

MEMORANDUM

TO: Mr. Donald Kingman
Director of Campus Planning and
Construction
Concord Academy
166 Main Street
Concord, MA 01742

FROM: Mr. Jeffrey S. Dirk, P.E., PTOE, FITE 
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RE: 9489

SUBJECT: Transportation Impact Assessment
Concord Academy Centennial Arts Center – 166 Main Street (Route 62)
Concord, Massachusetts

Vanasse & Associates, Inc. (VAI) has completed an assessment of the traffic impacts associated with the proposed construction of the Centennial Arts Center (CAC) within the Concord Academy campus located at 166 Main Street (Route 62) in Concord, Massachusetts (hereafter referred to as the “Project”). The Project will not result in an increase in the student population or the number of faculty or staff over current levels and, as such, will not create additional traffic or parking demands. As such, this assessment focuses on establishing an existing conditions context for the Project with respect to the transportation infrastructure and evaluates the changes that are proposed to the existing campus driveways along Main Street and on-campus parking.

Based on this assessment, we have concluded the following with respect to the Project:

1. Given that the Project will not result in an increase in the number of faculty, staff or students, and that the new performance space will be smaller than the existing auditorium (which will be repurposed for all-school meetings and assembly’s), ***the Project will not result in a material increase in traffic or parking demands over that associated with current campus activities;***
2. When special events are scheduled at the campus, they are typically scheduled in the evening or on weekends when traffic volumes and parking demands are lower. This will not change with the construction of the CAC;
3. The reconfiguration of the parking lots within the campus to accommodate the Project and the associated reconstruction of the westernmost campus driveway and relocation of the West Gate will serve to disperse trips between the two driveways, with the western driveway to serve as the primary vehicular access to the CAC. The off-set between Belknap Street and the reconstructed



western driveway will be approximately 50 feet, which meets the recommended off-set distance between intersections for the posted speed limit along Main Street (30 miles per hour (mph));¹

4. The construction of the Project will result in a reduction in the number of parking spaces provided within the Concord Academy campus, from 204 parking spaces to 147 parking spaces. Parking demand observations performed within the campus indicate that with the reduction in parking, a potential parking deficit of 24 spaces may exist during the peak parking demand period to accommodate actual observed parking demands within the campus;
5. The number of parking spaces that will be provided (147) is 57 parking spaces below the number of parking spaces requested under the Concord Zoning Bylaw for the campus with consideration of prior relief that has been granted (321 parking spaces are required, 204 parking spaces have been requested);
6. Based on a review of parking demand studies that have been conducted of public parking located within an approximate 5-minute walking distance of the campus, there are over 240 parking spaces available between 7:00 AM and 7:00 PM on both a weekday and a Saturday to the extent necessary to accommodate additional campus parking demands, which exceeds the 24 additional parking spaces necessary to accommodate the observed peak parking demand and the number of additional parking spaces that are required by the Zoning Bylaw with previously granted relief (57 parking spaces); and
7. Lines of sight at the intersections of Main Street with the relocated West Gate and the reconstructed (widened) west driveway will meet or exceed the recommended minimum sight distance for safe operation with consideration of prohibiting parking within 20 feet of the driveways.

Based on these findings, it has been concluded that the Project can be accommodated within the confines of the existing transportation infrastructure, and that there is more than sufficient available parking within a reasonable walking distance of the Project site to accommodate the addition of the CAC to the Concord Academy campus.

The following details of assessment of the Project.

PROJECT DESCRIPTION

The Project will entail the construction of a new 37,000± square foot (sf) Centennial Arts Center (CAC) to be situated at the location of the central parking lot and west of the Chapel within the Concord Academy campus. The CAC will include two performance areas: a playhouse/theater with 175 seats and a music hall with 125 seats. The existing 25,000± sf, 400 seat Performing Arts Center (PAC) will be retained and used for all-school meetings and assembly's, with the performances that are currently held at the PAC moved to the CAC.

In order to facilitate the construction of the CAC, two (2) existing faculty residences will be relocated to the west portion of the campus and the tennis courts and central parking lot will be removed. Additional improvements within the campus to support the CAC include the construction of two (2) new surface parking lots, one the east of the CAC building and one to the south between Main Street and the CAC building; the relocation and reconstruction of the West Gate and westernmost campus driveways along

¹Massachusetts Highway Department Project Development & Design Guide; MassHigway; 2006.



Main Street; and the development of campus wide enhancements to landscaping and pedestrian connectivity. The Project will not result in an increase in the number of faculty, staff or students, and the new performance space will be smaller than the existing auditorium (which will be repurposed for all-school meetings and assembly's). The removal of the central parking lot will result in a reduction in the number of on-campus parking spaces from 204 parking spaces to 147 parking spaces, or a reduction of 57 parking spaces, which will be off-set through the use of available public parking that is located proximate to the Concord Academy campus along Main Street and Academy Lane.



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Access to the campus will continue to be provided by way of individual driveways situated along the north side of Main Street between Sudbury Road and the westernmost driveway that is located approximately 50 feet west of Belknap Street. The primary access driveways are defined as the East Gate and the West Gate, and are located approximately 200 feet west the Main Street/Sudbury Road intersection and 285 feet west of Academy Lane, respectively. In conjunction with the Project, the West Gate will be relocated approximately 25 feet to the west (measured between the centerline of the existing and proposed driveway locations) and the westernmost driveway (located 50 feet west of Belknap Street) will be widened to 20-feet. The improved western driveway will serve as the vehicular access to the CAC and the associated parking area that is to be constructed to the west of the CAC building.

EXISTING CONDITIONS CONTEXT

Roadway Geometry and Accommodations

The Concord Academy campus is situated along the north side of Main Street (Route 62), which is a two-lane roadway that is functionally classified as an urban principal arterial roadway and traverses Concord Center in a general east-west alignment. In the vicinity of the campus, Main Street is approximately 40-feet in width and provides two 11± foot wide travel lanes separated by a double-yellow centerline with on-street parking along both sides of the roadway except where otherwise restricted. A sidewalk is provided along both sides of the roadway, with marked crosswalks provided at the following



intersections: Main Street/Sudbury Road, Main Street/Concord Academy East Gate, Main Street/ Academy Street, Main Street/Concord Academy West Gate, and Main Street/Belknap Street. Formal bicycle facilities are not provided, with bicycles accommodated in a shared traveled-way condition (i.e., motor vehicles and bicyclists sharing the roadway). The posted speed limit along Main Street in the vicinity of the Project site is 30 miles per hour (mph). Public transportation services are not currently provided along Main Street. Concord Station on the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail system (Fitchburg Line) is located within an approximate 7-minute walk (0.3 miles) of the Concord Academy campus. Land use in the vicinity of the Project site consists of Concord Academy, residential and commercial properties, the Concord Free Public Library, and areas of open and wooded space.

Motor Vehicle Crash Data

A review of the MassDOT high crash location database for roadways and intersections proximate to the Project site indicates that the Main Street corridor between the Concord Free Public Library and Monument Square and Walden Street between Main Street and 69 Walden Street are included on MassDOT's Highway Safety Improvement Program (HSIP) listing as high bicycle crash cluster locations for 2010-2019. MassDOT defines a HSIP eligible cluster as: "...one in which the total number of 'equivalent property damage only' crashes are within the top 5% in the region." The Equivalent Property Damage Only (EPDO) index is a method of combining the number of crashes with the severity of crashes based on a weighted scale, where a property damage only crash is worth 1 point and injury and fatal crashes are worth 21 points. Designation as a HSIP location allows for MassDOT to prioritize funding for safety-related improvements in a specific region of the state.

PROJECT-GENERATED TRAFFIC

As stated previously, the Project will not result in an increase in the number of faculty, staff or students, and the new performance space will be smaller than the existing auditorium (which will be repurposed for all-school meetings and assembly's). The addition of the CAC will afford opportunities to improve the campus environment by enhancing circulation and reallocating space within campus buildings to better accommodate students, faculty and staff. Accordingly, the Project will not result in a material increase in traffic or parking demands over that associated with current campus activities.

When special events are scheduled at the campus, they are typically scheduled in the evening or on weekends when traffic volumes and parking demands are lower. This will not change with the construction of the CAC.

PARKING

In order to accommodate the Project, parking and circulation within the campus will be modified. The net impact of these changes will be a reduction in the number of parking spaces within campus from 204 parking spaces to 147 parking spaces, or a reduction of 57 parking spaces. Section 7.7.2.1 of the Concord Zoning Bylaw² requires that 1.0 parking spaces per staff member be provided along with 1.0 parking spaces per five (5) students. Assuming 155 staff occupying the campus at peak and a population of 400 students would require that a total of 321 parking spaces be provided to comply with the Zoning Bylaw. The Zoning Board of Appeals previously granted a reduction of 107 parking spaces from the

²One (1) parking space per staff member is required, plus 1.0 parking space per 5 students.



number of parking spaces required for the campus under the Zoning Bylaw. Concord Academy is requesting an additional 10 spaces of relief, resulting in a parking requirement of 204 parking spaces under the current Zoning Bylaw.

A parking demand study was conducted in April 2022³ in order to define the current parking demands of the campus and the availability of public parking in the area to off-set the on-campus parking that will be removed to accommodate the Project (57 parking spaces). This study indicated that during the peak parking demand period (12:00 PM on Wednesday and Friday), 171 of the 204 on-campus parking spaces were occupied (approximately 84 percent), with 33 parking spaces available (open). The average observed parking occupancy was found to be 76 percent, or 155 of the 204 on-campus parking spaces. The study also identified that there are 111 on-street public parking spaces along Main Street and Academy Lane between Sudbury Road and Thoreau Street that can be used to accommodate all or a portion of the 57 on-campus parking spaces that will be removed as a part of the Project. During the peak parking demand period (12:00 PM on a Tuesday and a Thursday), 85 of the 111 on-street parking spaces were found to be occupied (77 percent utilization) with a reserve of 26 parking spaces. The average on-street parking occupancy was found to be 56 percent, or 62 of the 111 on-street parking spaces occupied. A prior parking demand study conducted by VAI for the Concord Free Public Library in April 2019⁴ that included a larger area identified that there are 759 public parking spaces located within an approximate 5-minute walking distance of the Concord Academy Campus (including the 111 on-street parking spaces that were identified in the April 2022 parking study), of which over 240 parking spaces were found to be available between 7:00 AM and 7:00 PM on both a weekday and a Saturday.

A reserve parking plan has also been developed for the campus that would replace the 57 parking spaces that will be removed as a part of the Project. This plan would create additional parking areas in the western portion of the campus. In order to implement this plan, additional tree removal and creation of additional impervious surface would be required. Based on the results of the April 2022 parking demand observations and as evidenced by the April 2019 parking study conducted by VAI over a larger area, there is sufficient available on-street parking to accommodate the parking demands of the campus during the peak parking demand period such that the construction of the reserve parking spaces is not necessary.

A Parking Management Plan has been developed for large campus events (i.e., family weekend, Admissions open house and commencement) that includes the use of off-street parking that is available at neighboring institutions when required to accommodate additional parking demands for major campus events. These larger events are typically scheduled in the evening and on weekends when traffic and parking demands are lower. These events are coordinated with the community safety officer of the Concord Police Department.

SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the intersections of Main Street with the relocated West Gate and the reconstructed (widened) west driveway in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)⁵ requirements. Both stopping sight distance (SSD) and intersection sight distance (ISD) 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

³*Concord Academy – West Campus Parking Overview*; Dewing Schmid Kearns; July 28, 2022, revised August 18, 2022.

⁴*Parking Demand Assessment, Concord Free Public Library Expansion – 129 Main Street, Concord, Massachusetts*; VAI; April 10, 2019.

⁵*A Policy on Geometric Design of Highway and Streets, 7th Edition*; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.



striking an object in its travel path. 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 oncoming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 1 presents the measured SSD and ISD at the subject intersections.

Table 1
SIGHT DISTANCE MEASUREMENTS^a

Intersection/Sight Distance Measurement	Feet		
	Required Minimum (SSD)	Desirable (ISD) ^b	Measured
<i>Main Street at the Relocated West Gate</i>			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	250	--	500+
Main Street approaching from the west	250	--	500+
<i>Intersection Sight Distance:</i>			
Looking to the east from the Relocated West Gate	250	335	250+ ^c
Looking to the west from the Relocated West Gate	250	390	250+ ^c
<i>Main Street at the Western Campus Driveway</i>			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	250	--	500+
Main Street approaching from the east	250	--	500+
<i>Intersection Sight Distance:</i>			
Looking to the east from the Western Campus Driveway	250	335	250+ ^c
Looking to the west from the Western Campus Driveway	250	390	250+ ^c

^aRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018; and based on a 35 mph approach speed on Main Street.

^bValues shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.

^cWith the removal of one (1) parking space on either side of the driveway or the restriction of parking within 20-feet.

As can be seen in Table 1, with the restriction of parking with 20-feet (approximately one (1) parking space) on either side of the relocated West Gate and the reconstructed west driveway, the available lines of sight to and from the intersection of these driveways with Main Street will exceed the recommended minimum sight distance to function in a safe manner (SSD) based on a 35 mph appropriate approach speed along Main Street, which is 5 mph above the posted speed limit approaching the driveways (30 mph).



SUMMARY

VAI has completed an assessment of the traffic impacts associated with the proposed construction of the Centennial Arts Center (CAC) within the Concord Academy campus located at 166 Main Street (Route 62) in Concord, Massachusetts. Based on this assessment, we have concluded the following with respect to the Project:

1. Given that the Project will not result in an increase in the number of faculty, staff or students, and that the new performance space will be smaller than the existing auditorium (which will be repurposed for all-school meetings and assembly's), ***the Project will not result in a material increase in traffic or parking demands over that associated with current campus activities;***
2. When special events are scheduled at the campus, they are typically scheduled in the evening or on weekends when traffic volumes and parking demands are lower. This will not change with the construction of the CAC;
3. The reconfiguration of the parking lots within the campus to accommodate the Project and the associated reconstruction of the westernmost campus driveway and relocation of the West Gate will serve to disperse trips between the two driveways, with the western driveway to serve as the primary vehicular access to the CAC. The off-set between Belknap Street and the reconstructed western driveway will be approximately 50 feet, which meets the recommended off-set distance between intersections for the posted speed limit along Main Street (30 mph);
4. The construction of the Project will result in a reduction in the number of parking spaces provided within the Concord Academy campus, from 204 parking spaces to 147 parking spaces. Parking demand observations performed within the campus indicate that with the reduction in parking, a potential parking deficit of 24 spaces may exist during the peak parking demand period to accommodate actual observed parking demands within the campus;
5. The number of parking spaces that will be provided is 57 parking spaces below the number of parking spaces requested under the Concord Zoning Bylaw for the campus with consideration of prior relief that has been granted (321 parking spaces are required, 204 parking spaces have been requested);
6. Based on a review of parking demand studies that have been conducted of public parking located within an approximate 5-minute walking distance of the campus, there are over 240 parking spaces available between 7:00 AM and 7:00 PM on both a weekday and a Saturday to the extent necessary to accommodate additional campus parking demands, which exceeds the 24 additional parking spaces necessary to accommodate the observed peak parking demand and the number of additional parking spaces that are required by the Zoning Bylaw with the granted relief (67 additional parking spaces are required); and
7. Lines of sight at the intersections of Main Street with the relocated West Gate and the reconstructed (widened) west driveway will meet or exceed the recommended minimum sight distance for safe operation with consideration of prohibiting parking within 20 feet of the driveways.

Based on these findings, it has been concluded that the Project can be accommodated within the confines of the existing transportation infrastructure, and that there is more than sufficient available parking within a reasonable walking distance of the Project site to accommodate the addition of the CAC to the Concord Academy campus.

