

2020 Traffic Monitoring Program

Devens, Massachusetts

PREPARED FOR



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12/16/2021



Executive Summary

Introduction

The 1995 Devens Final Environmental Impact Report (FEIR), issued by the United States Department of the Army, allowed portions of Fort Devens to be redeveloped as a mixed use planned community in accordance with the Devens Reuse Plan. Massachusetts Development Finance Agency (MassDevelopment, formerly The Massachusetts Land Bank) is the public agency with the exclusive responsibility to maintain, control, and redevelop the Devens community. As part of the 1995 FEIR, MassDevelopment committed to a traffic monitoring program at select locations to identify trends (changes) in traffic patterns and traffic volumes in the adjacent communities.

The Devens Base Reuse Plan originally limited development to 8.5 million square feet, and a daily vehicle-trip threshold of 59,265 trips was calculated based on projected development levels in the EIR. However, since the 8.5 million square foot threshold has been lifted as a criteria per the 2008 Notice of Project Change with MEPA, only the 59,625 daily trip threshold was analyzed for this report. This study is the fifth 5-year Traffic Monitoring Report.

This study had originally been planned to be conducted in 2020, however, due to the COVID-19 pandemic, the study was postponed to 2021 when traffic levels had returned to a more typical level. Even still, traffic counts that were collected during this period were approximately 10% lower than pre-pandemic levels and transit usage has not returned. As such, all traffic volumes that were collected as part of this update were adjusted slightly using MassDOT factors so that the information presented in this study is consistent with historic regional traffic levels.

Traffic Data Collection

The study area for this report was defined in the original 1995 EIR and has remained essentially unchanged from prior monitoring efforts. The specific study area includes Devens (the regional enterprise zone) as well as the surrounding towns of Ayer, Shirley, Harvard, Lancaster, Boxborough, Groton, Littleton, and Lunenburg which are included in the study area as communities that could be potentially impacted.

Traffic data were collected during Spring 2021 in order to develop an understanding of traffic operations at critical roadways and intersections within the defined study area. The following data were collected for this study:

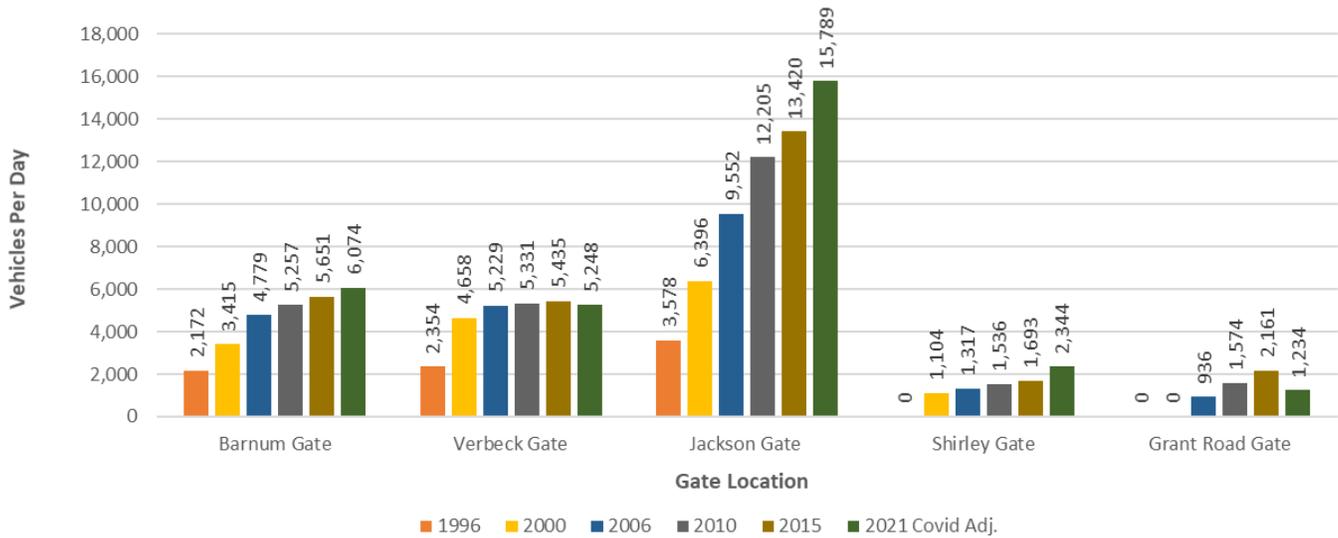
- › Weekday morning (7-9AM) and weekday afternoon (4-6PM) peak period Turning Movement Counts (TMCs) at thirteen (13) intersections internal to Devens, at seventeen (17) business driveways within Devens, and at fourteen (14) intersections in towns surrounding Devens (external);
- › 48-hour and 7-day Automatic Traffic Recorder (ATR) counts at key locations consistent with previous reports, located both within Devens and in the surrounding communities;
- › An origin-destination study using StreetLight Data was conducted for each of the five Devens access/egress gates;
- › Transportation surveys of both residents and employees of businesses in Devens; and
- › Commuter rail transit ridership data from the Massachusetts Bay Transportation Authority (MBTA).

Findings

To evaluate the 2021 conditions, the traffic volume data and the results of the capacity analyses were compared to those from previous reports, including the 2005, 2010, and 2015 years. The findings are summarized below:

- › Collectively, the traffic volumes on roadways external to Devens have experienced an increase of 1.5% in traffic volumes when compared to the 2015 volumes (including a Covid adjustment). Additionally, the 7-day traffic volume trends show that the traffic volumes along Route 2 in the vicinity of Devens have increased by 21% since 2015.
- › Weekday traffic volumes at all Devens Gates have increased by 8% since 2015 (Figure ES-1). The Shirley Gate has seen the largest increase at 38% over 2015 volumes (+651 vehicles per day), while Jackson Gate experienced the largest volume increase with 2,369 vehicles (+18%) over 2015 observations. During the morning peak hour, traffic volumes have increased by 9% (+255 vehicles), and in the evening, traffic volumes have increased by 25% (+632 vehicles) for the collective Devens Gates.

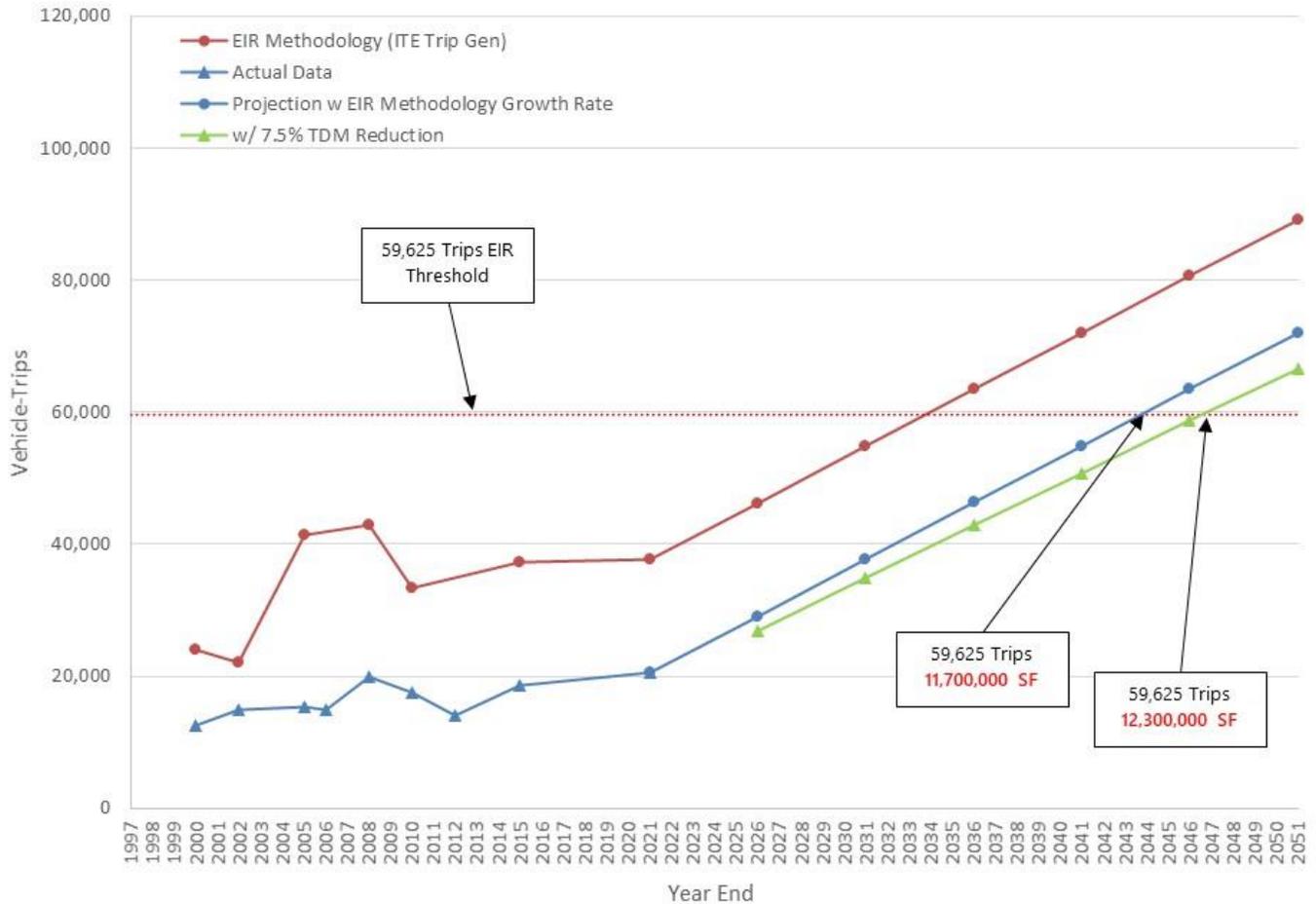
Figure ES-1 Average Weekday Daily Traffic by Gate



- › Overall, average weekday daily truck traffic has decreased by 32% (-1,038) per day since 2015 with all gates seeing a decrease when compared to 2015 data. Jackson Gate (45%) and Barnum Gate (42%) continue to process the most truck traffic with the Grant and Shirley Gates experiencing the most significant decreases in truck traffic since 2015, having seen decreases of 70% and 72% respectively.
- › It was determined that in 2021, 33 percent of vehicles which enter Devens at one of the five gates use Devens roadways as cut-through routes. This percentage is essentially the same as it was in 2015 (a 1 percent decrease). The total number of morning (6am to noon) cut-through trips decreased when compared to 2015, suggesting perhaps that fewer drivers are using Devens as a cut-through to avoid regionally congested roadways in the morning periods. The highest number of cut-through trips continue to occur during the afternoon peak hours, with over 50% of all entering Devens’ trips from 3:00 PM to 6:00 PM classified as cut-through trips. The largest daily origin-destination movements for the gates are Jackson Gate to Verbeck Gate (17%), Verbeck Gate to Jackson Gate (15%), and Barnum Gate to Jackson Gate (14%).
- › Transportation surveys prepared by MassDevelopment were distributed to residents and employees of businesses in Devens. The purpose of the surveys was to collect current information about commutes to and from Devens. The results of the survey, which were received from 670 people (81 residents and 589 employees) are summarized below:
 - 81% of Devens residents and employees utilize automobiles to get to work in 2021. 1% of those surveyed carpool, 1% walk, 3% use transit, and no responses indicated using bicycles as their main mode of travel.
 - Jackson Gate continues to be the most utilized gate, used by 60% of those surveyed.
- › The Massachusetts Bay Transportation Authority (MBTA) Fitchburg commuter rail line services Devens and the surrounding communities at four stations: Ayer, Shirley, North Leominster, and Fitchburg. Between 2013 and 2018, ridership boardings at Devens area stations decreased by 42% (which would not have been influenced by the COVID-19 pandemic).

- › The occupied development in Devens has increased by approximately 1.87 million square feet from 4.71 million square feet in 2015 to 6.58 million square feet in 2021.
- › Using standardized Institute of Transportation Engineers (ITE) trip generation rates, it is estimated that existing Devens developments would generate 37,697 vehicle-trips on weekdays. After being adjusted for cut-through trips, the actual traffic counts at the gates indicate an average weekday daily traffic volume of 20,562 vehicle-trips in 2021. This means that Devens is currently generating traffic at a rate of 54% of what standardized ITE projects a comparable development would generate. By way of comparison, in 2015, results indicated that Devens was generating traffic at a rate of 50% of what a comparable development would generate.
- › Previous reports utilized a yearly build-out projection of 225,000 square feet per year. Conversations with MassDevelopment indicate that this rate should be held for the 2021 5-Year Traffic Monitoring Report. Using this rate, measured traffic volume data, and current development, it is estimated that the 59,625 vehicle-trip threshold would not be reached until 2044 – which would translate to approximately 11,700,000 square feet of occupied development in Devens at the above noted pace of absorption. With implementation of a reasonable Traffic Demand Management Strategies reducing traffic volumes by 7.5%, this threshold is not expected to be reached until 2047. (Figure ES-2). By way of comparison, the 2005 5-year Traffic Monitoring Report estimated that this threshold would be reached in 2014 with 7,360,854 square feet of development. This current update shows that Devens is currently generating significantly less traffic and being developed at a slower rate than projected using the standardized ITE-based projections.

Figure ES-2 Devens Build-out Summary by Year – Trips



- › Intersection Level of Service analyses were performed at fourteen study intersections external to Devens for the morning and evening peak hours using methodologies from the Highway Capacity Manual, 6th Edition. The results indicate that seven of the fourteen analyzed intersections have experienced no change in level of service from 1996 to 2021. Two study intersections have deteriorated by only one level of service and five study intersections have deteriorated by two or more levels of service.
- › Based on the review of the past 25 years of data, traffic on the regional roadway network has remained steady or in some instances decreased. Trips associated with the development of Devens have increased less than anticipated, resulting in minimal impacts on surrounding local roadways and intersections.

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1

Introduction

1.1 Project Purpose and Goals

The 1995 Devens Final Environmental Impact Report (FEIR), issued by the United States Department of the Army, allowed portions of Fort Devens to be redeveloped as a mixed use planned community in accordance with the Devens Reuse Plan. Massachusetts Development Finance Agency (MassDevelopment, formerly The Massachusetts Land Bank) is the public agency with the exclusive responsibility to maintain, control, and redevelop the Devens community. As part of the 1995 FEIR, MassDevelopment committed to a traffic monitoring program at selected locations to identify trends (changes) in traffic patterns and traffic volumes on the adjacent communities.

The Devens Base Reuse Plan limited development to 8.5 million square feet, and a daily vehicle-trip threshold of 59,265 trips was calculated based on projected development levels in the EIR. This study is the fifth 5-year Traffic Monitoring Report (2000, 2005, 2010, and 2015 being the prior dates), comprised of the following:

1. A comprehensive review of current traffic trends;
2. Detailed comparison with previous traffic data from the EIR and 2000-2015 Traffic Monitoring Reports; and
3. Future traffic projections based on current traffic trends and methodology presented in the EIR.

1.2 Study Area

The study area for this report was originally defined in the EIR (Figure 1-1). Devens is a regional enterprise zone established by legislation and comprised of parts of Ayer, Shirley, Harvard, and Lancaster. Surrounding towns of Boxborough, Groton, Littleton, and Lunenburg are included in the study area as potential impact communities.

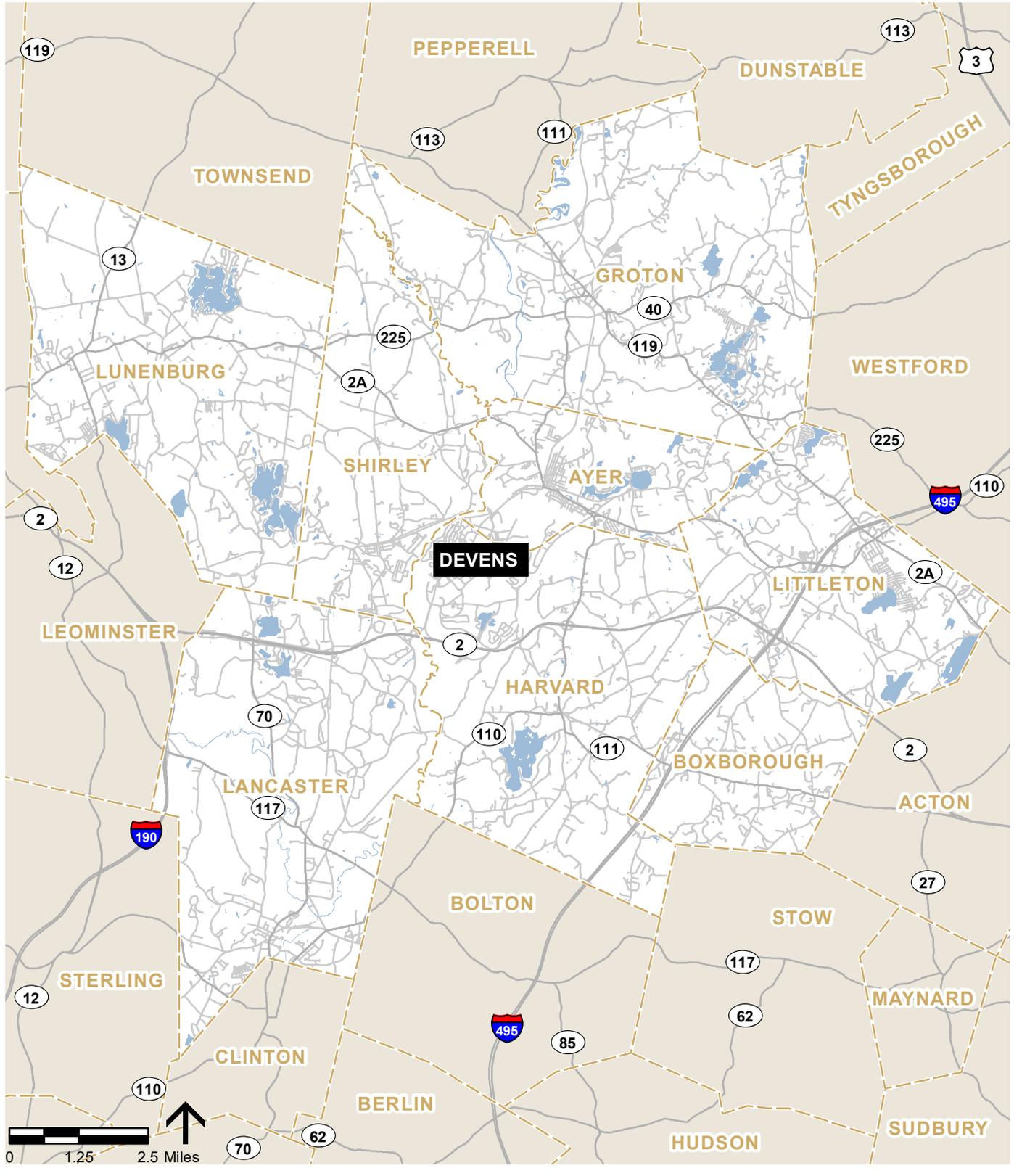


Figure 1-1

Study Area
Devens Traffic Monitoring Program
Devens, Massachusetts

1.3 Scope of Work

The tasks completed in this study are as follows:

- › Automatic traffic recorder volumes
- › Turning movement traffic volumes
- › Origin-destination study
- › Devens resident and business transportation survey
- › Build-out analysis of Devens for future traffic volumes
- › Traffic model update
- › Level of Service analysis for existing conditions, future no-build, and future build scenarios

1.4 Project Coordination

Communities surrounding Devens were contacted in order to gain an understanding of development patterns in the region. Each community was asked to provide an overview of the type and size of current, planned, proposed, and approved projects within its town. The following communities were contacted:

- › Ayer
- › Boxborough
- › Groton
- › Harvard
- › Lancaster
- › Littleton
- › Lunenburg
- › Shirley

The Montachusett Regional Planning Commission (MRPC) was also contacted in order to obtain historic background growth rate data, recent traffic trends, and planned development in the region that could affect the study transportation area.



2

Traffic Data Collection and Research

2.1 Overview

Extensive traffic data were obtained at locations identified in previous reports for consistency and comparison for traffic trends. The locations were both internal (Figure 2-1) and external (Figure 2-2) to Devens. The following traffic data were collected:

- › Intersection turning movement counts
- › Average daily traffic counts
- › Federal Highway Administration (FHWA) vehicle classifications
- › Origin-destination survey
- › Transportation Survey of Devens residents and employees
- › Transit ridership provided by the Massachusetts Bay Transportation Authority (2018 data)

2.2 COVID-19 Considerations

In Spring 2020, traffic conditions were influenced significantly by the outbreak of the COVID-19 virus and resulting pandemic. MassDevelopment, working with other state agencies, agreed to postpone the traffic counting efforts associated with the 2020 monitoring efforts until 2021 when traffic volumes would hopefully return to more traditional levels. The data collected and presented in this report reflect actual traffic counts conducted in late April and early May 2021 and a one-time 10-percent growth factor to reflect the reduced volumes around and within the Devens area. The 10-percent growth number was developed through review of 2019, 2020, and 2021 permanent count station data and an interim study prepared for MassDevelopment in September 2020 which indicated that traffic volumes were not fully back to 'normal' following the pandemic.

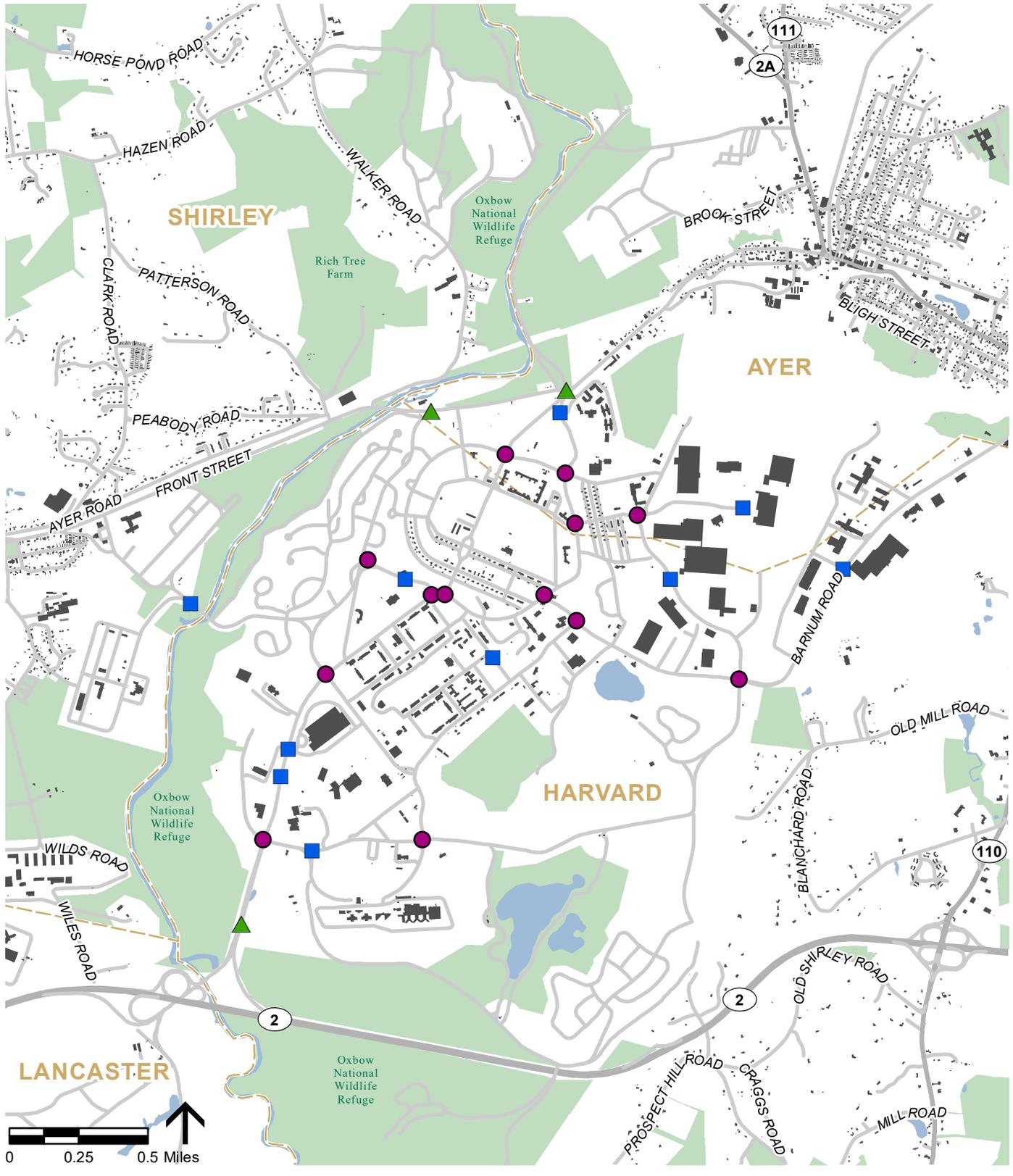
This study presents the existing traffic volume data that has been increased by 10 percent across the board. Raw, unadjusted, traffic data is provided in the Appendix material for this report if needed.

2.3 Intersection Turning Movement Counts

Existing intersection traffic volumes were collected during the weekday AM (7-9) and PM (4-6) peak hours to establish a baseline 2021 condition. The locations and intersection numbering system used in this study are consistent with those from previous studies. Intersection turning movement counts were conducted at locations both internal (Figure 2-1) and external (Figure 2-2) to Devens.

2.3.1 Internal Counts

Intersection turning movement counts were conducted at thirteen locations internal to Devens during the weekday morning (7-9AM) and weekday afternoon (4-6PM) peak hours in April and May of 2021. These counts classified cars, heavy vehicles, pedestrians, and bicycles. The locations and count dates are listed on page 7 with corresponding intersection ID numbers, which will be used to identify the locations throughout this report. Morning and afternoon peak hour turning movement counts at internal intersections are provided in Figures 2-3 and 2-4, respectively.

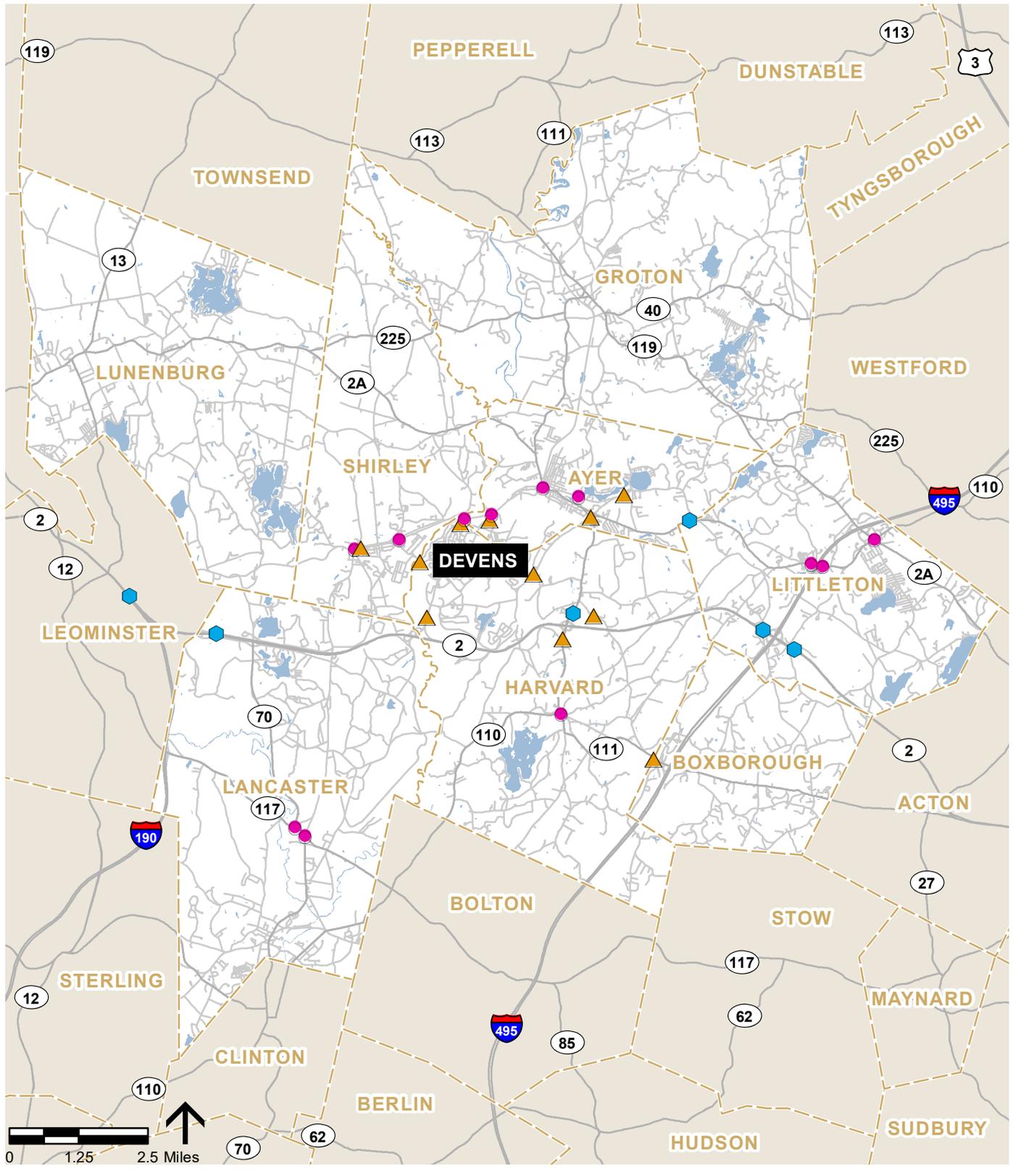


- Driveway
- ▲ Gate
- Intersection



Figure 2-1

Internal Count Locations
Devens, Massachusetts



- ▲ ATR Location - 48 Hours
- ATR Location - 7 Days
- Turning Movement Count



Figure 2-2

External Count Locations
Devens, Massachusetts

ID	Intersection	Date
I-1	Jackson Road/Patton Road	5/6/2021
I-2	Patton Road/Queenstown Street	5/25/2021
I-3	<i>Eliminated (2010)</i>	
I-4	Jackson Road/Givry Street	5/6/2021
I-5	<i>Eliminated (2010)</i>	
I-6	Jackson Road/Pine Road	5/6/2021
I-7	Grant Road/Pine Road	5/6/2021
I-8	Jackson Road/Barnum Road	5/6/2021
I-9	Queenstown Street/Barnum Road	5/6/2021
I-10	Antietam Street/Sherman Avenue	4/29/2021
I-11	Antietam Street/Jackson Road	4/29/2021
I-12	Buena Vista Street/Jackson Road	4/29/2021
I-13	Buena Vista Street/Saratoga Boulevard/Independence Drive	4/29/2021
I-14	Patton Road/Barnum Road/Saratoga Boulevard	5/6/2021
I-15	Jackson Road/Sherman Avenue	5/6/2021

Internal intersections I-3 and I-5 were eliminated in the 2010 study. Intersection I-7 was relocated in the 2015 study from Jackson Road/MacArthur Road to Grant Road/Pine Road in order to establish a baseline scenario for a new residential development to be constructed in the vicinity of this intersection.

Driveway turning movement counts and vehicle classifications were conducted at seventeen businesses during the weekday morning (7-9AM) and weekday afternoon (4-6PM) peak hours in April and May of 2021. The locations and count dates are listed below with corresponding intersection ID numbers, which will be used to identify the locations throughout this report. These volumes provide a snapshot of trip generation by Devens businesses. Peak hour driveway turning movement volumes are also included in Figures 2-3 and 2-4.

ID	Business Driveway	Date
D-1	Quiet Logistics (formerly American Superconductor) – 64 Jackson Road	5/6/2021
D-2	Quiet Logistics (formerly Anheuser-Busch) – 235 Barnum Road	5/6/2021
D-3	FBOP – Federal Medical Facility – 24 Patton Road	5/27/2021
D-4	Quiet Logistics (formerly Gillette) – 66 Saratoga Boulevard	4/29/2021
D-5	Job Corps – 270 Jackson Road	4/29/2021
D-6	<i>Eliminated</i>	
D-7	<i>Eliminated</i>	
D-8	<i>Eliminated</i>	
D-9	SMC LTD (formerly Sonoco) – 18 Independence Drive	4/29/2021
D-10	Rock Tenn (formerly Southern Container) – 51 Independence Boulevard	4/29/2021
D-11	AOA Xinetics – 115 Jackson Road	5/6/2021
D-12	Army Enclave at Quebec Street and 10 th Mountain Division Road	5/6/2021
D-13	Devens Common – Ryans Way	5/6/2021
D-14	Devens Common – Andrews Parkway	5/6/2021
D-15	Bristol-Meyer Squibb – 38 Jackson Road	5/6/2021
D-16	NYPRO (formerly Evergreen Solar) – 112 Barnum Road	5/6/2021
D-17	Army Enclave at Lovell Road at Hospital Road	5/6/2021
D-18	IMEC Systems – 137-139 Barnum Road	5/6/2021
D-19	National Distribution Centers (formerly NFI) – 32 Independence Drive	4/29/2021
D-20	Devens Recycling Center – 45 Independence Drive	4/29/2021

Driveway locations were eliminated because they were either vacant or determined to be duplicative due to other access points to the same properties.

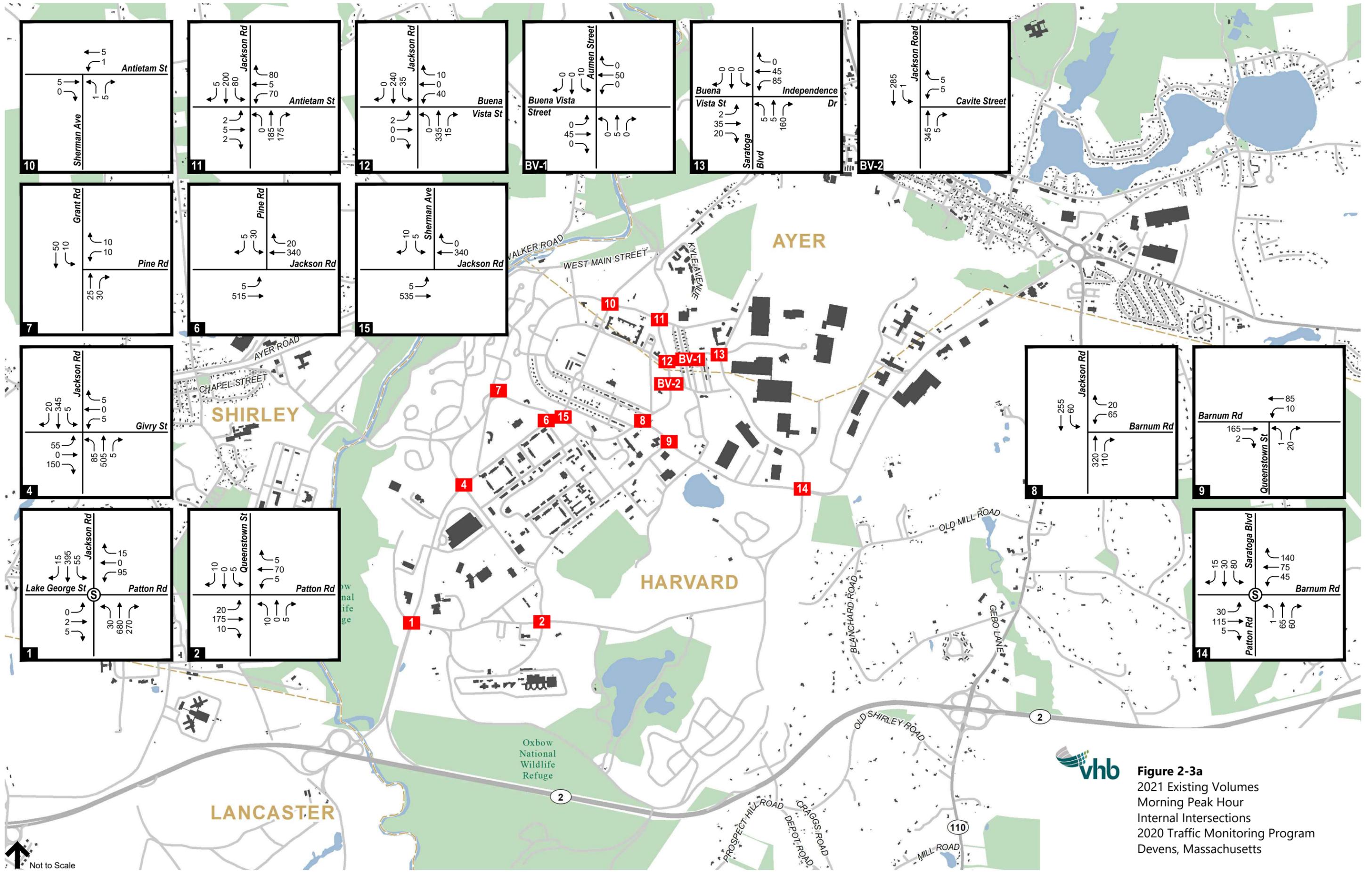
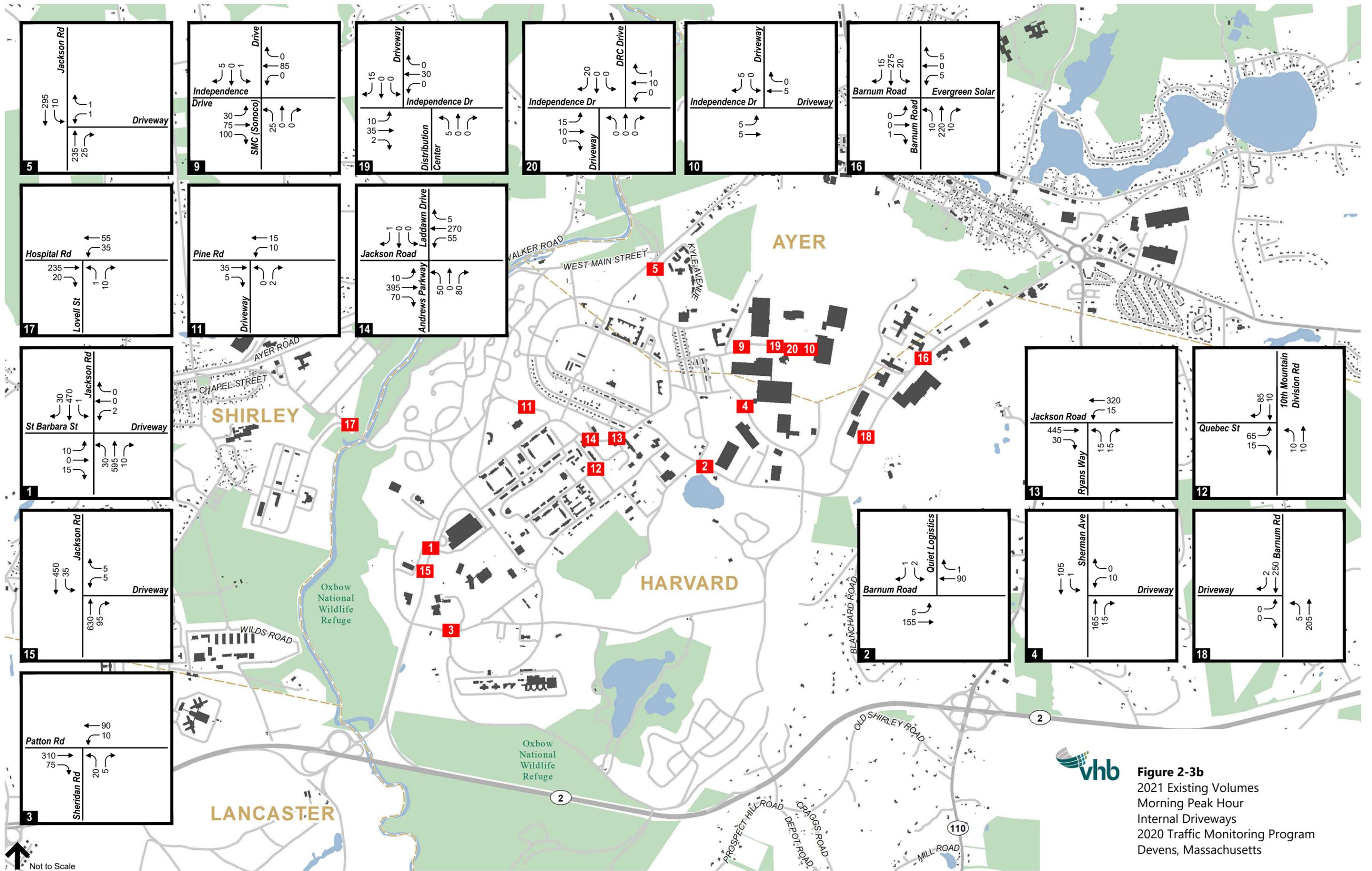


Figure 2-3a
 2021 Existing Volumes
 Morning Peak Hour
 Internal Intersections
 2020 Traffic Monitoring Program
 Devens, Massachusetts



vhb **Figure 2-3b**
2021 Existing Volumes
Morning Peak Hour
Internal Driveways
2020 Traffic Monitoring Program
Devens, Massachusetts

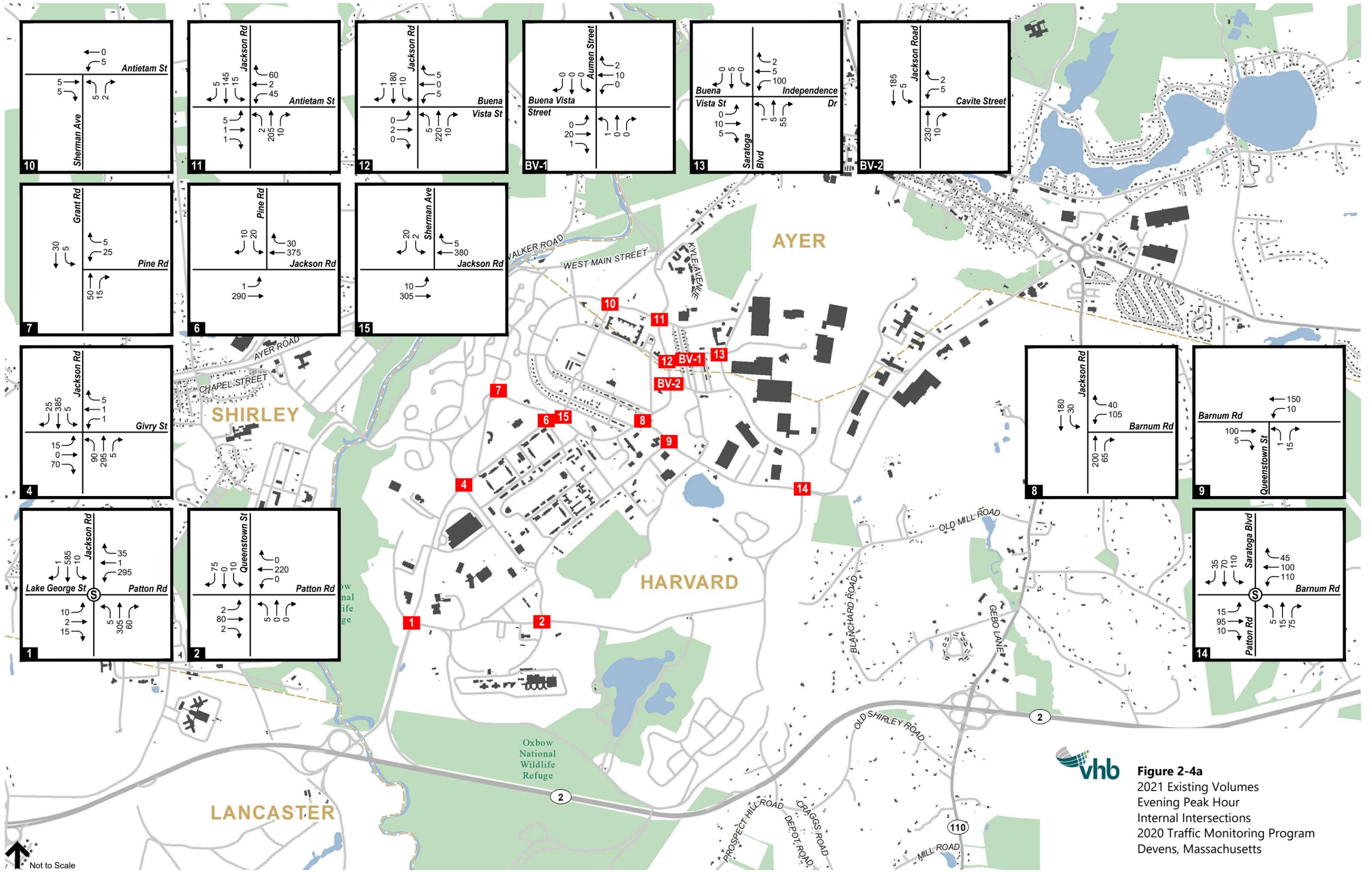
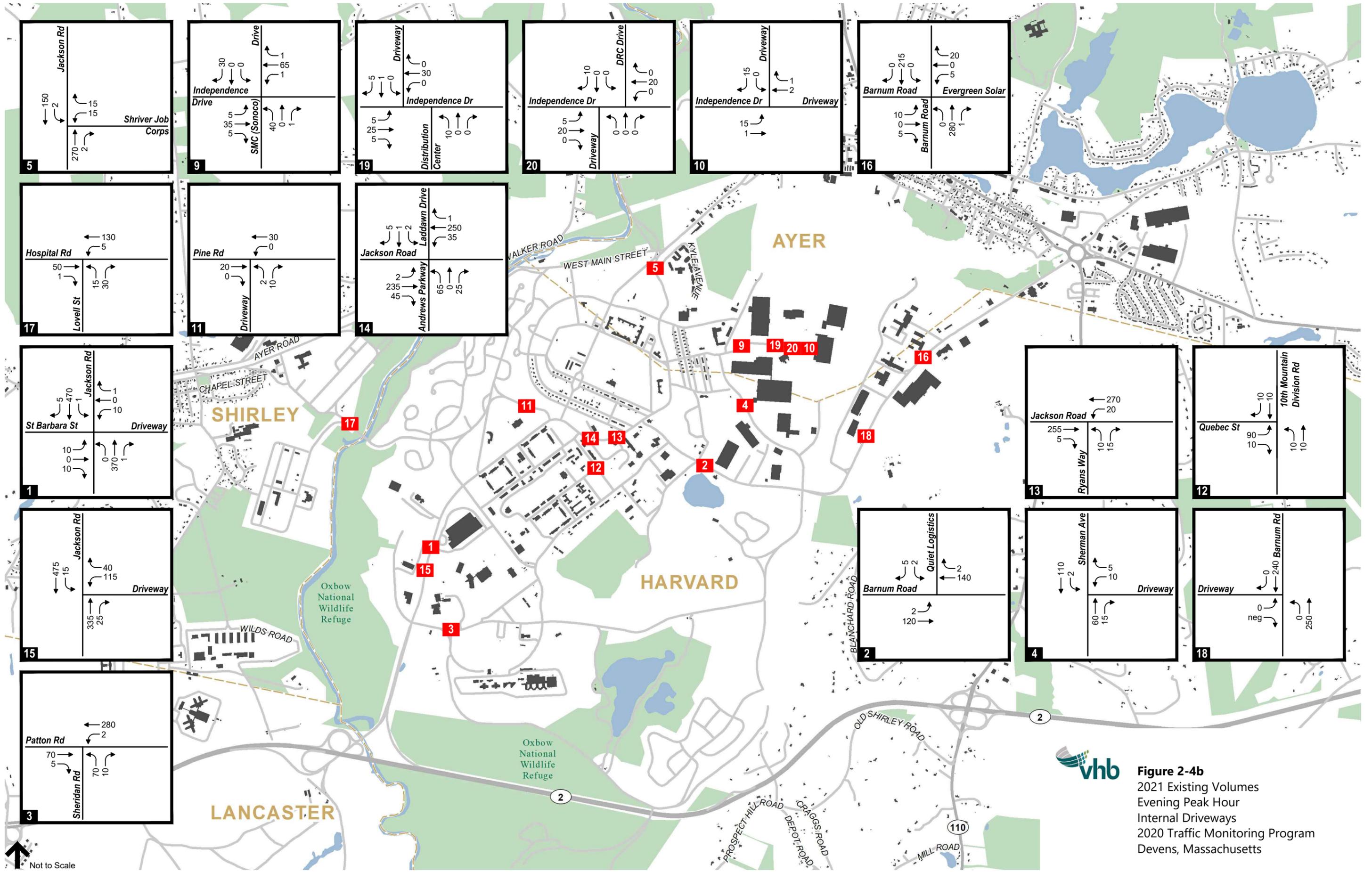


Figure 2-4a
 2021 Existing Volumes
 Evening Peak Hour
 Internal Intersections
 2020 Traffic Monitoring Program
 Devens, Massachusetts



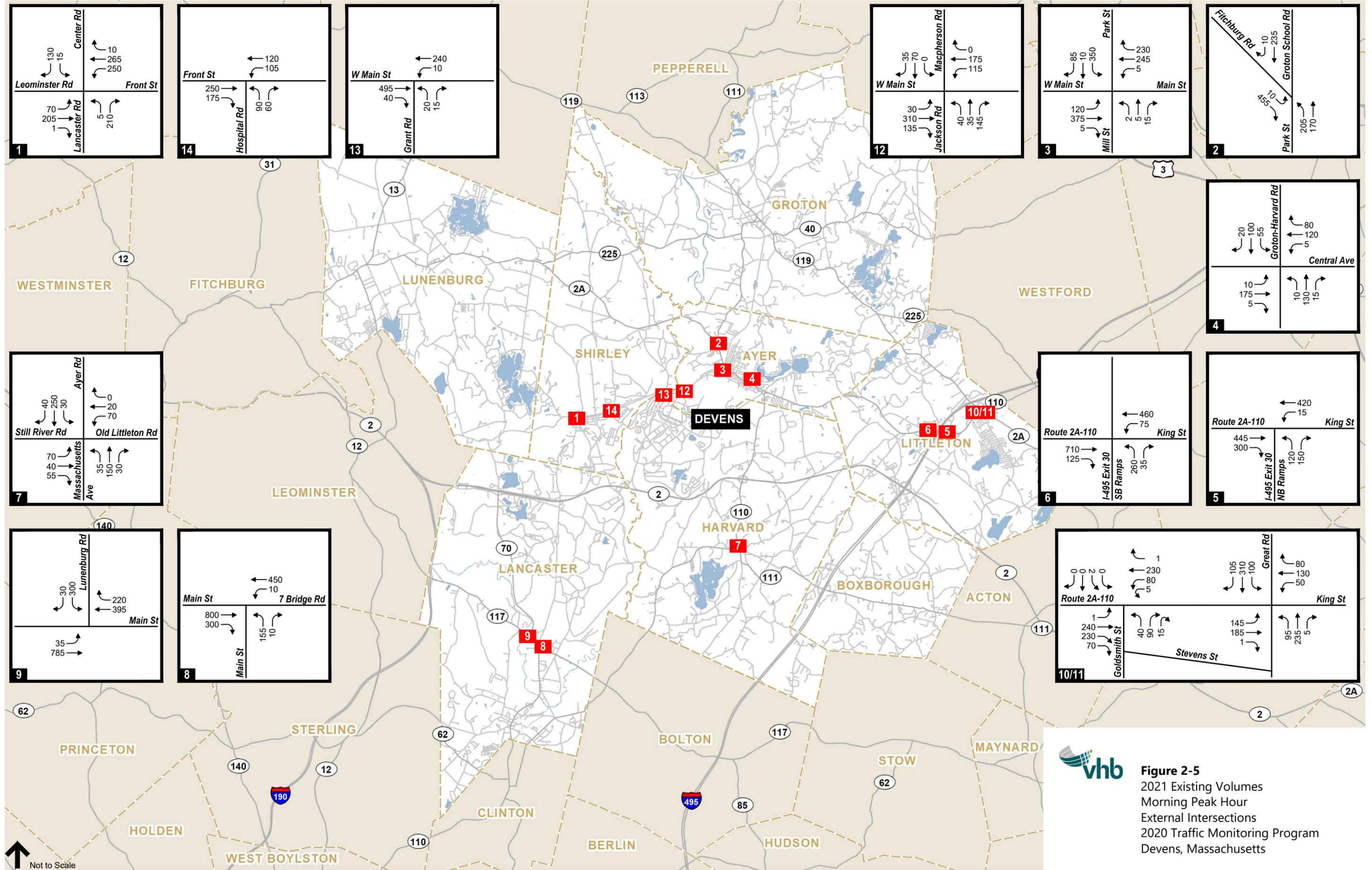
vhb **Figure 2-4b**
 2021 Existing Volumes
 Evening Peak Hour
 Internal Driveways
 2020 Traffic Monitoring Program
 Devens, Massachusetts

Not to Scale

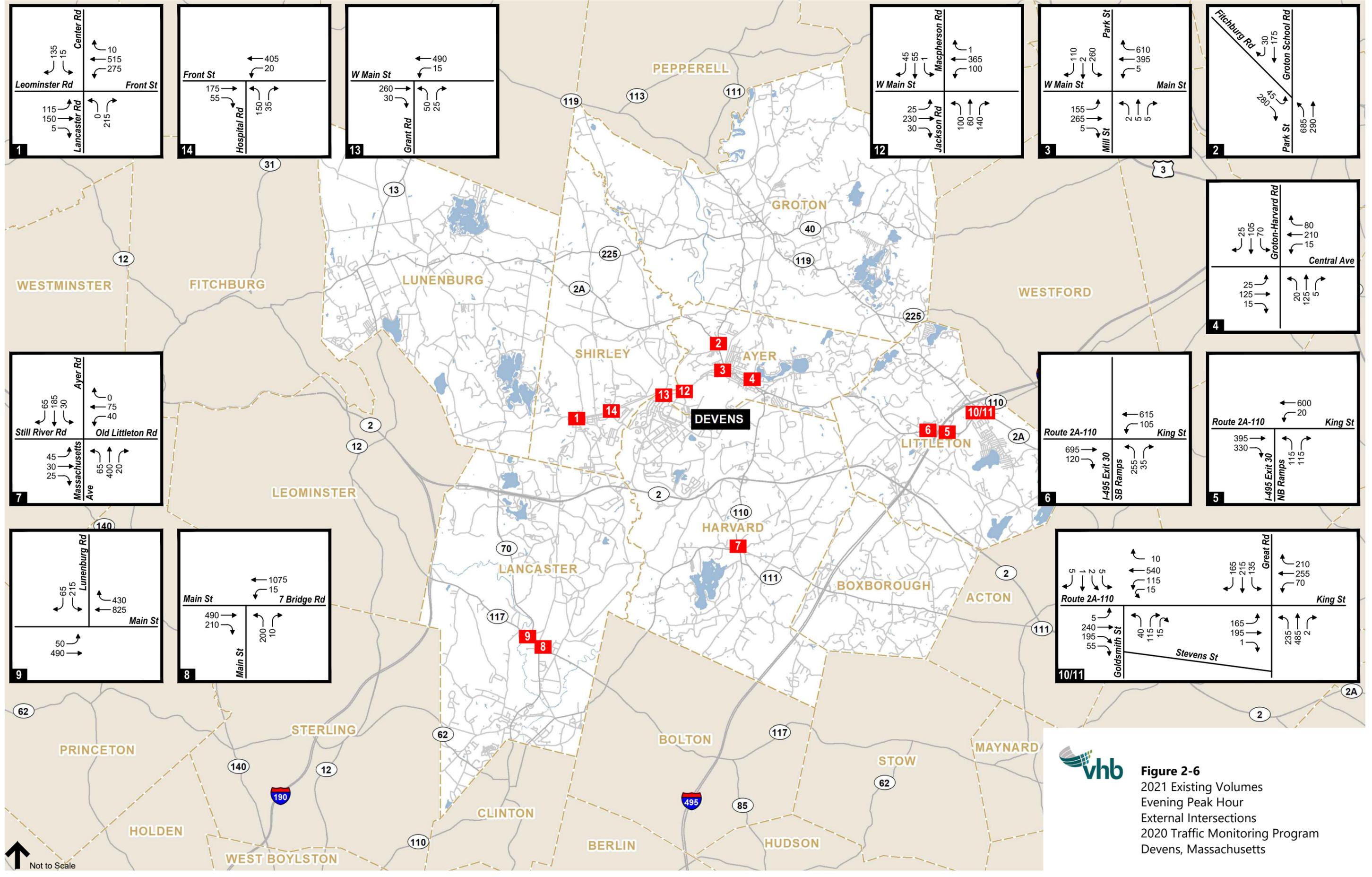
2.3.2 External Counts

Intersection turning movement counts and vehicle classifications were conducted at fourteen locations in towns surrounding Devens during the weekday morning (7-9AM) and weekday afternoon (4-6PM) peak hours on Tuesday April 27, 2021. These external locations and count dates are listed below with corresponding intersection ID numbers, which will be used to identify the locations throughout this report. Morning and afternoon peak hour turning movement counts at external intersections are provided in Figures 2-5 and 2-6, respectively.

ID	Intersection	Town	Date
1	Front Street/Lancaster Street/Leominster Road/Center Road	Shirley	4/27/2021
2	Park Street/Fitchburg Road/Groton School Road	Ayer	4/27/2021
3	Park Street/Main Street/West Main Street	Ayer	4/27/2021
4	Groton-Harvard Road/Central Avenue	Ayer	4/27/2021
5	Route 2A-110/I-495 Exit 30 Northbound (NB) Ramps	Littleton	4/27/2021
6	Route 2A-110/I-495 Exit 30 Southbound (SB) Ramps	Littleton	4/27/2021
7	Route 110-111 (Ayer Road)/Route 110 (Still River Road)/Route 111	Harvard	4/27/2021
8	Route 70/117 (Seven Bridge Road)	Lancaster	4/27/2021
9	Route 70/117 (Lunenburg Road)	Lancaster	4/27/2021
10	Route 110 (King Street)/Route 119/Route 2A (Great Road)	Littleton Common	4/27/2021
11	Route 2A-110 (King Street)/Goldsmith Street	Littleton Common	4/27/2021
12	Verbeck Gate/MacPherson Road	Ayer	4/27/2021
13	Grant Road/West Main Street	Ayer	4/27/2021
14	Hospital Road/Front Street	Shirley	4/27/2021



vhb Figure 2-5
 2021 Existing Volumes
 Morning Peak Hour
 External Intersections
 2020 Traffic Monitoring Program
 Devens, Massachusetts



vhb Figure 2-6
 2021 Existing Volumes
 Evening Peak Hour
 External Intersections
 2020 Traffic Monitoring Program
 Devens, Massachusetts

2.4 Average Daily Traffic Counts

In addition to turning movement counts, automatic traffic recorders (ATRs) were placed at key locations consistent with previous reports to record 48-hour and 7-day traffic volume counts. Count dates and a summary of average weekday daily traffic (AWDT) volumes are provided in Table 2-1. Data recorded include:

- › Weekday daily volumes
- › AM and PM peak hour volumes
- › Vehicle classification based on FHWA criteria: motorcycles, passenger cars, 4 Tire single unit, buses, 2 Axle 6 Tire, 3 Axle Single, 4 Axle Single, <5 Axle Double, 5 Axle Double, >6 Axle Double, <6 Axle Multi, 6 Axle Multi and >6 Axle Multi vehicles.

The data shows that Jackson Gate has the highest number of daily vehicle-trips in and out of Devens (15,789) followed by Barnum (6,074), Verbeck (5,248), and Shirley (2,344). Grant Road Gate recorded the fewest number of daily trips (1,234). Additional discussions of the traffic data trends are presented in Section 3.

2.5 Origin-Destination Survey

An origin-destination study was conducted in order to determine the amount of traffic using Devens as a cut-through route. Traffic data was gathered using StreetLight for the dates traffic counts were gathered along Devens roadways. StreetLight uses location-based services data from smartphone applications combined with navigation-GPS data from connected commercial vehicles normalized against U.S. Census data to gather vehicle trip data.¹ Using StreetLight software, vehicles were recorded as they passed through the each of the five Devens gates. The trip identifiers were sorted and matched according to the 60-minute interval in which they were recorded passing into or out of one of the gates. These identifiers entering Devens at each of the five gates were then matched to those exiting the other four Devens gates. Results of the origin-destination survey as well as discussions on cut-through traffic are provided in Section 3.6.

1 *StreetLight AADT 2019 Methodology and Validation White Paper*, StreetLight Insight, May 2020.

Table 2-1 Average Weekday ATR Counts

Location Number	Location	Count Dates	AWDT 2021	AM Peak Hour 2021	PM Peak Hour 2021
48-Hour ATR Counts					
1	Route 111 at Boxborough /Harvard Town Line	5/11/2021-5/12/2021	5,026	407	492
2	Route 2A at Ayer/Shirley Town Line	5/5/2021-5/6/2021	8,118	650	853
3	Route 111 at Ayer/Groton Town Line	5/5/2021-5/6/2021	5,084	425	508
4	Sandy Pond Road east of Central Avenue, Ayer	5/11/2021-5/12/2021	7,106	560	725
5	Groton-Harvard Road at Ayer/Groton Town Line	5/5/2021-5/6/2021	4,380	371	421
6	Front Street west of Ayer Street, Shirley	5/11/2021-5/12/2021	8,011	590	810
7	Jackson Gate		15,789	1,628	1,625
	› From Route 2 WB Off Ramp to Jackson Road NB	4/27/2021-4/28/2021	3,043	438	176
	› From Route 2 EB Off Ramp to Jackson Road NB	4/27/2021-4/28/2021	5,152	766	282
	› From Jackson Road SB to Route 2 WB On Ramp	4/27/2021-4/28/2021	4,951	273	820
	› From Jackson Road SB to Route 2 EB On Ramp	4/27/2021-4/28/2021	2,643	152	348
8	Verbeck Gate	5/4/2021-5/5/2021	5,248	567	531
9	Shirley Gate	5/4/2021-5/5/2021	2,344	204	254
10	Barnum Gate	5/4/2021-5/5/2021	6,074	462	644
11	Grant Road Gate	5/4/2021-5/5/2021	1,234	103	157
12	Poor Farm Road east of Route 110/111, Harvard	5/11/2021-5/12/2021	1,289	107	128
13	Carlton Rotary				
	› Route 2A/110 east of rotary	4/27/2021-4/28/2021	13,395	873	1,228
	› Sandy Pond Road north of rotary	4/27/2021-4/28/2021	3,969	279	383
	› Route 2A/111 west of rotary (WB)	4/27/2021-4/28/2021	8,154	461	933
	› Route 2A/111 west of rotary (EB)	4/27/2021-4/28/2021	8,007	756	582
	› Barnum Road south of rotary	4/27/2021-4/28/2021	7,352	596	669
	› Route 110/111 south of rotary	4/27/2021-4/28/2021	14,007	1,059	1,187
14	Route 110/111 south of Route 2, Harvard	5/11/2021-5/12/2021	8,395	705	814
48 Hour ATR Counts – Buena Vista Area					
BV-A	Jackson Avenue north of Antietam Street	5/4/2021-5/5/2021	5,248	567	531
BV-B	Jackson Avenue south of Antietam Street	5/4/2021-5/5/2021	5,027	590	481
BV-C	Jackson Avenue south of Buena Vista Street	5/4/2021-5/5/2021	5,322	625	575
BV-D	Jackson Avenue south of Cavite Street	5/4/2021-5/5/2021	5,432	620	521
BV-E	Antietam Street west of Cook Street	5/4/2021-5/5/2021	954	157	149
BV-F	Buena Vista Street west of Saratoga Boulevard	5/4/2021-5/5/2021	1,141	114	67
BV-G	Saratoga Boulevard south of Buena Vista Street	5/4/2021-5/5/2021	2,881	299	294
7-Day ATR Counts					
1	Route 110-111 north of Route 2, Harvard	4/26/2021-4/30/2021	14,453	1,145	1,305
2	Route 2A-110 at Littleton/Ayer Town Line	4/26/2021-4/30/2021	11,717	822	1,026
3	Route 2 east of I-495, Littleton	4/26/2021-4/30/2021	42,571	3,422	3,291
4	Route 2 west of I-495, Littleton	4/26/2021-4/30/2021	57,632	4,637	4,765
5	Route 2 west of Route 70, Lancaster	4/26/2021-5/2/2021	57,855	4,567	4,968
6	Route 2 west of I-190, Leominster	4/26/2021-5/2/2021	85,495	6,234	6,871

2.6 Devens Resident and Business Employee Transportation Survey

Transportation surveys prepared by MassDevelopment were distributed to both residents and employees of businesses in Devens. The purpose of the survey was to collect information about commutes to and from Devens. The survey (see Appendix) posed the following questions:

- › How do you travel to work?
- › What time do you typically arrive to work and leave work Monday through Friday?
- › Do you work within Devens or outside of Devens?
- › Which gate/entrance do you use most often to get to work?
- › Which gate/entrance do you use most often to return home from work?
- › What are the primary route(s) you use to and from work?
- › Where do you work?
- › What town do you live in?
- › Has COVID-19 changed your commuting habits?
- › Do you foresee returning to a commuting pattern you experienced prior to the Pandemic?

Results of the survey were received from 156 people (116 residents and 40 employees). The results are summarized in Figures 2-7, and 2-8. In 2010 and 2015, the results of this survey indicated that the majority of residents and employees (~55%) used Jackson Gate for their commutes to and from work. Results of the survey in 2021 indicate that Jackson Gate continues to be the most highly utilized gate, used by 60% of those surveyed. This is in line with the overall traffic trends and utilization of the gates.

As expected, a high number of respondents noted that they drove alone (81%) in 2021. This is to be expected given the guidance in place by the Center of Disease Control (CDC) on commuting /carpooling with others. More typically, prior reports note that majority of those surveyed in 2015 (86%) drove to and from work by themselves. The 13% indicated in Figure 2-8 represents both work from home and retired respondents.

Figure 2-7 Devens Transportation Survey Results (by Gate)

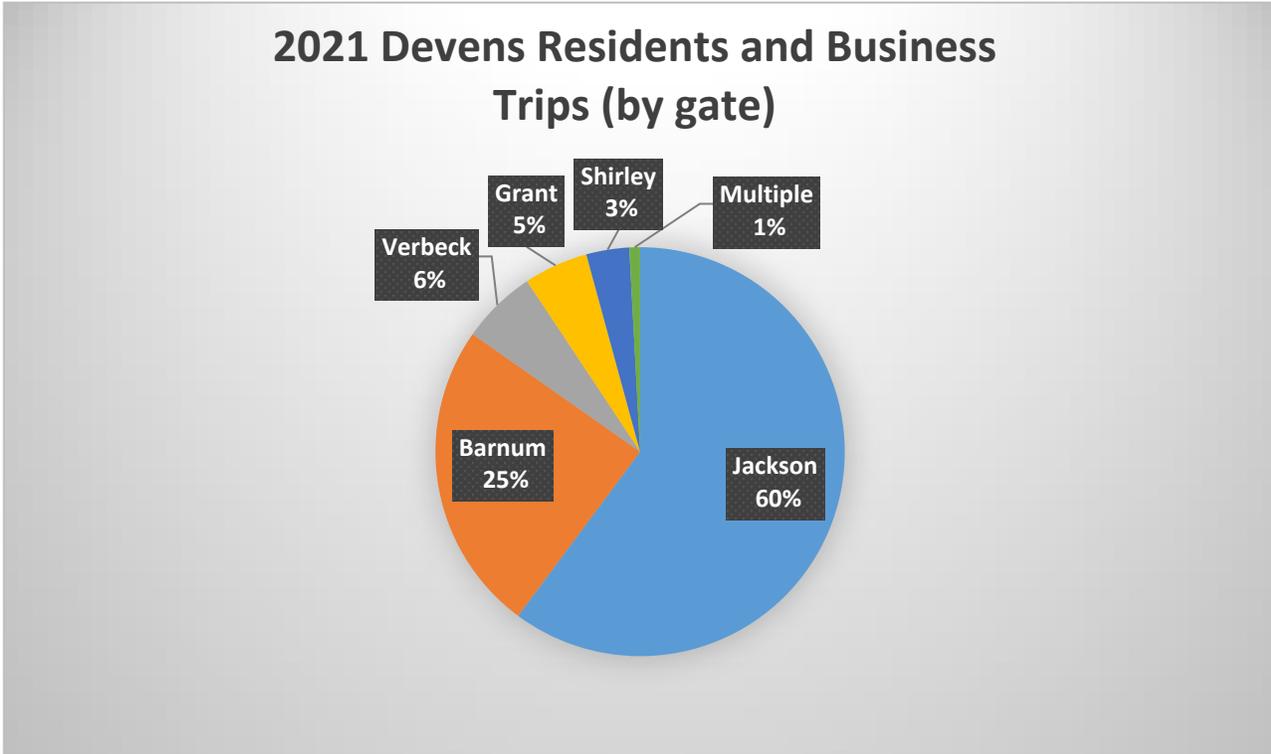
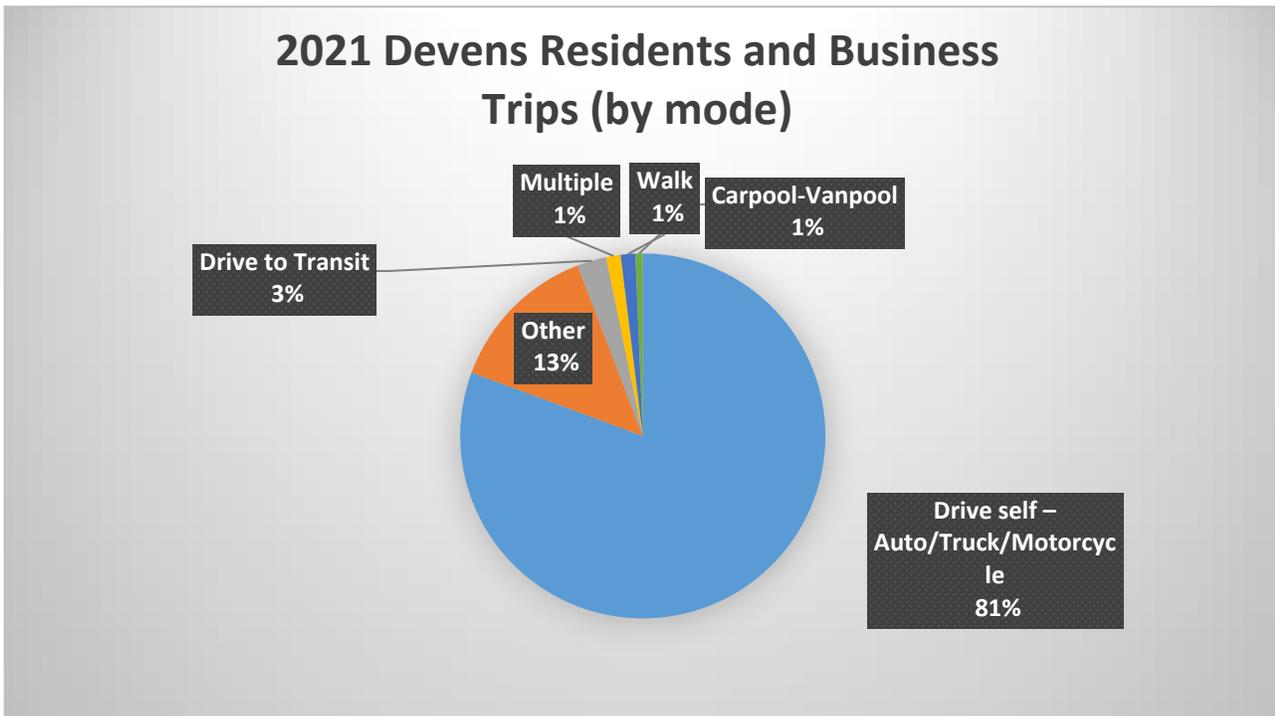


Figure 2-8 Devens Transportation Survey Results (by mode)



2.7 Transit Ridership

The Massachusetts Bay Transportation Authority (MBTA) Fitchburg commuter rail line services Devens and surrounding communities at four stations, Ayer, Shirley, North Leominster, and Fitchburg. Between 2013 and 2018, daily boardings have fluctuated each year (Table 2-2). The latest MBTA data available (2018) shows a decrease of 42% since 2013.

Boardings at Shirley Station have decreased by more than half between 2013 and 2018. Ayer, North Leominster, and Fitchburg stations have also decreased boardings. Overall, combined daily boardings at the four stations have decreased by 42% from 2013 to 2018.

Table 2-2 MBTA Commuter Rail Daily Boardings at Devens Area Stations

Station	2/99	2/00	2/01	2/02	2/03	2/04	2/05	4/06	6/07	2/08	2/09	11/10	11/11	11/12	4/13	5/18	% Change 4/13 - 5/18
Ayer	186	190	228	194	209	245	292	336	327	427	490	304	419	405	435	244	-44%
Shirley	162	171	151	115	116	130	180	179	191	218	144	189	240	297	315	147	-53%
North Leominster	217	200	208	185	176	186	311	321	357	408	366	348	481	318	313	236	-25%
Fitchburg	201	231	209	240	236	195	307	363	386	440	462	429	465	411	516	287	-44%
Total	766	792	796	734	737	756	1090	1199	1261	1493	1462	1270	1605	1431	1579	914	-42%

Source: Massachusetts Bay Transit Authority

Results of the transportation survey indicate that 3% of Devens residents use transit to get to and from work, while no employee responses indicated this mode. Montachusett Area Regional Transit (MART) typically provides a shuttle from Littleton Station (which provides commuter rail service to North Station in Boston) to and from Devens businesses during morning and afternoon peak hours to encourage use of the commuter rail by those reverse commuting to and from the Boston area. Due to concerns over COVID-19, this shuttle was not in service at the time the traffic counts were conducted.

'MART' provides regional shuttle services to the general public from Fitchburg and Leominster to Devens, Shirley and Ayer.² The shuttle service has fixed stops in Fitchburg and Leominster but begins flag-down service once it reaches the Devens area. Service runs on a fixed schedule in the early AM and the evening on Monday - Friday. This service has two fare zones—Regional (from Fitchburg/Leominster) and Local (within Shirley, Ayer and Devens). Service to the Devens Area is currently an on-demand taxi service.

Bristol-Myers Squibb (BMS) operates a shuttle from their Devens location (38 Jackson Road) to Alewife Station with a stop at the Littleton/495 Commuter Rail Station.³ There are two shuttles that operate in both the morning and evening peak hour at no charge for employees.

² <http://www.mrta.us/routes-schedules/devens-regional-shuttle>

³ <http://www.bmsshuttle.com/>

2.8 Background Traffic Growth

Background traffic growth is typically a function of future land development, increased economic activity, and changes in travel patterns. These developments are external to Devens. The MRPC was consulted to determine the appropriate annual growth rate for projecting future traffic volumes in the Devens area. MRPC indicated that a 2% regional growth rate is warranted for the MRPC region. A growth rate of 1.77% was used in the 2015 report. However, to remain conservative, and at the recommendation of the MRPC, a 2% background growth rate was used.

2.9 Regional Development

There is currently no ongoing construction for projects of regional significance in the Devens area. This was confirmed through consultation with MRPC. The closest project noted was the Route 2 Athol interchange project, which is currently listed in the Regional Transportation Plan as a regionally significant project. This project is currently not approved but is also not expected to directly influence traffic volume conditions in and around the Devens area once constructed. A number of projects on the MRPC Transportation Improvement Program within the study area had less of a regional focus.

Municipalities surrounding Devens as well as the MRPC were contacted in order to understand in progress, planned, and potential projects that may contribute to future traffic volumes in and around Devens. The following are the results of this correspondence:

- › Ayer
 - West Main Street Smart-Growth Public Infrastructure Improvements (MassWorks funded)
 - 26-unit subdivision at Shaker Mill Pond
 - 19-unit subdivision at Littleton Road/Route 110
 - 26-unit subdivision on Washington Street
- › Boxborough
 - 5,000 SF Veterinary Dental Office Building (opening October 2015)
 - Jefferson at Beaver Brook – 244-unit Chapter 40B rental project (opening mid to late 2016)
 - 100 units of 55+ housing being proposed, no formal application filed
- › Groton
 - Village Meadows Subdivision (Bluebird Lane) – 9-lot flexible development subdivision on Townsend Road (formerly 372 Townsend Road; Parcel 206-22)
 - Music Center at Indian Hill, 122 Old Ayer Road – anticipated opening in fall 2022 (Parcel 222-55). Includes pending improvements of the intersection of Old Ayer Road and Route 119 (Main Street/Boston Road)
 - Kilbourn Place, 240 Main Street – conversion of former Donelan’s Market to office/retail space (Parcel 112-90)
 - Village at Shepley Hill (Longley Road and Sand Hill Road) – 13 duplex townhomes (26 total units); age restricted to 55+ (Parcel 226-2)

- Hayes Woods (Maple Avenue and Pepperell Road) – 16 total units comprised of 7 conventional lots and 9 flexible development lots (Parcels 104-30 and 212-13)
- 330 Old Dunstable Road – 3 new conventional lots with shared driveway (Parcel 248-6)
- › Harvard
 - Ayer Road Reconstruction Project (TIP Project) – Addition of a multi-use pedestrian/bicycle path along Ayer Road in Harvard, MA.
- › Lancaster
 - Main Street (Route 70/117) intersection project – roadway and drainage improvements
 - Capital Commerce project – industrial buildings and retail space
 - Transportation distribution center off Fort Point Road, abutting Route 3
 - Various Improvements to the Old Union Turnpike at Exit 34 (as part of the February 2020 Road Safety Audit)
- › Littleton
 - 151 and 153 Taylor Street – e-commerce last-mile distribution facility
 - Infrastructure improvements:
- › Foster Street
- › Great Road/Beaver Brook Road intersection
- › Route 2A/Willow Road/Bruce Street intersection
- › Lunenburg
 - Leominster-Shirley Road – 300,000 SF warehouse
- › Shirley
 - Benjamin Road – 40B project, proposed to consist of 48 units
 - Lancaster Road – marijuana and retail establishment

Based on information received from the municipalities, Groton expects to see the most significant amount of new development. Given the overall decrease or flat growth in traffic volumes in recent years, the application of the 2% per year annual growth rate would yield conservative estimates (i.e., higher than expected) and account for any specific regional background growth projects.



3

Traffic Trends

Traffic data obtained in the 2020 traffic monitoring program were compared with data from previous years in order to identify changes in traffic over time. The following trends were analyzed:

- › Devens driveway volumes
- › Average weekday daily traffic counts at locations internal and external to Devens
- › Peak external intersection volumes
- › Average weekday daily traffic volumes at Devens gates
- › Weekday truck traffic
- › Cut-through traffic

For the purposes of this report, traffic trends are generally compared with the 2015 Five-Year Traffic Report. Data from previous five-year traffic studies as well as biennial studies are included throughout this report.

3.1 COVID-19 Pandemic Adjustments

In March 2020, the World Health Organization (WHO) declared the COVID-19 virus outbreak a pandemic. This action led to the United State government, state and municipal agencies, and businesses to implement a series of actions aimed at trying to restrict the transmission of the virus which had a direct impact on traffic volumes at every level of roadway (local, regional, and interstate).

Locally, businesses within Devens asked employees to stay at home and adjusted their workforces to comply with the requests/requirements of the community leaders leading to reduced volumes on local roadways. In September 2020, MassDevelopment conducted traffic counts at the five major gates entering Devens which indicated that volumes were 83% of pre-pandemic volumes.

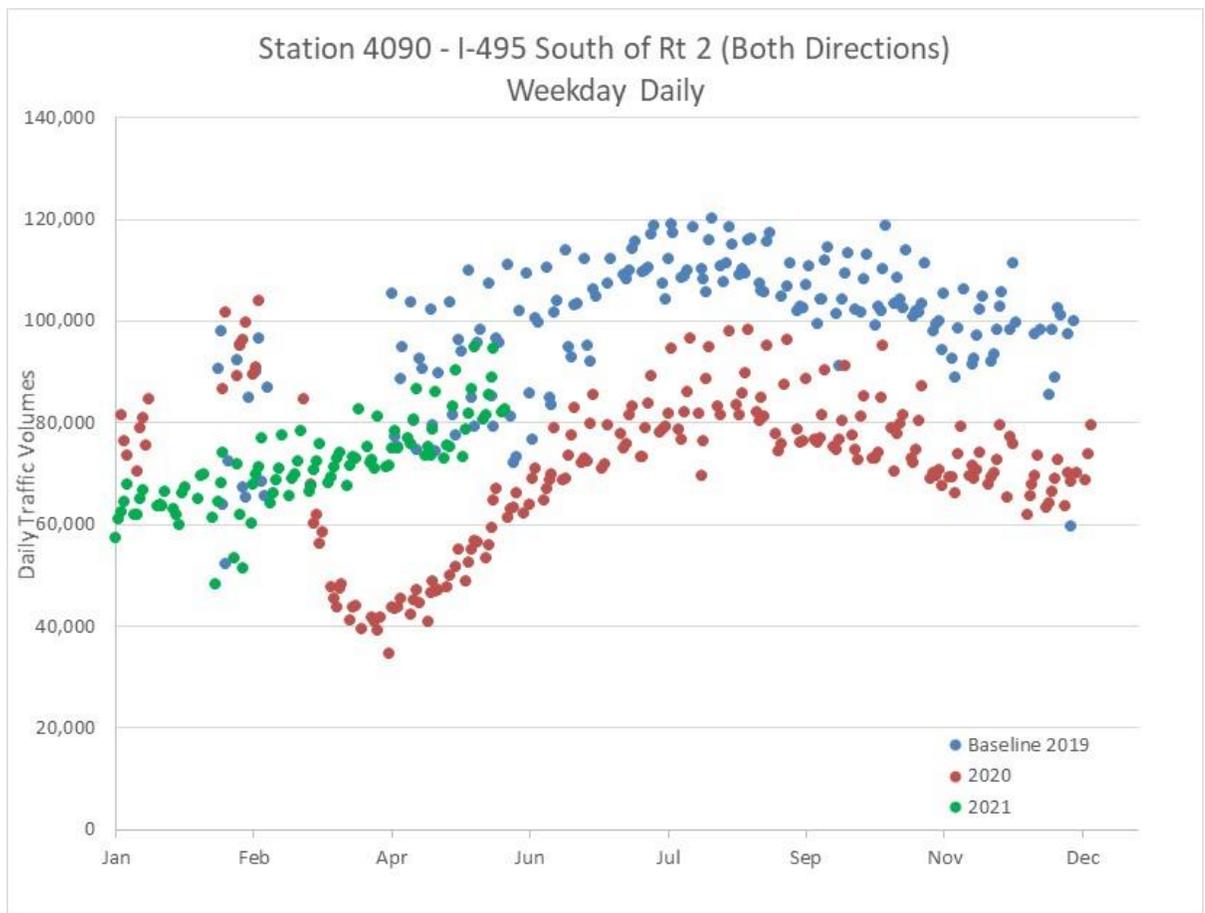
Working with MassDOT, information was gathered from regional counting stations to provide a summary of how volumes were pre-pandemic, during the pandemic, and at the time of data

collection in this study in April/May 2021. Figure 3-1 below provides a scatter diagram of these volumes as they exist along I-495 just south of Route 2 (the closest regional traffic counting station near Devens).

The resulting findings note that on a daily basis, existing regional volumes along I-495 were approximately 15 percent less than pre-pandemic volumes. Additionally, the peak hour volumes (AM and PM) were shown to be about 10 percent lower than pre-pandemic volumes.

Daily and hourly traffic counts were conducted at each of the Devens gates and noted that traffic volumes were approximately 10 percent less than pre-pandemic volumes. For this reason, the existing traffic counts that were gathered in April and May 2021 as part of the 5-year monitoring effort were increased by 10% to match pre-pandemic volumes and allow for comparisons with prior monitoring efforts.

Figure 3-1 Weekday Daily Traffic STA 4090 (2019-2021)



3.2 Devens Driveway Volumes

Morning and evening peak hour turning movement volumes at ten driveways within Devens were compared to volumes from previous years (Table 3-1). Driveways D-19 and D-20, both located on Independence Drive, were added to this edition of the traffic monitoring report, and therefore has been excluded from any historical comparisons.

The most significant decreases since 2015 took place at the Systems H2O, American Superconductor, and Army Enclave at Lovell Road, which experienced decreases of 91% (-56 vehicles), 74% (-34 vehicles), and 62% (-112 vehicles), respectively during the AM peak hour, and decreases of 96% (-58 vehicles), 49% (-14 vehicles), and 68% (-101 vehicles), respectively during the PM peak hour. The driveway with the most significant increase since 2015 was the Bristol-Meyer Squibb driveway with 26% (+30 vehicles) and 42% (+58 vehicles), during the AM and PM peak hour, respectively. The Army Enclave at Quebec Street and 10th Mountain Division Road also saw an increase of 43% (+53 vehicles) during the AM peak hour.

Table 3-1 Devens Business Driveway Count Comparison (2000-2021)

Driveway Turning Movement Counts	AM Peak Hour						PM Peak Hour					
	2000	2005	2010	2015	2021 ¹	Difference 2015-2021	2000	2005	2010	2015	2021 ¹	Difference 2015-2021
D-1 American Superconductor - 64 Jackson Road	n/a	21	77	46	12	-34	n/a	23	48	28	14	-14
D-2 Anheuser Busch – 235 Barnum Road	n/a	7	0	n/a	9	n/a	n/a	5	0	n/a	10	n/a
D-3 FBOP - Federal Medical Facility	195	164	195	175	112	-63	109	89	163	85	88	3
D-4 Quiet Logistics (Gillette) - 66 Saratoga Boulevard	20	18	6	50	28	-23	17	34	17	23	25	2
D-5 Job Corps - MacArthur Avenue	35	62	55	52	36	-16	55	72	62	54	32	-22
D-6 Netstal / Xinetics – 53 & 57 Jackson Road	27	15	20	n/a	n/a	n/a	24	15	15	n/a	n/a	n/a
D-7 Parker-Hannifin – 14 Robbins Pond Road	22	28	53	n/a	n/a	n/a	32	23	33	n/a	n/a	n/a
D-8 Ryerson – 45 Saratoga Boulevard	18	10	14	n/a	n/a	n/a	10	0	15	n/a	n/a	n/a
D-9 Sonoco – 18 Independence Boulevard	n/a	75	50	n/a	123	n/a	n/a	23	17	n/a	48	n/a
D-10 Southern Container - 51 Independence Boulevard	n/a	11	40	36	11	-25	n/a	11	19	19	33	14
D-11 Xinetics - 115 Jackson Road	n/a	20	2	7	14	7	n/a	18	5	8	11	3
D-12 Army Enclave at Quebec Street and 10th Mountain Division Road	n/a	n/a	265	123	176	53	n/a	n/a	169	114	128	14
D-13 Devens Common – Ryans Way	n/a	n/a	151	n/a	74	n/a	n/a	n/a	90	n/a	48	n/a
D-14 Devens Common – Andrews Parkway	n/a	n/a	347	n/a	253	n/a	n/a	n/a	195	n/a	172	n/a
D-15 Bristol-Meyer Squibb - 38 Jackson Road	n/a	n/a	173	115	145	30	n/a	n/a	125	137	195	58
D-16 Evergreen Solar – 112 Barnum Road	n/a	n/a	67	n/a	40	n/a	n/a	n/a	141	n/a	24	n/a
D-17 Army Enclave at Lovell Road	n/a	n/a	117	180	68	-112	n/a	n/a	90	149	48	-101
D-18 Systems H2O - 137 Barnum Road	n/a	n/a	n/a	61	6	-56	n/a	n/a	n/a	60	2	-58
D-19 National Distribution Center at Independence Drive	n/a	n/a	n/a	n/a	22	n/a	n/a	n/a	n/a	n/a	12	n/a
D-20 Devens Recycling Center at Independence Drive	n/a	n/a	n/a	n/a	32	n/a	n/a	n/a	n/a	n/a	13	n/a

1 Traffic counts from 2021 were adjusted by 10% to account for COVID-19 impacts. See section 3.1 for more information on the adjustment.

The 2021 driveway count data was compared with trip generation rates provided by the Institute of Transportation Engineers (ITE), which will be discussed in Section 5.3.

3.3 Average Weekday Traffic – External Locations

Average weekday daily traffic counts from 2021 were compared to counts from previous years, as shown in Figures 3-2 and 3-3 and Tables 3-2 through 3-5. Collectively, the study roadways have experienced a 1.5% increase in traffic volume since 2015 (including a Covid adjustment). The annual traffic growth rate based on this data is 0.24%. The historical annual growth rate cited earlier in this report is 2%. Compared to this rate, towns surrounding Devens are experiencing no growth conditions.

Most roadways have not experienced significant changes in volume since 2015. The most significant increase in traffic occurred at Front Street west of Ayer Street in Shirley, at which traffic volumes increased by 38% (+2,205 vehicles). Sandy Pond Road north of the Rotary in Ayer experienced the greatest decrease in traffic, with a net loss of 29% (-1,642 vehicles).

Four ATRs were placed along Route 2 in the vicinity of Devens. Collectively, weekday traffic volumes at these locations have increased by 21% (+39,053 vehicles) since 2015. The largest increases occurred west of I-190 (35% or +21,347 vehicles) and west of I-495 (19% or +8,596 vehicles). The increase in traffic along Route 2 could be reflective of economic expansion and population growth in the region.

Figure 3-2 Average Weekday Daily Traffic – 48 Hour Count Locations

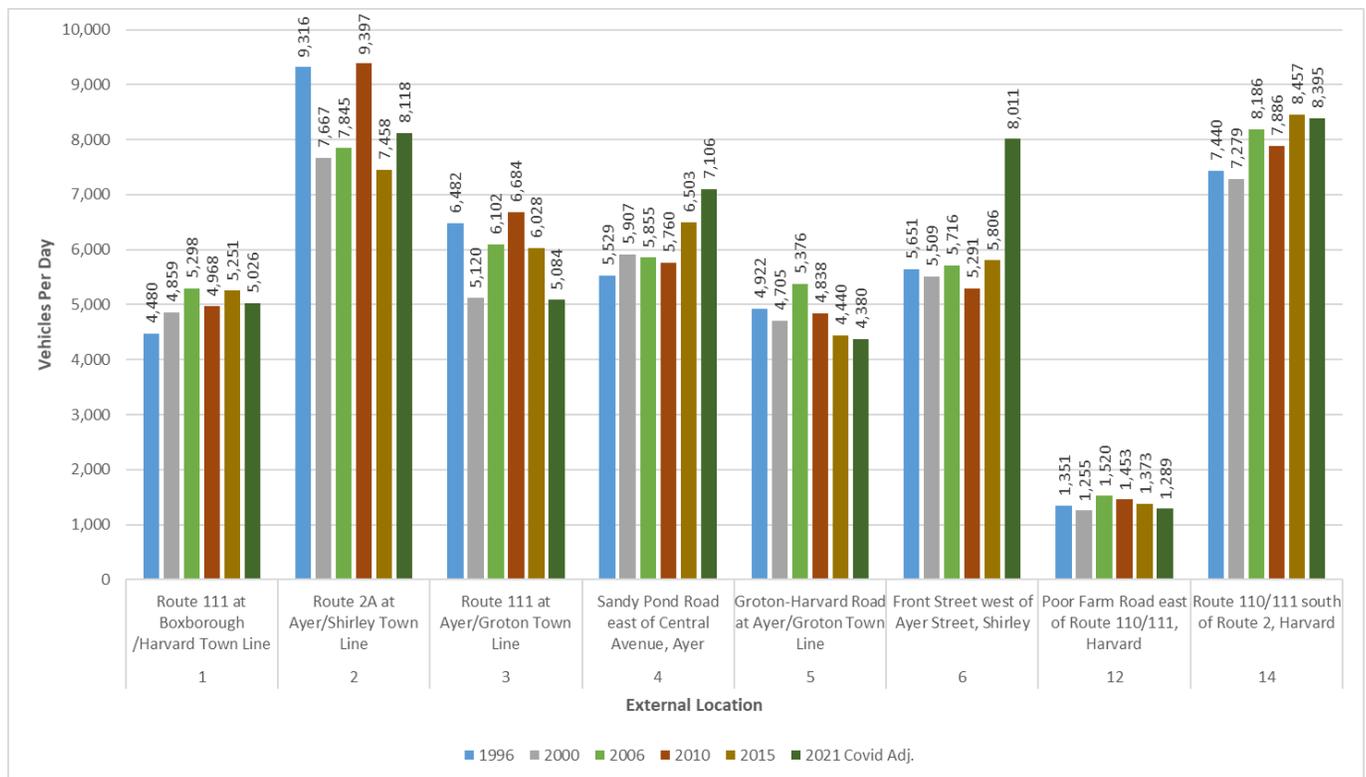


Table 3-2 Average Weekday Daily Traffic (AWDT) – External Locations (48 Hour Counts)

Location Number	Location	1996	2000	2006	2010	2015	2021 COVID Adj.
1	Route 111 at Boxborough /Harvard Town Line	4,480	4,859	5,298	4,968	5,251	5,026
2	Route 2A at Ayer/Shirley Town Line	9,316	7,667	7,845	9,397	7,458	8,118
3	Route 111 at Ayer/Groton Town Line	6,482	5,120	6,102	6,684	6,028	5,084
4	Sandy Pond Road east of Central Avenue, Ayer	5,529	5,907	5,855	5,760	6,503	7,106
5	Groton-Harvard Road at Ayer/Groton Town Line	4,922	4,705	5,376	4,838	4,440	4,380
6	Front Street west of Ayer Street, Shirley	5,651	5,509	5,716	5,291	5,806	8,011
7	Jackson Gate	3,578	6,398	9,552	12,205	13,420	15,789
	From Route 2 WB Off Ramp to Jackson Road				2,062	2,323	3,043
	From Route 2 EB Off Ramp to Jackson Road NB				4,505	4,357	5,152
	From Jackson Road SB to Route 2 WB On Ramp				4,299	4,378	4,951
	From Jackson Road SB to Route 2 EB On Ramp				2,110	2,670	2,643
8	Verbeck Gate	2,354	4,655	5,229	5,331	5,435	5,248
9	Shirley Gate	n/a	1,104	1,317	1,536	1,693	2,344
10	Barnum Gate	2,172	3,418	4,779	5,257	5,651	6,074
11	Grant Road Gate	n/a	n/a	936	1,574	2,161	1,234
12	Poor Farm Road east of Route 110/111, Harvard	1,351	1,255	1,520	1,453	1,373	1,289
13	Carlton Rotary						
	Route 2A/110 east of rotary	14,472	14,131	16,722	13,744	14,177	13,395
	Sandy Pond Road north of rotary	4,701	3,798	5,178	5,236	5,611	3,969
	Route 2A/111 west of rotary (WB)	10,355	9,629	10,080	9,102	9,462	8,154
	Route 2A/111 west of rotary (EB)	9,951	9,483	9,370	8,670	8,947	8,007
	Barnum Road south of rotary	3,186	3,418	5,920	6,314	5,835	7,352
	Route 110/111 south of rotary	13,837	13,475	10,715	12,864	13,348	14,007
14	Route 110/111 south of Route 2, Harvard	7,440	7,279	8,186	7,886	8,457	8,395

Table 3-3 AM Peak Hour Traffic – External Locations (48 Hour Counts)

Location Number	Location	1996	2000	2006	2010	2015	2021 COVID Adj.
1	Route 111 at Boxborough /Harvard Town Line	448	540	516	526	592	407
2	Route 2A at Ayer/Shirley Town Line	852	723	728	788	666	650
3	Route 111 at Ayer/Groton Town Line	596	426	496	544	490	425
4	Sandy Pond Road east of Central Avenue, Ayer	445	502	481	482	514	560
5	Groton-Harvard Road at Ayer/Groton Town Line	473	546	552	440	392	371
6	Front Street west of Ayer Street, Shirley	412	429	456	416	515	590
7	Jackson Gate	324	812	951	1,469	1,319	1,628
	From Route 2 WB Off Ramp to Jackson Road				382	328	438
	From Route 2 EB Off Ramp to Jackson Road NB				693	596	766
	From Jackson Road SB to Route 2 WB On Ramp				204	218	273
	From Jackson Road SB to Route 2 EB On Ramp				190	188	152
8	Verbeck Gate	217	470	454	457	534	567
9	Shirley Gate	n/a	70	132	194	181	204
10	Barnum Gate	159	260	366	400	462	462
11	Grant Road Gate	n/a	n/a	97	190	212	103
12	Poor Farm Road east of Route 110/111, Harvard	129	132	154	147	143	107
13	Carlton Rotary						
	Route 2A/110 east of rotary	1,023	1,071	1,097	1,005	1,059	873
	Sandy Pond Road north of rotary	307	325	433	426	450	279
	Route 2A/111 west of rotary (WB)	537	519	546	495	489	461
	Route 2A/111 west of rotary (EB)	1,056	1,034	890	802	878	756
	Barnum Road south of rotary	220	260	403	518	488	596
	Route 110/111 south of rotary	1,075	1,121	796	1,000	1,054	1,059
14	Route 110/111 south of Route 2, Harvard	658	672	738	733	824	705

Table 3-4 PM Peak Hour Traffic – External Locations (48 Hour Counts)

Location Number	Location	1996	2000	2006	2010	2015	2021 COVID Adj.
1	Route 111 at Boxborough /Harvard Town Line	538	530	603	496	558	492
2	Route 2A at Ayer/Shirley Town Line	905	704	762	986	681	853
3	Route 111 at Ayer/Groton Town Line	554	406	529	578	540	508
4	Sandy Pond Road east of Central Avenue, Ayer	538	575	563	530	629	725
5	Groton-Harvard Road at Ayer/Groton Town Line	438	453	483	431	399	421
6	Front Street west of Ayer Street, Shirley	492	471	495	445	526	810
7	Jackson Gate	369	579	926	1,188	1,225	1,625
	From Route 2 WB Off Ramp to Jackson Road				147	152	176
	From Route 2 EB Off Ramp to Jackson Road NB				268	258	282
	From Jackson Road SB to Route 2 WB On Ramp				519	579	820
	From Jackson Road SB to Route 2 EB On Ramp				254	292	348
8	Verbeck Gate	206	380	488	462	457	531
9	Shirley Gate	n/a	122	138	160	175	254
10	Barnum Gate	172	367	462	430	510	644
11	Grant Road Gate	n/a	n/a	92	153	200	157
12	Poor Farm Road east of Route 110/111, Harvard	147	124	140	133	142	128
13	Carlton Rotary						
	Route 2A/110 east of rotary	1,248	1,133	1,414	1,093	1,148	1,228
	Sandy Pond Road north of rotary	456	320	494	484	486	383
	Route 2A/111 west of rotary (WB)	1,232	1,043	1,086	922	1,006	933
	Route 2A/111 west of rotary (EB)	611	581	604	574	587	582
	Barnum Road south of rotary	261	367	598	536	524	669
	Route 110/111 south of rotary	1,222	1,098	944	1,081	1,142	1,187
14	Route 110/111 south of Route 2, Harvard	760	600	764	696	834	814

Table 3-5 Average Weekday Daily Traffic (AWDT) — External Locations (7 Day Counts)

Location Number	Location	1996	2000	2006	2010	2015	2021 COVID Adj.
ADT							
1	Route 110-111 north of Route 2, Harvard	11,912	13,258	12,758	14,511	10,754	13,231
2	Route 2A-110 at Littleton/Ayer Town Line ^a	8,567	12,039	11,376	10,233	11,456	11,453
3	Route 2 east of I-495, Littleton	36,141	43,851	41,970	40,131	36,777	38,836
4	Route 2 west of I-495, Littleton	41,510	42,485	52,484	49,552	44,169	52,765
5	Route 2 west of Route 70, Lancaster	41,441	n/a	53,198	54,266	46,072	53,164
6	Route 2 west of I-190, Leominster	51,857	58,650	69,094	66,889	60,181	81,528
AWDT							
1	Route 110-111 north of Route 2, Harvard	13,185	14,748	13,907	15,606	11,769	14,453
2	Route 2A-110 at Littleton/Ayer Town Line ^a	9,598	12,039	13,101	11,362	12,657	11,717
3	Route 2 east of I-495, Littleton	40,233	50,195	45,982	42,787	37,591	42,571
4	Route 2 west of I-495, Littleton	44,720	46,707	57,240	53,297	45,321	57,632
5	Route 2 west of Route 70, Lancaster	43,940	43,870	57,464	58,973	48,316	57,855
6	Route 2 west of I-190, Leominster	55,588	64,482	73,935	71,220	60,577	85,495
AM Peak Hour							
1	Route 110-111 north of Route 2, Harvard	1,083	1,201	1,150	1,303	897	1,145
2	Route 2A-110 at Littleton/Ayer Town Line ^a	799	1,030	958	902	859	822
3	Route 2 east of I-495, Littleton	3,886	4,374	4,217	3,774	2,495	3,422
4	Route 2 west of I-495, Littleton	4,096	4,486	5,008	4,580	3,119	4,637
5	Route 2 west of Route 70, Lancaster	4,143	^b	4,830	4,712	3,224	4,567
6	Route 2 west of I-190, Leominster	4,701	5,556	5,998	5,213	4,309	6,234
PM Peak Hour							
1	Route 110-111 north of Route 2, Harvard	1,169	1,237	1,185	1,285	907	1,305
2	Route 2A-110 at Littleton/Ayer Town Line ^a	725	940	1,060	1,019	1,014	1,026
3	Route 2 east of I-495, Littleton	3,872	5,133	4,025	3,688	2,561	3,291
4	Route 2 west of I-495, Littleton	4,008	4,052	4,914	4,583	3,270	4,765
5	Route 2 west of Route 70, Lancaster	3,858	^b	4,966	4,788	3,652	4,968
6	Route 2 west of I-190, Leominster	4,625	5,313	6,058	5,758	4,779	6,871

a 2-day count in 2000

b Data not available from MHD permanent count locations

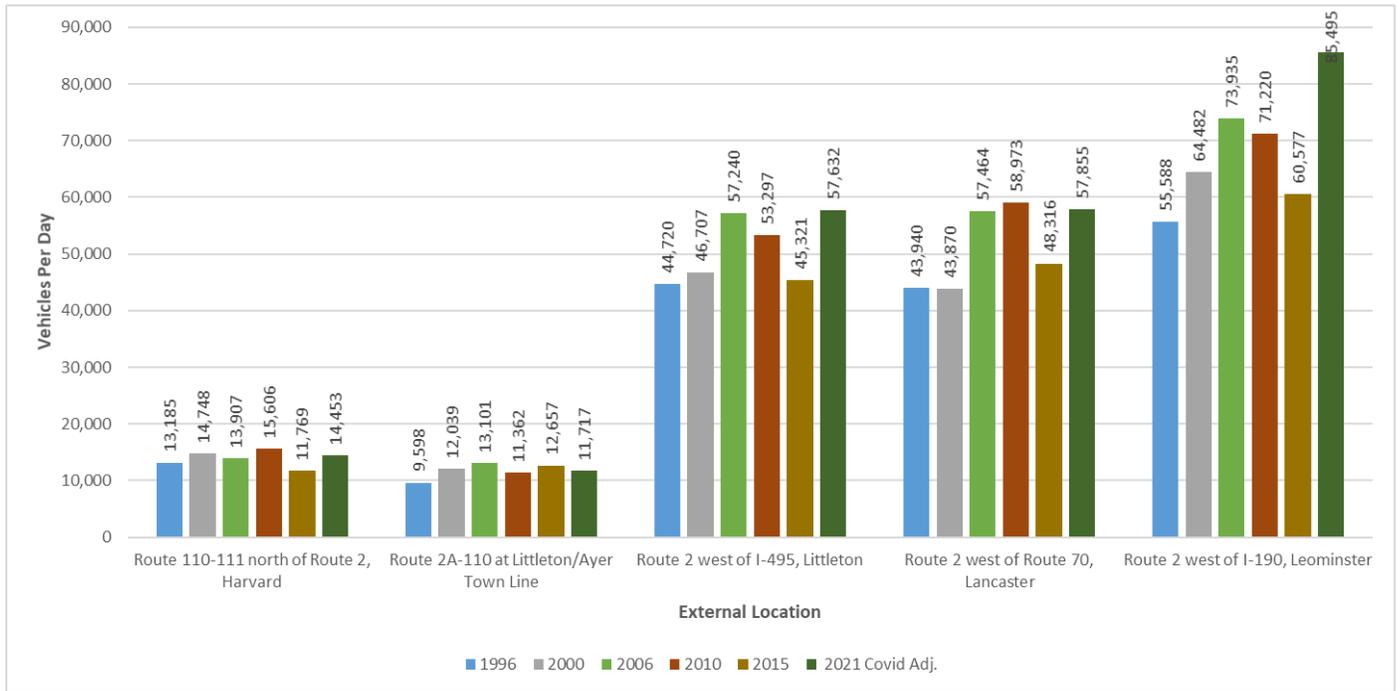
Table 3-5 Average Weekday Daily Traffic (AWDT) -- External Locations (7 Day Counts) (continued)

Location Number	Location	1996	2000	2006	2010	2015	2021 COVID Adj.
Saturday Peak Hour							
1	Route 110-111 north of Route 2, Harvard	880	875	1,000	1,133	790	1,135
2	Route 2A-110 at Littleton/Ayer Town Line ^a	553	n/a	704	606	635	1,148
3	Route 2 east of I-495, Littleton	2,047	2,227	2,595	2,918	1,879	2,171
4	Route 2 west of I-495, Littleton	2,383	2,341	3,134	3,103	2,396	2,879
5	Route 2 west of Route 70, Lancaster	2,553	^b	3,341	3,311	3,566	3,011
6	Route 2 west of I-190, Leominster	3,174	3,952	4,680	4,399	3,929	6,071
Sunday Peak Hour							
1	Route 110-111 north of Route 2, Harvard	628	828	800	909	639	838
2	Route 2A-110 at Littleton/Ayer Town Line ^a	491	n/a	652	625	642	986
3	Route 2 east of I-495, Littleton	1,989	2,436	2,758	2,411	1,679	2,462
4	Route 2 west of I-495, Littleton	2,499	2,616	3,363	3,340	2,688	3,383
5	Route 2 west of Route 70, Lancaster	2,642	^b	3,289	3,266	2,526	3,432
6	Route 2 west of I-190, Leominster	3,310	3,592	4,454	4,445	4,247	6,992
Saturday							
1	Route 110-111 north of Route 2, Harvard	10,175	10,641	11,307	13,367	9,214	11,663
2	Route 2A-110 at Littleton/Ayer Town Line ^a	6,597	n/a	9,003	7,799	9,020	12,209
3	Route 2 east of I-495, Littleton	27,235	28,399	34,039	39,368	30,608	29,715
4	Route 2 west of I-495, Littleton	30,194	33,015	42,099	41,038	39,015	40,462
5	Route 2 west of Route 70, Lancaster	35,527	^b	45,817	46,279	42,586	40,330
6	Route 2 west of I-190, Leominster	43,925	43,368	62,440	60,836	55,794	70,980
Sunday							
1	Route 110-111 north of Route 2, Harvard	7,282	8,442	8,464	10,185	7,222	8,639
2	Route 2A-110 at Littleton/Ayer Town Line ^a	5,380	n/a	6,906	7,026	7,882	9,426
3	Route 2 east of I-495, Littleton	24,582	27,591	29,845	27,603	27,475	29,304
4	Route 2 west of I-495, Littleton	29,775	30,834	38,089	39,340	36,773	40,783
5	Route 2 west of Route 70, Lancaster	32,387	^b	39,248	38,713	36,098	42,563
6	Route 2 west of I-190, Leominster	41,133	30,834	51,540	51,272	51,021	72,173

a 2-day count in 2000

b Data not available from MHD permanent count locations

Figure 3-3 Average Weekday Daily Traffic – 7 Day Count Locations



Daily traffic volumes dropped in 2015 from 2006 and 2010 levels but have since rebounded in 2021.

3.4 Total Intersection Volumes – External Locations

Tables 3-6 and 3-7 show the peak hour volumes for external intersections. Almost all AM peak hour intersection volumes have decreased since 2015, while many of the PM Peak hour intersection volumes have increased since 2015. Overall, traffic volumes during the AM peak hour have decreased by 9% (-1,672 vehicles) between 2015 and 2021, and volumes during the PM peak hour have increased by 8% (+1,439 vehicles). Traffic volumes at external study intersection locations are either lower (AM Peak) or have a minor increase (PM Peak) despite regional traffic volumes, external to Devens, increasing greatly.

Table 3-6 Total AM Peak Hour Intersection Volumes – External Locations

Intersection	1996 (vph)	2000 (vph)	2006 (vph)	2010 (vph)	2015 (vph)	2021 COVID Adj.
1. Front St./Lancaster St./Leominster Rd./Center Rd., Shirley	802	803	815	841	907	850
2. Park St./Fitchburg Rd./Groton School Rd., Ayer	1,210	1,157	1,196	1,220	1,218	1,087
3. Park St./Main St./West Main St., Ayer	1,492	1,361	1,578	1,448	1,335	1,452
4. Groton-Harvard Rd./Central Ave., Ayer	864	880	782	737	707	716
5. Route 2A-110 (King St.)/I-495 Exit 30 NB Ramps, Littleton	1,555	1,833	1,462	1,559	1,694	1,452
6. Route 2A-110 (King St.)/I-495 Exit 30 SB Ramps, Littleton	1,539	1,830	1,657	1,631	1,847	1,664
7. Route 110-111 (Ayer Rd.)/Route 110/Route 111, Harvard	818	833	891	844	1,026	793
8. Route 70/Route 117 (Seven Bridge Rd.), Lancaster	1,452	1,616	1,621	1,620	1,767	1,720
9. Route 70/Route 117 (Lunenburg Rd.), Lancaster	1,471	1,652	1,664	1,681	1,833	1,761
10. Route 110 (King St.)/Route 119/Route 2A, Littleton Common	2,085	2,225	1,873	1,825	1,979	1,438
11. Route 2A-110 (King St.)/Goldsmith St., Littleton Common	1,469	1,674	1,213	1,138	1,355	1,001
12. Verbeck Gate/Macpherson Rd., Ayer	774	888	1,094	883	1,000	1,092
13. Grant Rd./West Main St., Ayer	n/a	n/a	625	649	850	820
14. Hospital Rd./Front St., Shirley	n/a	n/a	553	624	805	804

Table 3-7 Total PM Peak Hour Intersection Volumes – External Locations

Intersection	1996 (vph)	2000 (vph)	2006 (vph)	2010 (vph)	2015 (vph)	2021 COVID Adj.
1. Front St./Lancaster St./Leominster Rd./Center Rd., Shirley	953	847	776	815	973	1,048
2. Park St./Fitchburg Rd./Groton School Rd., Ayer	1,353	1,447	1,450	1,381	1,283	1,500
3. Park St./Main St./West Main St., Ayer	1,721	1,698	1,804	1,689	1,325	1,823
4. Groton-Harvard Rd./Central Ave., Ayer	841	904	796	693	738	820
5. Route 2A-110 (King St.)/I-495 Exit 30 NB Ramps, Littleton	1,675	1,656	1,893	1,514	1,626	1,580
6. Route 2A-110 (King St.)/I-495 Exit 30 SB Ramps, Littleton	1,844	1,814	1,959	1,655	1,761	1,824
7. Route 110-111 (Ayer Rd.)/Route 110/Route 111, Harvard	869	668	609	592	820	978
8. Route 70/Route 117 (Seven Bridge Rd.), Lancaster	1,614	1,657	1,677	1,730	1,826	1,992
9. Route 70/Route 117 (Lunenburg Rd.), Lancaster	1,578	1,679	1,720	1,787	1,889	2,071
10. Route 110 (King St.)/Route 119/Route 2A, Littleton Common	2,809	2,574	2,450	2,304	2,310	2,131
11. Route 2A-110 (King St.)/Goldsmith St., Littleton Common	1,758	1,588	1,521	1,440	1,480	1,356
12. Verbeck Gate/Macpherson Rd., Ayer	726	926	1,093	924	1,004	1,156
13. Grant Rd./West Main St., Ayer	n/a	n/a	617	713	831	872
14. Hospital Rd./Front St., Shirley	n/a	n/a	591	610	684	838

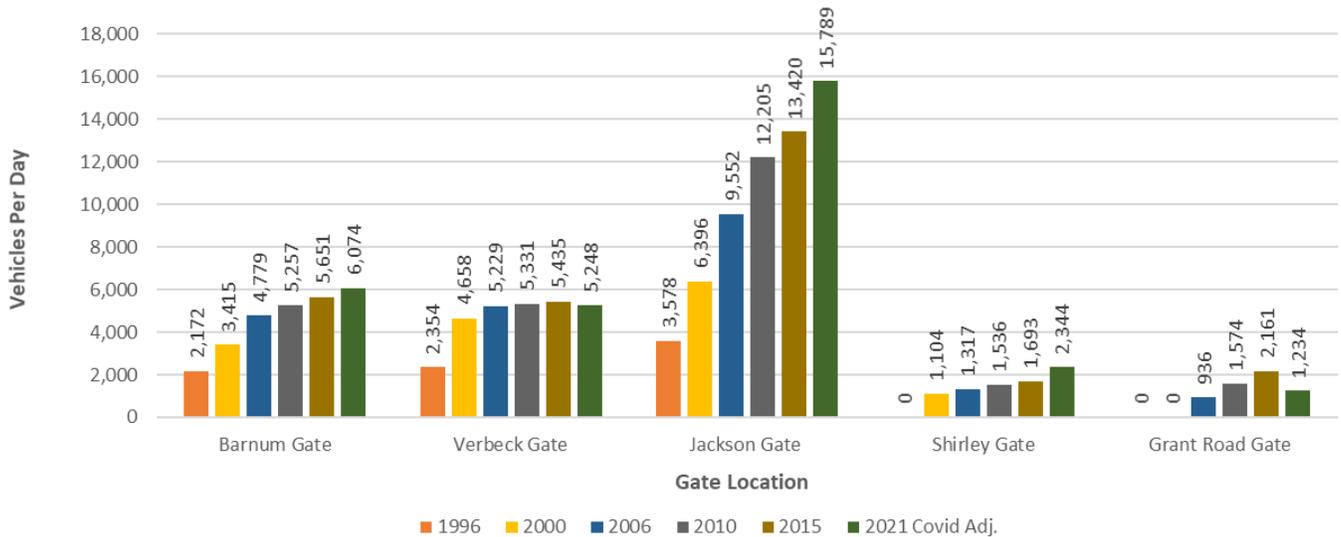
3.5 Average Weekday Traffic – Devens Gates

Weekday traffic volumes at the five Devens Gates have collectively increased by 8% since 2015 (Table 3-8 and Figure 3-4). Shirley Gate experienced the largest percentage increase with 38% (+651 vehicles), while Jackson Gate saw the largest volume increase with 2,369 vehicles (+18%) since 2015. Both Grant Road Gate and Verbeck Gate experienced a decrease in traffic since 2015.

Table 3-8 Average Weekday Daily Traffic (AWDT) – Devens Gates

Location	1996	2000	2006	2010	2015	2021 COVID Adj.
Barnum Gate	2,172	3,415	4,779	5,257	5,651	6,074
Verbeck Gate	2,354	4,658	5,229	5,331	5,435	5,248
Jackson Gate	3,578	6,396	9,552	12,205	13,420	15,789
Shirley Gate	n/a	1,104	1,317	1,536	1,693	2,344
Grant Road Gate	n/a	n/a	936	1,574	2,161	1,234
Total	8,104	15,573	21,813	25,903	28,360	30,690

Figure 3-4 Average Weekday Daily Traffic by Gate



On a daily basis, the distribution of traffic throughout the gates (which are used to access Devens) has remained constant. The largest changes in distribution were a 4% increase in utilizing Jackson Gate and a 4% decrease in using Grant Road Gate.⁴ Barnum Gate (20%) and Verbeck Gate (17%) are the next highest used gates after Jackson Gate (51%). Shirley Gate (8%) and Grant Road Gate (4%) are the least used gates.

Peak hour traffic at the gates has remained relatively stable for the morning peak hour but has seen a large increase in the evening peak hour since 2015 (Table 3-9). During the morning peak hour, traffic volumes have increased by 9% (+255 vehicles), and in the evening, traffic volumes have increased by 25% (+632 vehicles).

Table 3-9 Peak Hour Traffic – Devens Gates

Location	1996		2000		2006		2010		2012		2015		2021 COVID Adj.	
	AM Peak	% Total	AM Peak	% Total	AM Peak	% Total	AM Peak	% Total	AM Peak	% Total	AM Peak	% Total	AM Peak	% Total
Barnum Gate	159	23%	260	16%	366	18%	400	15%	441	17%	462	17%	462	16%
Verbeck Gate	217	31%	470	29%	454	23%	457	17%	474	19%	534	20%	567	19%
Jackson Gate	324	46%	812	50%	951	48%	1,469	54%	1,302	51%	1,319	49%	1,628	55%
Shirley Gate	n/a	n/a	70	4%	132	7%	194	7%	172	7%	181	7%	204	7%
Grant Road Gate	n/a	n/a	n/a	n/a	97	5%	190	7%	173	7%	212	8%	103	3%
Total	700	100%	1,612	100%	2,000	100%	2,710	100%	2,562	100%	2,708	100%	2,963	100%

Location	1996		2000		2006		2010		2012		2015		2021 COVID Adj.	
	PM Peak	% Total	PM Peak	% Total	PM Peak	% Total	PM Peak	% Total	PM Peak	% Total	PM Peak	% Total	PM Peak	% Total
Barnum Gate	172	23%	367	25%	462	22%	430	18%	423	18%	510	20%	644	20%
Verbeck Gate	206	28%	380	26%	488	23%	462	19%	432	19%	457	18%	531	17%
Jackson Gate	369	49%	579	40%	926	44%	1,188	50%	1,150	49%	1,225	48%	1,613	50%
Shirley Gate	n/a	n/a	122	8%	138	7%	160	7%	162	7%	175	7%	254	8%
Grant Road Gate	n/a	n/a	n/a	n/a	92	4%	153	6%	162	7%	200	8%	157	5%
Total	747	100%	1,448	100%	2,106	100%	2,393	100%	2,329	100%	2,567	100%	3,199	100%

4 Note: The Grant Road gate was closed for a period of time prior to these counts and some drivers may have used other gates to access the Devens campus.

3.6 Average Weekday Daily Truck Traffic – Devens Gates

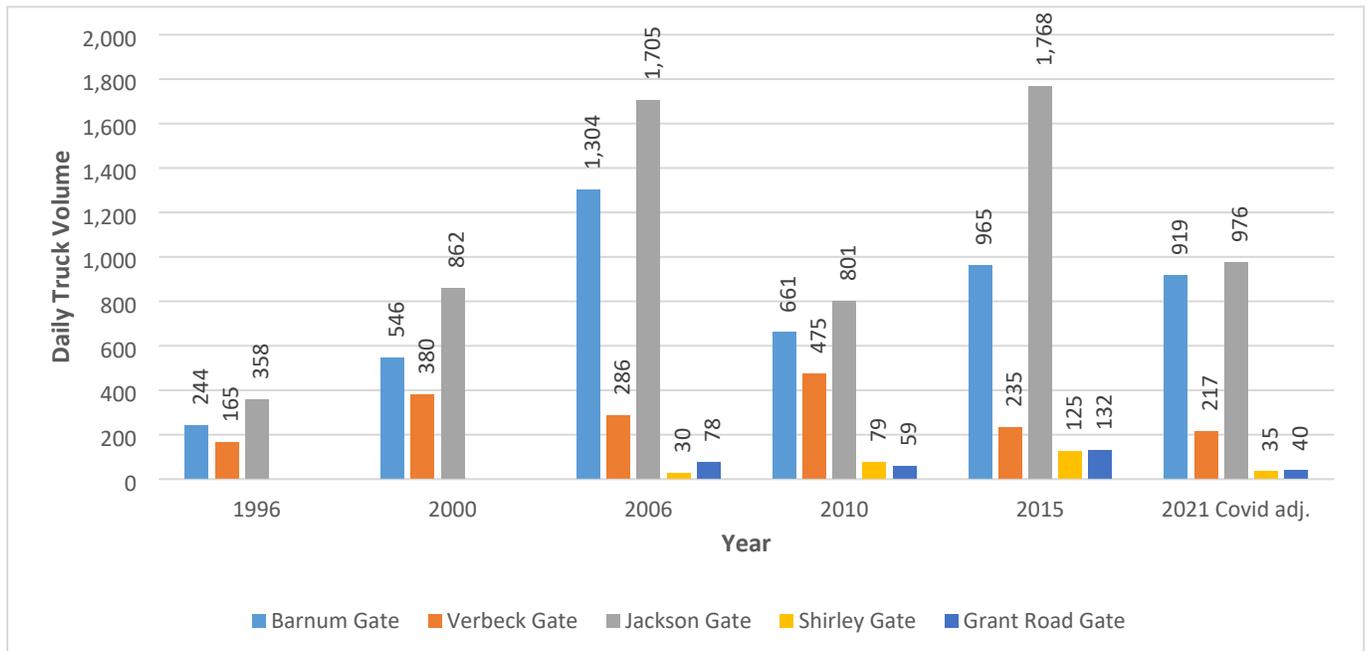
For the purposes of this report, the following FHWA vehicle classifications are considered trucks: buses, 2 Axle 6 Tire, 3 Axle Single, 4 Axle Single, <5 Axle Double, 5 Axle Double, >6 Axle Double, <6 Axle Multi, 6 Axle Multi and >6 Axle Multi vehicles.

Most likely as a result of the pandemic impacts, truck traffic in Devens has decreased at all gates and has a total reduction of 32% (-1,038 vehicles) since 2015 (Table 3-10 and Figure 3-5). Grant Road and Shirley Gates experienced the most significant decreases in truck traffic, having experienced decreases of 70% (-92 trucks) and 72% (-90 trucks) respectively. Jackson Road Gate saw a decrease in 792 trucks (-45%). 87% of truck traffic passes through either Jackson Gate (45% or 976 trucks) or Barnum Gate (42% or 919 trucks).

Table 3-10 Average Weekday Daily Truck Traffic – Devens Gates

Location	1996	2000	2006	2010	2015	2021 COVID Adj.
Barnum Gate	244	546	1,304	661	965	919
Verbeck Gate	165	380	286	475	235	217
Jackson Gate	358	862	1,705	801	1,768	976
Shirley Gate	n/a	n/a	30	79	125	35
Grant Road Gate	n/a	n/a	78	59	132	40
Total	767	1,788	3,403	2,075	3,224	2,186

Figure 3-5 Average Weekday Daily Truck Distribution by Gate



Truck volumes were significantly higher in 2006 and 2015 when compared to 2010 and 2021.

3.7 Origin-Destination Survey

An origin-destination study was conducted to determine the amount of cut-through traffic in Devens. In previous iterations of this report, this was completed by recording the last three alpha-numeric characters of license plates entering and exiting the five gates. However, due to the COVID-19 pandemic, this approach was not feasible. As such, StreetLight data (algorithm using location records of smart phones and navigation devices with normalized travel patterns via traffic counts and embedded sensors) was used to complete the O-D study. Using StreetLight, zones (the 5 Gates plus Devens proper) were setup that identified which gate(s) a trip was completed through or if a trip started/ended in Devens. For this purpose, a cut-through is defined as a vehicle entering one gate and exiting another within a 60-minute interval. It is assumed that vehicles entering and exiting in this amount of time are using Devens as a means to reach a destination outside of Devens, and thus are not factored into trip generation calculations.

Table 3-11 shows cut-through traffic by hour. By comparing the total number of vehicles entering Devens' gates and the number of vehicles using the gates as a cut-through, it was determined that 33% of trips that pass through the gates between the hours of 6:00 AM and 6:00 PM are cut-through trips. The cut-through percentage steadily increased from 2000-2010, during which it increased by 14%. This percentage has now begun to stabilize, having increased by 2% from 2010 to 2015 and having decreased 1% from 2015 to 2021. The total number of cut-through trips decreased between the times of 6:00 AM and 12:00 PM, suggesting that fewer drivers are using Devens as a cut-through during the morning than in 2015. This shows that Devens is used as a cut-through mainly by commuters traveling to and from the regional highway network. The highest number of cut-through trips continue to occur during the afternoon peak hour, with over 50% of trips from 3:00 PM to 6:00 PM being cut-through trips.

Table 3-11 Cut-through Traffic by Hour

Start Time	End Time	Total Entering					Total Cut-Through					Cut-Through Percentage of Total Trips				
		2000	2005	2010	2015	2021 COVID Adj.	2000	2005	2010	2015	2021 COVID Adj.	2000	2005	2010	2015	2021 COVID Adj.
6:00 AM	7:00 AM	739	938	898	918	1,505	81	140	204	223	259	11%	15%	23%	24%	17%
7:00 AM	8:00 AM	935	1,176	1,296	1,221	1,898	160	223	254	306	408	17%	19%	20%	25%	22%
8:00 AM	9:00 AM	787	1,094	1,218	1,044	1,564	136	223	318	277	386	17%	20%	26%	27%	25%
9:00 AM	10:00 AM	390	566	622	563	883	57	131	178	147	187	15%	23%	29%	26%	21%
10:00 AM	11:00 AM	330	380	480	423	729	76	90	196	155	244	23%	24%	41%	37%	34%
11:00 AM	12:00 PM	358	496	516	494	785	62	145	216	183	238	17%	29%	42%	37%	30%
12:00 PM	1:00 PM	411	672	691	640	927	64	146	214	170	293	16%	22%	31%	27%	32%
1:00 PM	2:00 PM	401	550	601	691	867	65	129	221	229	327	16%	23%	37%	33%	38%
2:00 PM	3:00 PM	398	652	625	628	998	72	166	240	264	392	18%	25%	38%	42%	39%
3:00 PM	4:00 PM	387	607	725	783	1,034	124	203	316	361	558	32%	33%	44%	46%	54%
4:00 PM	5:00 PM	382	555	667	758	904	119	233	291	383	460	31%	42%	44%	51%	51%
5:00 PM	6:00 PM	338	663	601	713	706	27	218	237	347	447	8%	33%	39%	49%	63%
Total		5,856	8,349	8,940	8,876	12,800	1,043	2,047	2,885	3,045	4,197	18%	25%	32%	34%	33%

Table 3-12 shows the number of cut-through trips by gate. Since 2015, the total percentage of cut-through trips has remained constant as well as the distribution of these trips through each gate. Cut-through trips between Jackson Gate (origin) and Verbeck Gate (destination) have increased by 7% since 2015. In contrast, trips between Grant Road Gate (origin) and Jackson Gate (destination) have decreased 6%, while cut-through trips between Jackson Gate and Shirley Gate have increased by 3%. The three routes that make up nearly half (46%) of all cut-through trips are Jackson to Verbeck (17%), Verbeck to Jackson (15%) and Barnum to Jackson (14%).

Table 3-12 Cut-through Traffic by Gate

Origin	Destination	Total Number of Cut-throughs					Percent Overall				
		2000	2005	2010	2015	2021 COVID Adj.	2000	2005	2010	2015	2021 COVID Adj.
Jackson Gate	Verbeck	270	479	367	305	730	26%	23%	17%	10%	17%
	Shirley	66	170	154	212	426	6%	8%	7%	7%	10%
	Barnum	93	176	260	298	385	9%	9%	12%	10%	9%
	Grant Road	n/a	44	150	272	338	n/a	2%	7%	9%	8%
Verbeck Gate	Jackson	287	327	299	423	634	28%	16%	14%	14%	15%
	Shirley	15	24	22	14	32	1%	1%	1%	0%	1%
	Barnum	49	63	81	67	90	5%	3%	4%	2%	2%
	Grant Road	n/a	11	29	30	22	n/a	1%	1%	1%	1%
Shirley Gate	Jackson	47	181	131	247	278	5%	9%	6%	8%	7%
	Verbeck	14	35	28	25	18	1%	2%	1%	1%	0%
	Barnum	15	33	41	56	40	1%	2%	2%	2%	1%
	Grant Road	n/a	9	11	12	0	n/a	0%	1%	0%	0%
Barnum Gate	Jackson	109	212	252	483	600	10%	10%	12%	16%	14%
	Verbeck	51	117	87	83	202	5%	6%	4%	3%	5%
	Shirley	27	47	37	54	89	3%	2%	2%	2%	2%
	Grant Road	n/a	12	13	33	11	n/a	1%	1%	1%	0%
Grant Road	Jackson	n/a	67	130	353	244	n/a	3%	6%	12%	6%
	Verbeck	n/a	19	28	25	4	n/a	1%	1%	1%	0%
	Shirley	n/a	7	17	13	24	n/a	0%	1%	0%	1%
	Barnum	n/a	14	23	40	30	n/a	1%	1%	1%	1%
Total		1,043	2,047	2,160	3,045	4,197	100%	100%	100%	100%	100%

3.8 Carlton Rotary

Traffic volumes were recorded entering and exiting each leg of the Carlton Rotary (Tables 3-13 through 3-15). These volumes were then balanced so that the total number of vehicles entering the rotary is equivalent to the total number of vehicles exiting the rotary.

Table 3-13 Carlton Rotary – Weekday Volumes – Entering/ Exiting (balanced)

Location	Entering (vpd)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	7,200	6,994	8,248	7,068	7,388	6,685
Route 110-111, South of Rotary	7,400	6,775	6,194	6,960	7,089	7,214
Barnum Road	1,650	1,704	3,105	3,337	3,054	3,626
Route 2A-111 EB, West of Rotary	10,350	9,489	9,300	9,234	9,318	8,073
Route 2A-111 WB, West of Rotary	n/a	n/a	n/a	n/a	n/a	n/a
Sandy Pond Road	2,650	2,003	2,082	2,242	2,423	1,958
Total	29,250	26,965	28,929	28,841	29,272	27,555

Location	Exiting (vpd)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	7,600	7,140	8,235	7,103	7,083	6,765
Route 110-111, South of Rotary	6,750	6,693	4,605	6,325	6,541	6,853
Barnum Road	1,550	1,713	2,693	3,179	2,902	3,757
Route 2A-111 EB, West of Rotary	n/a	n/a	n/a	n/a	n/a	n/a
Route 2A-111 WB, West of Rotary	10,350	9,625	10,318	9,104	9,462	8,154
Sandy Pond Road	3,000	1,794	3,079	3,130	3,284	2,026
Total	29,250	26,965	28,930	28,841	29,272	27,555

Location	Total (vpd)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	14,800	14,134	16,483	14,171	14,471	13,450
Route 110-111, South of Rotary	14,150	13,468	10,799	13,285	13,630	14,067
Barnum Road	3,200	3,417	5,798	6,516	5,956	7,382
Route 2A-111 EB, West of Rotary	10,350	9,489	9,300	9,234	9,318	8,073
Route 2A-111 WB, West of Rotary	10,350	9,625	10,318	9,104	9,462	8,154
Sandy Pond Road	5,650	3,797	5,161	5,372	5,707	3,984
Total	58,500	53,930	57,859	57,682	58,544	55,110

The overall balanced volumes increased by 1.5% from 2010 to 2015, but decreased by 5.9% from 2015 to 2021. Traffic volumes have stayed relatively stable dating back to 1996. The morning peak hour saw an 11.4% reduction in volumes while the evening peak hour experienced a 5.8% reduction in total volumes.

Table 3-14 Carlton Rotary – AM Peak Hour Volumes – Entering/Exiting (balanced)

Location	Entering Peak (vph)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	332	658	436	421	421	406
Route 110-111, South of Rotary	441	586	357	477	486	479
Barnum Road	86	252	197	200	193	230
Route 2A-111 EB, West of Rotary	1,143	518	842	873	892	704
Route 2A-111 WB, West of Rotary	n/a	n/a	n/a	n/a	n/a	n/a
Sandy Pond Road	150	186	229	231	234	149
Total	2,152	2,200	2,061	2,202	2,226	1,967

Location	Exiting Peak (vph)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	716	413	643	603	644	468
Route 110-111, South of Rotary	651	515	426	546	575	563
Barnum Road	141	118	210	328	298	366
Route 2A-111 EB, West of Rotary	n/a	n/a	n/a	n/a	n/a	n/a
Route 2A-111 WB, West of Rotary	476	1,019	568	519	489	457
Sandy Pond Road	168	135	214	206	220	122
Total	2,152	2,200	2,061	2,202	2,226	1,976

Location	Peak Total (vph)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	1,048	1,071	1,079	1,024	1,065	873
Route 110-111, South of Rotary	1,092	1,101	783	1,023	1,061	1,042
Barnum Road	227	370	407	528	491	596
Route 2A-111 EB, West of Rotary	1,143	518	940	873	892	704
Route 2A-111 WB, West of Rotary	476	1,019	622	519	489	457
Sandy Pond Road	318	321	443	437	454	271
Total	4,304	4,400	4,122	4,404	4,452	3,942

Table 3-15 Carlton Rotary – PM Peak Hour Volumes – Entering/Exiting (balanced)

Location	Entering Peak (vph)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	820	359	828	649	658	683
Route 110-111, South of Rotary	809	438	632	638	703	661
Barnum Road	110	45	326	312	312	325
Route 2A-111 EB, West of Rotary	579	1,063	659	634	623	516
Route 2A-111 WB, West of Rotary	n/a	n/a	n/a	n/a	n/a	n/a
Sandy Pond Road	169	228	204	225	223	188
Total	2,487	2,133	2,649	2,458	2,520	2,373

Location	Exiting Peak (vph)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	458	703	609	497	528	502
Route 110-111, South of Rotary	443	678	346	496	480	514
Barnum Road	61	210	302	250	230	254
Route 2A-111 EB, West of Rotary	n/a	n/a	n/a	n/a	n/a	n/a
Route 2A-111 WB, West of Rotary	1,232	443	1,099	937	1,006	906
Sandy Pond Road	293	99	293	278	276	197
Total	2,487	2,133	2,649	2,458	2,520	2,373

Location	Peak Total (vph)					2021 COVID
	1996	2000	2006	2010	2015	Adj.
Route 2A-110, East of Rotary	1,278	1,062	1,437	1,146	1,186	1,185
Route 110-111, South of Rotary	1,252	1,116	978	1,134	1,183	1,175
Barnum Road	171	255	628	562	542	579
Route 2A-111 EB, West of Rotary	579	1,063	659	634	623	516
Route 2A-111 WB, West of Rotary	1,232	443	1,099	937	1,006	906
Sandy Pond Road	462	327	497	503	499	385
Total	4,974	4,266	5,298	4,916	5,040	4,746



4

Traffic Demand Management

The purpose of Transportation Demand Management (TDM) is to reduce the number of single occupancy vehicle-trips during morning and afternoon peak hours. As part of the FEIR for the redevelopment of Devens, a TDM program will be initiated once development reaches a critical mass. This program provides alternative transportation options throughout the community. The goal of this program is to reduce at least 15% of overall vehicle-trips in Devens. MassDevelopment is the agency in charge of initiating this program. It is noted that the results of the transportation survey show that approximately 1% of Devens employees and residents carpool to work.

The United States Environmental Protection Agency (EPA) requires that businesses with at least 250 employees file a TDM Plan with the Massachusetts Department of Environmental Protection (MassDEP). TDM strategies that could be implemented include:

- › Carpooling, ridesharing, vanpools
- › Shuttle bus service to and from public transit
- › Public transportation (MBTA commuter rail)
- › Parking management
- › Park and ride lots
- › Non-vehicle accommodations (bicycle racks, showering facilities, access to trail networks, etc.)
- › Guaranteed ride home program
- › Flexible work hours (to reduce peak hour traffic)
- › Improved access to local services (dry cleaners, day care, bank etc.)

The MBTA has established a reverse commute schedule for trains between North Station and both Littleton and Fitchburg Stations in the morning and evening peak commuting periods. MART has also established a shuttle for reverse commuters from the Littleton and Fitchburg MBTA Stations to Mount Wachusett Community College and is planning a bus route through Devens that will connect the Shirley MBTA station, downtown Devens, and the Ayer MBTA station. The availability of this

shuttle makes commuting from Boston to Devens via the commuter rail a viable transportation option.

Mass Development in conjunction with the Devens Enterprise Commission informs every applicant about TDM and requires them to incorporate trip reduction strategies to the extent reasonable and practical. In addition, each unfiled permit issued includes a requirement that at such time a transportation management association is created in Devens, they agree to join.

Previous studies used a 7.5% target reduction in vehicle-trips as a result of TDM implementation to be conservative. This report will continue to use the 7.5% figure, although the transportation survey showed that 1% of Devens employees and residents carpool to and from work.



5

Build-out Analysis and Trip Generation/ Distribution

5.1 Overview

New development and redevelopment of existing facilities at Devens have continued over the past several years, including the expansion of Biotechne, construction of Little Leaf Farms, and construction of the Devens Common Commercial Building. This section focuses on documenting current level of development, existing trip comparison with standard trip generation methodology, and future projection based on thresholds identified in the EIR and Final Environmental Impact Study (FEIS). It determines where development and traffic currently are and forecasts to determine future impacts based on current characteristics using standard methodology from the EIR. This year's traffic monitoring report also affords the opportunity to check projections made twenty-five years ago.

The original Devens Base Reuse Plan limited total development in Devens to 8.5 million square feet and a daily vehicle-trips threshold of 59,625 vehicle-trips per day was calculated based on projected development levels. In a 2008 Notice of Project Change (NPC) filing to MEPA, MassDevelopment received approval to discontinue using the building floor area as the basis for build-out limit.

5.2 Existing Build-out

In order to develop a build-out analysis, all available data pertaining to existing and planned development was reviewed. The MassDevelopment Real Estate Office provided information related to existing, planned, and potential build-out in Devens. The following information was provided:

- › Building owner
- › Address
- › Zoning District

- › Building Size (SF)
- › Projected Expansion Size (SF)
- › Projected Number of Employees

Table 5-1 summarizes the build-out information provided by MassDevelopment.

Table 5-1 Devens Build-out Summary

Category	Area (Building SF)
Existing Reuse (occupied)	434,563
New Construction (occupied)	<u>6,150,058</u>
<i>subtotal (occupied development)</i>	<i>6,584,621</i>
Existing Reuse (unoccupied)	182,699
New Construction (unoccupied)	<u>344,034</u>
<i>subtotal (unoccupied development)</i>	<i>526,733</i>
Potential Expansions	1,538,846
Current Projects Under Construction	<u>1,204,778</u>
<i>subtotal (future development)</i>	<i>2,743,624</i>
Total Actual and Planned Buildout	9,854,978

As of June 2021, approximately 6.58 million square feet of total build-out is occupied, 526,733 square feet is unoccupied, and 2.74 million square feet of build-out is under construction or has potential to be constructed. The total and actual planned build-out (9.85 million square feet) is 1.35 million square feet above the previously discussed 8.5 million square feet threshold commissioned as part of the Devens Base Reuse Plan, but as noted later in this report, the traffic volumes are still well below the thresholds contemplated as part of that effort. Since 2015, the total occupied build-out has increased by 1,876,522 square feet.

The 2015 Traffic Monitoring Report used an average build-out rate of 225,000 square feet per year. Based on conversations with MassDevelopment, this rate was retained for consistency.

5.3 Existing Trip Generation

Trip generation results quantify trips associated with any development. To estimate the trip generation characteristics for future development in Devens, the Institute of Transportation Engineers (ITE) Trip Generation⁵ manual was employed. The ITE Manual is widely used by traffic engineers for this application and provides vehicle-trip generation projections for a number of land uses. It incorporates data from all over the country and, as shown in previous Traffic Monitoring R

⁵ *Trip Generation Manual, 10th ed.*, Institute of Transportation Engineers (ITE), Washington, D.C., 2017

reports, could be conservative compared to actual local data. The current traffic counts in Devens confirm this.

Based on the Devens real estate information provided by the MassDevelopment Real Estate Office, vehicle-trips were generated for each existing development. Trip generation information for existing uses is provided in the Appendix. As previously discussed, driveway turning movement counts were conducted at 17 business driveways throughout Devens. The total entering and exiting volumes were calculated for both the morning and afternoon peak hours. These volumes were then compared with projections based on ITE trip generation rates and equations. Most of these rates and equations are based on building size in square feet; however others utilize variables such as number of hotel rooms or employees. Table 5-2 provides existing driveway counts in addition to projections based on rates and equations from the ITE Manual.

Table 5-2 Devens Driveway Trip Generation Comparison

Driveway Turning Movement Counts	AM Peak Hour			PM Peak Hour		
	Existing	ITE Projection	Difference	Existing	ITE Projection	Difference
D-1 American Superconductor - 64 Jackson Road	12	53	-41	14	57	-43
D-2 Anheuser Busch – 235 Barnum Road	9	28	-19	10	29	-19
D-3 FBOP - Federal Medical Facility	112	226	-114	88	91	-3
D-4 Quiet Logistics - 66 Saratoga Boulevard	28	130	-102	25	139	-114
D-5 Job Corps - MacArthur Avenue	36	171	-135	32	171	-139
D-9 Sonoco – 18 Independence Boulevard	123	201	-78	48	217	-169
D-10 Southern Container - 51 Independence Boulevard	11	134	-123	33	145	-112
D-11 Xinetics - 115 Jackson Road	14	53	-39	11	40	-29
D-12 Army Enclave at Quebec Street and 10th Mountain Division Road	176	86	176	128	86	128
D-13 Devens Common – Ryans Way	74	177	-103	48	203	-155
D-14 Devens Common – Andrews Parkway	253	559	-306	172	530	-358
D-15 Bristol-Meyer Squibb – 38 Jackson Road	145	248	-103	195	268	-73
D-16 Evergreen Solar – 112 Barnum Road	40	248	-208	24	268	-244
D-17 Army Enclave at Lovell Road	68	42	+26	48	42	+6
D-18 Systems H2O – 139 Barnum Road	6	84	-78	2	71	-69
D-19 National Distribution Center at Independence Drive	22	176	-154	12	104	-92
D-20 Devens Recycling Center at Independence Drive	32	76	-44	13	55	-42
Total	1161	2692	-1445	903	2516	-1527

The results of this comparison indicate that developments in Devens are generating traffic at rates well below those published by ITE, which is consistent with previous 5-Year Traffic Monitoring Reports. As Table 5-2 indicates, these trips are 38 to 47 percent lower on a peak hour basis. For this

study, trip generation rates for future expansions and planned developments will be based on rates provided in the ITE Manual.

5.4 Build-out Projections

In previous monitoring reports, two development scenarios were analyzed as part of the build-out analysis: 8.5 million square feet threshold and 59,625 daily trips. However, since the 8.5 million square foot threshold has been lifted as a criteria per the 2008 Notice of Project Change with MEPA, only the 59,625 daily trip threshold was analyzed for this report. In order to evaluate conditions under this scenario, potential development and traffic volumes were projected out to the 59,625 daily vehicle-trip threshold (Figure 5-1 and Figure 5- 2). It is noted that as of the most recent NPC, the 59,625 vehicle-trip limit has been removed; however, it has been included in this report for comparison with previous reports.

The Year 2021 total average weekday traffic (AWDT) at the Devens Gates is 30,690 vehicle-trips. To account for the fact that 33 percent of this traffic is made up of cut-through trips, this number was adjusted to 20,562 vehicle-trips in order to focus on only the traffic being generated by development within Devens. This volume serves as the baseline condition for projecting future weekday daily vehicle- trips.

Build-out projections are based on measured traffic volume data and the real estate data provided by MassDevelopment. Where insufficient information is available, the following assumptions were made:

1. Development will take place at a rate of 225,000 square feet per year, corresponding with a rate of 1,717 additional daily vehicle-trips per year.
2. Unplanned development will consist of similar land uses as current development.

Figure 5-1 Devens Build-out Summary by Year – Trips

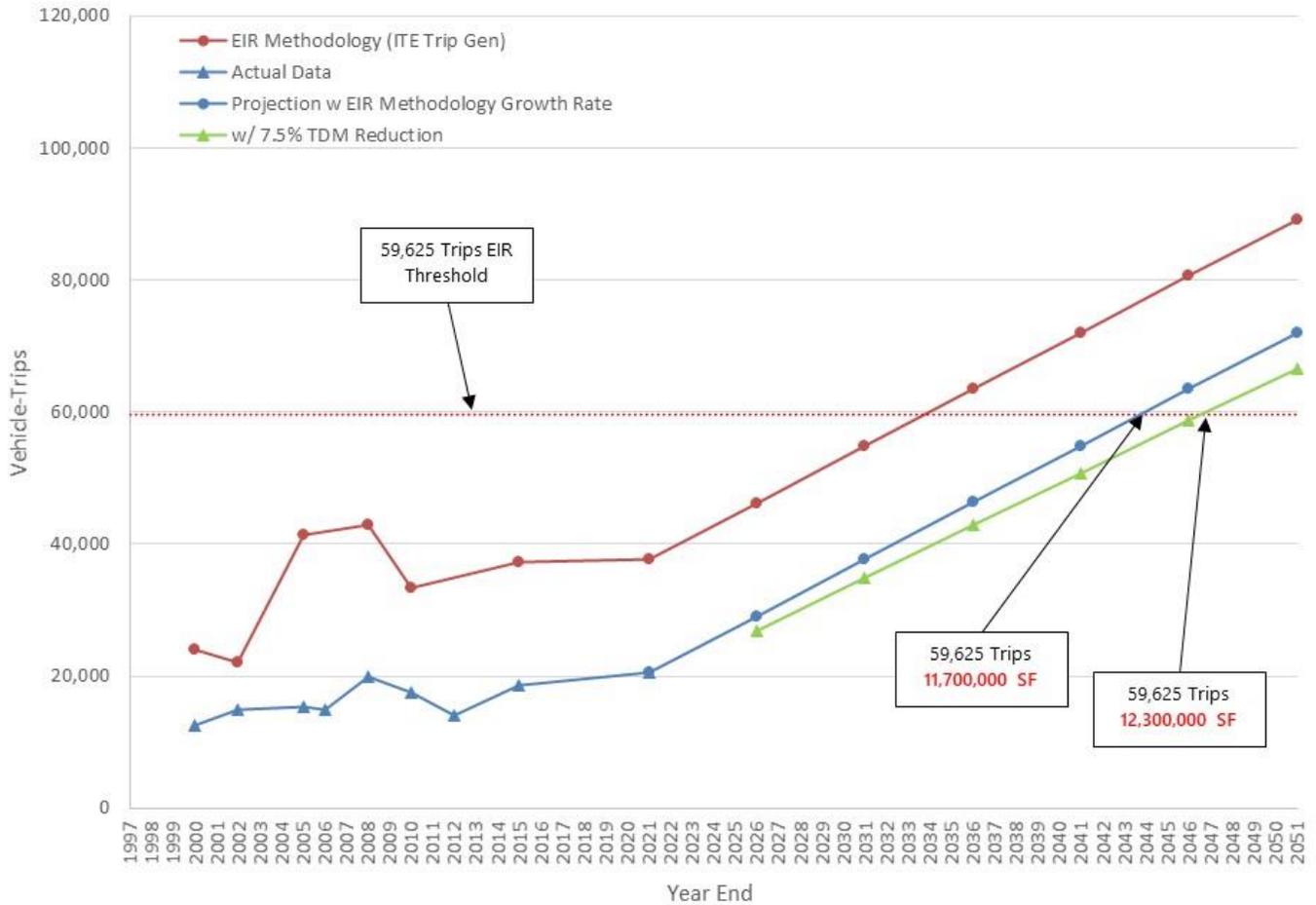


Figure 5-1 projects development over time and forecasts when daily vehicle-trip and development thresholds will be reached. The trend labeled “EIR Methodology” represents historic and current trip estimates based on ITE trip generation rates and is projected in a linear fashion after 2021. The trend labeled “Actual data” represents traffic volume counts collected in 2021 as well as previous traffic studies with a linear projection for years after 2021. Using this projection, it is estimated that the 59,625 vehicle-trip threshold (Scenario 1) will not be reached until 2044, assuming approximately 11,700,000 square feet of occupied development in Devens. The 2005 5-year Traffic Monitoring Report estimated that this threshold would be reached in 2014 with 7,360,854 square feet of development. This shows that Devens is currently generating significantly less traffic and being developed at a slower rate than projected.

The trend labeled “w/ 7.5% TDM” represents the projection of vehicle-trips at a linear rate with the previously discussed TDM measures in place. Using this rate, the 59,625 daily vehicle-trip threshold would not be reached until 2047. At that time, it is projected that there would be approximately 12,300,000 square feet of build-out assuming that development continues to take place at a rate of 225,000 square feet per year.

Figure 5-2 Devens Build-Out Summary by Square Feet – Trips

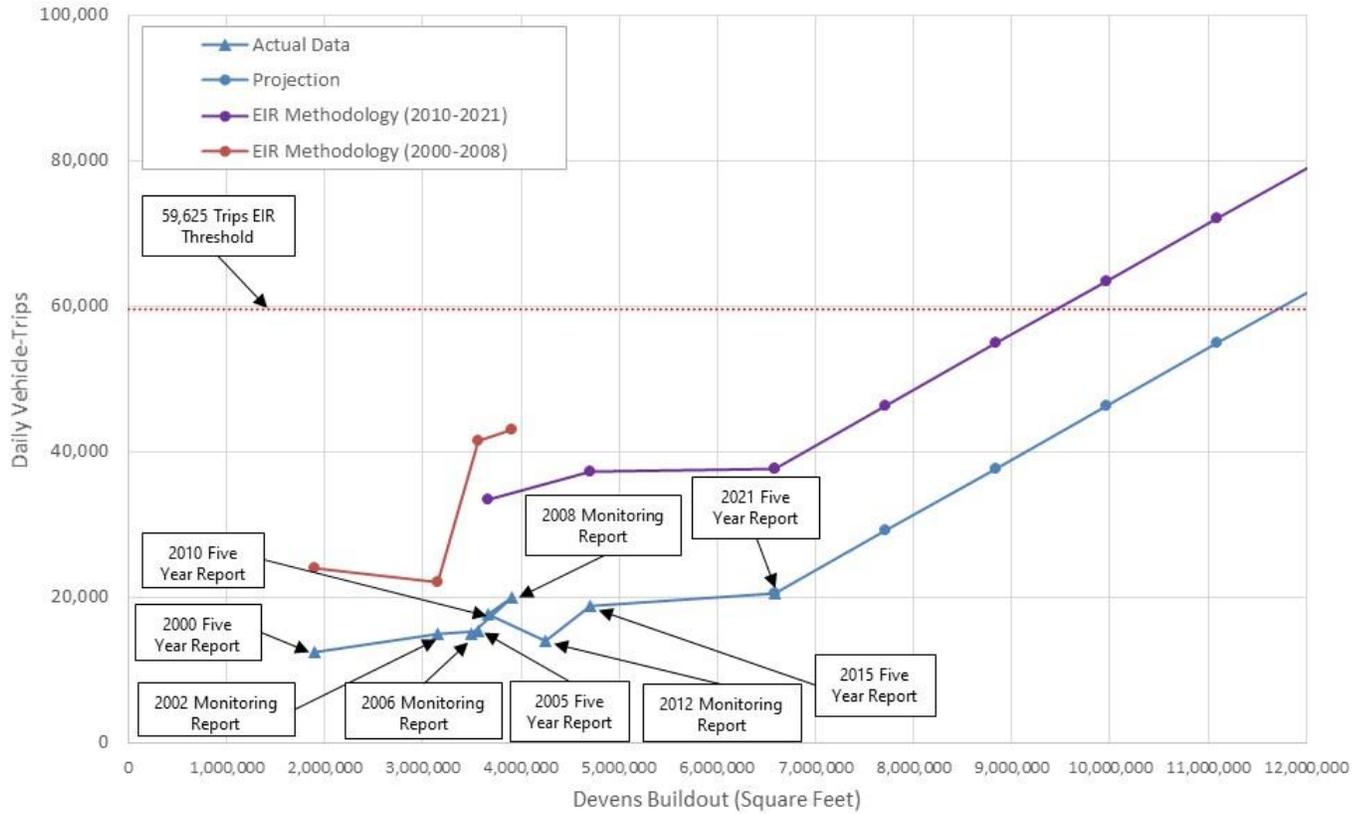


Figure 5-2 represents the relationship between square feet of occupied development in Devens and daily vehicle-trips. The trend labeled “EIR Methodology (2000-2008)” represents historic traffic volume estimates based on ITE trip generation rates during those years. The trend labeled “EIR Methodology (2010-2015)” represents traffic volume estimates based on ITE trip generation rates from the 2010 5-Year Traffic Monitoring Report forward. The reason for this discrepancy is that from 2000-2008, these estimates were based on more generic land uses. Starting with the 2010 report, trip generation was based on more specific land uses in order to produce a more accurate estimate. This accounts for the lower number of trips corresponding with equivalent build-out areas.

It should be noted that the 2021 EIR methodology utilized ITE 10th edition trip generation rates while the 2015 EIR methodology utilized ITE 9th edition trip generation rates. The ITE 10th edition trip generation rates are generally lower than ITE 9th edition trip generation rates, but reflect the current commuting and delivery trends in residential and commercial space and should be considered more reflective of traffic projections. Furthermore, many of the developments that have been occupied since 2015 have been relatively low generators of traffic when compared to the assumptions made in the original traffic projections. These include large warehousing developments and manufacturing facilities.

5.5 Traffic Analysis Zones

As part of the EIR, traffic analysis zones (TAZ) were established to analyze existing and future traffic conditions. These zones have been carried forward throughout all subsequent Traffic Monitoring Reports and will be utilized in this report for consistency and comparison purposes. Figure 5-3 depicts the boundaries of each TAZ. In order to establish a baseline condition, each existing development was assigned to a specific zone. Trip generation for each of the scenarios required assigning each planned development to a specific zone. A detailed breakdown of land use and area for each TAZ is provided in the Appendix.

AM and PM peak hour trips as well as daily trips were projected for three different scenarios. These trips were calculated using ITE trip generation rates and traffic volume counts at Devens gates. The three scenarios are as follows:

1. Existing Trips – Existing Methodology: existing buildings and occupied new construction. Trips calculated using 2021 traffic volume data.
2. Existing Trips – EIR Methodology: existing buildings and occupied new construction. Trip generation rates based on ITE Manual.
3. Future Trips – Scenario 1: build-out condition where 59,625 daily vehicle-trip limit is reached. Trip generation rates based on 2021 traffic volume data and ITE Manual.

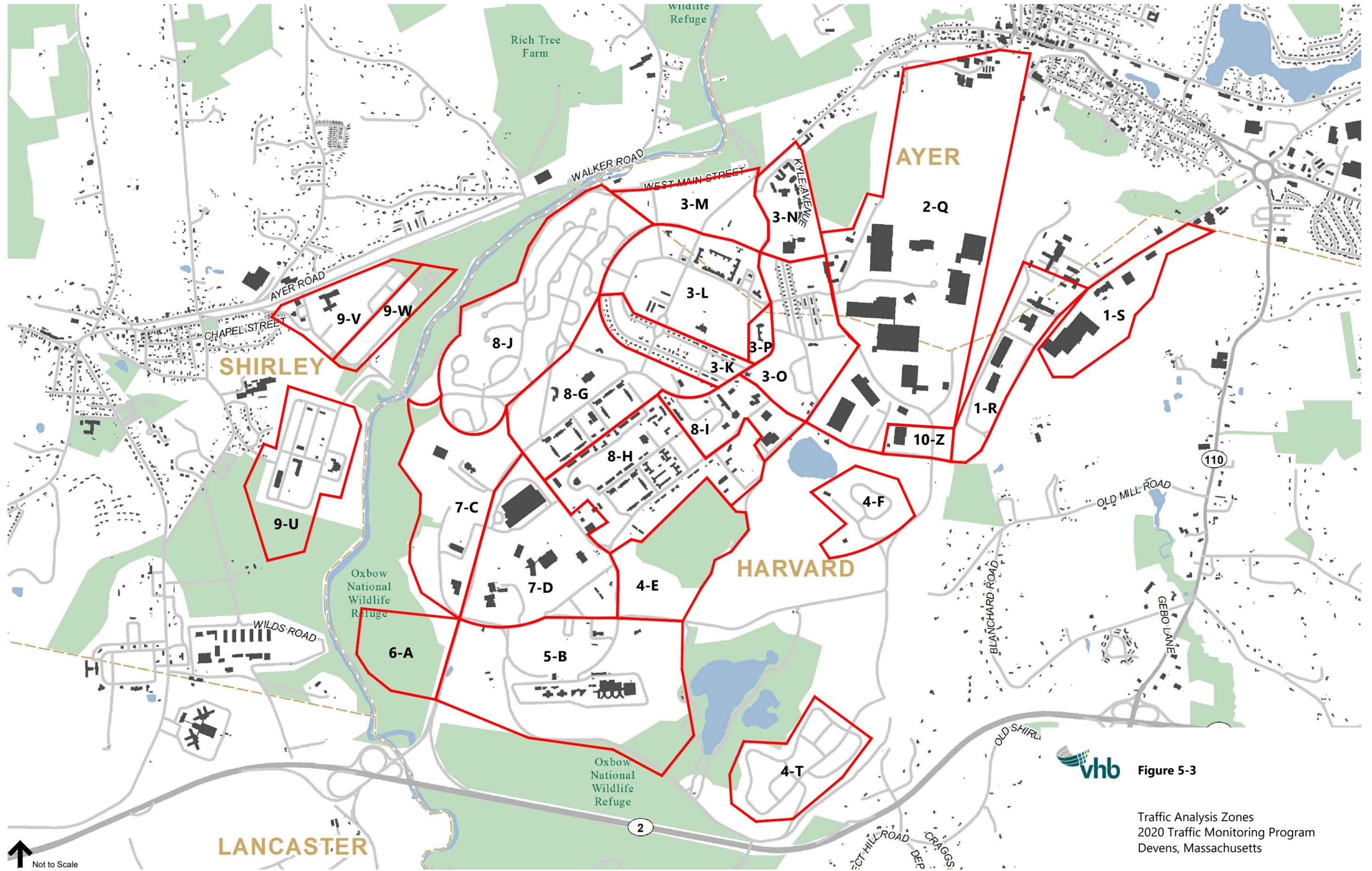


Figure 5-3

Traffic Analysis Zones
2020 Traffic Monitoring Program
Devens, Massachusetts



Not to Scale

Table 5-3 Trip Generation Summary by Scenario

	Existing Trips - Existing Methodology					Existing Trips - EIR Methodology				
	AM in	AM out	PM in	PM out	Daily	AM in	AM out	PM in	PM out	Daily
Zone 1	282	96	156	309	2,088	518	175	286	566	3,829
Zone 2	378	112	175	338	3,393	693	205	320	620	6,221
Zone 3	314	181	223	382	3,598	576	332	409	701	6,596
Zone 4	15	14	15	20	355	28	26	28	36	651
Zone 5	75	46	43	115	580	137	85	79	211	1,063
Zone 6										
Zone 7	387	146	209	356	2,908	709	268	383	653	5,331
Zone 8	495	253	301	547	7,107	908	463	552	1,003	13,029
Zone 9	49	43	41	41	533	91	79	75	75	977
Zone 10										
Zone 11										
Zone 12										
Total	1,996	891	1,162	2,108	20,562	3,659	1,633	2,131	3,865	37,697
	Future Trips - Scenario 1									
	AM in	AM out	PM in	PM out	Daily					
Zone 1	220	98	128	232	2,262					
Zone 2	600	268	349	633	6,175					
Zone 3	228	102	132	241	2,345					
Zone 4	194	87	112	205	1,998					
Zone 5										
Zone 6										
Zone 7	601	268	349	635	6,187					
Zone 8	245	110	142	258	2,517					
Zone 9	43	20	25	46	444					
Zone 10	0	0	0	0	0					
Zone 11	0	0	0	0	0					
Zone 12	0	0	0	0	0					
Total	2,130	952	1,238	2,250	21,928					
				Cumulative	59,625					

5.6 Build-out Analysis/Trip Generation Summary

Using ITE trip generation rates, it is estimated that existing Devens developments would generate 37,697 vehicle-trips on weekdays. After being adjusted for cut-through trips, the actual traffic counts at the gates indicate an average weekday daily traffic volume of 20,562 vehicle-trips in 2021. This means that Devens is currently generating traffic at a rate of 54% of what ITE projects a comparable development would generate. In 2015, results indicated that Devens was generating traffic at a rate of 50% of what a comparable development would generate. Table 5-5 shows an average trip generation rate of 3.12 trips/KSF in 2021 compared to 3.98 trips/KSF in 2015. ITE estimates that a comparable development would generate 5.73 trips/KSF when 6,584,621 square feet of build-out is occupied.

Table 5-4 Trip Generation Summary

	Year 2015	Year 2021	Difference
Occupied Development	4,708,099 SF	6,584,621 SF	+1,876,522 SF
Total Daily Traffic Counts at Devens Gates	28,360 vehicle trips	30,690 vehicle trips	+2330 vehicle trips
Daily Gate Counts Adjusted for Cut-Thru Traffic	18,718 vehicle trips	20,562 vehicle trips	+1,844 vehicle trips
Daily Vehicle-trips per 1,000 SF Development	3.98 trips/KSF	3.12 trips/KSF	-0.86 trips/KSF
ITE Estimated Daily Devens Trips	37,207 vehicle trips	37,697 vehicle trips	+490 vehicle trips
ITE Estimated Daily Trips per 1,000 SF	7.90 trips/KSF	5.73 trips/KSF	-2.17 trips/KSF

5.7 Trip Distribution

After trip generation was established, forecasted trips generated within the study area were distributed to determine where people living and working in Devens travel to and from. Trip distribution patterns consist of trips leaving the region, trips entering the region, and trips that travel within the region.

Separate distributions were produced for those who live in Devens and those who work in Devens.

Devens employee trip distribution was developed from the following sources:

- › 2021 Devens Business Employee Transportation Survey
- › 2012-2016 US Census Journey-to-Work Data

Devens resident trip distribution was developed from the following sources:

- › 2021 Devens Resident Transportation Survey
- › 2012-2016 US Census Journey-to-Work Data

Figure 5-4 shows the distribution of Devens employment trips through thirteen external gateways around Devens. Previous reports placed these gateways in locations that must be passed through in order to enter any of the Devens gates. Using 2012-2016 Journey-to-Work census data, trips from surrounding municipalities were assigned to the various gateways, and then these trips were aggregated in order to produce a percentage of trips traveling through each gateway. Gateway 8, Route 2 west of Route 70, continues to be the most utilized gateway, making up approximately 42% of total trips into Devens.

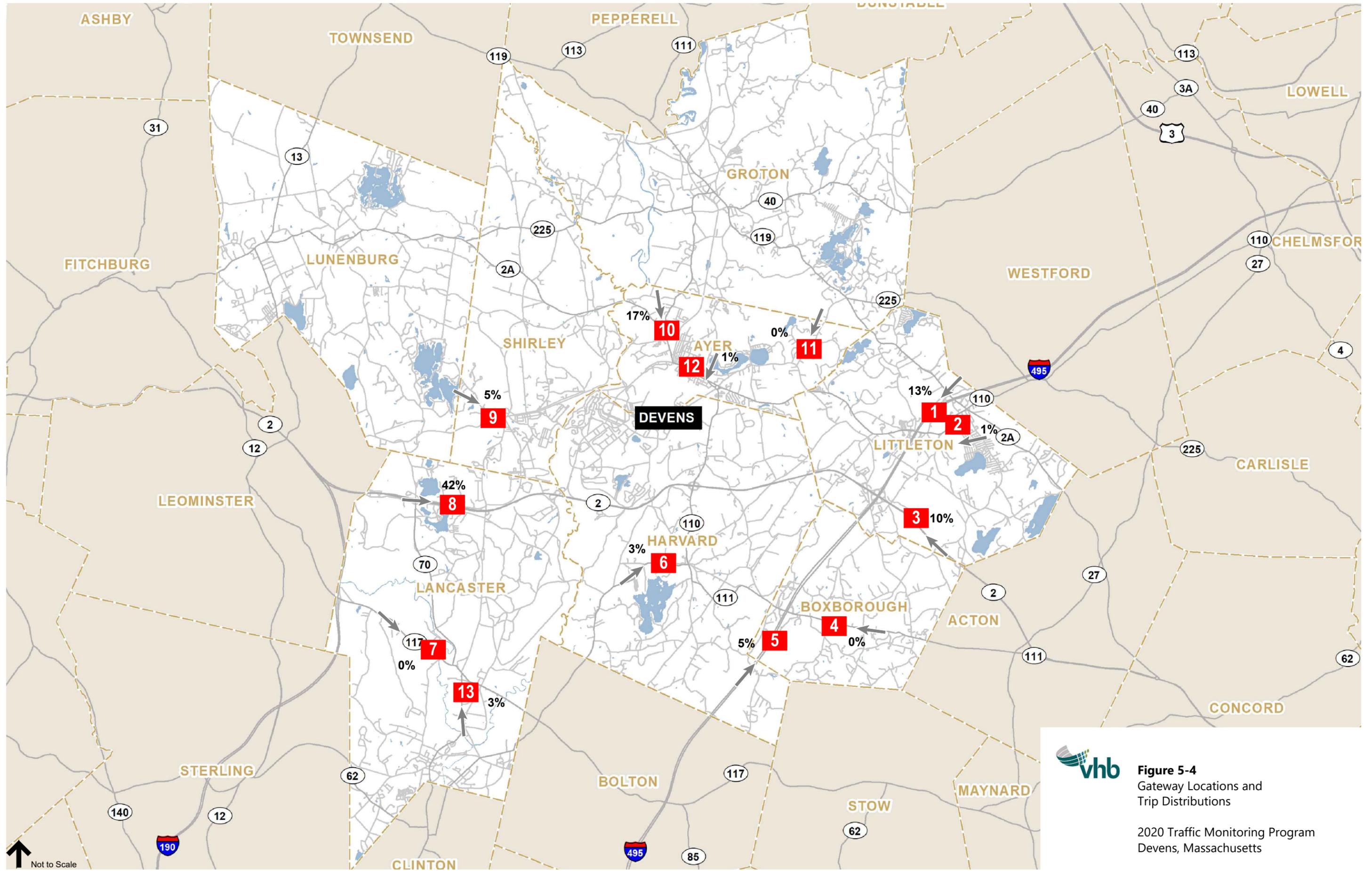


Figure 5-4
Gateway Locations and
Trip Distributions

2020 Traffic Monitoring Program
Devens, Massachusetts

5.8 Comparison with 1995 Final Environmental Impact Report

The 1995 FEIR projected traffic volumes twenty years into the future (2015). Tables 5-6 through 5-8 show comparisons between 1990 baseline volumes, 2021 projections using 1995 FEIR methodologies, and traffic volumes counted in 2021 for off-post roadways, Devens entrances, and Devens Roadways, respectively.

The 1995 FEIR did not project traffic volumes past 2015. The 1995 FEIR used a total background growth rate (prior to development growth) of 8.9% over 25 years. To be consistent with the 1995 FEIR, a growth rate (1.7%) was applied to the 2015 FEIR projected baseline volumes to create the 2021 levels. The 2021 projected volumes were then compared with the 2021 actual traffic volumes.

Off-post roadways on which traffic volumes were counted in 1990 are currently experiencing 55% of projected traffic volumes in the morning peak hour and 59% in the evening peak hour. Devens entrances are experiencing 32% of projected traffic volumes in the morning peak hour and 45% in the evening peak hour. Devens roadways are experiencing traffic volumes at rates of 26% and 29% of projections during the morning and evening peak hours, respectively.

Compared with measured 1990 baseline traffic volumes, off-post roadways are currently experiencing 3% (320 vehicles) more traffic in the morning peak hour and 5% (486 vehicles) in the evening peak hour. This is in contrast to the 2015 counts when external locations experienced a drop in traffic volumes. In 2021, traffic volumes at the Devens gates are also higher than in 1990. In the morning and evening peak hours, traffic counts are currently 49% (+660 vehicles) and 53% (+745 vehicles) higher, respectively, than they were 25 years ago. Because traffic counts were not performed at two of the three internal intersections in 1990, volumes at these intersections cannot be compared.

Table 5-5 Off-post Roadways FEIR Comparison

Location	Direction	1990 Baseline Volume	FEIR 2021	2021	Difference
			Projection	Counted Volume	
Morning Peak Hour					
Route 2					
West of Jackson Road	EB	3,025	5,872	3,205	-2,667
East of Routes 110/111	EB	2,670	3,340	2,855	-485
Jackson Road Ramps					
From Route 2 West		440	2,964	766	-2,198
From Route 2 East		85	1,386	438	-948
Routes 110/111					
South of Carlton Rotary	NB	445	709	549	-160
South of Carlton Rotary	SB	730	872	629	-243
Routes 2A/110 East of Carlton Rotary	WB	660	817	446	-371
McPherson Road North of Verbeck Gate	SB	131	490	107	-383
Routes 111/2A					
Park St. North of Main St., Ayer	SB	592	1,126	448	-678
West of Carlton Rotary	EB	1,100	1,080	756	-324
Total		9,878	18,657	10,199	-8,458
Evening Peak Hour					
Route 2					
West of Jackson Road	WB	2,910	5,286	3,339	-1,947
East of Routes 110/111	WB	2,535	3,573	2,869	-704
Jackson Road Ramps					
From Route 2 West		430	2,510	343	-2,167
From Route 2 East		100	1,180	185	-995
Routes 110/111					
South of Carlton Rotary	NB	815	1,022	721	-301
South of Carlton Rotary	SB	450	674	601	-73
Routes 2A/110 East of Carlton Rotary	EB	815	911	664	-247
McPherson Road North of Verbeck Gate	NB	106	482	88	-394
Routes 111/2A					
Park St. North of Main St., Ayer	NB	621	1,081	770	-311
West of Carlton Rotary	WB	1,245	1,174	933	-241
Total		10,027	17,893	10,513	-7,380

Table 5-6 Fort Devens Entrances FEIR Comparison

Location	Direction	1990 Baseline	FEIR 2021 Projection	2021 Counted Volume	Difference
Morning Peak Hour					
Jackson Gate	NB	525	4,341	1205	-3136
Barnum Gate	SB	325	1,058	250	-808
Verbeck Gate	SB	495	824	345	-479
Shirley Gate	EB	n/a	84	140	56
Grant Gate	SB	n/a	n/a	65	n/a
Total		1,345	6,307	2,005	-4367
Evening Peak Hour					
Jackson Gate	SB	530	3,277	1170	-2107
Barnum Gate	NB	265	782	310	-472
Verbeck Gate	NB	605	668	350	-318
Shirley Gate	WB	n/a	64	200	136
Grant Gate	SB	n/a	n/a	115	n/a
Total		1,400	4,791	2,145	-4367

Table 5-7 Fort Devens Roadways FEIR Comparison

Location	Direction	1990 Baseline	FEIR 2021 Projection	2021 Counted Volume	Difference
Morning Peak Hour					
Jackson Road					
North of Patton Road	NB	n/a	2,686	696	-1990
Patton Road					
East of Jackson Road	EB	n/a	1,699	329	-1370
Barnum Road					
At Railroad Bridge	SB	<u>253</u>	<u>528</u>	<u>257</u>	<u>-271</u>
Total		253	4,914	1282	-3631
Evening Peak Hour					
Jackson Road					
North of Patton Road	SB	n/a	2,217	597	-1620
Patton Road					
East of Jackson Road	WB	n/a	1,525	332	-1193
Barnum Road					
At Railroad Bridge	NB	<u>259</u>	<u>481</u>	<u>277</u>	<u>-204</u>
Total		259	4,224	1206	-3017



6

Traffic Model

6.1 Overview

A Devens traffic model was created for 2021 conditions in order to obtain information about current conditions and forecast future traffic volumes. The model was created using PTV Vistro, a successor to the Traffix software used for analysis in the previous Traffic Monitoring Reports. It is made up of a network of study area roadways and intersections, traffic volumes, and TAZs. The model utilizes the four steps of the transportation planning process:

- › Trip generation
- › Trip distribution
- › Mode Split
- › Trip Assignment

The model includes 2021 morning and afternoon peak hour baseline traffic volumes, along with traffic volume projections for the following conditions as discussed in Section 5.4:

- › No-Build (year 2044)
- › Build Scenario 1 (year 2044)

6.2 Traffic Model Development

A traffic model was created using PTV Vistro software to model current 2021 conditions. The 2021 traffic volumes were input in order to establish a baseline condition. Traffic generated from the Scenario 1 build-out scenario, as discussed in Section 5, were input to forecast future traffic volumes. Along with current and future traffic volumes, trip distributions through each of the thirteen gateways were added to the model.

6.2.1 Intersection Volume Data

Data from turning movement counts collected in 2021 (see Section 2) were entered into the model to represent current 2021 traffic conditions. These data include traffic volumes, heavy vehicle percentages, and peak hour factors for both the morning and evening peak hours. Figures 6-1 through 6-4 show turning movement volumes for the morning and evening peak hours under the conditions of each build-out scenario.

6.2.2 Roadway Network

The model roadway network created in PTV Vistro is made up of roadways and intersections both internal and external to Devens. The network includes roadway geometry along with lane configurations.

6.2.3 Traffic Analysis Zones

The twelve TAZs established in previous reports and retained for consistency were created within the model. Each TAZ was defined by its geographical location and current and future traffic volumes. The TAZs reflect 2021 baseline volumes as well as the traffic volume projections discussed in Section 5.

6.2.4 Trip Distribution

The distribution entered into the model assumes that future travel patterns will be consistent with existing traffic patterns as established in Section 5. The thirteen gateway locations from previous 5-Year Traffic Monitoring Reports have been retained, but gateway utilization has been updated to reflect 2012-2016 US Census Journey-to-Work data for employees working in Devens.

6.2.5 Background Traffic Growth

Background traffic growth is typically a function of future land development, increased economic activity, and changes in travel patterns external to Devens. Because of this, planned and proposed developments external to Devens were evaluated to determine any possible effects they may have on future traffic volumes. As discussed in Section 2, the annual traffic growth rate of 2.0%, as recommended by MRPC was used for the traffic model.

6.2.6 Project Traffic

For this study, project traffic includes the additional trips generated by future developments internal to Devens. The additional trips generated in each TAZ due to projected Devens build-out (Section 5) were entered into the traffic model for the Scenario 1 build out.

6.2.7 Traffic Assignment

Traffic generated by future Devens build-out was assigned routes through the roadway network based on the origin and destination of each of these trips, in addition to data from the Devens Resident and Employee Transportation Survey.

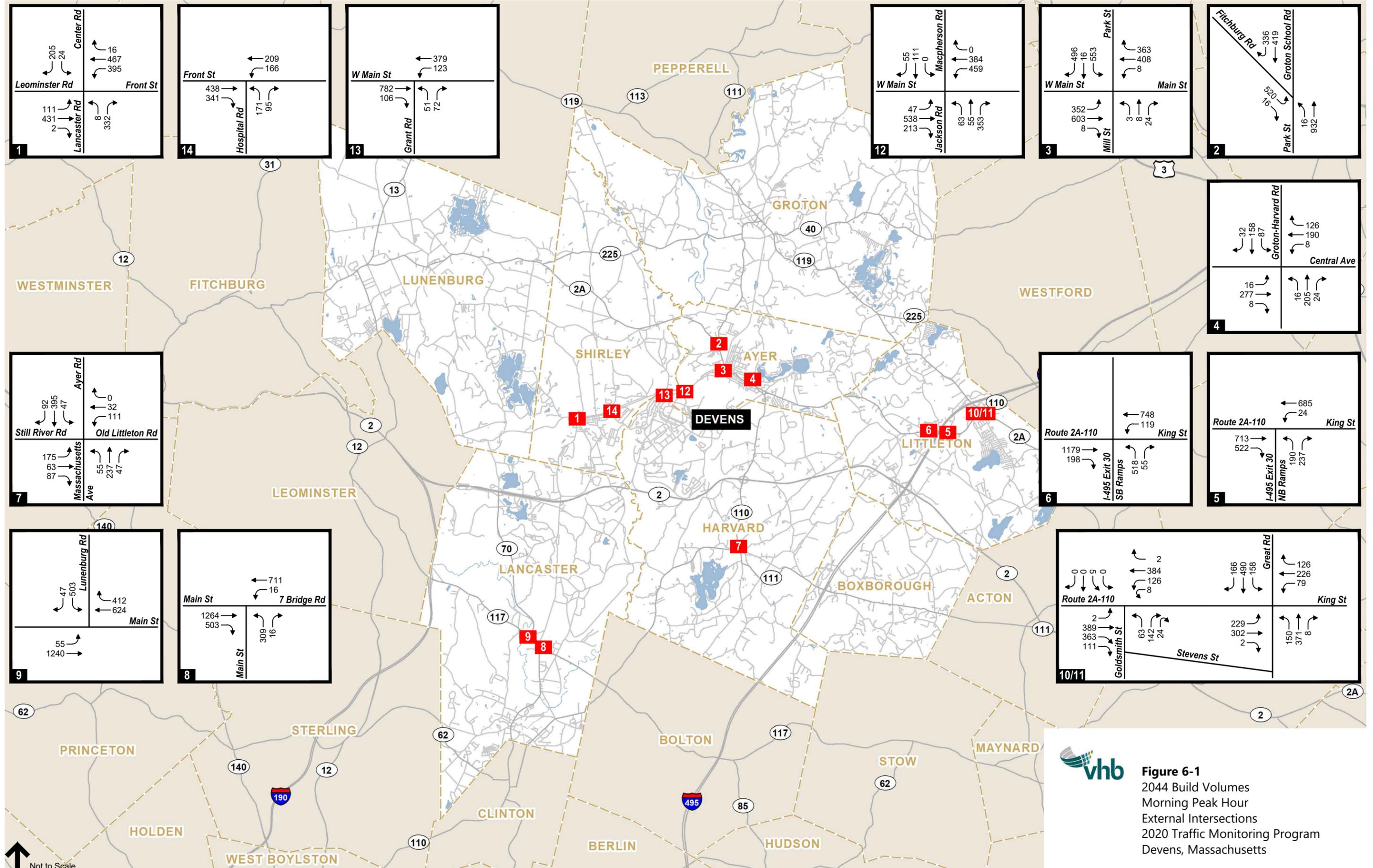
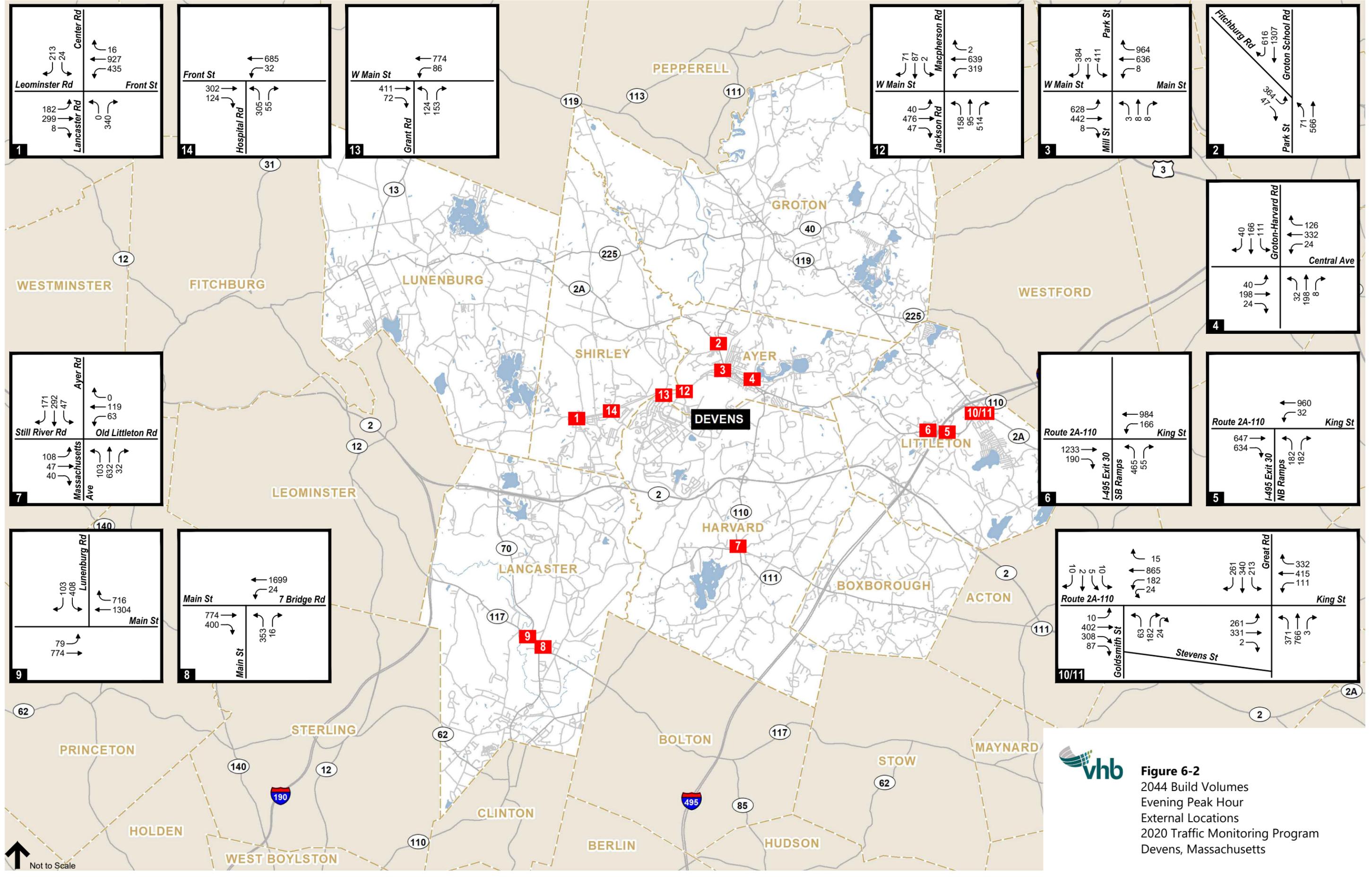


Figure 6-1
 2044 Build Volumes
 Morning Peak Hour
 External Intersections
 2020 Traffic Monitoring Program
 Devens, Massachusetts

↑
Not to Scale



vhb Figure 6-2
 2044 Build Volumes
 Evening Peak Hour
 External Locations
 2020 Traffic Monitoring Program
 Devens, Massachusetts

6.2.8 Transportation Mode Split

Modal split was determined by results of the transportation survey in addition to MBTA commuter rail ridership data. The transportation survey indicated that 81% of Devens residents and employees utilize automobiles to get to work in 2021. 1% of those surveyed carpool, 1% walk, 3% use transit, and no responses indicated using bicycles as the main mode. As noted previously, the mode share data gathered in 2021 is heavily influenced by the impact of COVID-19 and should not be considered representative of typical conditions. Interestingly, the MBTA commuter rail data shows an 42% decrease in boardings at Devens area stations between the years of 2013 and 2018 (which would not have been influenced by the COVID-19 pandemic). Some of the decrease could be the result of a change in commuter rail scheduling that the MBTA implemented, specifically reverse commute activity to and from the Boston-core area. Similarly, the increase in available private-sector shuttle services to and from Cambridge and Alewife areas may have also influenced these volumes as well. For the purposes of developing the model, all trips were assumed to be made by vehicle in order to present a conservative assessment of potential traffic volumes on area roadways.



7

Model Results Summary

7.1 Overview

Intersection capacity analysis has been performed to determine traffic operations under existing and future conditions for each scenario. Capacity analyses provide a standardized indication of the ability of an intersection to accommodate the traffic demands placed upon it. The primary results of capacity analyses are intersection delay (by approach and overall delay) and levels of service.

The concept of Level of Service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists. A Level of Service definition generally describes operational conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. In doing so, Level of Service provides an index to quality of traffic flow.

Six Levels of Service are defined for each type of facility. They are given letter designations, from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. Since the Level of Service of a traffic facility is a function of traffic flows placed upon it, an intersection may operate at a wide range of Levels of Service, depending on time of day, day of week, or period of year.

The average delay per vehicle approaching an intersection is used to quantify the Level of Service at a particular intersection. LOS designations for signalized and unsignalized intersections are defined in Table 7-1. Average delay measures the mean stopped delay experienced by vehicles entering an intersection during the design period. Average delay is measured for each individual turning movement that must yield the right of way, and for the intersection as a whole, if signalized (including through vehicles that experience no delay). The volume to capacity (v/c) ratio is also reported for each of the movements.

Table 7-1 Level of Service Designations for Unsignalized and Signalized Intersections

Category	Unsignalized Intersection Delay	
	(sec/veh)	Signalized Intersection Delay (sec/veh)
LOS A	0.0 – 10.0	0.0 – 10.0
LOS B	10.1 – 15.0	10.1 – 20.0
LOS C	15.1 – 25.0	20.1 – 35.0
LOS D	25.1 – 35.0	35.1 – 55.0
LOS E	35.1 – 50.0	55.1 – 80.0
LOS F	50.1 +	80.1 +

Source: *Transportation Research Board, Highway Capacity Manual 6*, National Research Council, 2016.

7.2 Existing (2021) Conditions

Capacity analysis for Existing 2021 Conditions has been performed in order to serve as a baseline for this study (Tables 7-2 and 7-3). Generally, the 2021 levels of service are similar to those measured in the 2015 Traffic Monitoring Report. Notable levels of service changes since 2015 are as follows:

- › **Location 1 (Front Street/Lancaster Street/Leominster Road/Center Road):** AM and PM peak hour operations for the northbound and southbound approaches, Lancaster Road and Center Road, respectively, have improved. It should be noted that this is likely due to the way the intersection was analyzed as opposed to any marked volume shifts. Under 2021 Existing Conditions, this intersection was modeled as two separate intersections, each with its minor street approach under STOP-sign control. This is due to the large offset (>200 feet) between the two minor streets and the belief that these intersections most likely function as separate intersections. To remain consistent with the 2015 report, the two intersections were presented as a single intersection.
- › **Location 3 (Park Street/Main Street/West Main Street):** Geometry modifications were completed at this location since 2015. Exclusive right-turn lanes were provided for the westbound and southbound approaches. PM peak hour operations for the northbound (Park Street) and eastbound approaches (West Main Street) have degraded since 2015. The addition of the right-turn lanes on these approaches allows for through traffic volumes to enter the intersection without waiting behind right-turning vehicles.
- › **Location 5 (Route 2A-110/I-495 Exit 30 NB Ramps):** AM and PM peak hour operations for the northbound approach (exiting I-495 Ramps) have improved due to an overall decrease in northbound traffic volumes.
- › **Location 7 (Route 110-111 (Ayer Road)/Still River Road):** PM peak hour operations for the northbound and southbound Ayer Road left-turns have degraded due to an overall increase in northbound and southbound approach volumes.
- › **Location 10 (Route 110 (King Street)/Route 119 (Great Road):** AM Peak operations were generally the same with improvements seen for the King Street northbound through/right-turn movement, King Street southbound left-turn movement, and westbound Great Road through/right-turn movement. These improvements are due to a decrease in traffic volumes for these approaches since 2015. The PM peak hour also saw improvements for the King Street northbound through/right-turn movement and the King Street southbound left-turn movement. The most notable change during the PM peak hour was a degradation on the Great Road westbound left-

- turn movement due to an increase in the Great Road eastbound opposing through/right-turn traffic volume.
- › **Location 11 (Route 2A-110 (King Street)/Goldsmith Street):** AM and PM peak hour operations for the northbound approach (Goldsmith Street) have improved due to a reduction in northbound traffic volumes.
 - › **Location 12 (Verbeck Gate/MacPherson Road/West Main Street):** AM peak hour operations for the northbound approach (MacPherson Road) have degraded due to an increase in traffic volumes for all northbound movements.
 - › **Location 13 (Grant Road/West Main Street):** PM peak hour operations for the northbound approach (Grant Road) have improved due to decreased traffic volumes on this approach.
 - › **Location 14 (Hospital Road/Front Street):** AM and PM peak hour operations for the northbound approach (Hospital Road) have degraded due to increased traffic volumes on this approach.

Table 7-2 Intersection Capacity Analysis Level of Service Summary – 1996 to 2021 AM Peak Hour

	1996		2000		2006		2010		2015		2021 COVID Adj.	
	LOS	Delay	LOS	Delay								
UNSIGNALIZED INTERSECTIONS												
Location 1 - Front/Lancaster/Leominster/Center												
All movements from Lancaster Northbound	B	6	D	26	B	13	C	19	C	16	B	13
All movements from Center Southbound	B	10	E	48	C	23	F	52	F	57	B	13
Left turn from Leominster Eastbound	A	2	A	8	A	7	A	8	A	8	A	8
Left turn from Front Street Westbound	A	3	A	8	A	8	A	8	A	8	A	9
Location 2 - Park/Fitchburg/Groton School												
Left/Right from Groton School Southbound (stop control)	F	>120	F	102	C	20	F	>120	F	>120	F	59
Left turn from Fitchburg Road Eastbound	A	3	A	8	A	9	A	8	A	8	A	8
Location 3 - Park/Main/West Main												
All movements from Park (Mill) Street Northbound	B	9	n/a	n/a	C	15	C	20	C	18	C	20
All movements from Park Street Southbound	F	>120	F	>120								
Left turn from West Main Street Eastbound	A	4	A	9	A	9	A	9	A	8	A	9
Left turn from Main Street Westbound	A	3	n/a	n/a	A	8	A	8	A	8	A	8
Location 4 - Groton-Harvard/Central												
All movements from Groton-Harvard Northbound	B	8	C	18	B	13	F	55	C	15	C	17
All movements from Groton-Harvard Southbound	C	12	F	80	C	20	C	18	C	24	C	20
Left turn from Central Eastbound	A	3	A	8	A	8	A	8	A	8	A	8
Left turn from Central Westbound	A	3	A	8	A	8	A	8	A	8	A	8
Location 5 - Route 2A-110/ I-495 Northbound Ramps												
Left turn from Ramps Northbound	C	16	E	106	C	22	E	35	F	83	F	79
Right turn from Ramps Northbound	C	15	F	n/a	B	13	C	20	D	27	B	14
Left turn from Route 2A-110 Westbound	B	5	B	11	A	9	A	10	B	10	A	9
Location 6 - Route 2A-110/I-495 Southbound Ramps*												
Left turn from Ramps Northbound	F	>120	F	>120								
Right turn from Ramps Northbound	B	6	C	21	B	14	C	15	C	18	B	15
All movements from Murray Park Southbound	E	35	F	>120	F	76	F	>120	F	>120	n/a	n/a
Left turn from Route 2A-110 Eastbound	A	3	A	8	A	8	A	8	A	8	n/a	n/a
Left turn from Route 2A-110 Westbound	B	6	B	12	B	10	B	11	B	12	B	11
Location 7 - Route 110-111(Ayer Road)/Still River												
All movements from Still River Road Eastbound	C	11	E	47	C	20	B	13	C	15	C	15
All movements from Still River Road Westbound	C	12	F	>120	D	27	B	12	B	13	C	15
All movements from Ayer Road Northbound	A	3	A	8	A	8	C	17	D	27	C	20
All movements from Ayer Road Southbound	A	3	A	8	A	8	C	22	D	34	D	33

Table 7-2 Intersection Capacity Analysis Level of Service Summary – 1996 to 2021 AM Peak Hour (Continued)

	1996		2000		2006		2010		2015		2021 COVID Adj.	
	LOS	Delay	LOS	Delay								
UNSIGNALIZED INTERSECTIONS												
Location 8 - Route 70/Route 117 (Seven Bridge Rd)*												
Left turn from Seven Bridge Rd (Rt.117) Eastbound	F	88	A	< 8	n/a	n/a	A	3	A	0	n/a	n/a
Left turn from Seven Bridge Road Westbound	B	10	B	11	B	11	B	11	B	12	B	11
All movements from Route 70 Northbound	B	7	F	>120	F	>120	F	>120	F	>120	F	>120
All movements from Route 70 Southbound	n/a	n/a	E	43	D	26	n/a	n/a	n/a	n/a	n/a	n/a
Location 9 - Route 70 (Lunenburg Road) Route 117												
All movements from Lunenburg Road Southbound	F	>120	F	>120								
Left turn from Route 117 Eastbound	A	4	A	9	A	8	A	9	A	9	A	9
Location 11 - Route 2A-110/Goldsmith												
All movements from Goldsmith Northbound	F	>120	F	117	C	20	C	20	D	34	C	19
Left turn from Route 2A-110 Westbound	B	9	B	12	A	10	A	9	B	10	A	9
Location 12 - Verbeck Gate/MacPherson/ West Main												
All movements from MacPherson Northbound	B	7	C	20	E	36	D	31	D	32	F	58
All movements from MacPherson Southbound	B	6	A	< 5	D	35	E	40	E	44	E	42
Left turn from West Main Eastbound			A	< 5	A	8	A	8	A	8	A	8
Left turn from West Main Westbound	A	4	A	9	A	9	A	9	A	9	A	9
Location 13 - Grant/West Main												
All movements from Grant Road Northbound					B	12	B	13	C	18	C	17
Left turn from Front Street (West Main St) Westbound					A	8	A	8	A	9	A	9
Location 14 - Hospital/Front												
All movements from Hospital Road Northbound					B	12	C	16	C	25	E	46
Left turn from Front Street Westbound					A	8	A	9	A	9	A	4
SIGNALIZED INTERSECTIONS												
Location 10 – Route110 (King St)/ Route 119 (Great Road) *												
Left turn from King St Northbound (or Eastbound)	F	66	F	>120	B	17	D	43	C	27	C	25
Through/Right from King St Northbound (or Eastbound)	C	17			B	16	D	43	C	27	B	16
Left turn from King St Southbound (or Westbound)	D	38			B	14	C	33	D	36	C	20
Through/Right from King St Southbound (or Westbound)	B	13			B	15	C	33	B	18	B	16
Left turn from Great Road Westbound (or Northbound)	B	6			A	6	B	14	D	50	D	35
Through/Right from Great Road Westbound (or Northbound)	B	7			C	28	B	17	D	36	B	18
Left turn from Great Road Eastbound (or Southbound)	A	4			A	8	A	10	D	43	D	35
Through/Right from Great Road Eastbound (or Southbound)											C	24

Note: (*) Location 6 southbound and Location 8 southbound approaches were not counted in 2021. Location 10 was a signalized intersection as of 2006.

Table 7-3 Intersection Capacity Analysis Level of Service Summary – 1996 to 2021 PM Peak Hour

	1996		2000		2006		2010		2015		2021 COVID Adj.	
	LOS	Delay	LOS	Delay								
UN SIGNALIZED INTERSECTIONS												
Location 1 - Front/Lancaster/Leominster/Center												
All movements from Lancaster Northbound	B	9	C	23	C	16	C	24	D	30	B	11
All movements from Center Southbound	C	12	C	24	C	23	E	38	E	39	C	19
Left turn from Leominster Eastbound	A	3	A	8	A	8	A	8	A	8	A	9
Left turn from Front Street Westbound	A	3	A	8	A	8	A	8	A	8	A	8
Location 2 - Park/Fitchburg/Groton School												
Left/Right from Groton School Southbound (stop control)	F	>120	F	>120	F	54	F	>120	F	70	F	>120
Left turn from Fitchburg Road Eastbound	B	6	B	11	A	10	B	10	B	10	A	1
Location 3 - Park/Main/West Main												
All movements from Park (Mill) Street Northbound	C	10			D	33	D	26	C	24	F	62
All movements from Park Street Southbound	F	>120	F	>120								
Left turn from West Main Street Eastbound	B	8	B	10	B	13	B	11	A	9	B	13
Left turn from Main Street Westbound	A	3			A	8	A	8	A	7	A	8
Location 4 - Groton-Harvard/Central												
All movements from Groton-Harvard Northbound	C	10	D	34	C	23	D	26	C	19	C	20
All movements from Groton-Harvard Southbound	B	10	D	34	C	24	C	18	C	19	D	30
Left turn from Central Eastbound	A	3	A	8	A	8	A	8	A	8	A	8
Left turn from Central Westbound	A	2	A	8	A	8	A	8	A	8	A	8
Location 5 - Route 2A-110/I-495 Northbound Ramps												
Left turn from Ramps Northbound	F	73	F	94	F	>120	F	59	F	55	E	43
Right turn from Ramps Northbound	B	6	C	16	C	20	B	14	B	13	B	12
Left turn from Route 2A-110 Westbound	A	4	A	9	A	9	A	9	A	9	A	9
Location 6 - Route 2A-110/I-495 Southbound Ramps												
Left turn from Ramps Northbound	F	>120	F	>120								
Right turn from Ramps Northbound	B	5	B	14	B	13	B	12	B	13	B	14
All movements from Murray Park Southbound	F	49	F	78	F	>120	F	82	F	>120	n/a	n/a
Left turn from Route 2A-110 Eastbound	A	5	A	9	A	10	A	9	A	9	n/a	n/a
Left turn from Route 2A-110 Westbound	B	5	A	9	A	10	A	10	B	10	B	10
Location 7 - Route 110-111(Ayer Road)/Still River												
All movements from Still River Road Eastbound	C	11	C	18	C	16	A	10	B	11	B	12
All movements from Still River Road Westbound	B	9	C	23	C	19	A	9	B	11	B	13
All movements from Ayer Road Northbound	A	3	A	8	A	8	B	11	C	22	E	41
All movements from Ayer Road Southbound	A	3	A	8	A	8	A	10	B	14	C	17

Table 7-3 Intersection Capacity Analysis Level of Service Summary – 1996 to 2021 PM Peak Hour (Continued)

	1996		2000		2006		2010		2015		2021 COVID Adj.	
	LOS	Delay	LOS	Delay								
UNSIGNALIZED INTERSECTIONS												
Location 8 - Route 70/Route 117 (Seven Bridge Rd)*												
Left turn from Seven Bridge Rd (Rt.117) Eastbound	F	>120	A	10	A	10	A	3	A	0	n/a	n/a
Left turn from Seven Bridge Road Westbound	C	14	A	9	A	9	A	9	A	9	A	9
All movements from Route 70 Northbound	A	4	F	>120	F	>120	F	>120	F	>120	F	>120
All movements from Route 70 Southbound	B	5	E	36	E	37	n/a	n/a	n/a	n/a	n/a	n/a
Location 9 - Route 70 (Lunenburg Road)/Route 117												
All movements from Lunenburg Road Southbound	F	>120	F	>120								
Left turn from Route 117 Eastbound	B	7	B	11	B	11	B	12	B	12	B	13
Location 11 - Route 2A-110/Goldsmith												
All movements from Goldsmith Northbound	F	>120	F	58	F	88	C	22	F	54	D	34
Left turn from Route 2A-110 Westbound	B	7	A	9	A	10	A	9	A	9	A	9
Location 12 - Verbeck Gate/MacPherson/West Main												
All movements from MacPherson Northbound	B	7	E	44	F	>120	D	35	F	53	F	99
All movements from MacPherson Southbound	B	7	C	16	D	33	C	18	C	18	C	24
Left turn from West Main Eastbound	A	3	A	8	A	8	A	8	A	8	A	8
Left turn from West Main Westbound	A	3	A	8	A	8	A	8	A	8	A	8
Location 13 - Grant/West Main												
All movements from Grant Road Northbound					B	12	C	16	F	101	C	20
Left turn from Front Street (West Main St) Westbound					A	8	A	8	A	9	A	8
Location 14 - Hospital/Front												
All movements from Hospital Road Northbound					B	13	C	16	C	19	D	28
Left turn from Front Street Westbound					A	8	A	8	A	8	A	8
SIGNALIZED INTERSECTIONS												
Location 10 – Route 110 (King Street)/ Route 119 (Great Road) *												
Left turn from King St Northbound (or Eastbound)	F	>120	F	>120	F	>120	C	28	F	>120	F	>120
Through/Right from King St Northbound (or Eastbound)	B	7			B	16	C	28	C	23	B	19
Left turn from King St Southbound (or Westbound)	B	11			B	15	E	70	C	35	C	25
Through/Right from King St Southbound (or Westbound)	B	15			C	33	E	70	D	35	C	34
Left turn from Great Road Westbound (or Northbound)	E	60			A	9	B	19	D	46	F	>120
Through/Right from Great Road Westbound (or Northbound)	D	39			F	>120	C	21	C	28	C	33
Left turn from Great Road Eastbound (or Southbound)	E	55			A	7	C	22	D	49	D	41
Through/Right from Great Road Eastbound (or Southbound)											C	29

Based on the above results, operations at study area intersection have changed to various degrees. When comparing existing levels of service to 1996 baseline conditions, these intersections can be classified as unaffected, minimally affected, or affected.

Unaffected intersections are those intersections where the 2021 levels of service have remained relatively unchanged from 1996. The unaffected intersections are as follows:

- › Location 1 - Front Street/Lancaster Street/Leominster Road/Center Road
- › Location 2 - Park Street/Fitchburg Road/Groton School Road
- › Location 6 - Route 2A-110/I-495 Exit 30 SB Ramps
- › Location 9 - Route 70/117 (Lunenburg Road)
- › Location 11 - Route 2A-110 (King Street)/Goldsmith Street
- › Location 13 - Grant Road/West Main Street
- › Location 14 - Hospital Road/Front Street

Minimally affected intersections are those intersections where the 2021 levels of service have degraded only one level since 1996. The additional delay may be attributed to several factors, including regional traffic growth. The minimally affected intersections are as follows:

- › Location 4 - Groton-Harvard Road/Central Avenue
- › Location 5 - Route 2A-110/I-495 Exit 30 NB Ramps

Affected intersections are those intersections where the 2021 levels of service have degraded by more than one level since 1996. The additional delay may be attributed to several factors, including regional traffic growth. The affected intersections are as follows:

- › Location 3 - Park Street/Main Street/West Main Street (PM only)
- › Location 7 - Route 110-111 (Ayer Road)/Route 110 (Still River Road)/Route 111
- › Location 8 - Route 70/117 (Seven Bridge Road)
- › Location 10 - Route 110 (King Street)/Route 119/Route 2A (Great Road)
- › Location 12 - Verbeck Gate/MacPherson Road/West Main Street

7.3 Future No-Build (2044)

In order to evaluate traffic impacts associated with future development, future No-Build Condition traffic volumes were examined to provide a baseline condition for comparison. The No-Build Condition traffic volumes were projected for the year 2044 based on baseline traffic volume data.

Future No-Build Condition traffic volume projections consist of general background growth. Typically, background growth is a function of changes in population, future land development, increased economic activity, and changes in travel patterns. As discussed previously, a regional growth rate of 2.0% was utilized in projecting traffic volumes. Compounding this rate over 23 years results in significant traffic growth, and therefore increased delay. This increase in delay often results in LOS F at study intersections (Table 7-4).

Table 7-4 Intersection Level of Service Comparison – Existing versus No-Build

	AM Peak Hour				PM Peak Hour			
	2021 COVID Adj. Existing		2044 No-Build		2021 COVID Adj. Existing		2044 No-Build	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
UNSIGNALIZED INTERSECTIONS								
Location 1A –Lancaster/Leominster	D	28	F	94	B	11	B	14
Location 1B – Lancaster/Center/Main	C	19	E	47	D	28	F	>120
Location 2 – Park/Fitchburg/Groton School	F	59	F	>120	F	>120	F	>120
Location 3 – Park/Main/West Main	F	120	F	>120	F	>120	F	>120
Location 4 – Groton-Harvard/Central	C	23	F	>120	D	33	F	>120
Location 5 – Route 2A-110/I-495 NB Ramps	F	80	F	>120	E	43	F	>120
Location 6 – Route 2A-110/I-495 SB Ramps	F	>120	F	>120	F	>120	F	>120
Location 7 – Route 110-111(Ayer Road)/Still River	C	24	F	>120	D	27	F	>120
Location 8 – Route 70/Route 117 (Seven Bridge Road)	F	>120	F	>120	F	>120	F	>120
Location 9 – Route 70 (Lunenburg Road)/Route 117	F	>120	F	>120	F	>120	F	>120
Location 11 – Route 2A-110/Goldsmith	D	25	F	>120	F	52	F	>120
Location 12 – Verbeck Gate/MacPherson/West Main	F	>120	F	>120	F	>120	F	>120
Location 13 – Grant/West Main	C	19	E	47	C	23	F	>120
Location 14 – Hospital/Front	E	49	F	>120	D	29	F	>120
SIGNALIZED INTERSECTION								
Location 10 – Route 110 (King Street)/ Route 119 (Great Road)	C	22	F	>81	E	65	F	>120

The following intersections are expected to deteriorate to LOS E or LOS F in the morning or evening peak hours as a result of regional background growth independent of additional development in Devens:

- › Location 1 - Front Street/Lancaster Street/Leominster Road/Center Road
- › Location 4 - Groton-Harvard Road/Central Avenue
- › Location 7 - Route 110-111 (Ayer Road)/Still River Road
- › Location 9 - Route 70/117 (Lunenburg Road)
- › Location 10 - Route 110 (King Street)/Route 119/Route 2A (Great Road)
- › Location 11 - Route 2A-110 (King Street)/Goldsmith Street
- › Location 13 - Grant Road/West Main Street
- › Location 14 - Hospital Road/Front Street

7.4 Future Build (2044) Scenario 1

The future Build scenarios include traffic generated by projected development in Devens in addition to regional traffic growth (Figures 6-1 through 6-4). It is projected that most study intersections will operate at LOS F in the future with or without further development in Devens. Tables 7-5 and 7-6 show comparisons between existing (2021) and Build (2044) levels of service and delays for study area intersections.

Table 7-5 Intersection Capacity Analysis Level of Service Summary Existing versus Build AM Peak Hour

	2021 Existing		2044 Build	
	LOS	Delay	LOS	Delay
UNSIGNALIZED INTERSECTIONS				
Location 1A - Lancaster/Leominster				
All movements from Lancaster Northbound	B	13	F	>120
Left turn from Front Street Westbound	A	9	B	11
Location 1B - Lancaster/Center/Main				
All movements from Center Southbound	B	13	E	39
Left turn from Leominster Eastbound	A	8	A	10
Location 2 - Park/Fitchburg/Groton School				
Left/Right from Groton School Southbound (stop control)	F	59	F	>120
Left turn from Fitchburg Road Eastbound	A	8	A	10
Location 3 - Park/Main/West Main				
All movements from Park (Mill) Street Northbound	C	20	F	>120
All movements from Park Street Southbound	F	>120	F	>120
Left turn from West Main Street Eastbound	A	9	C	16
Left turn from Main Street Westbound	A	8	A	9
Location 4 - Groton-Harvard/Central				
All movements from Groton-Harvard Northbound	C	17	F	82
All movements from Groton-Harvard Southbound	C	20	F	>120
Left turn from Central Eastbound	A	8	A	8
Left turn from Central Westbound	A	8	A	9
Location 5 - Route 2A-110/I-495 Northbound Ramps				
Left turn from Ramps Northbound	F	79	F	>120
Right turn from Ramps Northbound	B	14	E	41
Left turn from Route 2A-110 Westbound	A	9	B	12
Location 6 - Route 2A-110/I-495 Southbound Ramps				
Left turn from Ramps Northbound	F	>120	F	>120
Right turn from Ramps Northbound	B	15	D	29
All movements from Murray St (Hartwell Ave) Southbound	n/a	n/a	n/a	n/a
Left turn from Route 2A-110 Eastbound	n/a	n/a	n/a	n/a
Left turn from Route 2A-110 Westbound	B	11	C	18
Location 7 - Route 110-111(Ayer Road)/Still River				
All movements from Still River Road Eastbound	C	15	F	109
All movements from Still River Road Westbound	C	15	E	48
All movements from Ayer Road Northbound	C	20	F	>120
All movements from Ayer Road Southbound	D	33	F	>120

Table 7-5 Intersection Capacity Analysis Level of Service Summary Existing versus Build AM Peak Hour (Continued)

	2021 Existing		2044 Build	
	LOS	Delay	LOS	Delay
UNSIGNALIZED INTERSECTIONS				
Location 8 - Route 70/Route 117 (Seven Bridge Rd)				
Left turn from Seven Bridge Rd (Rt.117) Eastbound	n/a	n/a	n/a	n/a
Left turn from Seven Bridge Road Westbound	B	11	C	17
All movements from Route 70 Northbound	F	>120	F	>120
All movements from Route 70 Southbound	n/a	n/a	n/a	n/a
Location 9 - Route 70 (Lunenburg Road)/Route 117				
All movements from Lunenburg Road Southbound	F	>120	F	>120
Left turn from Route 117 Eastbound	A	9	B	12
Location 11 - Route 2A-110/Goldsmith				
All movements from Goldsmith Northbound	C	19	F	>120
Left turn from Route 2A-110 Westbound	A	9	B	11
Location 12 - Verbeck Gate/MacPherson/West Main				
All movements from MacPherson Northbound	F	58	F	>120
All movements from MacPherson Southbound	E	42	F	>120
Left turn from West Main Eastbound	A	8	A	8
Left turn from West Main Westbound	A	9	D	31
Location 13 - Grant/West Main				
All movements from Grant Road Northbound	C	17	F	>120
Left turn from Front Street (West Main St) Westbound	A	9	B	12
Location 14 - Hospital/Front				
All movements from Hospital Road Northbound	E	46	F	>120
Left turn from Front Street Westbound	A	4	B	12
SIGNALIZED INTERSECTION				
Location 10 – Route 110 (King St)/Route 119 (Great Road) (overall)				
Left turn from King St Northbound (or Eastbound)	C	25	F	>120
Through/Right from King St Northbound (or Eastbound)	B	16	C	29
Left turn from King St Southbound (or Westbound)	C	20	D	41
Through/Right from King St Southbound (or Westbound)	B	16	C	34
Left turn from Great Road Westbound (or Northbound)	D	35	F	81
Through/Right from Great Road Westbound (or Northbound)	B	18	C	23
Left turn from Great Road Eastbound (or Southbound)	D	35	E	64
Through/Right from Great Road Eastbound (or Southbound)	C	24	F	69

Table 7-6 Intersection Capacity Analysis Level of Service Summary Existing versus Build PM Peak Hour

	2021 Existing		2044 Build	
	LOS	Delay	LOS	Delay
UNSIGNALIZED INTERSECTIONS				
Location 1A - Lancaster/Leominster				
All movements from Lancaster Northbound	B	11	C	16
Left turn from Front Street Westbound	A	8	A	10
Location 1B - Lancaster/Center/Main				
All movements from Center Southbound	C	19	F	>120
Left turn from Leominster Eastbound	A	9	B	13
Location 2 - Park/Fitchburg/Groton School				
Left/Right from Groton School Southbound (stop control)	F	>120	F	>120
Left turn from Fitchburg Road Eastbound	A	1	C	23
Location 3 - Park/Main/West Main				
All movements from Park (Mill) Street Northbound	F	62	F	>120
All movements from Park Street Southbound	F	>120	F	>120
Left turn from West Main Street Eastbound	B	13	F	>120
Left turn from Main Street Westbound	A	8	A	8
Location 4 - Groton-Harvard/Central				
All movements from Groton-Harvard Northbound	C	20	F	>120
All movements from Groton-Harvard Southbound	D	30	F	>120
Left turn from Central Eastbound	A	8	A	9
Left turn from Central Westbound	A	8	A	8
Location 5 - Route 2A-110/I-495 Northbound Ramps				
Left turn from Ramps Northbound	E	43	F	>120
Right turn from Ramps Northbound	B	12	C	20
Left turn from Route 2A-110 Westbound	A	9	B	13
Location 6 - Route 2A-110/I-495 Southbound Ramps				
Left turn from Ramps Northbound	F	>120	F	>120
Right turn from Ramps Northbound	B	14	D	30
All movements from Murray St (Hartwell Ave) Southbound	n/a	n/a	n/a	n/a
Left turn from Route 2A-110 Eastbound	n/a	n/a	n/a	n/a
Left turn from Route 2A-110 Westbound	B	10	C	18
Location 7 - Route 110-111(Ayer Road)/Still River				
All movements from Still River Road Eastbound	B	12	C	20
All movements from Still River Road Westbound	B	13	C	23
All movements from Ayer Road Northbound	E	41	F	>120
All movements from Ayer Road Southbound	C	17	F	>120

Table 7-6 Intersection Capacity Analysis Level of Service Summary Existing versus Build PM Peak Hour (Continued)

	2021 Existing		2044 Build	
	LOS	Delay	LOS	Delay
Location 8 - Route 70/Route 117 (Seven Bridge Rd)				
Left turn from Seven Bridge Rd (Rt.117) Eastbound	n/a	n/a	n/a	n/a
Left turn from Seven Bridge Road Westbound	A	9	B	12
All movements from Route 70 Northbound	F	>120	F	>120
All movements from Route 70 Southbound	n/a	n/a	n/a	n/a
Location 9 - Route 70 (Lunenburg Road)/Route 117				
All movements from Lunenburg Road Southbound	F	>120	F	>120
Left turn from Route 117 Eastbound	B	13	D	28
Location 11 - Route 2A-110/Goldsmith				
All movements from Goldsmith Northbound	D	34	F	>120
Left turn from Route 2A-110 Westbound	A	9	B	11
Location 12 - Verbeck Gate/MacPherson/West Main				
All movements from MacPherson Northbound	F	99	F	>120
All movements from MacPherson Southbound	C	24	F	>120
Left turn from West Main Eastbound	A	8	A	9
Left turn from West Main Westbound	A	8	B	11
Location 13 - Grant/West Main				
All movements from Grant Road Northbound	C	20	F	>120
Left turn from Front Street (West Main Street) Westbound	A	8	A	9
Location 14 - Hospital/Front				
All movements from Hospital Road Northbound	D	28	F	>120
Left turn from Front Street Westbound	A	8	A	8
SIGNALIZED INTERSECTION				
Location 10 – Route 110 (King Street)/Route 119 (Great Road) (overall)				
Left turn from King St Northbound (or Eastbound)	F	>120	F	>120
Through/Right from King St Northbound (or Eastbound)	B	19	C	31
Left turn from King St Southbound (or Westbound)	C	25	D	50
Through/Right from King St Southbound (or Westbound)	C	34	F	>120
Left turn from Great Road Westbound (or Northbound)	F	>120	F	>120
Through/Right from Great Road Westbound (or Northbound)	C	33	F	109
Left turn from Great Road Eastbound (or Southbound)	D	41	F	>120
Through/Right from Great Road Eastbound (or Southbound)	D	29	D	53



8

Conclusions

This comprehensive traffic study indicates that regional traffic volumes in the vicinity of Devens have generally increased since 2015. The impact of the COVID-19 Pandemic has impacted the observations in a number of ways and the findings of this study should consider these impacts when making any specific conclusions from the data. That said, the study area intersections external to Devens have collectively experienced a 9% decrease (-1,672 vehicles) during the morning peak hour but have experienced an 8% increase (+1,439 vehicles) during the evening peak hour since 2015.

Total daily traffic volumes at Devens gates have increased since 2015.

- › During both morning and evening peak hours, traffic volumes have increased. The morning peak hour experienced an increase of 9% (+255 vehicles) while the evening peak hour experienced an increase of 25% (+632 vehicles).
- › Average total weekday truck traffic volumes have decreased at all gates since 2015.
- › Cut through traffic includes vehicles entering Devens gates and passing through Devens without stopping. In 2015, the 34% of trips through Devens gates were classified as cut-through trips. This number has essentially remained the same at 33% in 2021.

Previous restrictions for Devens Base Reuse Plan limited total development in Devens to 8.5 million square feet. This build-out coincided with a daily vehicle-trip threshold of 59,625 trips per day. In a 2008 Notice of Project Change (NPC) filing to MEPA, MassDevelopment received approval to discontinue using the building floor area as the basis for build-out limit.

- › As of June 2021, approximately 6.58 million square feet of total build-out was occupied, while 344,000 square feet of new construction is unoccupied and 2.74 million square feet of build-out is planned for potential new buildings or expansions of current buildings.
- › The total square footage of occupied, unoccupied, and planned build-out (9.85 million square feet) is 1.35 million square feet more than the 8.5 million square feet previously permitted under Devens By-Laws.
- › It is projected that the 59,625 daily vehicle-trip threshold will not be reached until 2044, with a corresponding 12.3 million square feet of occupied development in Devens.

According to a review of the 1995 FEIR, the following intersections were identified as potential off-site locations that would require MassDevelopment to implement mitigation should congestion become a problem:

- › Location 2 - Park Street/Fitchburg Road/Groton School Road in Ayer
- › Location 5 - Route 2A-110/I-495 Exit 30 NB Ramps in Littleton
- › Location 6 - Route 2A-110/I-495 Exit 30 SB Ramps in Littleton
- › Location 3 - Park Street/Main Street/West Main Street in Ayer
- › Carlton Rotary in Ayer

Level of service analyses of these locations show that, compared to 1996 baseline volumes, levels of service have either been unaffected or minimally affected. Considering the minimal increase in regional traffic volumes surrounding Devens, it is unlikely that traffic generated by Devens has adversely affected delay at these intersections beyond what was projected and, in many cases, is well below what was anticipated at that time. Traffic volumes in 2021 are similar to pre-2000 volumes even with the redevelopment of Devens.

As noted earlier, information from MRPC indicated that traffic in the region is stable, even declining in some communities. The findings in this study are similar to MRPC's observations. In areas where there are increases in traffic volumes, the magnitudes are not significant. Existing infrastructure is, for the most part, able to accommodate the increased and increasing development occurring within Devens; therefore, it is anticipated that the continued development at Devens will have negligible impact on the regional roadway network at its current pace.

The 1995 Section 61 Finding required that MassDevelopment implement a "5-Year traffic reporting program to evaluate results of, and redirect as necessary, the traffic monitoring program." As noted in Chapter 3, regional traffic volumes at the external study locations have increased only slightly (1.5%) since 2015. Documented data including the 2021 results have shown that Devens development is generating significantly less traffic than was anticipated in the original MEPA and transportation planning studies conducted in 1995.

Although there is an increase in the area redeveloped within Devens, traffic operations at external intersections have not been significantly impacted due to the combined effect of the increase in regional traffic and the lower Devens trip rates. While cut-through traffic has increased since 2000, almost doubling from 18% in 2000 to 33% in 2021, the cut-through rate has remained constant over the last several years with the cut-through percentage being 32% in 2010 and 34% in 2015. This is an indication that the redevelopment of Devens over the last several years has not had a significant and unexpected impact on the area roadway network.