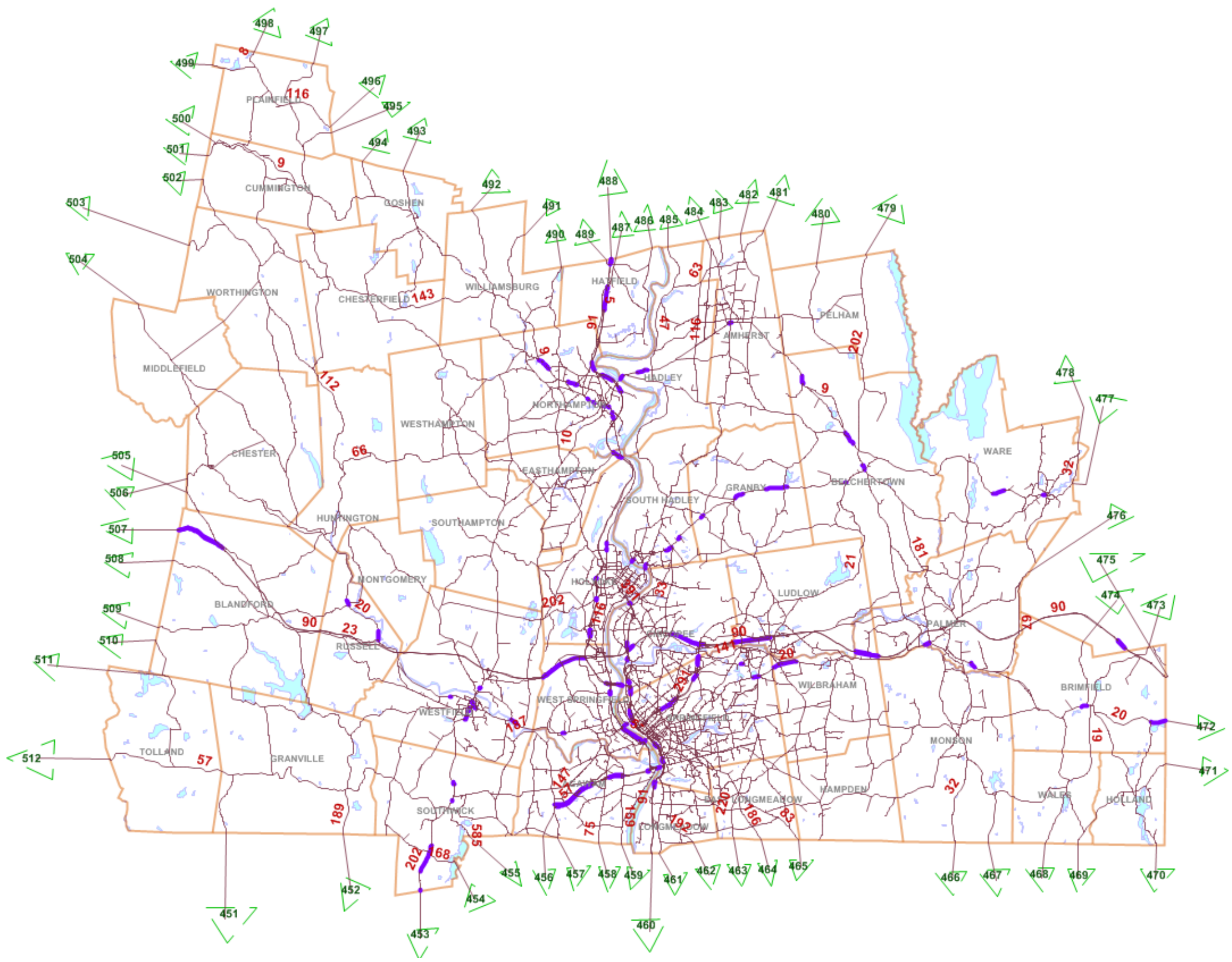
2010 Regional Transportation Model Update

Draft Report – April, 2016

Prepared by the

Pioneer Valley Planning Commission



The analysis in this report was completed after the adoption of the Regional Transportation Plan (RTP) by the Metropolitan Planning Organization (MPO). However, this analysis does not change the recommendations included as part of the adopted RTP.

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2010 REGIONAL TRANSPORTATION DEMAND MODEL UPDATE

A. INTRODUCTION

Travel demand forecasting is a major step in the transportation planning process. By simulating the current roadway conditions and the travel demand on those roadways, deficiencies in the system are identified. This is an important tool in planning future network enhancements and analyzing currently proposed projects.

Travel demand models are developed to simulate actual travel patterns and existing demand conditions. Networks are constructed using current roadway inventory files containing data for each roadway within the network. Travel demand is generated using socioeconomic data such as household size, automobile availability and employment data. Once the existing conditions are evaluated and adjusted to satisfactorily replicate actual travel patterns and vehicle roadway volumes, the model inputs are then altered to project future year conditions.

There are four basic steps in the traditional travel demand forecasting process: trip generation, trip distribution, modal choice, and trip assignment. There is also a preliminary step of network and zone development and a subsequent step of forecasting future conditions. The Pioneer Valley Planning Commission (PVPC) uses the TransCAD software to perform a 3-step process for forecasting near and future conditions including trip generation, trip distribution and trip assignment.

1. Network and Zone Development

1.1 Highway Network

The preliminary step in the development of a travel demand model is identifying the network and dividing the area into workable units. The highway network is composed of nodes and lines. Nodes represent intersections or centroids. Centroids are used to identify the center of activity within a zone and connect the zone to the highway network. Lines represent roadway segments or centroid connectors. Centroid connectors represent the path from a centroid to the highway network and typically represent the local roads and private driveways within the centroid. General information required for network developments include system length, demand, service conditions and connections to zones.

1.2 Transportation Analysis Zones

A Transportation Analysis Zone (TAZ) is the basic geographic unit representing tabulated data of individual households and business establishments aggregated for a region. The activity center of a zones is represented by a centroid. The centroid is not necessarily the geographic center of a zone, but rather the point that best represents the average trip time in and out of a zone. A centroid connector links the zone with the roadway network. It often represents local streets that carry traffic out of or into a zone. Centroid connectors generally connect to adjacent collector or arterial roads.

2. Trip Generation

Trip generation is the first step in the modeling process. The goal of which is to identify the number of person trips that are made to and from traffic analysis areas (TAZ's). Trip generation analysis estimates the number of trips that are produced by each zone and the number of trips attracted to each zone for each of the six trip purposes:

1) Home-Based Work (includes work-related) (HBW)
2) Home-Based Personal Business (includes shopping) (HBPB)
3) Home-Based Social and Recreational (HBSR)
4) Home-Based Pick-Up and Drop-Off (HBPD)
5) Non-Home-Based Work (NHBW), and
6) Non-Home-Based Other (NHBO)

Households generally produce trips, while employment and other activity centers generally attract trips. Estimates of household based trips are affected by socioeconomic factors, such as auto ownership, and household size. Employment based trips depend on employment type (Basic/Retail/Service) and size. The trip generation model uses forecasted demographic and employment data associated with a zone to calculate person trips. Subsequently, total trips attracted are balanced to match the total trips produced to reconcile inconsistencies between them.

3. Trip Distribution

Trip distribution determines the destination of the vehicle trips produced in each zone and how they are divided among all the other zones in the area. A relationship is developed between the number of trips produced by and attracted to zones and the accessibility of zones to other zones in terms of time and distance.

A basic trip distribution model is the gravity distribution model. In the gravity model, trips between zones are calculated based on the origin zone size; possible destinations size; as well as distance to neighboring zones. A friction factor is used in the gravity model to relate travel time to zone attractiveness. Travel time between two zones is based on the travel route selected and the speed on each road along the travel route. The following points list assumptions and inputs of the gravity model:

- Zone size is measured in terms of total population and total employment.
- Distance is measured in terms of travel time.
- A computerized assignment program designed to find the absolute shortest route between each pair of zones selects the travel route.

4. Trip Assignment

Trip assignment is used to estimate the flow of traffic on a network. The trip assignment model takes as input a matrix of flows that indicate the volume of traffic between origin and destination pairs. The flows for each origin and destination pair are loaded on the network based upon the travel time or impedance of the alternative paths that could carry this traffic.

5. Forecasts

The preparation of a future year socioeconomic database is the last step in the travel demand forecast process. Forecasts of population and socioeconomic data as well as the attributes affecting travel are used to determine the number of trips that will be made in the future. The basic future year forecasts include total regional population, total number of households, and total number of jobs. The forecasted values are then divided by community in a region and subsequently divided into the various Transportation Analysis Zones. The zone-level estimates that forecasts provide are direct inputs in the travel demand forecasting model. Once travel demand is known and deficiencies identified, alternative transportation systems may be developed.

B. 2010 BASE YEAR MODEL

The regional travel demand model is made up of three major components: a roadway network, transportation analysis zones, and socioeconomic data. Each of these components add a critical contribution to the development of a working transportation simulation model. The 2010 base year model used 2010 socioeconomic data in a Quick Response trip generation model to calculate the home-based trips productions per housing unit as well as the non home-based trips production per retail/non-retail employee, and household. The 2011-MTS survey data was used by the CTPS staff to estimate trip rates by area type. Standard vehicle occupancy rates. were used to convert personal trips into vehicle trips before conducting the trip assignment process. This model was updated according to guidance of the MassDOT planning staff to a 2010 Base Year Model using information from the 2010 Census as part of the Federal Fiscal Year 2015 Unified Planning Work Program for the Pioneer Valley MPO.

1. Network

A roadway network represents the regional transportation system in the regional travel demand model. A highway network was developed based on the federal functional classification of roadways. All roadways in the region classified as interstate, principal arterial and collector were included in this highway network. Local roads carrying minimal through traffic were represented only as centroid connectors to areas of traffic activity in a TAZ.

The characteristics of a roadway were coded as attributes and tabulated in a regional database for each line representing the roadway. Generally, speed and capacity attributes were based on the functional classification of a roadway and determined from the state roadway inventory files for the region. Adjustments were made to these attributes based on field observations, examination of aerial photographs, and review of regional and local traffic studies. Adjustments to these inputs were also made to better replicate regional travel activity in the model simulation. Out of the 45,719 roadway links in the Pioneer Valley regional network, a third (15,507) are included in the model. Local roadway links with a functional classification of zero are excluded from the model.

2. Transportation Analysis Zones

Transportation Analysis Zones are geographic divisions of a region into analysis units that allow linking tabulated data to a physical location serviced by the roadway network. Attributes of a TAZ include socioeconomic data which would impact the generation of trips in a zone either by spurring the production of trips or the attraction of trips to that zone. The current TAZ's size and location is based on the 2010 Census because it is the most comprehensive, current, and readily available source of socioeconomic and demographic information. The Pioneer Valley area is divided by the census into units of geographic areas called blocks containing the socioeconomic and demographic information and aggregated into block groups. The 2010 TAZ's geographic boundaries match the 2010 census block group boundaries for the most part except for certain urban areas warranting further detail due to a concentration of activity. On the other hand, two block groups were aggregated in a rural area with minimal activity. The Pioneer Valley region 2010 base year model has 462 internal zones, and 62 external zones that represent external stations.

3. Socioeconomic Data

Basic socioeconomic data for the 2010 base year model came from the 2010 Census at the block level. Detailed socioeconomic data was obtained from the American Community Survey (ACS) 2009-2013 five year estimates at the tract level. The socio economic data included the following list of variables: population, number of households, population in households, population in group quarters, auto availability, income, and number of workers.

The employment data was obtained from the department of labor for each of the communities in the region. The total number of workers in each community was then distributed into the various zones in that community according to their ratios in the ACS survey. After breaking down of the number of jobs by job types they were aggregated into three categories: Basic, Retail, and Service.

To build the 2010 Census block / TAZ and 2010 Census tract / TAZ lookup tables used to generate the demographic tables, the following steps were performed by the MassDOT planning staff:

- The original TAZ shapefile based on the 2000 Census geographies was overlayed with 2010 Census block polygon features from the 2012 TIGER base map (ArcGIS identity tool). The quality of the 2012 TIGER is much better than that of earlier generations, and the features align quite well with those of other datasets in our spatial database as well as with aerial imagery.

- The resulting polygon attributes were edited to ensure that TAZs nest completely within a single town (except zone 10, which includes all of Middlefield and Worthington).
- Attributes were edited to ensure that 2010 Census blocks are not split among multiple TAZs. There is one exception to the no splits rule for Springfield tract 800900, block 1000 which is split between zones 245 and 246. For this block "Google Street View" was used to count the housing units in the zone 245 portion in order to estimate a factor for splitting the block data between the two zones.
- The resulting block / TAZ lookup table were used to estimate total population, household population and group quarters population by TAZ from 2010 Census Summary File 1 block level statistics. This block / TAZ lookup was also used to generate the various factors in the 2010 Census tract / TAZ lookup table.
- The tract / TAZ lookup table was used to generate the tables of household statistics (vehicles, workers, income) from the 2010 American Community Survey 5-year Summary File. Tract statistics were used to generate these tables due to high margins of error among block group estimates. The ACS household statistics were adjusted at the tract level to match 2010 Census total households before applying the tract / TAZ factors to generate the TAZ summaries.
- The employment data was extracted from the AASHTO Census Transportation Planning Products (CTPP) web query tool. This data is published at the tract level as well, and was allocated to TAZ based on the percentage of the land area of a tract that is contained in each of one or more TAZs. The CTPP employment estimates (collected between 2006 and 2010) were then adjusted so that town totals match the ES-202 totals published by the Massachusetts Executive Office of Labor and Workforce Development.

4. Regionally Significant Projects

Only “regionally significant” projects are required to be included in travel demand modeling efforts. The final federal conformity regulations define regionally significant as follows:

> **Regionally significant:** a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sport complexes, etc., or transportation terminals as well as most terminals themselves) and would be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.

“Non-Exempt” projects add capacity to the existing transportation system and must be included as part of the air quality conformity determination for the RTP. Examples of “Non-Exempt” projects include those defined as regionally significant in addition to projects expected to widen roadways for the purpose of providing additional travel lanes.

Projects considered regionally significant were included as part of the 2010 Baseline model network and subsequent future model networks based on the project's expected construction date. These projects include non exempt system expansion projects that were financially constrained.

The 2010 base year roadway network includes all regionally significant TIP projects that were already included in the 2000 Baseline model network as well as projects that were completed by the end of 2010. Those projects include the following:

- Hadley: Widening Route 9 from two lanes to four lanes from West Street to Coolidge Bridge.
- Hadley/Northampton: Rehabilitation of the Coolidge Bridge with lane addition and widening from three lanes to four lanes.
- Springfield: Reverse the direction of four existing I-91 ramps.
- Westfield: Route 10/202 Great River Bridge - two bridges acting as one-way pairs.
- Holyoke: Commercial Street extension project from the I-391 ramp to Appleton Street.
- Chester: Maple Street Bridge one way northbound, connecting Route 20 to Main Street.

The 2020 model network includes the following regionally significant projects:

- Wilbraham: Boston Road reconstruction. Currently one lane in each direction, will become two lanes in each direction. Project starts at the Springfield City Line and continues east to Stony Hill Road (0.28 miles), but does not include Stony Hill Road. Expected in 2016.
- Through the region: New Commuter Rail Service from Hartford, CT to Greenfield, MA. (Currently not modeled)
- Hadley: Route 9 Phase 1 - Widens Route 9 from one lane to two lanes in each direction. Project starts west of Middle Street and continues until East Street. Expected in 2020.

The 2030 model network includes the following regionally significant projects:

- Hadley: Route 9 Phase 2 - Widens Route 9 from one lane to two lanes in each direction. Starts at East Street and continues to the Lowe’s driveway. Expected in 2023

- Hadley: Route 9 Phase 3 - Widens Route 9 from one lane to two lanes in each direction. Project starts east of the Lowe’s driveway and continues to the Home Depot driveway. Expected in 2026.

C. FUTURE BUILD OUT

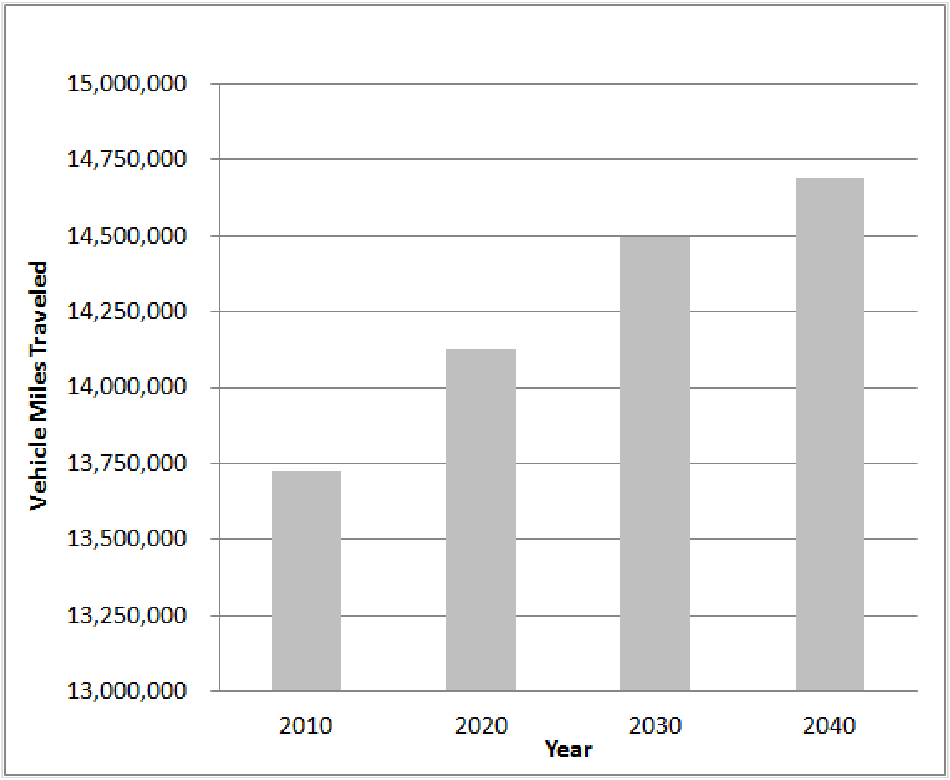
Future Build Out Years of the Regional Travel Demand Model were projected consecutively in ten year increments from the Base Year 2010 to cover the 30 year span of the long range transportation plan. Therefore, build out years were selected for 2020, 2030, and 2040. Each build out year uses projected land use socio economic data based on anticipated growth in population, households, and employment as inputs for the build out model. The roadway network was modified to reflect any regionally significant projects that are planned to be completed by that specific build out year. The regional travel demand model was rerun for each of these build out years using the appropriate inputs to estimate the Average Daily Traffic Flow on the regional roadway network and from there calculate the Average Daily Vehicle Miles Traveled (VMT) by multiplying link flow by link length.

1. Vehicle Miles Traveled

Total Vehicle Miles Traveled (VMT) were estimated for model years 2010, 2020, 2030, and 2040 based on Census 2010 data. The total estimated VMT in base year 2010 model was 13,726,171 (Figure 1). Total VMT was projected to increase over the next thirty years with growth rates slowing down with time. Annual compound growth rates between model projection years were as follows: 0.29% per year from 2010 to 2020, 0.26% per year from 2020 to 2030, and 0.13% per year from 2030 to 2040.

These estimates were derived from the results of model build out years using updated socio economic land use data provided by the Central Transportation Planning Staff (CTPS) for the Pioneer Valley Region. The results in this section came from the new PVPC Regional Travel Model developed in 2015 in collaboration with CTPS and MassDOT. Earlier estimates of regional VMT for 2010 and future build out year projections were furnished by MassDOT and derived from the Statewide Travel Model. The PVPC Regional Travel Demand Model uses different assumptions and data inputs than the Statewide Travel Demand Model. Therefore, it is expected that the output results would be different as well.

Figure 1 - Estimated Future Vehicle Miles Traveled



Vehicle Miles Traveled tabulated by community validated the growth patterns projected by community in the Pioneer Valley (Table 1).

Table 1 - Estimated Vehicle Miles Traveled by Community

Town	2010 VMT	2020 VMT	2030 VMT	2040 VMT
Agawam	605,620	624,396	639,063	645,779
Amherst	336,120	341,774	362,868	369,763
Belchertown	303,642	316,480	325,877	332,238
Blanford	184,669	189,940	194,234	196,903
Brimfield	262,028	269,224	274,706	277,976
Chester	31,098	31,373	31,467	31,235
Chesterfield	31,303	31,352	31,225	30,762
Chicopee	1,117,536	1,151,762	1,183,998	1,200,253
Cummington	53,061	54,215	55,003	55,297
East Longmeadow	276,168	286,693	297,697	306,414
Easthampton	220,428	228,462	236,270	239,001
Goshen	50,927	52,142	52,923	53,403
Granby	160,704	165,836	169,427	170,765
Granville	44,250	44,985	45,594	45,958
Hadley	377,492	389,279	407,025	413,296
Hampden	91,448	95,523	98,741	100,738
Hatfield	153,053	157,435	161,200	163,256
Holland	32,699	33,521	34,021	34,302
Holyoke	1,269,455	1,305,039	1,340,150	1,355,979
Huntington	39,501	39,799	39,840	39,540
Longmeadow	376,512	385,388	392,659	396,889
Ludlow	607,161	624,008	639,806	646,942
Middlefield	4,744	4,794	4,837	4,803
Monson	176,707	180,519	183,949	185,954
Montgomery	11,965	12,202	12,349	12,368
Northampton	815,845	831,911	847,818	855,262
Palmer	650,532	664,489	676,081	681,928
Pelham	54,671	56,470	58,071	58,929
Plainfield	22,327	23,011	23,574	23,838
Russell	127,551	130,608	131,103	133,659
South Hadley	184,373	188,589	192,589	194,773
Southampton	105,530	110,263	115,053	116,453
Southwick	225,878	233,700	239,854	242,196
Springfield	2,284,007	2,370,197	2,440,310	2,486,910
Tolland	15,999	16,381	16,707	16,915
Wales	25,418	25,993	26,575	26,856
Ware	141,262	143,453	144,856	145,202
West Springfield	1,014,411	1,045,407	1,069,966	1,079,420
Westfield	762,563	782,606	796,618	805,745
Westhampton	35,735	36,395	36,818	36,523
Wilbraham	330,994	340,831	350,512	358,870
Williamsburg	97,214	98,911	100,000	100,579
Worthington	14,118	14,151	14,080	13,872
Total	13,726,717	14,129,505	14,495,513	14,687,746

2. Future Traffic Volume Projection Estimates

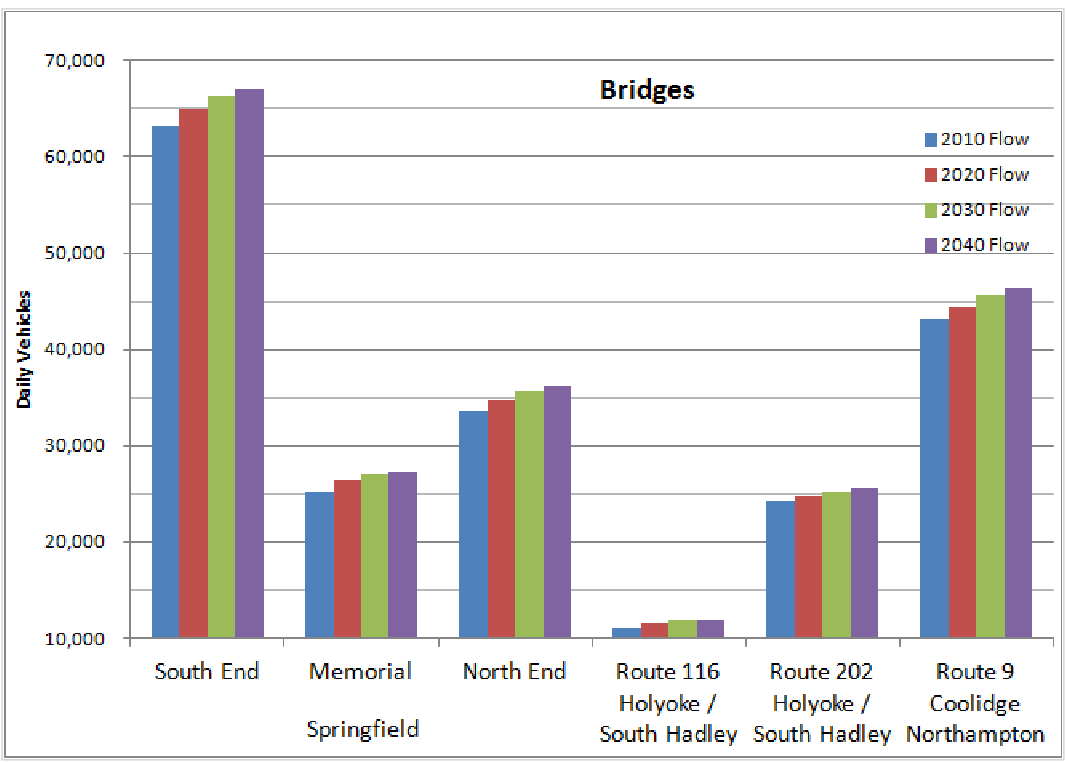
The Average Daily Traffic (ADT) at key points along major corridors within the Pioneer valley region was calculated from local and statewide traffic counts. Total traffic flows were estimated for the base year model 2010 and compared with 2010 ADT counts. Traffic flows along major corridors within the region were estimated for the three build year models 2020, 2030, and 2040 and were used to generate the following figures to represent the change in traffic flow over the 30 year span of the plan between 2010 and 2040.

2.1. Bridges

There are six major bridges in the Pioneer Valley region that provide vital connections for arterial roadways across the Connecticut River. The Julia Buxton Bridge (Route 5/57), more commonly known as the South End Bridge connects I-91 in Springfield with Routes 5 and 57 in Agawam. The Memorial Bridge (Route 147) and the North End Bridge (Route 20) connect the City of Springfield and the Town of West Springfield. Two bridges connect the City of Holyoke to the Town of South Hadley via Route 116 and Route 202 respectively. The Calvin Coolidge Bridge connects the City of Northampton to the Town of Hadley via Route 9.

The average daily traffic flows on the South End, Memorial, and North End bridges was projected to significantly increase from 2010 to 2020. This was likely the result of an expected growth in employment in Springfield (Figure 2).

Figure 2 - Estimated Average Daily Traffic Flow on Area Bridges

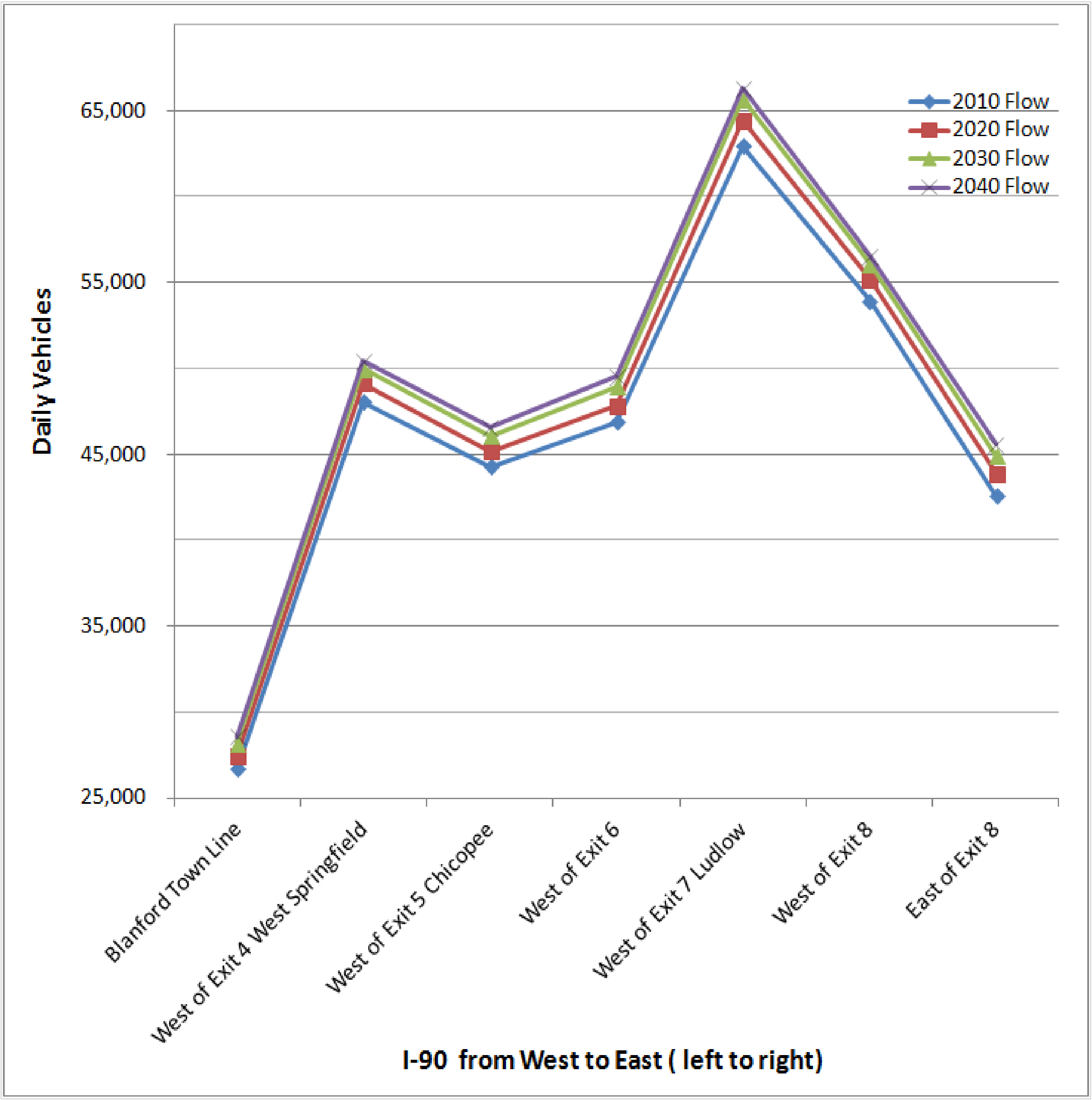


2.2. Interstate 90 (Massachusetts Turnpike)

Traffic volumes on the Massachusetts Turnpike (Interstate 90 or I-90) within the Pioneer Valley region between exits 4 and 8 were estimated to steadily increase from 2010 to 2040 (Figure 3). Traffic volumes on I-90 had highest volumes west of exit 7, at the traffic count location between interchange 6 and 7. There was a difference of approximately 15,000 in traffic volume attributed to traffic from I-291 accessing I-90 at Interchange 6. The largest urban community in the Pioneer Valley is the City of Springfield, through which I-291 provides direct access to regional hospitals and the bulk-mail distribution center. The Westover Metropolitan Airport and Westover Air Base in the City of Chicopee's closest access to I-90 is also via interchange 6.

Several factories and major industries are located in northeast section of Springfield flanked by access roads to interchanges 6 and 7 of I-90. These include Solutia Inc. and Smith and Wesson Corp. Traffic flow volume between interchange 7 and 8 was second in magnitude in the region. Route 21 provides access to I-90 at Interchange 7 for the City of Springfield and Town of Ludlow. Parker Street (Route 21) in the City of Springfield provides access to several residential neighborhoods as well as the Eastfield Mall. The Hampden County Correctional Facility at Stonybrook is located in Ludlow and is accessed via either interchange 6 or 7.

Figure 3 - Estimated Average Daily Traffic Flow on Interstate 90

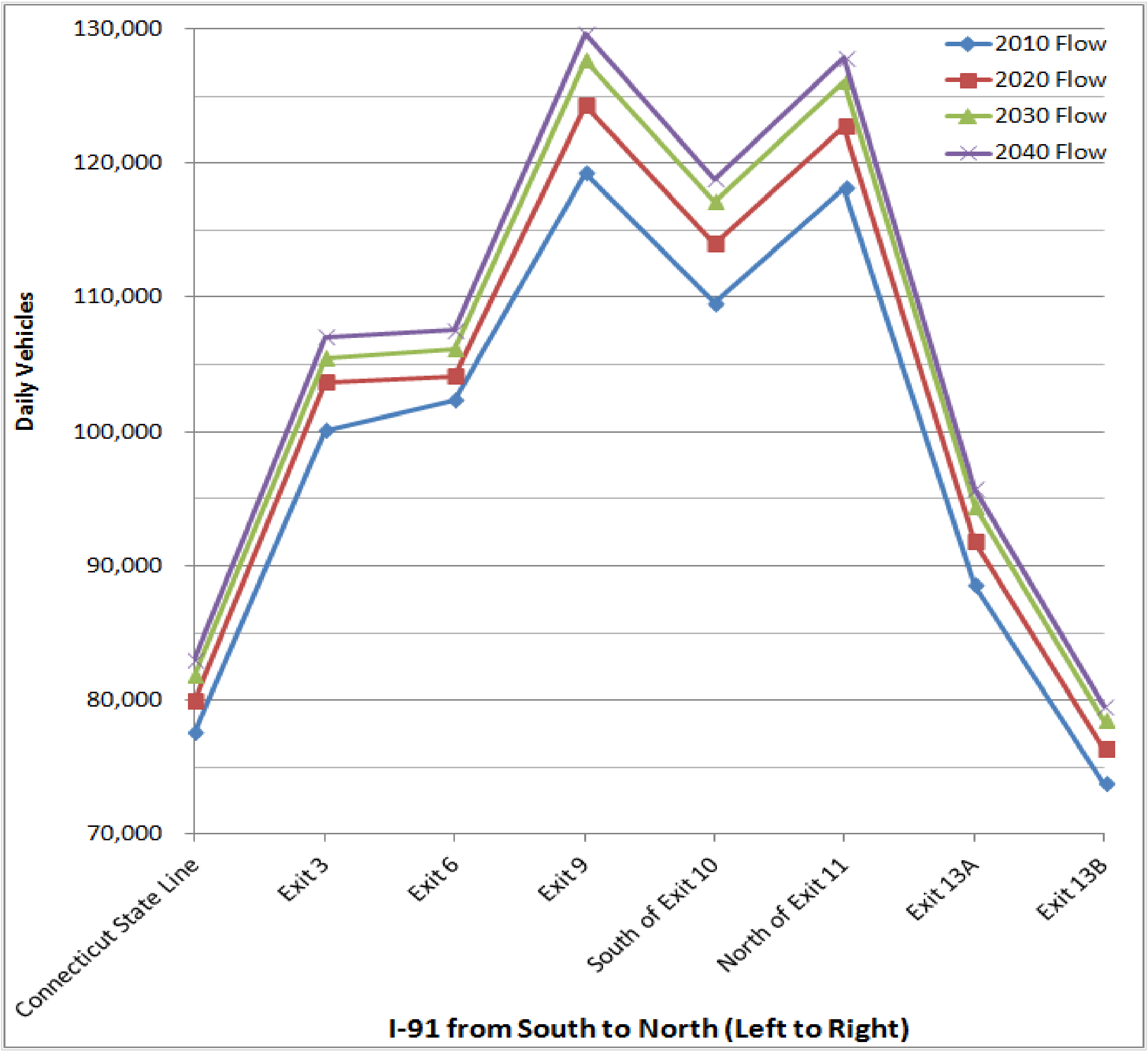


2.3. Interstate 91 (I-91)

Average traffic flow volumes along I-91 were estimated to experience a larger increase between exits 3 and 13 in Springfield and West Springfield, while traffic volumes moderately increased north of Exit 16 in Holyoke (Figure 4). The largest increase in traffic flow volumes occurred through the Central Business District Areas (CBD) in the larger urban communities of Springfield, West Springfield and Holyoke.

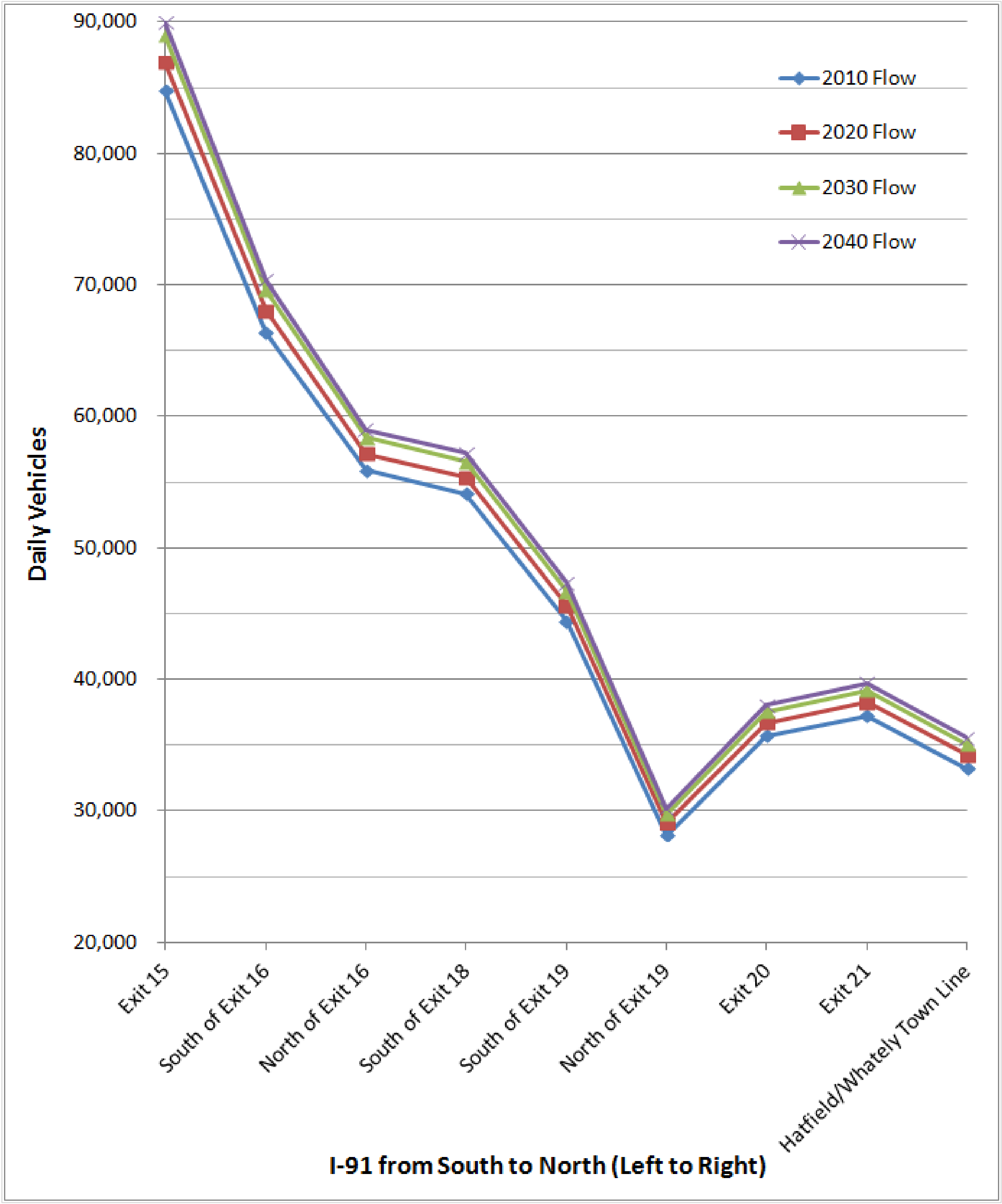
Traffic from I-291 and I-391 merges with Traffic on I-91 between Interchanges 9 and 12. I-91 Exit 9 provides access to three major area hospitals: Baystate, Mercy, and Shriners. Interchange 13 also provides access to many businesses on Riverdale Street. Interchange 12 connects I-91 with I-391, which in turn connects the second and third largest communities in the Pioneer Valley, the cities of Holyoke and Chicopee. This increase in traffic flow reflected the growth trends in population and employment within these areas between 2010 and 2040.

Figure 4 - Estimated Average Daily Traffic Flow on Interstate 91



The major activity center at Interchange 15 is the Holyoke Mall in addition to hotels, and business offices (Figure 5). Interchange 19 provides access to Route 9 and connects to a major employer in the region, the University of Massachusetts in Amherst.

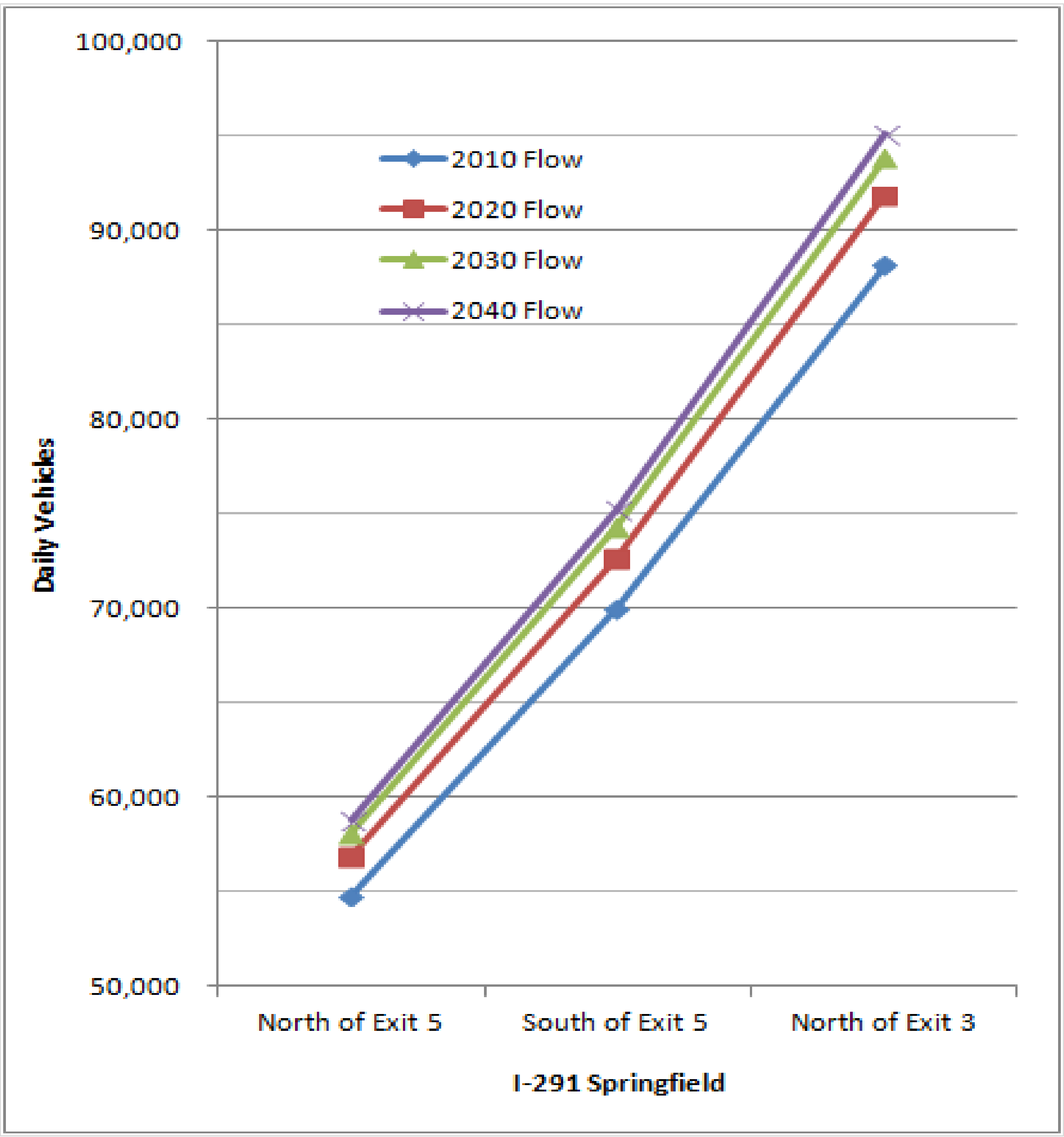
Figure 5 - Estimated Average Daily Traffic Flow on Interstate 91 (continued)


90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
Daily Vehicles
2010 Flow
2020 Flow
2030 Flow
2040 Flow
Exit 15
South of Exit 16
North of Exit 16
South of Exit 18
South of Exit 19
North of Exit 19
Exit 20
Exit 21
Hatfield/Whately Town Line
I-91 from South to North (Left to Right)

2.4. Interstate 291 (I-291)

Estimated traffic flow at three locations along I-291 in Springfield showed a steady increase in traffic volume along this corridor (Figure 6). The largest increase in average traffic flows were projected to occur by 2020 within the first ten years of the base year model. Exit 3 at Armory Street in Springfield provides access to three hospitals: Baystate Medical Center, Mercy Medical Center, and Shriners Hospital for Children. Exit 5 at Page Boulevard provides access to major employers such as Smith and Wesson, Big Y supermarket, and the Springfield Central High School.

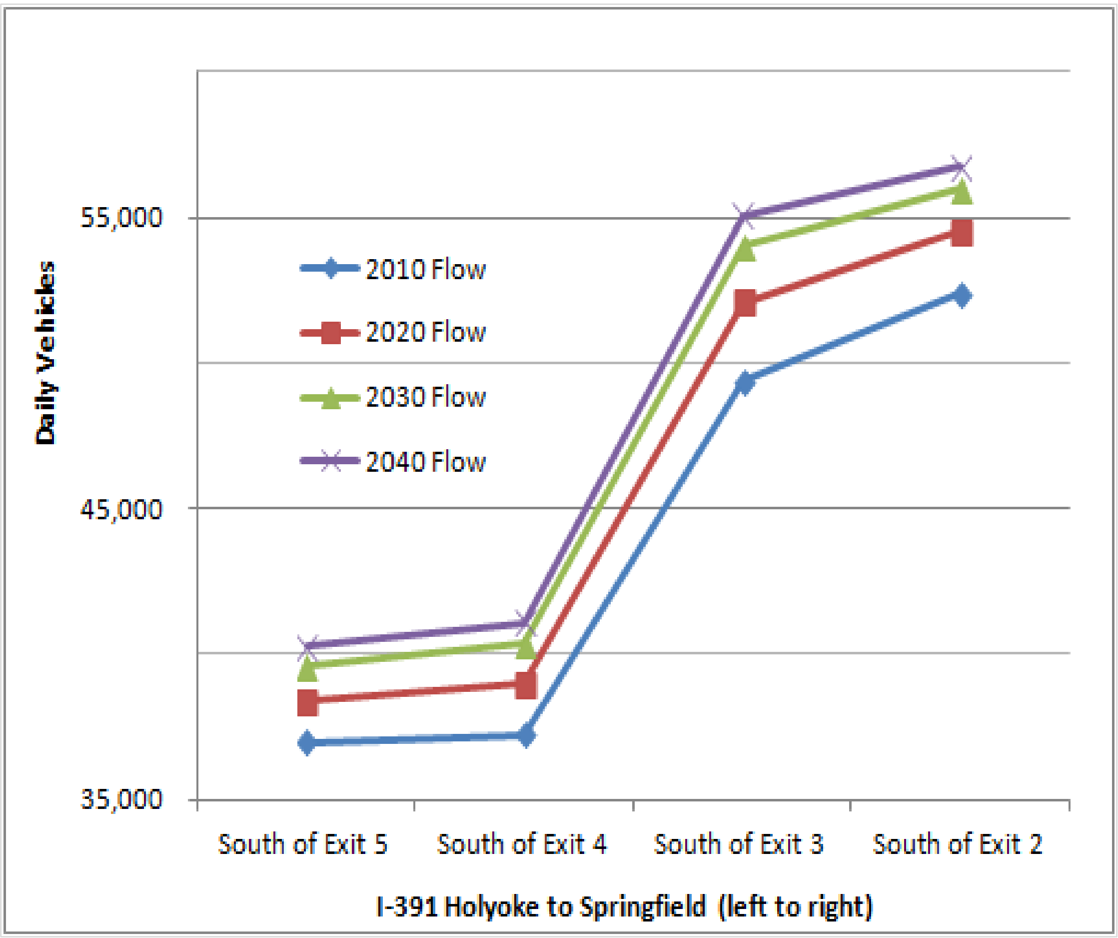
Figure 6 - Estimated Average Daily Traffic Flow on Interstate 291



2.5. Interstate 391(I-391)

Estimated traffic flow volumes for I-391 were projected to increase the most within the first 10 years of the base year 2010 model and then more moderately thereafter by 2030 and 2040 (Figure 7). Interstate I-391 provides vital access to the Interstate Highway System for the City of Chicopee. The closer to I-91 the heavier the traffic volumes become on I-391 as reflected by the higher volumes in the vicinity of Exit 2.

Figure 7 - Estimated Average Daily Traffic Flow on Interstate 391

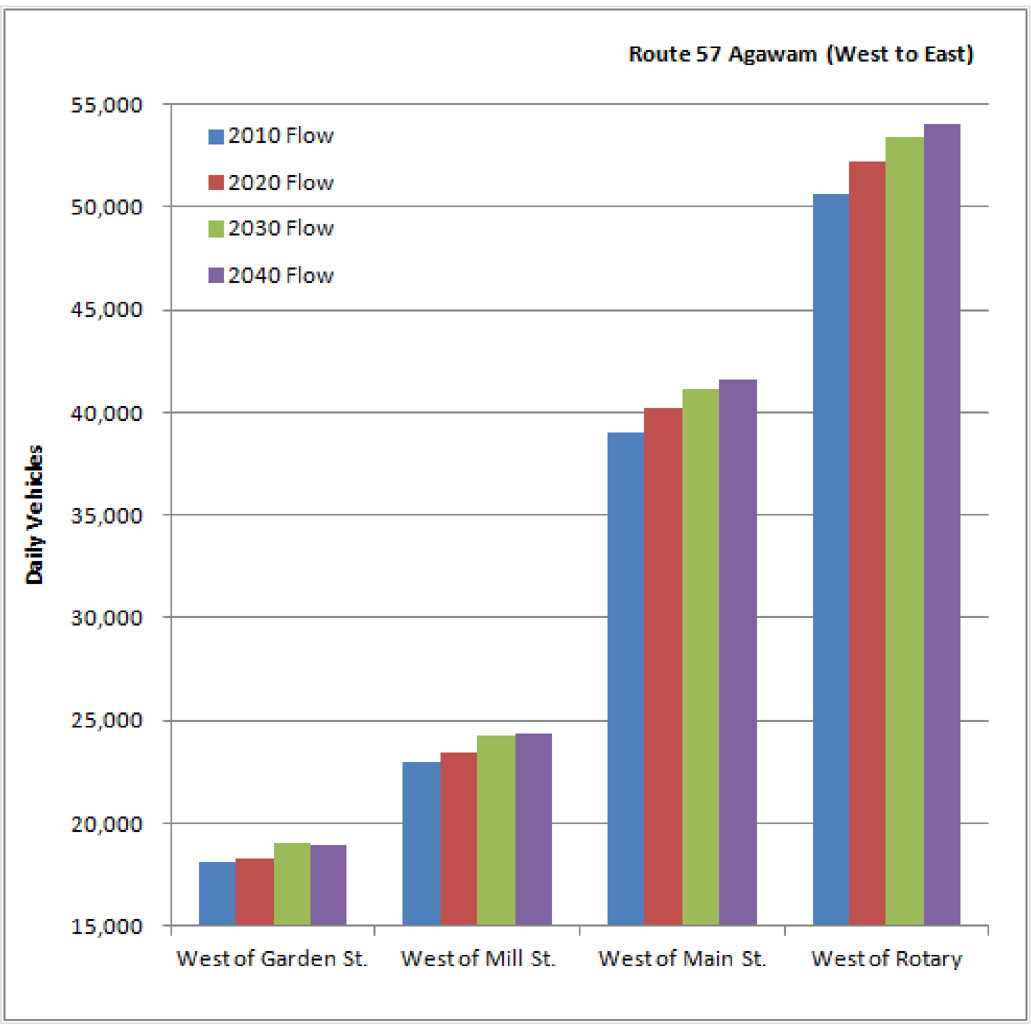


2.6. Route 57

Route 57 is a limited access highway from South Westfield Street (Route 187) in the Town of Agawam until the Route 5/57 rotary near the South End Bridge. It provides a connection to the regional amusement park, Six Flags New England. The park is located along Main Street (Route 159) in Agawam. It can also be accessed from Route 5 and I-91 via the Agawam rotary and River Road. There was an upward increase in traffic on Route 57 as travelers approach the rotary and its connection to I-91 via the South End Bridge.

Estimated traffic flow volumes for Route 57 were projected to increase near the Agawam rotary especially within the first 10 years of the base year 2010 model and moderately increase for the following 20 years (Figure 8). The increase in projected traffic volumes was more apparent towards the eastern section of the corridor where Route 57 meets Route 5, a major north south corridor in the Pioneer Valley region.

Figure 8 - Estimated Average Daily Traffic Flow on Route 57

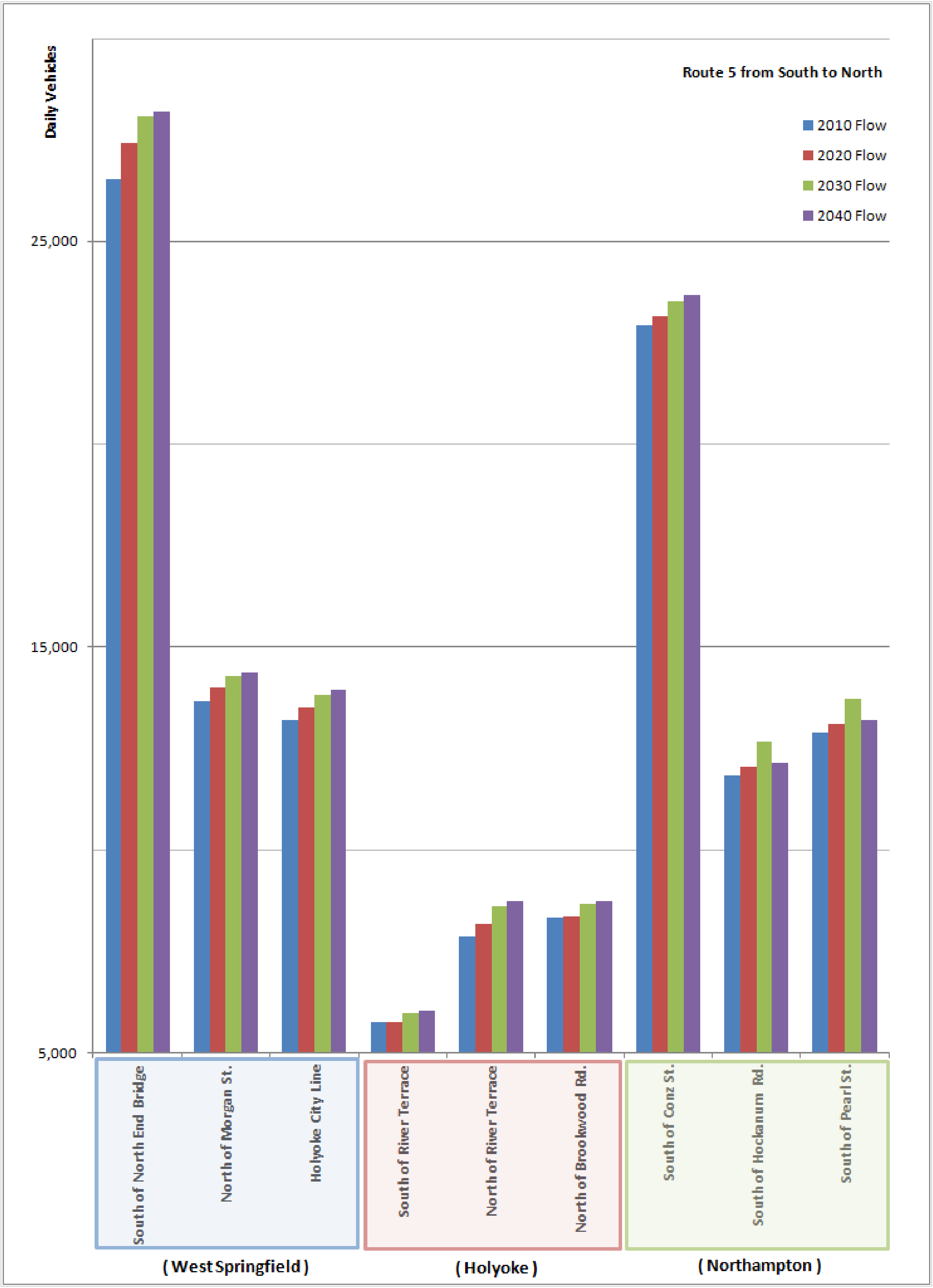


2.7. Route 5

Estimated traffic flow volumes for Route 5 were projected to increase throughout the corridor by 2030. A decrease in average traffic flows, however, was observed from 2030 to 2040 at two locations close to the Northampton City center (Figure 9). A change in the direction of population and employment projections in the central business district in Northampton could be the result of the drop in traffic volume. In addition, the City actively plans for non-motorized traffic accommodations to make the downtown area more pedestrian and bicycle friendly.

Increases in projected traffic volumes was more evident within the boundaries of the Town of West Springfield. This could be attributed to the expected growth in population and employment in the area where Route 5 is flanked by business and residential developments.

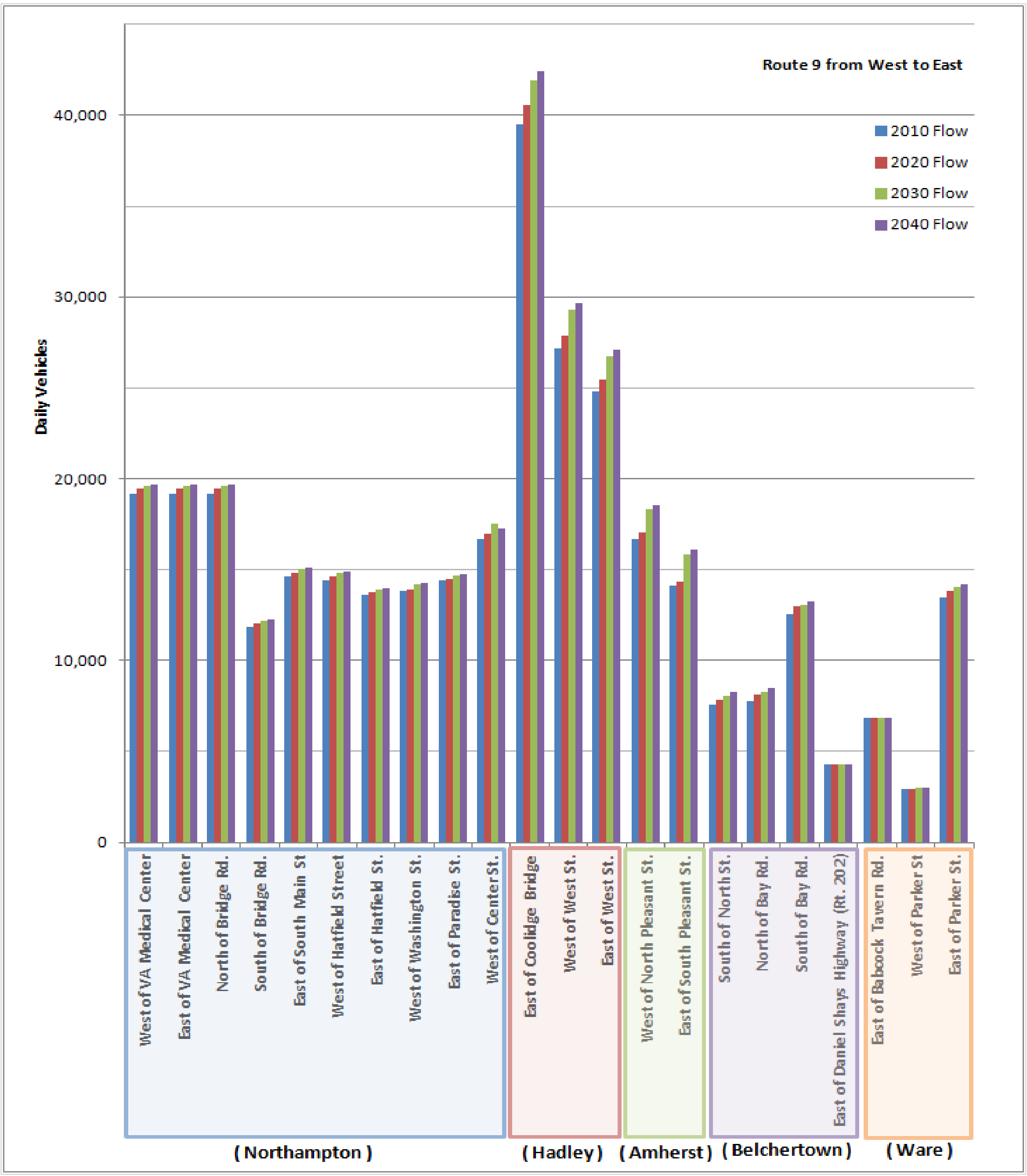
Figure 9 - Estimated Average Daily Traffic Flow on Route 5



2.8. Route 9

Estimated traffic flow volumes for Route 9 were projected to increase throughout the corridor in the next 30 years (Figure 10). The larger traffic flow volumes on Route 9 within the Town of Hadley could be attributed to the continued corridor development and business growth planned for this corridor. Traffic volumes are highest in the vicinity of the Coolidge Bridge due to the access it provides to I-91 at Interchange 19.

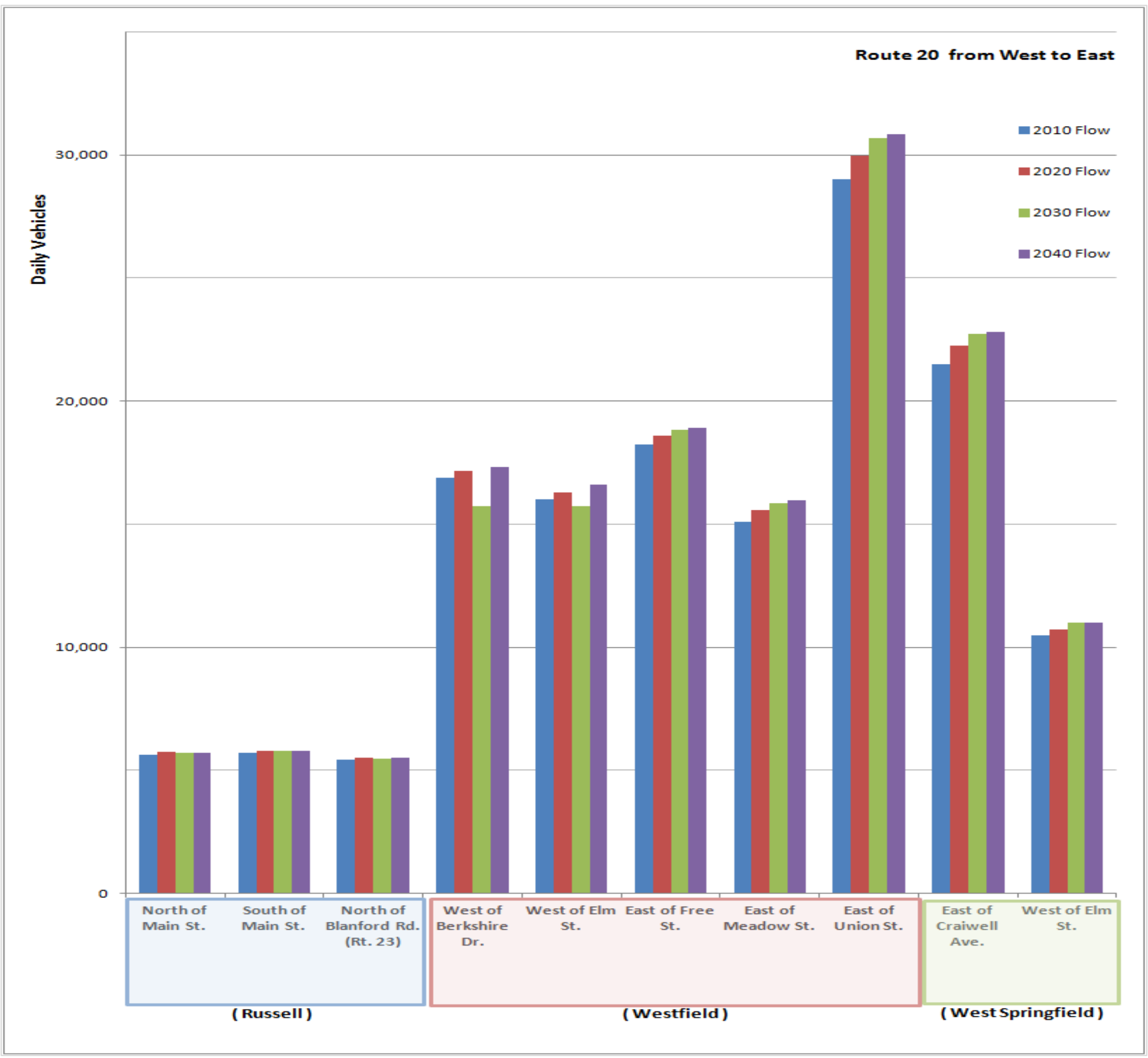
Figure 10 - Estimated Average Daily Traffic Flow on Route 9



2.9. Route 20 (Western Region)

Estimated traffic flow volumes for Route 20, within the western part of our region, were projected to increase in Westfield and part of West Springfield over the next 30 years (Figure 11). Growth in traffic flow volumes in Westfield could be linked to the expected growth in the student community at the Westfield State University and the associated growth in development to meet their increased demand. The development of the Westfield Transportation Center establishes that community as a hub for travel within the western region. Also, Route 20 intersects with Route 202 in the center of Westfield and connects the community with I-90 Exit 3 via North Elm Street. In the Town of Russell, traffic flows were projected to increase in the first 10 years and decrease thereafter on Route 20.

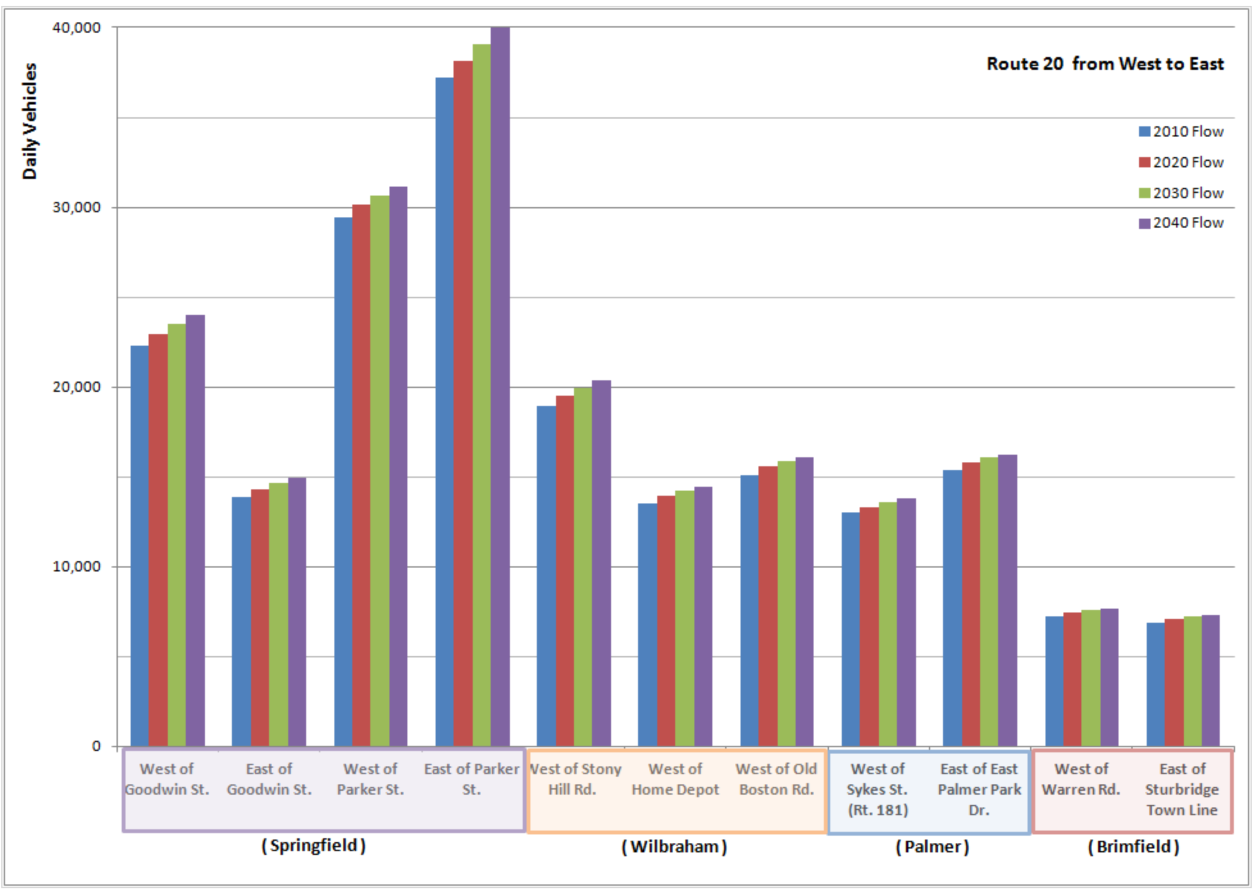
Figure 11 - Estimated Average Daily Traffic Flow on Route 20 (Western Region)



2.10. Route 20 (Eastern Region)

Estimated traffic flow volumes for Route 20, within the eastern part of the Pioneer Valley region through the communities of Springfield, Wilbraham, Palmer, and Brimfield were projected to increase in the next 30 years (Figure 12). Growth in the larger communities reflected a larger increase in traffic flow as apparent within the boundaries of the City of Springfield. Boston Road (Route 20) in Springfield is flanked by mixed use developments which would continue to increasingly attract vehicular trips. Higher traffic volumes were evident where Route 20 intersected with Parker Street in Springfield which could be attributed to the access Parker Street (Route 21/141) provides to I-90 Exit 7.

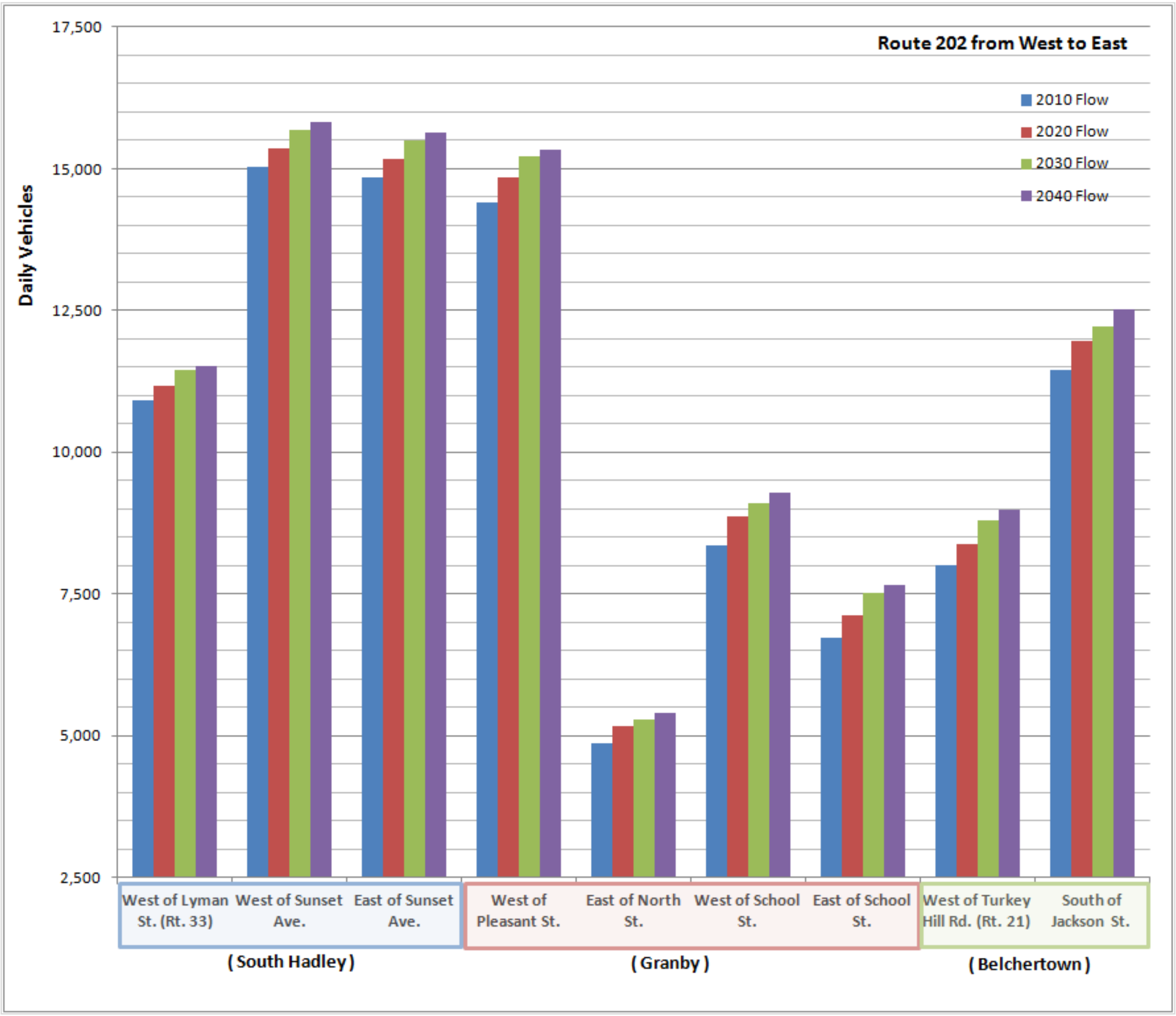
Figure 12 - Estimated Average Daily Traffic Flow on Route 20 (Eastern Region)



2.11. Route 202 (Northern Region)

Estimated traffic flow volumes for Route 202, within the communities of South Hadley, Granby, and Belchertown in the northern part of the Pioneer Valley region, were projected to increase over the next 30 years (Figure 13). Route 202 intersects with Route 181 in the center of Belchertown, which provides access to I-90 Exit 8 in Palmer.

Figure 13 - Estimated Average Daily Traffic Flow on Route 202 (Northern Region)



2.12 Route 202 (Southern Region)

Estimated traffic flow volumes for Route 202, within the communities of Westfield and Southampton in the southern part of the Pioneer Valley region, were projected to increase over the next 30 years (Figure 14). Route 202 intersects with Route 20 in the center of Westfield, and leads to I-90 Exit 3. In Southwick, Route 10/202 intersects with Route 57 which provides access to the Agawam Rotary and connects to Route 5 and the South End Bridge in Springfield. Route 202 continues south to the state of the Connecticut.

Figure 14 - Estimated Average Daily Traffic Flow on Route 10/202 (Southern Region)