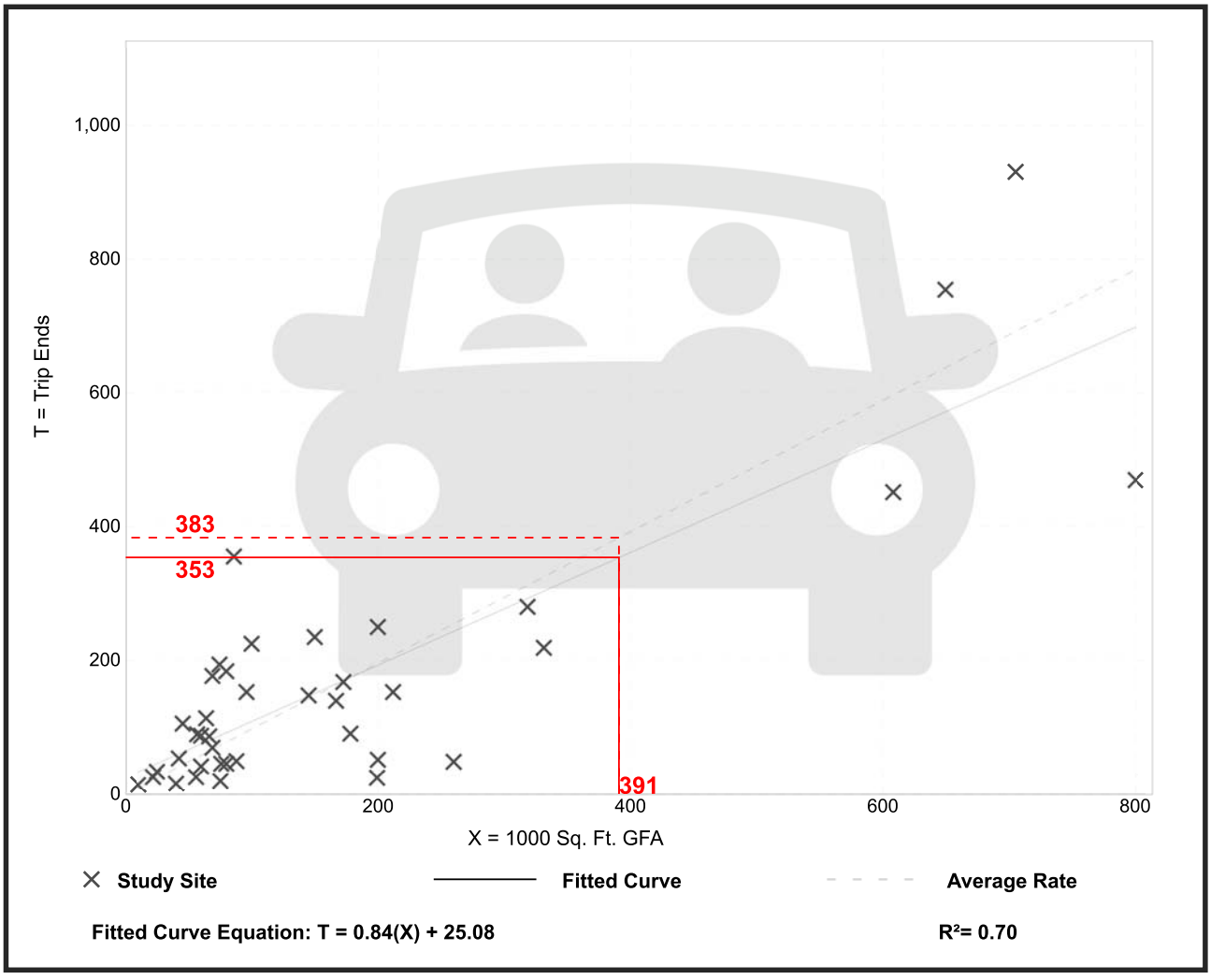
Data Plot and Equation



Manufacturing
(140)

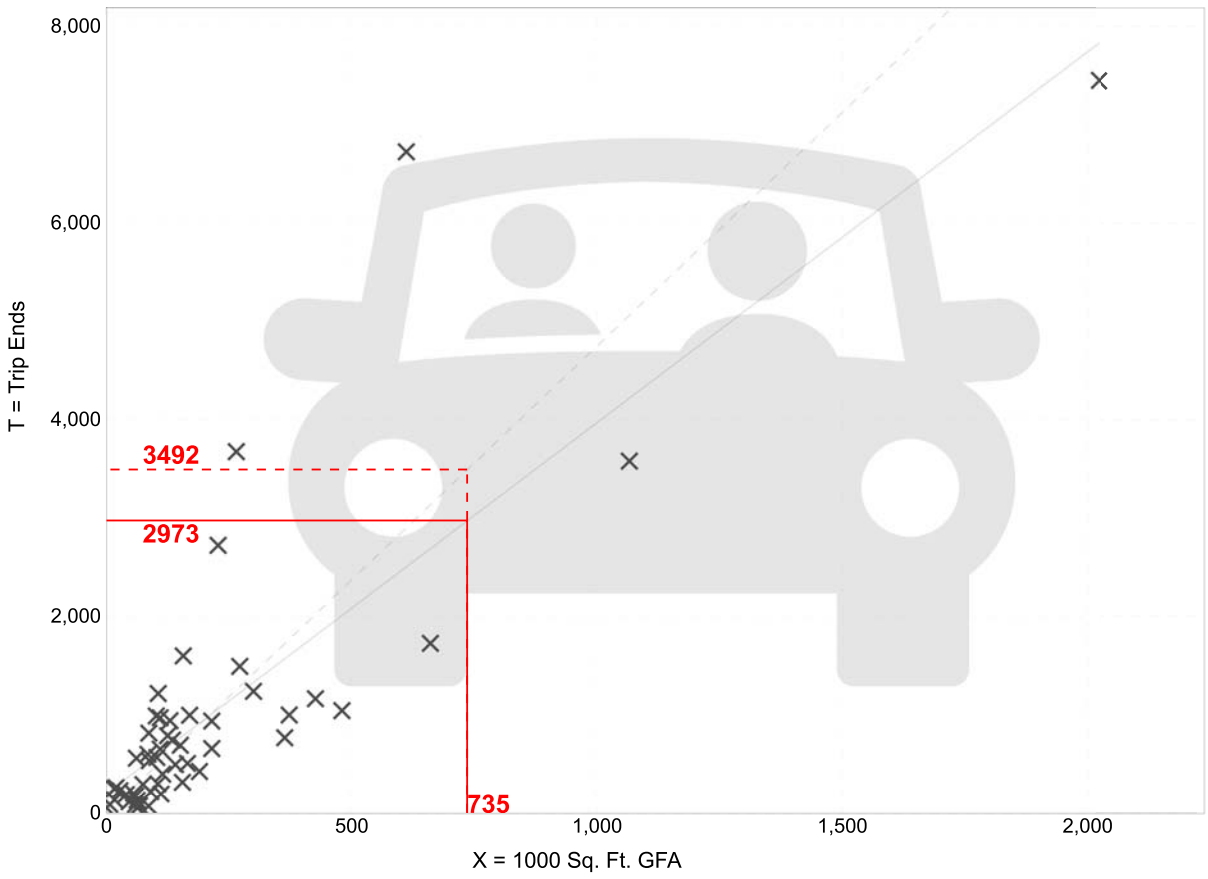
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 53
Avg. 1000 Sq. Ft. GFA: 208
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.75	0.83 - 49.50	3.20

Data Plot and Equation



Fitted Curve Equation: T = 3.77(X) + 201.98

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Manufacturing
(140)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
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One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 48
Avg. 1000 Sq. Ft. GFA: 138
Directional Distribution: 76% entering, 24% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
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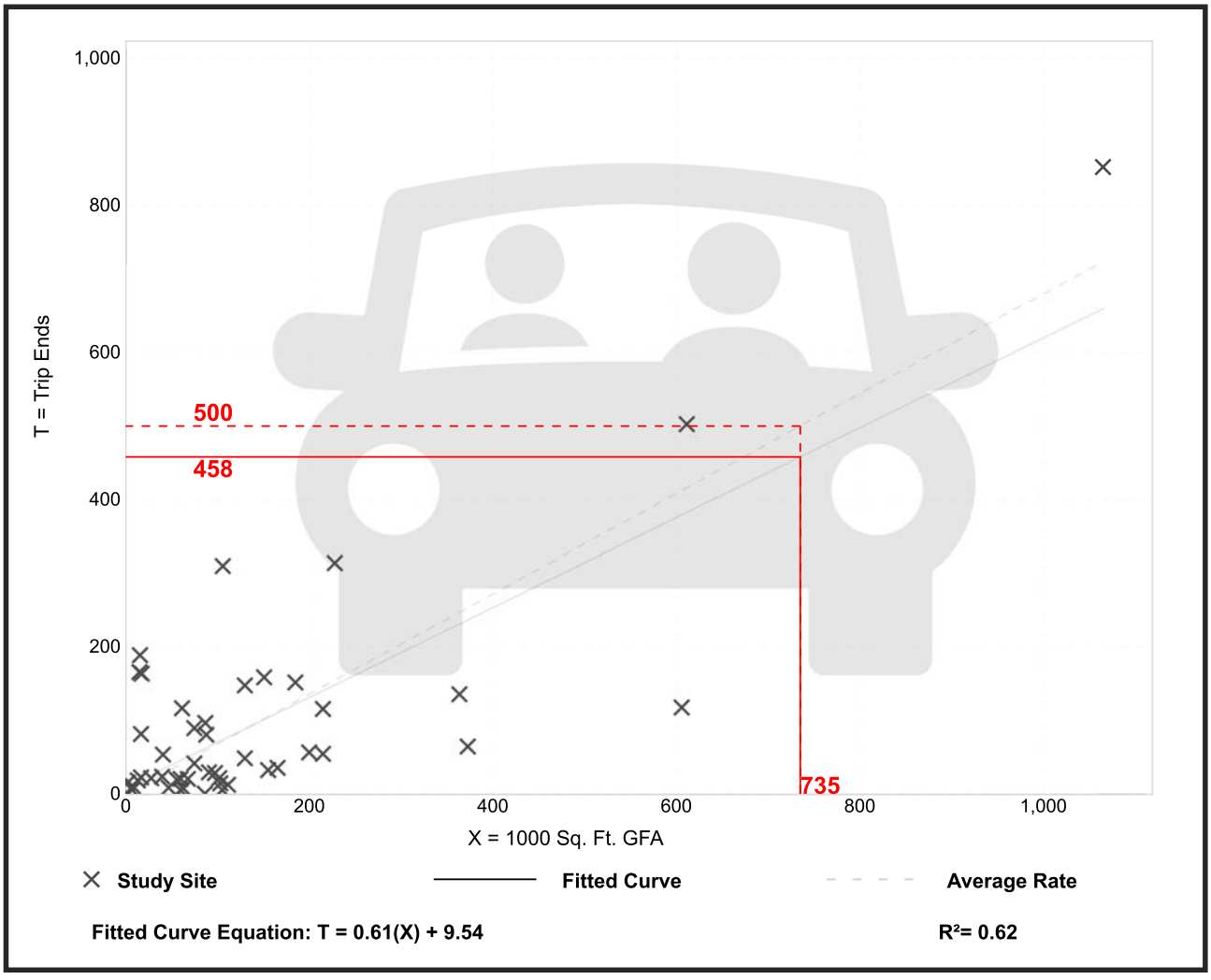
Data Plot and Equation



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Manufacturing
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Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 55
Avg. 1000 Sq. Ft. GFA: 142
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.74	0.07 - 11.37	0.93

Data Plot and Equation