

Traffic Impact and Access Study

Proposed Residential Development

Concord, MA

FEB 20 2003

Prepared for:

West Concord Development LLC
Needham, Massachusetts

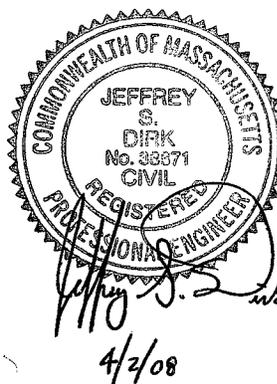
TRAFFIC IMPACT AND ACCESS STUDY

PROPOSED RESIDENTIAL DEVELOPMENT CONCORD, MASSACHUSETTS

Prepared for:

WEST CONCORD DEVELOPMENT LLC
Needham, Massachusetts

October 2007
Amended February 2008



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EXECUTIVE SUMMARY

Vanasse & Associates, Inc. (VAI) has conducted a Traffic Impact and Access Study (TIAS) in order to determine the traffic impacts associated with the construction of a 350-unit residential apartment community to be located at 48 Old Powder Mill Road in Concord, Massachusetts, with access to the proposed site being located in Acton, Massachusetts. The project site is generally bounded by commercial properties to the north and east; and residential properties, municipal land and private properties to the south and west. The project site currently contains two commercial buildings and associated parking areas and appurtenances that will be removed in conjunction with the planned development. Access to the proposed project will be provided by way of Old Powder Mill Road, a public way within the Town of Acton that intersects the northeast side of Sudbury Road immediately adjacent to the Acton-Maynard Town Line and south of Route 62, in Acton, Massachusetts.

This study was prepared in consultation with the Massachusetts Highway Department (MassHighway) and the Towns of Acton, Concord, Maynard, and Sudbury, and was performed in accordance with the state standards for the preparation of Traffic Impact Assessments (TIAs).

EXISTING CONDITIONS

A comprehensive field inventory of traffic conditions on the study area roadways was conducted in September and December 2006; July and August 2007; and January 2008. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; public transportation services; traffic volumes; and operating characteristics; as well as posted speed limits and land use information within the study area.

The study area for the project was selected to contain the major roadways providing access to the development, including Powder Mill Road (Route 62), High Street and Sudbury Road in Acton; Main Street (Route 62) and Old Marlborough Road in Concord; Powder Mill Road (Route 62), Parker Street (Route 27) and Waltham Street in Maynard; and North Road (Route 117), Powder Mill Road and Powers Road in Sudbury; as well as thirteen (13) major intersections located along these roadways through which project-related traffic will travel.

Existing Traffic Volumes

In order to determine existing traffic-volume demands and flow patterns within the study area, automatic traffic recorder (ATR) counts, manual turning movement counts (TMCs) and vehicle classification counts were completed in September and December 2006, July 2007, and January 2008. The ATR

counts were conducted on Sudbury Road, north of Old Powder Mill Road, in order to record weekday daily traffic conditions in the vicinity of the project site over an extended period. The TMCs were conducted at the study intersections during the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak periods. Traffic volumes for the months of January, July, and December were found to be representative of below average-month conditions and were adjusted upward accordingly. The September traffic volumes were found to be representative of slightly above average-month conditions and were not adjusted downward in order to provide a conservative (above-average) design condition. In addition, the 2006 traffic volumes were adjusted to 2007 conditions by applying a compounded annual background traffic growth rate of 1.0 percent. A detailed discussion concerning the development of the background traffic growth rate is presented in the Future Conditions section of this report. Note that the adjusted January 2008 traffic volumes were incorporated onto the 2007 Existing traffic volume networks for consistency with the prior assessment completed for the project.

Sudbury Road, north of Old Powder Mill Road, was found to accommodate approximately 4,030 vehicles on an average weekday, with approximately 415 vehicles per hour (vph) during the weekday morning peak hour and 452 vph during the weekday evening peak hour.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 7:15 and 8:15 AM, with the weekday evening peak hour generally occurring between 4:00 and 5:00 PM.

Pedestrian and Bicycle Facilities

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in August 2007 and January 2008. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study area intersections, as well as the locations of existing and planned future bicycle facilities.

Sidewalks are provided along Route 62 and intermittently along High Street and Sudbury Road proximate to Route 62 within the Town of Acton; along both sides of Pine Street, Church Street, Commonwealth Avenue and Route 62 in the vicinity of the Village of West Concord; along both sides of the study area roadways within the Town of Maynard, with the exception of the south side of Powder Mill Road (Route 62), portions of Great Road (117), and Waltham Street; and along the south side of North Road (Route 117) in Sudbury, and generally between Waltham Street and a point east of Powder Mill Road. Marked crosswalks and pedestrian signal equipment are provided at all signalized intersections within the study area. Marked crosswalks are also provided across Sudbury Road, south of Route 62, in Acton, and at designated locations across Route 27, Route 117, Main Street, and Waltham Street in Maynard. In addition, the 2nd Phase of the Town of Concord's Main Street Footprints Project is currently under design and will entail the reconstruction of a 1.2 mile segment of Main Street (Route 62) between Water Street and the Acton Town Line to include the installation of sidewalks and crosswalks in conjunction with roadway and drainage system improvements. This project has been funded and is being coordinated by MassHighway, with construction expected to commence in the summer of 2008.

The Assabet River Rail Trail (ARRT) is a 12.5-mile long multi-purpose trail that is currently under construction, with completed portions open to the public, that will connect Marlborough, Hudson, Stow, Maynard, and Acton. The ARRT is located approximately 2.5-miles west of the project site.

Public Transportation

Public transportation services are not directly available proximate to the project site; however, there are two Massachusetts Bay Transportation Authority (MBTA) Commuter Rail stations that are located within a 2.5-mile radius of the project site in South Acton and West Concord.

Spot Speed Measurements

Vehicle travel speed measurements were performed on Sudbury Road in the vicinity of the project site using a pneumatic speed measuring device (ATR). These measurements indicate that the average vehicle travel speed along Sudbury Road in the vicinity of the project site is approximately 24 miles per hour (mph), with the average measured 85th percentile vehicle travel speed found to be approximately 28 mph. The 85th percentile vehicle travel speed is used as the basis of engineering design and in the evaluation of sight distances, and is often used in establishing posted speed limits.

Motor Vehicle Crash Data

Motor vehicle crash information for the study area intersections was provided by the MassHighway Safety Management/Traffic Operations Unit for the most recent three-year period available (2004 through 2006) in order to examine motor vehicle crash trends occurring within the study area. A review of this information indicates that the study area intersections averaged approximately 15 or fewer reported motor vehicle crashes per year over the three-year review period and, with the exception of the intersections of Route 27 at Route 62 (two intersections) and Route 117 at Powder Mill Road, were found to have a motor vehicle crash rate below the MassHighway average for signalized or unsignalized intersections, as appropriate, for the MassHighway district in which the intersections are located (District 3 or 4). The intersection of Route 27 at Route 62 and Waltham Street was found to have experienced the largest number of reported motor vehicle crashes of the study intersections, with a total of 44 crashes reported over the three-year review period. The majority of the crashes occurring at this intersection involved property damage only (37 out of 44); occurred on a weekday (37 out of 44); involved angle-type collisions (21 out of 44); and occurred during daylight (35 out of 44).

The intersections of Summer Street and Waltham Street at Route 62 and Route 27, Route 27 and Route 62 at Waltham Street, and Route 117 at Powder Mill Road and Mossman Road (three intersections) were found to have a motor vehicle crash rate above the MassHighway District in which the intersections are located (District 3). In and of itself, this does not necessarily indicate that specific safety deficiencies exist at these locations. In order to verify these findings, the detailed motor vehicle crash records for the subject intersections have been requested from the Police Departments of the Towns of Maynard and Sudbury, as appropriate to the specific intersection.

The intersection of High Street and Parker Street was previously identified as a location that experienced a disproportionate number of motor vehicle collisions; however, the current MassHighway motor vehicle crash data indicates a slight decline in the number of collisions occurring at the intersection and that the intersection no longer exceeds the MassHighway crash rate for an unsignalized intersection. That said, the detailed motor vehicle crash records for this intersection were obtained from the Town of Acton for the time period between January 2004 and September 2007. A total of 11 motor vehicle crashes were reported at the subject intersection within the aforementioned review period. The majority of the crashes occurring at the intersection involved property damage only (7 out of 11); occurred on a weekday (8 out of 11); and were classified as angle-type collisions (8 out of 11). This data is generally consistent with the MassHighway motor vehicle crash data. A review of the detailed crash records indicates that all of the angle-type collisions involved a motorist entering the intersection from the Parker Street north or southbound approach (STOP-sign controlled) that failed to yield to traffic along High Street. This type

of collision may be the result of inadequate sight distances for vehicles approaching the intersection combined with vehicle travel speeds that are not conducive to the geometry of the intersection.

No fatal motor vehicle crashes were reported at the study area intersections over the three-year review period.

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2012, which reflects a five-year planning horizon consistent with state traffic study guidelines. Independent of the proposed project, traffic volumes on the roadway network in the year 2012 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated project-generated traffic volumes superimposed upon this 2012 No-Build traffic network reflect 2012 Build conditions with the project.

Specific Development by Others

MassHighway and the Planning Departments of the Towns of Acton, Concord, Maynard, and Sudbury were contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, the following projects were identified:

- ***Proposed 129 Parker Street Redevelopment, Maynard, Massachusetts.*** This proposed project consists of the redevelopment of an existing 550,000 square foot (sf) office complex located at 129 Parker Street, in Maynard, Massachusetts.
- ***Proposed Walgreens, Maynard, Massachusetts.*** This proposed project consists of the construction of a two-story commercial building that will contain a 10,454 sf Walgreens pharmacy and 10,454 sf of office space to be located at the intersection of Main Street at Summer Street in Maynard, Massachusetts.
- ***Proposed Residential Development, Acton, Massachusetts.*** This proposed project consists of the construction of 30 residential condominium/townhouse units to be located at 4 High Street in Acton, Massachusetts.
- ***Northwood at Sudbury, Sudbury, Massachusetts.*** This project is currently under construction and consists of 66 residential condominium/townhouse units to be located off of Route 117 in Sudbury, Massachusetts.
- ***Proposed Residential Development, Sudbury, Massachusetts.*** This proposed project consists of the construction of 50 residential condominium/townhouse units to be located at 16 North Road in Sudbury, Massachusetts.
- ***Proposed Residential Development, Sudbury, Massachusetts.*** This proposed project consists of the construction of 32 residential condominium/townhouse units to be located off Willard Grant Road in Sudbury, Massachusetts.
- ***Maynard Commons, Maynard, Massachusetts.*** This proposed project consists of the construction of 40 apartment units to be located on the southeast corner of the intersection of Waltham Street at Parker Street in Maynard, Massachusetts.

No other projects were identified at this time that would impact future traffic volumes within the study area beyond the general background traffic growth rate.

General Background Traffic Growth

Traffic-volume data compiled by MassHighway from historic traffic counts in the area were reviewed in order to determine general traffic growth trends. Based on a review of this data, it was determined that traffic volumes within the Towns of Acton, Concord, Maynard, and Sudbury have fluctuated over the past several years, ranging from increases of approximately 2.4 percent to decreases of approximately 2.5 percent. On average, historic traffic volumes within the study area were found to have remained relatively stable over the past 10-years. In order to account for future traffic growth and presently unforeseen development within the study area, a 1.0 percent per year compounded annual background traffic growth rate was used.

Planned Roadway Improvements

MassHighway and the Towns of Acton, Concord, Maynard, and Sudbury were contacted in order to determine if there are any planned roadway improvement projects expected to be completed within the study area. Based on these discussions, the following roadway improvement projects were identified:

Main Street (Route 62) Reconstruction Project

This project is being undertaken by MassHighway and the Town of Concord and will entail the reconstruction of a 1.2 mile segment of Main Street (Route 62) between Water Street and the Acton Town Line to include: the reclaiming and repaving of the existing roadway; the installation of granite curb and sidewalks; drainage system improvements; and the placement of existing overhead utilities underground. This project is currently funded and under design, with construction expected to commence in the summer of 2008.

Route 62/Route 27/Route 117 Traffic Signal and Intersection Improvements

The proponent of the Route 129 Parker Street redevelopment project has proposed to provide \$260,000 to the Town of Maynard to implement roadway, intersection and traffic control improvements at the intersections of Summer Street and Waltham Street at Route 27 and Route 62; Route 27 and Route 62 at Waltham Street; and Summer Street at Nason Street. With respect to the first two intersections which are a part of the study area assessed as part of this report, the planned improvements will entail the following:

- ***Summer Street and Waltham Street at Route 27 and Route 62:*** Replace/upgrade the traffic signal system; optimize traffic signal timing; coordinate with the traffic signal at the intersection of Route 27 and Route 62 at Waltham Street; complete minor geometric improvements; install curbing; and resurface the intersection approaches.
- ***Route 27 and Route 62 at Waltham Street:*** Replace/upgrade the traffic signal system; optimize traffic signal timing; coordinate with the traffic signal at the intersection of Summer Street and Waltham Street at Route 27 and Route 62; complete minor geometric improvements; install curbing; and resurface the intersection approaches.

In addition, the proponent of the Route 129 Parker Street redevelopment has proposed to develop and implement an optimal traffic signal timing and phasing plan for the intersection of Route 27 at Route 117.

No other roadway improvement projects aside from routine maintenance activities were identified to be planned within the study area at this time.

No-Build Traffic Volumes

The 2012 No-Build condition peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2007 Existing peak-hour traffic volumes and then superimposing the peak-hour traffic volumes expected to be generated by the previously identified specific development by others.

Project-Generated Traffic

The proposed project will entail the construction of a 350-unit residential apartment community. In order to develop the traffic characteristics of the proposed project, trip-generation statistics published by the Institute of Transportation Engineers (ITE)¹ for a similar land use as that proposed were used. ITE Land Use Code (LUC) 220, Apartment, with the independent variable of number of dwelling units equal to 350, was used to develop the traffic characteristics of the planned residential development.

The proposed project is expected to generate approximately 2,254 vehicle trips on an average weekday (1,127 entering and 1,127 exiting), with approximately 175 vehicle trips (35 entering and 140 exiting) during the weekday morning peak hour and 210 vehicle trips (137 entering and 73 exiting) during the weekday evening peak hour.

Trip Distribution and Assignment

The directional distribution of generated trips to and from the proposed project was determined based on a review of journey-to-work data obtained from the 2000 U.S. Census for persons residing within the Towns of Acton, Concord, Maynard, and Sudbury, and adjusted based on existing travel patterns at the study area intersections and the relative location of the project in relation to the Concord public schools. In general, 40 percent of project-related traffic was assigned to/from the east on Route 62, with 1 percent oriented to/from the north on Church Street; 2 percent to/from the south on Pine Street; 3 percent to/from the south on Harrington Avenue; 3 percent to/from the east on Parker Street; 14 percent to/from the north on High Street; 4 percent to/from the north on Route 27; 3 percent to/from the west on Summer Street; 3 percent to/from the west on Route 117; 10 percent to/from the south on Route 27; 14 percent to/from the east on Route 117; and 3 percent to/from the east on Powers Road.

Build Condition Traffic-Volume Networks

The 2012 Build condition traffic-volume networks were developed by adding project-generated traffic to the 2012 No-Build peak-hour traffic volumes within the study area. In addition, we note that the proposed project was shown to result in peak-hour traffic-volume increases external to the immediate study area ranging from 1 to 85 vehicles.

TRAFFIC OPERATIONS ANALYSIS

In order to assess the impact of the proposed project on the roadway network, traffic operations and vehicle queue analyses were performed at the study intersections under 2007 Existing, 2012 No-Build, and 2012 Build conditions. This analysis has indicated that the proposed project will not result in a

¹*Trip Generation*, Seventh Edition; Institute of Transportation Engineers; Washington, DC; 2003.

significant change in motorist delays or vehicle queuing at the study intersections over anticipated future conditions without the project (No-Build conditions). All movements at the intersection of Sudbury Road at Old Powder Mill Road (the site access) were shown to operate at a level-of-service (LOS) B or better during the peak periods, with minimal vehicle queuing (0 to 1 vehicle).

TRAFFIC SIGNAL WARRANTS ANALYSIS

A detailed Traffic Signal Warrants Analysis (TSWA) was conducted at the intersection of Route 62 at Sudbury Road in order to determine if the installation of a traffic control signal is justified in order to improve traffic operations at the intersection. The analysis was completed in accordance with the methodology and procedures outlined in the *Manual on Uniform Traffic Control Devices (MUTCD)*² and was performed under 2007 Existing, 2012 No-Build, and 2012 Build conditions. A review of this analysis indicates that the installation of a traffic control signal appears to be warranted at the intersection of Route 62 at Sudbury Road under 2007 Existing Conditions independent of the proposed project.

SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the intersection of Sudbury Road at Old Powder Mill Road in accordance with MassHighway and American Association of State Highway and Transportation Officials (AASHTO)³ standards. These measurements indicate that the available lines of sight both approaching and exiting Old Powder Mill Road currently meet or exceed the recommended minimum sight distance requirements for a 28 mph approach speed, consistent with the measured 85th percentile vehicle travel speed along this segment of Sudbury Road.

RECOMMENDATIONS

A detailed transportation improvement program has been developed for the proposed project that is designed to provide safe and efficient access to the site while minimizing impacts to motorists traveling along adjacent roadways and to address any deficiencies found at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and, subject to receiving the necessary state and local approvals, will be completed in conjunction with the project.

Site Access

Access to the proposed residential community will be provided by way of Old Powder Mill Road, a public way within the Town of Acton, that intersects the east side of Sudbury Road. It is recommended that Old Powder Mill Road be reclaimed (resurfaced) and reconstructed as necessary to provide a minimum roadway cross-section of 22-feet (paved area). Further, it is recommended that Old Powder Mill Road be realigned approaching Sudbury Road to form as close to a perpendicular intersection as possible. This can be accomplished through a combination of curbing and pavement markings. Vehicles approaching Sudbury Road from Old Powder Mill Road should be placed under STOP-sign control with illumination provided. In addition, it is recommended that a secondary means of access be developed to the project for emergency vehicles.

²*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration, Washington, D.C.; 2003.

³*A Policy on Geometric Design of Highway and Streets, Fifth Edition*; American Association of State Highway and Transportation Officials (AASHTO); 2004.

Any signs or landscaping adjacent to the intersection of Old Powder Mill Road with Sudbury Road and within the community should be designed and maintained so as not to restrict sight lines of sight to or from intersecting roadways. If centerline pavement markings are provided along Old Powder Mill Road or the roadways within the site, they should consist of a double-yellow line in accordance with the centerline pavement marking standards of the MUTCD.

Off-Site

Sudbury Road

The pavement width and condition along Sudbury Road vary significantly along its alignment and should be improved independent of the proposed project. It is recommended that Sudbury Road be reconstructed to the north of Old Powder Mill Road to provide a minimum roadway cross-section of 22-feet within the available public right-of-way. To the south of Old Powder Mill Road, it is recommended that the existing roadway profile (crest vertical curve) be reduced (flattened) in order to improve sight lines approaching Old Powder Mill Road, and that the roadway be reconstructed and widened within the public right-of-way to provide a minimum roadway cross-section of 22-feet, consistent with the recommended width of the northern portion of the roadway. During the permitting process, the proponent will discuss with the Town of Acton the possibility of creating a pedestrian connection along Sudbury Road between Route 62 and Old Powder Mill Road. Further, it is recommended that double-yellow centerline and edgeline pavement markings be provided along the improved Sudbury Road in order to separate the directions of travel along the roadway and to delineate the edge of the traveled-way.

Route 62 at Sudbury Road

An analysis of operating conditions at this unsignalized intersection indicates that all movements from Sudbury Road are currently operating over capacity (LOS F) during the weekday evening peak hour, independent of the proposed project. A review of the TSWA performed at this intersection indicates that the installation of a traffic control signal in order to improve operating conditions at the intersection may be warranted under 2007 Existing conditions independent of the proposed project. Recognizing the importance of this intersection in providing access to the project and the residences and businesses in the area, the proponent will: 1) prepare the necessary engineering design plans for the construction of a fully actuated traffic control signal at the intersection of Route 62 at Sudbury Road; and 2) provide partial funding for construction based on the project's overall impact on operating conditions at the intersection as measured by the percent increase in traffic attributable to the project over No-Build conditions.

High Street at Parker Street

The proposed project was not shown to have a significant impact on traffic operations at this unsignalized intersection. Further, a review of the most recent motor vehicle crash history at the intersection indicates a decrease in the frequency of occurrence of motor vehicle collisions such that the intersection does not exceed the MassHighway crash rate for an unsignalized intersection. Accordingly, no improvements are required at this intersection to accommodate the proposed project.

Route 62 at Harrington Avenue

An analysis of operating conditions at this unsignalized intersection indicates that all movements from Harrington Avenue are currently operating at the design capacity of the approach (LOS E) during the weekday morning peak hour and are operating over capacity (LOS F) during the weekday evening peak hour, independent of the proposed project. A review of the peak-hour traffic signal warrant (Warrant 3)

presented in the MUTCD indicates that the installation of a traffic control signal in order to improve operating conditions at the intersection does not appear to be Warranted under 2007 Existing conditions. Recognizing the relatively minor impact of the project at the intersection (0 to 2 vehicle increase in vehicle queuing) and that there were no identified safety deficiencies at this location, no improvements are required at this intersection to accommodate the proposed project.

Independent of the proposed project, it is recommended that a STOP-line be installed on the Harrington Avenue approach to Route 62 in order to define the desired stopping point for vehicles on this approach and that the exiting single-yellow centerline be replaced with a double-yellow centerline consistent with the centerline pavement marking standards of the MUTCD.

Route 62 at High Street

Overall operating conditions at the signalized intersection of Route 62 at High Street were found to be acceptable (LOS C or better) under all three analysis conditions; however, left-turn movements from Route 62 northbound were found to become constrained (LOS F) during the weekday evening peak hour with the addition of project-related traffic. In order to improve operating conditions at this intersection, it is recommended that an optimal traffic signal timing and phasing plan be designed and implemented for the intersection within one-year of the issuance of the final Certificate of Occupancy for the project. With the implementation of an optimal traffic signal timing and phasing plan at the intersection, overall operating conditions were shown to remain at LOS B during the weekday morning peak hour and at LOS C during the weekday evening peak hour under 2012 Build with Mitigation conditions, with operating conditions for the left-turn movement from Route 62 northbound shown to improve to LOS C during the weekday evening peak hour.

Route 62 at Pine Street and Church Street

Overall operating conditions at the signalized intersection of Route 62 at Pine Street and Church Street were shown to remain acceptable (LOS B or better) during the peak periods with the addition of project-related traffic. Further, a review of the motor vehicle crash analysis indicates that the subject intersection had a crash rate below the MassHighway average for an unsignalized intersection. As such, no improvements are required at this location to accommodate the proposed project.

Route 62 at Commonwealth Avenue

Overall operating conditions at the signalized intersection of Route 62 at Commonwealth Avenue were found to be acceptable (LOS D or better) under all three analysis conditions; however, all movements from Commonwealth Avenue eastbound were shown to be currently operating under constrained conditions (LOS F) during the weekday morning peak hour, independent of the proposed project. In order to improve operating conditions at the intersection of Route 62 at Commonwealth Avenue, it is recommended that an optimal traffic signal timing and phasing plan be designed and implemented for the intersection within one-year of the issuance of the final Certificate of Occupancy for the project. With the implementation of an optimal traffic signal timing and phasing plan, overall operating conditions were shown to improve to LOS C during the weekday morning peak hour, with all movements from Commonwealth Avenue eastbound shown to improve to LOS D.

Summer Street and Waltham Street at Route 27 and Route 62

The proposed project was not shown to have a significant impact on traffic operations at the signalized intersection of Summer Street and Waltham Street at Route 27 and Route 62, with overall operating conditions shown to remain at LOS D or better during the peak periods with the addition of project-related traffic. However, the intersection was found to have a motor vehicle crash rate that exceeded the MassHighway District 3 average for signalized intersections. This intersection will be reconstructed as a part of the 129 Parker Street project to include the replacement and upgrade of the traffic signal system and roadway and intersection geometric improvements. The planned improvements will result in improved traffic operations (i.e., reduced motorist delays and vehicle queuing) and should reduce the frequency of occurrence of motor vehicle collisions at the intersection. With the completion of the aforementioned improvements in conjunction with the Route 129 Parker Street project, no additional improvements are required at this intersection to correct existing deficiencies.

Route 27 and Route 62 at Waltham Street

Overall operating conditions at the signalized intersection of Route 27 and Route 62 at Waltham Street are expected to be at or over capacity (LOS E or F, respectively) under 2012 No-Build conditions during the peak periods, independent of the proposed project. Further, the intersection of Route 27 and Route 62 at Waltham Street was found to have a motor vehicle crash rate that exceeded the MassHighway District 3 average for signalized intersections. This intersection will be reconstructed as a part of the 129 Parker Street project to include the replacement and upgrade of the traffic signal system and roadway and intersection geometric improvements. The planned improvements will result in improved traffic operations (i.e., reduced motorist delays and vehicle queuing) and should reduce the frequency of occurrence of motor vehicle collisions at the intersection. With the completion of the aforementioned improvements in conjunction with the Route 129 Parker Street project, no additional improvements are required at this intersection to correct existing deficiencies.

With the implementation of a refined optimal traffic signal timing, phasing, and coordination plan in conjunction with the Route 129 Parker Street project, overall operating conditions at the intersection of Route 27 and Route 62 at Waltham Street were shown to remain at LOS E during the weekday morning peak hour, with a reduced volume-to-capacity ratio, and to improve to LOS E during the weekday morning peak hour under 2012 Build with Mitigation conditions.

Route 27 at Route 117

Overall operating conditions at the signalized intersection of Route 27 at Route 117 are expected to be at capacity (LOS E) under 2012 No-Build conditions during the weekday morning peak hour, independent of the proposed project. An optimal traffic signal timing and phasing plan will be implemented at this intersection as a part of the Route 129 Parker Street project. With the implementation of refinements to the planned intersection improvements to be completed in conjunction with the Route 129 Parker Street project, overall operating conditions at the intersection of Route 27 at Route 117 were shown to improve to LOS D during the weekday morning peak hour and to remain operating at LOS D during the weekday evening peak hour with an improvement in overall intersection capacity (i.e., reduced volume-to-capacity (V/C) ratio) under 2012 Build with Mitigation conditions.

Route 117 at Powers Road

The critical movements (all movements from Powers Road) at the unsignalized intersection of Route 117 at Powers Road were shown to remain acceptable (LOS C or better) during the peak periods with the addition of project-related traffic. Further, a review of the motor vehicle crash analysis indicates that the

subject intersection had a crash rate below the MassHighway District 3 average for unsignalized intersections. As such, no improvements are required at this location to accommodate the proposed project.

Route 117 at Powder Mill Road and Mossman Road

An analysis of operating conditions at this unsignalized intersection indicates that all movements from Powder Mill Road are currently operating over capacity (LOS F) during both the weekday morning and evening peak hours, independent of the proposed project. In addition, the intersection of Route 117 at Powder Mill Road and Mossman Road was found to have a motor-vehicle crash rate that exceeded the MassHighway District 3 average for an unsignalized intersection. A review of the four-hour and peak-hour traffic signal warrants (Warrants 2 and 3, respectively) presented in the MUTCD⁴ indicates that the installation of a traffic control signal in order to improve operating conditions at the intersection appears to be warranted under 2007 Existing conditions. In order to improve safety at the intersection, the existing signs and pavement markings at and in advance of the intersection should be reviewed, replaced and supplemented as necessary, and a review of sight lines at and approaching the intersection should be undertaken independent of the proposed project.

Powder Mill Road at Powers Road

All movements at the unsignalized intersection of Powder Mill Road at Powers Road were shown to remain acceptable (LOS B or better) during the peak periods with the addition of project-related traffic. Further, a review of the motor vehicle crash analysis indicates that the subject intersection had a crash rate below the MassHighway District 3 average for unsignalized intersections. As such, no improvements are required at this location to accommodate the proposed project.

Powers Road

The segment of Powers Road between Old Powder Mill Road and the Concord Town Line was reviewed as a part of this assessment with respect to roadway geometry and alignment. This segment of Powers Road varies in width between approximately 18 and 20 feet, with several horizontal and vertical curves along its alignment. Trees and other vertical elements are situated within one to two feet of the edge of the traveled way. Land use along Powers Road consists primarily of residential properties and areas of open and wooded space. The observed features of Powers Road (narrow traveled-way and horizontal and vertical alignment changes combined with the proximity of vertical elements to the edge of the traveled-way) serve to create an environment that is conducive to the residential nature of the adjacent land use and slow travel speeds. However, the absence of positive guidance by way of signs and pavement markings along the roadway, particularly under low light conditions, has the potential to create confusion for motorists that are unfamiliar with the roadway environment and should be reviewed and corrected independent of the proposed project. In order to address these existing deficiencies, the proponent will design and construct a comprehensive sign and pavement marking improvement program for the segment of Powers Road between Powder Mill Road and the Concord Town Line.

With implementation of the above recommendations, safe and efficient access will be provided to the planned development and the proposed project can be constructed with minimal impact on the roadway system.

⁴Ibid 2.