MEMORANDUM

TO: Taj Estates II of Randolph, LLC
c/o Mr. Mirajuddin Ahmed
95 East Main Street
Westborough, MA 01581

FROM: Mr. Jeffrey S. Dirk, P.E.*, PTOE, FITE
Managing Partner *and*
Mr. Daniel LaCivita
Transportation Engineer
Vanasse & Associates, Inc.
35 New England Business Center Drive
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**Professional Engineer in CT, MA, ME, NH, RI and VA*

DATE: September 13, 2022

RE: 9440

SUBJECT: Transportation Impact Assessment
Proposed Mixed-Use Development – 16 Fencourt Avenue
Randolph, 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 proposed construction of a mixed-use development to be located at 16 Fencourt Avenue in Randolph, Massachusetts (hereafter referred to as the "Project"). This assessment: i) reviews the existing conditions context of the transportation infrastructure serving the Project site; and ii) qualitatively evaluates the potential impact of the Project on the transportation infrastructure.

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

1. Using trip-generation statistics published by the Institute of Transportation Engineers (ITE)[1] for similar land uses that will be located within the Project site, the Project is expected to generate approximately 1,334 vehicle trips on an average weekday (two-way, 24-hour volume), with approximately 188 vehicle trips expected during the weekday morning peak-hour and 200 vehicle trips expected during the weekday evening peak-hour;

2. In comparison to the former use that operated within the Project site and that will be removed to accommodate the Project (senior and veterans center), the Project is expected to generate 1,046 additional vehicle trips on an average weekday, with 169 additional vehicle trips expected during the weekday morning peak-hour and 175 additional vehicle trips expected during the weekday evening peak-hour;

3. No apparent safety deficiencies were noted with respect to the motor vehicle crash history in the vicinity of the Project site; and

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

4. Lines of sight to and from the Project site driveway are expected to exceed the recommended minimum distance for the intersection to operate in a safe manner.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the recommendations defined herein. The following details our findings with respect to the Project.

PROJECT DESCRIPTION

The Project will entail the construction of a mixed-use development to be located at 16 Fencourt Avenue in Randolph, Massachusetts, that will include a 12,000± square foot (sf) day care facility and two (2) three-story residential buildings that will accommodate a total of 107 multifamily units. The Project site encompasses 7.13± acres of land that is bounded by residential properties and Fencourt Avenue to the north; residential properties, Castleton Avenue and Restarick Avenue to the south; Fencourt Avenue, Castleton Avenue and residential properties to the east; and Desmond Avenue and residential properties to the west. The Project site is currently occupied by a one-story building (former James M. Hurley Senior & Veterans Center) with associated parking area and appurtenances that will be removed to the accommodate the Project, and areas of open and wooded space.

Imagery ©2022 Google

Access to the Project site will be provided by way of a new driveway that will intersect the west side of Fencourt Avenue at the 90 degree bend approximately 320 feet south of Union Street (Route 139). Vehicles entering and exiting the Project site will be separated by a raised landscaped island at Fencourt Avenue. Off-street parking will be provided for 183 vehicles to support both uses. Sidewalks are provided within the Project site and around the building perimeters that link the proposed buildings to the sidewalk along Fencourt Avenue.

EXISTING CONDITIONS

In order to establish the existing conditions context of the Project with respect to the transportation infrastructure, a review of existing roadway geometrics; pedestrian and bicycle facilities; posted speed limits; and land use information was completed along Fencourt Avenue and at the intersections of Fencourt Avenue with both Union Street (Route 139) and Center Street. The following provides a description of the transportation infrastructure serving the Project site.

Roadways

Fencourt Avenue

- Two-way local access roadway under Town jurisdiction
- Traverses a circuitous alignment between Center Street and Route 139
- Provides a variable width paved traveled way that ranges from 20-feet to 40-feet, with the 40-foot wide section located between the 90 degree bend at the Project site and Route 139
- A faded double-yellow centerline is provided approaching Route 139 for a distance of approximately 130-feet, with no pavement markings provided along the remainder of the roadway
- Sidewalks are provided along both sides of the roadway between Route 139 and the existing driveway that serves the Project site
- Illumination is provided by way of street lights mounted on wood poles
- The statutory speed limit pursuant to M.G.L. c. 90 § 17C is 25 miles per hour (mph)[2]
- Land use within the study area consists of the Project site, residential properties and areas of open and wooded space

Intersections

Table 1 summarizes existing lane use, traffic control, and pedestrian and bicycle accommodations at the study area intersections.

[2]The statutory or "prima facie" speed is defined in M.G.L Chapter 90, Section 17, as the speed which would be deemed reasonable and proper to operate a motor vehicle. On March 27, 2017, the Town of Randolph enacted a townwide statutory speed limit of 25 mph on roadways located within a thickly settled district that are not subject to a special speed regulation (i.e., posted speed limit).

Table 1
STUDY AREA INTERSECTION DESCRIPTION

Intersection	Traffic Control Type[a]	No. of Travel Lanes Provided	Shoulder Provided? (Yes/No/Width)	Pedestrian Accommodations? (Yes/No/Description)	Bicycle Accommodations? (Yes/No/Description)
Rte. 139/ Fencourt Ave.	S	1 general-purpose travel lane provided on all approaches	Yes; 2 to 5-feet on Rte. 139	Yes; sidewalks provided along both sides of the intersecting roadways; crosswalk provided for crossing Fencourt Ave. and the Rte. 139 west leg approximately 50 ft west of the intersection	Yes; shared-traveled-way along Rte. 139[b]
Center St./ Fencourt Ave.	S	1 general-purpose travel lane provided on all approaches	Yes; 3 to 6-feet on Center St.	Yes; sidewalk provided along the west side of Center St. south of the intersection	Yes; shared-traveled-way along Center St.

[a]S = STOP-sign control.
[b]Combined shoulder and travel lane width equal to or exceed 14 feet.

Pedestrian and Bicycle Facilities

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in September 2022. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of existing and planned future bicycle facilities. Sidewalks are provided along both sides of Route 139, along the west side of Center Street south of Fencourt Avenue, and on both sides of Fencourt Avenue from Union Street to the 90 degree bend in the roadway, with marked crosswalks provided for crossing the Fencourt Avenue and Route 139 west legs of the Route 139/Fencourt Avenue intersection.

Formal bicycle facilities are not provided within the study area; however, Route 139 and Center Street provide sufficient width (combined travel lane and shoulder) on a continuous basis to support bicycle travel in a shared traveled-way configuration (i.e., motor vehicles and bicyclists sharing the roadway).[3]

Public Transportation Services

Public transportation services are provided within the study area by the Massachusetts Bay Transportation Authority (MBTA). The MBTA provides fixed-route bus service along Route 139 by way of Route 238, *Holbrook/Randolph – Quincy Center Station*, and Route 240, *Avon Square - Ashmont Station* (weekday service only) The Route 238 bus provides service between Quincy Center and the MBTA Randolph/Holbrook Commuter Rail Station, where connections can be made to the Red Line subway, the Commuter Rail (Middleborough/Lakeville Line) and other MBTA bus routes. The Route 240 bus provides service between Avon Square and Ashmont Station on the MBTA Red Line subway system, with weekday peak period service provided to the Randolph/Holbrook Commuter Rail Station. The closest regular stop for the Route 238 and Route 240 buses is located at the Route 139/Fencourt Avenue intersection, approximately 0.1 miles (a 2-minute walk) to the north of the Project site. In addition, the MBTA also operates the RIDE paratransit service for eligible persons who cannot use fixed-route bus services all or

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

some of the time due to a physical, cognitive, or mental disability in compliance with the Americans with Disabilities Act (ADA).

Motor Vehicle Crash Data

A review of the MassDOT statewide high crash location database (Highway Safety Improvement Program (HSIP) listing) indicates that there are no high crash locations in the vicinity of the Project site.

PROJECT-GENERATED TRAFFIC

As proposed the Project will entail the construction of a mixed-use development that will include a 12,000± sf day care facility and two (2) three-story residential buildings that will accommodate a total of 107 multifamily units. In order to determine the traffic characteristics of the Project, trip-generation statistics and methodologies published by the Institute of Transportation Engineers (ITE)[4] for similar land uses as those proposed were used. ITE Land Use Codes (LUCs) 220, *Multifamily Housing (Low-Rise)* and 565, *Day Care Center*, were used develop the base trip-generation calculations of the Project.

Transit Use

Given the availability of public transportation services to the Project site (MBTA bus service and connections to the Commuter Rail) and the interconnected network of sidewalks and bicycle accommodations, it is expected that a portion of the residents of the Project will use public transportation services, walk, or bicycle, thereby reducing the volume of single-occupant vehicle (SOV) trips that may be associated with the Project. In order to determine the proportion of residents of the Project that may use transit, walk, or bicycle as their primary mode of transportation, travel mode data obtained from the 2015-2019 American Community Survey (ACS) for the Census Tracts that contain the Project site (Census Tracts 4203.01 and 4203.02) were reviewed. Based on the ACS data, the following commuting modes were identified for workers aged 16 or older who reside within the Town:

- Single-Occupant Vehicle: 77.0%
- Car/Vanpool/Taxi: 9.7%
- Public Transportation: 9.7%
- Walk/Bike/Other: 2.5%%
- Worked at Home: 1.1%

According to the ACS data, approximately 23 percent of workers that reside in the Census Tracts that contain the Project site reported they used an alternative mode of transportation to a SOV to travel to/from work, with approximately 10 percent participating in car or vanpool, 10 percent using public transportation (transit) and 3 percent walking/bicycling or using other methods of transportation. In addition, 1 percent of respondents reported that they worked at home.

That being said, in order to provide conservative (high) traffic volumes from which to assess the potential impact of the Project on the transportation infrastructure, a reduction of the ITE base trip-generation calculations was not applied to account for transit use or the use of alternative modes of transportation to SOVs.

Table 2 summarizes the anticipated traffic characteristics of the Project using the above methodology.

[4] Ibid 1.

Table 2
TRIP GENERATION SUMMARY

Time Period/Direction	Vehicle Trips (A) Multifamily Residential (107 units)[a]	(B) Day Care Center (12,000 sf)[b]	(A + B) Total Trips
Average Weekday Daily:			
Entering	381	286	667
Exiting	381	286	667
Total	762	572	1,334
Weekday Morning Peak Hour:			
Entering	13	70	83
Exiting	43	62	105
Total	56	132	188
Weekday Evening Peak Hour:			
Entering	42	62	104
Exiting	25	71	96
Total	67	133	200

[a]Based on ITE LUC 220, *Multifamily Housing (Low-Rise)*.
[b]Based on ITE LUC 565, *Day Care Center.*

Project-Generated Traffic Volume Summary

As can be seen in Table 3, the Project is expected to generate approximately 1,334 vehicle trips on an average weekday (two-way volume over the operational day of the Project, or 667 vehicles entering and 667 exiting), with approximately 188 vehicle trips (83 vehicles entering and 105 exiting) expected during the weekday morning peak-hour and 200 vehicle trips (104 vehicles entering and 96 exiting) expected during the weekday evening peak-hour.

With consideration of the use of public transportation and pedestrian/bicycle trips by the residents of the Project and the dispersal of trips over the respective peak hours and to Route 139, Center Street, and the surrounding roadways, the additional traffic attributable to the Project would not be expected to result in a significant impact (increase) on motorist delays or vehicle queueing over existing conditions. The potential impacts associated with the Project can be further reduced through implementation of a Transportation Demand Management (TDM) program that encourages the use of alternative modes of transportation to SOVs (discussed in the Recommendations section of this assessment).

Table 3 compares the traffic characteristics of the Project to those of the former Senior & Veterans Center that operated at the Project site.

Table 3
TRIP GENERATION SUMMARY COMPARISON

Time Period/Direction	Vehicle Trips (A) Proposed Mixed-Use Development	(B) Existing Senior and Veterans Center (10,000± sf)[a]	(A - B) Difference
Average Weekday Daily:	1,334	288	+1,046
Weekday Morning Peak Hour:	188	19	+169
Weekday Evening Peak Hour:	200	25	+175

[a]Based on ITE LUC 495, *Recreational Community Center*.

As can be seen in Table 3, in comparison to the former Senior & Veterans Center, the Project is expected to generate approximately 1,046 additional vehicle trips on an average weekday, with 169 additional vehicle trips expected during the weekday morning peak-hour and 175 additional vehicle trips expected during the weekday evening peak hour.

SIGHT DISTANCE ASSESSMENT

The Project site driveway has been situated along Fencourt Avenue so as to afford clear lines of sight to and from Route 139 and Center Street, with the sight line to/from Union Street approximately 338 feet and the sight line to/from Center Street approximately 570 feet. For context, a minimum sight distance of 200 feet is required for safe operation of the intersection assuming an approach speed of 30 mph along Fencourt Avenue, which is 5 mph above the statutory speed limit (25 mph).

SUMMARY

VAI has completed an assessment of the potential impacts on the transportation infrastructure associated with the proposed construction of a mixed-use development to be located at 16 Fencourt Avenue in Randolph, Massachusetts. This assessment has: i) reviewed the existing conditions context of the transportation infrastructure serving the Project site; and ii) qualitatively evaluated the potential impact of the Project on the transportation infrastructure. Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the ITE[5] for similar land uses that will be located within the Project site, the Project is expected to generate approximately 1,334 vehicle trips on an average weekday (two-way 24-hour volume), with approximately 188 vehicle trips expected during the weekday morning peak-hour and 200 vehicle trips expected during the weekday evening peak-hour;

[5]Ibid 1.

2. In comparison to the former use that operated within the Project site and that will be removed to accommodate the Project (senior and veterans center), the Project is expected to generate 1,046 additional vehicle trips on an average weekday, with 169 additional vehicle trips expected during the weekday morning peak-hour and 175 additional vehicle trips expected during the weekday evening peak-hour;

3. No apparent safety deficiencies were noted with respect to the motor vehicle crash history in the vicinity of the Project site; and

4. Lines of sight to and from the Project site driveway are expected to exceed the recommended minimum distance for the intersection to operate in a safe manner.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the recommendations that follow.

RECOMMENDATIONS

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified as a part of this assessment. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

Project Access

Access to the Project site will be provided by way of a new driveway that will intersect the west side of Fencourt Avenue at the 90 degree bend approximately 320 feet south of Route 139. Vehicles entering and exiting the Project site will be separated by a raised landscaped island at Fencourt Avenue. The following recommendations are offered with respect to the design and operation of the Project site access and internal circulation, many of which are reflected on the Site Plans:

- The Project site driveway should accommodate a 20-foot wide entering travel lane and a 20-foot wide exiting travel lane separated by a raised island that should be a minimum of 6-feet in width unless a reduced travel lane width is approved by the Fire Chief. The driveway geometry and internal circulating drives should be designed to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle.

- Where perpendicular parking is proposed the drive aisle behind the parking will be a minimum of 24 feet in order to facilitate parking maneuvers.

- Vehicles exiting the Project site to Fencourt Avenue will be placed under STOP-sign control and a marked STOP-line should be provided.

- All signs and pavement markings to be installed within the Project site shall conform to the applicable standards of the *Manual on Uniform Traffic Control Devices* (MUTCD).[6]

[6] *Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.

- Appropriate signs ("KEEP RIGHT" and "DO NOT ENTER") and pavement markings should be provided in the landscaped island at Fencourt Avenue to provide proper guidance for motorists entering and exiting the Project site.

- A sidewalk has been provided along the south side of the Project site driveway that will connect to a sidewalk that will be constructed along the frontage of the Project site along Fencourt Avenue. The proposed sidewalks will be connected to the existing sidewalk along Fencourt Avenue by way of a marked crosswalk across the Project site driveway that will include American with Disabilities Act (ADA)-compliant wheelchair ramps.

- Signs and landscaping to be installed as a part of the Project within intersection sight triangle areas should be designed and maintained so as not to restrict lines of sight.

- Snow accumulations (windrows) within sight triangle areas will be promptly removed where such accumulations would impede sight lines.

- Consideration should be given to providing electric vehicle (EV) charging stations within the Project site.

Day Care Center Traffic Management

A student drop-off/pick-up management plan should be developed for the day care center. The tenants of the plan should include staggered or timed arrivals and departures in order to manage the number of parent/caregiver vehicles arriving and departing to a level that can be accommodated within the Project site without impeding access or circulation. It is recommended that vehicle circulation for student drop-off/pick-up be directed in a one-way counterclockwise pattern around the perimeter of the Project site and that students are transferred from/to vehicles queued curbside along the west side of the day care building. The drive aisle between the residential building and the day care building should operate in a one-way northbound direction during student drop-off/pick-up periods.

Transportation Demand Management

In an effort to encourage the use of alternative modes of transportation to SOVs and to promote healthy transportation options to residents of the Project, the following Transportation Demand Management (TDM) measures should be considered for implementation as a part of the Project:

- A transportation coordinator should be assigned for the Project to coordinate the TDM program;

- Information regarding public transportation services, maps, schedules and fare information should be posted in a central location and/or otherwise made available to residents;

- A "welcome packet" should be provided to residents detailing public transportation services, bicycle and walking alternatives, and other available commuting options;

- Pedestrian accommodations have been incorporated within the Project and consist of sidewalks that connect to the existing sidewalk along Fencourt Avenue;

- A central mail drop should be provided for the residential component of the Project; and

- Secure bicycle parking should be provided at an appropriate location within the Project site.

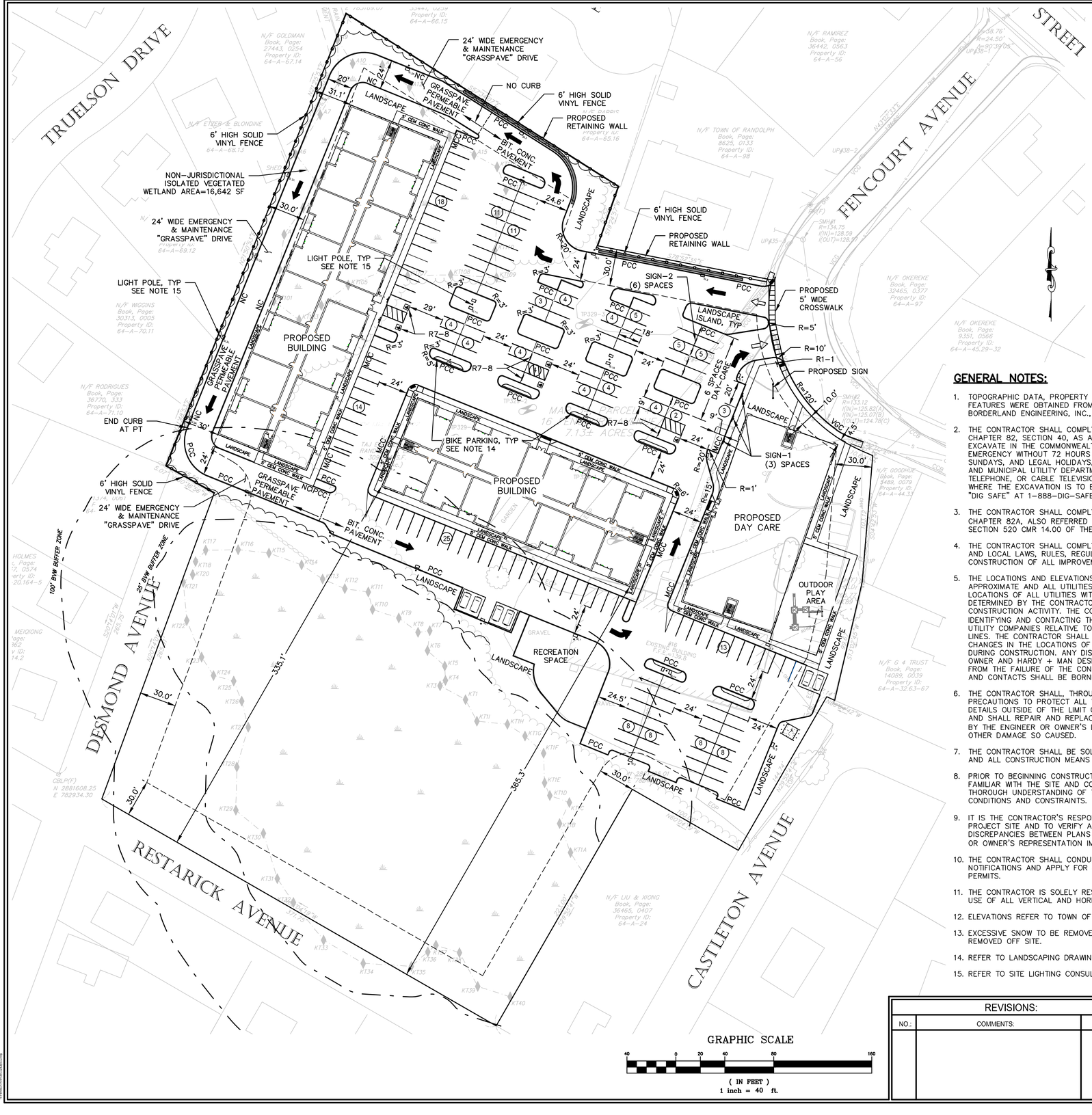
With implementation of the aforementioned recommendations, safe and efficient access will be provided to the Project site and the Project can be accommodated within the confines of the existing and improved transportation system.

cc: File

ATTACHMENTS

PROJECT SITE PLAN
PUBLIC TRANSPORTATION SCHEDULE
MASSDOT HIGH CRASH LOCATION MAPPING
TRIP-GENERATION CALCULATIONS
US CENSUS DATA

PROJECT SITE PLAN



TRAFFIC SIGN SUMMARY

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW		BACK-GROUND	LEGEND	BORDER	
R7-8	12"	18"	RESERVED PARKING	SEE 2009 MUTCD STANDARDS	SEE 2009 MUTCD STANDARDS	SEE 2009 MUTCD STANDARDS	5	SEE 2009 MUTCD STANDARDS	SEE 2009 MUTCD STANDARDS	SEE 2009 MUTCD STANDARDS	P-5 5
R1-1	30"	30"	STOP				1				P-5 1
SIGN-1	12"	18"	DAY CARE PARKING PICKUP DROPOFF				3				P-5 3
SIGN-2	12"	18"	DAY CARE PARKING ONLY				6				P-5 6

GENERAL NOTES:

1. TOPOGRAPHIC DATA, PROPERTY LINE INFORMATION, AND EXISTING SITE FEATURES WERE OBTAINED FROM TURNING POINT ENGINEERING, AND BORDERLAND ENGINEERING, INC., DATED AUGUST 13, 2022.
2. THE CONTRACTOR SHALL COMPLY WITH MASSACHUSETTS GENERAL LAWS CHAPTER 82, SECTION 40, AS AMENDED, WHICH STATES THAT NO ONE MAY EXCAVATE IN THE COMMONWEALTH OF MASSACHUSETTS EXCEPT IN AN EMERGENCY WITHOUT 72 HOURS NOTICE, EXCLUSIVE OF SATURDAYS, SUNDAYS, AND LEGAL HOLIDAYS, TO NATURAL GAS PIPELINE COMPANIES, AND MUNICIPAL UTILITY DEPARTMENTS THAT SUPPLY GAS, ELECTRICITY, TELEPHONE, OR CABLE TELEVISION SERVICE IN OR TO THE CITY OR TOWN WHERE THE EXCAVATION IS TO BE MADE. THE CONTRACTOR SHALL CALL "DIG SAFE" AT 1-888-DIG-SAFE.
3. THE CONTRACTOR SHALL COMPLY WITH MASSACHUSETTS GENERAL LAWS CHAPTER 82A, ALSO REFERRED TO AS JACKIE'S LAW, AS DETAILED IN SECTION 520 CMR 14.00 OF THE CODE OF MASSACHUSETTS REGULATIONS.
4. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS, RULES, REGULATIONS AND SAFETY CODES IN THE CONSTRUCTION OF ALL IMPROVEMENTS.
5. THE LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES ARE APPROXIMATE AND ALL UTILITIES MAY NOT BE SHOWN. PRESENCE AND LOCATIONS OF ALL UTILITIES WITHIN THE LIMIT OF WORK MUST BE DETERMINED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING AND CONTACTING THE CONTROLLING AUTHORITIES AND/OR UTILITY COMPANIES RELATIVE TO THE LOCATIONS AND ELEVATIONS OF THEIR LINES. THE CONTRACTOR SHALL KEEP A RECORD OF ANY DISCREPANCIES OR CHANGES IN THE LOCATIONS OF ANY UTILITIES SHOWN OR ENCOUNTERED DURING CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED TO THE OWNER AND HARDY + MAN DESIGN GROUP, PC. ANY DAMAGE RESULTING FROM THE FAILURE OF THE CONTRACTOR TO MAKE THESE DETERMINATIONS AND CONTACTS SHALL BE BORNE BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL, THROUGHOUT CONSTRUCTION, TAKE ADEQUATE PRECAUTIONS TO PROTECT ALL WALKS, GRADING, SIDEWALKS AND SITE DETAILS OUTSIDE OF THE LIMIT OF WORK AS DEFINED ON THE DRAWINGS AND SHALL REPAIR AND REPLACE OR OTHERWISE MAKE GOOD AS DIRECTED BY THE ENGINEER OR OWNER'S DESIGNATED REPRESENTATIVE ANY SUCH OR OTHER DAMAGE SO CAUSED.
7. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR JOB SITE SAFETY AND ALL CONSTRUCTION MEANS AND METHODS.
8. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE SITE AND CONSTRUCTION DOCUMENT TO DEVELOP A THOROUGH UNDERSTANDING OF THE PROJECT, INCLUDING ANY SPECIAL CONDITIONS AND CONSTRAINTS.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BECOME FAMILIAR WITH THE PROJECT SITE AND TO VERIFY ALL CONDITIONS IN THE FIELD AND REPORT DISCREPANCIES BETWEEN PLANS AND ACTUAL CONDITIONS TO THE OWNER OR OWNER'S REPRESENTATION IMMEDIATELY.
10. THE CONTRACTOR SHALL CONDUCT ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS.
11. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE ESTABLISHMENT AND USE OF ALL VERTICAL AND HORIZONTAL CONSTRUCTION CONTROLS.
12. ELEVATIONS REFER TO TOWN OF RANDOLPH DATUM.
13. EXCESSIVE SNOW TO BE REMOVED BY AN INDEPENDENT CONTRACTOR AND REMOVED OFF SITE.
14. REFER TO LANDSCAPING DRAWINGS FOR BIKE PARKING DETAILS.
15. REFER TO SITE LIGHTING CONSULTANT FOR EXACT LOCATIONS AND DETAILS.

DIMENSIONAL REQUIREMENTS

ZONING ITEM	UCTD	EXISTING	PROPOSED
MIN. LOT AREA	5 ACRES	7.13 ACRES	7.13 ACRES
MIN. LOT FRONTAGE/DEPTH	100/75 FT	142.5/599FT	142.5/599FT
MAX. YARD – FRONT	10 FT**	167.5 FT	5.4 FT
MIN. YARD – SIDE	30 FT***	69.9 FT	30 FT
MIN. YARD – REAR	30 FT***	287.3 FT	30 FT
BUILDING HEIGHT	NOTE****	1 STORY	3 STORIES
MIN. OPEN SPACE	10%	79%	45.1%

* VARIANCE REQUIRED

** IN ORDER TO DEFINE A CONSISTENT BUILDING LINE ALONG THE STREET, NEW BUILDING SHALL NOT BE SET BACK MORE THAN (10) FEET FROM THE FRONT PROPERTY LINE.

*** A UCTD PROJECT SHALL COMPLY WITH THE FOLLOWING REQUIREMENT:
1) SIDE YARD SETBACK FOR THREE (3) STORY BUILDING ABUTTING A RESIDENTIAL DISTRICT: 30 FEET FROM THE LOT LINE.
2) REAR YARD SETBACK FOR THREE (3) STORY BUILDING ABUTTING A RESIDENTIAL DISTRICT: 30 FEET FROM THE LOT LINE.

**** THE MINIMUM PERMITTED HEIGHT FOR BUILDING IN A UCTD PROJECT SHALL BE TWO (2) STORIES OR TWENTY (20) FEET, WHICHEVER IS GREATER, AND THE MAXIMUM PERMITTED HEIGHT FOR BUILDING AND STRUCTURES IN A UCTD PROJECT SHALL BE FOUR (4) STORIES OR (FORTY) 40 FEET, WHICH EVER IS LESS.
1) THE HEIGHT OF A BUILDING OR STRUCTURE IN THE UCTD SHALL BE DEFINED AS THE VERTICAL DISTANCE FROM THE AVERAGE GRADE OF THE STREET THE PROPERTY HAS FRONTAGE ON, ALONG THE FRONTAGE OF THE LOT/S OF THE UCTD PROJECT AT THE TIME OF THE SPECIAL PERMIT APPLICATION, TO THE TOP OF THE STRUCTURE (THE HIGHEST ROOF BEAMS OF A FLAT ROOF, THE DECK OF A MANSARD ROOF OR THE MEAN LEVEL OF THE HIGHEST GABLE OR SLOPE OF A HIP ROOF).

PARKING REQUIREMENTS

ZONING	REQUIRED	PROVIDED
107 UNITS/12,000 SF COMMERCIAL	201*	183

* (107x1.5) + (12000/400) + (107/10) = 160.5 + 30 + 10.7 = 201

LEGEND

MCC	MONOLITHIC CONCRETE CURB
NC	NO CURB
PCC	PRECAST CONCRETE CURB
VGC	VERTICAL GRANITE CURB
TYP	TYPICAL
	DETECTABLE WARNING PANEL
	CEMENT CONCRETE
	FIRE TRUCK ACCESS EXHIBIT
	VEHICLE TRAFFIC FLOW
	PROPOSED 6' HIGH SOLID VINYL FENCE
	PROPOSED TREE LINE
	PROPOSED SITE LIGHTING

CHI Y MAN
CIVIL
NO. 43441
REGISTERED
PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

09/06/2022

REVISIONS:		
NO.:	COMMENTS:	DATE:

LAYOUT PLAN
16 Fencourt Ave
RANDOLPH, MASSACHUSETTS

DRAWN BY: JKY
DESIGNED BY: CYM
CHECKED BY: CYM
DATE: 9-06-2022
LATEST REVISION:
SCALE: 1" = 40'

HARDY + MAN DESIGN GROUP, PC
CIVIL ENGINEERING & LAND DEVELOPMENT CONSULTING
1285 WASHINGTON STREET
WEYMOUTH, MA
(781) 335-1464

PREPARED FOR:
PERMITTING

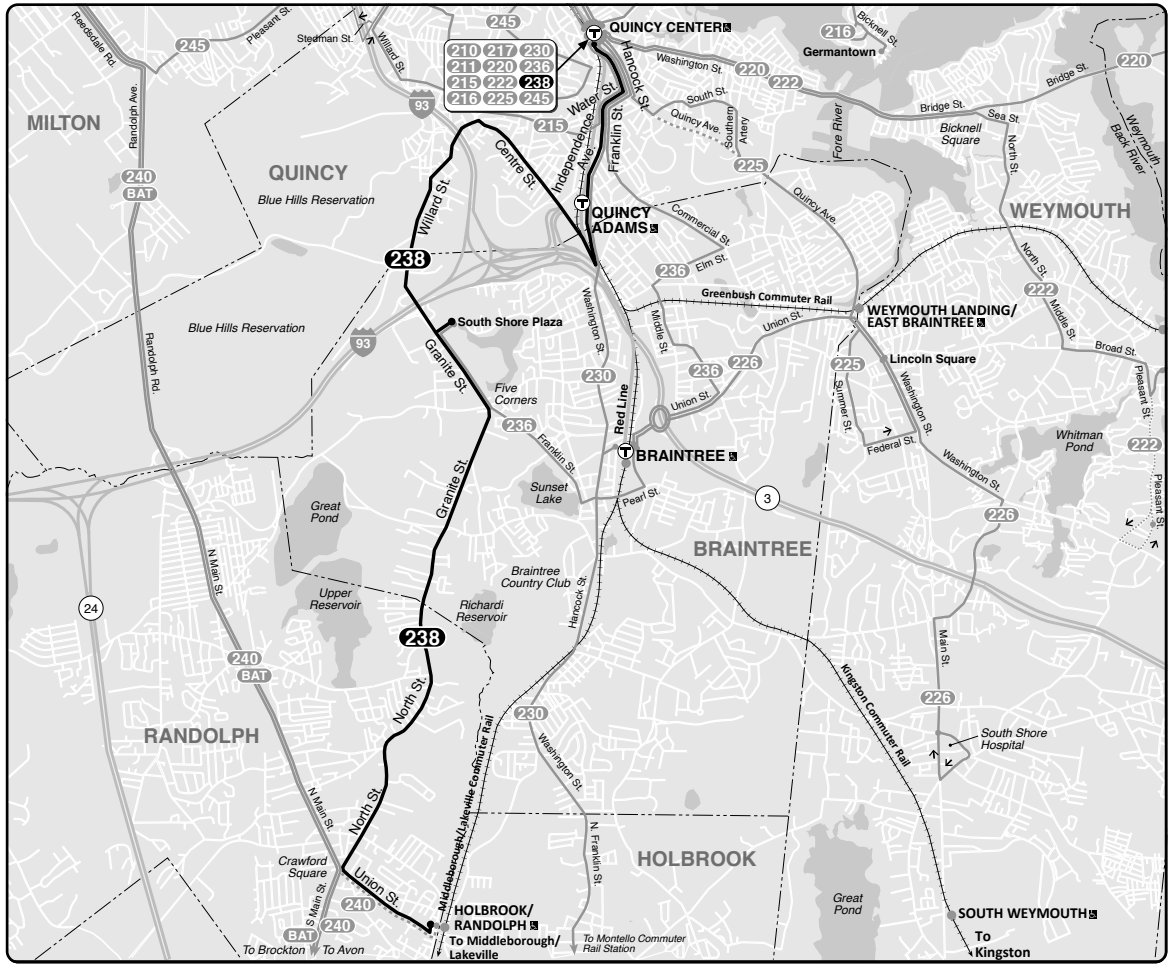
SHEET
C-2

PUBLIC TRANSPORTATION SCHEDULE

Effective **August 28, 2022** Replaces March 2022

238 Holb/Rand Sta – Quincy Center Sta

Schedule Change – Saturday, Sunday



Connections

- RED LINE
- GREENBUSH LINE
- KINGSTON LINE
- MIDDLEBOROUGH/LAKEVILLE LINE

- Transfer to bus/subway available on CharlieCard—good for 2 hours, pay fare difference.
- Children 11 & under ride free with a paying customer.

All MBTA buses are accessible to people with disabilities.

	CharlieCard	Cash on board	Reduced fare
Bus	**$1.70**	**$1.70**	**$0.85**
Bus + Subway	**$2.40**	**$4.10**	**$1.10**

Complete fare/pass rules and free/reduced fare eligibility:
mbta.com/fares or call **617-222-3200**

Information **617-222-3200**
Lost and Found **617-222-5367**
TTY **617-222-5146**

Realtime arrival information, maps, and more
mbta.com

A128-3-22.1

Weekday 238

Inbound

Holbrook/ Randolph Station	Crawford Square	South Shore Plaza	Quincy Center Station
5:05	5:09	5:20	5:41
5:30	5:34	5:45	6:06
5:50	5:54	6:07	6:32
6:10	6:14	6:28	6:53
6:35	6:39	6:53	7:18
7:00	7:04	7:18	7:43
7:25	7:29	7:43	8:09
7:55	7:59	8:13	8:40
8:25	8:29	8:43	9:10
8:55	8:59	9:13	9:40
9:25	9:29	9:43	10:10
9:55	9:59	10:13	10:40
10:35	10:39	10:53	11:20
11:35	11:39	11:53	**12:20**
12:40	**12:44**	**12:58**	**1:25**
1:45	**1:49**	**2:05**	**2:34**
2:50	**2:54**	**3:10**	**3:39**
3:55	**3:59**	**4:15**	**4:44**
5:00	**5:04**	**5:20**	**5:48**
5:50	**5:54**	**6:07**	**6:35**
6:30	**6:34**	**6:47**	**7:15**
7:05	**7:09**	**7:22**	**7:50**
-	**7:40**	**7:53**	**8:17**
8:40	**8:44**	**8:55**	**9:16**
-	**9:02**	**9:13**	**9:34**
-	**9:41**	**9:52**	**10:13**
-	**11:01**	**11:12**	**11:33**

Outbound

Quincy Center Station	South Shore Plaza	Crawford Square	Holbrook/ Randolph Station
[A] 5:23	5:44	5:54	-
5:50	6:11	6:24	6:27
6:15	6:36	6:49	6:52
6:37	6:58	7:12	7:15
7:05	7:30	7:44	7:47
7:35	8:00	8:14	8:17
8:00	8:25	8:39	8:42
8:25	8:50	9:04	9:07
8:55	9:20	9:34	9:37
9:25	9:50	10:04	10:07
10:30	10:55	11:09	11:12
11:40	**12:06**	**12:21**	**12:24**
12:40	**1:06**	**1:21**	**1:24**
1:45	**2:14**	**2:34**	**2:37**
2:50	**3:19**	**3:39**	**3:42**
3:55	**4:24**	**4:44**	**4:47**
4:35	**5:04**	**5:24**	**5:27**
5:15	**5:44**	**6:04**	**6:07**
5:57	**6:26**	**6:46**	**6:49**
6:41	**7:08**	**7:24**	**-**
7:45	**8:08**	**8:24**	**8:27**
9:00	**9:23**	**9:39**	**-**
10:20	**10:43**	**10:59**	**-**

Saturday 238

Inbound

Crawford Square	South Shore Plaza	Quincy Center Station
7:27	7:40	7:59
8:04	8:17	8:37
8:50	9:04	9:27
9:40	9:54	10:17
10:30	10:44	11:07
11:23	11:37	**12:00**
12:08	**12:22**	**12:45**
1:03	**1:17**	**1:40**
2:06	**2:20**	**2:43**
3:11	**3:25**	**3:48**
4:15	**4:29**	**4:52**
5:18	**5:32**	**5:55**
6:19	**6:33**	**6:56**
7:04	**7:18**	**7:40**
7:48	**8:01**	**8:22**
8:28	**8:41**	**9:02**
9:15	**9:28**	**9:49**
9:50	**10:03**	**10:24**
11:15	**11:28**	**11:49**

Outbound

Quincy Center Station	South Shore Plaza	Crawford Square
5:11	5:29	5:46
5:51	6:09	6:26
6:35	6:53	7:10
7:15	7:33	7:50
8:10	8:32	8:49
8:48	9:10	9:27
9:32	9:54	10:11
10:25	10:48	11:07
11:15	11:38	11:57
12:15	**12:38**	**12:57**
12:58	**1:21**	**1:40**
1:48	**2:11**	**2:30**
2:54	**3:17**	**3:36**
3:35	**3:58**	**4:17**
4:15	**4:38**	**4:57**
5:04	**5:27**	**5:46**
6:03	**6:26**	**6:45**
7:04	**7:27**	**7:46**
7:47	**8:08**	**8:25**
8:30	**8:49**	**9:06**
9:11	**9:30**	**9:47**
10:33	**10:52**	**11:09**

Sunday 238

Inbound

Avon Square	Crawford Square	South Shore Plaza	Quincy Center Station
-	8:00	8:14	8:34
-	9:20	9:34	9:54
-	10:35	10:49	11:09
-	11:50	**12:04**	**12:24**
-	**1:05**	**1:19**	**1:39**
-	**2:25**	**2:39**	**2:59**
3:35	**3:42**	**3:54**	**4:14**
4:55	**5:02**	**5:14**	**5:34**
6:15	**6:22**	**6:34**	**6:54**
7:30	**7:37**	**7:49**	**8:09**
8:45	**8:52**	**9:03**	**9:20**
10:00	**10:07**	**10:18**	**10:35**
11:00	**11:07**	**11:18**	**11:35**

Outbound

Quincy Center Station	South Shore Plaza	Crawford Square	Avon Square
[B] 6:30	-	6:57	-
7:30	7:48	8:00	8:05
8:40	8:58	9:10	9:15
9:59	10:17	10:29	10:34
11:14	11:36	11:48	11:53
12:30	**12:52**	**1:04**	**1:09**
1:45	**2:07**	**2:21**	**-**
3:05	**3:27**	**3:41**	**-**
4:20	**4:42**	**4:56**	**-**
5:40	**6:00**	**6:14**	**-**
7:00	**7:20**	**7:34**	**-**
8:20	**8:40**	**8:54**	**-**
9:30	**9:50**	**10:04**	**-**
10:39	**10:56**	**11:10**	**-**

Quincy Adams served on Sundays only.

[A] continues to Avon Square

[B] does not serve Quincy Adams Busway

PM times are **bold**

Information in this timetable is subject to change without notice. Traffic and weather may affect running times.

Always check bus destination signs before boarding. Some buses may only serve a part, or skip portions of this route.

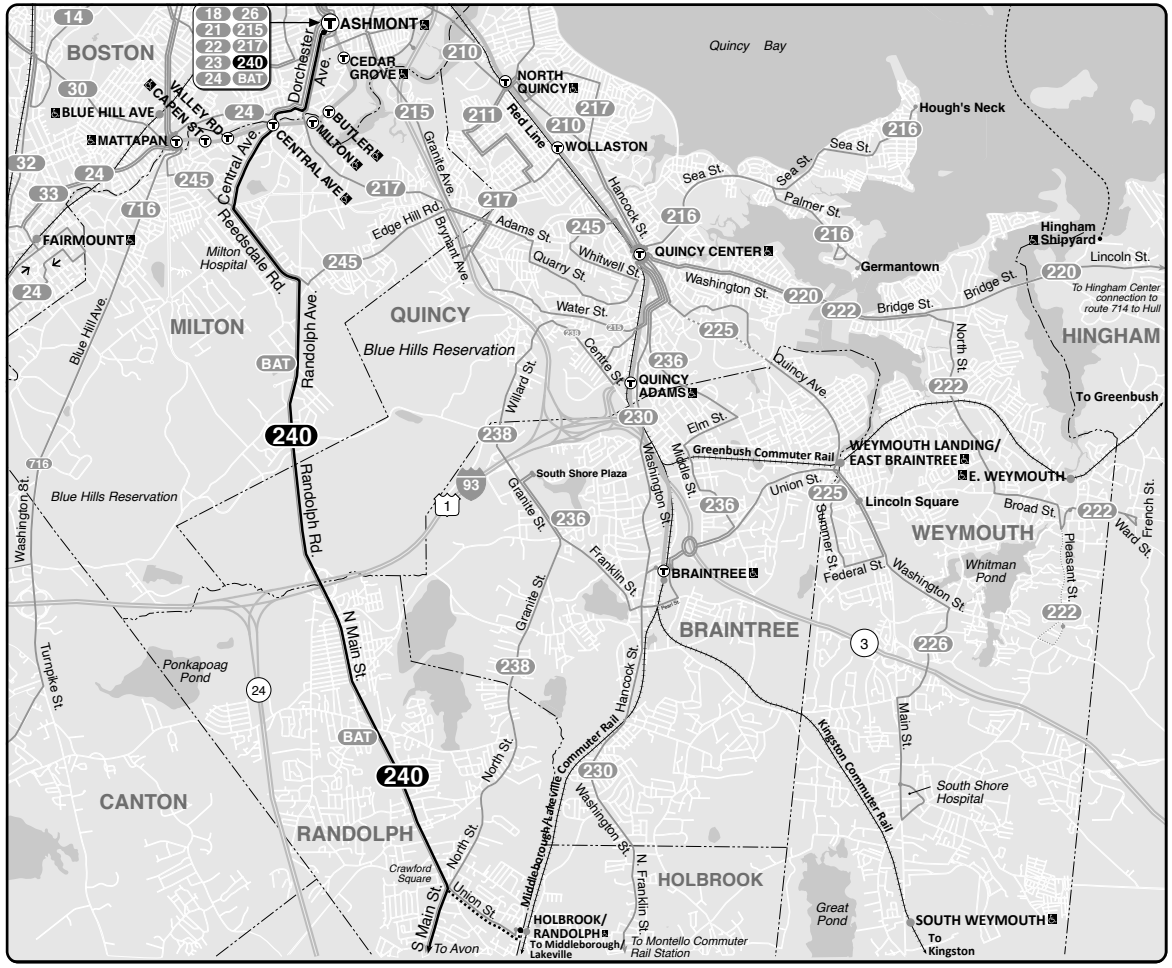
2022 Holidays

- SUN Memorial Day
- SUN Independence Day
- SUN Labor Day
- SUN Thanksgiving Day
- SUN Christmas Day
- SUN Christmas Day Observed
- SAT New Year's Eve
- SUN New Year's Day

Effective **August 28, 2022** Replaces March 2022

240 Avon Sq or Holb/Rand Sta – Ashmont Sta

Schedule Change – Sunday



- Transfer to bus/subway available on CharlieCard—good for 2 hours, pay fare difference.
- Children 11 & under ride free with a paying customer.

All MBTA buses are accessible to people with disabilities.

	CharlieCard	Cash on board	Reduced fare
Bus	**$1.70**	**$1.70**	**$0.85**
Bus + Subway	**$2.40**	**$4.10**	**$1.10**

Complete fare/pass rules and free/reduced fare eligibility:
mbta.com/fares or call **617-222-3200**

Connections

RED LINE **MATTAPAN LINE**

MIDDLEBOROUGH/LAKEVILLE LINE

Information **617-222-3200**
Lost and Found **617-222-5367**
TTY **617-222-5146**

Realtime arrival information, maps, and more
mbta.com

A128-3-22.1

Weekday 240

Inbound

	Avon Square	Holbrook/ Randolph Station	Crawford Square	Ashmont Station
	-	-	4:45	5:26
	-	-	4:55	5:36
	-	-	5:05	5:46
	-	-	5:15	5:56
	5:20	-	5:25	6:06
	-	-	5:35	6:16
	-	-	5:50	6:31
	6:00	-	6:05	6:46
	-	-	6:15	6:56
	6:26	-	6:31	7:17
	-	-	6:40	7:28
	6:46	-	6:51	7:46
	-	6:59	7:02	8:02
	7:13	-	7:18	8:18
	-	7:25	7:28	8:28
	-	7:50	7:53	8:53
	8:05	-	8:10	9:06
	-	8:25	8:28	9:17
	8:40	-	8:45	9:26
	9:00	-	9:05	9:41
	-	9:27	9:29	10:05
	9:57	-	10:02	10:38
	-	10:27	10:29	11:05
	10:59	-	11:04	11:38
	-	11:30	11:33	**12:03**
	12:00	**-**	**12:04**	**12:34**
	-	**12:30**	**12:33**	**1:03**
	1:00	**-**	**1:04**	**1:34**
	-	**1:30**	**1:33**	**2:03**
	2:00	**-**	**2:04**	**2:34**
	-	**2:30**	**2:33**	**3:03**
	3:05	**-**	**3:10**	**3:52**
	-	**3:45**	**3:48**	**4:28**
	4:10	**-**	**4:14**	**4:50**
	-	**4:35**	**4:38**	**5:14**
	5:16	**-**	**5:20**	**5:56**
	-	**5:40**	**5:43**	**6:19**
	6:10	**-**	**6:14**	**6:50**
	6:34	**-**	**6:38**	**7:12**
A	**-**	**6:50**	**6:53**	**-**
	6:56	**-**	**7:00**	**7:29**
A	**-**	**7:08**	**7:11**	**-**
	7:23	**-**	**7:27**	**7:56**
	7:48	**-**	**7:52**	**8:21**
A	**-**	**-**	**8:14**	**-**
	8:41	**-**	**8:45**	**9:14**
	9:57	**-**	**10:01**	**10:24**
	11:10	**-**	**11:13**	**11:36**
	12:17	-	12:20	12:43

Outbound

Ashmont Station	Crawford Square	Holbrook/ Randolph Station	Avon Square
5:41	6:05	6:08	-
5:53	6:17	-	6:22
6:05	6:29	-	-
6:18	6:46	6:49	-
6:30	7:01	-	7:06
6:43	7:14	7:17	-
7:08	7:39	7:42	-
7:36	8:07	8:10	-
7:55	8:26	-	8:31
8:15	8:46	-	8:51
8:45	9:16	9:19	-
9:15	9:46	-	9:51
9:45	10:16	10:19	-
10:15	10:46	-	10:51
10:46	11:17	11:20	-
11:15	11:46	-	11:51
11:45	**12:16**	**12:19**	**-**
12:15	**12:46**	**-**	**12:51**
12:45	**1:16**	**1:19**	**-**
1:15	**1:46**	**-**	**1:51**
1:45	**2:16**	**2:19**	**-**
2:15	**2:50**	**-**	**2:57**
2:45	**3:25**	**3:28**	**-**
3:15	**3:55**	**-**	**4:02**
3:45	**4:25**	**4:28**	**-**
4:15	**5:01**	**-**	**5:08**
4:40	**5:27**	**5:32**	**-**
5:05	**5:52**	**-**	**5:57**
5:30	**6:15**	**-**	**6:20**
5:50	**6:35**	**6:38**	**-**
6:00	**6:44**	**-**	**6:49**
6:15	**6:56**	**6:59**	**-**
6:30	**7:09**	**-**	**7:14**
7:00	**7:38**	**-**	**7:43**
7:37	**8:08**	**-**	**-**
8:04	**8:33**	**-**	**8:38**
8:29	**8:56**	**-**	**-**
9:21	**9:48**	**-**	**9:53**
10:32	**10:59**	**-**	**11:04**
11:43	12:09	-	12:14
12:50	1:16	-	-

Saturday 240

Inbound

	Avon Square	Crawford Square	Ashmont Station
	-	5:50	6:16
	-	6:30	6:58
	6:52	6:59	7:27
	-	7:14	7:42
	7:37	7:44	8:12
	-	7:54	8:22
	8:28	8:35	9:03
	-	8:52	9:20
	9:08	9:15	9:44
	-	9:29	9:58
	10:08	10:15	10:44
	-	10:18	10:47
	10:46	10:53	11:25
	-	11:15	11:49
	11:36	11:43	**12:17**
	-	**12:05**	**12:39**
	12:42	**12:49**	**1:23**
	-	**1:05**	**1:39**
A	**-**	**1:48**	**-**
	1:42	**1:49**	**2:23**
	-	**2:38**	**3:09**
	2:50	**2:55**	**3:26**
	-	**3:44**	**4:15**
	4:01	**4:06**	**4:37**
	-	**4:25**	**4:56**
	-	**5:05**	**5:35**
	5:05	**5:10**	**5:40**
	5:46	**5:51**	**6:21**
	-	**5:56**	**6:26**
	6:31	**6:36**	**7:06**
	-	**6:53**	**7:23**
	7:16	**7:21**	**7:50**
	8:13	**8:18**	**8:47**
	9:09	**9:14**	**9:43**
	10:01	**10:05**	**10:34**
	10:45	**10:49**	**11:18**
	11:30	**11:34**	12:00
	12:15	12:19	12:45

Outbound

Ashmont Station	Crawford Square	Avon Square
6:21	6:41	6:47
7:03	7:23	7:29
7:32	7:59	-
7:47	8:14	8:22
8:18	8:45	-
8:27	8:54	9:02
9:08	9:35	-
9:25	9:52	10:00
9:49	10:16	-
10:03	10:30	10:39
10:50	11:17	-
10:53	11:20	11:29
11:31	**12:02**	**-**
11:55	**12:26**	**12:35**
12:23	**12:54**	**-**
12:50	**1:21**	**1:30**
1:29	**2:00**	**-**
1:55	**2:26**	**2:35**
2:29	**3:00**	**-**
3:15	**3:46**	**3:55**
3:33	**4:04**	**-**
4:21	**4:50**	**4:59**
4:43	**5:11**	**-**
5:02	**5:30**	**5:39**
5:41	**6:09**	**6:18**
5:46	**6:14**	**-**
6:27	**6:55**	**-**
6:32	**7:00**	**7:09**
7:12	**7:40**	**-**
7:29	**7:57**	**8:06**
7:57	**8:25**	**-**
8:28	**8:53**	**9:02**
9:05	**9:30**	**9:39**
9:51	**10:16**	**10:25**
10:40	**11:03**	**11:11**
11:30	**11:53**	12:01
12:20	12:43	12:51
12:53	1:16	-

Sunday 240

Inbound

Avon Square	Crawford Square	Ashmont Station
-	7:00	7:27
8:10	8:15	8:44
9:25	9:30	10:02
10:40	10:45	11:18
11:55	**12:00**	**12:33**
1:10	**1:15**	**1:48**
-	**2:25**	**2:57**
-	**3:45**	**4:15**
-	**5:00**	**5:30**
-	**6:20**	**6:47**
-	**7:40**	**8:07**
-	**9:00**	**9:24**
-	**10:08**	**10:29**
-	**11:14**	**11:35**
-	12:13	12:35

Outbound

Ashmont Station	Crawford Square	Avon Square
7:30	7:57	-
8:50	9:17	-
10:05	10:32	-
11:20	11:47	-
12:35	**1:02**	**-**
1:55	**2:22**	**-**
3:00	**3:27**	**3:34**
4:20	**4:47**	**4:54**
5:35	**6:04**	**6:10**
6:50	**7:16**	**7:22**
8:10	**8:37**	**8:43**
9:30	**9:54**	**10:00**
10:30	**10:53**	**10:59**
11:35	**11:58**	12:04
12:40	1:00	-

A runs express to Quincy Center Station

PM times are **bold**

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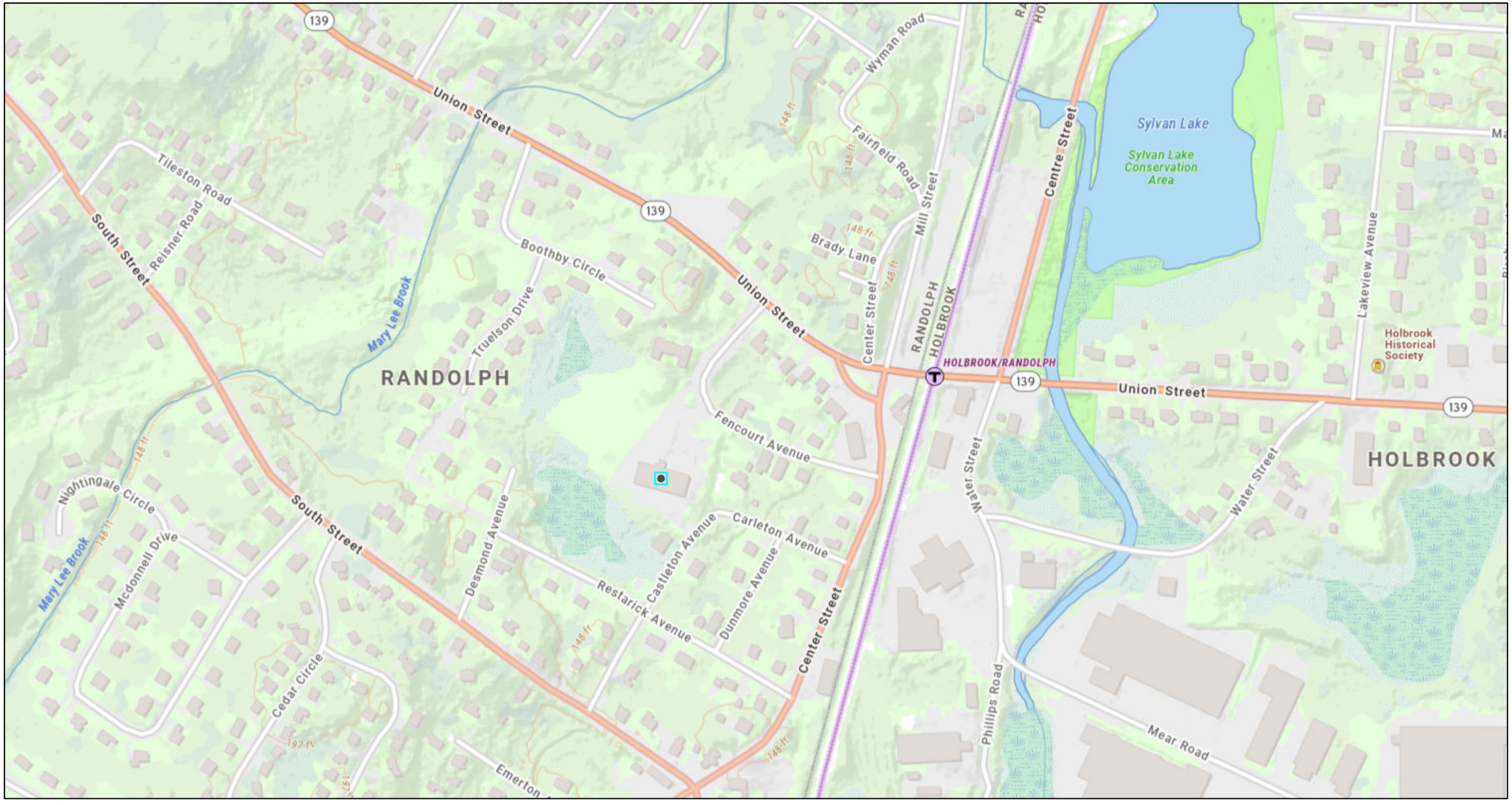
Always check bus destination signs before boarding. Some buses may only serve a part, or skip portions of this route.

2022 Holidays

- SUN Memorial Day
- SUN Independence Day
- SUN Labor Day
- SUN Thanksgiving Day
- SUN Christmas Day
- SUN Christmas Day Observed
- SAT New Year's Eve
- SUN New Year's Day

MASSDOT HIGH CRASH LOCATION MAPPING

MassDOT Top Crash Locations



9/9/2022, 11:56:53 AM

1:4,514

0 0.04 0.08 0.16 mi

0 0.05 0.1 0.2 km

MassGIS

MassDOT
MassGIS |

TRIP-GENERATION CALCULATIONS

Graph Look Up

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

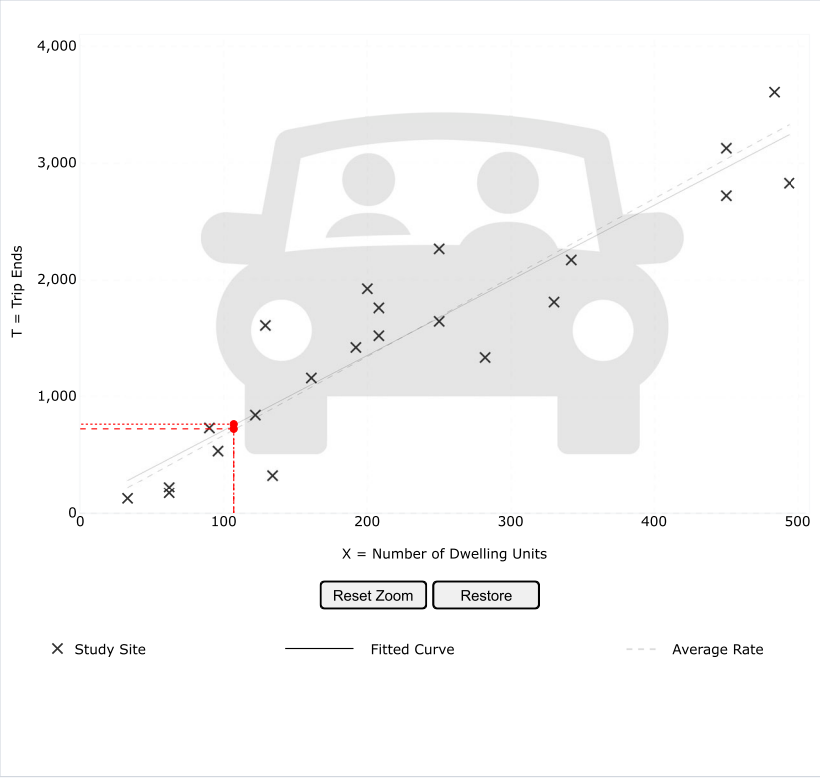
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
107 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. Num. of Dwelling Units:
229

Average Rate:
6.74

Range of Rates:
2.46 - 12.50

Standard Deviation:
1.79

Fitted Curve Equation:
T = 6.41(X) + 75.31

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 721 (Total), 360 (Entry), 361 (Exit)
Fitted Curve: 761 (Total), 380 (Entry), 381 (Exit)

Graph Look Up

ITETripGen Web-based App

- Graph Look Up
- How to Use ITETripGen
- TGM Desk Reference
- TGM Appendices
- Support Documents
- Add Users
- Comments

Add-ons to do more

Try OTISS Pro

Query | Filter

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 220

LAND USE GROUP: (200-299) Residential

LAND USE : 220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY: Not Close to Rail Transit

SETTING/LOCATION: General Urban/Suburban

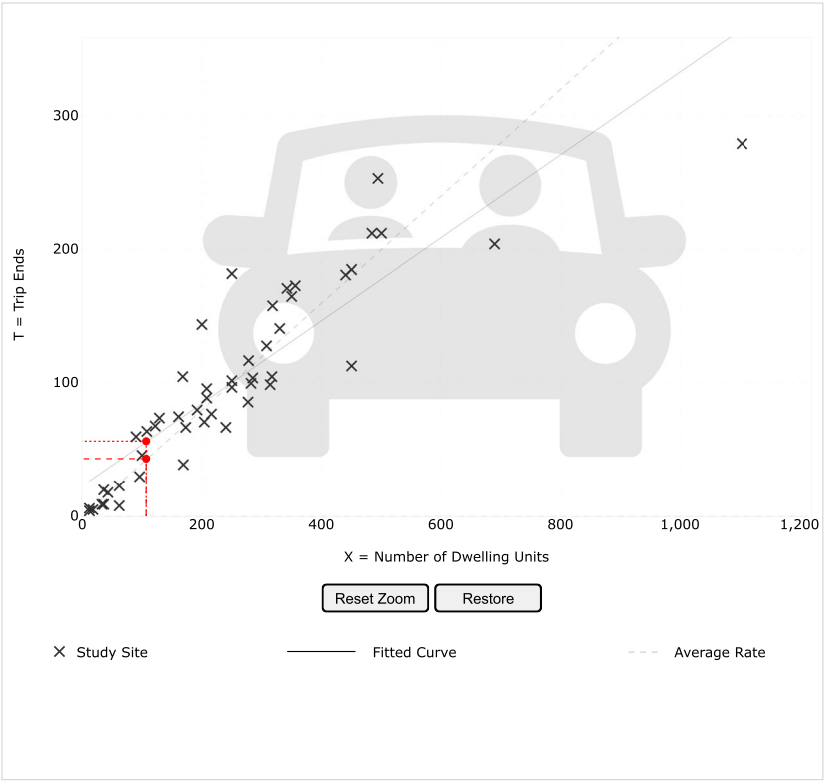
INDEPENDENT VARIABLE (IV): Dwelling Units

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 107 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
49

Avg. Num. of Dwelling Units:
249

Average Rate:
0.40

Range of Rates:
0.13 - 0.73

Standard Deviation:
0.12

Fitted Curve Equation:
T = 0.31(X) + 22.85

R^2:
0.79

Directional Distribution:
24% entering, 76% exiting

Calculated Trip Ends:
Average Rate: 43 (Total), 10 (Entry), 33 (Exit)
Fitted Curve: 56 (Total), 13 (Entry), 43 (Exit)

Graph Look Up

ITETripGen Web-based App

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- TGM Desk Reference
- TGM Appendices
- Support Documents
- Add Users
- Comments

Add-ons to do more

Try OTISS Pro

Query | Filter

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 220

LAND USE GROUP: (200-299) Residential

LAND USE : 220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY: Not Close to Rail Transit

SETTING/LOCATION: General Urban/Suburban

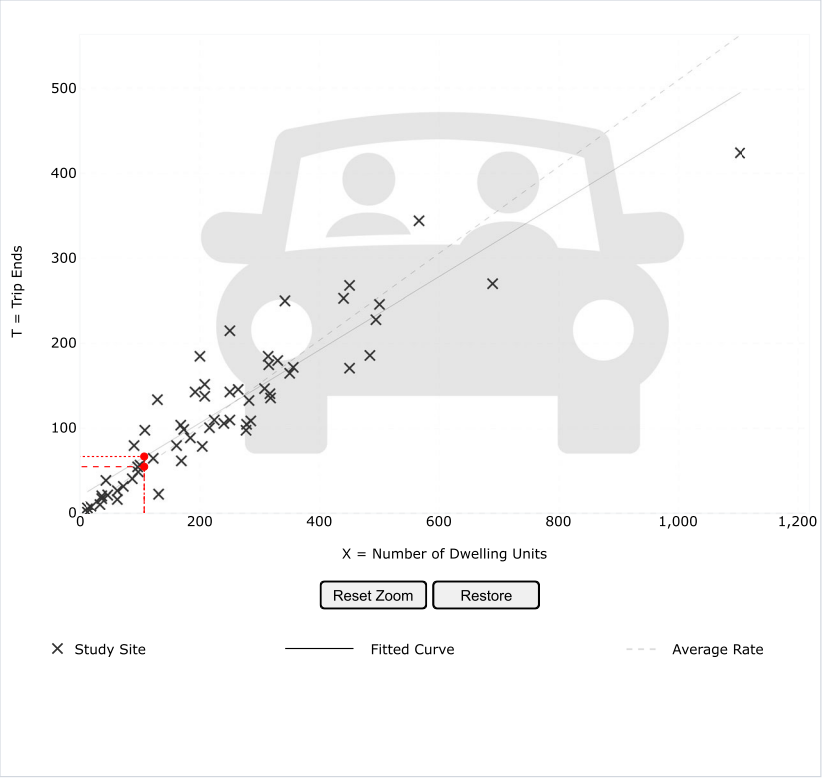
INDEPENDENT VARIABLE (IV): Dwelling Units

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 107 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
59

Avg. Num. of Dwelling Units:
241

Average Rate:
0.51

Range of Rates:
0.08 - 1.04

Standard Deviation:
0.15

Fitted Curve Equation:
T = 0.43(X) + 20.55

R^2:
0.84

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 55 (Total), 34 (Entry), 21 (Exit)
Fitted Curve: 67 (Total), 42 (Entry), 25 (Exit)

Graph Look Up

ITETripGen Web-based App

- Graph Look Up
- How to Use ITETripGen
- TGM Desk Reference
- TGM Appendices
- Support Documents
- Add Users
- Comments

Add-ons to do more

Try OTISS Pro

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
565

LAND USE GROUP:
(500-599) Institutional

LAND USE :
565 - Day Care Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

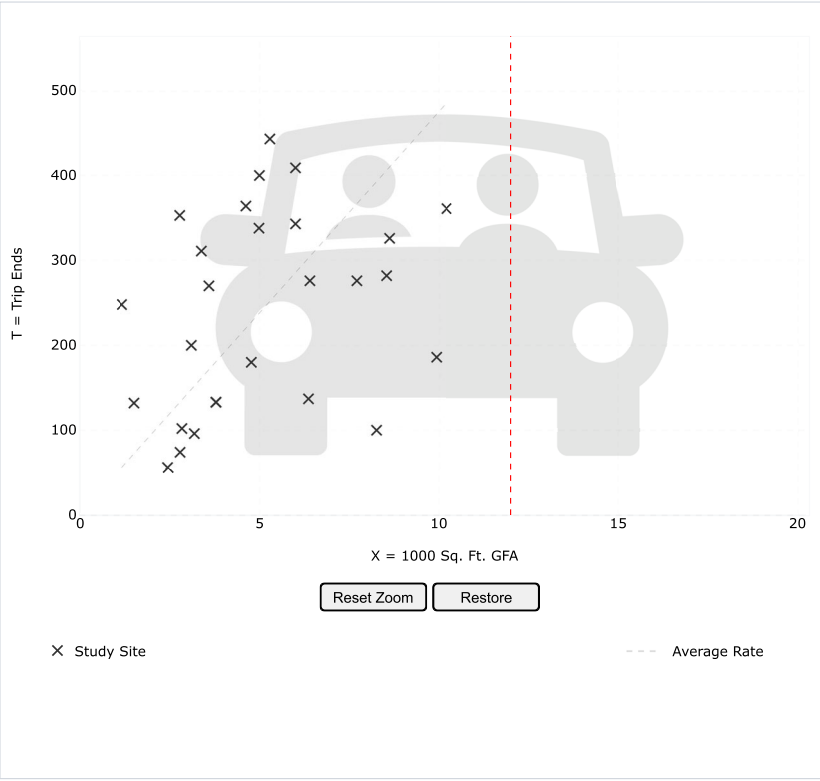
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
12 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Day Care Center (565) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
27

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
47.62

Range of Rates:
12.12 - 211.06

Standard Deviation:
29.78

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 571 (Total), 285 (Entry), 286 (Exit)

Graph Look Up

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Add-ons to do more

Try OTISS Pro

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
565

LAND USE GROUP:
(500-599) Institutional

LAND USE :
565 - Day Care Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

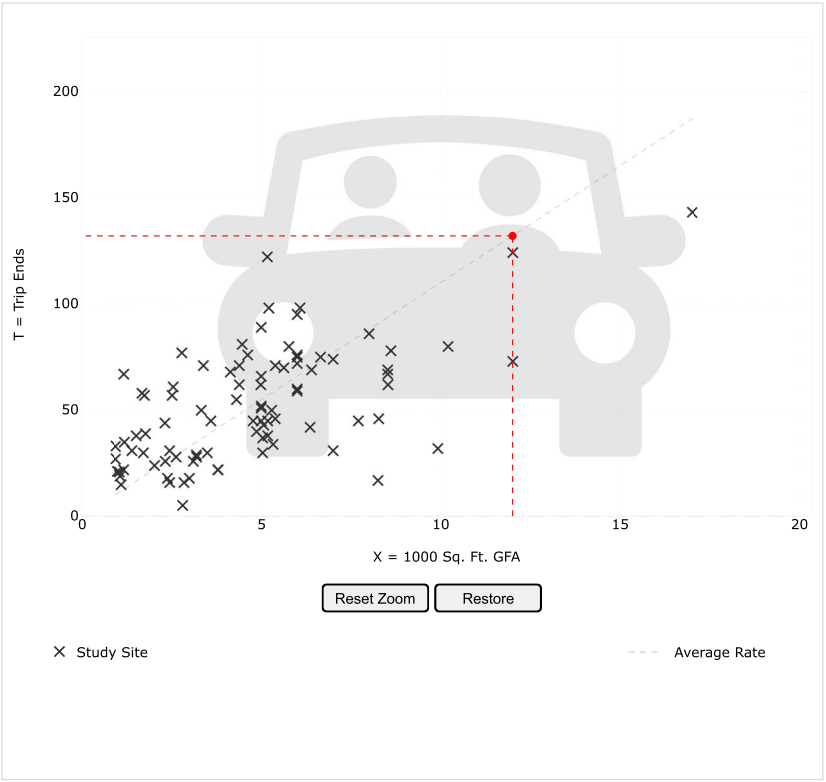
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
12 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Day Care Center (565) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
89

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
11.00

Range of Rates:
1.79 - 57.02

Standard Deviation:
6.08

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
53% entering, 47% exiting

Calculated Trip Ends:
Average Rate: 132 (Total), 70 (Entry), 62 (Exit)

Graph Look Up

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Add-ons to do more

Try OTISS Pro

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
565

LAND USE GROUP:
(500-599) Institutional

LAND USE :
565 - Day Care Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

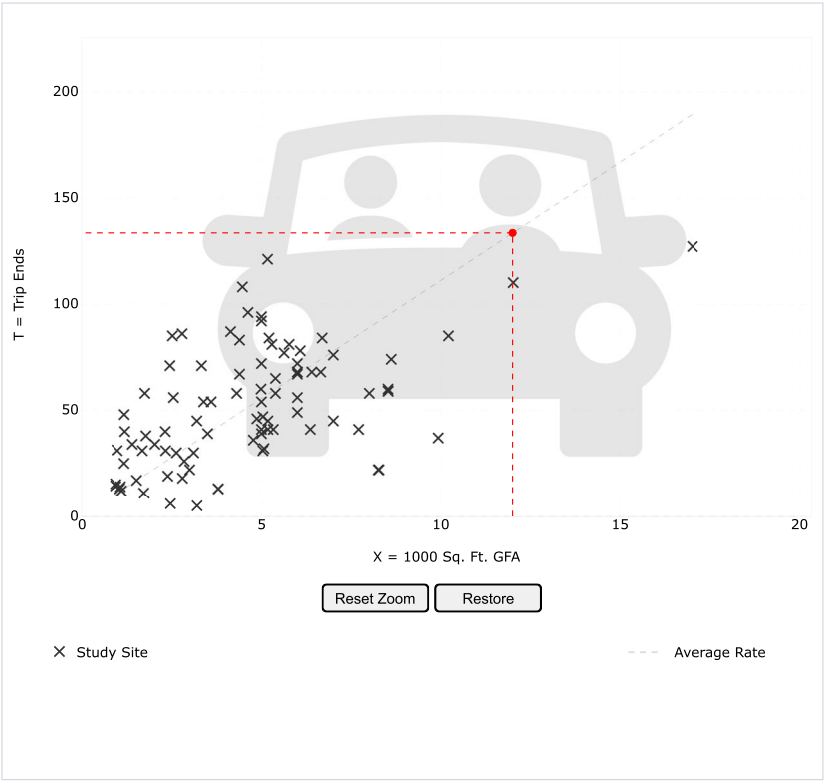
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
12 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Day Care Center (565) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
90

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
11.12

Range of Rates:
1.56 - 40.85

Standard Deviation:
6.28

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
47% entering, 53% exiting

Calculated Trip Ends:
Average Rate: 133 (Total), 62 (Entry), 71 (Exit)

Graph Look Up

Query | Filter

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 495

LAND USE GROUP: (400-499) Recreational

LAND USE : 495 - Recreational Community Center

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

INDEPENDENT VARIABLE (IV): 1000 Sq. Ft. GFA

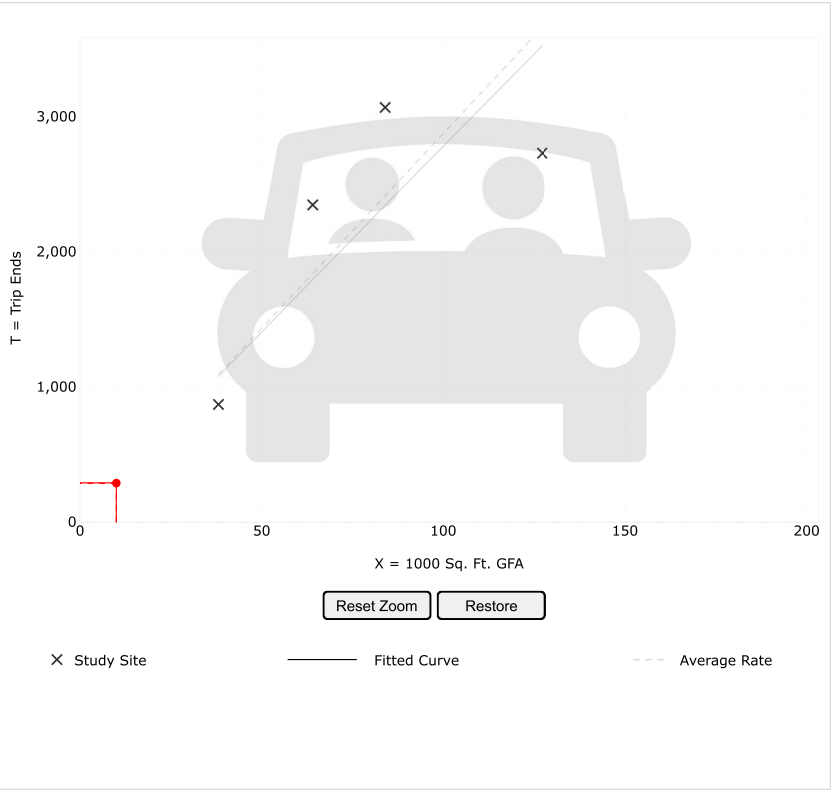
TIME PERIOD: Weekday

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 10 Calculate

Data Plot and Equation

Caution – Small Sample Size



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Recreational Community Center (495) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
4

Avg. 1000 Sq. Ft. GFA:
78

Average Rate:
28.82

Range of Rates:
21.49 - 36.71

Standard Deviation:
8.56

Fitted Curve Equation:
Ln(T) = 0.98 Ln(X) + 3.42

R^2:
0.74

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 288 (Total), 144 (Entry), 144 (Exit)
Fitted Curve: 292 (Total), 146 (Entry), 146 (Exit)

Graph Look Up

Query | Filter

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 495

LAND USE GROUP: (400-499) Recreational

LAND USE : 495 - Recreational Community Center

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

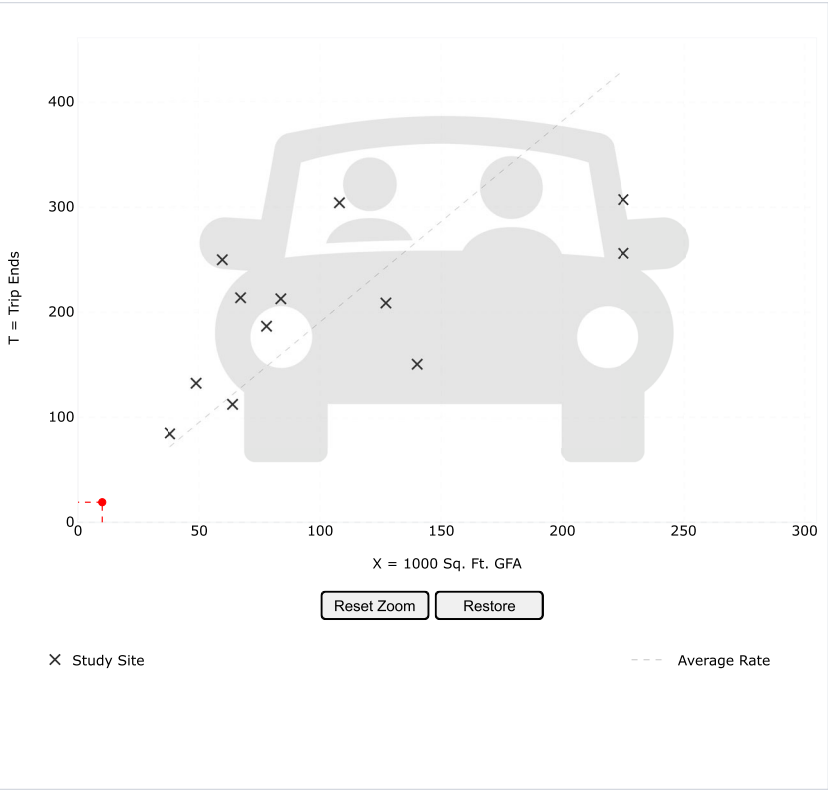
INDEPENDENT VARIABLE (IV): 1000 Sq. Ft. GFA

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 10 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Recreational Community Center (495) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
12

Avg. 1000 Sq. Ft. GFA:
105

Average Rate:
1.91

Range of Rates:
1.08 - 4.18

Standard Deviation:
0.88

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
66% entering, 34% exiting

Calculated Trip Ends:
Average Rate: 19 (Total), 13 (Entry), 6 (Exit)

Graph Look Up

Query | Filter

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 495

LAND USE GROUP: (400-499) Recreational

LAND USE : 495 - Recreational Community Center

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

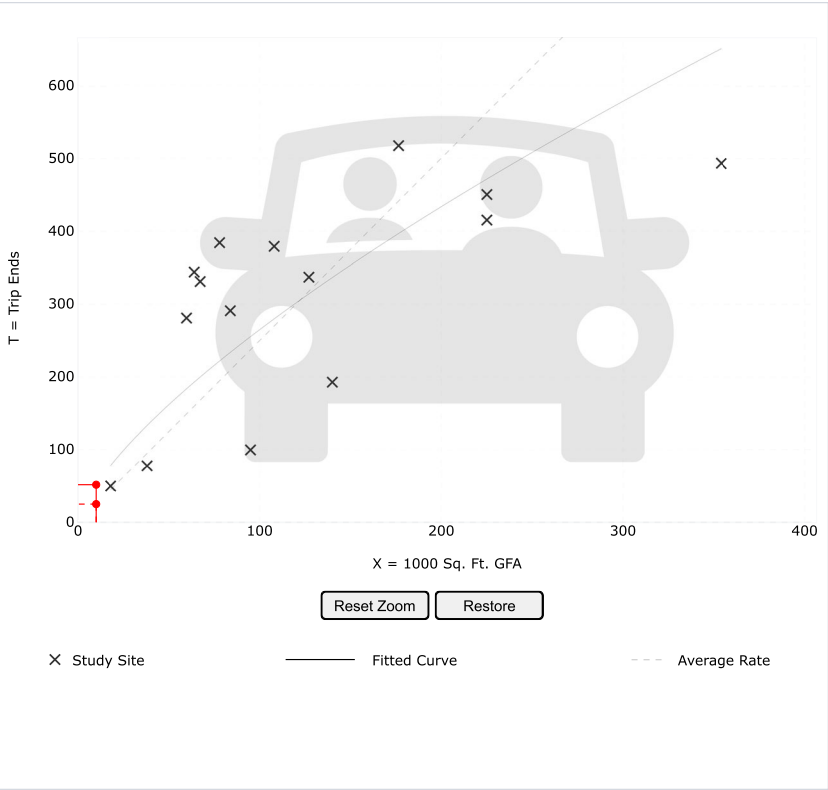
INDEPENDENT VARIABLE (IV): 1000 Sq. Ft. GFA

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 10 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Recreational Community Center (495) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
15

Avg. 1000 Sq. Ft. GFA:
124

Average Rate:
2.50

Range of Rates:
1.05 - 5.37

Standard Deviation:
1.28

Fitted Curve Equation:
Ln(T) = 0.71 Ln(X) + 2.31

R^2:
0.57

Directional Distribution:
47% entering, 53% exiting

Calculated Trip Ends:
Average Rate: 25 (Total), 12 (Entry), 13 (Exit)
Fitted Curve: 52 (Total), 24 (Entry), 28 (Exit)

US CENSUS DATA

MEANS OF TRANSPORTATION TO WORK

United States® Census Bureau

Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

	Census Tract 4203.01, Norfolk County, Massachusetts		Census Tract 4203.02, Norfolk County, Massachusetts	
Label	**Estimate**	**Margin of Error**	**Estimate**	**Margin of Error**
Total:	3,549	±367	4,013	±468
Car, truck, or van:	3,037	±367	3,513	±454
Drove alone	2,749	±411	3,064	±418
Carpooled:	288	±162	449	±255
In 2-person carpool	261	±160	293	±186
In 3-person carpool	27	±49	0	±17
In 4-person carpool	0	±17	154	±196
In 5- or 6-person carpool	0	±17	0	±17
In 7-or-more-person carpool	0	±17	2	±16
Public transportation (excluding taxicab):	293	±153	444	±214
Bus	90	±77	141	±118
Subway or elevated rail	173	±114	182	±133
Long-distance train or commuter rail	30	±36	121	±103
Light rail, streetcar or trolley (carro público in Puerto Rico)	0	±17	0	±17
Ferryboat	0	±17	0	±17
Taxicab	0	±17	0	±17
Motorcycle	0	±17	0	±17
Bicycle	40	±61	0	±17
Walked	93	±65	24	±39
Other means	32	±38	0	±17
Worked from home	54	±52	32	±40

Table Notes

MEANS OF TRANSPORTATION TO WORK

Survey/Program: American Community Survey
Universe: Workers 16 years and over
Year: 2019
Estimates: 5-Year
Table ID: B08301

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates

2019 ACS data products include updates to several categories of the existing means of transportation question. For more information, see: Change to Means of Transportation.

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see ACS Technical Documentation). The effect of nonsampling error is not represented in these tables.

Workers include members of the Armed Forces and civilians who were at work last week.

The 2015-2019 American Community Survey (ACS) data generally reflect the September 2018 Office of Management and Budget (OMB) delineations of metropolitan and micropolitan statistical areas. In certain instances, the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB delineation lists due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Explanation of Symbols:

An "**" entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
An "-" entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution, or the margin of error associated with a median was larger than the median itself.
An "-" following a median estimate means the median falls in the lowest interval of an open-ended distribution.
An "+" following a median estimate means the median falls in the upper interval of an open-ended distribution.
An "***" entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
An "*****" entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
An "N" entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
An "(X)" means that the estimate is not applicable or not available.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Technical Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.