

# WOBURN STREET CORRIDOR STUDY

## Executive Summary

Prepared by:

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## **Introduction**

The Woburn Street Corridor Study Area lies within the communities of Tewksbury, Lowell and Billerica, and spans a distance of approximately 1.75 miles. The study area begins north of the I-495 interchange, at the intersection of Easton Street/Gaudreau Street in Lowell, and extends southeasterly along Woburn Street and Billerica Avenue, through the towns of Tewksbury and Billerica, terminating at the intersection of Mount Pleasant Street in Billerica, as shown on Map 1.

This report examines land use, transportation and economic development issues along the corridor with an eye toward addressing any land use conflicts that might exist and identifying opportunities where the communities of Billerica, Lowell and Tewksbury can work together to promote the corridor and to plan for the future. Future development and redevelopment within the study area will depend on the uses allowed under each community's zoning bylaw or ordinance, the availability of adequate infrastructure and overall market conditions.

The corridor is nearly built-out and there is little vacant land available. However, the redevelopment of existing and underutilized parcels will provide future economic development opportunities, particularly within the communities of Billerica and Tewksbury. In order to determine what land is readily available for redevelopment and/or development, a parcel-level inventory was conducted. The inventory included information on parcel size, zoning and land use, based on information obtained from the Assessor Departments within the three communities. The land use and zoning section of the full report identifies present land uses, and examines opportunities for development and redevelopment.

The transportation section of the document analyzes existing traffic conditions along the corridor and makes recommendations for future improvements. The transportation section also addresses bicycle and pedestrian issues and public transportation within the corridor.

### **Land Use Characteristics of Existing Parcels**

The parcel inventory database contains 122 parcels comprising 545.95 acres of land within the three communities. All three study area communities utilize the standardized three-digit land use codes to provide a description of use for each tax parcel. For this study, NMCOG organized land use codes by property type (e.g. Residential, Commercial, Industrial and Exempt).

As detailed in Table 1, approximately 82.50% (450.39 acres) of the total land area within the Study Area is used for industrial purposes. Residential land uses comprise only 5.94% (32.41 acres) of the study area corridor. Exempt (municipal and institutional, etc.) land uses represent 4.39% (23.98 acres) of the Study Area. Developable and potentially developable vacant industrial land represented 9.42% (51.44 acres) of the total area, and undevelopable industrial land represented 11.66% (63.68 acres).

**Table 1: Current Land Use by Community (2009)**

Class of Use	Billerica (Acres)	% Total Acreage	Tewksbury (Acres)	% Total Acreage	Lowell (Acres)	% Total Acreage	Total Acreage
<b>Residential</b>							
Single-family dwellings (101)	20.85 (29)	5.39%	3.24(8)	2.89%	4.18 (18)	8.91%	28.27 (55)
Two-family dwellings (104)	2.06 (3)	0.53%	0.11 (1)	0.10%	0.77 (4)	1.64%	2.94 (8)
Three-family dwellings (105)	--	--	--	--	0.18 (1)	0.38%	0.18 (1)
Child care facility (140)	0.52 (1)	0.13%	--	--	--	--	0.52 (1)
Developable vacant land (130)	--	--	--	--	0.13 (1)	0.28%	0.13 (1)
Potentially developable land (131)	--	--	--	--	0.37 (1)	0.79%	0.37(1)
<b>Total</b>	<b>23.43 (33)</b>	<b>6.05%</b>	<b>3.35 (9)</b>	<b>2.99%</b>	<b>5.63 (25)</b>	<b>12.00%</b>	<b>32.41 (67)</b>
<b>Commercial</b>							
Motor vehicle services (338)	25.80 (2)	6.66%	--	--	--	--	25.80 (2)
Lumber Yards (313)	2.44 (2)	0.63%	--	--	--	--	2.44 (2)
Storage, warehouse and distribution facility (316)	--	--	2.76 (1)	2.46%	--	--	2.76(1)
Discount/Department store (322)	--	--	5.28 (2)	4.71%	--	--	5.28 (2)
Commercial retail building (325)	--	--	--	--	1.60 (2)	3.41%	1.60 (2)
Auto repair facilities (332)	--	--	1.29 (1)	1.15%	--	--	1.29 (1)
<b>Total</b>	<b>28.24 (4)</b>	<b>7.30%</b>	<b>9.33 (4)</b>	<b>8.32%</b>	<b>1.60 (2)</b>	<b>3.41%</b>	<b>39.17 (10)</b>
<b>Industrial</b>							
Buildings for manufacturing (400)	167.30 (2)	43.22%	6.32 (1)	5.63%	--	--	173.62 (3)
Warehouses for storage of manufactured goods (401)	4.12 (1)	1.06%	--	--	--	--	4.12 (1)
Office building – part of manufacturing (402)	25.35 (4)	6.55%	39.59 (7)	35.28%	--	--	64.94 (11)
R & D facilities (404)	5.37 (1)	1.39%	30.84 (1)	27.48%	--	--	36.21 (2)
Electric transmission right-of-way (423)	54.39 (6)	14.05%	--	--	--	--	54.39 (6)
Developable vacant land (440)	--	--	22.68 (6)	20.21%	--	--	22.68 (6)
Potentially developable vacant land (441)	28.76 (7)	7.43%	--	--	--	--	28.76 (7)
Undevelopable vacant land (442)	25.00 (1)	6.46%	0.11 (1)	0.10%	38.57 (1)	82.19%	63.68 (3)
Commercial condo (445?)	1.99 (1)	0.51%	--	--	--	--	1.99 (1)
<b>Total</b>	<b>312.28 (23)</b>	<b>80.67%</b>	<b>99.54 (16)</b>	<b>88.70%</b>	<b>38.57 (1)</b>	<b>82.19%</b>	<b>450.39 (40)</b>
<b>Exempt</b>							
Public Service (901)	2.74 (1)	0.71%	--	--	--	--	2.74 (1)
Municipal (903)	20.41 (2)	5.27%	--	--	0.83 (2)	1.77%	21.24 (4)
<b>Total</b>	<b>23.15 (3)</b>	<b>5.98%</b>	<b>N/A</b>	<b>N/A</b>	<b>0.83 (2)</b>	<b>1.77%</b>	<b>23.98 (5)</b>
<b>Total acreage</b>	<b>387.10 (63)</b>	<b>100%</b>	<b>112.22 (29)</b>	<b>100%</b>	<b>46.63 (30)</b>	<b>100%</b>	<b>545.95 (122)</b>

Source: Tewksbury, Billerica and Lowell Assessor's Database for FY 2009

Note: 25.80 (2) = Acreage (Parcels)

-- Denotes that municipality does not have parcels in the Study Area under the specified class of use.

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### **Residential Land Uses Within Tewksbury**

Only 10.34% (3.35 acres) of the Study Area acreage used for residential purposes lies within Tewksbury. Only 2.99% of the 112.22 total acres of land located within the Tewksbury portion of the study area is used for residential purposes. Single-family dwellings occupy eight (8) parcels covering 3.24 acres, while there is only one (1) two-family dwelling occupying 0.11 acres. Tewksbury is the only community along the corridor where all of the residential land uses are located on parcels that are zoned for industrial purposes.

### **Commercial Land Uses Within Tewksbury**

Tewksbury contains 23.82% (9.33 acres) of the total commercial land uses within the three community study areas, although commercial land uses only comprise 8.32% of the 112.22 commercial acres located within Tewksbury. Commercial uses include a warehouse and distribution facility, auto repair facility and two (2) discount/convenient stores.

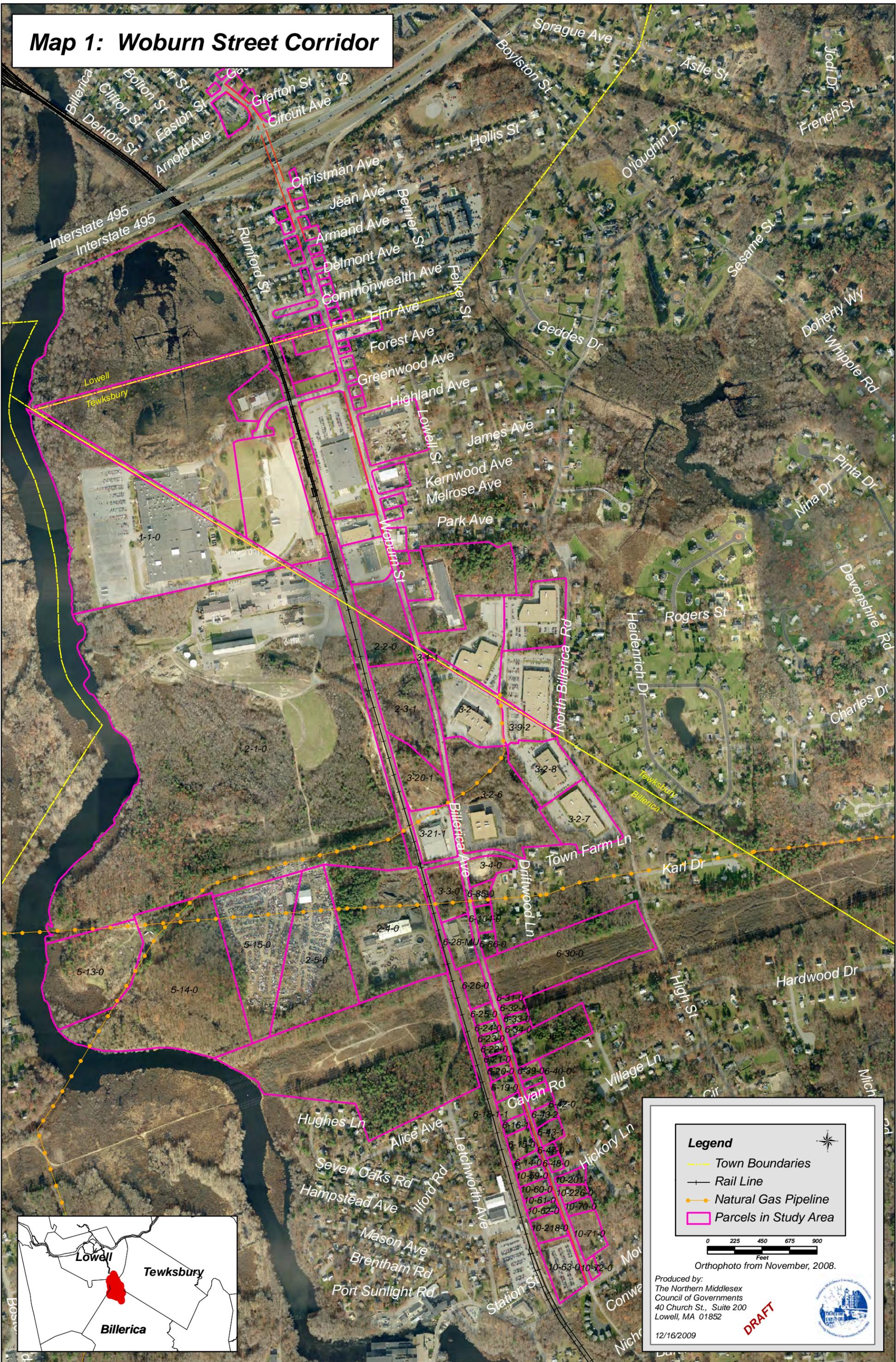
### **Industrial Land Uses Within Tewksbury**

While Billerica has the most industrial land of the three study area communities, Tewksbury's industrial land uses represent 22.10% (99.54 acres) of the total industrial acreage within the study area. Industrial uses occupy 88.70% of the total acreage within Tewksbury's portion of the overall Study Area. There are six (6) parcels containing 22.68 acres, including the 13-acre parking lot parcel located in front of the former Raytheon building, which is considered to be developable. Tewksbury also has several vacant and partly-vacant industrial office buildings located on Billerica Industrial Park Road, totaling approximately 20 acres. When these properties are combined with vacant office properties located in Billerica, there are nearly 50 acres of industrial land available for redevelopment within the overall study area.



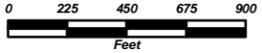
**Image 1:** Former Raytheon building site

# Map 1: Woburn Street Corridor



**Legend**

- Town Boundaries
- +— Rail Line
- Natural Gas Pipeline
- Parcels in Study Area



Orthophoto from November, 2008.

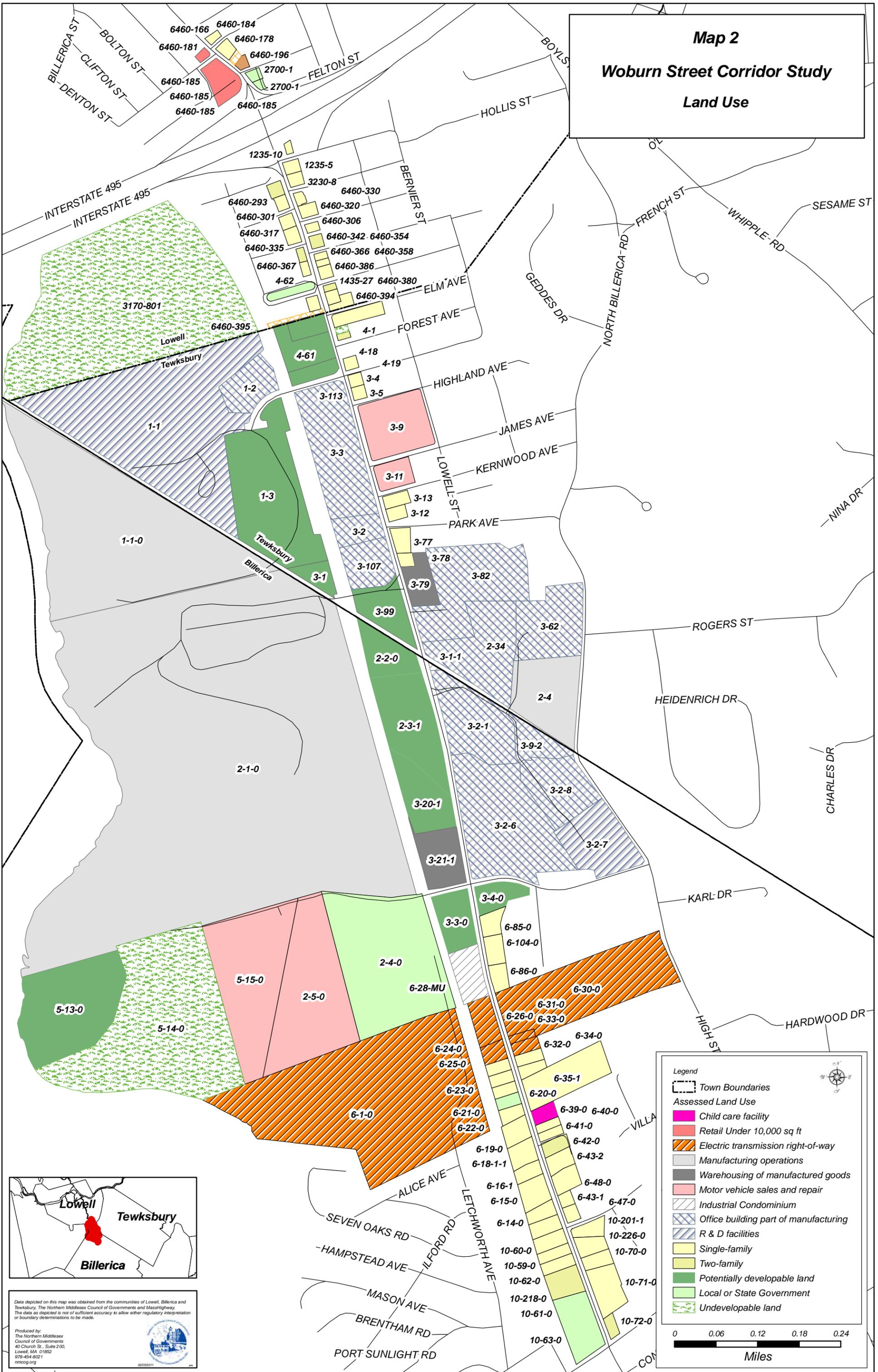
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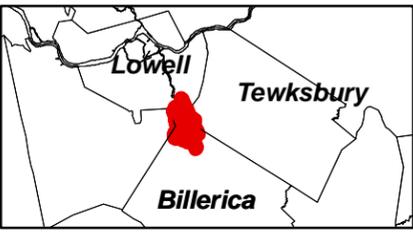
# Map 2 Woburn Street Corridor Study Land Use



**Legend**

- Town Boundaries
- Assessed Land Use**
- Child care facility
- Retail Under 10,000 sq ft
- Electric transmission right-of-way
- Manufacturing operations
- Warehousing of manufactured goods
- Motor vehicle sales and repair
- Industrial Condominium
- Office building part of manufacturing
- R & D facilities
- Single-family
- Two-family
- Potentially developable land
- Local or State Government
- Undevelopable land

0 0.06 0.12 0.18 0.24  
Miles



Data depicted on this map was obtained from the communities of Lowell, Billerica and Tewksbury, The Northern Middlesex Council of Governments and MassHighway. The data as depicted is not of sufficient accuracy to allow either regulatory interpretation or boundary determinations to be made.

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## Zoning Overview and Characteristics

Billerica and Tewksbury assign jurisdiction over development to either the Planning Board or ZBA, while the City of Lowell splits this responsibility between the Planning Board, City Council and ZBA. Policies and procedures set in place over the years by each community have influenced the development of the Corridor, and will continue to impact the quality and appearance of future development and redevelopment endeavors. The capacity of a zoning bylaw or ordinance to steer redevelopment is as important as its capacity to guide the development of vacant land.

Zoning classification data for every parcel in the Study Area has been compiled as shown in Table 2. There are fifty-one (51) industrially zoned (I, HI and LI) parcels within the Study Area that account for 455.81 acres or 83.49% of the total acreage. There are sixty-five (65) residentially zoned (RR, VR, TSF and TTF) parcels that account for 85.02 acres or 15.57% of the total acreage. There are only six (6) commercially zoned (NB and RR) parcels within the study area, which account for 5.12 acres or 0.94% of the total acreage. The Heavy Industrial (HI) zoning district applies to all twenty-nine (29) parcels located within the Tewksbury portion of the study area, covering 112.22 acres. The former Raytheon building represents Tewksbury’s largest parcel, covering 30.84 acres. The zoning districts for the study area are shown on Map 3 on the following page.

**Table 2: Zoning District Classifications by Community**

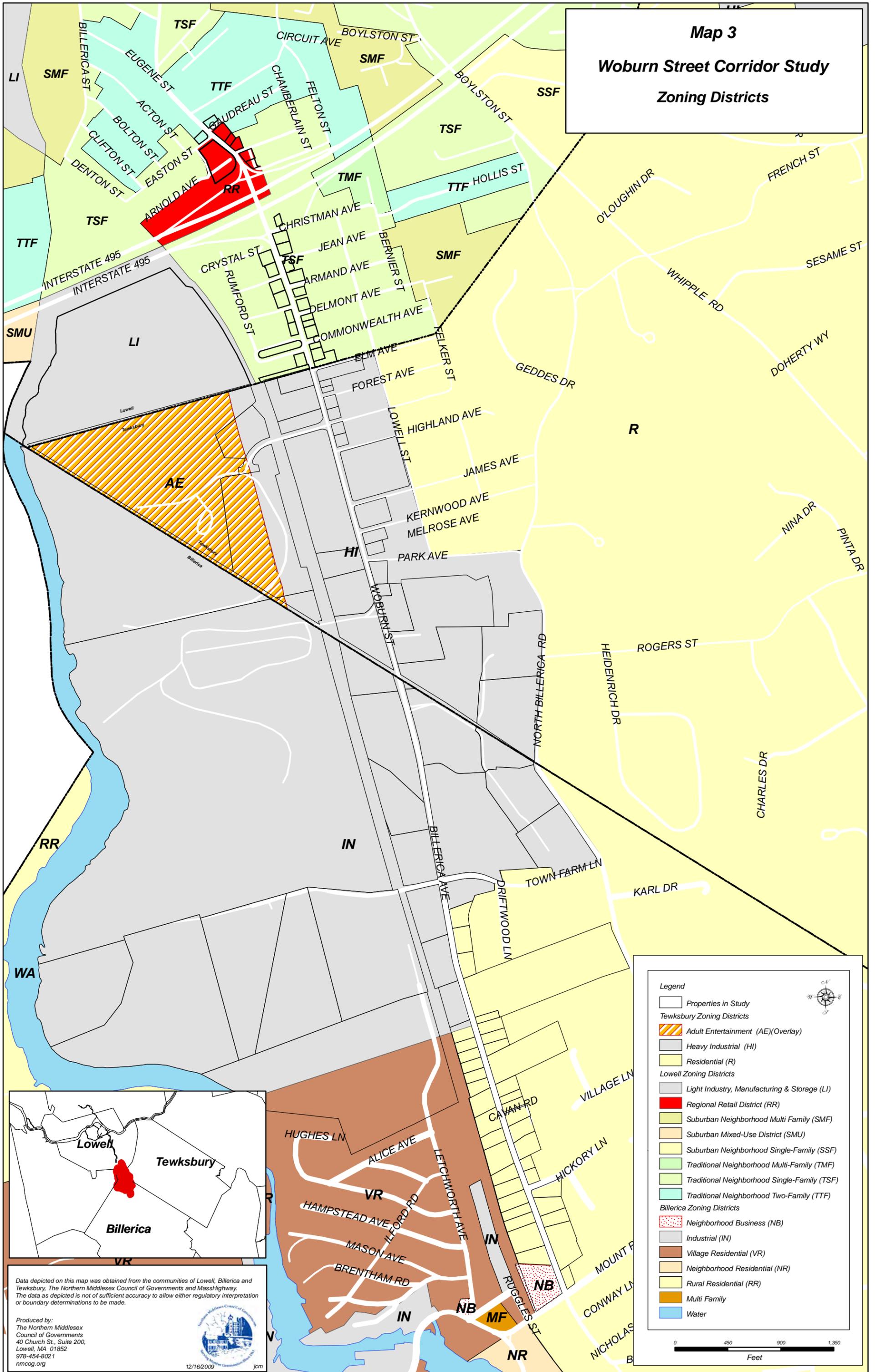
Zoning Classification	Number of Parcels	Total Acreage	Percentage
<b>Billerica</b>			
Industrial (I)	21	305.02	55.87%
Rural Residential (RR*)	29	35.49	6.50%
Village Residential (VR)	12	43.85	8.03%
Neighborhood Business (NB)	1	2.74	0.50%
<b>Total</b>	<b>63</b>	<b>387.10</b>	<b>70.90%</b>
<b>Tewksbury</b>			
Heavy Industrial (HI)	29	112.22	20.55%
<b>Total</b>	<b>29</b>	<b>112.22</b>	<b>20.55%</b>
<b>Lowell</b>			
Traditional Neighborhood Single-Family (TSF)	22	5.36	0.98%
Traditional Neighborhood Two-Family (TTF)	2	0.32	0.06%
Regional Retail District (RR)	5	2.38	0.44%
Light Industrial (LI)	1	38.57	7.06%
<b>Total</b>	<b>30</b>	<b>46.63</b>	<b>8.54%</b>
<b>Zoning District Summary</b>			
Residential (RR*, VR, TSF, TTF)	65	85.02	15.57%
Commercial (NB, RR)	6	5.12	0.94%
Industrial (I, HI, LI)	51	455.81	83.49%
<b>TOTAL</b>	<b>122</b>	<b>545.95</b>	<b>100%</b>

Source: Billerica, Lowell and Tewksbury Tax Assessor Records.

# Map 3

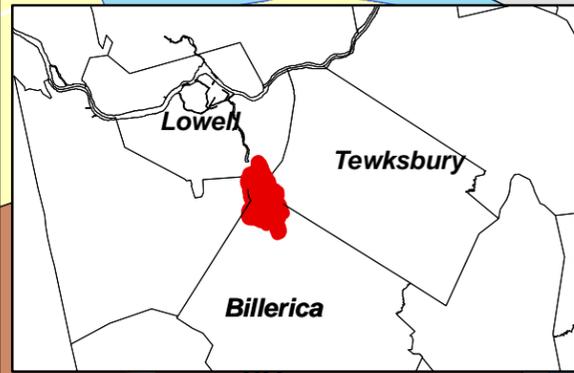
## Woburn Street Corridor Study

### Zoning Districts



**Legend**

- Properties in Study
- Tewksbury Zoning Districts
  - Adult Entertainment (AE)(Overlay)
  - Heavy Industrial (HI)
  - Residential (R)
- Lowell Zoning Districts
  - Light Industry, Manufacturing & Storage (LI)
  - Regional Retail District (RR)
  - Suburban Neighborhood Multi Family (SMF)
  - Suburban Mixed-Use District (SMU)
  - Suburban Neighborhood Single-Family (SSF)
  - Traditional Neighborhood Multi-Family (TMF)
  - Traditional Neighborhood Single-Family (TSF)
  - Traditional Neighborhood Two-Family (TTF)
- Billerica Zoning Districts
  - Neighborhood Business (NB)
  - Industrial (IN)
  - Village Residential (VR)
  - Neighborhood Residential (NR)
  - Rural Residential (RR)
  - Multi Family
  - Water

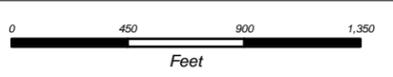


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## Vacant and Underutilized Parcels

Table 3 on the next page identifies the undeveloped/vacant parcels that lie within the Study Area, while Table 4 outlines the parcels that are considered to be underutilized. Of the one hundred twenty-two (122) parcels that make up the Study Area, there are twenty-two (22) parcels, comprising 155.42 acres considered to be undeveloped or vacant. The corridor also presents significant redevelopment opportunities for underutilized parcels. Table 4 shows that the redevelopment of existing, underutilized parcels holds greater potential for economic development than development of vacant undeveloped land. There are currently twenty-one (21) parcels representing 314.64 acres of underutilized land within the Study Area.

Within Tewksbury, there are only four (4) parcels of undeveloped land totaling 7.88 acres. The largest parcel is 3.06 acres in size and abuts the Billerica town line. The other three (3) parcels have frontage on Woburn Street and are contiguous lots totaling 4.82 acres and are north of the access road to the former Raytheon building.

There are eight (8) parcels comprising 84.10 acres that are considered to be underutilized. The Billerica Business Center (shown below in Figure 1), which is located on the Tewksbury town line has five (5) parcels consisting of 30.72 acres. The Business Center is currently facing an extremely high vacancy rate and holds significant opportunities for economic development. There are five (5) commercial buildings, which are zoned for industrial uses.

Image 1: Billerica Office Park which lies partly in Tewksbury



**Table 3: Undeveloped/Vacant Parcels**

Map/Block/Lot	Acreage	Land Use Code	Description	Zoning	Address	Status
<b>Billerica</b>						
2-2-0	2.00	441	Potentially Developable Vacant Land	Industrial	Billerica Ave.	Parcel abuts Tewksbury town-line and on eastern side of railroad tracks in front of Baker Commodities, Inc.
2-3-1	6.87	441	Potentially Developable Vacant Land	Industrial	Billerica Ave.	Parcel on the western side of Billerica Avenue, across from the vacant Billerica Business Center Building
3-1-1	0.12	441	N/A	Industrial	Billerica Ave.	Parcel abutting Tewksbury town-line near Billerica Business Center
3-4-0	1.51	441	Potentially Developable Vacant Land	Industrial	Billerica Ave.	Parcel immediately south of Town Farm Lane. Land looks to have been recently excavated and staging area for construction equipment
3-3-0	2.60	441	Potentially Developable Vacant Land	Industrial	Billerica Ave.	Parcel on western side of Billerica Ave. and in front of the Sewer/Wastewater Treatment Plant.
3-20-1	3.76	441	Potentially Developable Vacant Land	Industrial	Billerica Ave.	Vacant land for sale. Across from the vacant Billerica Business Center Building.
5-14-0	25.00	442	Undevelopable Land	Industrial	Town Farm Lane	Vacant land behind junkyard. Wetlands on the southwestern portion of parcel. Northern portion seems to have some development potential.
6-30-0	15.44	423	Electric transmission right-of-way	Rural Residential	Billerica Ave.	Vacant Land/Powelines
5-13-0	11.90	441	Potentially Developable Vacant Land	Industrial	Town Farm Lane	Parcel west of the junkyard, which abuts the River. Wetland issues. Parcel has abandoned vehicles and trailers on it.
6-26-0	1.33	423	Electric transmission right-of-way	Industrial	Billerica Ave.	Vacant Land/Powelines
6-1-0	36.17	423	Electric transmission right-of-way	Village Residential	Billerica Ave./Rear	Vacant Land/Powelines
6-31-0	0.28	423	Electric transmission right-of-way	Rural Residential	Billerica Ave.	Vacant Land/Powelines
6-32-0	0.47	423	Electric transmission right-of-way	Rural Residential	Billerica Ave.	Vacant Land/Powelines
6-25-0	0.70	423	Electric transmission right-of-way	Rural Residential	Billerica Ave.	Vacant Land/Powelines
<b>14 Parcels</b>	<b>108.15 Acres</b>					
<b>Tewksbury</b>						
3-99	3.06	440	Developable vacant land	Heavy Industrial	525 Woburn Street/Adjacent	Vacant industrial land abutting Billerica and in front of Baker Commodities on the eastern side of railroad tracks
3-113	1.49	440	Developable vacant land	Heavy Industrial	451 Woburn Street	Rectangular parcel on the northern side of Raytheon Building access drive

Map/Block/Lot	Acres	Land Use Code	Description	Zoning	Address	Status
4-61	2.32	440	Developable vacant land	Heavy Industrial	Woburn Street	Parcel north of 3-113. Vacant commercial land for sale.
4-62	1.01	440	Developable vacant land	Heavy Industrial	395 Woburn Street	Vacant parcel abutting Lowell City line.
<b>4 Parcels</b>	<b>7.88 Acres</b>					
<b>Lowell</b>						
2700-1	0.32	903	Municipal	Regional Retail District	1 Grafton Street	Vacant parcel north of interchange between Grafton Street and Circuit Avenue.
6460-395	0.37	131	Potentially Developable Vacant Land	Traditional Neighborhood Single-Family	395 Woburn Street	Vacant strip abutting Tewksbury town-line.
3170-801	38.57	442	Undevelopable land(industrial)	Light Industrial	801 Interstate Route 495	Wetlands abutting I-495. Undevelopable to vast amount of wetland resource areas.
6460-184	0.13	130	Developable vacant land	Regional Retail District	184 Woburn Street	Residential vacant land.
<b>4 Parcels</b>	<b>39.39 Acres</b>					
<b>22 Total Parcels</b>				<b>155.42 Total Acres</b>		

**Table 4: Underutilized Parcels**

Map/Block/Lot	Acres	Land Use Code	Status	Zoning	Address	Status
<b>Billerica</b>						
1-1-0	35.87	400	Manufacturing Operations	Industrial	495 Billerica Ave./Rear	Former Raytheon Building - Current Tenants: Solitec Wafer Processing, Jabil Defense and Aerospace (occupies 81,000 +/- sq. ft.), Teleplan Radiowaves (590,724 gross bldg area)
2-1-0	131.43	400	Manufacturing Operations	Industrial	134 Billerica Ave.	Baker Commodities Inc. parcel. There is a significant amount of developable land south of the buildings.
2-5-0	12.90	338	Motor vehicle sales and service	Industrial	Town Farm Lane/ROW	Junkyard: Development potential.
5-15-0	12.90	338	Motor vehicle sales and service	Industrial	Town Farm Lane/ROW	Junkyard: Development potential.
3-2-1	5.54	402	Office building part of manufacturing	Industrial	101 Billerica Ave., Building 2	Vacant commercial building
3-2-6	13.21	402	Office building part of manufacturing	Industrial	95 Billerica Ave.	Vacant commercial building
3-2-7	5.37	404	R&D facilities	Industrial	101 Billerica Ave., Building 4	Vacant commercial building. There may be one or two tenants remaining in the building.
3-2-8	4.84	402	Office building part of manufacturing	Industrial	101 Billerica Ave., Building 5	Vacant commercial building. There may be few tenants remaining in the building.

3-9-2	1.76	402	Office building part of manufacturing	Industrial	101 Billerica Ave., Building 6	Commercial building is partially in Billerica and Tewksbury. Although this may be the most occupied commercial building in complex, there may be some vacant office space.
3-21-1	4.12	401	Warehousing for manufactured goods	Industrial	100 Billerica Ave.	D.J. Reardon, Tev Tech & Andes Imports Building. Appears to be some vacancy or infill development potential.
10-225-1-1	1.45	313	Lumber Yard	Village Residential/Industrial	15 Letchworth Ave.	Vacant Lumber Yard (Former Hughes Lumber)
10-45	0.99	313	Lumber Yard	Village Residential/Industrial	Letchworth Ave.	Vacant Lumber Yard (Former Hughes Lumber)
<b>12 Parcels</b>	<b>230.38 Acres</b>					
<b>Tewksbury</b>						
1-1	30.84	404	R&D facilities	Heavy Industrial	495 Woburn Street	Former Raytheon Building
2-4	6.32	400	Manufacturing operations	Heavy Industrial	Billerica Ind. Park Road/Off	Commercial building is partially in Billerica and Tewksbury. Although this may be the most occupied commercial building in complex, there may be some vacant office space.
3-62	6.03	402	Office building part of manufacturing	Heavy Industrial	Billerica Ind. Park Road	Nearly vacant commercial building.
2-34	7.90	402	Office building part of manufacturing	Heavy Industrial	632 Woburn Street	Nearly vacant commercial building.
3-82	10.00	402	Office building part of manufacturing	Heavy Industrial	600 Woburn Street	Parcel north of commercial office park. Underutilized building and land.
3-1	1.80	440	Developable vacant land	Heavy Industrial	Woburn Street/Off	Parking lot abutting Billerica. Lot for Baker Commodities.
1-3	13.00	440	Developable vacant land	Heavy Industrial	Woburn Street	Parking Lot in front of former Raytheon Building
3-3	8.21	402	Office building part of manufacturing	Heavy Industrial	515 Woburn Street	Saltor Training and Merrill Corp. Building. Infill development potential
<b>8 Parcels</b>	<b>84.10 Acres</b>					
<b>Lowell</b>						
6460-181	0.16	325	Retail under 10,000 sq. ft.	Traditional Neighborhood Single-Family	181 Woburn Street	Commercial/Retail building. Infill/development potential.
<b>1 Parcel</b>	<b>0.16 Acres</b>					
<b>21 Total Parcels</b>				<b>314.64 Total Acres</b>		



**Image 2:** Former Raytheon building with approximately 550,000 available sq. ft. in addition to parking lot (1-3), which offers 13 acres of development potential. The underutilized vacant land owned by Baker Commodities, Inc. represents significant development potential.

The former Raytheon building parcel (30.84 acres), including the front parking lot (13 acres), represents a significant redevelopment and development opportunity that will require a cooperative and collaborative working relationship between the three communities (See Image 2 above).

### Transportation Overview and Analysis

Woburn Street, known as Billerica Avenue in Tewksbury, is classified as an urban minor arterial. A two-lane roadway with a general north-south orientation, the roadway is approximately 32-34 feet wide with a posted speed limit ranging from 30-35 mph. Average daily traffic volumes range from 5,900 to 10,900 vehicles per day. The highest traffic volumes are found at the I-495 interchange, while the lowest volumes are found near the intersection with Mt. Pleasant Street in Billerica.

This study focused on the existing transportation conditions including; safety, traffic volumes, existing and projected levels of service, pavement condition, bicycle and pedestrian accommodations, and signage. The transit services along the corridor were also evaluated, including connections to the North Billerica Commuter Rail Station and the LRTA system.

The communities of Tewksbury and Billerica are actively pursuing the redevelopment of vacant and underutilized industrial and commercial areas along the corridor. This study also projected traffic conditions based on the revitalization of these properties. Recommended improvement strategies were outlined based on an evaluation of current and projected deficiencies along the corridor.

## **Pavement Condition**

Pavement conditions vary along the corridor. North of the I-495 interchange, the pavement is in good condition with light transverse and longitudinal cracking evident. In the I-495 area, which is located in a construction zone at data collection time, pavement conditions deteriorate with block cracking, alligator cracking, transverse and longitudinal cracking, and raveling evident throughout.

Near the Tewksbury Town Line in Billerica, Billerica Avenue is in need of pavement maintenance with block cracking, potholes, and transversal and longitudinal cracking evident. Pavement is in better condition in the residential areas of Billerica and along a recently repaved section in Tewksbury.

## **Pedestrian Accommodations**

Pedestrian accommodations are segmented throughout the corridor. In Lowell, sidewalks run along both sides of Woburn Street until the intersection with Bristol Street. At this point, the sidewalk ends and no accommodations exist until the intersection of Riverview Commerce Center and Woburn Street. The sidewalk then runs along the west side of the roadway through the property at 515 Billerica Avenue in Tewksbury where it ends again. Another small sidewalk segment exists in front of a vacant office building on the east side of Billerica Avenue, just north of Tower Lane. The sidewalk begins again in the mainly residential section of Billerica, south of the power line crossing, and ends at the intersection of Billerica Avenue and Mount Pleasant Street. There are two existing crosswalk areas in the corridor. One crosses Woburn Street in Lowell at a mid block location across from the Commonwealth Avenue playground. The other visible crosswalk area is at the intersection of Billerica Avenue and Mount Pleasant Street at the southern end of the study area.

Bicycle Facilities are limited in the corridor. The roadway is generally wide enough that bicyclists are able to share the road with vehicles; however there are no pavement markings showing a bicycle lane. There are a high percentage of large trucks accessing industrial areas along the corridor, making bicycling along the corridor difficult. The North Billerica MBTA Commuter Rail Station, located just north of the Billerica Avenue/Mount Pleasant Street intersection, provides designated parking facilities for up to fourteen (14) bicycles.

## **Public Transportation**

The Lowell Regional Transit Authority provides fixed route bus service along the Woburn Street Corridor via the South Lowell (Route 3) on weekdays, and the South Lowell–Shaw/Stevens (Route 3-4) on Saturdays. The #3 South Lowell bus route departs the Gallagher Intermodal Transit Center via Route 3A south, turning north onto Gorham Street then right onto Church Street and turns right onto Lawrence Street. The bus route turns onto Andrews Street then left on Moore Street returning to Lawrence Street and then right onto Woburn Street. The route continues along Woburn Street through Tewksbury and into Billerica, terminating at the North Billerica MBTA Commuter Rail Station. The inbound trip leaves the North Billerica Station following the outbound route to the Gallagher Intermodal Transportation Center. There are seventeen (17) round trip buses each weekday.

The #3-4 South Lowell–Shaw/Stevens bus route is a Saturday combination loop route. The outbound portion of the route follows the #3 South Lowell service, however, the inbound bus departs the North Billerica Train Station turning onto Lowell Street and Boston Road (Rte 3A) in Billerica. The bus enters Chelmsford along Rte 3A turning onto Carlisle Road and entering Lowell on Edison Street to Swan Street to Industrial Ave and back to Gallagher Intermodal Transportation Center via the weekday #4 bus route. There are five (5) bus runs on Saturdays.

In addition to LRTA bus service, the Massachusetts Bay Transit Authority (MBTA) serves the area with the North Billerica commuter rail station just north of the intersection of Mount Pleasant Street and Billerica Avenue. As part of the Lowell Commuter rail line, this station provides parking for 541 vehicles in two surface lots and serves a ridership of approximately 1,000 inbound daily.

**Existing Traffic Volumes**

Average daily traffic (ADT) volumes were collected along the Woburn Street/Billerica Avenue corridor in October and November of 2009 and are presented in Table 5. As noted below, the largest traffic volume area occurs near the I-495 interchange with Woburn Street in the Lowell section of the study area.

**Table 5: Woburn Street Corridor Average Daily Traffic Volumes**

Location	Community	Year Counted	Average Daily Traffic (ADT), vehicles per day (vpd)
Woburn St W of I-495	Lowell	2009	7,700
Woburn St S of I-495	Lowell	2009	10,900
Woburn St @ Billerica T.L. (Billerica Ave)	Tewksbury	2009	6,400
Billerica Ave N of "T" Station Entrance	Billerica	2009	5,900
Mount Pleasant Street N of Billerica Ave	Billerica	2009	3,900

Truck percentages along the corridor were noted as part of the Average Daily Traffic (ADT) determination. It is essential to collect truck data along this corridor because of the industrial and commercial uses throughout the study area. Table 6 provides a snapshot of truck percentages in the study area.

**Table 6: Truck Percentages along the Woburn Street/Billerica Avenue Corridor**

Location	Community	ADT	Truck Percentage
Woburn St W of I-495	Lowell	7,700	6%
Woburn St S of I-495	Lowell	10,900	7%
Woburn St @ Billerica T.L. (Billerica Ave)	Tewksbury	6,400	6%
Billerica Ave N of "T" Station Entrance	Billerica	5,900	5%

**Crash Analysis**

Crashes along the Woburn Street/Billerica Avenue corridor were reviewed for the three most recent years (2005-2007) available from MassDOT. There were a total of twenty-six (26)

crashes at key intersections along the corridor. Most were angle type crashes (62%) occurring during non-peak hours (73%) and under dry conditions (69%). Severity of crashes at key intersections is evenly split between property damage only and injury related incidents. No fatalities were reported in the study area.

The only location along the corridor which experienced a higher than expected crash rate is the intersection of Woburn Street at I-495 Northbound Ramp/Christman Avenue, with a total of twelve (12) incidents occurring between 2005 and 2007. The crash rate was calculated at 0.71 crashes per million vehicles entering the intersection, which is higher than the MassDOT Highway District 4 average crash rate of 0.58 for unsignalized intersections. The majority of the crashes were angle type incidents (8), or occurred under dry pavement conditions (9), or at non-peak periods of the day (10). The notable statistic was that nine of the twelve crashes (75%) involved injuries to persons in the vehicles.

### **Future Year Conditions**

Traffic volumes within the study area were forecast to 2020. Traffic growth trends were determined using historic growth patterns and past traffic studies. Regional traffic growth rates have averaged approximately 0.50% annually over the past ten years. To be conservative, a 1.0% annual traffic growth rate has been used in the 2020 no build scenario.

Potential development sites have been identified through discussions with the three communities. The following locations are included in the build scenario:

- The former Raytheon building at Riverview Commerce Center (550,000 square foot existing building with an additional 250,000 square foot parcel in front of the building available for development). The total developable area is approximately 800,000 square feet.
- The Billerica Business Center Properties:
  - Building 2: 40,543-81,086 square feet available for lease
  - Building 3: 26,000 square feet available for lease
  - Building 4: 60,992 square feet available for lease
  - Building 5: 2,000-12,540 square feet available for lease
  - Building 6: 12,557-42,960 square feet available for lease

The build scenario includes the no build figures plus the development of the Riverview Commerce Center building and full occupation at the Billerica Business Center to present a maximum traffic impact scenario.

The results of the trip generation for the build scenario at the Riverview Commerce Center and the Billerica Business Center are provided in Table 7 on the next page

**Table 7: Trip Generation Results for Woburn Street Developments**

Time Period/ Direction	Vehicle Trips for Potential Developments	
	Riverview Commerce Center Building	Billerica Business Center (2020 Build Scenario)
Daily Vehicle Trips Generated	825	2,462
<b>Morning Peak Hour</b>	281	347
Entering	224	305
Exiting	56	42
<b>Evening Peak Hour</b>	374	333
Entering	75	57
Exiting	299	276

**Level of Service**

Level of service (LOS) is a qualitative measure of traffic conditions ranging from free flow to major congestion. There are six levels of service ranging from A (free flow conditions) to F (highly delayed conditions). LOS accounts for various factors including traffic volume, roadway capacity, speed, roadway grade, traffic control devices, roadway types and geometry, and roadway delays. LOS A through D is considered acceptable within an urban area, while LOS E and F indicate unacceptable delays and congestion.

Stop controlled intersections use control delay as the performance measure for operational level of service analysis. Control delay at an unsignalized intersection is a quantitative result of motorist delay associated with the traffic control device. The LOS criteria are presented in the *2000 Highway Capacity Manual* and are provided below in Table 8.

**Table 8: Level of Service Criteria for Unsignalized Intersections**

LOS	Control Delay per Vehicle (seconds/vehicle)
A	≤ 10
B	> 10-15
C	>15-25
D	> 25-35
E	> 35-50
F	> 50

The following is a summary of the traffic operational analysis for each intersection. The Intersection Level of Service Summary is shown in Table 9 on the next two pages.

***I-495 Southbound Ramp at Woburn Street***

During each of the peak hours under all scenarios, I-495 Southbound ramp left turns operate at a level of service F at this unsignalized intersection with Woburn Street. Queues can often be seen backing up the entire length of the off ramp nearly onto mainline I-495. Other movements at this intersection operate at acceptable levels of service.

***I-495 Northbound Ramp at Woburn Street***

In a similar fashion to the southbound ramp, the I-495 Northbound ramp to Woburn Street operates under unacceptable conditions for left and through movements during peak traffic hours. In addition, left turns from Christman Avenue onto Woburn Street experience unacceptable delays in the future year scenarios. Other movements at this two-way stop controlled intersection experience acceptable operating conditions.

***Woburn Street at the Riverview Commerce Center Entrance***

Eastbound left turning vehicles from the Riverview Commerce Center to Woburn Street northbound experience unacceptable delays. The level of service is E with average delays of 45 seconds per vehicle. The poor level of service is due to high volumes along Woburn Street and the lack of sufficient gaps for turning movements.

***Billerica Avenue at the Billerica Business Center Entrance***

The intersection of Billerica Avenue and the Billerica Business Center operates at acceptable levels of service under existing and 2020 no-build scenarios. With the various businesses interspersed throughout the office park, it was observed that staggered work hours were in effect. There were no observed queues of vehicles entering or exiting the business center during typical peak hours of the day.

The 2020 build scenario includes a full occupation of the office park. With this occupancy, turning vehicles out of the center will experience unacceptable delays during both the morning and afternoon peak periods of the day.

***Billerica Avenue at Mount Pleasant Street***

This intersection sees unacceptable delays for minor street movements during both peak hours of the day under all scenarios. Currently, Billerica Avenue delays can reach over six minutes during the evening peak hour due to long queues at the intersection. The volume to capacity ratios are greater than one, meaning that the amount of traffic entering the intersection is greater than the capacity available at a two-way stop controlled intersection.

**Table 9: Intersection Level of Service Summary**

Intersection	2010 Existing		2020 No-Build		2020 Build	
	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS
<b>Woburn Street at I-495 SB</b>						
<b>AM Peak Period</b>						
Exit Ramp SB L	622.0	F	369.9	F	949.1	F
Exit Ramp SB R	10.0	B	10.1	B	10.2	B
Woburn St. WB L	6.0	A	9.3	A	10.0	B
<b>PM Peak Period</b>						
Exit Ramp SB L	576.0	F	301.8	F	--	F
Exit Ramp SB R	12.0	B	11.3	B	13.2	B
Woburn St. WB L	6.0	A	9.1	A	10.0	B
<b>Woburn Street at I-495 NB</b>						

Intersection	2010 Existing		2020 No-Build		2020 Build	
	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS
<b>AM Peak Period</b>						
Exit Ramp NB LT	68.0	F	139.5	F	378.5	F
Exit Ramp NB R	28.0	D	33.5	D	236.7	F
Woburn St. EB L	2.0	A	8.3	A	8.5	A
Christman Ave. SB L	15.0	C	257.6	F	--	F
<b>PM Peak Period</b>						
Exit Ramp NB LT	234.0	F	744.4	F	--	F
Exit Ramp NB R	12.0	B	9.9	A	13.1	B
Woburn St. EB L	3.0	A	12.1	B	13.3	B
Christman Ave. SB L	18.0	C	228.6	F	--	F
<b>Woburn Street at Riverview Commerce Center Driveway</b>						
<b>AM Peak Period</b>						
Woburn St. NB LT	9.7	A	10.1	B	13.0	B
RCC Drive EB L	45.4	E	60.1	F	--	F
RCC Drive EB R	15.4	C	16.9	C	25.9	D
<b>PM Peak Period</b>						
Woburn St. NB LT	8.0	A	8.1	A	8.4	A
RCC Drive EB L	22.3	C	26.0	D	798.5	F
RCC Drive EB R	10.3	B	10.5	B	11.5	B
<b>Billerica Avenue at Billerica Business Center Entrance</b>						
<b>AM Peak Period</b>						
Billerica Ave. SB L	7.8	A	7.9	A	9.7	A
BBC Entrance WB L	18.2	C	20.5	C	94.0	F
BBC Entrance WB R	9.4	A	9.5	A	10.9	B
<b>PM Peak Period</b>						
Billerica Ave. SB L	8.5	A	8.7	A	9.4	A
BBC Entrance WB L	15.4	C	16.8	C	44.7	E
BBC Entrance WB R	13.8	B	15.2	C	78.8	F
<b>Billerica Avenue at Mt. Pleasant Street</b>						
<b>AM Peak Period</b>						
Mt. Pleasant EB LTR	8.7	A	8.9	A	9.7	A
Mt. Pleasant WB LTR	7.4	A	7.4	A	7.4	A
Billerica Ave. NB LTR	--	F	--	F	--	F
Billerica Ave. SB LTR	61.0	F	119.4	F	186.0	F
<b>PM Peak Period</b>						
Mt. Pleasant EB LTR	9.4	A	10.0	A	10.3	B
Mt. Pleasant WB LTR	8.1	A	8.2	A	8.2	A
Billerica Ave. NB LTR	264.7	F	630.7	F	--	F
Billerica Ave. SB LTR	377.4	F	911.9	F	--	F

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left Turn Movement, T = Through Movement, R = Right Turn Movement, LOS = Level of Service

-- Roadway capacity was exceeded; therefore, the methodology does not compute delay.

The I-495 Corridor study recommends the installations of traffic control signal systems at the intersection of Woburn Street and I-495 southbound ramps and at the intersection of Woburn Street and I-495 northbound ramps/Christman Avenue. The installation of a traffic signal system and added left turn lane on Woburn Street would improve the level of service from F to C in the AM and from F to D in the PM peak hours. At the intersection of Woburn Street and the I-495 northbound ramp/Christman Avenue, the installation of a traffic signal system and added left turn lane on Woburn Street would improve LOS from F to B in the AM and from F to D in the PM peak hours.

In addition, the intersection of Mount Pleasant Street and Billerica Avenue currently meets warrant 2, four-hour vehicular volume for justification of a traffic control signal. Under future conditions, the intersections of Billerica Avenue at the Billerica Business Center Entrance and Woburn Street at Riverview Commerce Center would pass the peak hour warrant for justification of a traffic control signal.

The intersection of Billerica Avenue and Mount Pleasant Street benefits from added capacity and installation of a traffic control signal as well. The added capacity includes an exclusive left turn lane for eastbound Mount Pleasant Street and an exclusive right turn lane for southbound Billerica Avenue. Under existing conditions the intersection improves from a LOS F to B in both the AM and PM peak hours. The level of service will continue to be acceptable under 2020 build conditions with a reported LOS B for the AM and LOS C for the PM peak hours.

The intersection of Woburn Street and Riverview Commerce Center experiences unacceptable delays for left turns from the industrial park under the 2020 build scenario. Installation of a traffic control signal would improve the LOS from F to C for left turns but hinder the mainline movement along Woburn Street from LOS A to D during each peak period.

The intersection of Billerica Avenue and the Billerica Business Center Entrance experiences unacceptable delays for turning vehicles under the 2020 build scenario. Installation of a traffic signal would improve the intersection to an overall LOS B for both AM and PM peak time periods. Table 10 below shows the Intersection Level of Service Summary with Traffic Signal Mitigation.

**Table 10: Intersection Level of Service Summary with Traffic Signal Mitigation**

Intersection	2010 Conditions with added Traffic Signal		2020 Build Conditions with added Traffic Signal	
	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS
<b>Billerica Avenue at Mt. Pleasant Street</b>				
<b>AM Peak Period</b>				
Mt. Pleasant EB LTR	11.2	B	9.7	A
Mt. Pleasant WB LTR	38.7	D	53.3	D
Billerica Ave. NB LTR	10.9	B	14.5	B
Billerica Ave. SB LTR	0.4	A	0.6	A
<b>PM Peak Period</b>				
Mt. Pleasant EB LTR	23.6	C	40.0	D
Mt. Pleasant WB LTR	15.1	B	17.6	B
Billerica Ave. NB LTR	12.6	B	14.5	B
Billerica Ave. SB LTR	2.2	A	2.6	A
<b>Billerica Avenue at Billerica Business Center Entrance</b>				
<b>AM Peak Period</b>				
Billerica Ave. SB TL	--	--	14.7	B
Billerica Ave. NB TR	--	--	9.1	A
BBC Entrance WB L	--	--	12.6	B
BBC Entrance WB R	--	--	12.8	B
<b>PM Peak Period</b>				
Billerica Ave. SB TL	--	--	9.8	A
Billerica Ave. NB TR	--	--	21.5	C
BBC Entrance WB L	--	--	8.8	A
BBC Entrance WB R	--	--	11.2	B
<b>Woburn Street at Riverview Commerce Center Driveway</b>				

Intersection	2010 Conditions with added Traffic Signal		2020 Build Conditions with added Traffic Signal	
	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS
<b>AM Peak Period</b>				
Woburn St. NB LT	--	--	3.2	A
Woburn St. SB TR	--	--	51.6	D
RCC Drive EB L	--	--	26.3	C
RCC Drive EB R	--	--	26.7	C
<b>PM Peak Period</b>				
Woburn St. NB LT	--	--	43.3	D
Woburn St. SB TR	--	--	4.9	A
RCC Drive EB L	--	--	28.9	C
RCC Drive EB R	--	--	15.8	B

-- Denotes that there is no traffic signal in place

## Tewksbury Recommendations

- **Land Use and Zoning**

- Modify zoning to allow for allow for additional commercial support services that meet the needs of office and industrial uses.
- Address potential conflicts between industrial and residential uses through down zoning, transitional zoning and/or the use of an overlay district.
- Improve the quality of development through the use of design guidelines.

- **Economic Development**

- Focus on the development opportunities related to the former Raytheon site and the Billerica Business Center properties.
- Work with the Greater Lowell Workforce Investment Board (GLWIB) and the Career Center in Lowell to match prospective employees with available positions. Utilize the workforce development incentives available through the GLWIB.
- Focus upon the redevelopment opportunities available through the underutilized properties.
- Utilize the Economic Target Area (ETA) status to develop Tax Increment Financing (TIF) agreements with prospective businesses. Establish an Economic Opportunity Area (EOA) on the Tewksbury side of the former Raytheon plant to complement the EOA on the Billerica side of this site.
- Work with NMCOG to address brownfield and petroleum issues at the former Raytheon site, the former Corenco Corporation site and railroad tracks abutting the parcels in the

study area. Access brownfield funds from MassDevelopment as a result of the ETA designation.

- Work with the Town of Billerica to develop properties and to address the permit streamlining issues across communities.
- Encourage commercial development opportunities that would address the consumer needs of employees and residents in the target area.
- **Transportation**
  - Pavement markings throughout the corridor are lacking and should be restriped as part of any pavement maintenance program.
  - Alternative transportation options should be offered as way to improve traffic operations along the corridor. Such strategies should include alternative work schedules and ridesharing programs, as well as improved transit options and improved accommodations for non- motorized forms of travel.
  - There are no designated bus stops along the corridor as the LRTA uses a flagging system for picking up passengers. Redevelopment of the former Raytheon building and the Billerica Business Center may result in a need for a designated stop at each location, in addition to shuttle service to North Billerica station.
  - Improving the sidewalk network would promote alternative modes of transportation and increase pedestrian and bicyclist's safety.
  - Woburn Street at I-495 Southbound Ramps: installation of a fully actuated traffic signal system and the addition of a left turn lane for movements from Woburn Street to the I-495 southbound ramp.
  - Woburn Street at I-495 Northbound Ramp/Christman Avenue: installation of a fully actuated traffic signal system and construction an exclusive left turn lane for Woburn Street turning movements to Christman Avenue.
  - Woburn Street at Riverview Commerce Center Entrance: A traffic signal will be needed upon occupation of the now largely vacant office park to improve the level of service for left turning vehicles. Improved pedestrian accommodations should be part of the overall improvement plan along the corridor. The installation of sidewalks north of the intersection as well as along the Riverview Commerce Center roadway will help to encourage transportation alternatives.
  - Billerica Avenue at Billerica Business Center Entrance: Future build out of the Billerica Business Center will result in increased delays. Traffic conditions should be monitored until such time as installation of a traffic signal is warranted.

- Billerica Avenue at Mount Pleasant Street: The addition of an exclusive right turn lane on Billerica Avenue and an exclusive left turn lane for eastbound Mount Pleasant Street is recommended along with a fully actuated traffic signal system.