# *CHAPTER 3.0*
# *TRANSPORTATION*

## 3.1. Transportation Policies

The primary goal for the transportation network in Durham's future is to provide for the safe and efficient movement of persons, goods, and services in a way that is economically and energy efficient, while preserving the natural resources and historical character of the town. This goal is achievable through the incorporation of a diverse combination of transportation policies that the Town should encourage. Obtaining this goal will preserve the high quality of life Durham residents have come to enjoy.

Transportation policies that the town should encourage to achieve its goals include:

1) Preservation of the historical character and features of Main Street.

2) Promote energy efficient transportation alternatives to the single occupancy vehicle such as ridesharing, mass transportation, bicycling, walking, and integrate them into the traffic system.

3) Design a roadway network that accommodates these transportation alternatives.

4) Maintain the existing roadway network, while preserving the historic, aesthetic, and environmental resources located along Durham's streets.

5) Design a roadway network that emphasizes safety, and the natural and cultural resources of the town.

6) Use and promote flexible roadway and land use design standards to reduce adverse aesthetic and environmental impacts to the community and prevent traffic congestion within the community.

7) Design a roadway network that will provide an adequate level of service to the community throughout its design life.

8) Cooperate with federal, state, and regional agencies, interest groups, and the public in the transportation planning process.

### 3.1.1. Introduction

Currently, Durham residents are solely dependent upon the automobile for transportation. Most residents who are destined for work, shopping, and recreation can travel an extensive network of State roads (Routes 17, 68, 77, 79, 147, and 157) which radiate through most sections of Town. The most highly traveled of these, Route 17, bisects Durham. Its high use can be attributed to its junctions with Interstate 91 in New Haven to the south and Route 9 in Middletown to the north. This provides the link for most work-related trips. In addition, commercial areas which have emerged along Route 17 account for many local, non-work related trips.

### 3.1.2. Road System

The regional highway network provides a hierarchy of service functions that address the need for mobility and access to land-based activity. As a result, a hierarchical road network has evolved that corresponds to the travel needs of the population. These range from expressways, designed to allow a great deal of mobility, to local streets that permit direct access.

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. Basic to this process is the recognition that individual roads and streets do not serve travel independently. Rather, most travel involves movement through a network of roads. It becomes necessary to determine how this travel can be channeled within the network in a logical and efficient manner. Functional classification defines the nature of this process by defining how a particular road or street should serve the flow of trips through a highway network.

In urban areas, principal arterials are highways that serve major centers of activity, the highest traffic volume corridors and the longest trip desires. They should carry the major trips entering and leaving the urban area, and most of the urban area through movements. In addition, significant intra-area travel (i.e., between the central business district and the outlying residential areas) should be served by this class of roadway.

The urban main arterial network is intended to interconnect and augment the principal arterial system. It should provide service of trips of moderate length, with more emphasis on land access than the higher system, and offering a lower level of traffic mobility. Such facilities may carry local bus routes and provide intra-community continuity, but ideally should not enter identifiable neighborhoods. Main Street (Route 17A) in Portland is an example of such a roadway.

The urban collector street system provides both land access and traffic circulation within residential neighborhoods, commercial, and industrial areas. It differs from the arterial system in that collector streets may provide access to residential neighborhoods. Conversely, the collector street also collects traffic from local streets in residential, commercial, and industrial areas and directs it to the arterial system. In the central business district, the collector system may include a street grid that provides the basis for traffic circulation.

The local street system contains all roads not found on the higher systems. It provides direct access to abutting properties and access to higher road classifications. It offers the lowest level of mobility and usually contains no bus routes. Through traffic is discouraged.

The functional classification of roads in rural areas follows the same hierarchy as in urban areas. Principal arterials provide corridor service for trips that are primarily inter-regional or interstate, connecting urban areas such as Middletown and Meriden and providing an integrated, statewide network.

The rural main arterial system links cities, larger towns, and major traffic generators and inter-regional trips. However the system offers travel characteristics (speed and degree of uninterrupted travel) that are inferior to the higher system.

Rural collectors generally serve travel of intra-regional importance where travel distances are typically shorter than those on arterial routes. Major collector roads link the larger outlying communities and serve traffic generators of intra-regional importance.

Minor collectors link locally important traffic generators, such as neighborhood stores, with outlying rural areas and collect traffic from local roads.

Local roads in rural areas serve primarily to provide access to adjacent land and to accommodate short travel. This network comprises all roads not given a higher classification.

### 3.1.3. Arterials

The state roads, specifically Route 17, Route 68, Route 147, Route 157, Route 79, and Route 77, are arterial roads. These arterial roads (1) serve the vast majority of the vehicles entering and leaving the Town, (2) serve the longest trips, and (3) serve travel between suburban centers. The arterial roads can provide access to abutting land but such access should be controlled because the primary responsibility of the road is to service major traffic movements.

### 3.1.4. Collectors

The collector roads distribute trips from the arterials to the ultimate destination which may be collector or local streets. The collector also collects traffic from local streets and channels traffic to arterials. The collector provides both direct access to abutting land as well as access to local streets. Cherry Hill Road, Higganum Road, Parmelee Hill Road, and Pent Road are classified as rural major collectors.

### 3.1.5. Local Streets

The local streets provide direct access to abutting land areas (neighborhoods) and access to collector streets. Vehicular traffic movement through these areas should be deliberately discouraged. All other roads not classified on the prior map are designated as local.

### 3.1.6. Public Transit

The Middletown Transit District (MTD) provides public transportation services in the Midstate Region. Rural route service was incorporated in Durham in October 1987 as a two-year demonstration program with a grant from ConnDOT. The original loop ran through Durham, Middlefield, and Cromwell. On July 1, 1990, the MTD rural routes became official and no longer received the demonstration grant funding, prior to which, service was reduced from ten runs per day to six. As a result of the reduced service, Cromwell dropped the service in the fall of 1989, and Middlefield dropped the service in the summer of 1990 due to low ridership.

Currently MTD's Durham rural route originates at MTD's terminal in Middletown and follows Route 17 to Higganum Road in Durham to the turn around point of Route 79. From there the bus starts back to the terminal to complete the loop. A twenty-two passenger bus operates on the route to what approximately corresponds to the a.m. and p.m. peak commute hours, Monday through Friday. Busses leave the MTD terminal at 6:15 a.m., 7:05 a.m., 9:15 a.m., 11:45 a.m., 4:05 p.m., and 5:00 p.m. Ridership from FY 90 through FY 00 averaged 4,134 person trips annually. Total person trips are shown on the following table:

MTD'S DURHAM ROUTE

| Fiscal Year | 1989* | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Person Trips | 9349 | 4846 | 3209 | 2383 | 3493 | 4637 | 3427 | 4114 | 5070 | 4880 | 4614 |

| Fiscal Year | 2000 | 2001 | 2002 |
|---|---|---|---|
| Person Trips | 4847 | 4637 | 3440 |

* There were 10 trips/day prior to FY'90 and 6 trips/day thereafter.

Source: MTD Operating Statistics

### 3.1.7. Elderly & Disabled Transportation Services

The Americans with Disabilities Act requires that elderly and disabled paratransit service be provided to complement fixed bus routes. The Middlesex County Chapter of the American Red Cross operates this service in Durham as part of its regional program. Service is provided on a demand responsive dial-a-ride basis to elderly and disabled residents on a first-come, first-served basis. The Red Cross requests twenty-four hour notification time, but forty-eight is preferred. The service is provided Monday through Friday from 8:00 a.m. to 6:00 p.m., but is not available on most holidays. Service is free to all riders, and medical, shopping, recreational, educational, and all other types of trips are accommodated.

### 3.1.8. Travel Patterns to Work

The 1990 Census of Population and Housing depicted a 3,077 person workforce living in Durham. Of this workforce 2,988 worked in Connecticut and 1,527 in Middlesex County. The average travel time to work for Durham residents was twenty-four minutes, and there was an average of 2.33 vehicles per household. The majority of workers (2,593 or 84.3%) drove to work alone, while 313 carpooled, and the remainder used some other form of transportation or worked at home.

1990 Journey to Work statistics show the origins and destinations of workers. Most Durham residents worked in Middletown, followed by Durham, Meriden, Wallingford New Haven, and Hartford. Many of those who work in Durham also reside in Durham, or are residents of Middletown, Middlefield, or Wallingford. The table below illustrates the origins and destinations of workers in Durham.

1990 WORK TRIPS

| Destination of Durham Residents | Number | Percent | Origin of Durham's Workers | Number | Percent |
|---|---|---|---|---|---|
| Middletown | 681 | 23.2 | Durham | 434 | 31.1 |
| Durham | 434 | 14.8 | Middletown | 213 | 15.3 |
| Meriden | 205 | 7.0 | Middlefield | 114 | 8.2 |
| Wallingford | 199 | 6.8 | Wallingford | 91 | 6.5 |
| New Haven | 194 | 6.6 | Meriden | 79 | 5.7 |
| Hartford | 142 | 4.8 | Portland | 55 | 3.9 |
| Hamden | 83 | 2.8 | Guilford | 50 | 3.6 |
| Rocky Hill | 56 | 1.9 | North Branford | 36 | 2.6 |
| North Branford | 52 | 1.8 | Haddam | 34 | 2.4 |
| Cromwell | 43 | 1.5 | Madison | 27 | 1.9 |
| Newington | 36 | 1.2 | East Hampton | 22 | 1.6 |
| East Haven | 32 | 1.1 | Hartford | 22 | 1.6 |
| Stratford | 32 | 1.1 | East Haddam | 20 | 1.4 |
| Branford | 31 | 1.1 | New Haven | 20 | 1.4 |
| Remainder | 720 | 24.3 | Remainder | 178 | 12.8 |
| Total | 2,940 | 100 | Total | 1,395 | 100 |

Source: 1990 Census Journey to Work

ESTIMATED NUMBER OF VEHICLE TRIPS TO WORK PASSING THROUGH DURHAM FROM ADJACENT MUNICIPALITIES IN 1990

| | | |
|---|---|---|
| From Madison | Through Durham | 635 |
| | Terminating in Durham | 27 |
| | Total | 662 |
| From Guilford | Through Durham | 649 |
| | Terminating in Durham | 50 |
| | Total | 699 |
| From North Branford | Through Durham | 148 |
| | Terminating in Durham | 36 |
| | Total | 184 |
| From Wallingford | Through Durham | 668 |
| | Terminating in Durham | 91 |
| | Total | 759 |
| From Middlefield | Through Durham | 235 |
| | Terminating in Durham | 114 |
| | Total | 349 |
| From Middletown | Through Durham | 938 |
| | Terminating in Durham | 213 |
| | Total | 1,151 |
| From Haddam | Through Durham | 233 |
| | Terminating in Durham | 34 |
| | Total | 267 |
| From Killingworth | Through Durham | 405 |
| | Terminating in Durham | 17 |
| | Total | 422 |
| Summary Total | | 4,493 |
| Through Total | | 3,911 |
| Terminating Total | | 582 |

Source: 1990 Census Journey to Work

These figures are an estimate of work trips passing through Durham with origins and destinations outside of Durham. It is based on 1990 Journey to Work data, where trips were analyzed in municipalities adjacent to Durham, that would be likely to pass through Durham in order to reach their destinations. For example, a person residing in Guilford would likely pass through Durham on Route 77 and Route 17 to reach a work site in Middletown.

This data only reflects the number of workers with origins and destination in the vicinity of Durham based on the 1990 Census. Their actual routes to work are unknown, and therefore this data is not indicative of average daily traffic in Durham.

The average daily traffic is based on actual traffic counts and can be referred to in another subsection of this chapter.

### 3.1.9. Ridesharing

Ridesharing techniques, such as car and vanpooling, became popular during the fuel shortages of the mid- and late 1970s and continued through the 1980s as it primarily saved commuters money. Ridesharing has since decreased in the 1990s but should be considered a viable transportation alternative to the single occupancy personal automobile since it also reduces congestion, increases air quality, and is still more cost effective than driving alone.

The Rideshare Company is the commuter agency that services Durham. A service of the Rideshare Company is the publication The Commuters' Register. Its goal is to increase ridesharing and public transit use in Connecticut. It is funded through the Connecticut Department of Transportation, Federal Highway Administration, and corporate contributions.

The Commuters' Register provides free listing of rideshare opportunities in Connecticut and adjacent states. The rideshare program organizes its service area into seventy-five commuter zones. To use the register, match the area you commute from to the town you travel to for work. The register lists other commuters traveling to and from the same areas as you. Call those persons and arrange to share the commute. Placing an advertisement in The Commuters' Register is free and is published monthly.

The register also lists bus, train, and shuttle services available from zone to zone, and corporate site-specific ridesharing opportunities. Park and ride lot locations, commuter related articles, and other information can be found in The Commuters' Register. For additional information on carpools, vanpools, and Easy Street van service, contact the Rideshare Company directly.

JOURNEY TO WORK COMMUTING PATTERNS

| | Place or Residence | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Place of Work | | Cromwell | Durham | E. Haddam | E. Hampton | Haddam | Middle-field | Middle-town | Portland | Region | Non reg. | Total |
| | Cromwell | 1187 | 43 | 40 | 180 | 49 | 33 | 887 | 126 | 2545 | 2036 | 4581 |
| | Durham | 18 | 434 | 20 | 22 | 34 | 114 | 213 | 55 | 910 | 485 | 1395 |
| | E. Haddam | 26 | 0 | 811 | 54 | 78 | 0 | 72 | 11 | 1052 | 625 | 1677 |
| | E. Hampton | 0 | 12 | 96 | 1090 | 12 | 8 | 122 | 38 | 1378 | 498 | 1876 |
| | Haddam | 10 | 17 | 186 | 55 | 541 | 14 | 147 | 87 | 1057 | 691 | 1748 |
| | Middlefield | 50 | 148 | 32 | 17 | 35 | 284 | 276 | 21 | 863 | 426 | 1289 |
| | Middletown | 1308 | 681 | 569 | 1000 | 1183 | 691 | 10909 | 1169 | 17510 | 13076 | 30586 |
| | Portland | 78 | 29 | 41 | 211 | 72 | 42 | 543 | 995 | 2011 | 830 | 2841 |
| | Region | 2677 | 1364 | 1795 | 2629 | 2004 | 1186 | 13169 | 2502 | 27326 | 18667 | 45993 |
| | Non-reg. | 3865 | 1576 | 1793 | 3101 | 1790 | 951 | 9734 | 1802 | 24612 | | |
| | Total | 6542 | 2940 | 3588 | 5730 | 3794 | 2137 | 22903 | 4304 | 51938 | | |

Source: 1990 Census Journey to Work

Durham should place an emphasis on carpooling by promoting employer ridesharing incentives for employees such as flexible work hours, transit subsidies, or organizing a formal rideshare program. Promoting ridesharing and providing areas for commuter parking could help to lessen the congestion on Main Street.

### 3.1.10. Roadway Capacity

The primary objective of capacity analysis is to estimate the maximum amount of traffic that can be accommodated by a given roadway. Traffic facilities generally operate poorly at or near capacity, and facilities are rarely designed or planned to operate in this range. Capacity analysis is also intended to estimate the maximum amount of traffic that can be accommodated by a roadway.

In general, the capacity of a facility is defined as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time under prevailing roadway, traffic, and control conditions (i.e., traffic signals, stop and yield signs, etc.). The time period used in most capacity analysis is 15 minutes, which is considered the shortest interval during which stable flow exists.

Segments of Route 17 and Route 68 were identified as over capacity in 1995 according to the Connecticut Arterial System Study prepared by the Connecticut Department of Transportation. The Road Capacity map depicts roads that were over capacity in 1995, and includes additional roadways that are projected to be approaching and over capacity by 2015 and 2020.

Level of service is a qualitative measure that incorporates speed, travel time, traffic interruptions, freedom to maneuver, safety driving comfort, and convenience. The level of service was determined by the road's volume-to-capacity ratio (V/C). A V/C ratio of between 0.90 to 0.99 suggests a roadway is approaching capacity, whereas ratios of 1.00 or greater are roadways that are over capacity. Capacity analysis represents a good indication of identifying roads projected to be congested if current roadway conditions continue without the necessary improvements.

Level of service A represents free flow. Individual drivers are virtually unaffected by the presence of others in the roadway. Freedom to select desired speeds and to maneuver within traffic is extremely high. Level of service B is in the range of stable flow, but the presence of other drivers begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within traffic. Level of service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual drivers becomes

significantly affected by interactions with others in the roadway. Level of service D represents high density, but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a poor level of comfort and convenience. Level of service E represents operating conditions at or near the capacity level. All speeds are severely reduced. Freedom to maneuver within the traffic is extremely difficult, and is accomplished by forcing a vehicle to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor and driver frustration is generally high. Level of service F is used to describe breakdown flow. Queues form in these locations and the traffic flow is characterized by stop-and-go waves.

CAPACITY RATIO TABLE

| Level of Service | Volume/Capacity Ratio (V/C) |
|---|---|
| A | 0.0 - 0.35 |
| B | 0.35 - 0.5 |
| C | 0.5 - 0.75 |
| D | 0.75 - 0.9 |
| E | 0.9 - 1.0 |
| F | Over 1.0 |

Source: Transportation & Traffic Engineering Handbook, 1982 by Institute of Traffic Engineers

### 3.1.11. Accidents

The number of traffic accidents at given locations is an indication of deficiencies in the roadway network. This provides a broad measure of the overall need to improve roadway safety in the town. ConnDOT's Office of Inventory and Forecasting compiles accident reports for all the state roads in Connecticut to produce the Traffic Accident Surveillance Report (TASR) and Suggested List of Surveillance Study Sites (SLOSSS). The SLOSSS list shows TASR sites where the actual accident rate exceeds the critical accident rate and accident totals are more than fifteen during the three-year study period.

There were for 1998-2000 SLOSSSS site indicated in Durham, three of which were along Route 17.

HIGH ACCIDENT LOCATIONS ON STATE ROADS
(Greater than four accidents from 1998-2000)

| Route | Miles | Location | Number of Accidents |
|---|---|---|---|
| 17 | .23 | Between Route 79 and Town House Road | 19 |
| 17 | .03 | At Haddam Quarter Road and Route 147 | 25 |
| 17 | .29 | Between Route 147 and end of three lanes | 20 |
| 79 | Int. | At Route 17 and Higganum Road | 22 |

The 1996-1998 TASR sites list all accidents locations along Routes 17, 68, 77, 79, 147, and 157 in Durham. There were 202 accidents on Route 17, from mile 10.93 at Barbara Lane to mile 17.29 between Royal Oak Drive and Acorn Drive. Seven-two accidents occurred on Route 68 between Route 157 and Route 17. Twenty-four accidents occurred on Route 77 between Crooked Hill Road and Route 17. Forty-five accidents occurred between Old Johnson Road and Route 17 on Route 79. Forty-nine accidents occurred on Route 147 from Route 17 to in between Cherry Hill Road and Lyman Drive. Six accidents occurred on Route 157 from Route 68 to in between Commerce Circle and South Street. The following table summarizes the high accident locations on the state roads in Durham.

**HIGH ACCIDENT LOCATIONS ON STATE ROADS**
(Greater than four accidents from 1996-1998)

| Route | Miles | Location | Number of Accidents |
|---|---|---|---|
| 17 | 0.36 | Between Barbara Lane and Stagecoach Road | 5 |
| 17 | 0.82 | Between Stagecoach Road and Coe Road | 9 |
| 17 | Int. | At Route 77 | 6 |
| 17 | Int. | At Route 79 | 8 |
| 17 | 0.23 | Between Route 79 and Town House Road | 20 |
| 17 | 0.07 | Between Town House Road and Fowler Ave. | 5 |
| 17 | Int. | At Fowler and Maple Avenues | 7 |
| 17 | 0.15 | Between Pickett Lane and Route 68 | 5 |
| 17 | 0.29 | Between Maiden Lane and Talcott Lane | 10 |
| 17 | Int. | At Talcott Lane | 5 |
| 17 | 0.15 | Between Talcott La. and Haddam Quarter Rd. | 20 |

| Route | Miles | Location | Number of Accidents |
|---|---|---|---|
| 17 | 0.03 | At Haddam Quarter Road and Route 147 | 16 |
| 17 | 0.29 | Between Route 147 and the end of three lanes | 21 |
| 17 | 0.12 | Between Oak Terrace and Royal Oak Terrace | 5 |
| 17 **TOTAL** | 6.36 | Between Barbara Lane and town line | 202 |
| 68 | Int. | At Route 157 | 6 |
| 68 | 0.81 | Between Route 157 and Pent Road | 15 |
| 68 | Int. | At Pent Road | 12 |
| 68 | 0.11 | Between Pent Road and Linmar Drive | 5 |
| 68 | 0.27 | Between Old Wallingford and Tuttle Roads | 9 |
| 68 | 1.06 | Between Tuttle Road and Maple Avenue | 10 |
| 68 | Int. | At Maple Avenue | 6 |
| 68 **TOTAL** | 2.58 | Between Route 157 and Route 17 | 72 |
| 77 | Int. | At Route 17 | 10 |
| 77 **TOTAL** | 2.17 | Between Crooked Hill Road and Route 17 | 24 |
| 79 | 0.60 | Between Old Johnson Road and Pisgah Road | 5 |
| 79 | Int. | At Route 17 and Higganum Road | 24 |
| 79 **TOTAL** | 2.35 | Between Old Johnson Road and Route 17 | 45 |
| 147 | 0.21 | Between Route 17 and Maple Avenue | 8 |
| 147 | Int. | At Maple Avenue | 10 |
| 147 | 0.50 | Between Maple Avenue and Cherry Hill Road | 10 |
| 147 | 0.95 | Between Cherry Hill Road and Lyman Drive | 13 |
| 147 **TOTAL** | 1.71 | Between Route 17 and Lyman Drive | 49 |
| 157 **TOTAL** | 1.32 | Between Route 68 and South Street | 6 |

The Department of Public Safety, State Police Troop F in Westbrook keeps records of traffic accidents in Durham that they have been called to, mostly on state roads. Police records show that from July 1,1993, through December 31, 1995, there was a total of 382 accidents in Durham, resulting in 195 injuries and 1 fatality.

The number injured in an accident helps to show the seriousness of the accident. Two hundred fifty-three of the 382 accidents were non-injury accidents. There were 85 one-person injury accidents, 28 two-person injury accidents, 11 three-person injury accidents, 4 four-person injury accidents, and 1 five-person injury accidents.

Vehicle accidents show a breakdown of the number of vehicles involved in the collisions. There was 126 one-vehicle accidents, 237 two-vehicle accidents, 17 three-vehicle accidents, and 2 four-vehicle accidents.

Depicting accidents by hour shows the period when most accidents are likely to occur. Thirty-two accidents occurred between 4:00 and 4:59 p.m. Other high accident hours included 7:00-7:59 a.m. (30), 2:00-2:59 p.m. (28), 3:00-3:59 p.m. (26), 8:00-8:59 a.m. (25), and 5:00-5:59 p.m. (24). The lowest hours were 4:00-4:59 a.m. and 5:00-5:59 a.m., each with two accidents.

In December of 2000 the Durham Public Safety Committee prepared a report entitled "Motor Vehicle Accidents in the Town of Durham." Gathering accident, speed, and traffic data from a variety of local, regional, and state sources, the committee came to the following conclusions:

1. Most of the accidents occur during the a.m. and p.m. peak hour volumes (7-8 a.m. and 3-4 p.m.).
2. The most accidents occur on Friday, the day of the week with the highest volume of traffic.
3. The ten highest accident locations (all on State roads or at the intersection of a State road and a local road) account for 35% of Durham's motor vehicle accidents.
4. From 1994 –1999, there was an average of 160 accidents per year. Over the past three years, there has been a slight increase.
5. The number of vehicles involved in accidents has risen dramatically between 1995 and 2000. Accidents involving two cars rose from 58.0% to 65.0%, which translates to increased numbers of persons at risk of injury during each accident.
6. An analysis of selected road segments for their change of traffic volume shows an increase of 3.1% per year from 1995 to 1999. The increase in traffic volumes directly correlates to the number of accidents.
7. The committee's conclusion is that "… the major cause of increased accidents is increased volume."

### 3.1.12. Traffic Volume - State Roads

| Route | Segment | 2000 Average Daily Traffic (ADT) |
|---|---|---|
| 17 | North Branford/Durham town line to Stagecoach Road | 4,400 |
| 17 | Stagecoach Road to Route 77 | 5,300 |
| 17 | Route 77 to Route 79 | 10,000 |
| 17 | Route 79 to Route 68 | 18,000 |
| 17 | Route 68 to Route 147 | 18,600 |
| 17 | Route 147 to Durham/Middlefield town line | 14,300 |
| 68 | Wallingford/Durham town line to Route 157 | 12,600 |
| 68 | Route 157 to Route 17 | 9,600 |
| 77 | Guilford/Durham town line to Route 17 | 4,400 |
| 79 | Killingworth/Durham town line to Route 17 | 8,100 |
| 147 | Route 17 to Cherry Hill Road | 7,900 |
| 147 | Cherry Hill Road to Durham/Middlefield town line | 6,000 |
| 157 | Route 68 to Durham/Middlefield town line | 3,100 |

Source: ConnDOT, 1995 Traffic Volumes - State Maintained Highway Network

### 3.1.13. Traffic Volume - Local Roads

| Road | Segment | Average Daily Traffic (ADT) | Year |
|---|---|---|---|
| Bear Rock Road | North of Higganum Road | 420 | 1987 |
| Haddam Quarter Road | West of Brick Lane | 1,860 | 1989 |
| Haddam Quarter Road | West of Foot Hill Road | 310 | 1989 |
| Higganum Road | East of Route 17 | 750 | 1986 |
| Higganum Road | East of Bear Rock Road | 870 | 1987 |
| Howd Road | West of Route 17 | 570 | 1987 |
| Johnson Lane | East of Maiden Lane | 490 | 1990 |
| Maiden Lane | West of Johnson Lane | 780 | 1990 |
| Maple Avenue | South of Route 68 | 900 | 2000 |
| Maple Avenue | South of Route 147 | 970 | 1986 |
| Maple Avenue | West of Route 17 | 800 | 2000 |
| Parmelee Hill Road | West of Route 17 | 1,890 | 1986 |
| Parmelee Hill Road | West of David Road | 1,320 | 1987 |
| Pent Road | South of Route 68 | 1,140 | 1986 |
| Saw Mill Road | North of Route 17 | 600 | 1996 |
| Stagecoach Road | West of Wagon Wheel Road | 290 | 1988 |
| Stagecoach Road | North of Old Farm Road | 1,000 | 1988 |
| Tuttle Road | South of Route 68 | 750 | 1986 |

Source: MRPA Traffic Studies

### 3.1.14. Transportation Improvement Program (FY 2001 - 2003)

**Main Street Streetscape Improvements II**

The concept for this project was developed from the Durham Garden Club's Project 2000 Study (The Greening of Main Street) prepared in the summer of 1993. The report makes numerous suggestions and those relating to tree planting, tree removal, creating of planting islands, street lighting, and sidewalk repair and replacement were included in the proposal. The scope of Project 2000 includes basically the Historic District. This proposal was expanded to the north and south to be more inclusive of Main Street. Another event contributing to the development of this enhancement project was the discovery of the buried brownstone bridge over Allyn Brook dating back to 1823 and the subsequent decision by Connecticut Department of Transportation to preserve the historic structure. This combination of activities will enhance the historic character of Main Street and provide for better pedestrian access.

**Route 17**

A culvert replacement at the northern intersection of Stagecoach Road is programmed under the STP rural program to prevent re-occurring of flooding. The construction phase allocates $180,000 in FY 2004 for this improvement.

**Maple Avenue Bridge**

This project provides for the rehabilitation of the bridge over Allyn Brook, which was identified to be in poor condition under the provisions of the state and federal local bridge program. Total project cost is estimated at $468,500 with construction advertising date scheduled for October 2003.

**Saw Mill Road Bridge**

This project provided for the rehabilitation of the bridge over Parmelee Brook, which was identified to be in poor condition under the provisions of the state and federal local bridge program. Total project cost was $1,035,000 and was completed during 2002.

**Local Bridge Program**

The Local Bridge Program is concerned with bridges that are municipally owned and longer than six feet in length. ConnDOT annually sends the list of eligible deficient bridges to each municipality, which then sends the grant application back to ConnDOT to review. Local Bridge Program grants are given to qualifying projects on a sliding scale ranging from 10% to 33% of the total project cost. Low interest loans are also available to the municipalities for up to 50% of the project costs. Some local bridge projects may qualify for federal funding under the Off-System Program. If this occurs, the municipality may receive up to 80% federal funds for the project and the other 10%-20% from the state's Local Bridge Program, effectively requiring no local funds.

The primary difference between the Local Bridge Program and State Bridge Program is that ConnDOT inspects the state bridges more than twenty feet in length biannually, whereas the local bridges spanning between six and twenty feet were inspected once as mandated by Public Act 87-584. ConnDOT does not intend to inspect the local bridges again unless mandated by the Legislature. As a result, the Local Bridge Program eligibility list remains static. Bridges not on the list may be eligible for funding, but the municipality has to prove the bridge to be deficient by the guidelines in the Federal Highway Administration's "Recording and Coding Guide for the Structural Inventory and Appraisal of the Nations Bridges," dated December 1988. Municipalities can submit this information to ConnDOT for review and approval. If found deficient and approved for eligibility, ConnDOT will include the bridge on the list of eligible bridges

and establish a priority ranking for the bridge. The ranking and available funds determine funding authorization annually. If not authorized in one fiscal year, the municipality must resubmit project applications for consideration the next fiscal year.

### 3.1.15. Rail

Rail freight passes through Durham on a rail line in the town's northwest corner. The rail line is owned by the State of Connecticut from MP 15 (Reeds Gap) north to Middletown and by Tilcon Inc. south to New Haven. The Providence & Worcester Railroad (P&W) operates on the lines owned by Tilcon. The Connecticut Central Railroad operates on the lines owned by the state and has rights to operate south to New Haven in order to interchange traffic with Conrail.

The P&W replaced 7.8 miles of 107 lb. rail with 115 lb. rail along its Middletown Branch. This results from the fact that the rail joints were bent from inadequate support and the heavy weight of gravel cars operating over the line. P&W also has a policy to maintain operating speeds of 40 mph on its lines, but cannot do so on the Middletown Branch because of the joint problem. A 40 mph operating speed is necessary on this line to build enough momentum to climb grades without adding another engine.

Rail transport of both passengers and freight should be encouraged since rail transport is less polluting and more economically efficient than other forms of surface transportation. There is currently no passenger service in the region and approximately seventeen miles of active freight service.

The P&W Railroad operates freight service in the Midstate Region on rail line rights of way owned by ConnDOT. Service originates in Middletown, with three stub-end radial access lines to Cromwell, Portland, and Middletown. The main line runs southwest through Middletown, Middlefield, and Durham to Reeds Gap. From Reeds Gap to North Haven, the line is owned by Tilcon and operated by the Providence & Worcester Railroad, and from North Haven to New Haven, it is owned by Conrail. P&W has trackage rights to reach New Haven and interchange traffic with Conrail on the Northeast Corridor. From Middletown north to Hartford, P&W has upgraded the line.

### 3.1.16. Comprehensive Town-Wide Drainage Study 1991

Midstate Regional Planning Agency, in cooperation with the town of Durham, prepared a Comprehensive Town-Wide Drainage Study. The inventory focused on stream crossings and major road drainage structures. Survey information on 137 culverts was collected throughout Durham and each item provided essential information in working toward a priority system. This system would identify culverts in need of maintenance or undersized drainage systems. Thus, they can schedule to replace culverts with capacity related problems. Local officials can schedule those with sediment problems for maintenance and correct erosion problems.

Data collected for each structure in town included location and watercourse information. Also collected was data regarding the structure such as culvert type, length, diameter, roadway crossing condition, and a description of the upstream and downstream sections of the crossings that includes water depth, erosion, obstructions, and a history of flooding. Detailed information for each crossing structure in Durham can be found in the "Town of Durham Drainage Study" dated 1991. The report includes maps of all culverts in town, culvert size, type, and those with obstructions. Also included are bridges with spans less than six feet, six to twenty feet, and greater than twenty feet.

Maintenance of Durham's culverts and bridges should be a priority for the town to protect public safety through crossing maintenance and flood prevention. Bridges with spans from six to twenty feet may be eligible for reconstruction under the State's Local Bridge Program and should therefore be inspected for deficiencies. The town should notify property owners not to place cut brush streamside as it could wash into the stream, obstructing a culvert and causing localized flooding. An update of the drainage study would benefit local officials by showing which culverts are in need of repairs or replacement so they could take corrective action.

### 3.1.17. Traffic Studies

#### Main Street Traffic Study Summary

F. Andrew Wolfe, Ph.D., a Durham resident and a professor at the University of New Haven, conducted a study of Route 17 traffic during the fall of 1995 coinciding with the Durham Fair. As a volunteer organizer of the fair's annual activities, he donated his time to study traffic problems associated with both the fair and Main Street. Mr. Wolfe identified the following as the major traffic concerns on Main Street: traffic volume, signalization, side streets, vehicular speed, pedestrian safety, curb cuts, and driveways, intersection designs, and access to Main Street as the major issues. He identified improved traffic flow, intersection designs, and pedestrian access as the primary remedies.

The study noted that the highest traffic volume on Route 17 occurred between Route 79 and Route 147 and was primarily commuter-based traffic flowing through Durham. The study stated that speeds should be controlled and traffic signals coordinated along Route 17 in Durham to improve flow.

#### Route 17 Corridor Study Summary

Midstate Regional Planning Agency, in cooperation with Maguire Group Connecticut,

Inc. and its sub-consultants of Fitzgerald & Halliday, Inc. and VN Engineers, conducted a corridor study along Route 17 in Durham and Middletown. The Route 17 corridor study area was defined from the North Branford/Durham town line to the Route 9 entrance ramp in Middletown.

The Regional Transportation Plan for the Midstate Region, produced by MRPA in September 1994, defined the Route 17 corridor study area from the Route 17/Route 77 intersection north as a road that was approaching or over capacity in 1995. As a result, if present trends continued without the necessary improvements, the capacity constraints would continue to worsen and extend to other adjacent roadways.

The corridor study produced a Master Plan to guide local and state officials in designing short- and long-term traffic improvements to lessen congestion along the corridor. A ten-member advisory committee consisting of local officials, business owners, and residents from each town helped develop the study's goals and provided additional insights regarding the issues along the corridor. Five members were from each municipality. The Route 17 Advisory Committee members from Durham included Henry Robinson, George Eames III, William Clay Howe, Joan Hughes, and George Zeeb. The advisory committee met eight times at all critical points during the study. The objective of the corridor study was to produce two products, a Transportation Master Plan and an Access Management Plan.

The Master Plan consisted of management strategies and major transportation improvements to accommodate future travel demand along the corridor. The purpose of the Access Management Plan was to preserve existing capacity and extend the life of the road through capacity and operational improvements, such as design changes, land use controls, curb cut management, and signal revisions. A separate Access Management Plan was produced for Durham and Middletown.

**Goals and Objectives**

The overall goal of the corridor study was to provide direction for future transportation and land use planning with a focus on improving both safety and efficiency throughout the Route 17 corridor. A more refined set of goals and objectives was developed with information from the corridor Advisory Committee (AC). These corridor-specific goals included:

1) Provide a safe and efficient transportation system
    * Maintain acceptable traffic flow (level of service) along corridor and improve safety for various transportation modes
    * Plan for appropriate access to current and future land uses

2) Sustain quality of life

* Minimize disruption to natural, social, and aesthetic environments

3) Be feasible and affordable

* Minimize construction and maintenance costs
* Maintain consistency with regional goals and plans

4) Additional goals developed by the AC:

* Explore alternate modes of transportation (especially pedestrian and bicycle alternatives to use of single-occupancy vehicles)
* Improve safety, circulation, and signage for pedestrians and bicycles
* Improve traffic signalization and signal coordination
* Investigate traffic-calming strategies
* Discourage use of inappropriate alternate routes (short-cuts) to avoid Route 17 traffic
* Manage speeds and high volumes throughout the corridor
* Investigate strategies to improve access and circulation
* Implement comprehensive curb cut planning
* Evaluate parking impacts and opportunities for on-street parking and traffic calming to benefit local businesses

Several specific problems, issues, and areas of concern were also noted by the AC for Durham. These included:

* Alignment problems and safety concerns noted in Coe Road vicinity
* Route 17/79 intersection — safety concerns due to roadway geometrics
* Main Street — high traffic volumes and many curb cuts compromise safety
* Any proposed improvements on Main Street must consider its historic character
* Route 68 to Route 147 — turning lanes; "cut-throughs"; general safety concerns
* Traffic signal sequencing and coordination (several locations in the corridor)
* A portion of the state-owned right-of-way accessing 4-5 houses, north of Old Cemetery Road, is not being adequately maintained by the state
* Arrigoni property — future development should include comprehensive curb cut plan

The Route 17 corridor team and AC addressed the goals and issues presented above as an integral part of study tasks related to data collection, analysis, and selection of alternatives.

## Public Information Meetings

Three public meetings were held during the Route 17 Corridor Study. Notices of public meetings were published in local newspapers and sent to persons showing interest in the corridor study. The first took place on August 19, 1997, at the Frederick F. Brewster School in Durham, the second on November 24, 1997, at the DeKoven House in Middletown, and the third on May 13, 1998, at the Durham Public Library. The information contributed by residents, business owners, and concerned citizens who travel the route regularly provided essential insights on the nature and severity of problems along the corridor.

## Existing Conditions

Connecticut State Route 17 is a primarily a north-south arterial serving Durham, Middletown, and the south-central part of the state. In busier areas along the corridor, such as the intersection of Route 147 in Durham, additional lanes are provided to accommodate turning vehicles in areas that typically experience heavier traffic volumes.

Under current conditions, drivers experience frequent delays especially during peak commuter hours. Several factors contribute to congestion and delays. While volume is part of the problem, congestion in certain areas has been traced to conditions such as inadequate signage or signalization, lack of turning lanes, or poor driveway and side street alignments that hamper free traffic flow. Implementing minor physical improvements and/or roadway and access management strategies can ease many of these types of congestion factors. Addressing these strategies was a primary focus of this study.

## Existing Traffic Flow

Average Daily Traffic (ADT): Existing ADT, based on volumes collected from the Connecticut Department of Transportation (ConnDOT), indicated a range in Durham from a low of approximately 4,000 vehicles per day southwest of School House Lane to a high of approximately 16,800 vehicles per day south of Route 147 and Haddam Quarter Road.

Peak Hour Volumes: Turning movement counts were collected during May and June of 1997 at eleven key locations in Durham. At each approach to the intersection, movement of vehicles to either make a right turn, a left turn, or continue to travel through was recorded. Counts were collected during the morning peak period (7:00

a.m. to 9:00 a.m.) and the afternoon peak period (4:00 p.m. to 6:00 p.m.). These times were chosen so that traffic volumes would reflect commuter and school traffic.

Speeds: Eighty-fifth percentile (85%) speed data, representing a measure of the upper limit of reasonable speeds, were collected from ConnDOT and were observed during short non-peak periods. The data shows a speed range from five to fifteen miles per hour above the posted speed.

Travel Time and Delay: Travel time and delay runs showed the average time and speed to traverse from one end of the corridor to the other and any delays encountered along the way. The study was done during the morning peak period (7:00 a.m. to 9:00 a.m.) and the afternoon peak period (4:00 p.m. to 6:00 p.m.). A Saturday midday peak period (11:00 a.m. to 1:00 p.m.) was also conducted. Three runs were done in each direction during each time.

This exercise showed that during the morning peak period, school bus stops, and the high school entrance, along with red stop lights, contributed to delays. During the afternoon and Saturday midday peak periods, traffic was generally found to move smoothly with stops occurring for red lights and an occasional stop for a turning vehicle to clear the roadway.

Level of Service Analysis: A capacity analysis was performed at eleven key locations along the corridor in Durham. Capacity of an intersection (i.e., its ability to accommodate a moving stream of traffic) is defined as level of service (LOS). LOS is expressed in an alphabetic scale, A to F. LOS A represents clear traffic flow and the best conditions, while LOS F represents severely congested flow and is considered unacceptable.

The analysis showed many intersections are operating at a poor level of service in either the morning or evening peak period, or both. In Durham, Routes 79 and 68 operate poorly due to the delay vehicles experience because of high volumes of traffic sharing a lane. The Route 17 intersection with Fowler/Maple Avenue, operates poorly northbound in the a.m. peak period and southbound in the pm peak period, likely a result of inadequate lane capacity to meet the demand of commuter traffic. Haddam Quarter and Route 147 operate very poorly and vehicles entering these intersections experience significant delay. Maiden Lane operates at a poor level of service due to vehicle delays encountered while waiting to enter the flow of traffic on Route 17.

### Bicycle, Pedestrian, and Transit Issues

Route 17 is frequently used as a bike route, especially for cyclists reaching Routes 77 and 79. It is shown as a cross-state route in ConnDOT's Connecticut Bicycle Map,

although it was not specifically designed to accommodate bicycle traffic.

Pedestrian safety was noted by many as a primary issue in the corridor. Most pedestrian concerns were focused on the Main Street area. Sidewalks lack continuity currently, but the Main Street improvement program intends to place sidewalks from the Post Office to Strong School and southerly to just past the firehouse. Areas of concern for pedestrian crossings included the areas near Dairy Serve, Dunkin' Donuts, Allyn Brook, and the area between the library and town hall. School bus routes are designed so children do not have to cross Route 17.

The Middletown Transit District offers rural route service to Durham on Route 17 down to the Route 79 turnaround. Service is provided six times per day, primarily during the peak commuting hours, Monday through Friday.

**Environmental Constraints**

Transportation improvements frequently have the potential to impact the existing built and physical environment. The most significant environmental resources along the Route 17 corridor in Durham are historic resources and wetlands. Durham's Main Street is listed on the National Register of Historic Places as a historic district. Most of the architecture is 18th century colonial. There is a stone arch bridge over Allyn Brook that was preserved when the modern bridge was rehabilitated. Other historic homes can be found near Route 79 and farther south on New Haven Road.

Allyn Brook is a natural resource located near Old Cemetery Road. There are also several small stream crossings and wetland areas along Route 17. To the west of Route 17, there is a large wetlands called the Durham Meadows. Four animal and one plant species at Durham Meadows are on the state's list of rare, endangered, or threatened species.

**Problems and Needs**

Following an analysis of existing corridor conditions based on the available data sources, field observation, and information from the Advisory Committee, several distinct areas have emerged as particular areas of concern. Specific problem areas were identified based on safety, geometrics, pedestrian movement, land use and zoning, levels of service, access issues, and other pertinent factors. Where multiple problems were confirmed at a single location or area, or where roadway and/or access problems were considered particularly severe, the sites were determined to require a detailed alternatives evaluation.

Three such areas were identified in Durham including the primary business areas. Within these business areas, multiple intersections exhibit capacity and/or geometric problems; however, each individual intersection will not be viewed in isolation of other nearby conditions. To achieve a more meaningful analysis, the more densely developed areas in Durham were considered as one area for purposes of developing potential alternative scenarios. The main areas are listed as follows:

1) Routes 17/79/77
2) Main Street from the Routes 17/79/77 Intersection to Route 147/Haddam Quarter Road (includes Fowler/Maple, Route 68 and Maiden Lane intersections)
3) Route 147 and Haddam Quarter Road Area

Other areas along the corridor have also been identified as having specific safety or access problems. The relative need for improvement may be just as great in these areas and they were also the subject of future analysis. However, for the areas listed above, addressing the combinations of problems will require evaluation of several potential alternative scenarios.

**Future Traffic Flow**

An analysis of anticipated future conditions in the Route 17 corridor was performed to identify problems and needs that are likely to occur or persist in the future. Daily trip generation figures from ConnDOT's state transportation model, based on factors such as population and employment, were consulted to estimate rates of growth in traffic. Presently, traffic growth is anticipated at a 1.5% growth rate per year in this study area until the year 2020. This is equivalent to a 30% increase in traffic from 1997 to 2020.

Future traffic volumes, turning movements, and patterns of vehicular use were estimated and characterized using the peak hour traffic counts taken in May and June 1997 as a baseline condition. Data was adjusted utilizing ConnDOT's 2020 forecasts estimating future traffic volumes, turning movements, and levels of service. Further analysis of these figures with respect to current local zoning and developable acreage within Durham and Middletown provided the maximum development scenario. This scenario considered the localized effects of projected traffic increases if each parcel within the area were developed to its full potential under current regulations.

The Connecticut Department of Transportation model produced daily trip estimates for different trip purposes based on such factors as population, employment, vehicles per household, and regional and state transportation plans. Projected variables such as population and employment, compiled by the State Office of Policy and Management, were also added to the model to project daily traffic flow. Future estimated turning

movement volumes for both the morning and evening peak were obtained from ConnDOT for the year 2020.

**Future Level of Service**

A capacity analysis was done at the eleven key intersections in Durham using the projected p.m. peak hour traffic volumes. A roadway's capacity reflects its ability to accommodate a moving stream of traffic. Capacity of an intersection is defined in terms of level of service (LOS) which is based on the average stopped delay per vehicle and expressed in an alphabetic scale, A to F.

Under current year conditions, six intersections with Route 17 were identified as having a poor level of service in Durham. They included Route 17 and Route 79, Fowler/Maple Avenue, Route 68, Maiden Lane, Haddam Quarter Road, and Route 147. In general, an intersection experiencing a poor level of service under existing conditions, will continue to deteriorate further if no improvements are implemented.

Results from the future year 2020 LOS analysis show that an additional two intersections will experience a poor LOS in the future year. These intersections include School House Lane/Howd Road and Old Cemetery Road in Durham. There are also intersections identified as currently having a poor LOS for one or more movements (turning or through) and are expected to function poorly for additional movements in the future. These include Route 79, Fowler/Maple Avenue, Route 68, Maiden Lane, Haddam Quarter Road, and Route 147.

**Intersection Improvement Options**

A series of suggested improvements directed at improving traffic flow along the corridor were identified. Where a poor LOS was shown based on projected traffic volumes, additional turning or through lanes, or adjustments to signalization has been suggested to improve LOS.

At some intersections identified, it was not necessarily high traffic volume that was responsible for inefficiencies in turning movements and traffic flow. For example, a poor LOS was identified at several unsignalized intersections, not because of the volume of traffic at these intersections, but rather the inability of traffic from the side streets to safely enter the main traffic flow on Route 17 in a reasonable amount of time. At these locations, a traffic signal warrant analysis was suggested (School House Lane/Howd Road, Old Cemetery Road, and Maiden Lane).

## Alternative Improvement Concepts

A broad range of options for solving safety, congestion, access, and other transportation- related problems in the corridor have been identified and evaluated during this phase of the corridor study process. These improvement strategies/alternatives address both general concepts and detailed intersection-level options. The list of alternative transportation improvement strategies investigated included:

1) Route 17 Bypass:

Several residents and members of the Advisory Committee believed a Route 17 bypass road would alleviate traffic congestion along the Main Street section of Durham. This concept was discussed and potential routes were evaluated, including a bypass from Route 17 south of Route 79 to Route 68.

The greatest need and benefit of this bypass would be during peak hour travel. It was estimated that upwards of 50% of peak hour vehicles could potentially use this bypass. Even at that rate, volumes of traffic using this road would not be very high. The construction of a new Route 17 bypass would also have significant impacts to the natural and built environment. Wetlands, schools, and residents would be adversely affected by the construction of the road. Based upon cost estimates from other areas of the state, a Route 17 bypass road would cost several million dollars. It has been concluded that a Route 17 bypass road was not a feasible alternative. A broader area may need to be studied to determine the regional need for a bypass. Durham may also consider facilitating the use of local, bypass roads by commuters to reduce peak hour traffic on Main Street.

2) Full Four-Lane Construction of Route 17:

Given current and projected peak hour congestion and identified sections as approaching and/or over capacity, a complete widening of this two-lane arterial to four lanes could be considered an option. With an increase in capacity, the projected traffic growth of 30% over the next twenty years would be readily accommodated by essentially doubling the capacity of Route 17.

However, a four-lane option was not considered appropriate given the moderate volume of traffic, significant adverse effects on town character, and impacts to other natural and built resources. Clearly, neither the public nor any member of the Advisory Committee advocated a full roadway widening option. Therefore, a full four-lane widening of Route 17 was not considered a feasible alternative.

3) Intersection Improvements:

The focus of this study had been steered toward affecting moderate to large scale improvements at selected intersections. These improvements would solve most of the capacity and safety problems in the corridor while minimizing impacts to businesses, wetlands, and the historic character of Durham. They have been presented to the Advisory Committee, the public, and ConnDOT. A series of intersection widening and realignments was the primary alternative being pursued in the Route 17 Corridor Study.

4) Access Management:

Access management is the process that provides controlled access to land development while maintaining an adequate flow of traffic on adjacent roadways.

The frequency of traffic accidents was greatest along Route 17 where there are conflicts between land access (driveways and curb cuts) and through traffic. Proper management of these access points will reduce conflicts and the number of accidents. There are many driveways along several sections of both Durham and Middletown on Route 17. A goal of access management, therefore, is to close some driveways while maintaining property access. A reduction in the number of curb cuts can be accomplished without limiting a property owner's ability to conduct business. Access management is the responsibility of the Town of Durham and the City of Middletown; together with moderate upgrades of intersections, the reduction of curb cuts and implementation of other mechanics of access management are the recommended options to improve traffic conditions along Route 17.

5) Travel Demand Management:

Travel demand management includes transit and ridesharing strategies that can decrease overall traffic and improve level of service. Given the primarily rural/suburban nature of the corridor, an improvement in ridesharing would be the most practical option to better manage travel demand. The creation of strategically located commuter lots would be a start toward allowing peak hour travelers to coordinate trips. There are no commuter lots available to travelers along the corridor. A site(s) located south of Durham on Route 17, 77, and/or 79 would be a preferred location for a commuter lot.

6) Land Use Planning:

Route 17 is affected by the land development activities that surround it. Growth in land development in the region contributes to increased traffic on Route 17 and

adjacent streets. Local planning and zoning efforts should be directed at managing growth within the corridor and surrounding areas that may affect the Route 17 corridor. Purchase of open space and strict adherence to protection of environmentally sensitive areas also serves as prudent land management, reducing vehicles using local roads more than would otherwise occur.

As discussed above, access management is a method to control access to land development while maintaining an adequate flow of traffic on adjacent roadways. An access management plan has been produced as part of the corridor study that can be adopted by Durham if desired. Access management techniques can be applied to existing developments contingent on approval by the individual property owners. However, it is usually more beneficial to apply access management techniques to developing or redeveloping areas. To give legal status to the guidelines recommended in the plan, the proposed changes would have to be adopted in the site plan review guidelines, zoning, and subdivision regulations.

The access management plan proposes to create a Route 17 Corridor Overlay Zone in Durham that would incorporate access spacing standards into the land use planning and roadway design process. The proposed access management plan contains guideline regulations to address the land use and access conditions that may develop in town. Provisions in the guideline regulations regard 1) Applicability, 2) Plan conformance, 3) Access spacing, 4) Number of driveways, 5) Property and subdivision access, 6) Shared access, 7) Outparcels, phased development, and multiple parcels, 8) Reverse frontage, 9) Flag lots, 10) Nonconforming access, 11) Variance procedures, and 12) Site plan review guidelines. Once adopted, the regulations will help to maintain capacity on Route 17, provide reasonable access to abutting property, and preserve the character of the corridor. They will also increase safety due to the reduction in traffic conflicts and provide a roadway access framework for future land development decisions as well as improved site and design review processes.

**Specific Intersection Improvements**

The following table depicts the recommended intersection improvements selected for the problem areas with respect to evaluating criteria such as cost, environmental impact, historic impact, safety, and traffic flow. These criteria were considered in selecting a recommended improvement alternative for each intersection. These recommended alternatives essentially comprise the Durham section of the Corridor Plan.

Moving from south to north as shown in the table, there are major intersection improvement concepts that were recommended. The intersection of Coe Road and Route 17 was proposed to be realigned to improve safety. The intersection of Route 17

and 77 would be improved and could be incorporated with another improvement at the 17/79 intersection. At Route 17/79, realignment of the two state roads to create a four-way intersection has been proposed. While improving traffic flow and safety, this concept also offers the opportunity for curb cut closures that will further improve safety.

The signalized intersection of Maple Avenue and Fowler Avenue with Route 17 is in the heart of Durham and its historic district. Congestion was significant during the morning and evening rush hours. With 30% growth projected over the next twenty years, this intersection will remain a bottleneck. A trade-off of continued rush hour traffic congestion with conservation of Durham's historic character has been recommended. While moderate improvement alternatives could add left turn lanes both north and south and improve level of service conditions along Route 17, the consensus of members of the Advisory Committee was not to change the width or character of this intersection. Members recommended adding raised, cobblestone-type sections to the crosswalks and speed bumps on Maple Avenue between the library and town hall.

The junction of Route 17 with Old Cemetery Road would be altered by closing Old Cemetery Road. Access for residents will continue to be provided via Maple Avenue but the dangerous entry/exit to Route 17 would be eliminated by this proposal.

The intersection of Route 68 with Route 17 in Durham was noted as another busy area. Concerns from Advisory Committee members about impacts to historic properties and changes to the rural character result in minor widening to formalize existing turns lanes being the recommended option. Again, the trade-off of not adding full travel lanes that would provide capacity during peak hours will be a less efficient level of service for the traveling public.

The offset intersections of Route 147 and Haddam Quarter Rd. would be relocated to create a four-way intersection with Route 17. This solves the problems of safety and traffic congestion caused by the close proximity of these two signalized intersections. The design could be done without significant impact to business properties, but some wetland impacts would occur. Access management measures including curb cut closures and consolidations could be employed with this concept.

**Other Improvement Recommendations**

One recommendation was to increase ridesharing and transit use along the corridor. This would reduce traffic or slow the growth increase in volume throughout the corridor by reducing the number of single-occupancy vehicles (SOV). An increase in transit service and more aggressive marketing could help to reduce the number of

SOVs. Ridesharing could be increased through a program to help employers advertise in the Commuter's Register to promote ridesharing or staggered work hours. Another way to promote ridesharing would be through the provision of a commuter lot along the corridor. This would also stimulate ridesharing on the Route 17 corridor. One potential site could be near the junction of Routes 77/79, where commuters from the shoreline communities could park and ride to share their commutes, or potentially farther south on Route 17.

Recommendations addressing bicycle and pedestrian travel have also been formulated for the corridor. Route 17 could be made more bicycle friendly by adding pavement markings and signing the corridor as a designated bicycle route. Where applicable, the shoulder could also serve as a safer area for bicycle traffic if designated as such.

Pedestrian activity is mostly a concern in the center of Durham. Durham's Main Street Improvement Program will aid pedestrian movement in Durham Center. Sidewalks could also be constructed on both sides of the street in Durham Center and designated crosswalks placed in safe locations. Removable crosswalks signs could be placed in areas of high pedestrian traffic and also used for any special events. Crosswalks could be made of cobblestone for aesthetics and traffic calming in the Historic District and at the Notre Dame Church and Durham Pharmacy. The crosswalk at Maiden Lane should be eliminated since it is in a dangerous location and another crosswalk is located nearby at Route 68. Pedestrian phases should be added to all existing and future traffic signals.

Finally, a signal warrant analysis should be done at the intersection of Route 17 and Maiden Lane. If a signal is deemed necessary, it should be coordinated with the signal at Route 68. Another signal warrant analysis should be done at the intersection of Route 17 and School House Lane.

### 3.1.18. Recommended Transportation Projects

**Major Local Projects**

State and Local Road Improvements

* Main Street bypass and new road construction
  Coordinated computer traffic signal system on Main Street

* Selected widening, curb cut controls, and use of traffic control signals
  Intersection realignment and construction of a left-turn lane — Route 77 at Route 17
  Realign Route 68 at Maiden Lane
  Realign Haddam Quarter Road at Route 147 with Route 17

Reconstruction of Skeet Club Road (Route 157) at railroad bridge
Pent Road and Route 68 — Improve Line-Of-Sight
Realign Route 17 at Route 79 — Higganum Road
Realign Route 17 at Coe Road
Close access to Route 17 from Old Cemetery Road
Widen pavement on Route 17 at Route 68

* Upgrade Local Bypass Roads
Pent Road
Parmelee Hill Road
Meeting House Hill Road
Saw Mill Road
Tuttle Road
Sand Hill Road
Maple Avenue
Fowler Avenue
Cherry Lane

* Drainage Related
Guire Road over Herzig Brook
Airline Industrial Park Road over Asmun Brook
Parmelee Road Bridge over Parmelee Brook
Coe Road over Parmelee Brook
Creamery Road over Coginchaug River
Stagecoach Road over Parmelee Brook

* Access Management
Incorporate access management into zoning regulations
Close curb cuts and provide rear access at Route 17/147/Haddam Quarter Road

* Other
Realignment and relocation of the southerly portion of Powder Hill Road to the intersection of Route 157.
Reconstruct "S" curve 2000' east of Cherry Lane on Higganum Road
Guide rail barrier replacement
Conduct signal warrant analysis at Maiden Lane and School House Road
Conduct feasibility study of commuter lot near Routes 17/77/79
Remove crosswalk at Maiden Lane
Install cobblestone crosswalks in Historic District
Install textured, colored crosswalks in all existing crosswalk locations and Historic District if cobblestone crosswalks are not approved for use there
Install sidewalks on Main Street

### 3.1.19. Summary

The preservation of the historical character of Main Street is a major focus of this chapter and the health and safety of Durham residents and others as they travel through the town. Single-occupancy vehicles are the primary mode (84%) of transportation in Durham and there is a need for residents to carpool and "share the road" with other residents.

It has been estimated that the travel through traffic from adjacent towns is significant and this warrants the need for a bypass road to divert traffic off Main Street. Main Street is subject to seasonal fluctuations in traffic, as evident during the summer months when it becomes the main arterial from the beach and shoreline to Hartford. Research has demonstrated that coordination of traffic signals is effective in reducing delays, stops, fuel consumption, and vehicular emissions of pollutants. The coordination of traffic signals on Main Street is encouraged, particularly since Main Street was classified as over capacity during peak hours in the Connecticut Arterial System Study.

The number of accidents at a given location generally gives an indication of deficiencies in the roadway network. Locations with high accidents should be further analyzed and corrective measures implemented. These and other issues discussed in this chapter will continue to make Durham a pleasant place to live and work for residents and visitors alike.