

## MEMORANDUM

**TO:** Cobra Realty Trust  
c/o Messrs. Daniel Prouty and  
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**FROM:** Mr. Jeffrey S. Dirk, P.E.\*, PTOE, FITE   
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**DATE:** April 28, 2023

**RE:** 9650

**SUBJECT:** Transportation Impact Assessment  
Proposed Commercial Building – 150 Charlton Road (Route 20)  
Sturbridge, Massachusetts

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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 commercial building to be located at 150 Charlton Road (Route 20) in Sturbridge, Massachusetts (hereafter referred to as the “Project”). This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing traffic conditions and future traffic conditions, both with and without the Project, along Route 20 and at the intersection of Route 20 at the Project site driveway.

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),<sup>1</sup> the Project is expected to generate approximately 326 vehicle trips on an average weekday (two-way volume over the operational day of the Project), with 32 vehicle trips expected during the weekday morning peak-hour and 32 vehicle trips expected during the weekday evening peak-hour;
2. All movements exiting the Project site were shown to operate at a level-of-service (LOS) C during both the weekday morning and evening peak-hours with residual vehicle queues of up to one (1) vehicle, which can be contained within the Project site without impeding access or circulation, or the movement of vehicles along Route 20;
3. No apparent safety deficiencies were noted with respect to the motor vehicle crash history along Route 20 in the vicinity of the Project site; and
4. Lines of sight to and from the Project site driveway intersection with Route 20 were found to exceed the recommended minimum distance for safe operation.

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<sup>1</sup>*Trip Generation*, 11<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2021.



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 assessment of the Project.

## **PROJECT DESCRIPTION**

The Project will entail the construction of an 8,000± square foot (sf) commercial building to be located at 150 Charlton Road (Route 20) in Sturbridge, Massachusetts, that is anticipated to be occupied by a designer/manufacturer of prototype, laser-powered diagnostic and medical devices. The Project site encompasses approximately 6.18± acres of undeveloped land that is bounded by areas of open and wooded space and a solar farm to the north and west; Route 20 to the south; and commercial properties to the east.



Imagery ©2023 Google

Access to the Project site will be provided by way of a new driveway that will intersect the northwest side of Route 20 approximately 650 feet southwest of the Center at Hobbs Brook driveway. On-site parking will be provided for 16 vehicles, which exceeds the requirements of Part 4, Article XVI, Section 300-16.11, *Parking spaces required*, of the Zoning Bylaw of the Town of Sturbridge.<sup>2</sup>

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<sup>2</sup>The Bylaw requires a minimum of 1 parking space per two (2) employees (eight (8) employees are envisioned) for a manufacturing and production use. This would require that a minimum of four (4) parking spaces be provided to support the Project.



## **STUDY METHODOLOGY**

This study was prepared in consultation with the Massachusetts Department of Transportation (MassDOT) and the Town of Sturbridge; was performed in accordance with MassDOT's *Transportation Impact Assessment (TIA) Guidelines* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian and bicycle facilities; on-street parking; public transportation services; observations of traffic flow; and collection of pedestrian, bicycle, and vehicle counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for analyses consistent with MassDOT guidelines. The analysis conducted in stage two identifies existing or projected future capacity, safety, and access issues, as these areas relate to the transportation infrastructure.

The third stage of the study presents and evaluates measures to address deficiencies in the transportation infrastructure, if any, identified in stage two of the study.

## **EXISTING CONDITIONS**

A comprehensive field inventory of existing conditions within the study area was conducted in February and March 2023. This inventory included the collection of traffic-volume data and vehicle travel speed measurements, as well as a review of existing pedestrian and bicycle accommodations, public transportation services, and motor vehicle crash data. The following summarizes existing conditions within the study area.

### **Roadway**

#### **Route 20**

Route 20 is a four lane, urban principal arterial roadway under MassDOT jurisdiction that traverses the study area in a general northeast-southwest direction. Route 20 provides two (2) 11 to 12-foot wide travel lanes that are separated by a painted median with 2 to 3-foot wide marked shoulders. The posted speed limit within the study area is 50 miles per hour (mph). Sidewalks and formal bicycle facilities are not provided along Route 20 and Route 20 was not found to provide sufficient width to accommodate bicycle travel in a shared traveled-way condition (i.e., bicyclists and motor vehicles sharing the traveled-way).<sup>3</sup> Illumination is provided by way of street-lights mounted on wood poles. Land use along Route 20 within the study area consists of the Project site, commercial properties and areas of open and wooded space.

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



## Existing Traffic Volumes

In order to determine existing traffic-volume demands and flow patterns within the study area, automatic traffic recorder (ATR) counts were conducted on Route 20 in the vicinity of the Project site on March 8<sup>th</sup> through 9<sup>th</sup>, 2023 (Wednesday through Thursday, inclusive) in order to record weekday traffic over an extended period.

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, MassDOT weekday seasonal factors for Urban Group 3 roadways (principal arterials, the functional classification of Route 20) were reviewed.<sup>4</sup> Based on a review of this data, it was determined that traffic volumes for the month of March are approximately 2.0 percent above average-month conditions. As such, no adjustment was made to the raw traffic count data as the data is representative of traffic volume conditions that are higher than those under average-month conditions.

Based on updated guidance from MassDOT,<sup>5</sup> adjustments to account for the impact on traffic volumes and trip patterns resulting from the COVID-19 pandemic for traffic counts taken on or after March 1, 2022 are *not recommended* in areas where the adjacent land uses are not predominantly office properties. As the study area roadway and intersections serve a diverse range of land uses (residential, retail, office and industrial), further adjustment of the traffic-volume data was not required.

Route 20 in the vicinity of the Project site was found to accommodate approximately 21,010 vehicles per day on an average weekday (two-way, 24-hour volume), with approximately 1,477 vehicles per hour (vph) during the weekday morning peak-hour (8:00-9:00 AM) and 1,839 vph during the weekday evening peak-hour (4:15-5:15 PM). The 2023 Existing weekday morning and evening peak-hour traffic volumes are graphically depicted on Figure 1.

## Spot Speed Measurements

Vehicle travel speed measurements were performed on Route 20 in the vicinity of the Project site in conjunction with the ATR counts. Table 1 summarizes the vehicle travel speed measurements.

**Table 1**  
**VEHICLE TRAVEL SPEED MEASUREMENTS**

	Route 20	
	Northeastbound	Southwestbound
Mean Travel Speed (mph)	44	44
85 <sup>th</sup> Percentile Speed (mph)	50	52
Posted Speed (mph)	50	50

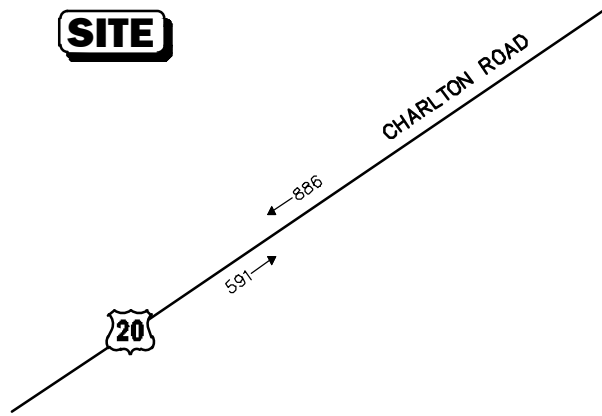
mph = miles per hour.

<sup>4</sup>MassDOT Statewide Traffic Data Collection; 2019 Weekday Seasonal Factors, Group U4-7.

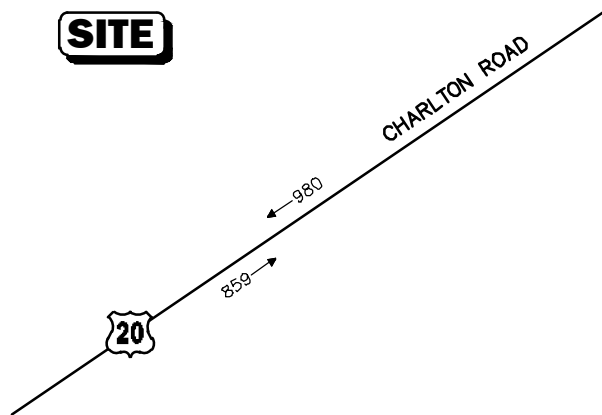
<sup>5</sup>*Traffic and Safety Engineering 25% Design Submission Guidelines*; MassDOT; Revised March 31, 2022.



WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



Not To Scale

Figure 1



2023 Existing Peak-Hour Traffic Volumes

As can be seen in Table 1, the mean vehicle travel speed along Route 20 in the vicinity of the Project site was found to be 44 mph in both the northeast and southwestbound directions. The measured 85<sup>th</sup> percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be 50 mph eastbound and 52 mph westbound, which is generally consistent with the posted speed limit (50 mph). The 85<sup>th</sup> percentile speed is used as the basis of engineering design and in the evaluation of sight distances, and is often used in establishing posted speed limits.

### **Public Transportation Services**

The Town of Sturbridge is a member of the Worcester Regional Transit Authority (WRTA); however, regularly scheduled, fixed-route public transportation services are not currently provided within the Town. The WRTA does provide fixed-route bus service to the Towns of Charlton and Southbridge by way of bus Route 29, which provides service along Route 169 and Route 20 to the east of the Project site, with continued service to Union Station in downtown Worcester, where connections can be made to the Massachusetts Bay Transportation Authority (MBTA) commuter rail system (Worcester Line) and to other WRTA bus routes.

### **Motor Vehicle Crash Data**

Motor vehicle crash information for the study area intersection was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent five-year period available (2016 through 2020, inclusive) in order to examine motor vehicle crash trends occurring within the study area. Based on a review of this data, no (0) motor vehicle crashes were reported to have occurred in the immediate vicinity of the Project site over the five-year review period. In addition, a review of the MassDOT statewide High Crash Location List indicated that there are no Highway Safety Improvement Program (HSIP) eligible high crash locations in the vicinity of the Project site.

***Based on a review of the MassDOT motor vehicle crash data, no discernible safety deficiencies were apparent at the intersection.***

### **FUTURE CONDITIONS**

Traffic volumes in the study area were projected to the year 2030, which reflects a seven-year planning horizon consistent with MassDOT guidelines. Independent of the Project, traffic volumes on the roadway network in the year 2030 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon the 2030 No-Build traffic volumes reflect 2030 Build traffic-volume conditions with the Project.

### **Future Traffic Growth**

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic; however, potential population growth and development external to the study area would not be accounted for in the resulting traffic projections.





To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

### **Specific Development by Others**

The Town of Sturbridge Planning Department and the Town of Charlton Planning Board were contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, the following projects were identified for inclusion in this assessment.

- ***Proposed Travel Center and Electric Vehicle Discovery Center, 195, 197, 201, and 201A Charlton Road (Route 20), Sturbridge, Massachusetts (EEA No. 16389).*** This proposed project will entail the construction of a travel center with an associated fueling facility and an electrical vehicle discovery center to be located at 195, 197, 201, and 201A Charlton Road (Route 20). As proposed, the travel center will include the following components: a 8,437± sf building that will contain a convenience store, coffee shop with drive-through window, a restaurant, an ice cream parlor and a common seating area; a 10-pump (20 vehicle fueling position (vfp)) fueling facility; a 4-pump diesel fueling facility; and 10 electric vehicle (EV) charging stations. The electric vehicle discovery center will consist of a separate 16,640± sf building that will contain an 8,866± sf electrical vehicle discovery conference center, 4,482± sf office space and a 120-seat sit-down restaurant. The conference center component of the discovery center will be used by electric vehicle manufacturers to display their vehicles and allow visitors to interact with manufacturer representatives and salespeople.
- ***Proposed Coffee Shop and Urgent Care Facility, 212, 216 and 226 Charlton Road (Route 20), Sturbridge, Massachusetts.*** This project will entail the construction of a 2,298± sf coffee shop with drive-through window and a 5,148± sf urgent care facility to be located at 212, 216 and 226 Charlton Road (Route 20).
- ***Tree House Brewing Expansion, 129 Sturbridge Road Charlton, Massachusetts (EEA No. 15900).*** This project consists of the expansion of the existing Tree House Brewing brewery located at 129 Sturbridge Road from 43,000± sf to 67,718± sf, of which 43,000± sf will continue as the brewery operation, 20,710± sf will be devoted to retail sales and 4,008± sf will consist of a timber frame pavilion to provide additional outdoor space for customers. In addition, a 7,600± sf outdoor “beer garden” area will also be constructed between the main building and the pavilion. This project is not expected to result in an increase in traffic during the weekday commuter peak-hours that would exceed the general background traffic growth rate.
- ***Auto Storage and Towing Facility, 299 Sturbridge Road, Charlton, Massachusetts.*** This project is currently under construction at 299 Sturbridge Road and is not expected to result in an increase in traffic within the study area that would exceed the general background traffic growth rate.
- ***Proposed Warehouse Development, 241 Sturbridge Road, Charlton, Massachusetts (EEA No. 16211).*** This project entails the construction of a 1,200,000± sf warehouse to be located at 241 Sturbridge Road.
- ***Proposed Sortation Warehouse, 53 Sturbridge Road, Charlton, Massachusetts (EEA No. 16386).*** This proposed project will entail the construction of a 2.85 ± million square foot (sf) sortation warehouse to be located at 53 Sturbridge Road.



- ***Proposed Gas Station and Convenience Market, 16 Sturbridge Road, Charlton, Massachusetts.***  
This project will entail the construction of a 4-pump (8 vfp) fueling facility with an associated 3,000± sf convenience market located at 16 Sturbridge Road and is not expected to result in an increase in traffic within the study area that would exceed the general background traffic growth rate.

Traffic volumes associated with the aforementioned specific development projects by others were obtained from the traffic study prepared in support of the project or were developed by using trip-generation information available from the Institute of Transportation Engineers (ITE)<sup>6</sup> for the appropriate land use, and were assigned onto the study area roadway network based on existing traffic patterns where no other information was available. No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

### **General Background Traffic Growth**

Traffic-volume data compiled by MassDOT from permanent count stations located in Sturbridge were reviewed in order to determine general traffic growth trends in the area. This data indicates that traffic volumes have fluctuated over the 10-year period between 2009 and 2019, with an average traffic growth rate of 0.48 percent. In order to provide a prudent planning condition for the Project, a 1.0 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and presently unforeseen development within the study area.

### **Roadway Improvement Projects**

MassDOT and the Town of Sturbridge were consulted in order to determine if there were any planned future roadway improvement projects expected to be complete by 2030. Based on these discussions, no roadway improvement projects aside from routine maintenance activities were identified to be planned in the vicinity of the Project site at this time.

To the east of the Project site, the proponent of the sortation warehouse that is to be located at 53 Sturbridge Road in Charlton will upgrade and replace the traffic signal controller and associated hardware and appurtenances necessary to implement adaptive traffic control systems (ATCS) technologies at the Route 20/The Center at Hobbs Brook intersection. To the west of the Project site, the proponent of the Travel Center and Electric Vehicle Discovery Center that is to be located at 195, 197, 201, and 201A Charlton Road (Route 20) in Sturbridge will be installing either a traffic signal that will include ATCS technologies or modern roundabout at the primary driveway to the travel center and will constrict geometric improvements along Route 20. These improvements will be complete within the horizon year of this assessment (2030) and are expected to result in an overall improvement in the flow of traffic along the Route 20 corridor with consideration of the increase in traffic that is expected from approved and planned future development along the corridor.

### **No-Build Traffic Volumes**

The 2030 No-Build condition peak-hour traffic-volumes were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2023 Existing peak-hour traffic volumes and then adding the traffic volumes associated with the identified specific development projects by others. The resulting 2030 No-Build weekday morning and evening peak-hour traffic volumes are shown on Figure 2.

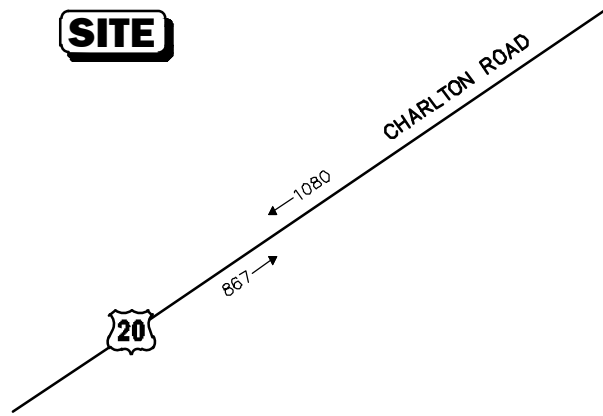
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<sup>6</sup>Ibid 1.

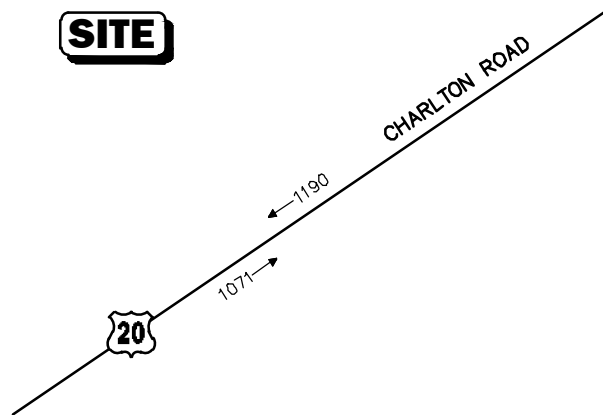




WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



Not To Scale



Figure 2

2030 Build  
Peak-Hour Traffic Volumes

## **Project-Generated Traffic**

As proposed, the Project will entail the construction of an 8,000± sf commercial building that is anticipated to be occupied by a designer/manufacturer of prototype, laser-powered diagnostic and medical devices. In order to develop the traffic characteristics of the Project, trip-generation statistics published by the ITE<sup>7</sup> for a similar land use as that proposed was used. ITE Land Use Code (LUC) 760, *Research and Development Center*, was used to develop the traffic characteristics for the Project, the results of which are summarized in Table 2.

**Table 2**  
**TRIP GENERATION SUMMARY**

<b>Time Period</b>	<b>Vehicle Trips<sup>a</sup></b>		
	<b>Entering</b>	<b>Exiting</b>	<b>Total</b>
<i>Average Weekday:</i>	163	163	326
<i>Weekday Morning Peak-Hour:</i>	26	6	32
<i>Weekday Evening Peak-Hour:</i>	5	27	32

<sup>a</sup>Based on ITE LUC 760, *Research and Development Center*.

## **Project-Generated Traffic-Volume Summary**

As can be seen in Table 2, the Project is expected to generate approximately 326 vehicle trips on an average weekday (two-way volume over the operational day of the Project, or 163 vehicles entering and 163 exiting), with 32 vehicle trips (26 vehicles entering and 6 exiting) expected during the weekday morning peak-hour and 32 vehicle trips (5 vehicles entering and 27 exiting) expected during the weekday evening peak-hour.

## **Trip Distribution and Assignment**

The directional distribution of generated trips to and from the Project site was determined based on a review of U.S. Census Journey-to-Work data for the Town of Sturbridge and then refined based on a review of existing traffic patterns within the study area. The general trip distribution for the Project is graphically depicted on Figure 3, with the additional traffic that is expected to be generated by the Project assigned on the study area roadway network as shown on Figure 4.

## **Build Traffic Volumes**

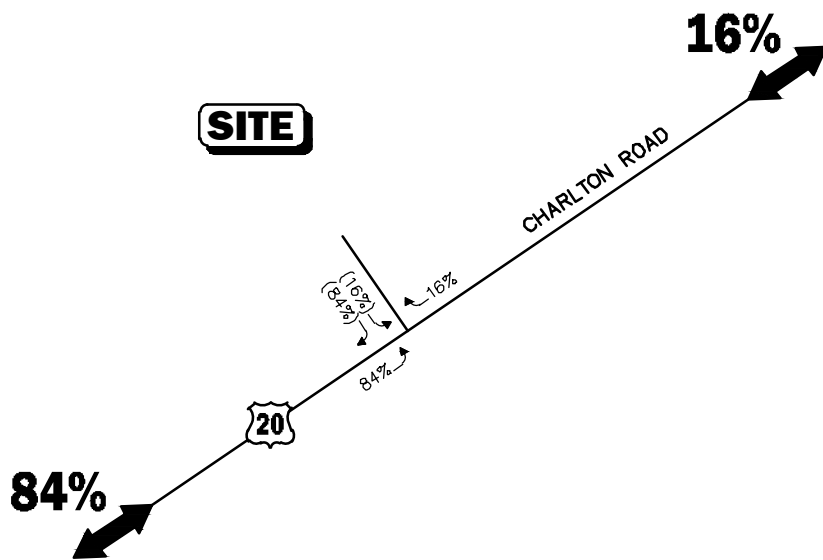
The 2030 Build condition traffic volumes consist of the 2030 No-Build traffic volumes with the addition of the traffic expected to be generated by the Project. The 2030 Build weekday morning and evening peak-hour traffic volumes are graphically depicted on Figure 5.

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<sup>7</sup>Ibid 1.



**Legend:**  
XX Entering Trips  
(XX) Exiting Trips



Not To Scale

Figure 3

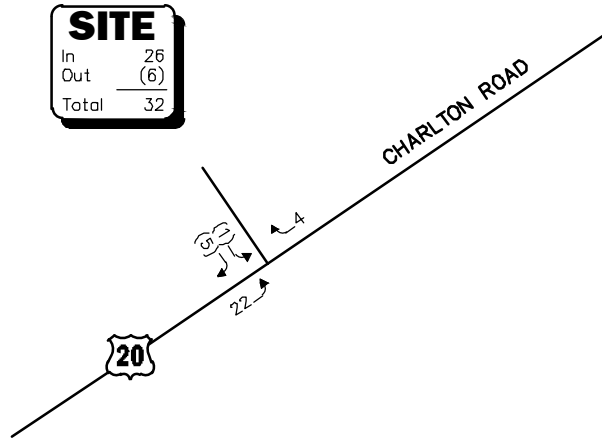
Trip Distribution Map



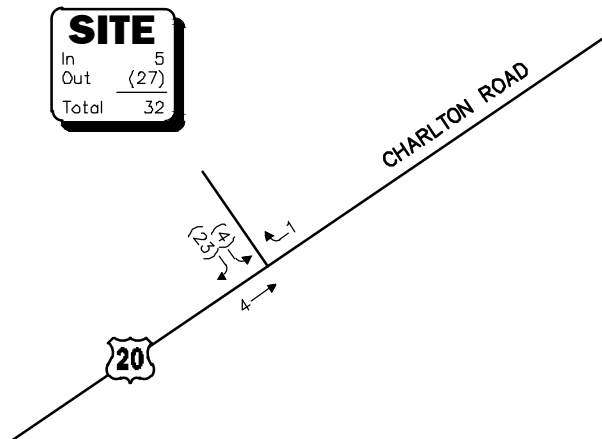
WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)

**Legend:**

- XX Entering Trips
- (XX) Exiting Trips



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



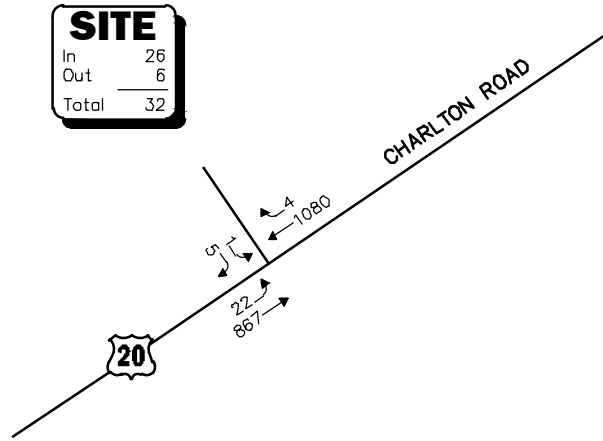
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Figure 4

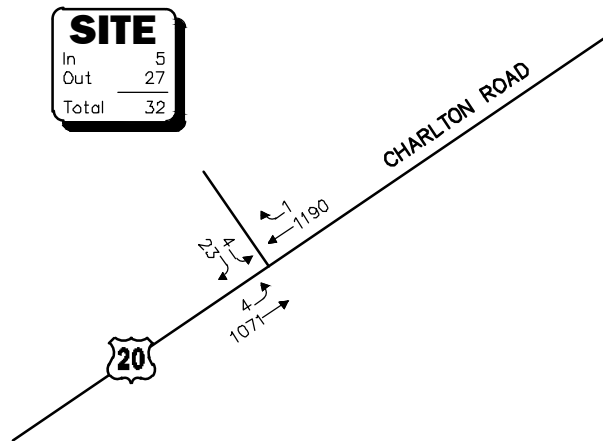


Project-Generated Peak-Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



Not To Scale

Figure 5



2030 Build  
Peak-Hour Traffic Volumes

## TRAFFIC OPERATIONS ANALYSIS

In order to assess the potential impact of the Project on the roadway network, a detailed traffic operations analysis (motorist delays, vehicle queuing, and level-of-service) was performed at the intersection of Route 20 at the Project site driveway. Capacity analyses provide an indication of how well transportation facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

In brief, six levels of service are defined for each type of facility. They are given letter designations ranging from A to F, with LOS “A” representing the best operating conditions and LOS “F” representing congested or constrained operations. An LOS of “E” is representative of a transportation facility that is operating at its design capacity with an LOS of “D” generally defined as the limit of “acceptable” traffic operations. Since the level-of-service of a traffic facility is a function of the flows placed upon it, such a facility may operate at a wide range of levels of service depending on the time of day, day of week, or period of the year. The Synchro® intersection capacity analysis software, which is based on the analysis methodologies and procedures presented in the *Highway Capacity Manual, 6<sup>th</sup> Edition* (HCM)<sup>8</sup> for unsignalized intersections, was used to complete the level-of-service and vehicle queue analyses.

### Analysis Results

Level-of-service and vehicle queue analyses were conducted for the study intersection under 2030 Build conditions. The results of the intersection capacity and vehicle queue analyses are summarized in Table 3, with the detailed analysis results attached. The following is a summary of the analysis results. For context, we note that an LOS of “D” or better is generally defined as “acceptable” operating conditions.

**Table 3**  
**UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/ Peak-Hour/Movement	2030 Build			
	Demand	Delay	LOS	Queue 95 <sup>th</sup>
<b>Route 20 at the Project Site Driveway</b>				
<i>Weekday Morning:</i>				
Project site driveway SEB LT/RT	6	19.8	C	0
Route 20 NEB LT/TH	889	0.8	A	0
Route 20 SWB TH/RT	1,084	0.0	A	0
<i>Weekday Evening:</i>				
Project site driveway SEB LT/RT	27	23.6	C	1
Route 20 NEB LT/TH	1,075	0.1	A	0
Route 20 SWB TH/RT	1,191	0.0	A	0

<sup>a</sup>Demand in vehicles per hour.

<sup>b</sup>Average control delay per vehicle (in seconds).

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in vehicles.

NEB = northeastbound; SWB = southwestbound; SEB = southeastbound

LT = left-turning movements; TH = through movements; RT = right-turning movements.

<sup>8</sup>*Highway Capacity Manual, 6<sup>th</sup> Edition*, Transportation Research Board; Washington, DC; 2016.





## Route 20 at the Project Site Driveway

All movements exiting the Project site driveway are predicted to operate at LOS C during both the weekday morning and evening peak-hours, with a predicted vehicle queue of up to one (1) vehicle. All movements along Route 20 approaching the driveway were shown to operate at LOS A during both the weekday morning and evening peak-hours with negligible vehicle queuing predicted.

### SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the Project site driveway intersection with Route 20 in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)<sup>9</sup> requirements. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 4 presents the measured SSD and ISD at the subject intersection.

**Table 4**  
**SIGHT DISTANCE MEASUREMENTS<sup>a</sup>**

Intersection/Sight Distance Measurement	Feet		
	Required Minimum (SSD)	Desirable (ISD) <sup>b</sup>	Measured
<b>Route 20 at the Project Site Driveway</b>			
<i>Stopping Sight Distance:</i>			
Route 20 approaching from the northeast	455	--	740
Route 20 approaching from the southwest	455	--	1,000+
<i>Intersection Sight Distance:</i>			
Looking to the northeast from the Project site driveway	455	500	480
Looking to the southwest from the Project site driveway	455	615	1,000+

<sup>a</sup>Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 7<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018; and based on a 52 mph approach speed along Route 20.

<sup>b</sup>Values shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed. The critical gap for left-turn movements exiting the Project site driveway was increased by 0.5 seconds in order to account for the time to cross the additional travel lane along Route 20.

As can be seen in Table 4, the available lines of sight at the Project site driveway intersection with Route 20 were found to exceed the recommended minimum sight distance for the driveway to function in a safe (SSD) manner based on a 52 mph approach speed along Route 20, which is slightly above the posted speed limit (50 mph) and consistent with the higher measured 85<sup>th</sup> percentile vehicle travel speed approaching the driveway (50/52 mph).

<sup>9</sup>*A Policy on Geometric Design of Highway and Streets*, 7<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.



## **SUMMARY**

VAI has completed a detailed assessment of the potential impacts on the transportation infrastructure associated with the proposed construction of a commercial building to be located at 150 Charlton Road (Route 20) in Sturbridge, Massachusetts. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project. Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the ITE<sup>10</sup> the Project is expected to generate approximately 326 vehicle trips on an average weekday (two-way volume over the operational day of the Project), with 32 vehicle trips expected during the weekday morning peak-hour and 32 vehicle trips expected during the weekday evening peak-hour;
2. All movements exiting the Project site were shown to operate at LOS C during both the weekday morning and evening peak-hours with residual vehicle queues of up to one (1) vehicle, which can be contained within the Project site without impeding access or circulation, or the movement of vehicles along Route 20;
3. No apparent safety deficiencies were noted with respect to the motor vehicle crash history along Route 20 in the vicinity of the Project site; and
4. Lines of sight to and from the Project site driveway intersection with Route 20 were found to exceed the recommended minimum distance for safe operation.

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 sites 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 northwest side of Route 20 approximately 650 feet southwest of the Center at Hobbs Brook driveway. 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 be a minimum of 24 feet in width and designed to accommodate the turning and maneuvering requirements of service and delivery vehicles and the largest anticipated responding emergency vehicle as defined by the Sturbridge Fire Department.

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<sup>10</sup>Ibid 1.



- Where perpendicular parking is proposed, the drive aisle behind the parking should be a minimum of 23 feet (24 feet is proposed) in order to facilitate parking maneuvers.
- One-way drives within the Project-site are a minimum of 20-feet in width. “One Way” and “Do Not Enter” signs should be installed where one-way traffic is to be conveyed and at locations where the one-way drive transitions to two-way operation.
- Vehicles exiting the Project sites should be placed under STOP-sign control with a marked STOP-line provided (shown on the Site Plan)
- All signs and pavement markings to be installed within the Project sites should conform to the applicable standards of the *Manual on Uniform Traffic Control Devices (MUTCD)*.<sup>11</sup>
- Pedestrian walkways are proposed within the Project site that should include ADA-compliant wheelchair ramps at all pedestrian crossings to link the parking field to the proposed building.
- Signs, landscaping and other features that are to be installed as a part of the Project within the intersection sight triangle areas of the Project site driveway should be designed and maintained so as not to restrict lines of sight.
- Snow accumulation (windrows) within the sight triangle areas of the Project site driveways should be promptly removed where such accumulations would impede sight lines.

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

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<sup>11</sup>*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.



## ATTACHMENTS

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PROJECT SITE PLAN  
AUTOMATIC TRAFFIC RECORDER COUNT DATA  
SEASONAL ADJUSTMENT DATA  
VEHICLE TRAVEL SPEED DATA  
TRANSIT SCHEDULES  
MASSDOT HIGH CRASH LOCATION MAPPING  
GENERAL BACKGROUND TRAFFIC GROWTH  
BACKGROUND DEVELOPMENT TRAFFIC-VOLUME NETWORKS  
PROPOSED TRIP-GENERATION CALCULATIONS  
US CENSUS JOURNEY-TO-WORK DATA  
SIGHT DISTANCE CALCULATIONS  
CAPACITY ANALYSIS WORKSHEETS



PROJECT SITE PLAN

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# DEFINITIVE SITE PLAN at 150 CHARLTON ROAD (ROUTE 20) STURBRIDGE, MA

1.) PROPERTY LINES/SITE FEATURES ARE THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY SUMMIT ENGINEERING & SURVEY, INC.

2.) ALL MATERIALS AND CONSTRUCTION PRACTICES SHALL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE TOWN OF STURBRIDGE'S DEPARTMENT OF PUBLIC WORKS & PARKS STANDARD SPECIFICATIONS & DETAILS, UNLESS OTHERWISE SPECIFIED BY LOCAL AUTHORITY OR THE ENGINEER.

3.) THE CONTRACTOR SHALL UTILIZE ALL MEASURES AND MATERIALS NECESSARY TO ENSURE THE SAFETY OF ALL PERSONS AND PROPERTIES AT THE SITE DURING CONSTRUCTION. ALL EXCAVATIONS SHALL CONFORM TO CURRENT OSHA STANDARDS.

4.) UNLESS OTHERWISE NOTED, ALL DISTURBED AREAS SHALL BE DRESSED WITH A MINIMUM OF FOUR INCHES (4") OF LOAM AND SHALL BE SEEDED WITH AN APPROVED GRASS MIX.

5.) THE CONTRACTOR SHALL PROVIDE APPROPRIATE EROSION AND SEDIMENTATION CONTROL MEASURES AT ALL TIMES. DEWATERING OPERATIONS SHALL BE PROVIDED, IF REQUIRED; ALL DISCHARGE SHALL PASS THROUGH SEDIMENTATION CONTROL DEVICES TO PREVENT IMPACTS UPON WATER BODIES, BORDERING VEGETATED WETLANDS, DRAINAGE SYSTEMS AND ABUTTING PROPERTIES.

6.) DISTURBED AREAS SHALL BE STABILIZED BY LOAMING AND SEEDING SOON AFTER THE FINISHED GRADE HAS BEEN MET. IF FINAL GRADING DOES NOT OCCUR DURING THE GROWING SEASON, THESE AREAS SHALL BE MULCHED WITH HAY SECURED BY WEIGHTED SNOW FENCE, CHICKEN WIRE MESH OR JUTE NETTING WITH STAPLES. SEED FOR PERMANENT GRASS COVER SHOULD BE ACCORDING TO SOIL CONSERVATION SERVICE GUIDELINES FOR SOIL AND MOISTURE CONDITIONS FOUND ON THE SITE.

7.) SEDIMENTATION CONTROL FENCE AND/OR STRAW BALES SHALL BE MAINTAINED UNTIL ALL SLOPES HAVE BEEN STABILIZED AND THERE IS NO DANGER OF EROSION DIRECTLY ONTO ABUTTING PROPERTIES.

8.) PRIOR TO INITIATING CONSTRUCTION, SEDIMENTATION CONTROL DEVICES SHALL BE INSTALLED. THE CONTRACTOR SHALL MAINTAIN THE DEVICES UNTIL ALL WORK IS COMPLETE AND ALL AREAS HAVE BEEN STABILIZED.

9.) IF THE PROPOSED ROADWAY AREAS ARE NOT PAVED IMMEDIATELY AFTER THE INSTALLATION OF THE DRAINAGE STRUCTURES, HAY BALES SHALL BE PLACED TO PROTECT THE INTEGRITY OF THE STRUCTURES.

10.) THE LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES ARE BASED ON FIELD AND RECORD INFORMATION. THE ENGINEER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION AND INVERT ELEVATIONS OF STRUCTURES AND UTILITIES, AS REQUIRED PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES WITH RECORD DATA SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY. PRIOR TO, AND DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE LOCAL UTILITY COMPANIES, WITH THE TOWN OF STURBRIDGE'S HIGHWAY DEPARTMENT, OTHER TOWN UTILITY DEPARTMENTS, APPLICABLE PRIVATELY OWNED UTILITY COMPANIES AND DIG-SAFE (1-888-344-7233) TO VERIFY UTILITY LOCATION AND TO PROTECT UTILITIES DURING AND AFTER CONSTRUCTION.

11.) IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE HIS WORK WITH THE APPROPRIATE HIGHWAY AND UTILITY DEPARTMENTS. CONTRACTOR SHALL MAINTAIN ALL EXISTING AND NEWLY INSTALLED UTILITIES IN GOOD WORKING ORDER AND SHALL PROTECT THEM FROM DAMAGE AT ALL TIMES UNTIL THE WORK IS COMPLETED AND ACCEPTED.

12.) THE CONTRACTOR SHALL PROVIDE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE TOWN OF STURBRIDGE REQUIREMENTS.

13.) NO TRENCHES SHALL BE ALLOWED TO REMAIN OPEN OVERNIGHT.

14.) ALL POTABLE WATER AND SANITARY BUILDING SERVICE CONNECTIONS SHALL BE SEPARATED HORIZONTALLY BY A MINIMUM OF TEN FEET.

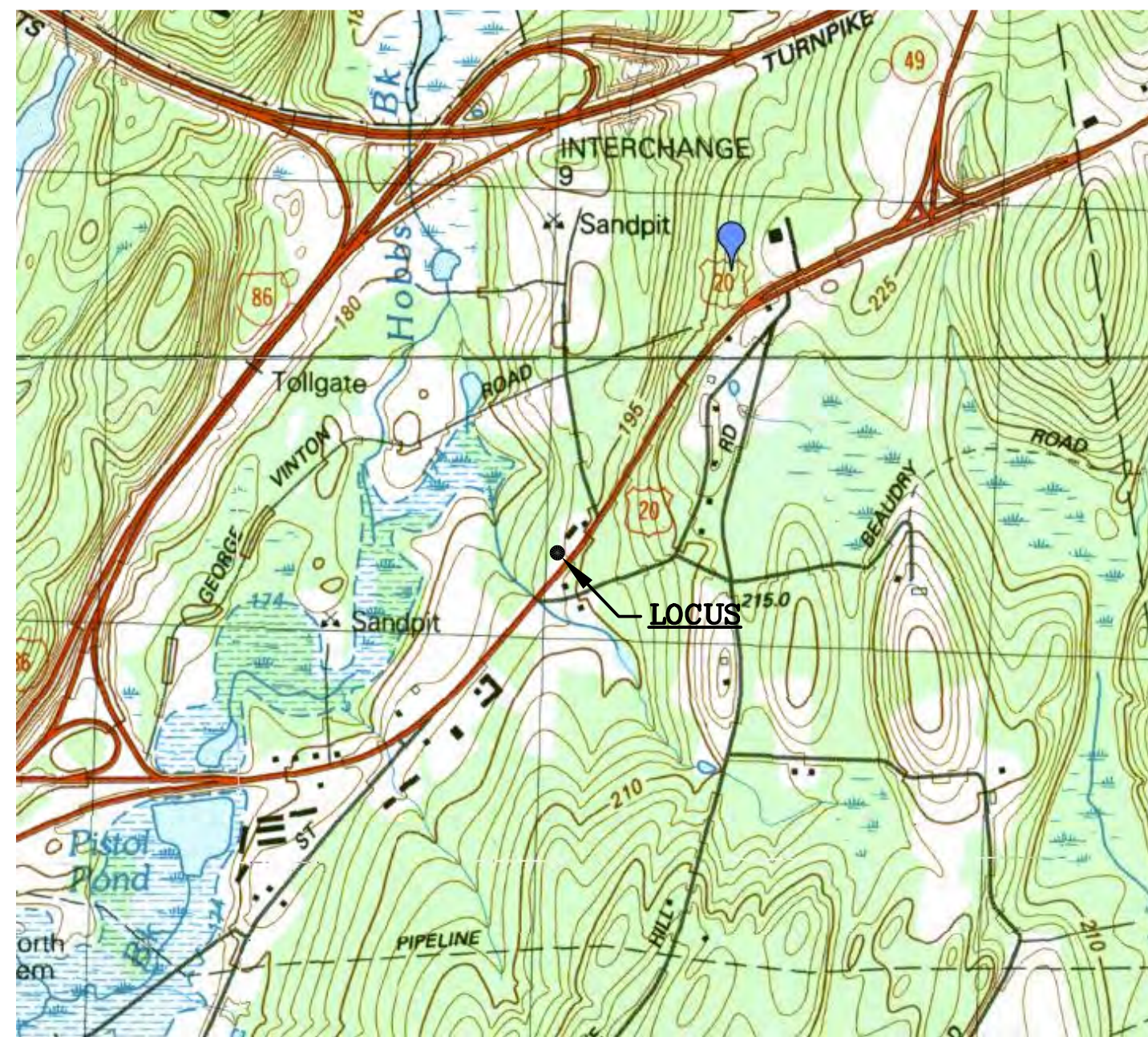
15.) TREE WORK MUST BE COMPLETED BY COMPANIES HOLDING CURRENT COMPLIANCE AGREEMENTS WITH THE MASSACHUSETTS LONGHORNED BEETLE ERADICATION PROJECT. ANY COMPANY CAN BECOME COMPLIANT BY ATTENDING A TRAINING SESSION AT THE PROGRAM OFFICE IN WORCESTER, MA.



DIG SAFE NOTE:

UTILITIES ARE PLOTTED FROM FIELD LOCATION AND ANY RECORD INFORMATION AVAILABLE, AND SHOULD BE CONSIDERED APPROXIMATE. OTHER UTILITIES MAY EXIST WHICH ARE NOT EVIDENT OR FOR WHICH RECORD INFORMATION WAS NOT AVAILABLE. CONTRACTORS (IN ACCORDANCE WITH MASS.G.L. CHAPTER 83 SECTION 40 AS AMENDED) MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING. ALSO, CALL "DIG-SAFE" AT 1(888)344-7233 1(888)DIG-SAFE.

EXISTING LINES OTHER THAN THOSE INDICATED ON THESE DRAWINGS MAY BE ON THE SITE. THE CONTRACTOR IS WARNED TO PROCEED WITH CAUTION WITH ALL WORK, ESPECIALLY EXCAVATION WORK, AND TO MAKE ALL POSSIBLE INVESTIGATIONS AS TO POSSIBLE UNMARKED UTILITY LINES.



LOCUS MAP

1" = 2000'

### LIST OF DRAWINGS:

SHEET - 1	COVER SHEET
SHEET - 2	EXISTING CONDITIONS
SHEET - 3	LAYOUT & MATERIALS PLAN
SHEET - 4	GRADING PLAN
SHEET - 5	UTILITY & DRAINAGE PLAN
SHEET - 6	EROSION & SEDIMENTATION CONTROL PLAN
SHEET - 7	LANDSCAPE PLAN
SHEET - 8	LIGHTING PLAN
SHEET - 9	CONSTRUCTION DETAIL SHEET#1
SHEET - 10	CONSTRUCTION DETAIL SHEET#2
SHEET - 11	CONSTRUCTION DETAIL SHEET#3

ZONING DISTRICT:	INDUSTRIAL PARK	REQUIRED	PROVIDED
MINIMUM AREA:	87,120 S.F. (2 Ac.)	269,200 S.F. (6.18 Ac.)	
MINIMUM FRONTAGE:	300'	406'	
MINIMUM SET BACK:			
FRONT:	60'	163'	
SIDE:	30'	47'	
REAR:	30'	70'	
MAXIMUM LOT COVERAGE:	33%	3%	
MAXIMUM IMPERVIOUS AREA:	70%	17.5%	
MAXIMUM BUILDING HEIGHT:	35'	<35'	

### PLAN NOTES:

PLAN BOOK 187 PLAN 21  
PLAN BOOK 799 PLAN 121  
PLAN BOOK 562 PLAN 14  
PLAN BOOK 631 PLAN 29

### PLAN NOTES:

1.) TOPOGRAPHY SHOWN IS THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY SUMMIT ENGINEERING & SURVEY, INC. IN OCTOBER & NOVEMBER 2020.

2.) THE BORDERING VEGETATED WETLANDS SHOWN WERE FLAGGED BY GLENN KREVOISKY OF EBT ENVIRONMENTAL CONSULTANTS, INC. IN OCTOBER 2020 AND LOCATED BY MEANS OF AN ON THE GROUND SURVEY PERFORMED BY SUMMIT ENGINEERING & SURVEY, INC. IN NOVEMBER 2020.

3.) VERTICAL DATUM IS MASS STATE PLANE NGVD88.

4.) THE LOCUS PROPERTY IS LOCATED IN A ZONE X AREA OF MINIMAL FLOODING. SEE FLOOD FIRM MAP 25027C 0768 E, PANEL 768 OF 1075, DATED JULY 4, 2011.

5.) LANDSCAPE & LIGHTING PLANS (SHEETS 7 & 8) PROVIDED BY McCARTY COMPANIES, LEOMINSTER, MA.

### APPLICANT:

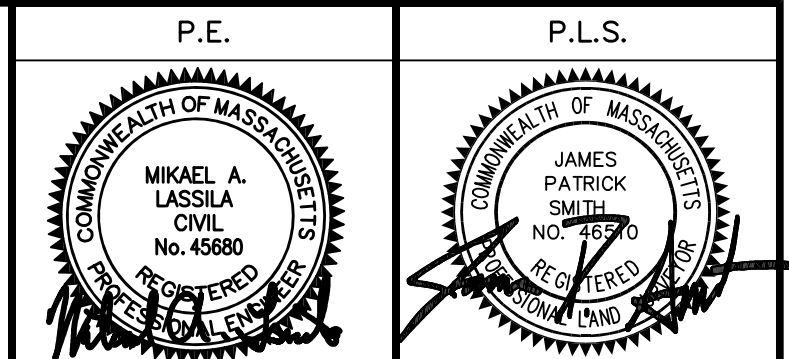
COBRA REALTY TRUST  
MICHAEL CIESLA & MELVYN GLICKMAN  
14 HARVARD STREET  
WORCESTER, MA

### OWNERS:

COBRA REALTY TRUST  
MICHAEL CIESLA & MELVYN GLICKMAN  
14 HARVARD STREET  
WORCESTER, MA

DEED BOOK 9104 PG. 301  
ASSESSORS PARCEL ID: 208-02612-150

REVISIONS		
REV.	DATE	DESCRIPTION
8	12/8/22	ISSUED FOR PB
7	8/31/22	REVISED PER COMMENTS.
6	8/17/22	REVISED PER COMMENTS.
5	6/22/22	REMOVED TEMP. CONST. ACCESS
4	6/13/22	ISSUED FOR COBRA REALTY TRUST
PROJECT NO. 20-409		
DESIGNED BY PML		
CHECKED BY AB		
DATE 9/13/21		
CAD FILE 19-288_150...A1t2.dwg		



APPROVAL UNDER SITE PLAN REVIEW.  
STURBRIDGE PLANNING BOARD

BEING A MAJORITY

APPROVAL DATE: \_\_\_\_\_

ENDORSEMENT DATE: \_\_\_\_\_

### LEGEND

○	IRON PIPE FOUND
●	DRILL HOLE FOUND
⊙	STONE OR CONCRETE MONUMENT
⊗	SEWER MANHOLE
⊕	DRAIN MANHOLE
⊖	ELECTRIC MANHOLE
⊗	TELEPHONE MANHOLE
⊕	WATER MANHOLE
⊖	UNDETERMINED MANHOLE
⊗	CATCH BASIN
⊕	CLEANOUT
⊖	MONITORING WELL
⊗	ANCHOR
⊕	UTILITY POLE
⊖	WATER GATE VALVE
⊗	WATER SHUT OFF
⊕	HYDRANT
⊖	BENCHMARK
⊗	GAS VALVE
⊕	SIGN
⊖	LIGHT POLE / LAMP POST
⊗	SPOT LIGHT
⊕	MAILBOX (MBX)
⊖	BOLLARD
⊗	OBSERVATION TEST PIT
⊕	HYDRIC SOIL TEST PIT
⊖	BORING TEST PIT
⊗	SHRUBS, BUSHES, ETC.
⊕	DECIDUOUS TREE
⊖	CONIFEROUS TREE
⊗	WETLAND FLAG
⊕	MAHW-26
⊖	MAHW-4
⊗	MEAN ANNUAL HIGH WATER
⊕	BOULDER
⊖	VERTICAL GRANITE CURBING
⊗	CONCRETE CURBING
⊕	CAPE COD BERM (BITUMINOUS)
⊖	BITUMINOUS CURBING (GENERIC)
⊗	ELECTRIC LINE
⊕	SEWER LINE
⊖	DRAIN LINE
⊗	WATER LINE
⊕	GAS LINE
⊖	TELEPHONE LINE
⊗	FIRE PROTECTION LINE
⊕	OVERHEAD WIRES
⊖	CABLE TELEVISION
⊗	ROOF DRAIN
⊕	STONEWALL
⊖	EDGE OF PAVEMENT
⊗	FENCING (AS NOTED)
⊕	GUARD RAILING (AS NOTED)
⊖	TREE LINE
⊗	EDGE OF LANDSCAPING
⊕	BORDERING VEGETATED WETLAND
⊖	PROPERTY LINE
⊗	SUBSURFACE DRAIN

PREPARED BY:

**SUMMIT**  
Engineering & Survey, Inc.

710 MAIN STREET  
DIXFORD, MA 01537  
P:(508) 987-8713 F:(508) 987-8714

SHEET TITLE

COVER SHEET

DEFINITIVE SITE PLAN  
at

150 CHARLTON ROAD  
(ROUTE 20)  
STURBRIDGE, MA

PREPARED FOR  
COBRA REALTY TRUST  
SHEET 1 OF 11

SHEET NO.

C-1.0







AUTOMATIC TRAFFIC RECORDER COUNT DATA



Accurate Counts  
978-664-2565

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA

96500001

3/8/2023 Time	NB		Hour Totals		SB		Hour Totals		Combined Totals	
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	26	164			14	191				
12:15	21	144			13	171				
12:30	16	183			6	143				
12:45	7	162	70	653	10	176	43	681	113	1334
1:00	10	171			6	195				
1:15	11	179			11	149				
1:30	7	156			6	177				
1:45	10	164	38	670	11	171	34	692	72	1362
2:00	8	177			8	169				
2:15	10	181			7	219				
2:30	6	171			5	217				
2:45	9	172	33	701	6	206	26	811	59	1512
3:00	12	203			7	209				
3:15	9	183			11	176				
3:30	7	223			12	200				
3:45	13	190	41	799	9	235	39	820	80	1619
4:00	14	221			15	245				
4:15	23	213			7	233				
4:30	27	211			26	266				
4:45	35	208	99	853	30	248	78	992	177	1845
5:00	28	217			44	232				
5:15	44	192			47	218				
5:30	57	185			56	207				
5:45	76	184	205	778	63	202	210	859	415	1637
6:00	103	143			62	177				
6:15	116	126			84	173				
6:30	129	120			109	124				
6:45	157	119	505	508	127	149	382	623	887	1131
7:00	120	94			143	124				
7:15	131	81			132	106				
7:30	153	81			140	111				
7:45	159	76	563	332	150	116	565	457	1128	789
8:00	127	78			128	97				
8:15	124	68			121	78				
8:30	167	55			125	72				
8:45	163	51	581	252	149	63	523	310	1104	562
9:00	134	72			136	41				
9:15	125	50			120	63				
9:30	152	40			155	52				
9:45	148	37	559	199	154	41	565	197	1124	396
10:00	126	37			127	54				
10:15	138	38			144	32				
10:30	153	18			170	29				
10:45	172	29	589	122	142	15	583	130	1172	252
11:00	137	8			151	26				
11:15	161	23			156	21				
11:30	156	18			156	22				
11:45	164	8	618	57	176	8	639	77	1257	134
Total	3901	5924			3687	6649			7588	12573
Percent	39.7%	60.3%			35.7%	64.3%			37.6%	62.4%

Accurate Counts  
978-664-2565

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA

96500001

3/9/2023 Time	NB		Hour Totals		SB		Hour Totals		Combined Totals	
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	11	165			15	158				
12:15	4	175			13	185				
12:30	9	140			6	182				
12:45	6	176	30	656	6	176	40	701	70	1357
1:00	5	151			15	177				
1:15	5	166			14	191				
1:30	6	183			9	174				
1:45	9	163	25	663	5	201	43	743	68	1406
2:00	9	185			9	204				
2:15	3	169			7	209				
2:30	13	165			4	186				
2:45	8	160	33	679	8	196	28	795	61	1474
3:00	7	212			12	203				
3:15	11	189			10	212				
3:30	13	222			7	262				
3:45	2	228	33	851	8	226	37	903	70	1754
4:00	17	206			16	229				
4:15	20	215			6	262				
4:30	20	230			26	228				
4:45	38	202	95	853	30	245	78	964	173	1817
5:00	34	220			46	244				
5:15	48	191			51	212				
5:30	62	194			49	216				
5:45	81	184	225	789	68	200	214	872	439	1661
6:00	95	149			94	164				
6:15	105	134			94	168				
6:30	134	138			121	158				
6:45	142	104	476	525	168	138	477	628	953	1153
7:00	126	99			212	134				
7:15	122	105			241	104				
7:30	135	84			285	110				
7:45	156	102	539	390	291	103	1029	451	1568	841
8:00	154	72			252	99				
8:15	146	72			315	99				
8:30	159	62			342	86				
8:45	140	44	599	250	339	55	1248	339	1847	589
9:00	135	62			207	49				
9:15	121	52			163	57				
9:30	141	49			146	49				
9:45	155	41	552	204	152	50	668	205	1220	409
10:00	151	36			134	50				
10:15	145	36			154	37				
10:30	135	13			136	34				
10:45	169	23	600	108	154	23	578	144	1178	252
11:00	144	25			175	21				
11:15	173	17			190	22				
11:30	164	15			188	14				
11:45	157	12	638	69	164	12	717	69	1355	138
Total	3845	6037			5157	6814			9002	12851
Percent	38.9%	61.1%			43.1%	56.9%			41.2%	58.8%
Grand Total	7746	11961			8844	13463			16590	25424
Percent	39.3%	60.7%			39.6%	60.4%			39.5%	60.5%

ADT

ADT: 21,007

AADT: 21,007

Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA

3/6/2023 Time	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Week Average	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	*	*	*	*	70	43	30	40	*	*	*	*	*	*	50	42
1:00	*	*	*	*	38	34	25	43	*	*	*	*	*	*	32	38
2:00	*	*	*	*	33	26	33	28	*	*	*	*	*	*	33	27
3:00	*	*	*	*	41	39	33	37	*	*	*	*	*	*	37	38
4:00	*	*	*	*	99	78	95	78	*	*	*	*	*	*	97	78
5:00	*	*	*	*	205	210	225	214	*	*	*	*	*	*	215	212
6:00	*	*	*	*	505	382	476	477	*	*	*	*	*	*	490	430
7:00	*	*	*	*	563	565	539	1029	*	*	*	*	*	*	551	797
8:00	*	*	*	*	581	523	599	1248	*	*	*	*	*	*	590	886
9:00	*	*	*	*	559	565	552	668	*	*	*	*	*	*	556	616
10:00	*	*	*	*	589	583	600	578	*	*	*	*	*	*	594	580
11:00	*	*	*	*	618	639	638	717	*	*	*	*	*	*	628	678
12:00 PM	*	*	*	*	653	681	656	701	*	*	*	*	*	*	654	691
1:00	*	*	*	*	670	692	663	743	*	*	*	*	*	*	666	718
2:00	*	*	*	*	701	811	679	795	*	*	*	*	*	*	690	803
3:00	*	*	*	*	799	820	851	903	*	*	*	*	*	*	825	862
4:00	*	*	*	*	853	992	853	964	*	*	*	*	*	*	853	978
5:00	*	*	*	*	778	859	789	872	*	*	*	*	*	*	784	866
6:00	*	*	*	*	508	623	525	628	*	*	*	*	*	*	516	626
7:00	*	*	*	*	332	457	390	451	*	*	*	*	*	*	361	454
8:00	*	*	*	*	252	310	250	339	*	*	*	*	*	*	251	324
9:00	*	*	*	*	199	197	204	205	*	*	*	*	*	*	202	201
10:00	*	*	*	*	122	130	108	144	*	*	*	*	*	*	115	137
11:00	*	*	*	*	57	77	25	21	*	*	*	*	*	*	41	49
Total	0	0	0	0	9825	10336	9838	11923	0	0	0	0	0	0	9831	11131
Day	0		0		20161		21761		0		0		0		20962	
AM Peak					11:00	11:00	11:00	8:00							11:00	8:00
Volume					618	639	638	1248							628	886
PM Peak					4:00	4:00	4:00	4:00							4:00	4:00
Volume					853	992	853	964							853	978
Comb Total	0		0		20161		21761		0		0		0		20962	
ADT	ADT: 21,007		AADT: 21,007													

SEASONAL ADJUSTMENT DATA

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Massachusetts Highway Department  
 Statewide Traffic Data Collection  
 2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
<b>R1</b>	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
<b>R2</b>	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
<b>R3</b>	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
<b>R4-R7</b>	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
<b>U1-Boston</b>	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
<b>U1-Essex</b>	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
<b>U1-Southeast</b>	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
<b>U1-West</b>	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
<b>U1-Worcester</b>	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
<b>U2</b>	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
<b>U3</b>	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
<b>U4-U7</b>	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
<b>Rec - East</b>	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
<b>Rec - West</b>	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

**Recreational - East Group** - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

**Recreational - West Group** - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114, 1116,2196,2197 and 2198.

VEHICLE TRAVEL SPEED DATA

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Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA  
Direction: NB

3/8/2023	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	Total
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	
12:00 AM	0	0	0	3	4	12	20	17	13	0	0	0	1	70
1:00	0	1	0	2	5	9	12	4	4	1	0	0	0	38
2:00	0	0	0	0	4	5	8	10	4	2	0	0	0	33
3:00	0	0	1	0	3	6	12	13	1	4	1	0	0	41
4:00	0	0	0	1	2	23	23	32	9	5	3	1	0	99
5:00	0	1	0	1	8	26	47	71	27	21	3	0	0	205
6:00	0	2	0	1	13	50	125	173	96	39	6	0	0	505
7:00	0	5	2	6	10	65	173	164	95	34	9	0	0	563
8:00	0	3	7	5	27	114	157	173	78	15	2	0	0	581
9:00	2	2	4	10	35	128	173	139	52	8	2	3	1	559
10:00	2	2	4	11	75	140	184	131	34	6	0	0	0	589
11:00	0	6	1	15	54	145	237	119	36	5	0	0	0	618
12:00 PM	2	6	6	7	63	136	205	143	66	17	0	2	0	653
1:00	2	3	3	9	52	156	230	143	59	11	1	1	0	670
2:00	2	7	2	7	38	169	216	183	66	9	2	0	0	701
3:00	3	4	7	9	30	119	247	247	100	32	1	0	0	799
4:00	0	8	12	14	34	167	276	223	89	25	5	0	0	853
5:00	4	6	3	1	29	158	258	218	83	14	4	0	0	778
6:00	2	2	3	10	30	110	186	126	33	5	1	0	0	508
7:00	1	2	2	0	11	61	108	95	42	10	0	0	0	332
8:00	0	1	0	2	9	58	80	69	26	6	1	0	0	252
9:00	0	1	0	4	8	40	63	53	26	3	1	0	0	199
10:00	0	0	0	0	7	20	37	33	18	5	2	0	0	122
11:00	0	0	0	0	5	6	13	24	9	0	0	0	0	57
Total	20	62	57	118	556	1923	3090	2603	1066	277	44	7	2	9825

Percentile	15th	50th	85th	95th
Speed	37	43	50	53
Mean Speed (Average)	43.4			
10 MPH Pace Speed	40-49			
Number in Pace	5679			
Percent in Pace	57.8%			
Number > 45 MPH	3999			
Percent > 45 MPH	40.7%			

Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA  
Direction: NB

3/9/2023 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	0	3	6	6	9	6	0	0	0	0	30
1:00	0	0	0	1	1	5	7	6	4	1	0	0	0	25
2:00	0	0	0	0	1	5	15	8	4	0	0	0	0	33
3:00	0	0	0	0	0	4	12	13	4	0	0	0	0	33
4:00	0	0	0	0	1	8	31	33	16	4	2	0	0	95
5:00	0	1	0	0	6	12	52	78	49	23	1	3	0	225
6:00	1	2	0	5	12	47	121	148	93	33	14	0	0	476
7:00	0	7	2	2	10	50	152	168	95	41	7	5	0	539
8:00	1	8	4	3	43	97	183	149	76	28	6	1	0	599
9:00	0	3	5	5	37	100	189	145	49	11	7	0	1	552
10:00	5	5	9	13	57	167	158	125	52	6	3	0	0	600
11:00	1	5	5	3	53	172	201	139	52	6	1	0	0	638
12:00 PM	2	2	4	5	24	149	204	182	65	18	0	1	0	656
1:00	3	12	3	11	37	140	215	151	65	23	2	1	0	663
2:00	1	7	1	7	38	143	216	172	72	19	3	0	0	679
3:00	5	8	4	7	48	190	250	214	84	34	5	2	0	851
4:00	2	5	2	10	35	147	301	221	101	19	10	0	0	853
5:00	2	2	5	8	35	193	241	178	106	14	5	0	0	789
6:00	0	9	4	6	32	126	172	120	49	7	0	0	0	525
7:00	1	2	1	1	25	87	129	100	31	11	2	0	0	390
8:00	1	2	1	2	9	38	83	72	37	2	3	0	0	250
9:00	0	1	0	2	8	34	71	55	26	4	3	0	0	204
10:00	0	1	0	0	7	16	28	32	16	3	4	1	0	108
11:00	0	0	0	0	0	0	8	11	4	0	2	0	0	25
<b>Total</b>	<b>25</b>	<b>82</b>	<b>50</b>	<b>91</b>	<b>522</b>	<b>1936</b>	<b>3045</b>	<b>2529</b>	<b>1156</b>	<b>307</b>	<b>80</b>	<b>14</b>	<b>1</b>	<b>9838</b>

Percentile	15th	50th	85th	95th
Speed	37	43	50	54
Mean Speed (Average)	43.6			
10 MPH Pace Speed	40-49			
Number in Pace	5562			
Percent in Pace	56.5%			
Number > 45 MPH	4087			
Percent > 45 MPH	41.5%			

<b>Grand Total</b>	<b>45</b>	<b>144</b>	<b>107</b>	<b>209</b>	<b>1078</b>	<b>3859</b>	<b>6135</b>	<b>5132</b>	<b>2222</b>	<b>584</b>	<b>124</b>	<b>21</b>	<b>3</b>	<b>19663</b>
Percentile	15th	50th	85th	95th										
Speed	37	43	50	54										
Mean Speed (Average)	43.5													
10 MPH Pace Speed	40-49													
Number in Pace	11242													
Percent in Pace	57.2%													
Number > 45 MPH	8086													
Percent > 45 MPH	41.1%													

Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA  
Direction: SB

3/8/2023 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	1	3	6	7	12	9	1	2	1	1	43
1:00	0	0	0	1	0	4	6	13	6	3	0	0	1	34
2:00	0	0	0	0	0	0	5	9	5	5	2	0	0	26
3:00	0	0	0	0	0	3	8	18	8	2	0	0	0	39
4:00	0	0	1	0	2	4	13	31	20	7	0	0	0	78
5:00	0	0	1	0	2	9	31	74	65	23	4	1	0	210
6:00	0	0	2	8	11	20	43	140	96	40	18	4	0	382
7:00	1	0	2	10	13	46	104	158	147	60	21	2	1	565
8:00	0	0	3	19	28	57	128	125	106	40	9	7	1	523
9:00	0	3	10	19	23	70	149	153	102	33	3	0	0	565
10:00	0	3	6	23	28	96	161	150	87	23	6	0	0	583
11:00	0	4	12	15	60	138	195	125	72	16	1	1	0	639
12:00 PM	1	2	9	24	53	142	190	193	55	8	4	0	0	681
1:00	0	2	7	25	59	125	203	163	76	28	4	0	0	692
2:00	1	9	7	19	41	145	267	177	104	26	14	1	0	811
3:00	1	7	14	44	61	104	224	194	123	40	5	1	2	820
4:00	2	9	10	26	46	106	268	296	159	48	21	1	0	992
5:00	1	1	10	25	49	105	250	258	129	24	5	2	0	859
6:00	0	1	4	21	35	80	161	191	108	18	4	0	0	623
7:00	0	2	2	13	15	46	106	150	87	31	4	1	0	457
8:00	0	0	1	0	8	35	92	102	52	16	4	0	0	310
9:00	2	0	0	3	1	22	50	67	36	11	3	1	1	197
10:00	0	1	0	0	3	18	37	39	20	7	2	2	1	130
11:00	0	0	1	0	0	5	24	22	13	8	2	2	0	77
Total	9	44	102	296	541	1386	2722	2860	1685	518	138	27	8	10336

Percentile	15th	50th	85th	95th
Speed	37	45	52	56
Mean Speed (Average)	44.8			
10 MPH Pace Speed	40-49			
Number in Pace	5553			
Percent in Pace	53.7%			
Number > 45 MPH	5236			
Percent > 45 MPH	50.7%			

Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA  
Direction: SB

3/9/2023 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	2	6	6	10	9	5	0	2	0	0	40
1:00	0	0	0	0	1	2	16	15	9	0	0	0	0	43
2:00	0	0	0	0	0	1	6	8	9	4	0	0	0	28
3:00	0	1	1	1	0	2	8	11	10	3	0	0	0	37
4:00	0	0	0	2	4	1	12	27	25	5	2	0	0	78
5:00	0	0	0	0	1	6	36	56	66	33	14	1	1	214
6:00	0	0	1	5	17	30	59	137	108	84	32	4	0	477
7:00	0	5	8	26	53	90	222	280	231	96	12	6	0	1029
8:00	8	19	62	108	167	216	275	239	138	12	4	0	0	1248
9:00	1	3	10	25	47	77	211	165	85	37	6	1	0	668
10:00	4	2	9	17	39	73	143	151	101	31	6	1	1	578
11:00	0	3	2	9	56	113	253	181	77	17	6	0	0	717
12:00 PM	0	1	5	14	35	122	207	176	97	41	3	0	0	701
1:00	2	2	11	24	37	119	202	225	94	23	3	0	1	743
2:00	1	3	5	31	76	106	209	200	126	35	1	2	0	795
3:00	1	9	10	37	67	151	250	240	97	33	8	0	0	903
4:00	3	7	20	46	56	133	281	242	129	41	3	2	1	964
5:00	0	5	20	27	49	134	260	255	96	24	2	0	0	872
6:00	0	1	1	15	30	98	178	182	90	25	6	2	0	628
7:00	2	0	4	6	23	51	120	139	67	29	6	3	1	451
8:00	1	2	1	7	23	28	82	121	44	22	5	3	0	339
9:00	0	1	0	3	5	35	50	58	41	11	1	0	0	205
10:00	0	1	0	1	1	10	47	40	29	11	3	0	1	144
11:00	0	0	0	0	0	3	2	6	8	2	0	0	0	21
Total	23	65	170	406	793	1607	3139	3163	1782	619	125	25	6	11923

Percentile	15th	50th	85th	95th
Speed	36	45	52	56
Mean Speed (Average)	44.1			
10 MPH Pace Speed	40-49			
Number in Pace	6271			
Percent in Pace	52.6%			
Number > 45 MPH	5720			
Percent > 45 MPH	48.0%			

Grand Total	32	109	272	702	1334	2993	5861	6023	3467	1137	263	52	14	22259
Percentile				15th	50th	85th	95th							
Speed				37	45	52	56							
Mean Speed (Average)				44.4										
10 MPH Pace Speed				40-49										
Number in Pace				11823										
Percent in Pace				53.1%										
Number > 45 MPH				10957										
Percent > 45 MPH				49.2%										

Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA  
Direction: Combined

3/8/2023	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	Total
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	
12:00 AM	0	0	0	4	7	18	27	29	22	1	2	1	2	113
1:00	0	1	0	3	5	13	18	17	10	4	0	0	1	72
2:00	0	0	0	0	4	5	13	19	9	7	2	0	0	59
3:00	0	0	1	0	3	9	20	31	9	6	1	0	0	80
4:00	0	0	1	1	4	27	36	63	29	12	3	1	0	177
5:00	0	1	1	1	10	35	78	145	92	44	7	1	0	415
6:00	0	2	2	9	24	70	168	313	192	79	24	4	0	887
7:00	1	5	4	16	23	111	277	322	242	94	30	2	1	1128
8:00	0	3	10	24	55	171	285	298	184	55	11	7	1	1104
9:00	2	5	14	29	58	198	322	292	154	41	5	3	1	1124
10:00	2	5	10	34	103	236	345	281	121	29	6	0	0	1172
11:00	0	10	13	30	114	283	432	244	108	21	1	1	0	1257
12:00 PM	3	8	15	31	116	278	395	336	121	25	4	2	0	1334
1:00	2	5	10	34	111	281	433	306	135	39	5	1	0	1362
2:00	3	16	9	26	79	314	483	360	170	35	16	1	0	1512
3:00	4	11	21	53	91	223	471	441	223	72	6	1	2	1619
4:00	2	17	22	40	80	273	544	519	248	73	26	1	0	1845
5:00	5	7	13	26	78	263	508	476	212	38	9	2	0	1637
6:00	2	3	7	31	65	190	347	317	141	23	5	0	0	1131
7:00	1	4	4	13	26	107	214	245	129	41	4	1	0	789
8:00	0	1	1	2	17	93	172	171	78	22	5	0	0	562
9:00	2	1	0	7	9	62	113	120	62	14	4	1	1	396
10:00	0	1	0	0	10	38	74	72	38	12	4	2	1	252
11:00	0	0	1	0	5	11	37	46	22	8	2	2	0	134
Total	29	106	159	414	1097	3309	5812	5463	2751	795	182	34	10	20161

Percentile	15th	50th	85th	95th
Speed	37	44	51	55
Mean Speed (Average)	44.1			
10 MPH Pace Speed	40-49			
Number in Pace	11232			
Percent in Pace	55.7%			
Number > 45 MPH	9236			
Percent > 45 MPH	45.8%			

Accurate Counts  
978-664-2565

96500001

Location : Route 20  
Location : North of Gifford Road  
City/State: Sturbridge, MA  
Direction: Combined

3/9/2023	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	Total
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	
12:00 AM	0	0	0	2	9	12	16	18	11	0	2	0	0	70
1:00	0	0	0	1	2	7	23	21	13	1	0	0	0	68
2:00	0	0	0	0	1	6	21	16	13	4	0	0	0	61
3:00	0	1	1	1	0	6	20	24	14	3	0	0	0	70
4:00	0	0	0	2	5	9	43	60	41	9	4	0	0	173
5:00	0	1	0	0	7	18	88	134	115	56	15	4	1	439
6:00	1	2	1	10	29	77	180	285	201	117	46	4	0	953
7:00	0	12	10	28	63	140	374	448	326	137	19	11	0	1568
8:00	9	27	66	111	210	313	458	388	214	40	10	1	0	1847
9:00	1	6	15	30	84	177	400	310	134	48	13	1	1	1220
10:00	9	7	18	30	96	240	301	276	153	37	9	1	1	1178
11:00	1	8	7	12	109	285	454	320	129	23	7	0	0	1355
12:00 PM	2	3	9	19	59	271	411	358	162	59	3	1	0	1357
1:00	5	14	14	35	74	259	417	376	159	46	5	1	1	1406
2:00	2	10	6	38	114	249	425	372	198	54	4	2	0	1474
3:00	6	17	14	44	115	341	500	454	181	67	13	2	0	1754
4:00	5	12	22	56	91	280	582	463	230	60	13	2	1	1817
5:00	2	7	25	35	84	327	501	433	202	38	7	0	0	1661
6:00	0	10	5	21	62	224	350	302	139	32	6	2	0	1153
7:00	3	2	5	7	48	138	249	239	98	40	8	3	1	841
8:00	2	4	2	9	32	66	165	193	81	24	8	3	0	589
9:00	0	2	0	5	13	69	121	113	67	15	4	0	0	409
10:00	0	2	0	1	8	26	75	72	45	14	7	1	1	252
11:00	0	0	0	0	0	3	10	17	12	2	2	0	0	46
Total	48	147	220	497	1315	3543	6184	5692	2938	926	205	39	7	21761

Percentile	15th	50th	85th	95th
Speed	37	44	51	55
Mean Speed (Average)	43.9			
10 MPH Pace Speed	40-49			
Number in Pace	11833			
Percent in Pace	54.4%			
Number > 45 MPH	9807			
Percent > 45 MPH	45.1%			

Grand Total	77	253	379	911	2412	6852	11996	11155	5689	1721	387	73	17	41922
Percentile	15th	50th	85th	95th										
Speed	37	44	51	55										
Mean Speed (Average)	44.0													
10 MPH Pace Speed	40-49													
Number in Pace	23065													
Percent in Pace	55.0%													
Number > 45 MPH	19043													
Percent > 45 MPH	45.4%													



TRANSIT SCHEDULES

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# Welcome aboard the **WRTA!**

This route timetable shows the times of departure at major stops along the route and contains route maps and other important information. Additional information can be obtained by calling the WRTA Information Line at **(508) 791-WRTA (9782)**, or visit our website at [www.TheRTA.com](http://www.TheRTA.com).

## WRTA FARE INFORMATION Effective July 1, 2017

Full Cash Fare (Adults age 14 and up) . . . . . \$1.75  
 Senior/Disabled Cash Fare . . . . . \$0.85  
 Children 5-13 years of age accompanied by an adult . . . . . \$0.85  
 Children 9 years of age not accompanied by an adult\*\* . . . . . \$1.75  
 Children under 5 accompanied by an adult . . . . . FREE

One Day 8 Ride Pass (Adults age 14 & up) . . . . . \$4.50  
 Senior/Disabled\*/Child One Day 8 Ride Pass . . . . . \$2.25

31 Day Pass . . . . . \$57.00  
 Senior/Disabled\*31 Day Pass . . . . . \$28.50

*\*Valid ID Required for Senior/Disabled Fare*

**Please have exact fare ready when boarding the bus.  
 The farebox does not accept pennies or half dollars.**

**The Charlie Card** is available to either purchase a monthly pass or add stored value (cash). The stored value gives you discounted fare with the WRTA. They can be used on the WRTA, MBTA and other participating RTA's in Massachusetts. You can obtain a Charlie Card at the Customer Service Center located at 60 Foster Street, Worcester, MA

Route schedules and the purchase of passes are available at the Customer Service Center at 60 Foster Street, Worcester.

**ACCESSIBILITY:** All WRTA buses are wheelchair accessible and feature bicycle racks for two bicycles. For TTY service call Massachusetts Relay TTY (800) 439-2370. For information, accommodations and or to provide feedback call 508-791-9782 option 2.

**PROPER IDENTIFICATION:** One of the following valid identification cards must be shown to the driver each time you board:

**SENIOR** . . . . . WRTA Senior I.D. card

**DISABLED** . . . Statewide Access Pass / WRTA ADA Photo I.D.  
 MCB ID and PCA-ride free

**MEDICARE** . . . . . Medicare card with Photo I.D.

**HOLIDAY SERVICE: Saturday\* Service** is provided on Martin Luther King, Jr. Day, Presidents' Day, Patriots' Day, Columbus Day, and the day after Thanksgiving.

**Weekday Service** is provided on Veterans' Day.

*Routes 29, 33, 42 and community shuttles operate on a weekday schedule on these holidays. Routes 19 and 30 operate on a modified Saturday schedule on these holidays.*

**NO SERVICE ON:** New Years Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day

## Please...NO Smoking, Eating, Drinking or Music

\*\*The Federal Transit Administration permits transit systems to set a minimum age limit for children riding without a parent or guardian. The WRTA has set this age limit at Nine (9) years old. In order to ensure compliance with this age limit, operators may question a child seeking to board a bus who appears, in the operator's opinion, to be Eight (8) years old or younger. If an operator is not satisfied with a child's answer, the operator may call for assistance from a WRTA supervisor and/or public safety personnel. This policy applies to Paratransit Service as well.

## OUTBOUND

### WEEKDAYS

See the map for matching timepoint locations

1	2	3	4	5	6	7
BUS STARTS	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS ENDS
Union Station Hub	Auburn Mall	Rt 12 & Rt 20	Rt 20 & Rt 169	Optical Dr Southbridge	Southbridge Library	Big Bunny Plaza
535a	550a	558a	610a	620a	624a	629a
735a	750a	758a	810a	820a	824a	829a
935a	950a	958a	1010a	1015a	1019a	1029a
1135a	1150a	1158a	1210p	1215p	1219p	1229p
135p	150p	158p	210p	215p	219p	229p
335p	350p	358p	410p	415p	419p	429p
535p	550p	558p	610p	615p	619p	629p

**THIS ROUTE DOES NOT PICK UP OR DROP OFF ON ROUTE 20  
 \*(SEE MAP INSERT)**

### SATURDAYS

See the map for matching timepoint locations

1	2	3	4	5	6	7
BUS STARTS	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS ENDS
Union Station Hub	Auburn Mall	Rt 12 & Rt 20	Rt 20 & Rt 169	Optical Dr Southbridge	Southbridge Library	Big Bunny Plaza
800a	815a	823a	835a	845a	849a	854a
1000a	1015a	1023a	1035a	1045a	1049a	1054a
1200p	1215p	1223p	1235p	1245p	1249p	1254p
200p	215p	223p	235p	245p	249p	254p
400p	415p	423p	435p	445p	449p	454p
600p	615p	623p	635p	645p	649p	654p

## INBOUND

### WEEKDAYS

See the map for matching timepoint locations

7	4	3	2	1
BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS ENDS
Big Bunny Plaza	Rt 20 & Rt 169	Rt 12 & Rt 20	Auburn Mall	Union Station Hub
633a	643a	705a	715a	735a
833a	843a	905a	915a	935a
1033a	1043a	1105a	1115a	1135a
1233p	1243p	105p	115p	135p
233p	243p	305p	315p	335p
433p	443p	505p	515p	535p
633p	643p	705p	715p	735p

**THIS ROUTE DOES NOT PICK UP OR DROP OFF ON ROUTE 20  
 \*(SEE MAP INSERT)**

### SATURDAYS

See the map for matching timepoint locations

6	4	3	2	1
BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS LEAVES	BUS ENDS
Southbridge Library	Rt 20 & Rt 169	Rt 12 & Rt 20	Auburn Mall	Union Station Hub
858a	908a	930a	940a	1000a
1058a	1108a	1130a	1140a	1200p
1258p	108p	130p	140p	200p
258p	308p	330p	340p	400p
458p	508p	530p	540p	600p
658p	708p	730p	740p	800p

# Route 29

## UNION STATION HUB - SOUTHBRIDGE - CHARLTON

**Effective Date: January 25, 2020**

## Worcester Regional Transit Authority



### Serving:

Auburn Mall

Optical Drive - Southbridge

Union Station Hub

Southbridge Library

Big Bunny Plaza

#### Translation

**English:** If this information is needed in another language, please visit [www.therta.com](http://www.therta.com) and use the Google Translate feature.

**Portuguese:** Se esta informação é necessária em outro idioma, por favor visite [www.therta.com](http://www.therta.com) e use o Google Translate.

**Spanish:** Si necesita esta información en otro idioma, por favor visite [www.therta.com](http://www.therta.com) y utilice Google Translate.

**French:** Si vous désirez ces renseignements dans une autre langue, prière de vous servir de Google Translate qui se trouve à l'adresse suivante: [www.therta.com](http://www.therta.com).

**Polish:** Jeśli ta informacja jest potrzebna w innym języku, proszę odwiedzić [www.therta.com](http://www.therta.com) i korzystać z Google Translate funkcji.

**Vietnamese:** Nếu thông tin này là cần thiết trong một ngôn ngữ khác, vui lòng truy cập [www.therta.com](http://www.therta.com) và sử dụng các tính năng của Google Translate.

**Chinese (Traditional):** 如果此信息需要以另一種語言，請訪問[www.therta.com](http://www.therta.com)並使用谷歌翻譯功能。

**Swahili:** Kama unahitaji habari hii katika nyingine lugha, unaweza kubonyeza mahali panaandikwa "Google Translate" hapa juu.

**Note:** French, Spanish, Polish and Portuguese translations were created by human translation from the English version. Vietnamese, Chinese and Swahili translations were created from the English version using Google Translate. There are likely grammatical errors in these translations, however time constraints required use of Google Translate for bus schedule printing within necessary timeframe (June 2017)

**For Transit Information Call  
 508-791-9782 or visit  
[www.therta.com](http://www.therta.com)**



Most Routes Serve:

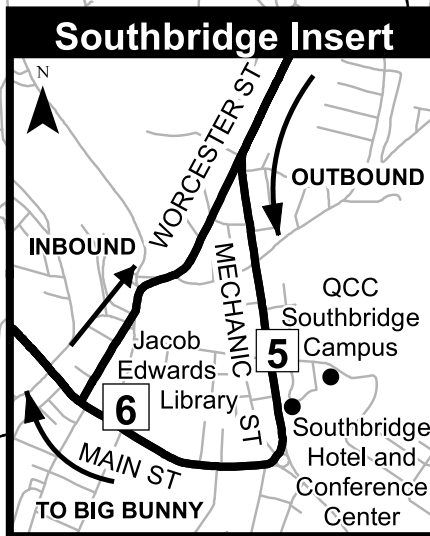
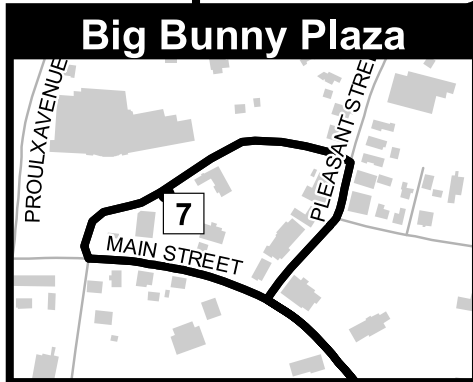
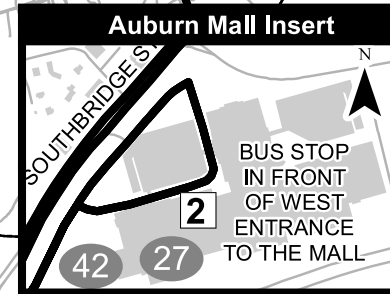
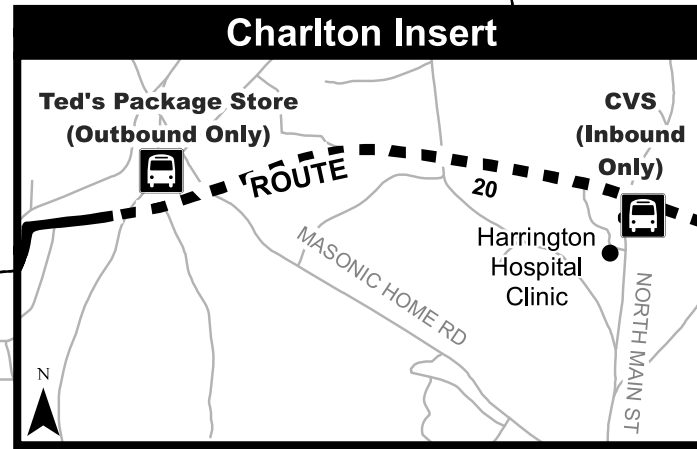
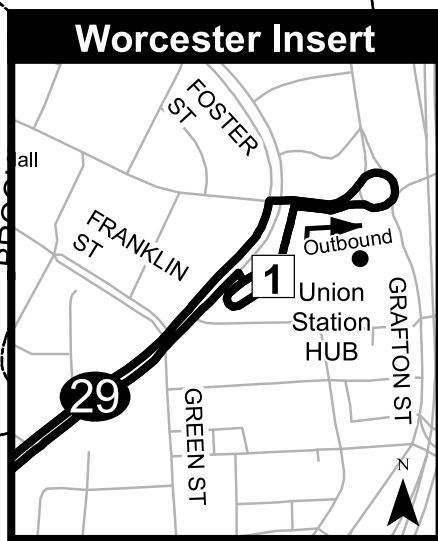
- ~ WRTA Customer Service Center/Hub
- ~ Union Station

Route 29 Serving:

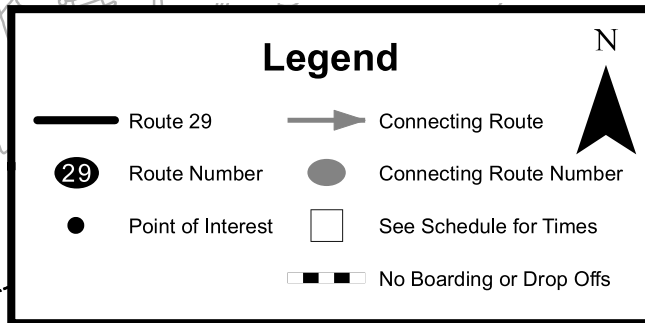
- ~ Southbridge Street
- ~ Auburn Mall
- ~ Charlton Family Practice
- ~ Imcon
- ~ QCC Southbridge Campus
- ~ Southbridge Hotel and Conference Center
- ~ Jacob Edwards Library
- ~ Downtown Southbridge
- ~ Big Bunny Plaza

Connecting Routes:

- Route 27
- Route 42



**U.S. ROUTE 20 NOTICE:**  
The Charlton Insert designates the only pick up and drop off points allowed on U.S. Route 20. For safety concerns, no other pick ups or drop offs on U.S. Route 20 are allowed.



Thank You for riding the WRTA

MASSDOT HIGH CRASH LOCATION MAPPING

---

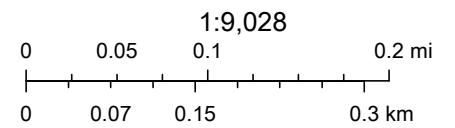




# MassDOT Top Crash Locations



4/24/2023, 7:20:41 PM



GENERAL BACKGROUND TRAFFIC GROWTH

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**General Background Traffic Growth - Daily Traffic Volumes**

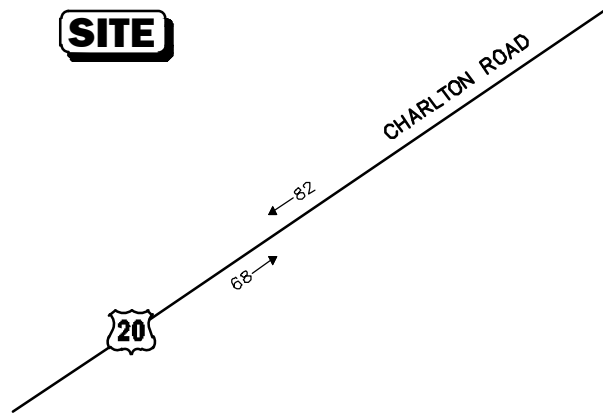
CITY/TOWN	ROUTE/STREET	LOCATION	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Growth Rate
Sturbridge	Hall Road	South of Route 20						4,359	4,459	4,735	4,815	4,829	4,810	2.15%
Sturbridge	Podunk Pike	North of Route 20						7,438	7,520	7,618	6,233	6,320	6,345	-3.89%
Sturbridge	Main Street	Under Interstate 84						12,925	13,067	13,237	13,383	13,570	13,624	1.11%
Sturbridge	Interstate 84	North of Route 20	62,300	61,600	62,934	53,795	51,213	54,862	57,166	62,036	63,153	63,785	64,423	0.66%
Sturbridge	Interstate 84	South of Route 20	54,652	55,400	53,645	51,486	52,177	52,522	55,467	55,862	56,868	57,169	57,566	0.68%
Sturbridge	New Boston Road	North of Route 20						3,204	3,278	3,481	3,540	3,551	3,537	2.16%
														0.48%

BACKGROUND DEVELOPMENT TRAFFIC-VOLUME NETWORKS

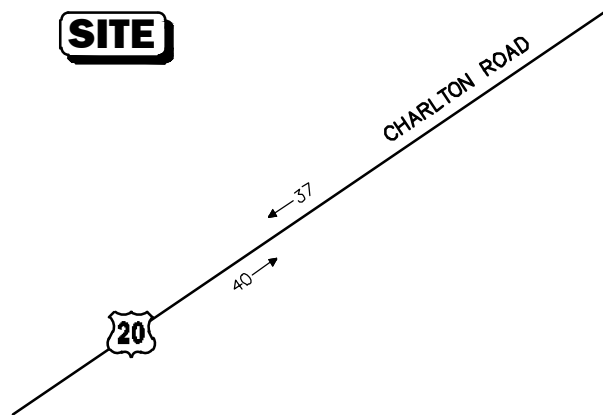




WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



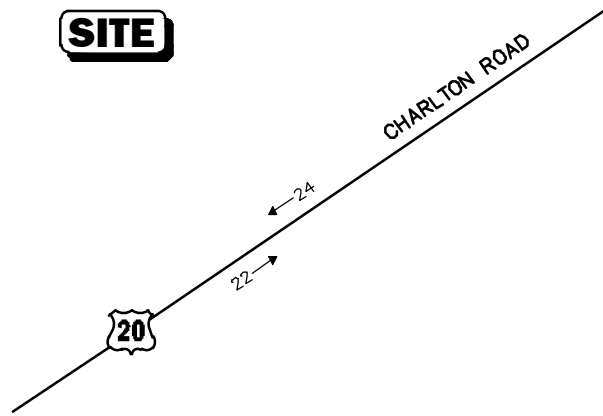
Not To Scale



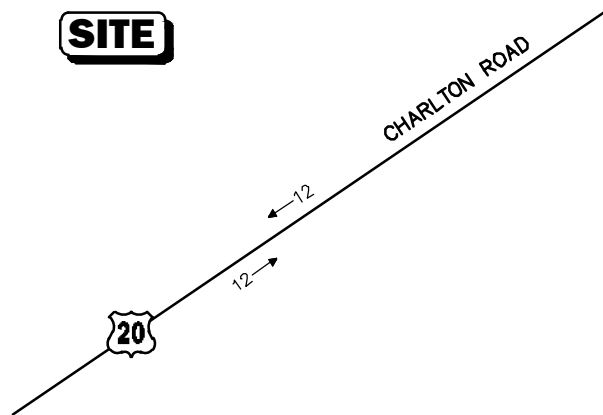
Figure A-1

Proposed Travel Center  
195 Charlton Road  
Peak-Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



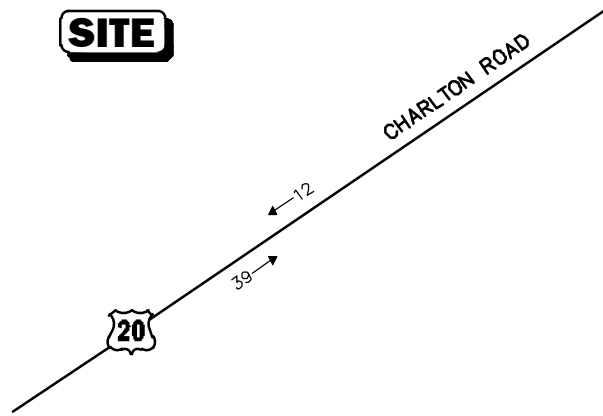
Not To Scale



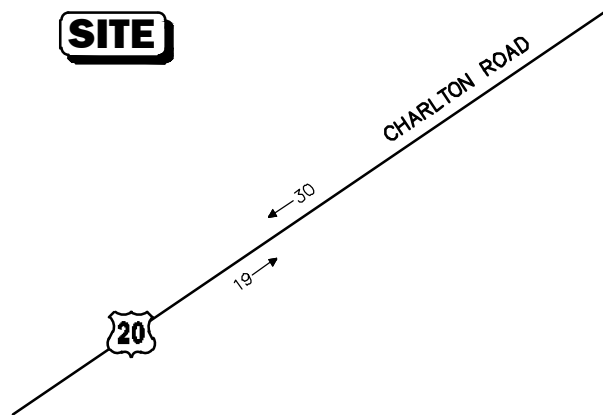
Figure A-2

Proposed Coffee Shop and Urgent Care Facility  
212, 216, and 226 Charlton Road  
Peak-Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



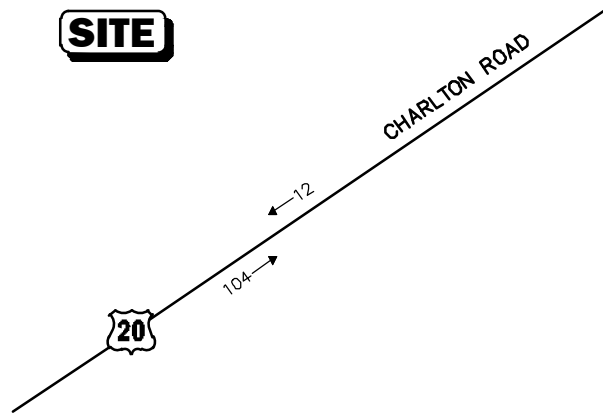
Not To Scale



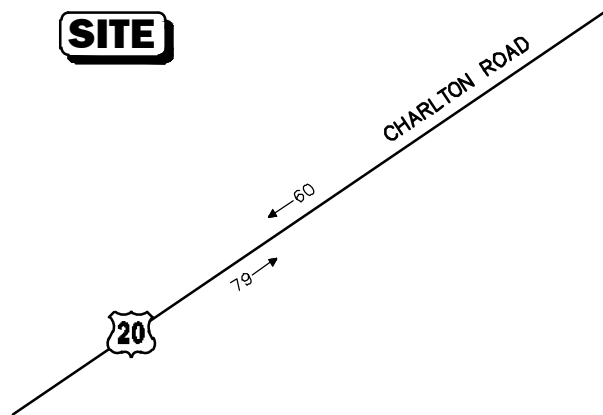
Figure A-3

Proposed Warehouse  
241 Sturbridge Road  
Peak-Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR (8:00 - 9:00 AM)



WEEKDAY EVENING PEAK HOUR (4:15 - 5:15 PM)



 Not To Scale



Figure A-4

Proposed Sortation Fulfillment  
Center Warehouse  
Peak-Hour Traffic Volumes

PROPOSED TRIP-GENERATION CALCULATIONS





# Graph Look Up



ITETripGen Web-based App

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

Query Filter

**DATA SOURCE:**  
Trip Generation Manual, 11th Ed

**SEARCH BY LAND USE CODE:**  
760

**LAND USE GROUP:**  
(700-799) Office

**LAND USE :**  
760 - Research and Development Center

**LAND USE SUBCATEGORY:**  
All Sites

**SETTING/LOCATION:**  
General Urban/Suburban

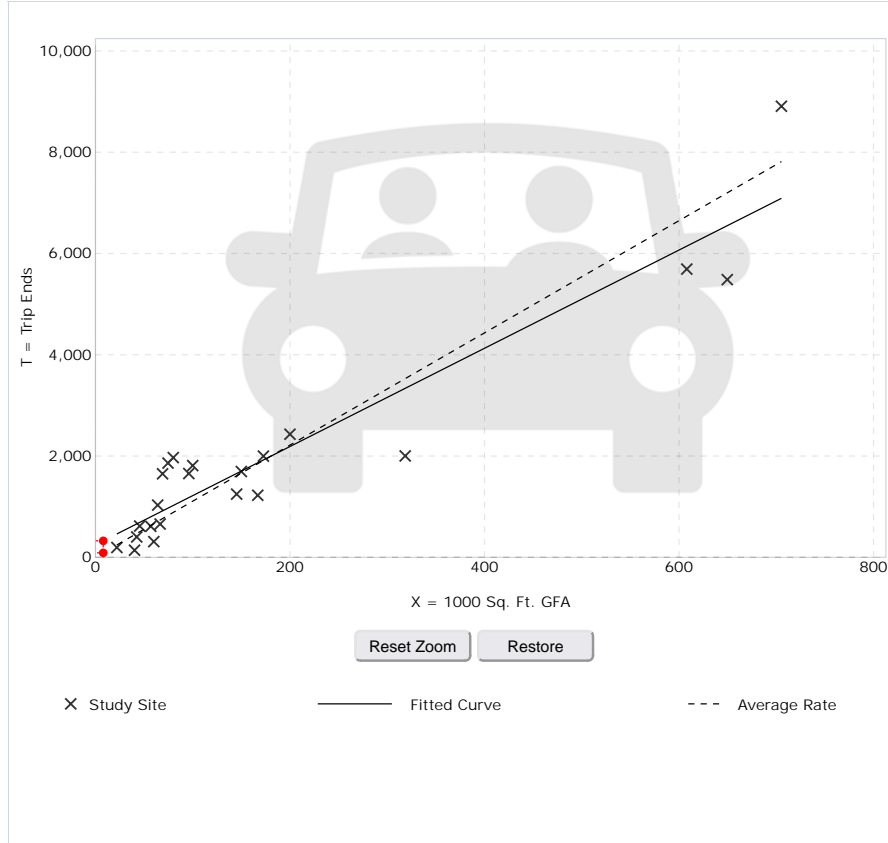
**INDEPENDENT VARIABLE (IV):**  
1000 Sq. Ft. GFA

**TIME PERIOD:**  
Weekday

**TRIP TYPE:**  
Vehicle

**ENTER IV VALUE TO CALCULATE TRIPS:**  
8 Calculate

## Data Plot and Equation



### DATA STATISTICS

<b>Land Use:</b>	Research and Development Center (760) <a href="#">Click for Description and Data Plots</a>
<b>Independent Variable:</b>	1000 Sq. Ft. GFA
<b>Time Period:</b>	Weekday
<b>Setting/Location:</b>	General Urban/Suburban
<b>Trip Type:</b>	Vehicle
<b>Number of Studies:</b>	22
<b>Avg. 1000 Sq. Ft. GFA:</b>	179
<b>Average Rate:</b>	11.08
<b>Range of Rates:</b>	3.48 - 24.95
<b>Standard Deviation:</b>	4.45
<b>Fitted Curve Equation:</b>	$T = 9.70(X) + 247.71$
<b>R<sup>2</sup>:</b>	0.89
<b>Directional Distribution:</b>	50% entering, 50% exiting
<b>Calculated Trip Ends:</b>	Average Rate: 89 (Total), 44 (Entry), 45 (Exit) <b>Fitted Curve: 325 (Total), 163 (Entry), 162 (Exit)</b>

Add-ons to do more

Try OTISS Pro



# Graph Look Up



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- Comments

Query Filter

**DATA SOURCE:**  
Trip Generation Manual, 11th Ed

**SEARCH BY LAND USE CODE:**  
760

**LAND USE GROUP:**  
(700-799) Office

**LAND USE :**  
760 - Research and Development Center

**LAND USE SUBCATEGORY:**  
All Sites

**SETTING/LOCATION:**  
General Urban/Suburban

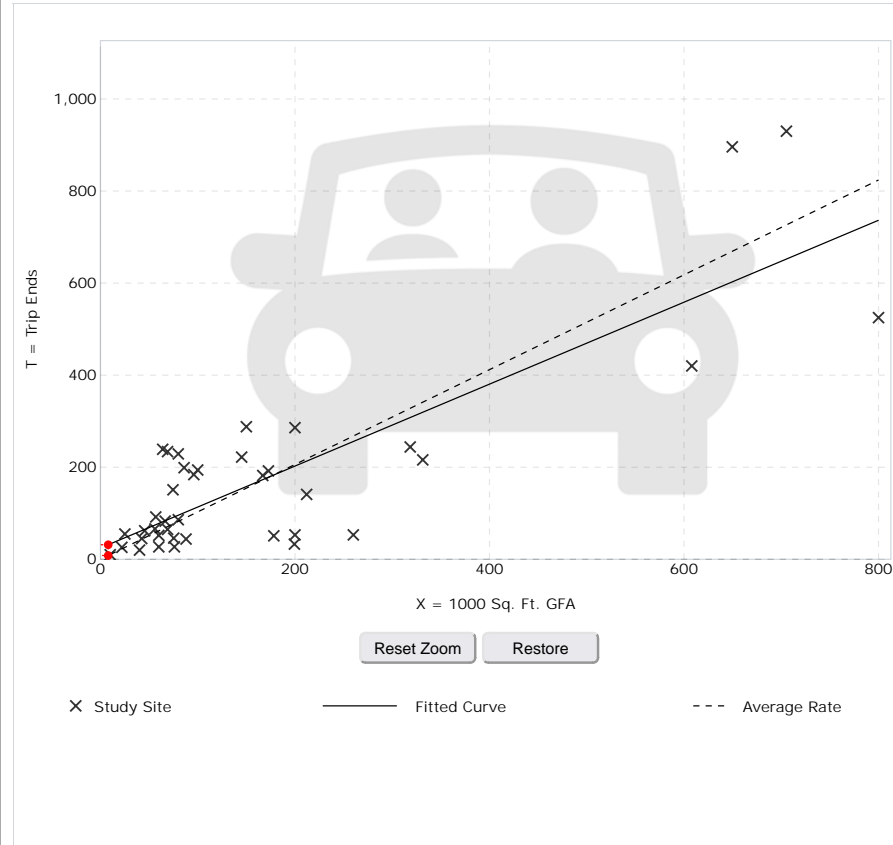
**INDEPENDENT VARIABLE (IV):**  
1000 Sq. Ft. GFA

**TIME PERIOD:**  
Weekday, Peak Hour of Adjacent Street Traffic, 1

**TRIP TYPE:**  
Vehicle

**ENTER IV VALUE TO CALCULATE TRIPS:**  
8 Calculate

## Data Plot and Equation



### DATA STATISTICS

<b>Land Use:</b>	Research and Development Center (760) <a href="#">Click for Description and Data Plots</a>
<b>Independent Variable:</b>	1000 Sq. Ft. GFA
<b>Time Period:</b>	Weekday Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.
<b>Setting/Location:</b>	General Urban/Suburban
<b>Trip Type:</b>	Vehicle
<b>Number of Studies:</b>	39
<b>Avg. 1000 Sq. Ft. GFA:</b>	173
<b>Average Rate:</b>	1.03
<b>Range of Rates:</b>	0.17 - 3.73
<b>Standard Deviation:</b>	0.65
<b>Fitted Curve Equation:</b>	$T = 0.89(X) + 24.54$
<b>R<sup>2</sup>:</b>	0.70
<b>Directional Distribution:</b>	82% entering, 18% exiting
<b>Calculated Trip Ends:</b>	Average Rate: 8 (Total), 7 (Entry), 1 (Exit) Fitted Curve: 32 (Total), 26 (Entry), 6 (Exit)



# Graph Look Up



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Query Filter

**DATA SOURCE:**  
Trip Generation Manual, 11th Ed

**SEARCH BY LAND USE CODE:**  
760

**LAND USE GROUP:**  
(700-799) Office

**LAND USE :**  
760 - Research and Development Center

**LAND USE SUBCATEGORY:**  
All Sites

**SETTING/LOCATION:**  
General Urban/Suburban

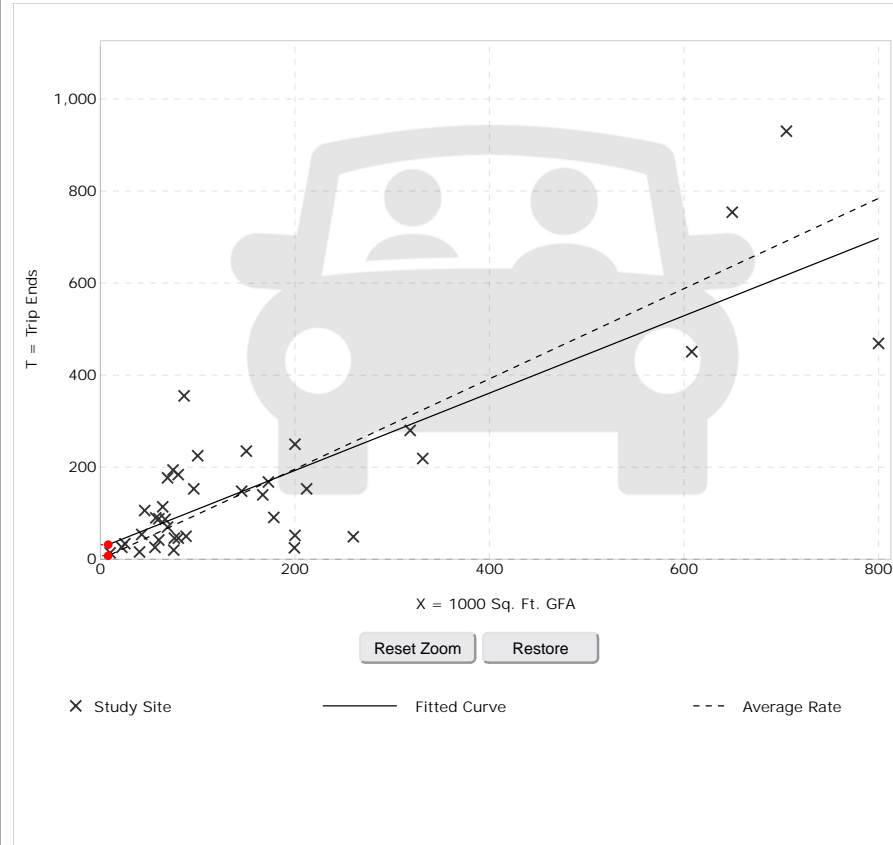
**INDEPENDENT VARIABLE (IV):**  
1000 Sq. Ft. GFA

**TIME PERIOD:**  
Weekday, Peak Hour of Adjacent Street Traffic, 1

**TRIP TYPE:**  
Vehicle

**ENTER IV VALUE TO CALCULATE TRIPS:**  
8 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.

Add-ons to do more

Try OTISS Pro

US CENSUS JOURNEY-TO-WORK DATA

---





## SIGHT DISTANCE CALCULATIONS

---



## Sight Distance Calculations – Route 20

### *Stopping Sight Distance:*

*Equation:*

$$SSD = 1.47 \times V \times t + 1.075 \times \frac{V^2}{a}$$

*Variables:*

$$V = 52 \text{ mph}$$

$$t = 2.5 \text{ s (SSD)}$$

$$a = 11.2 \text{ ft/s}$$

$$SSD = 1.47 \times 52 \times 2.5 + 1.075 \times \frac{52^2}{11.2} = 450.6 \approx \mathbf{455}$$

### *Intersection Sight Distance: looking to the northeast (turning right from stop):*

*Equation:*

$$ISD = 1.47 \times V \times t$$

*Variables:*

$$V = 52 \text{ mph}$$

$$t = 6.5 \text{ s (ISD, right turns for a passenger car)}$$

$$ISD = 1.47 \times 52 \times 6.5 = 496.9 \approx \mathbf{500}$$

### *Intersection Sight Distance: looking to the southwest (turning left from stop):*

*Equation:*

$$ISD = 1.47 \times V \times t$$

*Variables:*

$$V = 52 \text{ mph}$$

$$t = 8.0 \text{ s (ISD, left turns for a passenger car crossing an additional turning lane)}$$

$$ISD = 1.47 \times 52 \times 8.0 = 611.5 \approx \mathbf{615}$$

CAPACITY ANALYSIS WORKSHEETS

---



2030 Build Weekday Morning Peak Hour  
 1: Route 20 & Project Site Driveway

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	1	5	22	867	1080	4
Future Vol, veh/h	1	5	22	867	1080	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	5	24	942	1174	4

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1695	589	1178	0	-	0
Stage 1	1176	-	-	-	-	-
Stage 2	519	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	84	452	589	-	-	-
Stage 1	255	-	-	-	-	-
Stage 2	562	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	77	452	589	-	-	-
Mov Cap-2 Maneuver	77	-	-	-	-	-
Stage 1	233	-	-	-	-	-
Stage 2	562	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.8	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	589	-	249	-	-
HCM Lane V/C Ratio	0.041	-	0.026	-	-
HCM Control Delay (s)	11.4	0.5	19.8	-	-
HCM Lane LOS	B	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-



2030 Build Weekday Evening Peak Hour  
 1: Route 20 & Project Site Driveway

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	4	23	4	1071	1190	1
Future Vol, veh/h	4	23	4	1071	1190	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	25	4	1164	1293	1

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1884	647	1294	0	-	0
Stage 1	1294	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	62	414	531	-	-	-
Stage 1	221	-	-	-	-	-
Stage 2	517	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	61	414	531	-	-	-
Mov Cap-2 Maneuver	61	-	-	-	-	-
Stage 1	216	-	-	-	-	-
Stage 2	517	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	531	-	223	-	-
HCM Lane V/C Ratio	0.008	-	0.132	-	-
HCM Control Delay (s)	11.8	0.1	23.6	-	-
HCM Lane LOS	B	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-