3.0 Future No-Build Conditions

3.1 Introduction

Existing conditions along the Route I-495 project corridor were discussed in detail previously in Chapter 2 with regard to roadway infrastructure, traffic volumes, traffic operations, safety, public transportation, land use, socio-economics, and the environment. This chapter presents information on future year 2030 conditions along the corridor for several of these same topics.

The traffic discussion in this chapter assumes No-Build conditions. That is, it is assumed for purposes of discussion that no substantial improvements to the highway infrastructure, such as additional lanes, new interchanges, the introduction of signalization at unsignalized intersections, etc., will have been made between now and 2030.

3.2 Future No-Build Conditions

3.2.1 Transportation

This section discusses future transportation conditions within the I-495 study corridor with regard to traffic volumes, peak period operating conditions, and safety. Also included is a brief discussion of future proposed changes to public transportation services within the study area as contained in current regional transportation plans.

3.2.1.1 Traffic Volumes

Projections of future year weekday No-Build 2030 traffic volumes on I-495 itself and at its interchanges were provided by the Central Transportation Planning Staff (CTPS). These projections were derived by CTPS using their regional transportation model, modified as necessary to provide the detail needed for this particular study, including projections associated with specific known development in the study area. (See a CTPS memorandum on their regional transportation model in the Technical Appendix of this report.) It should be noted that regional transportation models such as this one are based on projections of future demographics, including population, employment, etc. If these inputs to the model should differ in the future from what was projected, then the results of the traffic model would also be affected. For example, the recent increases in gasoline prices were not considered when developing
the model. Should these higher prices persist over the long term, travel patterns and volumes could certainly be affected.

Projections of future traffic are produced and then analyzed so that future traffic issues can be identified. Once such issues are identified, a program of recommended improvements to be implemented in the future can be developed. These same projections of future traffic also provide indications of how long solutions developed in response to existing problems will remain effective.

Figures 3-1 and 3-2 illustrate the projected Average Weekday Daily Traffic (AWDT) on the I-495 main line as well as AM and PM peak period directional counts for 2030 Future No-Build conditions. The volumes shown on Figures 3-1 and 3-2 can be compared with those presented on Figures 2-3 and 2-4 respectively, in Chapter 2 to see how traffic is expected to grow at specific locations along the I-495 study corridor between now and 2030.

Figures 3-1 and 3-2 show that eastbound AWDT will vary from 72,600 in Westford at the study corridor’s far western end to 30,000 in Amesbury at the study corridor’s far eastern end. In the westbound direction, AWDT is projected to vary from 32,000 in Amesbury to 73,800 in Westford.

As under current conditions, the busiest section of I-495 in terms of AWDT traffic volumes will be in that section of the highway located in Lowell between Exits 36 and 37. Specifically, AWDT in this area is projected to be 77,000 eastbound and 78,000 westbound, for a total two-way AWDT of 155,000 vehicles per day. As a point of interest, existing (2006) two-way AWDT at this same location, which was also the location where AWDT was of greatest value under existing conditions, was shown in Chapter 2 to be 140,500 vehicles per day.

Year 2030 Future No-Build AM peak hour volumes in the eastbound direction range from 6,610 in the three-lane section of the highway in Westford to 1,880 in the two-lane section of the highway in Amesbury. In the westbound direction, they are projected to range from 2,450 in Amesbury to 5,890 in Westford. The highest eastbound AM peak hour volume is projected to occur west of Exit 32 in Westford, at 6,610 vehicles per hour. In the westbound direction during the AM peak hour, the highest volume will be 6,790 vehicles per hour between Exits 49 and 48 in Haverhill.

In the PM peak hour, eastbound volumes range from 5,250 in the three-lane section of the highway in Westford to 2,340 in the two-lane section of the highway in Amesbury. In the westbound direction, they range from 2,230 in Amesbury to 6,400 in Westford. The location with the highest PM peak hour volume in the eastbound direction is between Exit 48 and Exit 49 in Haverhill, where volume is estimated to be 6,610 vehicles per
Figure 3-1*

2030 Average Weekday Daily Traffic and AM and PM Peak Directional Volumes

Western Segment

Legend

<table>
<thead>
<tr>
<th></th>
<th>Average Daily Traffic Volume</th>
<th>AM Peak Hour Directional Volume</th>
<th>PM Peak Hour Directional Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Daily Traffic Volume</td>
<td>AM Peak Hour Directional Volume</td>
<td>PM Peak Hour Directional Volume</td>
</tr>
<tr>
<td></td>
<td>2030 Average Weekday Daily Traffic and AM and PM Peak Directional Volumes</td>
<td>Western Segment</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-2

2030 Average Weekday Daily Traffic and AM and PM Peak Directional Volumes

Eastern Segment

Legend

Average Daily Traffic Volume
AM Peak Hour Directional Volume
PM Peak Hour Directional Volume

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
hour. Westbound, the location with the highest value will be between Exits 37 and 36 in Lowell, with a total of 6,580 vehicles per hour.

AM and PM peak hour turning movements at all of the interchanges along the I-495 study corridor are presented in Figures 3-3 through 3-6. Again, the volumes presented on these four Figures can be compared with those given on Figures 2-5 through 2-8 in Chapter 2 to observe projected traffic growth at specific locations along the study corridor.

### 3.2.1.2 Projected (2030) No-Build Peak Hour Traffic Operations

In this section, projected 2030 traffic operating conditions along the study corridor are briefly discussed with regard to levels of service at unsignalized and signalized intersections; at merge, diverge, and weave locations; and at key links on I-495 itself. The brief text discussions of these issues are accompanied by a series of Figures that graphically illustrate the projected levels of service resulting from the analyses undertaken.

For this No-Build traffic operations analysis it is assumed that no major improvements/changes to the roadway network/infrastructure will have been made between now and 2030 aside from those planned, underway, or listed on the Transportation Improvement Programs (TIP) of the study corridor’s two regional planning agencies.

For those desiring more detailed information on the analyses results, please see Appendix C of this document. Tables in Appendix C present information with regard to not only level of service but also delays and queue length. Such information is provided on an individual-movement-within-an-intersection basis.

### Intersections

Results of the analyses of future 2030 No-Build intersection levels of service are given in this section, first for the AM peak period and then for the PM peak period. As noted in Chapter 2, the intersections studied are located where I-495’s on- and off-ramps meet the local street network.

**AM Peak Hour**

Figures 3-7 and 3-8 graphically illustrate projected 2030 AM peak hour levels of service for signalized and unsignalized intersections in the Western and Eastern Segments of the study corridor, respectively.
The Western Segment of the study corridor includes six interchanges with local streets, these being Exits 32 through 34 and Exits 37 through 39. These 6 interchanges are themselves comprised of a total of 12 intersections that are either signalized or stop-controlled and which were the subject of the analyses.

For the signalized intersections, Figure 3-7 shows that all six of them will continue to operate in the acceptable LOS A through LOS D range overall, as they did under existing 2006 conditions. When individual movements within these intersections were examined, the analysis showed that 40 movements (91 percent) of the total of 44 movements will operate in the LOS A through LOS D range, a decrease from 42 such movements (95 percent) for 2006. Of the four movements (9 percent) not in this range, there will be two at LOS E, one being at Exit 32 SB in Westford and the other at Exit 39 NB in Tewksbury. Unlike in 2006, by 2030 there will also be two movements at signalized intersections that will operate at LOS F. These two locations will be at Exit 32 NB in Westford and at Exit 39 SB in Tewksbury.

As stated in Chapter 2, unsignalized intersections do not receive an overall level of service determination, as do signalized intersections. Rather, only conflicting movements within such intersections are analyzed. Of the total of 23 such conflicting movements at the 6 unsignalized intersections in the Western Segment, 16 movements (70 percent) will continue to operate in the acceptable LOS A through LOS D range. In 2006, this percentage was 87 percent. Whereas in 2006 three movements (13 percent) were determined to be operating at LOS F, by 2030 there will be five movements (22 percent) at LOS F, namely, two at Exit 33 NB in Chelmsford, one at Exit 34 NB in Chelmsford, one at Exit 37 NB in Lowell, and one at Exit 37 SB in Lowell. In addition, by 2030 there will also be two movements (8 percent) operating under LOS E conditions. These two movements will be at Exit 34 SB in Chelmsford and at Exit 37 NB in Lowell.

With regard to signalized intersections in the Eastern Segment of the study corridor, it can be seen from Figure 3-8 that there are seven such intersections that were analyzed. Figure 3-8 also shows that all seven of these signalized intersections will operate in the desirable LOS A through LOS D range overall, as did all the signalized intersections in 2006. A total of 43 movements (98 percent) out of the 44 movements that these intersections contain will also operate in the desirable LOS A through LOS D range, the one exception being a left-turn movement at Exit 50 SB. It will operate at LOS F.
Figure 3-3*
2030 AM Peak Hour Turning Movement Volumes
Western Segment

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy of Environmental Affairs
Figure 3-4*
2030 AM Peak Hour Turning Movement Volumes
Eastern Segment

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3 - 5*
2030 PM Peak Hour Turning Movement Volumes
Western Segment

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
2030 PM Peak Hour Turning Movement Volumes
Eastern Segment

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3-8*
2030 AM Peak Hour LOS Intersection Operations
Eastern Segment

Legend
- Signalized Intersection - Overall intersection LOS shown by color of circle
- Unsignalized Intersection - Overall intersection LOS not applicable
- LOS A - D
- LOS E
- LOS F
* LOS was only calculated for intersections with stop and signal control
# Intersection was signalized after data was collected for existing conditions. It is analyzed as an unsignalized intersection in the existing 2006 case.

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
The Eastern Segment of the I-495 study area corridor contains, as shown on Figure 3-8, a total of 13 unsignalized intersections with a total of 53 movements that were analyzed to determine projected levels of service. There will be a total of 50 movements (94 percent) that will operate in the acceptable LOS A through LOS D range in 2030. The remaining three movements (six percent) will operate with LOS F conditions in 2030. These three movements projected to have LOS F conditions are located at Exit 43 NB and Exit 43 SB in North Andover, and Exit 55 NB in Amesbury.

PM Peak Hour

Projected 2030 levels of service determinations for signalized and unsignalized intersections in the Western and Eastern Segments of the I-495 study corridor during the PM peak hour are graphically presented in Figures 3-9 and 3-10, respectively.

Figure 3-9 shows that all six signalized intersections in the Western Segment will, in 2030, continue to operate in the desirable LOS A through LOS D range overall, as they did in 2006. On an individual movement basis, 38 movements (86 percent) of the total of 44 movements at these 6 intersections will operate in the LOS A through LOS D range. This result represents a slight decrease from 39 movements (89 percent) in 2006. Specifically, four movements (9 percent) will operate at LOS E in 2030, these movements being located at Exits 38 NB and 38 SB in Tewksbury. In 2006, there were only three such movements, all located at Exit 38 NB. The same 2 movements (5 percent) out of a total of 44 movements that were operating at LOS F in 2006 will continue to do so in 2030. These two movements are located at Exit 39 SB in Tewksbury.

For the six unsignalized intersections in the Western Segment during PM peak hour, the percentage of movements that will operate in the desirable LOS A through LOS D range will decrease from 78 percent in 2006 to 74 percent as the result of there being one more movement operating at LOS E in 2030 than in 2006. This additional movement is located at Exit 34 SB in Chelmsford, as can be seen from Figure 3-9. The five intersection turning movements at the six intersections that operated at LOS E or LOS F in 2006 will each continue to operate at exactly those same levels of service in 2030.

In the Eastern Segment of the study corridor during the PM peak hour, as shown on Figure 3-10, six (86 percent) of the seven intersections analyzed as being signalized for 2030 will operate in the desirable LOS A through LOS D range overall. At Exit 46 SB in Methuen, one combined movement will within that intersection will operate at LOS E, while at Exit 50 SB in Haverhill, one movement in that intersection will operate at LOS E and another at LOS F. The remaining signalized intersection, that at Exit 46 NB in Methuen, will have deteriorated in overall level of service
such that it will operate at LOS F by 2030, having been in the desirable LOS A through LOS D range in 2006. One individual movement within this intersection, a right-turn movement at the end of the ramp will also operate at LOS F.

The 13 intersections analyzed as being unsignalized in 2030 contain a total of 53 movements, as noted previously. It was determined from the analysis that 45 movements (85 percent) will operate at LOS D or better. Of the remaining 8 movements (15 percent), 3 will operate at LOS E. These three movements will be located at Exit 41 SB in Andover, Exit 49 NB in Haverhill, and Exit 52 NB in Haverhill. The remaining five movements will operate at LOS F. They will be located at Exits 43 NB and 43 SB in North Andover, Exits 49 NB and 49 SB in Haverhill, Exit 50 SB in Haverhill, and Exit 55 NB in Amesbury.

**Merges, Diverges, and Weaves**

This section presents the results of analyses performed to determine 2030 levels of service for merge, diverge, and weave movements along the I-495 study corridor.

**AM Peak Hour**

Figures 3-11 and 3-12 visually display the analysis results for the Western Segment and the Eastern Segment of the study corridor, respectively, for the 2030 AM peak hour. Results for both directions of the highway are shown on the Figures. As Figure 3-11 shows, the analyses of the total of 38 merge/diverge/weave movements examined in the Western Segment revealed that 25 locations (66 percent) will operate in the desirable LOS A through LOS D range during the 2030 AM peak hour, as compared with 34 locations (89 percent) during the AM peak hour in 2006. There will be 13 movements—5 diverges, 4 merges, and 4 weaves—that will experience LOS F conditions, but no movements at LOS E. Merge movements at LOS F in 2030 will be at Exit 32 NB in Westford, Exit 36 NB in Lowell, Exit 37 NB in Lowell, and Exit 40 SB in Andover. The diverge movements that will be at LOS F will be located at Exit 32 NB in Westford, Exit 33 NB in Westford, Exit 34 SB in Chelmsford, and Exit 37 NB in Lowell. Finally, weave movements at LOS F will be at or near Exits 34-35 in Chelmsford and Exit 40 in Andover.

Noteworthy is the fact that the majority of the merge/diverge/weave locations in the Western Segment of the study corridor that are predicted to operate at LOS F can be found along the eastbound side of the highway, corresponding to the predominant direction of traffic flow during the time of the AM peak period (see Figure 3-1).
Figure 3-9*
2030 PM Peak Hour LOS Intersection Operations
Western Segment

Legend
- Signalized Intersection - Overall intersection LOS shown by color of circle
- Unsignalized Intersection - Overall intersection LOS not applicable
  - LOS A - D
  - LOS E
  - LOS F

* Refer to Figure 2-13 for ramp operations

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3-11*
2030 AM Peak Hour Ramp Operations
Western Segment

Legend

LOS A - D  D  Diverge
LOS E  M  Merge
LOS F  W  Weave

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3-12*
2030 AM Peak Hour Ramp Operations
Eastern Segment

Legend
- LOS A - D: Diverge
- LOS E: Merge
- LOS F: Weave

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
The results of the merge/diverge/weave analyses for the AM peak hour in the Eastern Segment of the I-495 study corridor are illustrated on Figure 3-12. In the Eastern Segment of the corridor, a total of 65 merge/diverge/weave movements was studied. Of this total, it was determined that 53 movements (83 percent) will operate in the desirable LOS A through LOS D range, as compared with 61 movements (94 percent) in 2006. A total of 11 movements (17 percent) will operate at LOS F, and are comprised of 5 merges, 5 diverges, and 1 weave. No movements will operate at LOS E. These 5 merges will be located at Exit 42 SB in Lawrence, Exit 46 SB in Methuen, Exit 47 SB in Methuen, Exit 51 SB in Haverhill, and the eastbound merge of I-495 into I-95 in Salisbury. The 5 diverge movements operating at LOS F will be at Exit 41 SB in Andover, Exit 43 SB in North Andover, Exit 45 SB in Lawrence, Exit 46 SB in Methuen, and Exit 50 SB in Methuen. The one weave at LOS F will be located in the westbound direction between Exits 48 and 47.

Of particular note is that all of the merge/diverge/weave movements that are predicted to operate with LOS F conditions are, with only one exception, located at points along the westbound direction of the I-495 highway. Again, this reflects the very heavy predominance of traffic flow in the westbound direction on this section of the highway during the AM peak hour. The one exception in the eastbound direction during this time period will be, as noted above, the merge of I-495 NB with I-95 NB in Salisbury.

**PM Peak Hour**

Results of the analyses performed with regard to merge/diverge/weave movements for the 2030 PM peak hour are summarized graphically on Figures 3-13 and 3-14 for the Western Segment and the Eastern Segment of I-495, respectively.

Looking first at the Western Segment as illustrated on Figure 3-13, analyses show that, of the 38 merge/diverge/weave movements examined, 21 movements (55 percent) will operate in the desirable LOS A through LOS D range, compared with 32 movements (84 percent) in 2006. The remaining 17 locations (45 percent) will operate at either LOS E or LOS F levels. In this particular case, two movements, a merge at Exit 38 SB in Tewksbury and a weave at Exit 40 NB in Andover, will experience LOS E conditions. The remaining 15 movements at LOS F include 6 merges, 5 diverges, and 4 weaves, the locations of which can be clearly seen on Figure 3-13.

As Figure 3-13 illustrates, the majority of merge/diverge/weave movements predicted to operate at LOS E or LOS F levels are located on the westbound direction of the I-495 highway. This situation is the
opposite of the AM peak hour experience but, again, is entirely reflective of the higher traffic flows in this direction during the PM peak hour.

Conditions in the Eastern Segment of the study corridor with regard to merges, diverges, and weaves are illustrated in graphical form on Figure 3-14. Analyses have determined that the number of movements that will operate in the desirable LOS A through LOS D range during the PM peak hour in the Eastern Segment will be 52, representing 83 percent of the 65 merge/diverge/weave movements that were examined. For 2006, a total of 63 movements (97 percent) were determined to be operating in the desirable LOS A through LOS D range. In 2030, three movements (5 percent), two diverges and one weave, will experience LOS E conditions while eight movements (12 percent), three merges, three diverges, and two weaves will operate at LOS F. The two diverge movements that will operate at LOS E in 2030 will be located at Exit 47 NB in Methuen and Exit 50 NB in Haverhill, while the one weave movement at LOS E will also be at Exit 50 in Haverhill. The LOS F locations will be three merges at Exit 45 in Lawrence, Exit 47 in Methuen, and Exit 48 in Haverhill; three diverges at Exit 43 in North Andover, Exit 48 in Haverhill, and Exit 49 in Haverhill; and two weaves at Exit 45 in Lawrence and Exit 46 in Methuen.

The PM peak hour in the Eastern Segment is also particularly noteworthy with regard to the locations where merge/diverge/weave locations will operate at LOS E or LOS F. Again, all such movements, with the exception of the diverge movement from I-95 SB to I-495 SB in Salisbury, will be located in the eastbound direction of I-495 and all concentrated in the area between Exit 43 in North Andover and Exit 50 in Haverhill. The eastbound direction is the predominant flow of traffic in the PM peak hour in the Eastern Segment of the study corridor.

**Links**

Another key aspect of the analysis of Future 2030 No-Build conditions was the analysis of link levels of service along I-495 for the length of the study corridor. As with the analyses of intersections and merge/diverge/weave movements, the analyses of link levels of service are discussed here in briefly and illustrated graphically in accompanying Figures.

**AM Peak Hour**

On Figure 3-15 can be seen the graphical presentation of the link level of service analysis conducted for the Western Segment of the study corridor during the AM peak hour. Figure 3-15 shows a total of 18 link locations where LOS analyses were undertaken. As can be seen, only seven links
Figure 3-13*
2030 PM Peak Hour Ramp Operations
Western Segment

Legend
- LOS A - D
- LOS E
- LOS F
- D - Diverge
- M - Merge
- W - Weave

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3-14*

2030 PM Peak Hour Ramp Operations
Eastern Segment

Legend

- LOS A - D: Diverge
- LOS E: Merge
- LOS F: Weave

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3-15*
2030 AM Peak Hour Link Operations
Western Segment

Legend
LOS A - D
LOS E
LOS F

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
(39 percent) were predicted to operate in the desirable LOS A through LOS D range during the 2030 AM peak hour. Four of these seven locations were determined to be in the westbound direction, the direction which experiences less traffic during the AM peak than does the eastbound direction. Eight links (44 percent) were determined to operate at LOS E while the remaining three (17 percent) will see LOS F conditions.

Similar to the results presented in the section above regarding merges, diverges, and weaves, it is of interest to note that all of the links in the Western Segment that are predicted to operate at LOS F are located in the eastbound direction of the highway, once again reflecting the heavier volumes of traffic in this direction during the AM peak.

Figure 3-16 graphically presents AM peak hour link level of service determinations for the Eastern Segment of the study corridor. In the Eastern Segment, a total of 30 links was evaluated, 15 in each direction. Of the 30 links, 22 links (74 percent) will operate in the desirable LOS A through LOS D range. Of note is that all 15 links analyzed in the eastbound direction will be in this group. Of the remaining links out of the total of 30 analyzed, 4 links (13 percent) will see LOS E conditions and 4 links (13 percent) will operate at LOS F. Those link locations that will see LOS E or LOS F conditions are all located between Exit 50 in Haverhill and Exit 41 in Andover. Again, these links are all located on the side of I-495 in the Eastern Segment that sees the greatest volume of traffic during the AM peak, namely the westbound direction.

PM Peak Hour

On Figure 3-17 can be seen the results of the 2030 link level of service analysis for the PM peak hour in the Western Segment. Of the 18 links analyzed, 10 links (56 percent) will operate in the desirable LOS A through LOS D range. Of the remaining links, five links (28 percent) will operate at LOS E and three links (16 percent) will operate at LOS F. Note that all three links predicted to operate at LOS F are located in the westbound direction, where traffic flow in the PM peak is greater than that in the eastbound direction.

The final Figure in this series, Figure 3-18, graphically illustrates the results of the link level of service analysis for the Eastern Segment of the study corridor for the 2030 PM peak hour. Of the 30 locations analyzed, it was determined that 23 links (77 percent) will operate in the LOS A through LOS D range. All links in the westbound direction are included in this category. In the eastbound direction, there will be three links (10 percent) at LOS E and four links (13 percent) at LOS F. As with other examples noted previously in this section, the LOS E and LOS F conditions in the eastbound direction are directly related to the heavier
volumes of traffic that will be traveling in this direction during the PM peak hour.

3.2.1.3 Crashes

Studies and analyses undertaken throughout the country have revealed that there is a direct correlation between traffic volumes and the number of crashes that occur. As traffic volumes increase, so too do the number of crashes. The I-495 corridor, including the highway itself and its interchanges, have been determined to follow this nationwide pattern. There is no reason to assume that they will not continue to do so in the future. Accordingly, by 2030, the future year with regard to this study’s traffic analyses, the number of crashes that can be expected to occur can reasonably be assumed to rise in some proportion to projected increases in traffic volumes.

As noted elsewhere, volumes on I-495 are typically greater on the western end of the study corridor than on the eastern end of the corridor and will continue to be so in the future. Therefore, one can expect that the greatest number of crashes in the future will continue to occur at these same locations. In addition, Exits 32 in Westford, 35 in Chelmsford, 40 in Andover, and 51 in Haverhill will likely continue to experience the highest number of crashes of all the interchanges along I-495, as they do now.

Attempting to predict the actual number of crashes that will occur is far from an exact science. Nevertheless, one can reasonably conclude that there will be more crashes in the future along the corridor than there are today.

3.2.1.4 Future Transportation/Transit Improvements

Future transportation/transit improvements that relate to the study area have been identified in previous planning studies and documents. However, the majority of the improvements relate to the north-south mobility, specifically the transit and highway connections to New Hampshire as noted in the I-93 Corridor Study. One key recommendation of this study is for the MBTA to restore double trackage between Haverhill and Lawrence on the Haverhill commuter rail line so that more service could be offered, service that would have the potential for removing traffic from I-495. In addition, the MBTA, in cooperation with the Nashua Regional Planning Commission, is seeking to restore rail service from Manchester and Nashua to Lowell connecting the MBTA commuter rail service to Boston. This service could be operated by the MBTA as an extension service from Lowell and include a stop in North Chelmsford. The MBTA is also considering new express bus service from Lowell to the Hanscom Field/Hanscom Air Force Base area.
Legend

- LOS A - D
- LOS E
- LOS F

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

Figure 3-16*
2030 AM Peak Hour Link Operations
Eastern Segment
Figure 3-17*
2030 PM Peak Hour Link Operations
Western Segment

Legend

- **LOS A - D**
- **LOS E**
- **LOS F**

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Figure 3-18*
2030 PM Peak Hour Link Operations
Eastern Segment

Legend

*Map Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Additional recommendations were obtained from the Merrimack Valley Metropolitan Planning Organization FY 2008-2011 Transportation Improvement Program.

Transit projects within the Merrimack Valley Metropolitan Planning Organization FY 2008-2011 Transportation Improvement Program include:

Highway High Priority Projects (HPP) –

- Amesbury-Newburyport – Rehabilitation of I-95 Whittier Bridge;
- Andover – Design, Engineering and Construction at I-93 The Junction Interchange,
- (Andover, Tewksbury, and Wilmington);
- Haverhill – Construct Haverhill intermodal center access and vehicle capacity improvements;
- Lawrence – Design and construct Canal and Union Street Corridor improvements;
- Lawrence – Construct access improvements to the Lawrence Gateway Project;
- Methuen – Design, engineering and construction of Methuen Rotary alternative at I—93 and State Routes 110 and 113;
- Newbury – Rehabilitation and paving of Parker River Road;
- North Andover – Improvements to Mass. Ave., Andover St., Osgood St., Salem St. and Johnson Street in the Old Town Center of North Andover; and
- Salisbury to Danvers – Design, Engineer, Permit and Construct “Border to Boston Bikeway” rails-to-trails project.

Transit Projects for Bus and Bus-Related Facilities and Clean Fuels Grant Program—

- Haverhill – Design and Construct Intermodal Transit Parking Improvements;
- Newburyport – Design and Construct Intermodal Facility; and
- Lawrence – Gateway Intermodal and Quadrant Area Reuse.

3.2.2 Land Use

Section 2.3.2 in Chapter 2 provided discussions of existing land use within a one-mile radius of the various I-495 interchanges along the study corridor, specifically noting the dense urban development of the traditional mill cities of Lowell, Lawrence, and Haverhill and the contrasting low-density suburban development typical of many of the corridor communities. Within these discussions for several of the communities
were references to undeveloped land, the key locations of which are summarized here. It is likely that much of this undeveloped land will be developed in future years, one result of which will be additional traffic on I-495 generated by the new uses. Assumptions of future growth in these areas were incorporated into the CTPS traffic model that was used to project future traffic volumes on roadways in the study corridor.

In Westford in the study corridor’s Western Segment, it was noted that there are approximately 200 acres of industrially zoned land in the vicinity of Exit 32 available for development. An area of vacant land near Exit 35 in Chelmsford is also zoned for industrial development, but environmental issues associated with this land may limit its future development potential. In Lowell, the area of greatest future development potential was noted to be CrossPoint. Large areas of forested and industrially zoned land were described for locations in Tewksbury near the I-495 interchanges.

For Lawrence in the study corridor’s Eastern Segment, several old mill buildings being redeveloped into other land uses were noted, as were areas of forested land near the city’s interchanges. A large 50-acre tract of undeveloped land in Methuen near Exit 47 and zoned for commercial development was specifically cited. Other industrial land and forested land in the vicinity of this same Exit were also referenced. Near Exit 48 in Haverhill is another large area of undeveloped land offering the potential for a substantial amount of future development. Another large industrially zoned area of land near Exit 50 in Haverhill exists, but its development potential may be limited because of environmental issues. Similar land also exists near Exit 52 in Haverhill. Several large tracts of undeveloped land can be found near Exit 54 in Amesbury.

During the course of preparation of this corridor study, a number of specific development projects that have already entered the environmental impact review process and/or have received required permits were identified and taken into consideration. Among these projects were the following:

Again, these developments and others, as they are approved and constructed, will all result in additional traffic being placed on I-495. Traffic volumes likely to be associated with these known future developments were specifically added to projections of future traffic in the study area produced by CTPS. Other possible developments that, if they come to fruition will generate additional traffic, including the Brickstone/Shawsheen Square development at Exit 41 and the Golden Triangle development at Exit 55, have not been specifically included in the traffic analysis.
### 3.2.3 Socio-Economics

Projections of future socio-economic conditions in the I-495 study area corridor with regard to population, households, and employment, were presented and discussed in detail on a community-by-community basis in Section 2.3.3 of Chapter 2 in association with a presentation and discussion of existing socio-economic characteristics. The projections used were those developed by the Northern Middlesex Council of Governments and the Merrimack Valley Planning Commission, the two regional planning agencies serving the communities along the I-495 study corridor.

Population in the study area communities was projected to increase by 16 percent by the year 2030 in comparison with year 2000 population. The number of households was projected to increase by 21 percent during this same time period, and employment was projected to increase by 20 percent.

### 3.3 Summary of Future Conditions/Issues

#### Traffic Volumes

- Traffic volumes along the corridor will have grown since existing conditions, but at smaller rates than have been experienced in the past.
• Average weekday daily traffic volumes on I-495 will range from 146,400 vehicles per day at the far western end of the corridor in Westford to 62,000 vehicles per day at the eastern end of the corridor in Amesbury.

• During the AM peak hour in the eastbound direction, volumes will range from 6,610 vehicles in Westford to 1,880 in Amesbury. In the opposite westbound direction, they will range from 2,450 vehicles in Amesbury to 5,890 in Westford. In the eastbound direction during the PM peak hour, traffic volumes are projected to range from 5,250 vehicles in Westford to 2,340 in Amesbury. In the westbound direction, they will range from 2,230 in Amesbury to 6,400 in Westford.

Traffic Analyses

As was done for the study of existing traffic issues presented in Chapter 2, the analysis of future 2030 No-Build conditions also divided the I-495 study corridor into a Western Segment and an Eastern Segment.

Similarly, future 2030 No-Build traffic conditions were examined from the perspective of (1) signalized and unsignalized intersections, (2) merge, diverge, and weave movements, and (3) highway links between interchanges. In each case, level of service determinations were made to determine how well the I-495 highway system would be expected to be performing in the year 2030, assuming no specific physical changes to that system other than those already being planned independent of this study.

Key results of the analyses of future 2030 No-Build conditions are summarized below:

Intersections

• In the Western Segment of the study area in the AM peak hour, all six signalized intersections (100 percent) will continue to operate at LOS D or better in 2030. However, the percentage of individual movements within these intersections operating at LOS D or better will decrease from 95 percent in 2006 to 91 percent in 2030. For unsignalized intersections, the percentage of individual movements within them operating at LOS D or better will decrease from 87 percent in 2006 to only 70 percent in 2030.
For the Eastern Segment in the AM peak hour, the seven signalized intersections (100 percent) will operate with LOS D or better conditions in 2030. And, 43 out of 44 individual movements (98 percent) within the signalized intersections will operate at LOS D or better in 2030. With regard to unsignalized intersections, the percentage of individual movements that operate at LOS D or better will be 94 percent.

During the PM peak hour in the Western Segment, all six signalized intersections will continue in 2030 to operate at LOS D or better overall. However, the percentage of individual movements within these signalized intersections operating at LOS D or better will decrease slightly from 89 percent in 2006 to 86 percent in 2030. There will also be a similar decrease, from 78 percent in 2006 to 74 percent in 2030 for the individual movements at the unsignalized intersections in the Western Segment.

For the Eastern Segment during the PM peak hour, there will for the first time be a signalized intersection that will operate at LOS F overall, although the other six signalized intersections will operate at LOS D or better. It was determined that, with regard to individual movements within unsignalized intersections, 85 percent will operate at LOS D or better.

Merges, Diverges, and Weaves

In the Western Segment during the AM peak hour, 66 percent of these types of movements will operate at LOS D or better in 2030, compared with 89 percent in 2006. Similarly, in the Eastern Segment during the AM peak hour, 83 percent of these typed of movements will operate at LOS D or better, compared with 94 percent in 2006.

For the PM peak hour in the Western Segment, only 55 percent of these movements will operate at LOS D or better. The percentage in 2006 was 84 percent. In the Eastern Segment, the percentage will decline from 97 percent in 2006 to 83 percent in 2030.

Links

By 2030 in the Western Segment of the study corridor, only 39 percent of I-495’s links will operate with LOS D or better conditions during the AM peak hour. The corresponding value in the Eastern Segment of the study corridor during the AM peak hour will be 74 percent. All (100 percent) of these links currently in 2006 operate at LOS D or better. For the PM peak hour in the
Western Segment, only 56 percent of I-495’s links will operate at LOS D or better, with the percentage being 77 percent in the Eastern Segment. Again, all (100 percent) of these links presently operate at LOS D or better in 2006.

Conclusions

It is clear from the information presented in this chapter that conditions along I-495 will deteriorate from what they are today to what they are projected to be under the assumed 2030 No-Build case. That is, the projected increases in traffic volumes on the I-495 highway system resulting from population growth, changes in land use, increases in employment, etc. will put strains on the ability of that highway system to accommodate the increased demands being placed on it.

Impacts of the projected increases in traffic volumes have been identified with regard to signalized and unsignalized intersections located at the points where the highway’s ramps connect with the local street system; at merge, diverge, and weave locations at or near the highway’s interchanges; and on the mainline highway itself.

The vast majority of the identified impacts of the projected increases in traffic by 2030 will be located along that portion of the study corridor between Exit 32 in Westford and Exit 50 in Haverhill.

Chapter 4 presents a program of improvements that has been developed to address the deficiencies identified in this Chapter, as well as those identified in Chapter 2 and from the public involvement process. The improvements are categorized as being suitable for implementation in the near term (less than 2 years), mid term (2 to 8 years), and long term (more than years).

Other Transportation/Transit Improvements

More than one dozen potential future transportation projects by others have been identified in this chapter. They range from roadway improvements to extension and improvement of commuter rail services.