4.1 SCHEMATIC DESIGN REPORT

4.1.2 Schematic Design Binder

4.1.2.1 Introduction

Summary of Preferred Solution

Since submitting the PSR to MSBA in July 2018, the Owner, Design Team, and Owner's Project Manager have further developed the preferred alternative of a new high school serving grades 9-12 located on the existing 22-acre high school site. The new building will be 411,360 SF, consisting of four wings connected to a central spine. The wings consist of a four-story STEAM building, a five-story Humanities building, a two-story Performing Arts wing, and a two-story Athletics wing. The central spine includes the cafeteria and library learning commons. Additionally, a one-story toilet facility to serve the sports fields is 1,790 SF. The Arlington High School Building Committee voted its approval for this alternative at its June 26, 2018 meeting.

The District's preferred solution is Alternative 6A, all new construction on the existing high school property. The new building will be constructed in three phases plus a fourth phase for site development. In summary the alternative was chosen for the following reasons:

- Supports the educational vision
- Provides a strong alignment with guiding educational principles for the project
- Is the second least expensive option to construct and likely the least expensive to operate
- Constructing on part of the front green shortens construction time and creates swing space, minimizing disruption to the school operations during construction and the need for modular classrooms
- Maintains some of the front green
- The new building affords more opportunity for sustainability and offers the highest potential to achieve the Net Zero goal by incorporating rooftop solar panels and the potential for geothermal
- Performing Arts located in the front of the building on Mass Avenue provides more direct community access
- Core educational wings are both in the front and back of the building
- Gym is directly accessible to the fields
- Provides design for good community use of the building
- Minimizes soil contamination issues
- Provides ample and varied access to exterior green space
- New construction eliminates unexpected costs that can occur in the renovation of older buildings
- New school will provide iconic identity for AHS

In short, alternative 6A is the most educational sound and fiscally responsible solution for the Town of Arlington and the MSBA.

Overview of Community Process Undertaken

- Arlington High School Building Committee's open meetings occurred minimally twice per month throughout SD
- AHSBC's Sustainability (& MEP) Subcommittee, Finance Subcommittee, and Communications Subcommittee met regularly throughout SD
- Three Community Forums were held at Town Hall all are available for replay at http://acmi.tv/ahs-building-project/
- Two High School building tours were conducted
- Town-wide questionnaire was implemented
- AHSBC website was continually made current, all material generated were posted on the website along with an active question and answer page

- AHSBC members generated informational articles for inclusion in the Arlington Advocate newspaper and online at Wicked Local
- AHSBC communications teams presented at each elementary school, middle school, and at the senior center
- The design team met with police, fire, DPW, and other town departments
- AHSBC e-Bulletin was sent minimally once per month to over 800 subscribers
- AHSBC Facebook page provided continual updates throughout SD
- AHSBC provided a brief printed update at the Special Town Meeting on December 5, 2018
- Community event with True Story Theater was held
- AHSBC participated at Arlington Town Day with a booth to educate and inform the community about the project
- Approximately 103 community emails have been received/responded to

The Arlington High School Building Committee voted on the following criteria on the dates noted below:

- to proceed with CM at Risk on 12/04/18
- to approve the total project budget of $291,481,649 on 02/05/19
- to submit Schematic Design to MSBA on 02/19/19

District's Total Project Budget and Local Funding Process

The District's Total Project Budget is $291,481,649. See **Appendix A** for detail on this budget inclusive of the Total Project Budget spreadsheet and Budget Statement from the Town. The Arlington High School Building Committee has voted to support the submission of this project for approval by the MSBA. Upon MSBA's approval of a project scope and budget agreement, the Town will seek approval from Town Meeting for bonding and spending authority, at a Special Town Meeting which will start in May 2019. The Town will seek a debt exclusion override vote following Town Meeting in June of 2019.

Project Description

The proposed project is for all new construction of a 411,360 gross square feet high school, inclusive of Menotomy Preschool, LABBB Collaborative, and the District's Administrative Offices, to be located on the existing high school property. The high school property is approximately 22 acres. The high school will serve 1,755 students in grades nine through twelve, Menotomy Preschool serves 135 students, and the LABBB Collaborative serves 36 students. The Total Project Budget is $291,481,649. There are no alternatives proposed for this project. The construction delivery methodology will be Construction Manager at Risk.

See **Appendix B** for copies of the visual aids to be used in the MSBA Board presentation. These images are also provided electronically for MSBA's use.

See **Appendix C** for a copy of the MSBA PSR review and corresponding response documents.

4.1.2.2 Final Design Program

Architectural Characteristics

The desired architectural characteristics begin with the overall building parti. The parti is the organizing principle of the 400,000 plus square foot facility. The parti consists of a clear central spine off which each of the four wings connect. The central spine contains the cafeteria and the library learning commons and is the social/emotional/educational heart of the school. The central spine is key to providing clear, understandable circulation throughout the building which supports an ease of navigation for the student and visitor alike. Due in part to the unique building footprint, the school will be filled with natural light, every educational space and

corridor have access to daylight and views. The use of borrowed light (interior windows) supports the desire for extensive natural light and also provides thoughtful transparency between occupied (and unoccupied) spaces. This level of transparency will provide an ease of supervision as well as support collaboration between the occupants.

Overall the building needs to be welcoming to all and secure for its occupants. The two are not mutually exclusive. There are two main entry points, one to the south toward Massachusetts Avenue and the other to the north and the sports fields and access to Minuteman Bikeway. Upon entering at either location, one is immediately within the heart of the school building and able to clearly navigate to where one needs to go. The two main entries will be secured throughout the school day and be the controlled entry points, the rest of the building will be locked and not used to enter the building only to exit the building in a state of emergency. The main entries will have benches, bike racks, and plantings at each plaza creating a welcoming area to arrive to and/or hang out at.

The building's design will maximize the opportunities for connections to the outdoors with three courtyards, two plazas, and ease of connection to the sports fields. The outdoor spaces will be varied in size, scale, and materiality, and therefore in functionality. The courtyards will be secure throughout the school day, so students and teachers will be able to gather for teaching, collaborating, and socializing.

The building is designed as a sustainable facility to achieve the community's goal of being fossil fuel free in the future. Planning for extensive solar collectors and the use of geothermal wells to use the consistent temperature of the earth will support an all-electric building.

While the high school is to be an all-new building, several existing architectural elements will be reused and incorporated into the design to carry the history of the school facility forward. The exterior of the building will be primarily of brick masonry units with areas of accented material that will serve to "break down" the large mass of the building and to highlight specific programmatic areas. At the Mass Avenue entry new columns will be designed to highlight the entry and to be reminiscent of the original school while not being an exact replica. Instead, the history of the existing Collomb House façade will be remembered at the large courtyard façade with a graphic representation on the four-story glass façade. Additionally, the Fusco building stone pilasters and entry details will be relocated to inside the building along the central circulation spine. Other interior elements to be reused are the panel of intricate wood carving at the 1914 Fusco stairs and the River of Hands mosaic mural done specifically for the high school by a local artisan.

Both the interior and exterior of the school will support school spirit, allowing for areas of display of student work, vibrancy of color, and comfortable, varied furniture throughout for gathering and collaborating.

Schematic Design Educational Space Summary

See **Appendix D** for two signed copies of the updated **Educational Space Summary** and **Designer Certification**.

Below is the narrative description of all changes and the reasons for any variation, by Space Summary category, since the Preferred Schematic Report submission.

- **Core Academic**: The core academic spaces are over the PSR value by 980 square feet due to minor adjustments resulting from building design efforts. Of note, the PSR provided for 10 Teacher Planning rooms of equal size totaling 6,000 SF; upon coordinating closely with the school administration, it was deemed appropriate to provide various size planning rooms distributed throughout the building to accommodate the academic departments. The sizes vary because the academic departments vary in size/ number of teachers. Additionally, small offices for department heads have been planned for. Some Science Prep Rooms are combined when they occur between two Science Classrooms, otherwise the overall square footage of Prep Rooms remains the same as in the PSR submission.

- **Special Education**: The special educational spaces have decreased by 70 square feet due to minor adjustments resulting from building design efforts. Of note, the PSR provided for six equal size Academic Support spaces, but it has been deemed advantageous to have varying sized spaces for varying sized groups.

- **Art & Music**: The art and music spaces are the same as in the PSR. Two Art Storage rooms have been combined when located between two Art Classrooms. A portion of the square footage allotted for the Performing Arts Classroom is now located in the Performing Arts Control Room. The single 1,000 square foot Music Instrument Storage has been divided into two spaces of 500 square feet for flexibility of use and access.

- **Vocations & Technology**: The vocational and technology spaces are the same as in the PSR. A portion of the square footage allotted for the Discourse Lab is now located in the D. Lab Technology, a space just off the central spine to serve technology needs.

- **Health & Physical Education**: The health and physical education spaces have increased by 2 square feet since the PSR submission due to minor adjustments resulting from building design efforts.

- **Library Learning Commons**: The library learning commons aligns in size with the PSR space summary. The majority of the main library space is located on the third floor and there is a smaller portion located at the fourth floor titled Upper Learning Commons.

- **Auditorium/ Drama**: The auditorium/ drama education spaces align in size with the PSR space summary. The Auditorium Storage is now two spaces, in two locations instead of one and the total is slightly higher than at the PSR submission. The Dressing Rooms are slightly lower by 10 square feet each and the Controls is slightly lower by 20 square feet.

- **Dining & Food Service**: The dining and food service spaces have increased by 2 square feet since the PSR submission due to minor adjustments resulting from building design efforts.

- **Medical**: The medical spaces align in size with the PSR submission. Upon layout of the nurse's suite it was deemed appropriate to provide more square footage to the Nurse's Office/Waiting Room and less to the Resting area while still providing space for six cots.

- **Administration & Guidance**: The administration and guidance have increased by 217 square feet since the PSR submission due to minor adjustments resulting from building design efforts and the addition of two secure entry receptions located at each of the main entries. Currently the school has one main entry/reception point that is in the main lobby, two will be required in the new building.

- **Custodial & Maintenance**: The custodial and maintenance have increased by 18 square feet since the PSR submission due to minor adjustments resulting from building design efforts.

- **Other**: There other section has reduced from 36,855 square feet to 29,365 square feet, a reduction of 7,490 square feet. The Town was able to relocate the Town IT and Town Facilities to the DPW property, which is undergoing a planning process for upgraded facilities. The Town's Comptroller will be relocated to Town Hall. A portion of the Town Payroll will be relocated to Town Hall, while the remainder will stay at the high school and be co-located with the District Administration to continue the seamless operations since the majority of the town's payroll is for the school personnel. There have been numerous adjustments and reductions to the District Administrative spaces to accommodate Payroll. Additionally, several "district" personnel specifically serve the high school population, including the SRO (student resource officer), the Court Liaison/Diversion Coordinator, the METCO Director, the ELL Director, and one IT Coordinator, and as such they are located within the high school.

The Menotomy Preschool program has increased by 140 square feet since the PSR submission due to minor adjustments resulting from building design efforts. Of note, the Mail and Copy spaces are now two separate spaces and the Preschool Supply Storage has been divided into three separate spaces. Per the Massachusetts Building Code, the new school is designated as a high rise and as such requires a Fire Command Center and Fire Pump Room. (As noted in a 4.1.2.9 of this report, if not for this designation the project would not require a fire pump.) These two spaces are not listed within the Other category.

- **Total Building Gross Floor Area:** The overall building has reduced from the PSR submission of 415,292 GSF to 411,360 GSF.

Proposed Project Meets the Educational Program Narrative

The key Guiding Principles are the educational priorities of the Educational Program will be met by the proposed design of Alternative 6A as follows:

1-Department Pods: the building has two distinct academic wings, one for STEAM and the other for Humanities. Each occupy four stories and each floor level aligns. As noted by the District "this will create learning neighborhoods of common interest".

2-Central Library Learning Commons: the library learning commons is located central to all programs both horizontally in plan and vertically. It is on the third floor and centrally located between the academic wings and the shared use wings. Within the library learning common the students will have access to technology in the Smart Center, research tools, gathering and break-out spaces, and the Learning Center for tutoring.

3-Specialized and Distributed Spaces and Technology: each department is programmed to have a specialized space for instruction, inclusive of CADD Lab, STEM Lab, Digital Arts Lab, Digital Production Lab, Language/Multi-Media Lab, Smart Center, Discourse Lab, and two Makerspaces. The Makerspaces and CADD Lab comprise an interactive suite and each of the other labs are distributed throughout the building adjacent to classrooms "to support the varied learning needs of students as well as authentic and personalized learning".

4-Safe and Welcoming: the building is designed with distinct entrances for the various programs, inclusive of the high school, preschool, LABBB Collaborative, and special education programs. The distinct entrances will enable the building to be welcoming to the various occupants. The building will be secured throughout the day after arrival at the two main access points for the high school and a main entrance for the preschool. All visitors will be required to check-in at one of these entries. The loading/receiving area will be secured and with the use of security cameras, deliveries will be announced and received by custodial staff.

The design provides welcoming facades at both the front that faces Mass Avenue and at the Fields side. This will provide a welcoming pedestrian access from Mass Avenue to those students and community members that arrive via MBTA, bicycle, walking or vehicular drop off, as well as a vehicular, bicycle, and pedestrian entrance from the Fields side to welcome the students and community that arrive from the north side. The entrances are designed with transparency (glazing), protective canopies, and seating areas.

The centralized "hubs" of the library learning commons and cafeteria will allow for supervised gatherings, while the auditorium and gymnasiums will provide space for all-school assemblies. Spaces for academic support, testing, specialists, special education coordinators, academic deans and the guidance suite are distributed throughout the school to support student's social-emotional wellbeing and to create a "design that fosters safe and welcoming" environment.

5-Access to Nature: the new building's layout provides for various outdoor teaching/learning/gathering opportunities including: the tree-line green along Mass Avenue, the entry plaza at the back of the site that is easily accessed from the Cafeteria to provide spill-out space for dining and provides a gathering area for after school

activities. There are two three-sided "courtyards" located to the west and east of the central circulation spine of the building. One is developed as an amphitheater and the other as a multipurpose space for outdoor learning activities including performing and visual arts projects; science and math experiments and enviro-garden; history, ELA, and world language classes and projects. And there is a courtyard directly adjacent to the cafeteria. These spaces will become areas for gathering during and after school and create opportunities to provide "social-emotional student support".

6-Ease of Navigation: the layout promotes ease of navigation by providing one central axis that extends south to north and therefore front to back of the school site. This central spine is easily accessed by the four wings that extend from it, two academic wings to the east and the performing arts and athletics wings to the west. The new building is similar in size to the existing school, but with a much more organized circulation and much lower net to gross square foot ratio, which will provide shorter "distance to travel between classes" plus "good traffic flow with minimal congestion".

7-Security – externally: the academic wings are easily able to be locked off from the central spine to secure unused portions of the building on nights and weekends. This will be especially useful should the school administration allow foot traffic from the front of the site to the back via the central axis. The spaces that are typically used afterhours, gymnasium, performing arts, library learning commons, and cafeteria, are easily accessed and able to be monitored from the central spine.

There are numerous building egress points that will enable efficient evacuation of the building in an emergency, including the Mass Ave and Fields side main entry points, direct exits out from the auditorium and gymnasium, direct access to grade via the stairwells, as well as egress out to the two three-sided courtyards. Once outdoors, the students and adults are able to move away from the building in a safe manner.

The school's main entries (Mass Ave., Fields side, and preschool entry) will only be unlocked during arrival and dismissal. Beyond these timeframes, the building will be fully locked. The high school will use both main entries throughout the day via a security system, inclusive of security camera, buzzed in entry, check ID and sign-in process. As mentioned above, deliveries to be received at the loading dock area will also make use of security cameras and check-in by the custodial staff.

8-Security – internally: the most important and effective tool for security is the ability for the adults to know the students, to this end Arlington High School operates within a house system. Each house is led by a dean. Each dean's office is located between a wing and the central circulation axis. There is a dean on each of the academic floors of the building at alternating wings. As stated in the Educational Program "house offices provide a social, supervisory, and organizational hub for students, teachers, and administrators".

The central spine has a high-level of transparency and will provide visibility throughout the school footprint. The students at Arlington High School are given agency and autonomy while still being under adult supervision will occur throughout. Knowing the students and increased interaction via the central circulation spine will enhance security.

9-School as Community Hub: each of the primary shared use program spaces are easily accessed from the exterior and interior of the new building and this will promote ease of community use. The performing arts is directly accessed from the Mass Ave main entry and the athletics spaces are directly accessed from the Fields side main entry. Also, the two program areas are easily accessed via the central spine. The central spine will double as the student art gallery, gathering place during and after school, and the "lobby" for before and after events.

The building is designed with attributes that support an open and welcoming environment such as transparent glazing to activate the street presence and engage the community, canopies and outdoor plazas to allow for lingering and conversation, and open-air courtyards for informal gatherings and activities. The school will continue

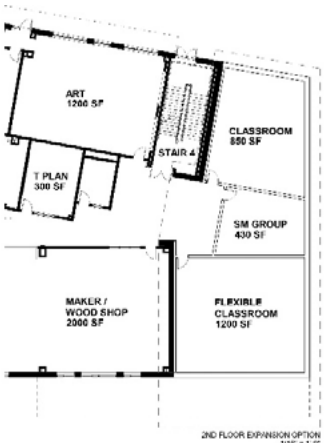
to be the main location for Arlington Community Education and as designed, the building will provide clear and easy circulation for the community to support its role as community hub.

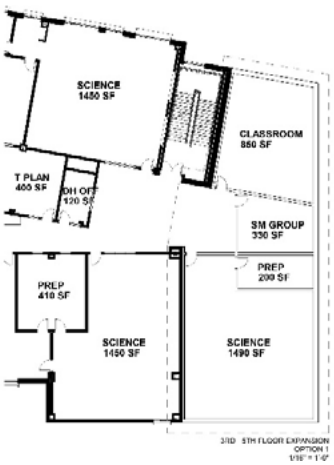
10-Aesthetic: the existing high school has provided an iconic presence for generations of Arlingtonians, the new design provides a new iconic presence, one that respects the past but is forward looking and reflective of the youth and energy and teaching and learning that will occur within the 21st century building. At the Mass Avenue entry new columns will be designed to highlight the entry and to be reminiscent of the original school while not being an exact replica. The history of the existing Collomb House façade will be remembered at the large courtyard façade with a graphic representation on the four-story glass façade. Additionally, the Fusco building stone pilasters and entry details will be relocated to inside the building along the central circulation spine. Other interior elements to be reused are the panel of intricate wood carving at the 1914 Fusco stairs and the River of Hands mosaic mural done specifically for the high school by a local artisan.

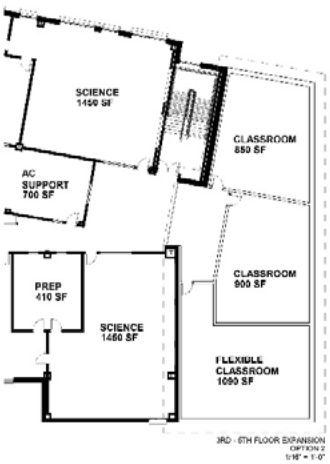
11-Sustainability: the school is planned for a future without reliance on fossil fuels. This begins with passive design. *Passive design* "is a building that responds to local climate and site conditions to maximize building users' comfort and health while minimizing energy use". The building siting provides for the ideal north-south solar exposure for the majority of the program spaces and nearly all academic spaces are at the perimeter and have windows for natural light and ventilation. The design includes maximizing the R-value of the building envelope inclusive of windows and insulation. The building is designed to be all-electric by making use of geothermal wells and extensive photovoltaic installations.

The building design has many outdoor access points and gathering areas to promote biophilia. "The *biophilia* hypothesis suggests that humans possess an innate tendency to seek connections with nature and other forms of life." The outdoor areas include the recreation of the science enviro-garden. The concept of "building as teacher" or building as a teaching tool is promoted by providing transparency of the building systems. Mechanical rooms will have borrowed lights, so occupants are able to see the inner workings of the systems, computer monitors will post energy use, and ceiling material will be eliminated (in portions of the building) to show the building's structure.

12-Expansion Potential: an important aspect of planning for the future is to identify where the school building may be expanded should student enrollment exceed the design enrollment. The expansion is planned for via an extension of the STEAM wing to the east at all four floor levels, which would provide a range of combinations of additional educational spaces from 4 science + 4 classrooms + 4 small group rooms to 4-1200 sf flexible classroom + 8 classrooms.







Existing and Proposed Instructional Technology

Arlington has been steadily expanding its use, access, and expertise in the use of instructional technology. Technology includes the range of digital information technology, digital fabrication tools, and traditional tools. Technology is transforming our ability to differentiate instruction, ability to engage students, ability to produce work, the nature of communication, and our ability to connect to learning beyond the school. Arlington believes in a style of learning that acknowledges that technology is always with us, so our new building must provide an environment that creates rich, flexible access to technology.

In spite of the aging facility, we have been expanding access to computers. Teachers have access to laptops, projection, connectivity, and increasingly robust network access. We have adopted a BYOD policy to encourage students to bring Chromebooks and laptops to supplement our school-provided classroom Chromebooks. At this point, there are roughly 100-120 devices per department, with a total of roughly 900 student devices. These are a mix of different generation devices. We have most recently focused on Chromebooks, with some departments using special carts (or tubs) of devices for particular purposes. We have piloted 1:1 classroom teaching in 9 classrooms, with more accessing the technology. Specialty carts, such as iPads for languages and laptops with science probes, have been obtained along with extensive training for the staff.

The result has been a rapid implementation of instructional technology and innovation among teachers and departments. All teachers make at least basic use of Google Apps for Education and Google Classroom. Most have moved their assignments, homework, and feedback largely online. As we distribute more classroom devices and see higher levels of BYOD, we have been transitioning one of our 2 legacy computer labs to the Library Makerspace (Smart Center). The spaces are still used by departments to supplement their mobile computing and to have better spaces for computer-based work with their classes.

As we move toward 1:1 computing in classrooms, we find a greater emphasis on specialized computer labs to achieve higher level goals, such as the STEM, CADD, Digital Arts, and Digital Production Labs.

Proposed configuration:

In the future, we envision fully wired classrooms with easy connectivity, interactive projection, robust Wi-Fi, and sound. Teachers need to have easy access to classroom devices to allow for 1:1 instruction. Classroom devices require easy storage, access, and charging. For advisory and communications, we want the ability to broadcast video to all classrooms. Student BYOD devices also call for robust Wi-Fi and furnishings that support the management of multiple devices.

We believe that AHS is ready to go beyond 1 to 1 meaning:

- Students often use more than one device
- A vastly robust and reliable wireless infrastructure
- Mobile and flexible access to technology
- Adaptable and flexible learning spaces
- A variety of devices for a variety of purposes

The value of information technology in developing citizens and learners is central in a digital age. Students must leverage existing and emerging technologies to thrive in the 21st century.

Functional Relationships and Critical Adjacencies

Arlington High School is designed with a four-story central spine that connects the two sides of the property (south to north) and the four wings of academic programs. The central spine is the academic and social hub of the school and as such includes the library learning commons and the cafeteria. The spine will act as the main circulation and gathering zone of the school. A reception desk and a school administrative suite is located at each of the main high

school entry points (Mass Ave and Field sides). The four wings that are accessed from the central spine include: STEAM, Humanities, Performing Arts, and Athletics. A distinct wing, separate but adjacent to the Humanities wing contains the Menotomy Preschool and District Offices, each with its own secure entry.

The STEAM wing is four stories, the first floor contains the Makerspace suite of rooms, including the CADD Lab, the Visual Arts classrooms, and Digital Arts Lab. The programs on this floor have direct access to the outdoors for expanded educational and maker space. The upper three floors of the STEAM wing include the Science and Math classrooms and the STEM Lab. The four floors of the STEAM wing align horizontally with the upper four floors of the Humanities wing. The Humanities wing includes classrooms for History/Social Studies, English Language Arts, and World Languages. The Debate and Discourse Lab and the Language Multi-Media Lab are located on the upper floors of the central spine where they are easily accessed by all departments. It is important that the academic floors align not only for ease of collaboration between the educational neighborhoods today but also for future program flexibility across disciplines.

There are four house deans and their offices are on alternating floors of alternating wings (between STEAM and Humanities) and near the central spine. This distribution and proximity allow for ease of supervision.

The Family and Consumer Sciences (FACS) classrooms are located at the lowest level of the Humanities wing and in near proximity to the Daycare, Menotomy Preschool, and Cafeteria, all of which are directly connected to the FACS culinary arts and early childhood education programs.

All Performing Arts programs are adjacent to one another and the Auditorium and the outdoor amphitheater. The Auditorium entry is off the central spine. All Athletics/Physical Education program and support spaces are adjacent to one another and with easy access to the outdoor sports fields. The main Gymnasium entry is off the central spine.

The Guidance and Nurse's suite are adjacent to one another for ease of communications to better serve the student population. Each are easily access from the Fields side entry inclusive of the vehicular or emergency pick-up zone. Additionally, the Nurse's location is near the Cafeteria, Gymnasiums, and sports fields, which are the more typical areas that a student may need medical attention.

All of the above noted functional relationships and adjacencies have informed the building the design and meet the program needs.

Security and Visual Access Requirements

The project team has met with Police, Fire and Inspectional Services. These officials were consulted in the planning process and all of their concerns to date have been addressed in the Schematic Design package. The design team will continue to have regular meetings with this group throughout design and construction of the new facility.

Particular District/project related items: as noted below, the project consists of the high school, preschool, and district administrative offices, each will be secured separately to provide a clear entry/egress process.

Main Entrance Design: during drop-off and pick-up, there will be two designated areas for the high school students to enter and leave the facility. Once drop-off is complete, all doors in the building will be locked. Visitors to the school will come to one of the two main entries where there will be greeted by reception. The building check-in will occur at the secure entry vestibules. The visitor will be buzzed into a secure vestibule. Inside the vestibule will be a teller-like window where the visitor can provide ID to gain access to the building or drop off items for students without having to enter the building. Adjacent to reception are school administration offices, the school principal is located at the Field side entry and the school assistant principal is located at the Mass Ave side entry. Menotomy Preschool's main administration offices are located at its entry enabling the same secure entry check-

in. In addition to visual inspection at the main entry doors there will also be access to remote camera viewing. Security cameras at the loading dock and District Administration entry will be viewed by administrative personnel to aid in the secure entry/access process.

Classroom Lockset Hardware: classroom locksets will have a locking feature such as a thumb push to secure the classroom from inside the space. This hardware will have a colored dial that illustrates that the door is locked from within the space. This is consistent with the District's lockdown procedures at this time. Review of locksets will be further discussed and developed with District personnel and Town officials in the next design phases.

Instructional Spaces Visibility: the educational space will have borrowed lights from the corridor into the space. These borrowed lights will have blinds that the educators can close for testing or in an emergency lockdown procedure and this is compatible with the District's current standards.

Alternative Entry Locations: alternative entries will continue to be reviewed with all safety officials during the design process. The project includes signage as required by Town officials that identify each doorway around the building perimeter, the location of Knox boxes, standpipes, and the fire command center. In the team's initial meetings with the Town officials it has been confirmed that the main entrance for emergency responders is at the Field side of the building where they will have direct access to the fire command center and the nurses' suite. All security features will be illustrated on stamped final drawings which will be delivered to emergency responders both electronically and in hardcopy formats.

Optimal Surveillance: the new facility will have smart security cameras throughout the building and the site. The concept of video surveillance monitoring "by exception" was discussed. The electronic analytics capabilities of the cameras allow users to set rules on cameras to receive notifications on 'exception' events. These cameras will allow staff to periodically monitor the facility from the main office, but full-time monitoring is not planned. The information from the security cameras will be recorded for after-event investigation by school or law-enforcement.

Options for large area surveillance monitoring will include the newer technology of thermal imaging directing cameras to specific locations where intruders are detected. This approach will be reviewed for large site areas including the fields and parking areas. Site surveillance coverage is to be provided in the following areas:

- Training and competition fields, in sufficient density to capture individual and vehicular incursions and activities.
- Parking areas, in sufficient density to capture vehicle images entering and exiting parking areas as well as to monitor activities at specific locations within the parking areas.
- Building perimeter, based on cameras coordinated to capture the entrances, and the entire perimeter of the building and pedestrian areas.
- Drop off areas including bus and vehicular locations.
- Day care/ preschool drop off and pick up area.
- Loading dock access and material handling spaces.

Cameras are to be positioned to avoid image capture of neighboring residential and commercial spaces.

Interior surveillance is to be provided in the following areas, and in compliance with the following guidelines:

- Corridors, stairs, cafeteria, central building spine, library learning commons, gymnasiums, fitness center, auditorium, performing arts theater, outside locker rooms and toilets, and generally areas of gathering and spaces that support occupancies of 30 or higher.

There will be an emergency call button in the main office and assistant principal's office for direct contact with law-enforcement.

Site Development Requirements

There are 227 parking spaces, 100 bike storage locations, sidewalks, bike paths, and stairs linking all aspects of the 22-acre property. The quantity of parking spaces where decided upon by the SBC based on the site development and review of trade-offs to ascertain the best balance of parking and sports fields to meet the school district's needs. The parking is distributed in two parking lots, one to the east and the other to the west of the school building, as well as front-in parking spaces located along Schouler Court toward the Mass Avenue side of the property and along the drive loop between the school building and the sports fields.

Desired Focal Points and Visual Aesthetics

The new Arlington High School will be viewed and accessible from all sides, to the south is Mass Avenue and to the north the open sports fields, Minuteman Bikeway, and Summer Street. Arrival by car and/or pedestrian will occur from all four directions. It is important that all components (wings) of the building are understood as being part of the whole. The Mass Avenue side's focus will be its main columned entry flanked by a four-story academic wing and an expressed auditorium volume. Similarly, to the north the main focus will be the five-story entry to the central circulation spine, which is flanked by a five-story academic wing and the volume of the gymnasiums.

The desired aesthetics is to at once reflect traditional values through the use of brick and 21st century teaching and learning through the use of glass at the main entries and a contrasting material highlighting unique program areas at each of the four main corners of the building. The contrasting material will help to breakdown the scale of the large building and guide the visitor around the building perimeter.

The desired focal point at the building interior is the central spine. This space connects all other spaces and wings of the school, it will be the most used and visited area, and it will be light-filled while offering transparency and ease of supervision for the school administration. It acts as the connector to the outdoor courtyards and to the historic reuse elements that tie the new with the old. It is the social and academic hub of the high school providing places for gathering, display, performance, social-time and quiet time.

4.1.2.3 Traffic Analysis

A Traffic Impact Analysis was completed in August 2018. The main purpose of the study was to identify the traffic impact based on the proposed on-site traffic pattern. The analysis included an existing conditions study, a use questionnaire completed by the building occupants, traffic forecasts, capacity analysis, safety analysis, and recommendations. The Traffic Impact Analysis in located in **Appendix E.** The 400-page appendix will be provided electronically upon request.

The existing school layout does not allow for regular traffic flow around the building, it does have a loop road for emergency access but is too narrow for regular two-way circulation. The existing school has a one-way drop off loop to the south from Mass Avenue and a one-way drop off loop to the east from Mill Street. High School students are dropped off and picked up in both locations, preschool students are dropped off and picked up primarily at the east side, buses for afterschool activities predominantly pick up at the east side, and the LABBB students are picked up and dropped off at both locations. High schoolers are also dropped off on the surrounding streets (Mass Ave, Summer Street, Grove Street, and Mill Street). Based on the results of the questionnaire survey undertaken approximately 15% of the high school student population arrive/depart via MBTA buses at bus stops located to the east and west of the school along Mass Avenue. Approximately 35% of the population walk or bike to and from the high school. The remaining approximately 50% travel by car, mostly by parent drop off and pick up, but approximately 20% of the high schoolers drive themselves (and friends and younger siblings) to school. High school students cannot park on the high school site, instead they park in the surrounding neighborhoods and walk.

Traffic forecasts begin with the existing volumes. The morning peak hour is 7:30-8:30 and the afternoon peak hour is 2:15-3:15. The loop at the Mass Avenue side of the building sees 179 vehicles in the morning and 73 vehicles in the afternoon. Millbrook Drive loop from Mill Street side of the building has 366 vehicles in the morning and 323 vehicles in the afternoon. The student population is projected to increase by 30% and the annual growth rate as forecasted by The Metropolitan Area Planning Council is at 0.07% for the Town of Arlington, these factors were used to determine trip generation in the future build out.

The proposed site design allows for two-way circulation connecting Mass Avenue and Mill Street around the new school. A drop off/ pick up zone is located along the north side of the school building and there is a drop off/ pick up loop at the east side of the building from Mill Street. Additionally, a new a pedestrian/bike way ramp will connect the school site with the Minuteman Bikeway. Students may continue to be dropped off at Grove Street, along the front of Mass Avenue, and at the surrounding streets.

The analysis reviewed the surrounding intersections that are impacted by the flow on and off the high school site in the morning and afternoon. Currently only the intersection of Schouler Court at Mass Avenue has a traffic signal. It is recommended that signalization be installed at the intersection of Mill Street and Millbrook Drive. This new traffic signal is off-site, and the Town understands that the associated costs of off-site work is deemed ineligible for reimbursement. The installation of the new signal will be performed by the District as part of the proposed project.

4.1.2.4 Environmental and Existing Building Analysis

The Hazardous Materials Identification Study was submitted in the PDP, the estimated costs have been updated to reflect the now further defined multi-year, multi-phased schedule. The updated Study is located in **Appendix F**. The allowance for abatement is included in the SD Cost Estimate and no further investigation is necessary. If the project is approved to proceed to Design Development, further MEPA (Massachusetts Environmental Protection Agency) NESHAP (National Emissions Standards for Hazardous Air Pollutants) inspections will be required and include destructive testing for asbestos containing material.

4.1.2.5 Geotechnical and Geo-environmental Analysis

In the Preliminary Foundation Engineering Report (PFER) dated June 27, 2018 prepared by McPhail Associates, LLC (McPhail) and submitted in the Preferred Schematic Report, foundation recommendations were provided for the southern and northern portions of the proposed building. During the Schematic Design phase, additional borings and test pits were conducted in order to verify the existing foundation conditions depicted in the available existing drawings and to assess geotechnical conditions under the footprint of the proposed building. These additional investigations confirmed the conclusions made during the Study Phase regarding the foundation design. Refer to the updated Preliminary Geotechnical Engineering Report (PGER) dated January 14, 2019 - see **Appendix G.1**.

Phase 1 of the proposed high school is to be located on the southern (Mass. Ave) side of the site. It is recommended that a ground improvement technology be utilized to improve the existing fill material to allow for conventional footing foundations to be constructed at the normal footing depth. The Phase 2 and Phase 3 New Buildings will be constructed on the northern side of the site over portions of the existing buildings to be demolished. As recommended in the PGER, this foundation will consist of pressure-injected footings (PIFs) and the ground floor slab will be a structured slab with grade beams. Existing piles and foundations in conflict with new foundation members will need to be removed. The proposed Stadium Toilet Facility Building is to be located outside the footprint of the new high school on the northern end of the property. The foundation is anticipated at this time to consist of helical piles. It is recommended that additional borings be conducted during the Design Development phase in order to assess specific conditions under other site development structures such as the Stadium Toilet Facility Building, the bike ramp, retaining walls, major underground utilities and excavation support walls. Please

refer to the PGER in **Appendix G.1** for additional design recommendations. The 143-page appendix will be provided electronically upon request.

An environmental due diligence assessment was initially completed as part of the PDP, the results which are documented in a Phase I Environmental Site Assessment Report and Phase II Vapor Intrusion Pathway Report prepared by McPhail. The environmental due diligence assessment identified multiple environmental concerns which include the following: releases of contamination that have affected soil and groundwater at the northern portion of the School campus, a release of chlorinated solvents that has affected sub-slab soil gas located beneath the southern and northern portions of the existing school building, former and abandoned underground storage tanks (USTs), and a historical transformer vault located within the basement of Collomb House. During Schematic Design, additional subsurface explorations were conducted to evaluate levels of contamination in soil within the proposed building footprint as well as within the areas of the proposed geothermal well fields. The results of these investigations are provided in the Preliminary Soil Management and Environmental Considerations Report - see **Appendix G.2**. The 407-page appendix will be provided electronically upon request.

Costs associated with on-site management and off-site disposal of contaminated soils and groundwater as well as providing a soil cap over portions of the site are captured in the SD estimate. The SD estimate also includes costs associated with the removal of USTs and the transformer vault. As result of the contamination, an engineered barrier and/or direct contact barrier have been constructed across northern portion of the School campus to restrict exposure to impacted soils. While every effort will be made during Design Development to locate all site utilities and site improvements outside of the footprint of existing engineered membrane barrier caps, it is prudent at this time to assume that some repair of the existing membrane may be necessary should construction activities impact the barrier. Costs are carried in the estimate for this potential occurrence. Furthermore, the SD estimate includes costs associated with installation of a vapor mitigation system to eliminate potential vapor intrusion within the proposed building from subsurface contamination. Costs associated with Health and Safety measures to be protective to the occupants of the existing school building during construction as well as construction workers are also captured in the SD estimate. As part of the Design Development phase, the completion of an additional subsurface exploration program will be necessary to pre-characterize the total quantity of excess soil that is anticipated to be generated during each construction phase. Furthermore, groundwater testing will be necessary to facilitate preparation and submittal of an application to discharge construction dewatering under a Remedial General Permit to the US EPA. Additional subsurface exploration activities will also be necessary to further evaluate the presence of the USTs and the transformer vault as well as their potential affects to soil and groundwater. The Design Development phase will also include submittal of MCP compliance reports to address the releases of contamination that are documented in soil, groundwater and soil gas across the School campus. Refer to the Preliminary Soil Management and Environmental Considerations Report- **Appendix G.2** for detailed information.

4.1.2.6 Code Analysis

Code Analysis- This project will follow the newest version of the MA Building Code 9th Edition/ IBC 2015 as well as the newest Energy Code IECC 2015. It will also adhere to all regulations for accessibility under MAAB and ADA 2010 Standards. HMFH provides the code analysis on the Code Sheet drawings (sheets A0.2, A0.3, A0.4, and A0.5) in **Schematic Design Drawings**. The Code Sheet provides detailed information regarding building type, number of occupants, widths of circulation routes, fire-rated rooms, fire separations, toilet count requirements, and is updated continuously throughout the design phases. Permitting and other regulatory requirements are as follows:

Notice of Intent (NOI) with DEP/ Arlington Conservation Commission
Wetland flagging will occur in the Design Development phase. See **Appendix H** for the site diagram showing Wetlands Buffer Zones at the high school property. Currently disturbed areas (i.e. paved) will continued to be disturbed in the planned design thereby allowed as an existing condition. There are no adverse impacts to the project due to the locations of the wetlands and buffer zone set back requirements. Due to wetland resource areas located on and adjacent to the site, any construction will require approval from the Arlington Conservation

Commission and DEP at a minimum and a Notice of Intent (NOI) will be filed. See **Project Manual** for the civil narrative.

It is assumed the permitting process with conservation will take approximately four to six months. A file number and any comment from Department of Environmental Protection must be received in order for the permit to be issued.

Prior to beginning construction, the project site will require the development of a Stormwater Pollution Prevention Plan (SWPPP).

Arlington Redevelopment Board (Planning Board)
The Town of Arlington's "site plan approval" is under the special permit review under Environmental review. It is assumed the review will require approximately four to six months. The following will need to be addressed as part of the permitting:

- Preservation of landscape
- Relation of building to environment
- Open space
- Circulation
- Surface water drainage
- Utility service
- Advertising features (i.e. signage)
- Safety
- Heritage
- Microclimate
- Sustainable building and site design

Arlington Zoning Board
A special permit application may need to be filed with the Arlington Zoning Board of Appeals. Initially, the Design Team will provide a narrative outlining how the proposed project meets or does not meet local zoning ordinances. It is understood that public schools are exempt from meeting zoning by-laws per the Dover Amendment, but it is good practice to provide documentation and to meet the zoning requirements wherever possible. As noted in the PSR, it is anticipated that the project will meet most requirements, except for building height. The existing Arlington High School does not meet the height ordinance.

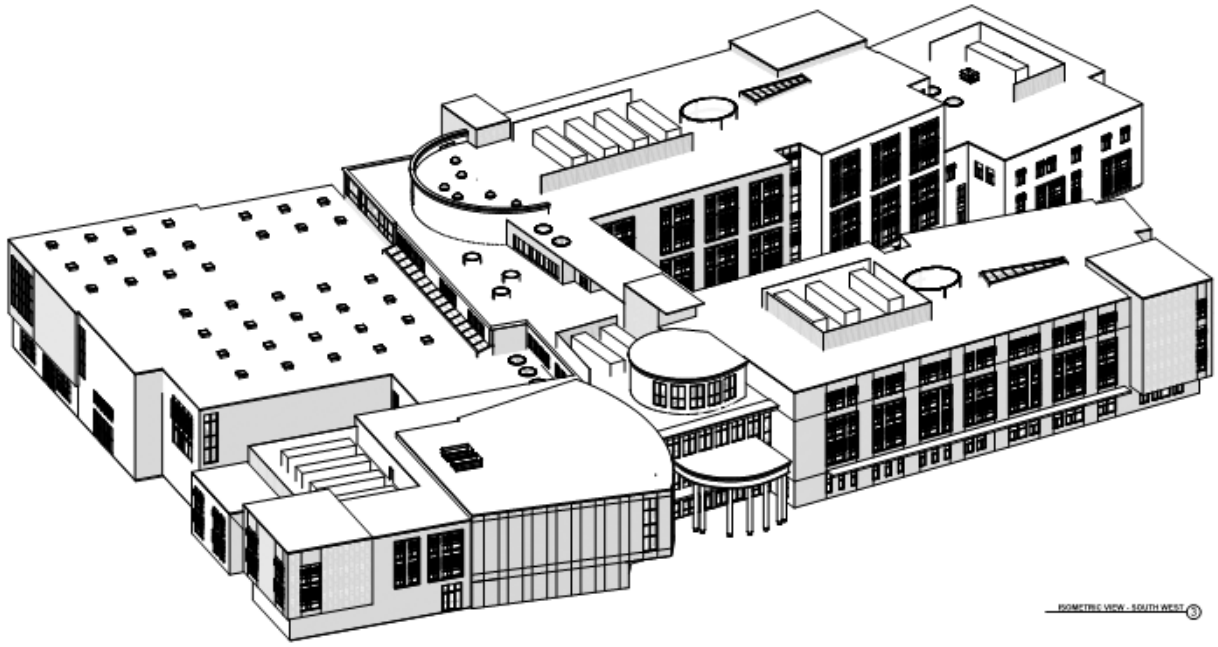
4.1.2.7 Utility Analysis

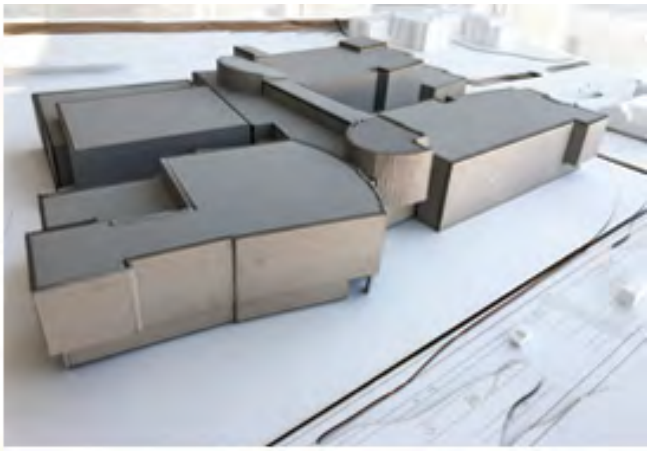
Utility Analysis- The utilities are shown on the Site Survey drawings included in the **Schematic Design Drawings**. Utilities are readily available and will provide the capacity required for the new school building. On-site septic/sewage treatment facilities are not required.

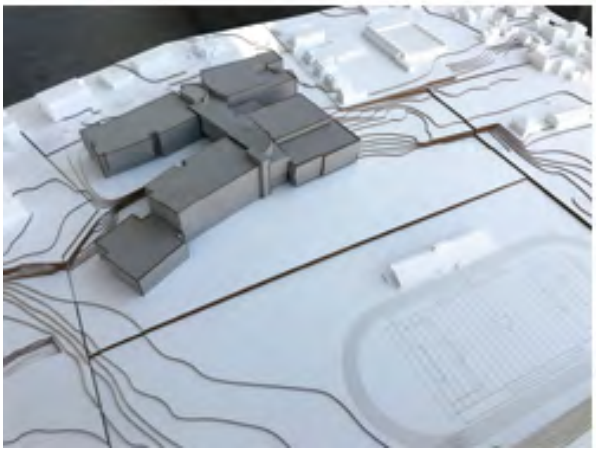
4.1.2.8 Massing Study

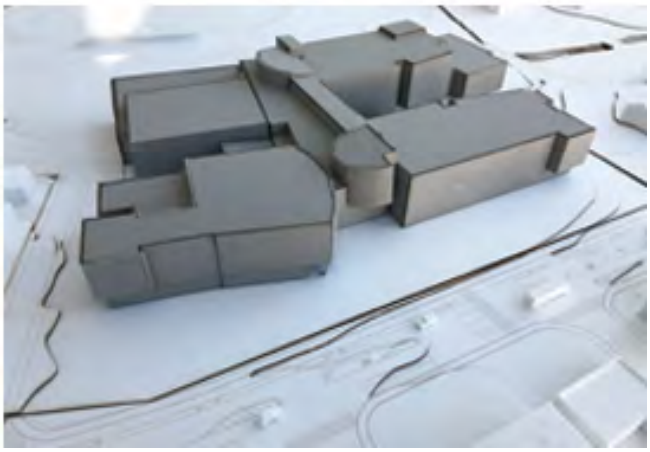
Massing Study- see **Schematic Design Drawings** and Visual Aids in **Appendix B** included in this submission.
The new Arlington High School is to be located generally where the existing school building is. The site has a 24'-0" grade change between the south and north sides of the property and the new school building takes advantage of this by having two main entry levels, one to the south and the other to the north. In order to construct the school on an occupied site, the first phase is constructed on a portion of the currently open front lawn and once completed, the phase 1 building will act as the "swing space" for the rest of the school's construction. A significant portion of the front lawn will remain open and the mature trees that line Massachusetts Avenue will remain. The massing/scale of the phase 1 building is similar to the existing with a four-story classroom wing and a two-story performing arts wing. The auditorium is expressed and its curve draws the visitor to the school's main entrance.

The design team has studied the massing through physical models, BIM 3-D models, drawings, and perspectives.









4.1.2.9 Building Systems Narratives

Sustainable Design Features – Arlington High School Building Committee established the Sustainability/MEP Sub Committee to work in collaboration with the Design Team's sustainability consultant In-Posse, Eversource's Accelerated Performance program consultant Seventh Wave, and the architectural / engineering Design Team. SMEP met regularly throughout the Schematic Design phase to establish goals for the new school that would align with the committee's goal of designing the building to be a Fossil Fuel Free Ready Facility.

In 2018 the District joined the Metropolitan Mayors Coalition (MAPC), which involves a commitment to achieving net zero carbon emissions by 2050. In order to align with these goals, the Design Team has been charged with designing a facility to strive for near Net Zero. The first step toward this design is to reduce the energy consumption or energy use intensity (EUI) of the facility as much as possible. The second step will be to incorporate as much renewable / photovoltaic panels on the building and site as possible.

Initial meetings of the SMEP Subcommittee established overall energy goals for the project documented in Eversource/National Grid's Accelerated Performance commitment. The project established a minimum EUI of 38 with a target to strive for as close to an EUI of 30 as possible. These EUI targets are contingent on the building being designed with a minimal use of fossil fuels as possible. See **Project Manual** for the Accelerated Performance Document.

Early phase energy modeling was completed by In-Posse to compare the baseline, or initial SD design, to models incorporating potential energy conservation measures (ECMs). These ECMs included improved insulation, triple glazing, vacuum glazing, reduced exterior glazing areas, and RTU Energy Recovery. The energy model's findings for the greatest combined energy savings incorporated reduced exterior glazing areas and energy recovery at the RTU's. These results were used to inform the final SD scope of the project. See **Project Manual** for the Preliminary Energy Model Study.

Energy conservation measures (ECMs) also incorporated into the scope of the project included; additional insulation at the Arts and Performance wing, Athletics wing, and triple glazing at north facing fenestration. All ECM's including these will be further evaluated during Design Development to review their overall Life Cycle Cost to better understand their return on investments (ROIs).

A ground loop geothermal system, serving chilled beam terminal units in combination with variable refrigerant flow (VRF) terminal units, has been identified as the preferred mechanical systems for heating and cooling within the facility due to their ability to operate fossil fuel free with low energy consumption. The mechanical engineer determined an approximate quantity of 400 wells are required to meet the load requirement for this size facility. The cost estimate accounted for 400 wells at a depth of 450 feet; the quantity and depth to be finalized in the Design Development phased once the site's hydrology is known.

The preliminary assumption is that wells will be located primarily in the fields and parking areas (avoiding all existing engineered barrier areas) as shown in the mechanical drawings. The field design will be finalized in the DD phase. The Designer will work with the CM to determine the schedule for well installation. This will depend on location of the well field relative to other construction activities and occupied school zones, the number of drilling rigs used, and other construction sequencing issues. Depending on the CM's recommendation, well drilling could be released as an early bid package.

In 2015 the District initiated a town wide Power Purchase Agreement (PPA) for solar panel installation at six public schools including the high school. The current intention of the District is to expand the current PPA at the new high school facility. The Design Team has been in correspondence with the PPA provider to determine feasibility and scope of areas identified for panel installation. These include, roof top, structured above RTU's, and structured above car parking areas. The PPA is willing to provide "turn key" installations where they will provide everything

from the ground up to support and secure the panels, along with the panels themselves. The project will be responsible only for providing the underground or under roof connections necessary to install the systems on site.

The Design Team will continue to work in collaboration with the SMEP Sub Committee and School staff as we enter Design Development to ensure that the new facility will best accommodate their needs while being as energy efficient as possible. Workshops will be planned with the school staff to review possibilities for reducing the end users plug loads on the building, which is one of the biggest sources of energy use as identified in the initial energy model.

Building Structure- The Preliminary Geotechnical Engineering Report submitted in the PSR and updated in the Schematic Design established recommendations for foundation design consisting of two foundation systems. Phase 1 proposed building will be conventional spread footings and concrete slab on grade with ground improvement technology utilized to "improve" the existing fill materials as needed. Phase 2 and 3 proposed building foundation will consist of pressure-injected footings and a structured slab with grade beams. Typical floor construction will be concrete slab on composite deck supported by composite structural steel beams and girders. Typical roof construction will be galvanized steel roof deck supported by structural steel beams or deep long span bar joists and steel girders. See **Project Manual** for the structural narrative.

Plumbing & HVAC Narratives-See **Project Manual**. Per M.G.L. c. 149, 44(m), the preliminary life cycle cost estimate is also in the **Project Manual.**
Fire Protection Narratives – See **Project Manual**. Flow test results received on December 21, 2018 determined that a fire pump is not necessary to serve a new fully automated fire suppression system for a typical school building, but because the building is classified as a High Rise as defined by the Massachusetts State Building Code, a fire pump will be required due to the water pressure requirement of 100psi for standpipes for High-Rise Buildings. See **Appendix I** for the Flow Test Results.

Electrical Narratives – See **Project Manual**.

Information Technology Narratives – See **Project Manual**.

4.1.2.10 Sustainable Building Design Guideline Documents

See **Appendix J** for the LEED Scorecard and LEED certification letter.

4.1.2.11 ADA Analysis

The design of the all new school building is compliant with the Massachusetts Architectural Access Board (MAAB) and the Americans with Disability Act (ADA). All exterior doors are accessible to those that are physically challenged. Once inside the building all floor levels are accessible through the use of three elevators. The auditorium stage is directly accessible from the audience seating area. All toilets facilities, plumbing fixtures (sinks, drinking fountains), door hardware, thresholds, and clearances, switches and controls, built-in casework, stair treads and handrails meet the requirements of MAAB and/or ADA, whichever is stricter. The project site has a steep grade change from south to north and a new stair and accessible ramp are provided to make this transition at the east side of the school building, this is not a code requirement, but is a convenience. Accessible parking spaces are provided at each entry door and sidewalks and pedestrian circulation routes are accessible by the physically challenged.

4.1.2.12 Room Data Sheets

Room Data Sheets- See **Appendix K**

4.1.2.13 Proposed Construction Methodology

Skanska USA Inc. described the criteria and analysis used by the Owner's Project Manager, in conjunction with the Designer, to compare the construction delivery methods provided in M.G.L. Chapters 149 and 149A for the Proposed Project.

This project requires rigorous planning and daily communications that is well-coordinated to keep the school fully operational during this phased occupied renovation and construction. Getting the Construction Manager under contract sooner and immediately engaged with planning is one of the most critical items of the Project and requires input, development and buy-in by the construction manager prior to buyout of the other trades, which is only possible with the CM at Risk delivery method. Early development of the phasing plan by the CM, as opposed to by the AE and OPM will reduce potential change orders and have the contractor executing "their" plan.

The scale and scope of this project requires flexibility for changes in phasing and logistics that are more suited to the CM at Risk contract method. Given the nature of the work and the potential for unforeseen site and building conditions which will most likely be encountered the contractor requires the flexibility to adjust the phasing and logistics to the conditions encountered which the CM at Risk contractual method allows for. The CM-at-risk method is also a more cost-effective approach to address unforeseen conditions and an aggressive schedule.

A PowerPoint presentation included in the **Appendix P** was made to the School Building Committee on December 4, 2018 reviewing the relative advantages and disadvantages associated with each of the construction delivery methods. Following the presentation, a motion was made and seconded and the District elected to proceed under the CM at Risk construction delivery methodology, and it passed unanimously. A copy of the certified vote is included in the **Appendix P**.

The application for authorization to proceed with the CM at Risk construction delivery method is in draft, the OPM is targeting to submit the application to the Office of The Inspector General by February 20, 2019. It is anticipated notice to proceed will be issued by the Office of The Inspector General within 60 days no later than April 22, 2019. The OPM confirms that cost estimates, proposed project schedule, estimated reimbursement rate, and Total Project Budget Spreadsheet reflect the selected construction delivery method.

4.1.2.14 District's Anticipated Reimbursement Rate

See **Appendix L** for the MSBA Reimbursement Appendix 4E Anticipated Reimbursement Rate table.

4.1.2.15 Total Project Budget

Total Project Budget Worksheet- See **Appendix A**

4.1.2.16 Designer's Construction Cost Estimate

Designer's Construction Cost Estimate- See **Appendix M**

4.1.2.17 OPM Construction Cost Estimate

Independent OPM Construction Cost Estimate- See **Appendix N**