

TRAFFIC AND PARKING STUDY

Zoning Changes Transportation Study Proposed Comprehensive Plan City of Beacon, New York

**Prepared for:
City of Beacon**

**Prepared by:
FREDERICK P. CLARK ASSOCIATES, INC.
Rye, New York • Fairfield, Connecticut**

July 2007

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	1
INTRODUCTION	4
EXISTING CONDITIONS	6
Roadways	6
Traffic Volumes	7
Capacity Analysis Procedures – Signalized and Unsignalized Intersections	9
Capacity Analysis Results	12
Main Street Parking	13
FUTURE TRAFFIC IMPACTS	15
Future Traffic Forecast – 2027	15
Estimation of Future Traffic – With Current Zoning	15
Estimation of Future Traffic – With Rezoning	16
Site Traffic Distribution and Assignment	16
Build Conditions – Current Zoning	19
Build Conditions – Proposed Future Zoning	19
Capacity Analysis Results – Current and Future Zoning	19
Capacity Analysis Results – Future Zoning with Proposed Improvements	20
Findings ²²	
APPENDIX	
Other Transportation and Parking Issues	

LIST OF TABLES

1.	2007 Two-Way Traffic Volumes – Peak Hours	9
2.	2007 Existing Conditions – Service Measure Summary – Peak Hour	13
3.	Current Zoning – Future Traffic Generation – Peak Hours	16
4.	Future Rezoning – Traffic Generation – Peak Hours	17
5.	2027 Future Proposed Zoning Change – Measure of Effectiveness (MOE) – Peak Hours	20
6.	2027 Future Proposed Zoning with Proposed Improvements – Measure of Effectiveness (MOE) – Peak Hours	22

LIST OF FIGURES

Follows

1.	Area Location Map	7
2.	Current Street System Characteristics	7
3.	2007 Existing Traffic Volumes – Weekday Morning Peak Hour	9
4.	2007 Existing Traffic Volumes – Weekday Afternoon Peak Hour	9
5.	2007 Existing Traffic Volumes – Saturday Midday Peak Hour	9
6.	Comprehensive Plan	14
7.	Current Hourly Parking Accumulation Study	14
8.	Current Hourly Parking Accumulation Study	14
9.	Current Hourly Parking Accumulation Study	14
10.	Current Hourly Parking Accumulation Study	14
11.	Current Hourly Parking Accumulation Study	14
12.	2027 Projected Traffic Volumes – Weekday Morning Peak Hour (Regional Increase)	15
13.	2027 Projected Traffic Volumes – Weekday Afternoon Peak Hour (Regional Increase)	15
14.	2027 Projected Traffic Volumes – Saturday Midday Peak Hour (Regional Increase)	15
15.	2027 Distribution Patterns (Waterfront)	17
16.	2027 Distribution Patterns (Main Street)	18
17.	2027 Distribution Patterns (East Side)	18
18.	2027 Current Zoning Traffic Generation and Assignment – Weekday Morning Peak Hour	18
19.	2027 Current Zoning Traffic Generation and Assignment – Weekday Afternoon Peak Hour	18
20.	2027 Current Zoning Traffic Generation and Assignment – Saturday Midday Peak Hour	18
21.	2027 Proposed Rezoning Traffic Generation and Assignment – Weekday Morning Peak Hour	18
22.	2027 Proposed Rezoning Traffic Generation and Assignment – Weekday Afternoon Peak Hour	18
23.	2027 Proposed Rezoning Traffic Generation and Assignment – Saturday Midday Peak Hour	18
24.	2027 Build Traffic Volumes (Current Zoning) – Weekday Morning Peak Hour	19
25.	2027 Build Traffic Volumes (Current Zoning) – Weekday Afternoon Peak Hour	19
26.	2027 Build Traffic Volumes (Current Zoning) – Saturday Midday Peak Hour	19

LIST OF FIGURES CONT'D

27.	2027 Build Traffic Volumes (Current Zoning) – Weekday Morning Peak Hour	19
28.	2027 Build Traffic Volumes (Current Zoning) – Weekday Afternoon Peak Hour	19
29.	2027 Build Traffic Volumes (Current Zoning) – Saturday Midday Peak Hour	19

COMPREHENSIVE MASTER PLAN UPDATE – TRANSPORTATION ISSUES

The following is a response to many comments prepared by Lee Kyriacou:

Main Street Parking

It is noted in this comment that there is a lack of parking along Main Street and that this is having a negative impact on the revitalization of Main Street. The results of a recent parking survey indicated that there was available parking along Main Street to serve current needs. However, it is reasonable to assume that as the revitalization of Main Street and the surrounding area increases over the next several years that there will be a need for additional parking. As part of any development or rezoning of properties along Main Street and each of the side roads in this corridor, it is critical each Site Plan incorporate the appropriate number of on-site parking spaces, as required by the zoning, or that the fees paid in lieu of parking are used to construct the necessary parking facilities. Furthermore, the City should continue to investigate the feasibility of creating more parking within the Main Street Downtown Corridor to support residents of future homes along Main Street, patrons of the existing and future commercial development and adequate parking for store owners and their employees.

The future parking needs can be provided in municipal parking lots and municipal parking garages, which are centrally located and within reasonable walking distance of the activities along Main Street.

Mr. Kyriacou suggested that the number of on-street parking spaces on Main Street be maximized, with the relocation of hydrants to near intersections, one-way driveways, the elimination of driveways and shorter parking spaces. Each of the items noted above are appropriate for consideration by the City, except for the reduced size of the parking spaces. It is strongly recommended that these spaces be 22 feet in length or, for end spaces, 20 feet. Any parking spaces that are measured at 20 feet in mid-block sections will result in motorists overlapping the next parking space and/or having difficulty maneuvering in and out of parking spaces. This will result in an increase in congestion along Main Street.

Road Infrastructure/Traffic

- *Reconnect Main Street to the Waterfront* – It was suggested that Main Street be reconnected to the Waterfront. The City should continue to investigate the feasibility of connecting Main Street to the Waterfront area. Options the City should consider are not only vehicular but pedestrian to enhance the feasibility of current and future residents living along Main Street to walk to and from the train station and/or the Waterfront area and its redevelopment.
- *Route 9D at Interstate 84* – There are significant traffic delays at the Interstate 84/9D, diamond-type interchange. The City should continue to have discussions with the Town of Fishkill and the New York State Department of Transportation to discuss possible modifications to this interchange to enhance not only

safety but increase the overall capacity of this interchange to accommodate future needs of both Beacon and Fishkill.

- *Van Ness Road* – It is suggested that the City consider connecting Van Ness Road to Deerfield Road. However, before such a connection is completed by the City a Traffic and Safety Study is necessary to determine the level of traffic that may use this connection and the potential negative impacts to Van Ness Road and the intersection at Route 9D.
- *West Main Street Train Traffic* – This road is now carrying Metro-North traffic during both the morning and evening peak periods. The City should continue to monitor the potential impacts and benefits of the new Metro-North entrance to the train station area and the potential impacts to West Main Street and River Street. There is a suggestion that River Street should be converted to a cul-de-sac to eliminate through traffic from Beekman Street to West Main Street. It is recommended that the River Street connection be maintained to determine future traffic patterns. Closure of this roadway must have the support of the Fire and Police Departments, as well as its residents.
- *Second Bridge Over Railroad Tracks* – Any discussion for a second bridge over the railroad tracks should be part of any redevelopment of the Waterfront and the analyses related to these developments.
- *Wolcott Avenue at Teller Avenue* – The City should consider discussions with the New York State Department of Transportation to realign and improve this intersection to create a more typical intersection, with appropriate traffic control. Further study is needed to identify traffic volumes, traffic volume patterns and peak hour conditions. This information is necessary to determine the appropriate modifications to this intersection. These improvements should be part of any future plans for improvements to Route 9D by the New York State Department of Transportation.
- *Connect Main Street to Route 52* – Any discussion of modification to the type of traffic control or extension of roadways needs further study.
- *Connect Route 52 at Matteawan Road and Interstate 84* – Further study is necessary to determine if an extension of roadways or new interchanges are feasible. However, any type of additional roadway connects would alleviate potential traffic impacts and traffic delay in other areas of the Downtown area and along Main Street. Furthermore, such connections would enhance access to the Business District and support future redevelopment.
- *Matteawan Road* – Further study is needed to determine if an expansion of this roadway in the future would be appropriate.
- *Wilkes Street* – Further study is necessary to determine any future improvements to Wilkes Street.

- *Streets Crossing Main Street* – The concept of providing one-way streets connecting to Main Street is appropriate. However, there needs to be a similar pattern for all roadways between Route 9D and at least North Chestnut Street/South Chestnut Street. Certain roadways, such as South Chestnut Street should be maintained as a two-way roadway between Main Street and Route 9D. Also, Teller Avenue and Fishkill Avenue should be maintained at two-way streets.
- *Streets Parallel to Main Street* – As the redevelopment of Main Street continues in the future, there will be more pressure to improve the parallel streets to Main Street. Motorists will find other routes paralleling Main Street or other north-south streets to avoid Main Street during peak traffic conditions. The City should be aware that the redevelopment of Main Street, which will include additional development and more traffic, will have an impact on adjacent local roadways.
- *Main Street Traffic Control Signage at Route 9D* – The City should work closely with the New York State Department of Transportation to upgrade the signing, as needed, to direct motorists to different roadways within the City Business District.
- *Traffic Signals* – Mr. Kyriacou noted that certain traffic signals are not needed and it may be appropriate to remove these traffic signals. Although we may agree that certain traffic signals are not necessary, it is found that removal of traffic signals that have been in place for a long time is a difficult process. Before there is a removal of any traffic signal, a very detailed Traffic Study and accident analysis is necessary to determine if the traffic signal is first needed and if the removal of this traffic signal will result in other traffic safety concerns.

TRAFFIC AND PARKING STUDY

Zoning Changes Transportation Study Proposed Comprehensive Plan City of Beacon, New York

PROJECT STAFF

Michael A. Galante
Executive Vice President/Principal-in-Charge

Mohamed El Saadani
Principal Engineer/Transportation

Steven T. Cipolla
Associate/Transportation

Donovan C. Gordon
Computer Graphics Specialist

SUMMARY

The purpose of this Traffic Study was to evaluate traffic conditions for current zoning and for proposed zone changes along the Waterfront, Main Street and several different sections to the northeast and southeast of the Main Street Business District.

This Study included detailed manual traffic volume surveys at several intersections during a typical weekday morning, weekday afternoon and Saturday midday time periods. These traffic volumes were expanded to reflect a 2027 design year, with the anticipation of development and redevelopment over a 20-year period.

Results of the analyses determined the level of additional traffic for current and future zoning changes and evaluated the potential impact of these traffic conditions on several key intersections for each of the peak hours.

Results of the analysis indicate the key signalized intersections along Route 9D and Main Street are currently operating at acceptable Levels of Service, which represent average conditions during each of the peak hours.

Under current zoning, the analysis of the anticipated build out over the next 20 years indicates that traffic delays can be expected to increase along Route 9D and Main Street; however, all but one of the intersections will continue to operate at acceptable levels. The intersection at Route 9D and Beekman/West Church Street will have significantly worse delays, especially during peak traffic volumes in the evening. However, it is anticipated that delays would increase beyond those shown in the computer modeling at the signalized intersections. Delays will increase during peak periods.

The analysis also takes into account the future rezoning of several areas to permit additional residential development along the Waterfront and Main Street in the Downtown Business District and a reduction in development potential in other sections of the City generally to the east of the Main Street Business District. This would result in additional traffic in the Waterfront and Main Street Business District areas and a reduction in traffic outside the Business District.

To accommodate the shift and/or increase in traffic modifications to the signalized intersections along Route 9D, which are included in this analysis, would require modification to traffic signal timing to reduce delays. This analysis does not include any road improvements; instead, it is limited to modifications to traffic control. It is possible that intersection/roadway improvements may be necessary in the future as development continues and is more specific to certain areas.

Along Main Street, the analysis shows that these intersections will continue to operate at acceptable levels but will experience greater delays during peak periods. However, it is likely that the City and State will need to

consider the removal of parking spaces near signalized intersections to incorporate left turn lanes and/or right turn lanes. These changes should be considered as other parking is provided in the general Business District.

The analysis indicates there will be a shift in traffic conditions, with more development in the Main Street Business District and along the Waterfront. As development continues, modifications to traffic control and turning lanes will be necessary. In addition to modifications to accommodate the additional traffic on area roads, off-street parking should be increased to accommodate the needs of the specific developments. These developments along Main Street and other areas should include the appropriate number of off-street parking spaces on each of the sites. In the Downtown area, additional municipal parking lots/garages should be considered and located within reasonable walking distance of Main Street and each of the developments in the area.

INTRODUCTION

This report will be part of the Comprehensive Plan and evaluates, in detail, aspects of zone changes in specific locations within the City. It specifically addresses traffic conditions along Main Street in the Business District, future development related to the Waterfront and areas in the East Side of the City, including the General Business District on Fishkill Avenue and areas east of the Fishkill Creek where residential densities are proposed to be reduced. It also includes an evaluation of current parking conditions along Main Street in the downtown area.

The traffic analyses in this report are targeted to areas and activities where significant changes from what currently exists or from what is allowed under current zoning are expected. Accordingly, the analysis for the Main Street area focused on potential increases in numbers of residential dwelling units, since most commercial spaces are currently fully occupied and utilized. While there may be increased commercial activity on Main Street in the future, it is likely to be related primarily to increased residential population. The analysis for the Waterfront/Train Station area focused on potential increases in numbers of residences because the proposed Transit Oriented Development Area actually reduces the allowable commercial floor area in this area from approximately 1 million square feet to less than 0.5 million.

The Proposed Land Use Map includes key transportation features of the City, including the limited access highway (Interstate 84) to the north of the City, major roads (Route 9D and Route 52/Main Street), collector roads, and local roads. Proposed collector roads are also featured, including extensions of Church Street to allow for a more convenient alternative route to Main Street, a modification to the alignment of Howland Avenue, a bridge between Liberty Street and Fishkill Avenue and a new collector road from Conklin Street to Route 9D to the north of the City.

The following sections of this report identify the baseline traffic volumes used in this analysis, existing and future parking conditions, analyses of traffic conditions, proposed zoning changes and the impacts related to traffic in specific areas along Main Street and Route 9D.

EXISTING CONDITIONS

In this section of the report a description of area roadways, traffic control, parking conditions and traffic volumes are described in detail.

Roadways

The following is a description of the major roadways within the designated Study Areas and to be part of the Comprehensive Plan. It addresses traffic and parking conditions along Main Street, traffic conditions along Route 9D and includes key intersections along both roadways.

1. *Main Street* – This is an east-west, two-lane, two-way, State-maintained roadway. It is designated New York State Route 52 and begins to the west at the signalized intersection with Route 9D. Main Street traverses the Business District of the City and provides access to several local, north-south, City-maintained roadways. Many of these side streets are controlled with STOP signs; however, key intersections are controlled with traffic signals and include Route 9D, South Chestnut Street/North Chestnut Street and Fishkill Avenue/Teller Avenue.
2. *Route 9D* – Is also designated North Avenue/Wolcott Avenue. This is a north-south, generally two-lane, State-maintained roadway. It begins to the north of the City of Beacon boundaries and provides full access to Interstate 84 at a diamond-type interchange. This road continues to the south through the City of Beacon and near the Business District and includes the key intersections of Tompkins Avenue/Ralph Street, Beekman Street/West Church Street, Main Street and several other local roadways. It has a posted speed limit of 30 miles per hour and provides a center turn lane in many locations.
3. *Beekman Street* – This is a generally a two-lane, City-maintained, north-south roadway, providing access to the Waterfront and the Metro-North Train Station. This road begins at a signalized intersection with Route 9D and generally parallels this roadway and terminates to the south at a southerly intersection with Route 9D. The southerly intersection is controlled with a STOP and YIELD signs. This road provides on-street permit parking for the Train Station.

Other key local roadways are generally two-lane, two-way roads. All or most of these roads include curbing and sidewalks and access to adjacent properties. Figure 1 shows the general Study Area intersections and the Main Street/Route 9D areas. Figure 2 graphically shows the current street system characteristics and intersections included in this analysis, which will be discussed further below. Photographs of area roadways and key intersections included in this analysis for the Comprehensive Plan are in the Appendix of this report.

Traffic Volumes

To develop baseline traffic volumes for area roadways, representatives of Frederick P. Clark Associates, Inc. conducted manual traffic volume surveys at certain intersections. Furthermore, traffic data available from other Traffic Studies were incorporated into this report and used for baseline conditions.

Traffic counts conducted by Frederick P. Clark Associates, Inc. included in the following intersections:

- Main Street at Route 9D/City Hall;
- Main Street at South Avenue;
- Main Street at South Chestnut Street/North Chestnut Street;
- Main Street at Fishkill Avenue/Teller Avenue;
- Route 9D at Beekman Street/West Church Street; and,
- Route 9D at Beekman Street (south).

The surveys conducted by Frederick P. Clark Associates, Inc. were completed on Tuesday, April 17, 2007 and Saturday, April 14, 2007. These surveys were conducted during the following time periods:

- Weekday morning – 7:00 to 9:00 A.M.;
- Weekday afternoon – 4:00 to 6:00 P.M.; and,
- Saturday midday – 10:00 A.M. to 2:00 P.M.

The surveys conducted and included in the Long Dock Beacon Traffic Report, which was prepared by John Collins Engineers, P.C., were obtained in April 2004. These volumes were adjusted to reflect 2007 conditions, based on the recent traffic surveys conducted at other locations and compared to the data from 2004.

Based on the results of the surveys the weekday morning, weekday afternoon and Saturday midday peak hour volumes were identified and used as a baseline condition for the traffic analysis.

For comparison purposes, Main Street, east of South Avenue, has a two-way volume of 425, 607 and 575 vehicles during the weekday morning, weekday afternoon and Saturday midday peak hours, respectively.

For comparison purposes, Route 9D, south of the Main Street intersection had a recorded two-way volume of 496, 573 and 668 vehicles during the same time periods noted above.

North Chestnut Street, north of Main Street had a two-way volume of 110, 146 and 125 vehicles during the same three peak hours noted above.

Fishkill Avenue, north of Main Street had a two-way volume of 428, 547 and 507 vehicles during the same time periods. Table 1 provides a more detailed breakdown of available two-way volumes for area roadways in each of the Study Areas based on the results of the most recent surveys and other data available from other studies. The field sheets for all the recent traffic counts are included in the Appendix of this report. Figures 3 through 5 provided a graphic presentation of the peak hour volumes, by turning movements for each of the intersections listed above.

Capacity Analysis Procedures – Signalized and Unsignalized Intersections

Procedures have been established by the Transportation Research Board through which roadway segments and intersections can be tested to determine their ability to accommodate traffic volumes. These procedures are described in this section.

Two methods of analysis are needed to evaluate intersections. These methods are based on procedures found in the Highway Capacity Manual (Special Report No. 209, Fourth Edition, 2000 update) and are described below.

Signalized Intersections - Capacity at signalized intersections is defined for each lane group. Lane group capacity is the maximum hourly rate at which vehicles may pass through the intersection under prevailing traffic, roadway, and signalization conditions. The flow rate is generally measured or projected for a 15-minute peak period, and capacity is stated in vehicles per hour.

Traffic conditions include volumes on each approach, the distribution of vehicles by movement (left, through, right), the vehicle type distribution within each movement, the location and use of bus stops within the intersection area, pedestrian crossing flows, and parking movements within the intersection area.

Roadway conditions include the basic geometry of the intersection, including the number and width of lanes, grades, and lane-use allocations (including parking lanes). Signalization conditions include a full definition of the signal phasing, timing, type of control, and signal progression on each approach.

Level of Service for a signalized intersection is defined in terms of the average control delay per vehicle for each lane group and approach and for the intersection as a whole during a peak 15-minute period during a peak 1-hour period. Six Levels of Service from A to F have been established as measures of vehicle delay. These levels and their related delay terms are as follows:

LEVEL OF SERVICE	CONTROL DELAY (SECONDS PER VEHICLE)
A	≤ 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	more than 80.0

More specific definitions of the six levels are best given by the Highway Capacity Manual:

Level of Service A - describes operations with very low delay, i.e., less than or equal to 10.0 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delays.

Level of Service B - describes operations with delays in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or cycle lengths. More vehicles stop than for Level of Service "A", causing higher levels of average delay.

Level of Service C - describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or short cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.

Level of Service D - describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At Level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths or high volume to capacity (V/C) ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E - describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.

Level of Service F - describes operations with delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e. when arrival flow rates exceed the capacity of the intersection. It may also occur at high V/C ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Unsignalized Intersections – Highway Capacity Manual 2000, Chapter 17, analyzes the capacity and level of service of two-way STOP-controlled (TWSC) and all-way STOP-controlled (AWSC) intersections. Level of service (LOS) for a TWSC intersection is determined by the computed or measured control delay and is defined for each minor movement. Control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the STOP line. Control delay includes initial deceleration delay, queue move-up time, stopped delay and final acceleration delay. Control delay per vehicle for AWSC is computed for each lane and each approach. The approach delay is the weighted average of the delay on each lane and the intersection delay is the weighted average of the delay on each approach.

LEVEL OF SERVICE	CONTROL DELAY (SECONDS PER VEHICLE)
------------------	--

A	≤ 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	more than 50.0

Capacity Analysis Results

1. *Route 9D at Beekman Street South* – Results of the analysis of this unsignalized intersection indicate it is currently operating at Level of Service “B” or better during each of the peak hours.
2. *Route 9D/Municipal Plaza Drive* – Results of the analysis of this signalized intersection indicates it is operating at an overall Level of Service “A” during each of the peak hours. However, it is important to note that field observations indicate short-term delays during peak hours.
3. *Route 9D at Beekman Street (North/West Church Street)* – Results of the analysis of this signalized intersection indicate it is currently operating at an overall Level of Service “B,” “C” and “B” during the weekday morning, weekday afternoon and Saturday midday peak hours, respectively.
4. *Main Street at South Avenue* –Results of the analysis of this unsignalized intersection indicate it is currently operating at a Level of Service “B” or better during the three peak hours included in this analysis.
5. *Main Street at North Chestnut Street/South Chestnut Street* – Results of the analysis of this signalized intersection indicate it is currently operating at an overall Level of Service “A” during both the weekday morning and weekday afternoons and overall Level of Service “B” during the Saturday midday peak hour. However, field observations indicate short-term delays during peak hours.
6. *Main Street at Fishkill Avenue/Teller Avenue* – Results of the analysis of this signalized intersection indicate it is operating at an overall Level of Service “B,” “B” and “A” during the three peak hours, which were previously noted. However, field observations indicate short-term delays during peak hours.

Table 2 provides a more detailed summary of the results of the analyses for each of the intersections included in these Study Areas. The capacity analysis worksheets for each of these intersections are included in the Appendix of this report.

Main Street Parking

Each of the parking facilities along Main Street, between Route 9D and East Main Street were identified. Furthermore, all of the on-street parking along Main Street was identified.

The inventory identified that there are 250 private/patron parking spaces located along the Main Street Corridor and within the Business District. These surveys indicated that there are a total of 346 municipal parking spaces located in municipal parking lots within one block of Main Street.

The inventory for on-street parking determined there are 260 spaces available along Main Street. This inventory does not include on-street parking spaces on side streets on the approaches to Main Street. Several of the side streets do provide on-street parking in addition to the number of space noted above. Figure 6 provides a graphic presentation of the available parking spaces for both municipal, private and on-street along Main Street.

To identify parking availability a Parking Accumulation Study was conducted by representatives of Frederick P. Clark Associates, Inc. along Main Street. These surveys were conducted from 9:00 A.M. to 3:00 P.M. The findings of this Accumulation Study, which was conducted on an hourly basis, indicates that for each block face along Main Street the total current parking demand was substantially lower than available parking. Therefore, the conclusion based on this survey data indicates there is currently more than adequate on-street parking available to residents and others throughout a typical Saturday. Figures 7 through 11 provide a graphic summary of the results of this Accumulation Study.

Frederick P. Clark Associates, Inc. also conducted a weekday parking utilization survey on Monday, February 27, 2006, which found that between the hours of 9:00 A.M. and 3:00 P.M., 61 percent of on-street parking was utilized, 51 percent of municipal parking lots were utilized and 45 percent of private parking lots were utilized. Further details of this Study can be found in Chapter V and in the Inventory and Analysis document, which is a companion volume to the Plan.

FUTURE TRAFFIC IMPACTS

This section of the report describes traffic conditions in 2027 for purposes of completing the environmental impact statement for the Comprehensive Plan. This analysis projects 20 years into the future, with regard to traffic conditions, with existing and proposed future zoning. Capacity analyses are conducted for each intersection for these future conditions to determine potential impact due to changes in zoning.

Future Traffic Forecast – 2027

To develop a traffic level for 2027 a one percent per year rate was applied to these volumes to account generally for growth. Therefore, the 2007 volumes were expanded by 20 percent to account for this general growth. Figures 12 through 14 show the peak hour volumes for each of the intersections in 2027 with this growth factor applied.

Estimation of Future Traffic – With Current Zoning

Based on a planning analysis it was determined that under existing zoning 1,444 dwelling units could be constructed within the area where residential densities are proposed to be changed, which could have potential impacts to Main Street, Route 9D and Route 52.

This level of residential development, under existing zoning, could generate 585, 749 and 736 vehicle trip ends during a typical weekday morning, weekday afternoon and Saturday midday peak hours, respectively.

These traffic estimates include credits for public transit and others that may walk. A 25 percent factor was applied to the Waterfront area since it is near the train station, which is also an intermodal facility offering bus and ferry services. A 30 percent factor was applied to the Main Street area. No credit was factored for the areas to the east of downtown, which accounts for 15 percent fewer vehicle trips due to walking between destinations and a 15 percent credit for public transportation. Table 3 summarizes traffic related to each area.

Estimation of Future Traffic – With Rezoning

The City is considering rezoning several areas including the Waterfront and Main Street to encourage more residential development in the Waterfront area near the Train Station and in the downtown area along Main Street. As part of this rezoning consideration, the City would decrease the number of units permitted in the East End and in several other areas of the City.

This analysis is based on a planning study which determined that under the proposed zoning, the Waterfront could have a maximum of 1,403 additional residential units, the Main Street Corridor could have up to 774 units and the East End would have 451 fewer potential units in the future. Therefore, the total maximum new number of units under a rezoning scenario would be 1,642 units.

This level of development would result in an increase in vehicle trip ends of 541, 673 and 672 vehicle trip ends during the weekday morning, weekday afternoon and Saturday midday peak hours, respectively.

This includes the reduction traffic, which would total 207, 262 and 262 fewer vehicle trips ends during the weekday morning, weekday afternoon and Saturday midday peak hours, respectively.

These site traffic projections include a conservative credit to account for new residents using public transportation and/or walking to other land uses and the Train Station.

Based on this analysis the traffic estimates for the Waterfront area include a 25 percent credit for public transportation utilization.

The Main Street Corridor area includes a 15 percent credit for public transportation use and an additional 15 percent credit to account for an internal capture. This internal capture represents residents walking to and from other commercial uses, since they will be located in the downtown area.

The East End development does not include any credit, since it assumes these residents would continue to use private vehicles for all trips to and from each of these development areas. Table 4 shows a more detailed breakdown of the entering and exiting traffic related to each of these development areas and a total overall development for the three areas within the City.

Site Traffic Distribution and Assignment

To appropriately account for new traffic related to residential units in each of the Study Areas, distribution patterns were developed for each of these areas and applied to the peak hour conditions for purposes of completing this traffic analysis.

For the Waterfront area it is anticipated that 65 percent of the site-generated traffic for the Waterfront area residential development will access Main Street from Route 9D at the Beekman Street/West Church Street intersection. The remaining 35 percent will use Beekman Street to the south at the Route 9D intersection.

It is anticipated that as much as 20 percent of the Waterfront residential traffic will use Main Street to access the Business District and other land uses. Figure 15 shows a more detailed breakdown of these distribution patterns.

For the Main Street area the distribution patterns were developed and indicate that 35 percent of the traffic destined for the Main Street will arrive and depart from the north on Route 9D, with 20 percent using Beekman Street North to access the railroad and Waterfront area. An additional 5 percent will use Beekman Street to the south to access Route 9D.

Along Main Street it is anticipated that 15 percent will use North Chestnut Street to access Main Street, 5 percent will access Main Street via South Chestnut Street, 5 percent will use Teller Avenue, 10 percent will use Main Street to the east of this intersection and another 20 percent will use Fishkill Avenue to the north to access the Main Street area. Figure 16 provides a more detailed breakdown of these distribution patterns.

For the East Side Study Area sections, distribution patterns were developed for the intersections included in this analysis. Along Main Street it is anticipated that approximately 15 percent of traffic related to these other developments to the east of the downtown area will use Main Street. Twenty percent will arrive and depart from the north on Route 9D and an additional 20 percent will use Route 9D to the south. Figure 17 provides a more detailed breakdown of these distribution patterns limited to the Study Area.

Traffic for each of the traffic conditions for current zoning are graphically shown in Figures 18 through 20 for the weekday morning, weekday afternoon and Saturday midday peak hours, respectively.

Traffic related to the rezoning of each of the areas and based on the distribution patterns described above are shown in Figures 21 through 23 for the weekday morning, weekday afternoon and Saturday midday peak hours, respectively.

Build Conditions – Current Zoning

The build traffic condition, with current zoning, is graphically shown in Figures 24 through 26 for each of the peak hours.

Build Conditions – Proposed Future Zoning

Build traffic volumes for the build condition for each of the peak hours is graphically shown in Figures 27 through 29.

Capacity Analysis Results – Current and Future Zoning

1. *Route 9D at Beekman Street South*

Current – This intersection will operate at Level of Service “C” or better under a build condition, with current zoning.

Proposed – Results indicate with proposed zoning, this intersection will remain at the same Level of Service during each peak hour.

2. *Route 9D at Main Street/Municipal Plaza Drive*

Current – The analysis indicates this intersection will operate at an overall Level of Service “A,” “B” and “B” during the three peak hours included in the analysis.

Proposed – Under the future condition with proposed zoning changes this intersection will operate at an overall Level of Service “A,” “B” and “B”.

3. *Route 9D at Beekman Street (North/West Church Street)*

Current – The analysis results indicate this intersection will operate at an overall Level of Service “B,” “E” and “B” during the three peak hours.

Proposed – Results of the analysis indicate this intersection will operate at an overall Level of Service “D,” “F” and “C” during the same three peak hours. The results indicate the intersection will operate at capacity with traffic delays during the weekday afternoon peak hour.

4. *Main Street at South Avenue*

Current – Results of the analysis indicate this intersection will operate at Level of Service “B” or better during each of the time periods.

Proposed – Results of the analysis indicate this intersection would continue to operate at Level of Service “B” or better during the three peak hours.

5. *Main Street at North/South Chestnut Street*

Current – Results of the analysis indicate this intersection will operate at an overall Level of Service “A,” “A” and “B” during the three peak hours.

Proposed – Results of the analysis indicate this intersection will operate at an overall Level of Service “A,” “A” and “B” during the three peak hours.

6. *Main Street at Fishkill Avenue/Teller Avenue*

Current – Results of the analysis indicate this intersection will operate at an overall Level of Service “B” during the three peak hours. However, it is likely motorists will experience delays.

Proposed – Results of the analysis indicate this intersection will continue to operate at an overall Level of Service “B” during each of the peak hours. However, it is likely motorists will experience delays.

Table 5 provides a more detailed summary of the results of the analysis of each of these intersections selected for this study for a condition with current zoning and proposed future zoning. The capacity analysis worksheets for each condition are included in the Appendix of this report.

Capacity Analysis Results – Future Zoning with Proposed Improvements

The following provides a summary of the types of improvements necessary to mitigate future traffic conditions during the weekday morning, weekday afternoon and Saturday midday peak hours to accommodate traffic related to additional development and/or modifications in traffic patterns due to the rezoning of specific properties.

1. *Route 9D at Main Street/Municipal Plaza Drive*

To improve the overall operation of this intersection the traffic signal timing should be modified in the future to address traffic volumes on specific lane group/approaches. These modifications are necessary

since this traffic signal works in conjunction with the traffic signal at the next intersection to the north at Beekman Street/West Church Street.

2. *Route 9D at Beekman Street (North)/West Church Street*

This intersection will operate with significant traffic delays in the future. To mitigate impact from additional traffic and/or modifications to traffic patterns due to rezoning, the traffic signal timing can be changed to reduce the overall delay and delays at specific lane group/approaches during each of the peak hours. With these modifications, the intersection will operate at an overall Level of Service “B,” “C” and “B” during the weekday morning, weekday afternoon and Saturday midday peak hours, respectively. Specific lane group/approaches will have a significant improvement with the recommended timing changes.

3. *Main Street at North/South Chestnut Street*

The results of the analysis indicate this intersection will continue to operate at acceptable Levels of Service during each of the peak hours in the future. However, it is likely that short-term traffic congestion at this signalized intersection will increase, with the redevelopment of Main Street. Therefore, the City and State will need to consider modifying traffic signal timing, as necessary, and in the future eliminate parking on the two Main Street approaches to incorporate exclusive left turn lanes.

4. *Main Street at Fishkill Avenue/Teller Avenue*

The results of the analysis indicate this intersection will continue to operate at acceptable Levels of Service during each of the peak hours in the future. However, it is likely that short-term traffic congestion at this signalized intersection will increase, with the redevelopment of Main Street. Therefore, the City and State will need to consider modifying traffic signal timing, as necessary, and in the future eliminate parking on the two Main Street approaches to incorporate exclusive left turn lanes.

Table 6 provides a summary of the results of the analyses for these intersections, where modifications will be necessary as development and redevelopment continues throughout the City. Capacity analysis worksheets are included in the Appendix of this report.

Findings

The purpose of this Traffic Study was to evaluate current traffic conditions for zoning and for proposed zone changes along the Waterfront, Main Street and several different sections to the northeast and southeast of the Main Street Business District.

This Study included detailed manual traffic volume surveys at several intersections during a typical weekday morning, weekday afternoon and Saturday midday time periods. These traffic volumes were expanded to reflect a 2027 design year, with the anticipation of development and redevelopment over a 20-year period.

Results of the analyses determined the level of additional traffic for current and future zoning changes and evaluated the potential impact of these traffic conditions on several key intersections for each of the peak hours.

Results of the analysis indicate the key signalized intersections along Route 9D and Main Street are currently operating at acceptable Levels of Service, which represent average conditions during each of the peak hours.

Under current zoning, the analysis of the anticipated build out over the next 20 years indicates that traffic delays can be expected to increase along Route 9D and Main Street; however, all but one of the intersections will continue to operate at acceptable levels. The intersection at Route 9D and Beekman/West Church Street will have significantly worse delays, especially during peak traffic volumes in the evening. However, it is anticipated that delays would increase beyond those shown in the computer modeling at the signalized intersections. Delays will increase during peak periods.

The analysis also takes into account the future rezoning of several areas to permit additional residential development along the Waterfront and Main Street in the Downtown Business District and a reduction in development potential in other sections of the Town generally to the east of the Main Street Business District. This would result in additional traffic in the Waterfront and Main Street Business District areas and a reduction in traffic outside the Business District.

To accommodate the shift and/or increase in traffic modifications to the signalized intersections along Route 9D, which are included in this analysis, would require modification to traffic signal timing to reduce delays. This analysis does not include any road improvements; instead, it is limited to modifications to traffic control. It is possible that intersection/roadway improvements may be necessary in the future as development continues and is more specific to certain areas.

Along Main Street, the analysis shows that these intersections will continue to operate at acceptable levels but will experience greater delays during peak periods. However, it is likely that the City and State will need to consider the removal of parking spaces near signalized intersections to incorporate left turn lanes and/or right turn lanes. These changes should be considered as other parking is provided in the general Business District.

The analysis indicates there will be a shift in traffic conditions, with more development in the Main Street Business District and along the Waterfront. As development continues, modifications to traffic control and turning lanes will be necessary. In addition to modifications to accommodate the additional traffic on area roads, off-street parking should be increased to accommodate the needs of the specific developments. These developments along Main Street and other areas should include the appropriate number of off-street parking spaces on each of the sites. In the Downtown area, additional municipal parking lots/garages should be considered and located within reasonable walking distance of Main Street and each of the developments in the area.

J:\DOCS2\100\Beacon\bcn7-001.mag - 2.doc:td:ev!
7/16/07

Table 1
 2007 TWO-WAY TRAFFIC VOLUMES – PEAK HOURS
 City of Beacon Comprehensive Plan
 Beacon, New York

LOCATION	VEHICLES		
	Weekday Morning	Weekday Afternoon	Saturday Midday
Beekman Street (South), West of Route 9D	100	213	102
Route 9D, South of Beekman Street (South)	455	594	630
Route 9D, North of Beekman Street (South)	455	547	632
Main Street (Route 52), East of South Avenue	425	607	575
Municipal Plaza Drive, East of Route 9D	76	21	0
Route 9D, South of Main Street (Route 52)/Municipal Plaza Drive	496	573	668
Route 9D, Between Main Street (Route 52)/Municipal Plaza Drive and West Church Street/Beekman Street (North)	738	1,008	1,067
Beekman Street (North), West of Route 9D	481	554	289
West Church Street, East of Route 9D	40	38	32
Route 9D, North of West Church Street/Beekman Street (North)	1,094	1,416	1,210
Main Street (Route 52), West of North/South Chestnut Street	400	593	621
Main Street (Route 52), between North/South Chestnut Street and Teller Avenue/Fishkill Avenue (Route 52)	384	537	603
South Chestnut Street, South of Main Street (Route 52)	134	208	149
North Chestnut Street, North of Main Street (Route 52)	110	146	125
Main Street, East of Teller Avenue/Fishkill Avenue (Route 52)	328	428	416
Teller Avenue, South of Main Street	401	434	423
Fishkill Avenue (Route 52), North of Main Street	428	547	507

Source: Manual turning movement counts by Frederick P. Clark Associates, Inc on Tuesday, April 17, 2007, and Saturday, April 14, 2007. Manual turning movement counts were conducted by John Collins Engineering, P.C. for Long Dock Beacon in April, 2004.

Frederick P. Clark Associates, Inc.
 J:\DOCS2\100\Beacon\bea7-001.stc.doc

Table 2
 2007 EXISTING CONDITIONS- SERVICE MEASURE SUMMARY – PEAK HOURS
 City of Beacon Comprehensive Plan
 Beacon, New York

INTERSECTION	CONTROL TYPE	LANE GROUP/ MOVEMENT/ APPROACH	2007 EXISTING CONDITIONS		
			Weekday Morning	Weekday Afternoon	Saturday Midday
Route 9D at Beekman Street (South)	TWSC	EB LR NB L	B/11.3 A/7.8	B/12.4 A/7.7	B/12.3 A/7.8
Route 9D at Main Street (Route 52)/Municipal Plaza Drive	Traffic Signal	EB LTR WB LTR NB L TR SB L TR Overall	B/19.5 B/11.6 A/4.6 A/9.1 A/3.9 A/4.8 A/7.6	C/25.6 B/12.3 A/0.0 A/9.7 A/6.2 A/3.1 A/8.0	A/0.0 B/12.5 A/0.0 B/10.0 A/6.3 A/3.1 A/7.9
Route 9D at Beekman Street (North)/West Church Street	Traffic Signal	EB LT R WB LTR NB L TR SB L TR Overall	D/41.7 B/10.9 C/21.7 A/4.5 A/6.6 A/5.3 B/11.5 B/13.3	D/46.9 A/7.4 B/14.5 B/11.0 B/16.2 B/10.8 C/23.6 C/26.0	C/32.2 B/10.2 B/17.5 A/4.8 A/7.1 A/4.6 B/10.5 B/10.6
Main Street (Route 52) at South Avenue	TWSC	WB LT NB LR	A/2.5 B/10.6	A/2.0 B/10.8	A/2.1 B/10.4
Main Street (Route 52) at North/South Chestnut Street (1)	Traffic Signal	EB LTR WB LTR NB LTR SB LTR Overall	A/3.9 A/4.1 B/13.0 B/14.9 A/6.6	A/4.8 A/4.6 B/16.0 B/12.2 A/7.3	B/13.1 B/14.6 A/7.0 A/6.2 B/12.3
Main Street at Fishkill Avenue (Route 52)/Teller Avenue (1)	Traffic Signal	EB LTR WB LTR NB LTR SB LTR Overall	A/7.2 A/6.8 B/16.8 B/17.7 B/12.7	A/7.1 A/6.0 B/17.3 B/16.8 B/12.1	B/13.7 B/10.8 A/8.1 A/7.3 A/10.0

(1) Field observations indicate that this intersection currently experiences traffic delays during peak hours.

Notes:

- Synchro 6.0 is used for capacity analysis.
- Level of Service determining parameter is called the service measure.
- For Unsignalized intersections: Level of Service/Average Control Delay per Vehicle (seconds per vehicle).
- For Signalized intersections: Level of Service/Average Total Delay per Vehicle (seconds per vehicle).
- TWSC = Two-Way STOP Control

NB = Northbound EB = Eastbound SB = Southbound WB = Westbound
 L = Left Turn T = Through R = Right Turn

Table 3
 CURRENT ZONING – FUTURE TRAFFIC GENERATION – PEAK HOURS
 Proposed Comprehensive Plan
 Beacon, New York

AREA	POTENTIAL DWELLING UNITS	DIRECTIONS	VEHICLE TRIP ENDS		
			Weekday Morning	Weekday Afternoon	Midday Saturday
Waterfront	162	Enter	14	46	37
		Exit	<u>43</u>	<u>24</u>	<u>33</u>
		Total	57	70	70
Main Street	482	Enter	41 (35)	156 (133)	127 (108)
		Exit	<u>147 (125)</u>	<u>82 (70)</u>	<u>111 (94)</u>
		Total	188 (160)	238 (203)	238 (202)
East End	800	Enter	80	304	248
		Exit	<u>288</u>	<u>160</u>	<u>216</u>
		Total	368	464	464
Total	1,444	Enter	135 (129)	506 (483)	412 (393)
		Exit	<u>478 (456)</u>	<u>266 (266)</u>	<u>360 (343)</u>
		Total	613 (585)	772 (749)	772 (736)

Note: Credits applied for use of public transit are the following:

- Waterfront: 25 percent
- Main Street: 15 percent (plus an internal capture credit of 15 percent)
- East End: No credit

Frederick P. Clark Associates, Inc.

Table 4
 FUTURE REZONING – TRAFFIC GENERATION – PEAK HOURS
 Proposed Comprehensive Plan
 Beacon, New York

AREA	POTENTIAL ADDITIONAL DWELLING UNITS	DIRECTIONS	VEHICLE TRIP ENDS		
			Weekday Morning	Weekday Afternoon	Midday Saturday
Waterfront	1,403	Enter	120	400	322
		Exit	<u>371</u>	<u>210</u>	<u>288</u>
		Total	491	610	610
Main Street	774	Enter	66 (56)	250 (213)	204 (173)
		Exit	<u>237 (201)</u>	<u>132(112)</u>	<u>178 (151)</u>
		Total	303 (257)	382 (325)	382 (324)
East End	-451	Enter	-45	-172	-140
		Exit	<u>-162</u>	<u>-90</u>	<u>-122</u>
		Total	-207	-262	-262
Total	1,642	Enter	141 (131)	478 (441)	386 (355)
		Exit	<u>446 (410)</u>	<u>230 (232)</u>	<u>344 (317)</u>
		Total	587 (541)	710 (673)	730 (672)

Note: Credits applied for use of public transit are the following:

- Waterfront: 25 percent
- Main Street: 15 percent (plus an internal capture credit of 15 percent)
- East End: No credit

Frederick P. Clark Associates, Inc.

Table 5
 2027 FUTURE PROPOSED ZONING CHANGE – MEASURE OF EFFECTIVENESS (MOE) – PEAK HOURS
 City of Beacon Comprehensive Plan
 Beacon, New York

INTERSECTION	CONTROL TYPE	LANE GROUP/ MOVEMENT	2027 BUILD CONDITIONS WITH CURRENT ZONING						2027 BUILD CONDITIONS WITH PROPOSED ZONING						PROJECT IMPACTS					
			Weekday Morning		Weekday Afternoon		Saturday Midday		Weekday Morning		Weekday Afternoon		Saturday Midday		Weekday Morning		Weekday Afternoon		Saturday Midday	
			LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	Deterio-ration in LOS	Project Delay (Seconds)	Deterio-ration in LOS	Project Delay (Seconds)
Route 9D at Beekman Street (South)	TWSC	EB LR NB L	B/13.2 A/7.9	0.14 0.19	B/12.4 A/7.7	0.27 0.17	C/16.4 A/8.1	0.26 0.28	C/15.3 A/7.9	0.36 0.13	C/23.6 A/7.9	0.63 0.19	C/21.4 A/8.1	0.46 0.24	B – C No	2.1 0.0	B – C No	11.2 0.2	No No	5.0 0.0
Route 9D at Main Street (Route 52)/Municipal Plaza Drive	Traffic Signal	EB LTR WB LTR NB L TR SB L TR Overall	B/19.0 B/11.6 A/5.2 B/12.7 A/6.7 A/6.1 A/9.8	0.13 0.54 0.02 0.45 0.47 0.26 --	C/26.0 B/13.1 A/0.0 B/15.9 B/18.2 A/4.4 B/13.3	0.10 0.66 0.00 0.47 0.78 0.27 --	A/0.0 B/13.4 A/0.0 B/18.0 C/25.6 A/4.5 B/15.7	0.00 0.65 0.00 0.58 0.82 0.29 --	B/19.1 B/11.7 A/5.8 B/12.6 A/7.0 A/5.8 A/9.6	0.13 0.60 0.02 0.38 0.49 0.24 --	C/25.5 B/13.1 A/0.0 B/16.1 B/18.9 A/3.7 B/14.2	0.10 0.71 0.00 0.44 0.82 0.20 --	A/0.0 B/13.9 A/0.0 B/17.3 C/23.1 A/3.9 B/15.7	0.00 0.62 0.00 0.53 0.83 0.23 --	No No No No No No No	0.1 0.1 0.6 0.0 0.3 0.0 0.0	No No No No No No No	0.0 0.0 0.0 0.2 0.7 0.0 0.9	No No No No No No No	0.0 0.5 0.0 0.0 0.0 0.0 0.6
Route 9D at Beekman Street (North)/West Church Street	Traffic Signal	EB LT R WB LTR NB L TR SB L TR Overall	D/45.5 A/9.4 C/20.2 A/6.8 A/8.7 A/5.9 C/20.5 B/18.7	0.68 0.17 0.15 0.26 0.39 0.02 0.79 --	F/88.9 A/6.0 B/15.0 B15.4 C/33.0 A/9.4 E/67.1 E/57.0	1.05 0.12 0.07 0.41 0.64 0.07 1.04 --	C/34.5 A/8.0 B/16.2 A/8.8 B/10.8 A/6.0 C/20.9 B/17.0	0.55 0.21 0.14 0.36 0.54 0.05 0.81 --	F/121.0 A/7.5 C/23.5 A/9.3 A/9.2 A/6.0 C/25.1 D/37.3	1.12 0.25 0.24 0.39 0.34 0.02 0.85 --	F/214.1 A/5.1 C/21.9 D/39.7 C/23.7 A/9.5 F/89.6 F/92.0	1.38 0.20 0.26 0.75 0.58 0.08 1.10 --	D/39.3 A/5.3 B/19.3 C/26.8 B/16.4 A/9.8 D/51.7 C/34.0	0.74 0.24 0.22 0.65 0.56 0.06 0.99 --	D – F No No No No No No B – D	75.5 0.0 3.3 2.5 0.5 0.1 4.6 18.6	No No B – C B – D No No E – F E – F	125.2 0.0 6.9 24.3 0.0 0.1 27.9 35.0	C – D No No A – C No No C – D B – C	4.8 0.0 3.1 18.0 5.6 3.8 30.8 17.0
Main Street (Route 52) at South Avenue	TWSC	WB LT NB LR	A/2.3 B/12.3	0.07 0.25	A/2.2 B/13.0	0.07 0.22	A/2.1 B/12.1	0.06 0.13	A/2.3 B/14.9	0.07 0.31	A/2.1 B/14.7	0.07 0.25	A/2.0 B/13.8	0.07 0.16	No No	0.0 2.6	No No	0.0 1.7	No No	0.0 1.7
Main Street (Route 52) at North/South Chestnut Street	Traffic Signal	EB LTR WB LTR NB LTR SB LTR Overall	A/5.1 A/5.2 B/13.0 B/14.9 A/7.4	0.30 0.29 0.24 0.44 --	A/6.7 A/6.1 B/17.5 B/11.3 A/8.6	0.40 0.32 0.47 0.35 --	B/14.9 B/16.5 A/9.6 A/7.4 B/14.4	0.62 0.68 0.20 0.19 --	A/5.2 A/4.9 B/13.4 B/15.8 A/7.3	0.34 0.25 0.26 0.40 --	A/6.4 A/6.4 B/17.8 B/11.7 A/8.7	0.35 0.34 0.48 0.35 --	B/16.1 B/12.0 B/12.9 B/11.6 B/13.2	0.64 0.46 0.47 0.52 --	No No No No No	0.1 0.0 0.4 0.9 0.0	No No No No No	0.0 0.3 0.3 0.4 0.1	No No A – B A – B No	1.2 0.0 3.3 4.2 0.0
Main Street at Fishkill Avenue (Route 52)/Teller Avenue	Traffic Signal	EB LTR WB LTR NB LTR SB LTR Overall	A/10.0 A/9.4 B/17.4 B/19.0 B/14.4	0.36 0.34 0.59 0.68 --	B/10.2 A/8.2 B/18.4 B/18.2 B/14.1	0.43 0.27 0.59 0.68 --	B/15.5 B/11.6 B/11.4 B/10.2 B/12.2	0.60 0.42 0.43 0.47 --	B/10.6 A/9.0 B/17.5 B/18.9 B/14.3	0.43 0.33 0.59 0.67 --	B/10.5 A/8.9 B/17.2 B/18.3 B/13.9	0.43 0.30 0.55 0.69 --	B/15.7 B/11.9 B/11.6 B/10.6 B/12.5	0.62 0.45 0.43 0.49 --	A – B No No No No	0.6 0.0 0.1 0.0 0.0	No No No No No	0.3 0.7 0.0 0.1 0.0	No No No No No	0.2 0.3 0.2 0.4 0.3

Cont'd Table 5

Notes:

- Synchro 6.0 is used for capacity analysis.
- Level of service determining parameter is called the service measure.
- For signalized intersections: Level of service/average total delay per vehicle (seconds per vehicle).
- For unsignalized intersections: Level of service/average control delay per vehicle (seconds per vehicle).
- TWSC = Two-Way STOP Control.
- ITE publication for Traffic Access and Impact Studies for Site Development "A Recommended Practice" indicated that overall level of service rating of "A" to "D" is normally considered acceptable for signalized intersections (Level "C" or better is considered desirable). Levels of Service "E" and "F" are normally undesirable.

NB = Northbound EB = Eastbound SB = Southbound WB = Westbound
L = Left Turn T = Through R = Right Turn

Frederick P. Clark Associates, Inc.
J:\DOCS\21100\Beacon\bea7-004.stc revised 6-28-07.doc:tl
Revised 6-28-07

Table 6
 2027 FUTURE PROPOSED ZONING WITH PROPOSED IMPROVEMENTS – MEASURE OF EFFECTIVENESS (MOE) – PEAK HOURS
 City of Beacon Comprehensive Plan
 Beacon, New York

INTERSECTION	CONTROL TYPE	LANE GROUP/ MOVEMENT	2027 BUILD CONDITIONS WITH PROPOSED ZONING						2027 BUILD CONDITIONS WITH PROPOSED ZONING AND PROPOSED IMPROVEMENTS						PROJECT IMPACTS					
			Weekday Morning		Weekday Afternoon		Saturday Midday		Weekday Morning		Weekday Afternoon		Saturday Midday		Weekday Morning		Weekday Afternoon		Saturday Midday	
			LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	Deterio-ration in LOS	Project Delay (Seconds)	Deterio-ration in LOS	Project Delay (Seconds)
Route 9D at Main Street (Route 52)/Municipal Plaza Drive	Traffic Signal	EB LTR	B/19.1	0.13	C/25.5	0.10	A/0.0	0.00	C/24.5	0.16	C/32.0	0.13	A/0.0	0.00	B – C	5.4	No	6.5	No	0.0
		WB LTR	B/11.7	0.60	B/13.1	0.71	B/13.9	0.62	B/15.1	0.66	B/15.5	0.75	B/16.3	0.67	No	3.4	No	2.4	No	2.4
		NB L	A/5.8	0.02	A/0.0	0.00	A/0.0	0.00	A/4.1	0.02	A/0.0	0.00	A/0.0	0.00	No	-1.7	No	0.0	No	0.0
		TR	B/12.6	0.38	B/16.1	0.44	B/17.3	0.53	B/10.6	0.31	C/23.4	0.52	C/24.9	0.62	No	-2.0	B – C	7.3	B – C	7.6
		SB L	A/7.0	0.49	B/18.9	0.82	C/23.1	0.83	A/6.5	0.43	B/16.8	0.59	B/15.1	0.61	No	-0.5	No	-2.1	C – B	-8.0
		TR	A/5.8	0.24	A/3.7	0.20	A/3.9	0.23	A/4.0	0.22	A/1.3	0.19	A/1.1	0.22	No	-1.8	No	-2.4	No	-2.8
		Overall	A/9.6	--	B/14.2	--	B/15.7	--	A/9.5	--	B/15.6	--	B/15.6	--	No	-0.1	No	1.4	No	-0.1
Route 9D at Beekman Street (North)/West Church Street	Traffic Signal	EB LT	F/121.0	1.12	F/214.1	1.38	D/39.3	0.74	D/48.8	0.82	D/52.4	0.94	D/50.5	0.74	F – D	-72.2	F – D	-161.7	No	11.2
		R	A/7.5	0.25	A/5.1	0.20	A/5.3	0.24	B/17.3	0.43	A/6.3	0.22	B/16.7	0.43	A – B	9.8	No	1.2	A – B	11.4
		WB LTR	C/23.5	0.24	C/21.9	0.26	B/19.3	0.22	B/18.1	0.18	B/14.7	0.15	C/26.6	0.28	C – B	-5.4	C – B	-7.2	B – C	7.3
		NB L	A/9.3	0.39	D/39.7	0.75	C/26.8	0.65	A/4.7	0.26	C/25.2	0.54	A/8.3	0.42	No	-4.6	D – C	-14.5	C – A	-18.5
		TR	A/9.2	0.34	C/23.7	0.58	B/16.4	0.56	A/5.4	0.35	B/19.2	0.69	A/5.1	0.52	No	-3.8	C – B	-4.5	B – A	-11.3
		SB L	A/6.0	0.02	A/9.5	0.08	A/9.8	0.06	A/5.5	0.02	C/22.5	0.13	A/6.6	0.05	No	-0.5	A – C	13.0	No	-3.2
		TR	C/25.1	0.85	F/89.6	1.10	D/51.7	0.99	A/6.7	0.43	C/27.5	0.72	B/12.1	0.46	C – A	-18.4	F – C	-62.1	D – B	-39.6
Overall	D/37.3	--	F/92.0	--	C/34.0	--	B/13.8	--	C/28.5	--	B/14.4	--	D – B	-23.5	F – C	-63.5	C – B	-19.6		

Notes:

- Synchro 6.0 is used for capacity analysis.
- Level of service determining parameter is called the service measure.
- For signalized intersections: Level of service/average total delay per vehicle (seconds per vehicle).
- For unsignalized intersections: Level of service/average control delay per vehicle (seconds per vehicle).
- TWSC = Two-Way STOP Control.
- ITE publication for Traffic Access and Impact Studies for Site Development "A Recommended Practice" indicated that overall level of service rating of "A" to "D" is normally considered acceptable for signalized intersections (Level "C" or better is considered desirable). Levels of Service "E" and "F" are normally undesirable.
- 2027 Build Conditions with Proposed Zoning and Proposed Improvements consist of optimization to the current timing plans at both signalized intersections on Route 9D in the Study Area.

NB = Northbound EB = Eastbound SB = Southbound WB = Westbound
 L = Left Turn T = Through R = Right Turn