

April 5, 2023

Ms. Donna DiNisco, Principal
DiNisco Design
99 Chauncy Street
Boston, MA 02111

Re: **Professional Traffic Engineering Services**
Existing Conditions Report
Fox Hill Elementary School
Burlington, Massachusetts
Pare Project No. 23052.00

Dear Ms. DiNisco:

Pare Corporation (Pare) has completed an existing traffic conditions assessment for Fox Hill Elementary School in Burlington, MA. The Town of Burlington is pursuing the replacement of the existing Fox Hill Elementary School situated at the end of two roads: Fox Hill Road and Westwood Street. The new school will most likely be located on the same site and will continue to hold grades Kindergarten through Grade 5. There are currently approximately 480 students enrolled at the existing school. Due to the anticipated reduction in overall enrollment, two alternatives for the new school are currently under consideration, including:

- Enrollment for Grades K-5, at current Fox Hill Elementary School site: 325 students
- Enrollment for Grades K-5, at a Consolidated Fox Hill Elementary School and Pine Glen Elementary School: 640 students, at current Fox Hill Elementary School site

The purpose of this existing conditions traffic assessment is to review existing traffic conditions at and around the school including traffic circulation patterns of school buses, parents and staff, arrival and dismissal operations, parking demands, and pedestrian and vehicular safety. The report includes a summary of observations at the site during the morning arrival period and the afternoon dismissal period on Wednesday, March 23, 2023. The weather conditions were sunny, and the high temperature for the day reached 50°F.

A full Traffic Impact Analysis (TIA) will be conducted at a future date and will provide a more detailed and specific assessment of the future traffic conditions associated with the new building project and the quantitative impact of the new traffic generated by the potential combination of Pine Glen Elementary School with Fox Hill Elementary School.

A study area map, showing the location of the Fox Hill Elementary School and the surrounding area, is shown in Figure 1.



FOX HILL
ELEMENTARY
SCHOOL

PINE GLEN
ELEMENTARY
SCHOOL



PROJECT NO. 23052.00

DATE: MARCH 2023

FIGURE 1
LOCUS MAP

FOX HILL ELEMENTARY SCHOOL
BURLINGTON, MA

EXISTING CONDITIONS

The existing Fox Hill Elementary School is situated immediately east of the intersection of Westwood Street and Fox Hill Road. Access to/from the site is provided via a single driveway that leads from the intersection of Fox Hill Road and Westwood Street into the site. A parking lot is located on the northern side of the site while the school building is situated south of the parking lot. The site driveway extends across the north side (front) of the building. The driveway at the front of the building serves school bus drop-off and pick-up operations (**Photo 1**). A one-way ring road extends from the main site driveway around the south side of the building, operating in a counterclockwise direction. In addition to providing emergency access to the entire perimeter of the building, the ring road is used by parents for drop-off/pick-up operations. Pedestrian access to/from the site consists of a sidewalk network that extends from the building west to the intersection of Fox Hill Road and Westwood Street. Sidewalks extend along Fox Hill Road and Westwood Street into the adjacent neighborhood.

The intersection of Fox Hill Road and Westwood Street is located only 150 feet from the school parking lot and, consequently, is integral to traffic operations on the school site. Fox Hill Road forms the south leg of the intersection, Westwood Street forms the west leg, and the school driveway forms the east leg. All approaches consist of a single travel lane. The northbound approach from Fox Hill Road is stop-controlled (with a stop sign) while the Westwood Road and school driveway approaches are uncontrolled. Crosswalks are striped across the south and east legs of the intersection. At the intersection, sidewalks are located along both sides of Westwood Street and the school driveway while sidewalk is only located on the west side of Fox Hill Road. **Figure 2** displays the existing intersection details.

Westwood Street travels in the east/west direction extending from Wilmington Road (Rte. 62) at its western end to Fox Hill Road at its eastern end. The roadway is 24 feet wide with an 11-foot travel lane and a 1' shoulder in each direction. A bituminous sidewalk is installed along the north side of the roadway for its entire limits. The posted speed limit along Westwood Street is 30 miles-per-hour. A school zone speed limit of 20 miles-per-hour is posted approximately 150' west of Fox Hill Road. **Photo 2** shows the cross section of Westwood Street approaching Fox Hill Elementary School

Fox Hill Road travels in the north/south direction, extending from Skilton Lane at its southern end to Westwood Street at its northern end. The roadway is typically 24 feet wide with a 12-foot travel lane in each direction. The travel lanes are divided by double-yellow striping. No white edge line is provided. A bituminous sidewalk is located along the west side of the roadway for its entire limits. The posted speed limit along most of the roadway 25 miles-per-hour. A school zone speed limit of 20 miles-per-hour is posted approximately 200' south of Westwood Street. **Photo 3** shows the cross section of Fox Hill Road approaching Fox Hill Elementary School. A series of speed bumps have been installed along Fox Hill Road spaced at intervals between 300' -500' in an effort to reduce vehicle speeds. **Photo 4** shows the typical speed bump with warning sign configuration on Fox Hill Road.



PROJECT NO. 23052.00 DATE: APRIL 2023

FIGURE 2
 EXISTING ROADWAY CONDITIONS
 FOX HILL ELEMENTARY SCHOOL
 BURLINGTON, MA



Photo 1: The front of Fox Hill Elementary School is used for bus drop-off/pick-up operations.



Photo 2: Westwood Street looking east towards Fox Hill Elementary School.



Photo 3: Fox Hill Road looking north towards Fox Hill Elementary School.



Photo 4: Multiple speed bumps are placed along Fox Hill Road south of Fox Hill Elementary School.

Arrival and Dismissal Operations

A review of the existing traffic conditions at and around the school were completed through field observations conducted during school arrival and dismissal periods. Parking occupancy was also recorded in the school parking lot. All observations at the Fox Hill Elementary School were conducted on Wednesday, March 22, 2023, while the school was operating under typical conditions. The following describes the traffic operations observed at the school with supplemental photos providing additional details. Additionally, **Figure 3** graphically displays the arrival operations of the school.

The school day at Fox Hill Elementary School formally begins at 8:10 a.m. and Pare began morning arrival observations at approximately 7:30 a.m. During the morning arrival period, all traffic enters the site from the Fox Hill Road/Westwood Street intersection. School faculty and staff park in the site's parking lot. Bus drop-off occurs at the front of the building (**Photo 5**). A total of seven buses were observed, however, the bus arrival is sporadic and no more than two buses were observed unloading at the same time. Students are unloaded from the buses under the covered walkway and enter the school through the front entrance. Buses circulate around the perimeter of the parking lot and back to the main site driveway. Two buses were observed parking at the rear of the parking lot after unloading and waiting several minutes before exiting the site.

Parent traffic uses the ring road around the rear of the building for drop-off (**Photo 6**). The ring road is approximately 1,050' in length. A total of 84 parent vehicles used the ring road for drop-off. Drop-off occurs along the east side of the building (**Photo 7**). School staff are positioned along the vehicle unloading zone and assist students in exiting vehicles. Pare observed up to five vehicles unloading simultaneously. Students then walk from the unloading area into the eastern building entrance. Parent vehicles are then directed by signing and striping to exit the site by traveling through the outside parking lot aisle. A chain at the beginning of the ring road is used to restrict access to the rear of the building outside of the arrival period. Access to the ring road was closed at 8:08 a.m. by school staff (**Photo 8**). Twenty-four (24) parents were also observed parking in the parking lot to unload students. Parents would assist students in exiting the vehicle then walk the student to the front door where they were met by school staff.

Twenty-six (26) students were observed walking to the site from Fox Hill Road and Westwood Street. A crossing guard was positioned at the intersection to assist students in safely traversing the crosswalks. Some students were accompanied by a parent when walking to school while many walked unaccompanied. Two students were observed entering the site on bikes (**Photo 9**). A school staff member was positioned at the entrance to the parent vehicle ring road where it crosses the sidewalk. This staff member stopped parent traffic from crossing the sidewalk when a student was walking in the area.

A total of four school vans were also observed during drop-off. One van was observed at the southwest corner of the school building adjacent to the accessible ramp (**Photo 10**). The remaining three vans were observed circulating through the parent loop. The van traffic did not appear to cause congestion or otherwise impact the circulation of parent vehicles through the loop.



PROJECT NO. 23052.00 DATE: APRIL 2023

FIGURE 3
MORNING DROP-OFF CIRCULATION
FOX HILL ELEMENTARY SCHOOL
BURLINGTON, MA



Photo 5: School bus drop-off occurs at the covered sidewalk at the front of the building.



Photo 6: The ring road around the rear of the building begins just east of the Fox Hill Road/Westwood Street intersection.



Photo 7: Parent vehicles unload at the east side of the building and students enter through the side doorway.



Photo 8: The ring road entrance to the rear of the building is closed outside of drop-off and pick-up operations.



Photo 9: Two students were observed biking to school. A third bike appeared to have been drop-off by a parent during the day.



Photo 10: One school van was observed unloading at the rear of the building at the accessible ramp.

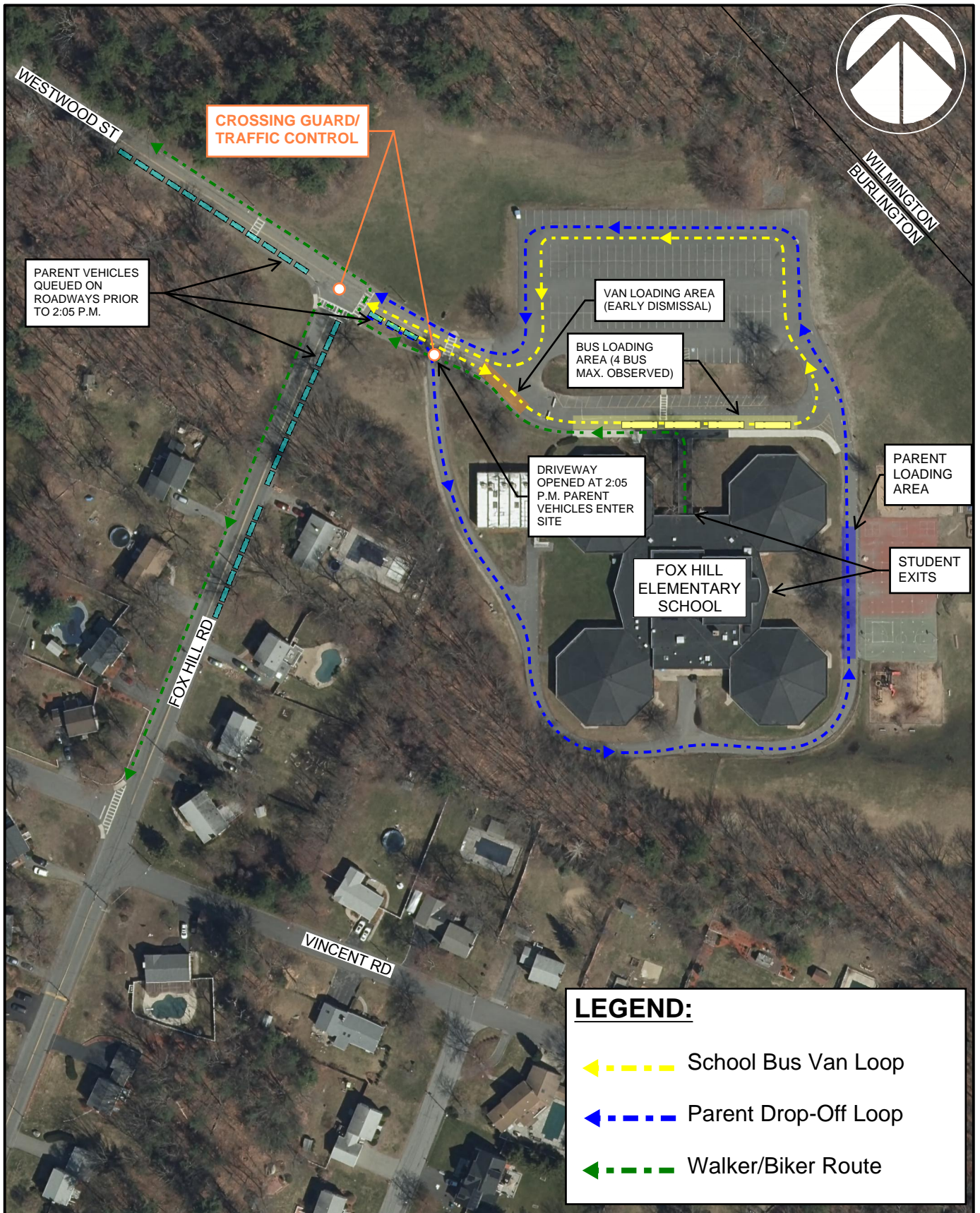
The afternoon dismissal procedure operates in a similar pattern to the morning arrival procedure. Pare first observed all four vans and approximately 5 parents picking up students at the northwest corner of the building, along the main site driveway. Students here were dismissed approximately 10-15 minutes early. These operations cleared prior to the full student dismissal at 2:10 p.m.

Parent traffic was observed beginning to queue along Fox Hill Road and Westwood Street well before the 2:10 p.m. dismissal. The rear ring road remained chained-off until 2:05 p.m. Pare observed a total of three parent vehicles queued adjacent to the ring road entrance (**Photo 11**), 12 parents vehicles queue along the south side of Westwood Street (**Photo 12**) and 17 parent vehicles queued along the east side of Fox Hill Road (**Photo 13**) before the chain was removed. Parent vehicles then filed into the ring road for student pick-up. A total of 44 parent vehicles used the loop for student pick-up. The maximum parent vehicle queue extended the entire limits of the ring road, approximately 1,050', resulting in one vehicle spilling into the main site driveway (**Photo 14**).

School bus students gathered at the front of the building and were formed into groups for each bus. Based on coordination with school staff, bus students usually wait in the gymnasium then are called out when each bus arrives. However, there was a staff meeting occurring in the gymnasium on the day of observations and the front of the school was therefore used for student dismissal operations. A total of seven buses arrived on site. Buses arrived and were loaded sporadically. The maximum number of buses observed loading at once was four.

Upon dismissal, 42 student walkers exited the building and traveled along the sidewalk to the Fox Hill Road/Westwood Street intersection. The three students with bikes were also in this group. The majority of students travel from the intersection down Fox Hill Road. Some students were accompanied by parents, but most were not.

Figure 4 graphically displays the dismissal operations of the school.



PROJECT NO. 23052.00 DATE: APRIL 2023

FIGURE 4
AFTERNOON PICK-UP CIRCULATION
FOX HILL ELEMENTARY SCHOOL
BURLINGTON, MA



Photo 11: Parent vehicles queued at the entrance to the rear building ring road awaiting dismissal.



Photo 12: Parent vehicles queue along the south side of Westwood Street awaiting student dismissal.



Photo 13: Parent vehicles queue along the east side of Fox Hill Road awaiting student dismissal.



Photo 14: The parent vehicle queue was observed extending just the end of the rear building ring road.

Additional Observations

Several additional observations regarding traffic circulation and safety were noted by Pare during the field review and include the following:

- The circulation pattern of the parent pick-up/drop-off operation positions the driver-side door adjacent to the building entrance. It is typically preferred to have the passenger-side of the vehicle adjacent to the building for loading/unloading operations to limit the need for students to cross the active lane of traffic. Although this configuration is not preferable, the staff involvement and oversight of student loading/unloading allows the operation to occur effectively and safely. Additionally, most students were seated in the rear seat behind the driver's seat, further reducing the need for students to cross traffic.
- The few students that were observed biking to/from school used the sidewalk on Westwood Street.
- None of the accessible sidewalk ramps within the site or at the intersection of Fox Hill Road and Westwood Street were accompanied by detectable warning panels. **(Photo 15)**
- There is no accessible ramp on the north side of the crosswalk across Westwood Street at Fox Hill Road. **(Photo 16)**
- Signing and striping at multiple locations through the site was faded making it illegible or difficult to read. **(Photo 17)**
- The school zone and pedestrian crossing signage on Fox Hill Road and Westwood Street does not conform to the current Manual of Uniform Traffic Control (MUTCD) standards. **(Photo 18)**
- Pare observed that the stacking of parent vehicles along the Fox Hill Road/Westwood Street intersection approaches results in some traffic safety concerns. Specifically, neither roadway has the shoulder area to allow vehicles to pull outside the limits of the travel lane. This forces northbound vehicles on Fox Hill Road and eastbound vehicles on Westwood Street to occupy the oncoming travel lane when traversing the intersection. Additionally, the presence of queued vehicles (especially larger trucks or SUVs) along the intersection approaches limit sight lines as drivers approach the intersection. While this intersection is in an isolated section of Town with little vehicle traffic outside of that generated by the school, Pare did observe other through traffic in the area during this time.
- The crossing guard noted that the number of walkers is significantly impacted by the weather and seasons. Once warmer weather arrives, many more students will walk.



Photo 15: Accessible ramps lack detectable warning panels throughout the study area.



Photo 16: There is not an accessible ramp at the north side of the crosswalk at Fox Hill Road and Westwood Street.



Photo 17: Striping within the parking lot directing parent traffic is faded.



Photo 18: School speed limit sign assemblies do not align with current standards.

Traffic Volume Data

Pare recorded the volume of parent vehicles, school buses, vans, walkers and bikers during the morning arrival period and afternoon dismissal period. These quantities are presented below in **Table 1**.

Table 1: Fox Hill Elementary School Observed Trips

Period	Parent Vehicle Drop-offs/ Pick-ups	Buses	Vans	Walkers	Bikers
Morning Arrival	108 ¹	7	4	26	2
Afternoon Dismissal	44	7	4	42	3

1. Includes 24 parent vehicles that parked in the parking lot and walked students into the building.

Parking Lot Survey

Parking space occupancy was recorded following the school start time (approximately 8:30 a.m.). **Table 2** below shows the results of the parking inventory.

Table 2: Fox Hill Elementary School Parking Summary

Occupied Spaces	Vacant Spaces	Total Parking Spaces
82	83	165 ¹

1. Includes 5 accessible parking spaces.

CONCLUSIONS AND RECOMMENDATIONS

The compilation of the existing conditions assessment has been provided to establish baseline traffic conditions for the traffic study. Pare was able to obtain existing information regarding the arrival and dismissal operations at the existing school, number of parent drop-offs at the school, parking demand at the school, and a sense of the traffic circulation patterns within the study area. In general, operations at the existing Fox Hill Elementary School work well and are efficient. The presence of school staff and the crossing guard enables safe student movement during vehicle loading and unloading and while walking to and from the site.

Based on the observations at the existing Fox Hill Elementary School, Pare recommends the following be considered as the project design progresses:

- Locate a parent vehicle queuing area on the site to eliminate the need for parents to queue within the existing travel lanes on Fox Hill Road and Westwood Road.
- Improve the sidewalk network in areas where it currently does not meet ADA standards.
- Provide school zone and student crosswalk signage and striping to meet current standards.

Ms. Donna DiNisco

(15)

April 5, 2023

- Consider conducting an all-way stop warrant analysis at the intersection of Fox Hill Road and Westwood Street. The presence of an all-way stop control may improve safety at the intersection. This change in intersection control may be more appropriate if Fox Hill Elementary School and Pine Glen Elementary School are combined, resulting in more traffic at the intersection.
- Consider consolidating the three existing crosswalks across Westwood Street. A safer alternative may be to position two crosswalks across Westwood Street at the Fox Hill Road intersection only.

If you have any questions or concerns or wish to discuss further, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read 'Timothy Thomson', written in a cursive style.

Timothy Thomson
Senior Project Engineer

TT/ks