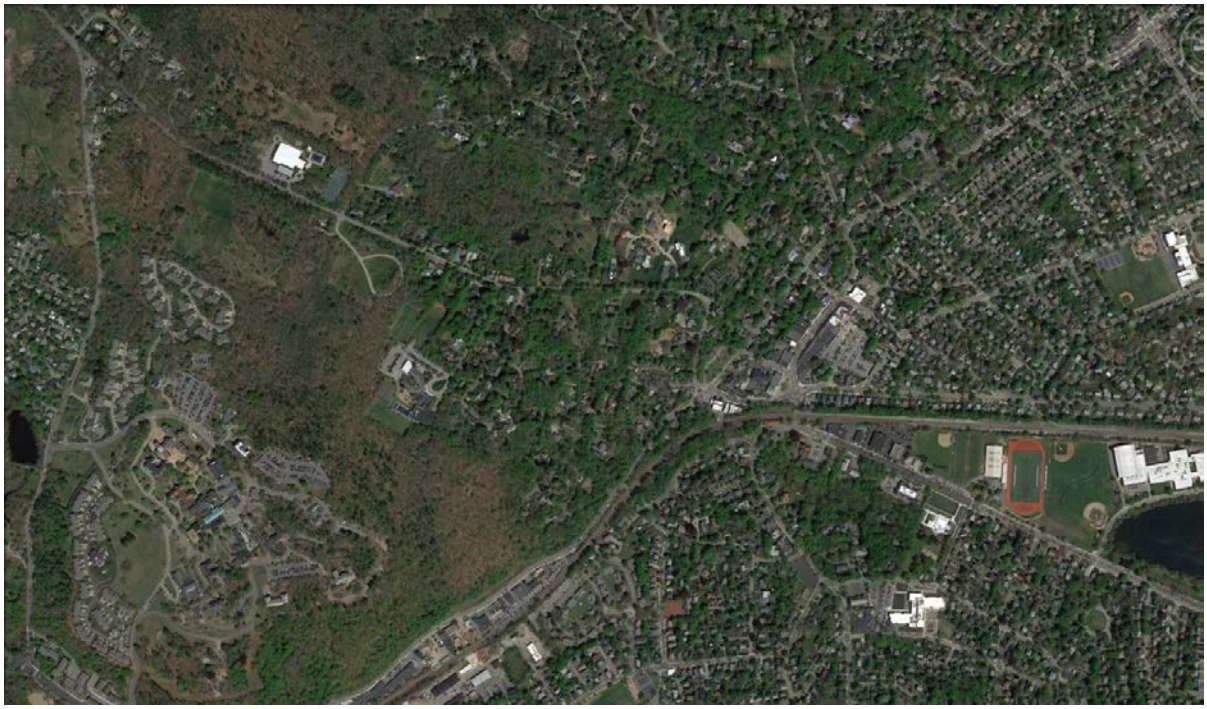
Traffic Impact and Access Study

Belmont Day School
Day School Lane



Belmont, MA
February 3, 2017

Prepared by:

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Prepared for:

Belmont Day School

TRAFFIC IMPACT AND ACCESS STUDY

BELMONT DAY SCHOOL

DAY SCHOOL LANE
BELMONT, MASSACHUSETTS

Prepared for:

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SECTION 1: EXECUTIVE SUMMARY

Bayside Engineering has prepared this study to assess the traffic and parking impacts and to evaluate the access requirements of the proposed modifications at the Belmont Day School (BDS) located on Day School Lane in Belmont, Massachusetts. BDS occupies approximately 12.4 acres of land south of Concord Avenue and west of Day School Lane, a private way. The private pre-K through 8th grade school serves approximately 270 students and employs approximately 73 faculty/staff members. The site is used for a camp outside of the school year. The school strives to be an integral part of the community and provides use of the existing athletic facilities (gym, tennis and sports fields) to local community groups in the evenings and on weekends. Belmont residents frequently park at the school early in the morning to enjoy walking the paths on the adjacent Lone Tree Hill property.

BDS proposes to increase the student population to 315 students and faculty/staff to 83 members, construct a new 25,817± gross square foot structure with associated parking and construct a new entrance only one-way driveway providing access from Concord Avenue ("the Project"). All work will be conducted within the existing school campus on land owned by BDS.

This report identifies existing traffic operating parameters on key roadways and intersections within the study area, evaluates the anticipated traffic volume and parking increases as a result of the proposed increase in enrollment, analyzes the project's traffic-related impacts, determines the projects access/egress requirements and identifies appropriate mitigating measures designed to minimize the traffic-related impacts created by the project. The following provides a brief summary of the project and the study's findings.

PROJECT DESCRIPTION

Current enrollment at the Belmont Day School is 270 students and there are 73 faculty and staff. Access is provided by way of Day School Lane, which in turn provides access to Concord Avenue. There are 127 parking spaces. Traffic at the school is generally

reflective of the school day schedule and drop-off and pick-up times are staggered by grade.

Over a five to seven year period, enrollment is expected to increase to 315 students (an increase of 45 students) and the number of faculty and staff will increase to 83 (an increase of 10). The number of parking spaces will increase from 127 to 131.

The proposed new educational structure ("the Barn") is a 2 story structure that will house a field house, changing rooms, wood shop and classrooms. Parking is proposed in the vicinity of the Barn, and after completion of the project, a total of 131 spaces will be provided. An enter-only, one-way driveway is proposed within a 40-foot wide strip of land connecting the larger school property and Concord Avenue. It will have a twenty-foot wide paved travel lane with a 7-foot wide parking area along the east side. The proposed driveway will create a one-way entry, with a one-way circulation pattern off Concord Avenue along the north-western edge of the campus. Day School Lane will remain two-way traffic flow for the residential homes and serve as the exit for BDS. Figure 1 shows the site location in relation to the surrounding area.

Figure 1
Site Location Map

STUDY METHODOLOGY

This study has been conducted in three stages. The first stage involved an assessment of existing conditions within the study area and included an inventory of roadway geometrics, pedestrian and bicycle facilities and public transportation services. Existing traffic counts were performed at the study area intersections.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the project were assessed along with future traffic demands due to expected traffic growth independent of the proposed project. In accordance with Massachusetts Department of Transportation (MassDOT) and Executive Office of Energy & Environmental Affairs (EEA) guidelines, the year 2023 was selected as the basis for modeling future transportation impacts of the proposed development to reflect a five-year planning horizon.

The third stage of the study presents and evaluates measures to address traffic issues, if any, and necessary improvements to accommodate the development, including an increase in parking.

STUDY AREA

The study area was coordinated with Town of Belmont Office of Community Development staff. Roadway geometry and traffic control information was collected for the following locations:

- Concord Avenue and Pinehurst Road
- Concord Avenue and Day School Lane
- Concord Avenue, Highland Meadow Cemetery Driveway and Somerset Street

EXISTING CONDITIONS

Evaluation of existing conditions within the study area includes a description of roadway geometrics, traffic constraints, land uses at the intersections, and quantification of traffic volumes.

Existing Traffic Volumes

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in October 2016. Peak-period turning movement counts were conducted during the weekday morning (7:00 to 9:00 AM) and weekday evening (2:00 to 6:00 PM) periods. Daily traffic counts were conducted on Concord Avenue and Day School Lane for a two day period using automatic traffic recorders (ATR).

The traffic-volume data gathered as part of this study was collected during the month of October 2016 when schools were in session. Data from the MassDOT was reviewed to determine the monthly variations of the traffic volumes. Based on the MassDOT data, October volumes are higher than average month volumes.

Concord Avenue was recorded to carry approximately 6,200 vehicles per day (vpd) west of Day School Lane. During the weekday morning peak hour (7:30 to 8:30 AM) approximately 757 vehicles per hour (vph) were recorded, and during the weekday evening peak hour (5:00 to 6:00 PM), approximately 745 vph were recorded.

Day School Lane was recorded to carry approximately 950 vpd (at the entrance to the Belmont Day School). During the weekday morning peak hour, approximately 324 vph were recorded, and during the weekday evening peak hour, approximately 121 vph were recorded.

Motor Vehicle Crash Data

Motor vehicle crash data for the study area intersections and roadways were obtained from the Belmont Police Department for 2010 through the present. The motor vehicle crash data was reviewed to determine crash trends in the study area. There has been only one (1) crash reported during the six year interval at the study area intersections. Based on a review of the data, the last crash occurred at the intersection of Concord Avenue and Pinehurst Road in January 2011. The crash report indicates that this was due to decreased visibility associated with snow banks. No fatalities were reported at any of the study area intersections.

PROBABLE IMPACTS OF THE PROJECT

No-Build Traffic Volumes

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2023. Traffic volumes on the roadway network at that time, in the absence of the proposed project, would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others expected to be completed by 2023. A one (1.0) percent compounded growth rate was used to develop future No-Build baseline conditions.

Discussions with the Town of Belmont indicate that there are no other projects planned that need to be included in the No-Build projections.

Build Traffic Volumes

Site generated traffic was based on trip-generation data published by the Institute of

Transportation Engineers (ITE) in the *Trip Generation* manual[1] and a review of traffic volume data collected from the existing Belmont Day School. The trip generation data for Land Use Code (LUC) 534 – Private School (K-8) published by the ITE were also reviewed in conjunction with the collected data to determine the expected trip generation for the project. With the project, student enrollment is expected to increase from 270 students to 315 students.

On a typical weekday, the proposed project is expected to generate 158 additional daily vehicle trips (79 vehicles entering and 79 vehicles exiting). During the weekday morning peak hour, 54 additional vehicle trips (31 vehicles entering and 23 vehicles exiting) are expected. During the weekday evening peak hour, 14 additional vehicle trips (5 vehicles entering and 9 vehicles exiting) are expected. Most of this traffic is expected to be automobiles.

TRAFFIC OPERATIONS ANALYSIS

In order to assess the impacts of the proposed project on the roadway network, traffic operations analyses were performed at the study area intersections under 2016 Existing, 2023 No-Build and 2023 Build conditions. These analyses indicate that the proposed project will not result in a significant impact on traffic operations at the study area intersections over No-Build conditions.

Under 2016 Existing conditions, during the weekday morning peak hour, the critical movements (all movements from Day School Lane) are projected to operate at acceptable levels of service during the weekday morning and evening peak hours. However, a comparison of actual recorded delays to modeled delays[2] shows that the actual observed delays (summarized in Table 2 of this report) are significantly smaller than the modeled delays, illustrating the conservative nature of the unsignalized *Highway Capacity Manual*[3] capacity analysis methodology.

PARKING

The peak parking rate per student recorded during three days of observations was 0.34 spaces per student (average was 0.30 space per student) and the average parking demand rate per faculty/staff member yields a parking rate of 1.11 spaces per faculty/staff member. Applying this rate to the proposed enrollment of 315 students and 83 staff members yields a projected parking demand of 103 - 108 spaces. The development plans propose 131 parking spaces, which provide adequate parking for the proposed increase in the student population (effective future parking rate will be 0.42 spaces per student.)

[1] *Trip Generation*, Ninth Edition; Institute of Transportation Engineers; Main, DC; 2012.

[2] Based on accepted practice and the procedures outlined in the 2010 Highway Capacity Manual published by the Transportation Research Board.

[3] *Highway Capacity Manual*; Transportation Research Board; Main, DC; 2010.

Parking at BDS has been compared with parking at the recently approved and constructed Wellington Elementary School. The Wellington School has 80 parking spaces, a student enrollment of 643 students (Pre-K through grade 4) and 79 faculty and staff members, for a parking demand rate of 0.12 spaces per student and 1.01 spaces per faculty/staff member.

Occasionally, BDS has events where students and their families are invited. For these events, BDS hires a bus company to transport the attendees from satellite parking locations (typically Belmont Hill Club and Belmont Country Club). BDS families are notified prior to the event that satellite parking is available and requested to use those locations for the specific event. Buses run prior to and following the event so that attendees are assured that they can reach their vehicles.

These major events typically include the following (based on 2016/17 Calendar Year):

- Back to School Picnic: September 6 - 4:00 PM - 300 adults
- Back to School Night: September 22 – 6:00 PM - 338 adults (Belmont Country Club (BCC) was used for overflow faculty parking - 75 total vehicles @ BCC)
- Grandparents' Day: October 14 – 8 AM - 250 adults (Belmont Hill Club (BHC) for overflow faculty parking - 30 total vehicles @ BHC)
- Winter Concert: December 19 - 6:30 PM - 300 adults (BCC for overflow faculty parking - 75 total vehicles @ BCC)
- Spring Auction (held every other year): April 29 – 7:00 PM 250 adults
- "Moving Up Assembly" – June 8 - 8:30 AM - 250 adults

CAMP OPERATIONS

During the period from 2010 through 2016, the peak numbers of campers (and staff) has been fairly consistent at 300 campers and 85 staff members, with minimal increases and decreases. The peak number of campers and staff (300 campers and 85 staff) is similar to the future build school year condition (315 student and 83 staff). Based on this, we anticipate that traffic volumes associated with the camp are likely to be comparable to those predicted under the future build condition.

RECOMMENDATIONS

The capacity analyses performed for the unsignalized study area intersections indicate that overall, the intersections operate at good levels of service, with minor delays for the critical movements.

The proposed entrance driveway from Concord Avenue has been designated as one-way entering from Concord Avenue. Vegetation or proposed landscaping along both Day School Lane in front of the site and within the layout should be cleared and maintained so as to maintain sight distances.

Two signs should be installed along Concord Avenue (approximately 500 feet from the new driveway location) to advise motorists that the turn into the school is being approached. The signs should follow the regulations of the Manual on Uniform Traffic Control Devices (MUTCD) for Cultural and Recreational signs. The sign should read 'BELMONT DAY SCHOOL 500 FT'.

Finally, it is suggested that a 'wayfarer' guide sign be located at the intersection of Concord Avenue and Mill Street (west of BDS) to guide drivers to BDS and to increase driver certainty as to the location of BDS.

SUMMARY

Review of the proposed project and access plan shows that in relation to roadway capacity, traffic safety, and traffic impacts upon the surrounding roadway network, the proposed project will have minimal impact on the surrounding roadways and intersections during the school year. The existing roadway system has sufficient capacity for the proposed project. Peak enrollment for the summer camp over the last six years is comparable to the build condition and no safety or traffic impacts have been noted during the camp season.

Traffic volumes on Day School Lane are expected to be reduced with the creation of the new entrance driveway. This enter-only driveway will improve on-site traffic circulation and provide on-site queuing space during drop-off and pick-up periods. The existing roadway system has sufficient capacity for the proposed project.

No significant changes to traffic on Concord Avenue are expected as part of this project. Relative to roadway capacity, traffic safety, and traffic impacts upon the surrounding roadway network, the proposed project will meet safety standards and have a minimal impact on existing traffic conditions. It is recommended that clear sight lines be maintained along frontage for the new driveway and it is expected that safe and efficient access can be provided to the local residents and to the motoring public in the area.

SECTION 2: EXISTING TRAFFIC CONDITIONS

STUDY AREA

Roadway geometry and traffic control information was collected for the following locations:

- Concord Avenue and Pinehurst Road
- Concord Avenue and Day School Lane
- Concord Avenue, Highland Meadow Cemetery Driveway and Somerset Street

FIELD SURVEY

A comprehensive field inventory of the proposed site was conducted in October 2016. The inventory included collection of existing roadway geometrics, traffic volumes, and safety data for the existing study area intersections and site access driveway locations. Traffic volumes were measured by means of automatic traffic recorder (ATR) counts and substantiated by manual turning movement counts (TMCs) conducted at the study area intersections.

GEOMETRICS

Primary study area roadways are described below.

Roadways

Concord Avenue

Concord Avenue is a two-lane, Urban Principal Arterial under the jurisdiction of the Town of Concord. Concord Avenue traverses the study area in a general east/west direction. Additional turn lanes are provided at major intersections. Travel lanes are generally separated by a double yellow centerline. Marked shoulders are also provided.

The posted speed limit on Concord Avenue in the vicinity of the site is 30 miles per hour (mph). Land use along Day School Lane in the study area consists of primarily residential homes and the Highland Meadow Cemetery.

Intersections

Concord Avenue and Pinehurst Road

Concord Avenue forms the east and west legs of this three legged unsignalized intersection with Pinehurst Road (south leg). The Concord Avenue approaches each consist of single lanes permitting left or right-turns. The Pinehurst Road northbound approach consists of a single lane permitting left or right-turns. Pinehurst Road operates under STOP-like control (no STOP sign is present). Land use at the intersection consists of residential homes.

Concord Avenue and Day School Lane

Concord Avenue forms the east and west legs of this three legged unsignalized intersection with Day School Lane (south leg). The Concord Avenue approaches each consist of single lanes permitting left or right-turns. The Day School Lane northbound approach consists of a single lane permitting left or right-turns. Day School Lane operates under STOP-like control (no STOP sign is present). Land use at the intersection consists of residential homes.

Concord Avenue, Highland Meadow Cemetery Driveway and Somerset Street

Concord Avenue forms the east and west legs of this four legged unsignalized intersection with the Highland Meadow Cemetery driveway (south leg) and Somerset Street (north leg). The Concord Avenue approaches each consist of single lanes permitting left or right-turns. The cemetery driveway northbound approach consists of a single lane permitting left, through or right-turn movements. The Somerset Street southbound approach consists of a single lane permitting left, through or right-turn movements. Both the cemetery driveway and Somerset Street approaches operate under STOP-like control (no STOP sign is present). Land use at the intersection consists of residential homes and the Highland Meadow Cemetery.

TRAFFIC VOLUMES

Existing Traffic Volumes

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in October 2016. Peak-period turning movement counts were conducted on Wednesday October 12, 2016 during the weekday morning peak period (7:00 to 9:00 AM) and weekday evening period (2:00 to 6:00 PM) at the following intersections:

- Concord Avenue and Pinehurst Road
- Concord Avenue and Day School Lane
- Concord Avenue, Highland Meadow Cemetery Driveway and Somerset Street

Daily traffic counts were conducted on Concord Avenue and Day School Lane for a two day period using automatic traffic recorders (ATR). The ATR counts were obtained in October 2016 when school was in session.

Analysis of the peak-period traffic counts indicated that the weekday morning commuter peak hour generally occurs between 7:30 and 8:30 AM and the weekday evening commuter peak hour generally occurs between 5:00 and 6:00 PM. The traffic count worksheets are provided in the Appendix.

Seasonal Adjustment

The manual turning movement traffic-volume data gathered as part of this study was collected during the month of October 2016. Data from the MassDOT was reviewed to determine the monthly variations of the traffic volumes. The traffic data showed October volumes to be slightly higher than average month conditions. Therefore, the October traffic volumes provide for a conservative analysis scenario. The 2016 existing daily and peak-hour traffic volumes are summarized below in Table 1. The 2016 Existing peak hour traffic flow networks are shown graphically on Figures 2 and 3 for the weekday morning and evening peak hours, respectively. The seasonal worksheets are provided in the Appendix.

TABLE 1
EXISTING WEEKDAY TRAFFIC-VOLUME SUMMARY[a]

Location	Weekday Traffic Volume[b]	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		Traffic Volume[c]	K Factor[d]	Directional Distribution[e]	Traffic Volume	K Factor	Directional Distribution
Concord Avenue, west of Day School Lane	6,200	757	12.2	72.0% EB	745	12.0	58.8% WB
Day School Lane	950	324	34.1	58.0% SB	121	12.7	66.1% NB

[a]Two-way traffic volume
[b]Daily traffic expressed in vehicles per day.
[c]Expressed in vehicles per hour.
[d]Percent of daily traffic volumes which occurs during the peak hour.
[e]Percent of peak-hour volume in the predominant direction of travel.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

Concord Avenue was recorded to carry approximately 6,200 vehicles per day (vpd) west of Day School Lane. During the weekday morning peak hour, approximately 757

vehicles per hour (vph) were recorded, and during the weekday evening peak hour, approximately 745 vph were recorded.

Day School Lane was recorded to carry approximately 950 vpd (at the entrance to the Belmont Day School). During the weekday morning peak hour, approximately 324 vph were recorded, and during the weekday evening peak hour, approximately 121 vph were recorded.

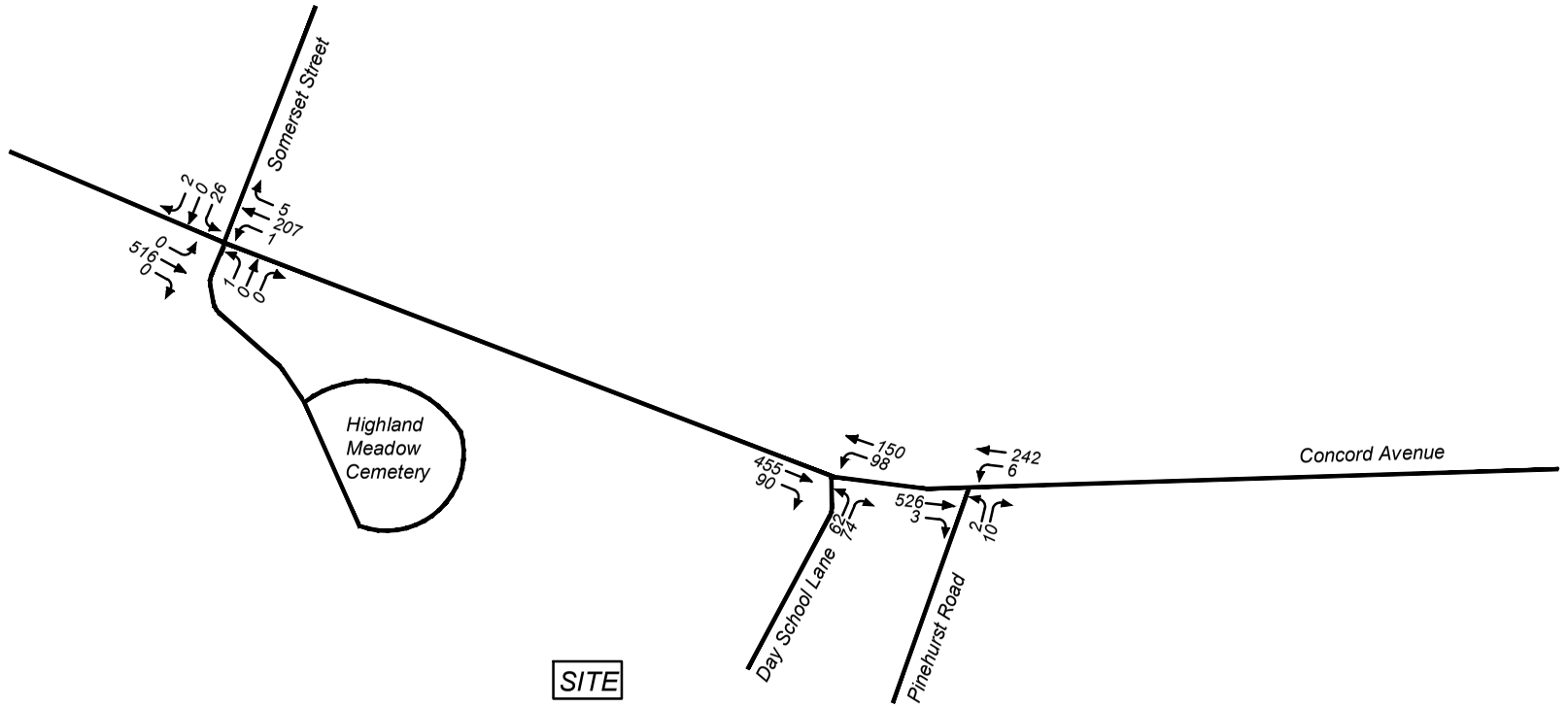
At the same time as the manual turning movement counts were conducted vehicle queues and delays for vehicles exiting Day School Lane were recorded. These are summarized in Table 2. The traffic delay worksheets are provided in the Appendix.

TABLE 2
EXISTING DAY SCHOOL LANE OBSERVED DELAYS AND QUEUES

Time Period	Average Peak Hour Delay per Vehicle (sec)	Minimum Peak Hour Delay per Vehicle Observed (sec)	Maximum Peak Hour Delay per Vehicle Observed (sec)	95th Percentile Vehicle Queue Observed (Veh)	Maximum Queue Observed (Veh)
Weekday Morning Peak Hour	11	0	45	4	5
Weekday Evening Peak Hour	5	0	29	1	2

[a]Based on count data compiled on October 12, 2016.

As shown in Table 2, the average delay for vehicles exiting Day School Lane onto Concord Avenue ranged from 11 to 5 seconds during the respective peak hours.



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Note: Imbalances exist due to driveways not shown.

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Figure 2

2016 Existing
Weekday Morning
Peak Hour Traffic Volumes

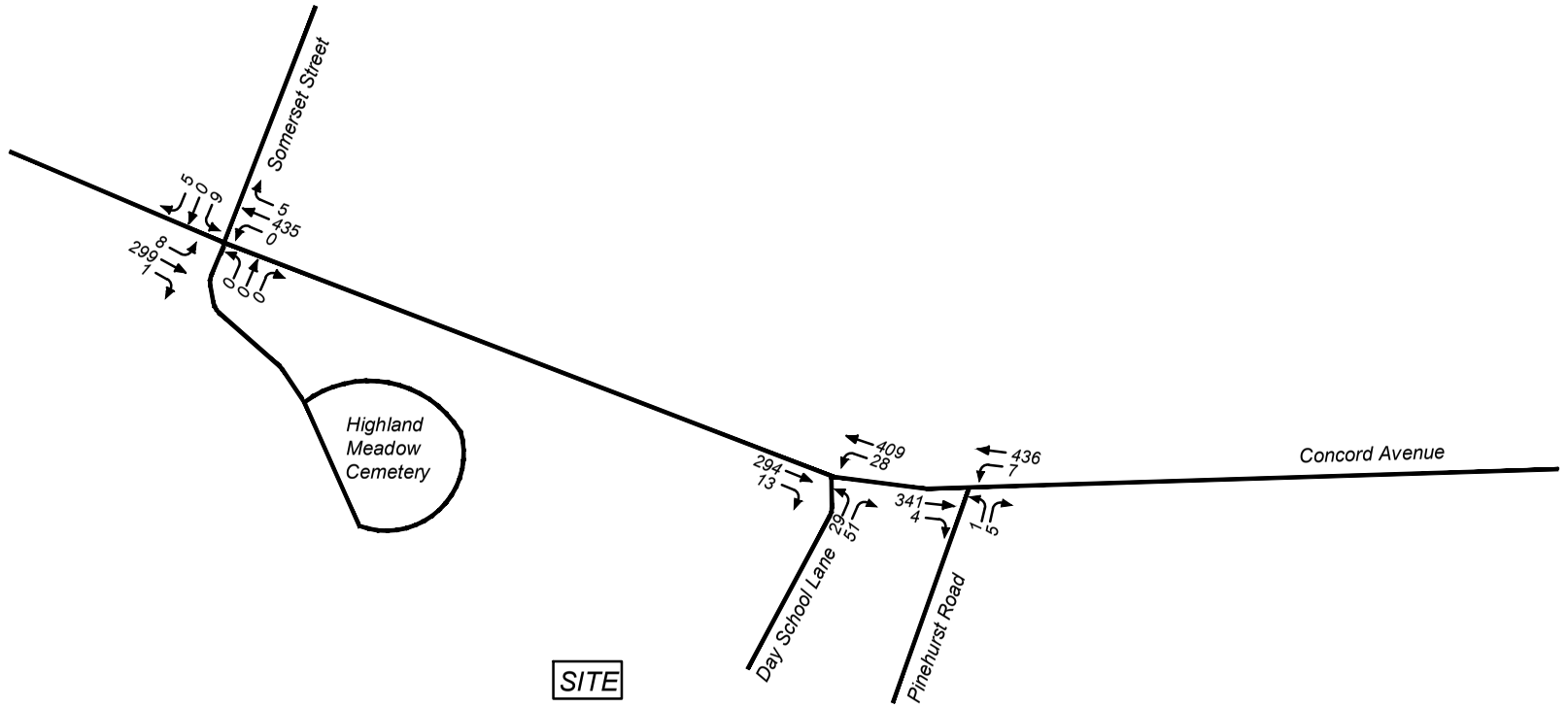

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Figure 3

2016 Existing
Weekday Evening
Peak Hour Traffic Volumes

SCHOOL OPERATIONS

Traffic at the school is generally reflective of the school day schedule. Under current and proposed conditions, the school generally adheres to the following schedule:

Drop-off
Extended Day: 7:30 AM (A few arrive around 7:15 AM)
Middle School: 8:00 AM
Lower School: 8:30 AM
Pre-K – Kindergarten: 8:30 AM

Pick-up
Extended Day: 4:30 or 5:45 PM
Middle School: 4:30 PM
Lower School: 3:30 PM
Pre-K – Kindergarten: 12:30 PM (Pre-K), 3:30 PM (Kindergarten)

On Fridays, the official dismissal time for all grades is 12:30 PM (unless going to extended day).

During the school year, the athletic fields are typically used by BDS students. An agreement with the town allows use of the Claflin field by town groups on Saturdays. The number of groups that has requested to use the field varies from year to year. Currently Belmont Girls Lacrosse uses the fields on Saturday mornings.

The gym is also open in the evening for community use during the early evening. Groups of 12-14 are on site at any one time, typically 2 or 3 times per week. These groups rent the facility and BDS staff is on-site to monitor use. Indoor soccer matches or other similar activities sometimes occur during the weekend days.

VEHICLE SPEEDS

Existing speed data for Concord Avenue was also collected using the ATR. The posted speed limit on Concord Avenue is 30 mph. The speed data is summarized in Table 3.

TABLE 3
OBSERVED VEHICLE SPEEDS

Direction	Posted Speed Limit (mph)	Average Observed Speed[a] (mph)	85th Percentile Speed (mph)
Concord Avenue Eastbound	30	35	38
Concord Avenue Westbound	30	35	38

[a]Based on speed data compiled on October 11 through October 12, 2016.

As shown in Table 3, the average speed of vehicles travelling eastbound or westbound on Concord Avenue was found to be 35 mph. The 85th percentile speed was found to be 38 mph for both eastbound and westbound vehicles. The 85th percentile speed is the speed at which sight distances are typically evaluated.

MOTOR VEHICLE CRASH DATA

Motor vehicle crash data for the study area intersections and roadways were obtained from the Belmont Police Department for the period from 2010 through the present. The motor vehicle crash data was reviewed to determine crash trends in the study area. There has been only one (1) crash reported during this six-year interval at the study area intersections. Based on a review of the data, the last crash occurred at the intersection of Concord Avenue and Pinehurst Road in January 2011. No fatalities were reported at any of the study area intersections.

PUBLIC TRANSPORTATION

There is currently no public transportation service to Day School Lane in Belmont provided by the MBTA.

PLANNED ROADWAY IMPROVEMENTS

Officials for MassDOT and the Town of Belmont were contacted regarding roadway improvements planned for the study area intersections. No improvements are currently planned.

SECTION 3:
2023 NO-BUILD AND BUILD TRAFFIC CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2023. Traffic volumes on the roadway network at that time, in the absence of the proposed project, would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others expected to be completed by 2023. Consideration of these factors resulted in the development of 2023 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic flow networks to develop 2023 Build conditions.

2023 NO-BUILD TRAFFIC VOLUMES

Traffic growth on area roadways is a function of the expected land development in the immediate area as well as the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used.

Background Traffic Growth

The Metropolitan Area Planning Council (MAPC) was contacted to determine regional growth for Belmont and the surrounding area. The Central Transportation Planning Staff (CTPS) travel model projects that vehicle miles traveled in the TAZ (transportation analysis zones) at this location in Belmont is forecast to increase by approximately 0.20% per year from 2009 – 2035. This is based on projected land use and travel patterns. To provide a conservative analysis, a background growth rate of 1.0 percent per year was applied to the existing through traffic volumes.

Specific Development by Others

Traffic volumes generated by the specific local developments by others were included in the 2023 No-Build condition. The Town of Belmont was contacted to identify specific planned developments. Based on these discussions, there are no project's that are currently planned, approved or under construction in the immediate area that would impact future traffic volumes beyond the general background traffic growth rate.

No-Build Condition Traffic Volumes

The 2023 No-Build weekday morning peak-hour traffic volumes were developed by applying a compounded one percent annual growth rate to the 2016 Existing peak-hour through movement traffic volumes. Figures 4 and 5 show the projected 2023 No-Build peak hour traffic volumes for the weekday morning and weekday evening peak-hour conditions, respectively.

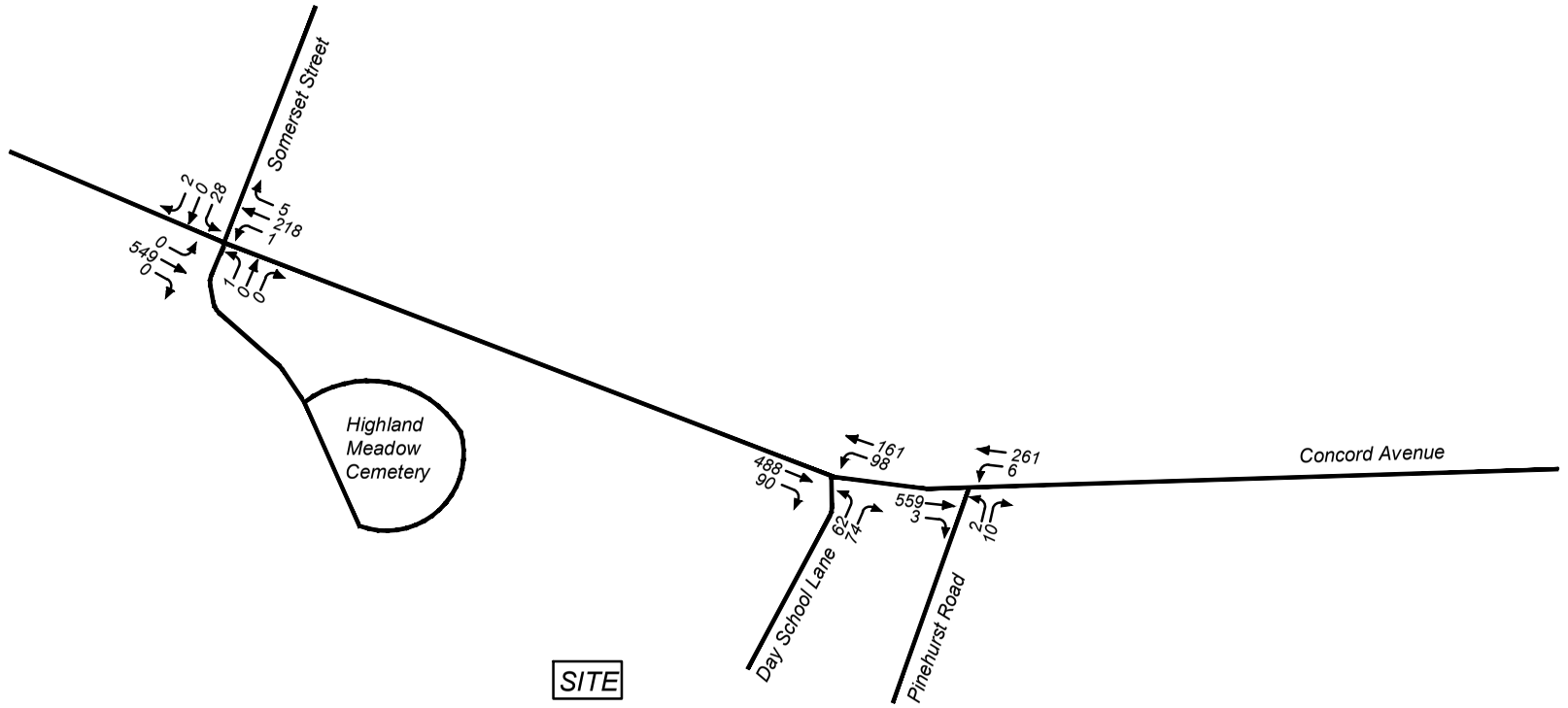

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Figure 4

2023 No-Build
Weekday Morning
Peak Hour Traffic Volumes

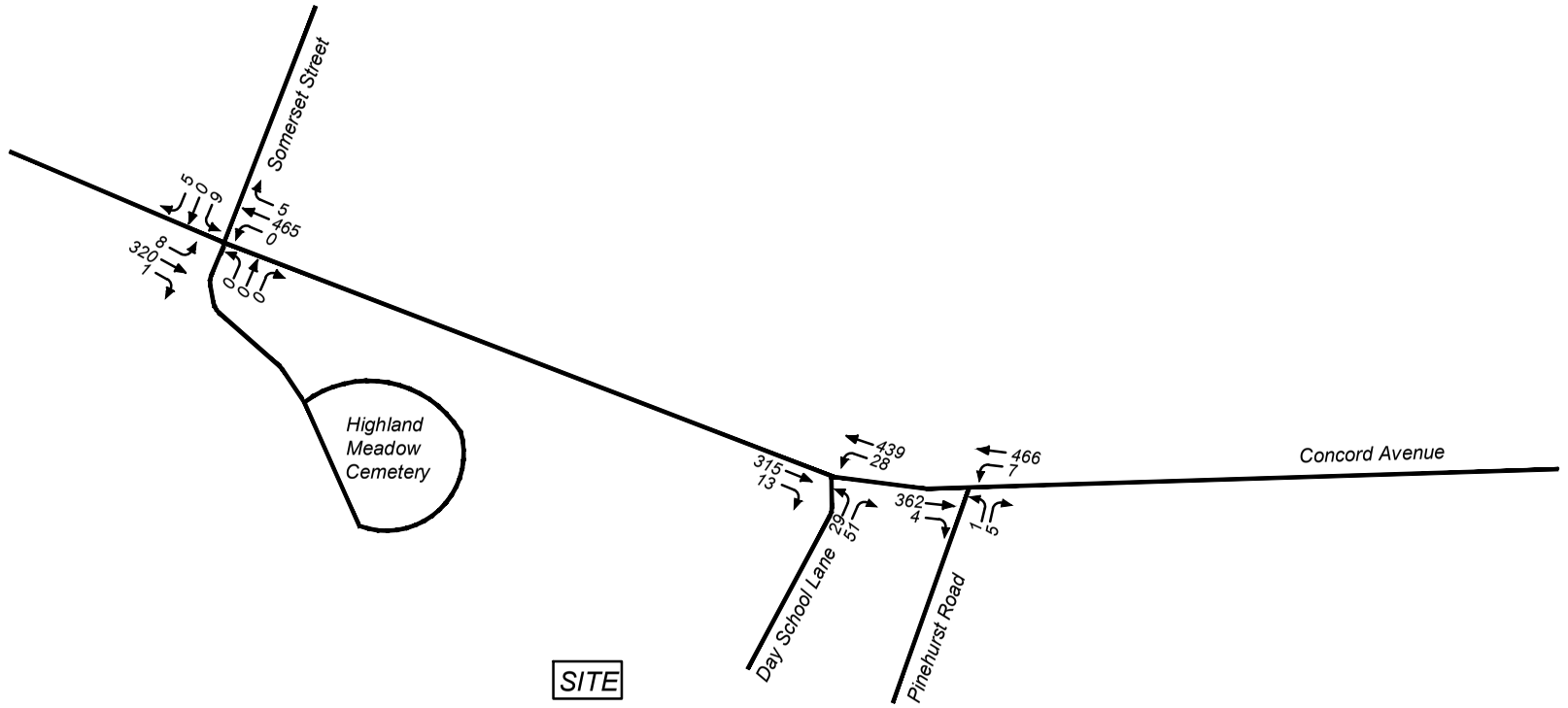

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Figure 5

2023 No-Build
Weekday Evening
Peak Hour Traffic Volumes

FUTURE 2023 BUILD CONDITIONS

Project Description

BDS occupies approximately 12.4 acres of land south of Concord Avenue and west of Day School Lane, a private way. The private pre-K through 8th grade school serves approximately 270 students and employs approximately 73 faculty/staff members. The site is used for a camp outside of the school year.

BDS proposes to construct a new 25,817± gross sf structure and associated parking, a secondary driveway providing access from Concord Avenue, and to increase enrollment over a 5-year period. All work will be conducted within the existing school campus on land owned by BDS ("the project").

Current enrollment at the Belmont Day School is 270 students and there are 73 faculty and staff. Access is provided via Day School Lane, which in turn provides access to Concord Avenue. There are 127 parking spaces. The development is to be located at the end of Day School Lane. Currently, the site consists of the existing Belmont Day School. Current enrollment at the Belmont Day School is 270 students. Student drop-off and pick up is staggered to manage traffic. Students are typically dropped off and picked up according to the following schedule:

Drop-off
Extended Day: 7:30 AM (A few arrive around 7:15 AM)
Middle School: 8:00 AM
Lower School: 8:30 AM
Pre-K – Kindergarten: 8:30 AM

Pick-up
Extended Day: 4:30 or 5:45 PM
Middle School: 4:30 PM
Lower School: 3:30 PM
Pre-K – Kindergarten: 12:30 PM (Pre-K), 3:30 PM (Kindergarten)

On Fridays, the official dismissal time for all grades is 12:30 PM (unless going to extended day).

Enrollment is expected to increase to 315 students (an increase of 45 students) and the number of faculty and staff will increase to 83 (an increase of 10). The number of parking spaces will increase from 127 to 131.

The proposed new educational structure ("the Barn") is a 2-story structure that will house a field house, changing rooms, wood shop and classrooms. Parking is proposed in the vicinity of the Barn, and after completion of the project, a total of 131 spaces will be provided. An enter-only, one-way driveway is proposed within a 40-foot wide strip of land connecting the larger school property and Concord Avenue. It will have a twenty-

foot wide paved travel lane with a 7 foot wide parking area along the east side. The proposed driveway will create a one-way entry, with a one-way circulation pattern off Concord Avenue along the north-western edge of the campus. Day School Lane will remain two-way traffic flow for the residential homes and serve as the exit for BDS.

Site Traffic Generation

Site generated traffic was based on trip-generation data published by the ITE *Trip Generation* manual[4] and existing trip generation data from the Belmont Day School traffic counts. The trip generation data for Land Use Code (LUC) 534 – Private School (K-8) published by the ITE was evaluated to determine the expected trip generation for the proposed project. The observed trip generation is summarized in Table 4 and the trip generation worksheets are included in the Appendix.

TABLE 4
OBSERVED BELMONT DAY SCHOOL TRIP-GENERATION SUMMARY

	October 12, 2016 Existing School Trips[a]	October 13, 2016 Existing School Trips[b]	Average Existing School Trips	Average Existing School Trip Rate[c]
Average Weekday Daily Traffic	874	1,020	947	3.51
Weekday Morning Peak Hour:				
Entering	178	187	183	0.68
Exiting	134	135	135	0.50
Total	312	322	318	1.18
Weekday Evening Peak Hour:				
Entering	12	39	26	0.10
Exiting	26	75	51	0.19
Total	38	114	77	0.29
Weekday Evening Peak Hour of the Generator[d]:				
Entering	92	106	99	0.37
Exiting	87	89	88	0.32
Total	179	195	187	0.69

[a]Based traffic counts conducted on October 12, 2016.
[b]Based traffic counts conducted on October 13, 2016.
[c]Based on 270 student enrollment.
[d]Peak hour of the generator (existing school) generally occurs between 2:00 PM and 4:00 PM and does not coincide with the weekday evening commuter peak hour.

[4]*Trip Generation*, Ninth Edition; Institute of Transportation Engineers; Main, DC; 2012.

The observed trip generated rate was then compared to the ITE data for LUC 534 – Private School (K-8). This comparison is summarized in Table 5.

TABLE 5
COMPARISON OF BELMONT DAY SCHOOL OBSERVED TRIPS WITH ITE LUC 534

	Average Existing School Trip Rate[a]	ITE School Trip Rate[b]
Average Weekday Daily Traffic	3.51	ND
Weekday Morning Peak Hour:		
Entering	0.68	0.50
Exiting	0.50	0.41
Total	1.18	0.91
Weekday Evening Peak Hour:		
Entering	0.10	ND
Exiting	0.19	
Total	0.29	
Weekday Evening Peak Hour of the Generator[d]:		
Entering	0.37	0.28
Exiting	0.32	0.31
Total	0.69	0.59

[a]From Table 4.
[b]Based on ITE LUC 534 – Private School (K-8), based on 270 student enrollment.
ND = No Data.

As shown in Table 5, the Belmont Day School generates peak hour trips at a rate that is slightly higher than the ITE for LUC 534. The ITE had no data for daily traffic generation or the weekday evening peak hour. However, as the Belmont Day School generates trips at a higher rate, these rates were used to generate trips for the projected student enrollment of 45 students. The projected trips are shown in Table 6.

TABLE 6
PROJECTED BELMONT DAY SCHOOL
TRIP-GENERATION SUMMARY

	Existing School Trip Rate[a]	New School Trips[b]
Average Weekday Daily Traffic	3.51	158
Weekday Morning Peak Hour:		
Entering	0.68	31
Exiting	0.50	23
Total	1.18	54
Weekday Evening Peak Hour:		
Entering	0.10	5
Exiting	0.19	9
Total	0.29	14
Weekday Evening Peak Hour of the Generator[d]:		
Entering	0.37	17
Exiting	0.32	14
Total	0.69	31

[a]From Table 4.
[b]Based on 45 student enrollment.
ND = No Data.

On a typical weekday, the proposed project is expected to generate 158 daily vehicle trips (79 vehicles entering and 79 vehicles exiting). During the weekday morning peak hour, 54 vehicle trips (31 vehicles entering and 23 vehicles exiting) are expected. During the weekday evening peak hour, 14 vehicle trips (5 vehicles entering and 9 vehicles exiting) are expected. Most of this traffic is expected to be automobiles.

Trip Distribution

The directional distribution of the vehicular traffic approaching and departing the site is a function of population densities, the location of employment, existing travel patterns, similar uses, and the efficiency of the existing roadway system. Table 7 summarizes the expected trip distribution for the project.

TABLE 7
PROPOSED TRIP DISTRIBUTION

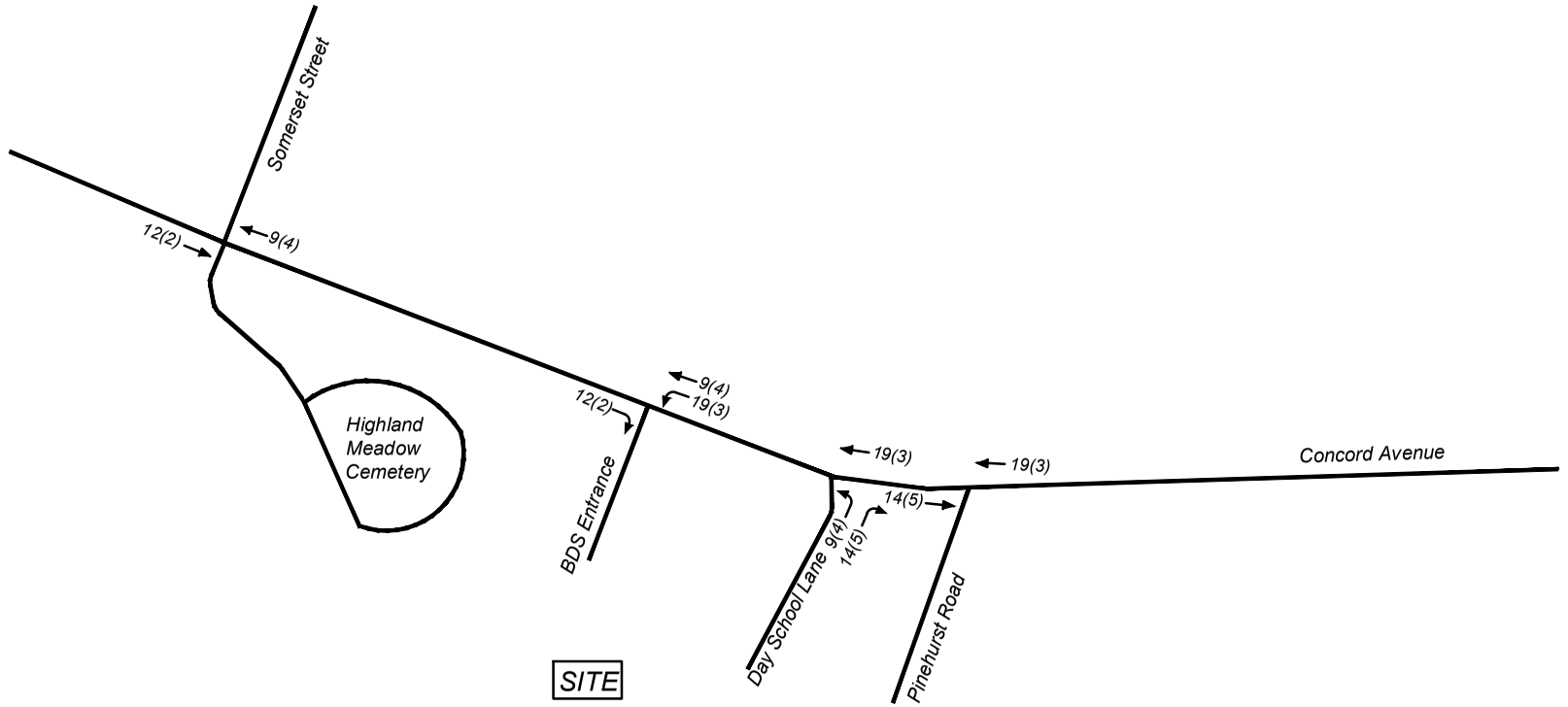
Route	Direction	Percent of Trips
Concord Avenue	East	61
Concord Avenue	West	39
TOTAL		100

Future Traffic Volumes - Build Condition

The site-generated traffic was distributed within the study area according to the percentages summarized in Table 7. The site generated traffic volumes are shown on Figure 6.

The site generated volumes were then superimposed onto the 2023 No-Build traffic volumes to represent the 2023 Build traffic-volume conditions. The anticipated 2023 Build weekday morning and weekday evening traffic volumes are graphically presented in Figures 7 and 8. With the new entrance driveway, school vehicles entering by way of Day School Lane will now divert to the new entrance driveway. This change is reflected on Figures 7 and 8. These volumes were used as the basis for all analysis as well as to identify potential mitigation measures to ameliorate the project's impacts.

A summary of 2023 peak-hour projected traffic-volume changes in the site vicinity are shown in Table 8. These volumes are based on the expected increases from the site traffic generation.



Legend
XX = AM
(XX) = PM

Note: Imbalances exist due to driveways not shown.

N

N.T.S.

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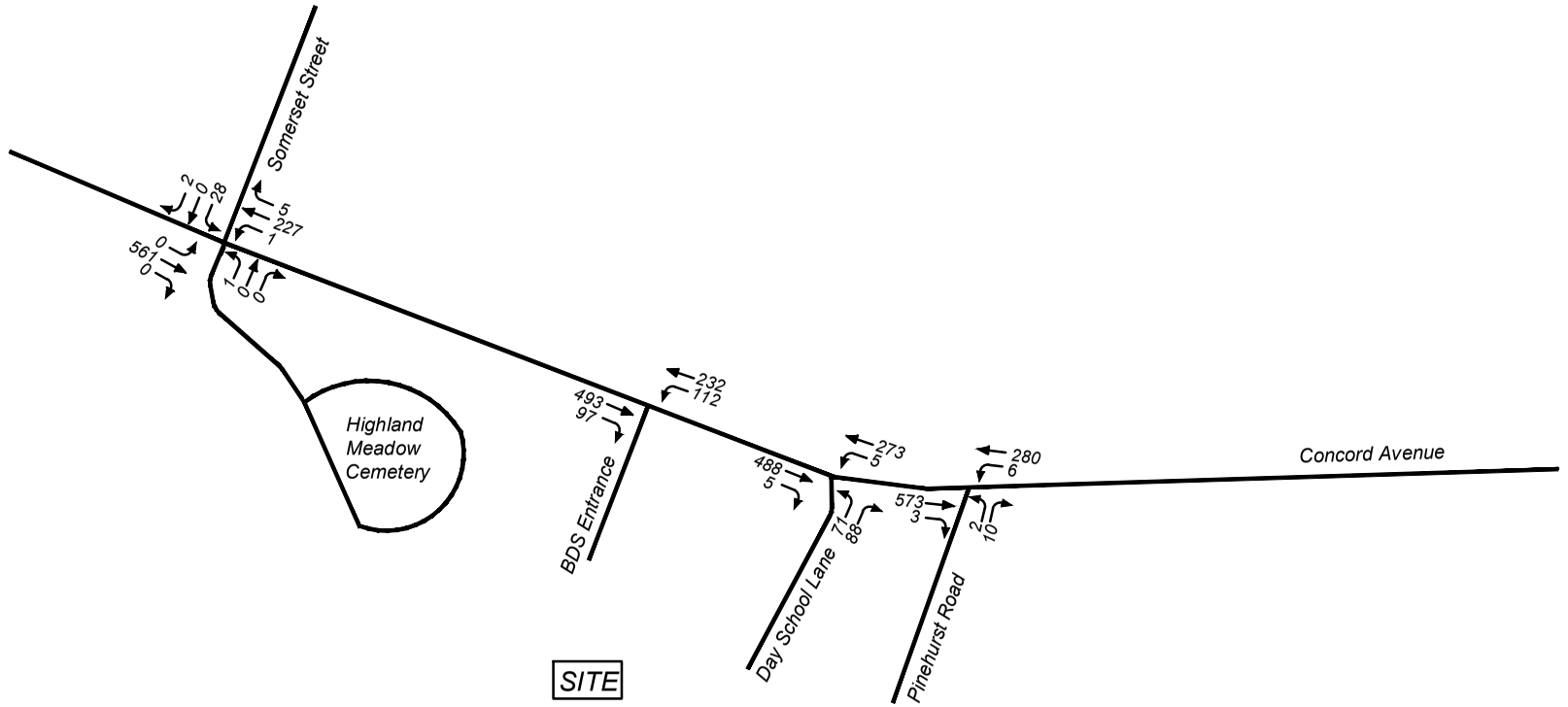
Belmont Day School
Belmont, MA

Figure 6

New Site Generated
Peak Hour Traffic Volumes



N

N.T.S.

Note: Imbalances exist due to driveways not shown.

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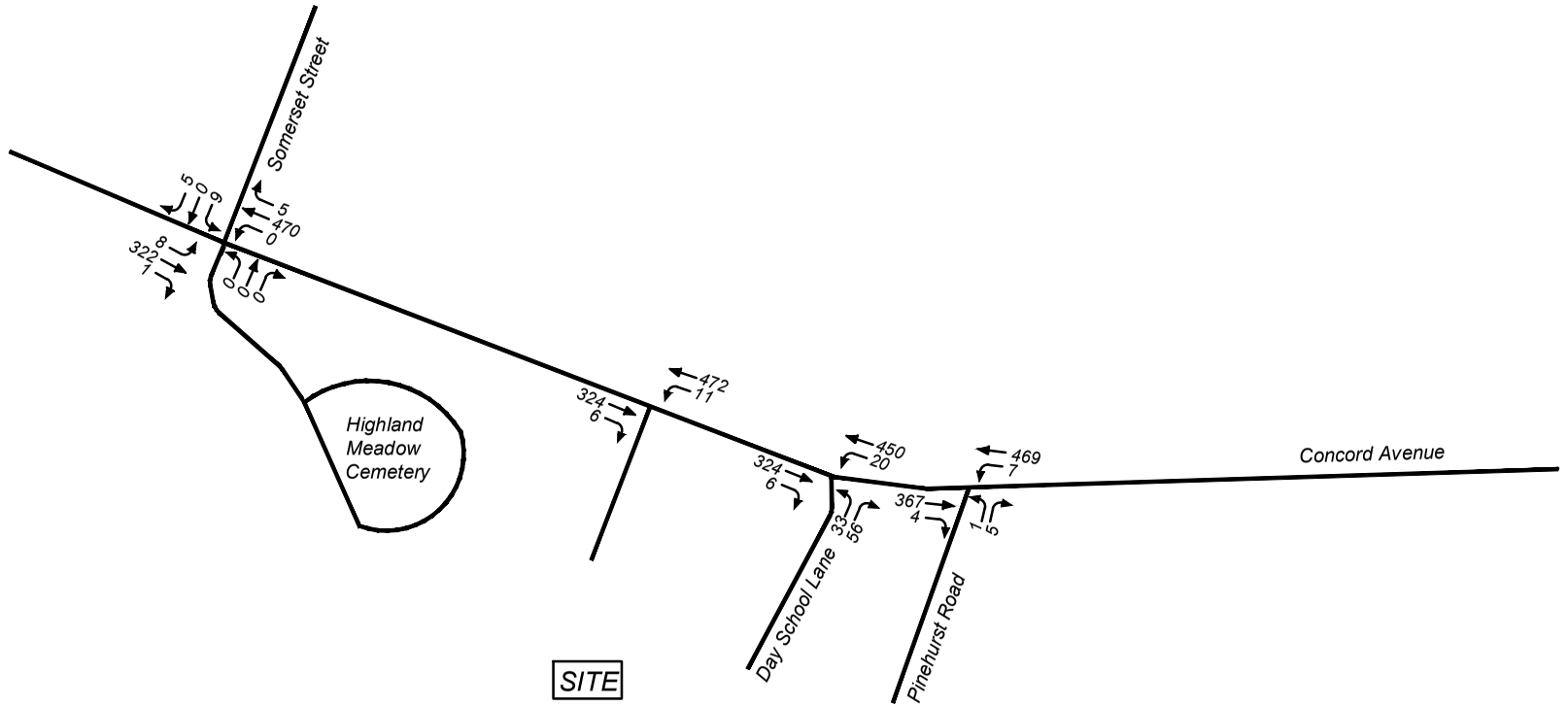
Belmont, MA

Figure 7

2023 Build
Weekday Morning
Peak Hour Traffic Volumes



N

N.T.S.

Note: Imbalances exist due to driveways not shown.

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Figure 8

2023 Build
Weekday Evening
Peak Hour Traffic Volumes

TABLE 8
TRAFFIC-VOLUME INCREASES[a]

Location/Peak Hour	2023 No-Build	2023 Build	Volume Increase over No-Build	Percent Increase over No-Build
Concord Avenue, east of Pinehurst Road				
Weekday Morning	836	869	33	3.9
Weekday Evening	840	848	8	0.9
Concord Avenue, west of Somerset Street				
Weekday Morning	770	791	21	2.7
Weekday Evening	799	806	7	0.9

[a]All volumes are vehicles per hour, total of both directions.

As shown in Table 8, project-related increases are in the range of 7 to 33 bi-directional vehicles during the peak hours. This is approximately equivalent to one additional vehicle every 4 minutes or less per direction on average during the peak hours.

BELMONT DAY CAMP

Camp Description

BDS operates a summer camp program that provides well-rounded, fun-filled, and exciting summer adventures with many opportunities for exploration and play. The camp accepts boys and girls, aged three to fifteen years, who are eager to participate in a wide variety of activities. The number of campers varies slightly from year to year but from 2010 through 2016, the peak numbers of campers has been fairly consistent at 300 campers and 85 staff members.

Campers are placed in coed groups by entering grade in the coming fall. Groups range in size from 10 to 18 depending on the age of the children and the session. As the age of the group increases, so does the amount of choice offered to campers in the activities they pursue. All groups take part in a swim lesson in the morning and enjoy a free swim period in the afternoon daily.

Belmont Day School offers one- and two-week sessions from the end of June to the middle of August. This eight-week period represents the primary camp weeks and encompasses four consecutive two-week periods (Session A, Session B, Session C and Session D).

Arrival and pick up hours vary depending on age and are typically:

- Drop-off: 8:45 to 9:00 AM
- Pick-up: 3:45 PM (12:30 PM available for pre-school/kindergarten)

There are also Extended Day operations:

- Drop-off: 7:45 AM
- Pick-up: 5:30 PM

Students who attend camp and their families are invited to take part in afternoon and early evening swim and tennis. This program typically operates during the same weeks as the camp until 8:00 PM.

Camp Operations

Staff

During session A, Belmont Day Camp has approximately 65 staff members at camp. During sessions B, C, and D, Belmont Day Camp has approximately 85 staff members at camp. During pre-camp and post-camp (1 week before and after Sessions A, B, C and D), Belmont Day Camp has approximately 100 campers. During post-camp 2, Belmont Day Camp has approximately 15 staff members.

Campers

During session A, Belmont Day Camp has approximately 150 campers. During sessions B, C, and D, Belmont Day Camp has approximately 300 campers per session. During pre-camp and post-camp (1 week before and after Sessions A, B, C and D), Belmont Day Camp has approximately 25 staff members. During post-camp 2, Belmont Day Camp has approximately 50 campers.

The peak number of campers and staff (300 campers and 85 staff) is similar to the future build school year condition (315 student and 83 staff). Based on this, we anticipate that traffic volumes associated with the camp are likely to be comparable to those predicted under the future build condition.

It is anticipated that with the new Barn, that the number of campers in session A, pre-camp and post-camp may increase to match sessions B, C, and D. There is no expectation that the number of campers will significantly exceed the current peak occupancy levels.

SECTION 4: CAPACITY ANALYSIS

To assess intersection operations, capacity analyses were conducted for Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the study area intersections serve existing and projected traffic volumes. Vehicle queue analyses provide a secondary measure of the operational characteristics of an intersection or section of roadway under study in terms of lane use and demand.

METHODOLOGY

Levels of Service

Level of service (LOS) is a quantitative measure used to describe the operation of an intersection or roadway segment. The level of service definition is described by the quality of traffic flow and is primarily defined in terms of traffic delays. The primary result of capacity analyses[5] is the assignment of a level of service to traffic intersections or roadway segments under various traffic-flow conditions. Six levels of service are defined for traffic intersections and roadway segments. Levels of service range from LOS A to LOS F. LOS A represents very good operating conditions and LOS F represents very poor operating conditions.

Unsignalized Intersections

The level of service for an unsignalized intersection is determined by the methodology and procedures described in the 2010 *Highway Capacity Manual.*[6] The level of service for unsignalized intersections is measured in terms of average delay for the critical movements (typically side street turning movements or mainline turning movements). The delay for the critical movements is a function of the available capacity for the movement and the degree of saturation of the lane group containing the critical movement. The delay calculation includes the effects of initial deceleration delay

[5]The capacity analysis methodology is based on procedures presented in the *Highway Capacity Manual;* Transportation Research Board; Main, DC; 2010.
[6]*Highway Capacity Manual*; Transportation Research Board; Main, DC; 2010.

approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. The definitions for level of service at unsignalized intersections are also provided in the 2010 *Highway Capacity Manual*. Table 9 summarizes the relationship between level of service and average control delay for the critical movements at unsignalized intersections.

TABLE 9
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[a]

Average Delay (seconds per vehicle)	Resulting Level of Service
≤ 10.0	A
10.1 to 15.0	B
15.1 to 25.0	C
25.1 to 35.0	D
35.1 to 50.0	E
>50.0	F

[a]*Highway Capacity Manual*; Transportation Research Board; Main, DC; 2010; page 17-2.

The analytical methodologies used for the analysis of unsignalized intersections use conservative analysis parameters, such as high critical gaps. The critical gap is defined as the minimum time between successive main line vehicles for a side street vehicle to execute the appropriate turning maneuver. Actual field observations indicate that drivers on minor streets accept smaller gaps in traffic than those used in the analysis procedures and therefore experience less delay than calculated by the HCM methodology. ***The analysis results overstate the actual delays experienced in the field.*** It should be noted that the unsignalized intersections along heavily trafficked roadways operate at constrained levels and the resulting calculated results of the unsignalized intersection analyses should be considered highly conservative.

Signalized Intersections

Levels of service for signalized intersections are calculated using the methodology and procedures described in the 2010 *Highway Capacity Manual*. The methodology assesses the intersection based on type of signal operation, signal timing and phasing, progression, vehicle mix, and intersection geometrics. Level-of-service designations are based on the delay per vehicle. Table 10 summarizes the relationship between level of service and delay. The calculated delay values result in level-of-service designations which are applied to individual lane groups, to individual intersection approaches, and to the entire intersection.

TABLE 10
LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS[a]

Delay per Vehicle (Seconds)	Resulting Level of Service
≤10.0	A
10.1 to 20.0	B
20.1 to 35.0	C
35.1 to 55.0	D
55.1 to 80.0	E
>80.0	F

[a]*Highway Capacity Manual*; Transportation Research Board; Main, DC; 2010; page 16-2.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2016 Existing, 2023 No-Build, 2023 Build conditions for the intersections within the study area. The results of the unsignalized analyses are in Table 11. Actual field observations indicate that drivers on minor streets did not experience the delays that the HCM methodology indicates, further supporting the conservative nature of the analysis methodology. Again, it is important to note that the analysis results overstate the actual delays experienced in the field**.** Detailed analysis sheets are presented in the Appendix.

TABLE 11
UNSIGNALIZED LEVEL-OF-SERVICE ANALYSIS SUMMARY

Critical Movement/ Peak Hour	2016 Baseline				2023 No-Build				2023 Build			
	Demand[a]	V/C[b]	Delay[c]	LOS[d]	Demand	V/C	Delay	LOS	Demand	V/C	Delay	LOS
Concord Avenue and Pinehurst Road												
All movements from Pinehurst Road:												
Weekday Morning	12	0.05	13.1	B	12	0.05	13.6	B	12	0.06	13.9	B
Weekday Evening	6	0.02	12.0	B	6	0.02	12.4	B	6	0.02	12.5	B
Concord Avenue and Day School Lane												
All movements from Day School Lane:												
Weekday Morning	136	0.60	30.3	D	136	0.64	34.5	D	159	0.59	25.8	D
Weekday Evening	80	0.26	16.8	C	80	0.27	18.0	C	89	0.30	18.4	C
Concord Avenue and Proposed Day School Lane Entrance Driveway												
Left turns movements into Entrance:												
Weekday Morning	--	--	--	--	--	--	--	--	112	0.14	9.4	A
Weekday Evening	--	--	--	--	--	--	--	--	11	0.01	8.2	A
Concord Avenue, Highland Meadow Cemetery Driveway and Somerset Street												
All movements from Somerset Street:												
Weekday Morning	29	0.11	17.7	C	30	0.13	19.1	C	30	0.14	19.7	C
Weekday Evening	14	0.07	17.5	C	14	0.07	18.8	C	14	0.07	19.0	C

[a]Demand of critical movements in vehicles per hour.
[b]Volume-to-capacity ratio.
[c]Delay in seconds per vehicle.
[d]Level of service.

Concord Avenue and Pinehurst Road

Under 2016 Existing conditions, during the weekday morning peak hour, the critical movements (all movements from Pinehurst Road) are projected to operate at LOS B and at LOS B during the weekday evening peak hour. Under future 2023 No-Build conditions, these critical movements are projected to continue to operate at LOS B during the weekday morning and weekday evening peak hours. Under future 2023 Build conditions, with the project, these critical movements are projected to continue to operate at LOS B during the weekday morning and weekday evening peak hours. The Pinehurst Road volume is less than 12 vehicles per hour during peak periods with a volume-to-capacity (v/c) ratio that is well below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. The additional traffic generated by the proposed project is not anticipated to increase queues on Pinehurst Road.

Concord Avenue and Day School Lane

Under 2016 Existing conditions, during the weekday morning peak hour, the critical movements (all movements from Day School Lane) are projected to operate at LOS D and at LOS C during the weekday evening peak hour. Comparing the modeled level of service to the actual observed delays summarized in Table 2 shows that actual conditions

are LOS B during the weekday morning peak hour and LOS A during the weekday evening peak hour. This shows the conservative nature of the unsignalized HCM capacity analysis methodology.

Under future 2023 No-Build conditions, the critical movements are projected to continue to operate at LOS D during the weekday morning peak hour and at LOS C during the weekday evening peak hour. Under future 2023 Build conditions, with the project, these critical movements are projected to continue to operate at LOS D during the weekday morning peak hour and at LOS C during the weekday evening peak hour.

Concord Avenue, Highland Meadow Cemetery and Somerset Street

Under 2016 Existing conditions, during the weekday morning and weekday evening peak hours, the critical movements (all movements from Somerset Street) are projected to operate at LOS C. Under future 2023 No-Build conditions, these critical movements are projected to continue to operate at LOS C during the weekday morning and weekday evening peak hours. Under future 2023 Build conditions, with the project, these critical movements are projected to continue to operate at LOS C during the weekday morning and weekday evening peak hours. The Somerset Street volume is less than 30 vehicles per hour during peak periods with a volume-to-capacity (v/c) ratio that is well below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. The additional traffic generated by the proposed project is not anticipated to increase queues on Somerset Street.

SIGHT DISTANCE

Sight distance measurements were performed at the intersection of the proposed entrance with Concord Avenue in accordance with Massachusetts Department of Transportation (MassDOT) and American Association of State Highway and Transportation Officials (AASHTO) standards. Stopping sight distance (SSD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. Intersection sight distance (ISD) or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway, to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. Table 12 presents the measured SSD at the intersection of the proposed entrance at Concord Avenue. As the proposed driveway will be an entrance only, the ISD is not relevant to the safety of this intersection. The sight distance calculations are included in the Appendix.

As can be seen in Table 12, the SSD measurements performed at the proposed entrance intersection with Concord Avenue indicate that the intersection exceeds the recommended minimum requirements based on the 85^{th} percentile speed of 38 mph. It is recommended that any proposed landscaping be less than three (3) feet in height and maintained for sight lines.

TABLE 12
SIGHT DISTANCE SUMMARY

	Required Minimum (Feet)[a]	Measured (Feet)
Proposed Entrance and Concord Avenue		
Stopping Sight Distance:		
Concord Avenue approaching from the east	278	500
Concord Avenue approaching from the west	278	500+

[a]Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2011, and based on 85th percentile speed for Concord Avenue.
[b]Recommended minimum value for vehicles turning right exiting a roadway under STOP-sign control.
[c]Recommended minimum value for vehicles turning left exiting a roadway under STOP-sign control.

SECTION 5: PARKING

EXISTING PARKING

To establish existing parking needs, parking observations were performed on Tuesday May 10, 2016, Tuesday May 17, 2016 and Thursday May 19, 2016. Observations started at 6:00 AM and the number of parked vehicles was recorded every half hour. The number of students and staff on site each of the three days was obtained from the Belmont Day School. Currently, there are 127 parking spaces on the school site, three (3) of which are handicapped spaces. The data is summarized in Table 13.

Based on the parking accumulation data, the average parking demand rate per faculty/staff member yields a parking rate of 1.11 spaces per faculty/staff member. Based on the student population, the average existing parking demand rate is 0.30 spaces per student and the peak rate is 0.34 spaces per student.

TABLE 13
SUMMARY OF PARKING OBSERVATIONS

Time	May 10, 2016	May 17, 2016	May 19, 2016
6:00 AM	6	1	1
6:30 AM	7	3	3
7:00 AM	12	12	11
7:30 AM	34	34	28
8:00 AM	67	69	73
8:30 AM	79	89	71
9:00 AM	74	77	62
9:30 AM	69	67	61
10:00 AM	60	65	62
10:30 AM	66	65	66
11:00 AM	66	65	65
11:30 AM	64	65	64
12:00 PM	67	67	66
12:30 PM	66	66	65
1:00 PM	67	64	63
1:30 PM	69	67	62
2:00 PM	63	67	60
2:30 PM	62	71	65
3:00 PM	69	74	105[c]
3:30 PM	--	82[a]	88[d]
4:00 PM	--	63	83
4:30 PM	--	48[b]	99[e]
5:00 PM	--	26	--
No. of Faculty/Staff	72	72	74
No. of Students	261	264	268
Parking Rate per Faculty/Staff	1.10	1.24	0.99
Parking Rate per Student	0.30	0.34	0.27

[a]Includes 10 cars idling waiting to pick up students.
[b]Includes 25 cars idling waiting to pick up students.
[c]Includes 32 cars idling waiting to pick up students.
[d]Includes 12 cars idling waiting to pick up students.
[e]Includes 10 cars idling waiting to pick up students.

As shown in Table 13, the peak parking rate per student during the three days of observations was 0.34 spaces per student. Applying this rate to the proposed enrollment of 315 students yields a projected parking demand of 108 spaces. As 131 parking spaces are proposed, and exceeds the projected demand, parking on the site will be adequate.

By comparison, the recently approved and constructed Wellington Elementary School

has 80 parking spaces with a 2016 student enrollment of 516 students. This yields a parking demand rate of 0.16 spaces per student.

EVENT PARKING

Occasionally during the year, BDS has major events at which students and families are present. For these events, BDS hires a bus company to transport the event attendees from satellite parking locations (typically Belmont Hill Club and Belmont Country Club). BDS families are notified prior to the event that satellite parking is available and requested to use those locations for the specific event. Shuttle buses run prior to and following the event so that attendees are assured that they can reach their vehicles.

These major events typically include the following (based on 2016/17 Calendar Year):

- Back to School Picnic: September 6 - 4:00 PM - 300 adults
- Back to School Night: September 22 – 6:00 PM - 338 adults (Belmont Country Club (BCC) was used for overflow faculty parking - 75 total vehicles @ BCC)
- Grandparents' Day: October 14 – 8 AM - 250 adults (Belmont Hill Club (BHC) for overflow faculty parking - 30 total vehicles @ BHC)
- Winter Concert: December 19 - 6:30 PM - 300 adults (BCC for overflow faculty parking - 75 total vehicles @ BCC)
- Spring Auction (held every other year): April 29 – 7:00 PM 250 adults
- "Moving Up Assembly" – June 8 - 8:30 AM - 250 adults

When necessary, BDS has used existing fields (Archery and Far) for additional parking.

SECTION 6: RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

The final phase of the analysis process is to identify the mitigation measures necessary to minimize the impact of the project on the transportation system. BDS has made a commitment to implement the mitigation measures listed below.

The capacity analyses performed for the unsignalized study area intersections indicate that overall, the intersections operate at good levels of service, with minor delays for the critical movements.

The side street (Pinehurst Road and Somerset Street) left- and right-turn volume onto Concord Avenue at the study area intersections is, in each case, less than 30 vehicles per hour during peak periods, with projected volume-to-capacity (v/c) ratios that will be well below 1.00. This indicates that there will be adequate capacity to accommodate the anticipated traffic volumes from the side streets onto Concord Avenue.

The capacity analyses indicate that the critical movements at the Day School Lane and Concord Avenue intersection are projected to operate at LOS D during the weekday morning peak hour and at LOS C during the weekday evening peak hour; observations of actual delays indicate that these levels of service will be better than modeled.

Sight lines at the proposed entrance driveway and Concord Avenue exceed AASHTO requirements. Vegetation or proposed landscaping along the entrance driveway and in front of the site and within the Concord Avenue layout should be cleared and maintained so as to maintain sight distances.

Two signs should be installed along Concord Avenue (approximately 500 feet from the new driveway location) to advise motorists that the turn into the school is being approached. The signs should follow the regulations of the Manual on Uniform Traffic Control Devices (MUTCD) for Cultural and Recreational signs. The sign should read 'BELMONT DAY SCHOOL 500 FT.'

Finally, it is suggested that a 'wayfarer' guide sign be located at the intersection of Concord Avenue and Mill Street (west of the BDS) to guide drivers to the BDS and to increase driver certainty as to the location of the BDS.

CONCLUSION

BDS proposes to increase enrollment by 45 students, construct a 25,817± gsf educational building and add an entrance only one-way driveway from Concord Avenue. All work will be completed within the existing campus footprint. On a typical weekday, the project is expected to generate approximately 158 additional vehicle trips. During the weekday morning peak hour, 54 additional vehicle trips (31 vehicles entering and 28 vehicles exiting) are expected. During the weekday evening peak hour, 14 additional vehicle trips (5 vehicles entering and 9 vehicles exiting) are expected. Most of this traffic is expected to be automobiles.

Capacity analyses were performed for each of the study area intersections for 2016 Existing, 2023 No-Build and 2023 Build conditions. Based on the analyses performed, there is no change in level of service from No-Build to Build conditions at the unsignalized study area intersections.

The proposed entrance driveway consists of one lane into the site. Vegetation or proposed landscaping along Concord Avenue in front of the entrance driveway and within the layout should be cleared and maintained so as to maintain sight distances. With the creation of the new entrance driveway, on-site circulation for BDS will be improved and there will be less traffic impact on Day School Lane residents.

Relative to roadway capacity, traffic safety, and traffic impacts upon the surrounding roadway network, the proposed project will meet safety standards and have a minimal impact on existing traffic conditions. With the proposed mitigation measures described above and maintaining sight distances from the driveway (clear sight lines along frontage), safe and efficient access can be provided to the local residents and to the motoring public in the area.

SECTION 7: TRAFFIC APPENDICES

Traffic appendices available upon request.