

3. Alternatives Analysis

Original Site

The existing John Pierce School site is a very tight site at the heart of Brookline Village, it is a critical part of an important civic space for the Town. In addition to the school, the area contains a commercial strip, the Brookline Town Hall, the Brookline Public Library, and the Brookline Health Building. Well-connected to transit and pedestrian routes, the school has an unusually high number of students who arrive on foot but would benefit from pedestrian/traffic safety measures and more straightforward site circulation. Sidewalks and crosswalks do not correspond to “desire lines” for pedestrian circulation throughout the site. Due to the 27-foot grade change across the site and the design of the existing buildings and adjacent buildings, the entrances are confusing and very little of the site is accessible.

The Pierce School Playground is across the street and access to the Playground is by way of a narrow, inaccessible, and uninviting pedestrian bridge with stair towers at each end. There are several small but well-loved outdoor play and learning spaces on the existing school site.

With the significant grade change across the existing school site and a high proportion of impervious surfaces, design of stormwater management will be an important aspect of the site improvements as well as an opportunity for environmental education and programming. The site would also benefit from more plantings for shade, habitat, urban heat island mitigation, and visual respite.

There are no applicable wetland or flood plain delineations on either site. Localized flooding is due to poor drainage infrastructure and perched water. Site utilities are relatively well-documented and all required services are available.

Feasibility Study Given the limited availability of land in the Town of Brookline, the team reviewed building options on the existing school site and on the Pierce School Playground across the street. All other sites within the Town had been previously reviewed and rejected under a separate project for a potential 9th school that is detailed in the 9th School Alternative Site Study (November 2017-March 2018) that is available on the Town’s website <https://www.brookline.k12.ma.us/9thschool>.

Traffic

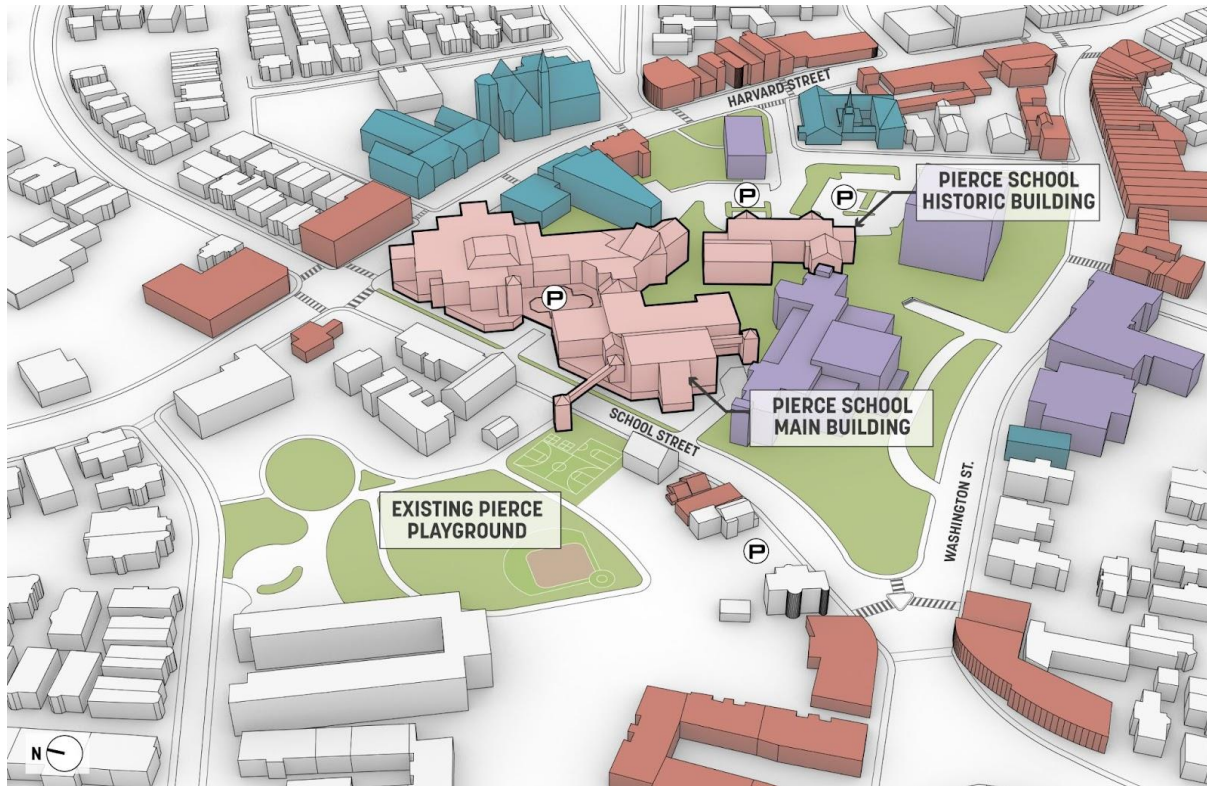
The proposed student population of the Pierce School (54 Pre-K plus 725 K-8 for a total of 779) is lower than historical population levels of the existing school (as high as 859), as the Town has just opened the new Driscoll School that can absorb some of the population in the buffer zones. The proposed parking space counts to be maintained or rebuilt in the proposed condition were to match existing counts. Therefore, there is no anticipated change in the traffic counts around the school area.

Timelines

This comprehensive analysis also projected environmental permitting scenarios and timelines for each site, ranging from 6-8 months to three years or more. Each site presented unique challenges and constraints, with considerations such as the Article 97 and MEPA processes for the existing Pierce School Playground.

Existing Pierce School Site - Renovation Only

In the Renovation Only scenario, the existing challenges and deficiencies within John Pierce School would persist and worsen over time. Without intervention, several critical aspects of the school's infrastructure and learning environment would continue to deteriorate, exacerbating the existing issues.



John Pierce School and Pierce School Playground

The John Pierce School is located in the heart of Brookline Village at 50 School Street and 32 Pierce Street. The original four-classroom Pierce School was completed in 1855 and remains the oldest functioning school building in Brookline and one of the oldest still in use in Massachusetts. In 1904, an addition was built onto the original building, expanding the school by eight classrooms. These 12 classrooms in the Historic Building continue to serve the school today as early elementary and middle school classrooms. In 1974, the Town finished construction of the Main Building (otherwise referred to as the 1970s building), which contains the remaining classrooms, library, cafeteria, and gymnasium.

The two buildings are on a very tight, steeply sloping parcel of land, totaling 138,055 SF with a site grade change of approximately 27 feet from north to east and 10 feet from north to south along School Street. The Town Library, Town Hall, and privately owned commercial buildings surround the east and south sides of the site. The playground, owned and operated by the Town of Brookline Parks & Open Space division, is located across School Street and students access the playground via a non-ADA compliant footbridge. The playground was renovated in 2016 and consists of 67,665 SF of dedicated active (little league field, basketball court, playground areas) and passive (natural grass and trees) play space.

The 1970s Building is located on the northwest side of the site, tightly bordering on Harvard and School Streets and tucked back behind the Historic Building on Pierce Street to the east. There is a long path from the surface parking lots and drop-off loop at Pierce Street down one level to the main entrance on the east side of the 1970s Building at Level 1. There is an alternate west Level 1 entrance on School Street that is perched up above the parking garages. Thus, the 1970s Building and its entrances are disconnected from all three streets.

None of the entrances are accessible. A ramp was added to the back of the historic building to provide a partially compliant path to and from the play area behind the building. There is no elevator, so neither the basement nor the second floor is accessible. Given the lack of natural light and the quality of the space, the basement is solely used for storage.



Historic Building - Viewed from the East



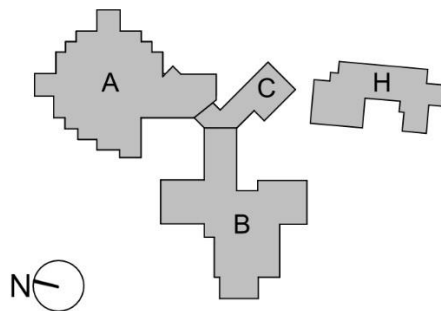
Historic Building - Viewed from the North - Amphitheater



Main 1970s Building - Viewed from the West



Main 1970s Building - Viewed from the East



Key Plan (1970's building - Units A, B, and C. Historic Building - H)

Considered a model example of the open-space design popular in the 1970s, the 1970s building consists of three wings or units (A, B, and C) over a parking garage. Its interior has a combination of brick and concrete masonry unit walls, exposed concrete structure, and exposed piping, with primarily carpet on the floors. Unit A has open classrooms centered around a two-story library/resource center, which encourages collaborative teaching and has proven to be an effective learning environment for an innovative and challenging academic program for grades 1-5. Given their middle school format and teaching such different content in each classroom, the limited number of enclosed spaces has a more significant impact on grades 6-8. They have such a negative response to the open format, that they now schedule grades 6-8 all around the buildings in an attempt to schedule them into only enclosed rooms. For all grades, the design, materials used, space, layout, and many lofts have proved to be challenging acoustically, are difficult to maintain, and many portions are inaccessible.

*Unit A Library**Unit A Open Classrooms*

Circulation between the parts of the building(s) are quite circuitous. Units A, B and C are only linked by a central, mostly unoccupied, extended corridor, ramp, and stair area that surrounds a courtyard. This zone significantly extends travel time between classes and makes the building areas feel disconnected. Given the density of the concrete construction, neither wing A nor B nor this circulation area take advantage of the courtyard.

*Central Ramp Area off Courtyard**Unit C Half Levels*

Unit C is a series of six half levels and only shares level 2 with units A and B. Thus, unit C is even more disconnected from the rest of the school. To get from level 1 in either unit A or B to unit C's level 1, one must travel across the level 1 floor plate, then up one floor, back across the level 2 floor plate, and back down one floor. Alternatively, one can travel outside and up a significant grade change and/or flight of stairs.



Unit C Circulation Between Levels



Connection from Unit C to Historic Building

Similarly, to get to the historic building, one must travel even farther down to the lowest level of unit C, across to the unoccupied basement of the Historic Building, and then back up one or two levels to the classrooms. Alternatively, one can travel outside from the main entrance of the 1970s building to the north entrance of the Historic Building. And to get to the 8th grade classrooms below the parking level of the Main Building, one must travel a significant distance outside along an inaccessible route.

There simply isn't enough occupiable space within the existing building to house the proposed educational program. And the nature of its concrete and CMU bearing wall construction does not allow for necessary modifications to teaching space sizes to meet the program requirements. And it would take up almost as much floor space to provide lifts to the various loft areas to make them accessible, as the loft spaces contain. Therefore, accessible routes to the loft areas were not feasible.

As full accessibility would have been required, the many small lofts in the 1970s building could only be used cost and space effectively as MEP/FP space. It is assumed that elevators and lifts would be added to access the many levels in Unit C, the historic building, and the program space at and slightly below the parking level. All of the existing parking area below is needed by either the Town or the School staff and cannot be renovated into net program space. Therefore, even with reconfiguration, the net usable program space available in both buildings is only about 75% of the total proposed program and the Renovation only option was eliminated in the Preliminary Design Program phase of the MSBA process.

New and Addition/Renovation Options

After the Renovation Only option was reviewed, four overall options were considered, three on the existing Pierce School site and one on the Pierce School Playground. All had a renovated or rebuilt parking garage below.

- Existing Pierce School Site - Options 1, 2, and 3
 - Option 1, a major renovation of 1970's wings A and B and historic building H, with an addition at the existing school site.
- Option 2, a major renovation of 1970's wing A and historic building H, with an addition (with renovated 'a' or new 'b' garage) at the existing school site.
- Option 3, a mostly new building (with renovated 'a' or new 'b' garage or new lower 'c' garage) on the existing school site, including renovation of the historic building H. Option 3b was further differentiated to include sub-options:
 - "3b-H" where the historic building H was renovated as part of the Pierce School, and
 - '3b', where the historic building H was renovated for another non-Pierce School use.

Pierce School Playground Site

Option 4, a new building on the Pierce School Playground site.

Existing Pierce School Site - Options 1, 2, and 3

Options 1, 2, and 3 were all on the existing Pierce School Site. They included various levels of removal and replacement of the wings of the existing 1970s building over parking garages.

As a previously developed, mostly hardscape site, the existing Pierce School site had the least permitting impacts. In addition to approvals from Town of Brookline Planning, Zoning, and Building, the following permits are required:

- Town of Brookline Department of Public Works Site Plan Review
- NDPES Construction General Permit (CGP)
- NDPES Dewatering and Remediation General Permit (DRGP)

The three options reviewed at the existing school site included:

The three options all shared the following advantages:

- They could meet the proposed Initial Space Summary and would solve some of the existing building's circulation and open classroom issues.
- As more and more of the existing building was replaced, they could better meet the relationships required amongst the Educational Program elements.
- As more and more of the existing building was replaced, the architectural presence of the school would be enhanced.
- They fit in with the scale of the existing adjacent public and commercial buildings.
- They maintained the use of the property as a school.
- They took advantage of the shared surface parking, drop-off loop, and receiving of the adjacent buildings.

Options 2 and 3 would have had a positive impact on the neighborhood, as they would consolidate the school and expand the available public land area and civic connections.

They all shared the following disadvantages:

- Having to remove the students from the site during construction. Fortunately, Brookline has the Old Lincoln School and the Fisher Hill property that, when combined, can accommodate the existing school population for the duration of the Pierce School construction.
- Loss of the lower parking area for Town Hall staff during construction.
- All were constrained by the tight site and neighboring properties. Though, less constrained than a new building on the Pierce School Playground site.

They are discussed in more detail under Section 2 - Design Stages.

Pierce School Playground Site - Option 4

The Pierce School Playground was considered in the Preferred Schematic Report submission to the MSBA on 12/28/21 as a possible location of the proposed Pierce School along with many options at the existing school site.

In examining the Pierce School Playground site, it became evident that permitting for a new school building on that site would require significantly more permitting. At a minimum, it would require the following permits:

- Town of Brookline Department of Public Works Site Plan Review
- NDPES Construction General Permit (CGP)

- NDPES Dewatering and Remediation General Permit (DRGP)
- Article 97 Permanent Disposition

Significant portions of the Pierce School Playground were perpetually protected under Article 97, necessitating the disposition of such protected land through a 2/3 vote of the Massachusetts legislature for its release. A land swap would have been required with the existing Pierce School site, as no other sites were available in Town. But with the significant grade change and size of the school site, it was not feasible to be officially conserved for no net loss of park/greenspace.

- MEPA
 - Expanded environmental Notification Form (EENF)
 - Draft and Final Environmental Impact Report (EIR)

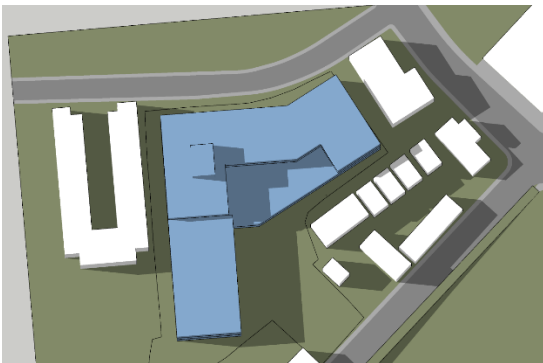
Unlike the existing school site that utilizes the public parking areas and drop-off loop for drop-off and pick-up traffic, as well as visitor parking, a school at the park site would have required a separate drop-off loop, as well as visitor parking and garage access, further reducing the available buildable and landscaped areas. There would have been no room for an at grade play space.

The primary street access would have remained on School Street to retain pre and post-development traffic patterns on the neighboring streets. Though, it was likely that building on the Pierce School Playground site would drive some informal pickup/drop-off traffic and street parking onto the smaller Harvard Avenue to the north, with a negative impact on this residential street.

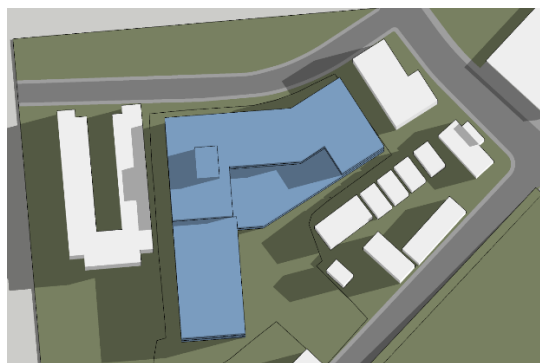
The Pierce School Playground has very little frontage on School Street, as the site is mostly surrounded by residential properties. A school on this site would have had limited opportunity for architectural or civic presence in the neighborhood, especially along School Street. The limited street frontage would have been compounded, if this narrow frontage would have needed to be shared with a garage access lane. Service and fire access would have also been complicated on this site, either taking up the remaining street frontage on School Street or being pushed to Harvard Avenue.

The Pierce School Playground site has more development restrictions, due to its zoning as M-1.0 (Apartment). To fit the program, Option 4 would have been a high-density building inserted into this low-rise, residential neighborhood. Though a four-story new building over a recessed garage would have generally fit in with the height of the neighboring building to the south, it's overall mass would have been out of scale with its neighbors.

The Pierce Playground residential neighbors are used to having views into and direct access to the well-loved park in their backyard. The playground was recently renovated in 2016 and the park site includes many large canopy trees, which are highly valued by the community. There would not have been neighborhood support for this option.



Shadow Study Morning



Shadow Study Evening

The massing of Option 4 would have cast significant shadows on the residential neighbors to the west in the mornings, to the east in the afternoons, and to the north in the winters. It is unlikely that the neighborhood would have supported this development, including the necessary support for potential zoning relief that would have been required.

Option 4 would have had the greatest civil-engineering impact as it would have required all new utilities connections.

Building a new school building on the Pierce School Playground site had the one advantage that the students and staff could have remained on the existing school site throughout the construction of the new school building. However, the Town would have lost the use of its local park for 3-4 years, depending on the growing seasons required for the final park.

Option 4 could have taken up to an additional 2 years to begin construction, due to the Article 97 approval process associated with building on the Pierce School Playground site.

Option 4, a new school building at the park site, was eliminated for the following reasons:

- The new school building would be too disconnected from any program elements remaining in the existing historic school building.
- The significant extended regulatory process of the land swap.
- The diminished quality of a park that could be built on the existing school site –
- The negative neighborhood impact of losing the park inside the existing block.
- The negative impact on the proposed educational program, due to the tighter site requiring an additional story (ie. four-story rather than three-story school building over parking garage).
- The drop-off loop would have had to be re-built within the park site.
- The negative impact of an oversized building being out of scale with the buildings on the abutting properties, blocking their views, and casting significant shadows to the west and east.
- The longer Article 97 impact.

This was the most-costly option. Ultimately, Option 3b-H New Building Connected to Renovated Historic Building on the existing school site was determined to be the preferred option. Therefore, the proposed school building will have no direct impact on the park. **Pedestrian Bridge/Overpass Options.**

The Pierce School Playground impact was also discussed around possible pedestrian overpass/bridge options between the proposed school and the park versus possible street closure or modification to improve the safety of the street crossing for students and staff.

Given the height requirements for a new bridge over School Street, any pedestrian bridge floor would have to be set at approximately 58'. An accessible route was achievable to the higher school side. But the grade at the park is only at approximately 36', so the park end would have to traverse 22' of grade change. Six options were studied:

- Study 1 – Elevator and Exterior Stair
- Study 2 – Tight Switchback Ramp (oriented north-south)
- Study 3 – Tight Switchback Ramp (oriented east-west)
- Study 4 – Gentler Switchback Ramp (oriented north-south)
- Study 5 – Elevator and Interior Stair
- Study 6 - Vehicular Tunnel Beneath School St. Crossing

The options each shared many of the following concerns:

- Too much impact on the open space of the park,
- Related Article 97 impact
- Limited access times to elevator due to school control,
- Difficult maintenance of elevators, open stairs, and open ramps
- Perceived inconvenience of using a bridge,
- Overall safety concerns relative to a public elevators, walkways, and stairs accessed from the exterior off-hours,

- Ramps too long/cumbersome,
- Costs excessive,
- Costs would not be reimbursable by MSBA,
- The bridge would have to be open to the elements or the MSBA would consider it as part of the already tight maximum grossing factor of 1.50 for the new building.
- Safety concerns if the bridge were open to the elements.
- Added transition times
- Basketball court would have to be relocated,
- Encroachments on side setback or on ball field,

And one added the following concerns:

- Rework of all utilities in School Street, if even feasible,
- Too much impact on School Street vehicular access points for receiving and neighbors.

Ultimately, it was decided that none of the pedestrian bridge options were viable and that a raised pedestrian crossing at grade with a traffic light was preferred. The removal of the existing bridge stair tower on the park side will slightly increase the open space at the east edge of the park. And the new at grade crossing will enhance access to the park and its civic connection to the school and town buildings.

Construction Logistics.

The basketball court area of the park was considered for lay down area for the primary construction in early logistics drawings. This area is no longer being considered for laydown. Therefore, the basketball court will only be impacted by the installation of geothermal wellfield piping.

HVAC Systems.

Three HVAC systems were analyzed for the proposed building. See HVAC System Narrative and Life Cycle Cost Analysis that were item 4.1.2.9.4 of the MSBA SD submission, available on the Pierce School Project website. Initially during schematic design, Option 2 high efficiency water-to-water source heat pump chiller plant with dry cooler and a supplemental electric hot water boiler plant was selected due to its lower up-front costs and payback timeframe:

Due to having to value engineer \$20 million dollars out of the original schematic design estimate, Option 3 high efficiency water-to-water source heat pump chiller plant with closed-loop geothermal wells was carried as an add alternate, due to its lower carbon emissions, lower annual energy cost, ease of maintenance, and durability.

Ultimately, similar to the Driscoll School, on 9/28/22 the Select Board voted to amend the budget and incorporate geothermal wells at the Park into the base project and it was approved at Town vote on 5/2/23 and Town Meeting on 5/23/23.

Wellfield Location Options.

Given the tight existing school site and numerous underground garages, there were only three possible locations for the geothermal well field. A Geothermal Feasibility Study was performed analyzing the following options:

- Option 1 - Under the Pierce School Playground
- Option 2 - Under the New Pierce School Building
- Option 3 - Under the Pierce Street Drop-off Loop (eliminated due to available site area)

Initially, the report identified Option 2 - Under the New Pierce School Building as the most cost-effective

location, but that study was only focused on the geothermal contractor scope. Further overall project impacts were considered and it was determined that Option 2 was not an acceptable option for the Pierce School Project, due to the following:

- Space limitations - 11' to 16' footings spaced 24' to 28' feet on center, and 12" minimum requirements for clearances/soil coverages of geothermal pipes left very limited space for the wells and extensive piping.
- Increased Logistical Impact - Sequencing of subcontractors and restricted access for the site contractor hamper smooth earthwork operations.
- Protection of geothermal system during construction - Protection of the geothermal well heads and piping during construction of the footings would be very difficult. Despite best efforts to protect the system, there would still be risk of damage by the concrete and site contractors.
- Schedule - 5-month extension to the project schedule
- Costs - Related fees and added logistics and coordination costs, as well as escalation due to the extended schedule, made the location under the building approximately \$720,000 more expensive than at the park.
- Future Access - There would be no access for replacement of the wells in the future.
- Risk – Significantly increased overall risk to the Town.

Therefore, Option 1 - Under the Pierce School Playground scope and schedule impacts were included in the final scope and schedule that were voted on by the Select Board, Town vote, and Town Meeting vote.

The same permits are required for the proposed geothermal wellfield under the Pierce School Playground site. Though, only a temporary disposition of the surface and a permanent disposition of the subsurface soils from 5' to 600' below grade at the location of the geothermal well system itself. Therefore, the limited scope is anticipated to lessen the MEPA and Article 97 processes. We will be seeking a waiver of the land swap, as there is no net loss, only improvements to the ballfield area of the Pierce School Playground.