3.1.4 EVALUATION OF EXISTING CONDITIONS

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3.1.4 - EVALUATION OF EXISTING CONDITIONS

A. LEGAL TITLE

The properties that comprise the current BHS site are owned by the Town and are available for development. See Appendix D for legal title references for parcels I-III.

MARSH, MORIARTY, ONTELL & GOLDER, P.C.
Attorneys at Law
18 Tremont Street
Boston, Massachusetts 02108

TITLE REPORT

52935
Sheet Number

ESTATE:	221-299, 305-307, 313-345 Concord Avenue, (Belmont High School Site), Belmont		
OWNER:	Town of Belmont		
[SOURCES OF TITLE]	a.	Eminent Domain Taking	48
	b.	Eminent Domain Taking / Confirmed by Taking Deed	68, 73
	c.	Eminent Domain Taking	74
	d.	Eminent Domain Taking, as confirmed by Deed	112, 115
	e.	Eminent Domain Taking, as confirmed by Deed	118, 122
	f.	Eminent Domain Taking, as confirmed by Deed	125, 128
	g.	Eminent Domain Taking, as confirmed by Deeds	131, 134, 135
	h.	Eminent Domain Taking, as confirmed by Deed	138, 140
	i.	Deed	143
DESCRIPTION:	I.	7.2 acres as shown on Plan Book 393 Plan 7 - also	11
		shown as 7.2 acres on Plan 1208 of 1930	13
	II.	3.328 acres as shown on Plan Book 393 Plan 7 - also	11
		shown as 3.328 acres on Plan 1208 of 1930	13
	III.	26.27 acres as shown on Plan Book 393 Plan 7	11
	IV.	529,600 square feet as shown on Plan Book 405 Plan 41	12
	V.	8914 square feet as shown on Plan 119 of 1934 - also	14
		shown as 9090 square feet on Plan 255 of 1935	15
		(See Remarks below regarding discrepancy in acreage)	
	VI.	239,131 square feet as shown on Plan 114 of 1937	16
	VII.	10,700 square feet as shown on Plan 877 of 1939	17
	(See also Assessors Plans- which show entire Site)		2-4 inclusive

B. HISTORICAL REGISTRATIONS

It has been determined by the Town of Belmont and the Project team that there are no Historical Registrations, and/or potential local/state requirements at the high school and therefore there is no impact on scope and time regarding this issue. Below refers to the letter from the Historic District Commission to the Belmont High School Building Committee, regarding the historic status of the high school building.

C. DEVELOPMENT RESTRICTIONS

There are no extraordinary development restrictions. The project will still need to comply with standard municipal and state requirements (i.e. some part of zoning, wetlands, soils/MCP requirements, etc.). The standard school project is completely viable on the site with the typical permitting requirements standard to Massachusetts.

OFFICE OF COMMUNITY DEVELOPMENT
TOWN OF BELMONT
19 Moore Street
Homer Municipal Building
Belmont, Massachusetts 02478-0900

Historic District Commission

November 21, 2017

Belmont High School Building Committee
Homer Municipal Building
19 Moore Street
Belmont, MA 02478

RE: Historic Status, Belmont High School

Dear Committee Members,

The Historic District Commission (HDC) has discussed the Belmont High School with respect to potential significance and determined it is not historic. Therefore, the HDC has no concerns regarding the renovation or demolition of the building.

The HDC does consider the extant portion of the park at Clay Pit Pond to be a historic landscape. Designed in 1928 by landscape architect Loring Underwood, it is an important part of the Concord Avenue corridor. We therefore ask that the general characteristics of the park be respected during the design process. This does not mean that improvements cannot be made to the park, just that the HDC considers the park to be historic and that rehabilitation work should take that into account.

If demolition or alteration is considered for the Colonial Revival Field House, constructed c.1910, the HDC recommends that it be evaluated in greater detail to determine if it is indeed significant. The HDC has discussed this building in the past, but has not considered it as high a priority as other civic buildings in Belmont. It is included in the Massachusetts Historical Commission's inventory form for the Clay Pit Pond area. Should the Field House become part of the project, the HDC kindly requests that it be consulted.

Should you have any further questions regarding the historic status or considerations related to the high school, please do not hesitate to ask.

Sincerely,

Lauren Meier, Co-Chair

3.1.4 - EVALUATION OF EXISTING CONDITIONS

D. EVALUATION OF BUILDING CODE

EXECUTIVE SUMMARY

The following information provides a summary of the report that follows. For further information, please refer to the appropriate topic in Section 7 of this report detailing project code compliance.

PROJECT DESCRIPTION

The project consists of the study of the existing high school building, to evaluate the potential scopes of work, including a major renovation, addition, construction of a new school, or a combination thereof. The potential scopes of work to address the needs of the school may include one or more of the following:

- Major interior renovation/alteration
- Addition interconnected with existing building
- Addition separated from existing building by a fire wall
- Demolition of existing high school, and construction of a new building

CONSTRUCTION TYPE & STRUCTURAL FIRE RESISTANCE RATINGS (SECTION 7.2)

The existing building is composed of steel and concrete non-combustible construction. A large majority of the building is protected with spray fireproofing, however unprotected steel was observed in various portions of the building including the gymnasium. It is our understanding that the existing fireproofing contains hazardous materials and will need to be abated as a result of this project. Implications on the building's structural fire ratings for the various scopes of work under consideration are as follows. Note that fire modeling may be used to justify omission of fireproofing in certain locations.

- Alteration: If the building undergoes an alteration, including removal of the existing fireproofing, then minimally the existing level of protection is required to be maintained (MEBC 701.2). All existing structural members that are protected are minimally required to be provided with new fireproofing that affords the same fire-resistance rating as the existing condition. Existing unaltered structural elements without fireproofing are permitted to remain.
- Addition without Fire Wall Separation: If the building undergoes an addition without a fire wall separation, then the construction type of the entire building is required to be upgraded to Type IB (2-hour) Construction (MEBC 1102.2). In addition to fireproofing any unprotected structural steel, a fire-resistance rating analysis will also be required to be conducted for the existing building's structural elements to determine if any additional protection is necessary.
- Addition with Fire Wall: If the building undergoes an addition, and the addition is entirely separated from the exiting building by a fire wall in accordance with 780 CMR Section 706, then the new addition is required to comply with the new construction requirements of 780 CMR Section 503, and the existing building is unaffected. The existing building is required to comply with requirements for an alteration.

VERTICAL OPENINGS (SECTION 7.3)

The existing exit stair enclosures consist of substantial construction with 90-minute doors containing wired glass. Over time the glass was damaged in many of the doors, and was replaced with non-wired/non-rated glass. Furthermore, several exit enclosure doors have broken latches. Regardless of the scope of work, all exit enclosures are required to be protected in accordance with one of the following:

- Where existing doors remain with their original wired glass, functional latches, and are in good condition they are permitted to remain;
- Where exiting doors have broken or non-functioning latches, the latches are required to be repaired/replaced;
- Where existing doors no longer have wired glass, they are required to be replaced with 90-hour rated & labeled doors; or
- Omit the rating on the stair on the basis that there are only two interconnected levels (780 CMR 712.1.12 & 1019.3(1)). The implication of this approach is that where such stairs are unenclosed, the travel distance measurement is required to be taken down the stairs measured diagonally along the nosings until reaching an exit.

If the construction type of the building is upgraded to Type IB construction, as discussed in the section above, then the existing stair enclosures are required to (1) be confirmed to have a 2-hour rating, (2) be upgraded to achieve a 2-hour rating, or (3) omit the rating on the stair and design as open exit access stairs as described above.

D. EVALUATION OF BUILDING CODE

SPRINKLER SYSTEM (SECTION 7.4.1)

The existing building is not served by a sprinkler system. It is expected that the project will consist of a major alteration or addition, requiring full sprinkler protection to be provided throughout the entire building in accordance with NFPA 13 (MEBC 804.2.2 & 904.1; 780 CMR T.903.2; MGL Ch. 148 s. 26G).

FIRE ALARM & DETECTION SYSTEM (SECTION 7.4.3)

The existing building is served by an addressable fire alarm and detection system that was recently installed. The existing system is permitted to remain with new devices installed in accordance with NFPA 72 based on any reconfigured or altered spaces. The existing fire alarm system will include new waterflow and tamper switches associated with the installation of a new sprinkler system. It should be confirmed by the fire alarm service vendor that the existing system has spare capacity to accommodate these new fire alarm points.

PLUMBING FIXTURES (SECTION 7.8)

Based on the proposed scope of work, it is expected that a plumbing fixture analysis in accordance with the new construction provisions of 248 CMR will be required for the building. Separate fixtures are required to be provided for staff, students, and kitchen staff, and fixtures are required to be sized to accommodate normal educational uses as well as potential municipal assembly events.

INTRODUCTION & PROJECT DESCRIPTION

Perkins + Will has retained Code Red Consultants to provide fire protection and life safety code consulting services for the Belmont High School feasibility study project located in Belmont, MA. The project consists of the study of the existing high school building, to evaluate the potential scopes of work, including a major renovation, addition, or construction of a new high school.

The existing high school building was originally constructed in 1970 with minimal renovations completed since, and consists of the following:

- Height & Area: Two stories in height, with a footprint area of approximately 170,000 sf
- Use: Contains classroom space, auditorium, gymnasium, cafeteria, pool, and supporting MEP spaces
- Occupancy: Educational use, potential for grades 7-12, 8-12, or 9-12 (Group E), as well as municipal assembly functions in cafeteria (Group A-2), theater (Group A-1), and other large assembly spaces such as cafeteria and library (Group A-3)
- Construction: Non-combustible construction, much of which is afforded a fire-resistance rating by means of asbestos-based encasement. Portions of the structure (specifically noted in gymnasium) are unprotected. The theater stage and stairs up to the second floor of the library appear to be of wood construction.
- Vertical Openings: Several exit stairs are open on one or both of the floors, and several spaces (field house, auditorium, etc.) are double-height spaces. Many of the stairs have rated doors, but the wired glass has been broken overtime or replaced with non-rated glazing. Several exit stair doors have broken latches.
- Fire Alarm System: Emergency voice/alarm communication fire alarm system with smoke detection throughout installed within the past year.
- Fire Extinguishers: Fire extinguishers provided throughout the building
- Exit Signage: Exit signage provided throughout the building
- Emergency Power: Building is served by an emergency generator that powers exit signage, emergency lighting, fire alarm system, etc.
- Fire Protection Systems: No sprinkler or standpipe system.
- Special Suppression Systems: Wet chemical system (PryoChem PCL-550) provided to protect kitchen hoods in cafeteria
- Accessibility: The building is primarily not accessible, including the following major deficiencies: non-accessible door hardware, non-accessible toilet rooms, no accessible seating provided in auditorium or gymnasium, no accessible means to access courtyard, etc. Marked accessible bathrooms were observed, however, the rooms/ fixtures are not fully compliance with 521 CMR/ADA.

The potential scopes of work to address the needs of the school may include one or more of the following:

- Major interior renovation/alteration
- Addition interconnected with existing building
- Addition separated from existing building by a fire wall

3.1.4 - EVALUATION OF EXISTING CONDITIONS

D. EVALUATION OF BUILDING CODE

- Demolition of existing high school, and construction of a new building

APPLICABLE CODES

Building Code	780 CMR - Massachusetts State Building Code 9th Edition, which is an amended version of the 2015 International Building Code (IBC).
780 CMR 34.00 is deleted and replaced by the Massachusetts Existing Building Code (MEBC), which is an amended version of the 2015 International Existing Building Code (IEBC).	
Fire Code	527 CMR - Massachusetts Comprehensive Fire Safety Code, which is an amended version of the 2012 Edition of NFPA 1 .
Plumbing Code	248 CMR 10.00 - Uniform State Plumbing Code.
Electrical Code	527 CMR 12.00 – Massachusetts Electrical Code, which is an amended version of the 2017 Edition of NFPA 70, National Electrical Code.
Mechanical Code	2015 International Mechanical Code (IMC) as amended by 780 CMR 28.00.
Energy Code	2015 International Energy Conservation Code (IECC) as amended by 780 CMR 13.00.
Elevator Code	524 CMR - Massachusetts Board of Elevator Regulations, which is an amended version of the 2004 Edition of ANSI A 17.1, Safety Code for Elevators and Escalators.
Accessibility	521 CMR - Architectural Access Board (AAB) Rules and Regulations.
2010 ADA Standards for Accessible Design.	
Other	Various National Fire Protection Association (NFPA) codes and standards as referenced by the codes listed above.

This report addresses the key features of these codes and standards. The primary intent of this document is to summarize the results of our investigation and evaluation of the aforementioned building in accordance with the Uniform Code. The evaluation has been provided in sufficient detail to ascertain the effects of the proposed work on the work area under consideration as well as the impact on the entire existing building. This report is intended to address code requirements as enforced by local and state authorities only.

EXISTING BUILDING SCOPING REQUIREMENTS

Portions of an existing building undergoing repair, alteration, addition, or a change in use are subject to the requirements of the MEBC. In general, existing materials and conditions can remain provided they were installed in accordance with the code at the time of original installation and are not deemed a hazardous condition by an authority having jurisdiction (AHJ). Work to existing buildings should be performed in accordance with 780 CMR for new construction unless otherwise specified by the MEBC. Alterations to existing buildings are not permitted to reduce the level of safety currently provided within the building unless the portion altered complies with the requirements of 780 CMR for new construction.

Where compliance with the requirements of the 780 CMR is impractical due to construction difficulties or regulatory conflicts, building officials are permitted to approve compliance alternatives. Any compliance alternatives being sought are required to be identified on the submittal documents (MEBC 101.5.0.1).

EXISTING BUILDING CODE COMPLIANCE METHOD

The IEBC has 3 different compliance methods that can be used to evaluate a renovation project (IEBC 301.1):

- Prescriptive Method (IEBC Chapter 4)
- Work Area Method (IEBC Chapters 5-13)
- Performance Method (IEBC Chapter 14)

Based on the potential scope of work, the Work Area Method has been selected to evaluate this project. The classification of the scope of work will vary based on the project selected. The specific scope of the project is unknown during the feasibility stage, but may include one or more of the following:

- Major interior renovation: Level 3 Alteration, requiring compliance with MEBC Chapters 7 through 9
- Addition: Addition, requiring compliance with MEBC Chapter 11
- Addition separated from existing building with fire wall: Addition

D. EVALUATION OF BUILDING CODE

is New Construction, requiring compliance with 780 CMR

- Demolition of existing building with new high school built: New Construction, requiring compliance with 780 CMR

A change of use will not be occurring as part of this project.

EXISTING BUILDING CODE ANALYSIS APPROACH

The scope of this document is limited to high-level fire protection, life safety, and accessibility code items that may have a major impact on the proposed scope of work and does not address finer-detail code compliance deficiencies. A comprehensive Investigation & Evaluation Report in accordance with 780 CMR Chapter 34 will be completed for the project after advancement of the proposed design. The observations outlined herein are based on visual observations taken by Carl Nelson, P.E. and Chris Lizewski, P.E. of Code Red Consultants on August 28, 2017. No destructive inspection or testing occurred. Drawings dated October 1968, and undated CAD plans, were provided to Code Red Consultants and were utilized for this analysis.

The following chapters of the report document the results of our analysis in accordance with the Massachusetts Existing Building Code (MEBC) and the Massachusetts State Building Code (780 CMR). The analysis generally focuses on the alteration or addition triggers. An addition separated from the existing building by a fire wall, or a brand-new building will need to comply with the new construction requirements of the applicable codes and standards in Chapter 2 of this document.

Materials already in use in a building in compliance with the requirements of approvals in effect at the time of their erection or installation are permitted to remain unless determined by the building official to be dangerous to life, health, or safety (IEBC 302.3). New and replacement materials are required to comply with the applicable code for new construction except as otherwise permitted by the IEBC (IEBC 302.4).

FIRE PROTECTION / LIFE SAFETY ANALYSIS

This Chapter addresses the overall code compliance approach for the project.

7.1 USE AND OCCUPANCY CLASSIFICATIONS

7.1.1 OCCUPANCY TYPE

The building is designed as a non-separated mixed use (780 CMR 508.3).

- 7.1.2.Occupancies Present
- Group E, Educational: Classrooms
- Group A-1, Assembly: Theater
- Group A-2, Assembly: Cafeteria
- Group A-3, Assembly: Fitness Areas; Lecture Halls; Function Areas (including municipal function areas)
- Group A-4, Assembly: Swimming Pool with Spectator Seating; Gymnasium with Spectator Seating
- Group S-1, Moderate Hazard Storage: General Storage
- Group S-2, Low Hazard Storage: MEP Spaces, Food Storage

7.2 HEIGHT, AREA, AND CONSTRUCTION TYPE

7.2.1 EXISTING CONSTRUCTION

The existing building consists of non-combustible construction, which is mostly encased with an asbestos-based fire proofing material. Portions of the existing structure are unprotected (i.e. in gymnasium). Given the presence of asbestos, it is our understanding that the existing fire proofing is planned to be removed as part of the project.

As there are unprotected portions of structure, the construction type of the existing building defaults to Type IIB construction. As the project is anticipated to include removal and replacement of existing fire proofing, it is expected that upgrades to existing construction type will be made as necessary including increasing the construction elements' fire resistance ratings where required.

7.2.2 HEIGHT & AREA

A full height and area analysis is provided in Appendix A of this report.

As illustrated in Appendix A, the existing building exceeds the allowable limitations for Type IIB or IIA construction as a non-separated mixed use with Group A-3 and E Occupancies. In order to be compliant at its current size, the building would need to be Type IB (2-hour) construction, as defined in Appendix A. The extent to which the existing building construction is required to be upgraded is summarized in the "Project Implications" section below.

7.2.3 PROJECT IMPLICATIONS

3.1.4 - EVALUATION OF EXISTING CONDITIONS

D. EVALUATION OF BUILDING CODE

Figure 1-1: Unprotected Steel Construction

Figure 1-2: Unprotected Steel Construction

Figure 2: Stage

The implications on the building height, area, and construction type for the various scopes of work under consideration are as follows:

- Alteration: If the building undergoes an alteration, including removal of the existing fire proofing, then minimally the existing level of protection is required to be maintained (MEBC 701.2). All existing structural members that are protected are minimally required to be provided with new fireproofing that affords the same fire-resistance rating as the existing condition. Existing unaltered structural elements without fire proofing are permitted to remain. A detailed review of existing documentation or an archaic fire-resistance rating analysis is required to confirm the existing building construction type for the purposes of establishing the required rating to provide.
- Addition without Fire Wall Separation: If the building undergoes an addition without a fire wall separation, then the construction type of the entire building is required to be upgraded to Type IB (2-hour) Construction (MEBC 1102.2).
- Addition with Fire Wall: If the building undergoes an addition, and the addition is entirely separated from the exiting building by a fire wall in accordance with 780 CMR Section 706, then the new addition is required to comply with the new construction requirements of 780 CMR Section 503, and the existing building is unaffected. The existing building is required to comply with requirements for an alteration.
- *Note: Where fire proofing is required, it may be justifiable to omit protection where justified with fire modeling. Common locations where fire modeling can be used for the omission of structural fire proofing generally have high ceilings (i.e. gymnasium) or very limited combustible contents.*

The theater stage and stairs up to the second floor of the library appear to be of wood construction. Under new code requirements these components are required to be of noncombustible construction and the stage is required to have a fire-resistance rating consistent with the building construction type. If there is an upgrade to the building's construction type (as outlined above), or if the

wood stage and/or stairs are renovated, they are required to be constructed in accordance with new construction requirements.

7.3 VERTICAL OPENINGS

The existing exit stair enclosures consist of substantial construction with 90-minute doors containing wired glass. Over time the glass was damaged in many of the doors, and was replaced with non-wired/non-rated glass. Furthermore, several exit enclosure doors have broken latches. Regardless of the scope of work, all exit enclosures are required to be protected in accordance with one of the following:

- Where exiting doors remain with their original wired glass, functional latches, and are in good condition they are permitted to remain;
- Where exiting doors have broken, missing, or non-functioning latches, the latches are required to be repaired/replaced;
- Where existing doors no longer have wired glass, they are required to be replaced with 90-hour rated & labeled doors; or
- Omit the rating on the stair on the basis that there are only two interconnected levels (780 CMR 712.1.12 & 1019.3(1)). The implication of this approach is that where such stairs are unenclosed, the travel distance measurement is required to be taken down the stairs measured diagonally along the nosings until reaching an exit.

If the construction type of the building is upgraded to Type IB, as discussed in the section above, then the existing stair enclosures are required to (1) be confirmed to have a 2-hour rating, (2) be upgraded to have a 2-hour rating, or (3) omit the rating on the stair and design as open exit access stairs as described above.

7.4 FIRE PROTECTION SYSTEMS

7.4.1 AUTOMATIC SPRINKLER SYSTEM

The existing building is not served by a sprinkler system. It is expected that the project will consist of a major alteration or addition , requiring full sprinkler protection to be provided throughout the entire building in accordance with NFPA 13 (MEBC 804.2.2 & 904.1; 780 CMR T.903.2;

Figure 3: Rated Stair Door with no Latch and Non-rated Glazing

Figure 4: Fire Alarm Control Panel

MGL ch. 148 s. 26G).

7.4.2 STANDPIPE SYSTEM

The existing building is not served by a standpipe system. A standpipe system is not required to be provided unless the floor level of the highest story is located more than 30 feet above the lowest level of fire department access (780 CMR 905.3.1). Additionally, standpipe connections are required on each side of stages with an area greater than 1,000 ft2 (780 CMR 905.3.4). Existing buildings are exempt from these requirements unless the work area includes exits shared by more than one tenant and is located more than 50 feet above the lowest level of fire department access (MEBC 804.3).

Currently, the existing building does not trigger this criterion and a standpipe system would only be required if the project impacts (1) building height, (2) fire department access height, or (3) a gut renovation to the stage or expansion of the stage. However, given the installation of a new sprinkler system, consideration should be given to installing a new standpipe system at the stage and other locations where deemed necessary by the fire department.

7.4.3 FIRE ALARM AND DETECTION SYSTEM

The existing building is currently served by an emergency voice/alarm communication fire alarm system that was recently installed (within past 4 years). Smoke detection is provided throughout the building including within corridors and common spaces. The system is permitted to remain. Within the renovated areas, it is expected that devices will have to be relocated/replaced as necessary. The existing fire alarm system will include new waterflow and tamper switches associated with the installation of the sprinkler system. It should be confirmed by the fire alarm service vendor that the existing system has spare capacity to accommodate new fire alarm points.

7.5 STANDBY / EMERGENCY POWER SYSTEMS

An emergency power system is required to serve the following building features (IBC 2702.2):

- Emergency voice/alarm communication in accordance with IBC 907.5.2.2.4.
- Exit signage in accordance with IBC 1013.6.3.
- Means of egress illumination in accordance with IBC 1008.3.5.

The existing building is served an emergency generator, which is continued to be used provided it is in good working order and adequately sized to accommodate the above systems.

7.6 MEANS OF EGRESS

The following section is intended to note major means of egress requirements that are applicable to the project and includes areas of existing noncompliance based on the new construction requirements that are required to be addressed.

The existing building is served by numerous exits to grade and numerous exit stairs. The occupant load and exit capacity analysis in Appendix B illustrates the evaluation of the existing building's number and capacity of exits.

7.6.1 CORRIDORS

Corridors were noted to be constructed of substantial noncombustible construction. Although not labeled, doors were similarly constructed of substantial construction with wired glass vision panels.

As the building will be required to be sprinklered as part of the project, corridor ratings are not required to be maintained. Phasing of sprinkler protection, and removal of corridor ratings will be required to be approved by the AHJ.

7.6.2 DOORS

A majority of the existing cross corridor doors were measured to be 29-30" in clear width. In addition, multiple stair enclosure doors were measures to have clear widths of 29.5" – 31.5". All doors that are replaced or provided new as part of the project are required to comply with the following requirements:

- Minimum of 32 inches in clear width;
- Are not permitted to have a swinging door leaf greater than 48 inches in nominal width;
- Where doors are provided in pairs without a mullion, at least one door is required to have the necessary clear width. If a mullion is provided, both doors are required to have the required clear width (780 CMR 1010.1.1).

7.6.3 GUARDS

D. EVALUATION OF BUILDING CODE

The existing guards provided along stair openings and convenience openings do not comply with new code requirements, based on heights of 35.5"-36" (less than the 42" required) and having large gaps.

As non-compliant guards are a hazardous condition that may be cited by the AHJ, it is recommended that these guards be addressed regardless of project scope. Where guards or handrails are replaced, they are required to be comply with the requirements for new construction, as outlined below.

In new construction, guards are required to be provided adjacent to every walking surface that has a drop-in elevation of more than 30" within 36", measured horizontally, from the edge of the walking surface (780 CMR 1013.1). Where new, such guards are required to be designed to resist the passage of a sphere 4 inches in diameter (780 CMR 1013.3). Guards are required to have a height of 42" above the floor surface (780 CMR 1013.2).

Figure 5: 29.5" Wide Cross Corridor Doors

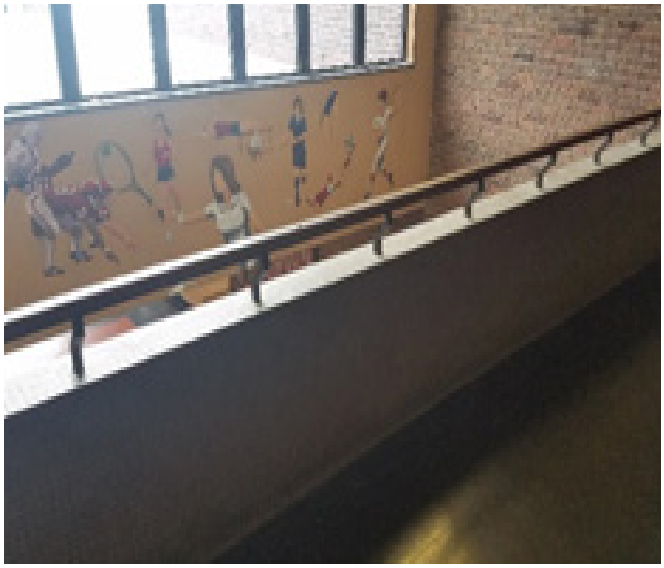


Figure 6: 2-Story Opening with 35.5" Guard

7.8 PLUMBING FIXTURES

The provision of existing plumbing fixtures is required to be analyzed as part of the renovation/addition project based on reconfigurations to toilet rooms and the function of individual spaces and occupant loads. Compliance with the new construction requirements of 248 CMR will be required.

7.8.1 PROGRAM OCCUPANT LOAD & BUILDING USES

Separate plumbing fixtures for males and females are required to be provided in sufficient number to accommodate the maximum expected program occupant load on each floor (248 CMR 10.10(18)(a)(ii)).

It is our understanding that the high school is also used for municipal assembly functions in addition to its normal operation as an educational building. The plumbing fixtures provided are required to be in sufficient quantity and arrangement to adequately serve each of these conditions.

For the educational function, separate plumbing fixtures for (1) building staff (teachers), (2) kitchen staff, and (3) students are required to be provided.

7.8.2 QUANTITY OF FIXTURES

The number of fixtures required is determined based on the factors contained in 248 CMR 10.10(18) Table 1 for each

	Toilets		Urinals	Lavatories (each sex)	Drinking Fountains
	Female	Male			
Students	1 / 30	1 / 90	1/90	1 / 90	1 / 75
Teachers	1 / 20	1 / 25	33% Sub. Permitted	1 / 40	-
Kitchen Staff[6]	1 / 20	1 / 25	33% Sub. Permitted	1 / 40	-

Table 1: Plumbing Fixture Factors - Educational Use

	Toilets		Urinals	Lavatories (each sex)	Drinking Fountains
	Female	Male			
Assembly	1/50	1/100	50% Sub. Permitted	1/200	-

Table 2: Plumbing Fixture Factors - Assembly Use Table 1: Plumbing Fixture Factors - Educational Use

of the primary uses under consideration. It is presumed that the educational and public assembly functions will not occur simultaneously, so the fixtures are required to be sized for each function, with the more restrictive governing.

7.8.3 FIXTURE ARRANGEMENT

- Students are required to be able to reach the required fixtures within a travel distance of 300 feet (248 CMR
- 10.10(18)) and are not permitted to travel up or down a level.
- Staff are permitted to travel up or down one level to reach required fixtures provided they are within a 300 foot travel distance (248 CMR 10310(18)(i)(b)).
- Assembly occupants are required to be able to reach the required fixtures within a travel distance of 300 feet (248 CMR 10.10(18)) and are not permitted to travel up or down a level.

7.8.4 ACCESSIBILITY OF FIXTURES

The High School is required to be designed to be accessible in accordance with 521 CMR (see Accessibility section). The existing and new toilet rooms should be designed to be fully accessible, which may impact the number of fixtures that can be provided within each existing restroom footprint.

7.9 ENERGY

The proposed work associated with the addition is required to comply with the Commercial provisions of the 2015 International Energy Conservation Code (IECC) with Massachusetts Amendments.

Additions, alterations, renovations, or repairs to an existing building, building system, or portion thereof are required to conform to the provisions of the 2015 IECC as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with the 2015 IECC (IECC C501.4). Additions, alterations, renovations or repairs are not permitted to create an unsafe or hazardous condition or overload existing building systems.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

D. EVALUATION OF BUILDING CODE / Appendix A

Belmont High School 8/30/2017

Project #: 175593 Calc. by: CL | Check by: CN

HEIGHT AND AREA CALCULATION

For the purposes of this height and area calculation, the building has been evaluated as a non-separated mixed use occupancy.

1 | BUILDING INFORMATION

Construction Type	Type IB
Footprint Area [sf]	170,000
Aggregate Area [sf]	323,000
Number of Stories Above Grade	2
Building Height [ft]	43.5

Sprinkler Protected?	(●) YES	( ) NO
Sprinklers used in place of 1 hour FRR?	( ) YES	(●) NO

2 | FRONTAGE CALCULATION

F =	1,403	Building perimeter that fronts on a public way or open space having 20' open min. width [ft]
P =	2,800	Perimeter of entire building [ft]
W =	20	Width of public way or open space in accordance with 506.2.1 [ft]
Frontage Increase =	17%	= {F/P - 0.25}W/30

3 | BUILDING USE GROUPS

Main Occupancy Use Groups Present

Use Group
A-3
E

4 | HEIGHT AND AREA CALCULATION

Building Area - Type IB Construction

Use Group	Base Allowable Area [sf] (T503)	Sprinkler Increase [sf] (506.3)	Frontage Increase [sf] (506.2)	Total Allowable Area [sf]
Use Group A-3	UL	-	-	UL
Use Group E	UL	-	-	UL

Most Restrictive Allowable Footprint Area [sf]	Actual Footprint Area [sf]	
UL	170,000	**COMPLIANT**

Allowable Footprint Area [sf]	Number of Stories Factor (506.5)	Allowable Aggregate Area [sf]	Actual Aggregate Area [sf]	
UL	2	UL	323,000	**COMPLIANT**

Number of Stories - Type IB Construction

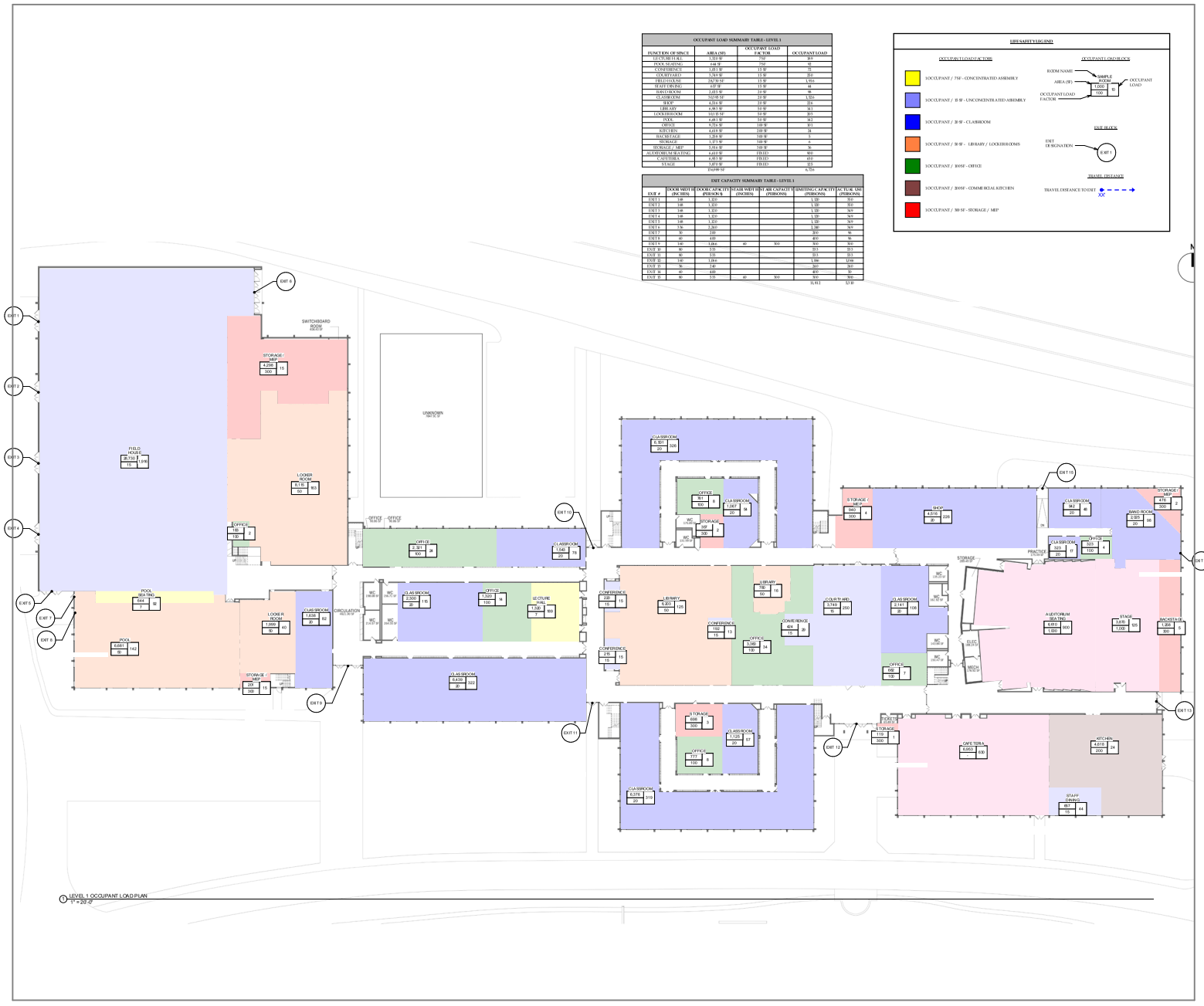
Use Group	Base Allowable Number (T503)	Sprinkler Increase (504.2)	Total Allowable Number [stories]
Use Group A-3	11	1	12
Use Group E	5	1	6

Most Restrictive Number of Stories	Actual Number of Stories	
6	2	**COMPLIANT**

Building Height - Type IB Construction

Use Group	Base Allowable Height [ft] (T503)	Sprinkler Increase [ft] (504.2)	Total Allowable Height [ft]
Use Group A-3	160	20	180
Use Group E	160	20	180

Most Restrictive Allowable Height [ft]	Actual Height [ft]	
180	43.5	**COMPLIANT**



CODE RED CONSULTANTS

Code Red Consultants, LLC
© 2016 Code Red Consultants, LLC. All Rights Reserved.
158 Turnpike Road, Suite 200
Southborough, MA 01772
Phone - (617) 500-7670
Fax - (617) 500-2074
www.crfire.com

No.	Revision	Date

Compiled: Scale: As indicated

Project Description: Belmont High School

Location: 221 Concord Ave., Belmont, MA 02478

Design: CL

Drawn: CL

Review: CN

Date: 9/1/17

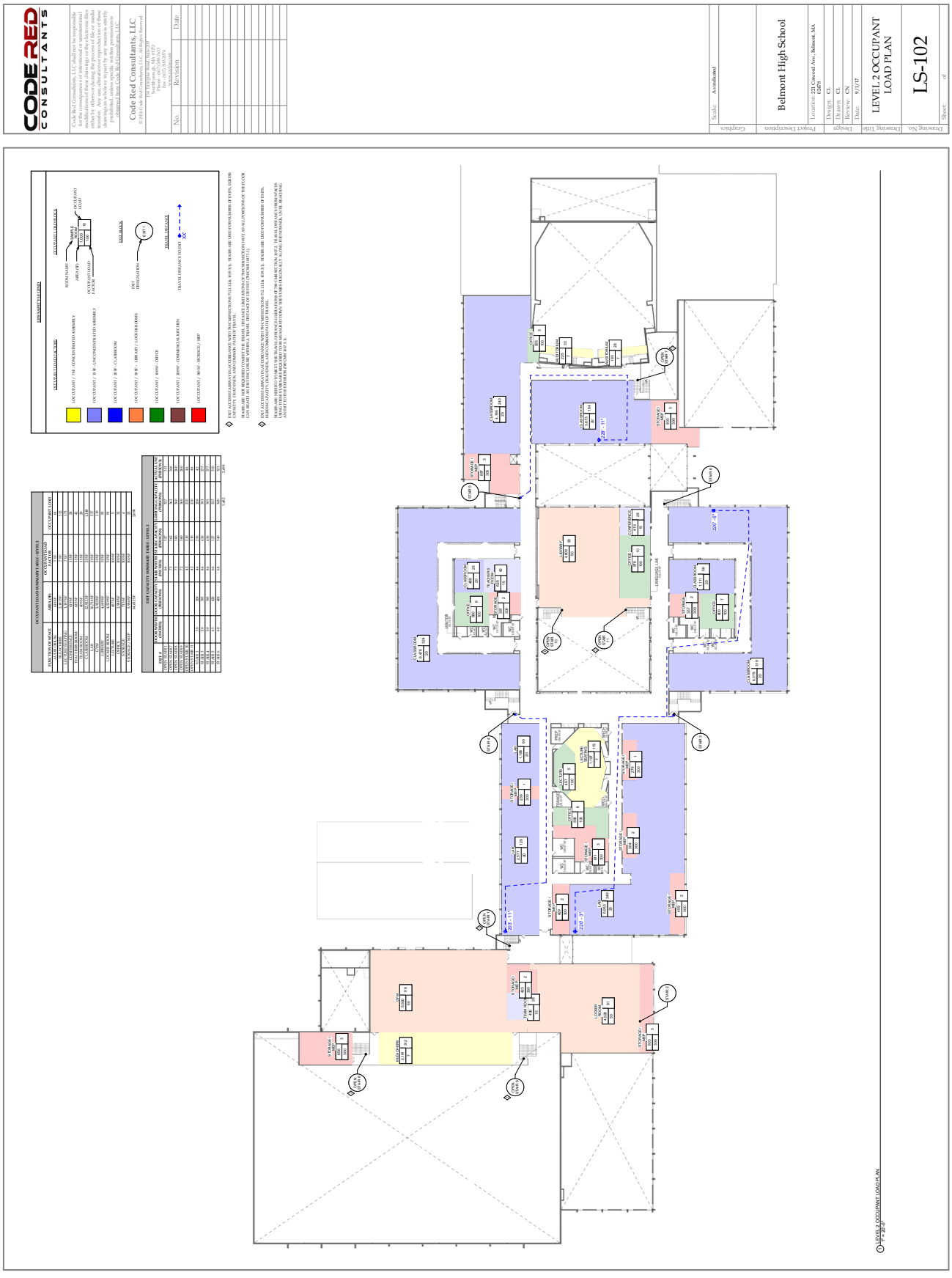
Drawing Title: LEVEL 1 OCCUPANT LOAD PLAN

Drawing No.: LS-101

Sheet: of

3.1.4 - EVALUATION OF EXISTING CONDITIONS

D. EVALUATION OF BUILDING CODE / Appendix B



E. EVALUATION OF ACCESS CODE

EXECUTIVE SUMMARY: ACCESSIBILITY

If the work costs more than 30% of the full and fair cash value of the building ($9,870,625), then all public portions of the building are subject to the requirements of 521 CMR. The following provides a high-level overview of the level of accessibility in the existing building:

- The main entrance is accessible
- A majority of the toilet rooms are not accessible. Signed accessible toilet rooms are not fully compliant.
- The elevator is not accessible
- The courtyard has no accessible access/egress
- The theater is not provided with accessible seating
- An accessible route is not provided from the theater seating to the stage
- The tiered lecture hall is not provided with accessible seating
- Gymnasium bleacher seating on the mezzanine is not accessible
- Locker rooms are not accessible
- Numerous instances of non-accessible door hardware with knobs
- Many cross-corridor door opening widths are less than the required 32" minimum
- Stairs are generally not compliant as they have (1) abrupt nosings, and (2) non-compliant handrails due to shape, no extensions, etc.

Figure 7: Lecture Seating

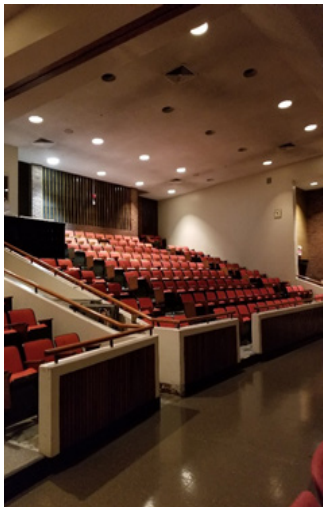


Figure 8: Auditorium Seating

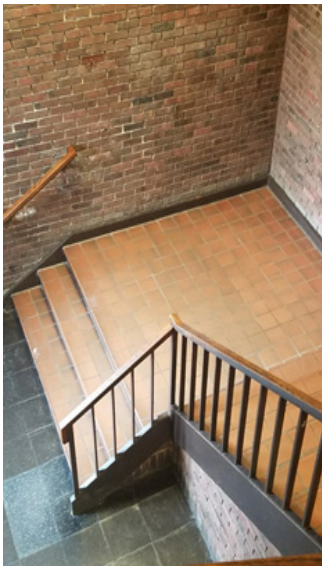


Figure 9: Typical Stair

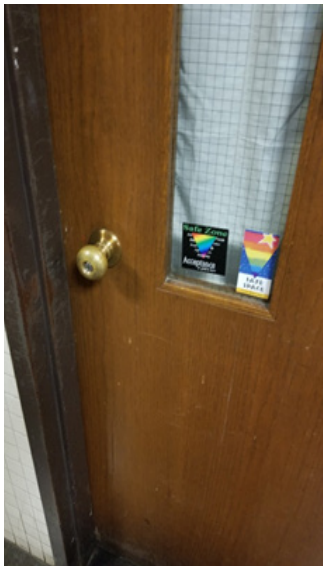


Figure 10: Door Knob on Corridor Door

1 521 CMR APPLICATION

The requirements of 521 CMR are limited to buildings or portions thereof that are open to the public. Employee-only spaces are exempt from these requirements. Note that employee spaces within the library that employ students will be considered as "public".

521 CMR Section 3.3 contains the following scoping requirements for projects in existing buildings. The costs referred to in the scoping requirements below are cumulative for all projects to the building within a rolling 36-month period:

3.1.4 - EVALUATION OF EXISTING CONDITIONS

E. EVALUATION OF ACCESS CODE

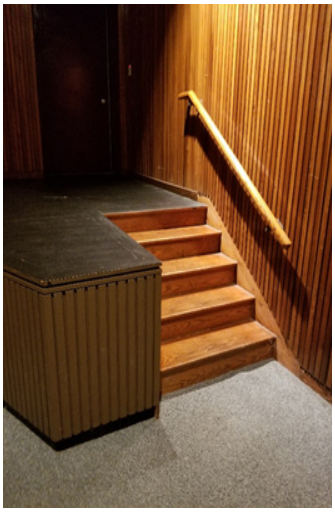


Figure 11: Stage Access

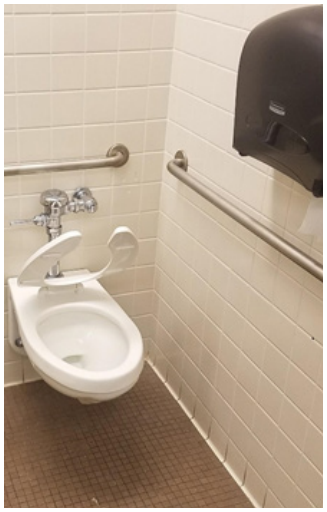


Figure 12: Toilet Paper Dispenser above Grab Bar

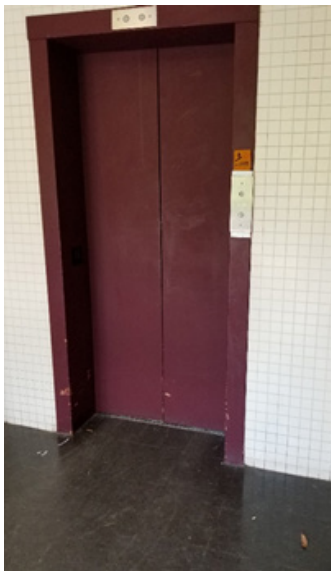


Figure 13: Elevator

Figure 14: Courtyard

- If the work is less than $100,000, then only the work being performed is required to comply with 521 CMR.
- If the work costs more than $100,000 but is less than 30%of the full and fair cash value of the building then in addition to the working being performed, the following accessible features are also required to be provided in the building:
  - Accessible entrance
  - Accessible toilet room
  - Accessible drinking fountain
  - Accessible public telephone (if provided)
- If the work costs more than 30% of the full and fair cash value of the building, then all public portions of the building are subject to the requirements of 521 CMR.

The assessed building value is $31,586,000 , as shown on the Town of Belmont Assessor's website. The Massachusetts Department of Revenue has assigned Belmont an assessment ratio of 0.96 . Thus, 30% of the full and fair cash value is $31,586,000 / 0.96 x 30% = $9,870,625. It is expected that the cost of the project will exceed this 30% value.

2 ADA APPLICATION

Although not enforced by any authority having jurisdiction on the project, the requirements of ADA are also applicable and enforced through civil litigation only.

The Americans with Disabilities Act Accessibility Guidelines (ADAAG) requires that altered portions of an existing building are required to be readily accessible to and usable by individuals with disabilities to the maximum extent feasible (ADAAG 36.402(a)(1)). Further, alterations to primary function areas should be made such that the level of accessibility, including the path of travel to the space, is made accessible to the maximum extent feasible. When determining if the upgrade is feasible, the ADAAG requirements state that the upgrade to the path of travel is disproportionate to the project when the cost to perform the work exceeds 20% of the cost of the alteration to the primary function area. In choosing which accessible elements to provide if the cost is disproportionate, priority

E. EVALUATION OF ACCESS CODE

should be given to those elements that will provide the greatest access, in the following order:

- An accessible entrance
- An accessible route to the altered area
- At least one accessible restroom for each sex or a single unisex restroom
- Accessible drinking fountains
- Accessible telephones

3 EXISTING CONDITIONS

Based on the results of the survey performed by Code Red Consultants, the following provides a high-level overview of the accessibility of the building:

- The main entrance is accessible
- A majority of the toilet rooms are not accessible. Signed accessible toilet rooms are not fully compliant (e.g. door clearances, toilet paper dispenser locations).
- The elevator is not accessible
- The courtyard has no accessible access/egress
- The theater is not provided with accessible seating
- An accessible route is not provided from the theater seating to the stage
- The tiered lecture hall is not provided with accessible seating
- Gymnasium bleacher seating on the mezzanine is not accessible
- Locker rooms are not accessible
- Numerous instances of non-accessible door hardware with knobs
- Many cross-corridor door opening widths are less than the required 32" minimum
- Stairs are generally not compliant as they have (1) abrupt nosings, and (2) non-compliant handrails due to shape, no extensions, etc.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Civil Assessment

Figure 1: Catch Basin along the north of the School

Figure 2: Sewer Manhole along the south of the School

Figure 3: Fire Hydrant along the north of the School

Nitsch Engineering has performed research of the existing site conditions and anticipated site permitting requirements for Belmont High School located on Concord Avenue in Belmont, Massachusetts. David Conway, PE of Nitsch Engineering conducted a site visit on August 28, 19 and September 1, 2017. Information included in the report was also based on compiled record drawings, MassGIS data, Town GIS data, and other documentation gathered by Nitsch Engineering. The record drawings include Plumbing plans, Site Plans and Details from 1968.

A summary of our observations and findings is described below.

GENERAL SITE DESCRIPTION

The existing Belmont High School is located at 221 Concord Avenue in Belmont, Massachusetts. The site is approximately 38 acres including the existing main building, parking areas, Claypit Pond, and associated walkways. The site is bounded by commercial properties to the west, MBTA Fitchburg line to the north, existing residences and Concord Avenue to the southeast, existing residences and Underwood Street to the southwest, and existing commercial buildings to the east. The site slopes generally south to Claypit Pond.

EXISTING SITE UTILITIES

STORM DRAINAGE

Stormwater from the site appears to be collected by three separate drainage systems. All three drainage systems collect stormwater from roof drains and catch basins around the site and discharge into Claypit pond via one of three headwalls.

Record drawings from 1968 indicate the western system collects stormwater from catch basins and roof drains via 6-, and 8-inch lines. These lines combine into a 10-inch line which continues south towards Claypit pond and increases to a 15-inch line and then an 18-inch line. This 18-inch line then reaches headwall #3 which discharges directly into Claypit Pond.

The central drainage system collects stormwater from catch basins, roof drains, and drains inside the central open air courtyard located inside of the building via 10-,12-, and 15-inch lines which continue south towards a central manhole which outlets to Headwall #2 and discharges to Claypit Pond.

The eastern drainage system collects stormwater from catch basins in the parking lot and roof drains from the existing school

via 10-, and 12-inch lines which continue south and increases to a 15-inch and then an 18-inch line which outlets to Headwall #1 and discharges to Claypit Pond.

Additionally, Southwest of the Claypit Pond in Concord Avenue there is a 15-and 18-inch Storm main

A 13-foot by 5-foot culvert carries stormwater from off-site from the southwest and into Claypit Pond which connects a 10-foot by 4-foot culvert which carries excess water from Claypit Pond off-site to the east. The culverts and pond would have an impact on site development, acting as almost a southern boundary for a new building or addition.

There appears to be no stormwater quality measures implemented on the site. There are no known detention, retention, or infiltration systems on the site.

SEWER

The sewer system is maintained by the Wastewater Treatment Division of the Department of Public Works.

Record drawings indicate that a 24-inch sewer main runs west to east across the front of the building. This 24-inch main carries sewer flows from upstream neighborhoods and also is the connection point for the high school's multiple existing sewer services. A 6-inch service exits the building at the southwest and ties into a sewer manhole located in the lawn in front of the pool. Two more 6-inch sewer service exit the building on the south face and tie into two other sewer manholes in the landscaped area in front of the school. Two 5-inch services exit the building on the south face on the eastern end, one wyes into the 24-inch sewer main in the school driveway and the other ties into another sewer manhole in school driveway. The 24-inch sewer main is located roughly under the landscaped area between the building and the sidewalk. Once past the eastern end of the building the 24-inch sewer turns north through the eastern parking lot, then turns east again, running under the tennis courts.

WATER

Water for the Town of Belmont is obtained from the Massachusetts Water Resources Authority (MWRA).

Water to the existing building appears to be serviced from a single 6-inch water lines on the Northwest face of the building. Record drawings indicate the 8-inch water main north of the building services three hydrants.

Figure 4: Fire Hydrant along the west of the School

Figure 5: Fire Hydrant along the north of the School

Figure 6: Gas meter along the north of the School

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Civil Assessment

Figure 7: Pavement

Figure 8-1: Pavement

Figure 8-2: Pavement

NATURAL GAS

Record drawings indicate a 6-inch gas main in Concord Avenue and an existing 3.5-inch service to the existing school. The gas service enters the building at the northwest face.

Refer to the MEP (Mechanical, Electrical and Plumbing) documentation for further information on gas services.

ELECTRICAL

Record drawings from 1968 indicate that electrical service to the school is served through a single transite conduit which crosses the parking lot and the north side of the school extending to the Northwest corner of the existing building.

Light poles are located East of the building in the parking lot, and also along the road south of the school. Some lights are provided along the faces of the building.

Refer to the MEP documentation for further information on the electrical and telephone services.

SITE CONDITIONS AND OPERATIONS

SOILS

Based on the Natural Resources Conservation Service (NRCS) Middlesex County Soil Survey, Issued September 2016, the site of the Belmont High School property is classified as Urban land wet substratum, Udorthents loamy, and Scio very fine sandy loam.

The NRCS does not provide Hydrologic Soil Group (HSG) classifications for the Urban land wet substratum, or Udorthents loamy soils. The Scio very fine sandy loam is classified as HSG 'B/D'.

Geotechnical investigations, including test pits, should be perfomed during the design stage to understand groundwater elevations and soil profiles for the puropose of stormwater management.

PAVEMENT

Pavement was assessed during the 2017 site visit. Images from google street view suggests that the parking lot was resurfaced in 2013. The asphalt pavement the parking lot, front drive, and walkways adjacent to the school were observed to be in fair condition with some cracking and degradation. The pavement in the driveway to the rear of the school was in poor condition. Curbing on the site is granite, and bituminous concrete in the

southwest parking lot. Bituminous concrete curbing appears to be in fair condition. Granite curbing appears to be in good condition. It is possible that the existing curb material is suitable for reuse.

PRELIMINARY PERMITTING CONSIDERATIONS

WETLANDS PROTECTION ACT (310 CMR 10.00)

The Wetlands Protection Act ensures the protection of Massachusetts' inland and coastal wetlands, tidelands, great ponds, rivers, and floodplains. It regulates activities in coastal and wetlands areas, and contributes to the protection of ground and surface water quality, the prevention of flooding, and storm damage and the protection of wildlife and aquatic habitat.

A review of the Massachusetts Department of Environmental Protection (MassDEP) wetland layers available on the Oliver Map provided by Massachusetts Geographic Information System (MassGIS) indicates that the site has "Land under Water Bodies and Waterways" which is classified as a Wetland.

The Town of Belmont Conservation Commission shall regulate activities within a 100-foot buffer of all wetland resource areas, including bank, Isolated and Bordering Vegetated Wetlands, so as to protect the wetland resource area values as indicated in the Town of Belmont Wetlands Protection By-Law and the Wetlands Protection Regulations. In addition, the Conservation Commission further limits activities within a Twenty-Five feet (25') from the resource area boundary. Activity in this area is limited to planting of native and indigenous vegetation; pruning and rountine maintenance of existing vegetation; maintenance and replacement of existing landscaped beds; removal of invasive plant species; maintenance of existing paths; maintenance of existing utilities and stormwater management systems; and improvements to the wildlife habitat values of the property.

SURFACE WATER SUPPLY PROTECTION (310 CMR 22.20)

The MassDEP ensures the protection of surface waters used as sources of drinking water supply from contamination by regulating land use and activities within critical areas of surface water sources and tributaries and associated surface water bodies to these surface water sources.

A review of the MassDEP resource layers available on the MassGIS, appear to indicate the site is NOT located within a Surface Water Supply Protection Zone.

Natural Heritage & Endangered Species Program

A review of Natural Heritage and Endangered Species Program (NHESP) data, dated August 1, 2017, published in the 13th Edition of the Massachusetts Natural Heritage Atlas and available on the Oliver Map provided by MassGIS Online, indicates that the Belmont High School site are NOT Priority Habitats of Rare Species or Estimated Habitats of Rare Wildlife; or located in an NHESP Natural Community.

The Oliver Map provided by MassGIS Online indicates majority of the site comprised of the existing high school is considered non-protected Open Space. However, the area of the site around Clay pit pond is considered Protected Open Space. Non-protected and protected Open Space includes recreational land such as town parks, playing fields, and school fields.

FLOOD PLAIN

Based on the Flood Insurance Rate Map (FIRM), Community Panel Number 25017C0418E dated June 4, 2010, the existing High School site is located mostly within Zone X (Areas determined to be outside the 0.2% annual chance floodplain). The area immediately around Clay Pit Pond is located in Zone AE (Areas determined to be within the 1% annual chance or greater floodplain).

USEPA NPDES

Construction activities that disturb more than one acre are regulated under the United States Environmental Protection Agency's (EPA) National Pollution Discharge Elimination System (NPDES) Program. In Massachusetts, the USEPA issues NPDES permits to operators of regulated construction sites. Regulated projects are required to develop and implement stormwater pollution prevention plans in order to obtain permit coverage.

STORMWATER MANAGEMENT

The Town of Belmont Stormwater Management By-law indicates that any activity that results in any work affecting the Town of Belmont Sanitary Sewer System or the Storm drainage systems requires a Stormwater Management and Erosion Control Permit which will include an Operation and Maintenance plan and associated fees.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Landscape Assessment

We visited the site on August 28, 2017 to observe existing site conditions for preparation of this report. In addition to information collected during our site visit, we subsequently reviewed other existing conditions documentation provided by Perkins + Will and other sources. This report excludes utilities and drainage which were reviewed separately by Nitsch Engineering.

The existing Belmont High School site is located at 221 Concord Avenue with residential neighborhoods surrounding the site and a few commercial properties of the east and west edges. The dominant site feature is 13 acre Claypit Pond.

The high school site consists of three parcels totaling approximately 56.5 acres. The primary 38.9 acre parcel at 221 Concord Avenue contains the high school building, vehicular circulation, and parking.

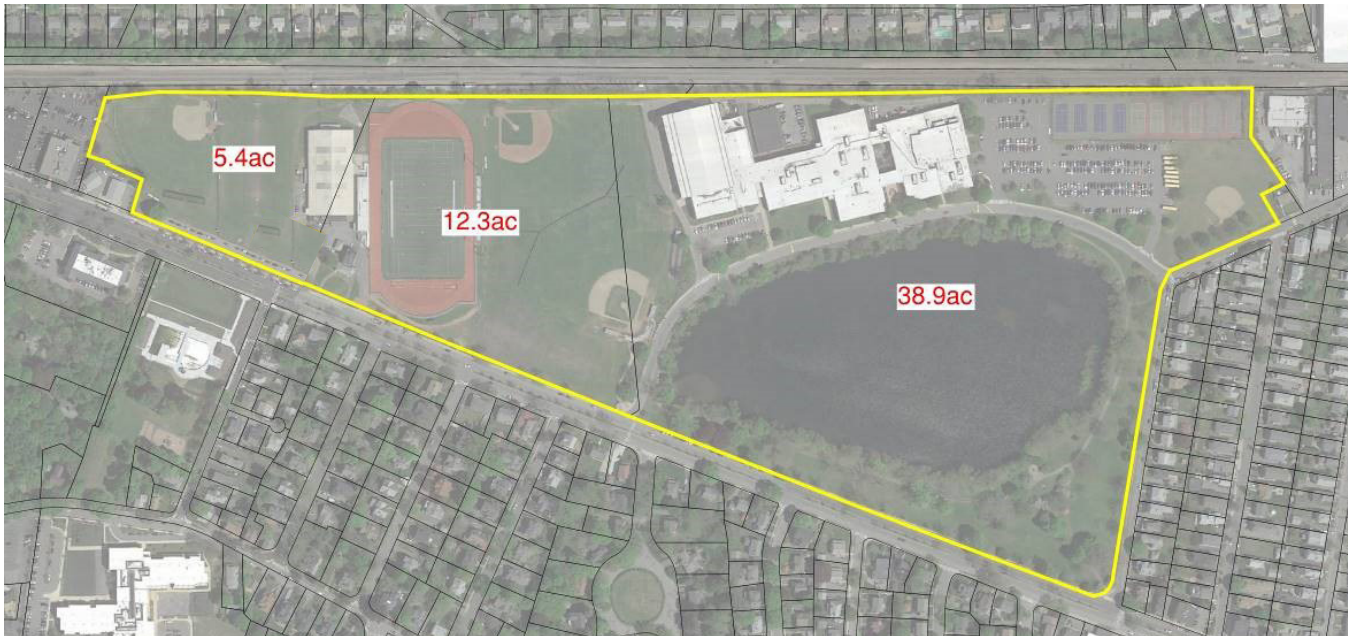
Athletic fields are concentrated on two parcels (12.3 ac and 5.4 ac) west of the school building. Tennis courts and a softball field are adjacent to the main school parking area to the east of the school building. The MBTA railroad right-of-way is located on the entire north edge of the site.

This report is limited to summarizing our observations regarding existing conditions and specifically excludes zoning and regulatory areas affecting the 56.5 acre site that are identified separately on the existing conditions site analysis plan.

SITE LAYOUT & FUNCTION

The existing school building is located on higher ground north of Claypit Pond towards the rear (north) of the site. The primary vehicular (car and bus) circulation and drop-off is a one-way loop from east (Hittinger Street) to west (Concord Avenue). The main pedestrian entrances are the south sides of the building. Buses drop off and pick up students along the south side of the building. The site has three primary parking areas. The largest parking lot (284 spaces) is located to the east of the school building. Small lots are located to the south (38 spaces) and north (21 spaces) of the building. Fifteen bus parking spaces are located in the west lot. All parking areas contain accessible parking.

The western portion of the site is dominated by the school athletic facilities and an indoor skating rink. Fields include two baseball fields (one with bleacher seating) with rectangular field layouts (for soccer and field hockey) overlapping their outfields, a rugby/ football practice field, and a running track with a synthetic turf (football) field interior, home and away bleachers and sports lighting. An indoor skating rink in poor condition and a football field house separate these fields from a second soccer/lacrosse and a softball field further west. Ten tennis courts are located adjacent to the east parking area and a second softball field is located further east of the primary east parking area.



3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Landscape Assessment

PHYSICAL CONDITIONS

Following is a summary of our observations with representative photographs.

Main Driveway Entrance to the school site looking east toward Hittinger Street (left) and west toward the school building (right)

Primary school building entry plaza

Looking south down Underwood Street (left) and east down Hittinger Street (right)

Primary parking lot east of the school building looking northeast to the tennis courts (left) and west to the school building (right)

Bus parking (left) and softball field east of the school building (right)

Service area (left) and secondary entrance (right) on east side of school building

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Landscape Assessment

Entrance to skating rink (left); south face of skating rink structure (right)

Modular building on north side of school building (left); electrical transformer on north side of school building with railroad embankment to the right (right)

Parking area on north side of school building (left); patched holes in north boundary fence between school building and MBTA right-of-way (right)

Drive on west side of building between fieldhouse and athletic fields (left); No exterior accessible entrance to fieldhouse (right)

Looking northeast toward school building from Brendan Grant Memorial Baseball Field (left); bleacher and dugouts at Brendan Grant Memorial Baseball (right)

Football/rugby field (left); Looking west toward Harris Field and White Field House (right)

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Landscape Assessment

Entrance to skating rink (left); south face of skating rink structure (right)

Home bleacher, press box with elevator (to remain) with skating rink to west. There are no public restrooms associated with Harris Field bleachers (left); Skating rink structure in poor condition (right)

Soccer/lacrosse field and Varsity softball field (with lighting) west of skating rink (left and right)

Multi-use synthetic turf field and track (to remain) in good condition (left); Looking west toward visitor bleacher, home bleacher and press box, sports lighting, and skating rink beyond (right)

Parking lot at southeast corner of school building, fieldhouse pool dehumidifier (left); Looking south from parking lot toward Concord Avenue exit (right)

Bicycle parking and planting beds adjacent to batting cages (left); Looking east up drop-off loop, mature maples trees on left and vegetation obscuring views to Claypit Pond on right (right)

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Landscape Assessment

Sidewalk in poor condition looking east up drop-off loop (left and right); Informal footpath around Claypit Pond (right)

Granite school entry sign at east parking lot (left); 10 tennis courts on north property line adjacent to east parking lot, lights removed/not working (right)

ACCESSIBILITY

Access for disabled persons is provided on the south, east, and north sides of the main school building with designated parking and accessible routes to the building from the south, east, and north parking lots. There are 10 accessible parking spaces in the south (2), east (6), and north (2) lots. There is also an accessible drop off south of the main building. All egress doors will need to provide accessible routes away from the building.

With the exception of the new multi-sport synthetic turf field and track, there are limited or incomplete accessible routes to existing athletic facilities. Brendan Grant Memorial Field has an accessible route to the bleacher from an accessible parking space on Concord Avenue, but there is no accessible route to the dugouts.

Accessible parking in east parking lot (left); Sidewalk condition is not accessible (right)

ATHLETIC FACILITIES

The current athletic facilities are identified on the diagram below.

1. Softball (Spring)
2. Soccer (Fall) Lacrosse (Spring)
3. Track and Harris Field multi-purpose Synthetic Turf
4. JV Baseball (Spring)
5. Field Hockey (Fall)
6. Brendan Grant Memorial – Varsity Baseball Field (Spring)
7. Soccer (Fall)
8. Football (Fall) and Rugby
9. Tennis
10. JV Softball (Spring)

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Landscape Assessment

With the exception of the multi-purpose synthetic turf field which was renovated in 2014, the fields are generally in average condition. All of the natural grass fields are irrigated except the JV softball field. The water supply and condition of the irrigation systems is unknown. There are 10 tennis courts, all of which need to be renovated. Four courts recently received a cosmetic short-term resurfacing and the remaining six courts are in poor condition. The tennis program needs may be met with courts elsewhere in town if tennis does not fit in the preferred schematic design for the high school project. Track program hosts dual meets. Discus is thrown on the lacrosse field. Shot put throwing area is north of the rink. Long, triple high jumps and pole vault are inside ends of track. Javelin is thrown on Harris Field. The White Field House houses football locker rooms and Recreation Department offices, but does not conform to current codes. The Recreation Department stores equipment at the rink.

OTHER TOWN PROJECTS

SKATING RINK

Proposals for replacing the failing indoor skating rink show the need for a larger building utilizing a portion of the school site. Planning efforts for the school project will need to consider the space needs for the future rink building, access and supporting facilities.

COMMUNITY PATH

A community path is being planned with a potential need to utilize a strip of land along the north side of the site abutting the MBTA railroad between Alexander Street and the east end of the site. This path intended to be a shared-use resource for walkers, joggers, bicyclists, in-line skaters, and other non-motorized forms of mobility would connect Belmont into a growing network of walking and cycling routes around Boston.

MULTI-GENERATIONAL WALKING PATH

The informal earth path within the flood-prone landscape around Claypit Pond is a 1,000 meter loop used by the Belmont High School cross country program and the general public. Plans for improving the pathway, veteran's memorial and water access points have been prepared and improvements on the Concord Avenue side are being implemented. The school project site design is intended to connect with this pathway loop and amenities.

This report is intended to serve as a general summary of our observations and information provided to us regarding the program use and condition of the existing site facilities and to identify the other projects the Town has planned for this site.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Traffic Assessment

INTRODUCTION

Belmont High School is a 224,000-square-foot facility, built in 1970, serving about 1,350 high school students located in central-eastern Belmont. The school site is bordered by the MBTA commuter rail tracks on the north and Claypit Pond and Concord Avenue on the south. Enrollment ranges from about 300 to 350 students in each grades 9-12. There are about 140 full-time staff employed at the school. In addition to academic facilities, the campus contains a variety of athletic facilities, including a football field and running track, three baseball diamonds, two soccer fields, ten tennis courts, an ice rink, and surface parking areas for students, teachers, and staff.

Several current transportation and parking issues inhibit the ability of students, parents, teachers, and staff to access the school safely and efficiently. These issues include high demand for parking during school hours, long traffic queues in all directions during peak pickup/drop-off periods, dangers for people crossing by foot and by bike across routes with high speeds, and vehicular traffic queues, and unwanted parking spillover from vehicles not accommodated on-site onto neighboring residential streets. Anticipated school population growth could compound these issues if not effectively mitigated. Belmont High School is expected to grow from its current enrollment of 1,300 students to about 1,450 students by 2024. In addition, Belmont Public Schools has considered enrolling seventh- and eighth-grade students at Belmont High School to ease population pressures at other schools in the district. The following report documents and analyzes the existing transportation and parking issues at Belmont High School and its immediate environs, in order to set a baseline for potential future solutions and/or mitigation measures.

- This report contains observations and analyses of the following:
- School operations
- Vehicular access
- Parking inventory and utilization
- Walking, biking and transit facilities and observations
- Safety analysis
- Existing traffic performance analysis

SCHOOL OPERATIONS

School is in session each day between 7:35 am and 2:25 pm except for Wednesdays, which conclude at 1:25 pm. The High School's schedule is divided into flexible 25-minute blocks, called "MODs," and students are generally expected to be on campus between 8:00 a.m. and 2:00 p.m. The school is an open campus. However, most students arrive at 7:35 a.m. and depart at 2:25 p.m. Seniors are permitted, by school policy, to leave campus during this time if they have met the required academic criteria for the privilege. Juniors also have access to this policy, however only on their second semester.

All students must register their vehicle with the main office by fully completing a parking agreement. A parking sticker is then issued and should be displayed attached to the rear windshield on the passenger's side of the vehicle. Parking in the student spaces is on a first-come, first-serve basis through the December break. After December break, only seniors who have won parking passes in a school-wide lottery are allowed to park on campus. Students driving vehicles to school must park them in the student parking lot located at the east end of campus near the tennis courts. The field house parking lot, located immediately north of the School building, is for faculty use only during the school day.

According to conversations with the Belmont Police Department, the High School after-school activities most responsible for parking spillover on residential streets near campus are varsity football and varsity soccer games during the fall, in which there are eight and nine home games per season, respectively.

Students may purchase a bus pass subject to the availability of space and distance from school. School bus service is available to any student paying the fee, but few High School students use the service, most of them 9th graders who are not eligible for driver's licenses. Belmont schools have staggered schedules, and as a result, high school students are picked up and dropped off earliest, followed by middle school and elementary school students.

The annual fee for busing is $575 per student.1F An initial transportation fee is $287.50 per pupil, payable by check or online. All students who live less than 2.0 miles from their assigned school are required to pay the busing fee. All students requiring bus service, regardless of grade or distance from school, must register for busing online. School bus routes, as of 2017, are shown in Figure 1.

Following established Belmont Police Department practice, there are no crossing guards dedicated to the High School, under the expectation that high school students can navigate the Concord Avenue crossings independently. One crossing guard is dedicated to Burbank Elementary School at Concord Avenue & Baker Street.

In 2016, the Town of Belmont commissioned an Enrollment Study from Symmes Maini & McKee Associates. The study outlined enrollment projections through 2026 and anticipated 1,311 students by the 2017-2018 school year (Figure 2). Recent enrollment of about 1,350 in the current school year indicates that the High School is exceeding these enrollment targets by between two and three years, a trend that may cause traffic impacts from school population growth to similarly outpace earlier estimates.

VEHICULAR ACCESS AND TRAFFIC OPERATIONS

Belmont High School's vehicular access/egress pattern is designed such that all traffic entering the campus has a single point of access, at the intersection of Hittinger & Underwood Streets, and two points of egress, either at the High School's driveway at Concord Avenue, on the west side of the Claypit Pond, or via Hittinger & Underwood Streets.

Vehicle queues were observed during the morning traffic peak on October 2, 2017, between about 6:50 a.m. to 7:50 a.m., in the following locations:

- Brighton Street in the southbound direction, between the MBTA tracks and Hittinger Street., for vehicles turning right onto Hittinger Street
- Concord Avenue in the westbound direction, between the High School's egress driveway and Goden Street, for vehicles turning around the block to access destinations east of the High School (no left turn is permitted from the driveway onto Concord Avenue.)
- Concord Avenue in the eastbound direction, between Emerson Street and Underwood Street, for vehicles turning left onto Underwood Street

To get an up-to-date understanding of traffic volumes and congestion points in the vicinity of Belmont High School, turn movement counts (TMC's) were performed at the following six intersections:

- Blanchard Road at Hittinger Street (Two-way stop control)
- Concord Avenue at Underwood Street (Uncontrolled)
- Concord Avenue at High School Driveway/ Orchard Street (Two-way stop control)
- Concord Avenue at Goden Street (Two-way stop control)
- Concord Avenue at Leonard Street / Common Street (Uncontrolled)
- Concord Avenue at Blanchard Road / Griswold Street (Signalized)

TMCs collected at these intersections recorded traffic movements

Route	Start Time	First Stop	Last Stop
1 – AM only	6:45 AM	927 Concord Avenue	375 Acorn Park Drive
2 – AM only	6:45 AM	422 Trapelo Road	School & Elm
2 – PM only	2:50 PM (1:50 PM Wednesdays only)	Marlboro & Unity	Trapelo & Hull
3 – PM only	2:40 PM (1:50 PM Wednesdays only)	Trapelo & Waverley	Brookside & Lorimer
4 – AM only	6:45 AM	1 Fletcher Road	Pleasant & Stella
6 – AM only	6:45 AM	Lorimer & Vernon	Waverley & Shean

Source: Belmont Schools

Figure1: School Bus Route Information

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
9	285	280	307	314	341	300	335	332	348	344	356	350	370	400	370	373
10	256	273	281	314	304	337	296	331	328	344	340	352	346	366	395	366
11	280	256	276	285	311	298	335	295	329	326	342	338	350	344	364	393
12	285	275	256	270	281	311	294	330	291	324	321	337	333	345	339	359
LABBB	30	20	19	16	22	23	23	23	23	23	23	23	23	23	23	23
	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Total: 9-12	1136	1104	1139	1199	1259	1269	1283	1311	1319	1361	1382	1400	1422	1478	1491	1514

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Total: 9-12	1136	1104	1139	1199	1259	1269	1283	1311	1319	1361	1382	1400	1422	1478	1491	1514
Change		-32	35	60	60	10	14	28	8	42	21	18	22	56	13	23
% Change		-2.8%	3.2%	5.3%	5.0%	0.8%	1.1%	2.2%	0.6%	3.2%	1.5%	1.3%	1.6%	3.9%	0.9%	1.5%

Figure2: Belmont High School Enrollment Studies and Projections, 2010-2026

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Traffic Assessment

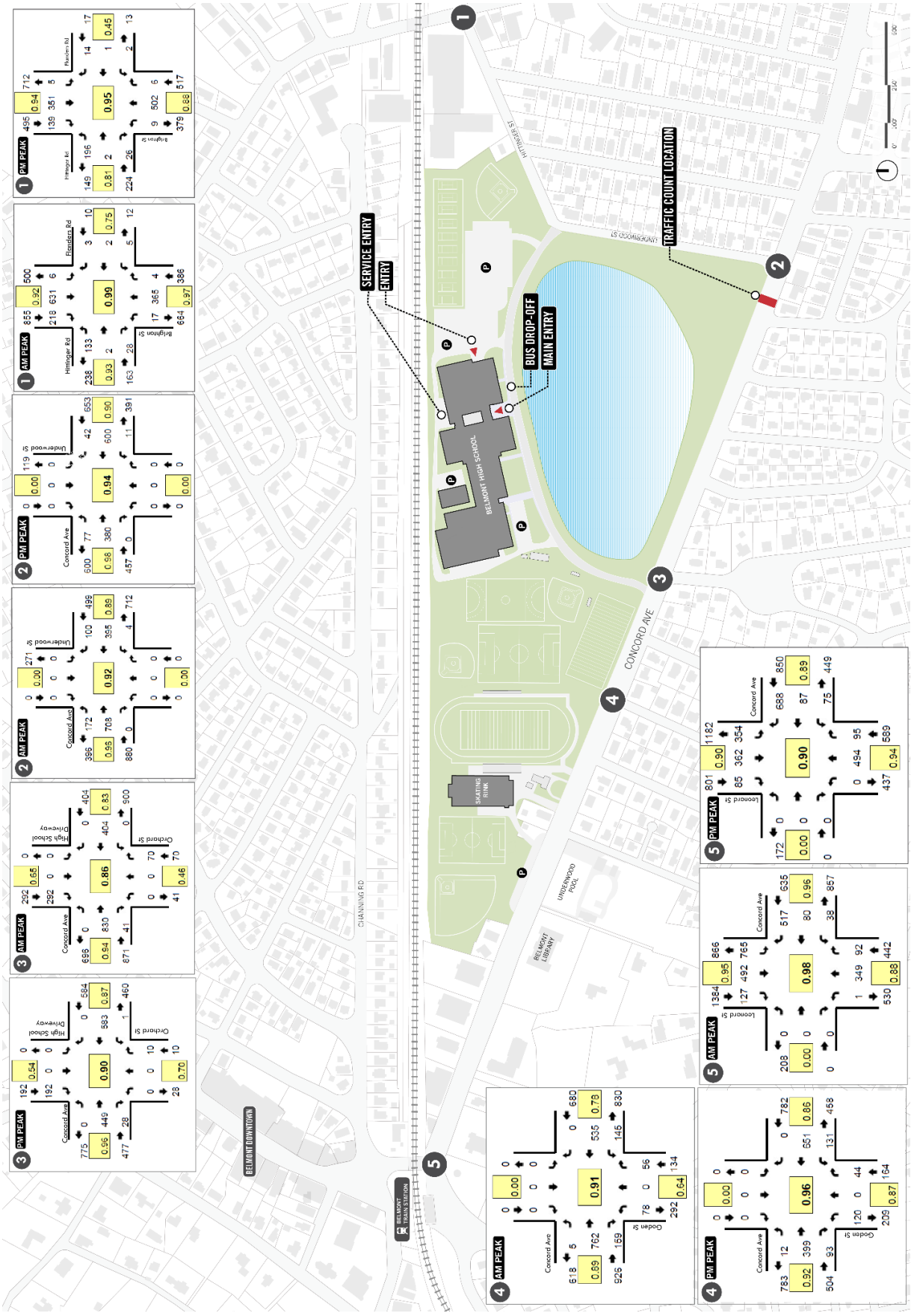


FIGURE 3: AM AND PM PEAK MOTOR VEHICLE TURNING MOVEMENTS

during AM and PM peaks for motor vehicles, bicycles, and pedestrians. TMC's were counted on Thursday, September 28, 2017, from 6:30 to 8:30 a.m. and 1:30 p.m. to 3:30 p.m. with 15-minute reporting intervals, to coincide with peak pickup and dropoff periods at the High School's typical bell schedule. AADT's were counted between September 27 and 28, 2017, for a 48-hour period with hourly reporting intervals. These counts were conducted at Concord Avenue, west of Underwood Street, and Brighton Street, north of Hittinger Street.

Traffic counts revealed that there is a roughly even split between vehicles entering the High School via Underwood Street (56%) and those entering via Hittinger Street (44%). Nearly nine out of ten (89%) of vehicles exit the High School via the main driveway onto Concord Avenue, where all vehicles are required to make a westbound right turn. Of these vehicles exiting onto Concord Avenue, half (44.5%) continue west to Belmont Town Center, while the other half turn left onto Goden Street, presumably to reach destinations east of the High School. Just 11% perform a loop in the primary student parking lot before exiting east via Underwood & Hittinger Streets to Brighton Street and points north. These access and egress patterns are shown in Figure 8.

The six study intersections above were evaluated for Level of Service (LOS) analysis. The following figures display AM and PM peak turning movements for each mode at each of these intersections. Due to the unique geometry of intersection 6, turning movements are included in a separate exhibit (Figures 4 to 6).

Using these observed turning movement counts, vehicular Level of Service and delay was calculated according to Highway Capacity Manual methods for each intersection. Results from this analysis are displayed in the table below. The majority of study intersections operate at an acceptable LOS D or above. While LOS D and C represent moderate amounts of delay, they are within a reasonable expectation of operations at urban intersections. Leonard Street and Concord Avenue, however, operates at LOS F during both AM and PM periods, indicating a failure to accommodate the observed levels of traffic. Concord Avenue at Goden Street also operates at LOS F during the PM peak, indicating that vehicles often queue at the Goden Street stop sign before turning left or right onto Concord Avenue.

Detailed descriptions of modeled traffic operations for each intersection are as follows:

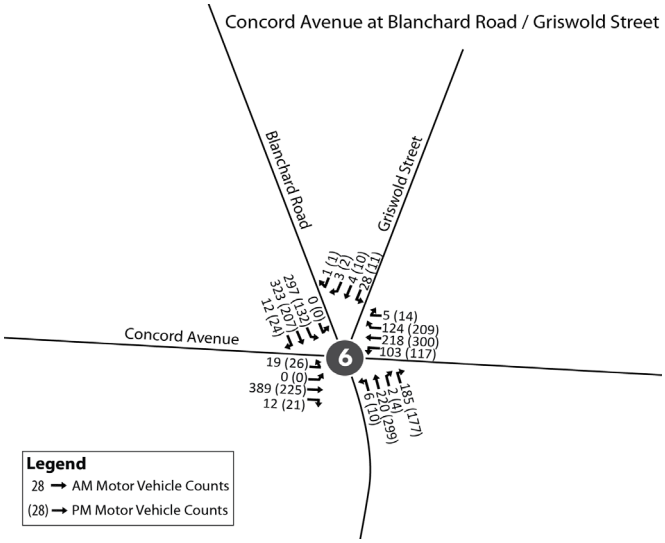


Figure 4: Concord at Blanchard AM/PM Peak Vehicle Movements

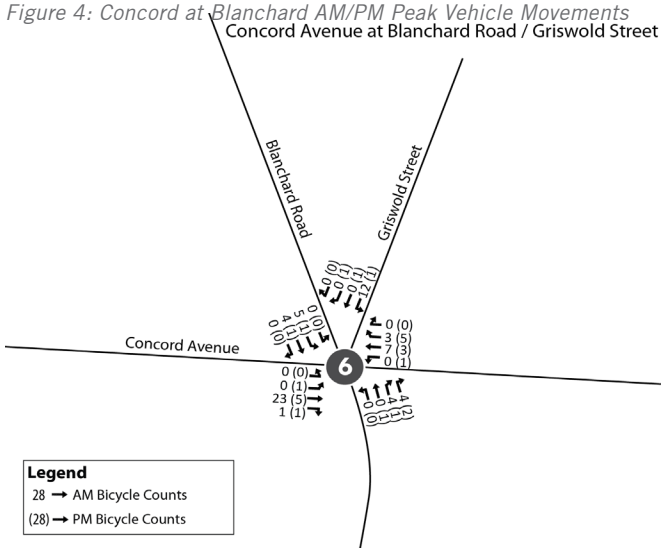


Figure 5: Concord at Blanchard AM/PM Peak Bicycle Movements

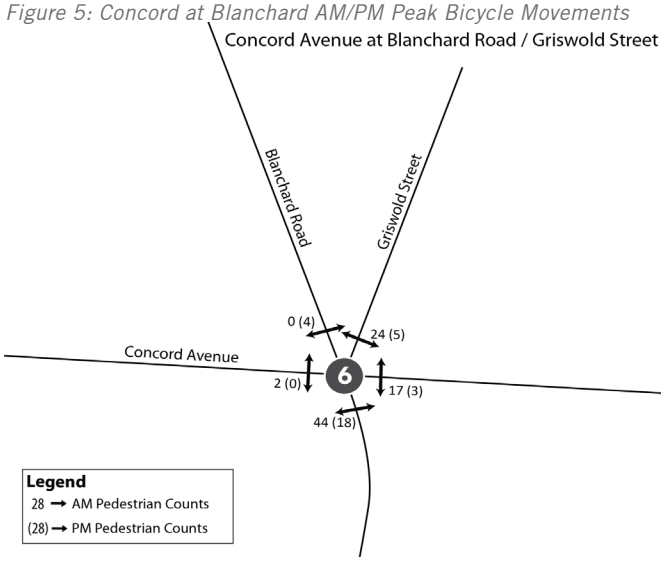


Figure 6: Concord at Blanchard AM/PM Peak Pedestrian Movements

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Traffic Assessment

- Leonard Street / Concord Avenue / Common Street: This intersection experiences extreme delay and queueing during both AM and PM observed periods. Due to the uncontrolled nature of the intersection, lack of a roundabout configuration, and the platooning effect of traffic patterns, one more approaches to the intersection are regularly forced to wait for upwards of 60 seconds prior to passing through the intersection. Each approach to the intersection experiences this effect in intervals. The westbound approach often experiences massive queueing when multiple left turning vehicles are forced to wait for a gap in cross traffic, forcing the larger volumes of right turning vehicles to wait for clearance. A similar effect occurs on the southbound approach, where multiple right turn or through vehicles stack up and prevent the larger volumes of left turning vehicles from proceeding freely.
- Concord Avenue / Goden Street: This intersection operates freely on both Concord Avenue approaches. However, during the AM peak queue occasionally form for vehicles turning left or right out of Goden Street, particularly when left turning vehicles must wait for an adequate gap. This effect also exists during the PM peak with even greater severity, forcing vehicles at the Goden Street approach to wait upwards of 50 seconds before completing their turns.
- Concord Avenue / Site Driveway: This intersection operates without significant delay. Vehicles exiting the site driveway are only allowed to turn right and almost always find a sufficient gap in Concord Avenue traffic to complete their turns with delay.
- Concord Avenue / Underwood Street: This intersection operates without perceptible delay during AM and PM periods. As Underwood Street is a one-way northbound corridor, vehicles turning right onto it from Concord Avenue face no delay. Eastbound vehicles turning left onto Underwood Street rarely have trouble finding an acceptable gap to make their turns, resulting in little delay.
- Concord Avenue / Blanchard Road / Griswold Street: This intersection is a signalized intersection with dedicated phases for each main approach. The Griswold Street approach is not signalized and operates with stop control. The intersection does experience moderate delay during both AM and PM peaks, but overall achieves LOS D, indicating an acceptable level of service for an urban arterial intersection.
- Blanchard Road / Hittinger Street: This intersection is stop-controlled at Hittinger Street and operates freely along Blanchard Road. While queue do form along Hittinger Street, particularly when vehicles attempt to turn left onto Blanchard Road, overall delay is within acceptable limits, indicating LOS D during the morning period and LOS C during the PM period.

Intersection Name	AM LOS	AM Delay	AM Avg Queue (Worst Approach)	PM LOS	PM Delay	PM Avg Queue (Worst Approach)
Leonard Street / Concord Avenue / Common Street	F	68.8	743 (SB)	F	72.4	616 (WB)
Concord Avenue / Goden Street	D	34.3	74 (NB)	F	52.8	143 (NB)
Concord Avenue / Site Driveway	A	7.7	61 (SB)	A	7.3	61 (SB)
Concord Avenue / Underwood Street	A	8	154 (EB)	A	5.3	66 (EB)
Concord Avenue / Blanchard Road / Griswold Street	D	42.1	381 (EBT)	D	45.8	524 (WBT)
Blanchard Road / Hittinger Street	D	26.3	82 (EB)	C	19.5	64 (EB)

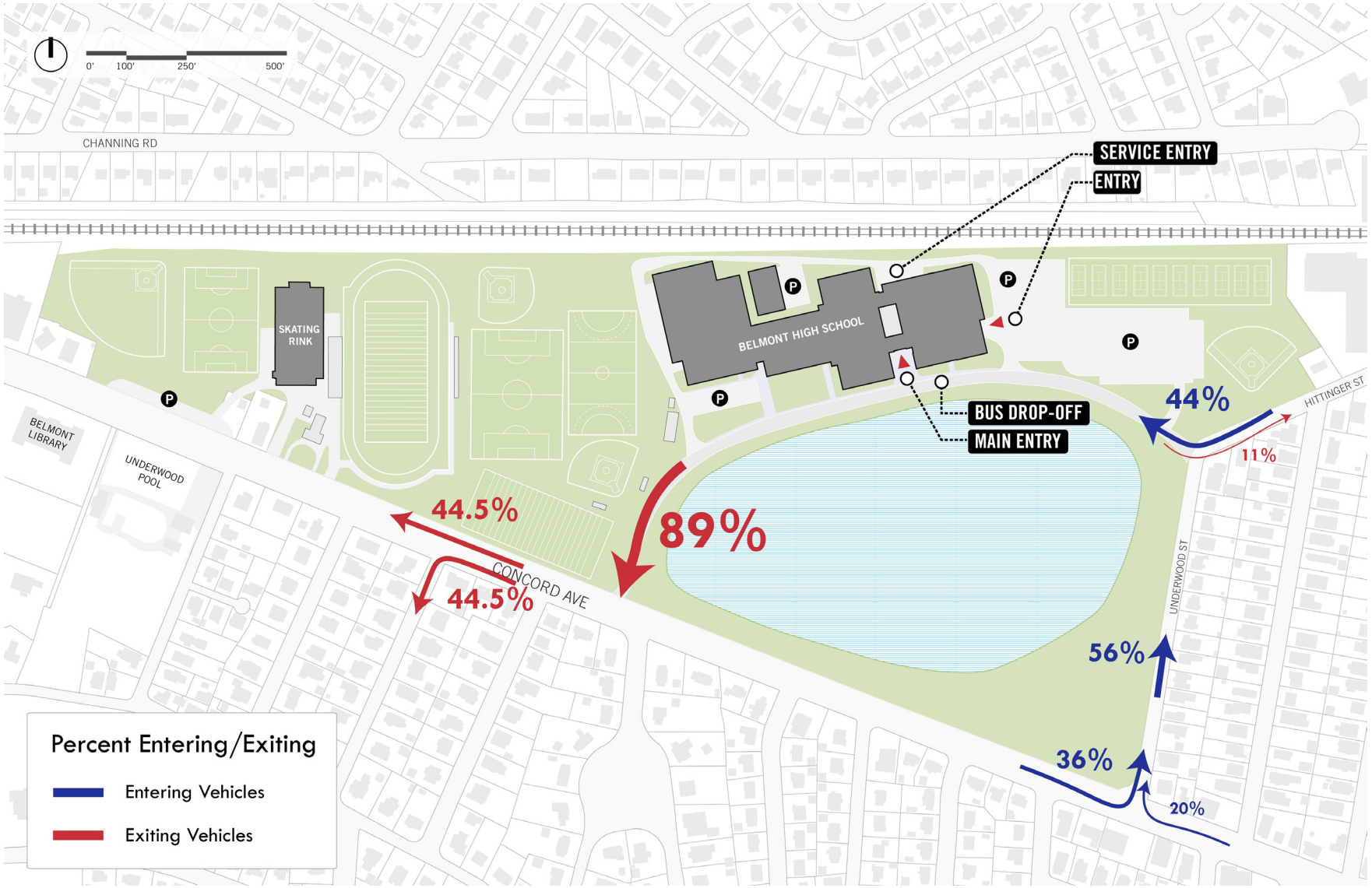
Figure 7 AM and PM Motor Vehicle Level of Service and Delay

Given these operational characteristics, the majority of study area intersections are operating within expected limits of their capacity, with a Level of Service of "D" or better. The intersection of greatest concern is Leonard Street at Concord Avenue, which experiences extreme delay and queueing, creating a safety and efficiency barrier of access for all users.

Qualitative site observations4F showed that congestion in and around the High School results not only from vehicles dropping off students, but from the dozens of campus affiliates wishing to park on-site. In particular, long queues on Underwood and Hittinger Streets result from conflicts between vehicles entering the High School entryway, from either Underwood or Hittinger, and vehicles that exit the High School campus after drop-off by making a left turn in the eastbound direction on the school drive from the student parking lot to exit via Hittinger.

Drop-off issues are more critical during the morning drop-off peak, while in the afternoon pick-up peak many students finish at staggered times due to after school activities. During stakeholder meetings, it was also reported that there is not a formally designated curb area for student drop-off and pick up; rather, students typically wait where their parents typically wait for them. Stakeholders consider this to be a safety concern. In the morning, the majority of students were observed being dropped off on the school's driveway, near the main building entrance, with a smaller

FIGURE 8: VEHICULAR ACCESS/EGRESS PATTERNS



number being dropped off at the building's eastern entrance from the faculty/staff lot.

The narrow period of access and egress observed also poses a challenge, with the majority of drop-off traffic occurring during a concentrated 20-minute span of about 7:18 – 7:38 a.m., in advance of the typical first period bell at 7:35 a.m. This generates longer queues and driver frustration, which can lead to impatient and dangerous maneuvers. Of the total vehicular counts collected, the overall morning peak of general commuter traffic on Concord Avenue occurred within the span of 7:15 – 8:15 a.m.

PARKING

There are 168 spaces allocated to students and 155 spaces dedicated to faculty and staff. In addition, there are five visitor spaces in the main faculty/staffing parking area, and two on-street disabled spaces located along the High School's main driveway. There are two off-street parking areas west of the football stadium, adjacent to Concord Avenue: one is a 28-space public parking facility just east of Concord Avenue, regulated with a 4-hour time limit, and the other is reserved for authorized service vehicles just south of the skating rink. During data collection, users were observed walking from the public parking lot towards the Belmont Town Center, indicating that, during the daytime, this lot is likely not utilized by High School affiliates. In total, there are 368 off-street spaces in campus parking facilities, and 229 on-street spaces located nearby on Concord Avenue or Underwood Street. Parking inventory is shown in Figure 9.

The project team conducted parking utilization counts on October 2, 2017, at 10 a.m – a time selected to represent peak accumulation once most affiliates have travelled to campus. Utilization counts showed that during peak occupancy, the High School's core parking facilities are about 76% full, with 251 vehicles parked in 330 available spaces. Demand in the student parking lot at the eastern end of campus approached 85% utilization, a threshold indicating it is functionally full, i.e. it might be difficult but not impossible to find a parking space. However, significant capacity remains unoccupied in the eastern faculty/staff lot, which has utilization of less than 70%. On-street spaces on Concord Avenue and Underwood Street remain under-utilized, with utilization rarely exceeding 25% on these segments. Parking utilization in and around campus is shown in Figure 10.

The Belmont School District operates eight school buses, which are parked at the High School in the easternmost portion of the student parking lot during the school day. High School stakeholders are evaluating whether school buses will continue to be stored in this location.

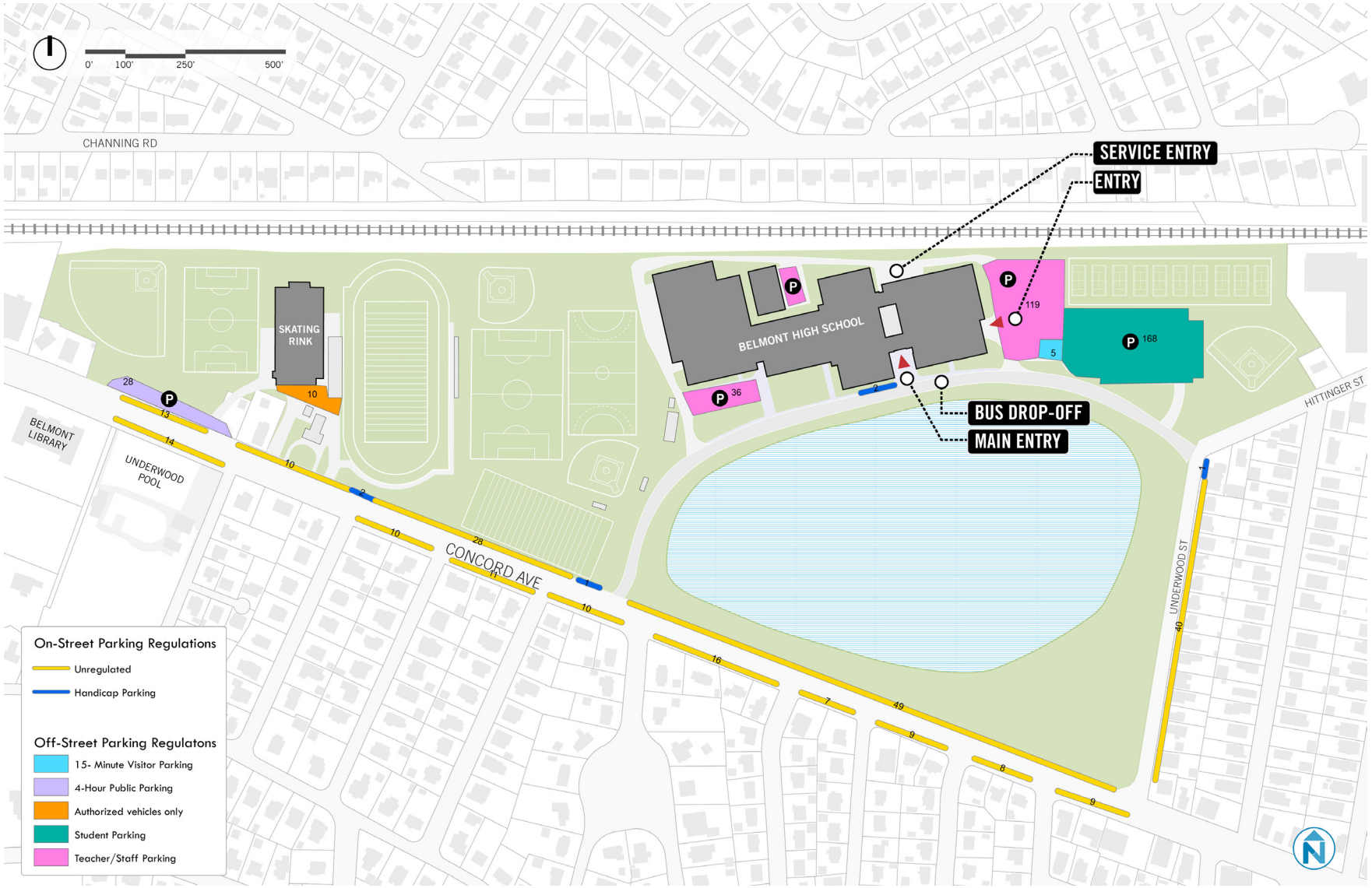
WALKING AND BIKING ACCESS

Walking and biking are popular means of accessing Belmont High School. The High School is accessible by on-street bike lanes on Underwood Street and on Concord Avenue, between Leonard Street and the Cambridge line. The High School is connected to a nearly complete network of sidewalks along Concord Avenue and Underwood Streets, along with two high-visibility pedestrian crossing signals at Concord Avenue & Orchard Street (Figure 11) and Concord Avenue & Cottage Road. The only significant gap in the sidewalk network exists on the north side of Hittinger Street, adjacent to the off-street parking area of the industrial facility that occupies a large property between Brighton Street and Trowbridge Street. In addition, a multiuse trail running parallel to the MBTA tracks, known as the "Fitchburg Cutoff Bikepath," runs from Alewife Station to the campus, terminating at the intersection of the tracks and Brighton Street, roughly 200 feet north of the intersection of Brighton & Hittinger. This off-street path provides walking and biking access not only to the Alewife "T" station but also to other destinations in Cambridge and Somerville. An off-street recreational path also exists around the circumference of Claypit Pond, just south of the High School, although this path does not currently offer direct or accessible connections to nearby on-street bike or pedestrian facilities.

In site observations conducted during the AM peak period5F of October 2, 2017, the project team counted roughly 250 people walking (Figure 16) and 100 people biking to the campus (Figure 15), comprising almost a quarter of all affiliates. The heaviest volumes of people walking were observed crossing Concord Avenue at Orchard Street into the High School's driveway (about 200 people walking observed), crossing Concord Avenue at Underwood Street (about 25 people walking), and crossing Brighton Street onto Hittinger (about 25 pedestrians). About 30 people bike to the High School via each intersection, as shown in Figure 15

In discussions with campus stakeholders, the most commonly cited walking access issue was that students frequently cross the MBTA tracks at a location immediately north of the baseball field, indicated on Figure 13, to connect with Alexander Avenue, Sherman Street, and other destinations in northern Belmont. Stakeholders noted that affiliates had previously cut a hole in

FIGURE 9: PARKING INVENTORY



3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Traffic Assessment

Figure 11 Pedestrian Crossing Signal at Concord & Orchard

Figure 12 Full Bike Racks at Belmont High School

the chain-link fence between the campus and the railroad tracks so that baseball players could retrieve foul balls. In addition to presenting a serious safety issue in which students are exposed to the risk of fatal collisions with oncoming rail traffic while crossing the tracks, this problem highlights the need for enhanced walking connections between the High School and neighborhoods in northern Belmont. Under existing conditions, there are no points of access between Concord Avenue and northern Belmont neighborhoods between Leonard Street and Brighton Street, a distance of over three-quarters of a mile.

Other stakeholders expressed concern over the lack of connection between the sidewalks on Concord Avenue and Underwood Street and the off-street path encircling the Claypit Pond. If present, the off-street path could provide additional utility for bikes and pedestrians on the east side of the High School's driveway or the west side of Underwood Street.

Bike racks in and around campus had high utilization during the site observation period described above (Figure 12). The high demand for bike parking on campus is evidence of the need for additional bike parking and enhanced biking access and safety improvements.

CRASH PROPENSITY ANALYSIS

The project team mapped and analyzed Belmont Police Department crash data from the last five years, 2012-2017. These data indicated that several locations on Concord Avenue have a high propensity for vehicle crashes, particularly those involving people walking and biking. The locations with the highest propensity for crashes in this period were Concord Avenue & Leonard Street/Common Street, Concord Avenue between Leonard Street and Cottage Road (mid-block), and Brighton & Hittinger Streets. Each of these locations have featured at least 10 crashes in the five-year period. The full results of the crash propensity analysis are shown in Figure 14. According to MassDOT, neither Brighton Street/Blanchard Road nor Concord Avenue are listed among the Top 200 intersection clusters in any survey period between 2002 and 2014. These corridors are also not among those eligible for Massachusetts Highway Safety Improvement Program (HSIP) funding.

FIGURE 10: PARKING UTILIZATION

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Traffic Assessment

FIGURE 13: CAMPUS BIKE AND PEDESTRIAN ACCESS

FIGURE 14: CRASH LOCATIONS AND PROPENSITY

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Traffic Assessment

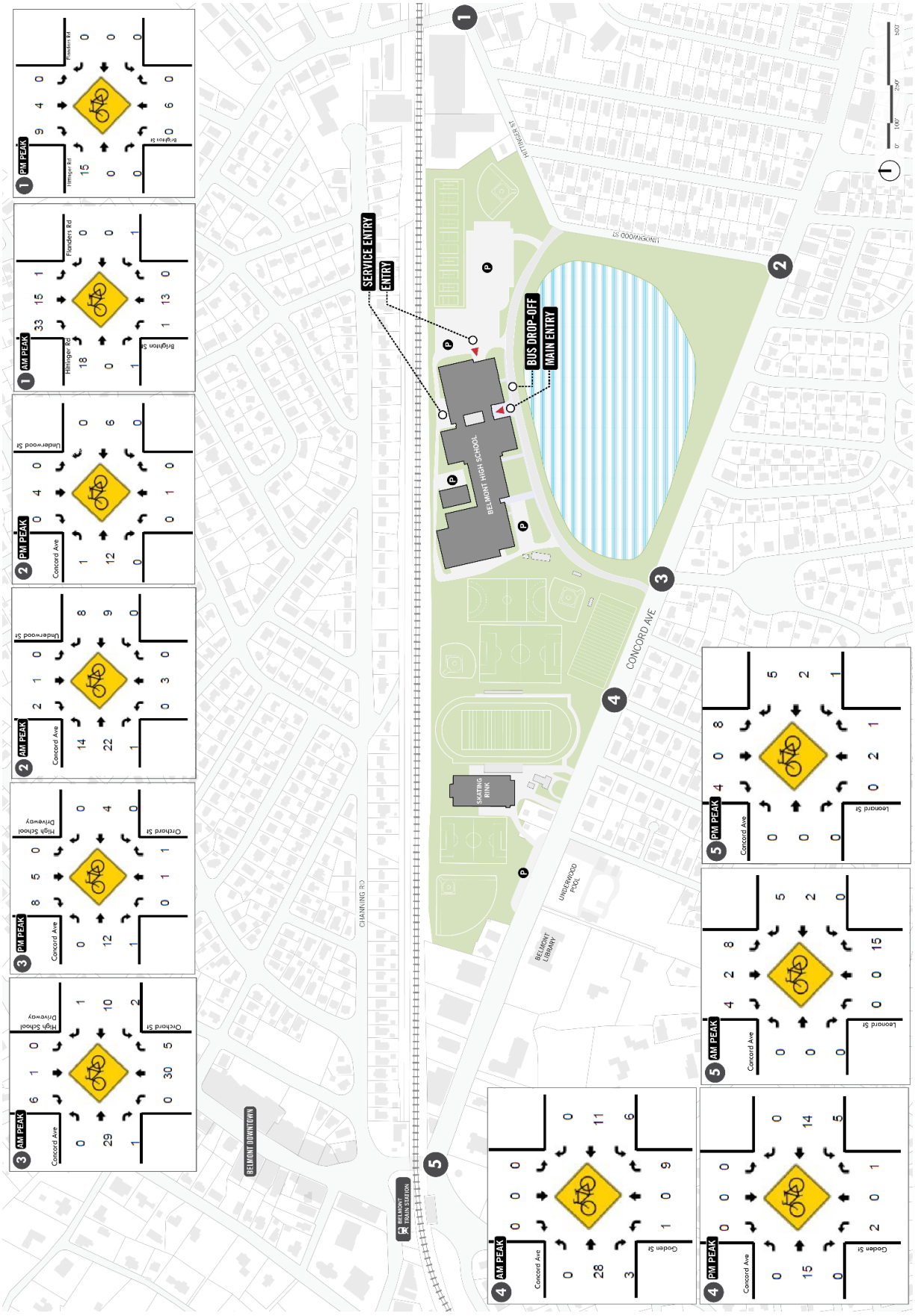
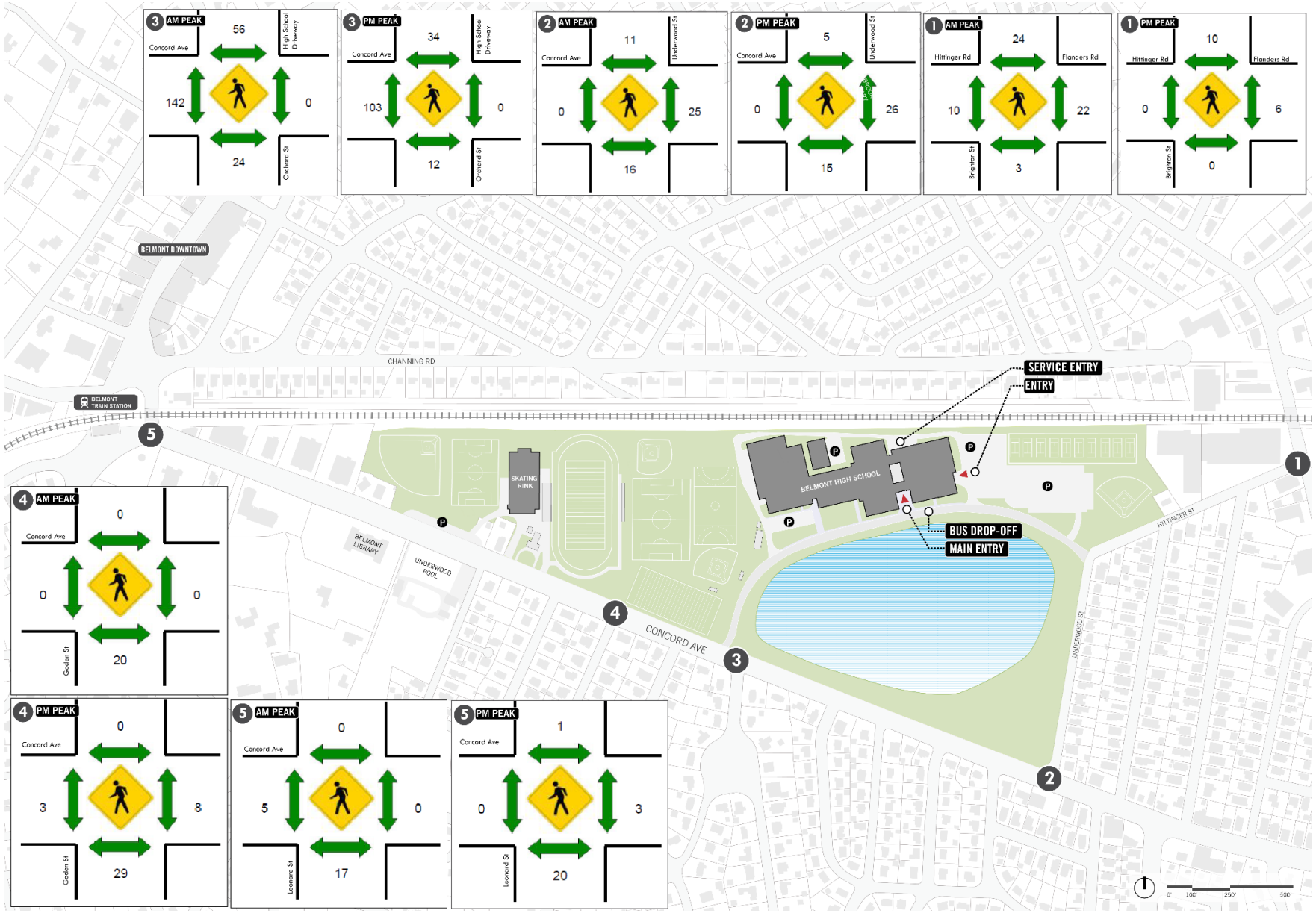


FIGURE 15: AM AND PM PEAK BICYCLE TURNING MOVEMENTS

FIGURE 16: AM AND PM PEAK PEDESTRIAN MOVEMENTS



TRANSIT

Four MBTA bus transit routes operate within walking distance of the campus, routed primarily along Concord Avenue and Brighton Street (Figure 17). Stakeholders report that teachers and staff make use of MBTA services to access campus but a ride survey has not been completed to objectively document this mode share. Through METCO, a statewide voluntary school desegregation program, Belmont High School currently receives 43 students from the City of Boston that board and alight at MBTA bus stops at Concord Avenue & Orchard Street.

A high-visibility pedestrian crossing signal at this intersection helps these students safely cross Concord Avenue into the campus. While bus stops exist within the vicinity of campus, none has bus stop amenities such as benches, shelters, lighting, or real-time travel information, which may encourage campus affiliates to take transit. Belmont High School can also be accessed via MBTA's Fitchburg Line, with a 15-minute walk along Concord Avenue to the west. Alternatively, campus affiliates can access the school via "T" subway service on the Red Line at Alewife Station, with a 9-minute bike ride on the Fitchburg Cutoff Bikepath that connects to Hittinger Street.

FIGURE 17: TRANSIT ACCESS NEAR BELMONT HIGH SCHOOL

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Architectural Assessment

The existing Belmont High School was designed and built in its entirety from 1969 to 1970 as a new public high school facility for the town of Belmont located near Clay Pit Pond. Currently, the facility is still owned and run as a high school. The building has been fairly maintained over the past 47 years, but the building enclosure systems and finishes are at the end of their useful life.

Much of the interior within the High School have generally not been updated (with exception to the Media Center), leading to worn ceilings, walls, and floors with moderate to minimal damage. Original doors, hardware, floors and lockers are still present in many of the spaces and would require replacement or major repair and refinishing. The classrooms and corridors still have the original VAT (vinyl asbestos tile) flooring, but numerous pieces have been removed and replaced throughout the building. Severe cracking of floor tile occurs through corridors, possibly due to a lack of expansion joints. Most flooring shows signs of damage at door locations in main corridors and classroom entries. The VAT does contain asbestos which poses a health hazard and would need to be abated. The main entry space contains original quarry tile flooring which appears to be in fair condition, but with signs of water damage. Auditorium and gym flooring are generally worn and past their useful life.

The majority of the interior walls are painted gypsum plaster, painted CMU, or exposed brick masonry – which could make selective renovation difficult. The interior CMU and brick masonry walls appear to be in good condition, but plaster walls show signs of moderate to fair signs of damage throughout classrooms and corridors. The acoustic ceiling tiles show a large amount of water damage and misalignment throughout entire building. Ceilings in the majority of the school are an asbestos-positive tested application and in need of abatement and complete replacement. Ceilings tiles are frequently falling out of ceilings and need to be contained quickly due to asbestos concerns – even observed a trash bag covering a ceiling hole in kitchen area. The ceiling heights in many spaces including corridors are currently around 8'-0" - 8'-8" in height.

Coil Wall Partitions are broken and inoperable in most spaces. The Auditorium and Cafeteria folding partition is not usable - damaged and falling off its track. Auditorium seating shows signs of excessive use and fabric/cushion is falling apart in vast majority of seating. Numerous permeant Seats in small instructional rooms (wellness room) have been removed for handicap access and collaboration areas. Holes from removed seat hardware remain in flooring.

The exterior precast Concrete Lintels, Precast Concrete Columns and Concrete Platforms show signs of deterioration/crumbling around entire exterior perimeter. The composition panel window sills and air distribution louvers show signs of corrosion and deformation. Most of the brick masonry is visibly in good condition with minimal deterioration, but light fixtures are missing throughout exterior wall elevations with exposed wiring and holes. Aluminum glass frame and doors at main entry of school / courtyard area continually leak during rain storms as well as provide little climate controlled insulation. Much of the building roofing systems seem to be in good condition, but some of the colored aluminum fascia of theater is missing in certain locations, exposing the exterior plywood substrate.

Water damage at window

No thermal barrier between doors

Paint damage at the door

Tiles falling off the wall

Flooring worn out at door locations

Ceiling modification due to water damage

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Architectural Assessment

Damaged locker room door

Deformed locker door

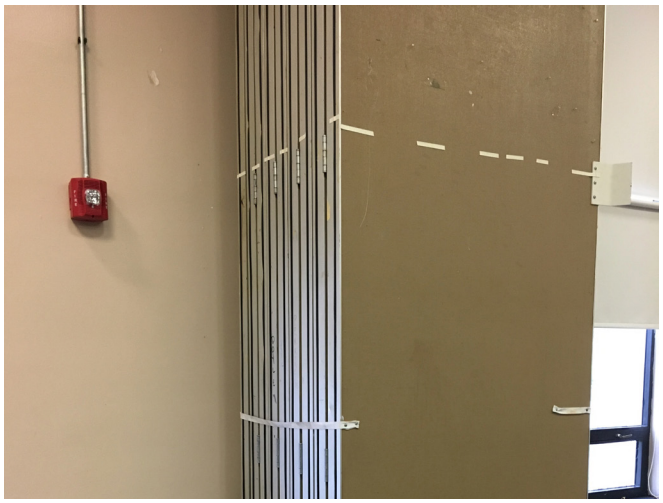
Corroded piping and wall

Water faucets inoperable

Severe cracking of floor tile

Excessive damage to auditorium seat

Damaged coil Wall partitions in auditorium



Damaged coil Wall partitions in cafeteria

Cabinet and shelves in deteriorated condition

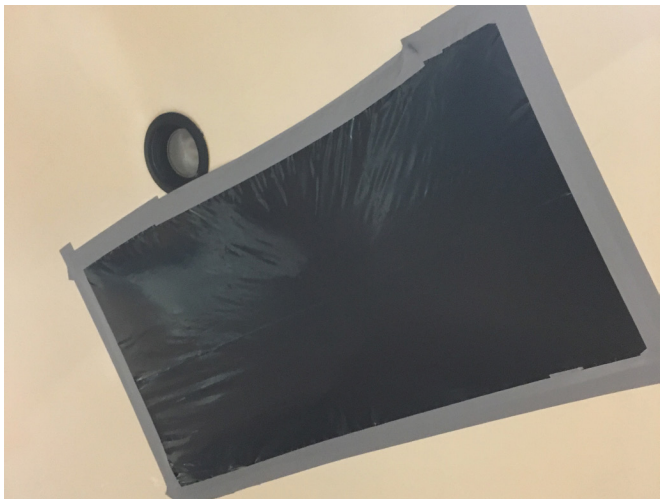
Cabinet and countertop in deteriorated condition

Water damage at ceilings

Falling ceiling tiles due to water damage

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Architectural Assessment



Black bag covering ceiling hole

Misaligned ceiling tiles

Damaged cabinet drawers

Tile damage at kitchen freezer

Cracks in wall finish

Broken glass in window panel

Worn wood flooring at wood shop and orchestra room

Water damage at ceiling diffuser

Damaged door louver

Cracked and damaged wood doors

Deterioration throughout extertior concrete

Exposed exterior wood substrate at theatre

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Structural Assessment

STRUCTURAL ASSESSMENT

The purpose of this report is to describe, in broad terms, the structure of the existing building; to comment on the condition of the existing building; and on the feasibility of renovation and expansion of the school.

SCOPE

1. Description of existing structure.
2. Comments on the existing condition.
3. Comments on the feasibility of renovation and expansion.

BASIS OF THE REPORT

This report is based on our visual observations during our site visit on August 28, 2017 and our review of the drawings of the original construction prepared by Korslund, LeNormand & Quann, Inc. dated October 8, 1968, and a review of the report entitled "Master Pan and Feasibility Study for Renovations to Belmont High School" prepared by Design Partnership of Cambridge, Inc., dated October 15, 2004.

During our site visit, we did not remove any finishes or take measurements, so our understanding of the structure is limited to the available drawings and observations of the exposed structure and the exterior facade.

BUILDING DESCRIPTION

The school is located on Concord Avenue in Belmont, Massachusetts. The school is a two story steel and concrete structure constructed in 1968. No major renovations or additions have been constructed since the school was originally constructed.

The school is divided into four units as laid out in the existing drawings. The units are laid out west to east. Unit 1 is the western most part of the school and it houses the field house and the pool. Unit 2 houses the science classrooms, laboratories and a mini theatre. Unit 3 houses a centrally located double story library and two academic classroom wings to the north and south of the library. Unit 4 houses the auditorium, cafeteria, kitchen, music spaces, a workshop and some classroom spaces.

The field house roof is a composition roof of 2 in. poured gypsum on 1 1/2 in. form board spanning between steel bulb tees supported on wide flange steel beams. The wide flange steel purlins are supported on steel bent frames composed of tapered steel members fabricated from steel plates. The base of the frames are tied with tension steel rods located within the depth of the first floor slab.

The typical roof over the pool and other portions of Unit 1 is poured gypsum over form deck supported on bulb tees spanning between metal bar joists and steel beams. The joists and beams are supported by wide flange steel girders and interior and exterior steel columns and precast concrete columns.

The typical second floor in this unit is a concrete flat slab supported on interior concrete columns, load bearing masonry walls, exterior concrete beams and exterior steel columns.

The first floor of the field house is a concrete slab-on-grade. The pool structure is constructed of reinforced concrete walls and slabs. The typical first floor slab is a mix of concrete flat slab supported on interior pile caps and exterior grade beams and concrete slabs-on-grade.

The typical roof construction of the remainder of the school is poured gypsum over form deck spanning between steel bulb tees supported on steel bar joists and steel beams spanning between steel girders supported on steel columns.

The typical second floor construction is a 2 ½ in. thick, concrete slab on metal form deck spanning between steel bar joists supported on wide flange steel girders and structural steel columns.

The typical first floor is a mix of reinforced concrete flat slab and concrete slab-on-grade. There is a utility tunnel located below the corridors of the first floor.

The roof of the auditorium is also typical roof construction, the steel bar joists are supported on structural steel trusses spanning between steel columns.

The structure of the entire school is supported on piles, varying in capacity from 50 to 90 tons.

It should be noted that we did not find tie beams connecting the pile caps in both directions, this is especially important at locations of concrete slabs-on-grade which cannot provide adequate lateral support to the piles under seismic events. We also noted that there are several columns that are supported on isolated single piles.

We did not find any lateral load resisting system that is specifically identified in the existing documents.

EXISTING CONDITIONS

Based on our observations, the school structure is performing well based on the age of the school. We observed signs of water leakage at a few locations. We observed cracks in the interior masonry walls at some locations. We observed cracks in the exterior masonry façade and signs of past repairs. We observed some minor spalling of concrete at the corners. In our conversation with school personnel, we were informed that there has been water infiltrating through the slab-on-grade and the floor finishes in the Field House in the past.

We did not observe any signs of foundation settlement. We did not observe any undue vibrations due to footfall on the supported floor slab.

PROPOSED SCHEMES

Based on our observations and our analysis of the existing drawings, no structural upgrades are required for any proposed scheme that has limited renovation scope and does not require any structural modifications. The extent of the code required structural upgrades is dependent on the extents of the proposed renovations. The following is a description of the compliance methods that may trigger upgrades to the structure, depending on the extents of the proposed renovations in any scheme.

GENERAL CODE CONSIDERATIONS

PRIMARY STRUCTURAL CODE ISSUES RELATED TO THE EXISTING STRUCTURE

If any repairs, renovations, additions or change of occupancy or use are made to the existing structures, a check for compliance with 780 CMR, Chapter 34 "Existing Building Code" (Massachusetts Amendments to The International Existing Building Code 2015) of the Massachusetts Amendments to the International Building Code 2015 (IBC 2015) and reference code "International Existing Building Code 2015" (IEBC 2015) is required. The intent of the IEBC and the related Massachusetts Amendments to IEBC is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction.

The IEBC provides three compliance methods for the repair, alteration, change of use or additions to an existing structure. Compliance is required with only one of the three compliance alternatives. Once the compliance alternative is selected, the project will have to comply with all requirements of that particular method. The requirements from the three compliance alternatives cannot be applied in combination with each other.

The three compliance methods are as follows:

1. Prescription Compliance Method.
2. Work Area Compliance Method.
3. Performance Compliance Method.

COMMENT

The approach is to evaluate the compliance requirements for each of the three methods and select the method that would yield the most cost effective solution for the structural scope of the project. The selection of the compliance method may have to be re-evaluated after the impact of the selected method is understood and after analyzing the compliance requirements of the other disciplines, Architectural, Mechanical, Fire Protection, Electrical and Plumbing.

Since the existing building contains un-reinforced masonry wall structures, the anchorage of the walls to the floor and roof structure will have to be evaluated if the work area of the project exceeds 50 percent of the aggregate floor and roof area of the building.

PRESCRIPTIVE COMPLIANCE METHOD

In this method, compliance with Chapter 4 of the IEBC is required. As part of the scope of this report, the extent of the compliance requirements identified are limited to the structural requirements of this chapter.

ADDITIONS

- Based on the project scope, the following structural issues have to be addressed:
- All additions should comply with the code requirements for new construction in the IBC.
- For additions that are not structurally independent of an existing structure, the existing structure and its addition, acting as a single structure, shall meet the requirements of the Code for New Construction for resisting lateral loads, except for the existing lateral load carrying structural elements whose demand-capacity ratio is not increased by more than 10 percent, these elements can remain unaltered.

- Any existing gravity, load-carrying structural element for which an addition or its related alterations causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.

ALTERATIONS

- Any existing gravity, load-carrying structural element for which an addition or its related alterations causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For alterations that would increase the design lateral loads or cause a structural irregularity or decrease the capacity of any lateral load carrying structural element, the structure of the altered building shall meet the requirements of the Code for New Construction, except for the existing lateral load carrying structural elements whose demand-capacity ratio is not increased by more than 10 percent, these elements can remain unaltered.

WORK AREA COMPLIANCE METHOD

In this method, compliance with Chapter 5 through 13 of the IEBC is required. As part of the scope of this report, the extent of the compliance requirements identified are limited to the structural requirements of these chapters.

In this method, the extent of alterations has to be classified into LEVELS OF WORK based on the scope and extent of the alterations to the existing structure. The LEVEL OF WORK can be classified into LEVEL 1, LEVEL 2 or LEVEL 3 Alterations. In addition, there are requirements that have to be satisfied for additions to the existing structure.

This report assumes that planned renovation schemes would affect more than 50 percent of the floor areas and invoke LEVEL 3 requirements; and, the following analysis is based on that assumption. This would require compliance with provision of Chapter 7, 8 and 9 of the IEBC. In addition, there are requirements that have to be satisfied for additions to the existing structure; and, this would trigger compliance with provisions in Chapter 11 of the IEBC.

LEVEL 3 ALTERATIONS

- Any existing gravity, load-carrying structural element for which an alteration causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For alterations where more than 30 percent of the total floor area and roof areas of a building or structure have been or proposed to be involved in structural alterations within a 12 month period, the evaluation and analysis shall demonstrate that the altered building complies with the full design wind loads as per the code requirements for new construction and with reduced IBC level seismic forces.
- For alterations where not more than 30 percent of the total floor and roof areas of a building are involved in structural alterations within a 12 month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads at the time of the original construction or the most recent substantial alteration (more than 30 percent of total floor and roof area). If these alterations increase the seismic demand-capacity ratio on any structural element by more than 10 percent, that particular structural element shall comply with reduced IBC level seismic forces.
- Existing anchorage of all unreinforced masonry walls to the structure have to be evaluated.

ADDITIONS

- All additions shall comply with the requirements for the Code for New Construction in the IBC.
- Any existing gravity, load-carrying structural element for which an addition or its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For additions that are not structurally independent of any existing structures, the existing structure and its additions, acting as a single structure, shall meet the requirements of the Code for New Construction in the IBC for resisting wind loads and IBC Level Seismic Forces (may be lower than loads from the Code for New Construction in the IBC), except for small additions that would not increase the lateral force story shear in any story by more than 10 percent cumulative. In this case, the existing lateral load resisting system can remain unaltered.

PERFORMANCE COMPLIANCE METHOD

Following the requirements of this method for the alterations and additions may be onerous on the project because this method requires that the altered existing structure and the additions meet

the requirements for the Code for New Construction in the IBC.

PARTICULAR REQUIREMENTS OF COMPLIANCE METHODS

For our project, in order to meet compliance with one of the two compliance methods "Prescriptive Compliance Method" or the "Work Area Compliance Method", we have to address the following:

PRESCRIPTIVE COMPLIANCE METHOD

ADDITIONS

The proposed additions would be designed structurally independent of the existing structures, thus, would not impart any additional lateral loads on the existing structure.

If the proposed alterations are such that the alterations increase the design lateral loads on the existing building or cause any structural irregularity of decrease the lateral load carrying capacity of the building, the structure of the altered building shall meet the requirements of the Code for New Construction in the IBC.

If the proposed additions increase the design gravity load on portions of the existing roof members, these members would have to be reinforced and this incidental structural alteration of the existing structures would have to be accounted for in the scope of the alterations to the existing school and would trigger requirements for alterations.

ALTERATIONS

Alterations that would increase the design gravity loads by more than 5 percent on any structural members would have to be reinforced.

If the proposed alterations of the structure increases the demand-capacity ratio of any lateral load resisting element by more than 10 percent, the structure of the altered building or structure shall meet the requirements for the Code for New Construction.

WORK AREA COMPLIANCE METHOD

LEVEL 3 ALTERATIONS

If the proposed structural alterations of an existing structure are less than 30 percent of the total floor and roof areas of the existing structure, we have to demonstrate that the altered structure complies with the loads applicable at the time of the original construction and that the seismic demand-capacity ratio is not increased by more than 10 percent on any existing structural element. Those structural elements whose seismic demand-capacity ratio is increased by more than 10 percent shall comply with reduced IBC level seismic forces.

If the proposed structural alterations of an existing structure exceed 30 percent of the total floor and roof areas of an existing structure, we have to demonstrate that the altered structure complies with the IBC for wind loading and with reduced IBC level seismic forces.

Existing anchorage of all unreinforced masonry walls to the structure have to be evaluated. If the existing anchorage of the walls to the structure is deficient, the tops of the masonry walls will require new connections to the structure.

ADDITIONS

Any proposed additions would be designed structurally independent of the existing structures, thus, they would not impart any additional lateral loads on the existing structures.

COMMENT

The compliance requirements of the two methods, in most respects, are very similar. The Prescriptive Compliance Method would require that the existing lateral load resisting systems meet the requirements of the Code for New Construction of the IBC, even for small increases of design lateral loads. The requirements of both methods will require anchorage of all existing masonry walls. Based on this, we would recommend the Work Area Compliance Method for the project.

SUMMARY

The existing school structure appears to be performing well. All of the structural components that are visible appear in sound condition. There are maintenance items that need to be addressed. The water infiltration through the slab-on-grade in the field house will require further study.

Any major, proposed renovations and additions would likely require that the structure be updated to meet the requirements for Code for New Construction. This may require addition of some shear walls, connecting the floor and roof diaphragms to the existing masonry walls and the clipping of non-structural masonry walls to the structure. All of the existing masonry walls would have to be adequately connected to the roof and floor structure. The stability of the existing pile caps will have to be verified, especially at locations of concrete slab-on-grade. It is possible

that reinforced tie beams may be required at these locations.

Great care will have to be taken for any proposed trenching required in the existing field house to assure that the existing tie rods connecting the columns are not disturbed.

Partial or phased demolition will require addition of new foundations and lateral load resisting elements in the existing structure. It is likely that the school will be occupied during construction; so, stability of portions of the structures that remain will have to be addressed.

Any new masonry shear walls constructed in the existing school will have to be supported on piles.

Engineers Design Group, Inc.

FOOD SERVICE ASSESSMENT

Crabtree McGrath Associates, Inc., a consulting group specializing in foodservice facilities planning and design has been retained by Perkins + Will to provide an analysis of the existing conditions of the Belmont High School kitchen.

Since 1955 Crabtree McGrath Associates has been a leader in foodservice design. We take great pride in being an independent equipment consulting and facilities design group. Based in Georgetown, MA our team of specialized and knowledgeable consultants are prepared to help clients navigate the design process and make thoughtful decisions that will provide a facility ready to meet the demands and needs of its users.

Bill Maidment
Crabtree McGrath Associates, Inc.
Food Facilities Planners
Phone: O: 978.352.8500 ,102; M: 401-480-6833
bmaidment@crabtree-mcgrath.com
www.crabtree-mcgrath.com

SUMMARY OF RECOMMENDATIONS FOR PLANNING

Given the age of the facility and its equipment and the limitations that the current design imposes on the school's ability to support the current population and future needs this would be a good time to review the master plan. We recommend the following:

- Design a new kitchen and servery that meets the needs of the student body and represent current trends in food nutrition, preparation and service experience.
  - Open concept kitchen
  - Servery area integrates cooking into the concept to demonstrate the use of freshly prepared foods.
  - Servery provides ample circulation and multiple food stations to disperse the students reducing long lines and waiting times.
- Kitchen incorporates high efficiency equipment that will save money on utility cost and provide labor savings through cross utilization of equipment.
- Kitchen equipment that maximizes the use of the kitchen footprint.
- Kitchen support areas appropriately sized to meet the needs of its purpose and the staff.

KITCHEN SIZE RECOMMENDATIONS

Please note that the charts below for existing and proposed area requirements exceed the recommendation of the Massachusetts School Building Authority. For a school population of 1,236 the MSBA guidelines only allow for 2,485 square feet. In our experience this amount of space only provides enough room for a single line up style serving line. This serving model has given way to the open concept servery as seen in higher education with multiple serving stations which provide both prepared ready to serve foods, freshly made food options and dedicated nutrition and safe food zones for students with allergies.

EXISTING CONDITIONS SUMMARY

A site visit was conducted on August 29th which included a tour of the existing facilities to establish an understanding of current operations, equipment condition and its needs for the future. It's apparent that the facility has not been updated in a very long time and is struggling to meet its current demands, especially the production kitchen areas which appear to be using the original and outdated design footprint and equipment. Following is an examination of the current facility conditions with problems noted for each area examined.

Food Service Existing Areas

	Area or Room Element	Qty.	Unit Size	Total Area (NSF)	Comments
1	Office	1	96	96	
2	Receiving	1	164	164	
3	Staff support areas	1	115	115	Lockers
4	Dry food storage	1	393	393	
5	General storage	1	142	142	
6	Refrigerated storage	1	260	260	Combined cooler and freezer
7	Production kitchen	1	1,260	1,260	
8	Dish washing	1	356	356	
9	Staff dining room	1	671	671	
10	Trash room	1	260	260	
11	Serving		1338	1,338	
	TOTALS			5,055	

Food Service Proposed Areas

	Area or Room Element	Qty.	Unit Size	Total Area (NSF)	Comments
1	Office	1	100	100	Large enough for two work
2	Receiving	1	100	100	
3	Staff support areas	1	125	125	Lockers, uniform storage, washer and dryer
3		2	65	130	Staff restrooms
3	Janitor's closet	1	45	45	Mop sink and chemical storage
4	Dry food storage	1	350	350	
5	General storage	1	160	160	Paper products
6	Refrigerated storage	2	150	300	Combined cooler and freezer
7	Production kitchen	1	1,100	1,100	
8	Dish washing	1	425	425	Dish washing, pan washing,
9	Staff dining room	1	0	-	
10	Servery	1	1700	1,700	
11	Trash and recycling room	1	200	200	
12	Mechanical and electical ro	2	100	200	
	TOTALS			4,935	

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Food Service Assessment

PHOTOGRAPHS DETAILING NOTED ISSUES

The hot water heater should be located in a dedicated room away from all food production operations.

Provide appropriate room lighting and integrated lighting for the food serving stations

The dish machine pictured is at least 10 years old. A new Energy Star rated unit will save a significant amount of water use, sewer cost and electrical demand.

This unit is near the end of its lifecycle.

The fan in the room suggest poor ventilation and uncomfortable working conditions.

Shown here are two single convection ovens which are nearing the end of the life cycle (ten years). New gas fueled units are Energy Star rated which qualifies them for a rebate from the gas company.

These units are near the end of their lifecycle.

Units can be double stacked to make better use of the floor space and reduce the exhaust hood footprint and the amount of air that must be exhausted from the room.

PHOTOGRAPHS DETAILING NOTED ISSUES

This mixer should be replaced with the new unit that provides protective safety guards and stainless steel mixing bowls. The peeling paint on the body of the unit is not allowed by the board of health.

Storage shelving made using galvalum is not resistant to chemicals and eventually corrodes as shown here. New shelving offers corrosion proof materials with easily removable sections that can placed in a sink or dish washing machine for easy cleaning and sanitationmust be exhausted from the room.

The walk-in refrigerated rooms are old and constructed from masonry with a stucco rough texture finish on the walls and ceiling. The picture above shows mold spores growing on the surface of the ceiling. The picture above shows ice build-up around the door frame which is indicative of poor room insulation and broken or missing door seals. A new walk-in will provide additional storage capacity and Energy Star rated refrigeration systems that will save energy. It'll provide insulated walls and door panels to that meet the requirements of the National Sanitation Foundations. The panel surface finishes will meet the board of health requirements for cleaning. Doors will be equipped with a view port window for safety.

These refrigerated rooms are past their lifecycle.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Food Service Assessment

PHOTOGRAPHS DETAILING NOTED ISSUES

The picture shows mold growing on the ceiling panels in the kitchen. All ceiling panels should smooth, water resistant and easy to clean to prevent the growth of mold.

The light fixtures shown here do not meet the board of health code. All lights are required to have shatterproof lens and coated bulbs.

Rusted framing, support legs and bottom shelf do not meet the board of health code. All tables and sinks should be fabrication from stainless steel and meet the standards of the NSF.

Numerous located throughout the kitchen indicate poor ventilation. A new kitchen should be designed to incorporate conditioned make-up air for better comfort.

KITCHEN AND SERVERY DESIGN OVERVIEW

The facility shall include all the necessary components of a functional kitchen including a receiving area to be used as a staging point for the breakdown and distribution of delivered goods. Refrigerated rooms for the bulk storage of refrigerated and frozen products are to be offered and sized to accommodate the needs of the facility. Dry goods storage shall also be made available for the keeping of canned, boxed, and other non-refrigerated food items. Food grade storage shelving and dunnage platforms shall be provided for dry goods storage.

Food preparation shall take place on stainless steel tables of various sizes and configurations. Tables may be fashioned with sinks, drawers, shelves, and overhead pot storage hooks. Motorized food preparation equipment such as a food slicer, food cutter, and mixer shall be provided. Sizing of this equipment is based on the scope of food preparation.

Cooking shall take place in a central location adjacent to both food storage and preparation. Equipment shall consist of standard pieces such as a convection oven, combi-oven, tilt kettle, braising pan, grill, and open burner range tops.

Ware washing will take place as two separate functions, pot washing and dish washing. A three compartment sink with equal sized drain-boards will provide a place for washing and sanitizing heavily soiled pots and pans. A dish machine will be used for washing and sanitizing trays and utensils. Mobile storage shelving for storing clean wares will be placed at various locations throughout the kitchen.

Serving will take place in an open area with food display and cooking stations designed to hold hot and cold food items. Other serving areas shall include refrigerated merchandise display cases for holding pre-made food offerings. A deli station and a salad station provide students the opportunity to make custom-make sandwiches and salads, a handmade pizza station. Other counters will be provided for serving beverages such as coffee and water.

Additional facilities located in the kitchen will include a chef's office, staff toilet rooms for men and women and a dedicated kitchen janitor's closet with enough space for a mop sink, storage of mops, buckets and a detergent cabinet. Also grouped with this equipment are employee lockers for the storage of personal items like coats, handbags, or shoes.

A new kitchen will be fitted with energy efficient kitchen equipment that will dramatically reduce the cost of operation. Additionally we will improve ergonomics which will reduce the cost of labor and free time to better deploy labor. New ventilation systems will provide more efficient heating and cooling which will provide a more comfortable working environment.

ENERGY CONSERVATION

- **Walk -in refrigerated rooms** - Typically mechanical refrigeration systems for these rooms are controlled with simple time clock defrosts at the freezer coils. It works well but it is not an intelligent system. We recommend utilizing a Smart Defrost system that is designed to defrost the refrigerated room only when they are needed. Typical time clock controlled electric defrost systems have four defrosts per day. Using a Smart Defrost system can reduce the number of defrosts from none to two per day. This system represents an average savings of 75% in energy. In addition to the smart defrost we recommend the use of PSC or ECM motors in all refrigeration room blower coils. These motors last longer and represent a 72% energy consumption reduction, and run quieter than traditional motors.
- **The Exhaust hoods** - Today there are new technologies on the market that allow us to realize savings without restricting the type of hood availability. These systems are called Energy Management Systems or EMS. What EMS controls do is modulate the speed of the exhaust and make-up air units (MAU) fan motors with variable frequency drives (VFD's). In simple terms the control system senses heat at the exhaust duct and increase or decreases the amount of exhaust rate based on demand rather than running at 100% capacity 100% of the time. EMS systems have been shown to significantly reduce the energy consumption and electrical demands associated with operating the hood systems. On average this represents a 62% reduction in electrical demand. In addition to electrical energy savings there would be an energy savings gained from the reduced heating load at the MAU. Typically the average fan speed associated airflow of the MAU will drop 30% resulting in a significant amount of air that does not need to be heated. The average pay back for these systems is less than one year and in most cases the cost is immediately reimbursed by the local gas and power utility.
- **Hood Lights** - By replacing the incandescent light bulbs in exhaust hoods significant reductions in energy usage can be realized. Incandescent bulbs transform about 85% of energy they use into heat. The life spans of these lights are approximately 750 to 1000 hours. Consider the constant vibration at the hood and this is reduced even further. The initial cost of a 60 watt incandescent bulb is about 50 cents each and assuming the typical hood has eight lights in it we can calculate that these eight bulbs will cost about $525 dollars per year to operate. Compact fluorescent lights CFL's are much more efficient. They convert only about 25% of energy put into them into heat. The lifespan of a CFL is 7,500 to 10,000 hours but the initial cost is about $10 each. This initial high cost is quickly recovered since the cost to operate CFL is about $160 per year. Compact fluorescents should be specified for all new hoods going forward but consider the savings if the change was implemented to include all existing hoods system wide.
- **Low-Flow Pre-Rinse Spray Valves** - A low-flow pre-rinse spray valve is one of the easiest and most cost effective energy saving devices available to the foodservice operator. In addition to minimizing water consumption, water heating energy and sewer charges are also reduced. Replacing a typical spray valve that flows up to three gallons of water per minute with a low-flow unit can yield the same result with less water.

HEATING, VENTILATING, AND AIR CONDITIONING ASSESSMENT

A. GENERAL:

1. This report is based on an August 28, 2017 site visit walk-through with Belmont School Facilities Personnel, existing drawings dated October 9, 1968, the Master Plan and Feasibility Study for Renovations to Belmont High School by Design Part-nership of Cambridge dated October 15, 2004 and progress HVAC drawings for RTU replacement dated February 5, 2008.
2. The primary heating for the building is provided by steam boilers that are original to the building construction (47+ years old). Most of the piping appears to be original construction. Steam is converted to hot water, which is circulated to unit ventilators in the classrooms. The unit ventilators are also original equipment. Automatic tem-perature controls are original to the building and are pneumatic.
3. The original rooftop air handling units were replaced in two phases in 2004 and 2008. The older units are within 2 to 5 years of their normal life expectancy.
4. There is no central cooling system in the building. Self-contained rooftop air condi-tioning units provide cooling for some areas. Five of the rooftop units have a re-mote web interface for accessing unit status information.
5. There have been some improvements and upgrades to the mechanical systems in recent years including new dual fuel burners for the boilers and replacement of the rooftop units and roof exhaust fans plus other smaller improvements. However, other systems and equipment that are original, such as the boilers, steam and hot water piping, unit ventilators, and automatic temperature controls have all exceeded their normal useful life and are in need of replacement.
6. The building structure has sprayed on fire proofing that contains asbestos, which makes it difficult to do any work in the building that requires routing systems above the ceilings.

B. STEAM HEATING SYSTEM

1. The building is heated by three fire tube steam boilers manufactured by Kewanee. The boilers have an original manufactured capacity of 8,369 MBH each. The boilers have been re-tubed several times to keep them in working order. The original No. 4 oil burners were replaced in 2011-2012 with dual fuel burners capable of burning No. 2 fuel oil and natural gas. Natural gas is typically used. The boilers are fed with chemicals to limit the extent of corrosion in the system.
2. There is a 20,000 gallon underground fuel oil tank outside the boiler room. A low level (approx. one third full) of fuel is maintained in the tank and is used occasionally to limit the age of the fuel in the tank.
3. Steam is piped to rooftop units, some unit ventilators and a steam convertor in the boiler room. The steam convertor provides heating hot water to most of the class-room unit ventilators and to cabinet heaters. Steam and hot water piping are distrib-uted through a pipe tunnel/trench from the boiler room through the first two seg-ments of the building. Access to this confined space is extremely limited.
4. The steam piping is at the end of its expected life. Steam traps require regular ser-vicing.

C. AIR CONDITIONING SYSTEMS

1. Some rooftop units have air-cooled self-contained DX cooling; Interior classrooms, Library, Administration, Reading Room, Staff Dining, small theater, Auditorium lower seating area, and Stage.
2. Ductless split air conditioning systems serve the computer labs and main IT room.

D. CLASSROOMS

1. Classrooms are heated and ventilated with unit ventilators located on the exterior wall. Outside ventilation air is provided through an exterior wall louver for each unit.
2. The units are provided with hot water for heating and have pneumatic temperature controls.
3. The classrooms are exhausted through combined exhaust systems serving multiple rooms, which connect to roof exhaust fans.

4. The unit ventilators are original to the building construction and are well beyond their normal life expectancy.

E. LIBRARY AND READING ROOM

1. The Library and Reading Room are heated, cooled and ventilated by rooftop units.

F. AUDITORIUM AND STAGE

1. There are four rooftop units that serve the auditorium and stage areas. One serves the main seating area and another serves the stage. The other two units serve the balcony seating areas on the right and the left.

G. CAFETERIA/ KITCHEN/ STAFF DINING

1. The cafeteria is served by two rooftop air handling units that provide heating and outdoor ventilation air.
2. The kitchen is served by a rooftop heating and ventilating unit that provides makeup air for the kitchen hood exhaust.
3. The staff dining area and serving area are served by a rooftop unit.

H. FIELD HOUSE / UPPER GYMNASIUM

1. The main field house gymnasium is heated and ventilated by four indoor air handling units suspended high inside the gym. Supply air is discharged directly from the unit with no ductwork distribution. Two large de-stratification fans were recently added, which help to increase heating efficiency and provide added comfort for spectators in the bleachers. Two small exhaust fans located at the ends of the gym near the roof peak help to relieve heat.
2. There is another smaller gymnasium on the second level that is not frequently used. Heating and ventilation is provided by two air handling units mounted high in the space. Supply air is discharged directly from the unit with no ductwork distribution. There are no destratification fans install in this gym.

I. LOCKER ROOMS

1. The locker rooms are heated and ventilated by unit ventilators and exhaust fans.

J. POOL

1. The pool is heated and ventilated by two air handling units. There is no dehumidifi-cation system. An exhaust system was added to exhaust low near the pool deck to help limit the buildup of chloramines and also provides negative pressurization for the pool. The system is ducted through the exterior wall to an exhaust fan that is mounted on grade.
2. A pool water UV filter system was added in 2014.

K. CORRIDORS

1. Corridors are heated by ceiling mounted cabinet unit heaters. The corridors are not provided with outdoor ventilation air.

L. TOILET ROOMS

1. Toilet rooms are exhausted with roof mounted exhaust fans.

PLUMBING AND FIRE PROTECTION ASSESSMENT

GENERAL

This report is based on an August 28, 2017 site visit with Belmont School Facilities personnel, taking into consideration the various systems viewed and current system conditions described by them. A review of previous evaluation reports made available by the town were also reviewed for historical information only.

FIRE PROTECTION

A. Fire protection systems in the form of sprinklers, standpipes, hose cabinets, etc. do not currently exist at the High School.

B. It appears that a portion of the kitchen hood has an Ansul system installed. The Ansul system does not protect the entire hood.

C. Massachusetts General Law M.G.L. c.148, s.26G requires that any existing building over 7,500 square feet that undergoes major alterations or modifications must be provided with a sprinkler system.

D. If the proposed scope of work is considered a major alteration, an automatic sprinkler system will be required for the building. A fire standpipe system may also need to be considered based on final code review and the final height of the building floor versus the lowest level of vehicular access by fire department equipment.

E. A hydrant flow test will be required for an evaluation of water supply capacities. Based on a short conversation with Matt Mancuso of the Belmont Water Department, current water pressure in the area of the school has not been a problem. A test will need to be performed by a third party with Water Department personnel present.

PLUMBING

A. Plumbing Fixtures

1) Existing water closets throughout the building are predominantly wall mounted, flush valve type fixtures. The water closets viewed during this site inspection do not appear to be low flow type fixtures which are currently required per the state plumbing code.

2) Existing urinals throughout the building are predominantly wall mounted, flush valve type fixtures. The urinals viewed during this site inspection do not appear to be low flow type fixtures. None of the urinals viewed were mounted at an ADA height which is a current plumbing code violation.

3) Existing lavatories throughout the building are predominantly wall hung type fixtures with metering faucets. The lavatories viewed during this site visit do not appear to be provided with individual mixing valves to limit the temperature of water provided at the fixture. Current plumbing code requirements limit the temperature of hot water at public lavatories to 110°F. Based on the temperature of hot water being stored and delivered (approximately 140°F) throughout the building, this requirement doesn't appear to be able to be met currently.

4) Janitor's service sinks throughout the building are predominantly floor mounted type fixtures with wall mounted faucets. These fixtures appear to be in good working order although all of these fixtures are older models and showing signs of age.

5) Toilet rooms are located on all levels of the school. It does not appear that the current configurations of most of these toilet rooms meet current ADA requirement for fixture types and possibly spacing requirements.

B. Domestic Cold Water System

1) The building is currently provided with a 6" domestic water service that enters Room #143 on the first floor. This 6" service immediately reduces down to 4" prior to the water meter and serves all plumbing fixtures in the building. No problems or issues have been reported with this size of service or the current water pressure in the building.

C. Domestic Hot Water System

1) A portion of the domestic hot water system in various wings of the school consists of electric water heaters to serve that particular wing of the building only. These water heaters are typically located in janitor closets on the second floors of the building. These heaters could possibly be serving plumbing fixtures that are more than 100 feet away from the heater. Per current state plumbing code requirements the hot water distribution system would require a dedicated hot water recirculation piping system that does not exist at this time.

2) The larger areas of the building are fed from two separate Patterson-Kelly steam-fired water heaters. One heater is located on the second floor. The areas served include the pool area locker rooms, as well as the boys and girls locker rooms. This heater is also serving the toilet rooms in the area, but the locker rooms are the largest load. This water heater is storing hot water at 140°F. There is no indication that a mixing valve exists to reduce the temperature of the hot water being delivered to these areas per current plumbing code requirements.

3) The second steam fired-heater is located on the first floor. This heater appears to feed the plumbing fixtures in the kitchen and all toilet rooms in this wing. This water heater is storing hot water at 140°F. A mixing valve is installed to reduce the water temperature to the toilet rooms. A separate 140°F feed bypasses the valve to serve the kitchen.

4) It appears that both of these steam-fired water heaters have been provided with hot water recirculation systems. These systems utilize a small return line with an in-line pump to circulate hot water throughout the main distribution piping, thereby minimizing the time it takes for hot water to get to fixtures.

5) There is an existing electric water heater located within the kitchen that also appears to feed the kitchen fixtures. It is assumed that this unit was possibly being used during the summer months for kitchen use when the boilers were shut down. Further investigation of the hot water system distribution to the kitchen will be needed.

6) All water heaters are original to the building and appear to be past their life expectancy.

D. Sanitary and Vent System

1) The original plans indicate the sanitary system is a gravity system. There are several locations throughout the building where the sanitary lines exit to manholes.

2) The sanitary piping that could be viewed was cast iron. There were areas observed where it appeared new piping had been installed. The existing piping appears to be in fair condition.

E. Storm Drainage

1) The building storm drainage system consists of roof drains located throughout the various building roof heights. All roof drains observed appeared to be in good condition. All roof drains observed were clear of debris. Internal storm system piping was not visible. The storm system appears to be adequate for the facility at present.

F. Natural Gas System

1) A relatively newer high pressure gas service is located just outside of the Boiler Room. The gas service is equipped with in-line regulators that reduce the gas pressure before entering the Boiler Room. An older gas service and gas piping is also located in this area. School personnel have stated that this system is no longer in service and piping to any equipment has been disconnected.

2) Gas is supplied to the boilers only at this time.

3) School personnel stated that the all gas piping to the Science wing of the building has been disconnected. Gas is no longer used in the Science wing.

4) When the new gas service was brought to the building, a second gas service was also brought to the building just outside of the existing cafeteria kitchen. This underground gas service is capped just outside of the building and is ready for extension into the kitchen in the future.

5) Any gas piping observed appeared to be in good condition.

G. Insulation

1) Hot and cold water piping that was in view is in fair condition. The pipe insulation appears to be fiberglass. In many locations the insulation is either hanging off the piping or has been completely removed from portions of the piping. Overall, where insulation exists, it is in only fair condition. Due to the age of the building, it can reasonably be assumed that the insulation contains asbestos.

H. Hose Bibbs and Wall Hydrants

1) Hose bibbs are required in toilet rooms in buildings with two or more water closets or urinals. The toilet rooms that were observed did not have hose bibbs installed.

I. Cross Connection Control

1) Currently cross connection control in the form of vacuum breakers for the protection of the domestic water system is not in place. As stated above, the exterior wall hydrants do not have integral vacuum breakers.

J. Boys' and Girls' & Pool Locker Rooms/Shower Areas

1) The Boy's Locker Room is in fair condition. The showers are controlled by means of four master control mixing valves, behind recessed cabinets, outside of the shower area. The shower areas themselves are a series of separate gang showers. The number of showerheads within each gang shower varies, but each showerhead can be individually turned on. It c ould not be determined if the showerheads were a code compliant in terms of water delivery requirements. Within each gang shower there is a single floor drain. This does not meet the current codes. The Massachusetts State Sanitary Code does not allow the water from one shower to cross into another shower area.

2) The Girl's Locker Room is in fair condition. The showers are controlled by means of a series of master control valves. Each valve controls one bay of showers. The mixing valves are exposed outside each shower bay. The shower units are separated into individual shower areas. Floor drains are located between each shower area. The shower water never passes from one shower area to the next. It could not be determined if the showerheads were code compliant in terms of water delivery requirements.

3) The pool showers are set up similar to the Boy's locker room showers. There are two separate shower areas. Each shower area is controlled by a master mixing valve, which is located in the coach's room between each shower. Each shower area has a single floor drain with multiple shower heads. This does not meet current sanitary codes.

4) The shower areas do not meet current ADA requirements and may not meet code requirements for low-flow fixtures and lavatory faucets.

K. Kitchen

1) All equipment in the kitchen is electric at this time No equipment is fed from the existing gas service.

2) The three-compartment sink is connected to a code required grease interceptor located on the floor below. Both the sink and interceptor are in bad condition. School personnel have stated that the sink and interceptor are not used as the kitchen does not have any cleaning capacity at this time. Only paper/plastic is being used and all of it is thrown away in the trash. Should the kitchen require future cleaning capabilities, a new three-compartment sink and grease interceptor will be required.

3) The existing dishwasher is conveyor type with an electric booster. However, as stated above, the unit is not currently being used. This piece of equipment should be replaced if cleaning capabilities will be required in the future.

L. Science Wing

1) School personnel have stated that the sanitary waste from the science wing is completely separate from the standard sanitary waste, but it does not empty into an acid neutralization system. This is in violation of the state plumbing code. The lab waste system exits the building separately and the existing plans show the lab waste connecting to the standard waste outside the building.

2) Hot and cold water to all lab faucets is connected to the same domestic water systems that serve the rest of the building. A separate non-potable water system should be serving this wing and it doesn't appear to exist. The faucets appear to be in fair condition.

3) Each science room is provided with an emergency shower. These showers do not appear to be served by a tempered water system and are located away from the entry door. Currently the state plumbing code requires emergency showers to be fed with tempered water and to be located adjacent to the entry door.

4) As stated previously, gas piping to the labs has been disconnected. School personnel have indicated a gas shut-off valve is located in the ceiling of the corridor. The state plumbing code requires a gas shut-off valve to be located within a cabinet at the exit door of each lab.

OPTION 1: CODE UPGRADES

FIRE PROTECTION

A. To comply with current codes, this building will require a complete sprinkler system installation per the Massachusetts State Building Code, Chapter 34. The Fire Protection system would be designed to meet the requirements of NFPA

13 "Installation of Sprinkler Systems" and Chapter 9 of the Massachusetts State Building Code, 780 CMR, "Fire Protection Systems".

B. A new dedicated 8" sprinkler service, connected to the town water system in the street, should be brought into the building. The exact entrance location will need to be coordinated with the Architect. As the sprinkler service enters the building a Massachusetts approved double check valve backflow preventer assembly, complete with OS&Y valves on the inlet and outlet, will be required.

C. The alarm check valve for the sprinkler system will be installed on the riser after the double check valve assembly in the water service entrance room. The alarm check valve will be complete with a standard trim package including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches.

D. The main feeds out to the system from the alarm check valve will extend out to the building through the first floor ceiling space. The piping will then extend to all areas of the building so that each section of the building and each floor can be divided into separate zones.

E. Due to the building being only two stories the Massachusetts State Building Code does not require a standpipe system throughout the School. However, regulations governing Auditoriums and Stages will require standpipes at each side of the backstage areas.

F. The sprinkler system risers will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control assembly off of the standpipe which feeds each floor will contain a flow switch and tamper switch. An inspector's test connection will be installed on the floor control valve station. If the stage is greater than 1,000 square feet then the fire department valves are located on each side of the stage.

G. Sprinkler heads throughout the facility where gypsum or suspended ceiling are installed will be glass bulb, quick response, chrome plated semi-recessed type. In areas where no ceilings are installed brass upright sprinklers will be installed. Where upright sprinklers are subject to potential damage, such as in storage rooms, protective cages will be installed. In areas where it is not possible to run piping above the ceiling the use of sidewall sprinkler heads would be recommended.

H. Sprinkler piping for the system will be as follows: Piping 2" and smaller shall be schedule 40 black steel with cast iron fittings with threaded joints. Piping 2 ½" and larger shall be Schedule 10 black steel with malleable iron fittings with rolled grooved joints.

I. All tamper and flow switches installed on the sprinkler system will be connected to the buildings fire alarm system. Each tamper and flow switch will be a dedicated point on the fire alarm system.

J. The siamese connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. Final location of the siamese connection will be coordinated with the Belmont Fire Department. An additional fire hydrant may need to be added on the site to be within the required distance of the siamese connection.

K. The hydraulic requirements for the building will be as follows: All offices, corridors and the auditorium are considered Light Hazard and the sprinkler system will provide 0.1 gpm per square foot over the most remote 1,500 square feet. All storage rooms and mechanical rooms are considered Ordinary Hazard Group I and the system will provide 0.15 gpm per square foot over the most remote 1,500 square feet. The stage area would be classified as Ordinary Hazard Group II. The sprinkler system in this area would be required to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

PLUMBING

A. Plumbing Fixtures

1) The majority of water closets, urinals and lavatories in the building are old and not current water conserving type. Removal of all fixtures is recommended as the existing fixtures have reached the end of their serviceable life. Water closets should be replaced with new low-flow flush valve fixtures (1.6 gpf or less). Urinals should be replaced with 0.25 gpf fixtures. Lavatories should be replaced and new low-flow type faucets (0.5 gpm or less) added with temperature limit stops which will deliver water with a maximum temperature of 110°F. ADA requirements will also need to be met during a renovation to the toilet rooms.

2) The state plumbing code dictates the number of plumbing fixtures required in a building. Minimum plumbing fixture requirements will be determined once the total occupancy numbers for the building have been established based on the final plan layout.

B. Domestic Cold Water System

1) The 6" water line that enters the building is the original service to the building. Although the 6" line which feeds the domestic water service appears to be adequate to meet the current building water requirements, this would be a good time to bring in a new 6" dedicated domestic water service since a new 8" service would be brought in to feed the proposed sprinkler system. The installation of a water meter on the new service would also be recommended.

C. Domestic Hot Water System

1) The existing steam water heaters serving the larger portions of the building are original to the building and have passed their useful life expectancy. Also with the use of these steam water heaters the boilers are required to operate during the summer months to allow hot water to be created for the building. It is recommended to install new gas-fired storage type water heaters in the same locations as the existing. It is also recommended that redundant water heaters be included in the new system design. This would allow the system to continue to deliver hot water if one of the water heaters were to need service. The water heaters would be sized to serve the existing fixtures as well as any planned additions to the building.

2) The existing electric water heaters serving the various wings of the building are older and have passed their useful life expectancy. These should be replaced with new electric water heaters of similar size.

D. Sanitary and Vent System

1) The sanitary system in the existing building appears to be in good condition but replacement may be required as a consequence of a possible fixture count change and probable relocation of fixtures in the renovation plan. Any new piping would connect to the existing waste and vent piping at a convenient point to be determined by further investigation.

E. Storm Drainage

1) The existing building roof drainage appears to be in good condition and no replacement is required. The roof itself appears to be in good condition and leaks around the roof drains themselves have not been reported.

2) Backwater valves should be installed on all interior storm system piping originating from roof drains on lower roof sections as per the state plumbing code.

3) Opportunities for the management and /or re-use of the storm water drainage should be explored with the civil engineer to determine if there could be any benefit to the school.

F. Natural Gas System

1) Currently the existing gas service is more than adequate to meet the school's demand requirements. Any new gas-fired kitchen equipment can be connected to the new capped gas service located just outside of the building near the kitchen.

G. Insulation

1) The insulation that currently exists should be tested to determine the extent of any hazardous materials. The insulation should be removed and replaced with new fiberglass insulation with an all service jacket. Piping which is not currently insulated should have new insulation installed.

2) Insulation will also need to be provided on waste piping and water piping below handicapped lavatories and sinks.

H. Hose Bibbs and Wall Hydrants

1) During any renovation done to the building, the existing hose bibbs in the toilet rooms should be removed and new wall mounted hose bibbs with an integral vacuum breaker and removable tee handle installed.

I. Cross Connection Control

1) As stated previously, the existing hose bibbs and wall hydrants do not have backflow prevention devices. Backflow devices will be integral to all new hose bibbs and wall hydrants installed during the renovation.

2) All service sink faucets installed during a renovation will also have integral vacuum breakers.

3) A new reduced pressure backflow preventer assembly should also be installed on the existing 6" domestic water (or on a new service if this is the preferred option) service to further protect the town's domestic water system.

J. Boys, Girls and Pool Locker Room/Shower Areas

1) All locker room/shower areas should be completely renovated. Floor drains within any new shower stalls should be arranged so that the water from one shower does not enter into the adjacent shower area. New shower valves should be installed with code compliant shower heads. Master mixing valves should be installed at each shower location. Valves shall be provided with limiting stops set to a maximum water temperature delivery of 112°F.

2) All plumbing fixtures will be replaced as discussed in the "Plumbing Fixture" section of this report.

K. Kitchen

1) If kitchen renovations include the addition of new or replaced gas-fired equipment, this equipment can be connected to the new gas service located outside the building as noted above.

2) Any new gas equipment would be fed by gas piping connecting to a master shut-off valve that would be interconnected with the kitchen hood and exhaust system. Gas would only operate as long as the kitchen hood exhaust system is operating.

3) Additional floor sinks and/or floor drains would be added to any new equipment design to ensure proper drainage throughout the kitchen.

4) A new three-compartment sink with new grease trap should be included per state code requirements.

5) A new dishwasher with accompanying grease trap should also be provided per state code requirements.

6) A new exterior grease trap, located underground, outside of the kitchen portion of the building will also need to be considered as part of any new design or renovation to the kitchen. Venting of this exterior grease trap should enter back into the school building and exit to the atmosphere above the roof.

L. Science Wing

1) If the existing science wing is to be renovated in its current location, all existing lab sinks and faucets should be replaced with new fixtures. Faucets should be low-flow type fixtures with a maximum delivery rate of 0.5 gpm.

2) The lab waste system should be removed in its entirety and replaced with a new polypropylene acid resistant piping system that empties into a central acid neutralization tank and system. This system would balance the pH of the lab waste and then safely discharge it into the regular sanitary waste system before it connects back to the town's sanitary waste system.

3) The existing hot and cold water systems serving the science wing should also be removed in their entirety. New protected hot and cold water systems should be created to serve the renovated science wing by installing reduced pressure backflow preventers on the hot and cold water piping designated to serve this area.

4) The existing main gas piping system serving the science wing could possibly be re-used. This piping should be reconnected to the new gas service in a convenient location. Gas piping to each science classroom should feed an emergency shut-off valve located in a valve box on the wall near the classroom exit door. Piping from this valve would then feed any gas turrets within that classroom only.

5) All existing emergency showers in the science wing and connections to the cold water system should be removed. A new tempered water system should be created to serve the science wing. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements.

OPTION 2: RENOVATION ONLY

FIRE PROTECTION

A. General

1) As part of a major renovation to the building, a new sprinkler system would be required. All items included under Option 1 (Code Upgrades) of this report would also apply for this option.

PLUMBING

A. General

1) It is assumed that this option would be classified as a major renovation and it would require that all existing systems be modified to comply with current codes. Therefore, all items included under Option 1 (Code Upgrades) of this report would also apply for this option.

2) It is recommended that all existing plumbing systems, or portions thereof, that were capable of remaining and being maintained would also be removed or modified to meet the requirements of any planned renovations.

3) It is also recommended to install new above ground sanitary waste piping throughout the building to replace the existing older system that is currently in place.

OPTION 3: RENOVATION AND ADDITION

FIRE PROTECTION

A. General

1) As part of a major renovation and to the building, a new sprinkler system would be required. All items included under Option 1 (Code Upgrades) of this report would also apply for this option.

PLUMBING

A. General

1) It is assumed that this option would be classified as a major renovation and addition and it would require that all existing systems be modified to comply with current codes. Therefore, all items included under Option 1 (Code Upgrades) of this report would also apply for this option. The following recommendations to the plumbing systems should also be considered.

2) All existing plumbing systems, or portions thereof, that were capable of remaining and being maintained should also be removed or modified to meet the requirements of any planned renovations.

3) All existing plumbing systems to be removed as part of the select building demolition should be removed back to the nearest point of connection of their respective system.

4) New above ground sanitary waste piping should be installed throughout remaining portions of the existing building to replace the existing older system that is currently in place.

5) New above ground domestic hot and cold water piping should be installed throughout remaining portions of the existing building to replace the existing older systems that are currently in place.

6) Install new waste outlets as required to accept HVAC condensate and sprinkler waste discharge.

OPTION 4: NEW BUILDING

FIRE PROTECTION

A. General

1) As part of a major renovation and to the building, a new sprinkler system would be required to be provided. All items included under Option 1 (Code Upgrades) of this report would also apply for this option.

PLUMBING

A. The new high school building will be provided with the following plumbing systems.

1) Sanitary waste and vent connecting to all fixtures as required. Sanitary waste piping shall extend 10'-0" beyond the building exterior for connection to the site sanitary piping system.

2) Lab waste and vent connecting to all fixtures as required. Lab waste piping shall discharge into a central acid neutralization system located on the lowest level of the building. System shall monitor and adjust the pH level of the waste and then discharge this waste to the sanitary waste piping system outside the building, as part of the underground system.

3) Grease waste piping system from the new kitchen to an exterior grease trap located outside of the building. Grease trap vent piping shall enter the new building underground and exit through the roof of the building per state code requirements.

4) Domestic cold water connecting to all fixtures as required. Domestic cold water piping shall extend 10'-0" beyond the building exterior for connection to the site water distribution piping system.

5) Domestic hot water will be produced and stored in two high-efficiency condensing type gas-fired domestic water storage heaters with a single code-compliant insulated tank sized to meet the highest hourly demand. There will be two insulated distribution and recirculation loops for domestic hot water; one for the kitchen (140°F) and a main building loop (125°F). All lavatories qualifying as "public" lavatories will be provided with individual mixing valves below the fixture to reduce HW discharge temperatures to 110°F maximum per code. Mixing valves for hand sinks in the kitchen shall reduce discharge temperature to 120°F maximum.

6) Non-potable (protected) hot and cold water systems shall be created to serve the renovated science wing by installing reduced pressure backflow preventers on the hot and cold water piping designated to serve this area.

7) A new tempered water system should be created to serve the Science wing. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements.

8) Storm water drainage system. Roof drainage will be a combination of roof drains with internal roof drain piping serving flat roofs, and gutters and downspouts serving sloped roof portions of the building. Internal roof drain piping will convey storm water to underground piping and exit the building through foundation walls to connection with site storm drainage piping. The Plumbing sub-contractor will be responsible for underground piping to a point 10'-0" beyond the building exterior. Horizontal roof leaders above grade within the building shall be insulated.

9) Natural gas service provided by the local gas company serving the town. The gas company shall provide the underground service, gas meter and gas regulator. Contractor's work will begin on the discharge side of the gas meter and extend to all equipment requiring natural gas.

B. Plumbing fixtures will be new high efficiency water conserving type and wall-hung for optimum sanitary purposes. Automatic hard-wired flushometer valves and student lavatory faucets are to be provided.

C. The cafeteria kitchen is to be provided with all plumbing connections noted on the food service drawings. Piping from the local grease interceptors and from kitchen floor drains subject to the introduction of fats, oil or grease will be by a dedicated grease waste piping system leading to the exterior grease trap. There will be three local grease interceptors; one for the three-compartment pot sink, one for the ware-washing/ garbage disposer and one dedicated to automatic dishwasher drainage. The grease waste discharge from these interceptors will be piped to an exterior grease trap.

D. A dedicated gas piping main will serve the new Science wing of the building. Gas will be supplied to each classroom. Each classroom with be equipped with an emergency gas shut-off valve located in a valve box near the exit door of the classroom. Gas will distribute from this location to bench or countertop gas turrets as required. Each science classroom will also be supplied with one emergency shower/eyewash unit as required by code. These units will be supplied with tempered water as required by code. Floor drains with trap primer connections will be provided under each shower/ eyewash unit to protect against water damage when in use or due to accidental discharge.

E. Below grade sanitary and storm drainage piping will be service weight bell and spigot cast iron with neoprene gasketed joints. Above grade sanitary and storm piping will be service weight hubless cast iron with Massachusetts approved stainless steel and neoprene no-hub connector assemblies.

F. All water supply and return piping shall be Type "L" copper.

G. All water supply and return piping insulation shall be in accordance with the Energy Code.

H. All gas piping will be threaded black steel piping up to 2 ½" size. Piping 3" and larger shall be welded.

I. Freeze proof wall hydrants shall be provided around the perimeter of the building.

J. Waste outlets to accept HVAC condensate and sprinkler discharge shall be provided as needed and connect to the storm water piping system.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Electrical Assessment

ELECTRICAL ASSESSMENT

A. GENERAL:

1. This report is based on an August 28, 2017 site visit to the school, discussions with Facilities Personnel and existing documents.

B. BUILDING OVERVIEW (40+ YEARS OLD)

1. The majority of electrical systems are in excess of 40 years of age and based on industry standards have reached the end of their serviceable life.
2. There is little or no physical space in existing main electric room to add onto existing equipment. There is minimal capacity on the existing electrical system for added loads. Any repairs or additions will require significant rework of existing facilities to suit new equipment and meet current codes. In some locations working clearance and systems foreign to electrical installations were observed which create code violations and safety hazards for school and service personnel.
3. The majority of existing lighting throughout the building consists of luminaires original to the building. Lamp sources are primarily fluorescent with the exception of the field house and pool where LED luminaires have been installed.
    a. Given the age of the fixtures with fluorescent lamp sources it would be highly expected to see significant energy saving as well as increased efficiencies and visual comfort with new LED luminaires.
    b. For the most part lighting controls consist of local switching in all areas of the building. There is little or no use of occupancy/vacancy controls or daylighting controls. Current energy codes require automatic shutoff for the majority of interior and exterior lighting which will enhance energy efficiencies and power consumption.
4. A new fire alarm system was installed throughout the building within the last year. The system is a voice system and provides complete audio/visual coverage throughout the building, manual pull station coverage and 100 percent smoke detector coverage as the building does not have a fire protection system.
5. The facility has an exterior 180kW diesel-fired generator manufactured by Kohler. This generator is several years old and is a replacement for the original building generator that is inoperative and still sits within the building.
    a. The generator is noted to primarily serve the building's emergency lighting system.
    b. This generator would not have capacity to serve many base line systems put on generator systems in today's newer facilities.
    c. The existing distribution system does not meet current code requirements for separation of life safety and non-life safety systems.
6. General Power and Branch Circuits
    a. The majority of spaces throughout the building have devices that are original to the building.
    b. Receptacles have been added in some areas of the building via surface raceways and exposed conduit.
    c. Additional devices would be required throughout the facility to serve updated space programming needs.

AUDIOVISUAL SYSTEMS ASSESSMENT

We visited Belmont High School on August 28, 2017 with the school and the entire design team to assess the existing conditions at the school. The following are our comments related to the audiovisual systems for the school.

BACKGROUND

Acentech is an independent consulting firm specializing in architectural acoustics, noise and vibration control, and the design of advanced sound, audiovisual, multimedia, and videoconferencing systems. In order to provide unbiased consulting and design services, Acentech does not sell or install equipment and does not represent any dealer, distributor, or manufacturer.

ROOM SCHEDULE

Unless otherwise noted, the focus of this project is limited to the following spaces and/or systems.

- Auditorium
- Music Classrooms
- Cafeteria
- Entry Hall
- Classrooms (including Art Classrooms)
- Lecture Hall (aka Little Theater)
- Book Rooms
- Gymnasium
- Natatorium
- Field House

EXISTING CONDITION EVALUATION

During our site visit, the existing audiovisual systems were reviewed. In general, the technology being used in the school is outdated and does not support current standards. Additionally, there did not appear to be consistency in the system components from room to room. Standardization is generally desirable so that technical staff can more easily troubleshoot and correct any problems with the systems, and also so that they can stock common replacement parts (such as projector lenses and filters). Consistency from system to system also allows them to be easier for the end users. If an end user needs to use the audiovisual system in a space that they do not typically use, the user can feel comfortable and confident that they will understand how to use the system in that room since it will be exactly the same as the one they typically use.

In all of the classrooms that we observed, the video projection systems included analog video (VGA) connections, but not digital video (HDMI). Analog video systems are rapidly being phased out. Fewer source devices support this connectivity, and the cost to support the older technology is increasing due to low supply of the components needed to support this. While some adapters allow users to connect digital video sources to analog displays (projectors and video display panels), the adapters are not reliable and do not always work.

Portable assistive listening systems were observed in some classrooms. These portable systems ("Redcat Lightspeed") are generally used for speech amplification. They do not typically connect to the audiovisual systems. In spaces with installed amplified sound systems, assistive listening systems are required in order to comply with the ADA (Americans with Disabilities Act). Further information about this requirement is listed later in this report.

It did not appear that audiovisual control system interfaces were used in most of the systems we observed. A control system interface (either as a touch screen control panel, or a button panel) will make the audiovisual system easier to use for the end user. The controls will always be available and in the same location (will not need to look for remote controls that can easily be lost).

The existing audiovisual equipment rack for the Auditorium is located on the downstage left corner. It is located next to electrical equipment and lighting dimmer racks. Unless the dimmer racks are using newer technologies, locating these racks in close proximity to one another should be avoided. Electrical "noise" (RF) from the lighting dimmers can create interference and create audible hum or buzz in the sound system.

Finally, current audiovisual system technologies allow the systems to connect to the data network. This allows the systems to automatically alert technicians about problems. For example, a system can alert a technician when a video projector's lamp has been used for a set number of hours. This allows the technician to

know ahead of time that the lamp will need to be replaced soon, and give them time to order replacement parts before the lamp no longer works.

BUDGET SUMMARY

This report describes the functionality of the proposed audiovisual systems and does not include cost estimates. A programming meeting with key users is recommended to confirm the features described in this report, and a more accurate narrative and budget can be developed to cover this. Please note that audiovisual technology cost estimates do not cover construction items traditionally carried in the mechanical and electrical engineers' budgets. These items include, but are not limited to, conduit, junction boxes, structural supports, electrical power, and data network cabling.

TOTAL COST OF OWNERSHIP

The total cost of ownership of the audiovisual systems, in addition to the installation costs of the systems, includes several on-going costs:

SUPPORT STAFF COSTS

The increase in the use of audiovisual systems carries with it the need to provide additional support for the users of the systems. This is balanced by network tools that allow support staff to work more efficiently. Specifically, the network-based management software will allow the staff to turn systems on and off, verify the operation of the equipment, schedule events for automatic operation, and receive automatic notification of system failures, projector lamp replacement, etc., without visiting the room. Without a detailed study of the current and anticipated support staff requirements, it is not possible to predict the staffing costs following the completion of the project; however, AV system management software is key to minimizing the support staff costs.

AV SYSTEM SERVICE

The installation contract should require the installing contractor to provide a service contract for all systems for an additional three years beyond the initial one-year P&L warranty. The cost of a service contract for the period following the expiration of the initial contract is likely to be approximately 10% of the cost of the initial installation per year. In addition, there will be charges associated with the actual repair of equipment that may fail during the life of the service contract.

EQUIPMENT REPLACEMENT

The useful life of audiovisual system equipment varies with the type of equipment. In general, the useful life of most AV equipment is 5 - 10 years. Replacing individual items of equipment will be necessary during the life of the systems. Complete upgrades of the systems may be appropriate after ten years, as much because of the progress of technology and because of equipment usable life.

INFRASTRUCTURE VS. EQUIPMENT

The distinction between infrastructure and equipment must be emphasized: Infrastructure is part of the building construction including, but not limited to, conduit, raceways, junction and device boxes, and is not outlined in this program. Other infrastructure provisions, such as electrical power and grounding specified exclusively for audiovisual systems cabling and equipment may be required and should be carried in the electrical budget. Properly designed AV infrastructure allows for not only the installation of the initially specified equipment, but for the evolution of the systems over many years. If proper infrastructure is provided, additional capabilities and equipment can be added later as technology progresses.

Equipment refers to the devices that can be connected through the infrastructure. Equipment includes microphones, loudspeakers, mixers, signal processing gear, video projectors, flat panel displays, cameras, AV control systems, equipment racks, and many other devices that comprise an AV system. One thing is certain – equipment will change over the life of the room as user needs and technology change. For this reason, infrastructure is the key to the long-term success of a thoughtfully conceived AV design project because it governs what can and cannot be easily installed in the future.

EQUIPMENT NOTES AND DEFINITIONS

- This program is not a technical specification and is insufficient to bid or build an AV system. Except where useful to illustrate a standard of performance or a specific user requirement, equipment manufacturers and model numbers are not used.
- Permanently installed refers to equipment that is part of the room systems and cannot easily be removed for use elsewhere.
- Portable refers to equipment that is available for connection at one or more locations, but is not hard-wired to the system. Portable equipment can be

disconnected by the user or technical personnel and stored or used with systems elsewhere in the facility.

- Future Provisions refers to equipment that may be purchased and used or installed at a future date.
- Options refer to equipment or systems that are not at this point considered to be central to the needs of the Owner but may be chosen if desired. Optional equipment is not included in the budget estimate totals.
- OFE (Owner Furnished Equipment) refers to equipment that is either already owned by the Owner, or may be purchased in the future as needs arise. FBO (Furnished by Others), or "by others" refers to any service or equipment (e.g. lighting) required but not a part of the AV system design or installation.

SYSTEM CLASSIFICATIONS

PRESENTATION SYSTEMS

Presentation systems are the source, routing, and display devices that provide highly intelligible communication of speech, music, information, and graphics to groups of people. This includes equipment such as microphones, loudspeakers, video projectors, plasma displays, computers, and the interfacing, mixing, routing, and control equipment that connects these devices together and allows the user to select the appropriate sources and operate the system.

ASSISTIVE LISTENING SYSTEMS

Permanently installed Assistive Listening Systems (ALS) are required by the ADA (Americans with Disabilities Act), a 1990 federal law that forbids discrimination against persons who are handicapped. A 2010 revision states, "In each assembly area where audible communication is integral to the use of the space, an assistive listening system shall be provided" in the following quantities and versions:

The term "assembly area" includes facilities used for entertainment, educational, or civic gatherings. Additionally, courtrooms are required to support Assistive Listening systems regardless of whether or not an installed sound system exists.

AUDIOVISUAL CONTROL SYSTEM

Audiovisual (AV) control systems are required to centralize the operation of the various functions of the AV system. This includes environmental controls such as lighting presets and shade and drape controls, as well as audiovisual functions such as system and projector power, source device selection and media transport controls, audio volume controls, and many other operational functions identified by the design team before the equipment is installed.

Advanced functions of the AV control system may include multi-level password protection for system operation to prevent

Receivers for Assistive Listening Systems

Capacity of Seating in Assembly Area	Minimum Number of Required Receivers	Minimum Number of Required Receivers Required to be Hearing-aid Compatible
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats[1]	2
201 to 500	2, plus 1 per 25 seats over 50 seats[1]	1 per 4 receivers*
501 to 1000	20, plus 1 per 33 seats over 500 seats[1]	1 per 4 receivers*
1001 to 2000	35, plus 1 per 50 seats over 1000 seats[1]	1 per 4 receivers*
2001 and over1	55 plus 1 per 100 seats over 2000 seats[1]	1 per 4 receivers*
		1 "Or Fraction thereof"

The term "assembly area" includes facilities used for entertainment, educational, or civic gatherings. Additionally, courtrooms are required to support Assistive Listening systems regardless of whether or not an installed sound system exists.

unauthorized use, control of automatic system shut-down sequences (to reduce unnecessary wear and tear), and a help system interface for user experiencing technical problems (see below).

REMOTE MANAGEMENT

Permanently-installed AV control systems can be connected to the Owner LAN to enable remote control and diagnostics of the AV systems. An asset management hardware / software suite allows monitoring and operation of AV systems via the Owner's LAN. These products allow technical personnel to operate audiovisual systems in remote locations from any computer with a web browser. The features of remote management systems include:

- Real-time monitoring of system status, including notification of imminent problems in certain devices before they fail.
- Mobile management.
- A method of asset management by tracking equipment usage in real time.
- Will integrate with other control system hardware/software.

VIDEO CONFERENCING/DISTANCE LEARNING

Videoconferencing equipment (HD CODECs, software codecs, cameras, echo cancellers, telephone interfaces and related devices) is equipment specifically designed to transmit and receive audio and video signals over local and wide area networks. This capability is not currently planned for this project.

BROADCAST SYSTEMS

Broadcast quality equipment and systems generally refer to audio and video devices (cameras, recorders, and editing equipment) of the highest quality, specifically designed for the recording, editing, and production at the commercial level, such as in network television studios. Broadcast equipment is an order of magnitude more expensive than "professional" quality equipment, and is not planned for this project.

PROPOSED AUDIOVISUAL SYSTEM DESCRIPTIONS

AUDITORIUM

The auditorium will be used for live music and theater performances, multimedia presentations with audio and video, lectures, and panel discussion. It is anticipated that the following will be required:

SOUND SYSTEM

- Microphones:
  - Wired Microphones: The system will include a stereo microphone that is hung in the room and used for audio recordings. Another microphone will be permanently installed over the stage/performance area and used for backstage monitoring. A gooseneck microphone will be provided for connection to a lectern (lectern, by others). Connections for wired microphones will be available at the sides of the stage, above the stage performance area, and along the side walls of the seating area.
  - Wireless Microphones: The system will include 4 wireless microphone systems. Each will include an interchangeable handheld and lavalier (clip-on) microphone transmitter.
- Audio Mixers: The system will operate in one of two microphone mixing modes; automatic or manual. These modes will be selectable from a control panel.
  - Automatic Microphone Mixing Mode: This mode will allow an end-user to simply connect a microphone to the system at one of multiple designated microphone receptacle locations. Master volume control will be accessible from the control panels. This will be the system's default setting and will be used for presentations, movies, and lectures.
  - Manual Microphone Mixing Mode: For events when more complex operation of the sound system is required, the automatic microphone-mixing can be bypassed and the system can be run by a trained operator. Volume levels of microphones and other audio playback sources will be controlled from a 32-channel digital mixing console; providing a flexible variety of audio outputs that can be used for special effects, recording, and speech reinforcement. The mixing console will be permanently located at a "tech position" within the house. The mixing location will require ample space for operation of the console and other items such as scripts required for rehearsals or performances. The mixing console will connect to the IT network and will have the capability of being controlled from an Owner-furnished tablet computer (such as an Apple iPad) that is connected via Wi-Fi to the same IT network.
- Audio Recorder: An audio recorder will used for recording events from the stereo microphone. The recorder will be capable of

connecting to the IT network and can upload recorded audio tracks to another computer or server. The USB connection will allow recordings to be transferred to a thumb drive.

- Audio Signal Processing: A digital audio signal processor will be used for automatic microphone mixing, and equalizing the loudspeakers. The signal processor will be expandable so that, if required, additional input and output capacity can be added to the system in the future.
- Production Communications: A two-channel intercom system will be used for communication between production crew members at control locations, and the backstage spaces. AV connection panels within the performance space will include receptacles for the connection of intercom belt-packs. Wall-mounted speaker stations will be located in the music classrooms and other backstage spaces. The system will be provided with eight dual-channel belt-packs, headsets, and cables.
- Loudspeakers:
  - Installed Auditorium System: The loudspeaker system will provide uniform audio coverage through the audience area allowing the system to provide high levels of speech intelligibility and musical clarity.
  - The loudspeaker configuration will consist of a central loudspeaker cluster above and in-line with the primary stage area. It will be used for speech reinforcement and playback of audio. Supplementary "delay" loudspeakers will be provided to cover the rear seating areas. Front-fill loudspeakers will be used in the stage apron. Subwoofers will also be provided. Left and right loudspeakers will be used for stereo audio playback, and for sound effects; which can be panned across the left, center, and right loudspeakers. Amplifiers will be provided to power the loudspeakers.
  - Control Room: A pair of wall-mounted loudspeakers will be installed in the Control Booth and will be used by technicians in the booth to monitoring audio from the stage performance/ event. Amplifiers will be provided to power the loudspeakers.
  - Portable: Four portable self-powered loudspeakers will be provided for use on stage as "wedge" monitor loudspeakers. These loudspeakers can also be used in the house or on stage as sound effects speakers. Additionally, the loudspeakers will slant for use as a "wedge" or fold back monitor loudspeaker for use on stage.
  - Backstage and Front of House: In addition to the Auditorium's loudspeakers, ceiling-mounted loudspeakers will be provided in backstage areas, dressing rooms, etc. for audio monitoring (for cues, etc.). Amplifiers will be provided to power the loudspeakers.
- Assistive Listening System: An FM-based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers (i.e., headphones) will be stored centrally and issued to participants as required. These receivers are intended to be used by patrons with hearing impairments.

DISPLAY SYSTEM

- Video Projector: The system will display computer and motion video using a high brightness video projector with appropriate lens. The projector will be installed at the rear of the Auditorium in the control booth.
- Projection Screen: A motorized video projection screen with a high-contrast screen material will hang from above the stage.
- AV Sources: AV sources will include an Owner-furnished computer. Inputs for portable AV devices, such as a laptop computer or portable audio player, will be available at three locations (one on one side of the stage, one at the in-house audio mix location, and one in the Control Booth).
- Video Cameras: A high-definition video camera with integral pan/tilt head will be installed in the Theater. In addition, a night vision camera will also be provided for viewing of dark scenes. The cameras will be used to feed images of events in the space to backstage and front-of-house areas with video displays. Control of the cameras will be via presets on the touchscreen control panel.
- Video Routing and Processing: A matrix type switcher will be used to route video and audio sources to the displays and sound system. This will include video signal transmitters and receivers that are needed to send digital video signals longer distances. It will support playback and distribution of digital and analog video formats and the transport system will be compatible with newer generation 4K sources. Fiber optic transmitter outputs will be provided to send signals to the backstage areas with video displays, such as the Music Classrooms.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of three 10" LCD touch screens (one at the side of the stage, one at the in-house audio mix location, and one in the Control Booth). The control panels will be able to control all functions of the audiovisual system; including source selection and media transport controls, volume control, and can interface with other operational functions including lighting and HVAC.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack(s), AC power distribution, and sequencers in the racks, custom connection panels at the stage/performance area and house mix position, audio press feed connections to locations within the room, and all cable, connectors, and additional hardware and labeling required to install the system.

MUSIC CLASSROOMS

The Music Classrooms will include the Band Room and Chorus Room. These spaces will be used for musical instruction and rehearsal for choir, jazz band, orchestra, and band groups. Each audiovisual system will comprise the following sub-systems:

SOUND SYSTEM

- Microphones: A stereo microphone will be provided and will hang from the ceiling. This microphone will tie into the AV system and can be used for recording performances.
- Audio Signal Processing: A digital audio signal processor will be used for signal routing and equalizing the loudspeakers.
- Audio Recording: A network USB/SD audio recorder will be provided.
- Loudspeakers: Wall-mounted loudspeakers will be wall-mounted at the front of the room for program audio playback. Amplifiers will be provided to power the loudspeakers.
- Assistive Listening System: An FM-based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers (i.e., headphones) will be stored centrally and issued to participants as required. These receivers are intended to be used by patrons with hearing impairments.

DISPLAY SYSTEM

- Video Projector: The system will display computer and motion video using short-throw, 3,300 ANSI lumen video projectors (1280 x 800 WXGA resolution). The projectors will be installed on the wall above the whiteboard/projection screens in each room (whiteboard material to be provided by Others). Note that the whiteboard material should be of a projection quality and should not create reflections or hot spots from the projector.
- AV Sources: AV sources will include connectivity for an Owner-furnished computer. Inputs for portable AV devices, such as a laptop computer or portable audio player, will be available at locations at the front of the room. An overflow audio and video feed from the Auditorium will also be provided.
- Video Routing and Processing: A matrix type switcher will be used to route video and audio sources to the display and sound system. This will include video signal transmitters and receivers that are needed to send digital video signals longer distances. It will support playback and distribution of digital and analog video formats and the transport system will be compatible with newer generation 4K sources.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of a 7"LCD touch screen at the presentation area. The control panel will be able to control all functions of the audiovisual system; including source selection and media transport controls, and volume control. Control system processing will be embedded in the video matrix switch.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack, AC power distribution and sequencers in the racks, custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

CAFETERIA

The Cafeteria will include seating for a large number of students. An audiovisual system will be provided for lectures and will serve as an area to view and hear overflow AV feeds from the

Auditorium. The audiovisual system will comprise the following sub-systems:

SOUND SYSTEM

- Microphones:
  - Wired Microphones: Connections for wired microphones will be available.
  - Wireless Microphones: The system will include a wireless microphone system. This will include lavalier (clip-on) microphone transmitter.
- Audio Signal Processing: A digital audio signal processor will be used for automatic microphone mixing and equalizing the loudspeakers.
- Loudspeakers: The loudspeaker configuration will consist of distributed ceiling-mounted loudspeakers and will be used for program audio and speech reinforcement. Amplifiers will be provided to power the loudspeakers.
- Assistive Listening System: An FM-based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers (i.e., headphones) will be stored centrally and issued to participants as required. These receivers are intended to be used by patrons with hearing impairments.

VIDEO SYSTEM

- Video Displays: Two wall-mounted video display panels will be provided to display computer and motion video. These can be used for digital signage with owner provided PC, local AV presentations, or overflow video feeds from the auditorium.
- AV Sources: Inputs for portable AV devices, such as a laptop computer or portable audio player, will be available at one location in the Cafeteria area.
- Video Routing and Processing: A matrix type switcher will be used to route video and audio sources to the display and sound system. This will include video signal transmitters and receivers that are needed to send digital video signals longer distances. It will support playback and distribution of digital and analog video formats and the transport system will be compatible with newer generation 4K sources.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of a 7" LCD touch screen. The control panel will be able to control all functions of the audiovisual system; including source selection and media transport controls, and volume control.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack, AC power distribution and sequencers in the racks, custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

ENTRY HALL

The Entry Hall is a public area where large murals are hung. A digital video wall will be used to display electronic artwork, and can also be used to display other images and announcements. The audiovisual system will comprise of the following sub-systems:

DISPLAY SYSTEM

- Video Display: The system will display computer and motion video using a wall-mounted video wall consisting of nine (9) x 55" video display panels arranged in a 3 x 3 grid. The overall image size will be approximately 81" high x 143.5" wide.
- AV Sources: Inputs for portable AV devices, such as a laptop computer, will be available at a wall-mounted receptacle panel in the main office area of the school. An Owner-furnished computer will connect to the system.
- Video Routing: A switcher will be used to route video and audio sources to the display and sound system. This will include video signal transmitters and receivers that are needed to send digital video signals longer distances. The video routing equipment will be compliant with newer generation digital video sources (4K).

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of a wall-mounted 7" LCD touch screen. It will be able to control all functions of the audiovisual system; including source selection and media transport controls.

MISCELLANEOUS

Miscellaneous equipment will include an equipment rack, AC power distribution and sequencing, custom connection panels, and all cable, connectors, and additional hardware and labeling that are required to install the system.

CLASSROOMS

The classrooms (including the art classrooms) will be used for lectures and presentations. The audiovisual systems will each comprise of the following sub-systems:

SOUND SYSTEM

- Loudspeakers: A pair of wall-mounted loudspeakers will be used for program audio playback. Amplifiers will be provided to power the loudspeakers.
- Assistive Listening System: An infrared-based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers (i.e., headphones) will be stored centrally and issued to participants as required. These receivers are intended to be used by patrons with hearing impairments.

DISPLAY SYSTEM

- Video Projector: The system will display computer and motion video using a wall-mounted short-throw video projector (1920 x 1200 WUXGA minimum resolution). The projector will display content on a wall-mounted white board suitable for projection (white board, by Others).
- AV Sources: AV sources will include inputs for portable AV devices, such as a laptop computer or portable audio player. It will be available at the front of the room on a wall-mounted receptacle panel.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of a wall-mounted button panel. It will be able to control all functions of the audiovisual system; including source selection, volume control, and power.

MISCELLANEOUS

Miscellaneous equipment will include custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

LECTURE HALL (AKA LITTLE THEATER)

The Lecture Hall will be used for multimedia presentations with audio and video, lectures, panel discussions, and community events.

SOUND SYSTEM

- Microphones
  - Wired Microphones: A gooseneck and handheld microphone will be provided for connection to a lectern (lectern, by others). Connections for additional wired microphones will be available.
  - Wireless Microphones: The system will include a wireless microphone system. The system will include handheld and lavalier (clip-on) microphone transmitters.
- Audio Signal Processing: A digital audio signal processor will be used for automatic microphone mixing and equalizing the loudspeakers.
- Loudspeakers: Loudspeakers will be provided for speech reinforcement and audio playback. Amplifiers will be provided to power the loudspeakers.
- Assistive Listening System: An FM-based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers (i.e., headphones) will be stored centrally and issued to participants as required. These receivers are intended to be used by patrons with hearing impairments.

DISPLAY SYSTEM

- Video Projector: The system will display computer and motion video using a high-brightness video projector (1920 x 1200 WUXGA minimum resolution).
- Projection Screen: A motorized video projection screen with a high-contrast screen material will hang from the presentation wall.
- AV Sources: AV sources will an Owner-furnished computer. Inputs for portable AV devices, such as a laptop computer or portable audio player, will be available at two locations at the front of the room.
- Video Cameras: One high-definition video camera with

integral pan/tilt head will be installed in the Lecture Hall on the rear wall. Control of the camera will be via presets on the touchscreen control panel.

- Video Routing and Processing: A matrix type switcher will be used to route video and audio sources to the display and sound system. This will include video signal transmitters and receivers that are needed to send digital video signals longer distances. It will support playback and distribution of digital and analog video formats and the transport system will be compatible with newer generation 4K sources.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of a 10" LCD touch screen at the presentation area. The control panel will be able to control all functions of the audiovisual system; including source selection and media transport controls, volume control, and can interface with other operational functions including lighting and HVAC. Control system processing will be embedded in the video matrix switch.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack, AC power distribution and sequencers in the racks, custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

BOOK ROOMS

The Book Rooms will be used for workgroups and tutorial sessions. The audiovisual systems will each comprise of the following sub-systems:

SOUND SYSTEM

- Loudspeakers: A pair of wall-mounted loudspeakers will be used for program audio playback. Amplifiers will be provided to power the loudspeakers.
- Assistive Listening System: An infrared-based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers (i.e., headphones) will be stored centrally and issued to participants as required. These receivers are intended to be used by patrons with hearing impairments.

DISPLAY SYSTEM

- Video Display Panel: The system will display computer and motion video using a wall-mounted video display panel.
- AV Sources: AV sources will include inputs for portable AV devices, such as a laptop computer or portable audio player. It will be available at the front of the room on a wall-mounted receptacle panel.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of a wall-mounted button panel. It will be able to control all functions of the audiovisual system; including source selection, volume control, and power.

MISCELLANEOUS

Miscellaneous equipment will include custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

GYMNASIUM

The Gymnasium will be used for practice, large games, presentations, and events. The audiovisual system will comprise of a number of sub-systems that include the following:

SOUND SYSTEM

- Microphones: The system will include one wireless handheld microphone transmitter. Connections for wired microphones will be available at wall-mounted receptacle panels and on a portable equipment rack.
- Audio Processing and Mixing: A digital audio signal processor will be used for automatic microphone mixing, and equalizing the loudspeakers. An 8-channel audio mixer in the portable equipment rack will be used to mix microphones and other audio sources.
- Loudspeakers: Distributed ceiling-mounted loudspeakers will be provided for speech reinforcement and program audio playback. Loudspeakers will be zoned so that they can be used over the entire Gymnasium floor, or over the individual courts (please note that we not anticipate sufficient acoustical isolation between the courts, and it is not recommended to use the two courts simultaneously for different audio playback

or reinforcement). For larger events and games, additional loudspeakers will be used to provide coverage to the bleacher seating area. Amplifiers will be used to power the loudspeakers.

- Assistive Listening System: An FM or infrared based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers, intended for use by patrons with hearing impairments, will be stored centrally and issued to participants as required. Inductive neck loop adapters will be provided along with the receivers for compatibility with telecoil-enabled hearing aids.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of one wall-mounted 5" LCD touch screen, and an additional 5" LCD touch screen in the portable equipment rack. The control panel will be able to control all functions of the audiovisual system; including source selection and media transport controls, and volume control.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack, a portable equipment rack for use during events and games, AC power distribution and sequencers in the rack(s), custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

NATATORIUM

The Natatorium will be used for recreation and competitions. The audiovisual system will comprise of a number of sub-systems that include the following:

SOUND SYSTEM

- Microphones: The system will include one wireless handheld microphone transmitter. Connections for wired microphones will be available on a wall-mounted receptacle panel in the teacher's office.
- Audio Processing and Mixing: A digital audio signal processor will be used for automatic microphone mixing, and equalizing the loudspeakers.
- Loudspeakers: Distributed weatherized ceiling-mounted loudspeakers will be provided for speech reinforcement and program audio playback.
- Assistive Listening System: An FM or infrared based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers, intended for use by patrons with hearing impairments, will be stored centrally and issued to participants as required. Inductive neck loop adapters will be provided along with the receivers for compatibility with telecoil-enabled hearing aids.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of one wall-mounted 5" LCD touch screen. The control panel will be able to control all functions of the audiovisual system; including source selection and media transport controls, and volume control.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack, AC power distribution and sequencers in the rack(s), custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

FIELD HOUSE

The Field House will be used for practice, large games, presentations, and events. The audiovisual system will comprise of a number of sub-systems that include the following:

SOUND SYSTEM

- Microphones: The system will include one wireless handheld microphone transmitter. Connections for wired microphones will be available at wall-mounted receptacle panels and on a portable equipment rack.
- Audio Processing and Mixing: A digital audio signal processor will be used for automatic microphone mixing, and equalizing the loudspeakers. An 8-channel audio mixer in the portable equipment rack will be used to mix microphones and other audio sources.
- Loudspeakers: Distributed ceiling-mounted loudspeakers will be provided for speech reinforcement and program audio playback. Loudspeakers will be zoned so that they can be

used over the entire Field House floor, or only over the smaller sections. For larger events and games, additional loudspeakers will be used to provide coverage to the bleacher seating area. Amplifiers will be used to power the loudspeakers.

- Assistive Listening System: An FM or infrared based wireless assistive listening system will be included to meet the requirements of the Americans with Disabilities Act. Portable receivers, intended for use by patrons with hearing impairments, will be stored centrally and issued to participants as required. Inductive neck loop adapters will be provided along with the receivers for compatibility with telecoil-enabled hearing aids.

SYSTEM CONTROL

The control system will be used to simplify the operation of the audiovisual system by unifying the operation under one platform and user interface. The user interface will consist of one wall-mounted 5" LCD touch screen, and an additional 5" LCD touch screen in the portable equipment rack. The control panel will be able to control all functions of the audiovisual system; including source selection and media transport controls, and volume control.

MISCELLANEOUS

Miscellaneous equipment will include a floor-standing and lockable equipment rack, a portable equipment rack for use during events and games, AC power distribution and sequencers in the rack(s), custom connection panels, and all cable, connectors, and additional hardware and labeling required to install the system.

ARCHITECTURAL, MECHANICAL, AND ELECTRICAL CONSIDERATIONS

- Architectural: The following items should be considered for proper coordination between audiovisual system components and other trades:
    - Loudspeaker coverage must not be obstructed.
    - Structure will be necessary to ensure that loudspeakers and the projection screen can be ceiling-mounted at recommended locations.
    - Antennas for the assistive listening system and wireless microphones will be mounted on the wall.
    - Wall-mounted connection panel locations will require coordination.
    - Ceiling-mounted video projectors must be free from vibration.
- AV Equipment Racks
    - Equipment racks will require coordination for space and cooling/airflow requirements. This will include floor-standing equipment racks, and any small equipment racks that may be installed within millwork.
        - Floor-standing AV equipment racks shall be fixed in position and will require front access for day-to-day operational needs. They will also require rear access for service. Clearances must be maintained around the AV equipment racks (36") to comply with the requirements of the Americans with Disabilities Act.
        - AV equipment rack rooms may require oversized doors.
- Auditorium Mixing Console
    - The Control Booth's mixing position will require ample space for operation of the console and other items such as scripts required for rehearsals or performances. The audio console is 48" wide by 36" deep.
    - Control Booth
        - Please note the following guidelines:
            - Coordination will be required with the acoustical consultant to maintain proper acoustical isolation between the Auditorium and the Control Booth.
            - The glass in front of the video projector should be low iron. It should also be tilted between 2 and 5 degrees. Coordinate direction of tilt with the acoustical consultant.
- Video Projection:
    - In order to optimize the viewing experience and achieve the minimum recommended video display contrast ratio, ambient lighting within the spaces with projection will need to be reviewed. Additionally, overhead lighting should be zoned so that lighting areas directly above the projection screen surfaces can be switched off during presentations.
    - Whiteboards & marker boards that are used as a projection surfaces shall be of projection quality so that

they minimize reflections and projection hotspots.

- Blocking will be required at all wall-mounted video display panel and loudspeaker locations.
- Mechanical/Electrical: The following items should be considered for proper coordination between the audiovisual system components and other trades:
    - The AC power system will be designed and specified by the electrical engineer and will include a dedicated power panel, transient voltage surge suppression, and AC outlets.
    - Electrical outlets will be required at the equipment racks, mix location floor-box, and wall-mounted receptacle panels.
    - IT data drops are strongly recommended at the equipment racks and all AV receptacle panels.
    - If lighting control is desired from the audiovisual system control touch panel, the lighting system will require an interface for communication with the control system.
    - Equipment Rack Locations:
        - AC power requirements and heat loads will need to be considered at each equipment rack and video projector location.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Technology Assessment

Fiber Optic Entry Point

Typical Classroom Projector Setup

Computer Lab Configuration

TECHNOLOGY ASSESSMENT

GENERAL

The purpose of this report is to describe, in broad terms, the existing structured cabling systems, data networking hardware, telephone and intercom systems; to comment on the condition of the existing systems; and on the feasibility of expansion within the context of any renovation and expansion of the school.

BASIS

This report is based on discussions with Technology Director Steve Mazzola and visual observations made during our site visit on August 28, 2017; and a review of fiber and network as-built documents provided by the Owner.

EXISTING SYSTEMS

STRUCTURED CABLING SYSTEMS

There is a district-wide fiber backbone connecting all facilities. The School Department is responsible for the fiber network for both the schools and the Town (including the light department and TV Studio). The fiber network handles general data as well as Phone (VoIP) and security for the school district and the Town. There are three centralization points for the fiber – the high school, Chenery Middle School, and the Town Library. Any future project must take into consideration the requirement for continued connectivity between and among facilities, and/or the replication of the existing termination points in a new facility. This would involve protection and relocation of the existing fiber during an add/reno project or the installation of new fiber during a new construction project.

The high school MDF is located off the Tech Office on the second floor. The fiber enters the building underground on The Theater/ parking lot side of the building and is routed internally to the MDF.

Comm-Tract, the Owner's vendor, is currently in the process of evaluating and documenting the town-wide fiber plant. Comm-Tract's report is expected to be completed within the next nine months and would provide valuable information as it related to relocating the existing fiber or providing new. LCN is the Owner's networking vendor. Both LCN and Comm-Tract are approved state contract vendors.

There are a total of ten IDFs. The IDFs are not dedicated spaces, but wall mounted racks and/or cabinets in existing classrooms

of storage spaces. The MDF is a dedicated space with a split cooling system that requires regular maintenance due to its age. The MDF and IDFs are connected via 6 strand MM fiber 1GbE backbone. Horizontal cabling from the MDF and IDFs to endpoint is Category 5. The Cat5 and cabling represents a bottleneck on the existing network and therefore has reached the end of its serviceable life. Any future project should include the installation of horizontal cabling based on current standards at the time of design, 20GbE backbone and dedicated MDF/IDF rooms with proper power and environmental treatments.

Every teacher is equipped with an iPad and each classroom has a fixed Dell computer workstation for teacher use. Every classroom has a projector and a Smartboard. Smartboard and projector ages range from new to >10 years old. The Smartboards in the modular classrooms are the newest. SPED classrooms have some audio reinforcement for special accommodations. General classrooms do not have audio reinforcement. All classrooms have an AppleTV connected to the projector. Any future project should provide updated technology for all classrooms, labs, teachers and students.

All printing is centralized. The Main Office and Nurse's office have fax machines. Printers are located in the center of each classroom wing. Printers are owned, not leased and should be updated as part of any future project.

There are five Computer Labs at the high school. Computer Labs are equipped with fixed desktop computers (hardwired), projector and Smartboard.

DATA COMMUNICATION SYSTEM

The high school is serviced by four Internet services – one Fios, one MEC, and two dedicated to Town use. These services support all the school facilities and the Town. Chenery Middle School serves as a backup/failover for the high school MDF servers and WiFi Controllers. There are a total of four virtualized servers with two at the high school and two at Chenery.

The wireless hardware is Alcatel-Lucent. The controller is at the high school with a backup controller at Chenery Middle School. Most APs within the school are mounted based on availability of data outlets because of the difficulty in adding cabling due to building/ceiling conditions. Many are in less than ideal locations. This would be remedied with the installation of new cabling infrastructure based on current standards, our recommendation for any project. Functionality of the wireless network is critical to the success for the technology program, which is iPad based one-to-one. Students take the iPads home with them. Any future project should provide updated WiFi technology.

The second floor MDF is the centralized management point for all data communications for the high school, the school district and the town. There is wallboard along two walls with Verizon service provider hardware, ONTs and termination blocks for voice cabling.

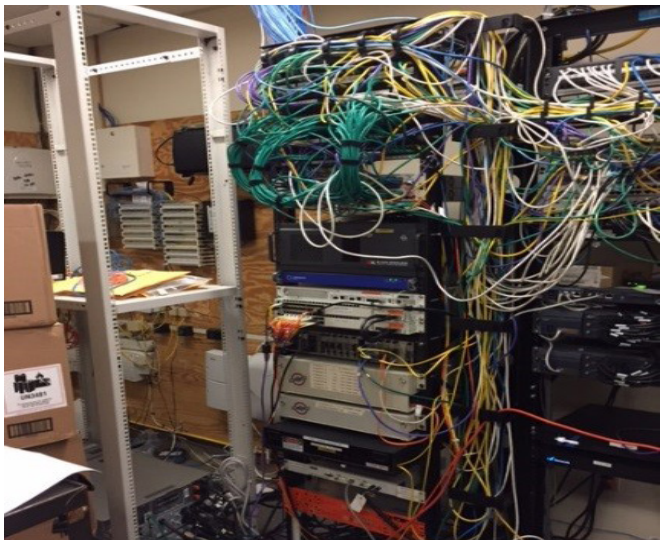
Within the primary MDF space, there are three racks – one 4-post and three 2-post. The 4-Post Rack is being used to house UPS hardware for the equipment in the three 2-post racks. The three 2-post racks are being used to house the following equipment:

Rack 1

- Horiztonal Cabling Patch Panels (Cat5)
- Alcatel-Lucent Edge Switches (Security)
- Pelco DX8100 VMS (Security)
- Lightspeed MDM
- Alcatel-Lucent Core Switches (1 OAW-4550, 2 stacked OS 6900-X20
- Transition Networks Fiber Media Converter Chassis
- Fiber Patch Panels/Cabinets for fiber backbone to High School IDFs
  - 6 Strand MM to RM 237
  - 6 Strand MM to RM 209
  - 6 Strand MM to RM 222
  - 6 Strand MM to RM 120
  - 6 Strand MM to RM 140
  - 6 Strand MM to RM 127B
  - 6 Strand MM to RM 129D
  - 6 Strand MM to RM 109
  - 6 Strand MM to RM 144B
  - 6 Strand MM to Auditorium
- iboss Content Filtering

3.1.4 - EVALUATION OF EXISTING CONDITIONS

F. PRELIMINARY EVALUATION OF EXISTING CONDITIONS / Technology Assessment



MDF Racks and Wallboard

Typical IDF Wall Mounted Cabinet

TELCO Entry Point

Rack 2

- Horizontal Cabling Patch Panels (Cat5)
- Alcatel-Lucent Edge Switches (Voice)
- NEC SV8300, Digital Stations Interfaces
- (2) Barracuda Spam and Virus Firewalls

Rack 3

- District/Town Fiber Patch Panels/Cabinets
  - 48 Strand SM to 99 Leonard Street Fire House
  - 6 Strand SM and 6 Strand MM to Substation 3 Hittinger Street
  - 36 Strand SM to Chenery MS
- (2) WatchGuard Network Security Appliances

In a side room just off the primary MDF space, there is currently one 4-post rack that the Owner is in the process of moving to the primary MDF rack space area alongside the other equipment. This 4-post rack houses the following equipment:

- Master View KVM, LCD Display, Keyboard
- VMWare Server/Storage
- UPS APC 1500
- Alcatel-Lucent Edge Switches (Fiber and PoE)
- UPS APC 2200

IDFs are equipped with Alcatel-Lucent OS6450 Switches,stacked.

Any future project should provide updated networking hardware for the MDF and IDFs based on current technology, with special attention paid to maintaining the functionality of the school-district and town wide network and services. IDFs should be dedicated spaces, with proper environmental treatment. Existing IDFs are not an adequate long term solution. In the case of an addition/renovation, the existing district/town-wide fiber backbone could be re-used if construction and demo plans allow.

VOICE COMMUNICATION SYSTEM

TELCO lines enter the high school underground at the front of the building, near the flagpole and are routed internally to a demarcation point near the main office. The demarcation point consists of several 110-blocks and cross connects on

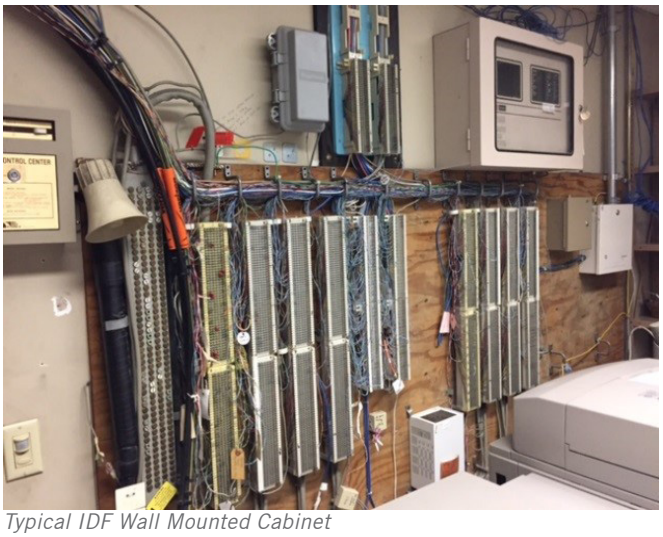
two wallboards on adjoining walls. There are also some older, presumably abandoned service risers and termination points at this location. Conduit enters from the floor to just below the voice termination wallboards. The demarcation point is used as an office and storage area. There are voice riser cables extending the TELCO lines to the second floor MDF, where they terminate on blocks and connect to the NEC SV8300.

VoIP is server-based NEC Univerge SV8300. The server is located in the high school MDF. The system is 10-12 years old. Four elementary schools in the district utilize the high school VoIP system. Wellington and Chenery do not. Wellington utilizes Centrex lines. Any future project should expand upon the NEC VoIP platform, upgrade to the newest technology, and consolidate systems as much as possible.

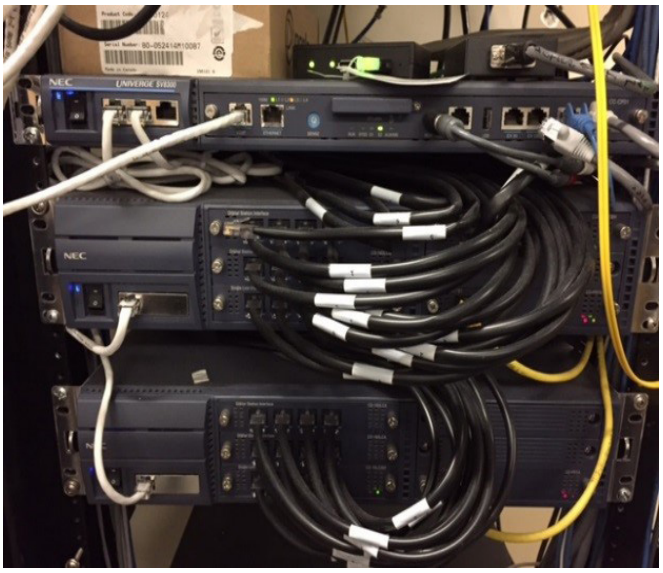
DISTRIBUTED COMMUNICATION SYSTEM

The Intercom system is a Simplex 5100 Series Building Communication System. The master clock system is a Simplex 2350 Master Time System. The intercom main equipment is located in the Main Office. The master clock system is located in the TELCO demark, mounted on the voice termination wallboard. Any future project should provide a new system based on current technology.

Classrooms are equipped with two-way speakers, secondary clocks and call buttons. Some of the equipment is no longer functional and have reached the end of their serviceable life. Many spaces are using battery operated clocks that are not synchronized. Bell system in not functional. Any future project should provide new components based on current technology.



Typical IDF Wall Mounted Cabinet



NEC SV8300 in MDF Rack

Intercom System in Office Area

Typical Speaker, Clock, Call Button Location

3.1.4 - EVALUATION OF EXISTING CONDITIONS

G. GEOTECHNICAL ASSESSMENT

McPhail Associates performed a Geotech site evaluation that included a review of existing geotechnical information in a document titled "The Report on Soil Investigations and Foundation Design Studies for the Proposed Belmont High School" prepared by Haley & Aldrich dated July 1968. Review of the document shows subsurface conditions at the Belmont High School site are variable and influenced by the former site usage as a municipal solid waste facility, the former path of Wellington Brook through the site, and the deep excavation that created Clay Pit Pond. Although thickness of strata vary across the BHS site, typically the sequence of soil units below ground surface are: topsoil, miscellaneous fill and debris, clay (stiff to very soft, ranging from 30 to 60 ft thick), and glacial deposits (primarily dense glacial till). Bedrock exists below the glacial deposits stratum at depth. Groundwater at the site is shallow and influenced by the water level in Clay Pit Pond, which is generally maintained at El. 6 NGVD by a submerged outlet at the east end of the Pond.

Data on the existing foundation system (size, type, depth) and observations/conclusions on the performance of the existing foundation system

Preliminary recommendations on what would be technically-feasible foundations for new construction and renovated portions of the existing building, and compatibility of those systems with the existing structure

We recommended that additional geotechnical borings and test pits be provided during the PSR phase study when more details about the appropriate options are developed and testing locations can be located in a more informed manner.

G. GEOTECHNICAL ASSESSMENT

Memorandum

Date:	November 28, 2017
Recipient:	Daedalus Projects Inc. Mr. Shane Nolan
Sender:	John A. Erikson, Chris M. Erikson, P.E.
Project:	Belmont High School; Belmont, MA
Project No:	6466.2.01
Subject:	Summary of Geotechnical Review and Preliminary Foundation Design Recommendations

Per our proposal dated August 21, 2017, this memorandum summarizes the results of our recently performed geotechnical engineering review for the Belmont High School project located in Belmont, Massachusetts. Specifically, McPhail Associates, LLC (McPhail) reviewed the results of previously performed subsurface exploration programs at the site as they pertain to the construction of the existing school building and proposed future construction at the site.

McPhail was provided with a geotechnical engineering report, entitled "Report on Soil Investigations and Foundation Design Studies – Proposed Belmont High School" dated July 1968, which was prepared by Haley and Aldrich (H&A) as part of the construction of the existing Belmont High School. This report contained the logs of borings and test pits which were performed across the footprint, and immediately adjacent to, the since constructed Belmont High School building.

In addition, McPhail was provided with a report entitled "Pile Load Test Report – Belmont High School" which was prepared by H&A and dated March 1969. This report contained installation logs for and the results of testing on two concrete filled steel pipe test piles which were installed at the project site.

Based upon the geotechnical reports provided to us, it is understood that the Belmont High School site is directly underlain by a thickness of urban fill which generally extends to depths between 8 and 14 feet below existing ground surface. It is noted, however, that isolated areas of deeper (up to 17 feet) and shallower (between 4 and 6 feet) were also encountered to the southeast and west, respectively. The fill material at the site is understood to contain significant quantities of steel, ash and cinders, and other miscellaneous debris representative of the former dump which existed at the site. Groundwater was typically encountered within the fill deposit at depths between 2 and 9 feet below existing ground surface.

Explorations contained in the provided report indicate that the fill across the site is directly underlain by a discontinuous natural sand deposit, varying in thickness from approximately 3.5 to 8 feet, and a marine clay deposit. The marine clay deposit was noted to consist an

GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERS
2269 Massachusetts Avenue
Cambridge, Massachusetts 02140
(617) 868-1420

Memorandum

approximate 10-foot thick dessicated crust in the areas outside of the known limits of the previous, on-site clay pit. It is further noted that this dessicated crust is not present within the southeast portion of the existing school building; an area which falls within the limits of the former clay pit.

Finally, it is understood that underlying the marine clay deposit at depths between approximately 53 and 75 feet below existing ground surface, the borings encountered a discontinuous, compact to very compact silty sand with some clay, as well as a very compact glacial till deposit. The borings were terminated upon an average refusal depth of 66.5 feet below Elevation +22 (approximate average ground surface).

Based upon the recommendations provided by H&A, the Belmont High School building was constructed utilizing driven piles for foundation support. A hybrid system of piles and conventional spread footings was discussed for this project, however it was determined that this foundation system would result in significant differential settlement and would require constant maintenance. It is understood that the piles driven for support of the school building (50 and 90-ton concrete filled, steel pipe piles) were driven through the natural marine clay deposit to the surface of the underlying, compact to very compact soils.

During McPhail's site walk of the existing Belmont High School building on November 3, 2017, no visible signs of apparent settlement or cracking were observed at interior finishes or the exterior facades. As such, it is anticipated that the existing foundation system of the structure is performing satisfactorily for its current use.

For reasons similar to those outlined by H&A, McPhail recommends that any proposed additions which will directly connect to the existing Belmont High School building be supported on pile foundations extending to the glacial till deposit or underlying bedrock. Although construction of conventional spread footings would be feasible in areas not located within the limits of the previous clay pit, differential settlement would be anticipated if these structures are connected to the existing Belmont High School building.

The type of piles to be used for proposed construction would be dependent on the proposed foundation loads and would therefore would need to be evaluated following the design phase of the project. Since significant loads are anticipated, driven piles or drilled mini-piles would likely need to be utilized to transfer the loads to the denser soils underlying the marine clay.

We trust that the above information is sufficient for your present requirements. Should you have any questions concerning the information presented herein, please do not hesitate to call us.

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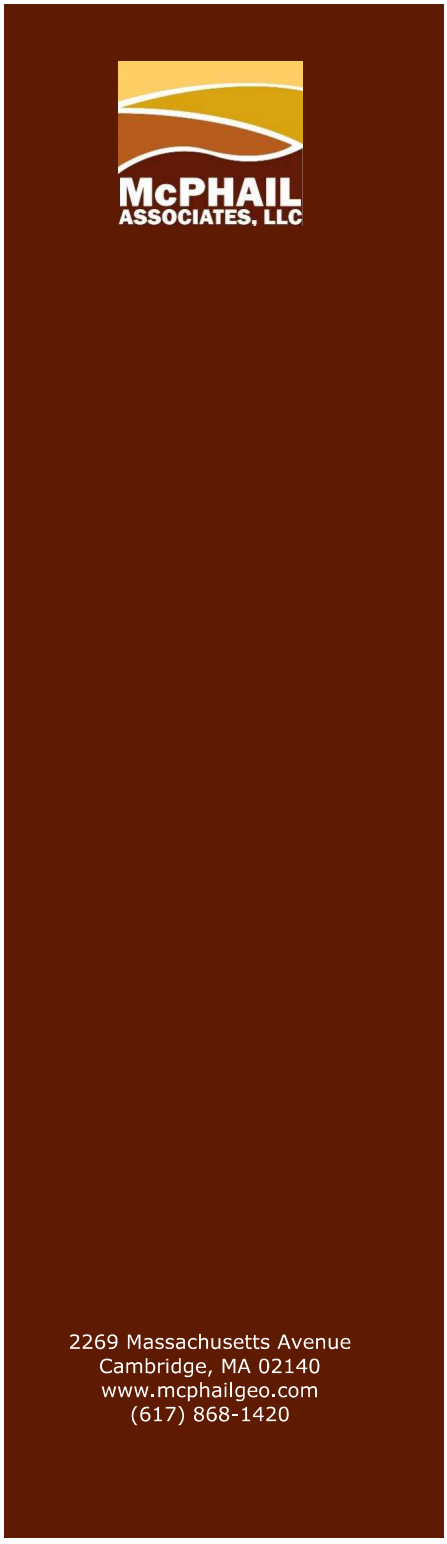
2269 Massachusetts Avenue
Cambridge, Massachusetts 02140
(617) 868-1420

H. ENVIRONMENTAL SITE ASSESSMENT (PHASE I)

McPhail Associates performed a Phase I Environmental Site Analysis. Please refer to their detailed report included in the Appendix, Item E



3.1.4 - EVALUATION OF EXISTING CONDITIONS

I. HAZARDOUS MATERIALS ASSESSMENT

FINAL REPORT
FOR
HAZARDOUS MATERIALS IDENTIFICATION
STUDY
AT THE
HIGH SCHOOL
221 CONCORD AVENUE
BELMONT, MASSACHUSETTS

PROJECT NO: 217 356.00

Survey Dates:
February 16-20, 2015

CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 Brewster Road
Framingham, MA 01702

I. HAZARDOUS MATERIALS ASSESSMENT

September 28, 2017

Ms. Brooke Trivas
Perkins + Will
225 Franklin Street, Suite 1100
Boston, MA 02110

Reference: Report for Hazardous Materials Identification Study
High School, Belmont, MA

Dear Ms. Trivas:

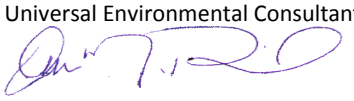
Thank you for the opportunity for Universal Environmental Consultants (UEC) to provide professional services.

Enclosed please find the report for the hazardous materials identification study at the High School, Belmont, MA.

Please do not hesitate to call should you have any questions.

Very truly yours,

Universal Environmental Consultants



Ammar M. Dieb
President

UEC:\217 356.00\Report.DOC

Enclosure

3.1.4 - EVALUATION OF EXISTING CONDITIONS

I. HAZARDOUS MATERIALS ASSESSMENT

1.0 INTRODUCTION:

Universal Environmental Consultants (UEC) has been providing comprehensive asbestos services since 2001 and has completed projects throughout New England. We have completed projects for a variety of clients including commercial, industrial, municipal, and public and private schools. We maintain appropriate asbestos licenses and staff with a minimum of twenty eight (28) years of experience.

UEC was contracted by Perkins + Will to conduct the following services at the High School, Belmont, Massachusetts as part of the feasibility study of the school:

- Asbestos Containing Materials (ACM) inspection and sampling;
- Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures inspection;
- PCB's Caulking inspection;
- Lead Based Paint (LBP) inspection;
- Mercury in Rubber Flooring inspection and sampling;
- Airborne Mold inspection and sampling;
- Radon sampling;
- Underground Storage Oil Tanks inspection.

The scope of work included the inspection of accessible ACM, collection of bulk samples from materials suspected to contain asbestos, determination and quantities of types of ACM found and cost estimates for remediation. A comprehensive survey per the Environmental Protection Agency (EPA) NESHAP regulation would be required prior to any renovation or demolition activities.

Bulk samples analyses for asbestos were performed using the standard Polarized Light Microscopy (PLM) Method in accordance with EPA standard. Bulk samples were collected by a Massachusetts licensed asbestos inspector Mr. Jason Becotte (AI-034963) and analyzed by a Massachusetts licensed laboratory EMSL, Woburn, MA.

Mercury samples were analyzed by an EPA licensed laboratory, EMSL, Cinnaminson, NJ in accordance with EPA method 7471B.

Airborne mold samples were analyzed by an EPA trained laboratory EMSL, Woburn, MA.

Radon samples were analyzed by an EPA licensed laboratory AccuStar, Medway, MA.

Samples results are attached.

2.0 FINDINGS:

Asbestos Containing Materials (ACM):
The regulations for asbestos inspection are based on representative sampling. It would be impractical and costly to sample all materials in all areas. Therefore, representative samples of each homogenous area were collected and analyzed or assumed.

All suspect materials were grouped into homogenous areas. By definition a homogenous area is one in which the materials are evenly mixed and similar in appearance and texture throughout. A homogeneous area shall be determined to contain asbestos based on findings that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent in accordance with EPA regulations. Per the Department of Environmental Protection (DEP) any amount of asbestos found must be disposed as asbestos. No additional suspect and accessible ACM were found during this survey.

Hidden ACM may be found during renovation and demolition activities.

I. HAZARDOUS MATERIALS ASSESSMENT

Number of Samples Collected:

August 2004:
Thirty eight (38) bulk samples were collected from materials suspected of containing asbestos, including:

Type and Location of Suspect Material

1. Dark brown vinyl floor tile at stairwell by classroom 130
2. Mastic for dark brown vinyl floor tile at stairwell by classroom 130
3. Light brown vinyl floor tile at classroom 112A
4. Mastic for light brown vinyl floor tile at classroom 112A
5. Linoleum floor covering at faculty lounge
6. Wood fire door at kitchen
7. Wood fire door at classroom 247
8. Wood fire door at classroom 142
9. Hard joint insulation off fiberglass insulated pipe at main corridor
10. Hard joint insulation off fiberglass insulated pipe at boiler room loft
11. Ceiling plaster at boiler room
12. Soft ceiling plaster at little theater
13. Soft ceiling plaster at little theater
14. Soft ceiling plaster at auditorium
15. Soft ceiling plaster at auditorium
16. Pressed wood material under hardwood floor at wood shop
17. Pressed wood material under hardwood floor at wood shop
18. 1' x 1' Acoustical wall tile at music area
19. Glue daub for 1' x 1' acoustical wall tile at music area
20. 1' x 1' Acoustical ceiling tile at library
21. 1' x 1' Acoustical ceiling tile at classroom 217
22. Soft black glazing caulking for exterior window
23. Soft black glazing caulking for exterior window
24. Soft black glazing caulking for exterior window
25. New 2' x 2' suspended acoustical ceiling tile at main corridor
26. New 2' x 2' suspended acoustical ceiling tile at main corridor
27. 2' x 4' Suspended acoustical ceiling tile at wood shop
28. 2' x 4' Suspended acoustical ceiling tile at classroom 111
29. 2' x 4' Suspended acoustical ceiling tile at classroom 140
30. Interior window framing caulking at library
31. Interior glazing caulking for window in door assembly
32. Hard rough ceiling plaster at stairwell by classroom 112
33. Wall plaster at music area
34. Wall plaster at classroom 247
35. Wall plaster at main corridor
36. Spray-on above ceiling at classroom 140
37. Spray-on debris on pipe chase floor at main corridor
38. Transite window sill at cafeteria

Sample Results:

Type and Location of Suspect Material	Sample Result
1. Dark brown vinyl floor tile at stairwell by classroom 130	8% Asbestos
2. Mastic for dark brown vinyl floor tile at stairwell by classroom 130	15% Asbestos
3. Light brown vinyl floor tile at classroom 112A	Not Analyzed
4. Mastic for light brown vinyl floor tile at classroom 112A	Not Analyzed
5. Linoleum floor covering at faculty lounge	25% Asbestos

6. Wood fire door at kitchen	30% Asbestos
7. Wood fire door at classroom 247	Not Analyzed
8. Wood fire door at classroom 142	Not Analyzed
9. Hard joint insulation off fiberglass insulated pipe at main corridor	No Asbestos Detected
10. Hard joint insulation off fiberglass insulated pipe at boiler room loft	10% Asbestos
11. Ceiling plaster at boiler room	No Asbestos Detected
12. Soft ceiling plaster at little theater	5% Asbestos
13. Soft ceiling plaster at little theater	Not Analyzed
14. Soft ceiling plaster at auditorium	4% Asbestos
15. Soft ceiling plaster at auditorium	Not Analyzed
16. Pressed wood material under hardwood floor at wood shop	No Asbestos Detected
17. Pressed wood material under hardwood floor at wood shop	No Asbestos Detected
18. 1’ x 1’ Acoustical wall tile at music area	No Asbestos Detected
19. Glue daub for 1’ x 1’ acoustical wall tile at music area	<1% Asbestos
20. 1’ x 1’ Acoustical ceiling tile at library	No Asbestos Detected
21. 1’ x 1’ Acoustical ceiling tile at classroom 217	No Asbestos Detected
22. Soft black glazing caulking for exterior window	15% Asbestos
23. Soft black glazing caulking for exterior window	Not Analyzed
24. Soft black glazing caulking for exterior window	Not Analyzed
25. New 2’ x 2’ suspended acoustical ceiling tile at main corridor	No Asbestos Detected
26. New 2’ x 2’ suspended acoustical ceiling tile at main corridor	No Asbestos Detected
27. 2’ x 4’ Suspended acoustical ceiling tile at wood shop	No Asbestos Detected
28. 2’ x 4’ Suspended acoustical ceiling tile at classroom 111	No Asbestos Detected
29. 2’ x 4’ Suspended acoustical ceiling tile at classroom 140	No Asbestos Detected
30. Interior window framing caulking at library	15% Asbestos
31. Interior glazing caulking for window in door assembly	5% Asbestos
32. Hard rough ceiling plaster at stairwell by classroom 112	No Asbestos Detected
33. Wall plaster at music area	No Asbestos Detected
34. Wall plaster at classroom 247	No Asbestos Detected
35. Wall plaster at main corridor	No Asbestos Detected
36. Spray-on above ceiling at classroom 140	15% Asbestos
37. Spray-on debris on pipe chase floor at main corridor	15% Asbestos
38. Transite window sill at cafeteria	20% Asbestos

September 2017:
Twenty eight (28) bulk samples were collected from materials suspected of containing asbestos, including:

Type and Location of Suspect Material

1. Grey sink coating at room 145
2. Grey sink coating at room 245
3. Black sink coating at room 243
4. Black sink coating at room 247
5. White sink coating at room 242
6. White sink coating at room 242
7. Interior expansion joint caulking at gymnasium hallway
8. Interior expansion joint caulking at cafeteria stairwell
9. Paper under hardwood floor at upper gymnasium
10. Paper under hardwood floor at shop area
11. Exterior expansion joint caulking cement to brick
12. Exterior expansion joint caulking cement to brick
13. Exterior expansion joint caulking brick to brick
14. Exterior expansion joint caulking brick to brick
15. Exterior expansion joint caulking steel to brick
16. Exterior expansion joint caulking steel to brick

17. Exterior window panel caulking
18. Exterior window panel caulking
19. Exterior window panel
20. Exterior window panel
21. Exterior window framing caulking
22. Exterior window framing caulking
23. Exterior window glazing caulking
24. Exterior window glazing caulking
25. Exterior unit vent grille caulking
26. Exterior unit vent grille caulking
27. Exterior door framing caulking
28. Exterior door framing caulking

Sample Results:

Type and Location of Suspect Material	Sample Result
1. Grey sink coating at room 145	5% Asbestos
2. Grey sink coating at room 245	5% Asbestos
3. Black sink coating at room 243	2% Asbestos
4. Black sink coating at room 247	2% Asbestos
5. White sink coating at room 242	No Asbestos Detected
6. White sink coating at room 242	No Asbestos Detected
7. Interior expansion joint caulking at gymnasium hallway	2% Asbestos
8. Interior expansion joint caulking at cafeteria stairwell	2% Asbestos
9. Paper under hardwood floor at upper gymnasium	No Asbestos Detected
10. Paper under hardwood floor at shop area	No Asbestos Detected
11. Exterior expansion joint caulking cement to brick	No Asbestos Detected
12. Exterior expansion joint caulking cement to brick	No Asbestos Detected
13. Exterior expansion joint caulking brick to brick	2% Asbestos
14. Exterior expansion joint caulking brick to brick	2% Asbestos
15. Exterior expansion joint caulking steel to brick	No Asbestos Detected
16. Exterior expansion joint caulking steel to brick	No Asbestos Detected
17. Exterior window panel caulking	No Asbestos Detected
18. Exterior window panel caulking	No Asbestos Detected
19. Exterior window panel	2% Asbestos
20. Exterior window panel	2% Asbestos
21. Exterior window framing caulking	No Asbestos Detected
22. Exterior window framing caulking	No Asbestos Detected
23. Exterior window glazing caulking	2% Asbestos
24. Exterior window glazing caulking	2% Asbestos
25. Exterior unit vent grille caulking	No Asbestos Detected
26. Exterior unit vent grille caulking	<1% Asbestos
27. Exterior door framing caulking	No Asbestos Detected
28. Exterior door framing caulking	No Asbestos Detected

Various samples were not analyzed (stop positive).

Observations and Conclusions:

The condition of ACM is very important. ACM in good condition does not present a health issue unless it is disturbed. Therefore, it is not necessary to remediate ACM in good condition unless it will be disturbed through renovation, demolition or other activity.

Refer to the AHERA Management Plan for condition of ACM.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

I. HAZARDOUS MATERIALS ASSESSMENT

1. Grey sink coating was found to contain asbestos.
2. Black sink coating was found to contain asbestos.
3. Interior expansion joint caulking was found to contain asbestos.
4. Exterior expansion joint caulking brick to brick was found to contain asbestos.
5. Exterior window panel was found to contain asbestos.
6. Exterior window glazing caulking was found to contain asbestos.
7. Exterior unit vent grille caulking was found contain <1% asbestos. Per DEP regulations the caulking will have to be treated and disposed as asbestos.
8. Stage fire curtain was previously assumed or found to contain asbestos.
9. Duct insulation was previously assumed or found to contain asbestos.
10. Boiler gasket was previously assumed or found to contain asbestos.
11. Insulation/rope within boilers was assumed to contain asbestos.
12. Tank insulation was previously assumed or found to contain asbestos.
13. Exterior soffit panels were previously assumed or found to contain asbestos.
14. Interior wall panels were previously assumed or found to contain asbestos.
15. Generator insulation was previously assumed or found to contain asbestos.
16. Transite panels within fume hoods were previously assumed or found to contain asbestos.
17. Joint compound was previously assumed or found to contain asbestos.
18. Hard joint insulation off fiberglass insulated pipes was previously found to contain asbestos.
19. Flexible connectors were previously assumed or found to contain asbestos.
20. Spray-on fireproofing was previously found to contain asbestos.
21. Counter lap tops were previously assumed or found to contain asbestos.
22. Dark brown vinyl floor tile was previously found to contain asbestos.
23. Mastic for dark brown vinyl floor tile was previously found to contain asbestos.
24. Linoleum floor covering was previously found to contain asbestos.
25. Insulation within fire doors was previously found to contain asbestos.
26. Soft ceiling plaster was previously found to contain asbestos.
27. Pressed wood material under wood shop hardwood floor was previously found not to contain asbestos.
28. 1’ x 1’ Acoustical wall tiles were previously found not to contain asbestos.
29. Glue daub for 1’ x 1’ acoustical wall tiles was previously found to contain <1% asbestos. Per DEP regulations the daubs will have to be treated and disposed as asbestos.
30. 1’ x 1’ Acoustical ceiling tiles were previously found not to contain asbestos.
31. 2’ x 2’ Acoustical ceiling tiles were previously found not to contain asbestos.
32. 2’ x 4’ Acoustical ceiling tiles were previously found not to contain asbestos.
33. Interior window glazing caulking was previously found to contain asbestos.
34. Interior glazing caulking for window in wood door was previously found to contain asbestos.
35. Hard wall plaster was previously found not to contain asbestos.
36. Hard ceiling plaster was previously found not to contain asbestos.
37. Transite window sill was previously found to contain asbestos.
38. Interior glazing caulking for exterior window was previously found to contain asbestos.
39. Insulation/paper around electrical wiring was assumed to contain asbestos.
40. Glue holding blackboard was assumed to contain asbestos.
41. Generator insulation was assumed to contain asbestos.
42. Underground sewer pipes were assumed to contain asbestos.
43. Roofing material was assumed to contain asbestos. Roofing material does not have to be removed by a licensed asbestos contractor. However, the Demolition/Roofing Contractor must comply with OSHA regulation during demolition and with state regulations for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval.
44. Damproofing on exterior and foundation walls was assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval.
45. Thru-wall flashing was assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval.

46. All other suspect materials were found not to contain asbestos. Hidden ACM may be found during renovation and demolition activities.

Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures:
Observations and Conclusions
Visual inspection of various equipments such as light fixtures, thermostats, exit signs and switches was performed for the presence of PCB's and mercury. Ballasts in light fixtures were assumed not to contain PCB's since there were labels indicating that "No PCB's" was found. Tubes in light fixtures, thermostats, signs and switches were assumed to contain mercury. It would be very costly to test those equipments and dismantling would be required to access. Therefore, the above mentioned equipments should be disposed in an EPA approved landfill as part of the demolition project.

PCB's in Caulking:
Observations and Conclusions
Caulking was assumed to contain PCB's. PCB's are manmade chemicals that were widely produced and distributed across the country from the 1950s to 1977 until the production of PCB's was banned by the US Environmental Protection Agency (EPA) law which became effective in 1978. PCB's are a class of chemicals made up of more than 200 different compounds. PCB's are non-flammable, stable, and good insulators so they were widely used in a variety of products including: electrical transformers and capacitors, cable and wire coverings, sealants and caulking, and household products such as television sets and fluorescent light fixtures. PCB's also do not readily evaporate into air but tend to remain as solids or thick liquids. Even though PCB's have not been produced or used in the country for more than 30 years, they are still present in the environment in the air, soil, and water and in our food. EPA requires that all construction waste including caulking be disposed as PCB's if PCB's level exceed 50 mg/kg (ppm). An abatement plan might also be required.

Lead Based Paint (LBP):
Observations and Conclusions
LBP was assumed to exit on painted surfaces. A school is not considered a regulated facility. All LBP activities performed, including waste disposal, should be in accordance with applicable Federal, State, or local laws, ordinances, codes or regulations governing evaluation and hazard reduction. In the event of discrepancies, the most protective requirements prevail. These requirements can be found in OSHA 29 CFR 1926-Construction Industry Standards, 29 CFR 1926.62-Construction Industry Lead Standards, 29 CFR 1910.1200-Hazards Communication, 40 CFR 261-EPA Regulations. According to OSHA, any amount of LBP triggers compliance.

Mercury in Rubber Flooring:
Number of Samples Collected

Two (2) bulk samples were collected from the following.

Type and Location of Material

1. Red rubber flooring at gymnasium
2. Red rubber flooring at gymnasium

Sample Results

Type and Location of Material	**Sample Result**
1. Red rubber flooring at gymnasium	0.085 mg/kg
2. Red rubber flooring at gymnasium	0.140 mg/kg

Observations and Conclusions:
Samples results indicated mercury levels to be lower than EPA limit of 0.2 mg/kg.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

I. HAZARDOUS MATERIALS ASSESSMENT

Airborne Mold:
Airborne mold testing was performed utilizing Zefon International Incorporated's Air-O-Cell® sampling device following all manufacturer supplied recommended sampling procedures.

The Air-O-Cell® is a direct read total particulate air sampling device. It works using the inertial impaction principle similar to other spore trap devices. It is designed for the rapid collection and analysis of airborne particulate including bioaerosols. The particulate includes fibers (e.g. asbestos, fiberglass, cellulose, clothing fibers) opaque particles (e.g. fly ash, combustion particles, copy toner, oil droplets, paint), and bioaerosols (e.g. mold spores, pollen, insect parts, skin cell fragments).[1]

The method involves drawing a known quantity of air through a sterile sampling cassette. Subsequent to sampling, the cassette is sealed and transferred to a microbiology laboratory under chain of custody protocol for microscopic analysis. This method counts both viable and nonviable mold spores.

Outside sample was collected outside at rear of building.

AIRBORNE MOLD and PARTICULATE

Lab ID #	Location	Total Mold Counts/M^3	Pollen	Insect Fragment	Hyphal Fragments
131704221-0001	Room 242	514	ND	7	ND
131704221-0002	Library	80	ND	ND	ND
131704221-0003	Room 238	120	ND	ND	ND
131704221-0004	Room 220	14	ND	ND	ND
131704221-0005	Room 125	160	ND	ND	ND
131704221-0006	Little Theater	20	7	ND	ND
131704221-0007	Room 111	40	ND	ND	ND
131704221-0008	Main Office	ND	ND	ND	ND
131704221-0009	Teacher's Dining Room	80	ND	ND	ND
131704221-0010	Outside	1,307	ND	ND	ND

AIRBORNE MOLD and PARTICULATE
(Subjective Scales)

Lab ID #	Location	Skin Fragment Density (SFD)	Fibrous Particulates (FP)	Total Background Particulate (TBP)
131704221-0001	Room 242	2	1	4
131704221-0002	Library	2	1	3
131704221-0003	Room 238	2	1	2
131704221-0004	Room 220	1	1	1
131704221-0005	Room 125	2	1	1
131704221-0006	Little Theater	2	1	2
131704221-0007	Room 111	2	1	2

[1] Zefon International Inc. <www.zefon.com>

I. HAZARDOUS MATERIALS ASSESSMENT

Lab ID #	Location	Skin Fragment Density (SFD)	Fibrous Particulates (FP)	Total Background Particulate (TBP)
131704221-0008	Main Office	2	1	2
131704221-0009	Teacher's Dining Room	1	1	1
131704221-0010	Outside	1	1	2

Legend:
ND - Not Detected

Observations:
There are currently no guidelines or standards promulgated by a government agency or widely recognized scientific organization for the interpretation of airborne mold spore levels. The most commonly employed tool used to assess if mold growth is occurring in a structure is to compare quantities and species of mold outdoors to indoor. If there were more mold indoor, and/or if species were present indoor which were not present outdoors, then growth is occurring and remediation is recommended.

Indoor airborne mold spore concentrations were found to be much lower than the outside sample. Based on comparisons with historical data from projects of similar type, building utilization, geographic location and season, the indoor airborne levels are considered very low. Indoor mold spore counts in late summer are typically in the 1,500-6,500-spores/cubic meter range.

Pollen, insect fragments and Hyphal fragments were either not present or low in the samples. Hyphal fragment is a non-reproductive part of the mold.

Total background particulate on all samples was assessed as "1-4" on a scale of 1-5 where 1 is low and 5 is high. Skin fragment density on all samples was assessed as "1-2" on a scale of 1-4 where 1 is low and 4 is high. The total background levels are measured to determine airborne dust not related to airborne mold. Skin fragments are measured to determine proper housing cleaning.

Radon:
Number of Samples Collected

Ten (10) air samples were collected at the following locations:

Sample Number and Location of Material

1. First floor teacher's dining
2. First floor stage
3. First floor band room
4. First floor room 145
5. First floor workroom 110
6. First floor main office
7. First floor room 140
8. First floor nurse room
9. First floor room 120
10. First floor little theater

Sample Number and Location of Material	Sample Result
1. First floor teacher's dining	<0.4 pCi/L
2. First floor stage	<0.4 pCi/L
3. First floor band room	<0.4 pCi/L
4. First floor room 145	<0.4 pCi/L

5.	First floor workroom 110	<0.4 pCi/L
6.	First floor main office	<0.4 pCi/L
7.	First floor room 140	<0.4 pCi/L
8.	First floor nurse room	<0.4 pCi/L
9.	First floor room 120	<0.4 pCi/L
10.	First floor little theater	<0.4 pCi/L

Observations and Conclusions:
The measured radon concentrations of the samples were found to be much lower than the EPA guideline of 4 picoCuris of radon per liter of air (pCi/L). No further action is required.

Underground Oil Storage Tank:
Observations and Conclusions
There is one underground oil storage tank on site. No records were found on-site for review.

3.0 COST ESTIMATES:

The cost includes removal and disposal of all accessible ACM, other hazardous material and an allowance for removal of inaccessible or hidden ACM that may be found during renovation or demolition projects.

Location	Material	Approximate Quantity	Cost Estimate ($)
Throughout	Vinyl Floor Tile and Mastic	130,000 SF	520,000.00
	Fireproofing	225,000 SF[1]	3,375,000.00
	Ceilings/Walls Demolition to Access ACM	500,000 SF[1]	500,000.00
	Hard Joint Insulation	1,000 Total	25,000.00
	Hidden Hard Joint Insulation	Unknown	50,000.00
	Interior Windows	450 Total	90,000.00
	Interior Doors	150 Total	30,000.00
	Interior Fire Doors	160 Total	32,000.00
	Sinks	25 Total	2,500.00
	Interior Expansion Joint Caulking	100 LF	1,000.00
	Miscellaneous Hazardous Materials	Unknown	50,000.00
	Tubes in Light Fixtures	Unknown	50,000.00
	Blackboards	150 Total	30,000.00
Various Locations	Joint Compound	10,000 SF	50,000.00
Auditorium	Soft Ceiling Plaster	10,000 SF	150,000.00
Little Theater	Soft Ceiling Plaster	2,000 SF	30,000.00
Stage	Fire Curtain	1 Total	9,500.00
Boiler Room	Duct Insulation	3,800 SF	76,000.00
	Boilers	3 Total	27,000.00
	Textured Ceiling Plaster	1,500 SF	15,000.00
	Tank Insulation	150 SF	3,000.00
Tunnel	Hard Joint Insulation	500 Total	20,000.00
Generator Room	Generator Insulation	25 LF	2,500.00
Gymnasium Storage Room	Tank Insulation	150 SF	3,000.00

I. HAZARDOUS MATERIALS ASSESSMENT

Location	Material	Approximate Quantity	Cost Estimate ($)
Science Rooms	Fume Hoods	13 Total	13,000.00
	Counter Tops	800 SF	8,000.00
Field House/Upper Gymnasium	Transite Panels (Exterior)	5,000 SF	50,000.00
	Transite Panels (Interior)	2,000 SF	20,000.00
Exterior	Roofing Materials	200,000 SF[2]	300,000.00
	Windows	270 Total	81,000.00
	Transite Panels	540 Total	54,000.00
	Unit Vent Grilles	90 Total	18,000.00
	Vertical Caulking	600 LF	6,000.00
	Transite Sewer Pipes	Unknown[3]	75,000.00
	Damproofing/Flashing on Walls	4,500 Tons[3]	675,000.00
	Underground Oil Tank	1 Total	25,000.00
	Contaminated Soil	Unknown	50,000.00
PCB's Remediation[4]			180,000.00
Estimated costs for PCB's Testing and Abatement Plans Services[4]			50,000.00
Estimated costs for NESHAP Inspection and Testing Services			25,000.00
Estimated costs for Design, Construction Monitoring and Air Sampling Services			328,500.00
		TOTAL:	**$ 7,100,000.00**

[1]: ACM was assumed to exist in wall cavities.
[2]: Estimated.
[3]: Part of total demolition.
[4]: Should results exceed EPA limit.

4.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

Asbestos:
Asbestos samples were collected using a method that prevents fiber release. Homogeneous sample areas were determined by criteria outlined in EPA document 560/5-85-030a. Bulk material samples were analyzed using PLM and dispersion staining techniques with EPA method 600/M4-82-020.

Mercury in Rubber Flooring:
The bulk sample was analyzed in accordance with EPA method 7471B.

Airborne Mold:
The samples were analyzed by an EPA approved laboratory EMSL, Woburn, MA.

Radon:
Radon samples were analyzed by an EPA licensed laboratory AccuStar, Medway, MA.

I. HAZARDOUS MATERIALS ASSESSMENT

5.0 LIMITATIONS AND CONDITIONS:

This report has been completed based on visual and physical observations made and information available at the time of the site visits, as well as an interview with the Owner's representatives. This report is intended to be used as a summary of available information on existing conditions with conclusions based on a reasonable and knowledgeable review of evidence found in accordance with normally accepted industry standards, state and federal protocols, and within the scope and budget established by the client. Any additional data obtained by further review must be reviewed by UEC and the conclusions presented herein may be modified accordingly.

This report and attachments, prepared for the exclusive use of Owner for use in an environmental evaluation of the subject site, are an integral part of the inspections and opinions should not be formulated without reading the report in its entirety. No part of this report may be altered, used, copied or relied upon without prior written permission from UEC, except that this report may be conveyed in its entirety to parties associated with Owner for this subject study.

Inspection by:

Jason Becotte
Asbestos Inspector
AI-034963

I. HAZARDOUS MATERIALS ASSESSMENT

OrderID: 131704274

131704274

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM

24-hour TAT

Town/City: Belmont, MA Building Name Belmont High School

Sample	Result	Description of Material	Sample Location
1		Gray sink coating	Room 145
2		" "	Room 245
3		Black sink coating	Room 243
4		" "	Room 247
5		White sink coating	Room 242
6		" "	" "
7		Int expansion caulk Brick to Brick	Gym Hall
8		" "	cafeteria stairwell
9		Pressed Paper under Hardwood	upper gym
10		" "	shop area
11		expansion joint caulk	exterior cement to brick
12		" "	" "
13		expansion joint caulk	exterior Brick to Brick
14		" "	" "
15		expansion joint caulk	exterior steel to Brick
16		" "	" "
17		window panel caulk	exterior window
18		" "	" "
19		window panel	exterior window
20		" "	" "

Reported By: Jason Beatte Date: 9-20-17

Received By: Date:

Due Date:

RECEIVED
SEP 21 2017
By

I. HAZARDOUS MATERIALS ASSESSMENT

OrderID: 131704274

131704274

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

PLM
24-hour TAT

Town/City: Belmont, MA Building Name: Belmont High School

Sample	Result	Description of Material	Sample Location
21		window frame caulk	exterior window
22		" "	" "
23		window glass glaze	exterior window
24		" "	" "
25		vent Grill caulk	exterior vent grill
26		" "	" "
27		Door frame caulk	exterior door frame
28		" "	" "

Reported By: Jason Becotte Date: 9-20-17

Received By: Date:

Due Date:

RECEIVED
SEP 21 2017
By 8:30 AM

I. HAZARDOUS MATERIALS ASSESSMENT

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131704274
Customer ID: UEC63
Customer PO:
Project ID:

Attention: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project: Belmont High School - Belmont, MA

Phone: (617) 984-9772
Fax: (508) 628-5488
Received Date: 09/21/2017 8:30 AM
Analysis Date: 09/21/2017 - 09/22/2017
Collected Date:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1 *131704274-0001*	Room 145 - Gray Sink Coating	Gray Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
2 *131704274-0002*	Room 245 - Gray Sink Coating	Gray Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
3 *131704274-0003*	Room 243 - Black Sink Coating	Black Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
4 *131704274-0004*	Room 247 - Black Sink Coating	Black Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
5 *131704274-0005*	Room 242 - White Sink Coating	White Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
6 *131704274-0006*	Room 242 - White Sink Coating	White Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
7 *131704274-0007*	Gym Hall - Int Expansion Caulk Brick to Brick	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
8 *131704274-0008*	Cafeteria Stairwell - Int Expansion Caulk Brick to Brick	Red Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile
9 *131704274-0009*	Upper Gym - Pressed Paper Under Hardwood	Tan Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
10 *131704274-0010*	Shop Area - Pressed Paper Under Hardwood	Tan Non-Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
11 *131704274-0011*	Exterior Cement to Brick - Expansion Joint Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12 *131704274-0012*	Exterior Cement to Brick - Expansion Joint Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
13 *131704274-0013*	Exterior Brick to Brick - Expansion Joint Caulk	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
14 *131704274-0014*	Exterior Brick to Brick - Expansion Joint Caulk	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
15 *131704274-0015*	Exterior Steel to Brick - Expansion Joint Caulk	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16 *131704274-0016*	Exterior Steel to Brick - Expansion Joint Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 09/22/2017 08:54:09

ASB_PLM_0008_0001 - 1.78 Printed: 9/22/2017 8:54 AM

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131704274
Customer ID: UEC63
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
17 *131704274-0017*	Exterior Window - Window Panel Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
18 *131704274-0018*	Exterior Window - Window Panel Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19 *131704274-0019*	Exterior Window - Window Panel	Gray Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
20 *131704274-0020*	Exterior Window - Window Panel	Gray Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
21 *131704274-0021*	Exterior Window - Window Frame Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
22 *131704274-0022*	Exterior Window - Window Frame Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
23 *131704274-0023*	Exterior Window - Window Glass Glaze	Black Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
24 *131704274-0024*	Exterior Window - Window Glass Glaze	Black Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
25 *131704274-0025*	Exterior Vent Grill - Vent Grill Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
26 *131704274-0026* *Small amount of black caulking attached to gray caulking.*	Exterior Vent Grill - Vent Grill Caulk	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
27 *131704274-0027*	Exterior Door Frame - Door Frame Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28 *131704274-0028*	Exterior Door Frame - Door Frame Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)
Elizabeth Stutts (28)

Steve Grise, Laboratory Manager
or Other Approved Signatory

Initial report from: 09/22/2017 08:54:09

I. HAZARDOUS MATERIALS ASSESSMENT

OrderID: 131704221

131704221

UEC universal environmental consultants

12 Brewster Road
Framingham, MA 01702

Phone: 508.628.5486
Fax: 508.628.5488

CHAIN OF CUSTODY

BUILDING / SITE NAME: Belmont High School
WORK AREA:

TOWN / CITY: Belmont
STATE: MA

Analysis Type	Turnaround Time (x) 6-8 Hr	12 Hr	24 Hr	48 Hr	72 hr
TEM / AHERA					
TEM / Level II					
TEM / Dust					
TEM / Bulk					
TEM / Water					
PLM					
Mold			X		
Other:					

Specific Project Notes

SAMPLE ID	MATERIAL DESCRIPTION	SAMPLE LOCATION	START	STOP	TIME	L/MIN	VOLUME
1	2496 2603	Room 242	1608	1618	10	15	150
2	2446 3519	Library mezzanine	1613	1623	10	15	150
3	2446 3599	Rm 238	1620	1630	10	15	150
4	2446 3530	Rm 220	1625	1635	10	15	150
5	2446 3495	Rm 125	1632	1642	10	15	150
6	2446 3509	Little theatre	1637	1647	10	15	150
7	2446 3491	Room 111	1644	1654	10	15	150
8	2446 3474	main office	1649	1659	10	15	150
9	2446 3535	Teachers dining room	1657	1707	10	15	150
10	2446 1043	outside	1701	1711	10	15	150

SAMPLED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:
Jason Beattie	9-18-17	RECEIVED SEP 19 2017	
RELINQUISHED BY:	DATE/TIME:	RECEIVED IN LAB BY:	DATE/TIME:
		By 8:30 AM	

Page 1 Of 1

3.1.4 - EVALUATION OF EXISTING CONDITIONS

I. HAZARDOUS MATERIALS ASSESSMENT

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131704221
Customer ID: UEC63
Customer PO:
Project ID:

Attn: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/18/2017
Received: 09/19/2017
Analyzed: 09/19/2017 - 09/20/2017

Project: Belmont High School - Belmont, MA

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	131704221-0001			131704221-0002			131704221-0003		
Client Sample ID:	1-24462603			2-24463519			3-24463599		
Volume (L):	150			150			150		
Sample Location	Room 242			Library Mezzanine			Room 238		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	1*	7*	1.4	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	22*	150*	29.2	-	-	-	-	-	-
Basidiospores	11	240	46.7	2	40	50	5	100	83.3
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	1	20	25	-	-	-
Curvularia	1*	7*	1.4	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	1	20	3.9	-	-	-	-	-	-
Pithomyces	3	70	13.6	1	20	25	3*	20*	16.7
Rust	1	20	3.9	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**40**	**514**	**100**	**4**	**80**	**100**	**8**	**120**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	1*	7*	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	4	-	-	3	-	-	2	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.

Steve Grise, Laboratory Manager
or other approved signatory

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA AIHA-LAP, LLC --EMLAP Accredited #180179

Initial report from: 09/20/2017 08:47:35

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

I. HAZARDOUS MATERIALS ASSESSMENT

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131704221
Customer ID: UEC63
Customer PO:
Project ID:

Attn: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/18/2017
Received: 09/19/2017
Analyzed: 09/19/2017 - 09/20/2017

Project: Belmont High School - Belmont, MA

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	131704221-0004			131704221-0005			131704221-0006		
Client Sample ID:	4-24463530			5-24463495			6-24463509		
Volume (L):	150			150			150		
Sample Location	Room 220			Room 125			Little Theatre		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-	-	-	-
Basidiospores	1*	7*	50	3	70	43.8	1	20	100
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	1*	7*	50	4	90	56.3	-	-	-
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**2**	**14**	**100**	**7**	**160**	**100**	**1**	**20**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	1*	7*	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	1	-	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	2	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.

Steve Grise, Laboratory Manager
or other approved signatory

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA AIHA-LAP, LLC --EMLAP Accredited #180179

Initial report from: 09/20/2017 08:47:35

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

3.1.4 - EVALUATION OF EXISTING CONDITIONS

I. HAZARDOUS MATERIALS ASSESSMENT

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EMSL Order: 131704221
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Attn: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/18/2017
Received: 09/19/2017
Analyzed: 09/19/2017 - 09/20/2017

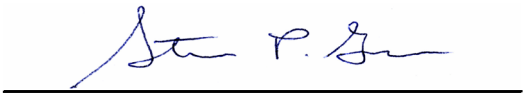
Project: Belmont High School - Belmont, MA

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	131704221-0007			131704221-0008			131704221-0009		
Client Sample ID:	7-24463491			8-24463474			9-24463535		
Volume (L):	150			150			150		
Sample Location	Room 111			Main Office			Teachers Dining Room		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-	-	-	-
Basidiospores	2	40	100	-	-	-	2	40	50
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	-	-	-	2	40	50
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**2**	**40**	**100**	**-**	**None Detect**	**-**	**4**	**80**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	2	-	-	1	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.



Steve Grise, Laboratory Manager
or other approved signatory

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Initial report from: 09/20/2017 08:47:35

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EMSL Order: 131704221
Customer ID: UEC63
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Project ID:

Attn: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/18/2017
Received: 09/19/2017
Analyzed: 09/19/2017 - 09/20/2017

Project: Belmont High School - Belmont, MA

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	**131704221-0010**		
Client Sample ID:	**10-24461043**		
Volume (L):	**150**		
Sample Location	**Outside**		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	2*	10*	0.8
Ascospores	-	-	-
Aspergillus/Penicillium	-	-	-
Basidiospores	49	1100	84.2
Bipolaris++	-	-	-
Chaetomium	-	-	-
Cladosporium	4	90	6.9
Curvularia	1*	7*	0.5
Epicoccum	-	-	-
Fusarium	-	-	-
Ganoderma	4	90	6.9
Myxomycetes++	-	-	-
Pithomyces	2*	10*	0.8
Rust	-	-	-
Scopulariopsis	-	-	-
Stachybotrys	-	-	-
Torula	-	-	-
Ulocladium	-	-	-
Unidentifiable Spores	-	-	-
Zygomycetes	-	-	-
Total Fungi	**62**	**1307**	**100**
Hyphal Fragment	-	-	-
Insect Fragment	-	-	-
Pollen	-	-	-
Analyt. Sensitivity 600x	-	22	-
Analyt. Sensitivity 300x	-	7*	-
Skin Fragments (1-4)	-	1	-
Fibrous Particulate (1-4)	-	1	-
Background (1-5)	-	2	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.

Steve Grise, Laboratory Manager
or other approved signatory

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Initial report from: 09/20/2017 08:47:35

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

I. HAZARDOUS MATERIALS ASSESSMENT

OrderID: 011707553

011707553

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Mercury
1-week TAT

Town/City: Belmont, MA Building Name Belmont High School

Sample	Result	Description of Material	Sample Location
1		Blue Rubber Floor	Field House
2		Red Rubber Floor	Field House

Reported By: Jason Becotte Date: 9-18-17 Due Date:

Received By: [signature] 21.7 Date: 9/20/17 09.35

*left VM regarding collection date (RJ) 9/20

RECEIVED
SEP 19 2017
By 8:30

*Rec'd in plastic

I. HAZARDOUS MATERIALS ASSESSMENT

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn: **Ammar Dieb** 9/27/2017
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Phone: (508) 628-5486
Fax: (508) 628-5488

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 9/20/2017. The results are tabulated on the attached data pages for the following client designated project:

Belmont High School

The reference number for these samples is EMSL Order #011707553. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Environmental Chemistry
Laboratory Director

The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 1877

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order:	011707553
CustomerID:	UEC63
CustomerPO:	
ProjectID:	

Attn: **Ammar Dieb**
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Phone: (508) 628-5486
Fax: (508) 628-5488
Received: 09/20/17 9:35 AM

Project: **Belmont High School**

Analytical Results

Client Sample Description 1 Blue Rubber Floor - Field House ***Collected:*** ***Lab ID:*** *011707553-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date*	*Analyst*	*Analysis Date*	*Analyst*
7471B	Mercury	0.085	0.050	mg/Kg	9/27/2017	JS	9/27/2017	JS

Client Sample Description 2 Red Rubber Floor - Field House ***Collected:*** ***Lab ID:*** *011707553-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date*	*Analyst*	*Analysis Date*	*Analyst*
7471B	Mercury	0.14	0.050	mg/Kg	9/27/2017	JS	9/27/2017	JS

Definitions:

ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)

I. HAZARDOUS MATERIALS ASSESSMENT

AccuStar
Laboratoire Professionnel D'analyse du Radon Depuis 1984

Radon in Air

NELAC NY 11769
NRPP 101193 AL
NRSB ARL0017

EPA Method #402-R-92-004
Liquid Scintillation
NRPP Device Code 8088
NRSB Device Code 12193

Laboratory Report for:

Universal Environmental Consultant
12 Brewster Road
Framingham MA 01702

Property Tested:

Belmont High School
221 Concord Avenue
Belmont MA 02478

Log Number	Device Number	Test Exposure Duration:		Area Tested	Result (pCi/L)
2167530	3486366	09/18/2017 3:07 pm	09/20/2017 3:49 pm	First Floor Teachers Dining	< 0.4
2167531	3486387	09/18/2017 3:14 pm	09/20/2017 3:51 pm	First Floor Stage	< 0.4
2167532	3486378	09/18/2017 3:17 pm	09/20/2017 3:52 pm	First Floor Band Room	< 0.4
2167533	3486358	09/18/2017 3:20 pm	09/20/2017 3:57 pm	First Floor 145 Room	< 0.4
2167534	3486373	09/18/2017 3:24 pm	09/20/2017 4:14 pm	First Floor 110 Workroom	< 0.4
2167535	3486393	09/18/2017 3:30 pm	09/20/2017 4:07 pm	First Floor Room Main Office	< 0.4
2167536	3486394	09/18/2017 3:34 pm	09/20/2017 4:23 pm	First Floor Room 140	< 0.4
2167537	3486367	09/18/2017 3:38 pm	09/20/2017 4:36 pm	First Floor Nurse Room	< 0.4
2167538	3486391	09/18/2017 3:41 pm	09/20/2017 4:34 pm	First Floor Room 120	< 0.4
2167539	3486368	09/18/2017 3:44 pm	09/20/2017 4:16 pm	First Floor Room Little Theatre	< 0.4

Comment: Universal Environmental Consultant was emailed a copy of this report. A copy of this report was emailed to adieb@uec-env.com.

Test Performed By: Jason Becotte

Distributed by: Universal Environmental Consultant

Date Received: 09/21/2017 Date Logged: 09/21/2017 Date Analyzed: 09/22/2017 Date Reported: 09/22/2017

Report Reviewed By: _____ Report Approved By: _____
Shawn Price, Director of Laboratory Operations, AccuStar Labs

Disclaimer:

The uncertainty of this radon measurement is ~+/- 10 %. Factors contributing to uncertainty include statistical variations, daily and seasonal variations in radon concentrations, sample collection techniques and operation of the dwelling. Interference with test conditions may influence the test results.

This report may only be transferred to a third party in its entirety. Analytical results relate to the samples AS RECEIVED BY THE LABORATORY. Results shown on this report represent levels of radon gas measured between the dates shown in the room or area of the site identified above as "Property Tested". Incorrect information will affect results. The results may not be construed as either predictive or supportive of measurements conducted in any area of this structure at any other time. AccuStar Labs, its employees and agents are not responsible for the consequences of any action taken or not taken based upon the results reported or any verbal or written interpretation of the results.

BELMONT HIGH SCHOOL

EXISTING CONDITIONS SUMMARY

PERKINS+WILL

BUILDING COMMITTEE MEETING

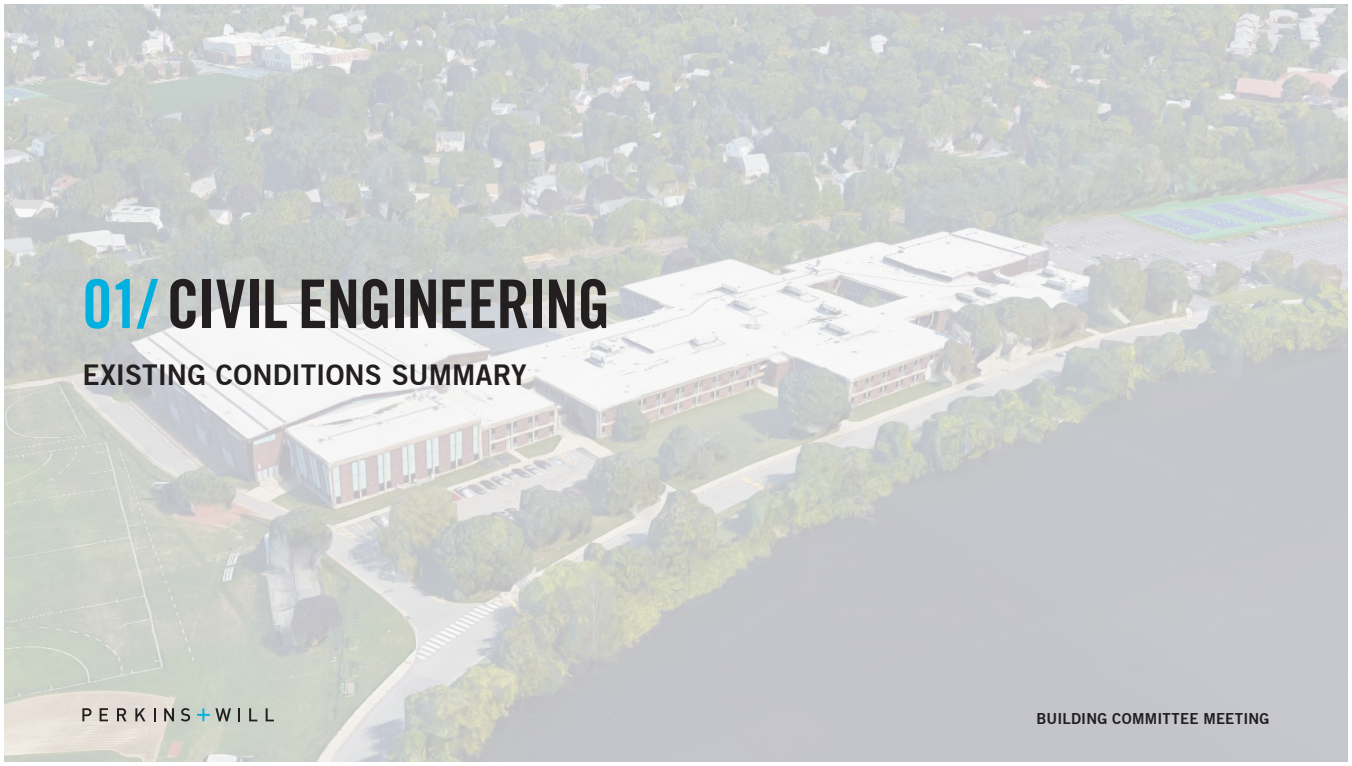
AGENDA

Existing Conditions Summary

01 / Civil
02 / Landscape
03 / Architectural
04 / Structural
05 / Mechanical & Electrical
06 / Plumbing

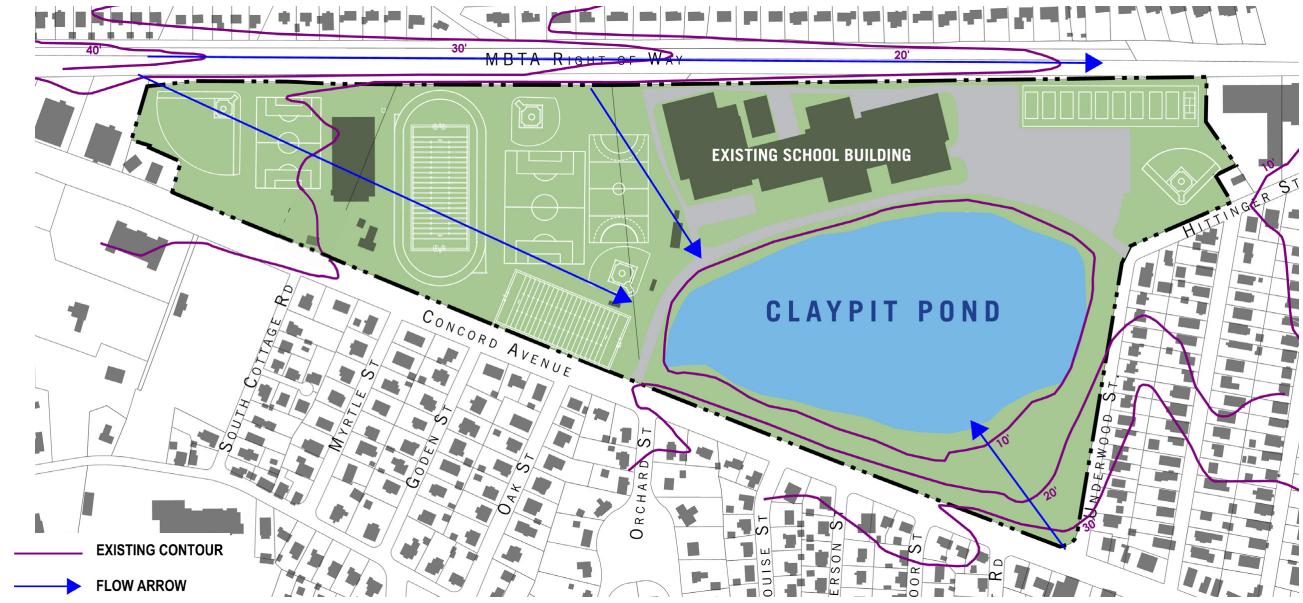
PERKINS+WILL

BUILDING COMMITTEE MEETING



01/ CIVIL ENGINEERING: ANALYSIS / TOPOGRAPHY

Belmont High School



PERKINS+WILL

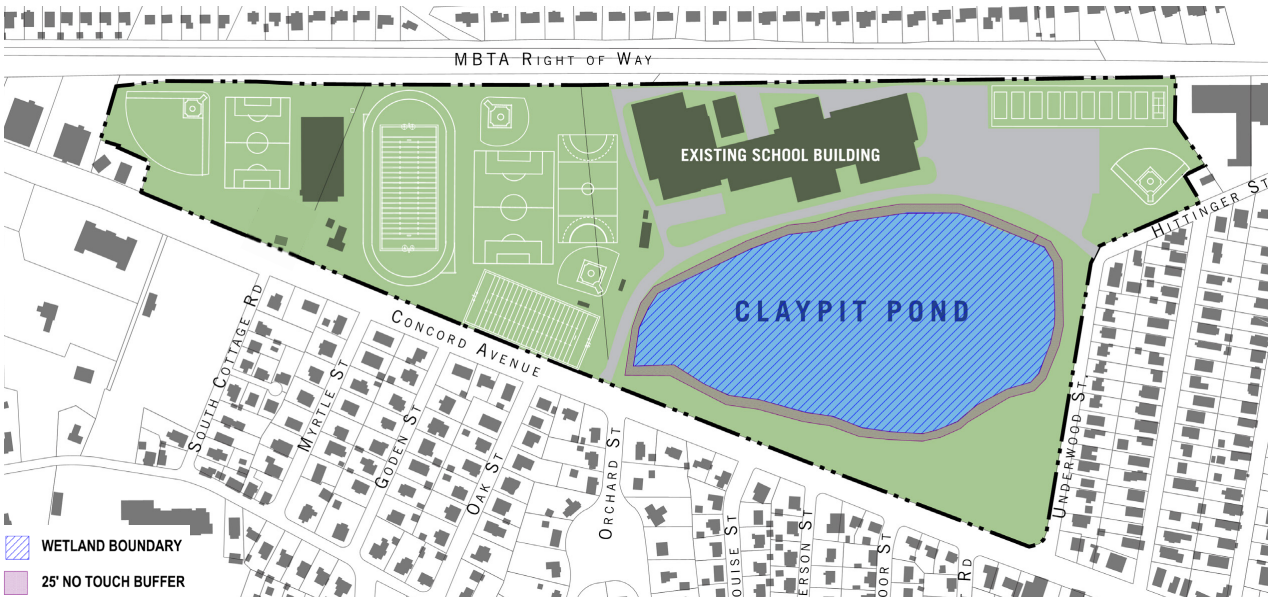
BUILDING COMMITTEE MEETING

3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

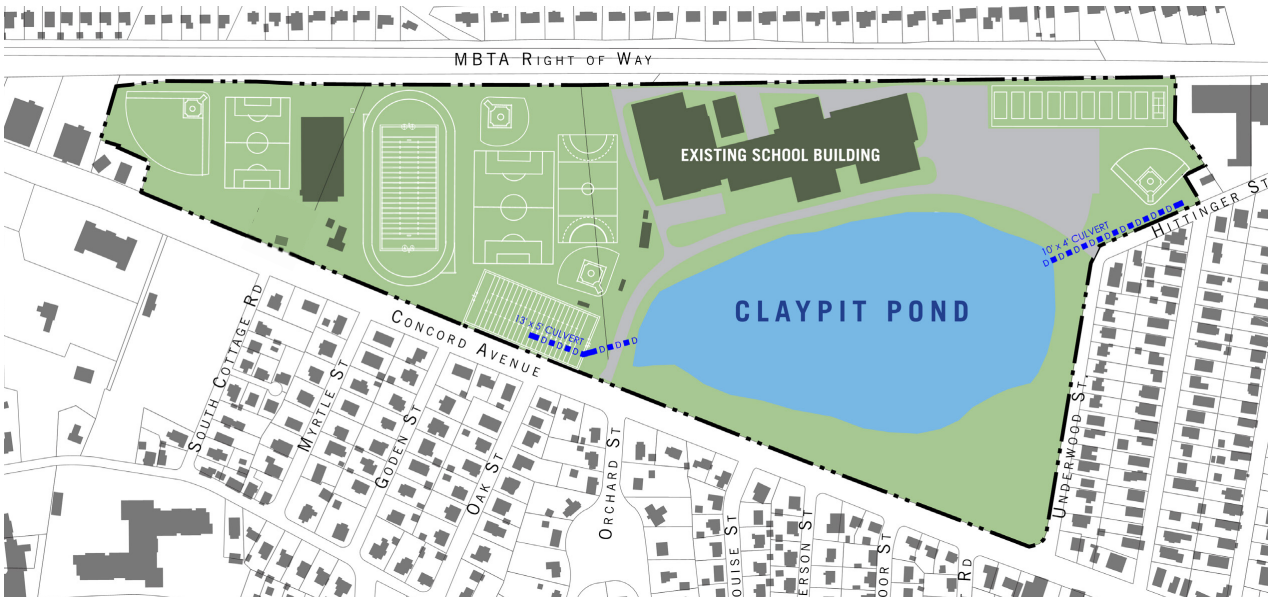
01/ CIVIL ENGINEERING: ANALYSIS / WETLAND RESOURCE AREAS

Belmont High School



01/ CIVIL ENGINEERING: ANALYSIS / STORM DRAINAGE

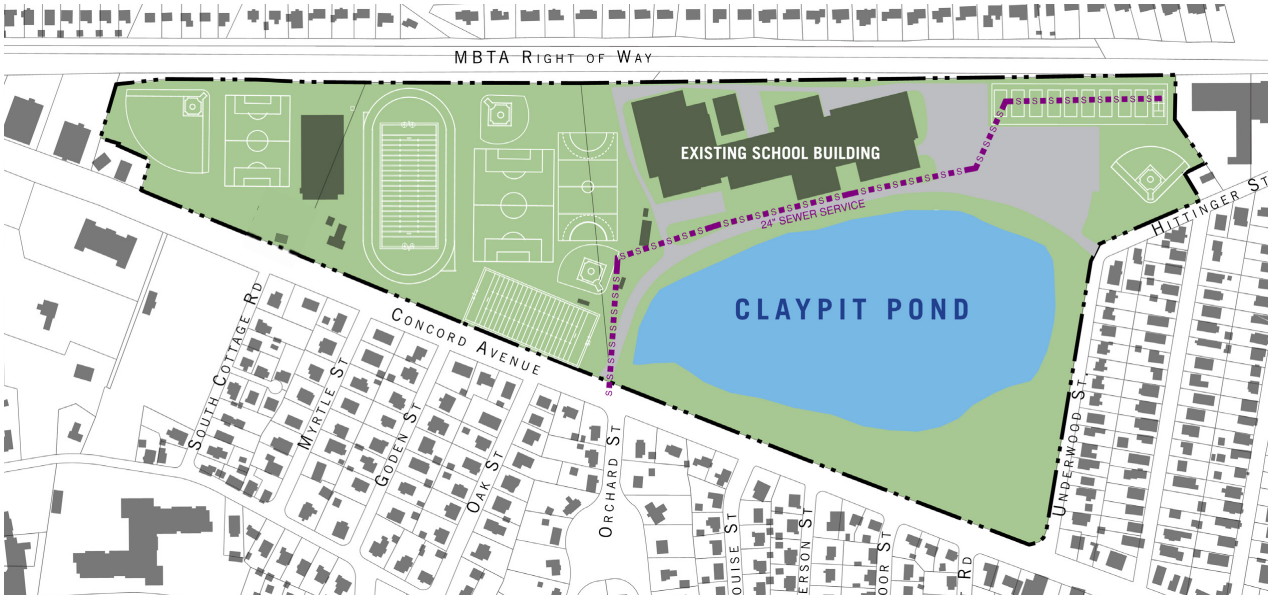
Belmont High School



J. EXISTING CONDITIONS PRESENTATION

01/ CIVIL ENGINEERING: ANALYSIS / SEWER SERVICE

Belmont High School

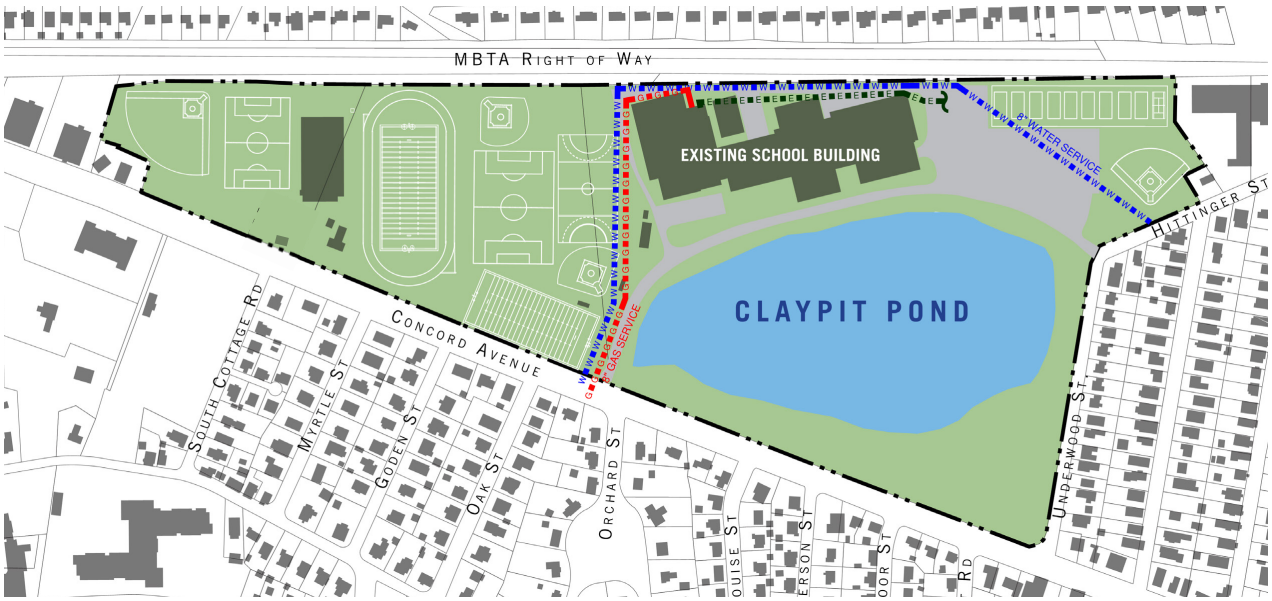


PERKINS+WILL

BUILDING COMMITTEE MEETING

01/ CIVIL ENGINEERING: ANALYSIS / WATER, GAS, AND ELECTRIC SERVICES

Belmont High School



PERKINS+WILL

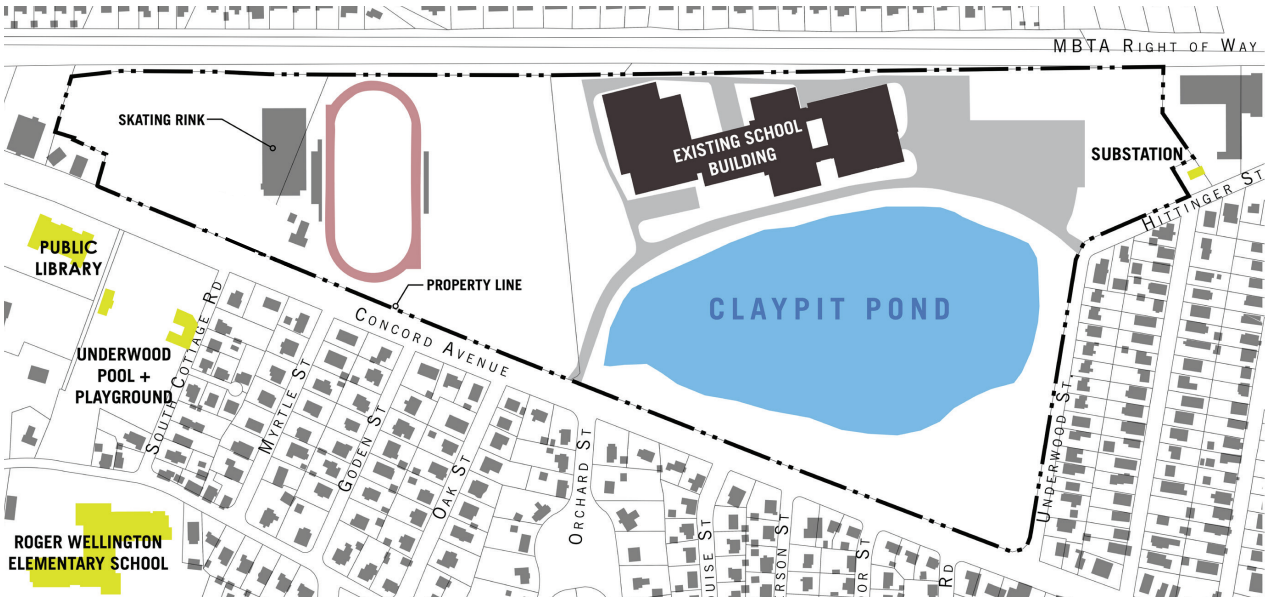
BUILDING COMMITTEE MEETING

3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

02/ LANDSCAPE: SITE ANALYSIS/ CONTEXT

Belmont High School

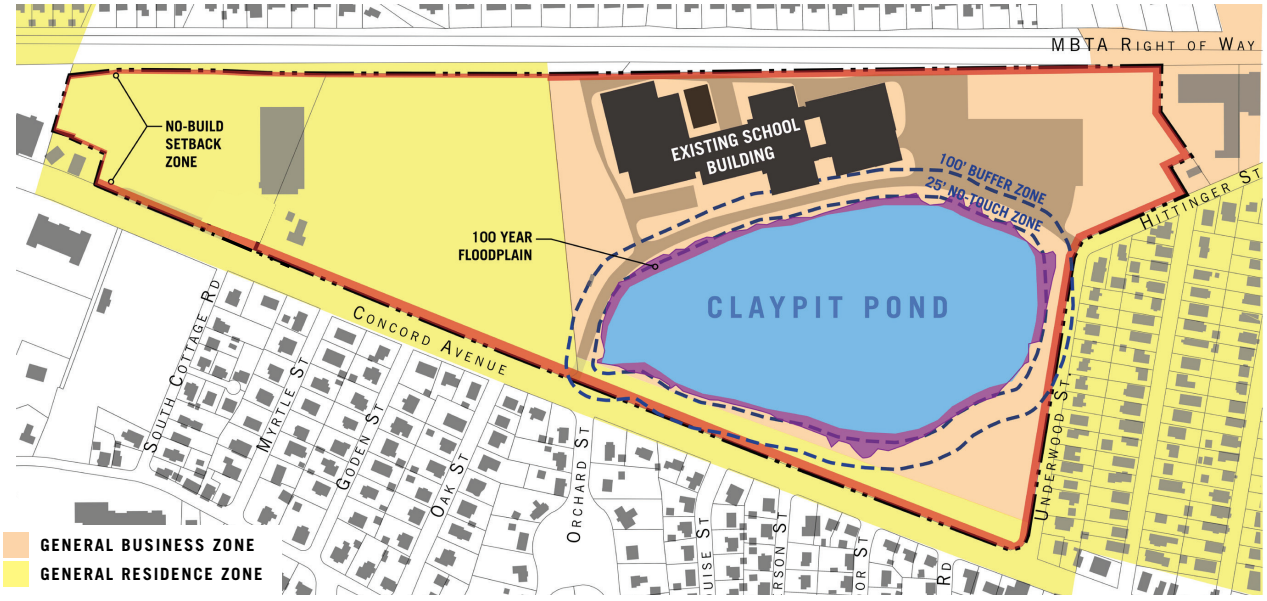


PERKINS+WILL

BUILDING COMMITTEE MEETING

02/ LANDSCAPE: SITE ANALYSIS/ REGULATORY CONSTRAINTS

Belmont High School



02/ LANDSCAPE: SITE ANALYSIS/ SOIL ASSESSMENT

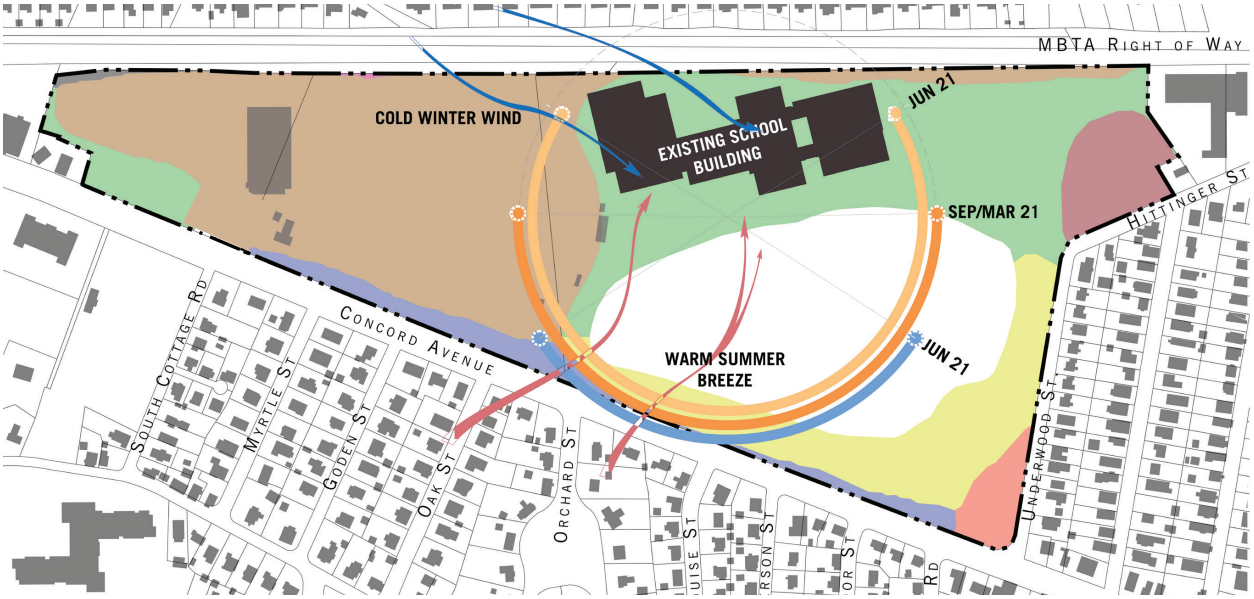
Belmont High School

3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

02/ LANDSCAPE: SITE ANALYSIS/ ENVIRONMENTAL ASSETS

Belmont High School



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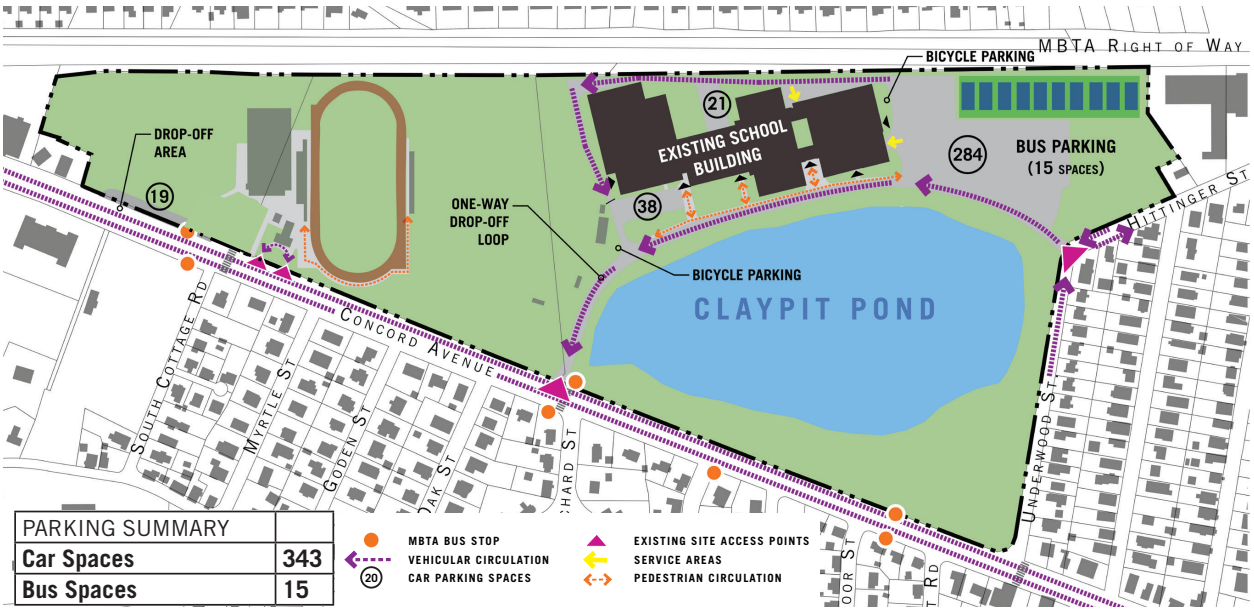
BUILDING COMMITTEE MEETING

02/ LANDSCAPE: SITE ANALYSIS/ CIRCULATION + PARKING

Belmont High School



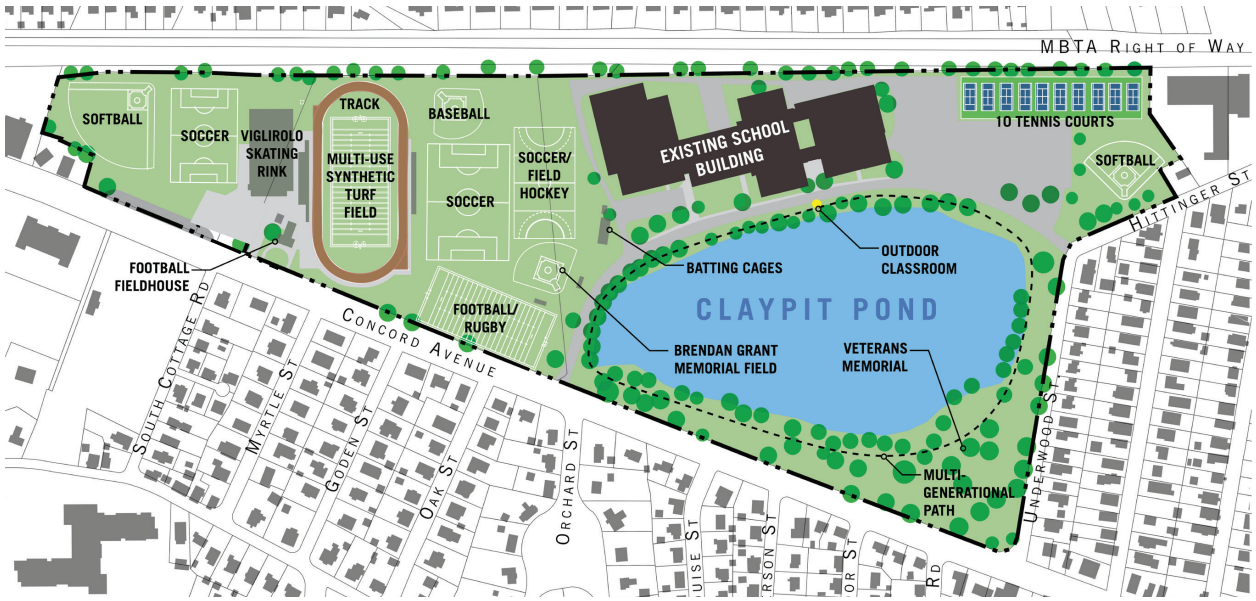
PERKINS+WILL

BUILDING COMMITTEE MEETING

J. EXISTING CONDITIONS PRESENTATION

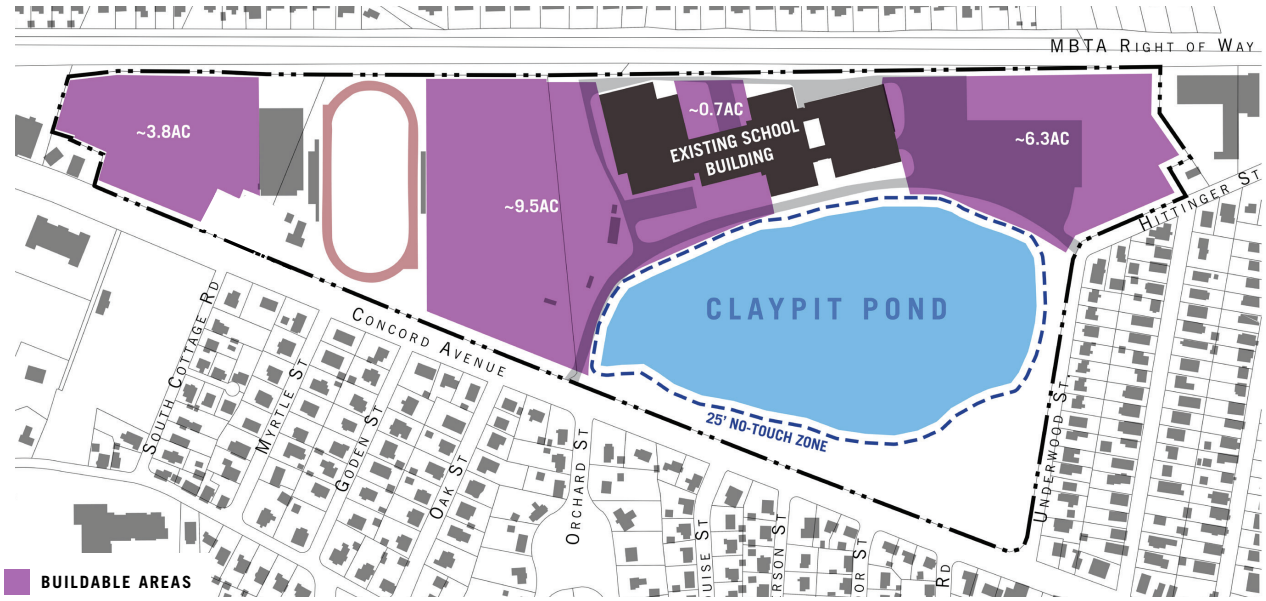
02/ LANDSCAPE: SITE ANALYSIS/ EXISTING PROGRAM

Belmont High School



02/ LANDSCAPE: SITE ANALYSIS/ BUILDABLE AREAS

Belmont High School

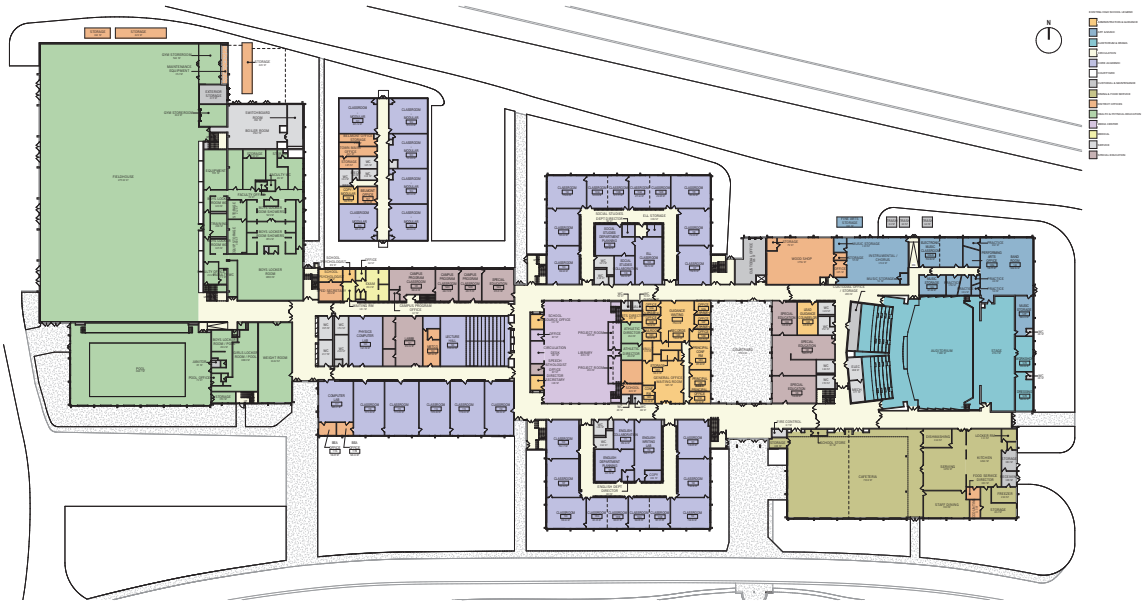


3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

03/ ARCHITECTURE: LEVEL 01 FLOOR PLAN

Belmont High School



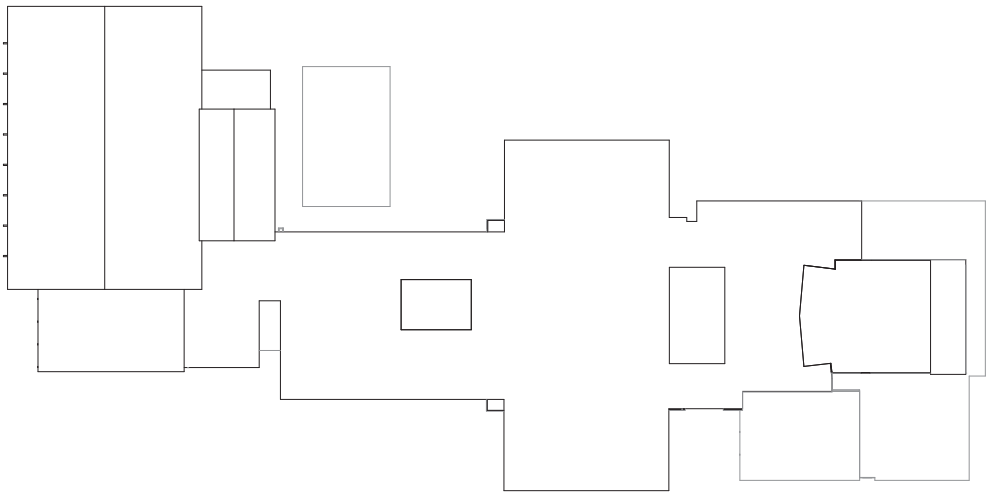
J. EXISTING CONDITIONS PRESENTATION

03/ ARCHITECTURE: LEVEL 02 FLOOR PLAN

Belmont High School

03/ ARCHITECTURE: ROOF LEVEL FLOOR PLAN

Belmont High School



3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

04/ STRUCTURE: EXISTING CONDITIONS

Belmont High School

TYPICAL ROOF: Poured gypsum over form deck supported on steel bulb tees, steel joists and beams.

TYPICAL FLOOR: 2 1/2" thick concrete slab-on-form deck supported on steel bar joists and wide flange steel girders.

FIRST FLOOR: Mix of reinforced concrete structural slab and concrete slab-on-grade

UTILITY TUNNELS: Below first floor corridor

FIELDHOUSE ROOF: is typical rood construction supported on structural steel bents

FOUNDATIONS: Concrete filled steel piles and pile caps supporting the building columns, walls and first floor slab at the majority of the footprint

LATERAL LOAD: No explicit lateral load resisting system (shear walls, braced frames, etc.) for resisting seismic and wind loads

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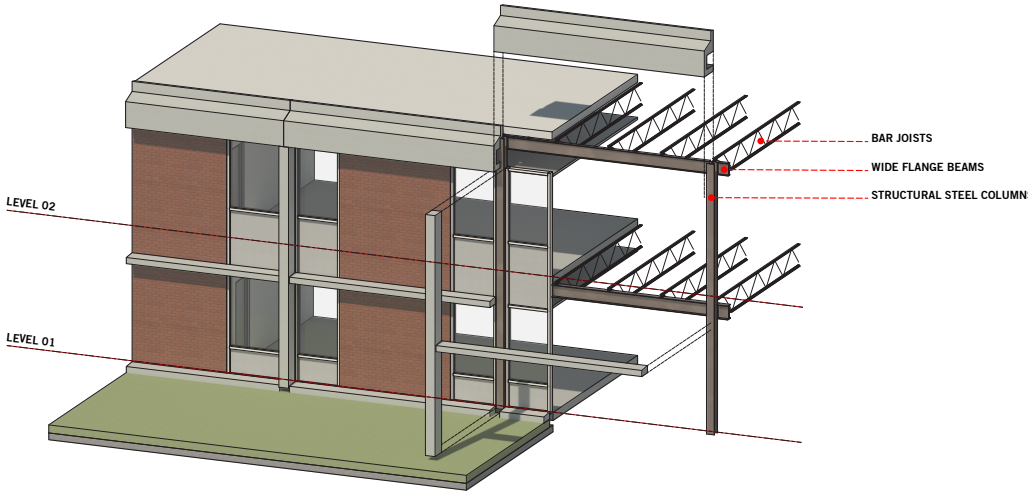
BUILDING COMMITTEE MEETING

J. EXISTING CONDITIONS PRESENTATION

04/ STRUCTURE: EXISTING CONDITIONS

Belmont High School



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BUILDING COMMITTEE MEETING

04/ STRUCTURE: EXISTING CONDITIONS

Belmont High School

EXISTING STRUCTURE

- The existing structure is performing well
- Signs of past water leaks were observed
- Minor cracks in the interior masonry walls and masonry facade were observed
- No undue vibration from footfall was perceived at supported slabs
- No signs of foundation settlement were observed

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3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

04/ STRUCTURE: FEASIBILITY OF RENOV. AND EXPANSION

Belmont High School

- Compliance with International Existing Building Code
- Compliance Method: Work Area Compliance Method
- Work area will be greater than 50%; thus, Level 3 Alterations

PERKINS+WILL

04/ STRUCTURE: FEASIBILITY OF RENOVATION AND EXPANSION

Belmont High School

SEISMIC CLIPPING: Clipping of all existing masonry walls will be required

DEMISING WALLS: Majority of walls do not appear to be structural in nature

RENOVATIONS: Proposed renovations will trigger an analysis of the existing building and will require the addition of shear walls or braced frames, which will probably require addition of piles within the building

SLAB ON GRADE AREAS: Addition of tie beams connecting pile caps at slab-on-grade areas.

GRADE BEAMS AND PILES: will be required for phased and partial demolition to support the new exterior walls.

RENOVATIONS: will require trenching of existing slabs:

- Not easy to trench under supported structural slabs, will need to maintain continuity of reinforcement of the slab
- Have to be careful in trenching through Fieldhouse floor due to tension cables

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BUILDING COMMITTEE MEETING

J. EXISTING CONDITIONS PRESENTATION

04/ STRUCTURE: FEASIBILITY OF RENOV. AND EXPANSION

Belmont High School

- Proposed additions should be horizontal additions, separated from the existing structure by expansion joints.
- Vertical additions may not be feasible, due to limited capacity of foundations and columns. The existing roof structure will not have capacity to support floor loads.

PERKINS+WILL

3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

05/ ELECTRICAL: EXISTING CONDITIONS

Belmont High School

LARGE SPACES LIGHTING: Cafeteria lighting is typical for the library/Media Center as well as other large spaces throughout the building.

ORIGINAL FIXTURES: Similar to many spaces throughout the building, the fixtures are original to the building, utilizing fluorescent lamps and inefficient vs. higher efficient LED fixtures.

CONTROLS: local line voltage switches vs. low voltage employing dimming, vacancy sensors and day lighting controls.

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05/ ELECTRICAL: EXISTING CONDITIONS

Belmont High School

UTILITY TRANSFORMER AND BACKUP GENERATOR: Existing (see photo).

TRANSFORMER: With any projected upgrades/ additions or rebuild the transformer size and/location will need to be addressed.

GENERATOR: The generator size offers limited opportunity to add equipment. The existing distribution does not meet current code required separation of systems.

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J. EXISTING CONDITIONS PRESENTATION

05/ ELECTRICAL: EXISTING CONDITIONS
Belmont High School

- For new or renovated designs all electrical equipment would be in dedicated electric closets.
- No equipment in storage closets or other non dedicated areas.

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05/ ELECTRICAL: EXISTING CONDITIONS
Belmont High School

MAIN ELECTRIC ROOM: Space Limitations

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3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

05/ ELECTRICAL: EXISTING CONDITIONS

Belmont High School

SCIENCE ROOMS

FLUORESCENT LIGHTING: is typical for most of the classrooms throughout the building. The fixtures are original to the building with fluorescent lamps vs. current LED fixtures offering higher efficiencies.

CONTROLS: are original to the building consisting of local line voltage switching vs. current low voltage dimming, vacancy sensors and day lighting controls

PERKINS+WILL

05/ MECHANICAL: EXISTING CONDITIONS

Belmont High School

STEAM BOILERS: 47+ year old steam boilers.

DUEL FUEL: burners can burn gas or fuel oil.

BOILERS: have been partially or completely re-tubed several times.

STEAM SYSTEM: requires maintenance of steam traps, condensate pumps, receiver tanks, control valves, anti-corrosion chemicals.

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05/ MECHANICAL: EXISTING CONDITIONS
Belmont High School

ROOF TOP UNITS

- Casings are in good condition. Corrosion around the unit base.
- There are two vintages of units. Same manufacturer, but with differences in technology. Five units have web interfaces.
- All have steam heating coils.
- Some have DX cooling.

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05/ MECHANICAL: EXISTING CONDITIONS
Belmont High School

UNIT VENTILATORS

- Provides heating with hot water and outdoor air ventilation through an exterior louver.
- Heavy gauge casings are in good condition, but some with dents and deformations. Chipped paint typical.
- Pneumatically controlled dampers and valves require a high level of maintenance.

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3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

05/ MECHANICAL: EXISTING CONDITIONS

Belmont High School

PNEUMATIC TEMPERATURE CONTROLS

- Master control panel and pressure control actuators (see photo)
- Original copper tubing with soldered fittings with some plastic tubing.
- Repairing of leaks is difficult. Some tubing is covered with fire proofing.
- Little to no monitoring capability.
- Pneumatic technicians harder to find.

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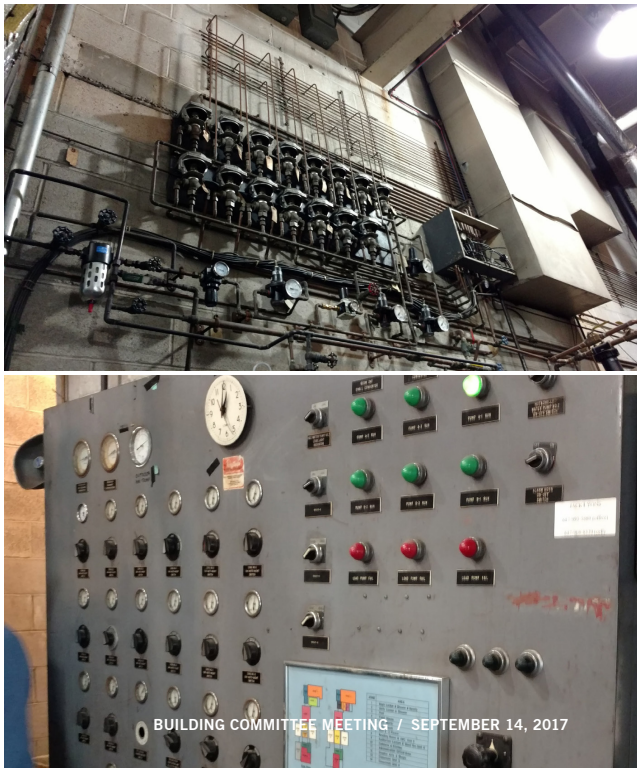

J. EXISTING CONDITIONS PRESENTATION

06/ PLUMBING: EXISTING CONDITIONS
Belmont High School

FIXTURE MODELS: Most are older models and not compliant with current codes.

FIXTURES (ADA): Not all fixture configurations or mounting heights meet current ADA requirements.

COLD WATER SYSTEM: More than adequate to meet existing / future demands

HOT WATER SYSTEM: Combination of steam-fired and electric water heaters. A more centralized approach should produce energy savings in future.

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06/ PLUMBING: EXISTING CONDITIONS
Belmont High School

SANITARY SYSTEM: Piping system is visibly in fair condition, but piping serving science lab is not acid-resistant per code.

STORM SYSTEM: Existing roof drains and visible piping systems appear in good condition.

NATURAL GAS SYSTEM: Existing gas service is mor than adequate to meet current needs of school and visible piping systems appear to be in good condition.

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3.1.4 - EVALUATION OF EXISTING CONDITIONS

J. EXISTING CONDITIONS PRESENTATION

06/ PLUMBING: EXISTING CONDITIONS

Belmont High School

KITCHEN

- Currently, all electric equipment/ no gas connections.
- No dish washing on site at this time all disposable plates and utensils.
- Three-compartment sink and associated grease trap not used.
- No exterior grease trap on site.

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06/ PLUMBING: EXISTING CONDITIONS

Belmont High School

SCIENCE WING

- No gas connections to counter top turrets.
- Main gas shut-off valve to wing is in ceiling and not code compliant.
- Lab sink waste piping is on its own system, but does not have acid resistant piping and treated before connecting to the building's main waste system.
- Water service to the lab is from the main domestic system.
- Lab water should be its own protected system.

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06/ PLUMBING: EXISTING CONDITIONS

Belmont High School

POOL LOCKERS + SHOWERS

- Existing locker rooms and shower rooms in fair condition.
- Single floor drain in shower areas.
- Water from one shower should not drain into other shower areas.

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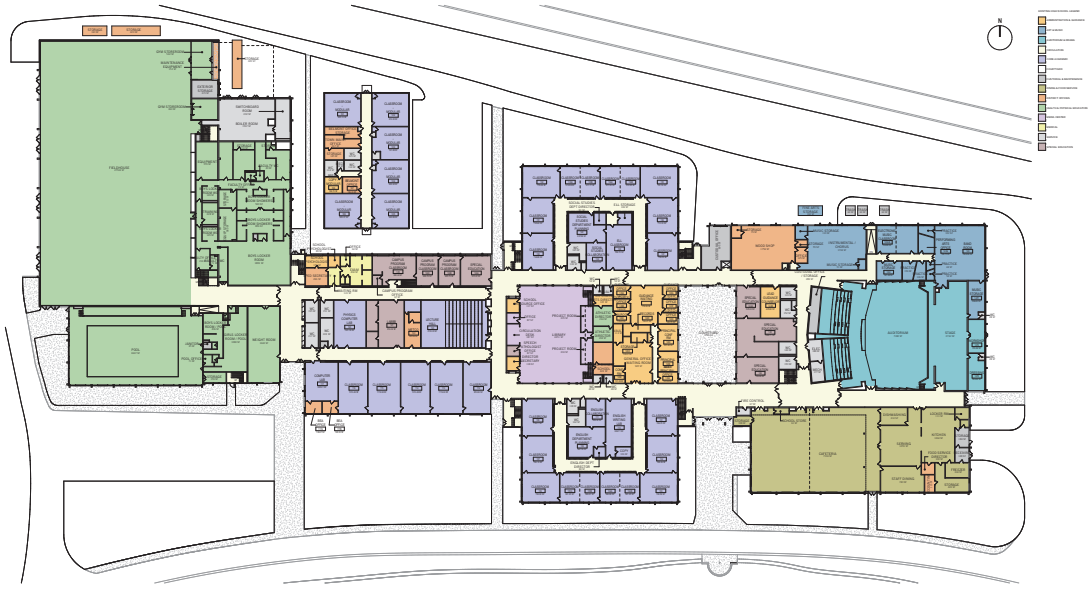
EXISTING CONDITIONS SUMMARY
Belmont High School

K. EXISTING CONDITIONS EXECUTIVE SUMMARY PRESENTATION

ARCHITECTURE
Existing Conditions Summary



ARCHITECTURE
Existing Conditions Summary

3.1.4 - EVALUATION OF EXISTING CONDITIONS

K. EXISTING CONDITIONS EXECUTIVE SUMMARY PRESENTATION

STRUCTURE

Existing Conditions Summary

Vertical additions may not be feasible, due to limited capacity of foundations, columns, and roof structure.

EXISTING CONDITION OBSERVATIONS

- The existing structure is performing well - Minor cracks in the interior/exterior masonry walls were observed.
- No signs of foundation settlement and no undue vibration from footfall were observed
- Majority of walls do not appear to be structural in nature

FEASIBILITY OF RENOVATION / EXPANSION

- Compliance with International Existing Building Code
- Proposed renovations will trigger an analysis of the existing building and will require the addition of shear walls or braced frames - probably requiring additional piles within the building.
- Grade beams and piles will be required for phased and partial demolition to support the new exterior walls.
- Renovations will require trenching of existing slabs - not easy to trench under supported structural slabs
- Proposed additions should be horizontal, separated from the existing structure by expansion joints.

ELECTRICAL

Existing Conditions Summary

Lighting fixtures are inefficient, controls are antiquated, and space/storage is not adequate for current needs.

EXISTING CONDITION OBSERVATIONS

- **Original Fixtures**: Fixtures are original to the building in most of the spaces - utilizing fluorescent lamps (inefficient).
- **Controls**: Currently have local line voltage switches, but should have low voltage switches employing dimming, vacancy sensors and day lighting controls.
- **Transformer**: The transformer size and location will need to be addressed with any projected upgrades/additions.
- **Generator**: The generator size offers limited opportunity to add equipment. The existing distribution does not meet today's code required separation of systems.
- **Electrical Closets**: For new/renovated designs, all electrical equipment would be in dedicated electric closets. No equipment in storage closets or other non-dedicated areas.
- **Main Electric Room**: There are current space limitations.
- **Science Room Lighting/Controls**: Original fluorescent lighting and controls (local line voltage switching) are typical for most of the classrooms throughout the building.

K. EXISTING CONDITIONS EXECUTIVE SUMMARY PRESENTATION

MECHANICAL

Existing Conditions Summary

Current mechanical systems are reaching end of life, difficult to repair, and are not positioned to be energy efficient.

EXISTING CONDITION OBSERVATIONS

- **Steam Boilers:** 47+ year old steam boilers in building.
- **Duel Fuel**: The current burners can burn gas or fuel oil.
- **Boilers**: All boilers have been partially or completely re-tubed several times.
- **Steam System**: Requires maintenance of steam traps, condensate pumps, receiver tanks, control valves.
- **Roof Top Units**: Casings are in good condition, but corrosion around the unit base. There are two vintages of units (same manufacturer), but with differences in technology. Five units have web interfaces. All have steam heating coils.
- **Unit Ventilators**: Provides heating with hot water and outdoor air ventilation through exterior louvers. The casings are in good/fair condition (dented). Pneumatically controlled dampers and valves require a high level of maintenance.
- **Pneumatic Temperature Controls**: Has original copper tubing, some covered in fireproofing - repairing of leaks is difficult. Little to no monitoring capability.

PLUMBING

Existing Conditions Summary

Current plumbing fixtures / systems are antiquated, do not meet current codes, and are not energy efficient.

EXISTING CONDITION OBSERVATIONS

- **Plumbing Fixtures:** Most fixtures are older models and are not compliant with current codes / does not meet ADA req.
- **Cold Water System**: More than adequate to meet existing / future demands.
- **Hot Water System**: Combination of steam-fired and electric water heaters. A more centralized approach should produce a more energy efficient solution.
- **Sanitary System**: Piping system is visibly in fair condition, but piping serving science labs is not acid-resistant per code. Lab water should be on its own protected system.
- **Storm System**: Existing roof drains and visible piping systems appear in good condition.
- **Natural Gas System**: Existing gas service is more than adequate to meet current needs of school and visible piping systems appear to be in good condition.
- **Kitchen**: Three-compartment sink / associated grease trap not used. No exterior grease trap on site.

3.1.4 - EVALUATION OF EXISTING CONDITIONS

L. LIST OF HISTORIC DOCUMENTS

The below list summarizes the historic documents given to Perkins+Will prior to compiling the Preliminary Design Program.

- 1968 Belmont High School Existing Conditions Drawings
- 1989 Ahera Belmont High School
- Haley and Aldrich Pile Load Test Report March 1989
- Haley and Aldrich ROA Burbank UST Release April 2004 Volume 1
- Haley and Aldrich ROA Burbank UST Release April 2004 Volume 2
- Haley and Aldrich Soil Investigations July 1968
- MSBA BHS Statement of Interest 4.1.2015
- SMMA Belmont Enrollment Study 12.7.2015
- TDPC BHS Master Plan and Feasibility Study Part 1
- TDPC BHS Master Plan and Feasibility Study Part 2
- TDPC BHS Master Plan and Feasibility Study Part 3

3.1.5 SITE DEVELOPMENT REQUIREMENTS

SITE DEVELOPMENT NARRATIVE AND DESCRIPTION A

Structures and Fences

Site Access and Circulation

Parking and Paving

Code Requirements

Zoning Setbacks and Limitations

Accessibility Requirements

Easements

Wetlands and / or Flood Restrictions

Emergency Vehicle Access

Safety and Security Requirements

Utilities

Athletic Fields and Outdoor Education Spaces

Site Orientation and Other Location Considerations

SITE DIAGRAMS B

HISTORICAL ANALYSIS C

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

A. SITE DEVELOPMENT NARRATIVE AND DESCRIPTION

STRUCTURES AND FENCES

Fencing and netting will be provided to separate pedestrian/ sports areas from vehicular areas. Fencing will also be provided to buffer service/mechanical areas to the greatest extent possible. Fencing owned by the Town of Belmont along the property line will be repaired or replaced as needed.

Retaining walls will be incorporated as required by the proposed building and site design to negotiate grade changes and provide accessibility.

Walls and fences are not considered structures according to the Town's Zoning Bylaws and are not subject to building setbacks. ZBL page 1-12, 9/20/17.

SITE ACCESS AND CIRCULATION

In general, improvements to the site must provide a safe entry and exit to the site from the adjacent Hittinger Street and Concord Avenue roadways and ensure adequate separation between pedestrians and vehicles. In addition, separation between bus drop-off and parent drop-off needs to be considered to ensure efficient circulation and student safety. There is currently no separation between pedestrian and vehicular circulation within the main parking lot. The site has the advantage of possessing extensive frontage on Concord Avenue, Underwood Street, and Hittinger Street, providing multiple opportunities for exploring optimal access points. Pedestrian and emergency vehicular connections to the school facilities on site should be considered as part of an effort to maintain a cohesive campus experience and the most efficient emergency access including to athletic facilities. Access for disabled persons conforming to the Massachusetts Architectural Access Board's Rules and Regulations and the Americans with Disabilities Act.

Trash/recycling storage and loading area(s) need to be provided in secure and clearly delineated location(s). A loading area is required for delivery of food and supplies. Currently food delivery to the school is on a daily basis.

PARKING AND PAVING

Design of parking facilities will be driven by the new school's programmatic needs. Extensive crack sealant applications underscore the need for new surfacing and proper drainage to ensure long-term viability. Pedestrian circulation needs to be addressed as it is currently not defined within the parking lot. Asphalt berm curbing is in disrepair along the entire northern edge of the parking lot. Paving and curbing will be per applicable Town of Belmont and/or state standards.

CODE REQUIREMENTS

Access for disabled persons is limited and is not in conformance with current regulations. Currently each of the three parking lots has accessible parking spaces close to school entrances but the number of accessible spaces is insufficient and the accessible routes do not conform to current regulations. A number of the existing building doors do not provide accessibility. The preferred building solution and site design will fully meet current accessibility regulations and building code requirements.

ZONING SETBACKS AND LIMITATIONS

The existing school site lies in both the General Residential and General Business zoning districts. Dimensional requirements for permitted uses for these zones are summarized in the table below:

	General Residential	General Business
Maximum Lot Coverage (%)	30%	-
Minimum Open Space (%)	40%	-
Minimum Setback (feet)		
Front	20	5
Side	10	6 or none
Rear	12	6 or none
Maximum Building Height		
Feet	33	36
Stories	2.5	-

The entire site is comprised of four (4) town-owned lots.

Design and Site Plan Review with the Town of Belmont Planning Board is required for any new building, addition or change in use of a predominantly non-residential building greater than 2,500 gross square feet gross floor area in any zoning district, or a proposal that results in the need for six (6) or more parking spaces on the lot or if the proposal reduces the number of on-site parking spaces or changes to the configuration of off-street parking, screening, egress, utilities, drainage or lighting.

ACCESSIBILITY REQUIREMENTS

The value of the proposed construction will exceed 30% of the full and fair cash value of the building, which triggers the requirement for full compliance with accessibility regulations governed by the Massachusetts Architectural Access Board and the Americans with Disabilities Act.

A. SITE DEVELOPMENT NARRATIVE AND DESCRIPTION

EASEMENTS

There are no known easement restrictions on the existing site.

WETLANDS AND/OR FLOOD RESTRICTIONS

Claypit pond is considered "Land under Water Bodies and Waterways" which is classified as a Wetland. The Town of Belmont Conservation Commission shall regulate activities within a 100-foot buffer of all wetland resource areas, including bank, Isolated and Bordering Vegetated Wetlands, so as to protect the wetland resource area values as indicated in the Town of Belmont Wetlands Protection By-Law and the Wetlands Protection Regulations. In addition, the Conservation Commission further limits activities within a Twenty-Five feet (25') from the resource area boundary. Activity in this area is limited to planting of native and indigenous vegetation; pruning and routine maintenance of existing vegetation; maintenance and replacement of existing landscaped beds; removal of invasive plant species; maintenance of existing paths; maintenance of existing utilities and stormwater management systems; and improvements to the wildlife habitat values of the property.

WETLANDS PROTECTION ACT (310 CMR 10.00)

The Town of Belmont Conservation Commission shall regulate activities within a 100-foot buffer of all wetland resource areas, including bank, Isolated and Bordering Vegetated Wetlands, so as to protect the wetland resource area values as indicated in the Town of Belmont Wetlands Protection By-Law and the Wetlands Protection Regulations. In addition, the Conservation Commission further limits activities within twenty-five feet (25') from the resource area boundary. Activity in this area is limited to planting of native and indigenous vegetation; pruning and rountine maintenance of existing vegetation; maintenance and replacement of existing landscaped beds; removal of invasive plant species; maintenance of existing paths; maintenance of existing utilities and stormwater management systems; and improvements to the wildlife habitat values of the property. Work within jurisdictional areas will require the filing and approval of a Notice of Intent with the Conservation Commission.

FLOOD PLAIN

Based on the Flood Insurance Rate Map (FIRM), Community Panel Number 25017C0418E dated June 4, 2010, the existing High School site is located mostly within Zone X (Areas determined to be outside the 0.2% annual chance floodplain).

The area immediately around Clay Pit Pond is located in a Zone AE (Areas determined to be within the 1% annual chance or greater floodplain). If any work were to be proposed within Zone AE, the work would need to be reviewed and approved by the Town of Belmont Conservation Commission. Typically, any work with Zone AE would require that no decrease in potential flood storage volume (filling) in that area.

EMERGENCY VEHICLE ACCESS

A minimum 20-foot wide emergency access route around the building is required by building code. Emergency access to athletic facilities is also required. The location, configuration, material and access restrictions will be reviewed with Belmont safety officials during design.

SAFETY AND SECURITY REQUIREMENTS

Safety and security at school campuses is of paramount concern. Currently seniors have open campus which means they can leave school grounds when they do not have a class. Juniors can earn this privilege the second half of the year. All other grades can go anywhere on the school campus (inside the school and marked areas outside the school) when they are not scheduled for a class. This policy may or may not continue once the new high school is built. None-the-less, safety concerns such as controlled access and points of entry, means of egress and evacuation routes, and safety barriers for protecting cyclists and pedestrians will be addressed in the new design.

UTILITIES

Stormwater from the site appears to be collected by three separate drainage systems. All three drainage systems collect stormwater from roof drains and catch basins around the site and discharge into Claypit pond via one of three headwalls.

The sewer system is maintained by the Wastewater Treatment Division of the Department of Public Works. Record drawings indicate that a 24-inch sewer main runs west to east across the front of the building. This 24-inch main carries sewer flows from upstream neighborhoods and also is the connection point for the high school's multiple existing sewer services. Smaller service lines from the existing building connect into this main line.

Water for the Town of Belmont is obtained from the Massachusetts Water Resources Authority (MWRA). Water to the existing building appears to be serviced from a single 6-inch water line on the Northwest face of the building.

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

A. SITE DEVELOPMENT NARRATIVE AND DESCRIPTION

Record drawings indicate a 6-inch gas main in Concord Avenue and an existing 3.5-inch service to the existing school. The gas service enters the building at the northwest face.

Record drawings from 1968 indicate that electrical service to the school is served through a single transite conduit which crosses the parking lot and the north side of the school extending to the Northwest corner of the existing building.

The existing site slopes generally south to Claypit Pond. There appears to be no stormwater quality measures implemented on the site. There are no known detention, retention, or infiltration systems on the site.

STORM DRAINAGE

The Town of Belmont Stormwater Management By-law indicates that any activity that results in any work affecting the Town of Belmont Sanitary Sewer System or the Storm drainage system requires a Stormwater Management and Erosion Control Permit which will include an Operation and Maintenance plan and associated fees. The review authority for the Stormwater Management and Erosion Control Permit is the Town of Belmont Engineering Department. The standards for design and construction of stormwater systems in Belmont, as dictated by the Engineering Department, follow standard engineering practice and Massachusetts Department of Environmental Protection Stormwater Management Regulations.

SEWER

The design and construction of the sewer system will need to be approved by the Department of Public Works. The standards for the design and construction of the sewer system, as promulgated by the Department of Public Works, follow general engineering practice typical for this area.

WATER

The Town of Belmont Department of Public Works Water Division will be responsible for the review and approval the water system. Design and construction requirements of the Department of Public Works are typical for this area.

NATURAL GAS

Gas service for the Town of Belmont is provided and maintained by National Grid. The design and construction of any new gas infrastructure for the project is subject to their review and approval.

ELECTRICAL

Belmont Light, the municipal electric utility serving Belmont, will review and approve the design and construction of the electric service.

ATHLETIC FIELDS AND OUTDOOR EDUCATION SPACES

The existing on site athletic facilities do not currently meet all athletic program needs, and the site redesign will be heavily influenced by the need to incorporate as much of the athletic program on site as possible. Combining field program through multi-sport fields with synthetic turf and sports lighting is a method that will maximize use of the limited site area. Tennis courts in other parts of town could be used for the school's tennis program if 5 or 10 tennis courts do not fit in the new site design.

The existing courtyard, entry plaza and curved seat wall by the flagpole adjacent to Claypit Pond are spaces that currently provide opportunities for outdoor education. The new site and building design will expand on this by improving access to comfortable outdoor spaces that are close and convenient to the academic spaces in the building.

SITE ORIENTATION AND OTHER LOCATION CONSIDERATIONS

The existing Belmont High School site is located at 221 Concord Avenue with residential neighborhoods surrounding the site and a few commercial properties at the east and west edges. The dominant site feature is 13 acre Claypit Pond. An MBTA railroad right-of-way with regular commuter rail traffic abuts the entire north edge of the site.

The high school site consists of three parcels totaling approximately 56.5 acres. The primary 38.9 acre parcel at 221 Concord Avenue contains the high school building, vehicular circulation, and parking. Athletic fields are concentrated on two parcels (12.3 ac and 5.4 ac) west of the school building. Tennis courts and a softball field are adjacent to the main school parking area to the east of the school building. The Town confirmed that none of the parcels are subject to Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts.

A. SITE DEVELOPMENT NARRATIVE AND DESCRIPTION

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

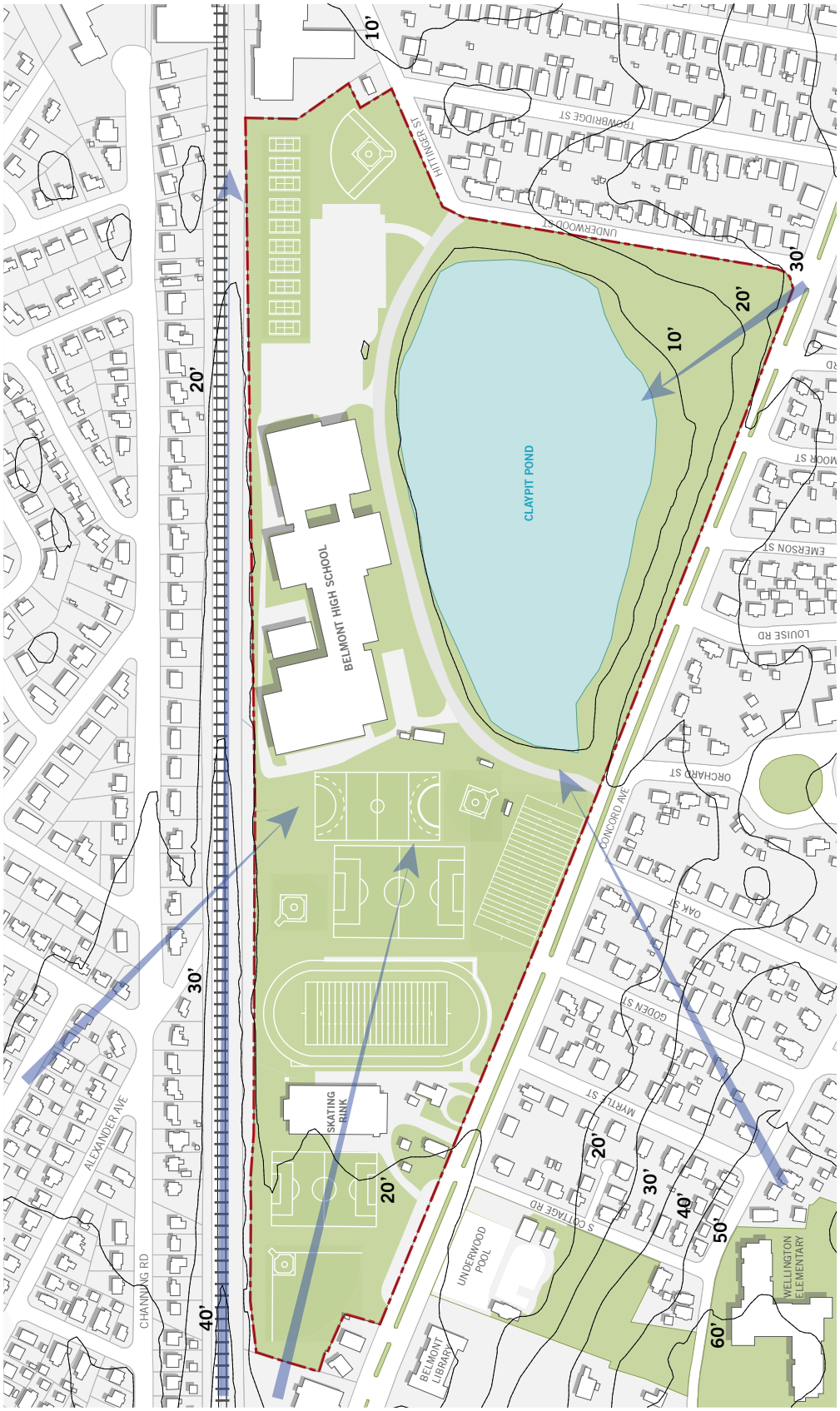
B. SITE DIAGRAMS

STORM DRAINAGE

■D■D■D■D CULVERT

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS



WATER GAS AND ELECTRIC SERVICES

W W W W W WATER SERVICE

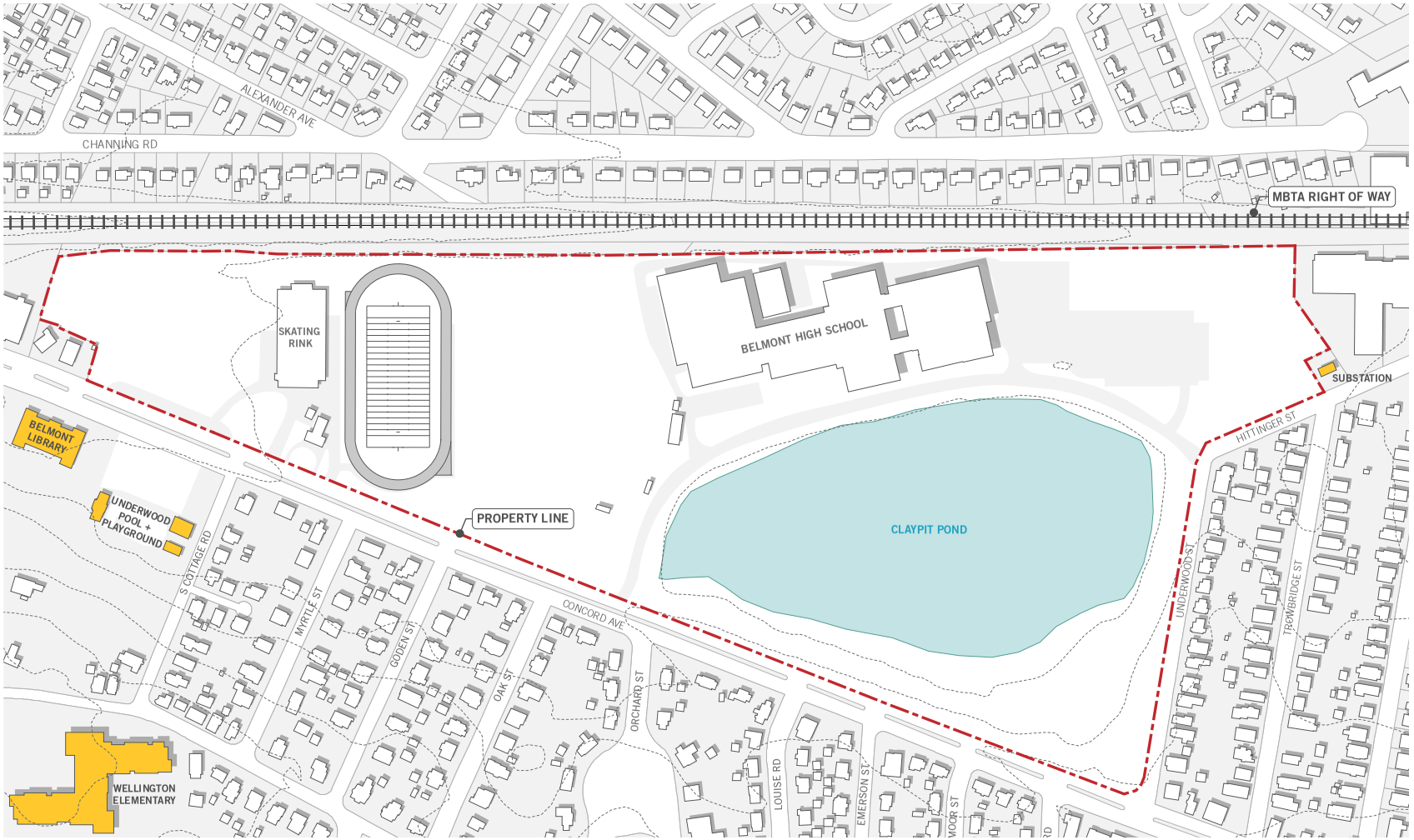
G G G G G GAS SERVICE

E E E E E ELECTRIC SERVICE

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS

CONTEXT

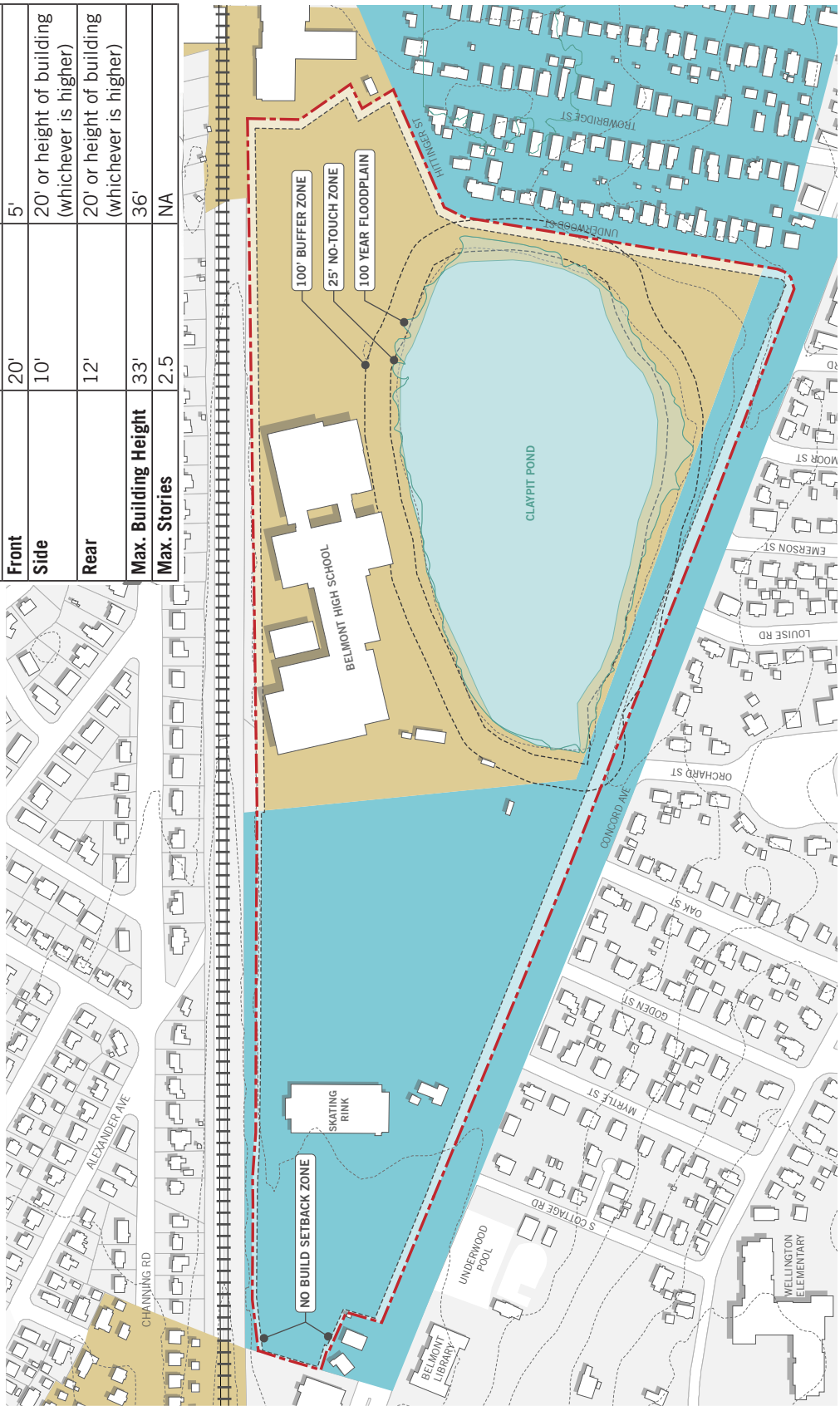

ALEXANDER AVE
CHANNING RD
MBTA RIGHT OF WAY
SKATING RINK
BELMONT HIGH SCHOOL
SUBSTATION
BELMONT LIBRARY
UNDERWOOD POOL + PLAYGROUND
PROPERTY LINE
CLAYPIT POND
HITTINGER ST
S COTTAGE RD
MYRTLE ST
GODEN ST
OAK ST
CONCORD AVE
ORCHARD ST
LOUISE RD
EMERSON ST
UNDERWOOD ST
TROWBRIDGE ST
WELLINGTON ELEMENTARY

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS

REGULATORY CONSTRAINTS

ZONING SUMMARY		
	General Residential	General Business
Setbacks		
Front	20'	5'
Side	10'	20' or height of building (whichever is higher)
Rear	12'	20' or height of building (whichever is higher)
Max. Building Height	33'	36'
Max. Stories	2.5	NA



SOIL ANALYSIS

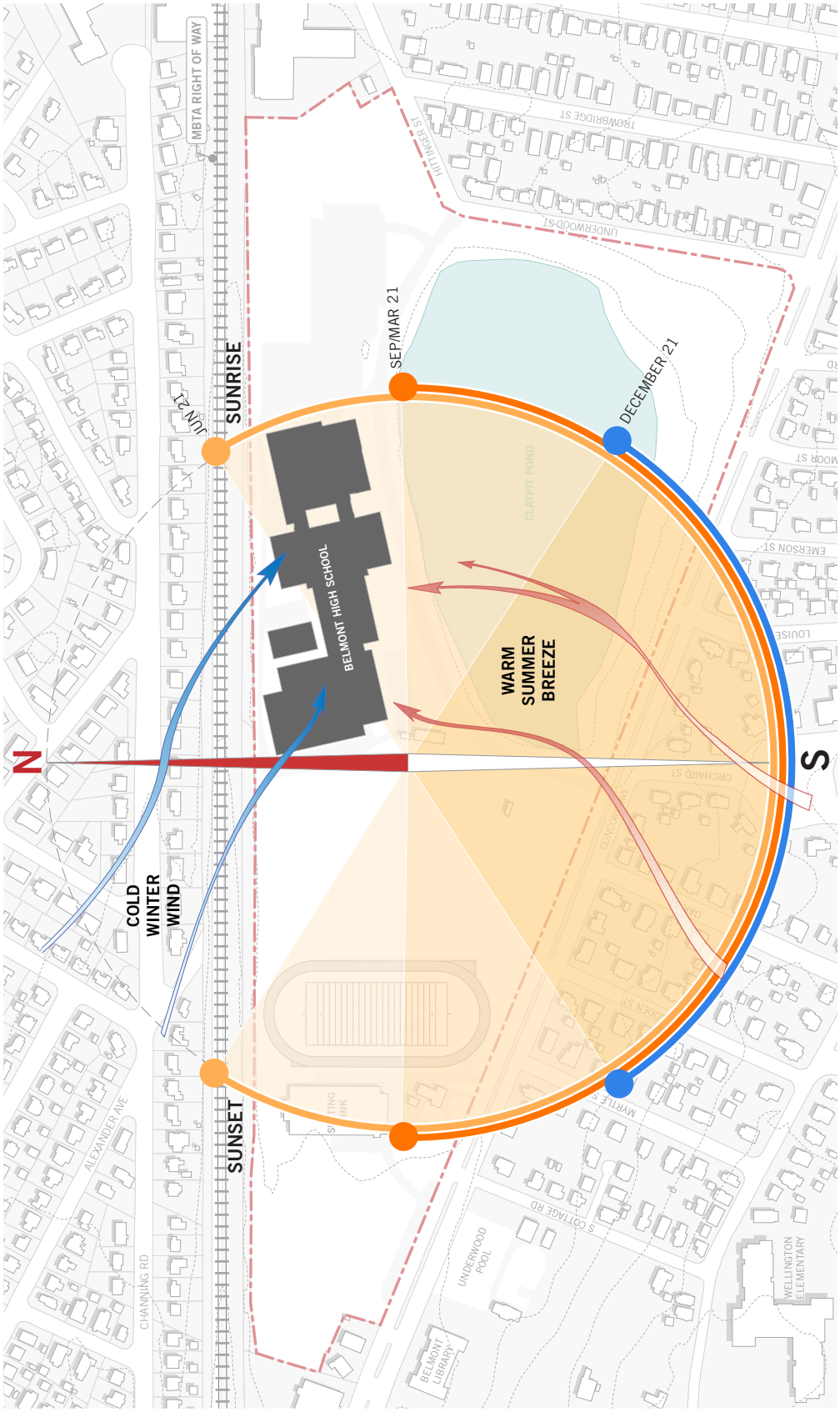
SOILS

- UDORTHENTS, WET SUBSTRATUM
- URBAN LAND, WET SUBSTRATUM
- SCIO VERY FINE SANDY LOAM, 3-8%
- SCIO URBAN LAND COMPLEX, 0-8%
- UDORTHENTS, WET SUBSTRANTUM
- NEWPORT URBAN LAND COMPLEX, 3-15%
- URBAN LAND
- MERRIMAC-URBAN LAND COMPLEX, 0-8%

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS

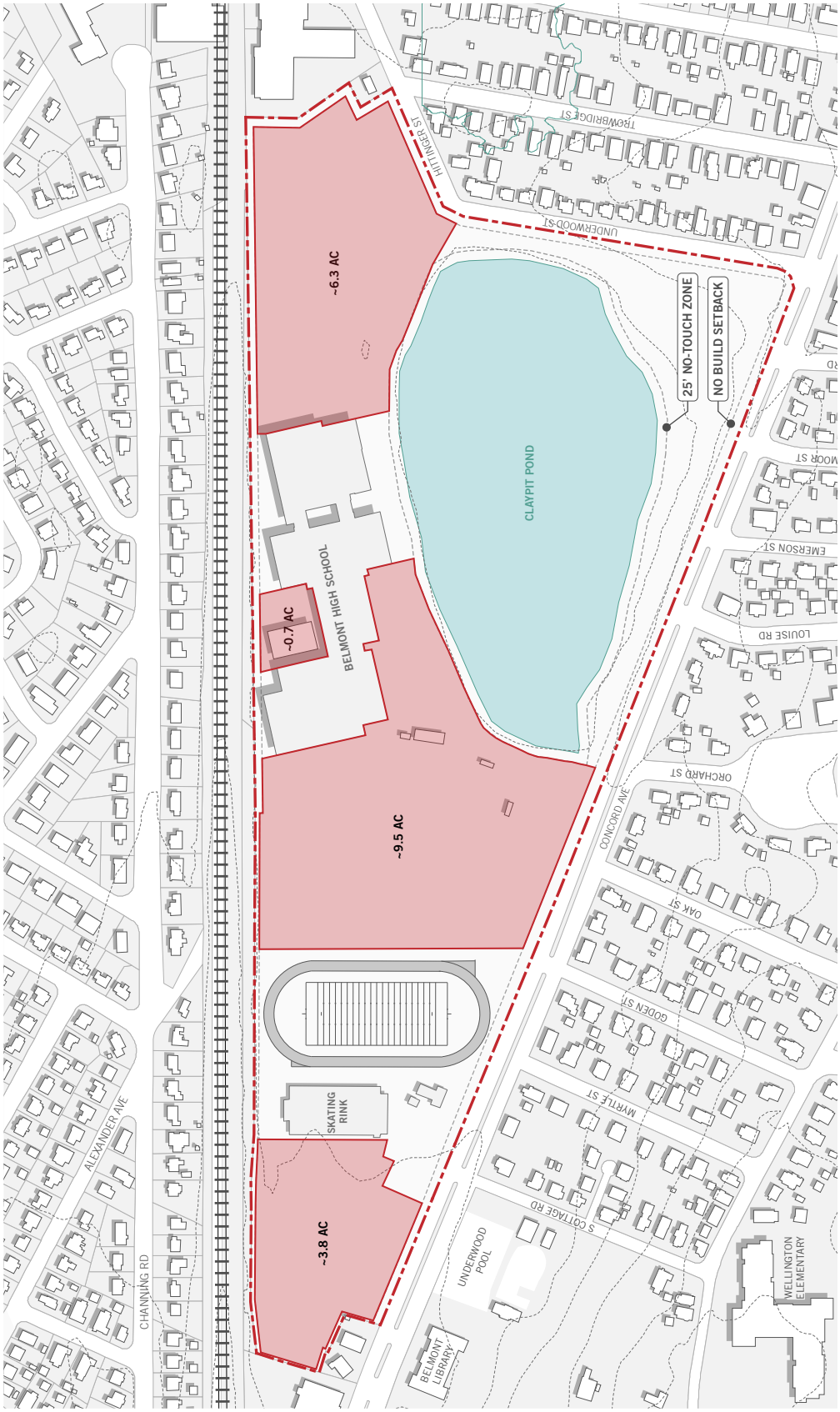
SOLAR ORIENTATION AND WIND ANALYSIS



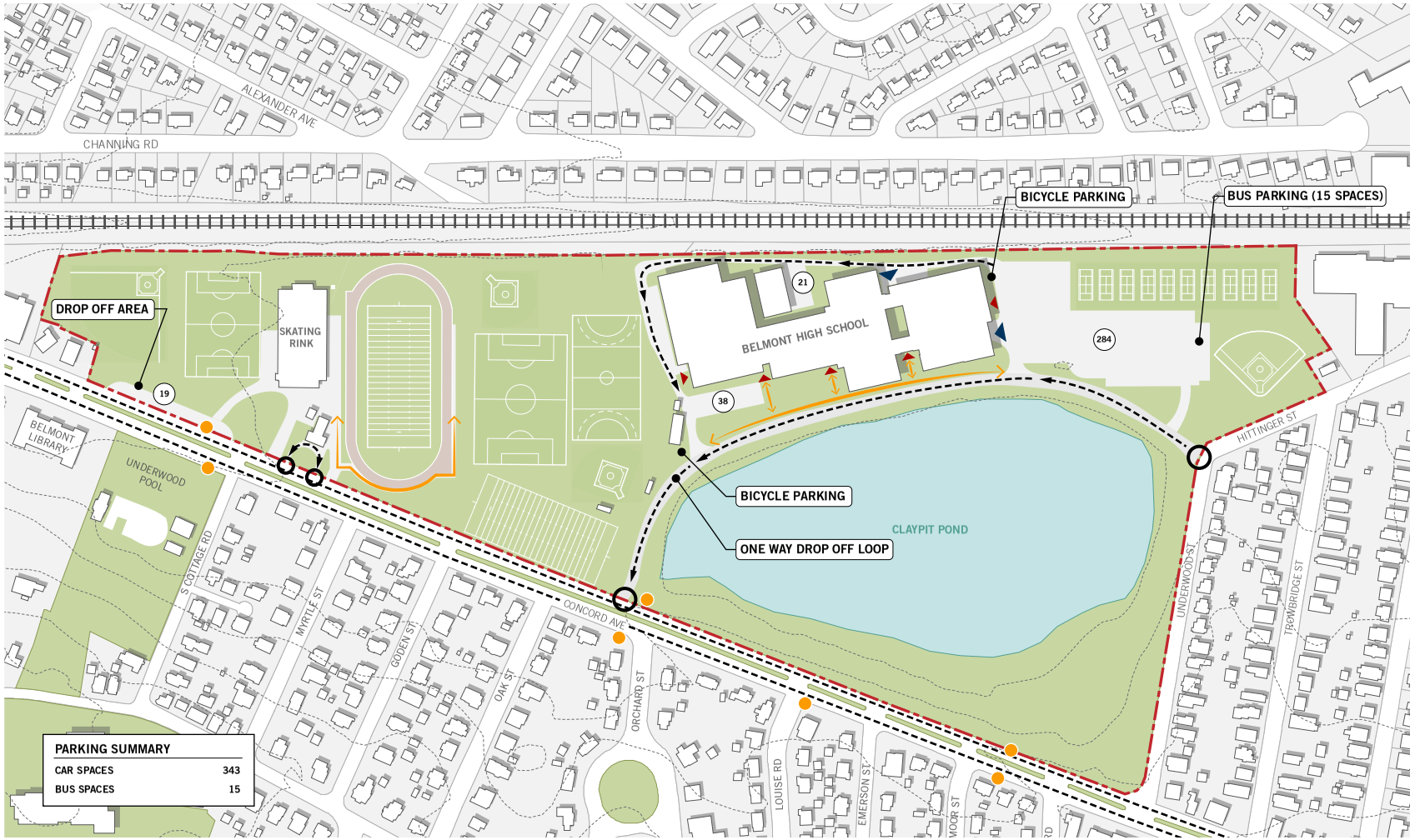
EXISTING PROGRAM / LANDSCAPE

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS



CIRCULATION + PARKING



MBTA BUS STOP
CAR PARKING SPACES
SERVICE AREAS
PEDESTRIAN CIRCULATION
VEHICULAR CIRCULATION
EXISTING SITE ACCESS POINTS
BUILDING ENTRIES

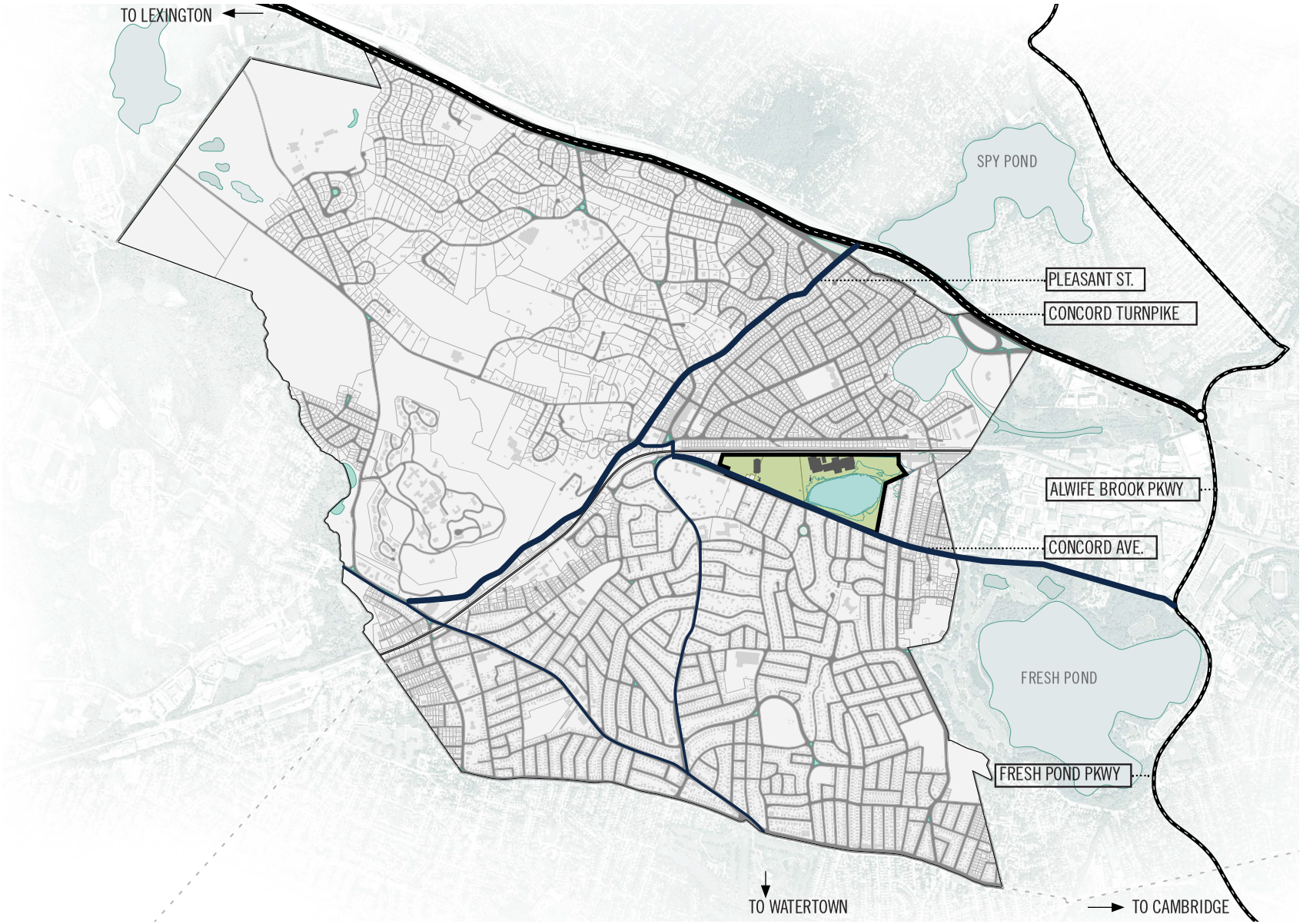
3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS

OWERALL SITE

BELMONT HIGH SCHOOL SITE

VEHICULAR CIRCULATION



MAJOR VEHICLE CIRCULATION

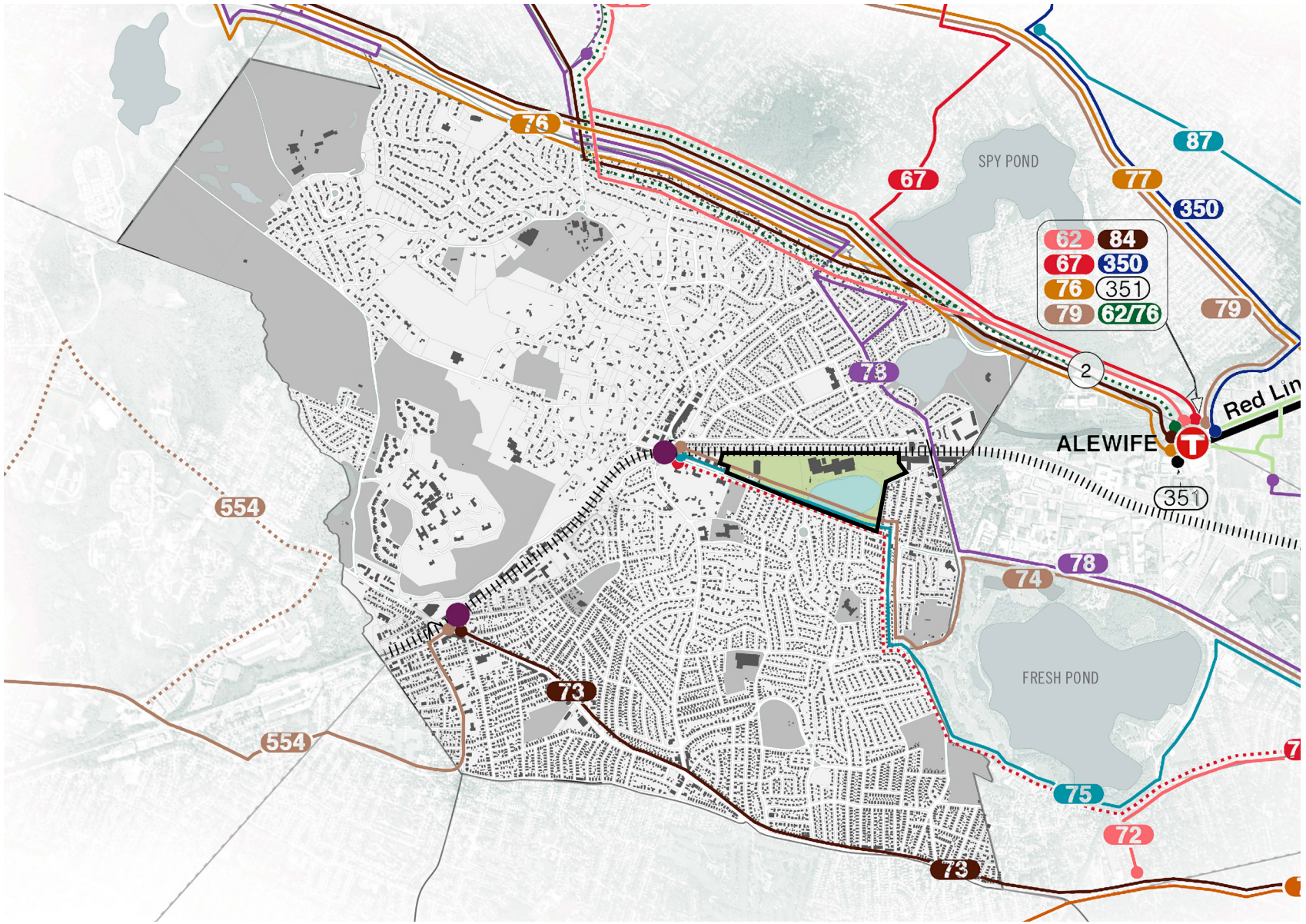
SECONDARY VEHICLE CIRCULATION

LOCAL ROADS

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS

PUBLIC TRANSIT



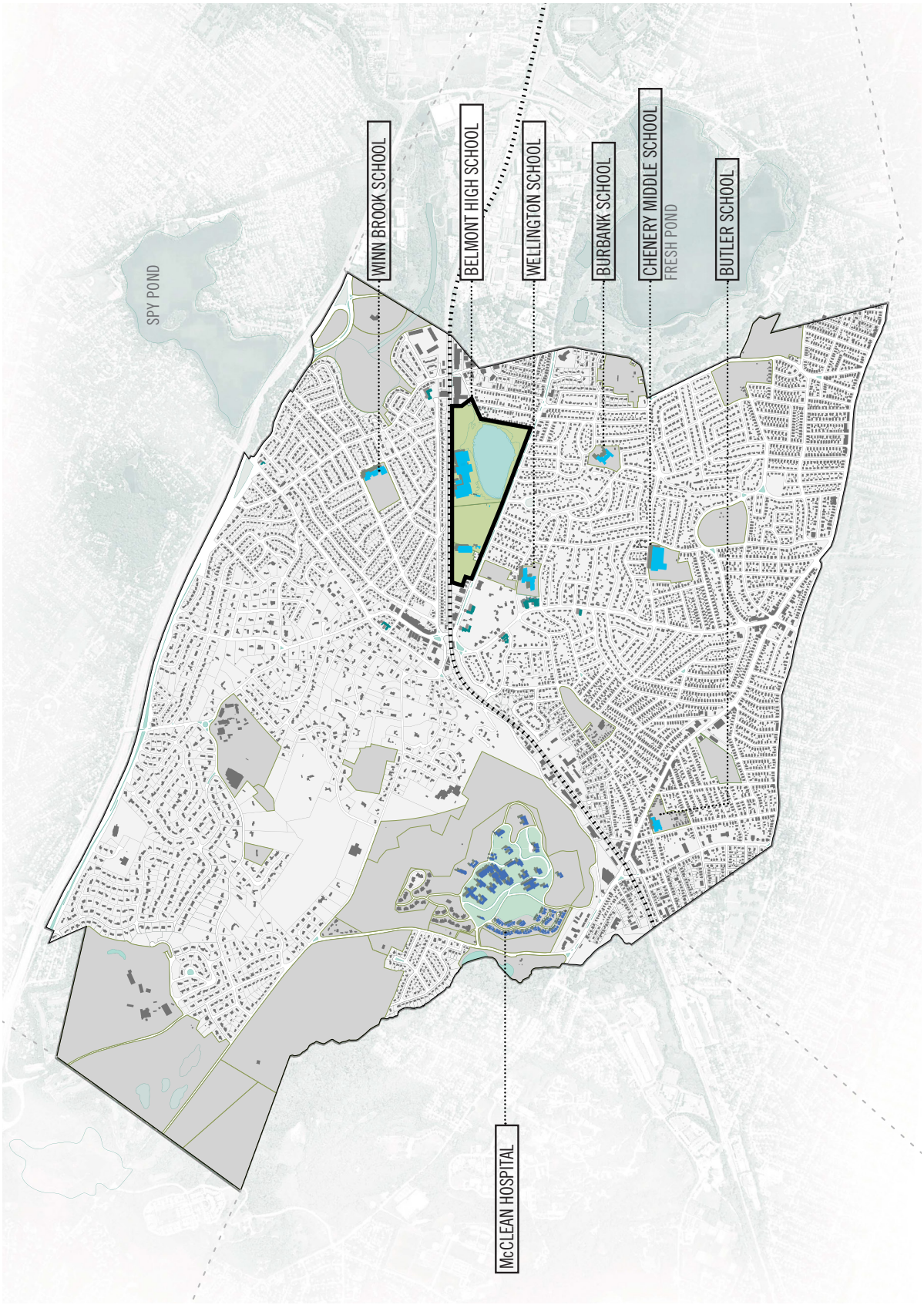
COMMUTER RAIL

BUS ROUTE

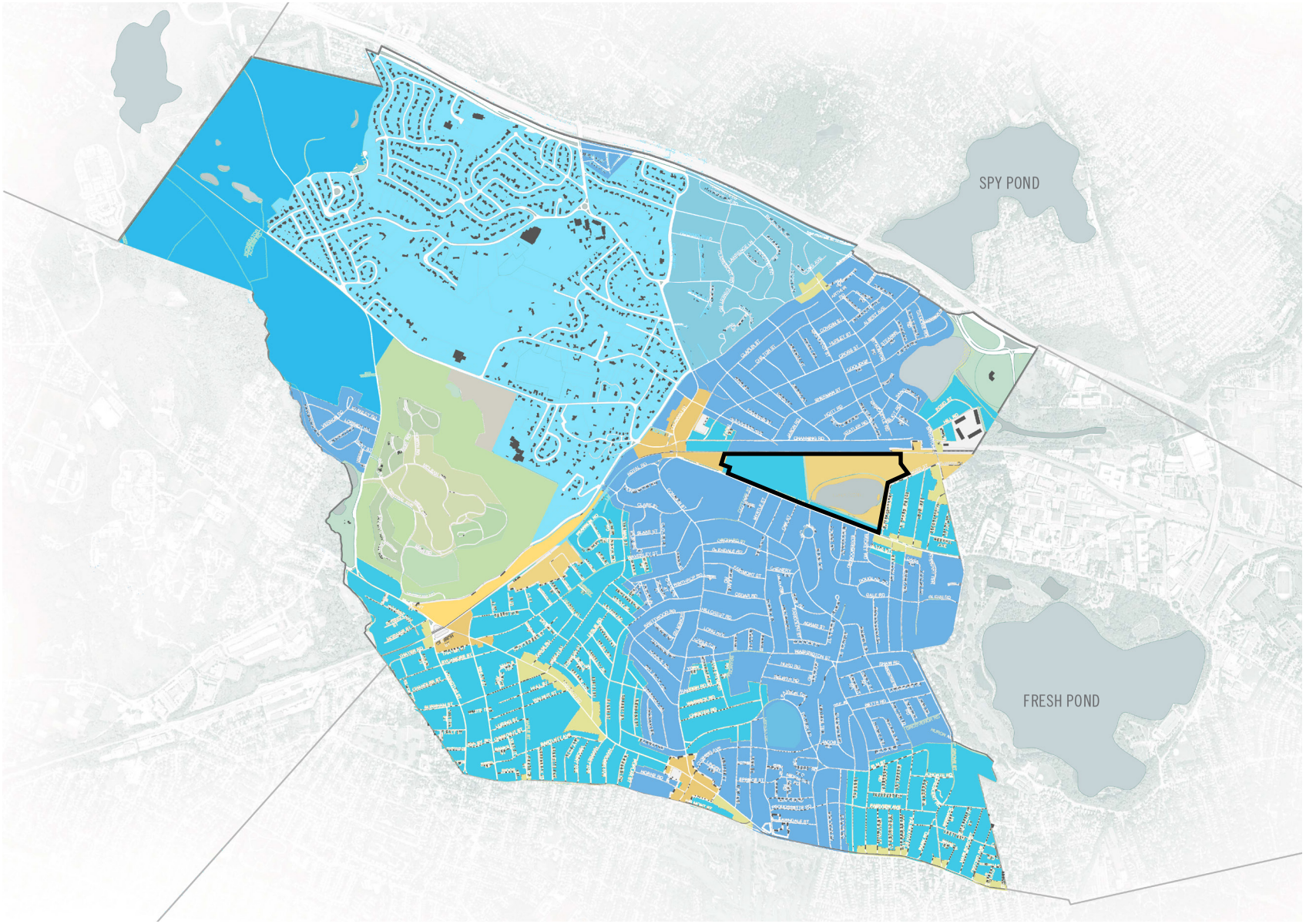
3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS

PUBLIC FACILITIES

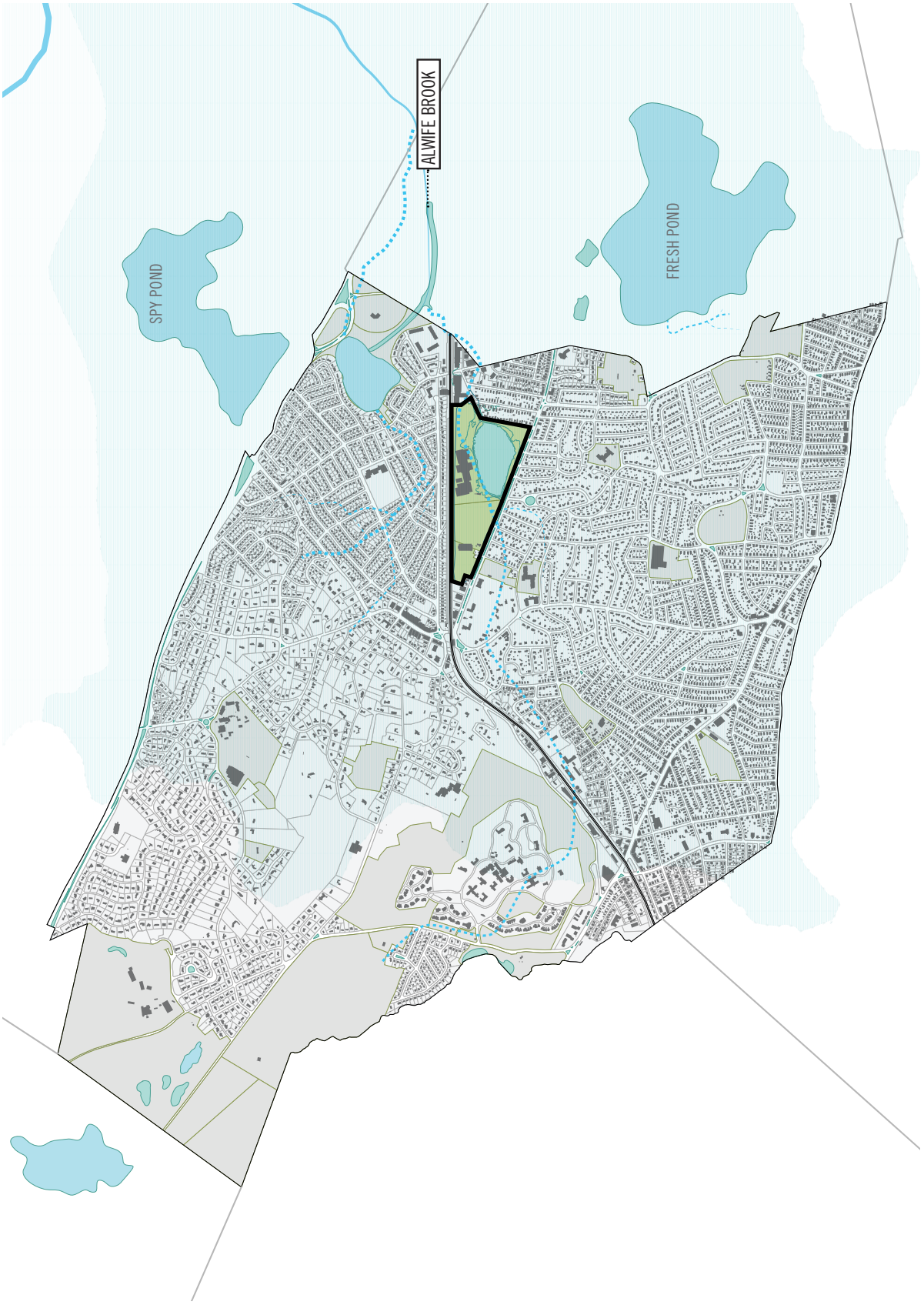


DISTRICTS


SPY POND
FRESH POND
GENERAL RESIDENCE
SINGLE RESIDENCE 1
SINGLE RESIDENCE 2
SINGLE RESIDENCE 3
SINGLE RESIDENCE 4
GENERAL BUSINESS
MCLEAN SUBDISTRICT

3.1.5 - SITE DEVELOPMENT REQUIREMENTS

B. SITE DIAGRAMS



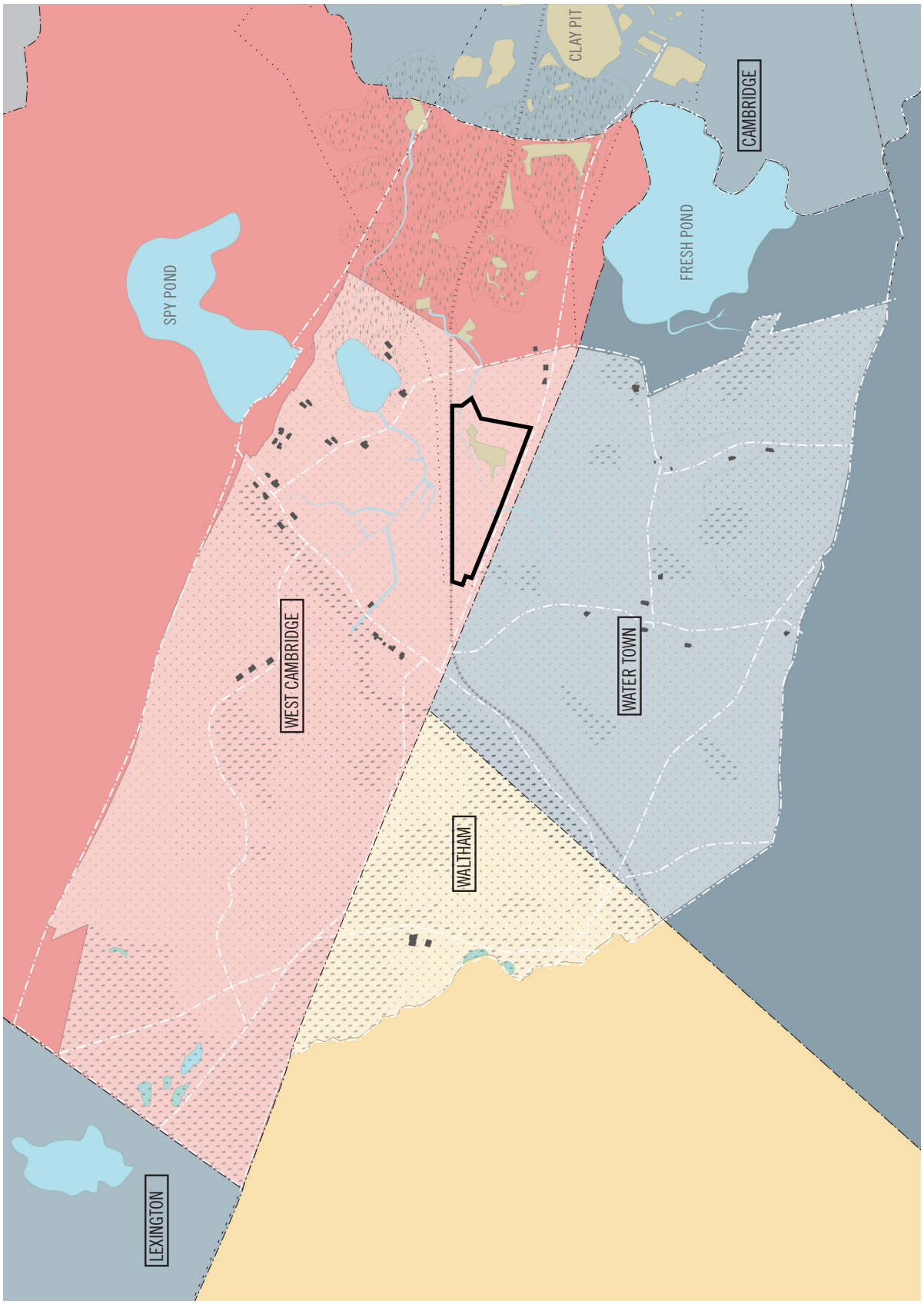
GREEN SPACE

GREEN SPACE

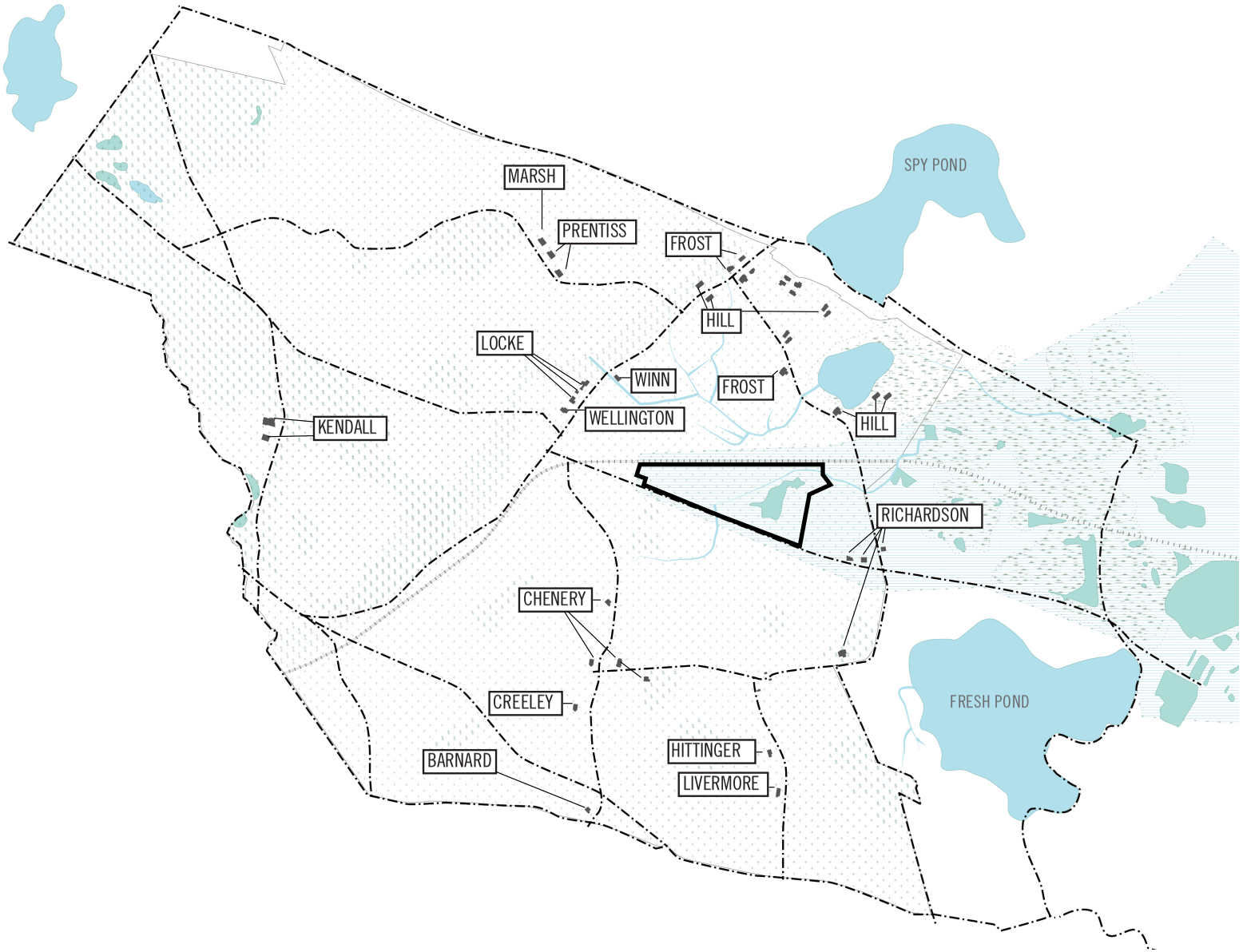
3.1.5 - SITE DEVELOPMENT REQUIREMENTS

C. HISTORICAL ANALYSIS

HISTORICAL ANALYSIS OF ORIGINAL TOWN BOUNDARIES - ESTABLISHMENT AS TOWN OF BELMONT (1859)



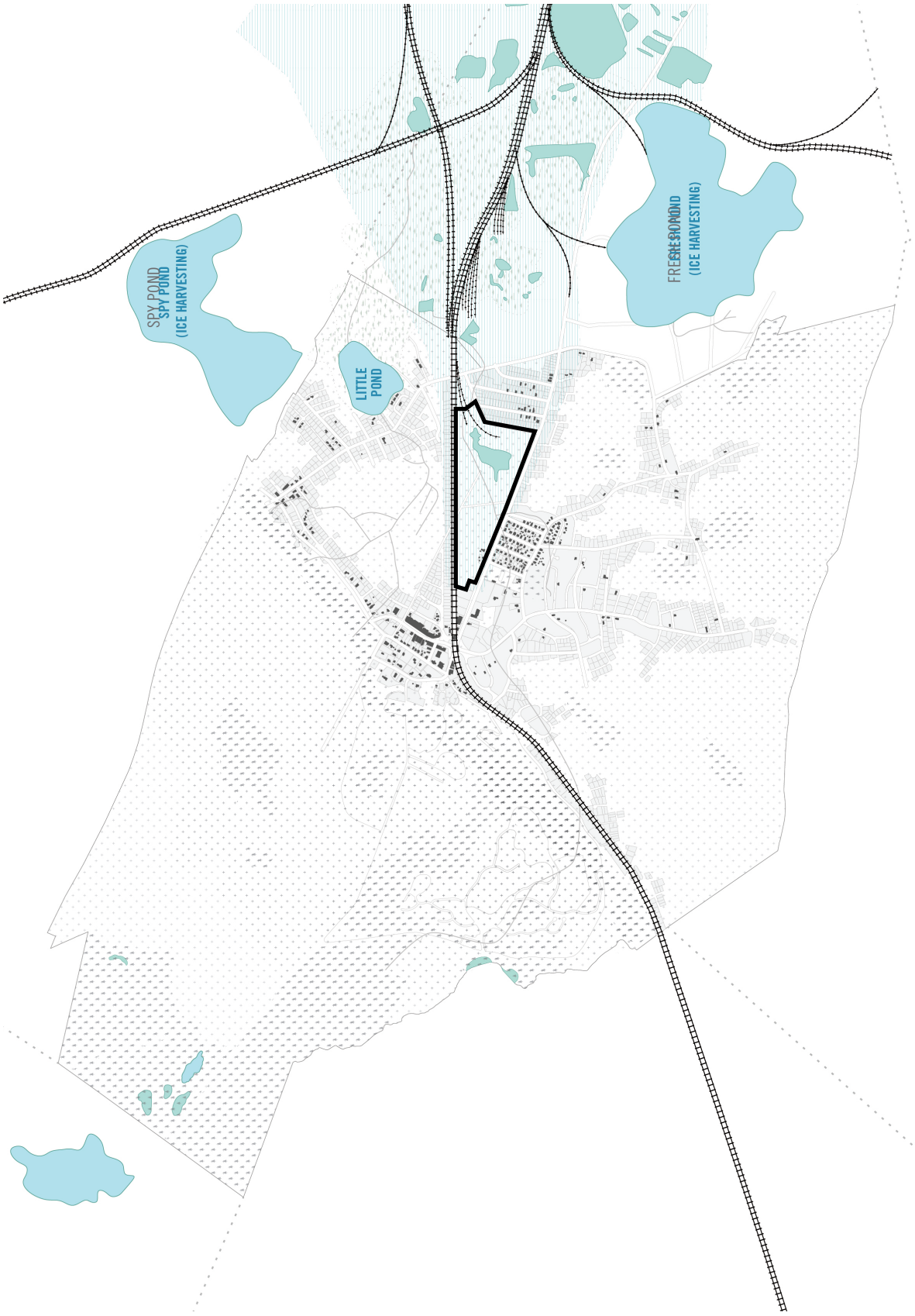
HISTORICAL ANALYSIS OF FARMLAND AREAS (1854)



XXXX EARLY FARMERS AT 1853

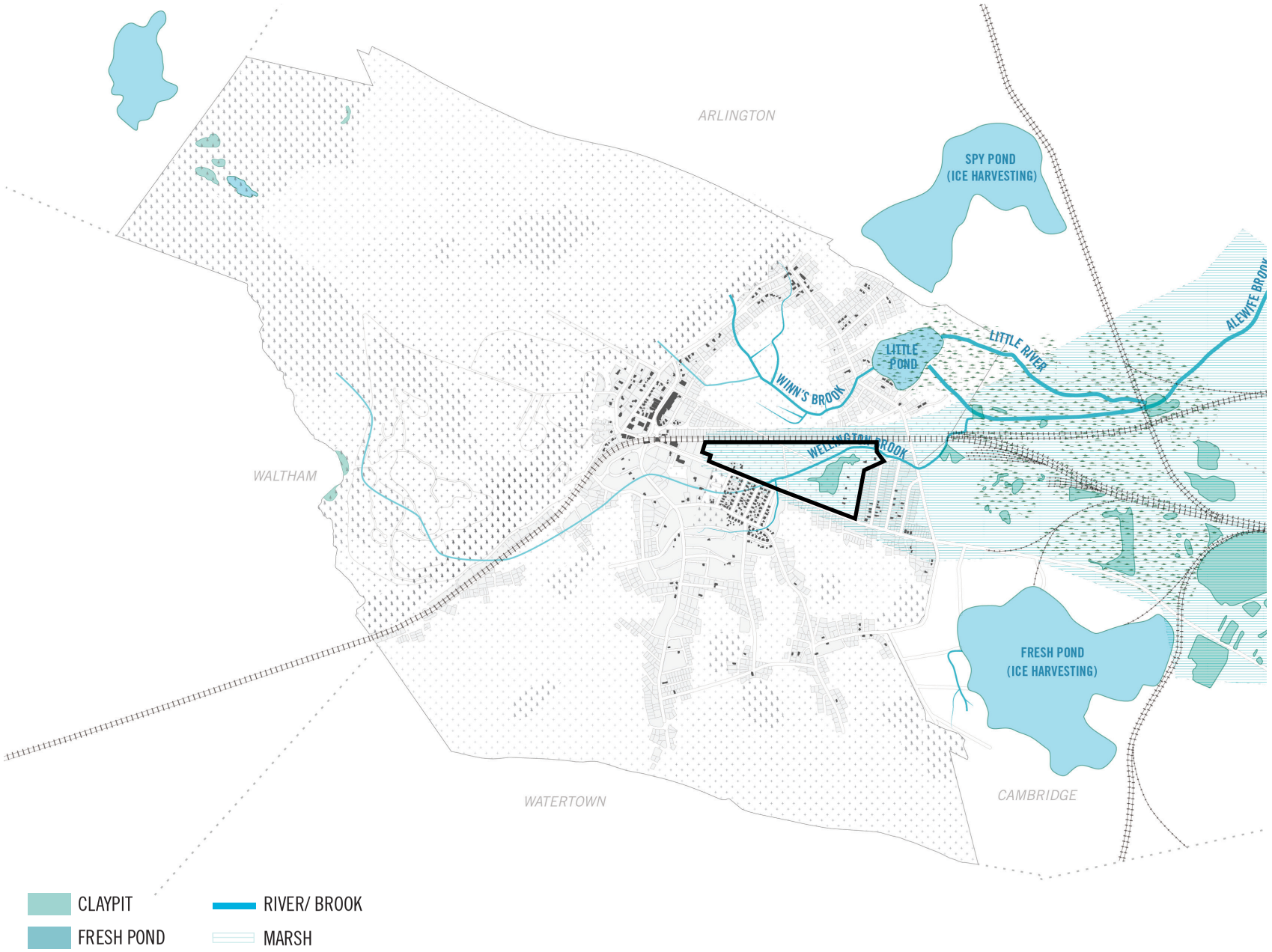
3.1.5 - SITE DEVELOPMENT REQUIREMENTS

C. HISTORICAL ANALYSIS



HISTORICAL ANALYSIS OF RAILWAY DEVELOPMENT (1854)

HISTORICAL ANALYSIS OF PONDS, WATERWAYS, AND CLAYPITS (1954)



3.1.6 PRELIMINARY EVALUATION OF ALTERNATIVES

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

DISTRICT OBJECTIVES ANALYSIS

A. ANALYSIS OF SCHOOL DISTRICT ASSIGNMENT

The Belmont Public School District consists of the following:

- Burbank Elementary
- Butler Elementary
- Winn Brook Elementary
- Wellington Elementary
- Chenery Middle School
- Belmont High School

All of the schools are currently at or beyond capacity.

B. TUITION AGREEMENTS WITH ADJACENT SCHOOL DISTRICTS:

The Belmont Public Schools does not have a tuition agreement with any neighboring communities. Belmont does belong, and is one of the founding members of, Minuteman Regional Vocational Technical School District. We currently send students to Minuteman. The Town of Belmont voted to remove themselves as a "member" district from Minuteman in May 2016. The district will seek alternative vocational programming for our students, inclusive of sending students to Minuteman as non-member district students. The current enrollment at Minuteman is currently around 30 students.

The district is a member of the LABBB Collaborative. We send students to LABBB, public collaborative and private placements for our students with special needs. The LABBB membership is a unique partnership as it requires that space be provided to the LABBB program by each member district. Belmont has LABBB programs with our school buildings at the elementary, middle, and high school levels. Our out of district enrollment, inclusive of LABBB is around 104 students at this time.

The Belmont Public Schools is a member of METCO. We currently enroll up to 105 students.

The Belmont School District does not participate in School Choice.

C. RENTAL OR ACQUISITION OF EXISTING BUILDINGS

There is no property within the Town of Belmont that is available for acquisition or lease to accommodate students. In the event of a renovation of any portion of the Belmont High School it is likely that temporary classrooms would need to be acquired or leased during construction.

D. EVALUATION OF ALTERNATIVES

The team developed 22 original options to be studied and presented to the Building Committee, administration and community members. They consisted of the following (*see full matix of options diagram)*

I. BASE REPAIRS ONLY

II. RENOVATION AND ADDITION

- **Option 2.1:** Major renovation minor addition (9-12/ 8-12/ 7-12)
- **Option 2.2:** Minor renovation major addition (9-12/ 8-12/ 7-12)
- **Option 2.3:** Minor renovation major addition (9-12/ 8-12/ 7-12)
- **Option 2.4:** Minor renovation major addition (9-12/ 8-12/ 7-12)
- **Option 2.5**: Minor renovation major addition (9-12/ 8-12/ 7-12)

III. NEW CONSTUCTION

- **Option 3.1:** New construction West of BHS (9-12/ 8-12/ 7-12)
- **Option 3.2**: New construction West of stadium (9-12/ 8-12/ 7-12)

THREE OPTIONS ELIMINATED FOR THE FOLLOWING REASONS:

Option 2.2: Consolidated with Option 2.1 option.

Option 2.5: Separating the field house from the general educational facility was not desirable. The proposed building location was too close to the East side of the site - making traffic, parking, and circulation too challenging to develop.

Option 3.2: Required moving a newly constructed stadium and an ice rink, which is not part of our project. Due to cost and schedule, this option was eliminated.

OPTIONS TO MOVE FORWARD INTO THE PSR (*See reduced Matrix)*

I. BASE REPAIRS ONLY

II. RENOVATION AND ADDITION

- **Option 2.1:** Major renovation minor addition (9-12/ 8-12/ 7-12)
- **Option 2.3:** Minor renovation major addition (9-12/ 8-12/ 7-12)
- **Option 2.4:** Minor renovation major addition (9-12/ 8-12/ 7-12)

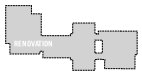
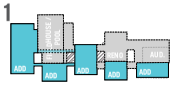
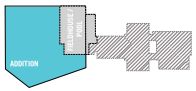
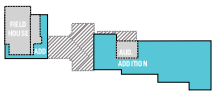
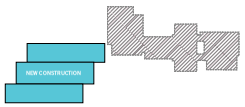
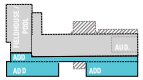
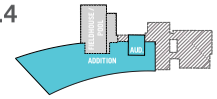
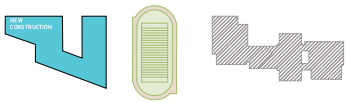
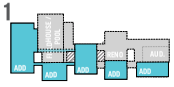
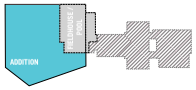
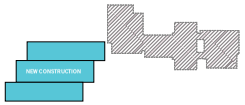
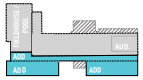
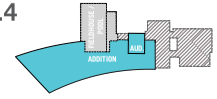
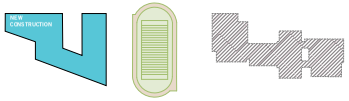
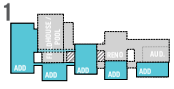
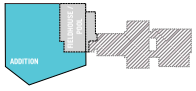
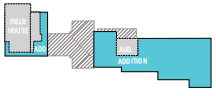
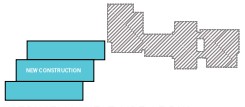
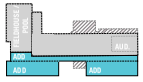
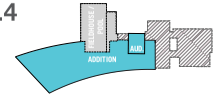
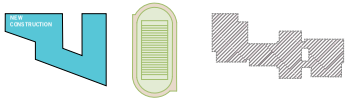
III. NEW CONSTRUCTION

- **Option 3.1:** New construction on West side of BHS.

E. NEW CONSTRUCTION ON ALTERNATIVE SITE

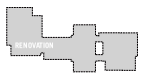
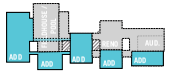
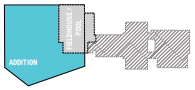
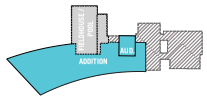
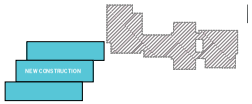
It has been determined that the Town of Belmont has no alternative sites to accommodate a new high school building.

3.1.6 BELMONT HIGH SCHOOL OPTIONS : FULL MATRIX OF 22 OPTIONS

	1 BASE REPAIR ONLY	2 RENOVATION + ADDITION			3 NEW CONSTRUCTION
A GRADES 9-12 1,470 Students	**A.1**  258,840 SF / EXISTING 310,000 SF+ / PROPOSED No educational capacity compliance	**A.2.1**  MAJOR RENOVATION MINOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**A.2.3**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool	**A.2.5**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**A.3.1**  NEW CONSTRUCTION WEST SIDE OF BHS Demolition BHS, New Gymnasium and Auditorium, no Pool
		A.2.2  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**A.2.4**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool		**A.3.2**  NEW CONSTRUCTION WEST SIDE OF TRACK / FIELD Demolition BHS, New Gymnasium and Auditorium, no Pool
B GRADES 8-12 1,845 Students		**B.2.1**  MAJOR RENOVATION MINOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**B.2.3**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool	**B.2.5**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**B.3.1**  NEW CONSTRUCTION WEST SIDE OF BHS Demolition BHS, New Gymnasium and Auditorium, no Pool
		B.2.2  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**B.2.4**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool		**B.3.2**  NEW CONSTRUCTION WEST SIDE OF TRACK / FIELD Demolition BHS, New Gymnasium and Auditorium, no Pool
C GRADES 7-12 2,215 Students		**C.2.1**  MAJOR RENOVATION MINOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**C.2.3**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool	**C.2.5**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**C.3.1**  NEW CONSTRUCTION WEST SIDE OF BHS Demolition BHS, New Gymnasium and Auditorium, no Pool
		C.2.2  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	**C.2.4**  MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool		**C.3.2**  NEW CONSTRUCTION WEST SIDE OF TRACK / FIELD Demolition BHS, New Gymnasium and Auditorium, no Pool

3.1.6 BELMONT HIGH SCHOOL OPTIONS : REDUCED MATRIX TO 13 OPTIONS

RECOMMENDED FOR FURTHER EVALUATION BASED ON GRADE CONFIGURATION DECISION

	1 BASE REPAIR ONLY	2 RENOVATION + ADDITION		3 NEW CONSTRUCTION
A GRADES 9-12 1,470 Students		**A,B,C / 2.1**	**A,B,C / 2.3**	**A,B,C / 3.1**
B GRADES 8-12 1,845 Students				
C GRADES 7-12 2,215 Students				
				
	BASE REPAIR ONLY	MAJOR RENOVATION MINOR ADDITION Maintains Exist. Fieldhouse/ Pool + Auditorium	MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool	MINOR RENOVATION MAJOR ADDITION Maintains Exist. Fieldhouse/ Pool
				
				NEW CONSTRUCTION WEST SIDE OF BHS Demolition BHS, New Gymnasium and Auditorium, no Pool

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

F. BASE REPAIR OPTION

Option 1 : Base Repair Only

The Base Repair Option retains the building as it is currently configured. The existing Belmont High School requires significant systems upgrades because most of the existing systems have not been upgraded/replaced since the building was constructed in 1970 (over 47 years ago).

The required upgrades in the Base Repair Option include, but are not limited to, interior finishes, replacement of windows, envelope repair, replacement of all MEP systems, and life safety - accessibility upgrades. The existing building requires replacement of all hardware, lighting fixtures and built-in casework. It should be noted that if any repairs, renovations, additions, or change of occupancy are made to the existing structures, a check for compliance with 780 CMR, Chapter 34 "Existing Building Code" (Massachusetts Amendments to The International Existing Building Code 2015) of the Massachusetts Amendments to the International Building Code 2015 (IBC 2015) and reference code "International Existing Building Code 2015" (IEBC 2015) is required. The intent of the IEBC (and the related Massachusetts Amendments to IEBC) is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction. Traffic and site circulation for the Base Repair Option should be addressed in order to alleviate current traffic issues related to vehicular circulation.

The construction phasing of the Base Repairs Option would require significant moving of students around the existing facility to complete the extensive-phased renovations at the BHS Facility. Given the constraints of the existing building and the absence of available swing space in the Town of Belmont to accommodate all of the school's population, it could be anticipated that modular classrooms would need to be employed to house students during the multi-year construction period.

The current square footage of the existing Belmont High School is 257,120 square feet, which is too small to accommodate even the smallest MSBA program requirement for grades 9-12. The developed summary indicates a Gross Square Footage for grades 9-12 of 343,494 GSF which is 86,374 GSF over the existing BHS building. As a result, it can be stated that this option does not solve either the educational or capacity requirements for any of the grade configurations put forth in this PDP summary of options.

PROS

- High School will meet the building code and ADA
- High School will have new HVAC, Plumbing and Electrical systems
- Hazardous materials will be abated

CONS

- The base repair renovations will not meet any capacity requirements.
- The base repair renovations will be a costly option with no educational upgrades.
- 48 month disruption to the students for only systems upgrades.
- Swing space / modular classrooms are needed for construction
- Traffic mitigation will be minimally addressed compared to other options that involve renovation/addition and/or new construction.

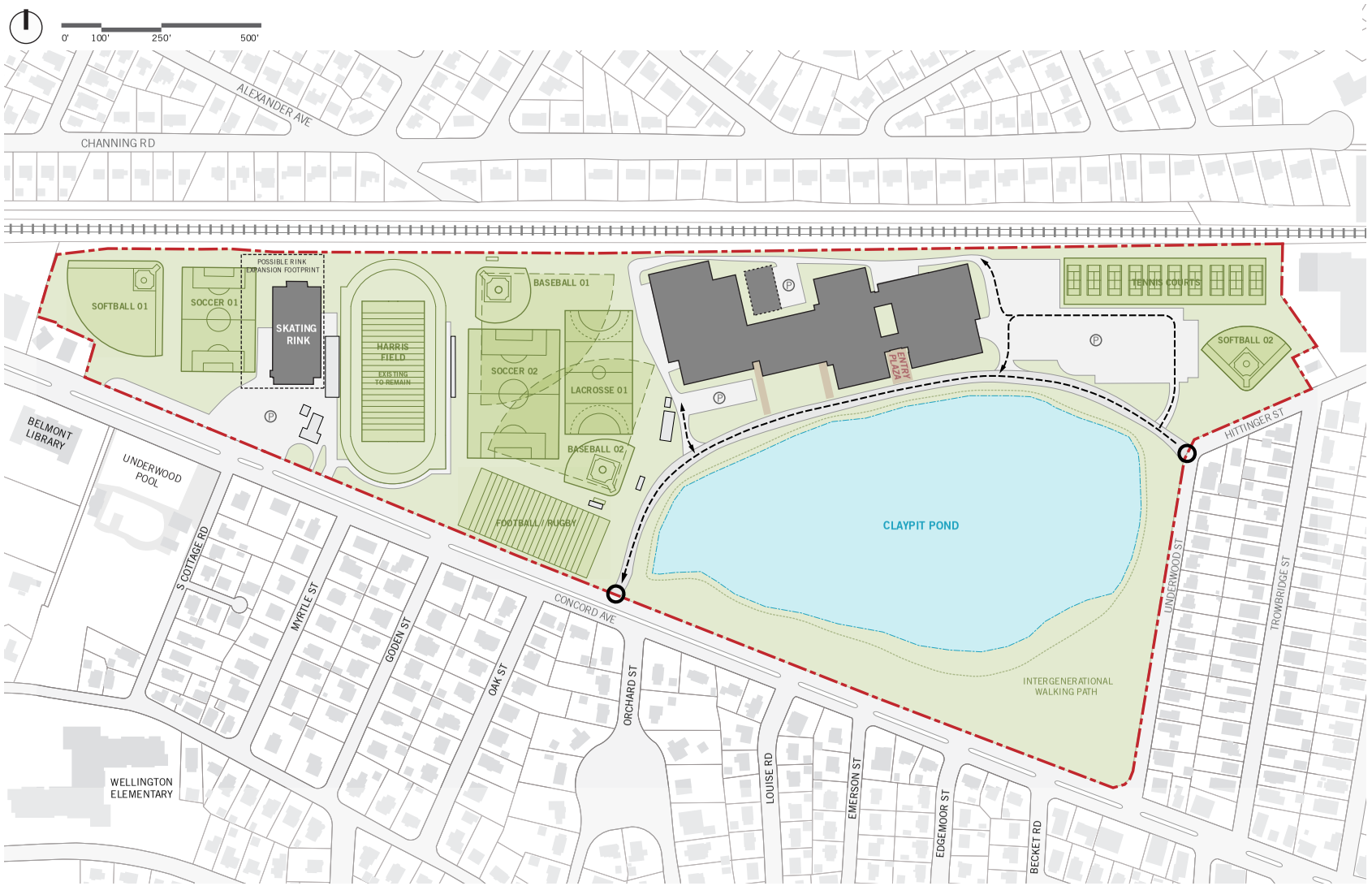
PROPOSED BUILDING CONFIGURATION : ESTIMATED CONSTRUCTION DURATION AND PROJECT COST

- Does not satisfy capacity of educational requirements / 257,120 GSF / Est. Construction Duration: 48 months / **$112,740,654***

** Project cost- all costs should be considered preliminary based on Order of Magnitude*

3.1.6 BELMONT HIGH SCHOOL OPTIONS : EXISTING SITE PLAN

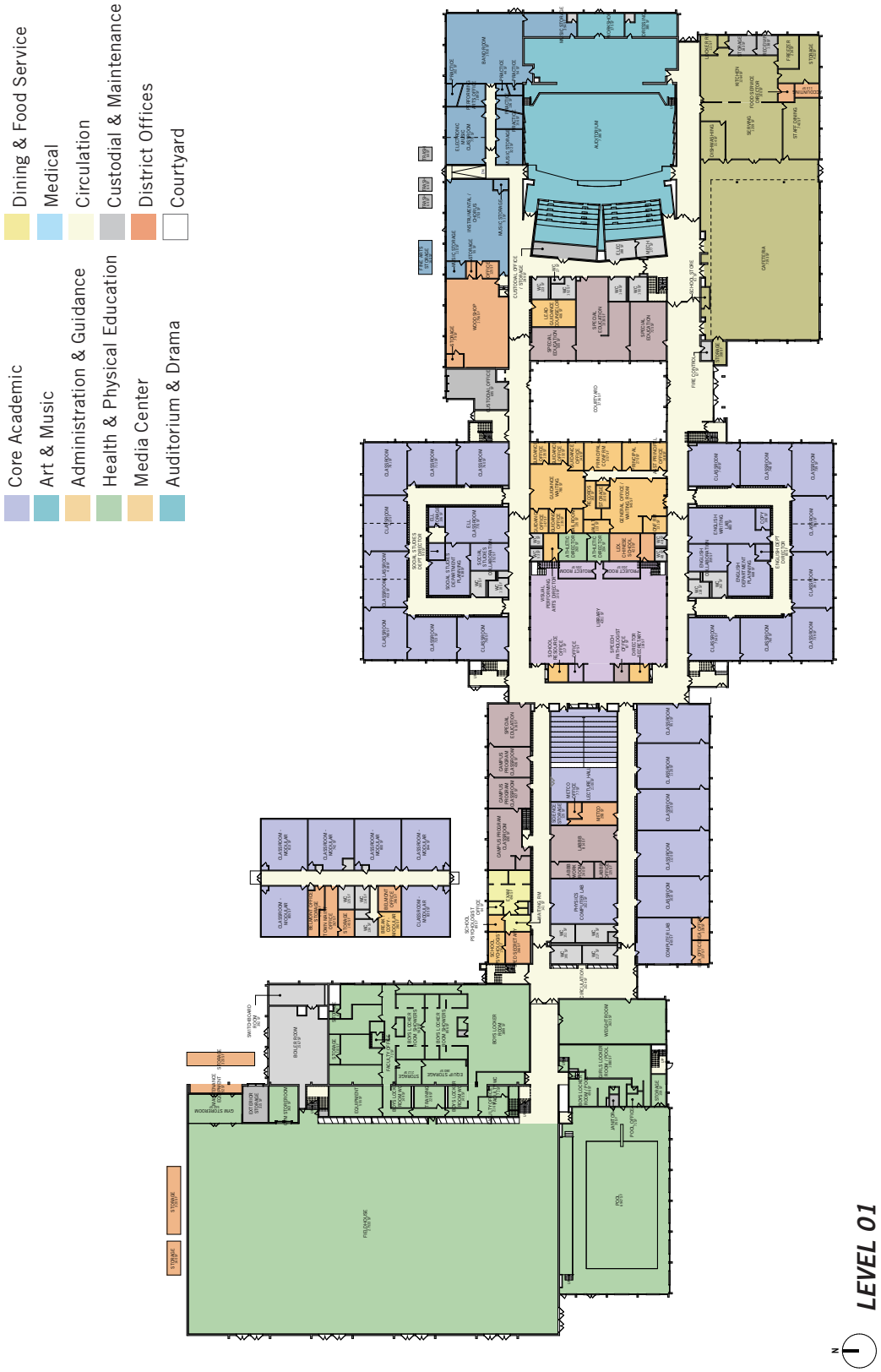
F. BASE REPAIR OPTION
Option 1 : Base Repair Only



3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

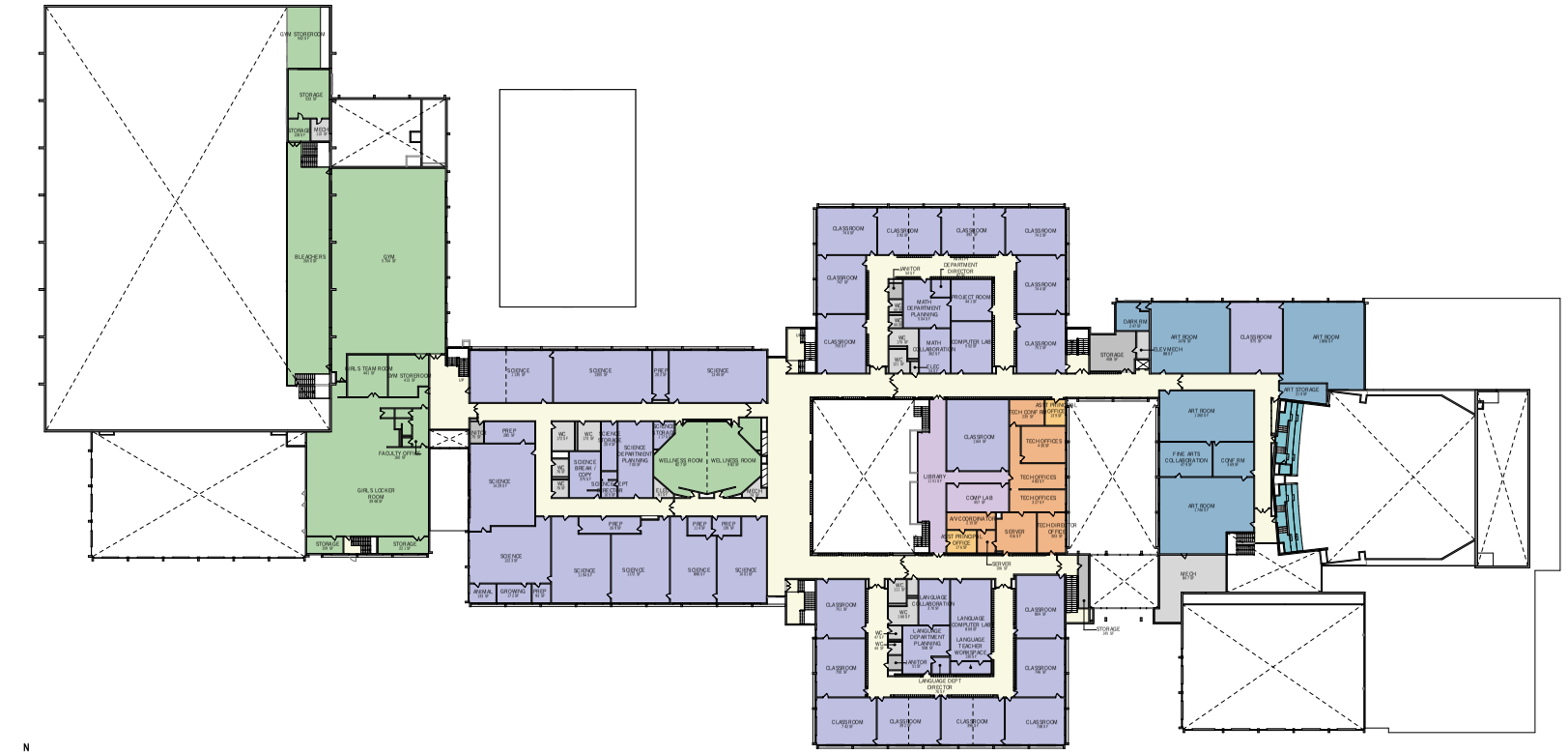
F. BASE REPAIR OPTION

Option 1 : Major Renovation Only



3.1.6 BELMONT HIGH SCHOOL : EXISTING LEVEL 01 FLOOR PLAN

3.1.6 BELMONT HIGH SCHOOL OPTIONS : EXISTING LEVEL 02 FLOOR PLAN



LEVEL 02

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.1 : Major Renovation-Minor Addition

Option 2.1 would be a phased renovation addition to the existing high school to create a new 9-12, 8-12, or 7-12 High School. In the first phase, a new addition would be constructed off the northwest edge of the existing high school building. The addition would include upper school administration, science labs and general classrooms, as well as a black box theater, an alternative PE space, an upper school cafeteria, kitchen and mechanical space. The upper school students would occupy this new addition and a second phase of construction would take place to demolish the existing high school building. The entire existing building structure - including caissons, foundations, concrete floor, roof slabs, and concrete beams - would remain and be reused, but a new structural system would be required if additional floor levels are added. The existing portion of the building would be renovated to include shared common amenity spaces such as the large auditorium, the large Gymnasium, and a new media commons. This second phase would also create a new lower school cafeteria, general classrooms / science labs and other support spaces. Both lower and upper school classroom wings would be designed to be shut off from the shared amenity spaces, which will be accessible for community use. This option would allow for a clear separation of some lower school and upper school functionality including administration spaces, student drop-offs / entrances (on different sides of the building), and core classrooms / science labs that would be in separate academic wings. If built, this option would maintain the same number of athletic playing fields that exist today with the exemption of the tennis courts.

PROS

- Full Educational Compliance
- Full Capacity Compliance
- New efficient HVAC, Plumbing and Electrical systems
- Ability to implement sustainability concepts
- Hazardous materials will be abated
- Improvements to vehicular circulation
- School will meet the building code and ADA
- Maintains existing fieldhouse, pool and auditorium
- Upper School and Lower School have entrances on different sides of the school for increased segregation of the two populations
- Added natural light from additional courtyards
- Maintains existing building placement and proximity to Concord Ave.

CONS

- Multiple construction phasing will result in academic disruption, additional costs, and longer schedule
- Only partially addresses the building's inherent programmatic inefficiencies
- Multiple phasing will impact athletic field use
- Multiple phasing will impact site parking and circulation during construction
- Swing space or modular classrooms likely required for construction
- Major public spaces are separated

PROPOSED BUILDING CONFIGURATION : ESTIMATED CONSTRUCTION DURATION AND PROJECT COST

- **A.2.1** : 9-12 high school for 1,470 students / 343,494 GSF / Est. Construction Duration: 48 months / **$223,962,169***
- **B.2.1 :** 8-12 high school for 1,845 students / 393,561 GSF / Est. Construction Duration: 48 months / **$243,626,634***
- **C.2.1 :** 7-12 high school for 2,215 students / 451,575 GSF / Est. Construction Duration: 48 months / **$284,514,819***

** Project cost- all costs should be considered preliminary based on Order of Magnitude*

G. RENOVATION AND ADDITIONS

Option 2.1 : Major Renovation-Minor Addition

3.1.6 OPTION 2.1 : MAJOR RENOVATION-MINOR ADDITION SITE PLAN

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.1 : Major Renovation-Minor Addition

0’ 100’ 250’

LEVEL 01 FLOOR PLAN

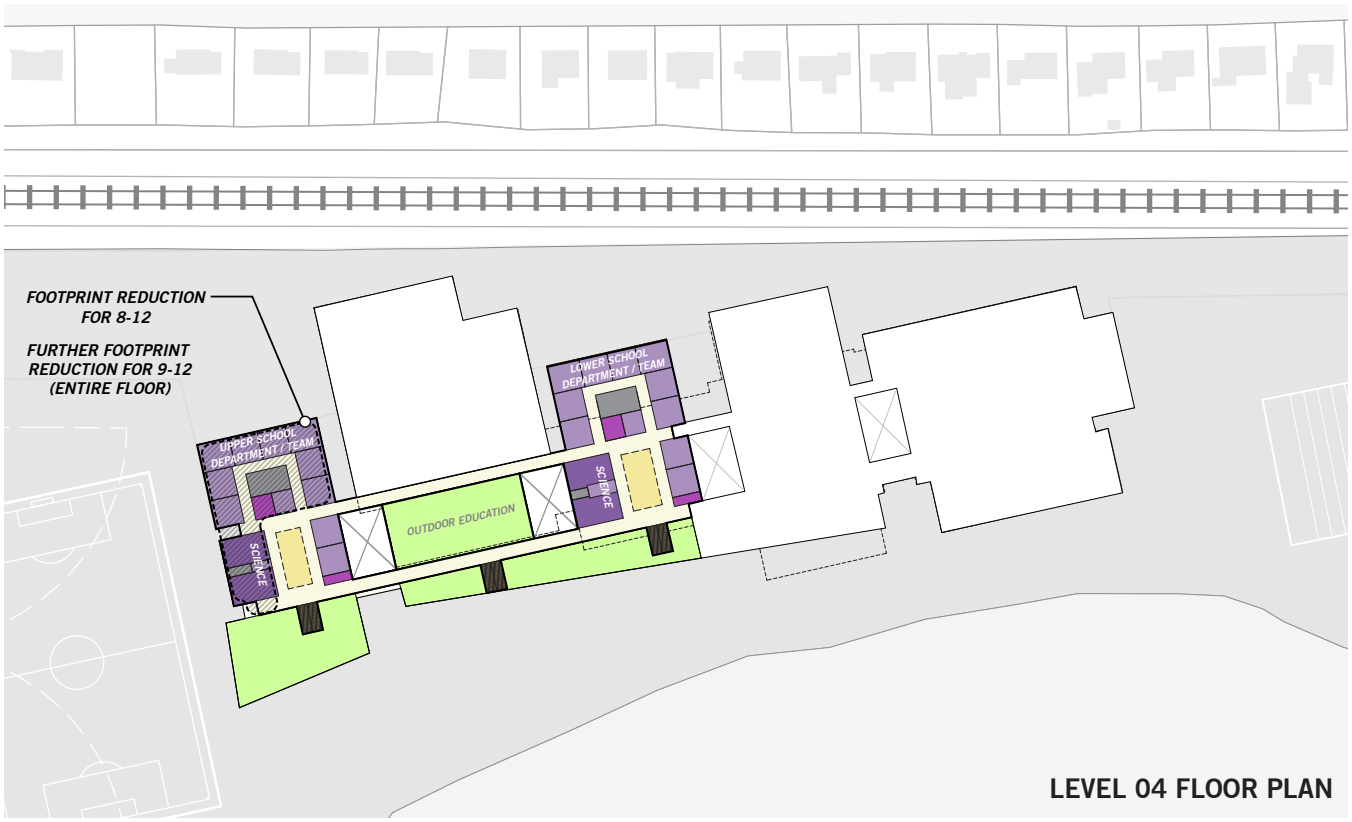
LEVEL 02 FLOOR PLAN

G. RENOVATION AND ADDITIONS

Option 2.1 : Major Renovation-Minor Addition

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Courtyard

LEVEL 03 FLOOR PLAN

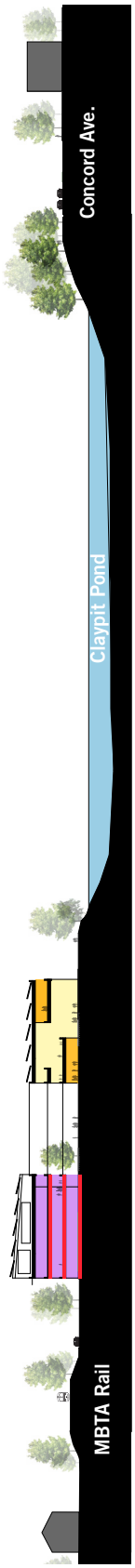


LEVEL 04 FLOOR PLAN

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.1 : Major Renovation-Minor Addition

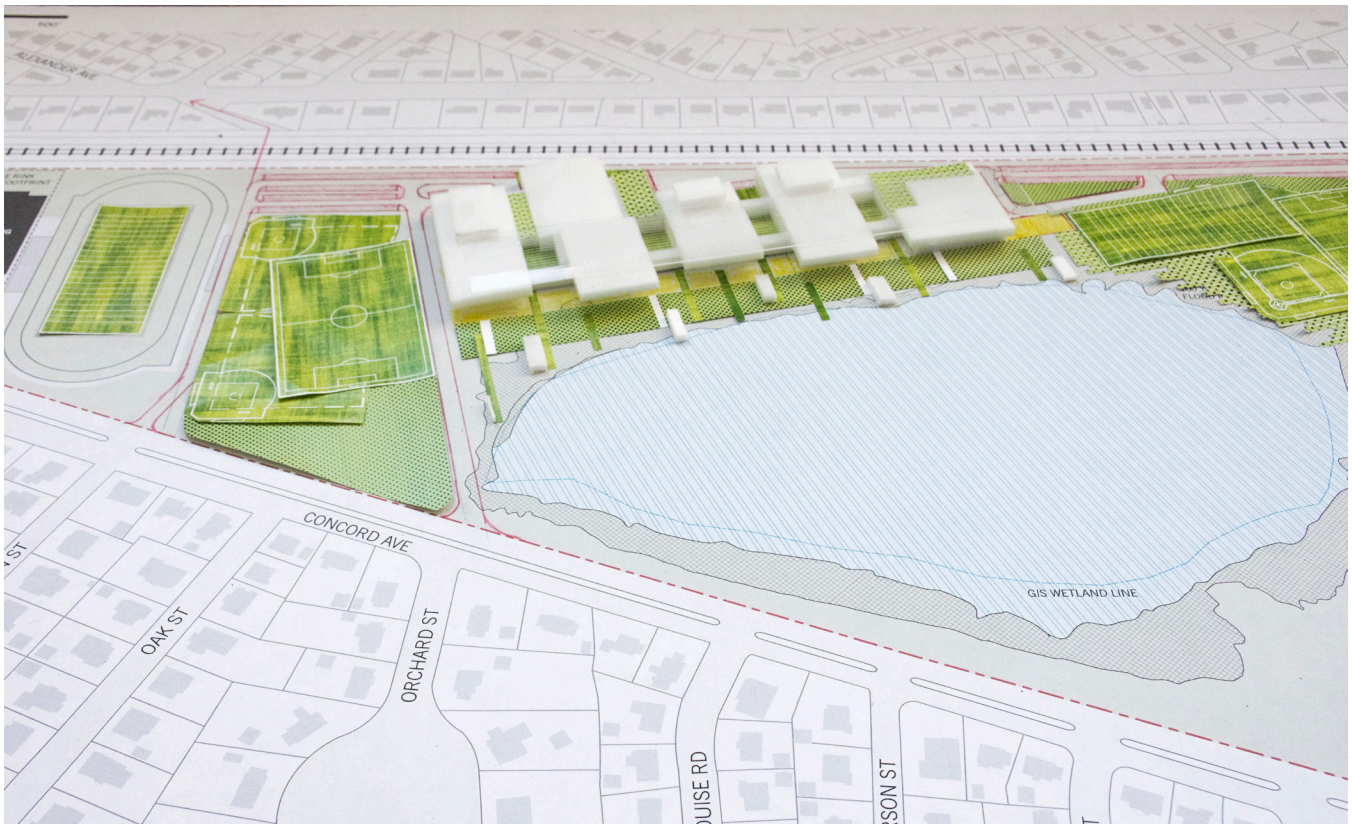


3.1.6 OPTION 2.1 : MAJOR RENOVATION-MINOR ADDITION SITE SECTION

G. RENOVATION AND ADDITIONS

Option 2.1 : Major Renovation-Minor Addition

OPTION 2.1 : MODEL IMAGE



OPTION 2.1 : MODEL IMAGE

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.3 : Minor Renovation-Major Addition

Option 2.3 would be a substantial addition and phased renovation to the existing high school to create a new 9-12, 8-12, or 7-12 high school. This scheme creates a compact building footprint that organizes the majority of the program around a multi-story and tiered commons. In the first phase, a substantial new addition would be constructed at the west side of the existing high school building. The addition would include the entirety of the upper school grade configuration including a new theater, commons space and cafeteria. The upper school students would occupy this new addition and a second phase of construction would take place to demolish the existing high school building. The eastern portion of the existing building structure including caissons, foundations, concrete floor and roof slabs would be demolished in a phased manner allowing for the lower school grade spaces, including a new small gymnasium and support spaces to be constructed east of the existing fieldhouse. The existing fieldhouse, pool, and associated athletic spaces would be renovated and displaced athletic fields would be constructed east of the newly constructed high school. There would be a distinct and separate entrance for both the upper school and for lower school students. All of the upper school classrooms and science labs would be in a separate wing from the lower school classrooms and science labs. Common amenity spaces would be organized in a tiered series of bridges that bring the entire school community together overlooking the site's scenic Claypit Pond area, allowing for outdoor learning and community use.

PROS

- Full Educational and Capacity Compliance
- New efficient HVAC, Plumbing and Electrical systems
- Ability to implement sustainability concepts - water reduction strategies
- Hazardous materials will be abated
- Improvements to vehicular site circulation
- School will meet the building code and ADA requirements
- Maintains the existing fieldhouse and pool/locker areas
- Creates separation between Upper School and Lower School in order to have complete segregation of the two populations in both drop-off / entry (on different sides of the school) and core academic classroom / science lab layouts
- Public amenity spaces are centrally grouped together
- Access to tiered roofs for outdoor education / event space
- Availability of natural light throughout core spaces
- Minimum amount of modular / swing spaces anticipated

CONS

- Construction phasing will result in academic disruption and additional costs
- Phasing will impact athletic field operation
- Phasing will impact site parking and circulation during construction

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PROPOSED BUILDING CONFIGURATION : ESTIMATED CONSTRUCTION DURATION AND PROJECT COST

- **A.2.3** : 9-12 high school for 1,470 students/ 343,494 GSF / Est. Construction Duration: 42 months / **$236,382,116***
- **B.2.3** : 8-12 high school for 1,845 students/ 393,561 GSF / Est. Construction Duration: 42 months / **$264,320,418***
- **C.2.3** : 7-12 high school for 2,215 students/ 451,575 GSF / Est. Construction Duration: 42 months / **$301,240,788***

** Project cost- all costs should be considered preliminary based on Order of Magnitude*

G. RENOVATION AND ADDITIONS

Option 2.3 : Minor Renovation-Major Addition

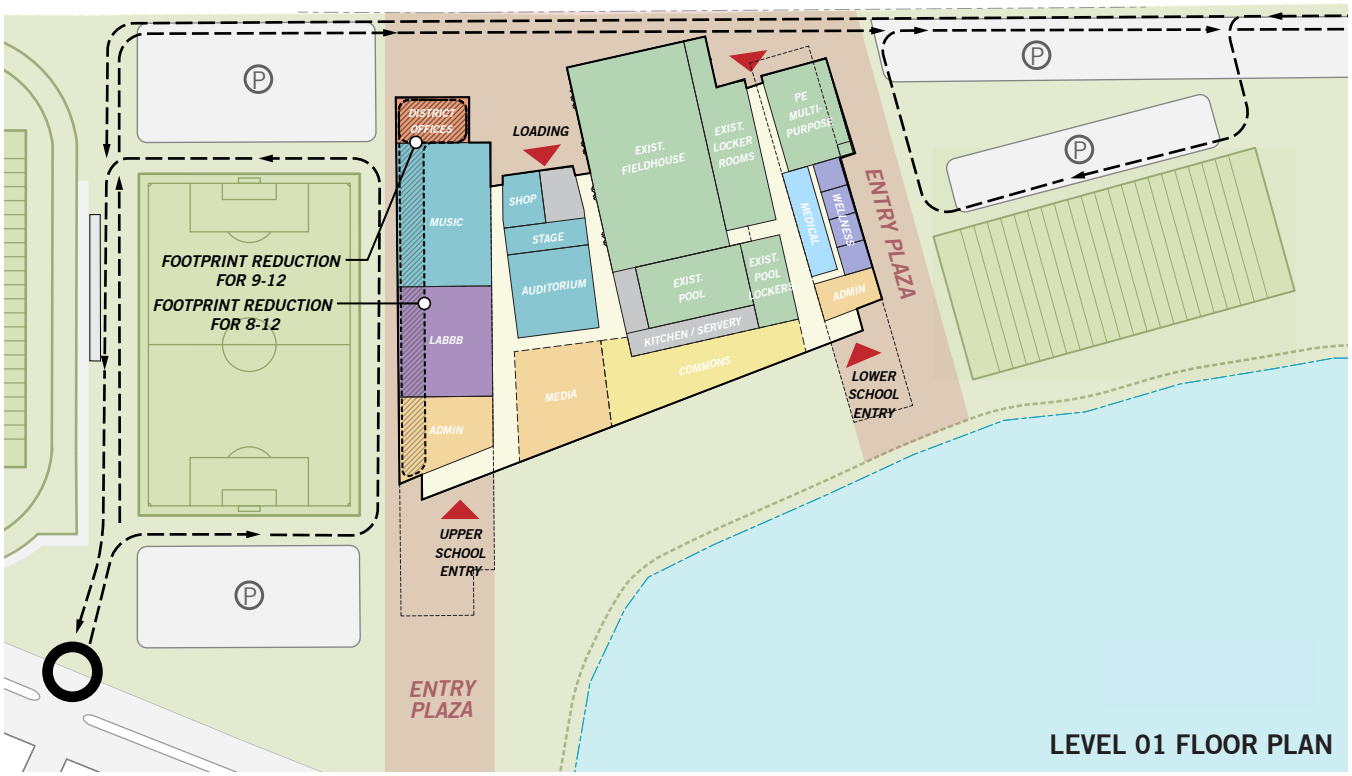
3.1.6 OPTION 2.3 : MINOR RENOVATION-MAJOR ADDITION SITE PLAN

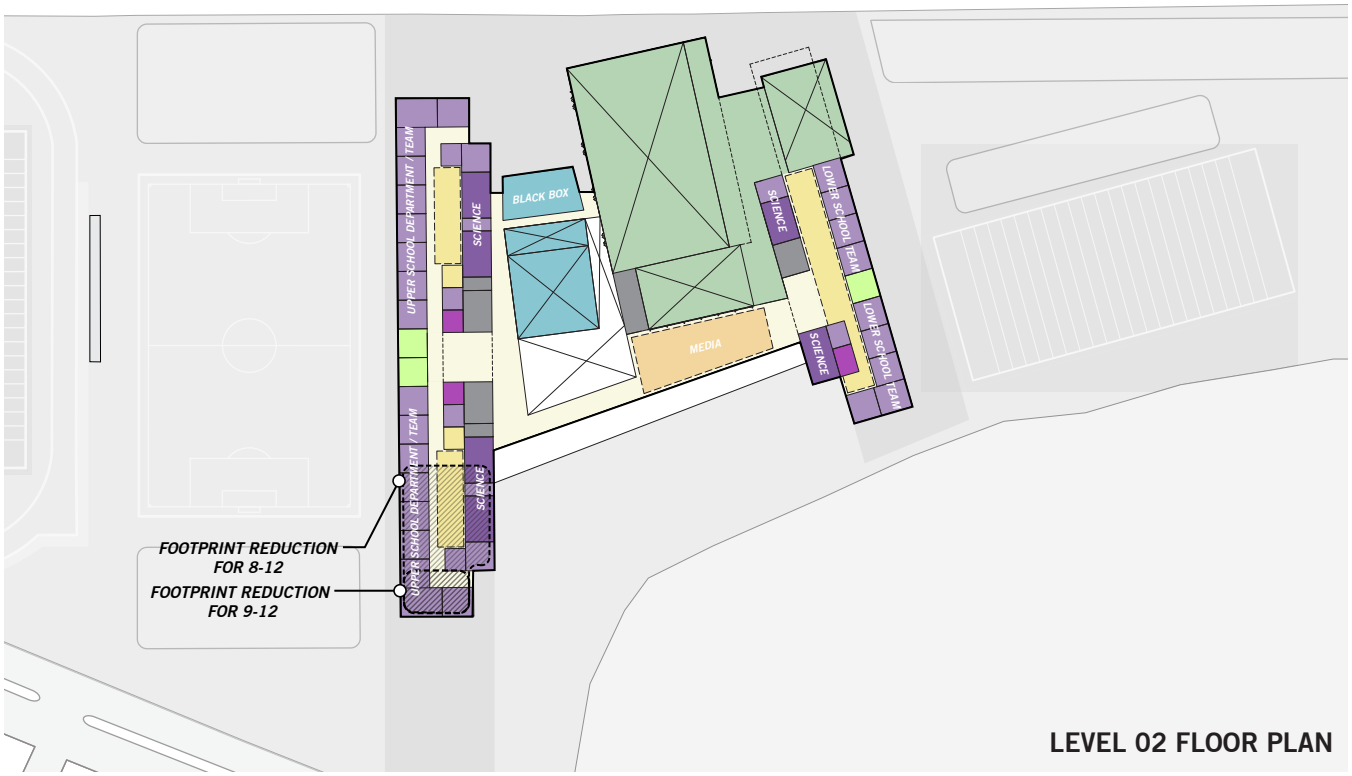
3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.3 : Minor Renovation-Major Addition

0’ 100’ 250’

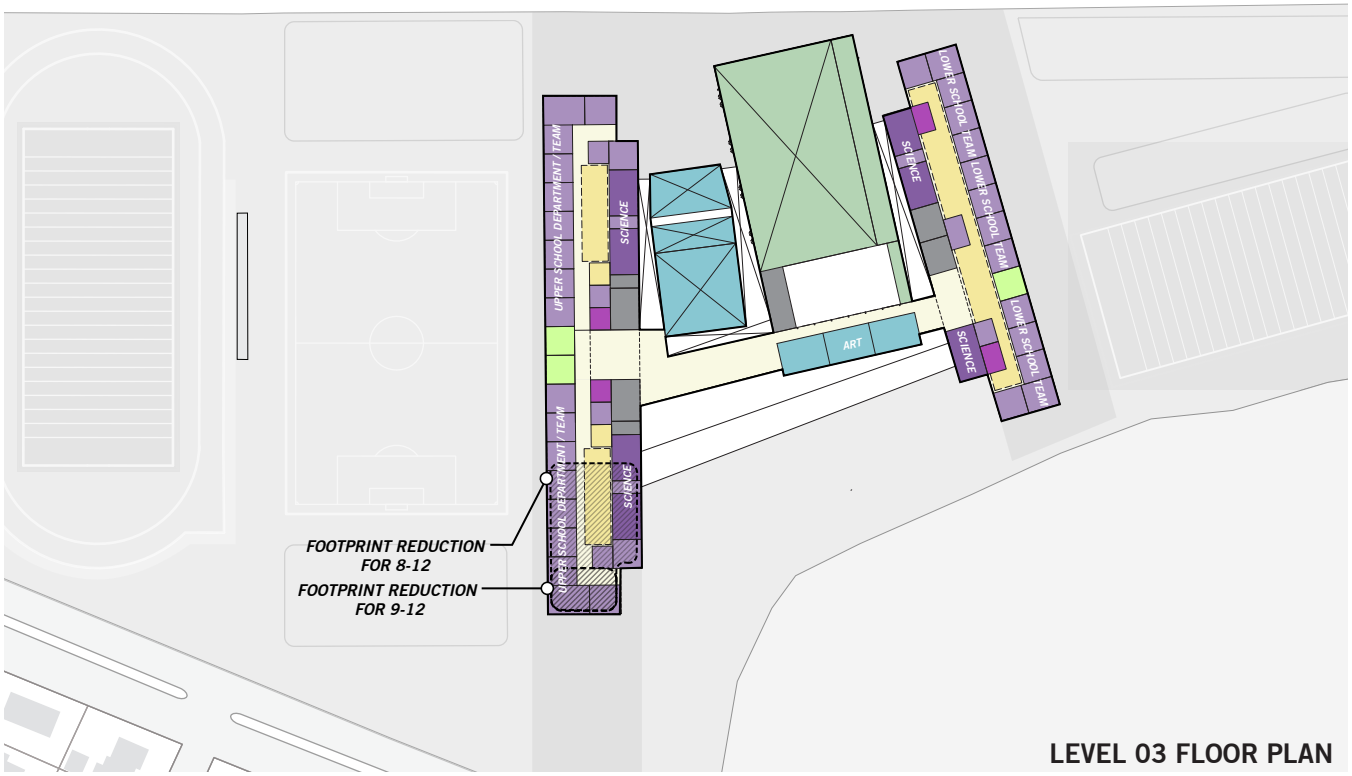




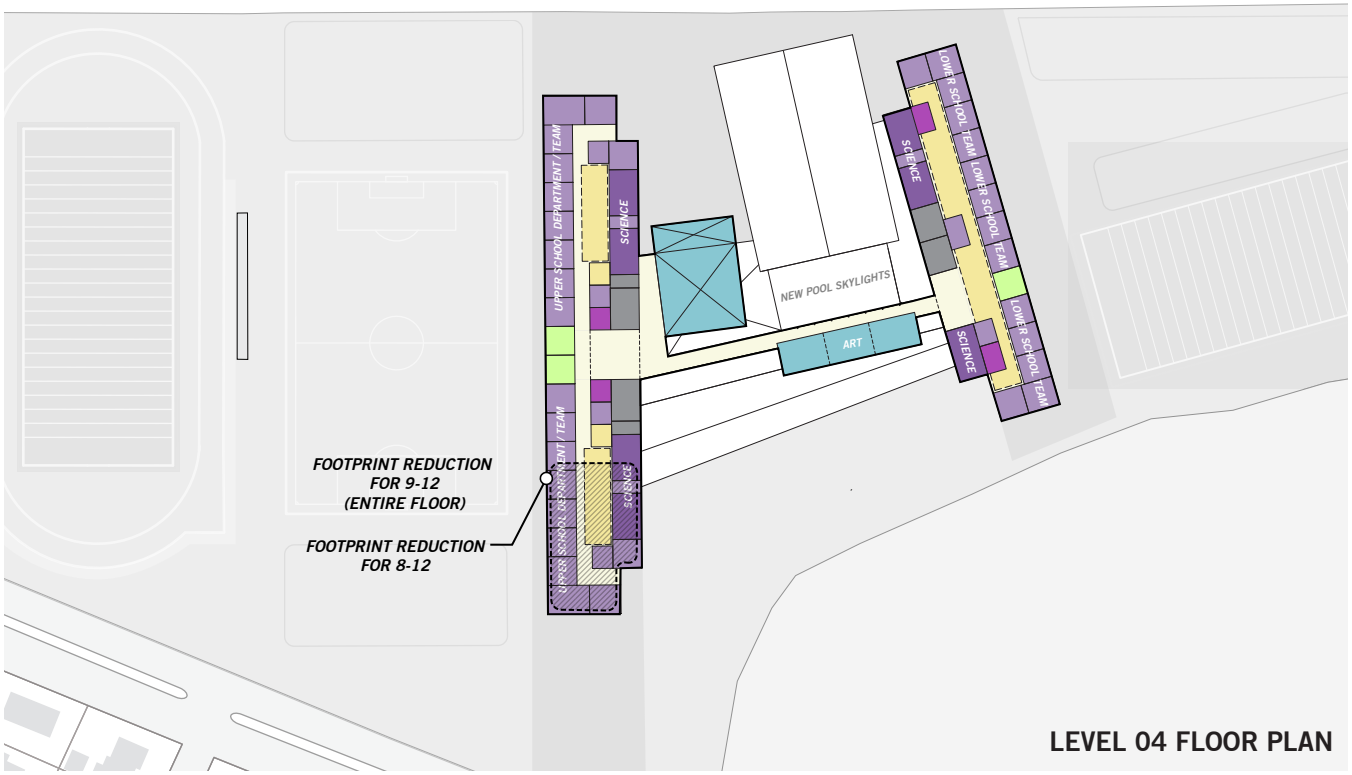
G. RENOVATION AND ADDITIONS

Option 2.3 : Minor Renovation-Major Addition

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Courtyard



LEVEL 03 FLOOR PLAN

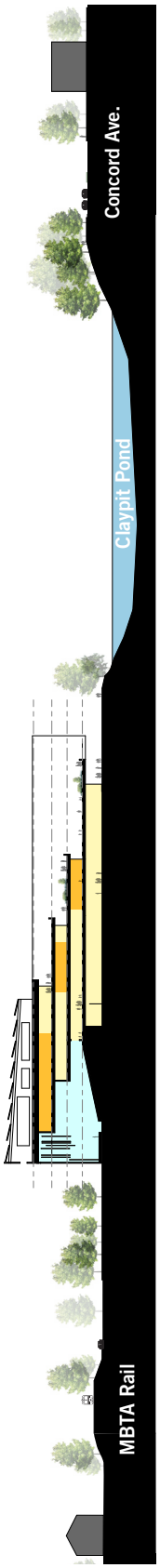


LEVEL 04 FLOOR PLAN

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.3 : Minor Renovation-Major Addition

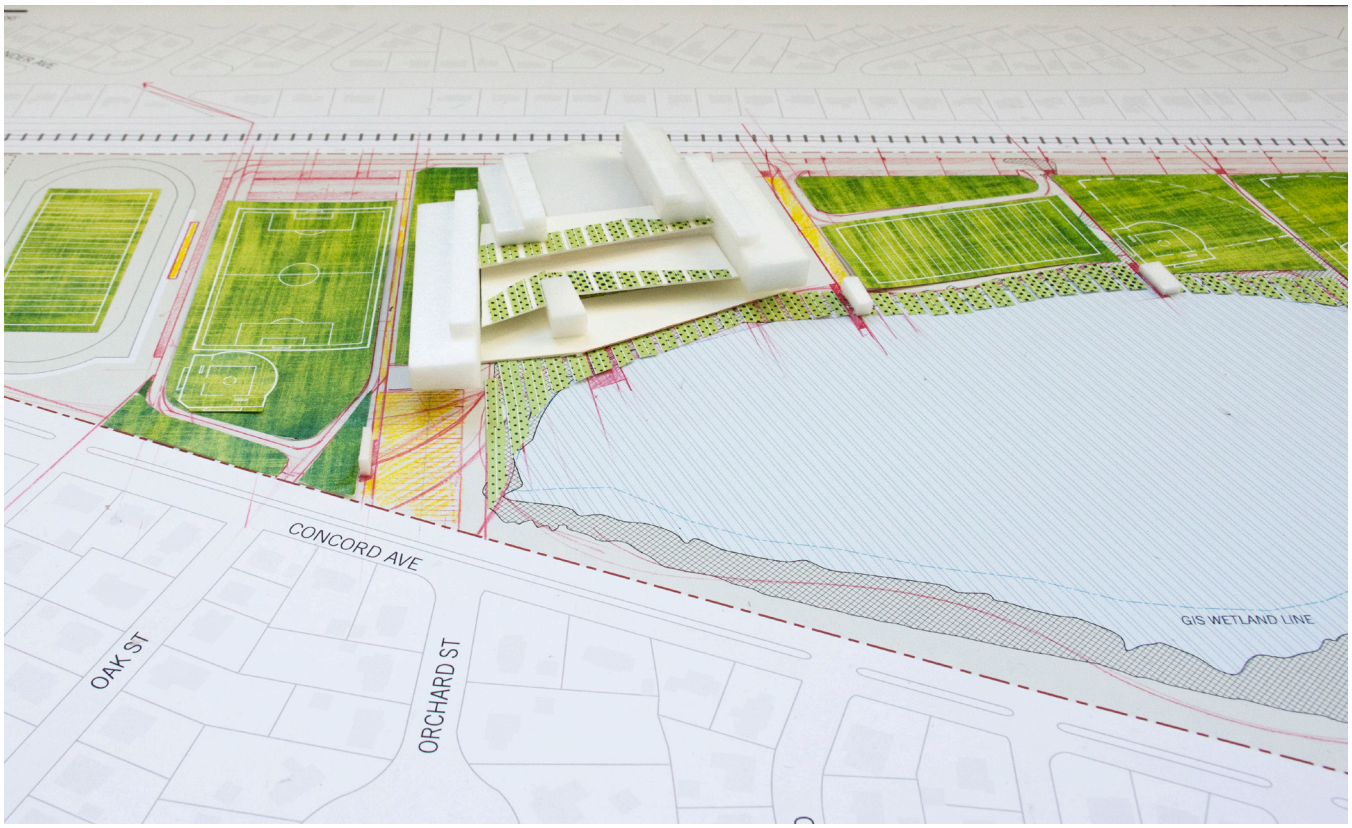


3.1.6 OPTION 2.3 : MINOR RENOVATION-MAJOR ADDITION SITE SECTION

G. RENOVATION AND ADDITIONS

Option 2.3 : Minor Renovation-Major Addition

OPTION 2.3 : MODEL IMAGE



OPTION 2.3 : MODEL IMAGE

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

Option 2.4 : Minor Renovation-Major Addition

Option 2.4 would be a substantial addition and phased renovation to the existing high school, creating a new 9-12, 8-12, or 7-12 high school. This scheme creates an elongated building footprint (in the East-West direction) that organizes the program around a daylit multi-story internal 'street'. In the first phase, a substantial new addition would be constructed at the southwest side of the existing high school building that stretches along the Claypit Pond edge. The addition would include the entirety of the upper school configuration including the media commons and cafeteria. The upper school students would occupy this new addition and a second phase of construction would take place to demolish the existing high school building. The entire existing building structure including caissons, foundations, concrete floor and roof slabs would be demolished in a phased manner allowing for the lower school spaces, including a new small gymnasium and support spaces to be constructed east of the existing fieldhouse. The fieldhouse, pool, and associated athletic spaces would be renovated and all displaced athletic fields would be reconstructed east of the newly constructed high school. There would be separate drop-offs and entries for both lower school students and high school students on opposite sides of the building's internal 'street'. All school classrooms and science labs could be integrated on opposite sides of each floor allowing lab spaces to be centrally located. Common amenity spaces would be organized at the base of the pond's edge to allow for a public expression of spaces that are highly used by the larger community.

PROS

- Full Educational and Capacity Compliance
- New efficient HVAC, Plumbing and Electrical systems
- Ability to implement sustainability concepts - water reduction strategies
- Hazardous materials will be abated
- Improvements to vehicular site circulation
- School will meet the building code and ADA requirments
- Maintains existing fieldhouse and pool/locker areas
- Creates seperation between Upper School and Lower School in order to have complete segregation of the two populations in both drop-off / entry (on different sides of the school) and core academic classroom / science lab layouts
- Public amenity spaces are grouped together on ground floor
- Availability of natural light throughout core spaces
- Minimum amount of modular / swing spaces anticipated

CONS

- Construction phasing will result in academic disruption and additional costs
- Phasing will impact athletic field operation
- Phasing will impact parking and circulation during construction

---

PROPOSED BUILDING CONFIGURATION : ESTIMATED CONSTRUCTION DURATION AND PROJECT COST

- **A.2.4** : 9-12 high school for 1,470 students/ 343,494 GSF / Est. Construction Duration: 42 months / **$230,781,735***
- **B.2.4** : 8-12 high school for 1,845 students/ 393,561 GSF / Est. Construction Duration: 42 months / **$261,093,620***
- **C.2.4** : 7-12 high school for 2,215 students/ 451,575 GSF / Est. Construction Duration: 42 months / **$297,961,090***

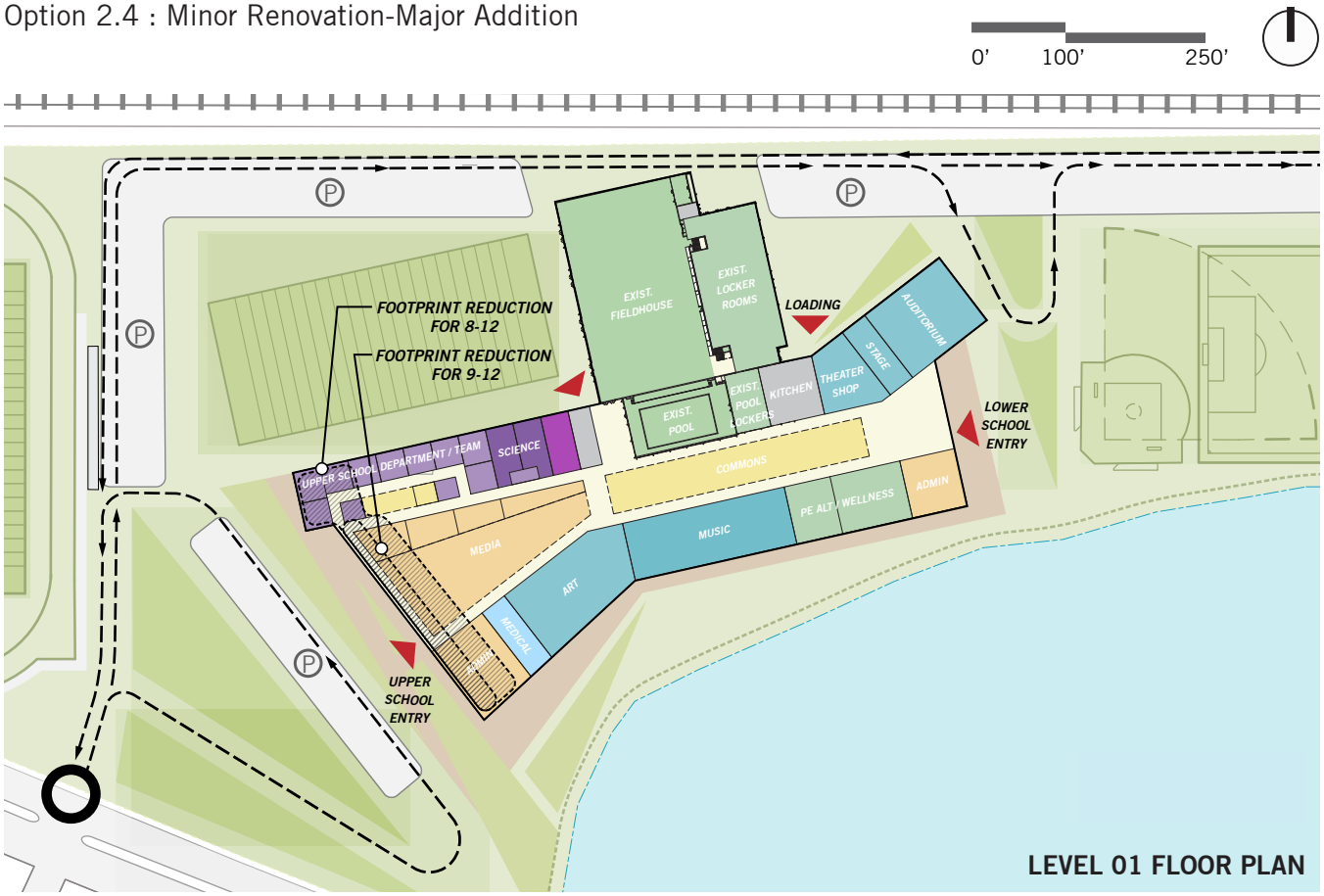
** Project cost- all costs should be considered preliminary based on Order of Magnitude*

3.1.6 OPTION 2.4 : MINOR RENOVATION-MAJOR ADDITION SITE PLAN

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

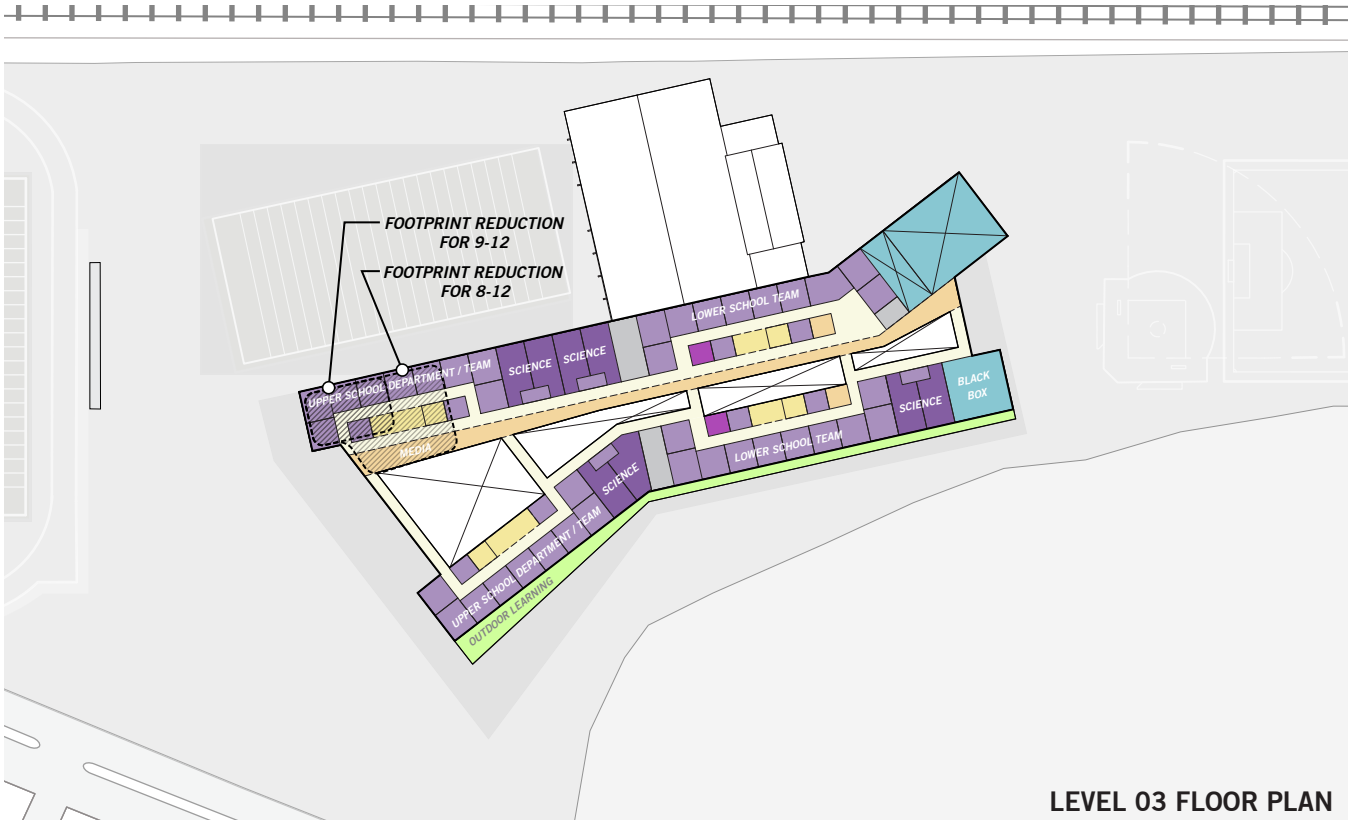
Option 2.4 : Minor Renovation-Major Addition



G. RENOVATION AND ADDITIONS

Option 2.4 : Minor Renovation-Major Addition

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Courtyard



LEVEL 03 FLOOR PLAN

LEVEL 04 FLOOR PLAN

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

G. RENOVATION AND ADDITIONS

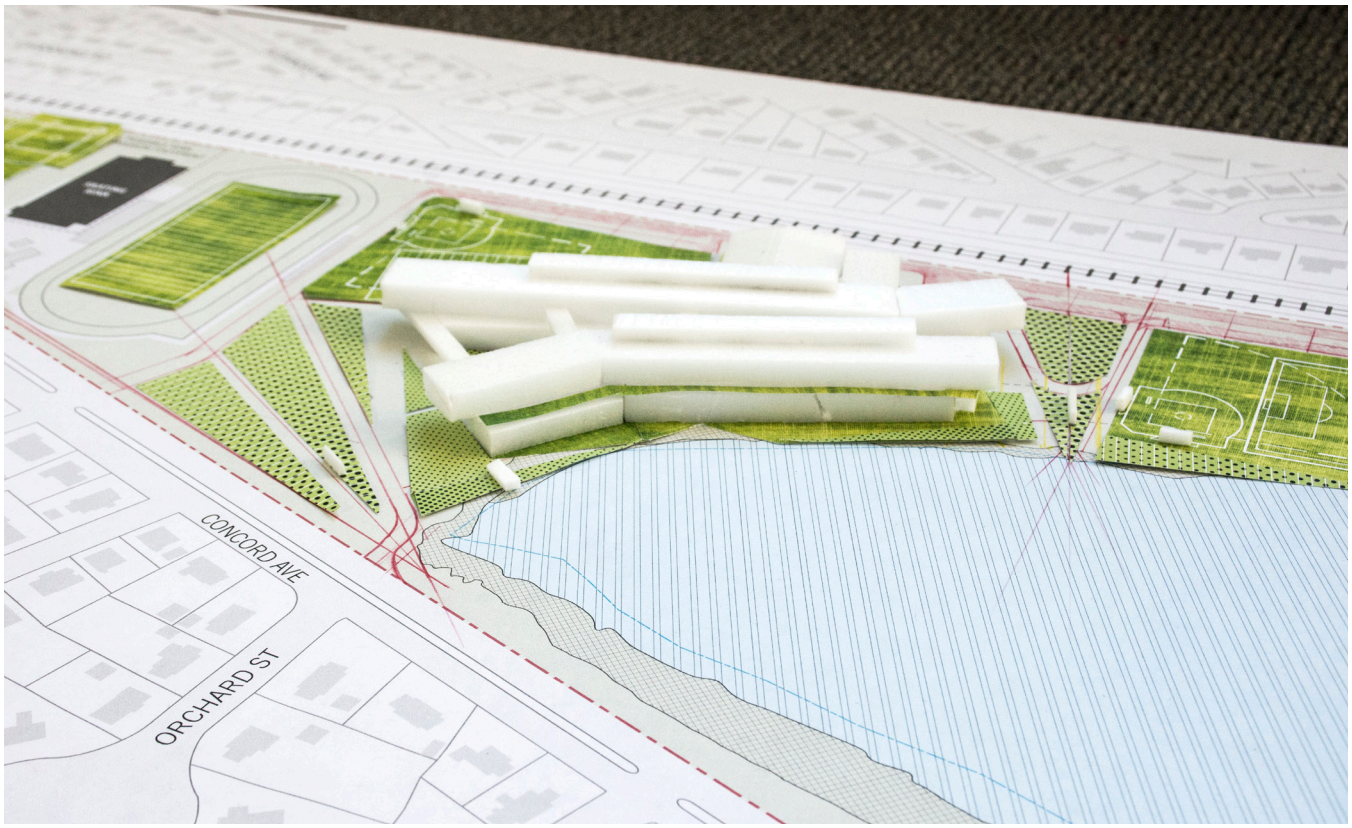
Option 2.4 : Minor Renovation-Major Addition

3.1.6 OPTION 2.4 : MINOR RENOVATION-MAJOR ADDITION SITE SECTION

G. RENOVATION AND ADDITIONS

Option 2.4 : Minor Renovation-Major Addition

OPTION 2.4 : MODEL IMAGE



OPTION 2.4 : MODEL IMAGE

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

H. NEW CONSTRUCTION ON EXISTING SITE

Option 3.1 : New Construction

Option 3.1 proposes a newly constructed 9-12, 8-12, or 7-12 high school. The scheme creates a series of east-west bars organizing the program around view corridors that look toward the existing pond and athletic fields. In the first phase, a completely new facility would be constructed off the southwest edge of the existing high school building that stretches along Claypit Pond. Program for all grade configurations could occupy the new building upon completion, allowing for a complete demolition of the existing building structure including caissons, foundations, concrete floor and roof slabs. The existing fieldhouse and associated pool would be demolished in this option as well.

Separate entrances and drop-offs are possible for lower school and upper school students on opposite sides of the building's centrally-located common amenity spaces. This common space is organized at the base of the building with focus on orientation toward the pond's natural edge. This allows for a visible public expression of spaces used frequently by the community. The science labs are integrated on opposite sides of centrally-located common spaces, with classroom spaces on the building's perimeter. After demolition of the existing school, the athletic fields could be organized to form a highly efficient and flexible green space stretching the entire east-west length of the site.

PROS

- Full Educational and Capacity Compliance
- New efficient HVAC, Plumbing and Electrical systems
- Ability to implement sustainability concepts - water reduction strategies
- No Hazardous Materials
- No swing space / modular classrooms expected to be needed for construction
- Improvements to vehicular site circulation
- School will meet the building code and ADA requirements
- Upper School and Lower School can have entrances on different sides of the school for increased segregation of the two populations
- Single phased construction would result in shorter construction duration and less impact to students
- Compressed and efficient building footprint
- Public amenity spaces are grouped together on ground floor with views toward the pond's natural edge

CONS

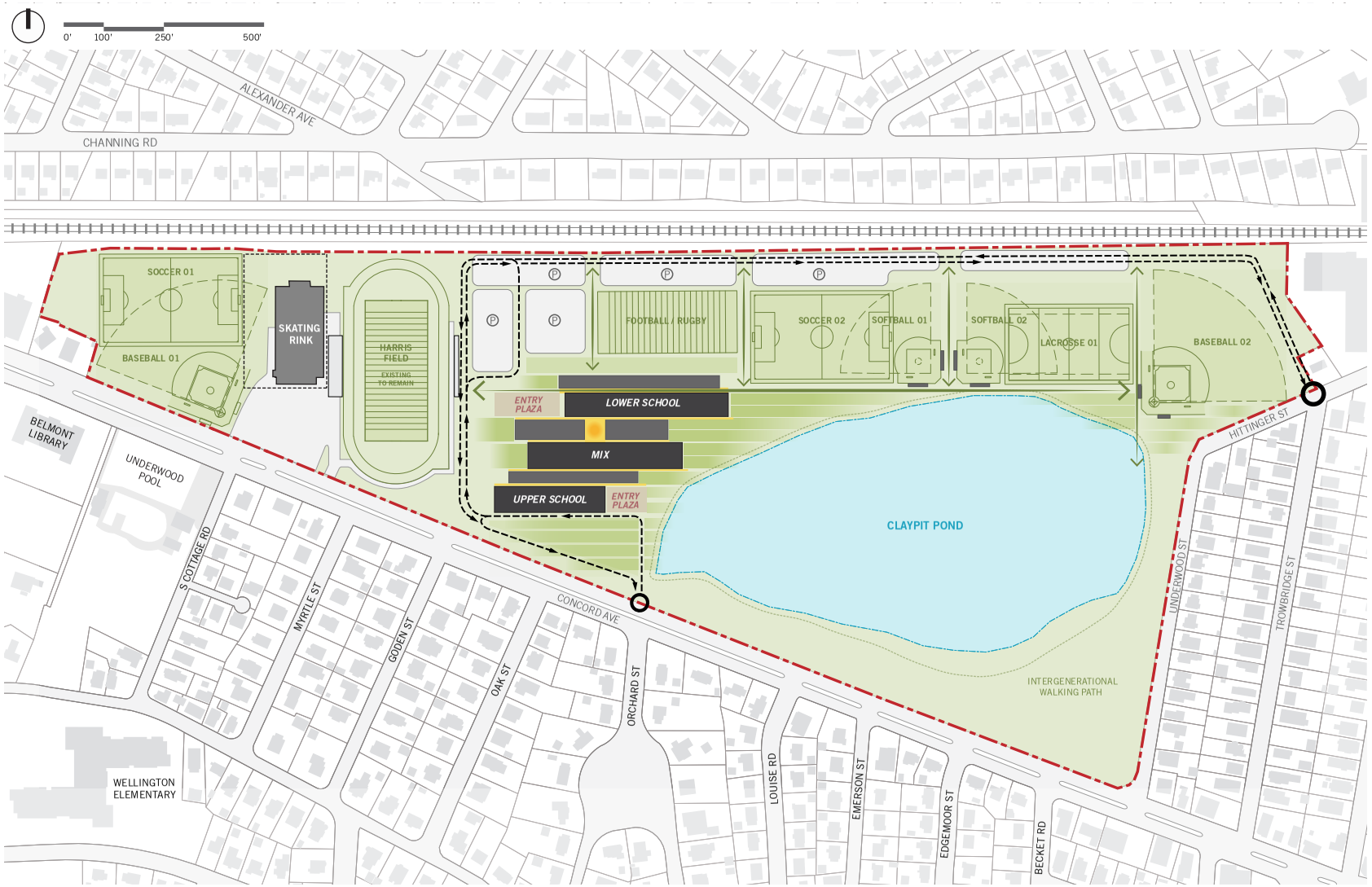
- Demolition of existing fieldhouse and pool requires that the pool be constructed in a future project
- New gymnasium would be smaller than the existing fieldhouse per the MSBA guidelines

PROPOSED BUILDING CONFIGURATION / ESTIMATED CONSTRUCTION DURATION AND PROJECT COST

- **A.3.1** : 9-12 high school for 1,470 students 311,619 GSF / Est. Construction Duration: 36 months / **$221,639,103***
- **B.3.1** : 8-12 high school for 1,845 students 363,186 GSF / Est. Construction Duration: 36 months / **$250,451,516***
- **C.3.1** : 7-12 high school for 2,215 students 422,700 GSF / Est. Construction Duration: 36 months / **$283,570,389***

** Project cost- all costs should be considered preliminary based on Order of Magnitude*

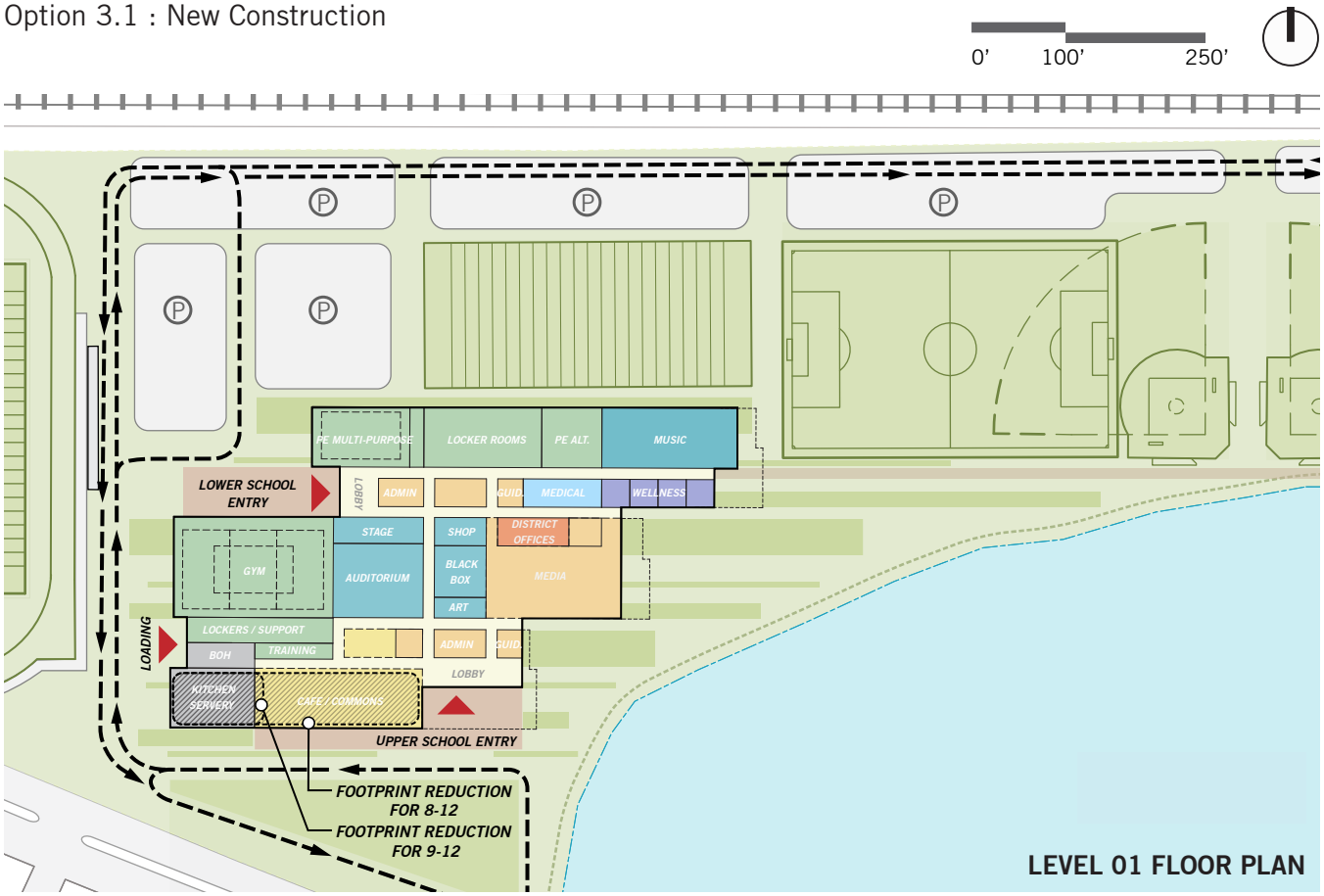
3.1.6 OPTION 3.1 : NEW CONSTRUCTION SITE PLAN

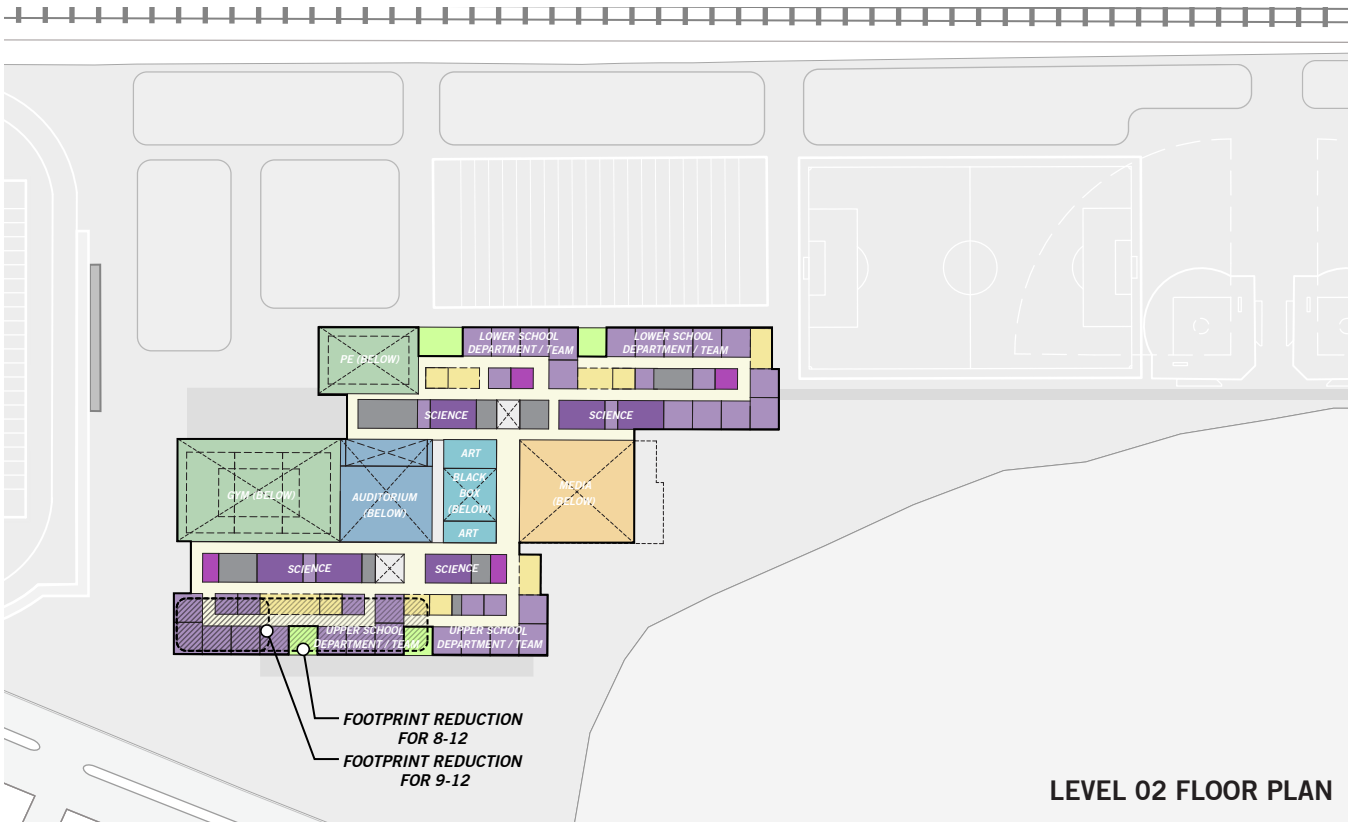


3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

H. NEW CONSTRUCTION ON EXISTING SITE

Option 3.1 : New Construction



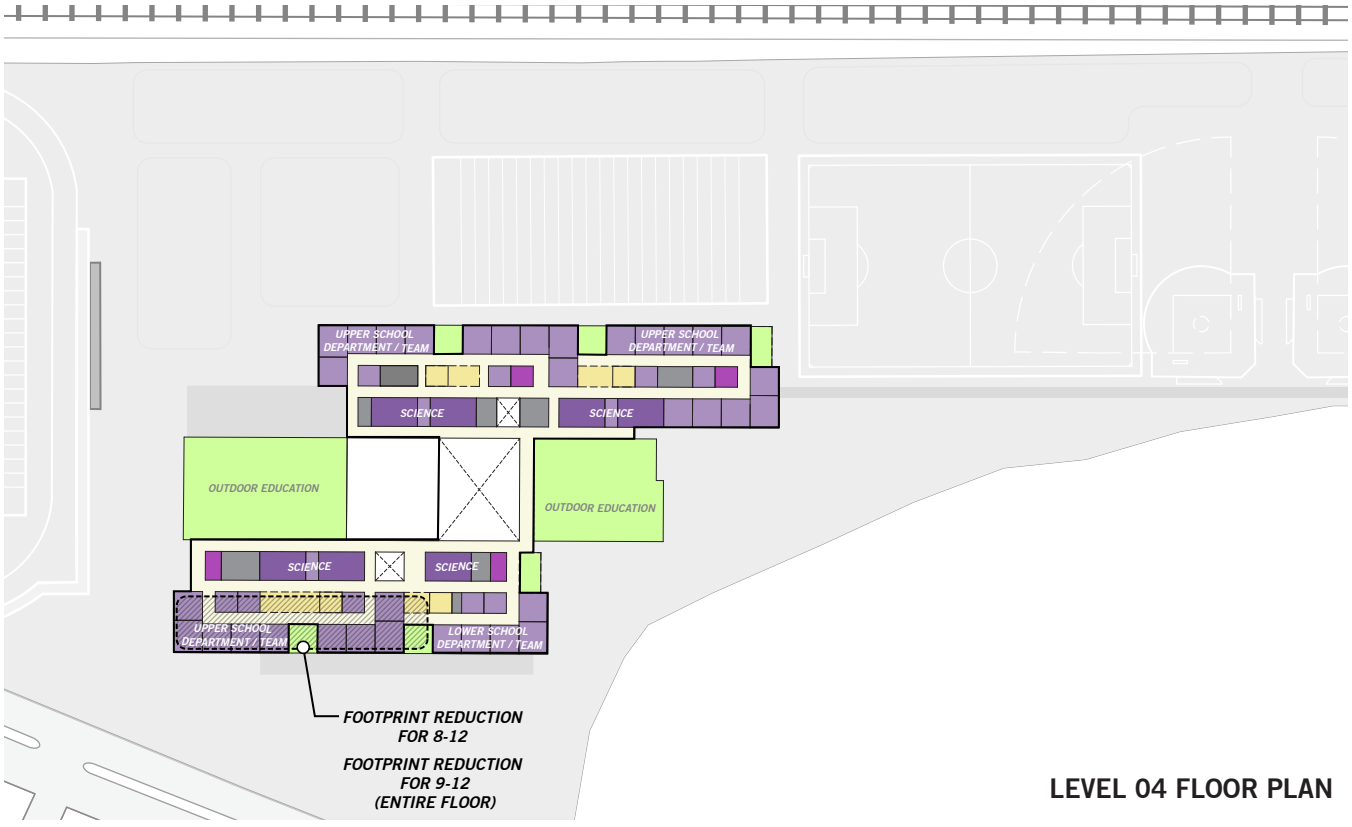


H. NEW CONSTRUCTION ON EXISTING SITE

Option 3.1 : New Construction

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Courtyard

LEVEL 03 FLOOR PLAN



LEVEL 04 FLOOR PLAN

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

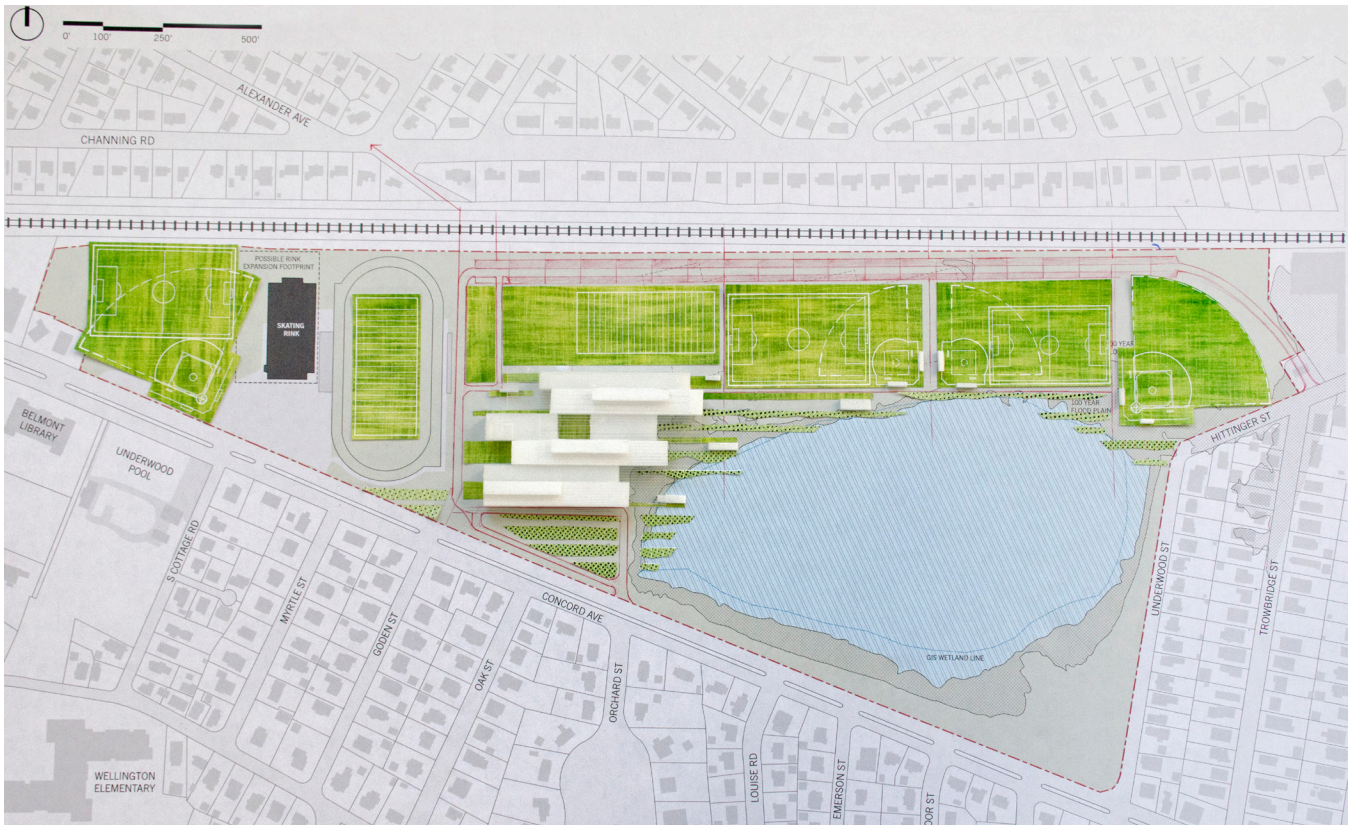
H. NEW CONSTRUCTION ON EXISTING SITE

Option 3.1 : New Construction

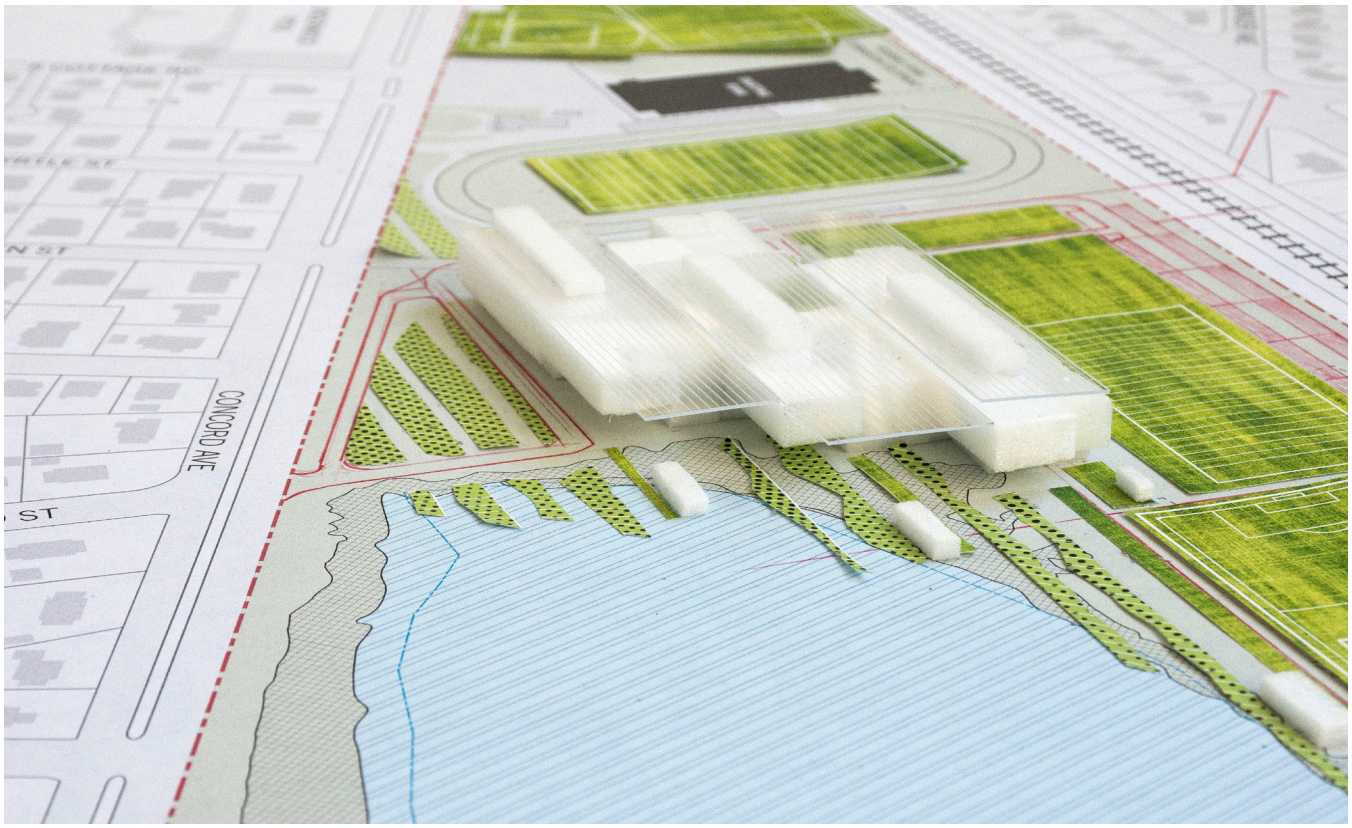
3.1.6 OPTION 3.1 : NEW CONSTRUCTION SITE SECTION

H. NEW CONSTRUCTION ON EXISTING SITE

Option 3.1 : New Construction



OPTION 3.1 : MODEL IMAGE

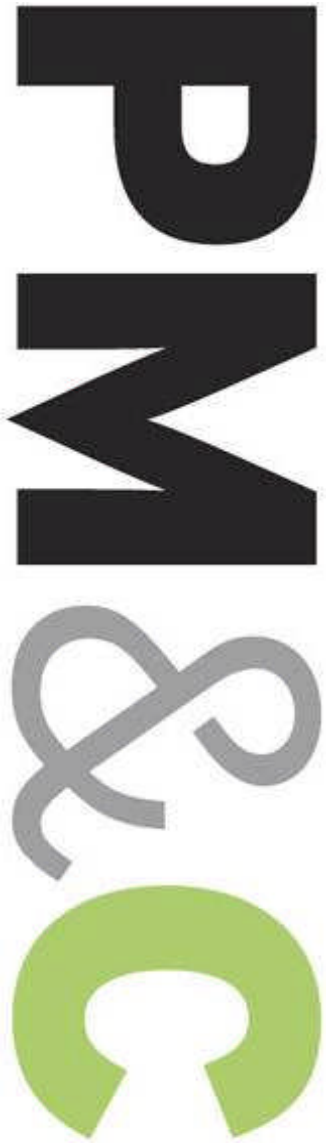


OPTION 3.1 : MODEL IMAGE

CONCEPT COST SUMMARY

DAEDALUS PROJECTS INC.
8-Dec-17

		Scheme A		Scheme B		Scheme C	
	Grade Configuration	9-12		8-12		7-12	
	Enrollment	1,470		1,845		2,215	
	existing SF	257,120		257,120		257,120	
	proposed SF Add/Reno	343,494		393,561		451,575	
	proposed SF New	311,619		363,186		422,700	
		Construction Cost	Project Cost	Construction Cost	Project Cost	Construction Cost	Project Cost
1	Renovation of existing only	$89,192,523	$112,740,654	N/A	N/A	N/A	N/A
	Per Sq Ft.	*$346.89*	*$438.47*				
2.1	Major Renovation/Minor Addition Maintains existing Fieldhouse/Pool & Auditorium	$177,169,735	$223,962,169	$192,901,307	$243,626,634	$225,611,855	$284,514,819
	Per Sq Ft.	*$515.79*	*$652.01*	*$490.14*	*$619.03*	*$499.61*	*$630.05*
2.3	Minor Renovation/Major Addition Maintains existing Fieldhouse/Pool	$187,105,693	$236,382,116	$209,456,334	$264,320,418	$238,992,630	$301,240,788
	Per Sq Ft.	*$544.71*	*$688.17*	*$532.21*	*$671.61*	*$529.24*	*$667.09*
2.4	Minor Renovation/Major Addition Maintains existing Fieldhouse/Pool	$182,625,389	$230,781,736	$206,874,896	$261,093,620	$236,368,872	$297,961,090
	Per Sq Ft.	*$531.67*	*$671.87*	*$525.65*	*$663.41*	*$523.43*	*$659.83*
3.1	New Construction West Side of BHS Demo BHS, New Gym & Auditorium. No Pool	$176,311,282	$221,639,103	$199,361,213	$250,451,516	$225,856,311	$283,570,389
	Per Sq Ft.	*$565.79*	*$711.25*	*$548.92*	*$689.60*	*$534.32*	*$670.85*



Conceptual Design Submission

Belmont High School
Design Pricing Matrix

Belmont, MA

PM&C LLC
20 Downer Avenue, Suite 1c
Hingham, MA 02043
(T) 781-740-8007
(F) 781-740-1012

Prepared for:

Perkins + Will

December 8, 2017

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Belmont, MA

December 8, 2017

Summary of Preliminary Design Pricing

Option (Description)	Total Gross Square Feet	Square Feet of Renovated Space (cost/sf)	Square Feet of New Construction (cost/sf)	Site, Building Takedown, Haz Mat. Cost	Estimated Total Construction (cost/sf)
Renovation Only Options					
Option A.1 Renovation only; Grades 9th thru 12th	257,120 GSF	257,120 $74,463,704 $289.61		$14,728,819	$89,192,523 $346.89 $/sf
Renovation and Addition Options; Grades 9-12					
Option A2.1 Major Renovation + Minor Addition; Grades 9th thru 12th	343,494 GSF	226,120 $86,803,340 $383.88	117,374 $55,802,273 $475.42	$34,564,122	$177,169,735 $515.79 $/sf
Option A2.3 Minor Renovation + Major Addition; Grades 9th thru 12th	343,494 GSF	39,600 $13,068,713 $330.02	303,894 $136,272,907 $448.42	$37,764,073	$187,105,693 $544.71 $/sf
Option A2.4 Minor Renovation + Major Addition; Grades 9th thru 12th	343,494 GSF	70,160 $24,557,762 $350.03	273,334 $122,679,419 $448.83	$35,388,208	$182,625,389 $531.67 $/sf
Renovation and Addition Options; Grades 8-12					
Option B2.1 Major Renovation + Minor Addition; Grades 8th thru 12th	393,561 GSF	226,120 $81,572,270 $360.75	167,441 $75,384,136 $450.21	$35,944,901	$192,901,307 $490.14 $/sf
Option B2.3 Minor Renovation + Major Addition; Grades 8th thru 12th	393,561 GSF	39,600 $13,017,802 $328.73	353,961 $158,105,747 $446.68	$38,332,785	$209,456,334 $532.21 $/sf
Option B2.4 Minor Renovation + Major Addition; Grades 8th thru 12th	393,561 GSF	70,160 24,450,049 $348.49	323,401 144,514,148 $446.86	$37,910,699	$206,874,896 $525.65 $/sf

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Belmont, MA

December 8, 2017

Summary of Preliminary Design Pricing

Option (Description)	Total Gross Square Feet	Square Feet of Renovated Space (cost/sf)	Square Feet of New Construction (cost/sf)	Site, Building Takedown, Haz Mat. Cost	Estimated Total Construction (cost/sf)
Renovation and Addition Options; Grades 7-12					
Option C2.1 Major Renovation + Minor Addition; Grades 7th thru 12th	451,575 GSF	226,120 $83,751,471 $370.39	225,455 $104,214,446 $462.24	$37,645,938	$225,611,855 $499.61 $/sf
Option C2.3 Minor Renovation + Major Addition; Grades 7th thru 12th	451,575 GSF	39,600 $13,178,097 $332.78	411,975 $186,285,098 $452.18	$39,529,435	$238,992,630 $529.24 $/sf
Option C2.4 Minor Renovation + Major Addition; Grades 7th thru 12th	451,575 GSF	70,160 $24,748,862 $352.75	381,415 $172,521,121 $452.32	$39,098,889	$236,368,872 $523.43 $/sf
New School Options					
Option A3.1 New Construction West Side of BHS; Grades 9th thru 12th	311,619 GSF		311,619 $139,514,830 $447.71	$36,796,452	$176,311,282 $565.79 $/sf
Option B3.1 New Construction West Side of BHS; Grades 8th thru 12th	363,186 GSF		363,186 $161,988,735 $446.02	$37,372,478	$199,361,213 $548.92 $/sf
Option C3.1 New Construction West Side of BHS; Grades 7th thru 12th	422,700 GSF		422,700 $187,897,491 $444.52	$37,958,820	$225,856,311 $534.32 $/sf

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Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
1 RENOVATION ONLY OPTIONS					
A.1 (Grades 9-12), B.1 (grades 8-12) and C.1 (grades 7-12) - Renovation Only Option Does Not Satisfy Program					
RENOVATE EXISTING HIGH SCHOOL			257,120	$184.94	$47,552,567
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
SITEWORK - Allowance					$2,305,833
SUB-TOTAL			257,120	$221.52	$56,958,400
DESIGN AND PRICING CONTINGENCY	15%				$8,543,760
ESCALATION to Mid-Point	12%				$6,835,008
SUB-TOTAL					$72,337,168
GENERAL CONDITIONS [2]		24	MTHS	$150,000	$3,600,000
GENERAL REQUIREMENTS [2]	4%				$2,893,487
BONDS	0.75%				$542,529
INSURANCE	1.10%				$795,709
PERMIT					NIC
SUB-TOTAL					$80,168,893
OVERHEAD AND FEE	2.50%				$1,808,429
GMP CONTINGENCY	3%				$2,405,067
PHASING	6%				$4,810,134
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTIONS A.1, B.1 + C.1			257,120	$346.89	**$89,192,523**

Executive Summary Page 4 PMC - Project Management Cost

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

2 RENOVATION and ADDITION OPTIONS

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION A2.1 - Grades 9-12 (Major Renovation + Minor Addition)					
RENOVATE EXISTING HIGH SCHOOL			226,120	$260.00	$58,791,200
NEW ADDITION TO HIGH SCHOOL			117,374	$290.00	$34,038,460
PREMIUM FOR PILE FOUNDATIONS			117,374	$30.00	$3,521,220
PREMIUM FOR ACOUSTIC WINDOWS			117,374	$2.00	$234,748
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			31,000	$10.00	$310,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
SITEWORK- ALLOWANCE (Harris field remains)					$14,000,000
SUB-TOTAL			343,494	$349.34	$119,995,628
DESIGN AND PRICING CONTINGENCY	10%				$11,999,563
ESCALATION to Mid-Point	12%				$14,399,475
SUB-TOTAL					$146,394,666
GENERAL CONDITIONS [2]		48	MTHS	$150,000	$7,200,000
GENERAL REQUIREMENTS [2]	4%				$5,855,787
BONDS	0.75%				$1,097,960
INSURANCE	1.10%				$1,610,341
PERMIT					NIC
SUB-TOTAL					$162,158,754
OVERHEAD AND FEE	2.50%				$3,659,867
GMP CONTINGENCY	2%				$3,243,175
PHASING	5%				$8,107,938
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION A2.1			343,494	$515.79	**$177,169,734**

Executive Summary

Page 5

PMC - Project Management Cost

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION A2.3 - Grades 9-12 (Minor Renovation + Major Addition)					
RENOVATE EXISTING FIELD HOUSE			31,781	$200.00	$6,356,200
RENOVATE EXISTING POOL			7,819	$350.00	$2,736,650
NEW ADDITION TO HIGH SCHOOL			303,894	$290.00	$88,129,260
PREMIUM FOR PILE FOUNDATIONS			303,894	$20.00	$6,077,880
PREMIUM FOR ACOUSTIC WINDOWS			303,894	$2.00	$607,788
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			217,520	$10.00	$2,175,200
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,000,000
SUB-TOTAL			343,494	$379.00	$130,182,978
DESIGN AND PRICING CONTINGENCY	10%				$13,018,298
ESCALATION to Mid-Point	12%				$15,621,957
SUB-TOTAL					$158,823,233
GENERAL CONDITIONS [2]		42	MTHS	$150,000	$6,300,000
GENERAL REQUIREMENTS [2]	4%				$6,352,929
BONDS	0.75%				$1,191,174
INSURANCE	1.10%				$1,747,056
PERMIT					NIC
SUB-TOTAL					$174,414,392
OVERHEAD AND FEE	2.50%				$3,970,581
GMP CONTINGENCY	2%				$3,488,288
PHASING	3%				$5,232,432
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION A2.3			343,494	$544.71	**$187,105,693**

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION A2.4 - Grades 9-12 (Minor Renovation + Major Addition)					
RENOVATE EXISTING FIELD HOUSE			31,781	$200.00	$6,356,200
RENOVATE EXISTING POOL			7,819	$350.00	$2,736,650
RENOVATE EXISTING LOCKER ROOMS at GYM			18,196	$280.00	$5,094,880
RENOVATE EXISTING LOCKER ROOMS at POOL			2,724	$280.00	$762,720
RENOVATE EXISTING SMALL GYM			9,640	$220.00	$2,120,800
NEW ADDITION TO HIGH SCHOOL			273,334	$290.00	$79,266,860
PREMIUM FOR PILE FOUNDATIONS			273,334	$20.00	$5,466,680
PREMIUM FOR ACOUSTIC WINDOWS			273,334	$2.00	$546,668
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			50,000	$10.00	$500,000
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,000,000
SUB-TOTAL			343,494	$369.59	$126,951,458
DESIGN AND PRICING CONTINGENCY	10%				$12,695,146
ESCALATION to Mid-Point	12%				$15,234,175
SUB-TOTAL					$154,880,779
GENERAL CONDITIONS [2]		42	MTHS	$150,000	$6,300,000
GENERAL REQUIREMENTS [2]	4%				$6,195,231
BONDS	0.75%				$1,161,606
INSURANCE	1.10%				$1,703,689
PERMIT					NIC
SUB-TOTAL					$170,241,305
OVERHEAD AND FEE	2.50%				$3,872,019
GMP CONTINGENCY	2%				$3,404,826
PHASING	3%				$5,107,239
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION A2.4			343,494	$531.67	**$182,625,389**

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION B2.1 - Grades 8-12 (Major Renovation + Minor Addition)					
RENOVATE EXISTING HIGH SCHOOL			226,120	$250.00	$56,530,000
NEW ADDITION TO HIGH SCHOOL			167,441	$290.00	$48,557,890
PREMIUM FOR PILE FOUNDATIONS			167,441	$20.00	$3,348,820
PREMIUM FOR ACOUSTIC WINDOWS			167,441	$2.00	$334,882
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			31,000	$10.00	$310,000
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,500,000
SUB-TOTAL			393,561	$339.67	$133,681,592
DESIGN AND PRICING CONTINGENCY	10%				$13,368,159
ESCALATION to Mid-Point	12%				$16,041,791
SUB-TOTAL					$163,091,542
GENERAL CONDITIONS [2]		48	MTHS	$150,000	$7,200,000
GENERAL REQUIREMENTS [2]	4%				$6,523,662
BONDS	0.75%				$1,223,187
INSURANCE	1.10%				$1,794,007
PERMIT					NIC
SUB-TOTAL					$179,832,398
OVERHEAD AND FEE	2.50%				$4,077,289
GMP CONTINGENCY	2%				$3,596,648
PHASING	3%				$5,394,972
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION B2.1			393,561	$490.14	**$192,901,307**

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION B2.3 - Grades 8-12 (Minor Renovation + Major Addition)					
RENOVATE EXISTING FIELD HOUSE			31,781	$200.00	$6,356,200
RENOVATE EXISTING POOL			7,819	$350.00	$2,736,650
NEW ADDITION TO HIGH SCHOOL			353,961	$290.00	$102,648,690
PREMIUM FOR PILE FOUNDATIONS			353,961	$20.00	$7,079,220
PREMIUM FOR ACOUSTIC WINDOWS			353,961	$2.00	$707,922
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			217,520	$10.00	$2,175,200
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,500,000
SUB-TOTAL			393,561	$371.74	$146,303,882
DESIGN AND PRICING CONTINGENCY	10%				$14,630,388
ESCALATION to Mid-Point	12%				$17,556,466
SUB-TOTAL					$178,490,736
GENERAL CONDITIONS [2]		42	MTHS	$150,000	$6,300,000
GENERAL REQUIREMENTS [2]	4%				$7,139,629
BONDS	0.75%				$1,338,681
INSURANCE	1.10%				$1,963,398
PERMIT					NIC
SUB-TOTAL					$195,232,444
OVERHEAD AND FEE	2.50%				$4,462,268
GMP CONTINGENCY	2%				$3,904,649
PHASING	3%				$5,856,973
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION B2.3			393,561	$532.21	**$209,456,334**

PMC - Project Management Cost

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION B2.4 - Grades 8-12 (Minor Renovation + Major Addition)					
RENOVATE EXISTING FIELD HOUSE			31,781	$200.00	$6,356,200
RENOVATE EXISTING POOL			7,819	$350.00	$2,736,650
RENOVATE EXISTING LOCKER ROOMS at GYM			18,196	$280.00	$5,094,880
RENOVATE EXISTING LOCKER ROOMS at POOL			2,724	$280.00	$762,720
RENOVATE EXISTING SMALL GYM			9,640	$220.00	$2,120,800
NEW ADDITION TO HIGH SCHOOL			323,401	$290.00	$93,786,290
PREMIUM FOR PILE FOUNDATIONS			323,401	$20.00	$6,468,020
PREMIUM FOR ACOUSTIC WINDOWS			323,401	$2.00	$646,802
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			186,960	$10.00	$1,869,600
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,500,000
SUB-TOTAL			393,561	$367.01	$144,441,962
DESIGN AND PRICING CONTINGENCY	10%				$14,444,196
ESCALATION to Mid-Point	12%				$17,333,035
SUB-TOTAL					$176,219,193
GENERAL CONDITIONS [2]		42	MTHS	$150,000	$6,300,000
GENERAL REQUIREMENTS [2]	4%				$7,048,768
BONDS	0.75%				$1,321,644
INSURANCE	1.10%				$1,938,411
PERMIT					NIC
SUB-TOTAL					$192,828,016
OVERHEAD AND FEE	2.50%				$4,405,480
GMP CONTINGENCY	2%				$3,856,560
PHASING	3%				$5,784,840
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION B2.4			393,561	$525.65	**$206,874,896**

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

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Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C2.1 - Grades 7-12 (Major Renovation + Minor Addition)					
RENOVATE EXISTING HIGH SCHOOL			226,120	$250.00	$56,530,000
NEW ADDITION TO HIGH SCHOOL			225,455	$290.00	$65,381,950
PREMIUM FOR PILE FOUNDATIONS			225,455	$20.00	$4,509,100
PREMIUM FOR ACOUSTIC WINDOWS			225,455	$2.00	$450,910
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			31,000	$10.00	$310,000
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$16,000,000
SUB-TOTAL			451,575	$337.22	$152,281,960
DESIGN AND PRICING CONTINGENCY	10%				$15,228,196
ESCALATION to Mid-Point	16%				$24,365,114
SUB-TOTAL					$191,875,270
GENERAL CONDITIONS [2]		48	MTHS	$150,000	$7,200,000
GENERAL REQUIREMENTS [2]	4%				$7,675,011
BONDS	0.75%				$1,439,065
INSURANCE	1.10%				$2,110,628
PERMIT					NIC
SUB-TOTAL					$210,299,974
OVERHEAD AND FEE	2.50%				$4,796,882
GMP CONTINGENCY	2%				$4,205,999
PHASING	3%				$6,308,999
TEMPORARY CLASSROOMS					By Owner
TOTAL OF ALL CONSTRUCTION OPTION C2.1			451,575	$499.61	**$225,611,854**

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

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Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C2.3 - Grades 7-12 (Minor Renovation + Major Addition)					
RENOVATE EXISTING FIELD HOUSE			31,781	$200.00	$6,356,200
RENOVATE EXISTING POOL			7,819	$350.00	$2,736,650
NEW ADDITION TO HIGH SCHOOL			411,975	$290.00	$119,472,750
PREMIUM FOR PILE FOUNDATIONS			411,975	$20.00	$8,239,500
PREMIUM FOR ACOUSTIC WINDOWS			411,975	$2.00	$823,950
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			217,520	$10.00	$2,175,200
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$16,000,000
SUB-TOTAL			451,575		$164,904,250
DESIGN AND PRICING CONTINGENCY	10%				$16,490,425
ESCALATION to Mid-Point	14%				$23,086,595
SUB-TOTAL					$204,481,270
GENERAL CONDITIONS [2]		42	MTHS	$150,000	$6,300,000
GENERAL REQUIREMENTS [2]	4%				$8,179,251
BONDS	0.75%				$1,533,610
INSURANCE	1.10%				$2,249,294
PERMIT					NIC
SUB-TOTAL					$222,743,425
OVERHEAD AND FEE	2.50%				$5,112,032
GMP CONTINGENCY	2%				$4,454,869
PHASING	3%				$6,682,303
TEMPORARY CLASSROOMS					BY OTHERS
TOTAL OF ALL CONSTRUCTION OPTION C2.3			451,575	$529.24	**$238,992,629**

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PM&C

Belmont High School
Design Pricing Matrix
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MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C2.4 - Grades 7-12 (Minor Renovation + Major Addition)					
RENOVATE EXISTING FIELD HOUSE			31,781	$200.00	$6,356,200
RENOVATE EXISTING POOL			7,819	$350.00	$2,736,650
RENOVATE EXISTING LOCKER ROOMS at GYM			18,196	$280.00	$5,094,880
RENOVATE EXISTING LOCKER ROOMS at POOL			2,724	$280.00	$762,720
RENOVATE EXISTING SMALL GYM			9,640	$220.00	$2,120,800
NEW ADDITION TO HIGH SCHOOL			381,415	$290.00	$110,610,350
PREMIUM FOR PILE FOUNDATIONS			381,415	$20.00	$7,628,300
PREMIUM FOR ACOUSTIC WINDOWS			381,415	$2.00	$762,830
DEMOLISH EXISTING HIGH SCHOOL - PARTIAL			186,960	$10.00	$1,869,600
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$16,000,000
SUB-TOTAL			451,575		$163,042,330
DESIGN AND PRICING CONTINGENCY	10%				$16,304,233
ESCALATION to Mid-Point	14%				$22,825,926
SUB-TOTAL					$202,172,489
GENERAL CONDITIONS [2]		42	MTHS	$150,000	$6,300,000
GENERAL REQUIREMENTS [2]	4%				$8,086,900
BONDS	0.75%				$1,516,294
INSURANCE	1.10%				$2,223,897
PERMIT					NIC
SUB-TOTAL					$220,299,580
OVERHEAD AND FEE	2.50%				$5,054,312
GMP CONTINGENCY	2%				$4,405,992
PHASING	3%				$6,608,987
TEMPORARY CLASSROOMS					BY OTHERS
TOTAL OF ALL CONSTRUCTION OPTION C2.4			451,575	$523.43	**$236,368,871**

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

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Conceptual Design Submission

3 NEW SCHOOL OPTIONS

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION A3.1 - Grades 9-12 (New Construction West Side of BHS)					
NEW HIGH SCHOOL			311,619	$290.00	$90,369,510
PREMIUM FOR PILE FOUNDATIONS			311,619	$20.00	$6,232,380
PREMIUM FOR ACOUSTIC WINDOWS			311,619	$2.00	$623,238
DEMOLISH EXISTING HIGH SCHOOL			257,120	$6.00	$1,542,720
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,000,000
SUB-TOTAL			311,619	$394.29	$122,867,848
DESIGN AND PRICING CONTINGENCY	10%				$12,286,785
ESCALATION to Mid-Point	14%				$17,201,499
SUB-TOTAL					$152,356,132
GENERAL CONDITIONS [2]		36	MTHS	$150,000	$5,400,000
GENERAL REQUIREMENTS [2]	4%				$6,094,245
BONDS	0.75%				$1,142,671
INSURANCE	1.10%				$1,675,917
PERMIT					NIC
SUB-TOTAL					$166,668,965
OVERHEAD AND FEE	2.50%				$3,808,903
GMP CONTINGENCY	2%				$3,333,379
PHASING	1.5%				$2,500,034
TEMPORARY CLASSROOMS					Not Required
TOTAL OF ALL CONSTRUCTION OPTION A3.1			311,619	$565.79	**$176,311,281**

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

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MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION B3.1 - Grades 8-12 (New Construction West Side of BHS)					
NEW HIGH SCHOOL			363,186	$290.00	$105,323,940
PREMIUM FOR PILE FOUNDATIONS			363,186	$20.00	$7,263,720
PREMIUM FOR ACOUSTIC WINDOWS			363,186	$2.00	$726,372
DEMOLISH EXISTING HIGH SCHOOL			257,120	$6.00	$1,542,720
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$15,500,000
SUB-TOTAL			363,186	$383.98	$139,456,752
DESIGN AND PRICING CONTINGENCY	10%				$13,945,675
ESCALATION to Mid-Point	14%				$19,523,945
SUB-TOTAL					$172,926,372
GENERAL CONDITIONS [2]		36	MTHS	$150,000	$5,400,000
GENERAL REQUIREMENTS [2]	4%				$6,917,055
BONDS	0.75%				$1,296,948
INSURANCE	1.10%				$1,902,190
PERMIT					NIC
SUB-TOTAL					$188,442,565
OVERHEAD AND FEE	2.50%				$4,323,159
GMP CONTINGENCY	2%				$3,768,851
PHASING	1.5%				$2,826,638
TEMPORARY CLASSROOMS					Not Required
TOTAL OF ALL CONSTRUCTION OPTION B3.1			363,186	$548.92	**$199,361,213**

3.1.6 - PRELIMINARY EVALUATION OF ALTERNATIVES

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

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Conceptual Design Submission

MAIN CONSTRUCTION COST SUMMARY

			Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C3.1 - Grades 7-12 (New Construction West Side of BHS)					
NEW HIGH SCHOOL			422,700	$290.00	$122,583,000
PREMIUM FOR PILE FOUNDATIONS			422,700	$20.00	$8,454,000
PREMIUM FOR ACOUSTIC WINDOWS			422,700	$2.00	$845,400
DEMOLISH EXISTING HIGH SCHOOL			257,120	$6.00	$1,542,720
REMOVE HAZARDOUS MATERIALS [1]					$7,100,000
TRAFFIC MITIGATION at CONCORD AVE					$2,000,000
SITEWORK- ALLOWANCE (Harris field remains)					$16,000,000
SUB-TOTAL			422,700	$375	$158,525,120
DESIGN AND PRICING CONTINGENCY	10%				$15,852,512
ESCALATION to Mid-Point	14%				$22,193,517
SUB-TOTAL					$196,571,149
GENERAL CONDITIONS [2]		36	MTHS	$150,000	$5,400,000
GENERAL REQUIREMENTS [2]	4%				$7,862,846
BONDS	0.75%				$1,474,284
INSURANCE	1.10%				$2,162,283
PERMIT					NIC
SUB-TOTAL					$213,470,562
OVERHEAD AND FEE	2.50%				$4,914,279
GMP CONTINGENCY	2%				$4,269,411
PHASING	1.5%				$3,202,058
TEMPORARY CLASSROOMS					Not Required
TOTAL OF ALL CONSTRUCTION OPTION C3.1			422,700	$534.32	**$225,856,310**

I. OPTION COMPARISON COST ESTIMATES : Pricing Matrix

PM&C

Belmont High School
Design Pricing Matrix
Belmont, MA

08-Dec-17

Conceptual Design Submission

INTRODUCTION

This cost estimate was produced from Feasibility Design drawings and narratives, dated November 16th, 2017 prepared by Perkins + Will and their design team.

This estimate includes all direct construction costs, construction managers overhead and profit and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under 149a of the Massachusetts General Laws to pre-qualified construction managers, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

All professional fees and insurance
Building Permit costs
Removal of contaminated soils
Rock excavation
Land acquisition, feasibility, and financing costs
All Furnishings, Fixtures and Equipment
Items identified in the design as Not In Contract (NIC)
Items identified in the design as by others
Owner supplied and/or installed items (e.g. draperies, furniture and equipment)
Rock excavation; special foundations (unless indicated by design engineers)
Utility company back charges, including work required off-site
Work to City streets and sidewalks, (except as noted in this estimate)

Notes per Summary sheets

[1] Costs from UEC report (includes design and monitoring services)

[2] Based on C. 149a CMr

3.1.7 LOCAL ACTIONS & APPROVALS

LOCAL ACTIONS AND APPROVAL CERTIFICATION

3.1.7 - LOCAL ACTIONS AND APPROVALS

LOCAL ACTIONS AND APPROVAL CERTIFICATION

TOWN OF BELMONT
OFFICE OF THE BOARD OF SELECTMEN
455 CONCORD AVENUE
BELMONT, MASSACHUSETTS 02478

Selectmen@belmont-ma.gov

455 CONCORD AVENUE
BELMONT, MA 02478-2573
PHONE (617) 993-2610
FAX (617) 993-2611

BOARD OF SELECTMEN
JAMES R. WILLIAMS, Chair
MARK A. PAOLILLO, Vice Chair
ADAM DASH

INTERIM TOWN ADMINISTRATOR
PHYLLIS L. MARSHALL

November 30, 2017

Ms. Diane Sullivan
Senior Capital Program Manager
40 Broad Street
Boston, Massachusetts 02109

Dear Ms. Sullivan:

The Town of Belmont School Building Committee ("SBC") has completed its review of the Feasibility Study *Preliminary Design Program* for the Belmont High School project (the "Project"), and on November 30, 2017, the SBC voted to approve and authorize the Owner's Project Manager to submit the Feasibility Study related materials to the MSBA for its consideration. A certified copy of the SBC meeting minutes, which includes the specific language of the vote and the number of votes in favor, opposed, and abstained, are attached.

Since the MSBA's Board of Directors invited the District to conduct a Feasibility Study on November 09, 2016, the SBC has held twenty (20) meetings regarding the proposed project, in compliance with the state Open Meeting Law. These meetings include:

1. School Building Committee meeting #10 held at the Homer Municipal Building, Belmont MA at 7:30am on December 08, 2016
2. School Building Committee meeting #11 held at Belmont Town Hall, Belmont MA at 4:30pm on December 22, 2016
3. School Building Committee meeting #12 held at the Homer Municipal Building, Belmont MA at 7:30am on January 05, 2017
4. School Building Committee meeting #13 held at the Homer Municipal Building, Belmont MA at 7:30am on February 02, 2017
5. School Building Committee meeting #14 held at the Homer Municipal Building, Belmont MA at 7:30am on February 17, 2017

6. School Building Committee meeting #15 at the Homer Municipal Building, Belmont MA at 7:30am on March 01, 2017
7. School Building Committee meeting #16 at the Beech Street Center, Belmont MA at 7:00pm on April 06, 2017
8. School Building Committee meeting #17 held at the Homer Municipal Building, Belmont MA at 7:30am on April 13, 2017
9. School Building Committee meeting #18 held at the Homer Municipal Building, Belmont MA at 7:30am on April 20, 2017
10. School Building Committee meeting #19 held at the Beech Street Center, Belmont MA at 6:00pm on May 04, 2017
11. School Building Committee meeting #20 held at the Homer Municipal Building, Belmont MA at 7:30am on June 15, 2017
12. School Building Committee meeting #21 held at the Homer Municipal Building, Belmont MA at 7:30am on July 20, 2017
13. School Building Committee meeting #22 held at the Homer Municipal Building, Belmont MA at 7:30am on August 10, 2017
14. School Building Committee meeting #23 held at the Homer Municipal Building, Belmont MA at 7:30am on August 24, 2017
15. School Building Committee meeting #24 held at the Homer Municipal Building, Belmont MA at 7:30am on September 14, 2017
16. School Building Committee meeting #25 held at the Homer Municipal Building, Belmont MA at 7:30am on October 5, 2017
17. School Building Committee meet #26 (joint meeting with School Committee) held at the Homer Municipal Building, Belmont MA at 7:30am on October 19, 2017
18. School Building Committee meeting #27 (joint meeting with Board of Selectmen and School Committee) held at the Wellington Middle School, Belmont MA at 6:30pm on November 2, 2017
19. School Building Committee meeting #28 (joint meeting with Board of Selectmen and School Committee) held at Belmont High School, Belmont MA at 6:30pm on November 16, 2017
20. School Building Committee meeting #29 (joint meeting with Board of Selectmen and School Committee) held at the Wellington Elementary School, Belmont MA at 6:30pm on November 30, 2017

In addition to the SBC meetings listed above, the District held three (3) public meetings, at which the Project was discussed. These meetings include:

1. New Belmont High School public presentation #2 held Chenery School Belmont MA at 7:00pm on September 19, 2017
2. New Belmont High School public presentation #3 held Beech Street Center,

3.1.7 - LOCAL ACTIONS AND APPROVALS

LOCAL ACTIONS AND APPROVAL CERTIFICATION

Belmont MA at 1:15pm on October 13, 2017

3. New Belmont High School public presentation #4 held at Belmont High School, Belmont MA at 10am October 28, 2017

The presentation materials for each meeting, meeting minutes, and summary materials related to the Project are available locally for public review at:

http://www.belmont-ma.gov/belmont-high-school-building-committee

To the best of my knowledge and belief, each of the meetings listed above complied with the requirements of the Open Meeting Law, M.G.L. c. 30A, §§ 18-25 and 940 CMR 29 *et seq*.

If you have any questions or require any additional information, please contact Thomas Gatzunis, Daedalus Projects Inc. tgatzunis@dpi-boston.com or (617) 451 2717.

By signing this Local Action and Approval Certification, I hereby certify that, to the best of my knowledge and belief, the information supplied by the District in this Certification is true, complete, and accurate.

By:

Title: Chief Executive Officer

Date: 11/30/17

By signing this Local Action and Approval Certification, I hereby certify that, to the best of my knowledge and belief, the information supplied by the District in this Certification is true, complete, and accurate.

By:

Title: Superintendent of Schools

Date: 11/30/17

By signing this Local Action and Approval Certification, I hereby certify that, to the best of my knowledge and belief, the information supplied by the District in this Certification is true, complete, and accurate.

By:

Title: Chair of the School Committee

Date: 11/30/17