3.3.3 - FINAL EVALUATION OF ALTERNATIVES
OPTION 2.3 - MINOR RENOVATION / MAJOR ADDITION

SUMMARY

Option 2.3 would be a substantial addition and phased renovation to the existing high school to create a new 7-12 high school. This option creates an L shaped building footprint that organizes the majority of the program around a multi-story and tiered commons that embraces the Pond edge. In the first phase, a substantial new addition would be constructed at the west side of the existing high school fieldhouse. 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 fully occupy this new addition when complete enabling a second phase that includes the demolition of the existing high school building and the completion of the additional space. 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, independent lower school entry 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 completed high school. Common amenity spaces would be organized in a tiered series of bridges that bring the entire school community together overlooking the site's scenic Clay Pit Pond area, allowing for outdoor learning and community use.

DESIGN STRATEGY

In this scheme the building mass is placed away from the existing rail bed with most academic teaching spaces overlooking fields to the north and west which may not be ideal for daylighting and site noise reduction. The stepped commons looks sout hover the pond giving preference to academic community spaces. This option, like the others, proposes two separate entry and exit points to the site helping to disperse traffic congestion during the drop-off and pick-up periods. It also provides separate building entry points allowing for a sensitivity to scale for lower and upper grades. In this option many of the athletic fields become collocated on the eastern half of the site allowing for more overlap and as a result higher use of the site. This colocation also helps in both the efficiency of maintenance and the ability to manage storm water in a sustainable, cost effective manner.

SUSTAINABILITY AND BUILDING PERFORMANCE

The following sustainability and resiliency attributes have been considered in evaluating this option:

ENVELOPE – Aggressive performance will be pursued in the new wall make-up including a goal of R-28 and minimized thermal bridging with the intent of minimizing air and vapor movement

ORIENTATION- This scheme orients the majority of teaching spaces to the north with the intent of eliminating glare and the majority of public and common spaces to the south.

SKIN TO VOLUME RATIO- The skin to volume ratio of the minor renovation- major addition schemes are similar and attempt to form a concise footprint while maximizing daylight.

WINDOW TO WALL RATIO- The window to wall ratio of the scheme will attempt to achieve 30-40 glazing balancing heat gain with effective daylighting.

PV POTENTIAL- This scheme stacks in massing to the north creating roof surfaces that do not shade themselves and optimizes roof top yield by orienting itself in the east-west direction.

SITE ENVIRONMENTAL PERFORMANCE- This scheme allows for one contiguous large geo-exchange field and allows for more performative landscape adjacent to the pond allowing outdoor teaching space to overlap with site sustainable strategies at the water edge.

PROSPECTIVE SITE ANALYSIS - OPTION 2.3

SITE

This narrative provide an analysis of the option including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access, and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed

A. PROSPECTIVE SITE ANALYSIS - OPTION 2.3

separately. All addition renovation and new building options include complete reconstruction of the site east of Harris Field to accommodate the site program requirements except tennis which will be accommodated at other existing courts in Town.

Harris Field including the track and supporting facilities are existing to remain. Spatial accommodations have been made in the site planning for the school project to accommodate a multi-modal community path along the north property line abutting the MBTA right-of-way and a multigenerational path around Clay Pit Pond – both with separate funding and implementation timelines. The school building project site design is anticipated to incorporate the portion of the multigenerational path that connects across the north side of Clay Pit Pond, as that will serve as a vital link between the school's site program elements and circulation through the campus.

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 (292 spaces) is located to the east of the school building. Small lots are located to the south (36 spaces) and north (21 spaces) of the building. Nine buses currently park along the far east side of the east parking lot. All parking areas contain accessible parking.

Most of the school's athletic facilities are located west of the school building including two baseball fields (varsity is played on Grant Memorial Field which includes bleacher seating, dugout shelters and a prominent gateway) with rectangular field layouts (for soccer and field hockey) overlapping their outfields, a rugby/football practice field and Harris Field which includes a running track and synthetic turf field, home and away bleachers and sports lighting. An indoor skating rink in poor condition and a football field house separate these fields from the varsity softball field further west with lighting and a soccer/lacrosse field overlapping the outfield. Ten tennis courts are located adjacent to the east parking area and the junior varsity softball field is located further east of the primary east parking area.

BUILDING FOOTPRINT

In Option C2.3, the only portion of the existing building to remain and be renovated is the field house, gym, pool and supporting facilities. The new school building is an addition to this structure expanding the building footprint to the south and west toward Concord Avenue.

ATHLETIC FIELDS

The athletic fields except Harris Field are reconfigured as follows:

- One softball and baseball combination field overlap with a soccer/field hockey field west of the rink.
- A football/rugby field is located between the field house and Harris Field just north of the new building construction.
- One softball and baseball combination field overlap with a soccer field at the east end of the site.
- A lacrosse/soccer field is located between the east softball/baseball combination field and the school building.

TRAFFIC CIRCULATION

The driveway between the building and Clay Pit Pond is eliminated, and a new 2-way driveway is located around the rear of the building with new access points across from Trowbridge and Goden Streets. Building entrances to the upper and lower school program have separate entrances and drop off loops at the east and west ends of the building. The multigenerational path connecting along the north side of the pond links the site and building program elements and provides pedestrian, bicycle and emergency vehicle access through the site.

PARKING

This site plan meets the school's parking need for 420-430 spaces. Parking is redistributed with a large lot between the school building and the east athletic field with the remaining parking spaces located along the driveway across the north side of the site between the MBTA rail line and the rest of the school campus.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

B. CONSTRUCTION IMPACT - OPTION 2.3

Option 2.3 would require minor renovations within the existing occupied school and would be undertaken in 2 or 3 phases. Modular classrooms are not anticipated to be required on site during renovations. Scheduling work over summer or holiday breaks may alleviate some of the disruption but would need to be carefully managed. The anticipated construction schedule is 42 months.

Work under this would be less disruptive to students and staff. Students would be forced to move only once to accommodate the construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

OPTION 2.3 - I. DESIGN AND CONSTRUCTION SCHEDULE

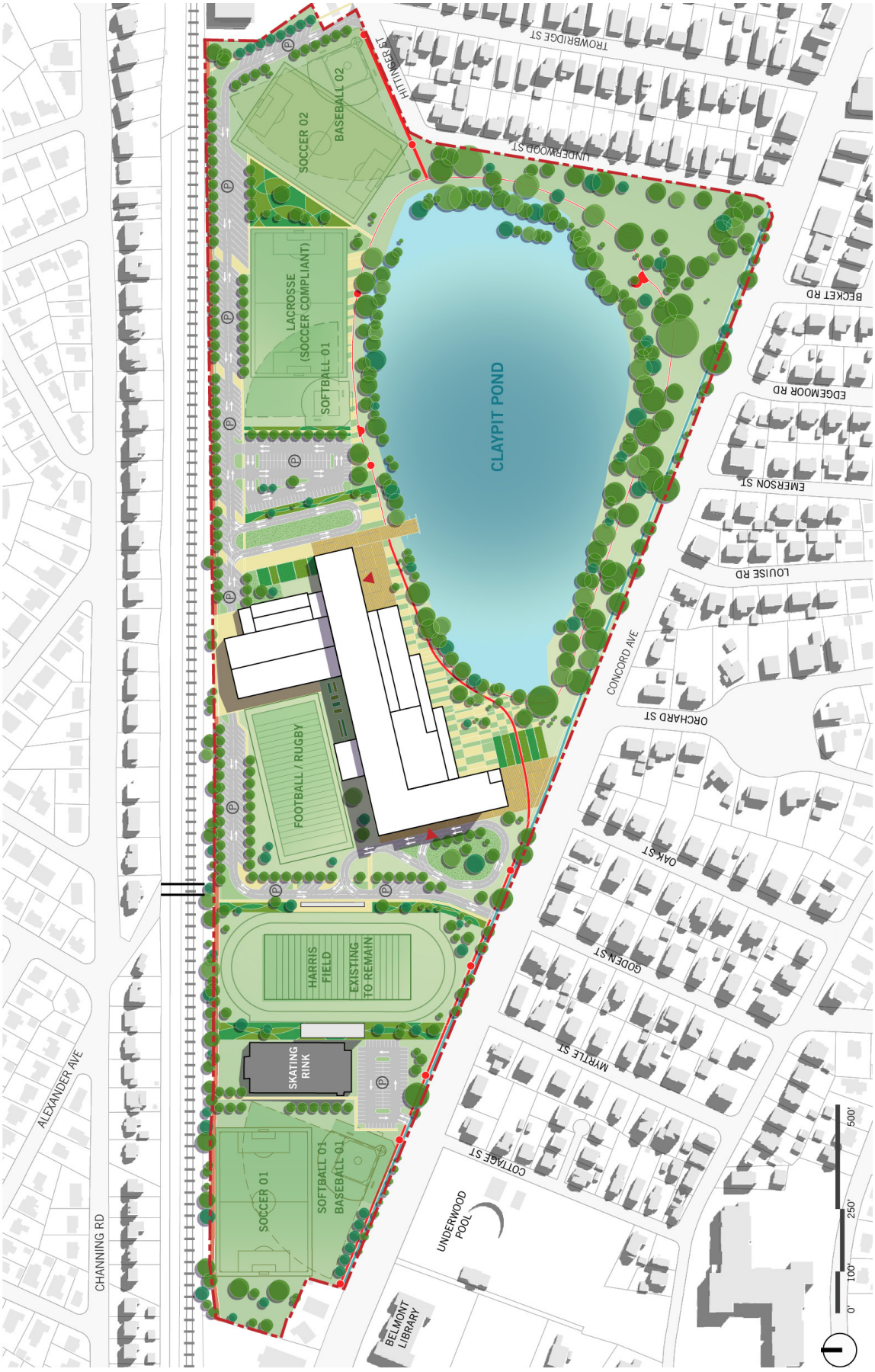
Anticipated MSBA Approval of PSR	April 10th, 2018 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 29th, 2018 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2018
Design Development Complete	November 2018 - April 2019
Construction Documents Complete	May 2019 – January 2020
Bid and Award	February 2020 - March 2020
Construction (multiple phases)	April 2020 – October 2023 (42 months)

B. CONSTRUCTION IMPACT - OPTION 2.3 / Phasing Diagrams

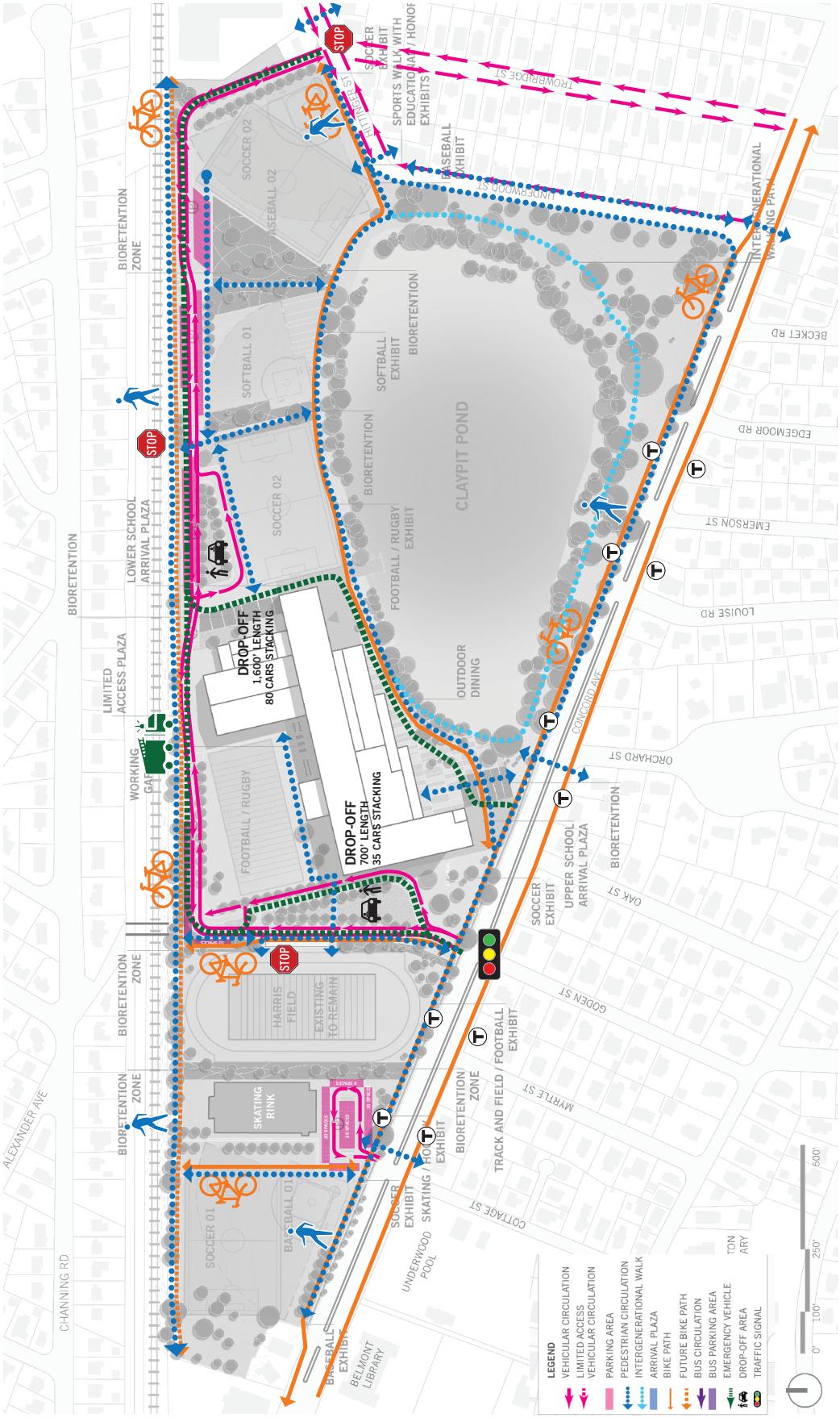
PERKINS+WILL

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

C. CONCEPT DRAWING - OPTION 2.3 / Site

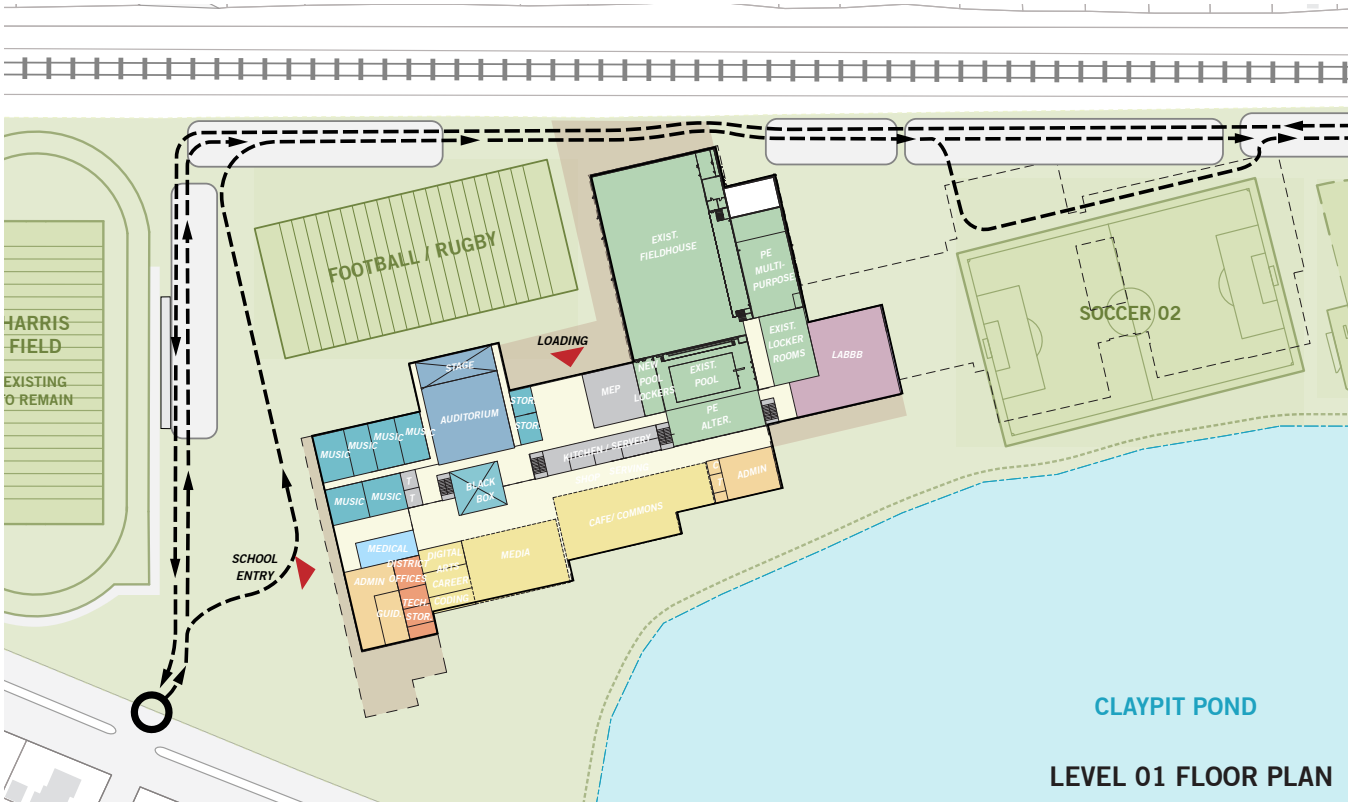


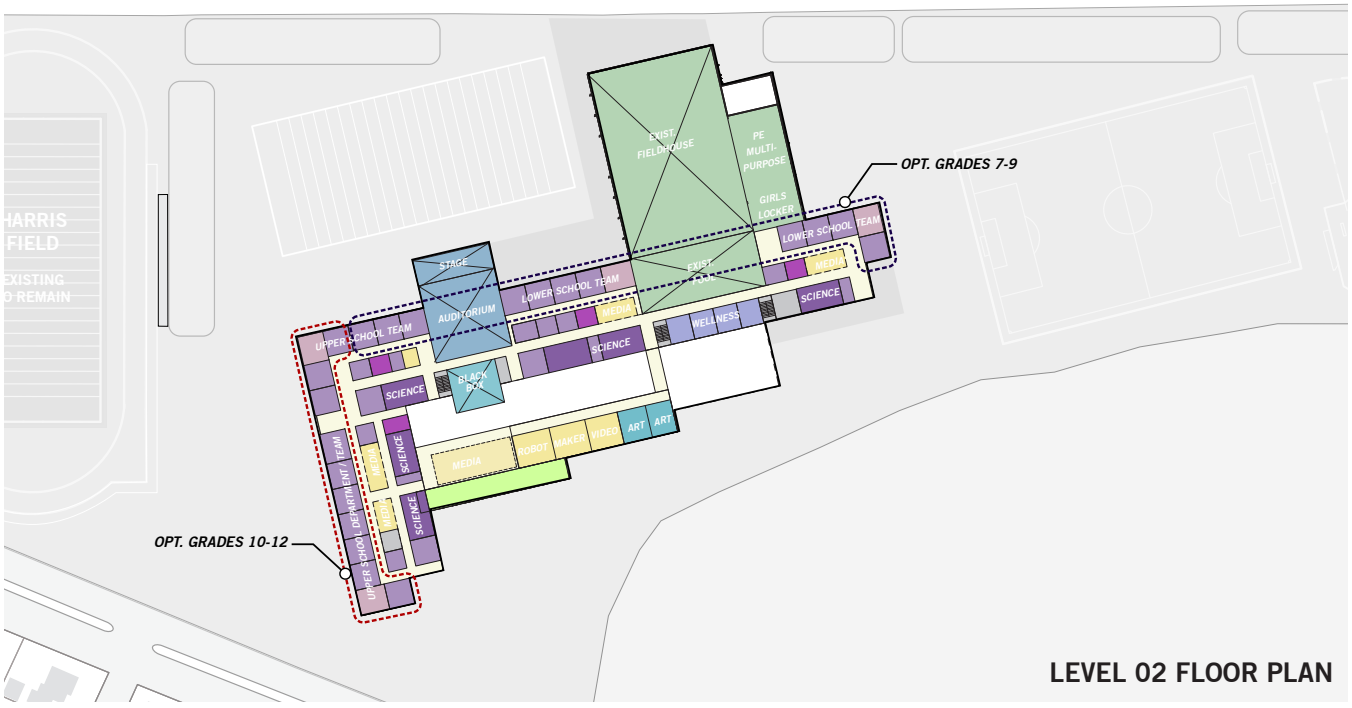
C. CONCEPT DRAWING - OPTION 2.3 / Traffic Site Plan



3.3.3 - FINAL EVALUATION OF ALTERNATIVES

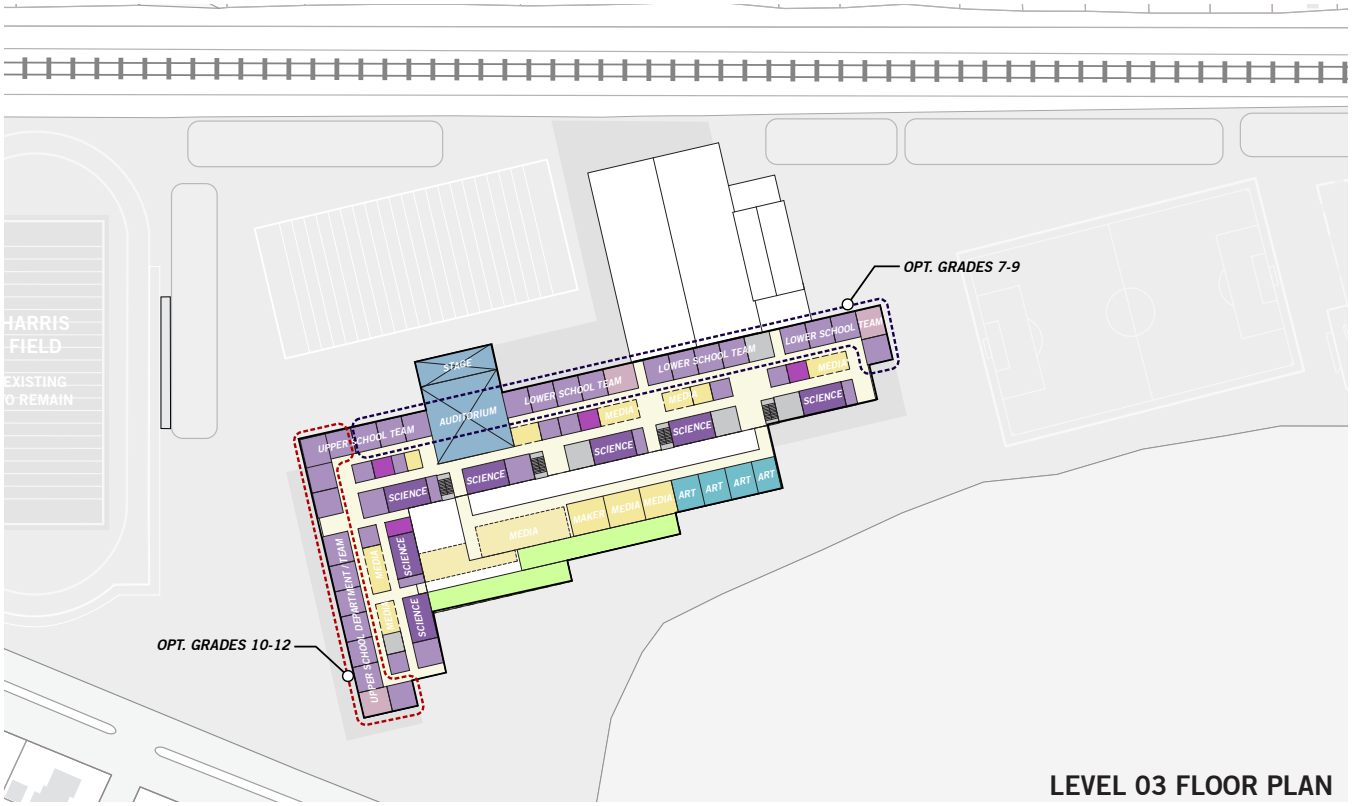
C. CONCEPT DRAWING - OPTION 2.3 / Architectural



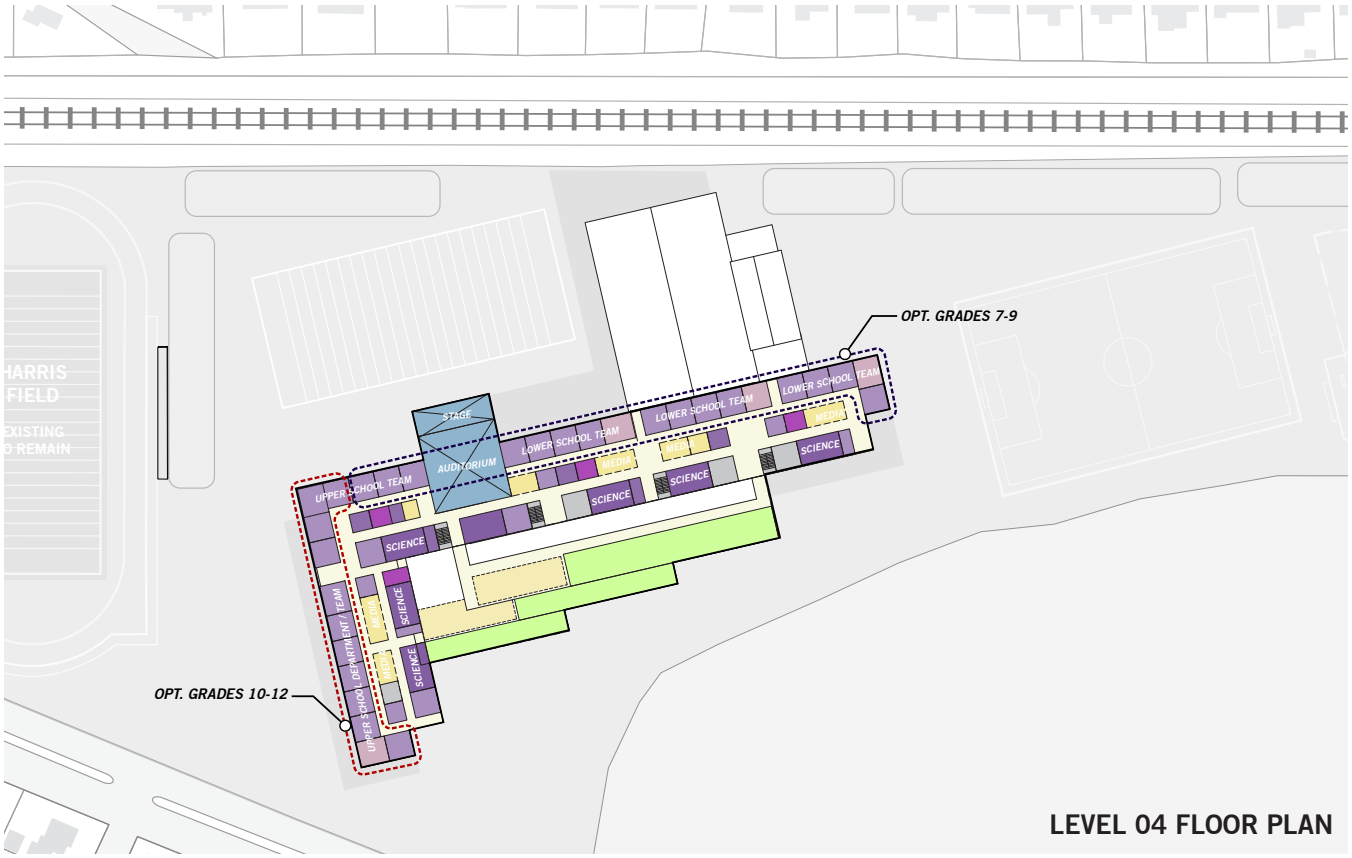


C. CONCEPT DRAWING - OPTION 2.3 / Architectural

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Special Education



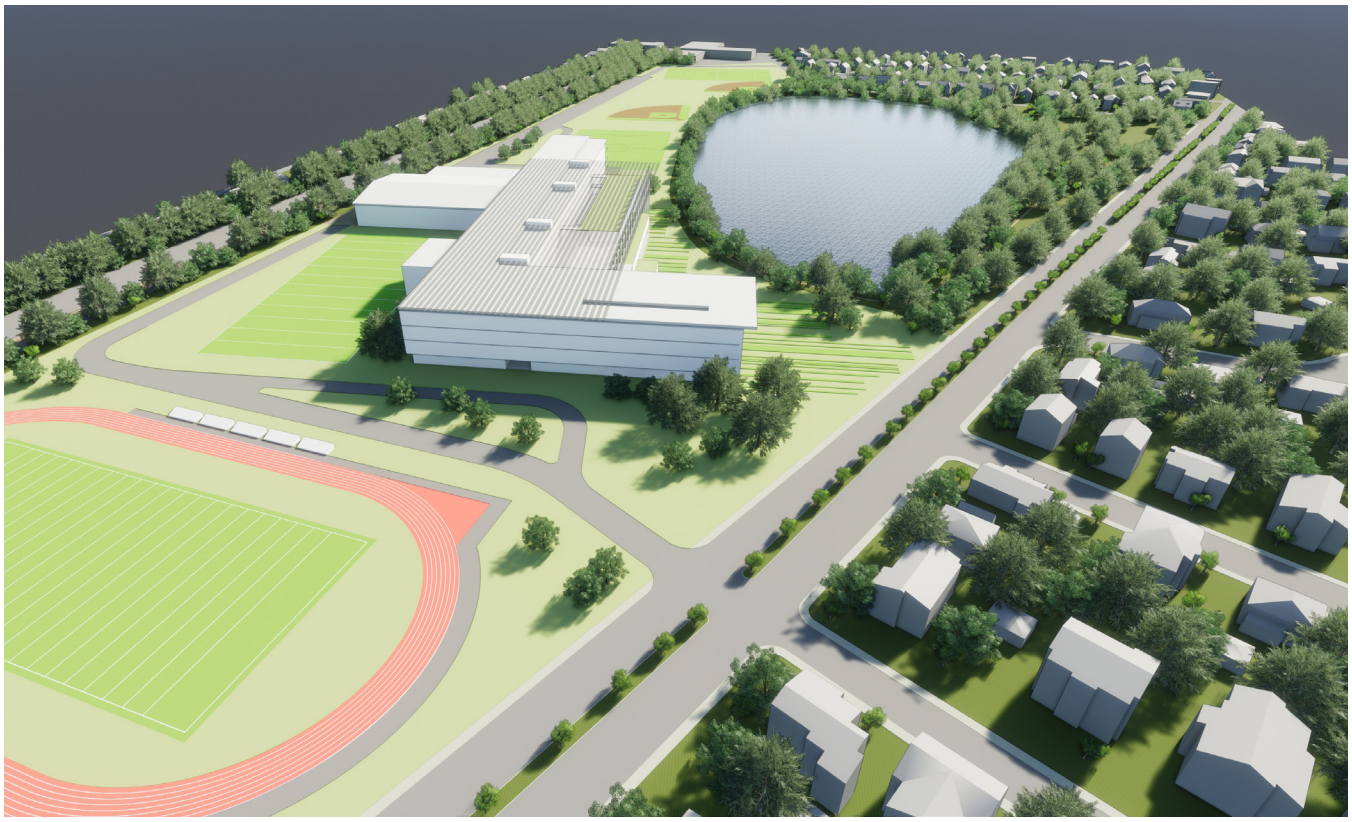
LEVEL 03 FLOOR PLAN

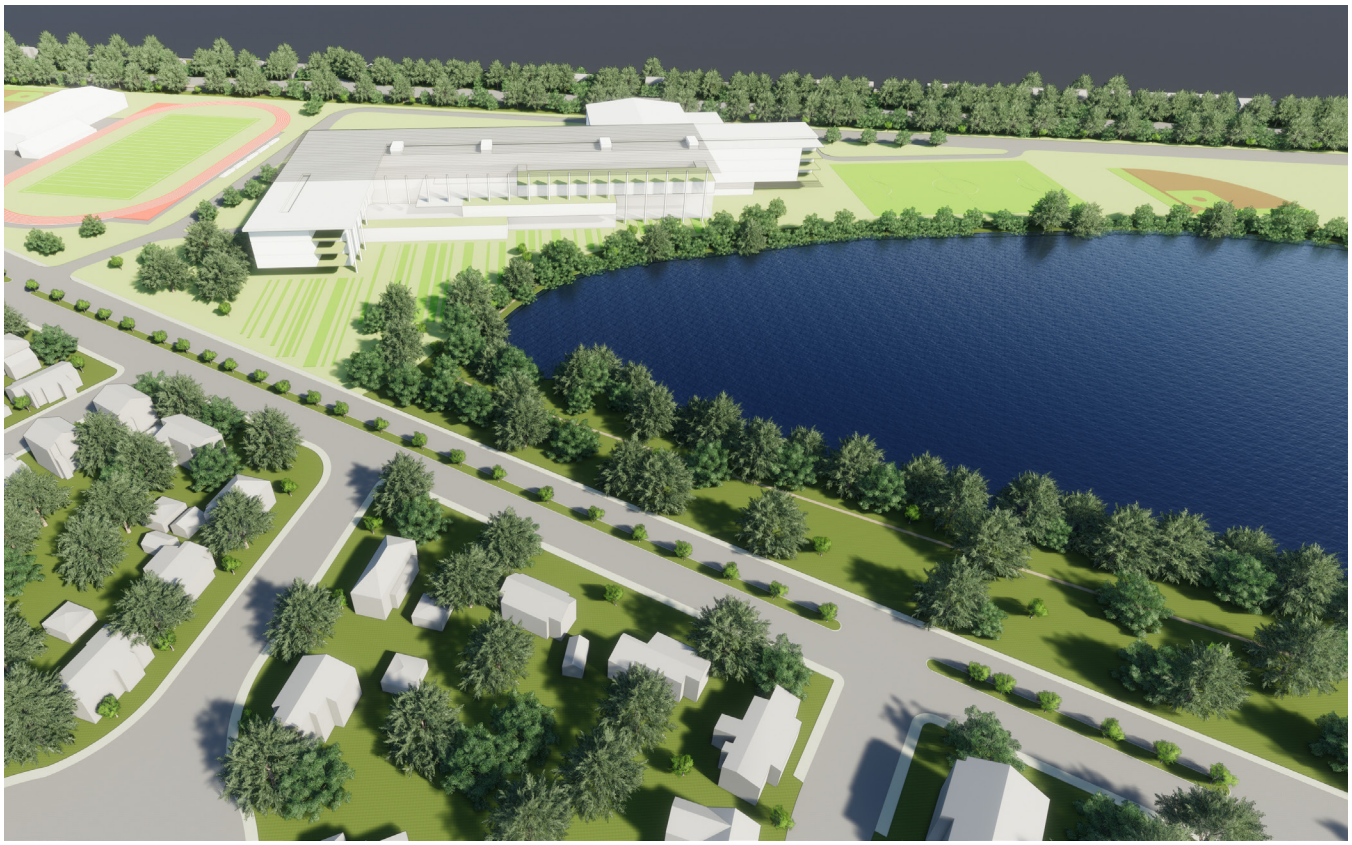


LEVEL 04 FLOOR PLAN

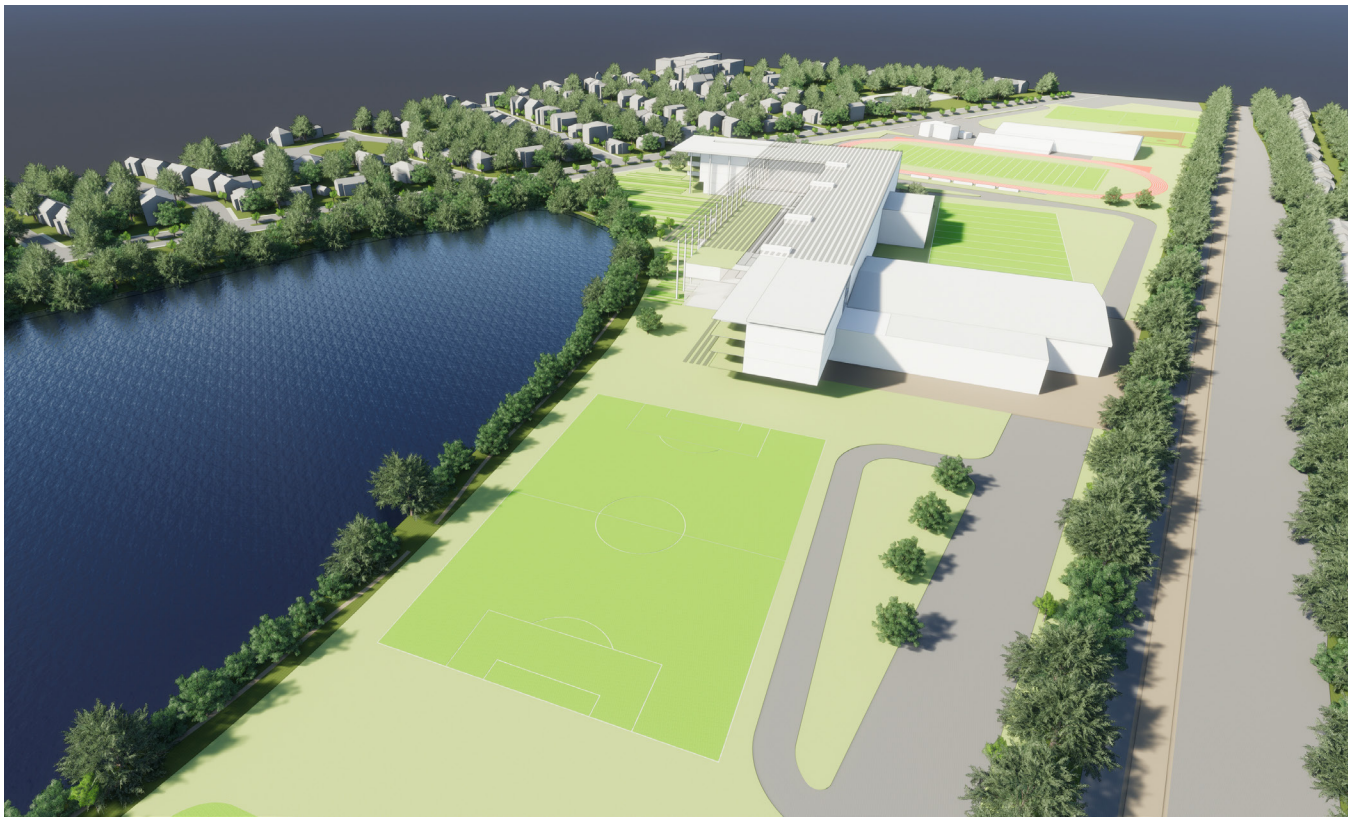
3.3.3 - FINAL EVALUATION OF ALTERNATIVES

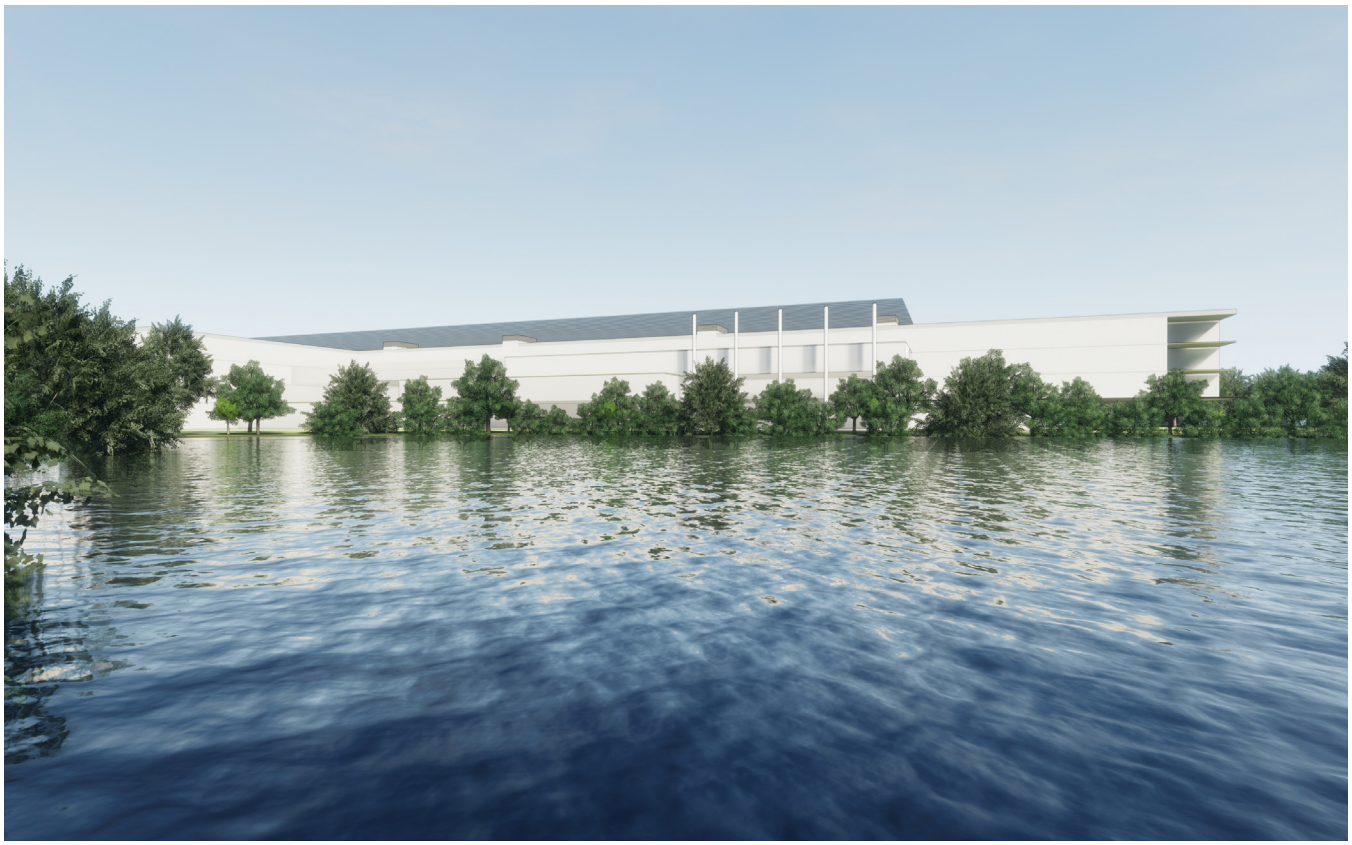
C. CONCEPT DRAWING - OPTION 2.3





C. CONCEPT DRAWING - OPTION 2.3





BELMONT HIGH SCHOOL
Structural Narrative – Option 2.3
Minor Renovation and Major Additions to the Existing School

January 22, 2018

PROPOSED SCHEME

The proposed scheme calls for phased renovations, demolition of portions of the existing school and construction of new additions. In the first phase, a substantial new addition will be constructed at the west side of the existing school building. The addition will house the entire upper school, including a new theatre, commons space and a cafeteria. The next phase will include demolition of the eastern portion of the existing school and construction of a new addition that would house the lower school grade spaces, including a new small gymnasium. The existing field house, pool and associated spaces will be renovated in the last phase.

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 structure, a check for compliance with 780 CMR, Chapter 34 "Existing Structures" (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 portions of the existing building are considered un-reinforced masonry bearing wall structures, the analysis and reinforcement of the existing structure would be governed by the requirements of Appendix A1 "Seismic Strengthening Provisions for Un-reinforced Masonry Bearing Wall Buildings" in the IEBC.

D. STRUCTURAL SYSTEMS - OPTION 2.3

1. PRESCRIPTIVE COMPLIANCE METHOD

In this method, compliance with Chapter 3 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 the 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.

2. 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.
The extent of the renovations (includes Architectural, FP and MEP renovations) for this project will exceed 50 percent of the aggregate area of the building, thus the LEVEL OF WORK for this project would be classified as LEVEL 3 Alterations. This would require compliance with provision of Chapter 7, 8 and 9 of the IEBC. The scope of the project includes new additions to the existing structure; 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 the 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 the 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.

- For alterations that involve structural alterations to more than 30 percent of the total floor and roof area of the building within a 12 month period, the evaluation and analysis shall demonstrate that the altered building structure complies with IBC for wind loading and with reduced IBC level seismic forces.
- For alterations where more than 25 percent of the roof is replaced for buildings assigned to seismic design category B, C, D, E or F, all un-reinforced masonry walls shall be anchored to the roof structure and un-reinforced masonry parapets shall be braced to the roof structure.

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 the existing structure, the existing structure and its addition, 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.

3. 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:

1. PRESCRIPTIVE COMPLIANCE METHOD

Additions

The proposed additions will be designed structurally independent of the existing structure, 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 structure 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 increase the effective seismic weight on the existing structure due to the greater snow loads from the drifted snow against any proposed addition, or, by addition of equipment on the roof, the increase of the effective seismic weight from the drifted snow and the equipment would require that the existing lateral load resisting system comply with the requirements of the Code for New Construction in the IBC and it would increase the demand-capacity ratio on certain structural elements of the existing lateral load resisting system.

2. WORK AREA COMPLIANCE METHOD

Level 3 Alterations
If the proposed structural alterations of the 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. The percentage increase in seismic demand-capacity ratio on any particular structural element from the added snowdrift load against the proposed addition would be fairly low, thus, this would not have any major impact on the existing lateral load resisting system, though we would have to verify that the increase in seismic demand-capacity ratio on any of those particular structural elements is not greater than 10 percent.

If the proposed structural alterations of the existing structure exceed 30 percent of the total floor and roof areas of the 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 have to be evaluated. If the existing anchorage of the walls is deficient, the tops of the masonry walls will require new connections to the structure.

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

Comment
The compliance requirements of the two methods, in most respects, are very similar. The Work Area Compliance Method would trigger anchorage of un-reinforced masonry walls, if re-roofing of the existing structure is included as part of the scope for this project. The Prescriptive Compliance Method would require that the existing lateral load resisting system meet the requirements of the code for new construction of the IBC, even for small increases of design lateral loads. We are required to comply with requirements of Appendix A1 of IEBC for either method, which requires anchorage of all existing masonry walls. Based on this, we would recommend the Work Area Compliance Method for the project.

Summary of Renovations to the existing structure
Based on the scope of the proposed scheme for renovations of the existing school, we have determined that the existing structure would essentially have to comply with the Code for New Construction which would require the addition of new lateral load resisting elements such as structural steel braced beams on masonry shear walls throughout the floor plates at every level. All of the un-reinforced masonry walls are required to be anchored to the floor and roof structure and all of the roof diaphragms have to be reinforced, to resist uplift loads per the Code for New Construction. The addition of braces will require modifications to the existing column foundations at the brace locations and will require the addition of new piles. At the locations of existing slabs-on-grade, new tie beams will be required to connect the existing column foundations.

Belmont High School *Structural Narrative*
Belmont, Massachusetts Option 2.3 – Minor Renovation and Major Additions

Proposed Scheme for the Proposed Additions

SUBSTRUCTURE

FOUNDATIONS

Based on the construction of the existing school and the recommendations of the Geotechnical Engineer, the entire addition will be supported on pile foundations. The columns of the proposed structure would bear on 4 ft. – 0 in. deep reinforced concrete pile caps on structural steel piles. The exterior walls will be supported on 5 ft. – 0 in. deep grade beams spanning between pile caps with intermediate piles at 10 ft. – 0 in. on center. Based on an assumed pile capacity of 50 tons, a typical interior column in the four story classroom wings would be supported on 8 ft. – 0 in. x 8 ft. – 0 in. x 4 ft. 0 in. deep pile caps on a four pile group and a typical exterior column would be supported on 8 ft. – 0 in. x 8 ft. – 0 in. x 4 ft. 0 in. deep pile caps on a three pile group. The columns supporting the long span structure of the single story gymnasium, cafeteria, music spaces and other ancillary spaces would be supported on 8 ft. – 0 in. x 8 ft. – 0 in. x 4 ft. – 0 in. deep pile caps on three pile groups. In addition, the ground floor slab would be supported on single piles with a 2 ft. – 0 in. x 2 ft. – 0 in. x 2 ft. – 0 in. deep pile caps spaced out approximately 15 ft. – 0 in. (including interior and exterior pile caps supporting the columns.) All of the interior and exterior pile caps will be tied to the supported concrete slab.

SLAB ON GRADE

Based on the construction of the existing school and the recommendations of the Geotechnical Engineer, the lowest level of the proposed addition would be a 12 in. thick reinforced concrete slab reinforced with 6 psf reinforcing over a vapor barrier on 2 in. thick rigid insulation on compacted granular structural fill supported on piles.

SUPERSTRUCTURE

FLOOR CONSTRUCTION

Typical Floor Construction
A 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be 15 psf for the typical framing.

ROOF CONSTRUCTION

Typical Roof Construction
The roof construction would be galvanized, corrugated 1 ½ in. deep, Type 'B' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab will be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be 13 psf.

Low Roof Structure above the Kitchen, Mechanical Room and the Utility Areas
The roof would be a continuation of the adjacent second floor and would be similar to the typical floor construction of 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. This roof will be supporting the mechanical units. The units would be screened by a screen comprised of structural steel posts and beams. The weight of the structural steel is estimated to be 15 psf.

Alt. PE and Media Center Roof Framing
The roof construction would be acoustic, galvanized corrugated 3 in. deep, Type 'NA' metal roof deck spanning between long span metal joists and hollow structural steel columns. The weight of the structural steel is estimated to be 13 psf.

D. STRUCTURAL SYSTEMS - OPTION 2.3

VERTICAL FRAMING ELEMENTS

Columns

Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8 columns and the columns at the double story spaces at the Gymnasium and Lobby would be HSS 12 x 12.

Lateral Load-Resisting System

The proposed addition would be separated from the existing building by way of an expansion joint. The typical lateral load resisting system for the other parts of the school would be concentric steel braced frames comprised of hollow structural steel sections.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

E. SITE UTILITIES - OPTION 2.3

SITE UTILITIES

Storm Drainage

Stormwater from the site will continue to be directed to Clay Pit Pond. Outside of the existing stormwater outfalls into Clay Pit Pond it is expected that the entire stormwater system will have to be reconstructed so that the new stormwater system can effectively mitigate stormwater quality, rate and volumes from the project site. Runoff generated by the new parking and driveway areas would be collected in a catch-basin to manhole closed drainage system. Water quality from these areas would be addressed by directing those flows through Stormceptor water quality units (or similar). Volume and rates of stormwater from the site would then be addressed by directing these flows to subsurface infiltration systems located beneath the parking areas. The infiltration systems would consist of galleys of 36-inch perforated pipe in crushed stone bedding. Overflows from these infiltration systems would then be directed through the new closed drainage system to the existing outfalls to Clay Pit Pond.

Roof drainage from the building is not required to be treated for water quality, therefore it can be tied directly into the new closed drainage system prior to discharge from the existing outfalls. A portion of the roof drainage could be daylighted to a raingarden or stormwater demonstration area that is incorporated into the landscape design. This landscaped area would consist of an area with variable topography to direct the stormwater through it, plantings to provide treatment and nutrient uptake, walkways or boardwalks that allow students to observe the processes and possibly even hardscape stormwater features such as runnels or small falls to provide aeration.

The new and reconstructed athletic fields would have sub-drainage located below the topsoil layer, as is typical of turf field construction. The sub-drains can be connected directly into the new closed drainage system.

Sewer

Building placement in this scheme appears to conflict with a portion of the existing sewer main which bisects the site, running west to east approximately under the sidewalk, adjacent to the existing access drive in front of the school. Approximately 500 linear feet of 24-inch sewer main would need to be relocated to accommodate the new building location. Portions of the existing 24-inch sewer not in conflict with the new building would be maintained. Sanitary sewer service connections from the new school would be connected to the new/maintained 24-inch main. Lab waste flows would be directed through a pH neutralization system prior to connection to the sanitary sewer system. Flows from the cafeteria would be directed through a new, 10,000-gallon, external grease trap.

Water

It appears that portions of the new construction would conflict with the existing water main that is routed around the rear of the existing building. A new 8-inch water main, approximately 2,500 feet long, would be installed in the first phase of the construction, along the rear property line, out of the way of any future phases. New 4-inch domestic water and 6-inch fire services would be provided to the building from the new 8-inch main. Six new fire hydrants, located along the main, would also be provided as directed by the Belmont Fire Department

Natural Gas

The existing gas service conflicts with the proposed construction. A new gas service, located to the west of the proposed building would be provided from the existing gas main in Concord Avenue to the mechanical area located at the rear of the proposed building.

Electrical

A new ductbanck consisting of four 4-inch, concrete encased conduits would be installed from the existing substation located just east of the site on Hittinger Street to the new electric room located to the rear of the proposed building.

PRELIMINARY PERMITTING CONSIDERATIONS

Wetlands Protection Act (310 CMR 10.00)

A Notice of Intent would need to be filed with the Town of Belmont Conservation Commission for any work within 100-feet of Clay Pit Pond. In addition, a Stormwater Pollution Prevention Plan (SWPPP) would need to be prepared and an application filed with the Environmental Protection Agency under the National Pollutions Discharge Elimination System (NPDES) program for the construction related activities. Erosion control measures will need to be installed and maintained in good working order around the perimeter of the site. Due to the phase nature of the construction, the perimeter controls will have to be re-installed several times over the duration of the project.

E. SITE UTILITIES - OPTION 2.3

Flood Plain

Based on the Flood Insurance Rate Map (FIRM), Community Panel Number 25017C0418E dated June 4, 2010, the portions of the existing High School site are located within Zone X (Areas determined to be outside the 0.2% annual chance floodplain). There is no regulatory requirement for working within a Zone X. The Zone AE, which is associated with the 100-year flood area, is located in close proximity to the banks of Clay Pit Pond. None of the proposed building or any critical infrastructure is being proposed within the Zone AE.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / PFP - OPTION 2.3

FIRE PROTECTION

A. General

1) A minor renovation and major addition to the building will require a new sprinkler system to be installed.

B. To comply with current codes, this existing building and addition 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".

C. 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.

D. The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing; i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

E. The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

F. Fire protection piping main feeds to the fire protection systems from the alarm check valves will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building to provide complete sprinkler cover age throughout. Potential sprinkler zoning will be coordinated with any new fire wall layouts.

G. The fire protection design will include a combination standpipe system located in all egress stairways. These standpipes will feed the sprinkler system as well as provide a fire department hose connection at each level of the building.

H. The sprinkler system standpipes will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control valve assembly at the riser that 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 auditorium stage is greater than 1,000 square feet, fire department valves will be required on each side of the stage.

I. Sprinkler heads installed in gypsum or suspended ceilings will be glass bulb, quick response, chrome plated semi-recessed type. In areas without ceilings, 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.

J. The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

K. 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.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

F. BUILDING SYSTEMS / PFP - OPTION 2.3

L. 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.

M. The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. The exact type of connection (storz or siamese) will be coordinated with the Belmont Fire Department. Final location and number of fire department connections will also be coordinated with the Belmont Fire Department.

N. The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

PLUMBING

A. General

1) A minor renovation and major addition to the building would require that all existing systems be modified to comply with current codes. 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.

B. Plumbing Fixtures

1) All water closets, urinals and lavatories in the existing building are old and not current water conserving type. Removal of all fixtures is required as the existing fixtures have reached the end of their serviceable life. Water closets should be replaced with new dual flush valve fixtures. A full flush will discharge at a rate of 1.6 gallons per flush (gpf). When only flushing liquid waste and paper, the reduced flush rate will be 1.1 gpf. 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 for fixture spacing, mounting heights and protection of any exposed piping will also need to be met during a renovation to the bathrooms.

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.

C. Domestic Cold-Water System

1) The existing 6" domestic water line that enters the building is the original service to the building. Although the existing 6" domestic water service appears to be adequate to meet the current building water requirements, consideration should be given to replacing it with a new 6" dedicated domestic water service since a new 8" water service would also be brought in at this time to feed the new sprinkler system. The installation of a water meter on the new service will be provided to allow the town to be able to monitor water usage as may be required.

D. 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 provide hot water to all fixtures within 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 removed. The new gas-fired water heaters should provide hot water to all fixtures that these units currently serve.

E. Sanitary Waste and Vent System

1) The sanitary system in the existing building appears to be in fair condition but replacement may be required because 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.

F. 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) New roof drains and storm water piping system will need to be added to the new addition. Discharge of the storm water will be coordinated with the civil engineer.

3) 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.

G. Natural Gas System

1) Currently the existing gas service is more than adequate to meet the school's demand requirements and should remain. Gas piping should be reconfigured to serve all mechanical equipment that will require gas. Any new gas-fired kitchen equipment should also be connected to this service. It is recommended that gas sub-metering be used to separately meter gas consumption for the mechanical equipment and kitchen uses.

H. Insulation

1) The pipe 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. Domestic water and horizontal storm drainage piping that is not currently insulated should have new insulation installed. New domestic water piping and horizontal storm drainage piping installed throughout the new building addition will be insulated.

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

I. 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. In the new addition, hose bibbs will be provided in all bathrooms and mechanical spaces. New wall hydrants will be provided on the exterior of the building and their locations coordinated with the architect.

J. Cross Connection Control

1) The existing hose bibbs and wall hydrants do not have backflow prevention devices. Backflow devices should be integral to all new hose bibbs and wall hydrants installed during the renovation.

2) All service sink faucets installed during a renovation and in the new addition, will also be supplied with integral vacuum breakers.

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

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

F. BUILDING SYSTEMS / PFP - OPTION 2.3

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 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.

L. Kitchen

1) The new cafeteria kitchen will include the addition of new 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 when 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 may 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 kitchen design. Venting of this exterior grease trap should enter back into the school building and exit to the atmosphere above the roof.

M. Science Wing

1) New science classrooms will include new sinks and faucets. Faucets should be low-flow type fixtures with a maximum delivery rate of 0.5 gpm.

2) All new science classroom sinks will connect to 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) New protected hot and cold-water systems should be created to serve the new science classrooms by installing reduced pressure backflow preventers on the hot and cold-water piping designated to serve this area.

4) Gas piping to each science classroom should first 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) New emergency showers and eyewashes will be installed in each science classroom. A new tempered water system should be created to serve these fixtures. 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. A tempered water return system will also be required to keep this system from becoming stagnant per state plumbing code requirements as well.

N. Pipe Materials

1) 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.

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

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

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

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / HVAC - OPTION 2.3

BELMONT HIGH SCHOOL

HEATING, VENTILATING, AND AIR CONDITIONING

MINOR RENOVATION / MAJOR ADDITION / C.2.3

A. General:

1. This description applies to the Minor Renovation / Major Addition option (C.2.3) where the existing fieldhouse and associated locker rooms and the swimming pool and associated locker rooms remain. The existing boiler and main electrical room also remain. New construction is built in two phases from west to east with the existing building largely remaining in operation initially and then being phased out after the initial phase is complete.

2. Heating, air conditioning and ventilation systems shall be high-efficiency systems that allow for the ability towards achieving a Net Zero Energy facility.

B. Ground Loop Geo-Exchange System:

1. A vertical borehole well field area consisting of (400) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 375 to 450 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

3. Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

4. Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

C. Central Heating and Cooling System:

1. Central geothermal heating and cooling shall be provided by four high efficiency 300 ton (approx. nominal capacity) heat recovery chiller-heaters or (40) 30 ton modular chiller-heaters connected to the ground loop system.

2. The ground loop circulation system shall be filled with 25% propylene glycol solution and shall be served by three 1000 GPM pumps with variable frequency drives.

3. Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three primary condenser water pumps at 1,000 GPM each.

4. Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three secondary heating pumps at 1,000 GPM each.

5. Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow with three 750 GPM pumps.

6. The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall be two-pipe configuration.

7. The building loop piping system shall contain a 25% propylene glycol solution for freeze protection and corrosion protection.

8. The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

D. Exterior Classrooms - Induction Units with Displacement:

1. The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe floor mounted chilled beam induction units with displacement supply air. Four 5 ft. long units shall be provided for each typical classroom mounted along the exterior wall. Units shall be served by two 7-inch diameter primary ventilation supply air ducts.

2. The primary supply air serving each classroom shall be provided with a modulating supply air volume control terminal to control supply air when the room is occupied.

3. Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4. A carbon dioxide sampling sensing system will be provided in classrooms to provide monitoring and occupied control of ventilation air.

E. Interior Classrooms and Other Spaces – Ceiling Induction Units:

1. Interior classrooms and other interior occupied spaces will be served with ventilation supply air from a rooftop heat recovery ventilation unit connected to ceiling mounted chilled beam induction terminals. Induction terminals shall be provided with four-pipe supply and return water connections.

2. Individual classrooms shall be provided with a supply air volume control terminal to control ventilation air when the room is occupied. A carbon dioxide sampling sensing system shall be provided for classrooms to monitor and control ventilation air.

F. Classroom and Interior Ventilation Systems:

1. Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2. The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives, total energy recovery wheels and secondary sensible reheat wheels to allow for a low level of dehumidification control. The units will be provided with two-pipe dual temperature water connections to a single combination pre-heat and cooling coil. Changeover between hot water and chilled water supply shall be provided with the use of changeover valves connected to the hot water and chilled water systems. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating.

3. All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4. Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air with limited volume control terminals in the exhaust air system.

5. Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

G. Existing Gymnasium:

1. The existing heating and ventilating units in the gym shall be replaced with new HVAC units in Phase 02. The units shall include a hydronic coil for heating and cooling using hot water and chilled water. Units shall also include a heat recovery section with an enthalpy wheel for outdoor air heat recovery meeting the requirements of the MA energy code due to the level of outdoor air required.

2. Two units shall be provided, which shall be located indoors or outdoors depending on structural and architectural requirements. Units be provided with a round ductwork distribution exposed within the space.

3. The units shall be provided with variable frequency drives for the supply and return fans to reduce the fan speed during times of low demand. Supply, return, and outside air flow measurement and control shall be provided.

4. Provide a new H&V unit with plate heat exchanger to serve the existing locker rooms.

H. Existing Swimming Pool:

1. The existing heating and ventilating unit serving the pool shall be replaced with a new H&V unit in Phase 02. The unit shall include a hydronic coil for heating using hot water. The unit shall also include an air-to-air flat plate heat exchanger for exhaust air sensible heat recovery.

2. The pool deck exhaust system shall remain, but the existing exterior mounted exhaust fan shall be relocated to the roof due to the Phase 02 construction. Exhaust duct shall be extended up through the building in a ne duct shaft.

3. Provide a new H&V unit with flat plate heat exchanger to serve the new locker rooms.

I. Miscellaneous Areas:

1. All normally occupied areas will be air conditioned except for corridors, the kitchen, and culinary classrooms with kitchen hoods (if applicable). The kitchen and culinary areas are partially tempered by using transfer air from the commons for make-up air.

2. The Auditorium, Stage, Media Center, Cafeteria, and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

3. Rooftop air conditioning units (RTU) will include supply fan, return fan, hot water heating coil, chilled water cooling coil, filters, and variable frequency drives. Units serving Administration, Media Center, Band/Chorus, and the Cafeteria will be variable air volume (VAV) with local variable air volume boxes for zone temperature control.

4. The Auditorium and Gymnasium units will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5. The Auditorium, Gymnasium, Cafeteria, and Media Center systems will be provided with space carbon dioxide (CO_2) sensors to provide modulation of outside air based on occupancy demand.

6. Areas such as the Cafeteria, Black Box, parts of the Media Center, main lobby and open group learning spaces may alternatively be provided with a radiant floor cooling and heating system. System shall include connections to the hot water and chilled water piping, circulation pumps, circuit headers, controls, and under-slab PEX piping distribution.

J. Building Management System (BMS):

1. Provide direct digital control (DDC) BMS with local and unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building including; chillers, pumps, heat recovery units, rooftop units, fans and terminal units shall be controlled and mapped to a central monitoring station. System shall be based on the Niagara Framework open protocol for interoperability between manufacturers.

2. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

K. Carbon Dioxide Sensing System:

1. Provide an Aircuity, or equal, carbon dioxide air sampling and sensing system consisting of room sensors, cabling, tubing, room probes, air routers, and vacuum pumps.

2. Air tubing from room sensors shall be collected through air routers to sensing stations.

3. The system shall include an information management system and shall be integration with the building management system.

4. Building management system input shall provide control input for modulating supply air terminal units or automatic dampers.

L. Electrical and BTU Metering:

1. Electrical metering shall be provided for collection of historical and real-time performance data. Separate meter groups shall be provided for the upper school areas and lower school areas consisting of meters for the measurement of lighting and plug loads for each classroom group by wing, floor or classroom type.

2. Individual metering of lighting and plug loads shall be provided for the Kitchen, Media Center, Auditorium/Stage, Gymnasium, and Administration areas.

3. Electrical metering shall be provided for each air handling system, central system pumps (by each group type), and each chiller-heater.

4. Provide BTU metering of chilled water, hot water, ground loop circulation systems and domestic hot water system.

M. Phasing Considerations:

1. Construction of the new facility is in two phases (Phase 02 and Phase 04). Phase 02 of construction allows for the existing building to remain occupied, while a large part of the new construction is completed. Therefore, the existing boiler room must remain active during Phase 02 and the new chiller-heater plant must be constructed to support the new construction. Approximately 900 SF of new mechanical space will need to be constructed next to the boiler

room in the first phase to provide space for the new equipment. One of the steam boilers may also be phased out and demolished in this first phase.

2. Construction phasing will require that the geothermal borehole field be installed in two phases. The first phase may be constructed in the area of the new football field, parking and drive lanes to the west of the fieldhouse. The second phase may be constructed in the area of the Soccer 02 field, and parking and drive lanes to the east.

3. The existing gym and pool areas will be renovated in Phase 02, including replacement and upgrade of the existing HVAC equipment.

4. Completion of the new central chiller-heater plant construction may begin in Phase 03 with the removal of the remainder of the existing boiler plant.

F. BUILDING SYSTEMS / Electrical - OPTION 2.3

Belmont High School

ELECTRICAL

2.3 Minor Renovation / Major Addition

A. Existing Electric Services:

1. Based on the proposed renovation/addition scope to maintain the Field House and Pool, existing services will be required to be maintained to deal with construction phasing and maintaining existing systems while renovations and new additions are completed.

2. The intent is that upon completion, there will be new services throughout the entire renovated facility and new additions.

3. The Main Electric Room housing the main electric switchboard is located adjacent the Boiler Room, these rooms are located at the northwest corner of the facility adjacent the Fieldhouse.

4. Scope will include maintaining and/or providing new feeders to existing panelboards and mechanical equipment to be kept operational during renovation and new construction.

5. Coordinate with Utility Company for the relocation of any utility poles and overhead pole lines associated with new construction and scheduled demolition of the existing school building.

6. All existing services shall be maintained for the complete operation of existing school building until the scheduled date of demolition of the existing building. Upon substantial completion, coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

7. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

8. Include maintaining the operation of existing site equipment such as irrigation pumps. Provide new services to all equipment affected by new construction.

B. New Main Electric Service:

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / Electrical - OPTION 2.3

C. New Normal Distribution System:

1. Main switchboard will be provided with surge protection (SPD) and ground fault protection on main and feeder devices.

2. Surge protection will be provided in all 120/208V panelboards.

D. New Emergency Distribution System:

1. Natural gas/diesel (fuel source to be determined) emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:

   a. Kitchen walk-in coolers and freezers.

   b. Telephone system.

   c. Security system.

   d. District and school IT head-end equipment (located in the MDF Room).

   e. Cooling equipment for school and district IT equipment.

   f. Fire alarm system.

   g. Circulator pumps and controls.

2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.

3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.

   a. Additional lighting in Gymnasium, Cafeteria, Kitchen, and associated toilets and corridors.

   b. HVAC ventilation equipment (no air-conditioning) associated with the Gymnasium, Cafeteria, Kitchen, and associated toilets and corridors.

   c. Receptacles in Gymnasium and Cafeteria.

4. Generator will be ground mounted at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank (if diesel). Generator will be mounted on an elevated concrete platform for survivability.

5. Emergency panels will be located in new two-hour rated electric closets.

6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.

8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.

E. Sustainable Design Intent LEED 4.0:

1. Sustainable Design Intent compliance will include:

a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).

b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.

c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.

d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.

e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of three locations on Level 3 and/or Level 4 electric closets.

F. Lighting:

1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.

3. Athletic field lighting will be provided at the Softball and Baseball fields.

G. Lighting Controls:

1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.

2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.

3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.

4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.

5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.

H. Auditorium:

1. A professional theatrical lighting system will be provided.

I. Convenience Power:

1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.

2. Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas such as Commons/Café, Kitchen and culinary areas.

J. Fire Alarm:

1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be maintained and utilized where applicable.

   a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.

   b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.

   c. Visual only units in conference rooms, meeting rooms and small toilets.

   d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.

   e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.

   f. Connections to all Fire Protection devices and Kitchen hood.

   g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.

   h. Remote annunciator at main entrance and secondary entrances as directed by Belmont Fire Department.

   i. 24 VDC magnetic hold open devices at smoke doors.

   j. Master box and exterior beacon (quantity of beacons per Belmont Fire Department.

   k. Wiring will be fire alarm MC cable.

K. Technology per Technology Section.

F. BUILDING SYSTEMS / Electrical - OPTION 2.3

L. Integrated Intrusion, Access Control, CCTV, and Alarm System:

1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in first, second, and third floor corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.

2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours community programs, including Gymnasium and Cafeteria entries.

3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.

4. Access control via card access system will be provided at all exterior doors.

5. CCTV system will be IP based with minimal 30 day recording capacity. System will be web based to allow viewing by Belmont Police Department.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / Information Technology - OPTION 2.3

Structured Cabling System:

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. Internet services and wireless controllers in the existing high school MDF provide connectivity at all the school facilities and the Town. These systems must remain operational during construction. Therefore, the MDF and the existing district fiber must be protected during construction.

A new MDF will be created. The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power. The new MDF will be built-out and cutover during an early phase of construction. The district fiber will be re-routed or extended to the new MDF location. Existing Telco lines, which terminate in the Main Office area will need to be protected and re-routed or extended. Temporary cabling and services may be necessary to maintain functionality of existing systems during demo work.

New IDFs will be created. The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be built-out and come on line in conjunction with construction phasing. Existing IDFs will be brought offline in conjunction with construction phasing. Temporary cabling and services may be necessary to maintain functionality of existing systems during demo work.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

The existing Category 5 horizontal cabling will be replaced. The new data cabling infrastructure will be based on a Category 6A, or most up to date standard at the time of bid. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. Cabling will terminate in the MDF or one of the IDFs. Temporary cabling may be necessary to maintain functionality of existing systems during demo work.

The existing fiber backbone within the school will be replaced. The new fiber backbone will connect the MDF and all IDFs. It will consist of twelve strands of multi-mode and six strands of single-mode fiber optic cables. All multimode fiber optic cables will use multimode, graded-index fibers with 50-micron cores only. Fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. Temporary cabling and services may be necessary to maintain functionality of existing systems during demo work.

Data and Voice Communication Systems:

Updated networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system, audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ chassis and power supplies, 10/100/1000 PoE+ modules, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Backbone will be 10Gb minimum.

Updated VoIP server and hardware will be provided. The existing NEC 8300 will be upgraded to the 9300 platform, or current standard at the time of bid. Several elementary schools in the district depend on the existing VoIP system for connectivity, so it must remain operational during

F. BUILDING SYSTEMS / Information Technology - OPTION 2.3

construction. The new system must be compatible with existing VoIP equipment in the district.

Audio/Visual Communication System

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems.

Distributed Communication System

The existing Simplex Building Communication System will be replaced with a new system. The new system should be built-out with the new MDF during an early phase of construction so that newly renovated or constructed areas can come online. The new distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school safety notifications and general communications. It will provide complete internal communications using state of the art IP technology with two-way loud speaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements in the future (additional hardware will be required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

ACENTECH

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BELMONT HIGH SCHOOL FEASIBILITY STUDY
AUDIOVISUAL SYSTEMS, OPTION C.2.3

SUBMITTED TO: PERKINS + WILL

CONSULTANT: ACENTECH

JANUARY 23, 2018

ACENTECH PROJECT NO. 629341

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
- 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:

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.

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 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.

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

1. Architectural: The following items should be considered for proper coordination between audiovisual system components and other trades:
    a. Loudspeaker coverage must not be obstructed.
    b. Structure will be necessary to ensure that loudspeakers and the projection screen can be ceiling-mounted at recommended locations.
    c. Antennas for the assistive listening system and wireless microphones will be mounted on the wall.
    d. Wall-mounted connection panel locations will require coordination.
    e. Ceiling-mounted video projectors must be free from vibration.
2. AV Equipment Racks:
    a. 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.
        i. 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.

ii. AV equipment rack rooms may require oversized doors.

3. Auditorium Mixing Console:
   a. 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.
   b. Control Booth:
      i. Please note the following guidelines:
         1. Coordination will be required with the acoustical consultant to maintain proper acoustical isolation between the Auditorium and the Control Booth.
         2. 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.
4. Video Projection:
   a. 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.
   b. Whiteboards & marker boards that are used as a projection surfaces shall be of projection quality so that they minimize reflections and projection hotspots.
5. Blocking will be required at all wall-mounted video display panel and loudspeaker locations.
6. Mechanical/Electrical: The following items should be considered for proper coordination between the audiovisual system components and other trades:
   a. 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.
   b. Electrical outlets will be required at the equipment racks, mix location floor-box, and wall-mounted receptacle panels.
   c. IT data drops are strongly recommended at the equipment racks and all AV receptacle panels.
   d. 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.
   e. Equipment Rack Locations:
      i. AC power requirements and heat loads will need to be considered at each equipment rack and video projector location.

* * * * * *

End of Feasibility Study

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

OPTION 2.4 - MINOR RENOVATION / MAJOR ADDITION

SUMMARY

Option 2.4 proposes a substantial addition and phased renovation to the existing high school, creating a new 7-12 high school. This scheme creates an elongated building footprint (in the East-West direction) that organizes the program around a daylight 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 Clay Pit 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. A 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 spaces, including a new entry, administration and wellness space to be constructed east of the existing fieldhouse. The fieldhouse, pool, and associated athletic spaces would be renovated including the existing small gymnasium. Upon completion 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. This configuration is unique within the options in that it allows for a balance between the needs for separate identities and scales for upper and lower school functions while achieving the synergies that allow both younger and more experienced students to engage in educationally beneficial ways at the buildings heart.

SITE STRATEGY

In this scheme the building mass is placed away from the existing rail bed with most academic teaching spaces overlooking the pond with optimal orientation for daylighting. This option proposes two separate entry and exit points to the site helping to disperse traffic congestion during the drop-off and pick-up periods. It also provides separate building entry points allowing for a sensitivity to scale for lower and upper grades. In this option many of the athletic fields become collocated on the eastern half of the site allowing for more overlap and as a result higher use of the site. This colocation also helps in both the efficiency of maintenance and the ability to manage storm water in a sustainable, cost effective manner.

SUSTAINABILITY AND BUILDING PERFORMANCE

The following sustainability and resiliency attributes have been considered in evaluating this option:

ENVELOPE – Aggressive performance will be pursued in the new wall make-up including a goal of R-28 and minimized thermal bridging with the intent of minimizing air and vapor movement

ORIENTATION- This scheme orients the majority of teaching spaces to the south and north with the intent of eliminating glare to the north and shading for glare control to the south. Public spaces will be day lit from above and through borrowed light

SKIN TO VOLUME RATIO- The skin to volume ratio of the minor renovation- major addition schemes are similar and attempt to form a concise footprint while maximizing daylight.

WINDOW TO WALL RATIO-The window to wall ratio of the scheme will attempt to achieve 30-40 glazing balancing heat gain with effective daylighting.

PV POTENTIAL- This scheme creates a simple continuous roof surface that does not shade its selves and optimizes roof top yield by orienting itself in the east-west direction.

SITE ENVIRONMENTAL PERFORMANCE- This scheme allows for one contiguous large geo-exchange field and allows for more performative landscape adjacent to the pond allowing outdoor teaching space to overlap with site sustainable strategies at the water edge.

PROSPECTIVE SITE ANALYSIS - OPTION 2.4

SITE

This narrative provide an analysis of the option including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access, and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed separately. All addition renovation and new building options include complete reconstruction of the site east of Harris Field to accommodate the site program requirements except tennis which will be accommodated at other existing courts in

A. PROSPECTIVE SITE ANALYSIS - OPTION 2.4

Town.

Harris Field including the track and supporting facilities are existing to remain. Spatial accommodations have been made in the site planning for the school project to accommodate a multi-modal community path along the north property line abutting the MBTA right-of-way and a multigenerational path around Clay Pit Pond – both with separate funding and implementation timelines. The school building project site design is anticipated to incorporate the portion of the multigenerational path that connects across the north side of Clay Pit Pond, as that will serve as a vital link between the school's site program elements and circulation through the campus.

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 (292 spaces) is located to the east of the school building. Small lots are located to the south (36 spaces) and north (21 spaces) of the building. Nine buses currently park along the far east side of the east parking lot. All parking areas contain accessible parking.

Most of the school's athletic facilities are located west of the school building including two baseball fields (varsity is played on Grant Memorial Field which includes bleacher seating, dugout shelters and a prominent gateway) with rectangular field layouts (for soccer and field hockey) overlapping their outfields, a rugby/football practice field and Harris Field which includes a running track and synthetic turf field, home and away bleachers and sports lighting. An indoor skating rink in poor condition and a football field house separate these fields from the varsity softball field further west with lighting and a soccer/lacrosse field overlapping the outfield. Ten tennis courts are located adjacent to the east parking area and the junior varsity softball field is located further east of the primary east parking area.

BUILDING FOOTPRINT

In Option C2.4, the only portion of the existing building to remain and be renovated is the field house, gym, pool and supporting facilities. The new school building is an addition to this structure expanding the building footprint to the south stretching east and west along the north side of Clay Pit Pond. The new building construction is positioned in the middle of the site set back from both Concord Avenue and the railroad right-of-way.

ATHLETIC FIELDS

The athletic fields except Harris Field are reconfigured as follows:

- One softball and baseball combination field overlap with a soccer/field hockey field west of the rink.
- A football/rugby field is located between the field house and Harris Field just north of the new building construction.
- The varsity baseball field (to replace the Brendan Grant Memorial Field) is located at the east end of the site with an overlapping soccer field.
- The varsity softball field is adjacent to the varsity baseball field. The soccer field also overlaps the softball outfield.
- A lacrosse/soccer field is located between the east softball and baseball fields and the school building.

TRAFFIC CIRCULATION

The driveway between the building and Clay Pit Pond is eliminated, and a new 2-way driveway is located around the rear of the building with new access points across from Trowbridge and Goden Streets. Building entrances to the upper and lower school program have separate entrances and drop off loops at the east and west ends of the building. The multigenerational path connecting along the north side of the pond links the site and building program elements and provides pedestrian, bicycle and emergency vehicle access through the site.

PARKING

This site plan meets the school's parking need for 430 spaces. Parking is redistributed along the entire length of the campus driveway providing convenient access to the school building and fields. This parking configuration also serves as a buffer between the school campus and MBTA rail line as well as the future multi-modal Community Path planned along the north border of the site.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

B. CONSTRUCTION IMPACT - OPTION 2.4

Option 2.4 would require minor renovations within the existing occupied school and would be undertaken in 2 or 3 phases. Modular classrooms are not anticipated to be required on site during renovations. Scheduling work over summer or holiday breaks may alleviate some of the disruption but would need to be carefully managed. The anticipated construction schedule is 42 months.

Work under this option would be less disruptive to students and staff. Students would be forced to move only once to accommodate the construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

OPTION 2.4 - I. DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	April 10th, 2018 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 29th, 2018 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2018
Design Development Complete	November 2018 - April 2019
Construction Documents Complete	May 2019 – January 2020
Bid and Award	February 2020 - March 2020
Construction (multiple phases)	April 2020 – October 2023 (42 months)

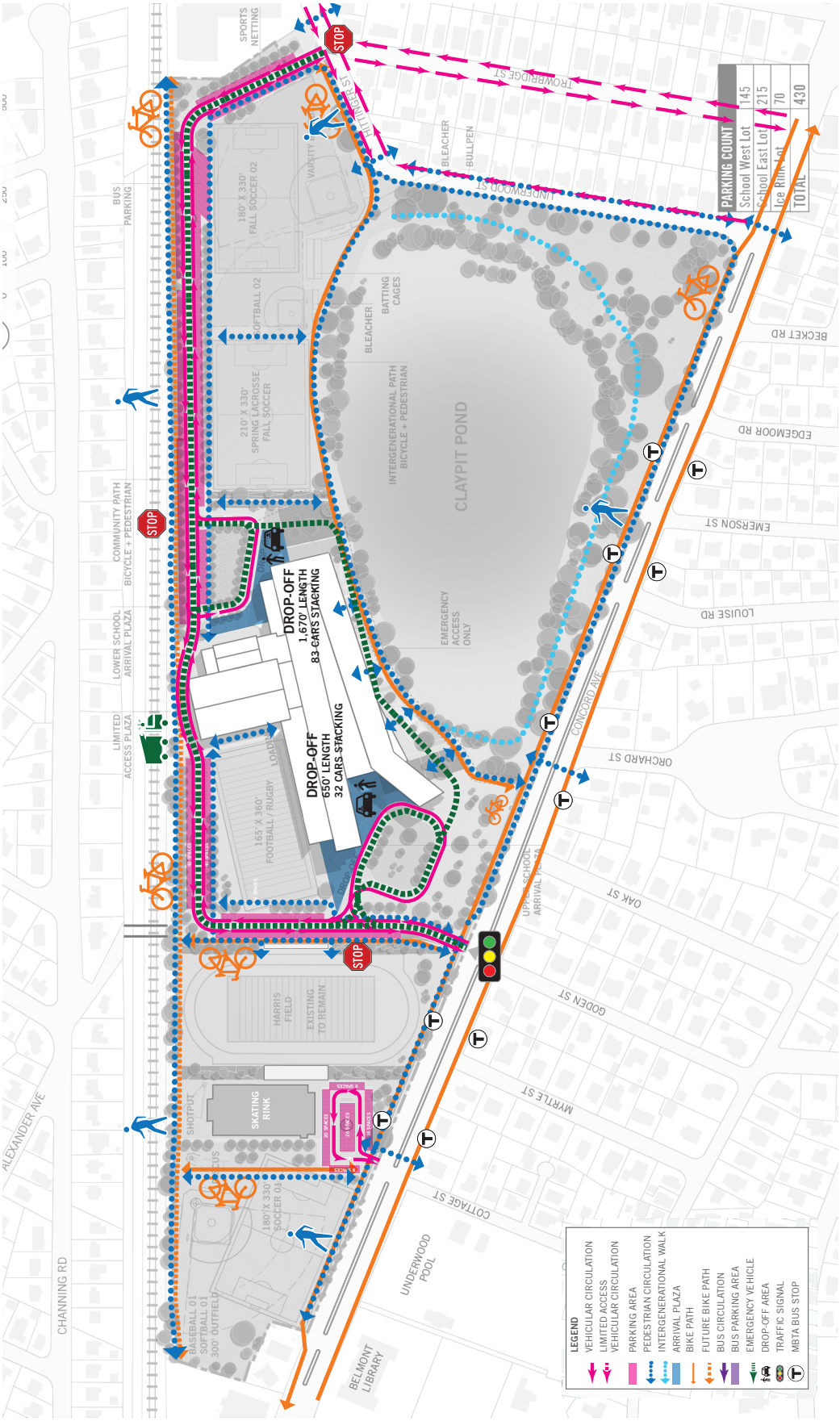
B. CONSTRUCTION IMPACT - OPTION 2.4 / Phasing Diagrams

PERKINS+WILL

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

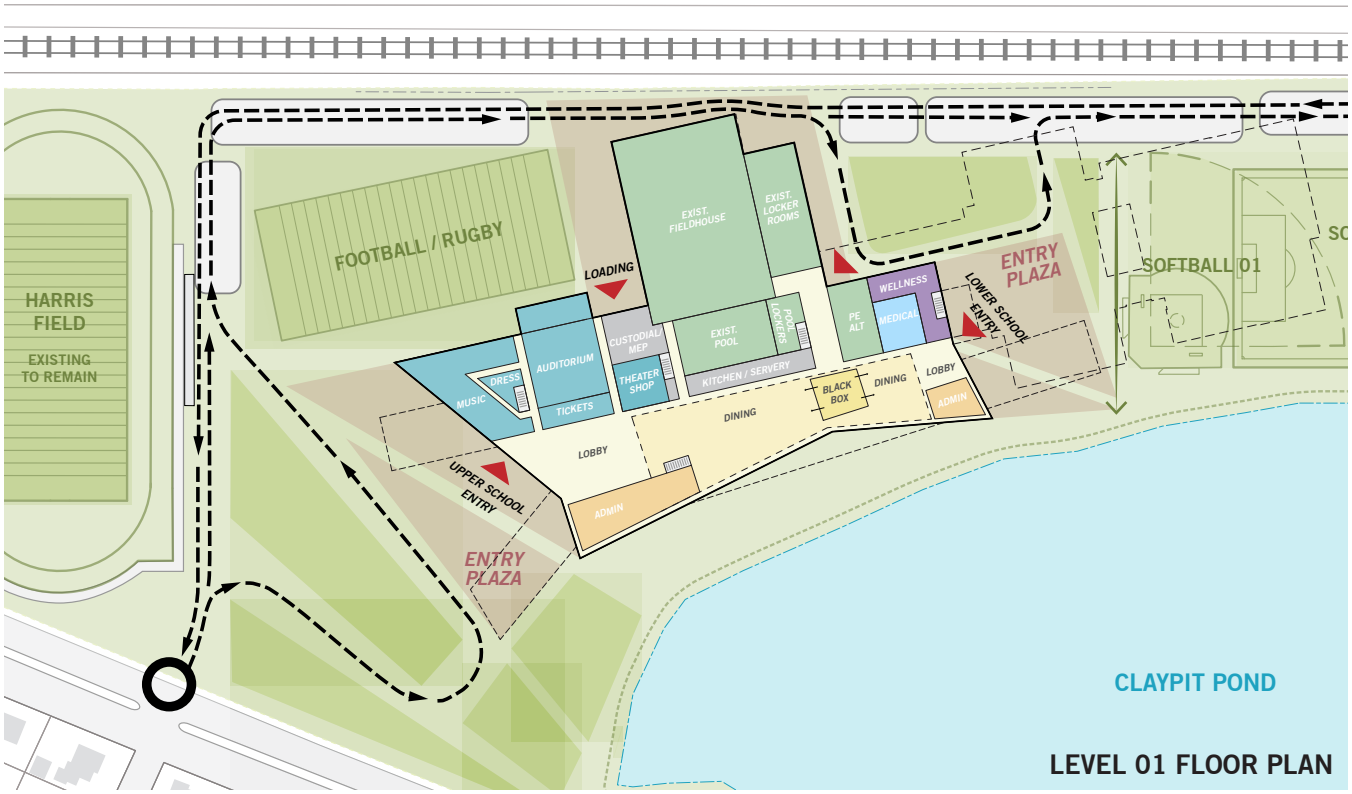
C. CONCEPT DRAWING - OPTION 2.4 / Site

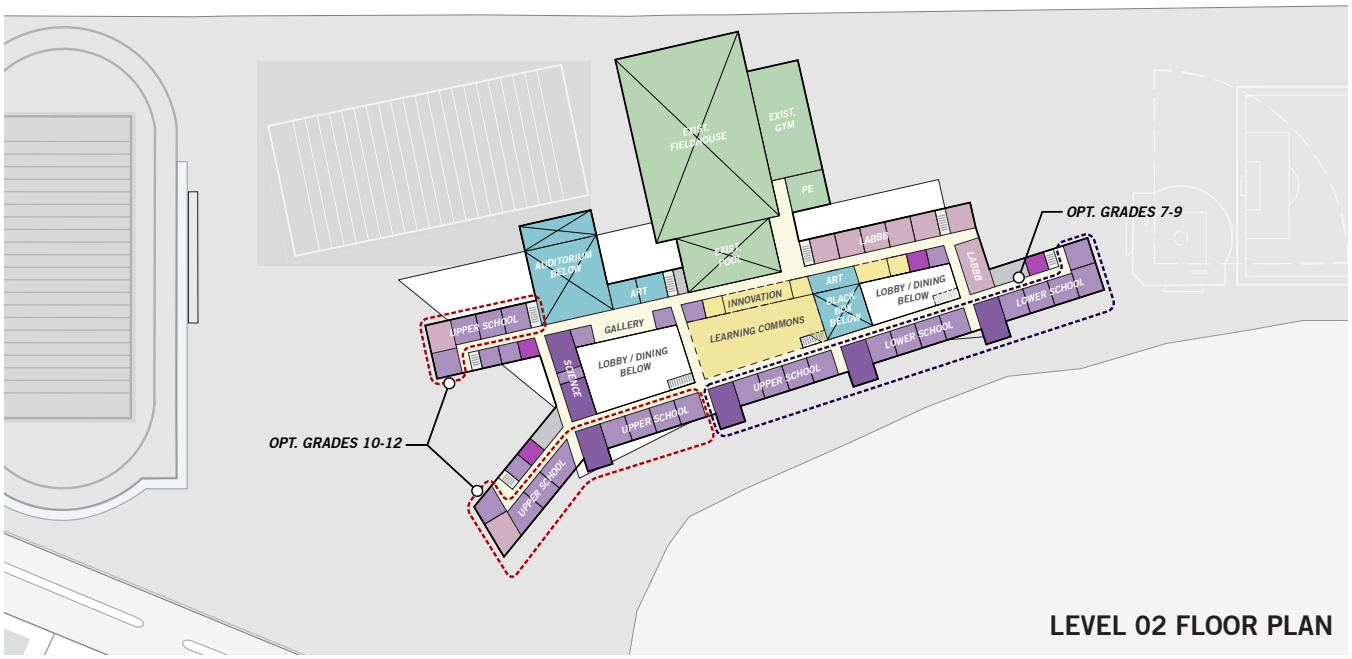
C. CONCEPT DRAWING - OPTION 2.4 / Traffic Site Plan



3.3.3 - FINAL EVALUATION OF ALTERNATIVES

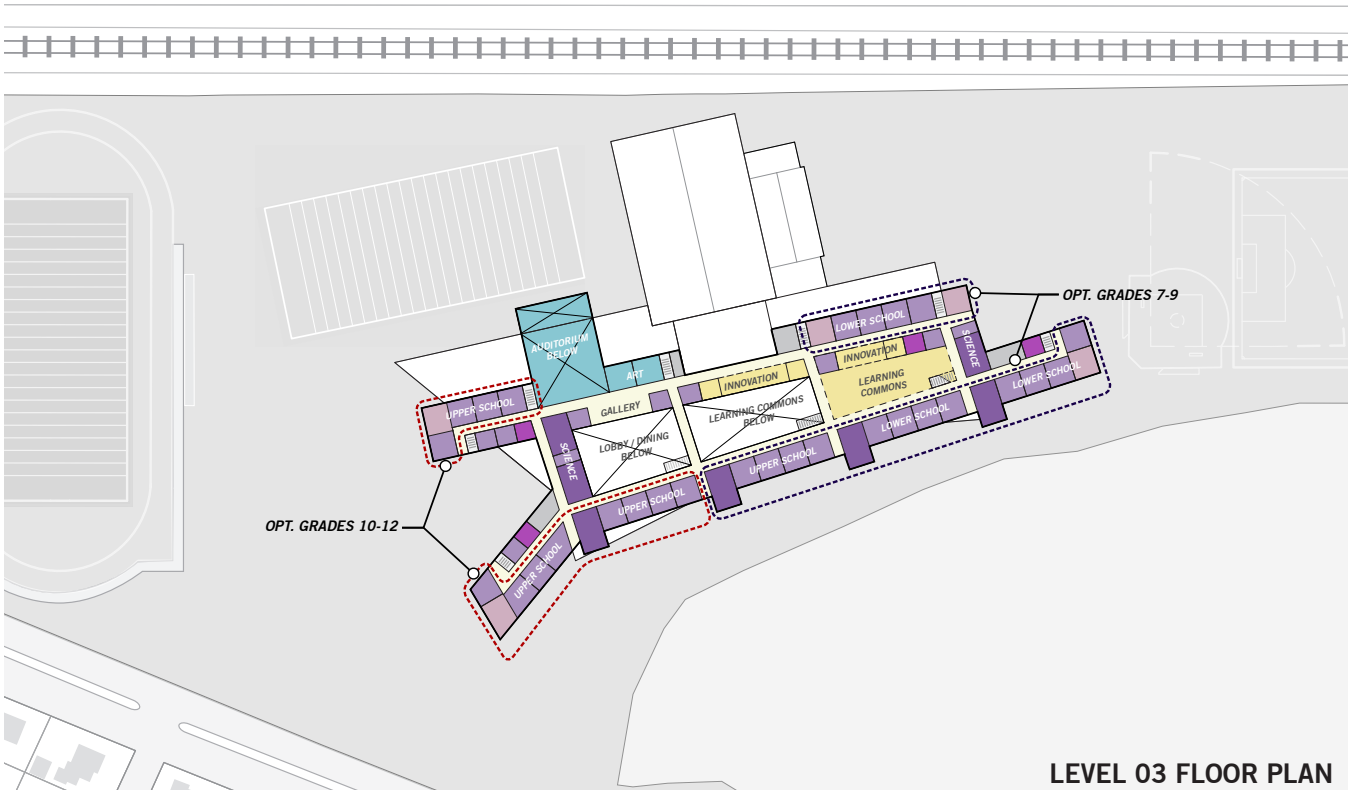
C. CONCEPT DRAWING - OPTION 2.4 / Architectural



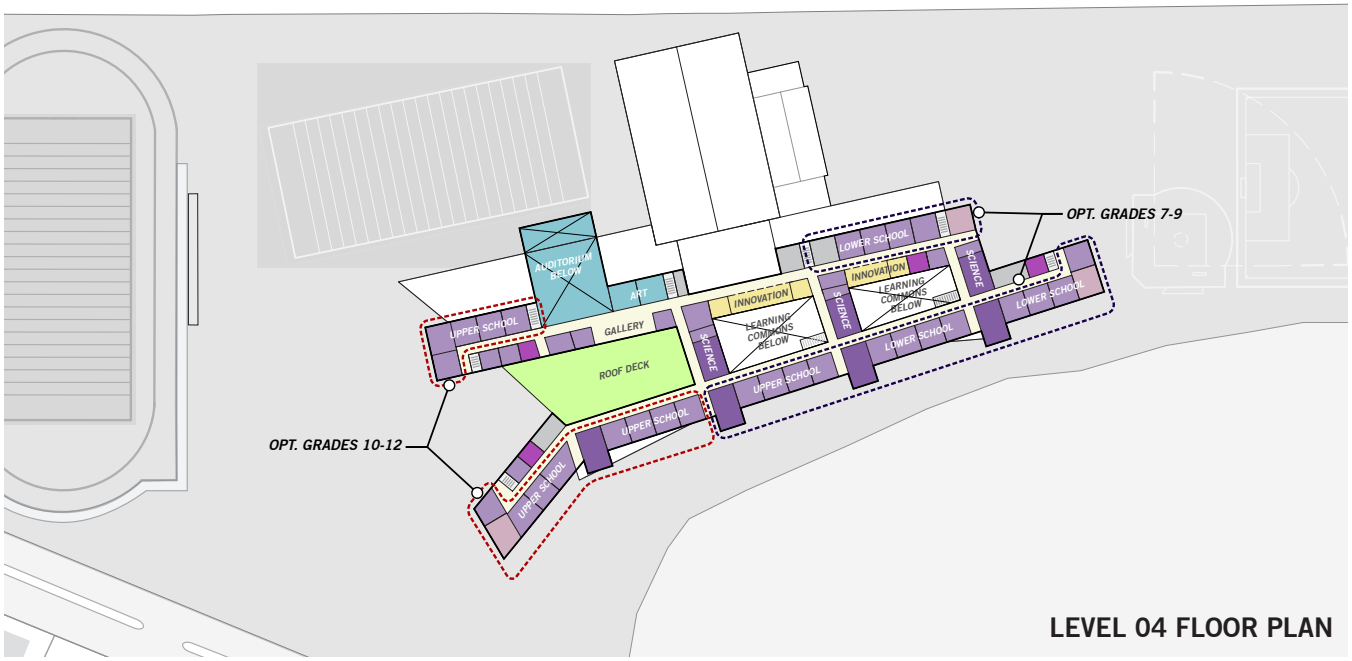


C. CONCEPT DRAWING - OPTION 2.4 / Architectural

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Special Education



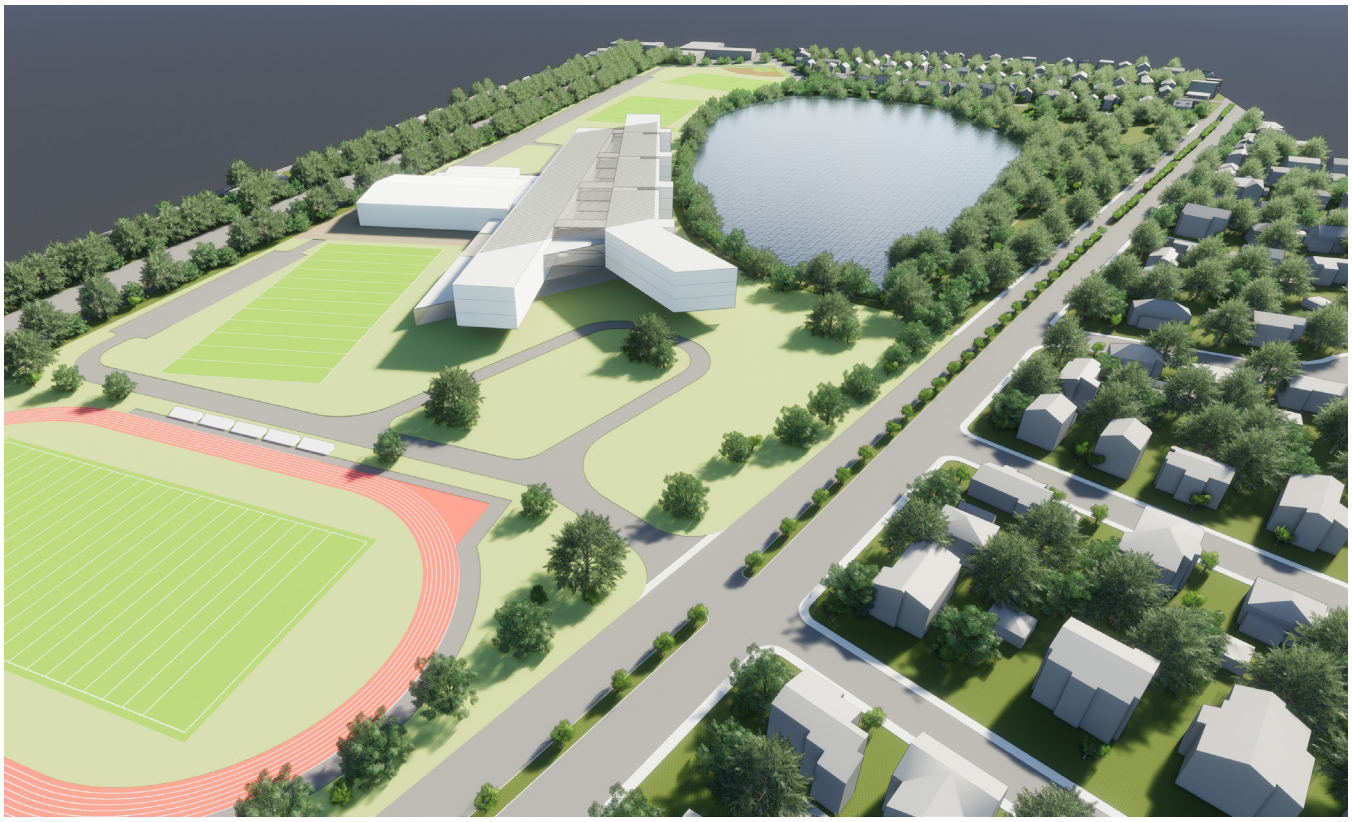
LEVEL 03 FLOOR PLAN



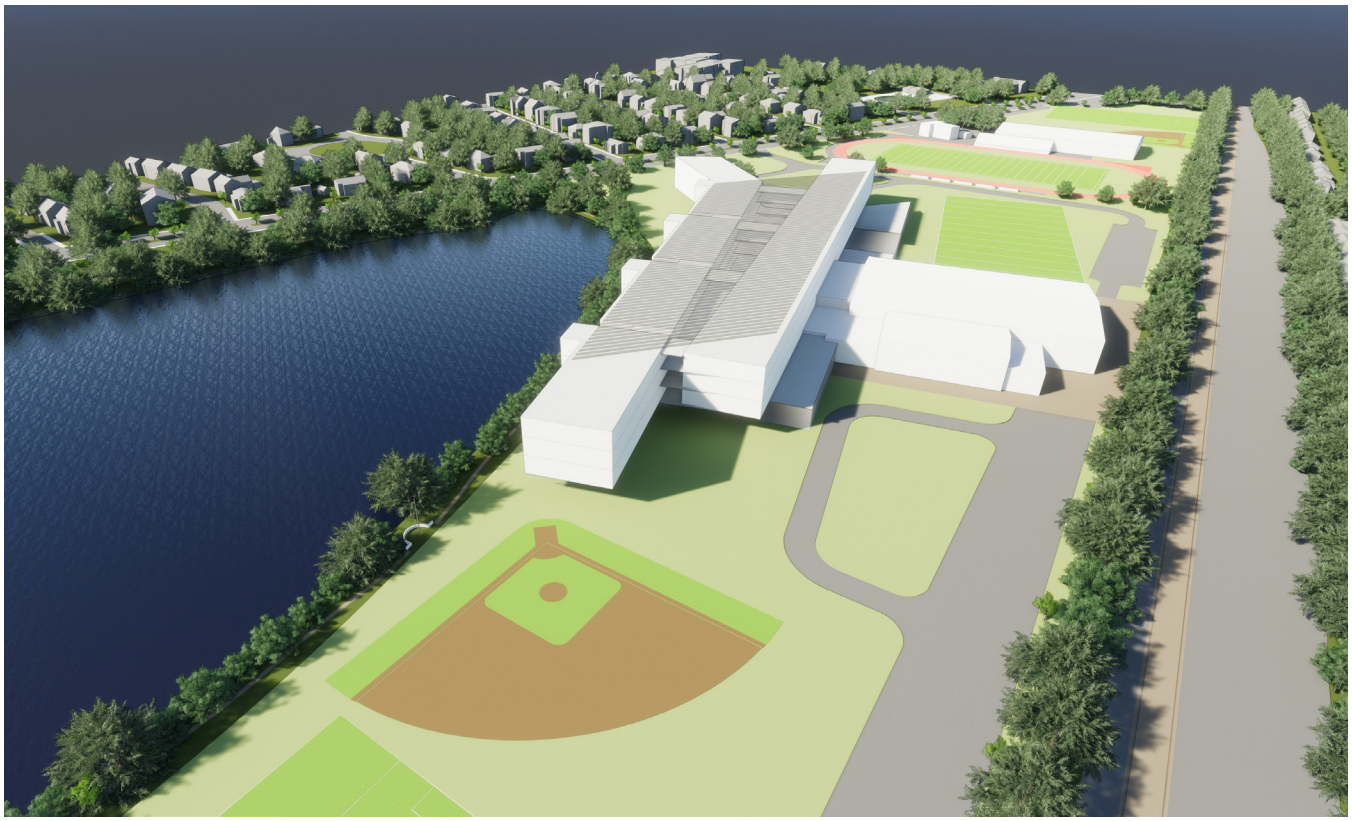
LEVEL 04 FLOOR PLAN

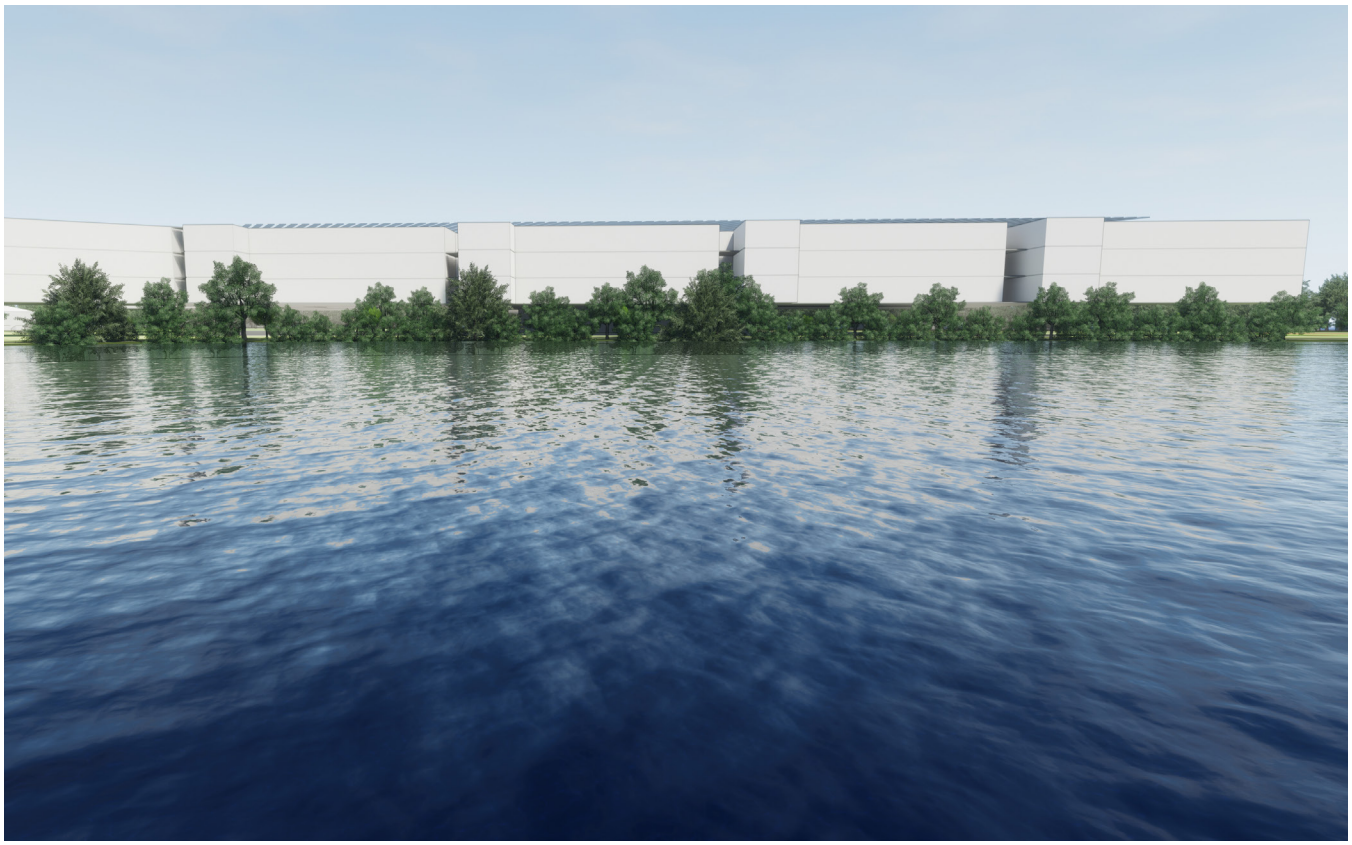
3.3.3 - FINAL EVALUATION OF ALTERNATIVES

C. CONCEPT DRAWING - OPTION 2.4



C. CONCEPT DRAWING - OPTION 2.4





BELMONT HIGH SCHOOL
Structural Narrative – Option 2.4
Minor Renovation and Major Additions to the Existing School

January 22, 2018

PROPOSED SCHEME

The proposed scheme calls for phased renovations, demolition of portions of the existing school and construction of new additions. In the first phase, a substantial new addition will be constructed at the west side of the existing school building. The addition will house the entire upper school, including a new theatre, commons space and a cafeteria. The next phase will include demolition of the eastern portion of the existing school and construction of a new addition that would house the lower school grade spaces, including a new small gymnasium. The existing field house, pool and associated spaces will be renovated in the last phase.

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 structure, a check for compliance with 780 CMR, Chapter 34 "Existing Structures" (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 portions of the existing building are considered un-reinforced masonry bearing wall structures, the analysis and reinforcement of the existing structure would be governed by the requirements of Appendix A1 "Seismic Strengthening Provisions for Un-reinforced Masonry Bearing Wall Buildings" in the IEBC.

D. STRUCTURAL SYSTEMS - OPTION 2.4

1. PRESCRIPTIVE COMPLIANCE METHOD

In this method, compliance with Chapter 3 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 the 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.

2. 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.
The extent of the renovations (includes Architectural, FP and MEP renovations) for this project will exceed 50 percent of the aggregate area of the building, thus the LEVEL OF WORK for this project would be classified as LEVEL 3 Alterations. This would require compliance with provision of Chapter 7, 8 and 9 of the IEBC. The scope of the project includes new additions to the existing structure; 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 the 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 the 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.

- For alterations that involve structural alterations to more than 30 percent of the total floor and roof area of the building within a 12 month period, the evaluation and analysis shall demonstrate that the altered building structure complies with IBC for wind loading and with reduced IBC level seismic forces.
- For alterations where more than 25 percent of the roof is replaced for buildings assigned to seismic design category B, C, D, E or F, all un-reinforced masonry walls shall be anchored to the roof structure and un-reinforced masonry parapets shall be braced to the roof structure.

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 the existing structure, the existing structure and its addition, 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.

3. 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:

1. PRESCRIPTIVE COMPLIANCE METHOD

Additions

The proposed additions will be designed structurally independent of the existing structure, 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 structure 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 increase the effective seismic weight on the existing structure due to the greater snow loads from the drifted snow against any proposed addition, or, by addition of equipment on the roof, the increase of the effective seismic weight from the drifted snow and the equipment would require that the existing lateral load resisting system comply with the requirements of the Code for New Construction in the IBC and it would increase the demand-capacity ratio on certain structural elements of the existing lateral load resisting system.

2. WORK AREA COMPLIANCE METHOD

Level 3 Alterations
If the proposed structural alterations of the 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. The percentage increase in seismic demand-capacity ratio on any particular structural element from the added snowdrift load against the proposed addition would be fairly low, thus, this would not have any major impact on the existing lateral load resisting system, though we would have to verify that the increase in seismic demand-capacity ratio on any of those particular structural elements is not greater than 10 percent.

If the proposed structural alterations of the existing structure exceed 30 percent of the total floor and roof areas of the 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 have to be evaluated. If the existing anchorage of the walls is deficient, the tops of the masonry walls will require new connections to the structure.

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

Comment
The compliance requirements of the two methods, in most respects, are very similar. The Work Area Compliance Method would trigger anchorage of un-reinforced masonry walls, if re-roofing of the existing structure is included as part of the scope for this project. The Prescriptive Compliance Method would require that the existing lateral load resisting system meet the requirements of the code for new construction of the IBC, even for small increases of design lateral loads. We are required to comply with requirements of Appendix A1 of IEBC for either method, which requires anchorage of all existing masonry walls. Based on this, we would recommend the Work Area Compliance Method for the project.

Summary of Renovations to the existing structure
Based on the scope of the proposed scheme for renovations of the existing school, we have determined that the existing structure would essentially have to comply with the Code for New Construction which would require the addition of new lateral load resisting elements such as structural steel braced beams on masonry shear walls throughout the floor plates at every level. All of the un-reinforced masonry walls are required to be anchored to the floor and roof structure and all of the roof diaphragms have to be reinforced, to resist uplift loads per the Code for New Construction. The addition of braces will require modifications to the existing column foundations at the brace locations and will require the addition of new piles. At the locations of existing slabs-on-grade, new tie beams will be required to connect the existing column foundations.

Belmont High School
Belmont, Massachusetts

Structural Narrative
Option 2.4 – Minor Renovation and Major Additions

Proposed Scheme for the Proposed Additions

SUBSTRUCTURE

FOUNDATIONS

Based on the construction of the existing school and the recommendations of the Geotechnical Engineer, the entire addition will be supported on pile foundations. The columns of the proposed structure would bear on 4 ft. – 0 in. deep reinforced concrete pile caps on structural steel piles. The exterior walls will be supported on 5 ft. – 0 in. deep grade beams spanning between pile caps with intermediate piles at 10 ft. – 0 in. on center. Based on an assumed pile capacity of 50 tons, a typical interior column in the four story classroom wings would be supported on 8 ft. – 0 in. x 8 ft. – 0 in. x 4 ft. 0 in. deep pile caps on a four pile group and a typical exterior column would be supported on 8 ft. – 0 in. x 8 ft. – 0 in. x 4 ft. 0 in. deep pile caps on a three pile group. The columns supporting the long span structure of the single story gymnasium, cafeteria, music spaces and other ancillary spaces would be supported on 8 ft. – 0 in. x 8 ft. – 0 in. x 4 ft. – 0 in. deep pile caps on three pile groups. In addition, the ground floor slab would be supported on single piles with a 2 ft. – 0 in. x 2 ft. – 0 in. x 2 ft. – 0 in. deep pile caps spaced out approximately 15 ft. – 0 in. (including interior and exterior pile caps supporting the columns.) All of the interior and exterior pile caps will be tied to the supported concrete slab.

SLAB ON GRADE

Based on the construction of the existing school and the recommendations of the Geotechnical Engineer, the lowest level of the proposed addition would be a 12 in. thick reinforced concrete slab reinforced with 6 psf reinforcing over a vapor barrier on 2 in. thick rigid insulation on compacted granular structural fill supported on piles.

SUPERSTRUCTURE

FLOOR CONSTRUCTION

Typical Floor Construction
A 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be 15 psf for the typical framing.

ROOF CONSTRUCTION

Typical Roof Construction
The roof construction would be galvanized, corrugated 1 ½ in. deep, Type 'B' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab will be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be 13 psf.

Low Roof Structure above the Kitchen, Mechanical Room and the Utility Areas
The roof would be a continuation of the adjacent second floor and would be similar to the typical floor construction of 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. This roof will be supporting the mechanical units. The units would be screened by a screen comprised of structural steel posts and beams. The weight of the structural steel is estimated to be 15 psf.

Alt. PE and Media Center Roof Framing
The roof construction would be acoustic, galvanized corrugated 3 in. deep, Type 'NA' metal roof deck spanning between long span metal joists and hollow structural steel columns. The weight of the structural steel is estimated to be 13 psf.

D. STRUCTURAL SYSTEMS - OPTION 2.4

VERTICAL FRAMING ELEMENTS

Columns
Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8 columns and the columns at the double story spaces at the Gymnasium and Lobby would be HSS 12 x 12.

Lateral Load-Resisting System
The proposed addition would be separated from the existing building by way of an expansion joint. The typical lateral load resisting system for the other parts of the school would be concentric steel braced frames comprised of hollow structural steel sections.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

E. SITE UTILITIES - OPTION 2.4

SITE UTILITIES

Storm Drainage

Stormwater from the site will continue to be directed to Clay Pit Pond. Outside of the existing stormwater outfalls into Clay Pit Pond it is expected that the entire stormwater system will have to be reconstructed so that the new stormwater system can effectively mitigate stormwater quality, rate and volumes from the project site. Runoff generated by the new parking and driveway areas would be collected in a catch-basin to manhole closed drainage system. Water quality from these areas would be addressed by directing those flows through Stormceptor water quality units (or similar). Volume and rates of stormwater from the site would then be addressed by directing these flows to subsurface infiltration systems located beneath the parking areas. The infiltration systems would consist of galleys of 36-inch perforated pipe in crushed stone bedding. Overflows from these infiltration systems would then be directed through the new closed drainage system to the existing outfalls to Clay Pit Pond.

Roof drainage from the building is not required to be treated for water quality, therefore it can be tied directly into the new closed drainage system prior to discharge from the existing outfalls. A portion of the roof drainage could be daylighted to a raingarden or stormwater demonstration area that is incorporated into the landscape design. This landscaped area would consist of an area with variable topography to direct the stormwater through it, plantings to provide treatment and nutrient uptake, walkways or boardwalks that allow students to observe the processes and possibly even hardscape stormwater features such as runnels or small falls to provide aeration.

The new and reconstructed athletic fields would have sub-drainage located below the topsoil layer, as is typical of turf field construction. The sub-drains can be connected directly into the new closed drainage system.

Sewer

Building placement in this scheme appears to conflict with a portion of the existing sewer main which bisects the site, running west to east approximately under the sidewalk, adjacent to the existing access drive in front of the school. Approximately 500 linear feet of 24-inch sewer main would need to be relocated to accommodate the new building location. Portions of the existing 24-inch sewer not in conflict with the new building would be maintained. Sanitary sewer service connections from the new school would be connected to the new/maintained 24-inch main. Lab waste flows would be directed through a pH neutralization system prior to connection to the sanitary sewer system. Flows from the cafeteria would be directed through a new, 10,000-gallon, external grease trap.

Water

It appears that portions of the new construction would conflict with the existing water main that is routed around the rear of the existing building. A new 8-inch water main, approximately 2,500 feet long, would be installed in the first phase of the construction, along the rear property line, out of the way of any future phases. New 4-inch domestic water and 6-inch fire services would be provided to the building from the new 8-inch main. Six new fire hydrants, located along the main, would also be provided as directed by the Belmont Fire Department

Natural Gas

The existing gas service conflicts with the proposed construction. A new gas service, located to the west of the proposed building would be provided from the existing gas main in Concord Avenue to the mechanical area located at the rear of the proposed building.

Electrical

A new ductbanck consisting of four 4-inch, concrete encased conduits would be installed from the existing substation located just east of the site on Hittinger Street to the new electric room located to the rear of the proposed building.

PRELIMINARY PERMITTING CONSIDERATIONS

Wetlands Protection Act (310 CMR 10.00)

A Notice of Intent would need to be filed with the Town of Belmont Conservation Commission for any work within 100-feet of Clay Pit Pond. In addition, a Stormwater Pollution Prevention Plan (SWPPP) would need to be prepared and an application filed with the Environmental Protection Agency under the National Pollutions Discharge Elimination System (NPDES) program for the construction related activities. Erosion control measures will need to be installed and maintained in good working order around the perimeter of the site. Due to the phase nature of the construction, the perimeter controls will have to be re-installed several times over the duration of the project.

E. SITE UTILITIES - OPTION 2.4

Flood Plain

Based on the Flood Insurance Rate Map (FIRM), Community Panel Number 25017C0418E dated June 4, 2010, the portions of the existing High School site are located within Zone X (Areas determined to be outside the 0.2% annual chance floodplain). There is no regulatory requirement for working within a Zone X. The Zone AE, which is associated with the 100-year flood area, is located in close proximity to the banks of Clay Pit Pond. None of the proposed building or any critical infrastructure is being proposed within the Zone AE.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / PFP - OPTION 2.4

FIRE PROTECTION

A. General

1) A minor renovation and major addition to the building will require a new sprinkler system to be installed.

B. To comply with current codes, this existing building and addition 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".

C. 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.

D. The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing; i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

E. The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

F. Fire protection piping main feeds to the fire protection systems from the alarm check valves will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building to provide complete sprinkler cover age throughout. Potential sprinkler zoning will be coordinated with any new fire wall layouts.

G. The fire protection design will include a combination standpipe system located in all egress stairways. These standpipes will feed the sprinkler system as well as provide a fire department hose connection at each level of the building.

H. The sprinkler system standpipes will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control valve assembly at the riser that 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 auditorium stage is greater than 1,000 square feet, fire department valves will be required on each side of the stage.

I. Sprinkler heads installed in gypsum or suspended ceilings will be glass bulb, quick response, chrome plated semi-recessed type. In areas without ceilings, 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.

J. The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

K. 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.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

F. BUILDING SYSTEMS / PFP - OPTION 2.4

L. 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.

M. The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. The exact type of connection (storz or siamese) will be coordinated with the Belmont Fire Department. Final location and number of fire department connections will also be coordinated with the Belmont Fire Department.

N. The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

PLUMBING

A. General

1) A minor renovation and major addition to the building would require that all existing systems be modified to comply with current codes. 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.

B. Plumbing Fixtures

1) All water closets, urinals and lavatories in the existing building are old and not current water conserving type. Removal of all fixtures is required as the existing fixtures have reached the end of their serviceable life. Water closets should be replaced with new dual flush valve fixtures. A full flush will discharge at a rate of 1.6 gallons per flush (gpf). When only flushing liquid waste and paper, the reduced flush rate will be 1.1 gpf. 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 for fixture spacing, mounting heights and protection of any exposed piping will also need to be met during a renovation to the bathrooms.

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.

C. Domestic Cold-Water System

1) The existing 6" domestic water line that enters the building is the original service to the building. Although the existing 6" domestic water service appears to be adequate to meet the current building water requirements, consideration should be given to replacing it with a new 6" dedicated domestic water service since a new 8" water service would also be brought in at this time to feed the new sprinkler system. The installation of a water meter on the new service will be provided to allow the town to be able to monitor water usage as may be required.

D. 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 provide hot water to all fixtures within 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 removed. The new gas-fired water heaters should provide hot water to all fixtures that these units currently serve.

E. Sanitary Waste and Vent System

1) The sanitary system in the existing building appears to be in fair condition but replacement may be required because 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.

F. 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) New roof drains and storm water piping system will need to be added to the new addition. Discharge of the storm water will be coordinated with the civil engineer.

3) 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.

G. Natural Gas System

1) Currently the existing gas service is more than adequate to meet the school's demand requirements and should remain. Gas piping should be reconfigured to serve all mechanical equipment that will require gas. Any new gas-fired kitchen equipment should also be connected to this service. It is recommended that gas sub-metering be used to separately meter gas consumption for the mechanical equipment and kitchen uses.

H. Insulation

1) The pipe 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. Domestic water and horizontal storm drainage piping that is not currently insulated should have new insulation installed. New domestic water piping and horizontal storm drainage piping installed throughout the new building addition will be insulated.

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

I. 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. In the new addition, hose bibbs will be provided in all bathrooms and mechanical spaces. New wall hydrants will be provided on the exterior of the building and their locations coordinated with the architect.

J. Cross Connection Control

1) The existing hose bibbs and wall hydrants do not have backflow prevention devices. Backflow devices should be integral to all new hose bibbs and wall hydrants installed during the renovation.

2) All service sink faucets installed during a renovation and in the new addition, will also be supplied with integral vacuum breakers.

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

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

F. BUILDING SYSTEMS / PFP - OPTION 2.4

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 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.

L. Kitchen

1) The new cafeteria kitchen will include the addition of new 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 when 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 may 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 kitchen design. Venting of this exterior grease trap should enter back into the school building and exit to the atmosphere above the roof.

M. Science Wing

1) New science classrooms will include new sinks and faucets. Faucets should be low-flow type fixtures with a maximum delivery rate of 0.5 gpm.

2) All new science classroom sinks will connect to 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) New protected hot and cold-water systems should be created to serve the new science classrooms by installing reduced pressure backflow preventers on the hot and cold-water piping designated to serve this area.

4) Gas piping to each science classroom should first 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) New emergency showers and eyewashes will be installed in each science classroom. A new tempered water system should be created to serve these fixtures. 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. A tempered water return system will also be required to keep this system from becoming stagnant per state plumbing code requirements as well.

N. Pipe Materials

1) 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.

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

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

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

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / HVAC - OPTION 2.4

BELMONT HIGH SCHOOL

HEATING, VENTILATING, AND AIR CONDITIONING

MINOR RENOVATION / MAJOR ADDITION / C.2.4

A. General:

1. This description applies to the Minor Renovation / Major Addition option (C.2.4) where the existing fieldhouse and associated locker rooms and the swimming pool and associated locker rooms remain. The existing boiler and main electrical room also remains. New construction is built in two phases from west to east with the existing building largely remaining in operation initially and then being phased out after the initial phase is complete.

2. Heating, air conditioning and ventilation systems shall be high-efficiency systems that allow for the ability towards achieving a Net Zero Energy facility.

B. Ground Loop Geo-Exchange System:

1. A vertical borehole well field area consisting of (400) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 375 to 450 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

3. Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

4. Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

C. Central Heating and Cooling System:

1. Central geothermal heating and cooling shall be provided by four high efficiency 300 ton (approx. nominal capacity) heat recovery chiller-heaters or (40) 30 ton modular chiller-heaters connected to the ground loop system.

2. The ground loop circulation system shall be filled with 25% propylene glycol solution and shall be served by three 1000 GPM pumps with variable frequency drives.

3. Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three primary condenser water pumps at 1,000 GPM each.

4. Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three secondary heating pumps at 1,000 GPM each.

5. Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow with three 750 GPM pumps.

6. The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall be two-pipe configuration.

7. The building loop piping system shall contain a 25% propylene glycol solution for freeze protection and corrosion protection.

8. The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

D. Exterior Classrooms - Induction Units with Displacement:

1. The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe floor mounted chilled beam induction units with displacement supply air. Four 5 ft. long units shall be provided for each typical classroom mounted along the exterior wall. Units shall be served by two 7-inch diameter primary ventilation supply air ducts.

2. The primary supply air serving each classroom shall be provided with a modulating supply air volume control terminal to control supply air when the room is occupied.

3. Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4. A carbon dioxide sampling sensing system will be provided in classrooms to provide monitoring and occupied control of ventilation air.

E. Interior Classrooms and Other Spaces – Ceiling Induction Units:

1. Interior classrooms and other interior occupied spaces will be served with ventilation supply air from a rooftop heat recovery ventilation unit connected to ceiling mounted chilled beam induction terminals. Induction terminals shall be provided with four-pipe supply and return water connections.

2. Individual classrooms shall be provided with a supply air volume control terminal to control ventilation air when the room is occupied. A carbon dioxide sampling sensing system shall be provided for classrooms to monitor and control ventilation air.

F. Classroom and Interior Ventilation Systems:

1. Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2. The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives, total energy recovery wheels and secondary sensible reheat wheels to allow for a low level of dehumidification control. The units will be provided with two-pipe dual temperature water connections to a single combination pre-heat and cooling coil. Changeover between hot water and chilled water supply shall be provided with the use of changeover valves connected to the hot water and chilled water systems. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating.

3. All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4. Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air with limited volume control terminals in the exhaust air system.

5. Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

G. Existing Gymnasium:

1. The existing heating and ventilating units in the gym shall be replaced with new HVAC units in Phase 02. The units shall include a hydronic coil for heating and cooling using hot water and chilled water. Units shall also include a heat recovery section with an enthalpy wheel for outdoor air heat recovery meeting the requirements of the MA energy code due to the level of outdoor air required.

2. Two units shall be provided, which shall be located indoors or outdoors depending on structural and architectural requirements. Units be provided with a round ductwork distribution exposed within the space.

3. The units shall be provided with variable frequency drives for the supply and return fans to reduce the fan speed during times of low demand. Supply, return, and outside air flow measurement and control shall be provided.

4. Provide a new H&V unit with plate heat exchanger to serve the existing locker rooms.

H. Existing Swimming Pool:

1. The existing heating and ventilating unit serving the pool shall be replaced with a new H&V unit in Phase 02. The unit shall include a hydronic coil for heating using hot water. The unit shall also include an air-to-air flat plate heat exchanger for exhaust air sensible heat recovery.

2. The pool deck exhaust system shall remain, but the existing exterior mounted exhaust fan shall be relocated to the roof due to the Phase 02 construction. Exhaust duct shall be extended up through the building in a ne duct shaft.

3. Provide a new H&V unit with flat plate heat exchanger to serve the existing locker rooms.

I. Miscellaneous Areas:

1. All normally occupied areas will be air conditioned except for corridors, the kitchen, and culinary classrooms with kitchen hoods (if applicable). The kitchen and culinary areas are partially tempered by using transfer air from the commons for make-up air.

2. The Auditorium, Stage, Media Center, Cafeteria, and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

3. Rooftop air conditioning units (RTU) will include supply fan, return fan, hot water heating coil, chilled water cooling coil, filters, and variable frequency drives. Units serving Administration, Media Center, Band/Chorus, and the Cafeteria will be variable air volume (VAV) with local variable air volume boxes for zone temperature control.

4. The Auditorium and Gymnasium units will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5. The Auditorium, Gymnasium, Cafeteria, and Media Center systems will be provided with space carbon dioxide (CO_2) sensors to provide modulation of outside air based on occupancy demand.

6. Areas such as the Cafeteria, Black Box, parts of the Media Center, main lobby and open group learning spaces may alternatively be provided with a radiant floor cooling and heating system. System shall include connections to the hot water and chilled water piping, circulation pumps, circuit headers, controls, and under-slab PEX piping distribution.

J. Building Management System (BMS):

1. Provide direct digital control (DDC) BMS with local and unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building including; chillers, pumps, heat recovery units, rooftop units, fans and terminal units shall be controlled and mapped to a central monitoring station. System shall be based on the Niagara Framework open protocol for interoperability between manufacturers.

2. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

K. Carbon Dioxide Sensing System:

1. Provide an Aircuity, or equal, carbon dioxide air sampling and sensing system consisting of room sensors, cabling, tubing, room probes, air routers, and vacuum pumps.

2. Air tubing from room sensors shall be collected through air routers to sensing stations.

3. The system shall include an information management system and shall be integration with the building management system.

4. Building management system input shall provide control input for modulating supply air terminal units or automatic dampers.

L. Electrical and BTU Metering:

1. Electrical metering shall be provided for collection of historical and real-time performance data. Separate meter groups shall be provided for the upper school areas and lower school areas consisting of meters for the measurement of lighting and plug loads for each classroom group by wing, floor or classroom type.

2. Individual metering of lighting and plug loads shall be provided for the Kitchen, Media Center, Auditorium/Stage, Gymnasium, and Administration areas.

3. Electrical metering shall be provided for each air handling system, central system pumps (by each group type), and each chiller-heater.

4. Provide BTU metering of chilled water, hot water, ground loop circulation systems and domestic hot water system.

M. Phasing Considerations:

1. Construction of the new facility is in two phases (Phase 02 and Phase 04). Phase 02 of construction allows for the existing building to remain occupied, while a large part of the new construction is completed. Therefore, the existing boiler room must remain active during Phase 02 and the new chiller-heater plant must be constructed to support the new construction. Approximately 900 SF of new mechanical space will need to be constructed next to the boiler

room in the first phase to provide space for the new equipment. One of the steam boilers may also be phased out and demolished in this first phase.

2. Construction phasing will require that the geothermal borehole field be installed in two phases. The first phase may be constructed in the area of the new football field, parking and drive lanes to the west of the fieldhouse. The second phase may be constructed in the area of the Lacrosse 02 field, and parking and drive lanes to the east.

3. The existing gym and pool areas will be renovated in Phase 02, including replacement of the existing HVAC equipment.

4. Completion of the new central chiller-heater plant construction may begin in Phase 03 with the removal of the remainder of the existing boiler plant.

F. BUILDING SYSTEMS / Electrical - OPTION 2.4

Belmont High School

ELECTRICAL

2.4 Minor Renovation / Major Addition

A. Existing Electric Services:

1. Based on the proposed renovation/addition scope to maintain the Field House and Pool, existing services will be required to be maintained to deal with construction phasing and maintaining existing systems while renovations and new additions are completed.

2. The intent is that upon completion, there will be new services throughout the entire renovated facility and new additions.

3. The Main Electric Room housing the main electric switchboard is located adjacent the Boiler Room, these rooms are located at the northwest corner of the facility adjacent the Fieldhouse.

4. Scope will include maintaining and/or providing new feeders to existing panelboards and mechanical equipment to be kept operational during renovation and new construction.

5. Coordinate with Utility Company for the relocation of any utility poles and overhead pole lines associated with new construction and scheduled demolition of the existing school building.

6. All existing services shall be maintained for the complete operation of existing school building until the scheduled date of demolition of the existing building. Upon substantial completion, coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

7. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

8. Include maintaining the operation of existing site equipment such as irrigation pumps. Provide new services to all equipment affected by new construction.

B. New Main Electric Service:

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / Electrical - OPTION 2.4

C. New Normal Distribution System:

1. Main switchboard will be provided with surge protection (SPD) and ground fault protection on main and feeder devices.

2. Surge protection will be provided in all 120/208V panelboards.

D. New Emergency Distribution System:

1. Natural gas/diesel (fuel source to be determined) emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:

   a. Kitchen walk-in coolers and freezers.

   b. Telephone system.

   c. Security system.

   d. District and school IT head-end equipment (located in the MDF Room).

   e. Cooling equipment for school and district IT equipment.

   f. Fire alarm system.

   g. Circulator pumps and controls.

2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.

3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.

   a. Additional lighting in Gymnasium, Cafeteria, Kitchen, and associated toilets and corridors.

   b. HVAC ventilation equipment (no air-conditioning) associated with the Gymnasium, Cafeteria, Kitchen, and associated toilets and corridors.

   c. Receptacles in Gymnasium and Cafeteria.

4. Generator will be ground mounted at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank (if diesel). Generator will be mounted on an elevated concrete platform for survivability.

5. Emergency panels will be located in new two-hour rated electric closets.

6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.

8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.

E. Sustainable Design Intent LEED 4.0:

1. Sustainable Design Intent compliance will include:

a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).

b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.

c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.

d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.

e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of three locations on Level 3 and/or Level 4 electric closets.

F. Lighting:

1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.

3. Athletic field lighting will be provided at the Softball and Baseball fields.

G. Lighting Controls:

1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.

2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.

3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.

4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.

5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.

H. Auditorium:

1. A professional theatrical lighting system will be provided.

I. Convenience Power:

1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.

2. Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas such as Commons/Café, Kitchen and culinary areas.

J. Fire Alarm:

1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be maintained and utilized where applicable.

   a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.

   b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.

   c. Visual only units in conference rooms, meeting rooms and small toilets.

   d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.

   e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.

   f. Connections to all Fire Protection devices and Kitchen hood.

   g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.

   h. Remote annunciator at main entrance and secondary entrances as directed by Belmont Fire Department.

   i. 24 VDC magnetic hold open devices at smoke doors.

   j. Master box and exterior beacon (quantity of beacons per Belmont Fire Department.

   k. Wiring will be fire alarm MC cable.

K. Technology per Technology Section.

F. BUILDING SYSTEMS / Electrical - OPTION 2.4

L. Integrated Intrusion, Access Control, CCTV, and Alarm System:

1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in first, second, and third floor corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.

2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours community programs, including Gymnasium and Cafeteria entries.

3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.

4. Access control via card access system will be provided at all exterior doors.

5. CCTV system will be IP based with minimal 30 day recording capacity. System will be web based to allow viewing by Belmont Police Department.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / Information Technology - OPTION 2.4

Structured Cabling System:

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. Internet services and wireless controllers in the existing high school MDF provide connectivity at all the school facilities and the Town. These systems must remain operational during construction. Therefore, the MDF and the existing district fiber must be protected during construction.

A new MDF will be created. The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power. The new MDF will be built-out and cutover during an early phase of construction. The district fiber will be re-routed or extended to the new MDF location. Existing Telco lines, which terminate in the Main Office area will need to be protected and re-routed or extended. Temporary cabling and services may be necessary to maintain functionality of existing systems during demo work.

New IDFs will be created. The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be built-out and come on line in conjunction with construction phasing. Existing IDFs will be brought offline in conjunction with construction phasing. Temporary cabling and services may be necessary to maintain functionality of existing systems during demo work.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

The existing Category 5 horizontal cabling will be replaced. The new data cabling infrastructure will be based on a Category 6A, or most up to date standard at the time of bid. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. Cabling will terminate in the MDF or one of the IDFs. Temporary cabling may be necessary to maintain functionality of existing systems during demo work.

The existing fiber backbone within the school will be replaced. The new fiber backbone will connect the MDF and all IDFs. It will consist of twelve strands of multi-mode and six strands of single-mode fiber optic cables. All multimode fiber optic cables will use multimode, graded-index fibers with 50-micron cores only. Fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. Temporary cabling and services may be necessary to maintain functionality of existing systems during demo work.

Data and Voice Communication Systems:

Updated networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system, audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ chassis and power supplies, 10/100/1000 PoE+ modules, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Backbone will be 10Gb minimum.

Updated VoIP server and hardware will be provided. The existing NEC 8300 will be upgraded to the 9300 platform, or current standard at the time of bid. Several elementary schools in the district depend on the existing VoIP system for connectivity, so it must remain operational during

F. BUILDING SYSTEMS / Information Technology - OPTION 2.4

construction. The new system must be compatible with existing VoIP equipment in the district.

Audio/Visual Communication System

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems.

Distributed Communication System

The existing Simplex Building Communication System will be replaced with a new system. The new system should be built-out with the new MDF during an early phase of construction so that newly renovated or constructed areas can come online. The new distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school safety notifications and general communications. It will provide complete internal communications using state of the art IP technology with two-way loud speaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements in the future (additional hardware will be required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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BELMONT HIGH SCHOOL FEASIBILITY STUDY
AUDIOVISUAL SYSTEMS, OPTION C.2.4

SUBMITTED TO: PERKINS + WILL

CONSULTANT: ACENTECH

JANUARY 23, 2018

ACENTECH PROJECT NO. 629341

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
- 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:

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.

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 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.

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

1. Architectural: The following items should be considered for proper coordination between audiovisual system components and other trades:
    a. Loudspeaker coverage must not be obstructed.
    b. Structure will be necessary to ensure that loudspeakers and the projection screen can be ceiling-mounted at recommended locations.
    c. Antennas for the assistive listening system and wireless microphones will be mounted on the wall.
    d. Wall-mounted connection panel locations will require coordination.
    e. Ceiling-mounted video projectors must be free from vibration.
2. AV Equipment Racks:
    a. 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.
        i. 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.

ii. AV equipment rack rooms may require oversized doors.

3. Auditorium Mixing Console:
   a. 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.
   b. Control Booth:
      i. Please note the following guidelines:
         1. Coordination will be required with the acoustical consultant to maintain proper acoustical isolation between the Auditorium and the Control Booth.
         2. 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.
4. Video Projection:
   a. 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.
   b. Whiteboards & marker boards that are used as a projection surfaces shall be of projection quality so that they minimize reflections and projection hotspots.
5. Blocking will be required at all wall-mounted video display panel and loudspeaker locations.
6. Mechanical/Electrical: The following items should be considered for proper coordination between the audiovisual system components and other trades:
   a. 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.
   b. Electrical outlets will be required at the equipment racks, mix location floor-box, and wall-mounted receptacle panels.
   c. IT data drops are strongly recommended at the equipment racks and all AV receptacle panels.
   d. 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.
   e. Equipment Rack Locations:
      i. AC power requirements and heat loads will need to be considered at each equipment rack and video projector location.

* * * * * *

End of Feasibility Study

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

OPTION 3.1 - NEW CONSTRUCTION

SUMMARY

Option 3.1 proposes a newly constructed 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 Clay Pit 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. The building's academic life is organized around a central commons. This common space is organized at the base of the building with a 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 with optimal solar orientation.

SITE STRATEGY

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. The new structure is placed equally between the existing rail line to the north and the smaller scale neighborhood to the south. 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.

SUSTAINABILITY AND BUILDING PERFORMANCE

The following sustainability and resiliency attributes have been considered in evaluating this option:

ENVELOPE– Aggressive performance will be pursued in the new wall make-up including a goal of R-28 and minimized thermal bridging with the intent of minimizing air and vapor movement

ORIENTATION- This scheme orients the majority of teaching spaces to the south and north with the intent of eliminating glare and the majority of public and common spaces to the south.

SKIN TO VOLUME RATIO- The skin to volume ratio of the new construction scheme is the most efficient but will rely on daylighting internal spaces from above which may conflict with PV placement.

WINDOW TO WALL RATIO- The window to wall ratio of the new construction scheme will attempt to achieve 30-40 glazing balancing heat gain with effective daylighting.

PV POTENTIAL- - This scheme creates a simple continuous roof surface that does not shade its selves and optimizes roof top yield by orienting itself in the east-west direction.

SITE ENVIRONMENTAL PERFORMANCE- This scheme also allows for one contiguous large geo-exchange field and allows for more performative landscape adjacent to the pond allowing outdoor teaching space to overlap with site sustainable strategies at the water edge. It also places the building mass close to the existing ice rink allowing for potential future synergies in energy and waste heat use. Phasing of the geo-exchange loop may be challenging given the schedule for demolition and logical location for the well field.

PROSPECTIVE SITE ANALYSIS - OPTION 3.1

SITE

This narrative provide an analysis of the option including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access, and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed separately. All addition renovation and new building options include complete reconstruction of the site east of Harris Field to accommodate the site program requirements except tennis which will be accommodated at other existing courts in Town.

A. PROSPECTIVE SITE ANALYSIS - OPTION 3.1

Harris Field including the track and supporting facilities are existing to remain. Spatial accommodations have been made in the site planning for the school project to accommodate a multi-modal community path along the north property line abutting the MBTA right-of-way and a multigenerational path around Clay Pit Pond – both with separate funding and implementation timelines. The school building project site design is anticipated to incorporate the portion of the multigenerational path that connects across the north side of Clay Pit Pond, as that will serve as a vital link between the school's site program elements and circulation through the campus.

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 (292 spaces) is located to the east of the school building. Small lots are located to the south (36 spaces) and north (21 spaces) of the building. Nine buses currently park along the far east side of the east parking lot. All parking areas contain accessible parking.

Most of the school's athletic facilities are located west of the school building including two baseball fields (varsity is played on Grant Memorial Field which includes bleacher seating, dugout shelters and a prominent gateway) with rectangular field layouts (for soccer and field hockey) overlapping their outfields, a rugby/football practice field and Harris Field which includes a running track and synthetic turf field, home and away bleachers and sports lighting. An indoor skating rink in poor condition and a football field house separate these fields from the varsity softball field further west with lighting and a soccer/lacrosse field overlapping the outfield. Ten tennis courts are located adjacent to the east parking area and the junior varsity softball field is located further east of the primary east parking area.

BUILDING FOOTPRINT

In Option C3.1, the existing school building would be completely removed after the new building is constructed on the adjacent athletic fields to the west. The new building footprint is positioned in the middle of the site set back from both Concord Avenue and the railroad right-of-way.

ATHLETIC FIELDS

The athletic fields except Harris Field are reconfigured as follows:

- One baseball field and overlapping softball field with a soccer/field hockey field overlapping the outfield is located west of the rink.
- A football/rugby field is located north of the new building inside one of the drop off driveway loops.
- The varsity baseball field (to replace the Brendan Grant Memorial Field) is located at the east end of the site.
- The varsity softball field is adjacent to the varsity baseball field.
- A soccer field overlaps the varsity softball outfield.
- A lacrosse/soccer field is located between the varsity softball field and the school building.

TRAFFIC CIRCULATION

The driveway between the building and Clay Pit Pond is eliminated, and a new 2-way driveway is located around the rear of the building with new access points across from Trowbridge and Goden Streets. Building entrances to the upper and lower school program have separate entrances and drop off loops along the north and south sides of the building. The multigenerational path connecting along the north side of the pond links the site and building program elements and provides pedestrian, bicycle and emergency vehicle access through the site.

PARKING

This site plan meets the school's parking need for 430 spaces. Parking is redistributed along the entire length of the campus driveway providing access to the school building and fields. This parking configuration also serves as a buffer between the school campus and MBTA rail line as well as the future multi-modal Community Path planned along the north border of the site.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

B. CONSTRUCTION IMPACT - OPTION 3.1

Option 3.1 would require little or no renovations within the existing occupied school. New construction would be would be undertaken in 1 phase. Modular classrooms would not be required on site during renovations. Scheduling work over summer or holiday breaks may alleviate some of the disruption but would need to be carefully managed. The anticipated construction schedule is 36 months.

Work under this option would be the least disruptive to students and staff. Students would not be forced to move until construction of the new building is complete. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

OPTION 3.1 - I. DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	April 10th, 2018 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 29th, 2018 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2018
Design Development Complete	November 2018 - April 2019
Construction Documents Complete	May 2019 – January 2020
Bid and Award	February 2020 - March 2020
Construction (multiple phases)	April 2020 – March 2023 (36 months)

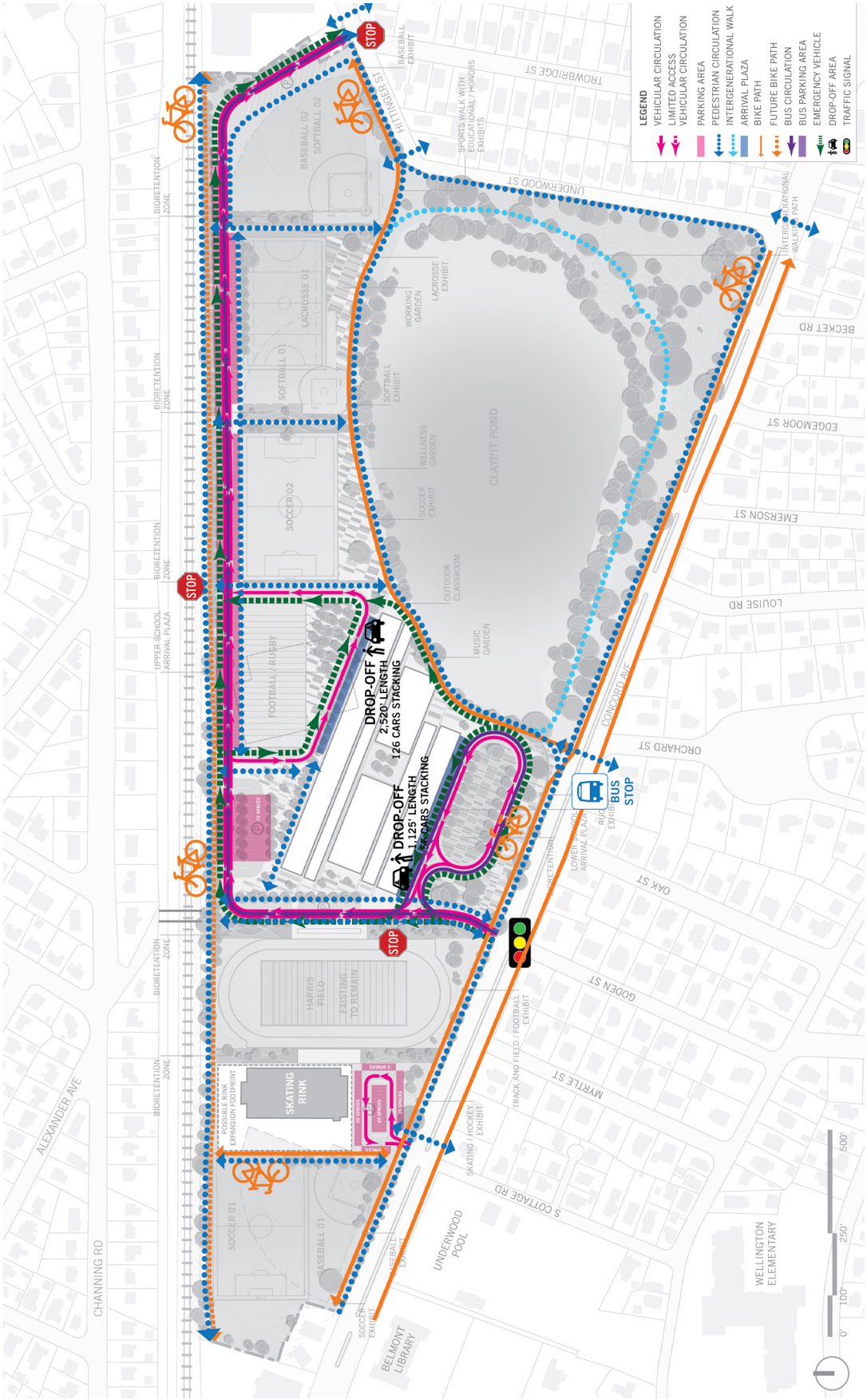
B. CONSTRUCTION IMPACT - OPTION 3.1 / Phasing Diagrams

PERKINS+WILL

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

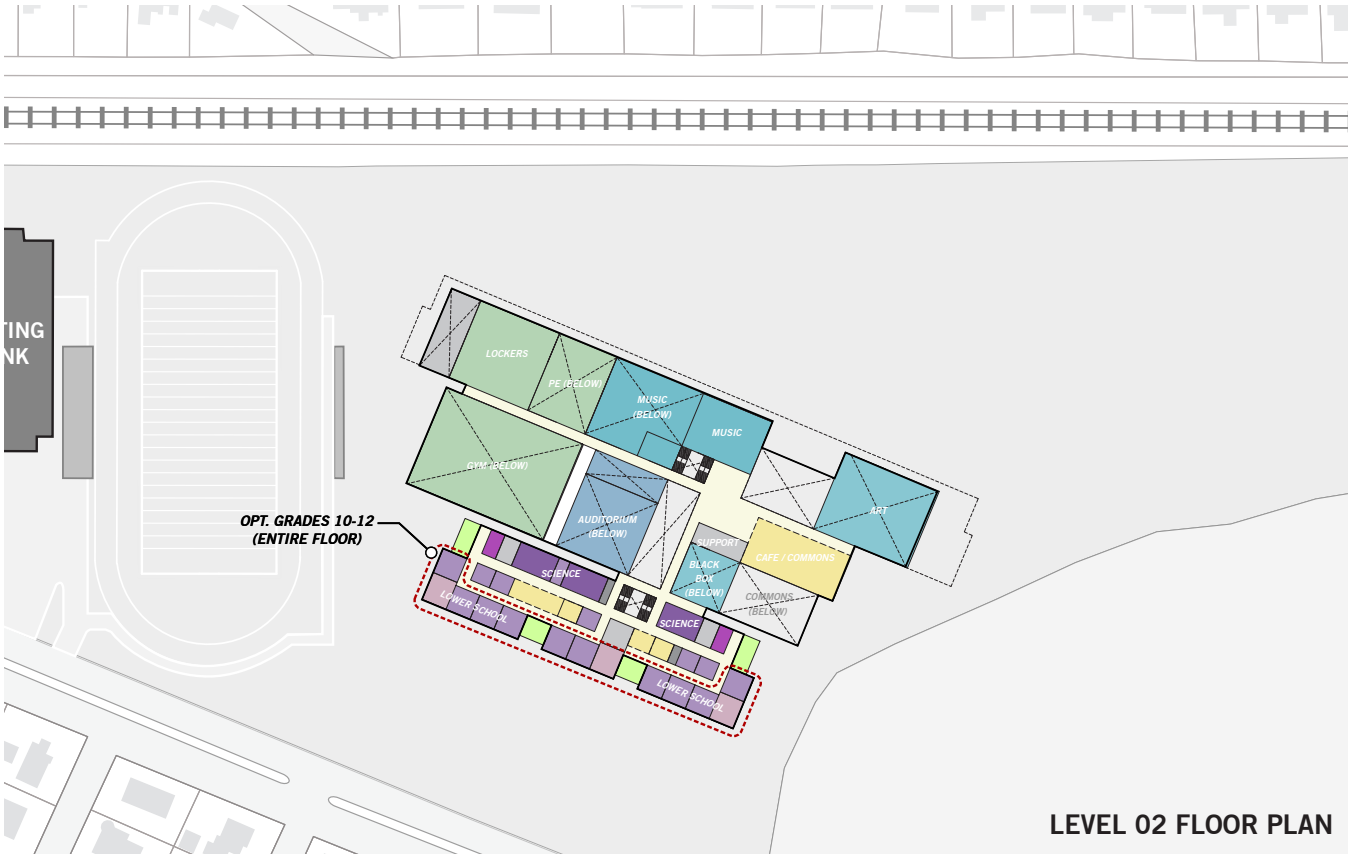
C. CONCEPT DRAWING - OPTION 3.1 / Site

C. CONCEPT DRAWING - OPTION 3.1 / Traffic Site Plan



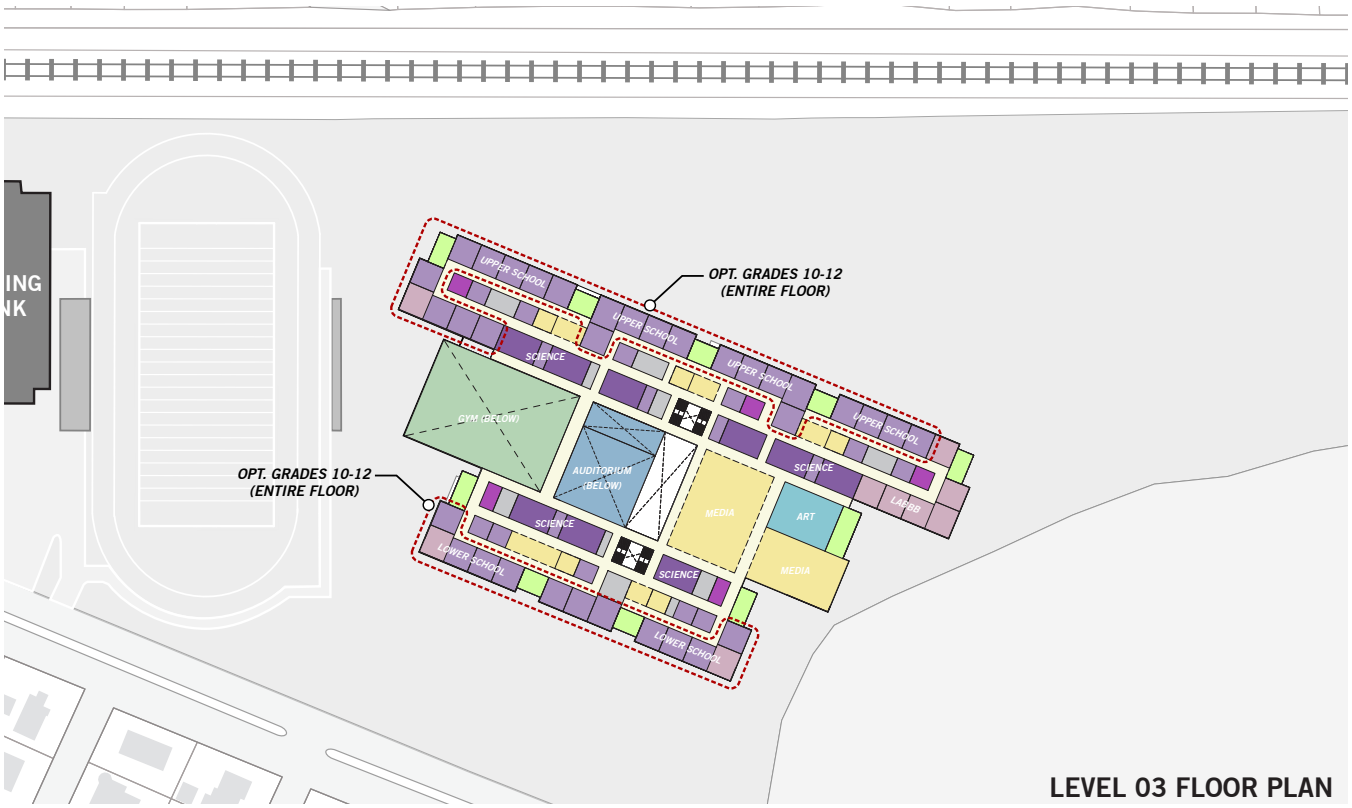
3.3.3 - FINAL EVALUATION OF ALTERNATIVES

C. CONCEPT DRAWING - OPTION 2.4 / Architectural



C. CONCEPT DRAWING - OPTION 2.4 / Architectural

Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Special Education

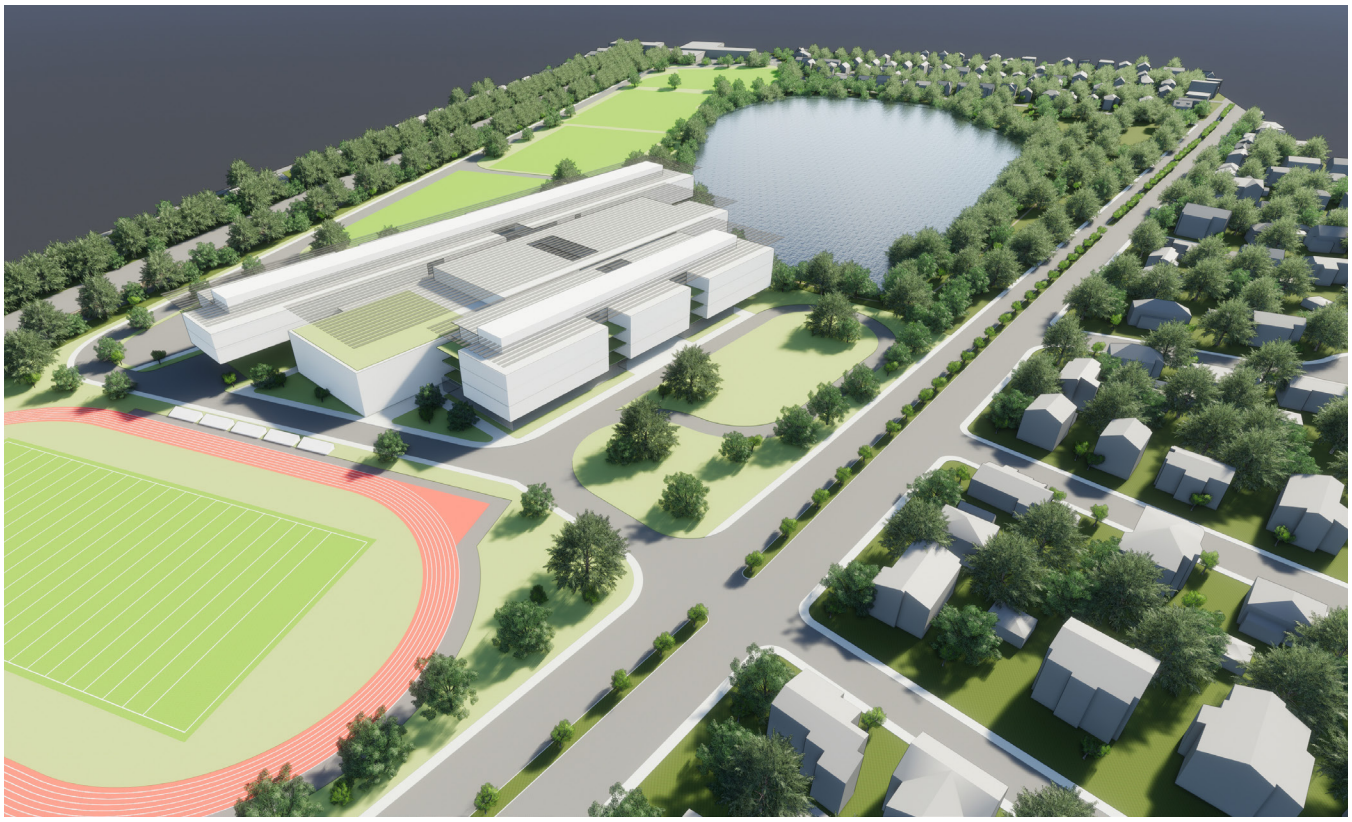


LEVEL 03 FLOOR PLAN

LEVEL 04 FLOOR PLAN

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

C. CONCEPT DRAWING - OPTION 3.1



C. CONCEPT DRAWING - OPTION 3.1

Belmont High School
Structural Narrative
New Construction – Option 3.1

January 22, 2018

SUBSTRUCTURE

FOUNDATIONS

Based on the construction of the existing school and recommendations of the Geotechnical Engineer, the entire structure of the school will be supported on pile foundations. The columns of the proposed structure would bear on 4 ft. - 0 in. deep reinforced concrete pile caps on structural steel piles. The exterior walls will be supported on 5 ft. – 0 in. deep grade beams spanning between pile caps with intermediate piles at 10 ft. - 0 in. on center. Based on the assumed pile capacity of 50 tons, a typical interior column in the four story classroom wings would be supported on 8 ft. 0 in. x 8 ft. 0 in. x 4 ft. 0 in. deep pile caps on a four pile group and a typical exterior column would be supported on 8 ft. 0 in. x 8 ft. 0 in. x 4 ft. 0 in. deep pile caps on a three pile group. The columns supporting the long span structure of the single story gymnasium, cafeteria, music spaces and other ancillary spaces would be supported on 8 ft. - 0 in. x 8 ft. - 0 in. x 4 ft. - 0 in. deep pile caps on three pile groups. In addition, the ground floor slab would be supported on single piles with a 2 ft. - 0 in. x 2 ft. - 0 in. x 2 ft. - 0 in. deep pile caps spaced out approximately 15 ft. - 0 in. (including interior and exterior pile caps supporting the columns.) All of the interior and exterior pile caps will be tied to the supported concrete slab.

SLAB ON GRADE

Based on the construction of the existing school and recommendations of the Geotechnical Engineer, the lowest level slab of the proposed structure would be a 12 in. thick reinforced concrete slab reinforced with 6 psf reinforcing over a vapor barrier on 2 in. thick rigid insulation on compacted granular structural fill supported on piles.

SUPERSTRUCTURE

FLOOR CONSTRUCTION

Typical Floor Construction
A 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be 13 psf for the typical framing. The weight of the structural steel for the long-span structure above the multi-purpose rooms and PE space is estimated to be 18 psf.

ROOF CONSTRUCTION

Typical Roof Construction
The roof construction would be galvanized, corrugated 1 ½ in. deep, Type 'B' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab will be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be 13 psf.

Low Roof Structures
The roof would be a continuation of the adjacent second floor and would be similar to the typical floor construction of 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams

spanning between steel girders and columns. This roof will be supporting the mechanical units. The units would be screened by a screen comprised of structural steel posts and beams. The weight of the structural steel is estimated to be 15 psf.

Gymnasium Roof Framing
The roof construction would be acoustic, galvanized, corrugated 3 in. deep, Type 'NA' metal roof deck spanning between long span steel joists. The weight of the structural steel framing is estimated to be 15 psf.

Auditorium Roof Framing
The roof construction would be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck spanning between long span steel joists. The weight of the structural steel framing is estimated to be 15 psf. The weight of the structural steel framing supporting the roof and the rigging above the stage is estimated to be 18 psf.

VERTICAL FRAMING ELEMENTS

Columns
Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8 columns and the columns at the double story spaces at the Gymnasium, Auditorium and Lobby would be HSS 12 x 12.

Lateral Load-Resisting System
The proposed school structure would be divided into three or four parts separated by way of expansion joints.

The typical lateral load resisting system for the other parts of the school would be concentric steel braced frames comprised of hollow structural steel sections.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

E. SITE UTILITIES - OPTION 3.1

SITE UTILITIES

Storm Drainage

Stormwater from the site will continue to be directed to Clay Pit Pond. Outside of the existing stormwater outfalls into Clay Pit Pond it is expected that the entire stormwater system will have to be reconstructed so that the new stormwater system can effectively mitigate stormwater quality, rate and volumes from the project site. Runoff generated by the new parking and driveway areas would be collected in a catch-basin to manhole closed drainage system. Water quality from these areas would be addressed by directing those flows through Stormceptor water quality units (or similar). Volume and rates of stormwater from the site would then be addressed by directing these flows to subsurface infiltration systems located beneath the parking areas. The infiltration systems would consist of galleys of 36-inch perforated pipe in crushed stone bedding. Overflows from these infiltration systems would then be directed through the new closed drainage system to the existing outfalls to Clay Pit Pond.

Roof drainage from the building is not required to be treated for water quality, therefore it can be tied directly into the new closed drainage system prior to discharge from the existing outfalls. A portion of the roof drainage could be daylighted to a raingarden or stormwater demonstration area that is incorporated into the landscape design. This landscaped area would consist of an area with variable topography to direct the stormwater through it, plantings to provide treatment and nutrient uptake, walkways or boardwalks that allow students to observe the processes and possibly even hardscape stormwater features such as runnels or small falls to provide aeration.

The new and reconstructed athletic fields would have sub-drainage located below the topsoil layer, as is typical of turf field construction. The sub-drains can be connected directly into the new closed drainage system.

Sewer

Building placement in this scheme appears to conflict with a portion of the existing sewer main which bisects the site, running west to east approximately under the sidewalk, adjacent to the existing access drive in front of the school. Approximately 400 linear feet of 24-inch sewer main would need to be relocated to accommodate the new building location. Portions of the existing 24-inch sewer not in conflict with the new building would be maintained. Sanitary sewer service connections from the new school would be connected to the new/maintained 24-inch main. Lab waste flows would be directed through a pH neutralization system prior to connection to the sanitary sewer system. Flows from the cafeteria would be directed through a new, 10,000-gallon, external grease trap.

Water

It appears that portions of the new construction would conflict with the existing water main that is routed around the rear of the existing building. A new 8-inch water main, approximately 1,600 feet long, would be installed in the first phase of the construction, along the rear property line, out of the way of any future phases. New 4-inch domestic water and 6-inch fire services would be provided to the building from the new 8-inch main. Six new fire hydrants, located along the main, would also be provided as directed by the Belmont Fire Department

Natural Gas

The existing gas service conflicts with the proposed construction. A new gas service, located to the west of the proposed building would be provided from the existing gas main in Concord Avenue to the mechanical area located at the rear of the proposed building.

Electrical

A new ductbanck consisting of four 4-inch, concrete encased conduits would be installed from the existing substation located just east of the site on Hittinger Street to the new electric room located to the rear of the proposed building.

PRELIMINARY PERMITTING CONSIDERATIONS

Wetlands Protection Act (310 CMR 10.00)

A Notice of Intent would need to be filed with the Town of Belmont Conservation Commission for any work within 100-feet of Clay Pit Pond. In addition, a Stormwater Pollution Prevention Plan (SWPPP) would need to be prepared and an application filed with the Environmental Protection Agency under the National Pollutions Discharge Elimination System (NPDES) program for the construction related activities. Erosion control measures will need to be installed and maintained in good working order around the perimeter of the site. Due to the phase nature of the construction, the perimeter controls will have to be re-installed several times over the duration of the project.

E. SITE UTILITIES - OPTION 3.1

Flood Plain

Based on the Flood Insurance Rate Map (FIRM), Community Panel Number 25017C0418E dated June 4, 2010, the portions of the existing High School site are located within Zone X (Areas determined to be outside the 0.2% annual chance floodplain). There is no regulatory requirement for working within a Zone X. The Zone AE, which is associated with the 100-year flood area, is located in close proximity to the banks of Clay Pit Pond. None of the proposed building or any critical infrastructure is being proposed within the Zone AE.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / PFP - OPTION 3.1

FIRE PROTECTION

A. General

1) Construction of a new school will require a new sprinkler system will be installed. The sprinkler system will include the following features.

B. A new 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".

C. 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.

D. The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing; i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

E. The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

F. Fire protection piping main feeds to the fire protection systems from the alarm check valves will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building to provide complete sprinkler cover age throughout. Potential sprinkler zoning will be coordinated with any new fire wall layouts.

G. The fire protection design will include a combination standpipe system located in all egress stairways. These standpipes will feed the sprinkler system as well as provide a fire department hose connection at each level of the building.

H. The sprinkler system standpipes will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control valve assembly at the riser that 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 auditorium stage is greater than 1,000 square feet, fire department valves will be required on each side of the stage.

I. Sprinkler heads installed in gypsum or suspended ceilings will be glass bulb, quick response, chrome plated semi-recessed type. In areas without ceilings, 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.

J. The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

K. 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.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

F. BUILDING SYSTEMS / PFP - OPTION 3.1

L. 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.

M. The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. The exact type of connection (storz or siamese) will be coordinated with the Belmont Fire Department. Final location and number of fire department connections will also be coordinated with the Belmont Fire Department.

N. The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

PLUMBING

A. General

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

B. Plumbing Fixtures

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

2) Fixture flow rates should be provided as follows:

- Water closets (dual flush type) at 1.6 gpf or 1.1 gpf
- Urinals - 0.25 gpf
- Lavatories - 0.5 gpm or less
- Showers – 1.5 gpm

3) 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.

C. Domestic Cold Water

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

D. Domestic Hot Water

1) 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 hot water discharge temperatures to 110°F maximum per code. Mixing valves for hand sinks in the kitchen shall reduce discharge temperature to 120°F maximum.

E. Sanitary Waste & Vent System

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

F. Storm Drainage

1) 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 service piping to a point 10'-0" beyond the building exterior. Horizontal roof leaders above grade within the building shall be insulated.

2) Waste outlets to accept HVAC condensate and sprinkler discharge shall be provided as needed and connect to the

storm water piping system.

G. Natural Gas System

1) 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.

H. Hose Bibbs and Wall Hydrants

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

2) Hose bibbs will be provided in all bathrooms with more than one flushing fixture and all mechanical spaces and will be provided with cross connection protection.

I. Kitchen

1) 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.

2) 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.

J. Science Labs

1) 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.

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

3) New emergency showers and eyewashes should be installed in each science classroom. A new tempered water system should be created to serve these fixtures. 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. A tempered water return system will also be required to keep this system from becoming stagnant per state plumbing code requirements as well.

4) A dedicated gas piping main will serve the new science labs 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.

K. Pipe Materials

1) 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.

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

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

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

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / HVAC - OPTION 3.1

BELMONT HIGH SCHOOL

HEATING, VENTILATING, AND AIR CONDITIONING

NEW CONSTRUCTION / C.3.1

A. General:

1. This description applies to the new construction option (C.3.1) where the new building is constructed while the existing building remains in operation.

2. Heating, air conditioning and ventilation systems shall be high-efficiency systems that allow for the ability towards achieving a Net Zero Energy facility.

B. Ground Loop Geo-Exchange System:

1. A vertical borehole well field consisting of (400) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 375 to 450 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

3. Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

4. Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

C. Central Heating and Cooling System:

1. Central geothermal heating and cooling shall be provided by four high efficiency 300 ton (approx. nominal capacity) heat recovery chiller-heaters or (40) 30 ton modular chiller-heaters connected to the ground loop system.

2. The ground loop circulation system shall be filled with 25% propylene glycol solution and shall be served by three 1000 GPM pumps with variable frequency drives.

3. Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three primary condenser water pumps at 1,000 GPM each.

4. Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three secondary heating pumps at 1,000 GPM each.

5. Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow with three 750 GPM pumps.

6. The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall be two-pipe configuration.

7. The building loop piping system shall contain a 25% propylene glycol solution for freeze protection and corrosion protection.

8. The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

D. Exterior Classrooms - Induction Units with Displacement:

1. The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe floor mounted chilled beam induction units with displacement supply air. Four 5 ft. long units shall be provided for each typical classroom mounted along the exterior wall. Units shall be served by two 7-inch diameter primary ventilation supply air ducts.

2. The primary supply air serving each classroom shall be provided with a modulating supply air volume control terminal to control supply air when the room is occupied.

3. Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4. A carbon dioxide sampling sensing system will be provided in classrooms to provide monitoring and occupied control of ventilation air.

E. Interior Classrooms and Other Spaces – Ceiling Induction Units:

1. Interior classrooms and other interior occupied spaces will be served with ventilation supply air from a rooftop heat recovery ventilation unit connected to ceiling mounted chilled beam induction terminals. Induction terminals shall be provided with four-pipe supply and return water connections.

2. Individual classrooms shall be provided with a supply air volume control terminal to control ventilation air when the room is occupied. A carbon dioxide sampling sensing system shall be provided for classrooms to monitor and control ventilation air.

F. Classroom and Interior Ventilation Systems:

1. Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2. The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives, total energy recovery wheels and secondary sensible reheat wheels to allow for a low level of dehumidification control. The units will be provided with two-pipe dual temperature water connections to a single combination pre-heat and cooling coil. Changeover between hot water and chilled water supply shall be provided with the use of changeover valves connected to the hot water and chilled water systems. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating.

3. All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4. Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air with limited volume control terminals in the exhaust air system.

5. Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

G. Miscellaneous Areas:

1. All normally occupied areas will be air conditioned except for corridors, the kitchen, and culinary classrooms with kitchen hoods (if applicable). The kitchen and culinary areas are partially tempered by using transfer air from the commons for make-up air.

2. The Auditorium, Stage, Media Center, Gymnasium, Cafeteria, and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

3. Rooftop air conditioning units (RTU) will include supply fan, return fan, hot water heating coil, chilled water cooling coil, filters, and variable frequency drives. Units serving Administration, Media Center, Band/Chorus, and the Cafeteria will be variable air volume (VAV) with local variable air volume boxes for zone temperature control.

4. The Auditorium and Gymnasium units will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5. The Auditorium, Gymnasium, Cafeteria, and Media Center systems will be provided with space carbon dioxide (CO_2) sensors to provide modulation of outside air based on occupancy demand.

6. Areas such as the Cafeteria, Black Box, parts of the Media Center, main lobby and open group learning spaces may alternatively be provided with a radiant floor cooling and heating system. System shall include connections to the hot water and chilled water piping, circulation pumps, circuit headers, controls, and under-slab PEX piping distribution.

H. Building Management System (BMS):

1. Provide direct digital control (DDC) BMS with local and unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building including; chillers, pumps, heat recovery units, rooftop units, fans and terminal units shall be controlled and mapped to a central monitoring station. System shall be based on the Niagara Framework open protocol for interoperability between manufacturers.

2. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

I. Carbon Dioxide Sensing System:

1. Provide an Aircuity, or equal, carbon dioxide air sampling and sensing system consisting of room sensors, cabling, tubing, room probes, air routers, and vacuum pumps.

2. Air tubing from room sensors shall be collected through air routers to sensing stations.

3. The system shall include an information management system and shall be integration with the building management system.

4. Building management system input shall provide control input for modulating supply air terminal units or automatic dampers.

F. BUILDING SYSTEMS / HVAC - OPTION 3.1

J. Electrical and BTU Metering:

1. Electrical metering shall be provided for collection of historical and real-time performance data. Separate meter groups shall be provided for the upper school areas and lower school areas consisting of meters for the measurement of lighting and plug loads for each classroom group by wing, floor or classroom type.

2. Individual metering of lighting and plug loads shall be provided for the Kitchen, Media Center, Auditorium/Stage, Gymnasium, and Administration areas.

3. Electrical metering shall be provided for each air handling system, central system pumps (by each group type), and each chiller-heater.

4. Provide BTU metering of chilled water, hot water, ground loop circulation systems and domestic hot water system.

K. Phasing Considerations:

1. Construction of the new facility is independent from the existing building, which is to remain in operation throughout the new construction phase.

2. After the completion of the new construction, the existing systems in the existing building shall be demolished.

3. Since the athletic fields will not be constructed until after the new building is occupied and the existing building is demolished, the outdoor space for the installation of a new geothermal distribution is limited to parking and drive lane areas behind the building. This is not sufficient to support the full heating and cooling load for the building. Therefore, it will be necessary to install a temporary boiler outdoors to supplement the heating demand through the winter months. It may also be necessary to install a temporary chiller system if it is not possible to install the complete geothermal well field prior to the following summer.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / Electrical - OPTION 3.1

Belmont High School

ELECTRICAL

3.1 New Construction

A. Existing Electric Services:

1. All existing services shall be disconnected and removed from the building. Coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

2. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

3. Include maintaining the operation of existing site equipment such as irrigation pumps. Provide new services to all equipment affected by new construction.

B. New Main Electric Service:

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

C. New Normal Distribution System:

1. Main switchboard will be provided with surge protection (SPD) and ground fault protection on main and feeder devices.

2. Surge protection will be provided in all 120/208V panelboards.

D. New Emergency Distribution System:

1. Natural gas/diesel (fuel source to be determined) emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:

   a. Kitchen walk-in coolers and freezers.

   b. Telephone system.

   c. Security system.

   d. District and school IT head-end equipment (located in the MDF Room).

e. Cooling equipment for school and district IT equipment.

f. Fire alarm system.

g. Circulator pumps and controls.

2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.

3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.

a. Additional lighting in Gymnasium, Cafeteria, Kitchen, and associated toilets and corridors.

b. HVAC ventilation equipment (no air-conditioning) associated with the Gymnasium, Cafeteria, Kitchen, and associated toilets and corridors.

c. Receptacles in Gymnasium and Cafeteria.

4. Generator will be ground mounted at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank (if diesel). Generator will be mounted on an elevated concrete platform for survivability.

5. Emergency panels will be located in new two-hour rated electric closets.

6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.

8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.

E. Sustainable Design Intent LEED 4.0:

1. Sustainable Design Intent compliance will include:

a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).

b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.

c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.

d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.

e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of three locations on Level 3 and/or Level 4 electric closets.

F. Lighting:

1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.

3. Athletic field lighting will be provided at the Softball and Baseball fields.

G. Lighting Controls:

1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.

2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.

3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.

4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.

5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.

H. Auditorium:

1. A professional theatrical lighting system will be provided.

I. Convenience Power:

1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.

2. Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas such as Commons/Café, Kitchen and culinary areas.

F. BUILDING SYSTEMS / Electrical - OPTION 3.1

J. Fire Alarm:

1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be retained and utilized where applicable.

   a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.

   b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.

   c. Visual only units in conference rooms, meeting rooms and small toilets.

   d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.

   e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.

   f. Connections to all Fire Protection devices and Kitchen hood.

   g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.

   h. Remote annunciator at main entrance and secondary entrances as directed by Belmont Fire Department.

   i. 24 VDC magnetic hold open devices at smoke doors.

   j. Master box and exterior beacon (quantity of beacons per Belmont Fire Department.

   k. Wiring will be fire alarm MC cable.

K. Technology per Technology Section.

L. Integrated Intrusion, Access Control, CCTV, and Alarm System:

1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in first, second, and third floor corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.

2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours community programs, including Gymnasium and Cafeteria entries.

3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.

4. Access control via card access system will be provided at all exterior doors.

5. CCTV system will be IP based with minimal 30 day recording capacity. System will be web based to allow viewing by Belmont Police Department.

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

F. BUILDING SYSTEMS / Information Technology - OPTION 3.1

Structured Cabling System:

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. Internet services and wireless controllers in the existing high school MDF provide connectivity at all the school facilities and the Town. These systems must remain operational during construction. The district fiber must be extended to the new school. The existing MDF and the existing district fiber must remain functional until cutover. The district fiber must be protected during site work.

The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power. The district fiber will be re-routed the new MDF.

The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

The new data cabling infrastructure will be based on a Category 6A, or most up to date standard at the time of bid. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. Cabling will terminate in the MDF or one of the IDFs.

Fiber backbone will connect the MDF and all IDFs. It will consist of twelve strands of multi-mode and six strands of single-mode fiber optic cables. All multimode fiber optic cables will use multimode, graded-index fibers with 50-micron cores only. Fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility.

Data and Voice Communication Systems:

Networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system, audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ chassis and power supplies, 10/100/1000 PoE+ modules, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Backbone will be 10Gb minimum.

VoIP server and hardware will be provided. The existing NEC 8300 will be upgraded to the 9300 platform, or current standard at the time of bid. Several elementary schools in the district depend on the existing VoIP system for connectivity, so it must remain operational during construction. The new system must be compatible with existing VoIP equipment in the district.

Audio/Visual Communication System

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage, solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems the Owner may have.

Distributed Communication System

The distributed communication system will consist of a fully

F. BUILDING SYSTEMS / Information Technology - OPTION 3.1

operational IP platform public address system for district and school internal communications system incorporating school safety notifications and general communications. It will provide complete internal communications using state of the art IP technology with two-way loud speaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements in the future (additional hardware will be required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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BELMONT HIGH SCHOOL FEASIBILITY STUDY – AUDIOVISUAL SYSTEMS, OPTION C.3.1

SUBMITTED TO: PERKINS + WILL

CONSULTANT: ACENTECH

JANUARY 23, 2018

ACENTECH PROJECT NO. 629341

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

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:

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.

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 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.

ARCHITECTURAL, MECHANICAL, AND ELECTRICAL CONSIDERATIONS

1. Architectural: The following items should be considered for proper coordination between audiovisual system components and other trades:
   a. Loudspeaker coverage must not be obstructed.
   b. Structure will be necessary to ensure that loudspeakers and the projection screen can be ceiling-mounted at recommended locations.
   c. Antennas for the assistive listening system and wireless microphones will be mounted on the wall.
   d. Wall-mounted connection panel locations will require coordination.
   e. Ceiling-mounted video projectors must be free from vibration.
2. AV Equipment Racks:
   a. 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.

i. 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.
ii. AV equipment rack rooms may require oversized doors.

3. Auditorium Mixing Console:
   a. 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.
   b. Control Booth:
      i. Please note the following guidelines:
         1. Coordination will be required with the acoustical consultant to maintain proper acoustical isolation between the Auditorium and the Control Booth.
         2. 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.
4. Video Projection:
   a. 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.
   b. Whiteboards & marker boards that are used as a projection surfaces shall be of projection quality so that they minimize reflections and projection hotspots.
5. Blocking will be required at all wall-mounted video display panel and loudspeaker locations.
6. Mechanical/Electrical: The following items should be considered for proper coordination between the audiovisual system components and other trades:
   a. 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.
   b. Electrical outlets will be required at the equipment racks, mix location floor-box, and wall-mounted receptacle panels.
   c. IT data drops are strongly recommended at the equipment racks and all AV receptacle panels.
   d. 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.
   e. Equipment Rack Locations:
      i. AC power requirements and heat loads will need to be considered at each equipment rack and video projector location.

* * * * * *

End of Feasibility Study

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE

The OPM and designer's estimator conducted a level 2 estimate as required by the MSBA.

After completion of both estimates, a reconciliation process commenced and the final construction costs are noted herein. The OPM added the appropriated factor for soft cost to create the total project cost budget.

Option 1 – Base Repair

Grade 7-12

Proposed Construction Cost	$89,192,522
Project Total Project Budget	$111,490,653

Option 2.1 – Major Reno- Minor Add

Grade 7-12

Proposed Construction Cost	$241,676,850
Project Total Project Budget	$302,096,061

Option 2.3 – Minor Reno- Major Add

Grade 7-12

Proposed Construction Cost	$245,805,460
Project Total Project Budget	$307,256,825

Option 2.4 – Minor Reno- Major Add

Grade 7-12

Proposed Construction Cost	$245,770,439
Project Total Project Budget	$307,161,440

Option 3.1 – New Construction

Grade 7-12

Proposed Construction Cost	$235,060,850
Project Total Project Budget	$293,826,063

DAEDALUS

Belmont High School
Preferred Schematic Option Selection Study
Belmont, MA

February 14, 2018

PSR Cost Estimate

Architect:
Perkins+Will
225 Franklin St,
Boston, MA 02110
(617) 478-0300

Owner's Project Manager:
Daedalus Projects, Inc.
1 Faneuil Hall Marketplace
South Market Bldg, Suite 4195
Boston, MA 02109
(617) 451 2717

INTRODUCTION

Project Description:

Analysis and comparison of Schematic Design Belmont High School Selection Study Options:
- hazardous material abatement
- partial or entire demolition of existing school building
- renovations, addition, and new construction
- new site utility infrastructure and improvements

Existing School Site Options:
- Option 1: Renovations and Repairs
- Option 2.1: Major Renovations and Minor Addition to existing School, phased
- Option 2.3: Minor Renovations and Major Addition, phased
- Option 2.4: Minor Renovations and Major Addition, phased
- Option 3.1: New Construction

Configuration of School Program applied to all Renovation and Addition options:
- 7-12 High School for 2,215 Students; 451,800gsf

Configuration of School Program applied to New Construction options:
- 7-12 High School for 2,215 Students; 422,925gsf

Project Particulars:

Schematic Design Documents received from Perkins+Will
- Site Plan and Building Plan Diagrams for Option C.2.1, C.2.3, C.2.4 and C.3.1 dated January 16, 2018
- Building Plan Diagrams for Option C.2.1 dated January 18, 2018
- Existing Building Floor Plans and Roof Plan received January 24, 2018

Structural Narratives for all Options by Engineers Design Group, Inc. dated January 22, 2018
Structural Narratives - Code Updates by Engineers Design Group, Inc. dated January 22, 2018
Detailed quantity takeoffs where possible from design documents and reports
Daedalus Projects, Inc. site visits
Daedalus Projects, Inc. experience with similar projects of this nature

Project Assumptions:

The project will be managed and built by a Construction Manager under a CM at Risk single prime contract
Our costs assume that there will be at least three subcontractors submitting unrestricted bids in each filed sub-trade
Unit rates are escalated to mid-point of construction duration and utilizing prevailing wage labor rates
Operation during normal working hours
Lay-down/storage area, jobsite shed and trailers, and construction site entrance will be located adjacent to Project area
Noise and vibration disturbances are anticipated and will be minimized or avoided during normal business hours
Phasing and logistics will be required where existing school is open and operational
Temporary electrical and water site utility connections will be available. General Conditions value includes utility connections and consumption costs
Existing water pressure is adequate for servicing the new building

INTRODUCTION

Project Assumptions: cont'd

Subcontractor's markups are included in each unit rate. These markups cover field and home office overhead and subcontractor's profit

Design and Pricing Contingency markup is an allowance for unforeseen design issues, design detail development and specification clarifications during the design period

Remainder of General Conditions covers general facilities to support Project, and site office overheads that are not attributable to the direct trade costs

Project Requirements value covers winter conditions, scaffolding, staging and access, temporary protection, and cleaning

Fee markup is calculated on a percentage of direct construction costs

Anticipated start of construction April 2020

- Option 2.1: Major Renovations and Minor Addition to existing School, phased, construction duration 48 months
- Option 2.3: Minor Renovations and Major Addition, phased, construction duration 42 months
- Option 2.4: Minor Renovations and Major Addition, phased, construction duration 42 months
- Option 3.1: New Construction, construction duration 36 months

Escalation allowance has been calculated at a rate of 3½% per year

Construction Cost Estimate Exclusions:

Work beyond the boundary of the site

Winter conditions

Pre-construction services

Unforeseen Conditions Contingency

Architectural/Engineering; Designer and other Professional fees, testing, printing, surveying

Owner's administration; legal fees, advertising, permitting, Owner's insurance, administration, interest expense

Project costs; utility company back charges prior to construction, construction of swing space and temporary facilities, program related phasing, relocation

Owner furnished and installed products; computer networking, desks, chairs, furnishings, equipment, artwork, loose case goods and other similar items

Utility company back charges during construction

Third Party testing & commissioning

Wetlands protection or restoration

Police details and street/sidewalk permits

G. COST ESTIMATE / OPM

GRADES 7-12 MAIN SUMMARY

ELEMENT				OPTION 1. Repairs Only 239,354 GSF 24 MTH	
Direct Trade Costs Details				$47,886,114	$200.06
Hazardous Material Abatement				$7,100,000	$27.61
Direct Trade Details SubTotal				**$54,986,114**	**$229.73**
Design and Pricing Contingency				$8,248,000	$34.46
Direct Trade Cost Total				**$63,234,114**	**$264.19**
Staffing, Supervision and Management				$4,800,000	$20.05
Remainder of General Conditions, Project Requirements				$3,200,000	$13.37
Phasing and Logistics				$1,580,900	$6.60
General Liability Insurance				$728,000	$3.04
Performance and Payment Bonds				$633,000	$2.64
GMP Contingency				$3,162,000	$13.21
Fee				$2,214,000	$9.25
Estimated Construction Cost Total				**$79,552,014**	**$332.36**
Escalation from now to start of Construction				$5,988,000	$25.02
Estimated Construction Cost at Start of Construction				**$85,541,000**	**$357.38**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST SUMMARY

ELEMENT				OPTION 1. Repairs Only 239,354 GSF	
A10 Foundations				$615,439	$2.57
A SUBSTRUCTURE				**$615,439**	**$2.57**
B10 Superstructure				$738,385	$3.08
B20 Exterior Closure				$4,341,550	$18.14
B30 Roofing				$100,000	$0.42
B SHELL				**$5,179,935**	**$21.64**
C10 Interior Construction				$3,953,217	$16.52
C20 Stairs				$210,500	$0.88
C30 Interior Finishes				$5,549,580	$23.19
C INTERIORS				**$9,713,297**	**$40.58**
D10 Conveying				$275,000	$1.15
D20 Plumbing				$2,872,248	$12.00
D30 HVAC				$10,770,930	$45.00
D40 Fire Protection				$1,124,964	$4.70
D50 Electrical				$9,574,160	$40.00
D SERVICES				**$24,617,302**	**$102.85**
E10 Equipment				$1,914,832	$8.00
E20 Furnishings				$2,393,540	$10.00
E EQUIPMENT & FURNISHINGS				**$4,308,372**	**$18.00**
G1020 Site Demolition, Selective Demolition				$1,436,770	$6.00
G1030 Earthwork				$85,000	$0.36
G1040 Hazardous Material Abatement				$7,100,000	$29.66
G10 SITE PREPARATION				**$8.621.770**	**$36.02**
G2010 Paving and Surfacing				$1,475,000	$6.16
G2040 Site Improvements				$240,000	$1.00
G2050 Plantings, Soft Landscaping				$125,000	$0.52
G20 SITE IMPROVEMENTS				**$1,840,000**	**$7.69**
G3010 Water Supply and Distribution				$50,000	$0.21
G3020 Sanitary Sewer System				$40,000	$0.17
G30 SITE MECHANICAL UTILITIES				**$90,000**	**$0.38**
Direct Trade Details SubTotal				**$54,986,114**	**$229.73**

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE					OPTION 1. Repairs Only QUANTITY	OPTION 1. Repairs Only COST
10	*Repairs only at Existing Building*							*239,354*	*GSF*
11									
12	**A SUBSTRUCTURE**								
13									
14	**A10 Foundations**								
15	Miscellaneous crack repairs and resurfacing at foundations	LS	$25,000.00					1	$25,000
16	Cutting and patching for new MEP system installs	GSF	$0.25					239,354	$59,839
17	New slab on grade; bathrooms, showers, kitchen	SF	$20.00					11,500	$230,000
18	Repair slab on grade; Fieldhouse	SF	$1.50					20,400	$30,600
19	12" structured slab, piles; new ramps	AL	$250,000.00					1	$250,000
20	New equipment pads	LS	$20,000.00					1	$20,000
21	**A10 Foundations Total**								**$615,439**
22									
23									
24	**B SHELL**								
25									
26	**B10 Superstructure**								
27	Cutting and patching for new MEP system installs	GSF	$0.50					239,354	$119,677
28	New ramps at upper floors	AL	$90,000.00					1	$90,000
29	2hr fireproofing of existing structure	GSF	$2.00					239,354	$478,708
30	Roof dunnage and supports	LS	$50,000.00					1	$50,000
31	**B10 Superstructure Total**								**$738,385**
32									
33	**B20 Exterior Closure**								
34	Repair brick facade, repoint, clean, staging	SF	$40.00					40,000	$1,600,000
35	precast concrete panels and decoration trims	SF	$33.00					13,000	$429,000
36	Remove metal wall panels, new composite metal wall panels	SF	$68.50					5,500	$376,750
37	Remove fascia panels, new ribbon aluminum fascia panels	SF	$73.50					5,700	$418,950
38	colored aluminum fascia panels	SF	$78.50					2,500	$196,250
39	Recaulk existing control joints	LS	$40,000.00					1	$40,000
40	Upgrade Courtyard exist to ADA code compliance	LS	$20,000.00					1	$20,000
41	Remove glazed opening, new window/curtainwall/translucent panels	SF	$95.00					9,500	$902,500
42	Remove louver, new architectural louver	SF	$60.00					700	$42,000
43	Remove door, new exterior pair of glazed doors	PR	$8,500.00					15	$127,500
44	single glazed door	LEAF	$4,000.00					3	$12,000
45	Remove door, new exterior pair of doors	PR	$4,000.00					23	$92,000
46	single door	LEAF	$2,100.00					3	$6,300
47	Remove overhead door, new overhead door	OPEN	$10,000.00					6	$60,000
48	Rough carpentry at all openings	SF	$1.50					12,200	$18,300
49	**B20 Exterior Closure Total**								**$4,341,550**
50									
51	**B30 Roofing**								
52	Patch roofing at new MEP installs	LS	$35,000.00					1	$35,000

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE						OPTION 1. Repairs Only QUANTITY	OPTION 1. Repairs Only COST
53	New stage smoke hatch	OPEN	$10,000.00						4	$40,000
54	Replace roof ladder/hatch/etc.	LS	$25,000.00						1	$25,000
55	**B30 Roofing Total**									**$100,000**
56										
57										
58	**C INTERIORS**									
59										
60	**C10 Interior Construction**									
7	Repair interior partitions	GSF	$6.50						239,354	$1,555,801
62	Remove glazed interior openings, new borrowed lites/sidelights	AL	$75,000.00						1	$75,000
63	Modify door opening for code compliance, new door set	OPEN	$3,350.00						150	$502,500
64	Remove door, new door set	LEAF	$1,000.00						300	$300,000
65	Lockers	EA	$250.00						1,470	$367,500
66	Replace equipment; athletic, workshop, music, band	AL	$100,000.00						1	$100,000
67	New guardrails and railings	LF	$95.00						1,000	$95,000
68	Specialties	GSF	$4.00						239,354	$957,416
69	**C10 Interior Construction Total**									**$3,953,217**
70										
71	**C20 Stairs**									
72	Upgrade existing stair; replace railings	FLT	$10,000.00						9	$90,000
73	New stairs	FLT	$30,000.00						2	$60,000
74	New rubber treads, risers and landings	FLT	$5,500.00						11	$60,500
75	**C20 Stairs Total**									**$210,500**
76										
77	**C30 Interior Finishes**									
78	New tile flooring; bathrooms, lockers, corridors	SF	$20.00						25,000	$500,000
79	Floor finishes	GSF	$10.00						239,354	$2,393,540
80	Ceiling finishes	GSF	$7.75						239,354	$1,854,994
81	New wall finishes; Auditorium, Little Theater	AL	$150,000.00						1	$150,000
82	Acoustic wall panels; Gym	AL	$50,000.00						1	$50,000
83	Practice, Music	SF	$25.00						2,500	$62,500
84	Prep and paint	GSF	$2.25						239,354	$538,547
85	**C30 Interior Finishes Total**									**$5,549,580**
86										
87										
88	**D SERVICES**									
89										
90	**D10 Conveying**									
91	Elevator; demo and disposal	EA	$50,000.00						1	$50,000
92	Elevator; new	EA	$190,000.00						1	$190,000
93	Lift; new, Auditorium	EA	$35,000.00						1	$35,000
94	**D10 Conveying Total**									**$275,000**
95										

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE					OPTION 1. Repairs Only QUANTITY	OPTION 1. Repairs Only COST
96									
97									
98	**D20 Plumbing**								
99	Plumbing	GSF	$12.00					**239,354**	$2,872,248
100	**D20 Plumbing Total**								**$2,872,248**
101									
102	**D30 HVAC**								
103	HVAC	EA	$45.00					**239,354**	$10,770,930
104	**D30 HVAC Total**								**$10,770,930**
105									
106	**D40 Fire Protection**								
107	Sprinkler Coverage	GSF	$4.70					**239,354**	$1,124,964
108	**D40 Fire Protection Total**								**$1,124,964**
109									
110	**D50 Electrical**								
105	Interior Electrical	GSF	$40.00					**239,354**	$9,574,160
112	**D50 Electrical Total**								**$9,574,160**
113									
114									
115	**E EQUIPMENT & FURNISHINGS**								
116									
117	**E10 Equipment**								
118	Allowance	GSF	$8.00					**239,354**	$1,914,832
119	**E10 Equipment Total**								**$1,914,832**
120									
121	**E20 Furnishings**								
122	Allowance	GSF	$10.00					**239,354**	$2,393,540
123	**E20 Furnishings Total**								**$2,393,540**
124									
125									
126	**G10 SITE PREPARATION**								
127									
128	**G1020 Site Demolition, Selective Demolition**								
129	Selective Site Demolition	AL	$240,000.00					**1**	$240,000
130	Existing school program interior selective demolition	GSF	$5.00					**239,354**	$1,196,770
131	**G1020 Site Demolition, Selective Demolition Total**								**$1,436,770**
132									
133	**G1030 Earthwork**								
134	Allowance	AL	$85,000.00					**1**	$85,000
135	**G1030 Earthwork Total**								**$85,000**
136									
137	**G1040 Hazardous Material Abatement**								
138	Removal and disposal of all ACM, PCB and other hazardous materials	AL	$7,100,000.00					**1**	$7,100,000

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE						OPTION 1. Repairs Only QUANTITY	OPTION 1. Repairs Only COST
139	**G1040 Hazardous Material Abatement Total**									**$7,100,000**
140										
141										
142	**G20 SITE IMPROVEMENTS**									
143										
144	**G2010 Paving and Surfacing**									
145	Allowance	AL	$750,000.00						1	$750,000
146	Sports fields	AL	$725,000.00						1	$725,000
147	**G2010 Paving and Surfacing Total**									**$1,475,000**
148										
149	**G2040 Site Improvements**									
150	Allowance	AL	$240,000.00						1	$240,000
151	**G2040 Site Improvements Total**									**$240,000**
152										
153	**G2050 Plantings, Soft Landscaping**									
154	Allowance	AL	$125,000.00						1	$125,000
155	**G2050 Plantings, Soft Landscaping Total**									**$125,000**
156										
157										
158	**G30 SITE MECHANICAL UTILITIES**									
159										
160	**G3010 Water Supply and Distribution**									
161	Allowance	AL	$50,000.00						1	$50,000
162	**G3010 Water Supply and Distribution Total**									**$50,000**
163										
164	**G3020 Sanitary Sewer System**									
165	Allowance	AL	$40,000.00						1	$40,000
166	**G3020 Sanitary Sewer System Total**									**$40,000**
167										
168										
169										

GRADES 7-12 MAIN SUMMARY

ELEMENT	OPTION C.2.1 Major Reno/Minor Add 451,800 GSF 48 MTH		OPTION C.2.3 Minor Reno/Major Add 451,800 GSF 42 MTH		OPTION C.2.4 Minor Reno/Major Add 451,800 GSF 42 MTH		OPTION C.3.1 New Construction 422,925 GSF 36 MTH	
Direct Trade Costs Details	$165,505,920	$366.33	$154,951,614	$342.97	$164,364,161	$363.80	$158,838,979	$375.57
Building Demolition	$84,303	$8.50	$1,632,595	$8.50	$1,632,595	$8.50	$1,478,440	$5.75
Hazardous Material Abatement	$7,100,000	$27.61	$7,100,000	$27.61	$7,100,000	$27.61	$7,100,000	$27.61
Concord Ave. Traffic Mitigation	$2,000,000	$4.43	$2,000,000	$4.43	$2,000,000	$4.43	$2,000,000	$4.73
Direct Trade Details SubTotal	**$174,690,223**	**$386.65**	**$165,684,209**	**$366.72**	**$175,096,756**	**$387.55**	**$169,417,419**	**$400.59**
Design and Pricing Contingency	$20,963,000	$46.40	$19,883,000	$44.01	$17,510,000	$38.76	$16,942,000	$40.06
Direct Trade Cost Total	**$195,653,223**	**$433.05**	**$185,567,209**	**$410.73**	**$192,606,756**	**$426.31**	**$186,359,419**	**$440.64**
Staffing, Supervision and Management	$9,600,000	$21.25	$8,190,000	$18.13	$8,190,000	$18.13	$6,840,000	$16.17
Remainder of General Conditions, Project Requirements	$6,400,000	$14.17	$5,460,000	$12.08	$5,460,000	$12.08	$4,560,000	$10.78
Phasing and Logistics	$4,891,400	$10.83	$2,783,600	$6.16	$2,889,200	$6.39	$931,800	$2.20
General Liability Insurance	$2,251,000	$4.98	$2,135,000	$4.73	$2,215,000	$4.90	$2,144,000	$5.07
Performance and Payment Bonds	$1,957,000	$4.33	$1,856,000	$4.11	$1,927,000	$4.27	$1,864,000	$4.41
GMP Contingency	$9,783,000	$21.65	$9,279,000	$20.54	$9,631,000	$21.32	$4,659,000	$11.02
Fee	$6,848,000	$15.16	$6,031,000	$13.35	$6,260,000	$13.86	$5,591,000	$13.22
Estimated Construction Cost Total	**$237,383,623**	**$525.42**	**$221,301,809**	**$489.82**	**$229,178,956**	**$507.26**	**$212,949,219**	**$503.52**
Escalation from now to start of Construction	$17,867,000	$39.55	$16,657,000	$36.87	$17,250,000	$38.18	$16,028,000	$37.90
Estimated Construction Cost at Start of Construction	**$255,251,000**	**$564.96**	**$237,959,000**	**$526.69**	**$246,429,000**	**$545.44**	**$228,978,000**	**$541.42**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST SUMMARY

ELEMENT	OPTION C.2.1 Major Reno/Minor Add 451,800 GSF		OPTION C.2.3 Minor Reno/Major Add 451,800 GSF		OPTION C.2.4 Minor Reno/Major Add 451,800 GSF		OPTION C.3.1 New Construction 422,925 GSF	
A10 Foundations	$14,139,581	$31.30	$14,629,208	$32.38	$14,216,828	$31.47	$17,114,941	$40.47
A SUBSTRUCTURE	**$14,139,581**	**$31.30**	**$14,629,208**	**$32.38**	**$14,216,828**	**$31.47**	**$17,114,941**	**$40.47**
B10 Superstructure	$9,703,272	$21.48	$16,630,192	$36.81	$16,381,833	$36.26	$17,441,657	$41.24
B20 Exterior Closure	$31,987,420	$70.80	$17,436,140	$38.59	$24,323,016	$53.84	$22,967,000	$54.31
B30 Roofing	$10,428,423	$23.08	$8,748,591	$19.36	$9,532,434	$21.10	$8,658,448	$20.47
B SHELL	**$52,119,114**	**$115.36**	**$42,814,923**	**$94.77**	**$50,237,283**	**$111.19**	**$49,067,105**	**$116.02**
C10 Interior Construction	$14,683,500	$32.50	$14,683,500	$32.50	$14,683,500	$32.50	$13,745,063	$32.50
C20 Stairs	$435,000	$0.96	$565,000	$1.25	$790,000	$1.75	$550,000	$1.30
C30 Interior Finishes	$13,022,885	$28.82	$12,580,250	$27.84	$12,580,250	$27.84	$11,630,438	$27.50
C INTERIORS	**$28,141,385**	**$62.29**	**$27,828,750**	**$61.60**	**$28,053,750**	**$62.09**	**$25,925,500**	**$61.30**
D10 Conveying	$430,000	$0.95	$430,000	$0.95	$430,000	$0.95	$380,000	$0.90
D20 Plumbing	$5,421,600	$12.00	$5,421,600	$12.00	$5,421,600	$12.00	$5,075,100	$12.00
D30 HVAC	$24,331,000	$53.85	$24,331,000	$53.85	$24,331,000	$53.85	$23,031,625	$54.46
D40 Fire Protection	$2,223,460	$4.92	$2,223,460	$4.92	$2,223,460	$4.92	$2,087,748	$4.94
D50 Electrical	$18,601,200	$41.17	$18,601,200	$41.17	$18,601,200	$41.17	$17,619,450	$41.66
D SERVICES	**$51,007,260**	**$112.90**	**$51,007,260**	**$112.90**	**$51,007,260**	**$112.90**	**$48,193,923**	**$113.95**
E10 Equipment	$1,879,500	$4.16	$1,879,500	$4.16	$1,879,500	$4.16	$1,057,313	$2.50
E20 Furnishings	$3,653,353	$8.09	$4,627,150	$10.24	$4,627,150	$10.24	$4,652,175	$11.00
E EQUIPMENT & FURNISHINGS	**$5,532,853**	**$12.25**	**$6,506,650**	**$14.40**	**$6,506,650**	**$14.40**	**$5,709,488**	**$13.50**
G1010 Site Clearing, Site Preparation	$685,272	$1.52	$685,272	$1.52	$685,272	$1.52	$685,272	$1.62
G1020 Building Demolition	$84,303	$0.19	$1,632,595	$3.61	$1,632,595	$3.61	$1,478,440	$3.50
G1020 Site Demolition, Selective Demolition	$2,819,087	$6.24	$1,048,547	$2.32	$1,048,547	$2.32	$425,547	$1.01
G1030 Earthwork	$467,310	$1.03	$505,535	$1.12	$513,184	$1.14	$462,640	$1.09
G1040 Hazardous Material Abatement	$7,100,000	$15.71	$7,100,000	$15.71	$7,100,000	$15.71	$7,100,000	$16.79
G10 SITE PREPARATION	**$11,155,972**	**$24.69**	**$10,971,950**	**$24.28**	**$10,979,598**	**$24.30**	**$10,151,899**	**$24.00**
G2010 Paving and Surfacing	$5,814,210	$12.87	$5,594,822	$12.38	$6,648,712	$14.72	$5,651,144	$13.36
G2040 Site Improvements	$171,400	$0.38	$171,400	$0.38	$305,660	$0.68	$171,400	$0.41
G2050 Plantings, Soft Landscaping	$624,934	$1.38	$526,897	$1.17	$659,831	$1.46	$959,905	$2.27
G20 SITE IMPROVEMENTS	**$6,610,544**	**$14.63**	**$6,293,119**	**$13.93**	**$7,614,203**	**$16.85**	**$6,782,449**	**$16.04**
G3010 Water Supply and Distribution	$417,850	$0.92	$417,850	$0.92	$417,850	$0.92	$417,850	$0.99
G3020 Sanitary Sewer System	$314,000	$0.69	$350,000	$0.77	$349,500	$0.77	$290,500	$0.69
G3030 Stormwater Management System	$1,868,514	$4.14	$1,623,348	$3.59	$2,366,184	$5.24	$2,423,215	$5.73
G4010 Site Electrical Utilities	$1,383,150	$3.06	$1,241,150	$2.75	$1,347,650	$2.98	$1,340,550	$3.17
G30 SITE MECHANICAL UTILITIES	**$3,983,514**	**$8.82**	**$3,632,348**	**$8.04**	**$4,481,184**	**$9.92**	**$4,472,115**	**$10.57**
Direct Trade Details SubTotal	**$172,690,223**	**$382.23**	**$163,684,209**	**$362.29**	**$173,096,756**	**$383.13**	**$167,417,419**	**$395.86**

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
10	***Total***			***451,800***	***GSF***	***451,800***	***GSF***	***451,800***	***GSF***	***422,925***	***GSF***
11	*Renovation*			*239,354*	*GSF*	*62,300*	*GSF*	*62,300*	*GSF*		
12	*New Construction / Addition*			*212,446*	*GSF*	*389,500*	*GSF*	*389,500*	*GSF*	*422,925*	*GSF*
13	*Building Demolition*			*9,918*	*GSF*	*192,070*	*GSF*	*192,070*	*GSF*	*257,120*	*GSF*
14											
15	**A SUBSTRUCTURE**										
16											
17	**A10 Foundations**										
18	*Reinforced concrete pile caps, structural steel piles, structured slab*										
19	steel pile, 50-ton; assume 25'long	LF	$75.00	**92,250**	$6,918,750	**105,750**	$7,931,250	**102,750**	$7,706,250	**125,250**	$9,393,750
20	concrete pile; 8x8x4 at clusters, 2x2x2 at single pile	EA	$5,340.00	**500**	$2,670,000	**610**	$3,257,400	**590**	$3,150,600	**730**	$3,898,200
21	grade beam at perimeter; 5' deep	LF	$590.00	**3,075**	$1,814,250	**2,110**	$1,244,900	**2,070**	$1,221,300	**2,125**	$1,253,750
22	grade beam at slab on grade; assume 60'oc grid	LF	$590.00	**390**	$230,100	**620**	$365,800	**600**	$354,000	**780**	$460,200
23	12" structured slab on grade, 6#/sf reinforcing, vapor barrier, 2" rigid insu	SF	$12.00	**77,950**	$935,400	**122,633**	$1,471,596	**119,300**	$1,431,600	**155,585**	$1,867,020
24	compacted granular structural fill; assume 12"	CY	$40.00	**3,031**	$121,256	**4,769**	$190,762	**4,639**	$185,578	**6,051**	$242,021
25	*New brace frames in existing to renovation areas*										
26	demo sog for new pile, patch and repair after install	LOC	$4,000.00	**25**	$100,000	**9**	$36,000	**9**	$36,000		
27	install new pile and pile cap	EA	$8,700.00	**25**	$217,500	**9**	$78,300	**9**	$78,300		
28	demo sog for new tie beam, patch and repair after install	LF	$190.00	**760**	$144,400	**280**	$53,200	**280**	$53,200		
29	*New building over Level 2 for Level 3 additions*										
30	demo sog for new pile, patch and repair after install	LOC	$4,000.00	**54**	$216,000						
31	install new pile and pile cap	EA	$8,700.00	**54**	$469,800						
32	demo sog for new tie beam, patch and repair after install	LF	$190.00	**1,590**	$302,125						
33	**A10 Foundations Total**				**$14,139,581**		**$14,629,208**		**$14,216,828**		**$17,114,941**
34											
35											
36	**B SHELL**										
37											
38	**B10 Superstructure**										
39	*New brace frames in existing to renovation areas*										
40	addition of brace frames; assume 2#/sf face area	TNS	$5,000.00	**24**	$120,000						
41	new masonry shear wall at existing building	SF	$25.00	**23,270**	$581,750						
42	Anchor un-reinforced masonry walls to floor & roof structure	EA	$150.00	**991**	$148,650	**326**	$48,900	**477**	$71,550		
43	Reinforce existing roof diaphragms to resist uplift loads; assume 1#/covera	TNS	$5,000.00	**38**	$192,183	**28**	$138,390	**23**	$116,328		
44	*New building over Level 2 for Level 3 additions*										
45	new columns from Level 1 up per floor	EA	$2,500.00	**56**	$140,000						
46	Structural steel floor framing - 13#/gsf allowance provided	TNS	$3,900.00							**1,738**	$6,777,069
47	15#/gsf allowance provided	TNS	$3,900.00	**1,009**	$3,934,008	**2,002**	$7,805,860	**2,027**	$7,903,350		
48	above multi-purpose rooms & PE space; 18#/gsf	TNS	$3,900.00	**134**	$522,007	**292**	$1,136,889	**311**	$1,211,652	**376**	$1,465,636
49	Structural steel roof framing - 13#/gsf allowance provided	TNS	$3,900.00	**461**	$1,798,456	**819**	$3,194,006	**718**	$2,799,401	**1,112**	$4,338,513
50	15#/gsf @ Gym & mechanical zone/low roof; add 2#/gsf	TNS	$4,680.00	**14**	$66,456	**25**	$117,936	**22**	$103,428	**55**	$255,996
51	5½" LWT slab on composite metal deck, fireproofing; upper slabs	SF	$12.50	**134,496**	$1,681,200	**266,867**	$3,335,838	**270,200**	$3,377,500	**267,340**	$3,341,750
52	low roof; assume 20% of roof area	SF	$12.50	**14,200**	$177,500	**25,200**	$315,000	**22,100**	$276,250	**34,300**	$428,750

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
53											
54	1½" Type B metal roof deck	SF	$3.75	**77,950**	$292,313	**122,633**	$459,874	**119,300**	$447,375	**155,585**	$583,444
55	5½" LWT slab on metal deck; mech zone assume 5% of roof area	SF	$12.50	**3,900**	$48,750	**6,200**	$77,500	**6,000**	$75,000	**7,800**	$97,500
56	3" Type NA acoustic metal roof deck; Gym	SF	$7.50							**20,400**	$153,000
57	**B10 Superstructure Total**				**$9,703,272**		**$16,630,192**		**$16,381,833**		**$17,441,657**
58											
59	**B20 Exterior Closure**										
60	Existing exterior façade to remain; repair, repoint, clean	SF	$40.00	**111,735**	$4,469,384	**20,090**	$803,580	**29,385**	$1,175,416		
61	remove and replace glazed openings; assume 20%	SF	$105.00	**22,350**	$2,346,750	**4,020**	$422,100	**5,880**	$617,400		
62	New façade; masonry, glass, doors	SF	$140.00	**179,795**	$25,171,286	**115,789**	$16,210,460	**160,930**	$22,530,200	**164,050**	$22,967,000
63	**B20 Exterior Closure Total**				**$31,987,420**		**$17,436,140**		**$24,323,016**		**$22,967,000**
64											
65	**B30 Roofing**										
66	Demo roof for new floor deck	SF	$15.00	**47,645**	$714,675						
67	Roofing; assume TPO	SF	$25.00	**70,945**	$1,773,625	**125,996**	$3,149,908	**110,430**	$2,760,750	**171,145**	$4,278,613
68	premium for green roof/teaching area - allowance agreed	AL	$500,000.00	**1**	$500,000	**1**	$500,000	**1**	$500,000	**1**	$500,000
69	add low roof/canopy	AL	$100.00	**14,800**	$1,480,000	**8,900**	$890,000	**20,800**	$2,080,000	**13,445**	$1,344,500
70	mechanical zone and screen - qty provided	LF	$750.00	**1,200**	$900,000	**1,200**	$900,000	**1,200**	$900,000	**1,200**	$900,000
71	soffits, fascia	LF	$425.00	**3,230**	$1,372,623	**2,215**	$941,184	**2,175**	$924,184	**2,230**	$947,835
72	Replace existing roofing w/new	SF	$30.00	**100,000**	$3,000,000	**56,000**	$1,680,000	**56,000**	$1,680,000		
73	Skylight - qty provided	SF	$125.00	**5,500**	$687,500	**5,500**	$687,500	**5,500**	$687,500	**5,500**	$687,500
74	**B30 Roofing Total**				**$10,428,423**		**$8,748,591**		**$9,532,434**		**$8,658,448**
75											
76											
77	**C INTERIORS**										
78											
79	**C10 Interior Construction**										
80	Renovate existing school	GSF	$32.50	**239,354**	$7,779,005	**62,300**	$2,024,750	**62,300**	$2,024,750		
81	Partitions	GSF	$20.00	**212,446**	$4,248,920	**389,500**	$7,790,000	**389,500**	$7,790,000	**422,925**	$8,458,500
82	Doors	GSF	$4.50	**212,446**	$956,007	**389,500**	$1,752,750	**389,500**	$1,752,750	**422,925**	$1,903,163
83	Storefront; assume 2% of interior walls	GSF	$1.75	**212,446**	$371,781	**389,500**	$681,625	**389,500**	$681,625	**422,925**	$740,119
84	Specialties	GSF	$6.25	**212,446**	$1,327,788	**389,500**	$2,434,375	**389,500**	$2,434,375	**422,925**	$2,643,281
85	**C10 Interior Construction Total**				**$14,683,500**		**$14,683,500**		**$14,683,500**		**$13,745,063**
86											
87	**C20 Stairs**										
88	Upgrade existing stair; assume replace railings	FLT	$15,000.00	**4**	$60,000	**1**	$15,000	**1**	$15,000		
89	New stairs	FLT	$35,000.00	**7**	$245,000	**12**	$420,000	**11**	$385,000	**12**	$420,000
90	Monumental/Open stair, allow	FLT	$65,000.00	**2**	$130,000	**2**	$130,000	**6**	$390,000	**2**	$130,000
91	**C20 Stairs Total**				**$435,000**		**$565,000**		**$790,000**		**$550,000**
92											
93	**C30 Interior Finishes**										
94	Renovate existing school	GSF	$30.00	**239,354**	$7,180,620	**62,300**	$1,869,000	**62,300**	$1,869,000		
95	*New School Building Construction*	*GSF*		***212,446***		***389,500***		***389,500***		***422,925***	

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
96	wall finishes	GSF	$6.75	212,446	$1,434,011	389,500	$2,629,125	389,500	$2,629,125	422,925	$2,854,744
97	flooring	GSF	$10.75	212,446	$2,283,795	389,500	$4,187,125	389,500	$4,187,125	422,925	$4,546,444
98	ceiling finishes	GSF	$10.00	212,446	$2,124,460	389,500	$3,895,000	389,500	$3,895,000	422,925	$4,229,250
99	**C30 Interior Finishes Total**				**$13,022,885**		**$12,580,250**		**$12,580,250**		**$11,630,438**
100											
101											
102	**D SERVICES**										
103											
104	**D10 Conveying**										
105	Elevator; demo and disposal	EA	$50,000.00	1	$50,000	1	$50,000	1	$50,000		
106	Elevator; new	EA	$190,000.00	2	$380,000	2	$380,000	2	$380,000	2	$380,000
107	**D10 Conveying Total**				**$430,000**		**$430,000**		**$430,000**		**$380,000**
108											
109	**D20 Plumbing**										
110	Plumbing	GSF	$12.00	451,800	$5,421,600	451,800	$5,421,600	451,800	$5,421,600	422,925	$5,075,100
111	**D20 Plumbing Total**				**$5,421,600**		**$5,421,600**		**$5,421,600**		**$5,075,100**
112											
113	**D30 HVAC**										
114	HVAC	EA	$45.00	451,800	$20,331,000	451,800	$20,331,000	451,800	$20,331,000	422,925	$19,031,625
115	Geothermal wells; 6" dia borehole @ 20'oc grid x400' deep	EA	$10,000.00	400	$4,000,000	400	$4,000,000	400	$4,000,000	400	$4,000,000
116	**D30 HVAC Total**				**$24,331,000**		**$24,331,000**		**$24,331,000**		**$23,031,625**
117											
118	**D40 Fire Protection**										
119	Sprinkler Coverage	GSF	$4.70	451,800	$2,123,460	451,800	$2,123,460	451,800	$2,123,460	422,925	$1,987,748
120	Fire Pump	EA	$100,000.00	1	$100,000	1	$100,000	1	$100,000	1	$100,000
121	**D40 Fire Protection Total**				**$2,223,460**		**$2,223,460**		**$2,223,460**		**$2,087,748**
122											
123	**D50 Electrical**										
105	Interior Electrical	GSF	$34.00	451,800	$15,361,200	451,800	$15,361,200	451,800	$15,361,200	422,925	$14,379,450
125	Roof borne PV system - qty provided	SF	$36.00	90,000	$3,240,000	90,000	$3,240,000	90,000	$3,240,000	90,000	$3,240,000
126	**D50 Electrical Total**				**$18,601,200**		**$18,601,200**		**$18,601,200**		**$17,619,450**
127											
128											
129	**E EQUIPMENT & FURNISHINGS**										
130											
131	**E10 Equipment**										
132	Renovate existing school	GSF	$2.50	239,354	$598,385	62,300	$155,750	62,300	$155,750		
105	existing pool; new equipment - allowance agreed	AL	$750,000.00	1	$750,000	1	$750,000	1	$750,000		
134	New Construction / Addition	GSF	$2.50	212,446	$531,115	389,500	$973,750	389,500	$973,750	422,925	$1,057,313
135	**E10 Equipment Total**				**$1,879,500**		**$1,879,500**		**$1,879,500**		**$1,057,313**
136											
137											
138	**E20 Furnishings**										

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
139	Renovate existing school	GSF	$5.50	**239,354**	$1,316,447	**62,300**	$342,650	**62,300**	$342,650		
140	New Construction / Addition	GSF	$11.00	**212,446**	$2,336,906	**389,500**	$4,284,500	**389,500**	$4,284,500	**422,925**	$4,652,175
141	**E20 Furnishings Total**				**$3,653,353**		**$4,627,150**		**$4,627,150**		**$4,652,175**
142	**G10 SITE PREPARATION**										
143											
144	**G1010 Site Clearing, Site Preparation**										
145	Clearing and grubbing	ACRE	$4,000.00	**40**	$160,000	**40**	$160,000	**40**	$160,000	**40**	$160,000
146	Construction fence	LF	$12.00	**11,017**	$132,204	**11,017**	$132,204	**11,017**	$132,204	**11,017**	$132,204
147	Double construction gate	PR	$2,800.00	**4**	$11,200	**4**	$11,200	**4**	$11,200	**4**	$11,200
148	Strip and stockpile existing topsoil; assume avg. 6"	CY	$8.00	**13,383**	$107,064	**13,383**	$107,064	**13,383**	$107,064	**13,383**	$107,064
149	Temporary construction entrance including maintenance	EA	$9,000.00	**4**	$36,000	**4**	$36,000	**4**	$36,000	**4**	$36,000
150	Temp signs	LS	$1,800.00	**2**	$3,600	**2**	$3,600	**2**	$3,600	**2**	$3,600
151	Wash down/re-fueling	SF	$2.00	**6,000**	$12,000	**6,000**	$12,000	**6,000**	$12,000	**6,000**	$12,000
152	Protection of existing to remain	LS	$35,000.00	**1**	$35,000	**1**	$35,000	**1**	$35,000	**1**	$35,000
153	Temporary parking lot	AL	$15,000.00	**1**	$15,000	**1**	$15,000	**1**	$15,000	**1**	$15,000
154	Dewatering	LS	$35,000.00	**1**	$35,000	**1**	$35,000	**1**	$35,000	**1**	$35,000
155	Erosion control barrier	LF	$12.00	**11,017**	$132,204	**11,017**	$132,204	**11,017**	$132,204	**11,017**	$132,204
156	Erosion control barrier at temporary construction period soil stockpile	AL	$3,500.00	**1**	$3,500	**1**	$3,500	**1**	$3,500	**1**	$3,500
157	Inlet protection	AL	$2,500.00	**1**	$2,500	**1**	$2,500	**1**	$2,500	**1**	$2,500
158	**G1010 Site Clearing, Site Preparation Total**				**$685,272**		**$685,272**		**$685,272**		**$685,272**
159											
160	**G1020 Building Demolition**										
161	Building structure demolition, phased	GSF	$8.50	**9,918**	$84,303	**192,070**	$1,632,595	**192,070**	$1,632,595		
162	Building structure demolition	GSF	$5.75							**257,120**	$1,478,440
163	**G1020 Building Demolition Total**				**$84,303**		**$1,632,595**		**$1,632,595**		**$1,478,440**
164											
165	**G1020 Site Demolition, Selective Demolition**										
166	*Selective Site Demolition*										
167	saw cut existing pavement	LF	$12.00	**150**	$1,800	**150**	$1,800	**150**	$1,800	**150**	$1,800
168	asphalt pavement	SF	$1.20	**181,037**	$217,244	**181,037**	$217,244	**181,037**	$217,244	**181,037**	$217,244
169	concrete pavement	SF	$1.75	**46,573**	$81,503	**46,573**	$81,503	**46,573**	$81,503	**46,573**	$81,503
170	Cut, cap and remove existing utility	AL	$50,000.00	**1**	$50,000	**1**	$50,000	**1**	$50,000	**1**	$50,000
171	Misc. demolition other than above	AL	$75,000.00	**1**	$75,000	**1**	$75,000	**1**	$75,000	**1**	$75,000
172	Existing school program interior selective demolition	GSF	$10.00	**239,354**	$2,393,540	**62,300**	$623,000	**62,300**	$623,000		
173	**G1020 Site Demolition, Selective Demolition Total**				**$2,819,087**		**$1,048,547**		**$1,048,547**		**$425,547**
174											
175	**G1030 Earthwork**										
176	Cut and fill for parking lot	CY	$11.00	**8,602**	$94,617	**7,014**	$77,153	**8,284**	$91,124	**10,571**	$116,281
177	concrete pavement	CY	$11.00	**4,369**	$48,064	**2,940**	$32,337	**4,460**	$49,061	**1,858**	$20,437
178	remainder of site grades	CY	$10.00	**5,848**	$58,478	**9,835**	$98,354	**7,519**	$75,191	**5,327**	$53,267
179	Rough and fine grading	SF	$0.50	**532,303**	$266,152	**595,383**	$297,692	**595,617**	$297,809	**545,310**	$272,655
180	**G1030 Earthwork Total**				**$467,310**		**$505,535**		**$513,184**		**$462,640**
181	**G1040 Hazardous Material Abatement**										

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
182	Removal and disposal of all ACM, PCB and other hazardous materials	AL	$7,100,000.00	1	$7,100,000	1	$7,100,000	1	$7,100,000	1	$7,100,000
183	**G1040 Hazardous Material Abatement Total**				**$7,100,000**		**$7,100,000**		**$7,100,000**		**$7,100,000**
184											
185											
186	**G20 SITE IMPROVEMENTS**										
187											
188	**G2010 Paving and Surfacing**										
189	Asphalt paving at bus drop-off, deliveries, parent drop-off and parking lot	SF	$3.15	185,793	$585,248	151,500	$477,225	178,934	$563,642	228,334	$719,252
190	gravel base to asphalt pavement	CY	$32.00	7,569	$242,208	6,172	$197,504	7,290	$233,280	9,302	$297,664
191	paint crosswalk	AL	$2,500.00	1	$2,500	1	$2,500	1	$2,500	1	$2,500
192	parking stall	EA	$35.00	6	$210	6	$210	6	$210	6	$210
193	HC parking stall	EA	$85.00	424	$36,040	424	$36,040	424	$36,040	424	$36,040
194	misc. pavement marking	AL	$5,000.00	1	$5,000	1	$5,000	1	$5,000	1	$5,000
195	Patching to existing paving at street	LS	$5,000.00	1	$5,000	1	$5,000	1	$5,000	1	$5,000
196	Concrete sidewalk	SF	$7.25	46,573	$337,654	20,757	$150,488	32,368	$234,668	27,735	$201,079
197	Intergenerational walking path	SF	$3.50	16,405	$57,418	16,370	$57,295	16,350	$57,225	16,250	$56,875
198	Sport walk	SF	$7.50					3,084	$23,130	3,360	$25,200
199	curb cut	EA	$380.00	12	$4,560	12	$4,560	12	$4,560	12	$4,560
200	Cement concrete entrance	SF	$30.00	54,661	$1,639,830	37,194	$1,115,820	70,443	$2,113,290	13,834	$415,020
201	Loading dock	SF	$15.00	2,050	$30,750	8,082	$121,230			3,424	$51,360
202	Gravel base to concrete pavement	CY	$30.00	3,176	$95,280	1,938	$58,140	3,529	$105,870	1,129	$33,870
203	Curbing	LF	$38.00	8,818	$335,084	8,199	$311,562	9,853	$374,414	10,675	$405,650
204	*Baseball and Softball field:*	*SF*		*50,099*		*72,268*		*82,881*		*150,922*	
205	Rough/fine grading	SF	$0.75	50,099	$37,574	72,268	$54,201	82,881	$62,161	150,922	$113,192
206	Cut and fill	CY	$12.00	2,171	$26,052	3,132	$37,584	3,592	$43,104	6,540	$78,480
207	8" Stone base	CY	$70.00	1,361	$95,270	1,963	$137,410	2,251	$157,570	4,099	$286,930
208	Sand base	CY	$80.00	340	$27,200	491	$39,280	563	$45,040	1,025	$82,000
209	Underdrain	GSF	$1.75	50,099	$87,673	72,268	$126,469	82,881	$145,042	150,922	$264,114
210	Infield surfacing	SF	$2.50	15,995	$39,988	47,608	$119,020	40,076	$100,190	46,458	$116,145
211	Sod	SF	$1.50	34,104	$51,156	24,660	$36,990	42,805	$64,208	104,464	$156,696
212	Irrigation	SF	$0.75	34,104	$25,578	24,660	$18,495	42,805	$32,104	104,464	$78,348
213	Base plate	EA	$450.00	8	$3,600	12	$5,400	12	$5,400	12	$5,400
214	Removable foul poles	EA	$2,500.00	4	$10,000	6	$15,000	6	$15,000	6	$15,000
215	Removable soccer goal posts	EA	$1,400.00	2	$2,800	3	$4,200	3	$4,200	3	$4,200
216	Backstop	SF	$10.00	3,660	$36,600	3,660	$36,600	3,660	$36,600	3,660	$36,600
217	*Football/Rugby, Lacrosse 01, Soccer field:*	*SF*		*258,471*		*313,908*		*282,489*		*279,312*	
218	Rough/fine grading	SF	$0.75	258,471	$193,853	313,908	$235,431	282,489	$211,867	279,312	$209,484
219	Cut and fill	CY	$12.00	11,200	$134,400	13,603	$163,236	12,241	$146,892	12,104	$145,248
220	8" Stone base	CY	$70.00	7,020	$491,400	8,526	$596,820	7,673	$537,110	7,586	$531,020
221	Sand base	CY	$80.00	1,755	$140,400	2,131	$170,480	1,918	$153,440	1,897	$151,760
222	Underdrain	GSF	$1.75	258,471	$452,324	313,908	$549,339	282,489	$494,356	279,312	$488,796
223	Sod	SF	$1.50	258,471	$387,707	313,908	$470,862	282,489	$423,734	279,312	$418,968
224	Irrigation	SF	$0.75	258,471	$193,853	313,908	$235,431	282,489	$211,867	279,312	$209,484

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
225	**G2010 Paving and Surfacing Total**				**$5,814,210**		**$5,594,822**		**$6,648,712**		**$5,651,144**
226											
227	**G2040 Site Improvements**										
228	Bioretention terraces	SF	$35.00					**3,836**	$134,260		
229	Flag pole w/ foundation	EA	$7,500.00	**1**	$7,500	**1**	$7,500	**1**	$7,500	**1**	$7,500
230	Bench	AL	$15,000.00	**1**	$15,000	**1**	$15,000	**1**	$15,000	**1**	$15,000
231	Bike racks	AL	$3,500.00	**1**	$3,500	**1**	$3,500	**1**	$3,500	**1**	$3,500
232	Metal trash receptacles	EA	$800.00	**8**	$6,400	**8**	$6,400	**8**	$6,400	**8**	$6,400
233	Concrete fill steel bollard	AL	$12,000.00	**1**	$12,000	**1**	$12,000	**1**	$12,000	**1**	$12,000
234	Misc. site improvement other than above	LS	$100,000.00	**1**	$100,000	**1**	$100,000	**1**	$100,000	**1**	$100,000
235	Traffic signs	AL	$12,000.00	**1**	$12,000	**1**	$12,000	**1**	$12,000	**1**	$12,000
236	Building sign	AL	$15,000.00	**1**	$15,000	**1**	$15,000	**1**	$15,000	**1**	$15,000
237	**G2040 Site Improvements Total**				**$171,400**		**$171,400**		**$305,660**		**$171,400**
238											
239	**G2050 Plantings, Soft Landscaping**										
240	Respread topsoil	CY	$10.00	**13,383**	$133,830	**13,383**	$133,830	**13,383**	$133,830	**13,383**	$133,830
241	Topsoil for planting beds, shrubs and perennials	CY	$28.00	**338**	$9,471	**278**	$7,778	**278**	$7,778	**278**	$7,778
242	Mulch	CY	$50.00	**52**	$2,617	**46**	$2,315	**46**	$2,315	**46**	$2,315
243	Lawn	SF	$0.40	**217,000**	$86,800	**377,696**	$151,078	**284,352**	$113,741	**196,000**	$78,400
244	Sod - Outdoor classroom	SF	$1.75							**10,189**	$17,831
245	New trees	AL	$156,000.00	**1**	$156,000	**1**	$156,000	**1**	$156,000	**1**	$156,000
246	Gardens	SF	$8.00	**28,277**	$226,216	**8,237**	$65,896	**29,521**	$236,168	**69,219**	$553,752
247	Groundcovers	AL	$10,000.00	**1**	$10,000	**1**	$10,000	**1**	$10,000	**1**	$10,000
248	**G2050 Plantings, Soft Landscaping Total**				**$624,934**		**$526,897**		**$659,831**		**$959,905**
249											
250											
251	**G30 SITE MECHANICAL UTILITIES**										
252											
253	**G3010 Water Supply and Distribution**										
254	8" T & S & G.	EA	$4,200.00	**1**	$4,200	**1**	$4,200	**1**	$4,200	**1**	$4,200
255	4" Gate	EA	$1,200.00	**1**	$1,200	**1**	$1,200	**1**	$1,200	**1**	$1,200
256	Hydrant and gate	EA	$2,800.00	**4**	$11,200	**4**	$11,200	**4**	$11,200	**4**	$11,200
257	4" CLDI domestic water	LF	$65.00	**50**	$3,250	**50**	$3,250	**50**	$3,250	**50**	$3,250
258	6" CLDI Fire	LF	$80.00	**200**	$16,000	**200**	$16,000	**200**	$16,000	**200**	$16,000
259	8" CLDI fire service and loop	LF	$95.00	**4,000**	$380,000	**4,000**	$380,000	**4,000**	$380,000	**4,000**	$380,000
260	Thrust blocks	LS	$2,000.00	**1**	$2,000	**1**	$2,000	**1**	$2,000	**1**	$2,000
261	**G3010 Water Supply and Distribution Total**				**$417,850**		**$417,850**		**$417,850**		**$417,850**
262											
263	**G3020 Sanitary Sewer System**										
264	Relocate existing sewer	AL	$250,000.00	**1**	$250,000	**1**	$250,000	**1**	$250,000	**1**	$250,000
265	SMH	EA	$4,000.00	**6**	$24,000	**10**	$40,000	**10**	$40,000	**4**	$16,000
266	1,500 Grease trap	EA	$7,500.00	**1**	$7,500	**1**	$7,500	**1**	$7,500	**1**	$7,500
267	Pump station	LS	$30,000.00								

G. COST ESTIMATE / OPM

GRADE 7-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
268	3" HDPE sewer force main	LF	$125.00								
269	8" sewer drain	LF	$65.00								
270	6" PVC sewer	LF	$50.00	**650**	$32,500	**1,050**	$52,500	**1,040**	$52,000	**340**	$17,000
271	**G3020 Sanitary Sewer System Total**				**$314,000**		**$350,000**		**$349,500**		**$290,500**
272											
273											
274	**G3030 Stormwater Management System**										
275	Temporary utilties to cover phasing and logisitcs - allowance agreed	AL	$150,000.00	**1**	$150,000	**1**	$150,000	**1**	$150,000	**1**	$150,000
276	Bioretention	SF	$24.00	**4,836**	$116,064	**8,802**	$211,248	**24,266**	$582,384	**30,925**	$742,200
277	Bioretention zone	SF	$5.00	**31,413**	$157,065	**34,887**	$174,435	**45,015**	$225,075	**32,876**	$164,380
278	Stormwater base in pavement area	GSF	$5.00	**289,077**	$1,445,385	**217,533**	$1,087,665	**281,745**	$1,408,725	**273,327**	$1,366,635
279	**G3030 Stormwater Management System Total**				**$1,868,514**		**$1,623,348**		**$2,366,184**		**$2,423,215**
280											
281									**$2,216,184**		
282	**G40 SITE ELECTRICAL UTILITIES**										
283											
284	**G4010 Site Electrical Utilities**										
285	*Primary and Secondary Service*										
286	Utility co. back charges	LS	$30,000.00	**1**	$30,000	**1**	$30,000	**1**	$30,000	**1**	$30,000
287	Electrical primary service riser	LS	$1,500.00	**1**	$1,500	**1**	$1,500	**1**	$1,500	**1**	$1,500
288	Primary ductbank 2-5" ductbank, empty; from East boundary	LF	$145.00	**1,750**	$253,750	**1,750**	$253,750	**1,750**	$253,750	**1,750**	$253,750
289	Transformer by utility company				By Utility Co.		By Utility Co.		By Utility Co.		By Utility Co.
290	Transformer pad	EA	$3,000.00	**1**	$3,000	**1**	$3,000	**1**	$3,000	**1**	$3,000
291	3000A secondary service	LF	$850.00	**60**	$51,000	**60**	$51,000	**60**	$51,000	**60**	$51,000
292	2500A secondary service	LF	$710.00	**340**	$241,400	**140**	$99,400	**290**	$205,900	**280**	$198,800
293	*Communications*										
294	Communications pole riser	EA	$1,500.00	**1**	$1,500	**1**	$1,500	**1**	$1,500	**1**	$1,500
295	Telecom ductbank 4-4" empty	LF	$152.00	**1,750**	$266,000	**1,750**	$266,000	**1,750**	$266,000	**1,750**	$266,000
296	Site CCTV (Security)	LS	$35,000.00	**1**	$35,000	**1**	$35,000	**1**	$35,000	**1**	$35,000
297	Sport field lighting; baseball, softball	AL	$200,000.00	**1**	$200,000	**1**	$200,000	**1**	$200,000	**1**	$200,000
298	Site lighting and circuitry	LS	$300,000.00	**1**	$300,000	**1**	$300,000	**1**	$300,000	**1**	$300,000
299	**G4010 Site Electrical Utilities Total**				**$1,383,150**		**$1,241,150**		**$1,347,650**		**$1,340,550**
300											
301											
302											

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADES 8-12 MAIN SUMMARY

ELEMENT	OPTION C.2.1 Major Reno/Minor Add 393,786 GSF 46 MTH		OPTION C.2.3 Minor Reno/Major Add 393,786 GSF 46 MTH		OPTION C.2.4 Minor Reno/Major Add 393,786 GSF 39 MTH		OPTION C.3.1 New Construction 363,411 GSF 34 MTH	
Direct Trade Costs Details	$137,374,406	$348.86	$130,720,675	$331.96	$139,110,404	$353.26	$136,235,705	$374.88
Building Demolition	$84,303	$0.21	$1,632,595	$4.15	$1,632,595	$4.15	$1,478,440	$4.07
Hazardous Material Abatement	$7,100,000	$18.03	$7,100,000	$18.03	$7,100,000	$18.03	$7,100,000	$19.54
Direct Trade Details SubTotal	**$144,558,709**	**$367.10**	**$139,453,270**	**$354.13**	**$147,842,999**	**$375.44**	**$144,814,145**	**$398.49**
Design and Pricing Contingency	$17,348,000	$44.05	$16,735,000	$42.50	$14,785,000	$37.55	$14,482,000	$39.85
Direct Trade Cost Total	**$161,906,709**	**$411.15**	**$156,188,270**	**$396.63**	**$162,627,999**	**$412.99**	**$159,296,145**	**$438.34**
Staffing, Supervision and Management	$9,200,000	$23.36	$8,970,000	$22.78	$7,690,200	$19.53	$6,422,600	$17.67
Remainder of General Conditions, Project Requirements	$6,133,400	$15.58	$5,980,000	$15.19	$5,126,800	$13.02	$4,281,800	$11.78
Phasing and Logistics	$4,047,700	$10.28	$2,342,900	$5.95	$2,439,500	$6.19	$796,500	$2.19
General Liability Insurance	$1,862,000	$4.73	$1,797,000	$4.56	$1,871,000	$4.75	$1,832,000	$5.04
Performance and Payment Bonds	$1,620,000	$4.11	$1,562,000	$3.97	$1,627,000	$4.13	$1,593,000	$4.38
GMP Contingency	$8,096,000	$20.56	$7,810,000	$19.83	$8,132,000	$20.65	$3,983,000	$10.96
Fee	$5,667,000	$14.39	$5,077,000	$12.89	$5,286,000	$13.42	$4,779,000	$13.15
Estimated Construction Cost Total	**$198,532,809**	**$504.16**	**$189,727,170**	**$481.80**	**$194,800,499**	**$494.69**	**$182,984,045**	**$503.52**
Escalation from now to start of Construction	$14,943,000	$37.95	$14,280,000	$36.26	$14,662,000	$37.23	$13,773,000	$37.90
Estimated Construction Cost at Start of Construction	**$213,476,000**	**$542.11**	**$204,008,000**	**$518.07**	**$209,463,000**	**$531.92**	**$196,758,000**	**$541.42**

AEDALUS

Belmont High School
Preferred Schematic Option Selection Study

GRADE 8-12 DIRECT TRADE COST SUMMARY

ELEMENT	OPTION C.2.1 Major Reno/Minor Add 393,786 GSF		OPTION C.2.3 Minor Reno/Major Add 393,786 GSF		OPTION C.2.4 Minor Reno/Major Add 393,786 GSF		OPTION C.3.1 New Construction 363,411 GSF	
A10 Foundations	$21,903,449	$55.62	$19,505,911	$49.53	$22,032,388	$55.95	$22,203,711	$61.10
A SUBSTRUCTURE	**$21,903,449**	**$55.62**	**$19,505,911**	**$49.53**	**$22,032,388**	**$55.95**	**$22,203,711**	**$61.10**
B10 Superstructure	$8,184,615	$20.78	$16,016,401	$40.67	$15,592,464	$39.60	$17,315,007	$47.65
B20 Exterior Closure	$21,217,809	$53.88	$11,303,620	$28.70	$14,902,629	$37.84	$15,431,500	$42.46
B30 Roofing	$3,908,560	$9.93	$4,841,101	$12.29	$6,428,263	$16.32	$6,318,086	$17.39
B SHELL	**$33,310,983**	**$84.59**	**$32,161,121**	**$81.67**	**$36,923,355**	**$93.77**	**$39,064,593**	**$107.49**
C10 Interior Construction	$12,798,045	$32.50	$12,798,045	$32.50	$12,798,045	$32.50	$11,810,858	$32.50
C20 Stairs	$330,000	$0.84	$425,000	$1.08	$685,000	$1.74	$410,000	$1.13
C30 Interior Finishes	$11,041,420	$28.04	$10,169,900	$25.83	$10,169,900	$25.83	$9,085,275	$25.00
C INTERIORS	**$24,169,465**	**$61.38**	**$23,392,945**	**$59.41**	**$23,652,945**	**$60.07**	**$21,306,133**	**$58.63**
D10 Conveying	$240,000	$0.61	$240,000	$0.61	$240,000	$0.61	$380,000	$1.05
D20 Plumbing	$4,725,432	$12.00	$4,725,432	$12.00	$4,725,432	$12.00	$4,360,932	$12.00
D30 HVAC	$17,720,370	$45.00	$17,720,370	$45.00	$17,720,370	$45.00	$16,353,495	$45.00
D40 Fire Protection	$1,950,794	$4.95	$1,950,794	$4.95	$1,950,794	$4.95	$1,808,032	$4.98
D50 Electrical	$13,388,724	$34.00	$13,388,724	$34.00	$13,388,724	$34.00	$12,355,974	$34.00
D SERVICES	**$38,025,320**	**$96.56**	**$38,025,320**	**$96.56**	**$38,025,320**	**$96.56**	**$35,258,433**	**$97.02**
E10 Equipment	$2,953,395	$7.50	$2,953,395	$7.50	$2,953,395	$7.50	$2,725,583	$7.50
E20 Furnishings	$4,922,325	$12.50	$4,922,325	$12.50	$4,922,325	$12.50	$4,542,638	$12.50
E EQUIPMENT & FURNISHINGS	**$7,875,720**	**$20.00**	**$7,875,720**	**$20.00**	**$7,875,720**	**$20.00**	**$7,268,220**	**$20.00**
G1010 Site Clearing, Site Preparation	$685,272	$1.74	$685,272	$1.74	$685,272	$1.74	$685,272	$1.89
G1020 Building Demolition	$84,303	$0.21	$1,632,595	$4.15	$1,632,595	$4.15	$1,478,440	$4.07
G1020 Site Demolition, Selective Demolition	$2,819,087	$7.16	$1,076,047	$2.73	$1,076,047	$2.73	$425,547	$1.17
G1030 Earthwork	$451,847	$1.15	$482,900	$1.23	$454,052	$1.15	$459,148	$1.26
G1040 Hazardous Material Abatement	$7,100,000	$18.03	$7,100,000	$18.03	$7,100,000	$18.03	$7,100,000	$19.54
G10 SITE PREPARATION	**$11,140,509**	**$28.29**	**$10,976,814**	**$27.88**	**$10,947,966**	**$27.80**	**$10,148,407**	**$27.93**
G2010 Paving and Surfacing	$4,793,468	$12.17	$4,779,751	$12.14	$4,693,048	$11.92	$5,472,563	$15.06
G2040 Site Improvements	$171,400	$0.44	$171,400	$0.44	$305,660	$0.78	$171,400	$0.47
G2050 Plantings, Soft Landscaping	$624,934	$1.59	$526,897	$1.34	$659,831	$1.68	$959,905	$2.64
G20 SITE IMPROVEMENTS	**$5,589,802**	**$14.20**	**$5,478,048**	**$13.91**	**$5,658,539**	**$14.37**	**$6,603,868**	**$18.17**
G3010 Water Supply and Distribution	$75,850	$0.19	$52,100	$0.13	$71,100	$0.18	$70,150	$0.19
G3020 Sanitary Sewer System	$66,000	$0.17	$102,000	$0.26	$101,500	$0.26	$42,500	$0.12
G3030 Stormwater Management System	$1,619,410	$4.11	$1,302,490	$3.31	$1,822,315	$4.63	$2,126,350	$5.85
G4010 Site Electrical Utilities	$782,200	$1.99	$580,800	$1.47	$731,850	$1.86	$721,780	$1.99
G30 SITE MECHANICAL UTILITIES	**$2,543,460**	**$6.46**	**$2,037,390**	**$5.17**	**$2,726,765**	**$6.92**	**$2,960,780**	**$8.15**
Direct Trade Details SubTotal	**$144,558,709**	**$367.10**	**$139,453,270**	**$354.13**	**$147,842,999**	**$375.44**	**$144,814,145**	**$398.49**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 8-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
10	***Total***			***393,786 GSF***		***393,786 GSF***		***393,786 GSF***		***363,411 GSF***	
11	*Renovation*			*239,354 GSF*		*65,050 GSF*		*65,050 GSF*			
12	*New Construction / Addition*			*154,432 GSF*		*328,736 GSF*		*328,736 GSF*		*363,411 GSF*	
13	*Building Demolition*			*9,918 GSF*		*192,070 GSF*		*192,070 GSF*		*257,120 GSF*	
14											
15	**A SUBSTRUCTURE**										
16											
17	**A10 Foundations**										
18	*Reinforced concrete pile caps, structural steel piles, structured slab*										
19	steel pile, 50-ton; assume 25'long	LF	$85.00	**39,750**	$3,378,750	**42,750**	$3,633,750	**47,250**	$4,016,250	**50,000**	$4,250,000
20	concrete pile; 8x8x4 at clusters, 2x2x2 at single pile	EA	$7,550.00	**660**	$4,983,000	**770**	$5,813,500	**880**	$6,644,000	**920**	$6,946,000
21	grade beam at perimeter; 5' deep	LF	$1,500.00	**3,075**	$4,612,500	**2,110**	$3,165,000	**2,070**	$3,105,000	**2,125**	$3,187,500
22	grade beam at slab on grade; assume 60'oc grid	LF	$1,500.00	**1,800**	$2,700,000	**2,800**	$4,200,000	**3,400**	$5,100,000	**3,600**	$5,400,000
23	12" structured slab on grade, 6#/sf reinforcing, vapor barrier, 2" rigid insu	SF	$14.00	**77,950**	$1,091,300	**122,633**	$1,716,862	**150,185**	$2,102,590	**155,585**	$2,178,190
24	compacted granular structural fill; assume 12"	CY	$40.00	**3,031**	$121,256	**4,769**	$190,762	**5,841**	$233,621	**6,051**	$242,021
25	*New brace frames in existing to renovation areas*										
26	demo sog for new pile, patch and repair after install	LOC	$4,000.00	**181**	$724,000	**37**	$148,000	**39**	$156,000		
27	install new pile and pile cap	EA	$11,700.00	**181**	$2,117,700	**37**	$432,900	**39**	$456,300		
28	demo sog for new tie beam, patch and repair after install	LF	$190.00	**5,395**	$1,025,018	**1,080**	$205,137	**1,151**	$218,627		
29	*New building over Level 2 for Level 3 additions*										
30	demo sog for new pile, patch and repair after install	LOC	$4,000.00	**54**	$216,000						
31	install new pile and pile cap	EA	$11,700.00	**54**	$631,800						
32	demo sog for new tie beam, patch and repair after install	LF	$190.00	**1,590**	$302,125						
33	**A10 Foundations Total**				**$21,903,449**		**$19,505,911**		**$22,032,388**		**$22,203,711**
34											
35											
36	**B SHELL**										
37											
38	**B10 Superstructure**										
39	*New brace frames in existing to renovation areas*										
40	addition of brace frames; assume 2#/sf face area	TNS	$5,000.00	**24**	$120,000						
41	new masonry shear wall at existing building	SF	$25.00	**23,270**	$581,750						
42	Anchor un-reinforced masonry walls to floor & roof structure	EA	$150.00	**991**	$148,650	**326**	$48,900	**477**	$71,550		
43	Reinforce existing roof diaphragms to resist uplift loads; assume 1#/covera	TNS	$5,000.00	**38**	$192,183	**28**	$138,390	**23**	$116,328		
44	*New building over Level 2 for Level 3 additions*										
45	new columns from Level 1 up per floor	EA	$2,500.00	**56**	$140,000						
46	Structural steel floor framing - 13#/gsf allowance provided	TNS	$3,900.00							**1,351**	$5,268,389
47	15#/gsf allowance provided	TNS	$3,900.00	**574**	$2,237,099	**1,546**	$6,028,513	**1,339**	$5,222,617		
48	above multi-purpose rooms & PE space; 18#/gsf	TNS	$3,900.00	**134**	$522,007	**292**	$1,136,889	**311**	$1,211,652	**376**	$1,465,636
49	Structural steel framing, columns & braced frames; assume 3#/gsf	TNS	$3,900.00	**232**	$903,427	**493**	$1,923,106	**493**	$1,923,106	**545**	$2,125,954
50	Structural steel roof framing - 13#/gsf allowance provided	TNS	$3,900.00	**461**	$1,798,456	**819**	$3,194,006	**939**	$3,660,629	**1,112**	$4,338,513
51	15#/gsf @ Gym & mechanical zone/low roof; add 2#/gsf	TNS	$4,680.00	**14**	$66,456	**25**	$117,936	**29**	$135,252	**55**	$255,996
52	5½" LWT slab on composite metal deck, fireproofing; upper slabs	SF	$12.50	**76,482**	$956,025	**206,103**	$2,576,288	**178,551**	$2,231,888	**207,826**	$2,597,825

G. COST ESTIMATE / OPM

GRADE 8-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
53	low roof; assume 20% of roof area	SF	$12.50	**14,200**	$177,500	**25,200**	$315,000	**28,900**	$361,250	**34,300**	$428,750
54	1½" Type B metal roof deck	SF	$3.75	**77,950**	$292,313	**122,633**	$459,874	**150,185**	$563,194	**155,585**	$583,444
55	5½" LWT slab on metal deck; mech zone assume 5% of roof area	SF	$12.50	**3,900**	$48,750	**6,200**	$77,500	**7,600**	$95,000	**7,800**	$97,500
56	3" Type NA acoustic metal roof deck; Gym	SF	$7.50							**20,400**	$153,000
57	**B10 Superstructure Total**				**$8,184,615**		**$16,016,401**		**$15,592,464**		**$17,315,007**
58											
59	**B20 Exterior Closure**										
60	Existing exterior façade to remain; patch and repair only	SF	$10.00	**111,735**	$1,117,346	**20,090**	$200,895	**29,385**	$293,854		
61	remove and replace glazed openings; assume 20%	SF	$105.00	**22,350**	$2,346,750	**4,020**	$422,100	**5,880**	$617,400		
62	New façade; masonry, glass, doors	SF	$125.00	**142,030**	$17,753,713	**85,445**	$10,680,625	**111,931**	$13,991,375	**123,452**	$15,431,500
63	**B20 Exterior Closure Total**				**$21,217,809**		**$11,303,620**		**$14,902,629**		**$15,431,500**
64											
65	**B30 Roofing**										
66	Demo roof for new floor deck	SF	$15.00	**47,645**	$714,675						
67	Roofing; assume TPO	SF	$22.50	**70,945**	$1,596,263	**125,996**	$2,834,917	**144,404**	$3,249,079	**171,145**	$3,850,751
68	add low roof/canopy	AL	$100.00	**14,800**	$50,000	**8,900**	$890,000	**20,800**	$2,080,000	**13,445**	$1,344,500
69	mechanical zone and screen	LS	$175,000.00	**1**	$175,000	**1**	$175,000	**1**	$175,000	**1**	$175,000
70	soffits, fascia	LF	$425.00	**3,230**	$1,372,623	**2,215**	$941,184	**2,175**	$924,184	**2,230**	$947,835
71	**B30 Roofing Total**				**$3,908,560**		**$4,841,101**		**$6,428,263**		**$6,318,086**
72											
73											
74	**C INTERIORS**										
75											
76	**C10 Interior Construction**										
77	Renovate existing school	GSF	$32.50	**239,354**	$7,779,005	**65,050**	$2,114,125	**65,050**	$2,114,125		
78	Partitions	GSF	$20.00	**154,432**	$3,088,640	**328,736**	$6,574,720	**328,736**	$6,574,720	**363,411**	$7,268,220
79	Doors	GSF	$4.50	**154,432**	$694,944	**328,736**	$1,479,312	**328,736**	$1,479,312	**363,411**	$1,635,350
80	Storefront; assume 2% of interior walls	GSF	$1.75	**154,432**	$270,256	**328,736**	$575,288	**328,736**	$575,288	**363,411**	$635,969
81	Specialties	GSF	$6.25	**154,432**	$965,200	**328,736**	$2,054,600	**328,736**	$2,054,600	**363,411**	$2,271,319
82	**C10 Interior Construction Total**				**$12,798,045**		**$12,798,045**		**$12,798,045**		**$11,810,858**
83											
84											
85	**C20 Stairs**										
86	Upgrade existing stair; assume replace railings	FLT	$15,000.00	**4**	$60,000	**1**	$15,000	**1**	$15,000		
87	New stairs	FLT	$35,000.00	**4**	$140,000	**8**	$280,000	**8**	$280,000	**8**	$280,000
88	Monumental/Open stair, allow	FLT	$65,000.00	**2**	$130,000	**2**	$130,000	**6**	$390,000	**2**	$130,000
89	**C20 Stairs Total**				**$330,000**		**$425,000**		**$685,000**		**$410,000**
90											
91	**C30 Interior Finishes**										
92	Renovate existing school	GSF	$30.00	**239,354**	$7,180,620	**65,050**	$1,951,500	**65,050**	$1,951,500		
93	*New School Building Construction*	*GSF*		***154,432***		***328,736***		***328,736***		***363,411***	
94	wall finishes	GSF	$6.75	**154,432**	$1,042,416	**328,736**	$2,218,968	**328,736**	$2,218,968	**363,411**	$2,453,024
95	flooring	GSF	$10.75	**154,432**	$1,660,144	**328,736**	$3,533,912	**328,736**	$3,533,912	**363,411**	$3,906,668

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 8-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
96	ceiling finishes	GSF	$7.50	154,432	$1,158,240	328,736	$2,465,520	328,736	$2,465,520	363,411	$2,725,583
97	**C30 Interior Finishes Total**				**$11,041,420**		**$10,169,900**		**$10,169,900**		**$9,085,275**
98	**D SERVICES**										
99											
100	**D10 Conveying**										
101	Elevator; ETR, new cab	EA	$50,000.00	1	$50,000	1	$50,000	1	$50,000		
102	Elevator; new	EA	$190,000.00	1	$190,000	1	$190,000	1	$190,000	2	$380,000
103	**D10 Conveying Total**				**$240,000**		**$240,000**		**$240,000**		**$380,000**
104											
105	**D20 Plumbing**										
106	Plumbing	GSF	$12.00	393,786	$4,725,432	393,786	$4,725,432	393,786	$4,725,432	363,411	$4,360,932
107	**D20 Plumbing Total**				**$4,725,432**		**$4,725,432**		**$4,725,432**		**$4,360,932**
108											
109	**D30 HVAC**										
110	HVAC	EA	$45.00	393,786	$17,720,370	393,786	$17,720,370	393,786	$17,720,370	363,411	$16,353,495
111	**D30 HVAC Total**				**$17,720,370**		**$17,720,370**		**$17,720,370**		**$16,353,495**
112											
113	**D40 Fire Protection**										
114	Sprinkler Coverage	GSF	$4.70	393,786	$1,850,794	393,786	$1,850,794	393,786	$1,850,794	363,411	$1,708,032
115	Fire Pump	EA	$100,000.00	1	$100,000	1	$100,000	1	$100,000	1	$100,000
116	**D40 Fire Protection Total**				**$1,950,794**		**$1,950,794**		**$1,950,794**		**$1,808,032**
117											
118	**D50 Electrical**										
105	Interior Electrical	GSF	$34.00	393,786	$13,388,724	393,786	$13,388,724	393,786	$13,388,724	363,411	$12,355,974
120	**D50 Electrical Total**				**$13,388,724**		**$13,388,724**		**$13,388,724**		**$12,355,974**
121											
122											
123	**E EQUIPMENT & FURNISHINGS**										
124											
125	**E10 Equipment**										
126	Renovate existing school	GSF	$7.50	239,354	$1,795,155	65,050	$487,875	65,050	$487,875		
127	New Construction / Addition	GSF	$7.50	154,432	$1,158,240	328,736	$2,465,520	328,736	$2,465,520	363,411	$2,725,583
128	**E10 Equipment Total**				**$2,953,395**		**$2,953,395**		**$2,953,395**		**$2,725,583**
129											
130	**E20 Furnishings**										
131	Renovate existing school	GSF	$12.50	239,354	$2,991,925	65,050	$813,125	65,050	$813,125		
132	New Construction / Addition	GSF	$12.50	154,432	$1,930,400	328,736	$4,109,200	328,736	$4,109,200	363,411	$4,542,638
133	**E20 Furnishings Total**				**$4,922,325**		**$4,922,325**		**$4,922,325**		**$4,542,638**
134											
135											
136	**G10 SITE PREPARATION**										
137											
138	**G1010 Site Clearing, Site Preparation**										

GRADE 8-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
139	Clearing and grubbing	ACRE	$4,000.00	40	$160,000	40	$160,000	40	$160,000	40	$160,000
140	Manter Well site; grassed	ACRE	$2,000.00								
141	Construction fence	LF	$12.00	11,017	$132,204	11,017	$132,204	11,017	$132,204	11,017	$132,204
142	Double construction gate	PR	$2,800.00	4	$11,200	4	$11,200	4	$11,200	4	$11,200
143	Strip and stockpile existing topsoil; assume avg. 6"	CY	$8.00	13,383	$107,064	13,383	$107,064	13,383	$107,064	13,383	$107,064
144	Temporary construction entrance including maintenance	EA	$9,000.00	4	$36,000	4	$36,000	4	$36,000	4	$36,000
145	Temp signs	LS	$1,800.00	2	$3,600	2	$3,600	2	$3,600	2	$3,600
146	Wash down/re-fueling	SF	$2.00	6,000	$12,000	6,000	$12,000	6,000	$12,000	6,000	$12,000
147	Protection of existing to remain	LS	$35,000.00	1	$35,000	1	$35,000	1	$35,000	1	$35,000
148	Temporary parking lot	AL	$15,000.00	1	$15,000	1	$15,000	1	$15,000	1	$15,000
149	Dewatering	LS	$35,000.00	1	$35,000	1	$35,000	1	$35,000	1	$35,000
150	Erosion control barrier	LF	$12.00	11,017	$132,204	11,017	$132,204	11,017	$132,204	11,017	$132,204
151	Erosion control barrier at temporary construction period soil stockpile	AL	$3,500.00	1	$3,500	1	$3,500	1	$3,500	1	$3,500
152	Inlet protection	AL	$2,500.00	1	$2,500	1	$2,500	1	$2,500	1	$2,500
153	**G1010 Site Clearing, Site Preparation Total**				**$685,272**		**$685,272**		**$685,272**		**$685,272**
154											
155	**G1020 Building Demolition**										
156	Building structure demolition, phased	GSF	$8.50	9,918	$84,303	192,070	$1,632,595	192,070	$1,632,595		
157	Building structure demolition	GSF	$5.75							257,120	$1,478,440
158	**G1020 Building Demolition Total**				**$84,303**		**$1,632,595**		**$1,632,595**		**$1,478,440**
159											
160	**G1020 Site Demolition, Selective Demolition**										
161	*Selective Site Demolition*										
162	saw cut existing pavement	LF	$12.00	150	$1,800	150	$1,800	150	$1,800	150	$1,800
163	asphalt pavement	SF	$1.20	181,037	$217,244	181,037	$217,244	181,037	$217,244	181,037	$217,244
164	concrete pavement	SF	$1.75	46,573	$81,503	46,573	$81,503	46,573	$81,503	46,573	$81,503
165	Cut, cap and remove existing utility	AL	$50,000.00	$1.00	$50,000	1	$50,000	1	$50,000	1	$50,000
166	Misc. demolition other than above	AL	$75,000.00	1	$75,000	1	$75,000	1	$75,000	1	$75,000
167	Existing school program interior selective demolition	GSF	$10.00	239,354	$2,393,540	65,050	$650,500	65,050	$650,500		
168	**G1020 Site Demolition, Selective Demolition Total**				**$2,819,087**		**$1,076,047**		**$1,076,047**		**$425,547**
169											
170	**G1030 Earthwork**										
171	Cut and fill for parking lot	CY	$11.00	8,381	$92,195	6,826	$75,091	8,284	$91,124	10,176	$111,935
172	concrete pavement	CY	$11.00	3,836	$42,199	1,935	$21,287	1,783	$19,609	2,011	$22,121
173	remainder of site grades	CY	$10.00	5,848	$58,478	9,835	$98,354	7,519	$75,191	5,327	$53,267
174	Rough and fine grading	SF	$0.50	517,951	$258,976	576,335	$288,168	536,256	$268,128	543,651	$271,826
175	**G1030 Earthwork Total**				**$451,847**		**$482,900**		**$454,052**		**$459,148**
176											
177	**G1040 Hazardous Material Abatement**										
178	Removal and disposal of all ACM, PCB and other hazardous materials	AL	$7,100,000.00	1	$7,100,000	1	$7,100,000	1	$7,100,000	1	$7,100,000
179	**G1040 Hazardous Material Abatement Total**				**$7,100,000**		**$7,100,000**		**$7,100,000**		**$7,100,000**
180											
181											

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 8-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
182	**G20 SITE IMPROVEMENTS**										
183											
184	**G2010 Paving and Surfacing**										
185	Asphalt paving at bus drop-off, deliveries, parent drop-off and parking lot	SF	$3.15	**181,037**	$570,267	**147,452**	$464,474	**178,934**	$563,642	**219,800**	$692,370
186	gravel base to asphalt pavement	CY	$32.00	**7,376**	$236,032	**6,007**	$192,224	**7,290**	$233,280	**8,955**	$286,560
187	paint crosswalk	AL	$2,500.00	**1**	$2,500	**1**	$2,500	**1**	$2,500	**1**	$2,500
188	parking stall	EA	$35.00	**6**	$210	**6**	$210	**6**	$210	**6**	$210
189	HC parking stall	EA	$85.00	**424**	$36,040	**424**	$36,040	**424**	$36,040	**424**	$36,040
190	misc. pavement marking	AL	$5,000.00	**1**	$5,000	**1**	$5,000	**1**	$5,000	**1**	$5,000
191	Patching to existing paving at street	LS	$5,000.00	**1**	$5,000	**1**	$5,000	**1**	$5,000	**1**	$5,000
192	Concrete sidewalk	SF	$7.25	**46,573**	$337,654	**5,757**	$41,738	**24,722**	$179,235	**27,735**	$201,079
193	Intergenerational walking path	SF	$3.50	**16,405**	$57,418	**16,370**	$57,295	**16,350**	$57,225	**16,250**	$56,875
194	Sport walk	SF	$7.50					**3,084**	$23,130	**3,360**	$25,200
195	curb cut	EA	$380.00	**12**	$4,560	**12**	$4,560	**12**	$4,560	**12**	$4,560
196	Cement concrete entrance	SF	$15.00	**45,065**	$675,975	**37,194**	$557,910	**18,728**	$280,920	**20,709**	$310,635
197	Loading dock	SF	$15.00	**450**	$6,750					**450**	$6,750
198	Gravel base to concrete pavement	CY	$30.00	**2,785**	$83,550	**1,633**	$48,990	**1,267**	$38,010	**1,409**	$42,270
199	Curbing	LF	$38.00	**8,818**	$335,084	**8,199**	$311,562	**9,853**	$374,414	**10,675**	$405,650
200	*Baseball and Softball field:*	*SF*		***50,099***		***72,268***		***82,881***		***150,922***	
201	Rough/fine grading	SF	$0.75	**50,099**	$37,574	**72,268**	$54,201	**82,881**	$62,161	**150,922**	$113,192
202	Cut and fill	CY	$12.00	**2,171**	$26,052	**3,132**	$37,584	**3,592**	$43,104	**6,540**	$78,480
203	8" Stone base	CY	$70.00	**1,361**	$95,270	**1,963**	$137,410	**2,251**	$157,570	**4,099**	$286,930
204	Sand base	CY	$80.00	**340**	$27,200	**491**	$39,280	**563**	$45,040	**1,025**	$82,000
205	Underdrain	GSF	$1.75	**50,099**	$87,673	**72,268**	$126,469	**82,881**	$145,042	**150,922**	$264,114
206	Infield surfacing	SF	$2.50	**15,995**	$39,988	**47,608**	$119,020	**40,076**	$100,190	**46,458**	$116,145
207	Sod	SF	$1.50	**34,104**	$51,156	**24,660**	$36,990	**42,805**	$64,208	**104,464**	$156,696
208	Irrigation	SF	$0.75	**34,104**	$25,578	**24,660**	$18,495	**42,805**	$32,104	**104,464**	$78,348
209	Base plate	EA	$450.00	**8**	$3,600	**12**	$5,400	**12**	$5,400	**12**	$5,400
210	Removable foul poles	EA	$2,500.00	**4**	$10,000	**6**	$15,000	**6**	$15,000	**6**	$15,000
211	Removable soccer goal posts	EA	$1,400.00	**2**	$2,800	**3**	$4,200	**3**	$4,200	**3**	$4,200
212	Backstop	SF	$10.00	**3,660**	$36,600	**3,660**	$36,600	**3,660**	$36,600	**3,660**	$36,600
213	*Football/Rugby, Lacrosse 01, Soccer field:*	*SF*		***258,471***		***313,908***		***282,489***		***279,312***	
214	Rough/fine grading	SF	$0.75	**258,471**	$193,853	**313,908**	$235,431	**282,489**	$211,867	**279,312**	$209,484
215	Cut and fill	CY	$12.00	**11,200**	$134,400	**13,603**	$163,236	**12,241**	$146,892	**12,104**	$145,248
216	8" Stone base	CY	$70.00	**7,020**	$491,400	**8,526**	$596,820	**7,673**	$537,110	**7,586**	$531,020
217	Sand base	CY	$80.00	**1,755**	$140,400	**2,131**	$170,480	**1,918**	$153,440	**1,897**	$151,760
218	Underdrain	GSF	$1.75	**258,471**	$452,324	**313,908**	$549,339	**282,489**	$494,356	**279,312**	$488,796
219	Sod	SF	$1.50	**258,471**	$387,707	**313,908**	$470,862	**282,489**	$423,734	**279,312**	$418,968
220	Irrigation	SF	$0.75	**258,471**	$193,853	**313,908**	$235,431	**282,489**	$211,867	**279,312**	$209,484
221	**G2010 Paving and Surfacing Total**				**$4,793,468**		**$4,779,751**		**$4,693,048**		**$5,472,563**
222											
223	**G2040 Site Improvements**										
224	Bioretention terraces	SF	$35.00					**3,836**	$134,260		

G. COST ESTIMATE / OPM

GRADE 8-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
225	Flag pole w/ foundation	EA	$7,500.00	1	$7,500	1	$7,500	1	$7,500	1	$7,500
226	Bench	AL	$15,000.00	1	$15,000	1	$15,000	1	$15,000	1	$15,000
227	Bike racks	AL	$3,500.00	1	$3,500	1	$3,500	1	$3,500	1	$3,500
228	Metal trash receptacles	EA	$800.00	8	$6,400	8	$6,400	8	$6,400	8	$6,400
229	Concrete fill steel bollard	AL	$12,000.00	1	$12,000	1	$12,000	1	$12,000	1	$12,000
230	Misc. site improvement other than above	LS	$100,000.00	1	$100,000	1	$100,000	1	$100,000	1	$100,000
231	Traffic signs	AL	$12,000.00	1	$12,000	1	$12,000	1	$12,000	1	$12,000
232	Building sign	AL	$15,000.00	1	$15,000	1	$15,000	1	$15,000	1	$15,000
233	**G2040 Site Improvements Total**				**$171,400**		**$171,400**		**$305,660**		**$171,400**
234											
235	**G2050 Plantings, Soft Landscaping**										
236	Respread topsoil	CY	$10.00	13,383	$133,830	13,383	$133,830	13,383	$133,830	13,383	$133,830
237	Topsoil for planting beds, shrubs and perennials	CY	$28.00	338	$9,471	278	$7,778	278	$7,778	278	$7,778
238	Mulch	CY	$50.00	52	$2,617	46	$2,315	46	$2,315	46	$2,315
239	Lawn	SF	$0.40	217,000	$86,800	377,696	$151,078	284,352	$113,741	196,000	$78,400
240	Sod - Outdoor classroom	SF	$1.75							10,189	$17,831
241	New trees	AL	$156,000.00	1	$156,000	1	$156,000	1	$156,000	1	$156,000
242	Gardens	SF	$8.00	28,277	$226,216	8,237	$65,896	29,521	$236,168	69,219	$553,752
243	Groundcovers	AL	$10,000.00	1	$10,000	1	$10,000	1	$10,000	1	$10,000
244	**G2050 Plantings, Soft Landscaping Total**				**$624,934**		**$526,897**		**$659,831**		**$959,905**
245											
246											
247	**G30 SITE MECHANICAL UTILITIES**										
248											
249	**G3010 Water Supply and Distribution**										
250	8" T & S & G.	EA	$4,200.00	1	$4,200	1	$4,200	1	$4,200	1	$4,200
251	4" Gate	EA	$1,200.00	1	$1,200	1	$1,200	1	$1,200	1	$1,200
252	Hydrant and gate	EA	$2,800.00	4	$11,200	4	$11,200	4	$11,200	4	$11,200
253	4" CLDI domestic water	LF	$65.00	50	$3,250	50	$3,250	50	$3,250	50	$3,250
254	6" CLDI Fire	LF	$80.00	200	$16,000	200	$16,000	200	$16,000	200	$16,000
255	8" CLDI fire service and loop	LF	$95.00	400	$38,000	150	$14,250	350	$33,250	340	$32,300
256	Thrust blocks	LS	$2,000.00	1	$2,000	1	$2,000	1	$2,000	1	$2,000
257	**G3010 Water Supply and Distribution Total**				**$75,850**		**$52,100**		**$71,100**		**$70,150**
258											
259	**G3020 Sanitary Sewer System**										
260	Connect to existing sewer	EA	$2,000.00	1	$2,000	1	$2,000	1	$2,000	1	$2,000
261	SMH	EA	$4,000.00	6	$24,000	10	$40,000	10	$40,000	4	$16,000
262	1,500 Grease trap	EA	$7,500.00	1	$7,500	1	$7,500	1	$7,500	1	$7,500
263	Pump station	LS	$30,000.00								
264	3" HDPE sewer force main	LF	$125.00								
265	8" sewer drain	LF	$65.00								
266	6" PVC sewer	LF	$50.00	650	$32,500	1,050	$52,500	1,040	$52,000	340	$17,000
267	**G3020 Sanitary Sewer System Total**				**$66,000**		**$102,000**		**$101,500**		**$42,500**
268											
269	**G3030 Stormwater Management System**										
270	Bioretention	SF	$20.00	4,836	$96,720	8,802	$176,040	24,266	$485,320	30,925	$618,500
271	Bioretention zone	SF	$5.00	31,413	$157,065	34,887	$174,435	45,015	$225,075	32,876	$164,380
272	Stormwater base in pavement area	GSF	$5.00	273,125	$1,365,625	190,403	$952,015	222,384	$1,111,920	268,694	$1,343,470
273	**G3030 Stormwater Management System Total**				**$1,619,410**		**$1,302,490**		**$1,822,315**		**$2,126,350**
274	**G40 SITE ELECTRICAL UTILITIES**										
275											
276	**G4010 Site Electrical Utilities**										
277	*Primary and Secondary Service*										
278	Utility co. back charges	LS	$30,000.00	1	$30,000	1	$30,000	1	$30,000	1	$30,000
279	Electrical primary service riser	LS	$1,500.00	1	$1,500	1	$1,500	1	$1,500	1	$1,500
280	Primary ductbank 2-5" ductbank, empty	LF	$145.00	400	$58,000	200	$29,000	350	$50,750	340	$49,300
281	Transformer by utility company				By Utility Co.		By Utility Co.		By Utility Co.		By Utility Co.
282	Transformer pad	EA	$3,000.00	1	$3,000	1	$3,000	1	$3,000	1	$3,000
283	3000A secondary service	LF	$850.00	60	$51,000	60	$51,000	60	$51,000	60	$51,000
284	2500A secondary service	LF	$710.00	340	$241,400	140	$99,400	290	$205,900	280	$198,800
285	*Communications*										
286	Communications pole riser	EA	$1,500.00	1	$1,500	1	$1,500	1	$1,500	1	$1,500
287	Telecom ductbank 4-4" empty	LF	$152.00	400	$60,800	200	$30,400	350	$53,200	340	$51,680
288	Site CCTV (Security)	LS	$35,000.00	1	$35,000	1	$35,000	1	$35,000	1	$35,000
289	Site lighting and circuitry	LS	$300,000.00	1	$300,000	1	$300,000	1	$300,000	1	$300,000
290	**G4010 Site Electrical Utilities Total**				**$782,200**		**$580,800**		**$731,850**		**$721,780**
291											
292											
293											

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADES 9-12 MAIN SUMMARY

ELEMENT	OPTION C.2.1 Major Reno/Minor Add 343,719 GSF 42 MTH		OPTION C.2.3 Minor Reno/Major Add 343,719 GSF 37 MTH		OPTION C.2.4 Minor Reno/Major Add 343,719 GSF 37 MTH		OPTION C.3.1 New Construction 311,844 GSF 32 MTH	
Direct Trade Costs Details	$118,782,399	$345.58	$115,974,006	$337.41	$122,230,111	$355.61	$120,095,572	$385.11
Building Demolition	$84,303	$0.25	$1,632,595	$4.75	$1,632,595	$4.75	$1,478,440	$4.74
Hazardous Material Abatement	$7,100,000	$20.66	$7,100,000	$20.66	$7,100,000	$20.66	$7,100,000	$22.77
Direct Trade Details SubTotal	**$125,966,702**	**$366.48**	**$124,706,601**	**$362.82**	**$130,962,706**	**$381.02**	**$128,674,012**	**$412.62**
Design and Pricing Contingency	$15,117,000	$43.98	$14,965,000	$43.54	$13,097,000	$38.10	$12,868,000	$41.26
Direct Trade Cost Total	**$141,083,702**	**$410.46**	**$139,671,601**	**$406.35**	**$144,059,706**	**$419.12**	**$141,542,012**	**$453.89**
Staffing, Supervision and Management	$8,600,000	$25.02	$7,410,000	$21.56	$7,410,000	$21.56	$6,080,000	$19.50
Remainder of General Conditions, Project Requirements	$5,733,400	$16.68	$4,940,000	$14.37	$4,940,000	$14.37	$4,053,400	$13.00
Phasing and Logistics	$3,527,100	$10.26	$2,095,100	$6.10	$2,160,900	$6.29	$707,800	$2.27
General Liability Insurance	$1,623,000	$4.72	$1,607,000	$4.68	$1,657,000	$4.82	$1,628,000	$5.22
Performance and Payment Bonds	$1,411,000	$4.11	$1,397,000	$4.06	$1,441,000	$4.19	$1,416,000	$4.54
GMP Contingency	$7,055,000	$20.53	$6,984,000	$20.32	$7,203,000	$20.96	$3,539,000	$11.35
Fee	$4,938,000	$14.37	$4,540,000	$13.21	$4,682,000	$13.62	$4,247,000	$13.62
Estimated Construction Cost Total	**$173,971,202**	**$506.14**	**$168,644,701**	**$490.65**	**$173,553,606**	**$504.93**	**$163,213,212**	**$523.38**
Escalation from now to start of Construction	$13,095,000	$38.10	$12,694,000	$36.93	$13,063,000	$38.00	$12,285,000	$39.39
Estimated Construction Cost at Start of Construction	**$187,067,000**	**$544.24**	**$181,339,000**	**$527.58**	**$186,617,000**	**$542.93**	**$175,499,000**	**$562.78**

GRADE 9-12 DIRECT TRADE COST SUMMARY

ELEMENT	OPTION C.2.1 Major Reno/Minor Add 343,719 GSF		OPTION C.2.3 Minor Reno/Major Add 343,719 GSF		OPTION C.2.4 Minor Reno/Major Add 343,719 GSF		OPTION C.3.1 New Construction 311,844 GSF	
A10 Foundations	$20,753,524	$60.38	$19,505,911	$56.75	$22,032,388	$64.10	$22,203,711	$71.20
A SUBSTRUCTURE	**$20,753,524**	**$60.38**	**$19,505,911**	**$56.75**	**$22,032,388**	**$64.10**	**$22,203,711**	**$71.20**
B10 Superstructure	$5,801,425	$16.88	$13,633,212	$39.66	$13,209,275	$38.43	$15,061,529	$48.30
B20 Exterior Closure	$14,830,521	$43.15	$7,751,745	$22.55	$9,182,129	$26.71	$10,616,250	$34.04
B30 Roofing	$3,908,560	$11.37	$4,841,101	$14.08	$6,428,263	$18.70	$6,318,086	$20.26
B SHELL	**$24,540,506**	**$71.40**	**$26,226,057**	**$76.30**	**$28,819,666**	**$83.85**	**$31,995,865**	**$102.60**
C10 Interior Construction	$11,170,868	$32.50	$11,170,868	$32.50	$11,170,868	$32.50	$10,134,930	$32.50
C20 Stairs	$330,000	$0.96	$285,000	$0.83	$580,000	$1.69	$270,000	$0.87
C30 Interior Finishes	$9,789,745	$28.48	$8,918,225	$25.95	$8,918,225	$25.95	$7,796,100	$25.00
C INTERIORS	**$21,290,613**	**$61.94**	**$20,374,093**	**$59.28**	**$20,669,093**	**$60.13**	**$18,201,030**	**$58.37**
D10 Conveying	$240,000	$0.70	$240,000	$0.70	$240,000	$0.70	$380,000	$1.22
D20 Plumbing	$4,124,628	$12.00	$4,124,628	$12.00	$4,124,628	$12.00	$3,742,128	$12.00
D30 HVAC	$15,467,355	$45.00	$15,467,355	$45.00	$15,467,355	$45.00	$14,032,980	$45.00
D40 Fire Protection	$1,715,479	$4.99	$1,715,479	$4.99	$1,715,479	$4.99	$1,565,667	$5.02
D50 Electrical	$11,686,446	$34.00	$11,686,446	$34.00	$11,686,446	$34.00	$10,602,696	$34.00
D SERVICES	**$33,233,908**	**$96.69**	**$33,233,908**	**$96.69**	**$33,233,908**	**$96.69**	**$30,323,471**	**$97.24**
E10 Equipment	$2,577,893	$7.50	$2,577,893	$7.50	$2,577,893	$7.50	$2,338,830	$7.50
E20 Furnishings	$4,296,488	$12.50	$4,296,488	$12.50	$4,296,488	$12.50	$3,898,050	$12.50
E EQUIPMENT & FURNISHINGS	**$6,874,380**	**$20.00**	**$6,874,380**	**$20.00**	**$6,874,380**	**$20.00**	**$6,236,880**	**$20.00**
G1010 Site Clearing, Site Preparation	$685,272	$1.99	$685,272	$1.99	$685,272	$1.99	$685,272	$2.20
G1020 Building Demolition	$84,303	$0.25	$1,632,595	$4.75	$1,632,595	$4.75	$1,478,440	$4.74
G1020 Site Demolition, Selective Demolition	$2,819,087	$8.20	$1,076,047	$3.13	$1,076,047	$3.13	$425,547	$1.36
G1030 Earthwork	$451,847	$1.31	$482,900	$1.40	$454,052	$1.32	$459,148	$1.47
G1040 Hazardous Material Abatement	$7,100,000	$20.66	$7,100,000	$20.66	$7,100,000	$20.66	$7,100,000	$22.77
G10 SITE PREPARATION	**$11,140,509**	**$32.41**	**$10,976,814**	**$31.94**	**$10,947,966**	**$31.85**	**$10,148,407**	**$32.54**
G2010 Paving and Surfacing	$4,793,468	$13.95	$4,779,751	$13.91	$4,693,048	$13.65	$5,472,563	$17.55
G2040 Site Improvements	$171,400	$0.50	$171,400	$0.50	$305,660	$0.89	$171,400	$0.55
G2050 Plantings, Soft Landscaping	$624,934	$1.82	$526,897	$1.53	$659,831	$1.92	$959,905	$3.08
G20 SITE IMPROVEMENTS	**$5,589,802**	**$16.26**	**$5,478,048**	**$15.94**	**$5,658,539**	**$16.46**	**$6,603,868**	**$21.18**
G3010 Water Supply and Distribution	$75,850	$0.22	$52,100	$0.15	$71,100	$0.21	$70,150	$0.22
G3020 Sanitary Sewer System	$66,000	$0.19	$102,000	$0.30	$101,500	$0.30	$42,500	$0.14
G3030 Stormwater Management System	$1,619,410	$4.71	$1,302,490	$3.79	$1,822,315	$5.30	$2,126,350	$6.82
G4010 Site Electrical Utilities	$782,200	$2.28	$580,800	$1.69	$731,850	$2.13	$721,780	$2.31
G30 SITE MECHANICAL UTILITIES	**$2,543,460**	**$7.40**	**$2,037,390**	**$5.93**	**$2,726,765**	**$7.93**	**$2,960,780**	**$9.49**
Direct Trade Details SubTotal	**$125,966,702**	**$366.48**	**$124,706,601**	**$362.82**	**$130,962,706**	**$381.02**	**$128,674,012**	**$412.62**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 9-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
10	***Total***			***343,719 GSF***		***343,719 GSF***		***343,719 GSF***		***311,844 GSF***	
11	*Renovation*			*239,354 GSF*		*65,050 GSF*		*65,050 GSF*			
12	*New Construction / Addition*			*104,365 GSF*		*278,669 GSF*		*278,669 GSF*		*311,844 GSF*	
13	*Building Demolition*			*9,918 GSF*		*192,070 GSF*		*192,070 GSF*		*257,120 GSF*	
14											
15	**A SUBSTRUCTURE**										
16											
17	**A10 Foundations**										
18	*Reinforced concrete pile caps, structural steel piles, structured slab*										
19	steel pile, 50-ton; assume 25'long	LF	$85.00	**39,750**	$3,378,750	**42,750**	$3,633,750	**47,250**	$4,016,250	**50,000**	$4,250,000
20	concrete pile; 8x8x4 at clusters, 2x2x2 at single pile	EA	$7,550.00	**660**	$4,983,000	**770**	$5,813,500	**880**	$6,644,000	**920**	$6,946,000
21	grade beam at perimeter; 5' deep	LF	$1,500.00	**3,075**	$4,612,500	**2,110**	$3,165,000	**2,070**	$3,105,000	**2,125**	$3,187,500
22	grade beam at slab on grade; assume 60'oc grid	LF	$1,500.00	**1,800**	$2,700,000	**2,800**	$4,200,000	**3,400**	$5,100,000	**3,600**	$5,400,000
23	12" structured slab on grade, 6#/sf reinforcing, vapor barrier, 2" rigid insu	SF	$14.00	**77,950**	$1,091,300	**122,633**	$1,716,862	**150,185**	$2,102,590	**155,585**	$2,178,190
24	compacted granular structural fill; assume 12"	CY	$40.00	**3,031**	$121,256	**4,769**	$190,762	**5,841**	$233,621	**6,051**	$242,021
25	*New brace frames in existing to renovation areas*										
26	demo sog for new pile, patch and repair after install	LOC	$4,000.00	**181**	$724,000	**37**	$148,000	**39**	$156,000		
27	install new pile and pile cap	EA	$11,700.00	**181**	$2,117,700	**37**	$432,900	**39**	$456,300		
28	demo sog for new tie beam, patch and repair after install	LF	$190.00	**5,395**	$1,025,018	**1,080**	$205,137	**1,151**	$218,627		
29	**A10 Foundations Total**				**$20,753,524**		**$19,505,911**		**$22,032,388**		**$22,203,711**
30											
31											
32	**B SHELL**										
33											
34	**B10 Superstructure**										
35	*New brace frames in existing to renovation areas*										
36	addition of brace frames; assume 2#/sf face area	TNS	$5,000.00	**24**	$120,000						
37	new masonry shear wall at existing building	SF	$25.00	**23,270**	$581,750						
38	Anchor un-reinforced masonry walls to floor & roof structure	EA	$150.00	**991**	$148,650	**326**	$48,900	**477**	$71,550		
39	Reinforce existing roof diaphragms to resist uplift loads; assume 1#/covera	TNS	$5,000.00	**38**	$192,183	**28**	$138,390	**23**	$116,328		
40	*New building over Level 2 for Level 3 additions*										
41	new columns from Level 1 up per floor	EA	$2,500.00	**56**	$140,000						
42	Structural steel floor framing - 13#/gsf allowance provided	TNS	$3,900.00							**1,016**	$3,961,166
43	15#/gsf allowance provided	TNS	$3,900.00	**198**	$772,639	**1,170**	$4,564,053	**964**	$3,758,157		
44	above multi-purpose rooms & PE space; 18#/gsf	TNS	$3,900.00	**134**	$522,007	**292**	$1,136,889	**311**	$1,211,652	**376**	$1,465,636
45	Structural steel framing, columns & braced frames; assume 3#/gsf	TNS	$3,900.00	**157**	$610,535	**418**	$1,630,214	**418**	$1,630,214	**468**	$1,824,287
46	Structural steel roof framing - 13#/gsf allowance provided	TNS	$3,900.00	**461**	$1,798,456	**819**	$3,194,006	**939**	$3,660,629	**1,112**	$4,338,513
47	15#/gsf @ Gym & mechanical zone/low roof; add 2#/gsf	TNS	$4,680.00	**14**	$66,456	**25**	$117,936	**29**	$135,252	**55**	$255,996
48	5½" LWT slab on composite metal deck, fireproofing; upper slabs	SF	$12.50	**26,415**	$330,188	**156,036**	$1,950,450	**128,484**	$1,606,050	**156,259**	$1,953,238
49	low roof; assume 20% of roof area	SF	$12.50	**14,200**	$177,500	**25,200**	$315,000	**28,900**	$361,250	**34,300**	$428,750
50	1½" Type B metal roof deck	SF	$3.75	**77,950**	$292,313	**122,633**	$459,874	**150,185**	$563,194	**155,585**	$583,444
51	5½" LWT slab on metal deck; mech zone assume 5% of roof area	SF	$12.50	**3,900**	$48,750	**6,200**	$77,500	**7,600**	$95,000	**7,800**	$97,500
52	3" Type NA acoustic metal roof deck; Gym	SF	$7.50							**20,400**	$153,000

G. COST ESTIMATE / OPM

GRADE 9-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add QUANTITY	OPTION C.2.1 Major Reno/Minor Add COST	OPTION C.2.3 Minor Reno/Major Add QUANTITY	OPTION C.2.3 Minor Reno/Major Add COST	OPTION C.2.4 Minor Reno/Major Add QUANTITY	OPTION C.2.4 Minor Reno/Major Add COST	OPTION C.3.1 New Construction QUANTITY	OPTION C.3.1 New Construction COST
53	**B10 Superstructure Total**				**$5,801,425**		**$13,633,212**		**$13,209,275**		**$15,061,529**
54	**B20 Exterior Closure**										
55	Existing exterior façade to remain; patch and repair only	SF	$10.00	**111,735**	$1,117,346	**20,090**	$200,895	**29,385**	$293,854		
56	remove and replace glazed openings; assume 20%	SF	$105.00	**22,350**	$2,346,750	**4,020**	$422,100	**5,880**	$617,400		
57	New façade; masonry, glass, doors	SF	$125.00	**90,931**	$11,366,425	**57,030**	$7,128,750	**66,167**	$8,270,875	**84,930**	$10,616,250
58	**B20 Exterior Closure Total**				**$14,830,521**		**$7,751,745**		**$9,182,129**		**$10,616,250**
59											
60	**B30 Roofing**										
61	Demo roof for new floor deck	SF	$15.00	**47,645**	$714,675						
62	Roofing; assume TPO	SF	$22.50	**70,945**	$1,596,263	**125,996**	$2,834,917	**144,404**	$3,249,079	**171,145**	$3,850,751
63	add low roof/canopy	AL	$100.00	**14,800**	$50,000	**8,900**	$890,000	**20,800**	$2,080,000	**13,445**	$1,344,500
64	mechanical zone and screen	LS	$175,000.00	**1**	$175,000	**1**	$175,000	**1**	$175,000	**1**	$175,000
65	soffits, fascia	LF	$425.00	**3,230**	$1,372,623	**2,215**	$941,184	**2,175**	$924,184	**2,230**	$947,835
66	**B30 Roofing Total**				**$3,908,560**		**$4,841,101**		**$6,428,263**		**$6,318,086**
67											
68											
69	**C INTERIORS**										
70											
71	**C10 Interior Construction**										
72	Renovate existing school	GSF	$32.50	**239,354**	$7,779,005	**65,050**	$2,114,125	**65,050**	$2,114,125		
73	Partitions	GSF	$20.00	**104,365**	$2,087,300	**278,669**	$5,573,380	**278,669**	$5,573,380	**311,844**	$6,236,880
74	Doors	GSF	$4.50	**104,365**	$469,643	**278,669**	$1,254,011	**278,669**	$1,254,011	**311,844**	$1,403,298
75	Storefront; assume 2% of interior walls	GSF	$1.75	**104,365**	$182,639	**278,669**	$487,671	**278,669**	$487,671	**311,844**	$545,727
76	Specialties	GSF	$6.25	**104,365**	$652,281	**278,669**	$1,741,681	**278,669**	$1,741,681	**311,844**	$1,949,025
77	**C10 Interior Construction Total**				**$11,170,868**		**$11,170,868**		**$11,170,868**		**$10,134,930**
78											
79	**C20 Stairs**										
80	Upgrade existing stair; assume replace railings	FLT	$15,000.00	**4**	$60,000	**1**	$15,000	**1**	$15,000		
81	New stairs	FLT	$35,000.00	**4**	$140,000	**4**	$140,000	**5**	$175,000	**4**	$140,000
82	Monumental/Open stair, allow	FLT	$65,000.00	**2**	$130,000	**2**	$130,000	**6**	$390,000	**2**	$130,000
83	**C20 Stairs Total**				**$330,000**		**$285,000**		**$580,000**		**$270,000**
84											
85	**C30 Interior Finishes**										
86	Renovate existing school	GSF	$30.00	**239,354**	$7,180,620	**65,050**	$1,951,500	**65,050**	$1,951,500		
87	*New School Building Construction*	*GSF*		***104,365***		***278,669***		***278,669***		***311,844***	
88	wall finishes	GSF	$6.75	**104,365**	$704,464	**278,669**	$1,881,016	**278,669**	$1,881,016	**311,844**	$2,104,947
89	flooring	GSF	$10.75	**104,365**	$1,121,924	**278,669**	$2,995,692	**278,669**	$2,995,692	**311,844**	$3,352,323
90	ceiling finishes	GSF	$7.50	**104,365**	$782,738	**278,669**	$2,090,018	**278,669**	$2,090,018	**311,844**	$2,338,830
91	**C30 Interior Finishes Total**				**$9,789,745**		**$8,918,225**		**$8,918,225**		**$7,796,100**
92											
93											
94	**D SERVICES**										
95											

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 9-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
96	**D10 Conveying**										
97	Elevator; ETR, new cab	EA	$50,000.00	1	$50,000	1	$50,000	1	$50,000		
98	Elevator; new	EA	$190,000.00	1	$190,000	1	$190,000	1	$190,000	2	$380,000
99	**D10 Conveying Total**				**$240,000**		**$240,000**		**$240,000**		**$380,000**
100											
101	**D20 Plumbing**										
102	Plumbing	GSF	$12.00	343,719	$4,124,628	343,719	$4,124,628	343,719	$4,124,628	311,844	$3,742,128
103	**D20 Plumbing Total**				**$4,124,628**		**$4,124,628**		**$4,124,628**		**$3,742,128**
104											
105	**D30 HVAC**										
106	HVAC	EA	$45.00	343,719	$15,467,355	343,719	$15,467,355	343,719	$15,467,355	311,844	$14,032,980
107	**D30 HVAC Total**				**$15,467,355**		**$15,467,355**		**$15,467,355**		**$14,032,980**
108											
109	**D40 Fire Protection**										
110	Sprinkler Coverage	GSF	$4.70	343,719	$1,615,479	343,719	$1,615,479	343,719	$1,615,479	311,844	$1,465,667
111	Fire Pump	EA	$100,000.00	1	$100,000	1	$100,000	1	$100,000	1	$100,000
112	**D40 Fire Protection Total**				**$1,715,479**		**$1,715,479**		**$1,715,479**		**$1,565,667**
113											
114	**D50 Electrical**										
105	Interior Electrical	GSF	$34.00	343,719	$11,686,446	343,719	$11,686,446	343,719	$11,686,446	311,844	$10,602,696
116	**D50 Electrical Total**				**$11,686,446**		**$11,686,446**		**$11,686,446**		**$10,602,696**
117											
118											
119	**E EQUIPMENT & FURNISHINGS**										
120											
121	**E10 Equipment**										
122	Renovate existing school	GSF	$7.50	239,354	$1,795,155	65,050	$487,875	65,050	$487,875		
123	New Construction / Addition	GSF	$7.50	104,365	$782,738	278,669	$2,090,018	278,669	$2,090,018	311,844	$2,338,830
124	**E10 Equipment Total**				**$2,577,893**		**$2,577,893**		**$2,577,893**		**$2,338,830**
125											
126	**E20 Furnishings**										
127	Renovate existing school	GSF	$12.50	239,354	$2,991,925	65,050	$813,125	65,050	$813,125		
128	New Construction / Addition	GSF	$12.50	104,365	$1,304,563	278,669	$3,483,363	278,669	$3,483,363	311,844	$3,898,050
129	**E20 Furnishings Total**				**$4,296,488**		**$4,296,488**		**$4,296,488**		**$3,898,050**
130											
131											
132	**G10 SITE PREPARATION**										
133											
134	**G1010 Site Clearing, Site Preparation**										
135	Clearing and grubbing	ACRE	$4,000.00	40	$160,000	40	$160,000	40	$160,000	40	$160,000
136	Manter Well site; grassed	ACRE	$2,000.00								
137	Construction fence	LF	$12.00	11,017	$132,204	11,017	$132,204	11,017	$132,204	11,017	$132,204
138	Double construction gate	PR	$2,800.00	4	$11,200	4	$11,200	4	$11,200	4	$11,200

G. COST ESTIMATE / OPM

GRADE 9-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
139	Strip and stockpile existing topsoil; assume avg. 6"	CY	$8.00	13,383	$107,064	13,383	$107,064	13,383	$107,064	13,383	$107,064
140	Temporary construction entrance including maintenance	EA	$9,000.00	4	$36,000	4	$36,000	4	$36,000	4	$36,000
141	Temp signs	LS	$1,800.00	2	$3,600	2	$3,600	2	$3,600	2	$3,600
142	Wash down/re-fueling	SF	$2.00	6,000	$12,000	6,000	$12,000	6,000	$12,000	6,000	$12,000
143	Protection of existing to remain	LS	$35,000.00	1	$35,000	1	$35,000	1	$35,000	1	$35,000
144	Temporary parking lot	AL	$15,000.00	1	$15,000	1	$15,000	1	$15,000	1	$15,000
145	Dewatering	LS	$35,000.00	1	$35,000	1	$35,000	1	$35,000	1	$35,000
146	Erosion control barrier	LF	$12.00	11,017	$132,204	11,017	$132,204	11,017	$132,204	11,017	$132,204
147	Erosion control barrier at temporary construction period soil stockpile	AL	$3,500.00	1	$3,500	1	$3,500	1	$3,500	1	$3,500
148	Inlet protection	AL	$2,500.00	1	$2,500	1	$2,500	1	$2,500	1	$2,500
149	**G1010 Site Clearing, Site Preparation Total**				**$685,272**		**$685,272**		**$685,272**		**$685,272**
150											
151	**G1020 Building Demolition**										
152	Building structure demolition, phased	GSF	$8.50	9,918	$84,303	192,070	$1,632,595	192,070	$1,632,595		
153	Building structure demolition	GSF	$5.75							257,120	$1,478,440
154	**G1020 Building Demolition Total**				**$84,303**		**$1,632,595**		**$1,632,595**		**$1,478,440**
155											
156	**G1020 Site Demolition, Selective Demolition**										
157	*Selective Site Demolition*										
158	saw cut existing pavement	LF	$12.00	150	$1,800	150	$1,800	150	$1,800	150	$1,800
159	asphalt pavement	SF	$1.20	181,037	$217,244	181,037	$217,244	181,037	$217,244	181,037	$217,244
160	concrete pavement	SF	$1.75	46,573	$81,503	46,573	$81,503	46,573	$81,503	46,573	$81,503
161	Cut, cap and remove existing utility	AL	$50,000.00	$1.00	$50,000	1	$50,000	1	$50,000	1	$50,000
162	Misc. demolition other than above	AL	$75,000.00	1	$75,000	1	$75,000	1	$75,000	1	$75,000
163	Existing school program interior selective demolition	GSF	$10.00	239,354	$2,393,540	65,050	$650,500	65,050	$650,500		
164	**G1020 Site Demolition, Selective Demolition Total**				**$2,819,087**		**$1,076,047**		**$1,076,047**		**$425,547**
165											
166	**G1030 Earthwork**										
167	Cut and fill for parking lot	CY	$11.00	8,381	$92,195	6,826	$75,091	8,284	$91,124	10,176	$111,935
168	concrete pavement	CY	$11.00	3,836	$42,199	1,935	$21,287	1,783	$19,609	2,011	$22,121
169	remainder of site grades	CY	$10.00	5,848	$58,478	9,835	$98,354	7,519	$75,191	5,327	$53,267
170	Rough and fine grading	SF	$0.50	517,951	$258,976	576,335	$288,168	536,256	$268,128	543,651	$271,826
171	**G1030 Earthwork Total**				**$451,847**		**$482,900**		**$454,052**		**$459,148**
172											
173	**G1040 Hazardous Material Abatement**										
174	Removal and disposal of all ACM, PCB and other hazardous materials	AL	$7,100,000.00	1	$7,100,000	1	$7,100,000	1	$7,100,000	1	$7,100,000
175	**G1040 Hazardous Material Abatement Total**				**$7,100,000**		**$7,100,000**		**$7,100,000**		**$7,100,000**
176											
177											
178	**G20 SITE IMPROVEMENTS**										
179											
180	**G2010 Paving and Surfacing**										
181	Asphalt paving at bus drop-off, deliveries, parent drop-off and parking lot	SF	$3.15	181,037	$570,267	147,452	$464,474	178,934	$563,642	219,800	$692,370

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / OPM

GRADE 9-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
182	gravel base to asphalt pavement	CY	$32.00	7,376	$236,032	6,007	$192,224	7,290	$233,280	8,955	$286,560
183	paint crosswalk	AL	$2,500.00	1	$2,500	1	$2,500	1	$2,500	1	$2,500
184	parking stall	EA	$35.00	6	$210	6	$210	6	$210	6	$210
185	HC parking stall	EA	$85.00	424	$36,040	424	$36,040	424	$36,040	424	$36,040
186	misc. pavement marking	AL	$5,000.00	1	$5,000	1	$5,000	1	$5,000	1	$5,000
187	Patching to existing paving at street	LS	$5,000.00	1	$5,000	1	$5,000	1	$5,000	1	$5,000
188	Concrete sidewalk	SF	$7.25	46,573	$337,654	5,757	$41,738	24,722	$179,235	27,735	$201,079
189	Intergenerational walking path	SF	$3.50	16,405	$57,418	16,370	$57,295	16,350	$57,225	16,250	$56,875
190	Sport walk	SF	$7.50					3,084	$23,130	3,360	$25,200
191	curb cut	EA	$380.00	12	$4,560	12	$4,560	12	$4,560	12	$4,560
192	Cement concrete entrance	SF	$15.00	45,065	$675,975	37,194	$557,910	18,728	$280,920	20,709	$310,635
193	Loading dock	SF	$15.00	450	$6,750					450	$6,750
194	Gravel base to concrete pavement	CY	$30.00	2,785	$83,550	1,633	$48,990	1,267	$38,010	1,409	$42,270
195	Curbing	LF	$38.00	8,818	$335,084	8,199	$311,562	9,853	$374,414	10,675	$405,650
196	*Baseball and Softball field:*	*SF*		*50,099*		*72,268*		*82,881*		*150,922*	
197	Rough/fine grading	SF	$0.75	50,099	$37,574	72,268	$54,201	82,881	$62,161	150,922	$113,192
198	Cut and fill	CY	$12.00	2,171	$26,052	3,132	$37,584	3,592	$43,104	6,540	$78,480
199	8" Stone base	CY	$70.00	1,361	$95,270	1,963	$137,410	2,251	$157,570	4,099	$286,930
200	Sand base	CY	$80.00	340	$27,200	491	$39,280	563	$45,040	1,025	$82,000
201	Underdrain	GSF	$1.75	50,099	$87,673	72,268	$126,469	82,881	$145,042	150,922	$264,114
202	Infield surfacing	SF	$2.50	15,995	$39,988	47,608	$119,020	40,076	$100,190	46,458	$116,145
203	Sod	SF	$1.50	34,104	$51,156	24,660	$36,990	42,805	$64,208	104,464	$156,696
204	Irrigation	SF	$0.75	34,104	$25,578	24,660	$18,495	42,805	$32,104	104,464	$78,348
205	Base plate	EA	$450.00	8	$3,600	12	$5,400	12	$5,400	12	$5,400
206	Removable foul poles	EA	$2,500.00	4	$10,000	6	$15,000	6	$15,000	6	$15,000
207	Removable soccer goal posts	EA	$1,400.00	2	$2,800	3	$4,200	3	$4,200	3	$4,200
208	Backstop	SF	$10.00	3,660	$36,600	3,660	$36,600	3,660	$36,600	3,660	$36,600
209	*Football/Rugby, Lacrosse 01, Soccer field:*	*SF*		*258,471*		*313,908*		*282,489*		*279,312*	
210	Rough/fine grading	SF	$0.75	258,471	$193,853	313,908	$235,431	282,489	$211,867	279,312	$209,484
211	Cut and fill	CY	$12.00	11,200	$134,400	13,603	$163,236	12,241	$146,892	12,104	$145,248
212	8" Stone base	CY	$70.00	7,020	$491,400	8,526	$596,820	7,673	$537,110	7,586	$531,020
213	Sand base	CY	$80.00	1,755	$140,400	2,131	$170,480	1,918	$153,440	1,897	$151,760
214	Underdrain	GSF	$1.75	258,471	$452,324	313,908	$549,339	282,489	$494,356	279,312	$488,796
215	Sod	SF	$1.50	258,471	$387,707	313,908	$470,862	282,489	$423,734	279,312	$418,968
216	Irrigation	SF	$0.75	258,471	$193,853	313,908	$235,431	282,489	$211,867	279,312	$209,484
217	**G2010 Paving and Surfacing Total**				**$4,793,468**		**$4,779,751**		**$4,693,048**		**$5,472,563**
218											
219	**G2040 Site Improvements**										
220	Bioretention terraces	SF	$35.00					3,836	$134,260		
221	Flag pole w/ foundation	EA	$7,500.00	1	$7,500	1	$7,500	1	$7,500	1	$7,500
222	Bench	AL	$15,000.00	1	$15,000	1	$15,000	1	$15,000	1	$15,000
223	Bike racks	AL	$3,500.00	1	$3,500	1	$3,500	1	$3,500	1	$3,500
224	Metal trash receptacles	EA	$800.00	8	$6,400	8	$6,400	8	$6,400	8	$6,400

G. COST ESTIMATE / OPM

AEDALUS

Belmont High School

Preferred Schematic Option Selection Study

GRADE 9-12 DIRECT TRADE COST DETAILS

	ELEMENT	UNIT	UNIT RATE	OPTION C.2.1 Major Reno/Minor Add		OPTION C.2.3 Minor Reno/Major Add		OPTION C.2.4 Minor Reno/Major Add		OPTION C.3.1 New Construction	
				QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
225	Concrete fill steel bollard	AL	$12,000.00	1	$12,000	1	$12,000	1	$12,000	1	$12,000
226	Misc. site improvement other than above	LS	$100,000.00	1	$100,000	1	$100,000	1	$100,000	1	$100,000
227	Traffic signs	AL	$12,000.00	1	$12,000	1	$12,000	1	$12,000	1	$12,000
228	Building sign	AL	$15,000.00	1	$15,000	1	$15,000	1	$15,000	1	$15,000
229	**G2040 Site Improvements Total**				**$171,400**		**$171,400**		**$305,660**		**$171,400**
230	**G2050 Plantings, Soft Landscaping**										
231	Respread topsoil	CY	$10.00	13,383	$133,830	13,383	$133,830	13,383	$133,830	13,383	$133,830
232	Topsoil for planting beds, shrubs and perennials	CY	$28.00	338	$9,471	278	$7,778	278	$7,778	278	$7,778
233	Mulch	CY	$50.00	52	$2,617	46	$2,315	46	$2,315	46	$2,315
234	Lawn	SF	$0.40	217,000	$86,800	377,696	$151,078	284,352	$113,741	196,000	$78,400
235	Sod - Outdoor classroom	SF	$1.75							10,189	$17,831
236	New trees	AL	$156,000.00	1	$156,000	1	$156,000	1	$156,000	1	$156,000
237	Gardens	SF	$8.00	28,277	$226,216	8,237	$65,896	29,521	$236,168	69,219	$553,752
238	Groundcovers	AL	$10,000.00	1	$10,000	1	$10,000	1	$10,000	1	$10,000
239	**G2050 Plantings, Soft Landscaping Total**				**$624,934**		**$526,897**		**$659,831**		**$959,905**
240											
241											
242	**G30 SITE MECHANICAL UTILITIES**										
243											
244	**G3010 Water Supply and Distribution**										
245	8" T & S & G.	EA	$4,200.00	1	$4,200	1	$4,200	1	$4,200	1	$4,200
246	4" Gate	EA	$1,200.00	1	$1,200	1	$1,200	1	$1,200	1	$1,200
247	Hydrant and gate	EA	$2,800.00	4	$11,200	4	$11,200	4	$11,200	4	$11,200
248	4" CLDI domestic water	LF	$65.00	50	$3,250	50	$3,250	50	$3,250	50	$3,250
249	6" CLDI Fire	LF	$80.00	200	$16,000	200	$16,000	200	$16,000	200	$16,000
250	8" CLDI fire service and loop	LF	$95.00	400	$38,000	150	$14,250	350	$33,250	340	$32,300
251	Thrust blocks	LS	$2,000.00	1	$2,000	1	$2,000	1	$2,000	1	$2,000
252	**G3010 Water Supply and Distribution Total**				**$75,850**		**$52,100**		**$71,100**		**$70,150**
253											
254	**G3020 Sanitary Sewer System**										
255	Connect to existing sewer	EA	$2,000.00	1	$2,000	1	$2,000	1	$2,000	1	$2,000
256	SMH	EA	$4,000.00	6	$24,000	10	$40,000	10	$40,000	4	$16,000
257	1,500 Grease trap	EA	$7,500.00	1	$7,500	1	$7,500	1	$7,500	1	$7,500
258	Pump station	LS	$30,000.00								
259	3" HDPE sewer force main	LF	$125.00								
260	8" sewer drain	LF	$65.00								
261	6" PVC sewer	LF	$50.00	650	$32,500	1,050	$52,500	1,040	$52,000	340	$17,000
262	**G3020 Sanitary Sewer System Total**				**$66,000**		**$102,000**		**$101,500**		**$42,500**
263											
264											
265	**G3030 Stormwater Management System**										
266	Bioretention	SF	$20.00	4,836	$96,720	8,802	$176,040	24,266	$485,320	30,925	$618,500
267	Bioretention zone	SF	$5.00	31,413	$157,065	34,887	$174,435	45,015	$225,075	32,876	$164,380
268	Stormwater base in pavement area	GSF	$5.00	273,125	$1,365,625	190,403	$952,015	222,384	$1,111,920	268,694	$1,343,470
269	**G3030 Stormwater Management System Total**				**$1,619,410**		**$1,302,490**		**$1,822,315**		**$2,126,350**
270											
271											
272											
273											
274	**G40 SITE ELECTRICAL UTILITIES**										
275											
276	**G4010 Site Electrical Utilities**										
277	*Primary and Secondary Service*										
278	Utility co. back charges	LS	$30,000.00	1	$30,000	1	$30,000	1	$30,000	1	$30,000
279	Electrical primary service riser	LS	$1,500.00	1	$1,500	1	$1,500	1	$1,500	1	$1,500
280	Primary ductbank 2-5" ductbank, empty	LF	$145.00	400	$58,000	200	$29,000	350	$50,750	340	$49,300
281	Transformer by utility company				By Utility Co.		By Utility Co.		By Utility Co.		By Utility Co.
282	Transformer pad	EA	$3,000.00	1	$3,000	1	$3,000	1	$3,000	1	$3,000
283	3000A secondary service	LF	$850.00	60	$51,000	60	$51,000	60	$51,000	60	$51,000
284	2500A secondary service	LF	$710.00	340	$241,400	140	$99,400	290	$205,900	280	$198,800
285	*Communications*										
286	Communications pole riser	EA	$1,500.00	1	$1,500	1	$1,500	1	$1,500	1	$1,500
287	Telecom ductbank 4-4" empty	LF	$152.00	400	$60,800	200	$30,400	350	$53,200	340	$51,680
288	Site CCTV (Security)	LS	$35,000.00	1	$35,000	1	$35,000	1	$35,000	1	$35,000
289	Site lighting and circuitry	LS	$300,000.00	1	$300,000	1	$300,000	1	$300,000	1	$300,000
290	**G4010 Site Electrical Utilities Total**				**$782,200**		**$580,800**		**$731,850**		**$721,780**
291											
292											
293											

PSR Estimate

Belmont High School

Design Options - GRADES 7-12

Belmont, MA

FINAL LEVEL 2 ESTIMATE

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Prepared for:

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February 12, 2018

G. COST ESTIMATE / Design Team

PM&C

Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

MAIN CONSTRUCTION COST SUMMARY

				Gross Floor Area	$/sf	Estimated Construction Cost
1 RENOVATION ONLY OPTION						
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 OPTION C.1				257,120	$346.89	**$89,192,523**

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

OPTION C2.1 MAJOR RENOVATION + MINOR ADDITION

RENOVATIONS TO EXISTING SCHOOL		239,354	$297.04	$71,097,101
ADDITIONS		212,446	$320.53	$68,095,552
DEMOLISH EXISTING SCHOOL - PARTIAL (phased)		9,918	$10.00	$99,180
REMOVE HAZARDOUS MATERIALS				$7,100,000
TRAFFIC MITIGATION at CONCORD AVE				$2,000,000
SITEWORK				$14,209,864
SUB-TOTAL		451,800	$359.90	$162,601,697
DESIGN AND PRICING CONTINGENCY	10%			$16,260,170
ESCALATION	12%			$21,463,424
SUB-TOTAL		451,800	$443.39	$200,325,291
GENERAL CONDITIONS (48 MTHS SCHEDULE)				$9,600,000
GENERAL REQUIREMENTS	4.00%			$8,013,012
BONDS	0.75%			$1,502,440
INSURANCE	1.10%			$2,203,578
PERMIT				Waived
CM FEE	3%			$6,009,759
CM/GMP CONTINGENCY	2%			$4,006,506
PHASING PREMIUM	5.0%			$10,016,265
TOTAL OF ALL CONSTRUCTION		451,800	$534.92	**$241,676,851**

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

		Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C2.3 MAJOR ADDITION + MINOR RENOVATION				
RENOVATIONS TO EXISTING SCHOOL		65,050	$216.21	$14,064,267
ADDITIONS		386,750	$340.21	$131,574,348
DEMOLISH EXISTING SCHOOL - PARTIAL (phased)		192,070	$8.00	$1,536,560
REMOVE HAZARDOUS MATERIALS				$7,100,000
TRAFFIC MITIGATION at CONCORD AVE				$2,000,000
SITEWORK				$14,481,792
SUB-TOTAL		451,800	$377.95	$170,756,967
DESIGN AND PRICING CONTINGENCY	10%			$17,075,697
ESCALATION	12%			$22,539,920
SUB-TOTAL		451,800	$465.63	$210,372,584
GENERAL CONDITIONS (42 MTHS SCHEDULE)				$8,400,000
GENERAL REQUIREMENTS	4.00%			$8,414,903
BONDS	0.75%			$1,577,794
INSURANCE	1.10%			$2,314,098
PERMIT				Waived
CM FEE	3%			$6,311,178
CM/GMP CONTINGENCY	2%			$4,207,452
PHASING PREMIUM	2.0%			$4,207,452
TOTAL OF ALL CONSTRUCTION		451,800	$544.06	**$245,805,461**

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

		Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C2.4 MAJOR ADDITION + MINOR RENOVATION				
RENOVATIONS TO EXISTING SCHOOL		62,300	$217.33	$13,539,413
ADDITIONS		389,500	$334.65	$130,345,510
DEMOLISH EXISTING SCHOOL - PARTIAL (phased)		194,820	$8.00	$1,558,560
REMOVE HAZARDOUS MATERIALS				$7,100,000
TRAFFIC MITIGATION at CONCORD AVE				$2,000,000
SITEWORK				$14,688,674
SUB-TOTAL		451,800	$374.57	$169,232,157
DESIGN AND PRICING CONTINGENCY	10%			$16,923,216
ESCALATION	12%			$22,338,645
SUB-TOTAL		451,800	$461.47	$208,494,018
GENERAL CONDITIONS (42 MTHS SCHEDULE)				$8,400,000
GENERAL REQUIREMENTS	4.00%			$8,339,761
BONDS	0.75%			$1,563,705
INSURANCE	1.10%			$2,293,434
PERMIT				Waived
CM FEE	3%			$6,254,821
CM/GMP CONTINGENCY	2%			$4,169,880
PHASING PREMIUM	3.0%			$6,254,821
TOTAL OF ALL CONSTRUCTION		451,800	$543.98	**$245,770,440**

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

		Gross Floor Area	$/sf	Estimated Construction Cost
OPTION C3.1 ALL NEW CONSTRUCTION				
NEW BUILDING		422,925	$334.94	$141,655,831
DEMOLISH EXISTING SCHOOL		257,120	$6.00	$1,542,720
REMOVE HAZARDOUS MATERIALS				$7,100,000
TRAFFIC MITIGATION at CONCORD AVE				$2,000,000
SITEWORK				$14,550,334
SUB-TOTAL		422,925	$394.51	$166,848,885
DESIGN AND PRICING CONTINGENCY	10%			$16,684,889
ESCALATION	12%			$22,024,053
SUB-TOTAL		422,925	$486.04	$205,557,827
GENERAL CONDITIONS (36 MTHS SCHEDULE)				$7,200,000
GENERAL REQUIREMENTS	4.00%			$8,222,313
BONDS	0.75%			$1,541,684
INSURANCE	1.10%			$2,261,136
PERMIT				Waived
CM FEE	3%			$6,166,735
CM/GMP CONTINGENCY	2%			$4,111,157
TOTAL OF ALL CONSTRUCTION		422,925	$555.80	**$235,060,852**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12 12-Feb-18
Belmont, MA

PSR Estimate

This PSR cost estimate was produced from drawings, narratives and other documentation prepared by Perkins + Wills Architects Inc. and their design team received January 12, 2018. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, construction manager's overhead, fee and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under Chapter 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:

- Relocation of Town wide fiber system
- Land acquisition, feasibility, and financing costs
- All professional fees and insurance
- Site or existing conditions surveys investigations costs, including to determine subsoil conditions
- 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 as indicated in the estimate
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)
- Construction contingency (GMP Contingency is included)
- Contaminated soils removal

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Belmont High School
Design Options
Belmont, MA

15-Nov-17

Feasibility Estimate

GFA 257,120

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
HIGH SCHOOL C.1 BASE RENOVATION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$25,000			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$581,034	**$606,034**	$2.36	1.3%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$718,560			
	B1020	Roof Construction	$50,000	**$768,560**	$2.99	1.6%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$3,128,209			
	B2020	Windows/Curtainwall	$1,067,797			
	B2030	Exterior Doors	$305,052	**$4,501,058**	$17.51	9.5%
B30	**ROOFING**					
	B3010	Roof Coverings	$30,000			
	B3020	Roof Openings	$57,000	**$87,000**	$0.34	0.2%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$1,617,720			
	C1020	Interior Doors	$986,450			
	C1030	Specialties/Millwork	$1,435,076	**$4,039,246**	$15.71	8.5%
C20	**STAIRCASES**					
	C2010	Stair Construction	$132,000			
	C2020	Stair Finishes	$66,000	**$198,000**	$0.77	0.4%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$1,465,800			
	C3020	Floor Finishes	$2,184,956			
	C3030	Ceiling Finishes	$1,829,048	**$5,479,804**	$21.31	11.5%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$240,000	**$240,000**	$0.93	0.5%
D20	**PLUMBING**					
	D20	Plumbing	$3,085,440	**$3,085,440**	$12.00	6.5%
D30	**HVAC**					
	D30	HVAC	$11,570,400	**$11,570,400**	$45.00	24.3%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$1,157,040	**$1,157,040**	$4.50	2.4%
D50	**ELECTRICAL**					
	D5010	Electrical Systems	$10,239,008	**$10,239,008**	$39.82	21.5%
E10	**EQUIPMENT**					
	E10	Equipment	$1,915,240	**$1,915,240**	$7.45	4.0%

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options
Belmont, MA

15-Nov-17

Feasibility Estimate

GFA 257,120

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
HIGH SCHOOL C.1 BASE RENOVATION						
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$2,406,493			
	E2020	Movable Furnishings	NIC	**$2,406,493**	$9.36	5.1%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**SELECTIVE BUILDING DEMOLITION**					
	F2010	Building Elements Demolition	$1,259,244			
	F2020	Hazardous Components Abatement	$0	**$1,259,244**	$4.90	2.6%
TOTAL DIRECT COST (Trade Costs)				***$47,552,567***	*$184.94*	*100.0%*

G. COST ESTIMATE / Design Team

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Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	HIGH SCHOOL C.1 BASE RENOVATION						
1	***GROSS FLOOR AREA CALCULATION***						
2							
3	***First Floor***				172,000		
4	***Second Floor***				85,120		
5							
6	***TOTAL GROSS FLOOR AREA (GFA)***				**257,120** ***sf***		
7							
8							
9	***A10 FOUNDATIONS***						
10							
11	**A1010 STANDARD FOUNDATIONS**						
12	Miscellaneous repairs/ resurfacing of cracks at exposed concrete foundations	**1**	ls	25,000.00	25,000		
13	SUBTOTAL					25,000	
14							
15	**A1020 SPECIAL FOUNDATIONS**						
16	No work in this section						
17	SUBTOTAL						
18							
19	**A1030 LOWEST FLOOR CONSTRUCTION**						
20	Cutting and patching for MEP	**1**	ls	50,000.00	50,000		
21	New slab at bathrooms, shower areas and kitchen	**11,455**	sf	20.00	229,100		
22	Slab on grade repair in Fieldhouse at water infiltration locations	**27,956**	sf	1.50	41,934		
23	Allowance for ramps on grade; 12" structural supported slab on piles - allowance	**8**	loc	30,000.00	240,000		
24	New equipment pads	**1**	ls	20,000.00	20,000		
25	Loading dock				ETR		
26	Elevator pit				ETR		
27	SUBTOTAL					581,034	
28							
29	***TOTAL - FOUNDATIONS***						**$606,034**
30							
31							
32	***B10 SUPERSTRUCTURE***						
33							
34	**B1010 FLOOR CONSTRUCTION**						
35	Openings in structure for MEP systems	**257,120**	gsf	0.50	128,560		
36	Allowance for ramps at upper floor including reinforcing existing structure	**6**	loc	15,000.00	90,000		
36	2hr Fireproofing to existing structure (excluding Pool, Fieldhouse, Auditorium, Tiered Lecture Hall & Modular building) approx 200,000sf	**1**	ls	500,000.00	500,000		
37	SUBTOTAL					718,560	
38							
39	**B1020 ROOF CONSTRUCTION**						
40	Support framing for new MEP systems	**1**	ls	50,000.00	50,000		
41	SUBTOTAL					50,000	
42							
43	***TOTAL - SUPERSTRUCTURE***						**$768,560**
44							
45							
46	***B20 EXTERIOR CLOSURE***						
47							
48	**B2010 EXTERIOR WALLS**	*62,796*	*sf*				
49	Repair and repoint exterior walls- brick; assume 100%	**39,835**	sf	32.00	1,274,720		
50	Repairs to precast concrete panels, fins and banding	**13,058**	sf	25.00	326,450		
51	Clean all exterior walls; includes staging	**50,493**	sf	8.00	403,944		

Belmont High School PSR Estimate 2.12.18 GR 7-12 Page 10 PMC - Project Management Cost

PM&C

Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	HIGH SCHOOL C.1 BASE RENOVATION						
52	Replace composite metal panels	**5,431**	sf	75.00	407,325		
53	Replace ribbon aluminum fascia panels	**5,684**	sf	80.00	454,720		
54	Replace colored aluminum fascia panels	**2,388**	sf	85.00	202,980		
55	Re-caulk existing CJ	**2,538**	lf	15.00	38,070		
56	Allowance for work at exits for ADA access to Courtyard	**1**	ls	20,000.00	20,000		
57	Seismic clips at masonry partitions				NR		
58	SUBTOTAL					3,128,209	
59							
60	**B2020 WINDOWS/CURTAINWALL**	*18,517*	*sf*				
61	Replace existing windows/curtainwall etc.; 50%	**5,860**	sf	110.00	644,600		
62	Replace existing translucent panels; 50%	**3,399**	sf	80.00	271,920		
63	Replace louvers	**700**	sf	65.00	45,500		
64	Backer rod & double sealant	**10,074**	lf	9.00	90,666		
64	Wood blocking at openings	**5,037**	lf	3.00	15,111		
65	SUBTOTAL					1,067,797	
65							
66	**B2030 EXTERIOR DOORS**						
66	Replace exterior glazed door, double	**15**	pr	8,500.00	127,500		
67	Replace exterior glazed door, single	**3**	ea	4,000.00	12,000		
67	Replace exterior single door	**3**	ea	2,100.00	6,300		
67	Replace exterior double door	**23**	pr	4,000.00	92,000		
67	Replace overhead doors; 8'x8'	**5**	ea	7,040.00	35,200		
68	Replace overhead doors; 12'x15'	**1**	ea	19,800.00	19,800		
68	Backer rod & double sealant	**1,021**	lf	9.00	9,189		
68	Wood blocking at openings	**1,021**	lf	3.00	3,063		
68	SUBTOTAL					305,052	
69							
69	***TOTAL - EXTERIOR CLOSURE***						**$4,501,058**
69							
69							
70	***B30 ROOFING***						
70							
70	**B3010 ROOF COVERINGS**						
70	Membrane roof system	**164,000**	sf		ETR		
71	Modular building roofing	**8,000**	sf		ETR		
71	Allowance for patching at new MEP penetrations	**1**	ls	30,000.00	30,000		
71	SUBTOTAL					30,000	
71							
72	**B3020 ROOF OPENINGS**						
72	New stage smoke hatches	**4**	ea	8,000.00	32,000		
72	Replace roof ladders/hatches etc.	**1**	ls	25,000.00	25,000		
72	SUBTOTAL					57,000	
73							
73	***TOTAL - ROOFING***						**$87,000**
73							
73							
74	***C10 INTERIOR CONSTRUCTION***						
74							
74	**C1010 PARTITIONS**						
74	Seismic clips at masonry partitions				NR		
75	Repair existing interior partitions disturbed by new work/ at ACM demo/ at ADA new access locations	**257,120**	sf	6.00	1,542,720		
75	Allowance to replace 20% interior borrowed lites/sidelights	**1**	ls	75,000.00	75,000		
75	SUBTOTAL					1,617,720	
75							
76	**C1020 INTERIOR DOORS**						

G. COST ESTIMATE / Design Team

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Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	HIGH SCHOOL C.1 BASE RENOVATION						
76	Adjust door openings, install new door frame to meet code requirements (door carried below)	**148**	ea	2,000.00	296,000		
76	New door & hardware at demolished doors/ ADA upgraded opes	**310**	ea	1,350.00	418,500		
76	Remove and replace doors	**281**	ea	500.00	140,500		
77	New hardware at existing to remain doors	**281**	ea	450.00	126,450		
77	Repalce wire glass vision lites at stair doors - allow	**1**	ls	5,000.00	5,000		
78	SUBTOTAL					986,450	
78							
79	**C1030 SPECIALTIES / MILLWORK**						
79	Toilet Partitions and accessories	**257,120**	gsf	0.80	205,696		
80	New markerboards/tackboards	**257,120**	gsf	1.00	257,120		
80	Academic lockers, full height	**1,470**	ea	190.00	279,300		
81	Replace athletic/workshop/music/band lockers - allowance	**1**	ls	100,000.00	100,000		
81	New guardrail at Fieldhouse bleachers	**150**	lf	200.00	30,000		
82	Rails at new ramps	**840**	lf	75.00	63,000		
82	Allowance for miscellaneous specialties; wall protection, fire extinguishers etc	**1**	ls	50,000.00	50,000		
83							
83	*055000 MISCELLANEOUS METALS*						
84	Miscellaneous metals throughout building	**257,120**	sf	0.50	128,560		
84							
85	*061000 ROUGH CARPENTRY*						
85	Rough blocking	**257,120**	sf	0.15	38,568		
86							
86	*070001 WATERPROOFING, DAMPPROOFING AND CAULKING*						
87	Miscellaneous sealants throughout building	**257,120**	sf	0.75	192,840		
87							
88	*101400 SIGNAGE*						
88	Code compliant signage	**257,120**	sf	0.35	89,992		
89	SUBTOTAL					1,435,076	
89							
90	***TOTAL - INTERIOR CONSTRUCTION***						**$4,039,246**
90							
91							
91	***C20 STAIRCASES***						
92							
92	**C2010 STAIR CONSTRUCTION**						
93	Upgrade existing stair rails and nosings for code upgrades	**9**	flt	8,000.00	72,000		
93	New stairs at Theater in Library	**2**	flts	30,000.00	60,000		
94	SUBTOTAL					132,000	
94							
95	**C2020 STAIR FINISHES**						
95	New stair finishes; rubber treads/risers/landing and painting	**11**	flt	6,000.00	66,000		
96	SUBTOTAL					66,000	
96							
97	***TOTAL - STAIRCASES***						**$198,000**
97							
98							
98	***C30 INTERIOR FINISHES***						
99							
99	**C3010 WALL FINISHES**						
100	Painting throughout	**257,120**	gsf	2.50	642,800		
100	New tile in bathrooms, lockers rooms and corridors	**25,000**	sf	22.00	550,000		
101	Replace wall finishes in auditorium & little theater	**1**	ls	150,000.00	150,000		

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

		DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		HIGH SCHOOL C.1 BASE RENOVATION						
101		Acoustic panels at gym	**1**	ls	60,000.00	60,000		
102		Allowance for acoustic panels in Practice & Music rooms	**2,520**	sf	25.00	63,000		
102		SUBTOTAL					1,465,800	
103								
103	**C3020**	**FLOOR FINISHES**	*244,507*	*sf*				
104		New resilient flooring throughout including floor prep	**140,322**	sf	8.00	1,122,576		
104		VCT in storage areas	**6,919**	sf	4.00	27,676		
105		Wood gym floor	**5,621**	sf	18.00	101,178		
105		Tile flooring in bathrooms	**4,683**	sf	22.00	103,026		
106		Tile flooring in kitchen/servery	**4,081**	sf	24.00	97,944		
106		Tile flooring in locker rooms	**11,442**	sf	22.00	251,724		
107		Stage flooring	**2,870**	sf	26.00	74,620		
107		Carpet in Admin areas	**2,446**	sy	45.00	110,070		
108		Fieldhouse flooring; patch at slab repairs	**27,956**	sf	2.00	55,912		
108		Sealed concrete at mech/elec areas	**7,933**	sf	1.50	11,900		
109		Resinous flooring in woodshop	**1,768**	sf	9.00	15,912		
109		Athletic flooring in Weight room	**1,721**	sf	14.00	24,094		
110		Pool area; assume ETR, allowance to patch/repair as necessary	**7,177**	sf	5.00	35,885		
110		Allowance for new bases	**1**	ls	152,438.78	152,439		
111		SUBTOTAL					2,184,956	
111								
112	**C3030**	**CEILING FINISHES**						
112		Allowance for gypsum ceiling on sound rated absorption panels in auditorium & lecture hall	**10,557**	sf	30.00	316,710		
113		ACT ceilings	**184,835**	sf	6.50	1,201,428		
113		Cafeteria ceiling allowance for acoustic baffles	**8,361**	sf	25.00	209,025		
114		Paint ceilings in Gym, Fieldhouse & Pool	**40,754**	sf	2.50	101,885		
114		SUBTOTAL					1,829,048	
115								
115		***TOTAL - INTERIOR FINISHES***						**$5,479,804**
116								
116								
117	***D10***	***CONVEYING SYSTEMS***						
117								
118		Remove existing elevator	**1**	ls	25,000.00	25,000		
118		New elevator in existing shaft	**2**	stp	90,000.00	180,000		
119		New lift in Auditorium	**1**	stp	35,000.00	35,000		
119		SUBTOTAL					240,000	
120								
120		***TOTAL - CONVEYING SYSTEMS***						**$240,000**
121								
121								
122	***D20***	***PLUMBING***						
122								
123	**D20**	**PLUMBING, GENERALLY**						
123		Plumbing upgrades	**257,120**	gsf	12.00	3,085,440		
124		SUBTOTAL					3,085,440	
124								
125		***TOTAL - PLUMBING***						**$3,085,440**
125								
126								
126	***D30***	***HVAC***						
127								
127	**D30**	**HVAC, GENERALLY**						
128		New HVAC system; full AC	**257,120**	gsf	45.00	11,570,400		
128		SUBTOTAL					11,570,400	
129								
129		***TOTAL - HVAC***						**$11,570,400**

G. COST ESTIMATE / Design Team

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Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	HIGH SCHOOL C.1 BASE RENOVATION						
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
	New sprinkler system	**257,120**	gsf	4.50	1,157,040		
	SUBTOTAL					1,157,040	
	TOTAL - FIRE PROTECTION						**$1,157,040**
	D50 ELECTRICAL						
	D5010 SERVICE & DISTRIBUTION						
	Gear & Distribution						
	2000 amp switchgear				ETR		
	Normal power distribution switchgear & feeders	**257,120**	sf	4.00	1,028,480		
	Emergency power						
	Emergency power distribution switchgear & feeders; 275 kW diesel generator	**257,120**	sf	4.00	1,028,480		
	UPS system						
	30kVA UPS system and switchgear	**1**	ea	30,000.00	30,000		
	Equipment Wiring						
	Equipment wiring	**257,120**	sf	2.25	578,520		
	SUBTOTAL					2,665,480	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power				-		
	Lighting fixtures (LED as BOD) with installation labor	**257,120**	sf	7.00	1,799,840		
	Lighting control system						
	Lighting controls including interface with DDC	**257,120**	sf	1.75	449,960		
	Branch devices						
	Branch devices	**257,120**	sf	0.50	128,560		
	Lighting and branch circuitry						
	Lighting & branch circuitry	**257,120**	sf	5.00	1,285,600		
	SUBTOTAL					3,663,960	
	D5030 COMMUNICATION & SECURITY SYSTEMS						
	Fire Alarm						
	Fire alarm system	**257,120**	sf	2.50	642,800		
	Bi-Directional System						
	BDA system	**257,120**	sf	0.50	128,560		
	Security System						
	Security System	**257,120**	sf	2.00	514,240		
	Telephone/Data/CATV						
	Network switches, PBX, IP, VP, CCTV (By owner)				By Owner		
	Telecommunications rough in	**257,120**	sf	1.50	385,680		
	Telecommunications devices and cabling	**257,120**	sf	3.00	771,360		
	Public Address/Clock System						
	PA/Master Clock system	**257,120**	sf	1.25	321,400		
	Audio Visual (rough-in and power only)						
	AV equipment				By Owner		
	Rough-In conduit and backboxes only	**257,120**	sf	0.50	128,560		
	Auditorium						
	Rigging system equipment & installation				See equipment		
	Power to rigging equipment	**1**	ls	12,000.00	12,000		
	Stage dimming system with performance fixture package, allow	**1**	ls	275,000.00	275,000		
	Installation, rough-in & 120V power to dimming equipment	**1**	ls	70,000.00	70,000		
	Performance audio visual equipment, installation & LV cabling, allow	**1**	ls	150,000.00	150,000		

PM&C

Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	HIGH SCHOOL C.1 BASE RENOVATION						
159	Performance audio visual rough-in and power	**1**	ls	60,000.00	60,000		
159	Gymnasium						
160	Sound system	**1**	ls	15,000.00	15,000		
160	Scoreboard/ shot clocks with feed and connection	**1**	ea	15,000.00	15,000		
161	Misc. gym equipment feed and connections	**1**	ls	15,000.00	15,000		
161	SUBTOTAL					3,504,600	
162							
162	**D5040 OTHER ELECTRICAL SYSTEMS**						
163	Miscellaneous						
163	Demolition & make safe	**1**	ls	30,000.00	30,000		
164	Temp power and lights	**257,120**	sf	0.45	115,704		
164	Seismic restraints	**1**	ls	15,000.00	15,000		
165	Lightning Protection System, UL Master label	**257,120**	sf	0.45	115,704		
165	Fees & Permits	**257,120**	sf	0.50	128,560		
166	SUBTOTAL					404,968	
166							
167	***TOTAL - ELECTRICAL***						**$10,239,008**
167							
168							
168	***E10 EQUIPMENT***						
169							
169	**E10 EQUIPMENT, GENERALLY**						
170	Gym wall pads	**1**	ls	20,000.00	20,000		
170	Basketball backstops; swing up; electric operated	**6**	loc	10,000.00	60,000		
171	Gymnasium dividing net; electrically operated; 60 lf	**1**	ea	30,000.00	30,000		
171	Volleyball net and standards	**1**	ls	5,000.00	5,000		
172	Score boards in Gym & Fieldhouse	**2**	loc	15,000.00	30,000		
172	Telescoping bleachers, electronic retracting (1008 seats)	**1**	ls	131,040.00	131,040		
173	Theatrical Equipment Stage curtains, rigging and controls (Auditorium & Lecture Hall)	**1**	ls	350,000.00	350,000		
173	Theatrical AV allowance (Auditorium & Lecture Hall)	**1**	ls	200,000.00	200,000		
174	Kitchen equipment	**1**	ls	550,000.00	550,000		
174	Fume hoods	**9**	ea	15,000.00	135,000		
175	Kiln	**1**	ea	5,000.00	5,000		
175	Allowance for new manual operable partitions in Cafeteria & Classrooms	**356**	lf	700.00	249,200		
176	Allowance for miscellaneous equipment; projection screens, residential appliances, loading dock equipment, wood workshop etc	**1**	ls	150,000.00	150,000		
176	SUBTOTAL					1,915,240	
177							
177	***TOTAL - EQUIPMENT***						**$1,915,240**
178							
178							
179	***E20 FURNISHINGS***						
179							
180	**E2010 FIXED FURNISHINGS**						
180	Window shades	**11,719**	sf	7.00	82,033		
181	Entrance mats	**1**	ls	20,000.00	20,000		
181	Replace auditorium seats	**600**	seat	350.00	210,000		
182	Replace lecture hall seats	**150**	seat	250.00	37,500		
182							
183	*123553 CASEWORK*						
183	Allowance for new casework throughout	**257,120**	sf	8.00	2,056,960		
184	SUBTOTAL					2,406,493	
184							

G. COST ESTIMATE / Design Team

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Belmont High School 15-Nov-17
Design Options
Belmont, MA

Feasibility Estimate **GFA** 257,120

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	HIGH SCHOOL C.1 BASE RENOVATION						
185	**E2020 MOVABLE FURNISHINGS**						
185	All movable furnishings to be provided and installed by owner						
186	SUBTOTAL					NIC	
186							
187	***TOTAL - FURNISHINGS***						**$2,406,493**
187							
188							
188	***F10 SPECIAL CONSTRUCTION***						
189							
189	**F10 SPECIAL CONSTRUCTION**						
190	Pool repairs				w/ MEP		
190	SUBTOTAL					-	
191							
191	***TOTAL - SPECIAL CONSTRUCTION***						
192							
192							
193	***F20 SELECTIVE BUILDING DEMOLITION***						
193							
194	**F2010 BUILDING ELEMENTS DEMOLITION**						
194	Remove exterior glazing, metal panels & transulucent panels	**23,462**	sf	6.00	140,772		
195	Interior demolition	**257,120**	gsf	4.00	1,028,480		
195	Temporary enclosures/protection	**257,120**	sf	0.35	89,992		
196	SUBTOTAL					1,259,244	
196							
197	**F2020 HAZARDOUS COMPONENTS ABATEMENT**						
197	See summary						
198	SUBTOTAL						
198							
199	***TOTAL - SELECTIVE BUILDING DEMOLITION***						**$1,259,244**
200							

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options
Belmont, MA

15-Nov-17

Feasibility Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK C.1 RENOVATE HIGH SCHOOL							
	G SITEWORK						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**5,000**	lf	12.00	60,000		
	Site construction fence gates	**1**	ea	10,000.00	10,000		
	Stabilized construction entrance	**1**	ls	15,000.00	15,000		
	Tennis Court demolition including perimeter fence	**63,000**	sf	1.25	78,750		
	Rear building paving demolition	**55,000**	sf	1.00	55,000		
	Miscellaneous demolition	**1**	ls	25,000.00	25,000		
	Site Earthwork						
	Strip topsoil and remove	**24,774**	cy	12.00	ETR		
	Fine grading	**118,000**	sf	0.20	23,600		
	Silt fence/erosion control, wash bays, stock piles	**3,750**	lf	12.00	45,000		
	Silt fence maintenance and monitoring	**1**	ls	15,000.00	15,000		
	Hazardous Waste Remediation						
	Remove existing underground fuel storage tanks	**1**	ls		NIC		
	Dispose/treat contaminated soils	**1**	ls		NIC		
	SUBTOTAL					327,350	
G20	**SITE IMPROVEMENTS**						
	Asphalt Paving; Rear building parking and roadway	*55,000*	sf				
	gravel base; 12" thick	**2,037**	cy	35.00	71,295		
	heavy duty asphalt; 4" thick	**6,111**	sy	24.00	146,664		
	Asphalt Paving; parking lot and roadway; mill and pave only	*260,000*	sf				
	gravel base; 12" thick	**9,630**	cy	35.00	ETR		
	asphalt; mill and pave	**28,889**	sy	16.00	462,224		
	VGC	**13,984**	lf	34.00	ETR		
	Single solid lines, 4" thick (343 spaces)	**1**	ls	10,000.00	10,000		
	Crosswalk hatchings, other road markings	**1**	ls	7,500.00	7,500		
	HC curb cuts; allow	**8**	loc	350.00	2,800		
	Signage	**1**	ls	20,000.00	20,000		
	Allowance for Courtyard upgrades	**4,000**	sf	15.00	60,000		
	Allowance for repairs/ replacement of existing paving and sidewalks	**25,000**	sf	7.00	175,000		
	Site Improvements						
	Tennis Courts; new asphalt surface & markings	**63,000**	sf	5.00	315,000		
	10' Chain-link fence w/ gates at Tennis Courts	**1,750**	lf	65.00	113,750		
	Tennis Court net system	**10**	ea	2,000.00	20,000		
	Other site improvements; existing field accessibility improvements, ADA ramps & entry pads, new walls, rails, fences etc.	**1**	ls	100,000.00	100,000		
	Allowance for fixed athletic equipment upgrades at existing softball & baseball fields; dugouts & backstop fencing etc	**4**	loc	20,000.00	80,000		
	Site furnishings; bollards, benches, bike racks, trash receptacles etc.	**1**	ls	50,000.00	50,000		
	Flag pole 50' high	**1**	ea	6,500.00	6,500		
	Community Path; connection at Alexander Ave			assumed separate project			
	Claypit Pond Improvements; Multi-Generational walkway path, Memorial & Water access points	**20,000**	sf		ETR		
	Skating rink	**30,000**	sf		ETR		
	Pressbox & bleachers				ETR		
	Field irrigation				ETR		
	SUBTOTAL					1,640,733	
	Landscaping						
	Synthetic turf field	**132,000**	sf		ETR		
	Playing fields/ Baseball fields; allowance to aerate and reseed	**340,200**	sf	0.25	85,050		
	Allowance to aerate & reseed existing grass areas	**498,800**	sf	0.25	124,700		
	New plantings/ mulch allowance	**1**	ls	30,000.00	30,000		

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options
Belmont, MA

15-Nov-17

Feasibility Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK C.1 RENOVATE HIGH SCHOOL							
	SUBTOTAL					239,750	
G30	**CIVIL MECHANICAL UTILITIES**						
	Water supply; allowance, pricing includes E&B and bedding						
	New DI piping; 8" Fire	**200**	lf	100.00	20,000		
	Tap existing water line for new hydrants	**3**	loc	5,000.00	15,000		
	FD connection	**1**	ea	2,000.00	2,000		
	Gate valves	**3**	ea	750.00	2,250		
	Fire hydrant	**3**	ea	5,000.00	15,000		
	Storm & Sanitary sewer lines						
	Allowance to clean and video inspect piping (approx 6000 lf)	**1**	ls	25,000.00	25,000		
	Allowance to spot repair broken lines	**250**	lf	75.00	18,750		
	Gas service						
	E&B trench for new gas pipe - install by plumbing				ETR		
	SUBTOTAL					98,000	
G40	**ELECTRICAL UTILITIES**						
	Electrical utilities & lighting				ETR		
	SUBTOTAL					-	
	TOTAL - SITE DEVELOPMENT						***$2,305,833***

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 239,354

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.1 RENOVATION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$1,275,920			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$581,034	**$1,856,954**	$7.76	2.6%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$2,568,708			
	B1020	Roof Construction	$500,000	**$3,068,708**	$12.82	4.3%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$3,105,859			
	B2020	Windows/Curtainwall	$1,984,317			
	B2030	Exterior Doors	$305,052	**$5,395,228**	$22.54	7.6%
B30	**ROOFING**					
	B3010	Roof Coverings	$5,478,220			
	B3020	Roof Openings	$557,000	**$6,035,220**	$25.21	8.5%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$6,298,204			
	C1020	Interior Doors	$986,450			
	C1030	Specialties/Millwork	$1,970,392	**$9,255,046**	$38.67	13.0%
C20	**STAIRCASES**					
	C2010	Stair Construction	$132,000			
	C2020	Stair Finishes	$90,000	**$222,000**	$0.93	0.3%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$1,436,124			
	C3020	Floor Finishes	$2,632,894			
	C3030	Ceiling Finishes	$2,393,540	**$6,462,558**	$27.00	9.1%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$240,000	**$240,000**	$1.00	0.3%
D20	**PLUMBING**					
	D20	Plumbing	$2,872,248	**$2,872,248**	$12.00	4.0%
D30	**HVAC**					
	D30	HVAC	$14,770,930	**$14,770,930**	$61.71	20.8%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$1,224,964	**$1,224,964**	$5.12	1.7%
D50	**ELECTRICAL**					
	D5010	Electrical Systems	$12,138,036	**$12,138,036**	$50.71	17.1%
E10	**EQUIPMENT**					
	E10	Equipment	$1,915,240	**$1,915,240**	$8.00	2.7%

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 239,354

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.1 RENOVATION						
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$2,790,659			
	E2020	Movable Furnishings	NIC	**$2,790,659**	$11.66	3.9%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$750,000	**$750,000**	$3.13	1.1%
F20	**SELECTIVE BUILDING DEMOLITION**					
	F2010	Building Elements Demolition	$2,099,310			
	F2020	Hazardous Components Abatement	$0	**$2,099,310**	$8.77	3.0%
TOTAL DIRECT COST (Trade Costs)				***$71,097,101***	*$297.04*	*100.0%*

Belmont High School PSR Estimate 2.12.18 GR 7-12 Page 20 PMC - Project Management Cost

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 239,354

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.1 RENOVATION						
1	***GROSS FLOOR AREA CALCULATION***						
2							
3	***First Floor***				156,365		
4	***Second Floor***				82,989		
5							
6	***TOTAL GROSS FLOOR AREA (GFA)***				**239,354** ***sf***		
7							
8							
9	***A10 FOUNDATIONS***						
10							
11	**A1010 STANDARD FOUNDATIONS**						
12	Repair cracks and resurface exposed concrete foundations	**1**	ls	25,000	25,000		
13	Foundation work as a result of increased loads	**156,365**	sf	8.00	1,250,920		
14	SUBTOTAL					1,275,920	
15							
16	**A1020 SPECIAL FOUNDATIONS**						
17	No work in this section						
18	SUBTOTAL						
19							
20	**A1030 LOWEST FLOOR CONSTRUCTION**						
21	Cutting and patching for MEP	**1**	ls	50,000.00	50,000		
22	New slab at bathrooms, shower areas and kitchen	**11,455**	sf	20.00	229,100		
23	Slab on grade repair in Fieldhouse at water infiltration locations	**27,956**	sf	1.50	41,934		
24	Allowance for ramps on grade; 12" structural supported slab on piles - allowance	**8**	loc	30,000.00	240,000		
25	New equipment pads	**1**	ls	20,000.00	20,000		
26	Loading dock				ETR		
27	Elevator pit				ETR		
28	SUBTOTAL					581,034	
29							
30	***TOTAL - FOUNDATIONS***						**$1,856,954**
31							
32							
33	***B10 SUPERSTRUCTURE***						
34							
35	**B1010 FLOOR CONSTRUCTION**						
36	Openings in structure for MEP systems	**239,354**	gsf	2.00	478,708		
37	Allowance for ramps at upper floor including reinforcing existing structure	**6**	loc	15,000.00	90,000		
38	2hr Fireproofing to existing structure (excluding Pool, Fieldhouse, Auditorium, Tiered Lecture Hall & Modular building) approx 200,000sf	**1**	ls	500,000.00	500,000		
39	Premium for building over existing	**1**	ls	1,500,000.00	1,500,000		
40	SUBTOTAL					2,568,708	
41							
42	**B1020 ROOF CONSTRUCTION**						
43							
44	Support framing for new MEP systems	**1**	ls	500,000.00	500,000		
45	SUBTOTAL					500,000	
46							
47	***TOTAL - SUPERSTRUCTURE***						**$3,068,708**
48							
49							
50	***B20 EXTERIOR CLOSURE***						
51							
52	**B2010 EXTERIOR WALLS**	*62,796*	*sf*				
53	Repair and repoint exterior walls- brick; assume 100%	**39,835**	sf	32.00	1,274,720		

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 239,354

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.1 RENOVATION						
54	Repairs to precast concrete panels, fins and banding	**13,058**	sf	25.00	326,450		
55	Clean all exterior walls; includes staging	**50,493**	sf	8.00	403,944		
56	Replace composite metal panels	**5,431**	sf	75.00	407,325		
57	Replace ribbon aluminum fascia panels	**5,684**	sf	80.00	454,720		
58	Replace colored aluminum fascia panels	**2,388**	sf	85.00	202,980		
59	Re-caulk existing CJ	**1,048**	lf	15.00	15,720		
60	Allowance for work at exits for ADA access to Courtyard	**1**	ls	20,000.00	20,000		
61	Seismic clips at masonry partitions				NR		
62	SUBTOTAL					3,105,859	
63							
64	**B2020 WINDOWS/CURTAINWALL**	*18,517*	*sf*		-		
65	Replace existing windows/curtainwall etc.	**11,720**	sf	110.00	1,289,200		
66	Replace existing translucent panels	**6,798**	sf	80.00	543,840		
67	Replace louvers	**700**	sf	65.00	45,500		
68	Backer rod & double sealant	**10,074**	lf	9.00	90,666		
69	Wood blocking at openings	**5,037**	lf	3.00	15,111		
70	SUBTOTAL					1,984,317	
71							
72	**B2030 EXTERIOR DOORS**						
73	Replace exterior glazed door, double	**15**	pr	8,500.00	127,500		
74	Replace exterior glazed door, single	**3**	ea	4,000.00	12,000		
75	Replace exterior single door	**3**	ea	2,100.00	6,300		
76	Replace exterior double door	**23**	pr	4,000.00	92,000		
77	Replace overhead doors; 8'x8'	**5**	ea	7,040.00	35,200		
78	Replace overhead doors; 12'x15'	**1**	ea	19,800.00	19,800		
79	Backer rod & double sealant	**1,021**	lf	9.00	9,189		
80	Wood blocking at openings	**1,021**	lf	3.00	3,063		
81	SUBTOTAL					305,052	
82							
83	***TOTAL - EXTERIOR CLOSURE***						**$5,395,228**
84							
85							
86	***B30 ROOFING***						
87							
88	**B3010 ROOF COVERINGS**						
89	Replace existing roofing systems	**156,365**	sf	28.00	4,378,220		
90	Roof equipment screen	**1**	ls	100,000.00	100,000		
91	Roof soffits	**1**	ls	1,000,000	1,000,000		
92	SUBTOTAL					5,478,220	
93							
94	**B3020 ROOF OPENINGS**						
95	New stage smoke hatches	**4**	ea	8,000.00	32,000		
96	Skylights, allow	**1**	ls	500,000.00	500,000		
97	Replace roof ladders/hatches etc.	**1**	ls	25,000.00	25,000		
98	SUBTOTAL					557,000	
99							
100	***TOTAL - ROOFING***						**$6,035,220**
101							
102							
103	***C10 INTERIOR CONSTRUCTION***						
104							
105	**C1010 PARTITIONS**						
106	Allowance to modify existing walls and add new walls	**239,354**	gsf	18.00	4,308,372		
107	Seismic upgrades	**239,354**	gsf	8.00	1,914,832		
108	Allowance to replace 20% interior borrowed lites/sidelights	**1**	ls	75,000.00	75,000		

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 239,354

		DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		OPTION 2.1 RENOVATION						
109		SUBTOTAL					6,298,204	
110								
111	**C1020**	**INTERIOR DOORS**						
112		Adjust door openings, install new door frame to meet code requirements (door carried below)	**148**	ea	2,000.00	296,000		
113		New door & hardware at demolished doors/ ADA upgraded opes	**310**	ea	1,350.00	418,500		
114		Remove and replace doors	**281**	ea	500.00	140,500		
115		New hardware at existing to remain doors	**281**	ea	450.00	126,450		
116		Replace wire glass vision lites at stair doors - allow	**1**	ls	5,000.00	5,000		
117		SUBTOTAL					986,450	
118								
119	**C1030**	**SPECIALTIES / MILLWORK**						
120		Toilet Partitions and accessories	**239,354**	gsf	0.80	191,483		
121		New markerboards/tackboards	**239,354**	gsf	1.00	239,354		
122		Academic lockers, full height	**1,470**	ea	190.00	279,300		
123		Replace athletic/workshop/music/band lockers - allowance	**1**	ls	100,000.00	100,000		
124		New guardrail at Fieldhouse bleachers	**150**	lf	200.00	30,000		
125		Rails at new ramps	**840**	lf	75.00	63,000		
126		Allowance for miscellaneous specialties; wall protection, fire extinguishers etc	**1**	ls	50,000.00	50,000		
127								
128	*055000*	*MISCELLANEOUS METALS*						
129		Miscellaneous metals throughout building	**239,354**	sf	2.50	598,385		
130								
131	*061000*	*ROUGH CARPENTRY*						
132		Rough blocking	**239,354**	sf	0.15	35,903		
133								
134	*070001*	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
135		Miscellaneous sealants throughout building	**239,354**	sf	1.25	299,193		
136								
137	*101400*	*SIGNAGE*						
138		Code compliant signage	**239,354**	sf	0.35	83,774		
139		SUBTOTAL					1,970,392	
140								
141		***TOTAL - INTERIOR CONSTRUCTION***						**$9,255,046**
142								
143								
144	***C20***	***STAIRCASES***						
145								
146	**C2010**	**STAIR CONSTRUCTION**						
147		Upgrade existing stair rails and nosings for code upgrades	**9**	flt	8,000.00	72,000		
148		New stairs at Theater in Library	**2**	flts	30,000.00	60,000		
149		SUBTOTAL					132,000	
150								
151	**C2020**	**STAIR FINISHES**						
152		Replace stair floor finish w/ rubber and add compliant stair nosing and tactile indicator strips	**9**	loc	10,000.00	90,000		
153		SUBTOTAL					90,000	
154								
155		***TOTAL - STAIRCASES***						**$222,000**
156								
157								
158	***C30***	***INTERIOR FINISHES***						
159								
160	**C3010**	**WALL FINISHES**						
161		Allowance for wall finishes	**239,354**	gsf	6.00	1,436,124		
162		SUBTOTAL					1,436,124	

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 239,354

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.1 RENOVATION						
	C3020 FLOOR FINISHES						
	Allowance for floor finishes	**239,354**	gsf	11.00	2,632,894		
	SUBTOTAL					2,632,894	
	C3030 CEILING FINISHES						
	Allowance for ceiling finishes	**239,354**	gsf	10.00	2,393,540		
	SUBTOTAL					2,393,540	
	TOTAL - INTERIOR FINISHES						**$6,462,558**
	D10 CONVEYING SYSTEMS						
	Remove existing elevator	**1**	ls	25,000.00	25,000		
	New elevator in existing shaft	**2**	stp	90,000.00	180,000		
	New lift in Auditorium	**1**	stp	35,000.00	35,000		
	SUBTOTAL					240,000	
	TOTAL - CONVEYING SYSTEMS						**$240,000**
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
	Plumbing allowance	**239,354**	gsf	12.00	2,872,248		
	SUBTOTAL					2,872,248	
	TOTAL - PLUMBING						**$2,872,248**
	D30 HVAC						
	D30 HVAC, GENERALLY						
	HVAC allowance for Geothermal wells; based 400 wells each 400 ft deep	**1**	ls	4,000,000.00	4,000,000		
	HVAC allowance	**239,354**	gsf	45.00	10,770,930		
	SUBTOTAL					14,770,930	
	TOTAL - HVAC						**$14,770,930**
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
	Fire pump	**1**	ls	100,000.00	100,000		
	New fire protection system	**239,354**	sf	4.70	1,124,964		
	SUBTOTAL					1,224,964	
	TOTAL - FIRE PROTECTION						**$1,224,964**
	D50 ELECTRICAL						
	D5010 ELECTRICAL WORK						
	Allowance for PV systems	**1**	ls	4,000,000.00	4,000,000		
	Complete electrical systems	**239,354**	gsf	34.00	8,138,036		
	SUBTOTAL					12,138,036	
	TOTAL - ELECTRICAL						**$12,138,036**
	E10 EQUIPMENT						

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 239,354

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.1 RENOVATION						
	E10 EQUIPMENT, GENERALLY						
	Gym wall pads	**1**	ls	20,000.00	20,000		
	Basketball backstops; swing up; electric operated	**6**	loc	10,000.00	60,000		
	Gymnasium dividing net; electrically operated; 60 lf	**1**	ea	30,000.00	30,000		
	Volleyball net and standards	**1**	ls	5,000.00	5,000		
	Score boards in Gym & Fieldhouse	**2**	loc	15,000.00	30,000		
	Telescoping bleachers, electronic retracting (1008 seats)	**1**	ls	131,040.00	131,040		
	Theatrical Equipment Stage curtains, rigging and controls (Auditorium & Lecture Hall)	**1**	ls	350,000.00	350,000		
	Theatrical AV allowance (Auditorium & Lecture Hall)	**1**	ls	200,000.00	200,000		
	Kitchen equipment	**1**	ls	550,000.00	550,000		
	Fume hoods	**9**	ea	15,000.00	135,000		
	Kiln	**1**	ea	5,000.00	5,000		
	Allowance for new manual operable partitions in Cafeteria & Classrooms	**356**	lf	700.00	249,200		
	Allowance for miscellaneous equipment; projection screens, residential appliances, loading dock equipment, wood workshop etc	**1**	ls	150,000.00	150,000		
	SUBTOTAL					1,915,240	
	TOTAL - EQUIPMENT						**$1,915,240**
	E20 FURNISHINGS						
	E2010 FIXED FURNISHINGS						
	Window shades	**18,517**	sf	7.00	129,619		
	Entrance mats	**1**	ls	20,000.00	20,000		
	Replace auditorium seats	**600**	seat	350.00	210,000		
	Replace lecture hall seats	**150**	seat	250.00	37,500		
123553	*CASEWORK*						
	Allowance for new casework throughout	**239,354**	gsf	10.00	2,393,540		
	SUBTOTAL					2,790,659	
	E2020 MOVABLE FURNISHINGS						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$2,790,659**
	F10 SPECIAL CONSTRUCTION						
	F10 SPECIAL CONSTRUCTION						
	Pool upgrades	**1**	ls	750,000.00	750,000		
	SUBTOTAL					750,000	
	TOTAL - SPECIAL CONSTRUCTION						**$750,000**
	F20 SELECTIVE BUILDING DEMOLITION						
	F2010 BUILDING ELEMENTS DEMOLITION						
	Remove exterior glazing	**18,517**	sf	6.00	111,102		
	Remove roofing	**156,365**	sf	2.00	312,730		
	Interior demolition	**239,354**	gsf	6.00	1,436,124		

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 239,354

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.1 RENOVATION						
280	Temporary enclosures/protection	**239,354**	sf	1.00	239,354		
281	SUBTOTAL					2,099,310	
282							
283	**F2020 HAZARDOUS COMPONENTS ABATEMENT**						
284	See summary						
285	SUBTOTAL						
286							
287	***TOTAL - SELECTIVE BUILDING DEMOLITION***						**$2,099,310**
288							

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate GFA 212,446

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.1 NEW ADDITION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$1,830,752			
	A1020	Special Foundations	$5,409,040			
	A1030	Lowest Floor Construction	$1,962,546	**$9,202,338**	$43.32	13.5%
A20	**BASEMENT CONSTRUCTION**					
	A2010	Basement Excavation	$0			
	A2020	Basement Walls	$0	**$0**	$0.00	0.0%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$5,719,916			
	B1020	Roof Construction	$3,011,712	**$8,731,628**	$41.10	12.8%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$5,304,788			
	B2020	Windows	$3,821,835			
	B2030	Exterior Doors	$73,680	**$9,200,303**	$43.31	13.5%
B30	**ROOFING**					
	B3010	Roof Coverings	$3,439,320			
	B3020	Roof Openings	$252,500	**$3,691,820**	$17.38	5.4%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$5,098,704			
	C1020	Interior Doors	$1,062,230			
	C1030	Specialties/Millwork	$1,779,107	**$7,940,041**	$37.37	11.7%
C20	**STAIRCASES**					
	C2010	Stair Construction	$422,000			
	C2020	Stair Finishes	$37,723	**$459,723**	$2.16	0.7%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$1,274,676			
	C3020	Floor Finishes	$2,336,906			
	C3030	Ceiling Finishes	$2,124,460	**$5,736,042**	$27.00	8.4%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$270,000	**$270,000**	$1.27	0.4%
D20	**PLUMBING**					
	D20	Plumbing	$2,549,352	**$2,549,352**	$12.00	3.7%
D30	**HVAC**					
	D30	HVAC	$9,560,070	**$9,560,070**	$45.00	14.0%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$998,496	**$998,496**	$4.70	1.5%
D50	**ELECTRICAL**					

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 212,446

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.1 NEW ADDITION						
	D5010	Complete System	$7,223,164	**$7,223,164**	$34.00	10.6%
E10	**EQUIPMENT**					
	E10	Equipment	$35,000	**$35,000**	$0.16	0.1%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$2,347,575			
	E2020	Movable Furnishings	NIC	**$2,347,575**	$11.05	3.4%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**HAZMAT REMOVALS**					
	F2010	Building Elements Demolition	$150,000			
	F2020	Hazardous Components Abatement	$0	**$150,000**	$0.71	0.2%
TOTAL DIRECT COST (Trade Costs)				***$68,095,552***	*$320.53*	*100.0%*

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 212,446

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.1 NEW ADDITION						
	GROSS FLOOR AREA CALCULATION						
	Ground Floor			83,216			
	First Floor			64,615			
	Second Floor			64,615			
	TOTAL GROSS FLOOR AREA (GFA)				**212,446**	***sf***	
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Allowance for pile caps, grade beams etc.	**83,216**	sf	22.00	1,830,752		
	SUBTOTAL					1,830,752	
	A1020 SPECIAL FOUNDATIONS						
	Driven piles; including mobilization	**83,216**	sf	65.00	5,409,040		
	SUBTOTAL					5,409,040	
	A1030 LOWEST FLOOR CONSTRUCTION						
	New Structural Slab, 12" thick	*83,216*	*sf*		-		
312000	Ordinary Fill, 6"	**1,541**	cy	16.00	24,656		
312000	Crushed stone, 6"	**1,541**	cy	35.00	53,935		
312000	Rigid insulation; 40 psi	**83,216**	sf	2.15	178,914		
033000	Vapor barrier	**83,216**	sf	0.80	66,573		
312000	Compact existing sub-grade	**83,216**	sf	0.55	45,769		
033000	Formwork	**778**	lf	12.00	9,336		
033000	Rebar, 6#/SF	**499,296**	lbs	1.20	599,155		
033000	Concrete - 12" thick; 4,000 psi	**3,236**	cy	120.00	388,320		
033000	Placing concrete	**3,236**	cy	90.00	291,240		
033000	Finishing and curing concrete	**83,216**	sf	3.00	249,648		
	Miscellaneous						
	Patch slab at foundations in existing building				W/Reno		
	New Elevator pit				W/Reno		
	New loading dock	**1**	ls	40,000.00	40,000		
	Equipment pads	**1**	ls	15,000.00	15,000		
	SUBTOTAL					1,962,546	
	TOTAL - FOUNDATIONS						**$9,202,338**
	A20 BASEMENT CONSTRUCTION						
	A2010 BASEMENT EXCAVATION						
	No Work in this section						
	SUBTOTAL					-	
	A2020 BASEMENT WALLS						
	No Work in this section						
	SUBTOTAL					-	
	TOTAL - BASEMENT CONSTRUCTION						
	B10 SUPERSTRUCTURE						
		14.61	lbs/sf		-		
	B1010 FLOOR CONSTRUCTION	1,552	tns		-		

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 212,446

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.1 NEW ADDITION							
	Floor Structure - Steel:						
	Steel beams and columns to new addition; 15#/SF	**969**	tns	3,800.00	3,682,200		
	Premium for HSS	**242**	tns	300.00	72,600		
	Shear studs	**25,846**	ea	2.50	64,615		
	Floor Structure						
	2" 18 Ga. Metal galvanized floor Deck	**129,230**	sf	3.75	484,613		
	WWF reinforcement	**148,615**	sf	0.80	118,892		
	Concrete Fill to metal deck; 6" Light Weight	**3,015**	cy	160.00	482,400		
	Place and finish concrete	**129,230**	sf	2.00	258,460		
	Rebar to decks	**38,769**	lbs	1.20	46,523		
	Misc. angles	**129,230**	sf	0.50	64,615		
	Miscellaneous						
	Fire proofing to columns and beams	**129,230**	sf	2.25	290,768		
	Intumescent paint	**1**	ls	25,000.00	25,000		
	Fire stopping floors	**129,230**	sf	1.00	129,230		
	SUBTOTAL					5,719,916	
B1020	**ROOF CONSTRUCTION**						
	Roof Structure - Steel:						
	Steel beams and columns to new addition; 14#/SF	**583**	tns	3,800.00	2,215,400		
	Premium for HSS	**146**	tns	300.00	43,800		
	Exposed steel	**1**	ls	50,000.00	50,000		
	Roof Structure						
	Acoustic deck allowance	**8,000**	sf	7.00	56,000		
	3" 20 Ga. galvanized Metal Roof Deck	**75,216**	sf	4.00	300,864		
	Miscellaneous						
	Concrete under RTU's	**15,000**	sf	8.00	120,000		
	Fire proofing to columns, beams and deck	**75,216**	sf	3.00	225,648		
	SUBTOTAL					3,011,712	
	TOTAL - SUPERSTRUCTURE						**$8,731,628**
B20	***EXTERIOR CLOSURE***						
B2010	**EXTERIOR WALLS**						
	Exterior Wall Area - Solid Assume 70%	*65,205*	sf				
042000	*MASONRY*						
	Brick veneer, 3 color; 75% of solid area	**48,904**	sf	40.00	1,956,160		
	Staging to exterior wall	**65,205**	sf	4.00	260,820		
055000	*MISC. METALS*						
	Stainless steel sign at main entrance	**1**	ls	15,000.00	15,000		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Air barrier	**65,205**	sf	6.50	423,833		
	Air barrier/flashing at windows	**16,438**	lf	6.25	102,738		
	Miscellaneous sealants to closure	**65,205**	sf	1.00	65,205		
072100	*THERMAL INSULATION*						
	Insulation	**65,205**	sf	2.25	146,711		
076400	*CLADDING*						

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 212,446

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.1 NEW ADDITION							
	Metal panel; 25% of solid area	**16,301**	sf	75.00	1,222,575		
092900	*GYPSUM BOARD ASSEMBLIES*						
	6" metal stud backup	**65,205**	sf	11.00	717,255		
	Gypsum Sheathing	**65,205**	sf	2.75	179,314		
	Drywall lining to interior face of stud backup	**65,205**	sf	3.30	215,177		
	SUBTOTAL					5,304,788	
B2020	**WINDOWS**						
	Exterior Wall Area - Glazed Assume 30%	*27,945*	sf				
061000	*ROUGH CARPENTRY*						
	Wood blocking at openings	**16,438**	lf	14.00	230,132		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Backer rod & double sealant	**16,438**	lf	8.50	139,723		
080001	*METAL WINDOWS*						
	Windows, double glazed; 20% of glazed area	**5,589**	sf	90.00	503,010		
	Curtainwall, double glazed; 80% of glazed area	**22,356**	sf	120.00	2,682,720		
	Sunshades; horizontal	**1**	ls	250,000.00	250,000		
089000	*LOUVERS*						
	Louvers	**250**	sf	65.00	16,250		
	SUBTOTAL					3,821,835	
B2030	**EXTERIOR DOORS**						
	Glazed entrance doors including frame and hardware; double door	**8**	pr	8,000.00	64,000		
	HM doors, frames and hardware- Double	**4**	pr	2,000.00	8,000		
	Backer rod & double sealant	**240**	lf	4.00	960		
	Wood blocking at openings	**240**	lf	3.00	720		
	SUBTOTAL					73,680	
	TOTAL - EXTERIOR CLOSURE						**$9,200,303**
B30	***ROOFING***						
B3010	**ROOF COVERINGS**						
	New roofing complete	**83,216**	sf	20.00	1,664,320		
	Roof equipment screen	**1**	ls	250,000.00	250,000		
	Green roof	**15,000**	sf	35.00	525,000		
	Roof soffits	**1**	ls	1,000,000	1,000,000		
	SUBTOTAL					3,439,320	
B3020	**ROOF OPENINGS**						
	Skylights, allow	**1**	ls	250,000.00	250,000		
	Roof hatch	**1**	loc	2,500.00	2,500		
	SUBTOTAL					252,500	
	TOTAL - ROOFING						**$3,691,820**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						
	Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	**212,446**	gsf	24.00	5,098,704		
	SUBTOTAL					5,098,704	

PM&C

Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 212,446

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.1 NEW ADDITION							
C1020	**INTERIOR DOORS**						
	Interior doors, frames and hardware	**212,446**	gsf	5.00	1,062,230		
	SUBTOTAL					1,062,230	
C1030	**SPECIALTIES / MILLWORK**						
	Toilet Partitions and accessories	**212,446**	gsf	0.80	169,957		
	Backer panels in electrical closets	**1**	ls	1,000.00	1,000		
	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	**212,446**	sf	1.00	212,446		
	Room Signs	**212,446**	gsf	0.40	84,978		
	Fire extinguisher cabinets	**71**	ea	350.00	24,850		
	Lockers	**212,446**	gsf	1.60	339,914		
	Janitors Work Shop Accessories	**1**	ls	1,500.00	1,500		
	Janitors Closet Accessories	**3**	rms	300.00	900		
	Media						
	Reception desks	**4**	loc	25,000	100,000		
	Railings to open to below areas	**1**	ls	100,000	100,000		
	Library shelving at perimeters 7' Tall				F,F & E		
	Library shelving at perimeters 3' Tall				F,F & E		
	Miscellaneous wood trim	**212,446**	gsf	0.50	106,223		
	Display cases	**212,446**	gsf	0.25	53,112		
	Miscellaneous metals throughout building	**212,446**	sf	1.50	318,669		
	Miscellaneous sealants throughout building	**212,446**	sf	1.25	265,558		
	SUBTOTAL					1,779,107	
	TOTAL - INTERIOR CONSTRUCTION						**$7,940,041**
C20	***STAIRCASES***						
C2010	**STAIR CONSTRUCTION**						
	Metal pan stair; egress stair	**6**	flt	25,000.00	150,000		
	Main staircase	**1**	flt	250,000.00	250,000		
	Commons steps	**2**	loc	5,000.00	10,000		
	Concrete fill to stairs	**6**	flt	2,000.00	12,000		
	SUBTOTAL					422,000	
C2020	**STAIR FINISHES**						
	High performance coating to stairs including all railings etc.	**6**	flt	3,000.00	18,000		
	Rubber tile at stairs - landings	**600**	sf	10.00	6,000		
	Rubber tile at stairs - treads & risers	**720**	lft	19.06	13,723		
	SUBTOTAL					37,723	
	TOTAL - STAIRCASES						**$459,723**
C30	***INTERIOR FINISHES***						
C3010	**WALL FINISHES**						
	Wall finishes	**212,446**	sf	6.00	1,274,676		
	SUBTOTAL					1,274,676	
C3020	**FLOOR FINISHES**						
	Floor finishes	**212,446**	sf	11.00	2,336,906		
	SUBTOTAL					2,336,906	
C3030	**CEILING FINISHES**						
	Ceiling finishes	**212,446**	sf	10.00	2,124,460		

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

PM&C

Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate GFA 212,446

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.1 NEW ADDITION							
	SUBTOTAL					2,124,460	
	TOTAL - INTERIOR FINISHES						**$5,736,042**
D10	***CONVEYING SYSTEMS***						
D1010	**ELEVATOR**						
	New three stop elevator	**2**	ea	135,000.00	270,000		
	SUBTOTAL					270,000	
	TOTAL - CONVEYING SYSTEMS						**$270,000**
D20	***PLUMBING***						
D20	**PLUMBING, GENERALLY**						
	Plumbing allowance	**212,446**	gsf	12.00	2,549,352		
	SUBTOTAL					2,549,352	
	TOTAL - PLUMBING						**$2,549,352**
D30	***HVAC***						
D30	**HVAC, GENERALLY**						
	HVAC allowance	**212,446**	gsf	45.00	9,560,070		
	SUBTOTAL					9,560,070	
	TOTAL - HVAC						**$9,560,070**
D40	***FIRE PROTECTION***						
D40	**FIRE PROTECTION, GENERALLY**						
	Fire protection system	**212,446**	gsf	4.70	998,496		
	SUBTOTAL					998,496	
	TOTAL - FIRE PROTECTION						**$998,496**
D50	***ELECTRICAL***						
D5010	**ELECTRICAL WORK**						
	Complete electrical systems	**212,446**	gsf	34.00	7,223,164		
	SUBTOTAL					7,223,164	
	TOTAL - ELECTRICAL						**$7,223,164**
E10	***EQUIPMENT***						
E10	**EQUIPMENT, GENERALLY**						
	Food Service equipment				In Renovation		
	Loading dock equipment	**1**	ls	20,000.00	20,000		
	Electrically operated projection screens	**1**	loc	15,000.00	15,000		
	SUBTOTAL					35,000	
	TOTAL - EQUIPMENT						**$35,000**
E20	***FURNISHINGS***						

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

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GFA 212,446

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.1 NEW ADDITION							
E2010	**FIXED FURNISHINGS**						
	Entry mats & frames - recessed with carpet/rubber strips	**500**	sf	55.00	27,500		
	Window blinds	**27,945**	sf	7.00	195,615		
	Counters, base cabinets, tall storage in classrooms and other rooms	**212,446**	gsf	10.00	2,124,460		
	SUBTOTAL					2,347,575	
E2020	**MOVABLE FURNISHINGS**						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$2,347,575**
F10	***SPECIAL CONSTRUCTION***						
F10	**SPECIAL CONSTRUCTION**						
	No items in this section						
	SUBTOTAL						
	TOTAL - SPECIAL CONSTRUCTION						
F20	***SELECTIVE BUILDING DEMOLITION***						
F2010	**BUILDING ELEMENTS DEMOLITION**						
	Demolition to make connection to existing building	**1**	ls	150,000.00	150,000		
	SUBTOTAL					150,000	
F2020	**HAZARDOUS COMPONENTS ABATEMENT**						
	See main summary for HazMat allowance				See Summary		
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						**$150,000**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK OPTION 2.1							
	G SITEWORK						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**8,200**	lf	12.00	98,400		
	Site construction fence gates/entrance	**2**	ea	15,000.00	30,000		
	Pavement/curbing removal, crush and re-use for sub-base	**200,000**	sf	1.00	200,000		
	Walkways	**1**	ls	30,000.00	30,000		
	Miscellaneous demolition	**1**	ls	150,000.00	150,000		
	Site Earthwork						
	Strip Topsoil and remove; 6" thick	**19,889**	cy	12.00	238,668		
	Fine grading	**1,000,000**	sf	0.20	200,000		
	Cut and Fill; assumed AV 2ft; balanced site	**74,074**	cy	8.00	592,592		
	Silt fence/erosion control, wash bays, stock piles	**8,200**	lf	12.00	98,400		
	Silt fence maintenance and monitoring	**1**	ls	60,000.00	60,000		
	Hazardous Waste Remediation						
	Dispose/treat contaminated soils				NIC		
	SUBTOTAL					1,698,060	
G20	**SITE IMPROVEMENTS**						
	Asphalt Paving; parking lot and roadway	*350,000*					
	gravel base; 12" thick	**12,963**	cy	40.00	518,520		
	asphalt; 4" thick	**38,889**	sy	25.00	972,225		
	VGC	**10,000**	lf	38.00	380,000		
	Road markings/signage	**1**	ls	30,000.00	30,000		
	Pedestrian Paving						
	Concrete paving						
	gravel base; 8" thick	**744**	cy	35.00	26,040		
	4" concrete paving	**30,000**	sf	7.00	210,000		
	Concrete pavers						
	Concrete pavers						
	sand bedding; 1" thick	**148**	cy	40.00	5,920		
	Precast concrete pavers	**50,000**	sf	16.00	800,000		
	gravel base; 8" thick	**1,241**	cy	35.00	43,435		
	concrete base; 4" thick	**50,000**	sf	5.00	250,000		
	Site Improvements						
	Flag pole 50' high	**1**	ea	6,500.00	6,500		
	Concrete retaining walls				Assumed not required		
	6' chain-link fence	**8,200**	lf	50.00	410,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Wood screen privacy fence 8'	**50**	lf	100.00	5,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Benches	**15**	ea	2,800.00	42,000		
	Bike racks	**1**	ls	30,000.00	30,000		
	Ornamental trash/recycling receptacles	**10**	ea	800.00	8,000		
	Monumental signage	**1**	ls	40,000.00	40,000		
	Way finding signage	**1**	ls	60,000.00	60,000		
	Other site improvements; walls, fences etc.	**1**	ls	1,500,000	1,500,000		
	Multi-purpose fields						
	Crushed stone - 12" thick	**16,815**	cy	40.00	672,600		
	Sports seeding	**454,000**	sf	0.50	227,000		
	Line markings - Allowance	**1**	ls	15,000.00	15,000		
	Football goals	**2**	loc	3,000.00	6,000		
	Soccer goals (movable) - Allowance	**3**	loc	10,000.00	30,000		
	20' sports netting	**1**	ls	50,000.00	50,000		
	Baseball/softball backstop	**2**	loc	40,000.00	80,000		
	SUBTOTAL					6,423,240	
	Landscaping						
	Topsoil -modify existing topsoil	**19,889**	cy	26.00	517,114		
	Lawn - loam & seed	**546,000**	sf	0.25	136,500		
	Planting allowance	**1**	ls	500,000.00	500,000		

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	SITEWORK OPTION 2.1							
63		Irrigation at sports fields	**454,000**	sf	1.00	454,000		
64		Allowance for new well	**1**	ls	150,000.00	150,000		
65		SUBTOTAL					1,757,614	
66								
67	**G30**	**CIVIL MECHANICAL UTILITIES**						
68		Utilities - Enabling						
69		Allowance for temporary utilities etc.	**1**	ls	150,000.00	150,000		
70		Water supply; Pricing includes E&B and bedding						
71		New DI piping; 8"	**200**	lf	100.00	20,000		
72		New DI piping; 8" Fire	**3,500**	lf	100.00	350,000		
73		Connect to existing	**1**	loc	10,000.00	10,000		
74		FD connection	**1**	ea	2,000.00	2,000		
75		Gate valves	**8**	ea	750.00	6,000		
76		Fire hydrant	**12**	ea	5,000.00	60,000		
77		Fire hydrant; relocate existing	**1**	ea	3,500.00	3,500		
78		Sanitary; Pricing includes E&B and bedding						
79		Manholes	**4**	ea	4,000.00	16,000		
80		Grease trap	**1**	ea	15,000.00	15,000		
81		8" PVC	**300**	lf	60.00	18,000		
82		Connect to existing drain	**1**	ea	3,000.00	3,000		
83		Relocate existing sewer system	**1**	ls	250,000.00	250,000		
84		Storm water; Pricing includes E&B and bedding						
85		Allowance to modify existing drainage systems	**350,000**	sf	7.00	2,450,000		
86		Perforated pipe @ recharge systems and crushed stone base under fields	**454,000**	sf	4.00	NR		
87		Gas service						
88		E&B trench for new gas pipe - install by plumbing	**250**	lf	25.00	6,250		
89		SUBTOTAL					3,359,750	
90								
91	**G40**	**ELECTRICAL UTILITIES**						
92								
93		Power						
94		Utility co. backcharges, allow	**1**	ls	30,000.00	30,000		
95		Connections at existing manhole				Utility co.		
96		Manhole	**1**	ls	8,500.00	8,500		
97		Connections in manhole	**1**	ls	3,500.00	3,500		
98		Primary ductbank 2-5" ductbank, empty, allow	**1100**	lf	120.00	132,000		
99		Transformer by utility company				By Utility Co.		
100		Transformer pad	**1**	ea	2,500.00	2,500		
101		Secondary service	**60**	lf	1,100.00	66,000		
102		Communications						
103		Connection at riser pole, allow	**1**	ea	1,500.00	1,500		
104		Telecom ductbank 4-4", allow	**1100**	lf	152.00	167,200		
105		Site Lighting						
106		Varsity baseball sports lighting (allow)	**1**	ls	120,000.00	120,000		
107		Softball sports lighting (allow)	**1**	ls	90,000.00	90,000		
108		Site Parking lighting (allow)	**1**	ls	350,000.00	350,000		
109		SUBTOTAL					971,200	
110								
111		**TOTAL - SITE DEVELOPMENT**						***$14,209,864***

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 65,050

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.3 RENOVATION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$25,000			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$75,000	**$100,000**	$1.54	0.7%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$0			
	B1020	Roof Construction	$50,000	**$50,000**	$0.77	0.4%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$822,040			
	B2020	Windows/Curtainwall	$589,164			
	B2030	Exterior Doors	$58,796	**$1,470,000**	$22.60	10.5%
B30	**ROOFING**					
	B3010	Roof Coverings	$1,821,400			
	B3020	Roof Openings	$10,000	**$1,831,400**	$28.15	13.0%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$585,450			
	C1020	Interior Doors	$195,150			
	C1030	Specialties/Millwork	$393,504	**$1,174,104**	$18.05	8.3%
C20	**STAIRCASES**					
	C2010	Stair Construction	$0			
	C2020	Stair Finishes	$0	**$0**	$0.00	0.0%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$390,300			
	C3020	Floor Finishes	$715,550			
	C3030	Ceiling Finishes	$520,400	**$1,626,250**	$25.00	11.6%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$0	**$0**	$0.00	0.0%
D20	**PLUMBING**					
	D20	Plumbing	$780,600	**$780,600**	$12.00	5.6%
D30	**HVAC**					
	D30	HVAC	$2,927,250	**$2,927,250**	$45.00	20.8%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$305,735	**$305,735**	$4.70	2.2%
D50	**ELECTRICAL**					
	D5010	Electrical Systems	$2,211,700	**$2,211,700**	$34.00	15.7%
E10	**EQUIPMENT**					
	E10	Equipment	$276,040	**$276,040**	$4.24	2.0%

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 65,050

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.3 RENOVATION						
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$65,050			
	E2020	Movable Furnishings	NIC	**$65,050**	$1.00	0.5%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$750,000	**$750,000**	$11.53	5.3%
F20	**SELECTIVE BUILDING DEMOLITION**					
	F2010	Building Elements Demolition	$496,138			
	F2020	Hazardous Components Abatement	$0	**$496,138**	$7.63	3.5%
TOTAL DIRECT COST (Trade Costs)				***$14,064,267***	*$216.21*	*100.0%*

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 65,050

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.3 RENOVATION						
	GROSS FLOOR AREA CALCULATION						
	First Floor				65,050		
	TOTAL GROSS FLOOR AREA (GFA)				**65,050** ***sf***		
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Repair cracks and resurface exposed concrete foundations	**1**	ls	25,000	25,000		
	SUBTOTAL					25,000	
	A1020 SPECIAL FOUNDATIONS						
	No work in this section						
	SUBTOTAL						
	A1030 LOWEST FLOOR CONSTRUCTION						
	Cutting and patching for MEP	**1**	ls	15,000.00	15,000		
	New slab at bathrooms and shower areas	**3,000**	sf	20.00	60,000		
	SUBTOTAL					75,000	
	TOTAL - FOUNDATIONS						**$100,000**
	B10 SUPERSTRUCTURE						
	B1010 FLOOR CONSTRUCTION						
	SUBTOTAL					-	
	B1020 ROOF CONSTRUCTION						
	Support framing for new MEP systems	**1**	ls	50,000.00	50,000		
	SUBTOTAL					50,000	
	TOTAL - SUPERSTRUCTURE						**$50,000**
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS	*18,676*	*sf*				
	Repair and repoint exterior walls- brick; assume 100%	**18,676**	sf	32.00	597,632		
	Repairs to precast concrete panels, fins and banding	**1**	ls	75,000.00	75,000		
	Clean all exterior walls; includes staging	**18,676**	sf	8.00	149,408		
	SUBTOTAL					822,040	
	B2020 WINDOWS/CURTAINWALL						
	Replace existing translucent panels	**6,798**	sf	80.00	543,840		
	Backer rod & double sealant	**3,777**	lf	9.00	33,993		
	Wood blocking at openings	**3,777**	lf	3.00	11,331		
	SUBTOTAL					589,164	
	B2030 EXTERIOR DOORS						
	Replace exterior single door	**3**	ea	2,100.00	6,300		
	Replace exterior double door	**4**	pr	4,000.00	16,000		
	Replace overhead doors; 8'x8'	**2**	ea	7,040.00	14,080		
	Replace overhead doors; 12'x15'	**1**	ea	19,800.00	19,800		
	Backer rod & double sealant	**218**	lf	9.00	1,962		
	Wood blocking at openings	**218**	lf	3.00	654		

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 65,050

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.3 RENOVATION						
59	SUBTOTAL					58,796	
60							
61	***TOTAL - EXTERIOR CLOSURE***						**$1,470,000**
62							
63							
64	***B30 ROOFING***						
65							
66	**B3010 ROOF COVERINGS**						
67	Replace existing roofing systems	**65,050**	sf	28.00	1,821,400		
68	SUBTOTAL					1,821,400	
69							
70	**B3020 ROOF OPENINGS**						
71	Replace roof ladders/hatches etc.	**1**	ls	10,000.00	10,000		
72	SUBTOTAL					10,000	
73							
74	***TOTAL - ROOFING***						**$1,831,400**
75							
76							
77	***C10 INTERIOR CONSTRUCTION***						
78							
79	**C1010 PARTITIONS**						
80	Allowance to modify existing walls and add new walls	**65,050**	gsf	6.00	390,300		
81	Seismic upgrades	**65,050**	gsf	3.00	195,150		
82	SUBTOTAL					585,450	
83							
84	**C1020 INTERIOR DOORS**						
85	Adjust door openings, install new door frame to meet code requirements (door carried below)	**65,050**	gsf	3.00	195,150		
86	SUBTOTAL					195,150	
87							
88	**C1030 SPECIALTIES / MILLWORK**						
89	Toilet Partitions and accessories	**65,050**	gsf	0.80	52,040		
90	New markerboards/tackboards	**65,050**	gsf	1.00	65,050		
91	Replace athletic lockers - allowance	**1**	ls	25,000.00	25,000		
92	New guardrail at Fieldhouse bleachers	**150**	lf	200.00	30,000		
93	Allowance for miscellaneous specialties; wall protection, fire extinguishers etc	**1**	ls	10,000.00	10,000		
94							
95	*055000 MISCELLANEOUS METALS*						
96	Miscellaneous metals throughout building	**65,050**	sf	1.50	97,575		
97							
98	*061000 ROUGH CARPENTRY*						
99	Rough blocking	**65,050**	sf	0.15	9,758		
100							
101	*070001 WATERPROOFING, DAMPPROOFING AND CAULKING*						
102	Miscellaneous sealants throughout building	**65,050**	sf	1.25	81,313		
103							
104	*101400 SIGNAGE*						
105	Code compliant signage	**65,050**	sf	0.35	22,768		
106	SUBTOTAL					393,504	
107							
108	***TOTAL - INTERIOR CONSTRUCTION***						**$1,174,104**
109							
110							
111	***C20 STAIRCASES***						
112							
113	**C2010 STAIR CONSTRUCTION**						
114	SUBTOTAL					-	
115							
116	**C2020 STAIR FINISHES**						

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 65,050

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.3 RENOVATION						
117	SUBTOTAL					-	
118							
119	***TOTAL - STAIRCASES***						
120							
121							
122	***C30 INTERIOR FINISHES***						
123							
124	**C3010 WALL FINISHES**						
125	Allowance for wall finishes	**65,050**	gsf	6.00	390,300		
126	SUBTOTAL					390,300	
127							
128	**C3020 FLOOR FINISHES**						
129							
130	Allowance for floor finishes	**65,050**	gsf	11.00	715,550		
131	SUBTOTAL					715,550	
132							
133	**C3030 CEILING FINISHES**						
134	Allowance for ceiling finishes	**65,050**	gsf	8.00	520,400		
135	SUBTOTAL					520,400	
136							
137	***TOTAL - INTERIOR FINISHES***						**$1,626,250**
138							
139							
140	***D10 CONVEYING SYSTEMS***						
141							
142	SUBTOTAL					-	
143							
144	***TOTAL - CONVEYING SYSTEMS***						
145							
146							
147	***D20 PLUMBING***						
148							
149	**D20 PLUMBING, GENERALLY**						
150	Plumbing allowance	**65,050**	gsf	12.00	780,600		
151	SUBTOTAL					780,600	
152							
153	***TOTAL - PLUMBING***						**$780,600**
154							
155							
156	***D30 HVAC***						
157							
158	**D30 HVAC, GENERALLY**						
159	HVAC allowance	**65,050**	gsf	45.00	2,927,250		
160	SUBTOTAL					2,927,250	
161							
162	***TOTAL - HVAC***						**$2,927,250**
163							
164							
165	***D40 FIRE PROTECTION***						
166							
167	**D40 FIRE PROTECTION, GENERALLY**						
168	New fire protection system	**65,050**	sf	4.70	305,735		
169	SUBTOTAL					305,735	
170							
171	***TOTAL - FIRE PROTECTION***						**$305,735**
172							
173							
174	***D50 ELECTRICAL***						
175							
176	**D5010 ELECTRICAL WORK**						
177	Complete electrical systems	**65,050**	gsf	34.00	2,211,700		
178	SUBTOTAL					2,211,700	
179							
180	***TOTAL - ELECTRICAL***						**$2,211,700**

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 65,050

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.3 RENOVATION						
	E10 EQUIPMENT						
	E10 EQUIPMENT, GENERALLY						
	Gym wall pads	**1**	ls	20,000.00	20,000		
	Basketball backstops; swing up; electric operated	**6**	loc	10,000.00	60,000		
	Gymnasium dividing net; electrically operated; 60 lf	**1**	ea	30,000.00	30,000		
	Volleyball net and standards	**1**	ls	5,000.00	5,000		
	Score boards in Gym & Fieldhouse	**2**	loc	15,000.00	30,000		
	Telescoping bleachers, electronic retracting (1008 seats)	**1**	ls	131,040.00	131,040		
	SUBTOTAL					276,040	
	TOTAL - EQUIPMENT						**$276,040**
	E20 FURNISHINGS						
	E2010 FIXED FURNISHINGS						
123553	*CASEWORK*						
	Allowance for new casework throughout	**65,050**	gsf	1.00	65,050		
	SUBTOTAL					65,050	
	E2020 MOVABLE FURNISHINGS						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$65,050**
	F10 SPECIAL CONSTRUCTION						
	F10 SPECIAL CONSTRUCTION						
	Pool upgrades	**1**	ls	750,000.00	750,000		
	SUBTOTAL					750,000	
	TOTAL - SPECIAL CONSTRUCTION						**$750,000**
	F20 SELECTIVE BUILDING DEMOLITION						
	F2010 BUILDING ELEMENTS DEMOLITION						
	Remove exterior glazing	**6,798**	sf	6.00	40,788		
	Remove roofing	**65,050**	sf	2.00	130,100		
	Interior demolition	**65,050**	gsf	4.00	260,200		
	Temporary enclosures/protection	**65,050**	sf	1.00	65,050		
	SUBTOTAL					496,138	
	F2020 HAZARDOUS COMPONENTS ABATEMENT						
	See summary						
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						**$496,138**

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate GFA 386,750

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.3 NEW ADDITION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$3,222,208			
	A1020	Special Foundations	$9,520,160			
	A1030	Lowest Floor Construction	$3,405,365	**$16,147,733**	$41.75	12.3%
A20	**BASEMENT CONSTRUCTION**					
	A2010	Basement Excavation	$0			
	A2020	Basement Walls	$0	**$0**	$0.00	0.0%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$10,615,447			
	B1020	Roof Construction	$5,395,748	**$16,011,195**	$41.40	12.2%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$9,770,917			
	B2020	Windows	$6,648,823			
	B2030	Exterior Doors	$73,680	**$16,493,420**	$42.65	12.5%
B30	**ROOFING**					
	B3010	Roof Coverings	$5,804,280			
	B3020	Roof Openings	$752,500	**$6,556,780**	$16.95	5.0%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$8,508,500			
	C1020	Interior Doors	$1,933,750			
	C1030	Specialties/Millwork	$3,071,826	**$13,514,076**	$34.94	10.3%
C20	**STAIRCASES**					
	C2010	Stair Construction	$584,000			
	C2020	Stair Finishes	$75,446	**$659,446**	$1.71	0.5%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$2,320,500			
	C3020	Floor Finishes	$4,254,250			
	C3030	Ceiling Finishes	$3,867,500	**$10,442,250**	$27.00	7.9%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$360,000	**$360,000**	$0.93	0.3%
D20	**PLUMBING**					
	D20	Plumbing	$4,641,000	**$4,641,000**	$12.00	3.5%
D30	**HVAC**					
	D30	HVAC	$21,403,750	**$21,403,750**	$55.34	16.3%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$1,917,725	**$1,917,725**	$4.96	1.5%
D50	**ELECTRICAL**					

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 386,750

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.3 NEW ADDITION						
	D5010	Complete System	$17,149,500	**$17,149,500**	$44.34	13.0%
E10	**EQUIPMENT**					
	E10	Equipment	$1,674,200	**$1,674,200**	$4.33	1.3%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$4,503,273			
	E2020	Movable Furnishings	NIC	**$4,503,273**	$11.64	3.4%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**HAZMAT REMOVALS**					
	F2010	Building Elements Demolition	$100,000			
	F2020	Hazardous Components Abatement	$0	**$100,000**	$0.26	0.1%
TOTAL DIRECT COST (Trade Costs)				***$131,574,348***	*$340.21*	*100.0%*

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3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate GFA 386,750

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.3 NEW ADDITION						
	GROSS FLOOR AREA CALCULATION						
	Ground Floor			146,464			
	First Floor			90,452			
	Second Floor			90,452			
	Third Floor			59,382			
	TOTAL GROSS FLOOR AREA (GFA)				**386,750**	***sf***	
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Allowance for pile caps, grade beams etc.	**146,464**	sf	22.00	3,222,208		
	SUBTOTAL					3,222,208	
	A1020 SPECIAL FOUNDATIONS						
	Driven piles; including mobilization	**146,464**	sf	65.00	9,520,160		
	SUBTOTAL					9,520,160	
	A1030 LOWEST FLOOR CONSTRUCTION						
	New Structural Slab, 12" thick	*146,464*	*sf*		-		
312000	Ordinary Fill, 6"	**2,712**	cy	16.00	43,392		
312000	Crushed stone, 6"	**2,712**	cy	35.00	94,920		
312000	Rigid insulation; 40 psi	**146,464**	sf	2.15	314,898		
033000	Vapor barrier	**146,464**	sf	0.80	117,171		
312000	Compact existing sub-grade	**146,464**	sf	0.55	80,555		
033000	Formwork	**778**	lf	12.00	9,336		
033000	Rebar, 6#/SF	**878,784**	lbs	1.20	1,054,541		
033000	Concrete - 12" thick; 4,000 psi	**5,696**	cy	120.00	683,520		
033000	Placing concrete	**5,696**	cy	90.00	512,640		
033000	Finishing and curing concrete	**146,464**	sf	3.00	439,392		
	Miscellaneous						
	Patch slab at foundations in existing building				W/Reno		
	New Elevator pit				W/Reno		
	New loading dock	**1**	ls	40,000.00	40,000		
	Equipment pads	**1**	ls	15,000.00	15,000		
	SUBTOTAL					3,405,365	
	TOTAL - FOUNDATIONS						**$16,147,733**
	A20 BASEMENT CONSTRUCTION						
	A2010 BASEMENT EXCAVATION						
	No Work in this section						
	SUBTOTAL					-	
	A2020 BASEMENT WALLS						
	No Work in this section						
	SUBTOTAL					-	
	TOTAL - BASEMENT CONSTRUCTION						
	B10 SUPERSTRUCTURE						
		14.92	lbs/sf		-		

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.3 NEW ADDITION							
B1010	**FLOOR CONSTRUCTION**	2,886	tns		-		
	Floor Structure - Steel:						
	Steel beams and columns to new addition; 15#/SF	**1,802**	tns	3,800.00	6,847,600		
	Premium for HSS	**451**	tns	300.00	135,300		
	Shear studs	**48,057**	ea	2.50	120,143		
	Floor Structure						
	2" 18 Ga. Metal galvanized floor Deck	**240,286**	sf	3.75	901,073		
	WWF reinforcement	**276,329**	sf	0.80	221,063		
	Concrete Fill to metal deck; 6" Light Weight	**5,607**	cy	160.00	897,120		
	Place and finish concrete	**240,286**	sf	2.00	480,572		
	Rebar to decks	**72,086**	lbs	1.20	86,503		
	Misc. angles	**240,286**	sf	0.50	120,143		
	Miscellaneous						
	Fire proofing to columns and beams	**240,286**	sf	2.25	540,644		
	Intumescent paint	**1**	ls	25,000.00	25,000		
	Fire stopping floors	**240,286**	sf	1.00	240,286		
	SUBTOTAL					10,615,447	
B1020	**ROOF CONSTRUCTION**						
	Roof Structure - Steel:						
	Steel beams and columns to new addition; 14#/SF	**1,084**	tns	3,800.00	4,119,200		
	Premium for HSS	**271**	tns	300.00	81,300		
	Exposed steel	**1**	ls	50,000.00	50,000		
	Roof Structure						
	Acoustic deck allowance	**8,000**	sf	7.00	56,000		
	3" 20 Ga. galvanized Metal Roof Deck	**138,464**	sf	4.00	553,856		
	Miscellaneous						
	Concrete under RTU's	**15,000**	sf	8.00	120,000		
	Fire proofing to columns, beams and deck	**138,464**	sf	3.00	415,392		
	SUBTOTAL					5,395,748	
	TOTAL - SUPERSTRUCTURE						**$16,011,195**
B20	***EXTERIOR CLOSURE***						
B2010	**EXTERIOR WALLS**						
	Exterior Wall Area - Solid Assume 70%	*120,257*	sf				
042000	*MASONRY*						
	Brick veneer, 3 color; 75% of solid area	**90,193**	sf	40.00	3,607,720		
	Staging to exterior wall	**120,257**	sf	4.00	481,028		
055000	*MISC. METALS*						
	Stainless steel sign at main entrance	**1**	ls	15,000.00	15,000		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Air barrier	**120,257**	sf	6.50	781,671		
	Air barrier/flashing at windows	**30,317**	lf	6.25	189,481		
	Miscellaneous sealants to closure	**120,257**	sf	1.00	120,257		
072100	*THERMAL INSULATION*						
	Insulation	**120,257**	sf	2.25	270,578		

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.3 NEW ADDITION							
076400	*CLADDING*						
	Metal panel; 25% of solid area	**30,064**	sf	75.00	2,254,800		
092900	*GYPSUM BOARD ASSEMBLIES*						
	6" metal stud backup	**120,257**	sf	11.00	1,322,827		
	Gypsum Sheathing	**120,257**	sf	2.75	330,707		
	Drywall lining to interior face of stud backup	**120,257**	sf	3.30	396,848		
	SUBTOTAL					9,770,917	
B2020	**WINDOWS**						
	Exterior Wall Area - Glazed Assume 30%	*51,539*	sf				
061000	*ROUGH CARPENTRY*						
	Wood blocking at openings	**30,317**	lf	14.00	424,438		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Backer rod & double sealant	**30,317**	lf	8.50	257,695		
080001	*METAL WINDOWS*						
	Windows, double glazed; 20% of glazed area	**10,308**	sf	90.00	927,720		
	Curtainwall, double glazed; 80% of glazed area	**41,231**	sf	120.00	4,947,720		
	Sunshades; horizontal	**1**	ls	75,000.00	75,000		
089000	*LOUVERS*						
	Louvers	**250**	sf	65.00	16,250		
	SUBTOTAL					6,648,823	
B2030	**EXTERIOR DOORS**						
	Glazed entrance doors including frame and hardware; double door	**8**	pr	8,000.00	64,000		
	HM doors, frames and hardware- Double	**4**	pr	2,000.00	8,000		
	Backer rod & double sealant	**240**	lf	4.00	960		
	Wood blocking at openings	**240**	lf	3.00	720		
	SUBTOTAL					73,680	
	TOTAL - EXTERIOR CLOSURE						**$16,493,420**
B30	***ROOFING***						
B3010	**ROOF COVERINGS**						
	New roofing complete	**146,464**	sf	20.00	2,929,280		
	Roof equipment screen	**1**	ls	350,000	350,000		
	Green roof	**15,000**	sf	35.00	525,000		
	Roof soffits	**1**	ls	2,000,000	2,000,000		
	SUBTOTAL					5,804,280	
B3020	**ROOF OPENINGS**						
	Skylights, allow	**1**	ls	750,000.00	750,000		
	Roof hatch	**1**	loc	2,500.00	2,500		
	SUBTOTAL					752,500	
	TOTAL - ROOFING						**$6,556,780**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.3 NEW ADDITION							
169		Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	**386,750**	gsf	22.00	8,508,500		
170		SUBTOTAL					8,508,500	
171								
172	**C1020**	**INTERIOR DOORS**						
173		Interior doors, frames and hardware	**386,750**	gsf	5.00	1,933,750		
174		SUBTOTAL					1,933,750	
175								
176	**C1030**	**SPECIALTIES / MILLWORK**						
177		Toilet Partitions and accessories	**386,750**	gsf	0.80	309,400		
178		Backer panels in electrical closets	**1**	ls	1,000.00	1,000		
179		Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	**386,750**	sf	1.00	386,750		
180		Room Signs	**386,750**	gsf	0.40	154,700		
181		Fire extinguisher cabinets	**129**	ea	350.00	45,150		
182		Lockers	**386,750**	gsf	1.60	618,800		
183		Janitors Work Shop Accessories	**1**	ls	1,500.00	1,500		
184		Janitors Closet Accessories	**3**	rms	300.00	900		
185		*Media*						
186		Reception desks	**4**	loc	25,000	100,000		
187		Railings to open to below areas	**1**	ls	100,000	100,000		
188		Library shelving at perimeters 7' Tall				F,F & E		
189		Library shelving at perimeters 3' Tall				F,F & E		
190		Miscellaneous wood trim	**386,750**	gsf	0.50	193,375		
191		Display cases	**386,750**	gsf	0.25	96,688		
192		Miscellaneous metals throughout building	**386,750**	sf	1.50	580,125		
193		Miscellaneous sealants throughout building	**386,750**	sf	1.25	483,438		
194		SUBTOTAL					3,071,826	
195								
196		***TOTAL - INTERIOR CONSTRUCTION***						**$13,514,076**
197								
198								
199	***C20***	***STAIRCASES***						
200								
201	**C2010**	**STAIR CONSTRUCTION**						
202		Metal pan stair; egress stair	**12**	flt	25,000.00	300,000		
203		Main staircase	**1**	flt	250,000.00	250,000		
204		Commons steps	**2**	loc	5,000.00	10,000		
205		Concrete fill to stairs	**12**	flt	2,000.00	24,000		
206		SUBTOTAL					584,000	
207								
208	**C2020**	**STAIR FINISHES**						
209		High performance coating to stairs including all railings etc.	**12**	flt	3,000.00	36,000		
210		Rubber tile at stairs - landings	**1,200**	sf	10.00	12,000		
211		Rubber tile at stairs - treads & risers	**1,440**	lft	19.06	27,446		
212		SUBTOTAL					75,446	
213								
214		***TOTAL - STAIRCASES***						**$659,446**
215								
216								
217	***C30***	***INTERIOR FINISHES***						
218								
219	**C3010**	**WALL FINISHES**						
220		Wall finishes	**386,750**	sf	6.00	2,320,500		
221		SUBTOTAL					2,320,500	
222								
223	**C3020**	**FLOOR FINISHES**						
224		Floor finishes	**386,750**	sf	11.00	4,254,250		
225		SUBTOTAL					4,254,250	

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.3 NEW ADDITION							
C3030	**CEILING FINISHES**						
	Ceiling finishes	**386,750**	sf	10.00	3,867,500		
	SUBTOTAL					3,867,500	
	TOTAL - INTERIOR FINISHES						**$10,442,250**
D10	***CONVEYING SYSTEMS***						
D1010	**ELEVATOR**						
	New four stop elevator	**2**	ea	180,000.00	360,000		
	SUBTOTAL					360,000	
	TOTAL - CONVEYING SYSTEMS						**$360,000**
D20	***PLUMBING***						
D20	**PLUMBING, GENERALLY**						
	Plumbing allowance	**386,750**	gsf	12.00	4,641,000		
	SUBTOTAL					4,641,000	
	TOTAL - PLUMBING						**$4,641,000**
D30	***HVAC***						
D30	**HVAC, GENERALLY**						
	HVAC allowance for Geothermal wells; based 400 wells each 400 ft deep	**1**	ls	4,000,000.00	4,000,000		
	HVAC allowance	**386,750**	gsf	45.00	17,403,750		
	SUBTOTAL					21,403,750	
	TOTAL - HVAC						**$21,403,750**
D40	***FIRE PROTECTION***						
D40	**FIRE PROTECTION, GENERALLY**						
	Fire pump	**1**	ls	100,000.00	100,000		
	Fire protection system	**386,750**	gsf	4.70	1,817,725		
	SUBTOTAL					1,917,725	
	TOTAL - FIRE PROTECTION						**$1,917,725**
D50	***ELECTRICAL***						
D5010	**ELECTRICAL WORK**						
	Allowance for PV systems	**1**	ls	4,000,000.00	4,000,000		
	Complete electrical systems	**386,750**	gsf	34.00	13,149,500		
	SUBTOTAL					17,149,500	
	TOTAL - ELECTRICAL						**$17,149,500**
E10	***EQUIPMENT***						
E10	**EQUIPMENT, GENERALLY**						
	Theatrical Equipment Stage curtains, rigging and controls (Auditorium & Lecture Hall)	**1**	ls	350,000.00	350,000		

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		OPTION 2.3 NEW ADDITION						
287		Theatrical AV allowance (Auditorium & Lecture Hall)	**1**	ls	200,000.00	200,000		
288		Kitchen equipment	**1**	ls	550,000.00	550,000		
289		Fume hoods	**9**	ea	15,000.00	135,000		
290		Kiln	**1**	ea	5,000.00	5,000		
291		Allowance for new manual operable partitions in Cafeteria & Classrooms	**356**	lf	700.00	249,200		
292		Allowance for miscellaneous equipment; projection screens, residential appliances, loading dock equipment, wood workshop etc	**1**	ls	150,000.00	150,000		
293		Loading dock equipment	**1**	ls	20,000.00	20,000		
294		Electrically operated projection screens	**1**	loc	15,000.00	15,000		
295		SUBTOTAL					1,674,200	
296								
297		***TOTAL - EQUIPMENT***						**$1,674,200**
298								
299								
300	***E20***	***FURNISHINGS***						
301								
302	**E2010**	**FIXED FURNISHINGS**						
303		Entry mats & frames - recessed with carpet/rubber strips	**500**	sf	55.00	27,500		
304		Window blinds	**51,539**	sf	7.00	360,773		
305		Auditorium seats	**600**	seat	350.00	210,000		
306		Lecture hall seats	**150**	seat	250.00	37,500		
307		Counters, base cabinets, tall storage in classrooms and other rooms	**386,750**	gsf	10.00	3,867,500		
308		SUBTOTAL					4,503,273	
309								
310	**E2020**	**MOVABLE FURNISHINGS**						
311		All movable furnishings to be provided and installed by owner						
312		SUBTOTAL					NIC	
313								
314		***TOTAL - FURNISHINGS***						**$4,503,273**
315								
316								
317	***F10***	***SPECIAL CONSTRUCTION***						
318								
319	**F10**	**SPECIAL CONSTRUCTION**						
320		No items in this section						
321		SUBTOTAL						
322								
323		***TOTAL - SPECIAL CONSTRUCTION***						
324								
325								
326	***F20***	***SELECTIVE BUILDING DEMOLITION***						
327								
328	**F2010**	**BUILDING ELEMENTS DEMOLITION**						
329		Demolition to make connection to existing building	**1**	ls	100,000.00	100,000		
330		SUBTOTAL					$100,000	
331								
332	**F2020**	**HAZARDOUS COMPONENTS ABATEMENT**						
333		See main summary for HazMat allowance				See Summary		
334		SUBTOTAL						
335								
336		***TOTAL - SELECTIVE BUILDING DEMOLITION***						**$100,000**

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SITEWORK OPTION 2.3

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	G SITEWORK						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**8,200**	lf	12.00	98,400		
	Site construction fence gates/entrance	**2**	ea	15,000.00	30,000		
	Pavement/curbing removal, crush and re-use for sub-base	**200,000**	sf	1.00	200,000		
	Walkways	**1**	ls	30,000.00	30,000		
	Miscellaneous demolition	**1**	ls	150,000.00	150,000		
	Site Earthwork						
	Strip Topsoil and remove; 6" thick	**19,889**	cy	12.00	238,668		
	Fine grading	**1,000,000**	sf	0.20	200,000		
	Cut and Fill; assumed AV 2ft; balanced site	**74,074**	cy	8.00	592,592		
	Silt fence/erosion control, wash bays, stock piles	**8,200**	lf	12.00	98,400		
	Silt fence maintenance and monitoring	**1**	ls	60,000.00	60,000		
	Hazardous Waste Remediation						
	Dispose/treat contaminated soils				NIC		
	SUBTOTAL					1,698,060	
G20	**SITE IMPROVEMENTS**						
	Asphalt Paving; parking lot and roadway	*370,000*					
	gravel base; 12" thick	**13,704**	cy	40.00	548,160		
	asphalt; 4" thick	**41,111**	sy	25.00	1,027,775		
	VGC	**7,286**	lf	38.00	276,868		
	Road markings/signage	**1**	ls	30,000.00	30,000		
	Pedestrian Paving						
	Concrete paving						
	gravel base; 8" thick	**744**	cy	35.00	26,040		
	4" concrete paving	**30,000**	sf	7.00	210,000		
	Concrete pavers						
	Concrete pavers						
	sand bedding; 1" thick	**133**	cy	40.00	5,320		
	Precast concrete pavers	**45,000**	sf	16.00	720,000		
	gravel base; 8" thick	**1,117**	cy	35.00	39,095		
	concrete base; 4" thick	**45,000**	sf	5.00	225,000		
	Site Improvements						
	Flag pole 50' high	**1**	ea	6,500.00	6,500		
	Concrete retaining walls				Assumed not required		
	6' chain-link fence	**8,200**	lf	50.00	410,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Wood screen privacy fence 8'	**50**	lf	100.00	5,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Benches	**15**	ea	2,800.00	42,000		
	Bike racks	**1**	ls	30,000.00	30,000		
	Ornamental trash/recycling receptacles	**10**	ea	800.00	8,000		
	Monumental signage	**1**	ls	40,000.00	40,000		
	Way finding signage	**1**	ls	60,000.00	60,000		
	Other site improvements; walls, fences etc.	**1**	ls	1,500,000	1,500,000		
	Multi-purpose fields						
	Crushed stone - 12" thick	**19,074**	cy	40.00	762,960		
	Sports seeding	**515,000**	sf	0.50	257,500		
	Line markings - Allowance	**1**	ls	15,000.00	15,000		
	Football goals	**2**	loc	3,000.00	6,000		
	Soccer goals (movable) - Allowance	**3**	loc	10,000.00	30,000		
	20' sports netting	**1**	ls	50,000.00	50,000		
	Baseball/softball backstop	**3**	loc	40,000.00	120,000		
	SUBTOTAL					6,456,218	
	Landscaping						
	Topsoil -modify existing topsoil	**19,889**	cy	26.00	517,114		
	Lawn - loam & seed	**485,000**	sf	0.25	121,250		
	Planting allowance	**1**	ls	300,000.00	300,000		

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	SITEWORK OPTION 2.3							
63		Irrigation at sports fields	**515,000**	sf	1.00	515,000		
64		Allowance for new well	**1**	ls	150,000.00	150,000		
65		SUBTOTAL					1,603,364	
66								
67	**G30**	**CIVIL MECHANICAL UTILITIES**						
68		Utilities - Enabling						
69		Allowance for temporary utilities etc.	**1**	ls	150,000.00	150,000		
70		Water supply; Pricing includes E&B and bedding						
71		New DI piping; 8"	**200**	lf	100.00	20,000		
72		New DI piping; 8" Fire	**4,300**	lf	100.00	430,000		
73		Connect to existing	**1**	loc	10,000.00	10,000		
74		FD connection	**1**	ea	2,000.00	2,000		
75		Gate valves	**8**	ea	750.00	6,000		
76		Fire hydrant	**14**	ea	5,000.00	70,000		
77		Fire hydrant; relocate existing	**1**	ea	3,500.00	3,500		
78		Sanitary; Pricing includes E&B and bedding						
79		Manholes	**4**	ea	4,000.00	16,000		
80		Grease trap	**1**	ea	15,000.00	15,000		
81		8" PVC	**300**	lf	60.00	18,000		
82		Connect to existing drain	**1**	ea	3,000.00	3,000		
83		Relocate existing sewer system	**1**	ls	250,000.00	250,000		
84		Storm water; Pricing includes E&B and bedding						
85		Allowance to modify existing drainage systems	**370,000**	sf	7.00	2,590,000		
86		Perforated pipe @ recharge systems and crushed stone base under fields	**515,000**	sf	4.00	NR		
87		Gas service						
88		E&B trench for new gas pipe - install by plumbing	**250**	lf	25.00	6,250		
89		SUBTOTAL					3,589,750	
90								
91	**G40**	**ELECTRICAL UTILITIES**						
92								
93		Power						
94		Utility co. backcharges, allow	**1**	ls	30,000.00	30,000		
95		Connections at existing manhole				Utility co.		
96		Manhole	**1**	ls	8,500.00	8,500		
97		Connections in manhole	**1**	ls	3,500.00	3,500		
98		Primary ductbank 2-5" ductbank, empty, allow	**1700**	lf	120.00	204,000		
99		Transformer by utility company				By Utility Co.		
100		Transformer pad	**1**	ea	2,500.00	2,500		
101		Secondary service	**60**	lf	1,100.00	66,000		
102		Communications						
103		Connection at riser pole, allow	**1**	ea	1,500.00	1,500		
104		Telecom ductbank 4-4", allow	**1700**	lf	152.00	258,400		
105		Site Lighting						
106		Varsity baseball sports lighting (allow)	**1**	ls	120,000.00	120,000		
107		Softball sports lighting (allow)	**1**	ls	90,000.00	90,000		
108		Site Parking lighting (allow)	**1**	ls	350,000.00	350,000		
109		SUBTOTAL					1,134,400	
110								
111		**TOTAL - SITE DEVELOPMENT**						***$14,481,792***

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 62,300

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.4 RENOVATION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$35,000			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$75,000	**$110,000**	$1.77	0.8%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$0			
	B1020	Roof Construction	$50,000	**$50,000**	$0.80	0.4%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$1,083,000			
	B2020	Windows/Curtainwall	$589,164			
	B2030	Exterior Doors	$58,796	**$1,730,960**	$27.78	12.8%
B30	**ROOFING**					
	B3010	Roof Coverings	$1,447,600			
	B3020	Roof Openings	$10,000	**$1,457,600**	$23.40	10.8%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$560,700			
	C1020	Interior Doors	$186,900			
	C1030	Specialties/Millwork	$379,615	**$1,127,215**	$18.09	8.3%
C20	**STAIRCASES**					
	C2010	Stair Construction	$0			
	C2020	Stair Finishes	$0	**$0**	$0.00	0.0%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$373,800			
	C3020	Floor Finishes	$685,300			
	C3030	Ceiling Finishes	$498,400	**$1,557,500**	$25.00	11.5%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$0	**$0**	$0.00	0.0%
D20	**PLUMBING**					
	D20	Plumbing	$747,600	**$747,600**	$12.00	5.5%
D30	**HVAC**					
	D30	HVAC	$2,803,500	**$2,803,500**	$45.00	20.7%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$292,810	**$292,810**	$4.70	2.2%
D50	**ELECTRICAL**					
	D5010	Electrical Systems	$2,118,200	**$2,118,200**	$34.00	15.6%
E10	**EQUIPMENT**					
	E10	Equipment	$276,040	**$276,040**	$4.43	2.0%

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 62,300

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.4 RENOVATION						
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$62,300			
	E2020	Movable Furnishings	NIC	**$62,300**	$1.00	0.5%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$750,000	**$750,000**	$12.04	5.5%
F20	**SELECTIVE BUILDING DEMOLITION**					
	F2010	Building Elements Demolition	$455,688			
	F2020	Hazardous Components Abatement	$0	**$455,688**	$7.31	3.4%
TOTAL DIRECT COST (Trade Costs)				***$13,539,413***	*$217.33*	*100.0%*

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 62,300

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.4 RENOVATION						
	GROSS FLOOR AREA CALCULATION						
	First Floor				51,700		
	Second Floor				10,600		
	TOTAL GROSS FLOOR AREA (GFA)				**62,300** ***sf***		
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Repair cracks and resurface exposed concrete foundations	**1**	ls	35,000	35,000		
	SUBTOTAL					35,000	
	A1020 SPECIAL FOUNDATIONS						
	No work in this section						
	SUBTOTAL						
	A1030 LOWEST FLOOR CONSTRUCTION						
	Cutting and patching for MEP	**1**	ls	15,000.00	15,000		
	New slab at bathrooms and shower areas	**3,000**	sf	20.00	60,000		
	SUBTOTAL					75,000	
	TOTAL - FOUNDATIONS						**$110,000**
	B10 SUPERSTRUCTURE						
	B1010 FLOOR CONSTRUCTION						
	SUBTOTAL					-	
	B1020 ROOF CONSTRUCTION						
	Support framing for new MEP systems	**1**	ls	50,000.00	50,000		
	SUBTOTAL					50,000	
	TOTAL - SUPERSTRUCTURE						**$50,000**
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS	*25,200*	*sf*				
	Repair and repoint exterior walls- brick; assume 100%	**25,200**	sf	32.00	806,400		
	Repairs to precast concrete panels, fins and banding	**1**	ls	75,000.00	75,000		
	Clean all exterior walls; includes staging	**25,200**	sf	8.00	201,600		
	SUBTOTAL					1,083,000	
	B2020 WINDOWS/CURTAINWALL						
	Replace existing translucent panels	**6,798**	sf	80.00	543,840		
	Backer rod & double sealant	**3,777**	lf	9.00	33,993		
	Wood blocking at openings	**3,777**	lf	3.00	11,331		
	SUBTOTAL					589,164	
	B2030 EXTERIOR DOORS						
	Replace exterior single door	**3**	ea	2,100.00	6,300		
	Replace exterior double door	**4**	pr	4,000.00	16,000		
	Replace overhead doors; 8'x8'	**2**	ea	7,040.00	14,080		
	Replace overhead doors; 12'x15'	**1**	ea	19,800.00	19,800		
	Backer rod & double sealant	**218**	lf	9.00	1,962		

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 62,300

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.4 RENOVATION						
58	Wood blocking at openings	**218**	lf	3.00	654		
59	SUBTOTAL					58,796	
60							
61	***TOTAL - EXTERIOR CLOSURE***						**$1,730,960**
62							
63							
64	***B30 ROOFING***						
65							
66	**B3010 ROOF COVERINGS**						
67	Replace existing roofing systems	**51,700**	sf	28.00	1,447,600		
68	SUBTOTAL					1,447,600	
69							
70	**B3020 ROOF OPENINGS**						
71	Replace roof ladders/hatches etc.	**1**	ls	10,000.00	10,000		
72	SUBTOTAL					10,000	
73							
74	***TOTAL - ROOFING***						**$1,457,600**
75							
76							
77	***C10 INTERIOR CONSTRUCTION***						
78							
79	**C1010 PARTITIONS**						
80	Allowance to modify existing walls and add new walls	**62,300**	gsf	6.00	373,800		
81	Seismic upgrades	**62,300**	gsf	3.00	186,900		
82	SUBTOTAL					560,700	
83							
84	**C1020 INTERIOR DOORS**						
85	Adjust door openings, install new door frame to meet code requirements (door carried below)	**62,300**	gsf	3.00	186,900		
86	SUBTOTAL					186,900	
87							
88	**C1030 SPECIALTIES / MILLWORK**						
89	Toilet Partitions and accessories	**62,300**	gsf	0.80	49,840		
90	New markerboards/tackboards	**62,300**	gsf	1.00	62,300		
91	Replace athletic lockers - allowance	**1**	ls	25,000.00	25,000		
92	New guardrail at Fieldhouse bleachers	**150**	lf	200.00	30,000		
93	Allowance for miscellaneous specialties; wall protection, fire extinguishers etc	**1**	ls	10,000.00	10,000		
94							
95	*055000 MISCELLANEOUS METALS*						
96	Miscellaneous metals throughout building	**62,300**	sf	1.50	93,450		
97							
98	*061000 ROUGH CARPENTRY*						
99	Rough blocking	**62,300**	sf	0.15	9,345		
100							
101	*070001 WATERPROOFING, DAMPPROOFING AND CAULKING*						
102	Miscellaneous sealants throughout building	**62,300**	sf	1.25	77,875		
103							
104	*101400 SIGNAGE*						
105	Code compliant signage	**62,300**	sf	0.35	21,805		
106	SUBTOTAL					379,615	
107							
108	***TOTAL - INTERIOR CONSTRUCTION***						**$1,127,215**
109							
110							
111	***C20 STAIRCASES***						
112							
113	**C2010 STAIR CONSTRUCTION**						
114	SUBTOTAL					-	
115							

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 62,300

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.4 RENOVATION						
	C2020 STAIR FINISHES						
	SUBTOTAL					-	
	TOTAL - STAIRCASES						
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
	Allowance for wall finishes	**62,300**	gsf	6.00	373,800		
	SUBTOTAL					373,800	
	C3020 FLOOR FINISHES						
	Allowance for floor finishes	**62,300**	gsf	11.00	685,300		
	SUBTOTAL					685,300	
	C3030 CEILING FINISHES						
	Allowance for ceiling finishes	**62,300**	gsf	8.00	498,400		
	SUBTOTAL					498,400	
	TOTAL - INTERIOR FINISHES						**$1,557,500**
	D10 CONVEYING SYSTEMS						
	SUBTOTAL					-	
	TOTAL - CONVEYING SYSTEMS						
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
	Plumbing allowance	**62,300**	gsf	12.00	747,600		
	SUBTOTAL					747,600	
	TOTAL - PLUMBING						**$747,600**
	D30 HVAC						
	D30 HVAC, GENERALLY						
	HVAC allowance	**62,300**	gsf	45.00	2,803,500		
	SUBTOTAL					2,803,500	
	TOTAL - HVAC						**$2,803,500**
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
	New fire protection system	**62,300**	sf	4.70	292,810		
	SUBTOTAL					292,810	
	TOTAL - FIRE PROTECTION						**$292,810**
	D50 ELECTRICAL						
	D5010 ELECTRICAL WORK						
	Complete electrical systems	**62,300**	gsf	34.00	2,118,200		
	SUBTOTAL					2,118,200	

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate **GFA** 62,300

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.4 RENOVATION						
180	***TOTAL - ELECTRICAL***						**$2,118,200**
181							
182							
183	***E10 EQUIPMENT***						
184							
185	**E10 EQUIPMENT, GENERALLY**						
186	Gym wall pads	**1**	ls	20,000.00	20,000		
187	Basketball backstops; swing up; electric operated	**6**	loc	10,000.00	60,000		
188	Gymnasium dividing net; electrically operated; 60 lf	**1**	ea	30,000.00	30,000		
189	Volleyball net and standards	**1**	ls	5,000.00	5,000		
190	Score boards in Gym & Fieldhouse	**2**	loc	15,000.00	30,000		
191	Telescoping bleachers, electronic retracting (1008 seats)	**1**	ls	131,040.00	131,040		
192	SUBTOTAL					276,040	
193							
194	***TOTAL - EQUIPMENT***						**$276,040**
195							
196							
197	***E20 FURNISHINGS***						
198							
199	**E2010 FIXED FURNISHINGS**						
200							
201	*123553 CASEWORK*						
202	Allowance for new casework throughout	**62,300**	gsf	1.00	62,300		
203	SUBTOTAL					62,300	
204							
205	**E2020 MOVABLE FURNISHINGS**						
206	All movable furnishings to be provided and installed by owner						
207	SUBTOTAL					NIC	
208							
209	***TOTAL - FURNISHINGS***						**$62,300**
210							
211							
212	***F10 SPECIAL CONSTRUCTION***						
213							
214	**F10 SPECIAL CONSTRUCTION**						
215	Pool upgrades	**1**	ls	750,000.00	750,000		
216	SUBTOTAL					750,000	
217							
218	***TOTAL - SPECIAL CONSTRUCTION***						**$750,000**
219							
220							
221	***F20 SELECTIVE BUILDING DEMOLITION***						
222							
223	**F2010 BUILDING ELEMENTS DEMOLITION**						
224	Remove exterior glazing	**6,798**	sf	6.00	40,788		
225	Remove roofing	**51,700**	sf	2.00	103,400		
226	Interior demolition	**62,300**	gsf	4.00	249,200		
227	Temporary enclosures/protection	**62,300**	sf	1.00	62,300		
228	SUBTOTAL					455,688	
229							
230	**F2020 HAZARDOUS COMPONENTS ABATEMENT**						
231	See summary						
232	SUBTOTAL						
233							
234	***TOTAL - SELECTIVE BUILDING DEMOLITION***						**$455,688**
235							

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate GFA 389,500

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.4 NEW ADDITION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$2,129,300			
	A1020	Special Foundations	$7,500,375			
	A1030	Lowest Floor Construction	$2,785,595	**$12,415,270**	$31.87	9.5%
A20	**BASEMENT CONSTRUCTION**					
	A2010	Basement Excavation	$0			
	A2020	Basement Walls	$0	**$0**	$0.00	0.0%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$11,936,356			
	B1020	Roof Construction	$5,240,800	**$17,177,156**	$44.10	13.2%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$10,544,059			
	B2020	Windows	$7,343,438			
	B2030	Exterior Doors	$73,680	**$17,961,177**	$46.11	13.8%
B30	**ROOFING**					
	B3010	Roof Coverings	$5,261,000			
	B3020	Roof Openings	$752,500	**$6,013,500**	$15.44	4.6%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$8,569,000			
	C1020	Interior Doors	$1,947,500			
	C1030	Specialties/Millwork	$3,092,250	**$13,608,750**	$34.94	10.4%
C20	**STAIRCASES**					
	C2010	Stair Construction	$584,000			
	C2020	Stair Finishes	$75,446	**$659,446**	$1.69	0.5%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$2,337,000			
	C3020	Floor Finishes	$4,284,500			
	C3030	Ceiling Finishes	$3,895,000	**$10,516,500**	$27.00	8.1%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$360,000	**$360,000**	$0.92	0.3%
D20	**PLUMBING**					
	D20	Plumbing	$4,674,000	**$4,674,000**	$12.00	3.6%
D30	**HVAC**					
	D30	HVAC	$21,527,500	**$21,527,500**	$55.27	16.5%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$1,930,650	**$1,930,650**	$4.96	1.5%
D50	**ELECTRICAL**					

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 389,500

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 2.4 NEW ADDITION						
	D5010	Complete System	$17,243,000	**$17,243,000**	$44.27	13.2%
E10	**EQUIPMENT**					
	E10	Equipment	$1,674,200	**$1,674,200**	$4.30	1.3%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$4,559,361			
	E2020	Movable Furnishings	NIC	**$4,559,361**	$11.71	3.5%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**HAZMAT REMOVALS**					
	F2010	Building Elements Demolition	$25,000			
	F2020	Hazardous Components Abatement	$0	**$25,000**	$0.06	0.0%
TOTAL DIRECT COST (Trade Costs)				***$130,345,510***	*$334.65*	*100.0%*

PM&C

Belmont High School 12-Feb-18
Design Options - GRADES 7-12
Belmont, MA

PSR Estimate GFA 389,500

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.4 NEW ADDITION							
	GROSS FLOOR AREA CALCULATION						
	Ground Floor			119,300			
	First Floor			95,500			
	Second Floor			91,800			
	Third Floor			82,900			
	TOTAL GROSS FLOOR AREA (GFA)				**389,500** ***sf***		
A10	***FOUNDATIONS***						
A1010	**STANDARD FOUNDATIONS**						
	Grade beams; 5ft x 12"	**371**	cy	700.00	259,700		
	Grade tie beams; 5ft x 12"	**446**	cy	700.00	312,200		
	Pile caps	**1,052**	cy	800.00	841,600		
	Allowance for misc. pile caps, grade beams etc. including E+B	**119,300**	sf	6.00	715,800		
	SUBTOTAL					2,129,300	
A1020	**SPECIAL FOUNDATIONS**						
	Driven piles mobilization and testing	**1**	ls	150,000.00	150,000		
	Steel piles	**86,475**	vlf	85.00	7,350,375		
	SUBTOTAL					7,500,375	
A1030	**LOWEST FLOOR CONSTRUCTION**						
	New Structural Slab, 12" thick	*119,300*	*sf*		-		
	Ordinary Fill, 6"	**2,209**	cy	16.00	35,344		
	Crushed stone, 6"	**2,209**	cy	35.00	77,315		
	Rigid insulation; 40 psi	**119,300**	sf	2.15	256,495		
	Vapor barrier	**119,300**	sf	0.80	95,440		
	Compact existing sub-grade	**119,300**	sf	0.55	65,615		
	Formwork	**778**	lf	12.00	9,336		
	Rebar, 6#/SF	**715,800**	lbs	1.20	858,960		
	Concrete - 12" thick; 4,000 psi	**4,639**	cy	120.00	556,680		
	Placing concrete	**4,639**	cy	90.00	417,510		
	Finishing and curing concrete	**119,300**	sf	3.00	357,900		
	Miscellaneous						
	Patch slab at foundations in existing building				W/Reno		
	New Elevator pit				W/Reno		
	New loading dock	**1**	ls	40,000.00	40,000		
	Equipment pads	**1**	ls	15,000.00	15,000		
	SUBTOTAL					2,785,595	
	TOTAL - FOUNDATIONS						**$12,415,270**
A20	***BASEMENT CONSTRUCTION***						
A2010	**BASEMENT EXCAVATION**						
	No Work in this section						
	SUBTOTAL					-	
A2020	**BASEMENT WALLS**						
	No Work in this section						
	SUBTOTAL					-	

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 389,500

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.4 NEW ADDITION							
	TOTAL - BASEMENT CONSTRUCTION						
B10	***SUPERSTRUCTURE***						
		14.70	lbs/sf		-		
B1010	**FLOOR CONSTRUCTION**	2,862	tns		-		
	Floor Structure - Steel:						
	Steel beams and columns to new addition; 15#/SF	**2,027**	tns	3,800.00	7,702,600		
	Premium for HSS	**507**	tns	300.00	152,100		
	Shear studs	**54,040**	ea	2.50	135,100		
	Floor Structure						
	2" 18 Ga. Metal galvanized floor Deck	**270,200**	sf	3.75	1,013,250		
	WWF reinforcement	**310,730**	sf	0.80	248,584		
	Concrete Fill to metal deck; 6" Light Weight	**6,305**	cy	160.00	1,008,800		
	Place and finish concrete	**270,200**	sf	2.00	540,400		
	Rebar to decks	**81,060**	lbs	1.20	97,272		
	Misc. angles	**270,200**	sf	0.50	135,100		
	Miscellaneous						
	Fire proofing to columns and beams	**270,200**	sf	2.25	607,950		
	Intumescent paint	**1**	ls	25,000.00	25,000		
	Fire stopping floors	**270,200**	sf	1.00	270,200		
	SUBTOTAL					11,936,356	
B1020	**ROOF CONSTRUCTION**						
	Roof Structure - Steel:						
	Steel beams and columns to new addition; 14#/SF	**835**	tns	3,800.00	3,173,000		
	Premium for HSS	**209**	tns	300.00	62,700		
	Exposed steel	**1**	ls	50,000.00	50,000		
	Roof Structure						
	Acoustic deck allowance	**8,000**	sf	7.00	56,000		
	3" 20 Ga. galvanized Metal Roof Deck	**111,300**	sf	4.00	445,200		
	Miscellaneous						
	Premium for overhangs	**1**	ls	1,000,000	1,000,000		
	Concrete under RTU's	**15,000**	sf	8.00	120,000		
	Fire proofing to columns, beams and deck	**111,300**	sf	3.00	333,900		
	SUBTOTAL					5,240,800	
	TOTAL - SUPERSTRUCTURE						**$17,177,156**
B20	***EXTERIOR CLOSURE***						
B2010	**EXTERIOR WALLS**						
	Exterior Wall Area - Solid Assume 70%	*129,787*	sf				
042000	*MASONRY*						
	Brick veneer, 3 color; 75% of solid area	**97,340**	sf	40.00	3,893,600		
	Staging to exterior wall	**129,787**	sf	4.00	519,148		
055000	*MISC. METALS*						
	Stainless steel sign at main entrance	**1**	ls	15,000.00	15,000		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 389,500

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.4 NEW ADDITION							
	Air barrier	**129,787**	sf	6.50	843,616		
	Air barrier/flashing at windows	**32,719**	lf	6.25	204,494		
	Miscellaneous sealants to closure	**129,787**	sf	1.00	129,787		
072100	*THERMAL INSULATION*						
	Insulation	**129,787**	sf	2.25	292,021		
076400	*CLADDING*						
	Metal panel; 25% of solid area	**32,447**	sf	75.00	2,433,525		
092900	*GYPSUM BOARD ASSEMBLIES*						
	6" metal stud backup	**129,787**	sf	11.00	1,427,657		
	Gypsum Sheathing	**129,787**	sf	2.75	356,914		
	Drywall lining to interior face of stud backup	**129,787**	sf	3.30	428,297		
	SUBTOTAL					10,544,059	
B2020	**WINDOWS**						
	Exterior Wall Area - Glazed Assume 30%	*55,623*	sf				
061000	*ROUGH CARPENTRY*						
	Wood blocking at openings	**32,719**	lf	14.00	458,066		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Backer rod & double sealant	**32,719**	lf	8.50	278,112		
080001	*METAL WINDOWS*						
	Windows, double glazed; 20% of glazed area	**11,125**	sf	90.00	1,001,250		
	Curtainwall, double glazed; 80% of glazed area	**44,498**	sf	120.00	5,339,760		
	Sunshades; horizontal	**1**	ls	250,000.00	250,000		
089000	*LOUVERS*						
	Louvers	**250**	sf	65.00	16,250		
	SUBTOTAL					7,343,438	
B2030	**EXTERIOR DOORS**						
	Glazed entrance doors including frame and hardware; double door	**8**	pr	8,000.00	64,000		
	HM doors, frames and hardware- Double	**4**	pr	2,000.00	8,000		
	Backer rod & double sealant	**240**	lf	4.00	960		
	Wood blocking at openings	**240**	lf	3.00	720		
	SUBTOTAL					73,680	
	TOTAL - EXTERIOR CLOSURE						**$17,961,177**
B30	***ROOFING***						
B3010	**ROOF COVERINGS**						
	New roofing complete	**119,300**	sf	20.00	2,386,000		
	Roof equipment screen	**1**	ls	350,000.00	350,000		
	Green roof	**15,000**	sf	35.00	525,000		
	Roof soffits/canopies	**1**	ls	2,000,000	2,000,000		
	SUBTOTAL					5,261,000	
B3020	**ROOF OPENINGS**						
	Skylights, allow	**1**	ls	750,000.00	750,000		
	Roof hatch	**1**	loc	2,500.00	2,500		
	SUBTOTAL					752,500	

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GFA 389,500

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.4 NEW ADDITION							
	TOTAL - ROOFING						**$6,013,500**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						
	Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	**389,500**	gsf	22.00	8,569,000		
	SUBTOTAL					8,569,000	
C1020	**INTERIOR DOORS**						
	Interior doors, frames and hardware	**389,500**	gsf	5.00	1,947,500		
	SUBTOTAL					1,947,500	
C1030	**SPECIALTIES / MILLWORK**						
	Toilet Partitions and accessories	**389,500**	gsf	0.80	311,600		
	Backer panels in electrical closets	**1**	ls	1,000.00	1,000		
	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	**389,500**	sf	1.00	389,500		
	Room Signs	**389,500**	gsf	0.40	155,800		
	Fire extinguisher cabinets	**130**	ea	350.00	45,500		
	Lockers	**389,500**	gsf	1.60	623,200		
	Janitors Work Shop Accessories	**1**	ls	1,500.00	1,500		
	Janitors Closet Accessories	**3**	rms	300.00	900		
	Media						
	Reception desks	**4**	loc	25,000	100,000		
	Railings to open to below areas	**1**	ls	100,000	100,000		
	Library shelving at perimeters 7' Tall				F,F & E		
	Library shelving at perimeters 3' Tall				F,F & E		
	Miscellaneous wood trim	**389,500**	gsf	0.50	194,750		
	Display cases	**389,500**	gsf	0.25	97,375		
	Miscellaneous metals throughout building	**389,500**	sf	1.50	584,250		
	Miscellaneous sealants throughout building	**389,500**	sf	1.25	486,875		
	SUBTOTAL					3,092,250	
	TOTAL - INTERIOR CONSTRUCTION						**$13,608,750**
C20	***STAIRCASES***						
C2010	**STAIR CONSTRUCTION**						
	Metal pan stair; egress stair	**12**	flt	25,000.00	300,000		
	Main staircase	**1**	flt	250,000.00	250,000		
	Commons steps	**2**	loc	5,000.00	10,000		
	Concrete fill to stairs	**12**	flt	2,000.00	24,000		
	SUBTOTAL					584,000	
C2020	**STAIR FINISHES**						
	High performance coating to stairs including all railings etc.	**12**	flt	3,000.00	36,000		
	Rubber tile at stairs - landings	**1,200**	sf	10.00	12,000		
	Rubber tile at stairs - treads & risers	**1,440**	lft	19.06	27,446		
	SUBTOTAL					75,446	
	TOTAL - STAIRCASES						**$659,446**
C30	***INTERIOR FINISHES***						

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2.4 NEW ADDITION							
C3010	**WALL FINISHES**						
	Wall finishes	**389,500**	sf	6.00	2,337,000		
	SUBTOTAL					2,337,000	
C3020	**FLOOR FINISHES**						
	Floor finishes	**389,500**	sf	11.00	4,284,500		
	SUBTOTAL					4,284,500	
C3030	**CEILING FINISHES**						
	Ceiling finishes	**389,500**	sf	10.00	3,895,000		
	SUBTOTAL					3,895,000	
	TOTAL - INTERIOR FINISHES						**$10,516,500**
D10	***CONVEYING SYSTEMS***						
D1010	**ELEVATOR**						
	New four stop elevator	**2**	ea	180,000.00	360,000		
	SUBTOTAL					360,000	
	TOTAL - CONVEYING SYSTEMS						**$360,000**
D20	***PLUMBING***						
D20	**PLUMBING, GENERALLY**						
	Plumbing allowance	**389,500**	gsf	12.00	4,674,000		
	SUBTOTAL					4,674,000	
	TOTAL - PLUMBING						**$4,674,000**
D30	***HVAC***						
D30	**HVAC, GENERALLY**						
	HVAC allowance for Geothermal wells; based 400 wells each 400 ft deep	**1**	ls	4,000,000.00	4,000,000		
	HVAC allowance	**389,500**	gsf	45.00	17,527,500		
	SUBTOTAL					21,527,500	
	TOTAL - HVAC						**$21,527,500**
D40	***FIRE PROTECTION***						
D40	**FIRE PROTECTION, GENERALLY**						
	Fire pump	**1**	ls	100,000.00	100,000		
	Fire protection system	**389,500**	gsf	4.70	1,830,650		
	SUBTOTAL					1,930,650	
	TOTAL - FIRE PROTECTION						**$1,930,650**
D50	***ELECTRICAL***						
D5010	**ELECTRICAL WORK**						
	Allowance for PV systems	**1**	ls	4,000,000.00	4,000,000		
	Complete electrical systems	**389,500**	gsf	34.00	13,243,000		
	SUBTOTAL					17,243,000	
	TOTAL - ELECTRICAL						**$17,243,000**

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2.4 NEW ADDITION						
	E10 EQUIPMENT						
E10	**EQUIPMENT, GENERALLY**						
	Theatrical Equipment Stage curtains, rigging and controls (Auditorium & Lecture Hall)	**1**	ls	350,000.00	350,000		
	Theatrical AV allowance (Auditorium & Lecture Hall)	**1**	ls	200,000.00	200,000		
	Kitchen equipment	**1**	ls	550,000.00	550,000		
	Fume hoods	**9**	ea	15,000.00	135,000		
	Kiln	**1**	ea	5,000.00	5,000		
	Allowance for new manual operable partitions in Cafeteria & Classrooms	**356**	lf	700.00	249,200		
	Allowance for miscellaneous equipment; projection screens, residential appliances, loading dock equipment, wood workshop etc	**1**	ls	150,000.00	150,000		
	Loading dock equipment	**1**	ls	20,000.00	20,000		
	Electrically operated projection screens	**1**	loc	15,000.00	15,000		
	SUBTOTAL					1,674,200	
	TOTAL - EQUIPMENT						**$1,674,200**
	E20 FURNISHINGS						
E2010	**FIXED FURNISHINGS**						
	Entry mats & frames - recessed with carpet/rubber strips	**500**	sf	55.00	27,500		
	Window blinds	**55,623**	sf	7.00	389,361		
	Auditorium seats	**600**	seat	350.00	210,000		
	Lecture hall seats	**150**	seat	250.00	37,500		
	Counters, base cabinets, tall storage in classrooms and other rooms	**389,500**	gsf	10.00	3,895,000		
	SUBTOTAL					4,559,361	
E2020	**MOVABLE FURNISHINGS**						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$4,559,361**
	F10 SPECIAL CONSTRUCTION						
F10	**SPECIAL CONSTRUCTION**						
	No items in this section						
	SUBTOTAL						
	TOTAL - SPECIAL CONSTRUCTION						
	F20 SELECTIVE BUILDING DEMOLITION						
F2010	**BUILDING ELEMENTS DEMOLITION**						
	Demolition to make connection to existing building	**1**	ls	25,000.00	25,000		
	SUBTOTAL					$25,000	
F2020	**HAZARDOUS COMPONENTS ABATEMENT**						
	See main summary for HazMat allowance				See Summary		
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						**$25,000**

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK OPTION 2.4							
	G SITEWORK						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**8,200**	lf	12.00	98,400		
	Site construction fence gates/entrance	**2**	ea	15,000.00	30,000		
	Pavement/curbing removal, crush and re-use for sub-base	**200,000**	sf	1.00	200,000		
	Walkways	**1**	ls	30,000.00	30,000		
	Miscellaneous demolition	**1**	ls	150,000.00	150,000		
	Site Earthwork						
	Strip Topsoil and remove; 6" thick	**19,889**	cy	12.00	238,668		
	Fine grading	**1,000,000**	sf	0.20	200,000		
	Cut and Fill; assumed AV 2ft; balanced site	**74,074**	cy	8.00	592,592		
	Silt fence/erosion control, wash bays, stock piles	**8,200**	lf	12.00	98,400		
	Silt fence maintenance and monitoring	**1**	ls	60,000.00	60,000		
	Hazardous Waste Remediation						
	Dispose/treat contaminated soils				NIC		
	SUBTOTAL					1,698,060	
G20	**SITE IMPROVEMENTS**						
	Asphalt Paving; parking lot and roadway	*350,000*					
	gravel base; 12" thick	**12,963**	cy	40.00	518,520		
	asphalt; 4" thick	**38,889**	sy	25.00	972,225		
	VGC	**10,500**	lf	38.00	399,000		
	Road markings/signage	**1**	ls	30,000.00	30,000		
	Pedestrian Paving						
	Concrete paving						
	gravel base; 8" thick	**744**	cy	35.00	26,040		
	4" concrete paving	**30,000**	sf	7.00	210,000		
	Concrete pavers						
	Concrete pavers						
	sand bedding; 1" thick	**148**	cy	40.00	5,920		
	Precast concrete pavers	**50,000**	sf	16.00	800,000		
	gravel base; 8" thick	**1,241**	cy	35.00	43,435		
	concrete base; 4" thick	**50,000**	sf	5.00	250,000		
	Site Improvements						
	Flag pole 50' high	**1**	ea	6,500.00	6,500		
	Concrete retaining walls				Assumed not required		
	6' chain-link fence	**8,200**	lf	50.00	410,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Wood screen privacy fence 8'	**50**	lf	100.00	5,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Benches	**15**	ea	2,800.00	42,000		
	Bike racks	**1**	ls	30,000.00	30,000		
	Ornamental trash/recycling receptacles	**10**	ea	800.00	8,000		
	Monumental signage	**1**	ls	40,000.00	40,000		
	Way finding signage	**1**	ls	60,000.00	60,000		
	Other site improvements; walls, fences etc.	**1**	ls	1,500,000	1,500,000		
	Multi-purpose fields						
	Crushed stone - 12" thick	**19,074**	cy	40.00	762,960		
	Sports seeding	**515,000**	sf	0.50	257,500		
	Line markings - Allowance	**1**	ls	15,000.00	15,000		
	Football goals	**2**	loc	3,000.00	6,000		
	Soccer goals (movable) - Allowance	**3**	loc	10,000.00	30,000		
	20' sports netting	**1**	ls	50,000.00	50,000		
	Baseball/softball backstop	**3**	loc	40,000.00	120,000		
	SUBTOTAL					6,603,100	
	Landscaping						
	Topsoil -modify existing topsoil	**19,889**	cy	26.00	517,114		
	Lawn - loam & seed	**485,000**	sf	0.25	121,250		
	Planting allowance	**1**	ls	300,000.00	300,000		

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK OPTION 2.4							
	Courtyard allowance	**2**	loc	100,000.00	200,000		
	Irrigation at sports fields	**515,000**	sf	1.00	515,000		
	Allowance for new well	**1**	ls	150,000.00	150,000		
	SUBTOTAL					1,803,364	
G30	**CIVIL MECHANICAL UTILITIES**						
	Utilities - Enabling						
	Allowance for temporary utilities etc.	**1**	ls	150,000.00	150,000		
	Water supply; Pricing includes E&B and bedding						
	New DI piping; 8"	**200**	lf	100.00	20,000		
	New DI piping; 8" Fire	**4,300**	lf	100.00	430,000		
	Connect to existing	**1**	loc	10,000.00	10,000		
	FD connection	**1**	ea	2,000.00	2,000		
	Gate valves	**8**	ea	750.00	6,000		
	Fire hydrant	**14**	ea	5,000.00	70,000		
	Fire hydrant; relocate existing	**1**	ea	3,500.00	3,500		
	Sanitary; Pricing includes E&B and bedding						
	Manholes	**4**	ea	4,000.00	16,000		
	Grease trap	**1**	ea	15,000.00	15,000		
	8" PVC	**300**	lf	60.00	18,000		
	Connect to existing drain	**1**	ea	3,000.00	3,000		
	Relocate existing sewer system	**1**	ls	250,000.00	250,000		
	Storm water; Pricing includes E&B and bedding						
	Allowance to modify existing drainage systems	**350,000**	sf	7.00	2,450,000		
	Perforated pipe @ recharge systems and crushed stone base under fields	**515,000**	sf	4.00	NR		
	Gas service						
	E&B trench for new gas pipe - install by plumbing	**250**	lf	25.00	6,250		
	SUBTOTAL					3,449,750	
G40	**ELECTRICAL UTILITIES**						
	Power						
	Utility co. backcharges, allow	**1**	ls	30,000.00	30,000		
	Connections at existing manhole				Utility co.		
	Manhole	**1**	ls	8,500.00	8,500		
	Connections in manhole	**1**	ls	3,500.00	3,500		
	Primary ductbank 2-5" ductbank, empty, allow	**1700**	lf	120.00	204,000		
	Transformer by utility company				By Utility Co.		
	Transformer pad	**1**	ea	2,500.00	2,500		
	Secondary service	**60**	lf	1,100.00	66,000		
	Communications						
	Connection at riser pole, allow	**1**	ea	1,500.00	1,500		
	Telecom ductbank 4-4", allow	**1700**	lf	152.00	258,400		
	Site Lighting						
	Varsity baseball sports lighting (allow)	**1**	ls	120,000.00	120,000		
	Softball sports lighting (allow)	**1**	ls	90,000.00	90,000		
	Site Parking lighting (allow)	**1**	ls	350,000.00	350,000		
	SUBTOTAL					1,134,400	
	TOTAL - SITE DEVELOPMENT						***$14,688,674***

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

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PSR Estimate GFA 422,925

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 3.1 NEW SCHOOL						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$3,392,158			
	A1020	Special Foundations	$10,022,285			
	A1030	Lowest Floor Construction	$3,581,490	**$16,995,933**	$40.19	12.0%
A20	**BASEMENT CONSTRUCTION**					
	A2010	Basement Excavation	$0			
	A2020	Basement Walls	$0	**$0**	$0.00	0.0%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$11,871,702			
	B1020	Roof Construction	$5,430,523	**$17,302,225**	$40.91	12.2%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$10,746,517			
	B2020	Windows	$7,479,480			
	B2030	Exterior Doors	$73,680	**$18,299,677**	$43.27	12.9%
B30	**ROOFING**					
	B3010	Roof Coverings	$5,958,780			
	B3020	Roof Openings	$752,500	**$6,711,280**	$15.87	4.7%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$9,304,350			
	C1020	Interior Doors	$2,114,625			
	C1030	Specialties/Millwork	$3,340,103	**$14,759,078**	$34.90	10.4%
C20	**STAIRCASES**					
	C2010	Stair Construction	$584,000			
	C2020	Stair Finishes	$75,446	**$659,446**	$1.56	0.5%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$2,537,550			
	C3020	Floor Finishes	$4,652,175			
	C3030	Ceiling Finishes	$4,229,250	**$11,418,975**	$27.00	8.1%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$360,000	**$360,000**	$0.85	0.3%
D20	**PLUMBING**					
	D20	Plumbing	$5,075,100	**$5,075,100**	$12.00	3.6%
D30	**HVAC**					
	D30	HVAC	$23,031,625	**$23,031,625**	$54.46	16.3%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$2,087,748	**$2,087,748**	$4.94	1.5%
D50	**ELECTRICAL**					

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CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
OPTION 3.1 NEW SCHOOL						
	D5010	Complete System	$18,379,450	**$18,379,450**	$43.46	13.0%
E10	**EQUIPMENT**					
	E10	Equipment	$1,674,200	**$1,674,200**	$3.96	1.2%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$4,901,094			
	E2020	Movable Furnishings	NIC	**$4,901,094**	$11.59	3.5%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**HAZMAT REMOVALS**					
	F2010	Building Elements Demolition	$0			
	F2020	Hazardous Components Abatement	$0	**$0**	$0.00	0.0%
TOTAL DIRECT COST (Trade Costs)				***$141,655,831***	*$334.94*	*100.0%*

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 3.1 NEW SCHOOL						
	GROSS FLOOR AREA CALCULATION						
	Ground Floor			154,189			
	First Floor			103,065			
	First Floor			103,065			
	Second Floor			62,606			
	TOTAL GROSS FLOOR AREA (GFA)				**422,925**	***sf***	
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Allowance for pile caps, grade beams etc.	**154,189**	sf	22.00	3,392,158		
	SUBTOTAL					3,392,158	
	A1020 SPECIAL FOUNDATIONS						
	Driven piles; including mobilization	**154,189**	sf	65.00	10,022,285		
	SUBTOTAL					10,022,285	
	A1030 LOWEST FLOOR CONSTRUCTION						
	New Structural Slab, 12" thick	*154,189*	*sf*		-		
312000	Ordinary Fill, 6"	**2,855**	cy	16.00	45,680		
312000	Crushed stone, 6"	**2,855**	cy	35.00	99,925		
312000	Rigid insulation; 40 psi	**154,189**	sf	2.15	331,506		
033000	Vapor barrier	**154,189**	sf	0.80	123,351		
312000	Compact existing sub-grade	**154,189**	sf	0.55	84,804		
033000	Formwork	**778**	lf	12.00	9,336		
033000	Rebar, 6#/SF	**925,134**	lbs	1.20	1,110,161		
033000	Concrete - 12" thick; 4,000 psi	**5,996**	cy	120.00	719,520		
033000	Placing concrete	**5,996**	cy	90.00	539,640		
033000	Finishing and curing concrete	**154,189**	sf	3.00	462,567		
	Miscellaneous						
	Patch slab at foundations in existing building				W/Reno		
	New Elevator pit				W/Reno		
	New loading dock	**1**	ls	40,000.00	40,000		
	Equipment pads	**1**	ls	15,000.00	15,000		
	SUBTOTAL					3,581,490	
	TOTAL - FOUNDATIONS						**$16,995,933**
	A20 BASEMENT CONSTRUCTION						
	A2010 BASEMENT EXCAVATION						
	No Work in this section						
	SUBTOTAL					-	
	A2020 BASEMENT WALLS						
	No Work in this section						
	SUBTOTAL					-	
	TOTAL - BASEMENT CONSTRUCTION						
	B10 SUPERSTRUCTURE						
		14.64	lbs/sf		-		

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OPTION 3.1 NEW SCHOOL							
B1010	**FLOOR CONSTRUCTION**	3,095	tns		-		
	Floor Structure - Steel:						
	Steel beams and columns to new addition; 15#/SF	**2,016**	tns	3,800.00	7,660,800		
	Premium for HSS	**504**	tns	300.00	151,200		
	Shear studs	**53,747**	ea	2.50	134,368		
	Floor Structure						
	2" 18 Ga. Metal galvanized floor Deck	**268,736**	sf	3.75	1,007,760		
	WWF reinforcement	**309,046**	sf	0.80	247,237		
	Concrete Fill to metal deck; 6" Light Weight	**6,271**	cy	160.00	1,003,360		
	Place and finish concrete	**268,736**	sf	2.00	537,472		
	Rebar to decks	**80,621**	lbs	1.20	96,745		
	Misc. angles	**268,736**	sf	0.50	134,368		
	Miscellaneous						
	Fire proofing to columns and beams	**268,736**	sf	2.25	604,656		
	Intumescent paint	**1**	ls	25,000.00	25,000		
	Fire stopping floors	**268,736**	sf	1.00	268,736		
	SUBTOTAL					11,871,702	
B1020	**ROOF CONSTRUCTION**						
	Roof Structure - Steel:						
	Steel beams and columns to new addition; 14#/SF	**1,079**	tns	3,800.00	4,100,200		
	Premium for HSS	**270**	tns	300.00	81,000		
	Exposed steel	**1**	ls	50,000.00	50,000		
	Roof Structure						
	Acoustic deck allowance	**8,000**	sf	7.00	56,000		
	3" 20 Ga. galvanized Metal Roof Deck	**146,189**	sf	4.00	584,756		
	Miscellaneous						
	Concrete under RTU's	**15,000**	sf	8.00	120,000		
	Fire proofing to columns, beams and deck	**146,189**	sf	3.00	438,567		
	SUBTOTAL					5,430,523	
	TOTAL - SUPERSTRUCTURE						**$17,302,225**
B20	***EXTERIOR CLOSURE***						
B2010	**EXTERIOR WALLS**						
	Exterior Wall Area - Solid Assume 70%	*132,282*	sf				
042000	*MASONRY*						
	Brick veneer, 3 color; 75% of solid area	**99,212**	sf	40.00	3,968,480		
	Staging to exterior wall	**132,282**	sf	4.00	529,128		
055000	*MISC. METALS*						
	Stainless steel sign at main entrance	**1**	ls	15,000.00	15,000		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Air barrier	**132,282**	sf	6.50	859,833		
	Air barrier/flashing at windows	**33,348**	lf	6.25	208,425		
	Miscellaneous sealants to closure	**132,282**	sf	1.00	132,282		
072100	*THERMAL INSULATION*						
	Insulation	**132,282**	sf	2.25	297,635		

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 422,925

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 3.1 NEW SCHOOL						
076400	*CLADDING*						
	Metal panel; 25% of solid area	**33,071**	sf	75.00	2,480,325		
092900	*GYPSUM BOARD ASSEMBLIES*						
	6" metal stud backup	**132,282**	sf	11.00	1,455,102		
	Gypsum Sheathing	**132,282**	sf	2.75	363,776		
	Drywall lining to interior face of stud backup	**132,282**	sf	3.30	436,531		
	SUBTOTAL					10,746,517	
B2020	**WINDOWS**						
	Exterior Wall Area - Glazed Assume 30%	*56,692*	sf				
061000	*ROUGH CARPENTRY*						
	Wood blocking at openings	**33,348**	lf	14.00	466,872		
070001	*WATERPROOFING, DAMPPROOFING AND CAULKING*						
	Backer rod & double sealant	**33,348**	lf	8.50	283,458		
080001	*METAL WINDOWS*						
	Windows, double glazed; 20% of glazed area	**11,338**	sf	90.00	1,020,420		
	Curtainwall, double glazed; 80% of glazed area	**45,354**	sf	120.00	5,442,480		
	Sunshades; horizontal	**1**	ls	250,000.00	250,000		
089000	*LOUVERS*						
	Louvers	**250**	sf	65.00	16,250		
	SUBTOTAL					7,479,480	
B2030	**EXTERIOR DOORS**						
	Glazed entrance doors including frame and hardware; double door	**8**	pr	8,000.00	64,000		
	HM doors, frames and hardware- Double	**4**	pr	2,000.00	8,000		
	Backer rod & double sealant	**240**	lf	4.00	960		
	Wood blocking at openings	**240**	lf	3.00	720		
	SUBTOTAL					73,680	
	TOTAL - EXTERIOR CLOSURE						**$18,299,677**
B30	***ROOFING***						
B3010	**ROOF COVERINGS**						
	New roofing complete	**154,189**	sf	20.00	3,083,780		
	Roof equipment screen	**1**	ls	350,000	350,000		
	Green roof	**15,000**	sf	35.00	525,000		
	Roof soffits	**1**	ls	2,000,000	2,000,000		
	SUBTOTAL					5,958,780	
B3020	**ROOF OPENINGS**						
	Skylights, allow	**1**	ls	750,000.00	750,000		
	Roof hatch	**1**	loc	2,500.00	2,500		
	SUBTOTAL					752,500	
	TOTAL - ROOFING						**$6,711,280**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 422,925

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 3.1 NEW SCHOOL							
	Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	**422,925**	gsf	22.00	9,304,350		
	SUBTOTAL					9,304,350	
C1020	**INTERIOR DOORS**						
	Interior doors, frames and hardware	**422,925**	gsf	5.00	2,114,625		
	SUBTOTAL					2,114,625	
C1030	**SPECIALTIES / MILLWORK**						
	Toilet Partitions and accessories	**422,925**	gsf	0.80	338,340		
	Backer panels in electrical closets	**1**	ls	1,000.00	1,000		
	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	**422,925**	sf	1.00	422,925		
	Room Signs	**422,925**	gsf	0.40	169,170		
	Fire extinguisher cabinets	**141**	ea	350.00	49,350		
	Lockers	**422,925**	gsf	1.60	676,680		
	Janitors Work Shop Accessories	**1**	ls	1,500.00	1,500		
	Janitors Closet Accessories	**3**	rms	300.00	900		
	Media						
	Reception desks	**4**	loc	25,000	100,000		
	Railings to open to below areas	**1**	ls	100,000	100,000		
	Library shelving at perimeters 7' Tall				F,F & E		
	Library shelving at perimeters 3' Tall				F,F & E		
	Miscellaneous wood trim	**422,925**	gsf	0.50	211,463		
	Display cases	**422,925**	gsf	0.25	105,731		
	Miscellaneous metals throughout building	**422,925**	sf	1.50	634,388		
	Miscellaneous sealants throughout building	**422,925**	sf	1.25	528,656		
	SUBTOTAL					3,340,103	
	TOTAL - INTERIOR CONSTRUCTION						**$14,759,078**
C20	***STAIRCASES***						
C2010	**STAIR CONSTRUCTION**						
	Metal pan stair; egress stair	**12**	flt	25,000.00	300,000		
	Main staircase	**1**	flt	250,000.00	250,000		
	Commons steps	**2**	loc	5,000.00	10,000		
	Concrete fill to stairs	**12**	flt	2,000.00	24,000		
	SUBTOTAL					584,000	
C2020	**STAIR FINISHES**						
	High performance coating to stairs including all railings etc.	**12**	flt	3,000.00	36,000		
	Rubber tile at stairs - landings	**1,200**	sf	10.00	12,000		
	Rubber tile at stairs - treads & risers	**1,440**	lft	19.06	27,446		
	SUBTOTAL					75,446	
	TOTAL - STAIRCASES						**$659,446**
C30	***INTERIOR FINISHES***						
C3010	**WALL FINISHES**						
	Wall finishes	**422,925**	sf	6.00	2,537,550		
	SUBTOTAL					2,537,550	
C3020	**FLOOR FINISHES**						
	Floor finishes	**422,925**	sf	11.00	4,652,175		
	SUBTOTAL					4,652,175	

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 422,925

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 3.1 NEW SCHOOL							
C3030	**CEILING FINISHES**						
	Ceiling finishes	**422,925**	sf	10.00	4,229,250		
	SUBTOTAL					4,229,250	
	TOTAL - INTERIOR FINISHES						**$11,418,975**
D10	***CONVEYING SYSTEMS***						
D1010	**ELEVATOR**						
	New four stop elevator	**2**	ea	180,000.00	360,000		
	SUBTOTAL					360,000	
	TOTAL - CONVEYING SYSTEMS						**$360,000**
D20	***PLUMBING***						
D20	**PLUMBING, GENERALLY**						
	Plumbing allowance	**422,925**	gsf	12.00	5,075,100		
	SUBTOTAL					5,075,100	
	TOTAL - PLUMBING						**$5,075,100**
D30	***HVAC***						
D30	**HVAC, GENERALLY**						
	HVAC allowance for Geothermal wells; based 400 wells each 400 ft deep	**1**	ls	4,000,000.00	4,000,000		
	HVAC allowance	**422,925**	gsf	45.00	19,031,625		
	SUBTOTAL					23,031,625	
	TOTAL - HVAC						**$23,031,625**
D40	***FIRE PROTECTION***						
D40	**FIRE PROTECTION, GENERALLY**						
	Fire pump	**1**	ls	100,000.00	100,000		
	Fire protection system	**422,925**	gsf	4.70	1,987,748		
	SUBTOTAL					2,087,748	
	TOTAL - FIRE PROTECTION						**$2,087,748**
D50	***ELECTRICAL***						
D5010	**ELECTRICAL WORK**						
	Allowance for PV systems	**1**	ls	4,000,000.00	4,000,000		
	Complete electrical systems	**422,925**	gsf	34.00	14,379,450		
	SUBTOTAL					18,379,450	
	TOTAL - ELECTRICAL						**$18,379,450**
E10	***EQUIPMENT***						
E10	**EQUIPMENT, GENERALLY**						
	Theatrical Equipment Stage curtains, rigging and controls (Auditorium & Lecture Hall)	**1**	ls	350,000.00	350,000		

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

GFA 422,925

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 3.1 NEW SCHOOL						
	Theatrical AV allowance (Auditorium & Lecture Hall)	**1**	ls	200,000.00	200,000		
	Kitchen equipment	**1**	ls	550,000.00	550,000		
	Fume hoods	**9**	ea	15,000.00	135,000		
	Kiln	**1**	ea	5,000.00	5,000		
	Allowance for new manual operable partitions in Cafeteria & Classrooms	**356**	lf	700.00	249,200		
	Allowance for miscellaneous equipment; projection screens, residential appliances, loading dock equipment, wood workshop etc	**1**	ls	150,000.00	150,000		
	Loading dock equipment	**1**	ls	20,000.00	20,000		
	Electrically operated projection screens	**1**	loc	15,000.00	15,000		
	SUBTOTAL					1,674,200	
	TOTAL - EQUIPMENT						**$1,674,200**
E20	***FURNISHINGS***						
E2010	**FIXED FURNISHINGS**						
	Entry mats & frames - recessed with carpet/rubber strips	**500**	sf	55.00	27,500		
	Window blinds	**56,692**	sf	7.00	396,844		
	Auditorium seats	**600**	seat	350.00	210,000		
	Lecture hall seats	**150**	seat	250.00	37,500		
	Counters, base cabinets, tall storage in classrooms and other rooms	**422,925**	gsf	10.00	4,229,250		
	SUBTOTAL					4,901,094	
E2020	**MOVABLE FURNISHINGS**						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$4,901,094**
F10	***SPECIAL CONSTRUCTION***						
F10	**SPECIAL CONSTRUCTION**						
	No items in this section						
	SUBTOTAL						
	TOTAL - SPECIAL CONSTRUCTION						
F20	***SELECTIVE BUILDING DEMOLITION***						
F2010	**BUILDING ELEMENTS DEMOLITION**						
	SUBTOTAL						
F2020	**HAZARDOUS COMPONENTS ABATEMENT**						
	See main summary for HazMat allowance				See Summary		
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK OPTION 3.1							
	G SITEWORK						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**8,200**	lf	12.00	98,400		
	Site construction fence gates/entrance	**2**	ea	15,000.00	30,000		
	Pavement/curbing removal, crush and re-use for sub-base	**200,000**	sf	1.00	200,000		
	Walkways	**1**	ls	30,000.00	30,000		
	Miscellaneous demolition	**1**	ls	150,000.00	150,000		
	Site Earthwork						
	Strip Topsoil and remove; 6" thick	**19,889**	cy	12.00	238,668		
	Fine grading	**1,000,000**	sf	0.20	200,000		
	Cut and Fill; assumed AV 2ft; balanced site	**74,074**	cy	8.00	592,592		
	Silt fence/erosion control, wash bays, stock piles	**8,200**	lf	12.00	98,400		
	Silt fence maintenance and monitoring	**1**	ls	60,000.00	60,000		
	Hazardous Waste Remediation						
	Dispose/treat contaminated soils				NIC		
	SUBTOTAL					1,698,060	
G20	**SITE IMPROVEMENTS**						
	Asphalt Paving; parking lot and roadway	***350,000***					
	gravel base; 12" thick	**12,963**	cy	40.00	518,520		
	asphalt; 4" thick	**38,889**	sy	25.00	972,225		
	VGC	**10,500**	lf	38.00	399,000		
	Road markings/signage	**1**	ls	30,000.00	30,000		
	Pedestrian Paving						
	Concrete paving						
	gravel base; 8" thick	**744**	cy	35.00	26,040		
	4" concrete paving	**30,000**	sf	7.00	210,000		
	Concrete pavers						
	Concrete pavers						
	sand bedding; 1" thick	**133**	cy	40.00	5,320		
	Precast concrete pavers	**45,000**	sf	16.00	720,000		
	gravel base; 8" thick	**1,117**	cy	35.00	39,095		
	concrete base; 4" thick	**45,000**	sf	5.00	225,000		
	Site Improvements						
	Flag pole 50' high	**1**	ea	6,500.00	6,500		
	Concrete retaining walls				Assumed not required		
	6' chain-link fence	**8,200**	lf	50.00	410,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Wood screen privacy fence 8'	**50**	lf	100.00	5,000		
	Double gates	**1**	ea	2,500.00	2,500		
	Benches	**15**	ea	2,800.00	42,000		
	Bike racks	**1**	ls	30,000.00	30,000		
	Ornamental trash/recycling receptacles	**10**	ea	800.00	8,000		
	Monumental signage	**1**	ls	40,000.00	40,000		
	Way finding signage	**1**	ls	60,000.00	60,000		
	Other site improvements; walls, fences etc.	**1**	ls	1,500,000	1,500,000		
	Multi-purpose fields						
	Crushed stone - 12" thick	**19,074**	cy	40.00	762,960		
	Sports seeding	**515,000**	sf	0.50	257,500		
	Line markings - Allowance	**1**	ls	15,000.00	15,000		
	Football goals	**2**	loc	3,000.00	6,000		
	Soccer goals (movable) - Allowance	**2**	loc	10,000.00	20,000		
	20' sports netting	**1**	ls	50,000.00	50,000		
	Baseball/softball backstop	**3**	loc	40,000.00	120,000		
	SUBTOTAL					6,483,160	
	Landscaping						
	Topsoil -modify existing topsoil	**19,889**	cy	26.00	517,114		
	Lawn - loam & seed	**485,000**	sf	0.25	121,250		
	Planting allowance	**1**	ls	400,000.00	400,000		

G. COST ESTIMATE / Design Team

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Belmont High School
Design Options - GRADES 7-12
Belmont, MA

12-Feb-18

PSR Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK OPTION 3.1							
	Irrigation at sports fields	**515,000**	sf	1.00	515,000		
	Allowance for new well	**1**	ls	150,000.00	150,000		
	SUBTOTAL					1,703,364	
G30	**CIVIL MECHANICAL UTILITIES**						
	Utilities - Enabling						
	Allowance for temporary utilities etc.	**1**	ls	150,000.00	150,000		
	Water supply; Pricing includes E&B and bedding						
	New DI piping; 8"	**200**	lf	100.00	20,000		
	New DI piping; 8" Fire	**4,300**	lf	100.00	430,000		
	Connect to existing	**1**	loc	10,000.00	10,000		
	FD connection	**1**	ea	2,000.00	2,000		
	Gate valves	**8**	ea	750.00	6,000		
	Fire hydrant	**14**	ea	5,000.00	70,000		
	Fire hydrant; relocate existing	**1**	ea	3,500.00	3,500		
	Sanitary; Pricing includes E&B and bedding						
	Manholes	**4**	ea	4,000.00	16,000		
	Grease trap	**1**	ea	15,000.00	15,000		
	8" PVC	**300**	lf	60.00	18,000		
	Connect to existing drain	**1**	ea	3,000.00	3,000		
	Relocate existing sewer system	**1**	ls	250,000.00	250,000		
	Storm water; Pricing includes E&B and bedding						
	Allowance to modify existing drainage systems	**350,000**	sf	7.00	2,450,000		
	Perforated pipe @ recharge systems and crushed stone base under fields	**515,000**	sf	4.00	NR		
	Gas service						
	E&B trench for new gas pipe - install by plumbing	**250**	lf	25.00	6,250		
	SUBTOTAL					3,449,750	
G40	**ELECTRICAL UTILITIES**						
	Power						
	Utility co. backcharges, allow	**1**	ls	30,000.00	30,000		
	Connections at existing manhole				Utility co.		
	Manhole	**1**	ls	8,500.00	8,500		
	Connections in manhole	**1**	ls	3,500.00	3,500		
	Primary ductbank 2-5" ductbank, empty, allow	**2000**	lf	120.00	240,000		
	Transformer by utility company				By Utility Co.		
	Transformer pad	**1**	ea	2,500.00	2,500		
	Secondary service	**60**	lf	1,100.00	66,000		
	Communications						
	Connection at riser pole, allow	**1**	ea	1,500.00	1,500		
	Telecom ductbank 4-4", allow	**2000**	lf	152.00	304,000		
	Site Lighting						
	Varsity baseball sports lighting (allow)	**1**	ls	120,000.00	120,000		
	Softball sports lighting (allow)	**1**	ls	90,000.00	90,000		
	Site Parking lighting (allow)	**1**	ls	350,000.00	350,000		
	SUBTOTAL					1,216,000	
	TOTAL - SITE DEVELOPMENT						***$14,550,334***

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

H. PERMITTING REQUIREMENTS

The following permitting requirements applies to all of the options.

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

Telephone: (617) 993-2650 Fax: (617) 993-2651

Building Division
(617) 993-2664
Engineering Division
(617) 993-2665
Planning Division
(617) 993-2666

January 18, 2018

Thomas G. Gatzunis P.E., C.B.O.
Daedalus - Senior Project Manager
1 Faneuil Hall Marketplace
South Market Bldg, Suite 4195
Boston, MA 02109-6117

Dear Mr. Gatzunis:

At your request I solicited municipal departments regarding what permits will be necessary for the proposed Town of Belmont High School Building project. Below is a compilation of responses I received.

Health Department

Annual permits to the high school for their cafeteria and pool.
Prior to signing off a demolition permit, will need to see proof of pest control services and an asbestos abatement report.
Dumpster permits as necessary.

Fire Department

1) Hot Work- welding, cutting, soldering etc.
2) Fire Alarm System plan review.
3) Fire Protection Plan review.
4) Temporary Heating (propane) for construction.
5) Combustible Fuel storage if Fuel Oil is means of heating/hot water for building.
6) Installation of heating unit if oil fired system.

Department of Public Works

Street Opening Permit, trenching permits, and Right of Way Occupancy permits.
Water works services and mains, permits for installations and connections.

Office of Community Development

Planning Board site plan approval.
Possible Zoning Board of Appeals approval (depending on final proposal and Dover Amendment impact).

Historic District Commission review – For White Field House depending on its fate.
Conservation Commission – Notice of Intent / Order of Conditions.
Stormwater Management and Erosion Control permits (the bylaw gives the conservation commission jurisdiction over stormwater management for a Notice of Intent filing. The Engineering Division will issue the erosion control permit).
Sewer and Stormwater connection permits.
Building Permits, Sheet Metal, Plumbing and Gas, and Electrical permits.
Sign permits.

Belmont Light Department

No response received. This is a municipal light department whose role is similar to an NStar or other electricity supplier.

Police Department

No response received. Beyond typical police details, I can't think of any permits they would require.

Please let me know if I can be of further assistance.

Sincerely,

Glenn R. Clancy, P. E.
Director

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

H. PERMITTING REQUIREMENTS

PERMITTING MATRIX

Belmont High School, Belmont, MA Updated 02/07/2018

Permit	Phase	Jurisdiction
Health Department		
Demolition Permit	CA	Building Dept.
Dumpster Permit	CA	Building Dept.
Fire Department		
Fire Alarm Review	Start of DD's	BFD
Fire Protection Plan Review	Start of DD's	BFD
Temporary Heating for Construction	Start of DD's	BFD
Combustible Fuel Storage	Start of DD's	BFD
Department of Public Works	Start of DD's	BFD
Department of Public Works		
Street Opening Permit	Start of CA	DPW
Trenching Permits	Start of CA	DPW
Right of Way Occupancy Permits	Start of CA	DPW
Water Work services and Mains	Start of CA	DPW
Installation and Connection Permits	Start of CA	DPW
Office of Community Development		
Design and Site Plan Approval	End of DD beginning of CD	Planning Board
Conservation Commission		
Notice of Intent	End of DD beginning of CD	Town of Belmont Conservation Commission
Order of Conditions	End of CD	Town of Belmont Conservation Commission
Engineering Division		
Erosion Control Permits	Start of CA	Town of Belmont Conservation Commission
Sewer and Storm water Connection Permits	End of DD beginning of CD	Engineering Dept.
Building Permits	Start of CA	Building Dept.
Sheet Metal Permit	Start of CA	Building Dept.
Plumbing and Gas Permit	Start of CA	Building Dept.
Electrical Permits	Start of CA	Building Dept.
Sign Permits	Start of CA	Building Inspector

I. CONSTRUCTION SCHEDULE

Please refer to the phasing plans for each options included earlier in this chapter for the Project Design and Construction Schedule.

J. PRELIMINARY DESIGN PRICING

Grade Configuration 7-12

Option (Description)	Total Gross Square Feet	Square Feet of Renovated Space (cost*/SF)	Square Feet of New Construction (Cost*/SF)	Site, building, Takedown, HazMat, Costs	Estimated Total Construction** (Cost*/SF)	Estimated Total Project Costs
Option 1	257,120 SF	257,120 SF	0 SF	$14,747,909	$89,192,522	$111,490,653
Base Repair		289.53 SF	0.00 SF		$346.89	
Option 2.1	451,800 SF	239,354 SF	212,446 SF	$34,947,073	$241,676,850	$302,096,061
Major Renovation/ Minor Addition		441.20 SF	476.01 SF		$534.92	
Option 2.3	451,800 SF	65,050 SF	386,750 SF	$36,266,346	$245,805,460	$307,256,825
Minor Renovation/ Major Addition		310.93 SF	489.50 SF		$544.06	
Option 2.4 ***	***451,800 SF***	***62,300 SF***	***389,500 SF***	***$36,896,842***	***$245,770,439***	***$307,161,440***
Minor Renovation/ Major Addition		***315.61 SF***	***485.78 SF***		***$543.98***	
Option 3.1	422,925 SF	0 SF	422,925 SF	$35,557,448	$235,060,850	$293,826,063
New Construction		0 SF	471.72 SF		$555.80	

* Marked Up Construction Costs

** Does not include Construction ContingencyMarked Up Construction Costs

***** District's Preferred Solution***

PMC/DPI PSR Options Reconciliation

	PMC	DPI	Delta	% delta
Option 1 Repair Only	$89,192,523	$85,541,000	$3,651,523	4.27%
Option 2.1 Major Reno/Minor Add	$241,676,851	$255,251,000	-$13,574,149	-5.32%
Option 2.3 Minor Reno/Major Add	$245,805,461	$237,959,000	$7,846,461	3.30%
Option 2.4 Minor Reno/Major Add	$245,770,440	$246,429,000	-$658,560	-0.3%
Option 3.1 New Construction	$235,060,852	$228,978,000	$6,082,852	2.66%

Based on PMC PSR Estimate February 9 and 12, 2018

Based on DPI PSR Estimate February 14, 2018

3.3.3 - FINAL EVALUATION OF ALTERNATIVES

K. QUALITATIVE MATRIX

The Belmont High School Committee worked together to determine the important compliance factors for the Belmont High School project and complied these factors into the evaluation matrix. The matrix was provided to all committee members for their review and completion. After the committee members completed the forms they had an open conversation to determine the preferred option. The BHSBC members looked at each issue relative to the building and project site. The matrix, along with the costing information, phasing, impact to students, traffic, educational compliance etcetera, formed the basis for the decision making process. The sum of the matrix evaluations shown below disclosed that Option 2.4 was the preferred option.

PERKINS+WILL

Belmont High School / Evaluation Matrix

OPTIONS	Compliance Factors														
	1. Ed Program Compliance	2. Traffic/ Site Circulation	3. Parking	4. Neighborhood Impact/ Shad	5. Design Flexibility	6. Site Access	7. Phasing Complexity	8. Fields Accommodation	9.Duration Schedule	10.Impact to Students Phasing	11. Sustainability	12. Civic Benefits	13. Permit/ Zoning	14. Rail Impact	Total
A.1.1 Renovation Only	○	○	◒	◒	○	○	○	◒	○	○	○	◒	●	○	20
A.2.1 Major Renovation, Minor Addition	◒	◒	●	◒	◒	◒	○	◒	○	○	◒	◒	◒	○	25
A.2.3 Major Addition, West Addition	●	●	●	◒	●	◒	◒	●	◒	●	●	●	◒	◒	36
A.2.4 Major Addition, South Addition	●	●	●	●	●	◒	●	●	◒	●	●	●	◒	◒	38
A.3.1 New Construction, West of BHS	●	●	●	○	◒	◒	●	●	●	●	●	○	◒	◒	34

● Fullfills expectations/ minimal impact(3)

◒ Neutral(2)

○ Fails expectations/ significant impact(1)

Compliance Factors

1. Ed Program Compliance – how effective/efficient can this design be at meeting the Ed Program
2. Traffic/ Site Circulation – how well can the design accommodate good traffic and circulation solutions on site
3. Parking – does the design provide a good solution for distributed parkin
4. Neighborhood Impact/ Shadows – how does the physical massing affect the neighborhood
5. Design Flexibility – how accommodating is the design in providing flexibility for changes in use over time
6. Site Access – how accommodating can the site design be when addressing neighborhood traffic issues
7. Phasing Complexity – how challenging will phasing be for construction
8. Fields Accommodation – how well does the site design accommodate the needs of the outside athletic programs
9. Duration Schedule – how much impact does phasing have on the construction schedule for this design
10. Impact to Students Phasing – How does the design solution reduce the impact on student/staff due to construction phasing
11. Sustainability – how accommodating will the design be to achieve high energy efficiency and low operating costs relative to baseline occupancy requirements
12. Civic Benefits – how beneficial to civic uses is this design
13. Permit/ Zoning – how will the process of permitting and zoning approvals be affected by the site/ building design
14. Rail Impact – how will the train noise be perceived inside the building

3.3.4 PREFERRED SOLUTION

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

BELMONT HIGH SCHOOL EDUCATIONAL PROGRAM

Summary and description of the existing educational program and/or new educational vision and specifications, process, etc., Teaching Philosophy Statement (including description of the following):

OVERVIEW

The Belmont Public Schools is an historically high performing district that provides students with high quality and rigorous academic experiences partnered with access to high quality out of classroom learning through co-curricular opportunities, performing arts and athletics. The Town of Belmont has a long history of quality educational outcomes for students who go on to great success in higher education, with a graduation rate of 96%, 79% of our seniors go on to 4 year College/University education, and 75% take at least one AP course during their junior or senior year. The school is a Level One School as defined by DESE and attendance rates are 96%. All of the above percentages are well above state averages.

The district is currently comprised of four elementary schools serving grades K-4, one middle school serving grades 5-8, and one high school serving grades 9-12. This configuration has been in place since 1997 when the Chenery Middle School opened.

Over the past five years, the Town has experienced a very significant increase in student population. This increase has been both in number of students and the diversity of families. Belmont's proximity to Cambridge and Boston provides an important access point for families to reach the metropolitan Boston area. This feature of Belmont has attracted families from all over the world. We have experienced a town-wide enrollment increase of 105 students per year on average and the MSBA projections indicate this trend to continue. The make-up of our new students shows an increase in non-English speaking families which has increased an average of 25% each year over the last five years (from 180 to 340). The result is that the Chenery Middle School and Belmont High School are above their design capacity and this trend is expected to continue for the next five years and possibly beyond.

The district continues to push for high rigor in schools by providing a meaningful teaching and learning environment that is accessible to all students, and respecting each child as a "whole person." The social emotional brain research we have studied has proven that when we create a culture where all students and staff feel safe, valued, and respected, then the neural pathways of learning open up for students to access and successfully engage in a rigorous academic experience.

The context of our MSBA Educational Plan is based on our mission to continue to grow this culture in the Belmont Public Schools; however, we are currently constrained by the current space and program limitations that exist across all of K-12 buildings in the district. At every level of the district, the increased enrollment, combined with our priority to build relationships with and engage a growing and complex student body, has resulted in significant challenges.

The following educational program materials are respectfully submitted by a team of Belmont Public Schools educators. The information provided communicates the current educational vision and programming offerings, the constraints that exist in our day to day implementation of this curriculum and pedagogy, as well as the vision for the Belmont Public Schools on behalf of the students, educators and community.

Three project options (grade configurations: 7-12, 8-12, 9-12) were approved by the MSBA for the Town of Belmont to explore. These options were viewed through an educational vision lens reflecting research-based strategies that will engage students and educators in teaching and learning experiences in the present and future. Throughout the process we explored our educational strategic planning with a vision of prioritizing what is best for students and how that work could be operationalized with three different grade configurations.

In January of 2017 the Belmont Public Schools began the process of reflecting, discussing and researching the topic of our current and future educational vision. This work involved three full days of educator planning/visioning meetings and two full days of parent/guardian, student, and educator visioning work. The content of these sessions focused on the educational priorities of the district and our vision of continuing and enhancing the teaching and learning in the Belmont Public Schools. Frank Locker (Education Facilitator) was hired to facilitate these sessions over the course of five months with the community.

In addition to this initial visioning work, the district embarked on the extension of this strategic planning with our Architect, Perkins and Will. In September 2017 we conducted two full days of collaboration with over 70 educators, parents/guardians, and students participating. Utilizing the outcome of our work from the

A. EDUCATIONAL PROGRAM

Frank Locker sessions as a foundation, the goal for these two days was to see our vision for the Belmont Public Schools with the lens of an expanded building in mind. We asked the question: How can we design a new building that can be a teaching tool and facilitating space to meet our educational vision and goals?

Over the last nine months the Belmont Public School has embarked on a significant journey that represents an investment in our children, educators, and our local constituency. The Belmont Public Schools firmly believes that after the seven days of representative visioning work, combined with community engagement meetings, PTO presentations and feedback from all our community stakeholders, we have an educational plan that will serve Belmont students well into the foreseeable future. We are confident that this work will result in a new building that serves as a teaching tool that allows for enhanced teaching and learning and improved outcomes for all students. In January, 2018, the Belmont School Committee unanimously approved the Administration's recommendation of a 7-12 grade configuration for the expanded Belmont High School. The current 5-8 Chenery Middle School will be converted to a 4-6 school (thereby eliminating its overcrowding), and the four elementary school will serve grades K-3, also eliminating overcrowding at the elementary schools.

VISION FOR TEACHING AND LEARNING

Educational Vision - After the work of visioning with district educators, parents / guardians and students, the district Leadership Council, made up of directors, principals and district administration drafted a Vision for Teaching and Learning statement to guide the work moving forward.

Belmont educators envision teaching and learning in the future will maintain our commitment to rigorous academic content through which students develop the skills of communication, collaboration, creativity, and critical thinking in school communities and learning environments that support the social and emotional development of each student, every day. Learning modalities will include opportunities for students to grapple with ideas, individually and in small groups, as they design, create, synthesize, and make meaning of content that is both meaningful and relevant to curious and engaged students. This will include project-based, thematic, interdisciplinary or inquiry-based learning through which students will discover their passions, sense of purpose, and optimism for their future. Learning will take place in an environment where each student is connected to caring adults, sees him/herself in the content, and feels socially, emotionally, and physically safe and valued for the assets and whole self he/she brings to school each day.

The current philosophy of our teaching and learning at all levels is grounded by the need to create relationships with each other (teacher to teacher, student to teacher, teacher to parent) and to support the learning process through the lens of Social Emotional Learning (SEL). Through our district SEL work over the last three years, we have learned that creating and maintaining trusting, safe, and thoughtful relationships improves school culture. We have also learned through research that this culture of all students "being known" opens up the brain for increased learning capacity. If students feel safe, they do not have to worry about those basic SEL needs and can focus sharply on the educational engagement, instructional content and secure the skills of critical thinking, collaborative partnering, and independent learning. In our work with Frank Locker, we learned that these students will have access to employment opportunities in many jobs that have not yet been created. We believe that by creating a culture that builds the skills for resilience (social competence, problem solving, autonomy, and a sense of purpose) while they learn academic skills and content, students will be prepared for their future success as engaged members of an increasingly complex society. We feel this philosophy allows the teachers to scaffold the content and instructional practices in a way that fosters student growth and development with the high level of rigor that is expected.

BELMONT PUBLIC SCHOOLS DISTRICT GRADE CONFIGURATION

The Town of Belmont has four neighborhood district elementary schools, one middle school, and one high school. The current grade configuration of the Belmont Public Schools is comprised of the following:

- 4 K-4 elementary schools serving grades K, 1, 2, 3, and 4 (Collective Enrollment of 1885)
  - One elementary school also serves the Pre-school population
- 1 middle school serving grades 5, 6, 7, and 8 (Enrollment of 1421 – design capacity of 1,200)
- 1 high school serving grades 9, 10, 11, and 12 (Enrollment of 1298)

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

Source: McKibben Associates / MSBA

Grade	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Elementary	1785	1824	1836	1805	1832	1830	1827	1823	1820
Middle	1359	1388	1419	1490	1491	1528	1539	1513	1546
BHS	1264	1301	1320	1360	1398	1427	1458	1528	1522
Total	4408	4513	4575	4655	4721	4785	4824	4864	4888

There has been unprecedented enrollment growth in the Town that is projected to continue. On October 1, 2011 the district had a K-12 enrollment of 3,900 students. The MSBA and the outside demographic company used by Belmont expect the enrollment to increase to 4,888 students by 2024.

The Town has studied three grades configuration options for Belmont High School. The School Committee recently voted unanimously to build the new Belmont High School to include grades 7-12. Chenery Middle School will become a Grade 4-6 School, and the three elementary schools will become K-3 schools. This will resolve the capacity issues at six schools for the foreseeable future.

CURRENT HIGH SCHOOL GRADE & SCHOOL CONFIGURATION

Belmont High School opened in 1970 and serves Grades 9-12. The current 257,120 GSF facility serves 1,304 students. Currently, our students are scheduled into a rotating block/mod schedule model with a department-based format.

The current facility and school structure does not foster the opportunity for interdisciplinary and collaborative teaching. It lacks adequate space for large groups of students to work collaboratively across classes. When two classes want to meet, they either open the access door between classrooms and go back and forth, or look for available times when other locations in the school are not occupied. Students who wish to collaborate sit on benches located throughout the building and/or sit on the floor in the hallways. The school is also lacking appropriate spaces for the 60 Belmont High School clubs and activities to meet. Often club members meet in classrooms while teachers are providing additional one-to-one help for students, push benches together in the hallways or find a space outside the building.

Spaces for teacher planning, collaboration and work are inadequate. Each of the major departments (English, foreign language, science and social studies) have a small collaboration space for all department members to share. The space limits collaboration and privacy when speaking and working with colleagues, students and parents/guardians. Other departments either have no space or have a combined storage/office location. To compensate for the lack of collaboration space, book storage rooms are being used as collaboration space. The directors of each department have utilized these spaces to provide student tutoring, storage of department materials, faculty mailroom, copier, and kitchenette needs. Privacy and the ability to appropriately service students' needs are compromised when store rooms are used for collaboration.

The goal of the new Belmont High School is to plan a newly reorganized school which fosters connections in academics and arts.

The new school building will provide:

- flexible classroom space,
- project rooms to support project-based learning,
- teacher planning rooms for the faculty and staff to collaborate within and across disciplines,
- privacy rooms to support students in need of additional academic and/or emotional supports
- flexible conference rooms to support student team meetings and individual parents/guardians meetings,
- and innovation labs.

CLASSROOMS

Currently, Belmont High has 53 general classrooms and 10 Science Labs. Average classroom size is 690 sf, which does not meet current minimum size requirements of the MSBA and class sizes average 25-26 students, with many classes exceeding these averages. Science labs average 1,075 sf (well below current standard of 1,440 sf), are outdated and are not up to current safety and space standards. While the building has generally been well maintained, floor and ceiling finishes are dated and nearing the end of their useful life. Lighting fixtures are original, and are now 47 years old. Heating and ventilation to the classrooms is via steam to 47 year old unit ventilators controlled by an outdated pneumatic control system.

A healthy, active classroom is a sharing classroom. Students are social beings and should be allowed to form groups, interact to exchange ideas, communicate in various ways and thrive

A. EDUCATIONAL PROGRAM

in a room that supports innovative and creative thinking. In a new facility, student classrooms will be looked upon as flexible "think tanks" which foster different learning modalities and social/emotional growth of students. Agile classrooms will give teachers the ability to respond to different students' needs. These classrooms should include a version of group gathering areas, multiple seating options and a flex area that can be adapted for unique instructional activities. These innovative and creative classrooms will be driven by students' interests, and the open, flexible spaces would allow students to come together to share, collaborate, innovate, and create.

In addition to collaboration and social/emotional learning, there are aspects of learning that call for quiet, independent study, reflection and processing of information. Breakout rooms, independent study areas and nooks will be incorporated in the new building to foster this style of learning and provide a safe place where students can go when necessary.

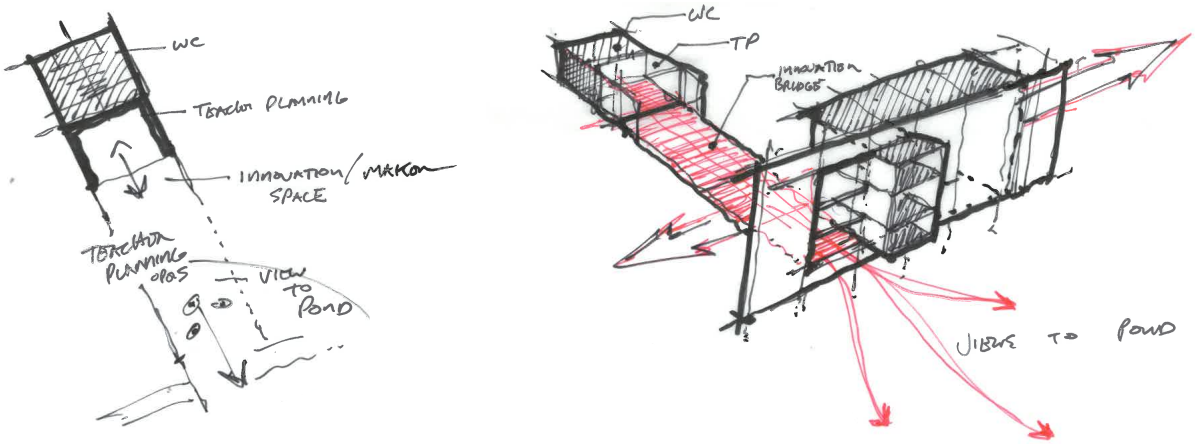
Technology integration will be a key aspect of modernizing the classroom design . A technology-modern classroom will allow teachers to use technology as a tool to stimulate curiosity, inspire innovation, creativity, collaboration, critical thinking and spark students' desire to learn. A modern classroom with technological enhancements will place information at students' fingertips and motivate them to research and make discoveries. In addition, technology supports inclusive classrooms as it allows students to move at their own pace whether they are looking for opportunities of enrichment or need assistance to catch up on curriculum.

With additional and modernized spaces, Belmont High School will have the opportunity to work on engaging all learning modalities in a blended-learning environment where students have opportunities to not only learn in multiple styles but are also guided by teachers in completing self-directed inquiry and investigation through research and hands-on activities.

The new Belmont High will have a total of 85 general classrooms, 36 for grades 7-8 and 49 for grades 9-12. There will be a total of 20 science labs (8 for grades 7-9 and 12 for grades 10-12). Each general classroom should be at least 850 sf, and should provide a flexible learning environment with minimal built in equipment to allow for changes in the future. Science labs shall meet the minimum space standards of the MSBA for the grades served. To serve our expanding ELL program there will be two sub-dividable 1,000 sf classrooms.

For grades 7-8, there will be four clusters at each grade level (total of 8 clusters), serving an average of 96 students. Each cluster will be made up of three general classrooms at 850 sf each, and one 1,200 sf science lab. In addition, there will be one 1,200 sf maker space shared by two clusters. Finally, each grade level will have one 1,200 sf teacher planning area to allow the 16 teachers an opportunity to meet, collaborate and plan their work.

For grades 9-12, the school will be organized by department. There will be four departments, each consisting of nine or ten classrooms. They will also be 850 sf, and should be flexible. Science labs will be 1,440 sf each (per MSBA guidelines) and each pair of labs will share a prep room. Teachers will share classrooms and all classrooms will be flexible for multiple use with a goal of 85% utilization.



Teacher Planning / Innovation Space - Concept Sketch

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

TEACHER PLANNING, ROOM ASSIGNMENT & CLASS SIZE

There are currently no district-wide policies pertaining to Teacher Planning, Room Assignment or Class Size. Teacher planning, however, is provided through the collective bargaining agreement with the Belmont Education Association. Room assignments are made annually by the building principal based on the educational and enrollment needs of the school. Currently, some teachers are provided with individual classrooms; however 29 teachers need to share two or more classrooms. While there is no district policy regarding class size at the high school, practice has been to schedule classes in the range of 22-26 students per class. In the 2017-18 school year, there are ninety-four classes that exceed 26 students (not including performing groups). This represents 25% of the classes at Belmont High School.

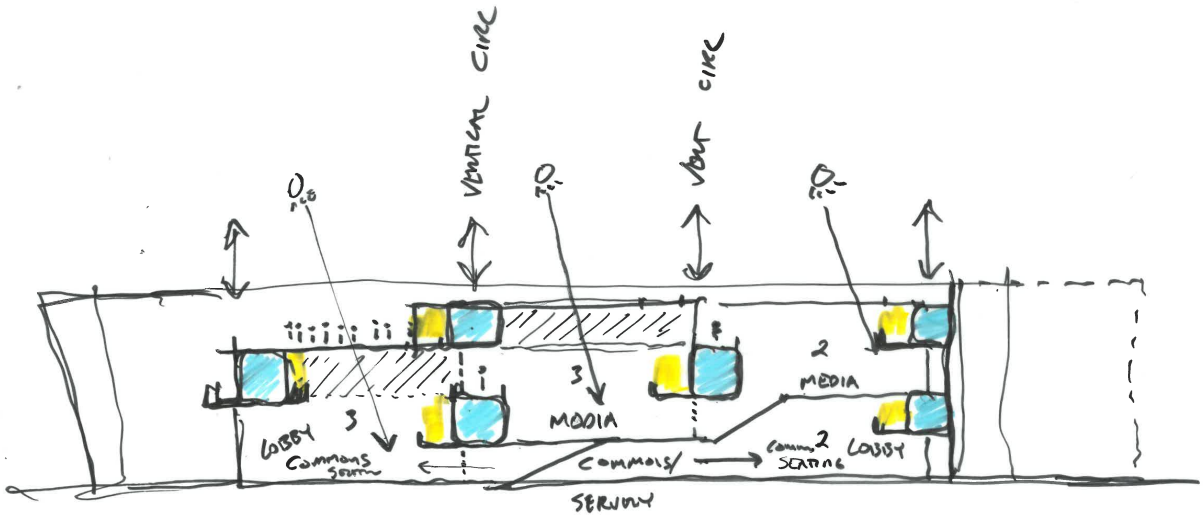
Currently, not all departments are afforded a planning room. Departments who do not have a planning room space do this work in their classrooms and are relocated when a class is scheduled in that location. This results in departments that do have a planning room sharing a space that is small and provides no privacy. If a teacher wishes to have a private conversation with a colleague or a meeting/phone conversation with a parent/guardian, they utilize the director's office when it is not occupied. In the new facility, each department will have a common area to collaborate with colleagues across departments and a private area to speak with parents/guardians in person or by phone. Adjacent to the department areas will be a separate work space for students to collaborate with teachers. This would allow teachers to provide additional support for students in need of extra assistance.

LUNCH PROGRAM

Belmont High School has a full lunch program that serves the high school population during the hours of 10:30AM - 1:00PM. Students are not scheduled for lunch but take advantage of the program during their "free" time in their schedules. Approximately 838 students of the current enrollment participate in the meal program. Belmont High School provides 550-600 lunches per day and 100 breakfast meals per day. Students have multiple options each day for lunch. There are hot lunch lines, a salad bar, a deli area, and pre-packaged foods. Breakfast consists of hot and cold meal options.

Students can access lunch during their unscheduled or split class time. The split class time was created for the 2017-2018 school year because of the overcrowding lunch periods. In order to best service students during peak times, teachers need to interrupt their instruction and allow students to get lunch. Once the lunch time has ended; students then return to class for continuation of the instruction. This modified lunch schedule has resolved some of the overcrowding lunch times at the current level of enrollment. It should be noted that the student population exceeds the seating capacity of the cafeteria space presently and is in need of expansion in order to address the forecasted increase. However it should be noted that the split schedule format is a daily academic interruption and is not ideal for learning.

In the new facility, it is expected that there will be three lunch periods – two for the 7-8 cohort and two for the 9-12 cohort. This means that the cafeteria will require a capacity of approximately 740 students for lunch. The kitchen will have



Building Section - Concept Sketch

4,100 sf including a "scramble" serving area The cafeteria will also be used for study spaces and after school activities. Chair and table storage should be available to allow for multiple uses of the cafeteria space.

SECURITY

Despite the limits of the aging building, the Belmont High School administration has made efforts to establish practices that ensure the highest level of safety and security for students and staff during the school day and for the community use of the facility after school hours. During the school day, all doors, except one main lobby door, are manually locked at 8:15AM. Visitors must sign in at the greeter's desk in the main lobby. Guests must wear a name badge while in the building and must verbally identify themselves and state their business when questioned. In cooperation with the Belmont Police Department, emergency response plans and lockdown procedures have been established and practiced.

In the expanded Belmont High School, security cameras inside and outside the building will be installed. Proper lighting to ensure safety for evening events will be installed in all parking and public areas. A two-way PA system will be included so all students and faculty and staff are informed during the event of an emergency. All doors would have the capability to be electronically locked and unlocked and visitors will be required to gain access to the school by the use of a buzzer and enter through a security vestibule. A new school will have clearly-defined traffic patterns, entry/egress systems, lines of sight, cameras, and other features as recommended by both FEMA and MEMA. Electronic swipe cards will also assist in the volume of requests to enter the building from faculty, staff and students during the school day. Hallway gates will be utilized to help control the student and community use after the school day. District personnel, architectural designers, Belmont Police and emergency experts will work together to ensure that all necessary safety and security features are included in the school renovation/construction

CONFIGURATION # 2 GRADES 7 & 8

Grade 7 and 8, which are currently part of the Winthrop L. Chenery Middle School, have a related set of beliefs:

The mission of Chenery Middle School is to inspire and support the intellectual, social and emotional growth and well-being of all students in the CMS community. With the support of families, we provide opportunities for students to think, create, reason and problem solve so that they can be positive and productive young adults who are of service to others.

CHENERY MIDDLE SCHOOL STUDENT SKILLS (3RS & 3ES)

At Chenery Middle School we share a set of beliefs and values that inform and guide our words and actions. These core values are represented by our school's motto:

Respectful, Responsible, & Ready to Learn: Everybody. Every Day. Everywhere.

By making these values central to our time together, we will be successful in ensuring the academic, social, and emotional growth of all children.

GRADE & SCHOOL CONFIGURATION

Grades 7-8 are housed at Chenery Middle School (along with Grades 5-6). Chenery opened in 1997. The current facility of approximately 182,000 GSF serves 1,436 students, 344 in Grade 7 and 344 in Grade 8. Currently, our 7th-8th grade students are scheduled into a fixed block schedule model within a team-based format. This structure provides teachers with colleagues from different departments to "wrap around" a group of 100-120 students and ensure their needs are being met in each core classroom.

In Grades 7-8 the current facility and school structure fosters the opportunity for interdisciplinary and collaborative teaching. Team classrooms are located alongside each other and each group of students inhabits one section of the hallway, ensuring that each student is known and "owned." Each day teachers on a team have a common meeting block -- a Team Meeting with the Assistant Principal, a Team Guidance Meeting, a Team Special Education Meeting, or a Team Choice Meeting (which can be used to plan lessons or simply to meet to discuss their own agenda). The current facility lacks adequate classroom space to effectively house all students; whereas teams used to be made up of 100 students, they are now more likely to be made up of 120-130 students. Whereas class sized used to be closer to 22, it is not uncommon to have classrooms between 27-29 students. Incoming projections suggest these high class sizes will increase if another Team is not added to both grades. We are fortunate to have two of the large, interdisciplinary meeting rooms that BHS lacks and they are used frequently to combine an entire team and conduct an interdisciplinary lesson.

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

In Grades 7-8 the Custodial and Maintenance staff has been attentive to the building's operational needs. Chenery Middle School is regularly commended for its bright appearance and overall cleanliness, especially considering its excessive use. The building is massively used during after school and weekend hours. It regularly hosts School Committee Meetings, Warrant Committee Meetings, a robust after school program, the Belmont After School Enrichment Collaborative (BASEC), and Saturday Morning Music School, to name just a few. The academic classrooms, programs, and support spaces are well arranged to facilitate efficient functionality of the school -- differing sections of the school can be cordoned off to allow for partial opening of the school during dances, concerts, and/or Chinese School weekend events. There is a relative shortage of storage spaces and office spaces, as many of those original spaces have been turned into alternative learning spaces over the years in response to the growing school population. For example, the science storage room is now a LABBB Collaborative classroom; the former Community Room Annex space and the Small Community Room are now home to the KEY Behavioral Program classrooms; the former Lower School Conference Room is now a Special Education Classroom; the rear of the Staff Development Room now houses a small group math space.

By moving Grades 7-8 to a new Belmont High School site, renewed space and flexibility will be returned to the Chenery Middle School, and will allow for sufficient space for grades 7 and 8 to expand to a 4-team-per-grade format. It will be possible to reorganize the Chenery Middle School into three grades (grades 4, 5, and 6) and "free up" anywhere between 10-19 spaces. These spaces will allow Chenery to expand to a 4-team-per-grade format to provide appropriate team and class sizes in the face of enrollment that increases annually, will allow the return of conference, meeting, and collaborative spaces to their original purposes, and would allow professionals to have their "own" spaces, rather than having to combine several Special Education Teachers into the same classroom or asking specialists to teach in spaces that were never originally designed to be instructional spaces. It will allow Chenery to create flexible classroom spaces, rooms to support project-based learning, and to better use conference rooms to support student team meetings and individual parents/guardians meetings.

CLASSROOMS

In Grades 7-8 there exists the same need as with High School students: Technology-modern spaces that allow for the formation of groups and sharing of ideas, spaces that foster different learning modalities, and spaces that provide for quiet, independent study and reflection.

TEACHER PLANNING, ROOM ASSIGNMENT & CLASS SIZE:

In Grades 7-8 there are currently no specific policies pertaining to Teacher Planning, Room Assignment or Class Size from either the district-wide or School Committee levels. In practice, however, we follow a few practical "rules of thumb": Each teacher is provided a single planning period per day as a result of the collective bargaining agreement with the Belmont Education Association. Their other "free" (that is, non-instructional) block of the day is spent in an assigned meeting with either grade-level, team-related, or department groups. Room assignments are made annually by the building principal based on the educational needs of the school. In 2017-2018, for example, there were 17 classroom changes made to ensure that teacher teams were located in close proximity to each other. Currently, all team classrooms are located proximal to one another to ensure that students' traveling time between classrooms is minimized. Due to a shortage of locker space -- yet another example of how the number of students has outpaced the original design of the building -- we currently have 38 students inhabiting lockers on a floor other than their classrooms. Whereas the school is designed for 25 students per homeroom, we are now placing upwards of 33 students into some rooms. That means that while we used to assign lockers directly outside of homerooms, now students are more likely to be assigned to a locker further down the hallway from their homeroom. Grade 7 is pushing into the Grade 8 hallway more than ever before. Rather than having one Grade 8 homeroom pushed to the second floor for their lockers, we now have two. The more students we add, the further everyone gets pushed down the line. To the extent possible we did our best to place students close to their homerooms. However, some students are not as close as they used to be. We have measured every open wall space and put in a request for more lockers, but for now we have to live with the insufficient number that we have. Currently, Grade 7-8 teachers are provided with individual classrooms. While there is no district policy regarding class size in Grades 7-8, practice has been to schedule classes in the range of 22-28 students per class.

Currently, there are no teams who are afforded their own planning

room. If a teacher wishes to have a private conversation with a colleague or a meeting/phone conversation with a parent/guardian, they utilize a Guidance, Assistant Principal, or the Directors' office when it is not occupied. It is the goal of the district to expand it capacity for hands on learning with additional sections of elective course offerings which would be inclusive of multipurpose "maker spaces." We currently have "study halls" in our middle school and we are looking to expand offerings to more children who currently sit idle. The spaces that currently serve our ELL and special education children should be larger in size and more appropriate for teaching and learning. When you walk the halls at Chenery you see many small groups of children learning and collaborating on the hallway floor. The need for team area small group space is essential to the type of student centered teaching methodology currently employed by our educators.

TECHNOLOGY

The vision for technology in the Belmont Public School is that students and staff will have ubiquitous access to the tools of technology and the skills to use them effectively in support of the district Vision for Teaching and Learning.

At Belmont High School, there are six computer labs, plus additional PCs in the library. Every student and most teachers have an iPad. Each classroom has a teacher computer, SMART Board, and wireless access; plus PC access in department offices, Special Education, and ELL areas.

Over the last five years Belmont High has established itself as a one to one device school that infuses technology into every department's curriculum and instructional methodology. The growing need for student collaboration spaces that have technology that can "show" student work on large screens or monitors is essential. Students currently lack sufficient space to show what they have learning via technology or in hands on learning environments. Creating space for this function is to be able to partner technology with kinesthetic learning opportunities for its students.

These spaces would support our physics, technology, art, health, social studies (and more) curricula by enabling teachers and students to express their learning outcomes in more progressive and authentic ways – not all learning should be assessed by a test or quiz.

At Chenery Middle school there are currently five computer labs, 11 iPad carts, and 11 Chromebook carts. Each classroom has a teacher computer, SMART Board and wireless access. Many classrooms have one to two student computers. Most teachers have an iPad. There are an additional 55 iPads distributed among Special Education and ELL support classrooms.

The Chenery is growing its technology capacity through the use of iPads, Smartboards and Chromebooks. The sharing of technology on carts is less than ideal for educators. Having updated technology features and multipurpose spaces would bring busy middle school students a place to show and demonstrate their learning. The growing technology classes offered at the Chenery are a combination of computer and hands on learning. The current space is limited and constrains the program. The fact that more students could enroll in these types of elective course is restricted by space. Instead students sit in a study hall. Middle school is a place where students need to learn through many modalities; providing technology resourced spaces combined with hands on learning capacity (like maker spaces) is vital.

Both schools have many networked printers, document cameras, AppleTV, complete wireless coverage, websites, e-mail lists, and high-speed internet access.

In the new school, it is anticipated that the technology capabilities will be expanded and modernized. Wireless access points will be located in each classroom and throughout public spaces to permit robust service to all areas of the building. The network will be designed for future expansion and adaptation as technology needs and capabilities expand in the coming years. Charging areas will be made available in areas such as the cafeteria to all students to charge devices safely and securely.

Specific teaching spaces dedicated to technology related education include the following planned spaces: a 1,200 sf Digital Arts laboratory which will provide capability for Animation, Graphics and other courses, a 1,200 sf electronic music classroom, and a 1,200 sf Coding classroom to teach programming and coding which is still increasing in importance. District wide technology support offices and workshops will be located at the High School (as is currently the case), which will facilitate timely, critical network support at the expanded school.

EDUCATIONAL PROGRAMS IN VISUAL ART

CURRENT PROGRAMS

Visual Art in Grades 9-12 is elective. One year of study in Visual & Performing Arts is the current graduation requirement at

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

Belmont High School, and students complete that year of study in either visual art, music or theater. Our current program includes offerings in Photography (traditional film), Ceramics, Sculpture and Drawing/Painting. During the 2017-18 school year there are 20 sections of Visual Art, each meeting four days per week for 50-75 minutes similar to all classes at BHS. We employ four full-time visual art teachers who work in four separate classrooms, each equipped for a specific discipline and medium.

All students in Grades 7-8 participate in visual art courses during the school day. Each class meets twice per six-day cycle for 50 minutes. During the 2017-18 school year there are 32 sections of Grade 7-8 Visual Art (64 instructional blocks). This is the equivalent of 2.2 FTE dedicated to Grade 7-8 Visual Art. At present, these classes are spread among four full-time art teachers who also teach Grade 5-6. There are currently four art rooms in use at Chenery Middle School, 2.2 of which would be required just for Grade 7-8 Visual Art.

As a result of their contact time with highly-qualified, experienced educators, students in Belmont produce artwork that exhibits a high level of technical skill, creativity, and artistic sensitivity. Each year dozens of Belmont students earn honors from the Boston Globe Scholastic Art Festival. Student artwork is displayed regularly throughout both CMS and BHS, though display space in both schools is limited. A number of art exhibits over the course of the year thrust student artwork into the spotlight, and most of these exhibits take place outside of school.

FUTURE PROGRAMS

Belmont Public School is increasing the graduation requirement at BHS from one year of study to two years of study in Visual & Performing Arts. As enrollment in the Belmont Public Schools continues to rise, we expect the need to continue adding sections of Visual Art at the middle and high school levels. Additionally, we are currently implementing programs in digital art, graphic design and computer animation that will require additional teaching spaces and staff. While our current programs, Grades 7-12, are staffed by 6.2 FTE in visual art, it is evident that enrollment growth and program expansion will require 7.0 FTE. Our current programs (7-12) employ six classrooms each day.

In the expanded school, five 1,200 sf art rooms will be provided to allow instruction in the Visual Arts. These will be supported by adequate storage spaces and workrooms. There will be a dark room to support the currently offered photography program. In addition, two kilns will be provided to support the ceramics program. Over the next decade and beyond, we anticipate that these programs will continue to grow - in part due to increasing enrollment in our schools, but also because we plan to enhance and diversify the kinds of educational experiences we offer to students. While some of the new experiences we offer will attract students from our existing programs, our intent is to make Visual and Performing Arts programs more accessible and engaging to students who may not be involved in our current programs. New space will allow us to increase the number of art classes, thereby engaging more students at all levels (as opposed to study halls at Chenery and unscheduled periods at the high school).

EDUCATIONAL PROGRAMS IN MUSIC

CURRENT PROGRAMS

Music at Belmont High School is elective. One year of study in Visual & Performing Arts is the current graduation requirement at Belmont High School, and students may complete that requirement in either visual art, music or theater. Current offerings at BHS include three bands, three choruses and two orchestras in addition to Music Theory, Guitar, and Music Technology. In 2017-18, BHS provides 11 sections of music courses, employing 1.9 FTE in music faculty. This FTE allocation is currently split among four individuals who teach a wide variety of music curriculum ranging from Grades 5-12.

All students in Grades 7-8 participate in music courses during the school day. Course offerings include performing ensembles - band, chorus, and orchestra - as well as general music experiences (Guitar and World Music). Performing ensembles meet four times per six-day cycle, and general music classes meet twice per cycle. Choruses in Grades 7-8 are split by gender four days per cycle, and meet combined twice per cycle. The 2017-18 offerings in music comprise 70 instructional blocks per cycle, employing 2.3 FTE in music faculty. This FTE allocation is currently split among six individuals who teach a wide variety of music curriculum ranging from Grades 5-12.

Enrollment in the performing ensembles (band, chorus, and orchestra) in Belmont is exceptionally high, and our music program has traditionally been considered one of the most successful in the state. Our largest band includes 120 students, the largest chorus 160, and the largest orchestra consists of over eighty students. Additionally, the music teaching spaces in both

existing schools are in constant use after school for a wide variety of activities. For example, the two band rooms in both schools are used at least four days per week after school for Grade 7-12 activities for ensembles ranging in size from 20 to 120 students.

FUTURE PROGRAMS

Belmont Public Schools will be increasing the graduation requirement at BHS from one year of study to two years of study in Visual & Performing Arts in __. Program expansion in our general music curriculum will include a greater emphasis on music technology, music production and audio engineering. This will require our music classrooms to be designed with these uses in mind. With continued enrollment growth, we expect that the number of students who participate in band, chorus and orchestra will also increase. For this reason, we have the need for two band rooms of different capacity (120 students for Grades 9-12, 90 students for Grade 7-8), two chorus rooms of different capacity (150+ students and 60 students) and one orchestra room (up to 80 students). Furthermore, the way that these classes are being taught will require "breakout spaces" for small/medium sized groups of students (5-20 students). Finally, small ensemble practice rooms should be provided, along with adequate dedicated music storage space to allow for flexibility.

Activity Type	Grade Level	Location	Number of Students	Frequency
Marching Band	9-12	Band Room	120	3x/week (Aug.-Nov.)
Jazz Collective	9-12	Band Room	20	3x/week all year
Jazz Band	9-12	Band Room	30	1x/week all year
Jazz Combo	9-12	Music Tech	7	1x/week all year
Madrigal Singers	9-12	Chorus Room	30	1x/week all year
Jazz Choir	9-12	Chorus Room	45	1x/week all year
A Cappella	9-12	Chorus/Tech	60	1x/week all year
Pit Orchestra	9-12	Band Room	30	2x/week (Jan.-March)
Theater	9-12	AUD/Little Theater	150+	4x/week all year
Chamber Orch.	7-8	Orchestra Room	60	1x/week all year
Chamber Singers	7-8	Chorus Room	60	1x/week all year
Honors Band	7-8	Band Room	75	1x/week all year
Jazz Ensemble	7-8	Band Room	35	1x/week all year
Brass Ensemble	7-8	Band Room	25	1x/week all year
Flute Ensemble	7-8	Gen. Music	25	1x/week all year
Double Reed Ens.	7-8	Gen. Music	15	1x/week all year
Jazz Combo	7-8	Gen. Music	12	1x/week all year
Theater	7-8	AUD/Chorus/GM	150	4x week (Jan.-May)

EDUCATIONAL PROGRAMS IN THEATER ARTS

CURRENT PROGRAMS

The Theater Arts program at Belmont High School is a great source of pride for the students, faculty and community at large. In 2017-18, we offer three courses during the school day in addition to a comprehensive after-school theater program (the Performing Arts Company). This program is overseen by one teacher, currently employed as 1.0 FTE.

Though we have offered Theater Arts electives to students in Grades 7-8 in the past, they are not offered during the 2017-18 school year. The Chenery Middle School has added elective courses to reduce the number of students in study halls; but has been unable to provide theater arts programming due to lack of sufficient and appropriate space.

FUTURE PROGRAMS

At the high school level, additional electives in Theater Arts or Television/Film are planned for the 2018/19 school year. The goal of the district is to provide an additional part-time teacher for Grade 7-8 theater, who would also serve as a Technical Director/ Facilities Manager for our new performance spaces. The return of Theater Arts electives in Grade 7-8 is a definite area of need, but we are currently limited by a lack of instructional space at Chenery Middle School. In the expanded school, it is expected that there will be at least 2.0 FTEs in the Theater Arts. In the new school. There will be a full Auditorium with a 2,400 sf stage, which will allow for musical theater productions as well as Band, Orchestra and Chorus performances from the stage. In addition, a flexible 3,000 sf Black Box theater should be provided to allow for open mike, small scale and experimental productions and slam poetry and other events. During the school day, this will be a teaching space for Theater Arts.

EDUCATIONAL PROGRAMS IN DANCE

CURRENT PROGRAMS

We currently do not offer curriculum in Dance during the school day at any grade level due to limited available space, although dance units are a part of the Physical Education curriculum in Grade 7-12. Dance is a major component of the after-school Theater Arts program, and there have been after-school offerings in dance at various times over the past decade.

FUTURE PROGRAMS

Dance is a part of the Massachusetts Frameworks and the National Standards for Arts Education. The Belmont Public Schools is committed to offer dance electives in Grades 7-12 in the expanded school. These will be interdisciplinary courses taught in conjunction with the Physical Education department, and will require a dedicated studio space that is suitable for dance instruction and rehearsal, including a wood floor, mirror walls and a ballet barre. The facility should be adjacent to suitable changing areas to allow for maximum participation time. We expect to have __ FTEs in the new dance program.

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

HIGH SCHOOL PHYSICAL EDUCATION PROGRAM OVERVIEW

SCHOOL POPULATION/TEACHERS/CLASSES

At Belmont High School, we utilize a Wellness approach to deliver the programming and curriculum for both the Physical Education and the comprehensive Health Education programs. The high school currently has 4.2 FTE Physical Education faculty members on staff to educate a school population of approximately 1,300 students. We also have a Director of Physical Education that oversees the entire K-12 Physical Education program, whose office is located at the high school. Within the daily schedule each Physical Education/Wellness instructor teaches no more than six classes a day and no less than five. Courses are offered on a quarter, semester & yearly basis.

CURRENT PROGRAM OVERVIEW

Students at Belmont High must earn 2 credits per year in Physical Education. Ninth graders must take Wellness 1 in order to fulfill their Physical Education requirement for that year. Tenth grade students must take Positive Decision Making & Life Skills for one Physical education credit and then earn one additional Physical Education credit. In grades 11-12 Physical Education credit is earned through taking a Physical Education activity course during the school day. Each quarter, various courses are offered based on student interest that count toward the Physical Education credit. The courses offered are: Outdoor Pursuits, Mindful Movement, Fitness Group Games, Muscular Strength Training & Body Toning, Team Sports & International Games, Recreational Sports & Lifetime Activities, Sports Medicine/ CPR & First Aid, and “The Mindful Marauders - Emerging Leaders.”

PROPOSED PROGRAM

It is expected that the physical education program will continue in the expended building.

LOCKER ROOMS

Our current female student population is 669. Currently there are inadequate lockers for female students. The lockers will also include seasonal team lockers which will be shared over the course of the year. Lockers for the Physical Education program are needed for a minimum 350 students per semester.

Our current male student population is 631. Lockers for the Physical Education program are needed for a minimum 350 students per semester. There is a teacher’s office that contains a bath/ shower room.

Accompanying wet area and privacy changing are to service the Wellness/PE students, LABBB students as well as afterschool athletics. There is a need for boys & girls lockers on same level, which are accessible without having to enter the field house.

These same spaces are extensively utilized after school for our interscholastic program.

Belmont High School offers an extensive interscholastic athletic program throughout the academic year consisting of 31 sports with 69 levels of competition. Our teams are members of the MIAA and compete in the Middlesex League. In recent years our program competed in numerous State Tournaments at both the Sectional and State Championship level. In the fall Belmont High School has been recognized & honored by the MIAA with their Sportsmanship Award.

Interscholastic sports are offered at the freshman, junior varsity, and varsity levels.

Fall sports are field hockey, cross country, soccer, girls’ swimming & diving, volleyball, golf, cheerleading, and football.

Winter sports include basketball, ice hockey, indoor track, boy’s swimming, and wrestling, and alpine skiing.

Spring sports include baseball, softball, outdoor track, tennis, lacrosse, and rugby.

Each year, approximately 75% of Belmont High School students participate in interscholastic athletics.

In the expanded School, it is anticipated that the existing 30,000 SF Field House will be retained and will continue to be used as a multi-purpose teaching and competition space. In addition, a +/- 6,000 sf gym will be provided with two teaching stations to service the 7-8 grade students. Finally, a 3,000 sf alternative PE space will be provided that will serve the currently offered programs in dance, yoga, cheerleading and wrestling.

SPECIAL EDUCATION

SPECIAL EDUCATION GRADES 9-12

The Special Education Program at BHS encompasses a full range of student support services for students on any type of support plan. These include students with IEPs, students on 504s and students on iCAPS (Individual Curriculum Accommodation Plans).

A. EDUCATIONAL PROGRAM

There are presently 143 students served by these programs, with 140-175 students per year typically supported by these resource rooms, teachers, psychologists, and related service providers.

The program is implemented by 6.6 FTE Special Education Teachers, and 1.76 FTE School Psychologists. Additional related services staff (Speech, OT, and PT) not based at BHS support the delivery of services as needed and warranted by a student's support plan.

The program is primarily inclusion oriented, with the majority of students receiving support within the regular education environment. This model is supported by resource room classes regularly scheduled for students as an elective. These resource rooms are where students receive targeted services and interventions as dictated by their support plan. Currently BHS has seven Designated Resource Rooms. Of these rooms, four serve students requiring more general types of academic support, two are tailored to supporting students with Emotional Difficulties and one is tailored to supporting students with Autism Spectrum Disorders (ASD).

Additionally, the BHS special education program includes two self-contained classrooms, five small offices and one small conference room. One of these classrooms is utilized by our NECC Partner Program to serve our low-functioning ASD students. The other self-contained classroom and two of the small office spaces are utilized by the LABBB Collaborative to provide services to students warranting more restrictive placements. The three remaining offices are used by the two school psychologists and related service providers to deliver their services.

SPECIAL EDUCATION GRADES 7 & 8

The Special Education programs and services at the 7th and 8th grades are designed to meet the support needs of students on IEPs, 504s and ICAPS (Individual Curriculum Accommodation Plans). The program is implemented by 4.5 FTE Special Education Resource Room Teachers, a 0.5 FTE Autism Inclusion Specialist, a 0.5 FTE School Psychologist, a 0.5 FTE School Social Worker, and a 0.33 FTE Speech and Language Therapist. Additional related services staff (OT and PT), not based at CMS, support the delivery of services as needed and warranted by a student's support plan.

Programming at CMS is primarily is based on an inclusion model of service delivery. Students receive instruction within general education classes with appropriate aides and supports as determined by a student's IEP, 504s or ICAPs. In addition, most students on IEPs receive services within grade level Resource Rooms. These Resource Rooms incorporate both small group and individualized instruction.

Currently the 7th and 8th grade special education programs include six designated Resource Room classrooms. Of these rooms, four service students requiring more general types of academic support, one is tailored to supporting students with Emotional Difficulties, and one is tailored to supporting students with Autism Spectrum Disorders.

CMS 7th and 8th grade is also home to two substantially separate classrooms, and one therapy/office, operated by our LABBB Collaborative to provide services to students with moderate to severe developmental disabilities. The three remaining offices at Chenery are used by the school psychologist, the therapeutic school social worker, and the speech and language therapist. The other related service providers share space within available classrooms, offices, or workrooms.

There are presently 78 7th and 8th grade students supported and served by these special education programs and staff.

NEED FOR INCREASED SPACE FOR SPECIAL EDUCATION PROGRAMS AT BHS

There are currently 59 students in grade 7-12 whose needs are being met in OOD placements. Increased space at BHS would allow the district to meet the needs of some of these students in-district. By increasing our classroom capacity for both partially and substantially separate programming, the district would be able to develop more in house programs to support our students. Although Out of District (OOD) placements are used by many districts to meet the needs of students whose disabilities present challenges beyond the expertise or program capacities of their home districts, Belmont has not been able to address the needs of some students due to lack of space to build appropriate programs. These include students with Language Based Learning Disabilities as well as lower functioning ASD students. Additionally, the programs that currently exist to support our ASD students, as well as students with Socio-emotional challenges have grown over the years warranting an increased need for space and ancillary supports. While our LABBB collaborative programs help meet many of these needs, and have programs based within our buildings, some of these needs could be more cost effectively met if there was room to expand.

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

In the new school, to support the 7-12 program, a total of ten 850 sf classrooms will be provided for special education instruction, together with six 500 sf Resource Rooms and five small group instruction rooms.

METCO

Belmont has long been a member of the METCO program, which serves non-white children from Boston. It is a voluntary program intended to expand educational opportunities, increase diversity, and reduce racial isolation, by permitting students in certain cities to attend public schools in other communities that have agreed to participate. In the expanded Belmont High School, we would like to provide an office for the METCO director and an 850 sf METCO classroom . The METCO classroom is used for a wide variety of uses during the school day as well as before and after school, including small group instruction, tutoring and meetings with students.

TRANSPORTATION POLICIES AND PROCEDURES

The Belmont Public Schools provide regular day transportation for students in grades Kindergarten through 12. Students in grades K-6 who live at least two miles from their assigned school are provided busing for free, in accordance with MGL Ch 71, § 68. Busing is offered for a fee of $575.00 for students in grades K-6 who live less than two miles from school and for students in grades 7-12, regardless of distance from school. The district offers partial or full fee waivers, based on household size and income. Fee waivers may be requested by parents and are reviewed confidentially. Due to limited resources, bus service is not offered in some areas of town at all grades, primarily where students live close to school.

The district contracts with a transportation vendor to provide buses and drivers. The district has utilized six 77-passenger school buses for several years, but has added an additional bus in Fiscal Year 2017 and another in Fiscal Year 2018 (for a total of eight buses) in response to growing enrollment and student ridership. In Fiscal Year 2018 there are 826 students registered for busing (256 elementary, 451 middle, 119 high).

The routes set for the eight buses include routes to transport some elementary students to district schools outside of their regularly-assigned elementary school. As new students continue to move into the town, they are placed in this manner in order to balance class size by grade across all elementary schools within the district.

The district is in the process of reviewing bus routes to decrease the number of stops and make the routes driven more efficient, where possible, in order to expedite the arrival of buses to school. This process is being developed in response to increasing student enrollment and ridership, increasing vehicle traffic in town during rush hour, and in light of the fact that each of the eight buses performs routes at multiple levels (elementary, middle and high).

When the grade configuration at Belmont High School changes as part of the current potential building project, routes will be reviewed and altered as needed.

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

BELMONT HIGH SCHOOL 15 MODULE SCHEDULE

	Monday	Tuesday	Wednesday	Thursday	Friday
7:35—7:59	A1	A2	A3 7:35-7:59	A4	A5
7:59—8:24	B1	B2	B3 7:59-8:24	B4	B5
8:27—8:52	C1	C2	C3 8:26-8:51	C4	C5
8:55—9:20	D1	D2	D3 8:54-9:19	D4	D5
9:23—9:49	E1	E2	E3 9:22-9:47	E4	E5
9:52—10:17	F1	F2	F3 9:49-10:14	F4	F5
10:20—10:45	G1	G2	G3 10:17-10:42	G4	G5
10:48—11:13	H1	H2	H3 10:45-11:10	H4	H5
11:16—11:41	I1	I2	I3 11:12-11:37	I4	I5
11:44—12:09	J1	J2	J3 11:40-12:05	J4	J5
12:12—12:37	K1	K2	K3 12:08-12:33	K4	K5
12:40—1:05	L1	L2	L3	L4	L5
1:08—1:33	M1	M2	M3	M4	M5
1:36—1:59	N1	N2	Staff Meeting Time	N4	N5
1:59-2:25	O1	O2		O4	O5

A. EDUCATIONAL PROGRAM

CHENERY MIDDLE SCHOOL MONDAY, TUESDAY, THURSDAY, FRIDAY BLOCK SCHEDULE

MONDAY, TUESDAY, THURSDAY, FRIDAY			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
Homeroom 7:55-7:58	Homeroom 7:55-7:58	Homeroom 7:55-7:58	Homeroom 7:55-7:58
PASSING TIME	PASSING TIME	PASSING TIME	PASSING TIME
Block A 8:00 - 8:50	Block A 8:00-8:50	Block A 8:00-8:50	Block A 8:00-8:50
PASSING TIME	PASSING TIME	PASSING TIME	PASSING TIME
Block B 8:52 - 9:42	Block B 8:52 - 9:42	Block B 8:52- 9:42	Block B 8:52 - 9:42
Block B/C 9:42 -10:07	PASSING TIME	PASSING TIME	PASSING TIME
Block C 10:07 - 10:57	Block C 9:44-10:34	Block C 9:44-10:34	Block C 9:44-10:34
Walk Class to Cafe 10:57-11:00	Lunch **10:34-10:59**	PASSING TIME	PASSING TIME
Lunch **11:00-11:25**	Block D 10:59-11:49	Block D 10:36-11:26	Block D 10:36-11:26
Walk Class from Cafe 11:25-11:2	PASSING TIME	PASSING TIME	Lunch **11:26-11:51**
Block E 11:28 - 12:18	Block E 11:51-12:41	Block E 11:28-12:18	Block E 11:51-12:41
Block E/F 12:18 - 12:43	PASSING TIME	Lunch **12:18-12:43**	PASSING TIME
Block F 12:43 - 1:33	Block F 12:43-1:33	Block F 12:43-1:33	Block F 12:43-1:33
PASSING TIME	PASSING TIME	PASSING TIME	PASSING TIME
Block G 1:35-2:25	Block G 1:35-2:25	Block G 1:35-2:25	Block G 1:35-2:25

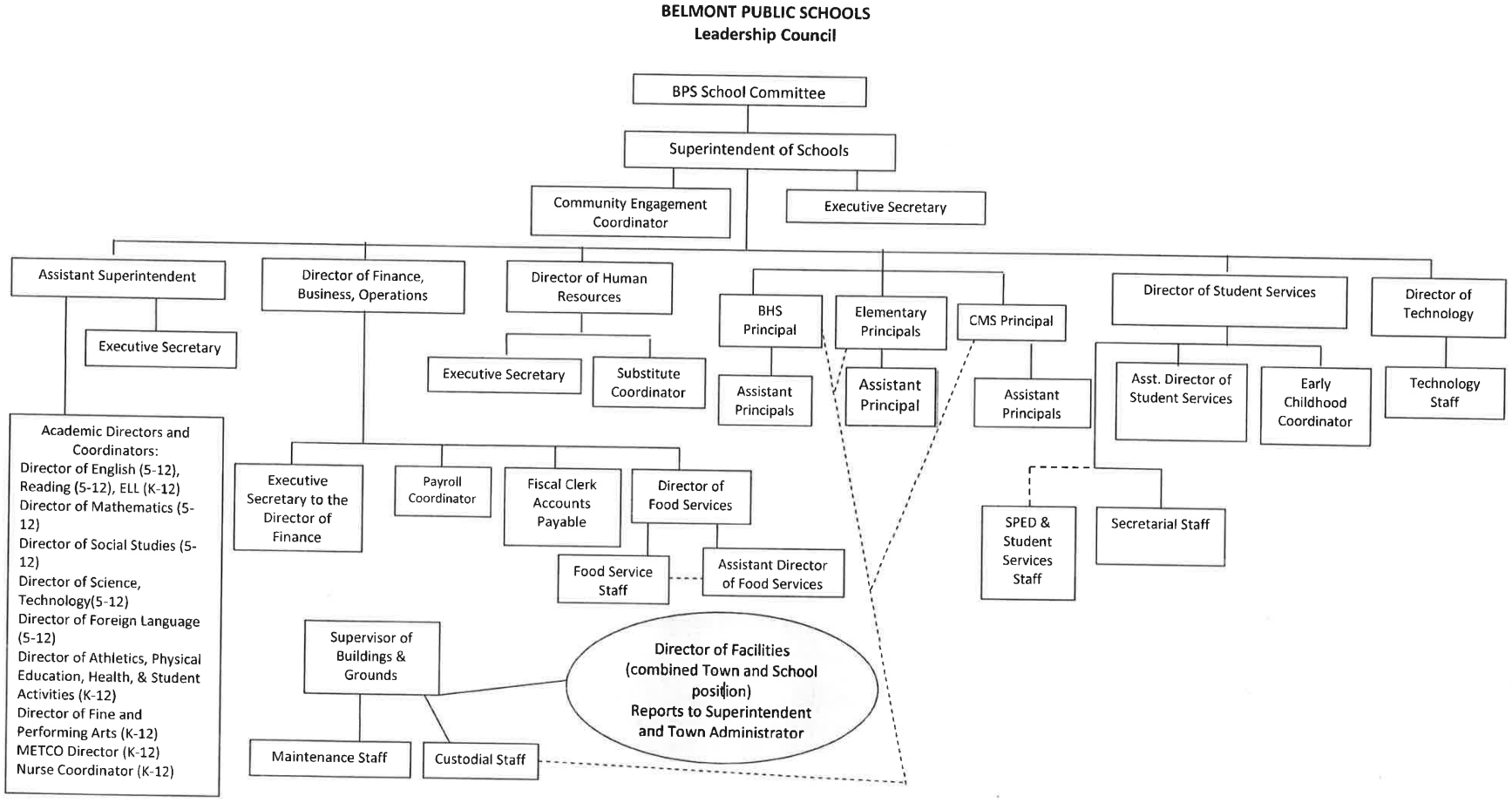
3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

CHENERY MIDDLE SCHOOL MONDAY, TUESDAY, THURSDAY, FRIDAY BLOCK SCHEDULE

WEDNESDAY			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
Homeroom 7:55-8:12	Homeroom 7:55-8:12	Homeroom 7:55-8:12	Homeroom 7:55-8:12
PASSING TIME	PASSING TIME	PASSING TIME	PASSING TIME
Block A 8:14 - 8:52	Block A 8:14-8:52	Block A 8:14-8:52	Block A 8:14-8:52
PASSING TIME	PASSING TIME	PASSING TIME	PASSING TIME
Block B 8:54-9:32	Block B 8:54-9:32	Block B 8:54-9:32	Block B 8:54-9:32
Block B/C 9:32 - 9:56	PASSING TIME	PASSING TIME	PASSING TIME
Block C 9:56 - 10:34	Block C 9:34-10:12	Block C 9:34-10:12	Block C 9:34-10:12
Walk Class to Cafe 10:34-10:37	Lunch **10:12-10:37**	PASSING TIME	PASSING TIME
Lunch **10:37-11:02**	Block D 10:37-11:15	Block D 10:14-10:52	Block D 10:14-10:52
Walk Class to Cafe 11:02-11:05	PASSING TIME	PASSING TIME	PASSING TIME
Block E 11:05-11:43	Block E 11:17-11:55	Block E 10:54-11:32	Block E 10:53-11:05
Block E/F 11:43 - 11:57	PASSING TIME	Lunch **11:32-11:57**	Lunch **11:05-11:30**
PASSING TIME	PASSING TIME	PASSING TIME	Block E 11:30-11:56
Block F 11:57 - 12:35	Block F 11:57-12:35	Block F 11:57-12:35	PASSING TIME
PASSING TIME	PASSING TIME	PASSING TIME	Block F 11:57-12:35
Block G 12:37-1:15	Block G 12:37-1:15	Block G 12:37-1:15	PASSING TIME
			Block G 12:37-1:15

DISTRICT ORGANIZATIONAL CHART



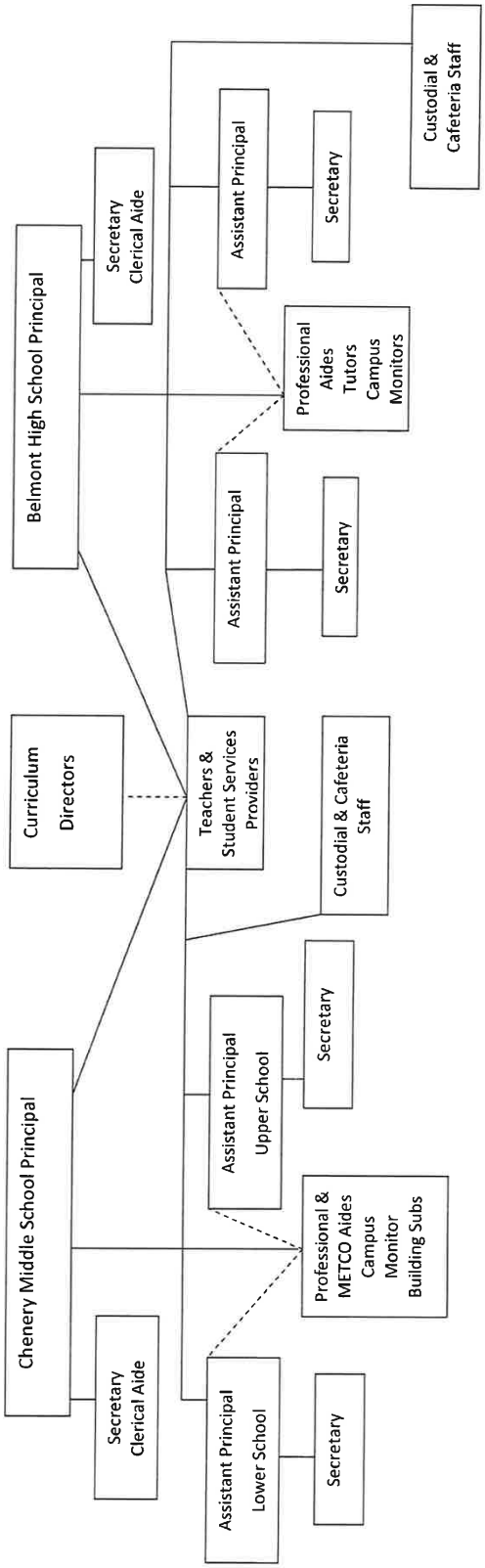
3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

BELMONT HIGH & CHENERY MIDDLE SCHOOL ORGANIZATIONAL CHART

SCHOOL BUILDINGS

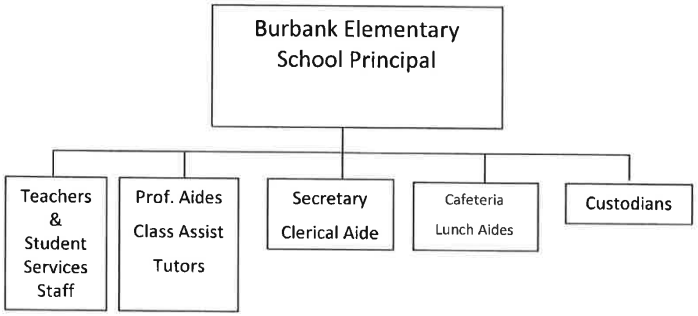
Middle and High School

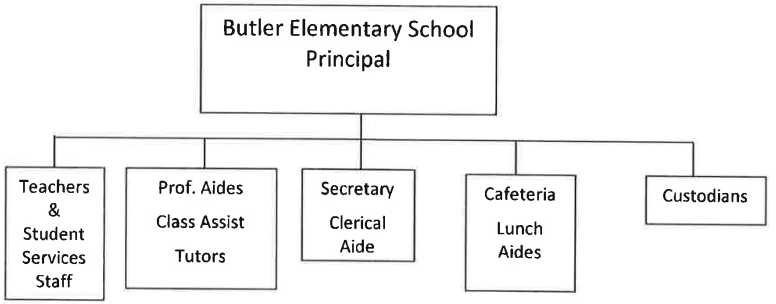


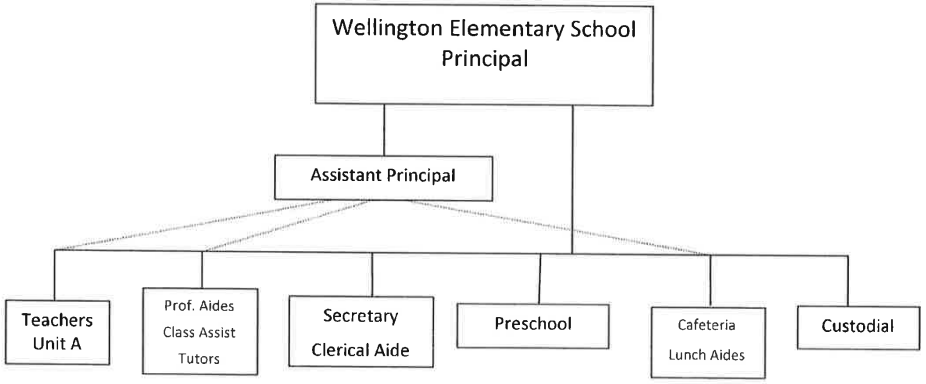
ELEMENTARY SCHOOL ORGANIZATIONAL CHART

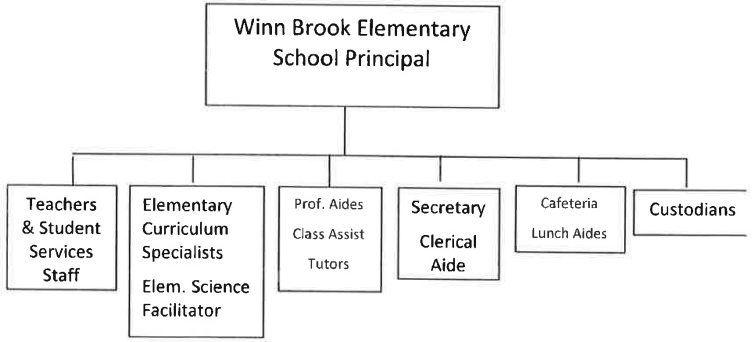
SCHOOL BUILDINGS

Elementary





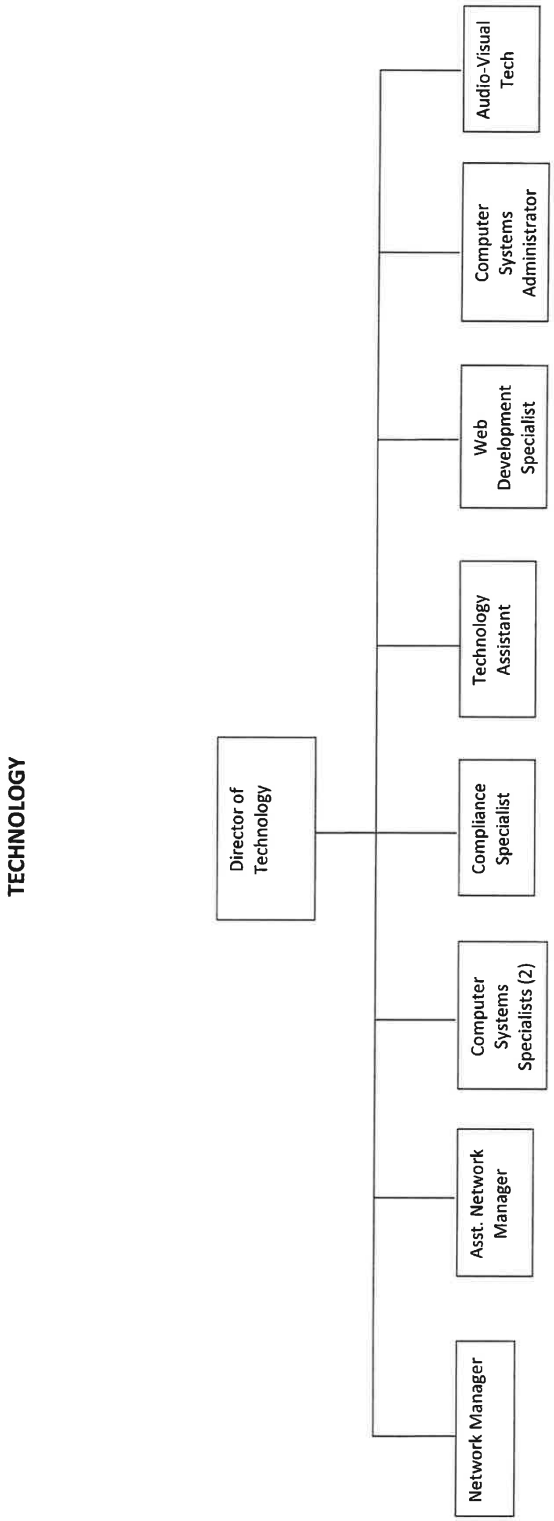




3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM

TECHNOLOGY ORGANIZATIONAL CHART



BPS STAFFING MODEL UNIT A 2017-18

Belmont High School is organized by department while Chenery Middle School is organized by team. Refer to "BPS Staffing Model Unit A 2017-18" below for staffing listing and model of Belmont High School and Belmont Chenery Middle School.

Packet #3
Document A

BPS Staffing Model Unit A 2017-2018

School	5 Eng/SS	5 Math/Sci	English	Social Studies	Math	Science	Tech Ed	Reading	Special Ed	Music	Art	ELL	Phys Ed/Health	OT	PT
Chenery	Eaton	Bayardi/Morrow	Lanoix	Panzarella	Vital	Gentes	Beebe	Mason	Bresnahan	Dagon(.4)	Byrnes	Yegen	Ciappina	Calden (.16)	Richards (.05)
	Hynes	Knapp	Salvato	Zmijewski	Coleman	Ligon	Dyer	Walls	Milstein	McLellan	Kelley	Brandt	Schmitt	Smith (.16)	
McAllister	Matthews	Dube	Tracey	Janulewicz	Kaushik	MacAulay			Gannon	Phipps	Libertini		Cocchiola		
Lewis	Foundas	Edwards	Niles	Ruane	Mitchell	Green			Watkins	Viscardi	Berson		Gonzales		
Hartunian	Hausman	Heffernan	Osborne	Silver	Waters	Nitchie			O'Regan	Carson					
	Pulizzi	Khan	Thompson	Semuels	Communiello	Reginald			Eichenberg	Landers (.4)			Frender		
	Ferraro	Williams, M	Connors	Tausek	Moyer	Bullard			Cadorette	Reavey(.6)					
			Corrieri	Metter	Golden	Marks			Willis						
			MacKinnon	Blake-Weber	Glick	Marks			LaPolla						
									Ahlborn-Hsu						
					Huestis (.6 coach)										

School	English	Social Studies	Math	Science	Tech Ed	Not Returning	Reading	Special Ed	Music/Theater	Art	ELL	Phys Ed/Health	OT	PT
High School	Carp (.6)	Shea, J (.4)	Lints	Partridge				Macnow	Ketchen	Milowsky	Murphy	O'Connor	Calden (.16)	
	Masterson	Shea, J	Olowinski	Chen				McCarthy	Reavey (.4)	Larkin		Reynolds	Smith (.16)	
Richards	Markley	Zilcoski/DiFonte	Lovett (.8)	Lewis	McLeod			Bruce	Landers (.6)	Roy		Marino		
Hurtubise	Schechinger	Pasternak (.4)	Shah/	Kim (.2)				Bruno		English		Asadoorian, S		
Turner	Yazdhiha	Pritchard	Phillips	Elfreth				Elefteriadis	Flam (.4)			Giusti (.2)		
Brow (.4)	Comment	Dasholf	Carew	Neuburger					Asadoorian, A (.2)					
	Safier/Rothenberg	Streit	Aller	Abbruzzese				Sullivan (.6)						
	Fant	McCabe	Moresco	DeFarias				Kirsten (.4JS+.6)						
	Bloom	Goldfine	Grossi	Williams										
	Reynolds	White	DeLorio	Lefebvre										
	Lockwood-Santiago	Prevost	Harper	John										
	Bosch	Berkman	Snell/Carlivati	Loosman										
		Snow	Pulido	Baker (.2)										
		McDevitt (.2)	Soliozy (.2)											
		Melnikoff (Community Service)												

BPS STAFFING MODEL UNIT A 2017-18

BPS Staffing Model Unit A 2017-2018

School	SLP	Psych	Autism	Guidance	Nurse	Not Returning	Social Wk/Adj	French	Spanish	Latin	Chinese	Library	
Chenery	Magier (.4)	Learner		Hawkins	Hogrefe/Chan		Lazar	Ahern	Sanchez	Manca	Zhang	Duff, K	
	McCann	Frankhouser (.2)		Culver	Rumley (.6)			Pruitt/Tanner (.3)	Pruitt/Tanner (.7)				
				Quinn	Jackman (.2)				Anderson				
				Vestein									
School	**SLP**	**Psych**	**Autism**	**Guidance**	**Nurse**			**French**	**Spanish**	**Latin**	**Chinese**	**Library**	
High School	Mamon (.5)	Glotzbecker		Brown	Jackman (.5)			Kaiser (.6)	Garschina-Bobrow	Brown (.6)	Chung-Swallom (.6)	Landry	
		Wiznitzer (.83)		Ross	MacKinnon			El-Gamel	Fraser/English (.8)	Dunn	Gu (.6)		
				Rowley				Sullivan, L (.6)	Sullivan, L (.4)				
				Taylor					MacIntosh				
				King					Talamas				
				Ruane					Foley (.2)				
									Porter(.6)				

CHENERY MIDDLE SCHOOL STAFFING LISTING BY TEAM AND PROGRAM FUNCTION

Packet #3

Document B

	5TH GRADE	Subject	Room	Phone
Red	Peter Ferraro	Eng/SS	216	6216
	Karen Dube	Math/Sci	217	6217
Orange	Dorothy Pulizzi	Eng/SS	219	6219
	Danielle Bayardi	Math/Sci	218	6218
Yellow	Nicole Hynes	Eng/SS	221	6221
	Mike Williams	Math/Sci	220	6220
Green	Rachel Hausman	Eng/SS	222	6222
	Yasmin Khan	Math/Sci	224	6224
Blue	Nicolette Foundas	Eng/SS	225	6225
	Nicole Heffernan	Math/Sci	223	6223
Indigo	Jennifer Mathews	Eng/SS	227	6227
	Catrina Knapp	Math/Sci	226	6226
Violet	Kerry Eaton	Eng/SS	229	6229
	Quinn Edwards	Math/Sci	231	6231

GUIDANCE			
Carla Hawkins	5th	LSO	5823
Lindsay Culver	6th	USO	5834
Robyn Vetstein	7th	LSO	5833
Joe Quinn	8th	USO	5824

FL/READING/MATH/ELL			
Carmen Anderson	Spanish	M2	1002
Beth Manca	Latin	M1	1001
Bei Zhang	Chinese	M6	1005
Eric Ahern	French Spanish	108	6108
Amy Sanchez	Spanish	M3	1003
Kari Tanner	French Spanish	109	6109
Liz Pruitt	French Spanish	106	6106
Kim Walls	Reading	M5	1005
Lois Mason	Reading	M4	1004
Julia Hueatis	Mathematics Specialist	SDR/376	TBD
Grace Yegen/Donna Stanton (LTS)	ELL	107	6107
Jane Brandt	ELL	101	6101

6th - Earth:	Subject	Room	Phone
Carrie Salvato	ELA	201	6201
Alane Januiewicz	SS	200	6200
Ben Ligon	Science	208	6208
Bhuvana Kaushik	Math	235	6235

6th - Wind:			
Maureen Lanoix	ELA	207	6207
Allison Ruane	SS	205	6205
Elizabeth Gentes	Science	210	6210
Karl Mitchell	Math	203	6203

6th - Fire			
Laura Tracey	ELA	209	6209
Brianne Panzarella	SS	214	6214
Andy MacAulay	Science	215	6215
Crystal Waters	Math	211	6211

ENCORE			
Monica Frender	Health	103	6103
David Beebe	Engineering	119	6119
Leon Dyer	Engineering	117	6117
Karen Duff	Library	IMC	5803
Kathleen Byrnes	Art	110	6110
Sarah Libertini	Art	113	6113
Steve Berson	Art	213	6213
Katie Kelley	Art	313	6313
Dana Cocchiola	PE	Gym	6154
Kristen Ciappina	PE	Gym	6154

NURSING			
Stephanie Chan	Head Nurse	Clinic	5806
Beth Rumley	Nurse	Clinic	5806
Mary Conant-Cantor	Nursing Director	Clinic	5806

LABBB			
Jessica Niland	LABBB	111	6111
Rose Farrell	LABBB	112	6112
Eileen Tomkiewicz Caroline Brown & Maggie Keen	LABBB	212 233	6212 6233

7-1:	Subject	Room	Phone
Adam Niles	English	303	6303
Rebecca Silver	Geography	301	6301
Rebecca Green	Science	308	6308
Emily Communiello	Math	302	6302

7-2:			
Lucy Osborn	English	309	6309
Peter Tausek	Geography	307	6307
Niki Nitchie	Science	310	6310
Becky Moyer	Math	305	6305

7-3:			
Kim Thompson	English	311	6311
Andrew Samuels	Geography	315	6315
Shoba Reginald	Science	314	6314
Jonathan Golden	Math	317	6317

ENCORE			
Ryan Schmitt	PE	Gym	6158
David Gonzales	PE Health	Gym 105	6158 6105
Sean Landers	Music	143	6143
Jackie Viscardi	Music/Chorus	144	6144
Sara Carson	Music/Chorus	141	6141
Sharon Phipps	Band/Music	140	6140
John McLellan	Band/Music	140	6140
Margot Reavey	Orchestra	Aud.	1011
Margaret Dagon	Orchestra	Aud.	1011
TBD	METCO Tutor		6232

Staff Spaces		Staff Spaces	
		LCR	6148
SDR/376	6377	Mac Lab	6115
US Conference Room	6326	Offices	
Staff Lounge	6120	Main	5801
Library	5803	Lower	5820
Lab 202	6202	Upper	5830
LS Copy Room	6232		
Directors' Office	5811	Kitchen	5804

8-1:	Subject	Room	Phone
Caitlin Corneri	English	331	6331
Katherine Meller	History	333	6333
Jon Marks	Science	324	6324
Wendy Coleman	Math	332	6332

8-2:			
Jill MacKinnon	English	327	6327
Suzanne Zmijewski	History	329	6329
Joanne Marks	Science	322	6322
Chandrika Vittal	Math	325	6325

8-3:			
Michelle Connors	English	320	6320
Natalie Blake-Weber	History	323	6323
Vanessa Bullard	Science	316	6316
Timothy Glick	Math	321	6321

SPECIAL EDUCATION	Subject	Room	Phone
Rebecca Gannon	Special Educ. 5	228	6228
Eleanor Ahlborn-Hsu	Special Educ. 5	369A	5810
Elizabeth Willis	Special Educ. 6	204	6204
Theresa Milstein	Special Educ. 6	204	6204
Catherine Bresnahan	Special Educ. 7	306	6306
Jessica Watkins	Special Educ. 7	369	6369
Denise LaPolla	Special Educ. 8	319	6319
Beverly Cadorette	Special Educ. 8	318	6318
Erin O'Regan	KEY/BEH	CRA	5814
Elizabeth Eichenberg	KEY/ASD	SCR	1010
Lianne McCann	Spe/Lang	206	6206
David Learner	Psych	MO	5813
Paula Lazar	Soc Work	MO	5812
Rene Magler Louisa Popkin	Spe/Lang Inclusion	320A	6328

Updated 9.1.2017

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM / BHS Faculty Visioning

VISUAL LISTENING : BHS FACULTY

Belmont High School

IMAGE FEEDBACK
VISUAL LISTENING

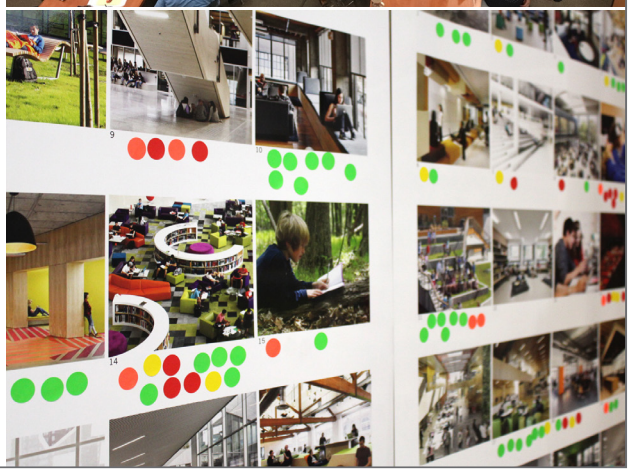
Purpose of 'Visioning Listening'

- To gauge feedback from key stakeholders through a selection of varying graphic images intended to describe certain feelings/spacial constructs that could describe potential educational space for this new project.
- This process is intended to begin to clarify who they are and what they are attracted to.
- Images are grouped into nine key categories : **Arts, Environmental Stewardship, Outdoor Learning, Personal Reflection, Socialization, Emotional Response, Athletic+Wellness, Group Learning, and Space for Making**

Rules of Engagement

- Grab some Dots :

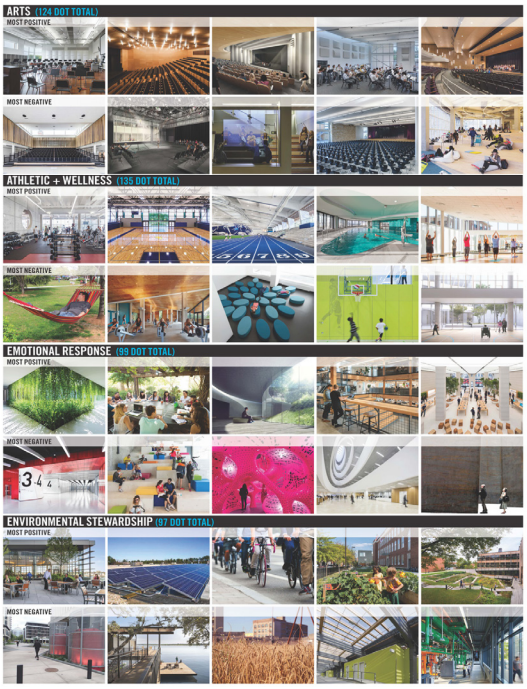
  Green (like) and Red (dislike)
- React and pick your favorite (and least favorite) images from each of the eight categories
- P+W will collect data from stakeholder feedback

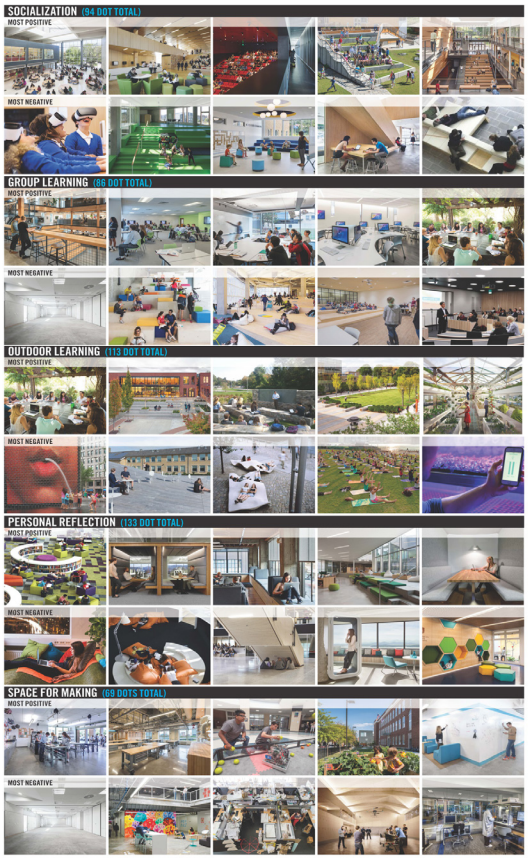


A. EDUCATIONAL PROGRAM / BHS Faculty Visioning

VISUAL LISTENING / BOARDS

VISUAL LISTENING
SUMMARY (TOP 5 / BOTTOM 5)





3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM / CMS Faculty Visioning

VISUAL LISTENING : CMS FACULTY

Belmont High School

IMAGE FEEDBACK
VISUAL LISTENING

Purpose of 'Visioning Listening'

- To gauge feedback from key stakeholders through a selection of varying graphic images intended to describe certain feelings/spacial constructs that could describe potential educational space for this new project.
- This process is intended to begin to clarify who they are and what they are attracted to.
- Images are grouped into nine key categories : **Arts, Environmental Stewardship, Outdoor Learning, Personal Reflection, Socialization, Emotional Response, Athletic+Wellness, Group Learning, and Space for Making**

Rules of Engagement

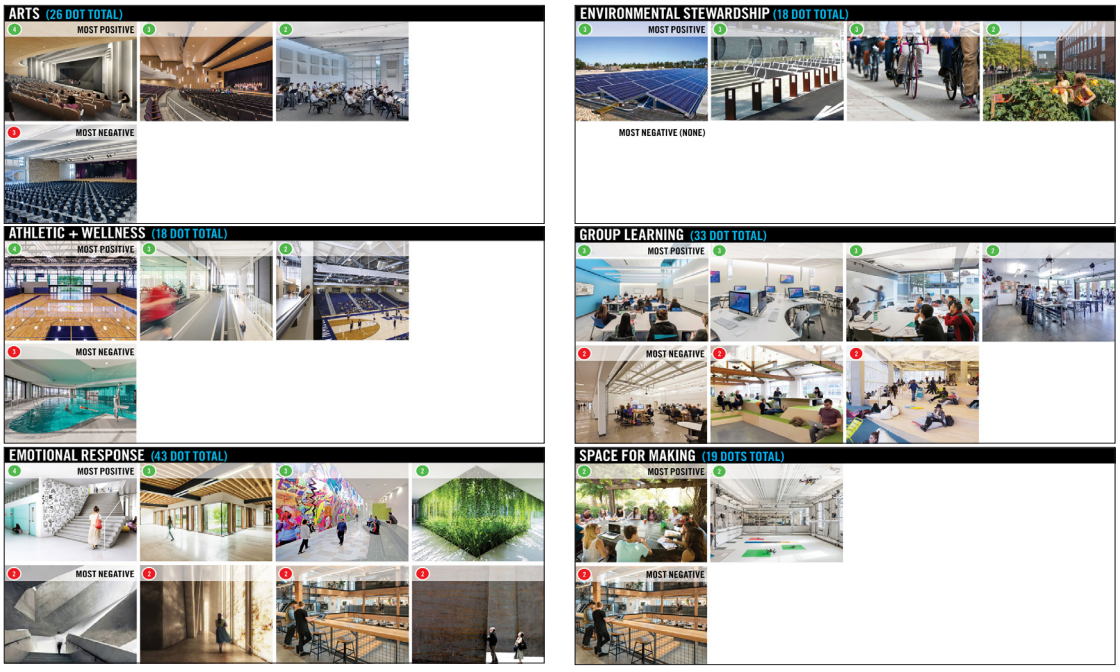
- Grab some Dots :

  Green (like) and Red (dislike)
- React and pick your favorite (and least favorite) images from each of the eight categories
- P+W will collect data from stakeholder feedback

A. EDUCATIONAL PROGRAM / CMS Faculty Visioning

VISUAL LISTENING / BOARDS

VISUAL LISTENING
SUMMARY (TOP / BOTTOM - RATED IMAGES)



3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM / CMS Faculty Visioning

VISUAL LISTENING
SUMMARY (TOP / BOTTOM - RATED IMAGES)

DISCUSSION NOTES
HOW DO WE IMPROVE UPON THESE SPACES?

1. LEARNING COMMONS

- Books, E-Books
- Use Carts, Mobile (currently)
- Teach small groups/classes 4-5 people (quiet) - Collaborate
- Not too much glass – distracting
- Audio Recording, Writing by Audio/Speaking
- Video Production, Green Screen
- More Small Spaces – Safe place for 7-8 people
- Classrooms, Small Group Spaces, Diversity of Space
- Comfy Furniture, Standing Desks, Variety
- Monitor of Space? Dedicated Staff? Supervised? After Hours? Secure
- Space for Books
- Tech Spaces with Acoustic Separation
- Video Production Room
- More Small Spaces for MS Students
- Air Conditioning

2. CIVIC COMMONS - CAFETERIA

- Too Big, Too Loud (currently)
- No Corridors, Need Acoustic Treatment
- Variety of Space to Serve Food
- Cozy Areas, Monitored/Supervised
- Flex Seating/ Bench, Booth Seating
- Recycling
- Smaller Spaces
- Better Access

3. OUTDOORS

- Garage Doors – Art ok, Not great otherwise – distracting in classroom
- One Outdoor Space Per Team, Access to Outside
- Courtyard – Outdoor, Secure
- Roof Garden – Not ideal, Danger, Need Enough Protection
- Working Space Defined – To Write, Think, etc.
- Better Protection for Roofs
- Greenhouse on Roof

4. CLASSROOMS

- Less Glass in Class for MS Students – Distracting!
- Diversity of Organization of Classroom – Flex of Use, Furniture
- Merge Classrooms Together a Possibility
- Moving Partitions that are Acoustic
- Natural Light, Operable Windows, A/C
- Can't Think When it's Too Hot
- Need Control of Natural Light – Glare (Movies, etc.)
- Safe, Efficient Emergency Exit / Process
- Connecting Doors Between Classes
- Differences in Team Classrooms for Flexibility
- Operable Walls
- Window Treatments for Less Distraction

PERKINS+WILL

December 18, 2017
Re: **Belmont High School Community Visioning – December 14, 2017**

VISUAL LISTENING : MOST LIKED (*At least 3 Green Dots*)

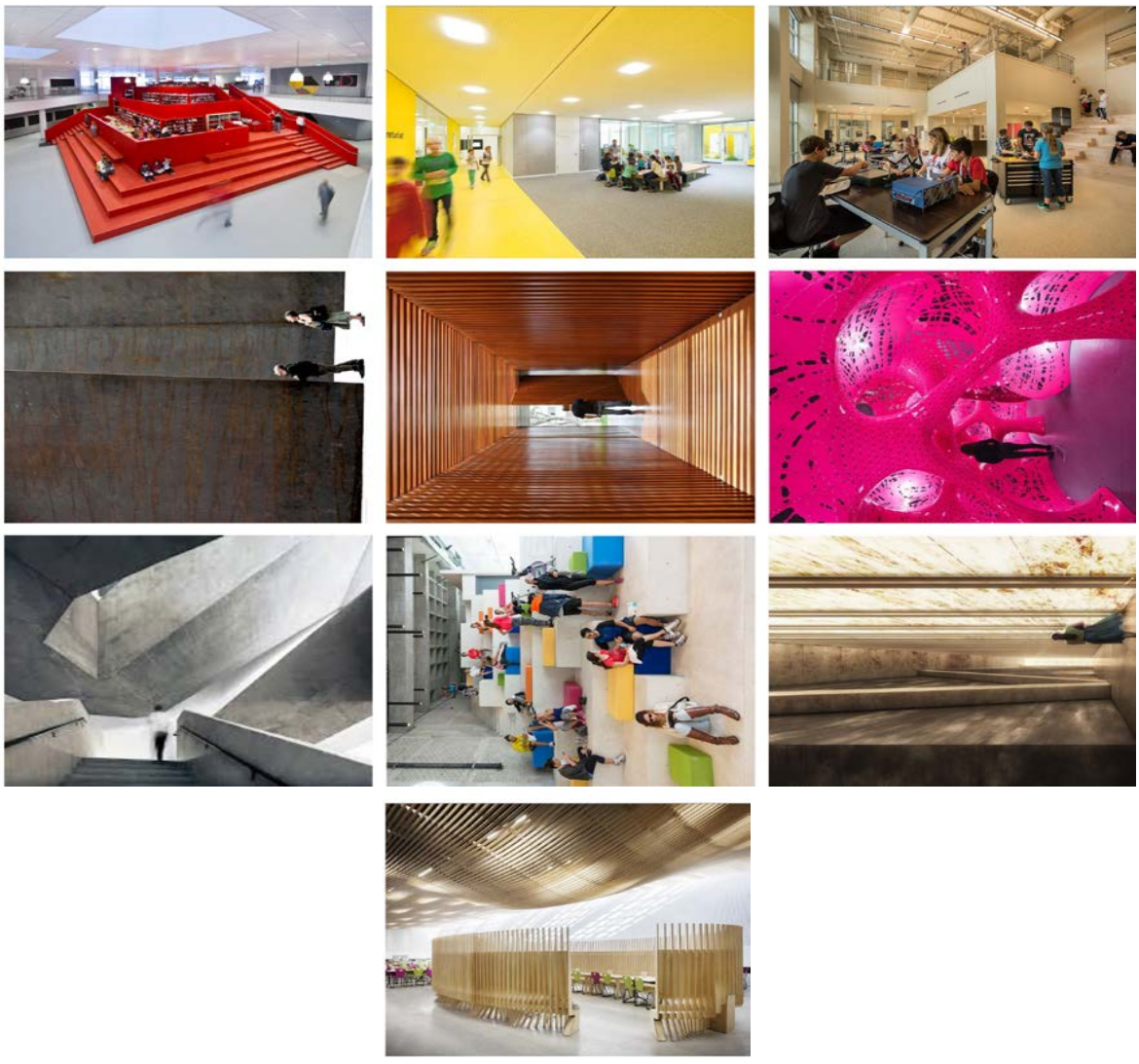
3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM / Community Engagement Visioning

PERKINS+WILL

December 18, 2017
Re: **Belmont High School Community Visioning – December 14, 2017**

VISUAL LISTENING : MOST NOT PREFFERED (*At least 2 Red Dots*)



BHS FACULTY : ‘MASH-UP’ EXERCISE

Belmont High School

BHS FACULTY WORKSHOP
‘MASH-UP’ EXERCISE

- **Break up into Working Groups**
- **Question**

  “How can traditional and non-traditional place ment of educational spaces support teaching and learning in new ways?”

- **Explore**

  Working groups to prepare adjacency diagrams with educational spaces. Take cut-outs of the major spaces and tape them to a boards to create a compelling adjacency diagram.

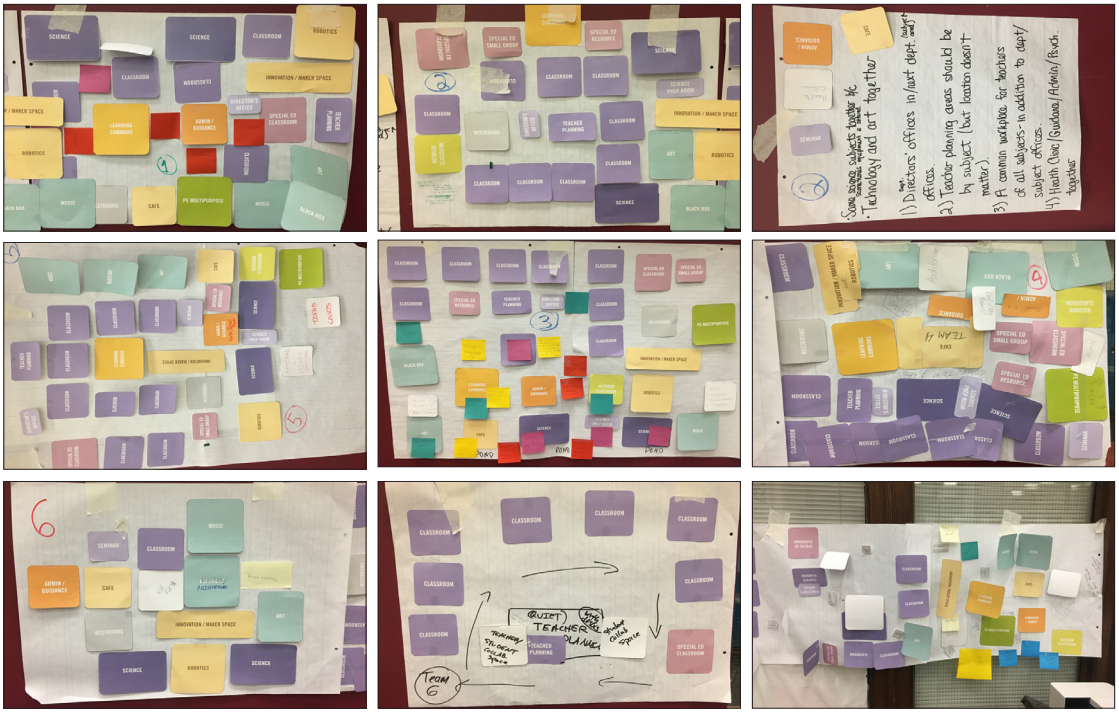
- **Report Back**

  Each team to present their arrangement and ideas that support their argument.

3.3.4 - PREFERRED SOLUTION

A. EDUCATIONAL PROGRAM / BHS Faculty “Mash-Up” Exercise

‘MASH-UP’ EXERCISE / BOARDS



‘MASH-UP’ EXERCISE / BOARDS

A. EDUCATIONAL PROGRAM / BHS Faculty "Mash-Up" Exercise

'MASH-UP' EXERCISE
SUMMARY

Group 01

- Classrooms should be surrounded by teacher planning spaces.
- Administration and Library Common spaces centrally located in school

Group 02

- Department Directors' offices should be in/next to department offices (same subject)
- Teacher planning areas should be by subject (location does not matter)
- A common workplace for teachers of all subjects (in addition to dept. / subject offices)
- Interdisciplinary work / Innovation space should be open to surrounding school.
- Administration spaces should be near health/wellness/ medical/psych. spaces.
- Technology spaces near Art spaces could create interesting projects and ideas.
- Science of same subject should be located together - to share resources / equipment

Group 03

- U-shaped classroom configuration
- Science and Art facing pond/nature
- Cafeteria commons has connection to pond
- Quiet spaces for students to focus
- Kiln needed for Arts programs
- Protected Bike racks
- More space for restrooms and teacher planning

Group 04

- Art spaces near Robotics could create dynamic projects
- Buffer the acoustics of Art spaces with surrounding school
- Have nurse space near the outdoors - access to athletics
- Administration and Guidance do not need to be together - spread out throughout the school

Group 05

- Maintain current departmental system for academic spaces
- Need Tennis Courts, Daycare
- Administration spaces should be near Guidance and Medical spaces.
- PE spaces should be located near outdoors
- Science Labs to be located together

'MASH-UP' EXERCISE
SUMMARY

Group 06

- Integrate Science Labs with the Arts
- Keep current academic Departmental Model
- Teachers need desks/storage in classrooms
- Keep current academic Departmental Model
- Teachers need desks/storage in classrooms

Group 07

- Cafeteria Commons can mix with the Learning Commons
- Have event spaces near parking for high volume outside participation / visiting
- Create 'fun' display spaces
- Need a highly flexible / multi-functional space in core of the school
- Recreational space (golf?) on roof terraces
- What recreational do we not have? Outdoor Basketball

Group 08

- Create an ideal / dynamic theater area (see diagram to right)
- Need more storage / changing rooms for Music spaces
- Create a shared Common space on ground level
- Devote one building level to Science / Labs

Idea theater / arts area layout (provided by group 08)

GRADES 7-12/ 2,215 STUDENTS

Date: 2/16/2018 Preferred Schematic Report

BELMONT HIGH SCHOOL	Existing Conditions			PROPOSED/ GRADES 7-12									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
CORE ACADEMIC SPACES			**62,291**			**0**			**112,750**			**112,750**			**105,110**	
(List classrooms of different sizes separately)																
Classroom - General	690	53	36,571				850	85	72,250	850	85	72,250	850	75	63,750	825 SF min - 950 SF max
Teacher Planning (MS-8@200, HS-6@500)	423	12	5,072										100	75	7,500	
MS Teacher Planning							200	8	1,600	200	8	1,600				
HS Teacher Planning							500	6	3,000	500	6	3,000				
Small Group Seminar (20-30 seats)							500	6	3,000	500	6	3,000	500	5	2,500	
Science Classroom / Lab	1,075	10	10,750				1,440	20	28,800	1,440	20	28,800	1,440	19	27,360	3 x85% ut=20 Seats-1 per /day/student
Prep Room	184	6	1,101				200	10	2,000	200	10	2,000	200	19	3,800	
Central Chemical Storage Rm							100	1	100	100	1	100	200	1	200	
ELL (full size classroom with partition)							1,000	2	2,000	1,000	2	2,000				
Math Department Planning (1 @ 504 SF)	*SF Included in Teacher Planning*															
Math Collaboration (1 @ 362 SF)	*SF Included in Teacher Planning*															
Language Department Planning (1 @ 508 SF)	*SF Included in Teacher Planning*															
Language Collaboration (1 @ 370 SF)	*SF Included in Teacher Planning*															
Language Teacher Workspace (1 @ 130 SF)	*SF Included in Teacher Planning*															
Social Studies Department Planning (1 @ 638 SF)	*SF Included in Teacher Planning*															
Social Studies Collaboration (1 @ 352 SF)	*SF Included in Teacher Planning*															
English Department Planning (1 @ 668 SF)	*SF Included in Teacher Planning*															
English Collaboration (1 @ 359 SF)	*SF Included in Teacher Planning*															
English Department Copy (1 @ 106 SF)	*SF Included in Teacher Planning*															
Science Department Planning (1 @ 700 SF)	*SF Included in Teacher Planning*															
Science Department Collaboration (1 @ 375 SF)	*SF Included in Teacher Planning*															
English Department Director Office	*80*	*1*	*80*													
Social Studies Department Director Office	*90*	*1*	*90*													
Science Department Director Office	*105*	*1*	*105*													
Language Department Director Office	*76*	*1*	*76*													
Math Department Director Office	*87*	*1*	*87*													
Physics Computer Lab	*1,022*	*1*	*1,022*													
Language Computer Lab	*869*	*1*	*869*													
English Writing Lab	*883*	*1*	*883*													
Growing Room	*172*	*1*	*172*													
Science Storage	*223*	*2*	*446*													
Animal Storage	*133*	*1*	*133*													
Science Computer Lab	*709*	*2*	*1,417*													
Math Project Room	*441*	*1*	*441*													
Lecture Hall	*2,100*	*1*	*2,100*													
ELL Classroom	*770*	*1*	*770*													
ELL Storage	*106*	*1*	*106*													
MODULAR HIGH SCHOOL																
*Classroom (6 @ 807 SF)**	*SF Included in Classroom - General*															
MIDDLE SCHOOL																
Classroom		*31*														
ELL Classroom		*2*														
Key 7-8		*2*														
SPECIAL EDUCATION			**6,172**			**0**			**26,510**			**26,510**			**22,150**	
(List classrooms of different sizes separately)																
Self-Contained SPED	794	4	3,176				850	10	8,500	850	10	8,500	950	15	14,250	825-950 SF equal to surrounding classrooms
Self-Contained SPED Toilet							60	4	240	60	4	240	60	15	900	
Resource Room							500	6	3,000	500	6	3,000	500	7	3,500	1/2 size Genl. Clrm.
Small Group Room							500	5	2,500	500	5	2,500	500	7	3,500	1/2 size Genl. Clrm.
Offices							120	3	360	120	3	360				

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BELMONT HIGH SCHOOL	Existing Conditions			PROPOSED/ GRADES 7-12									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
Life skills (kitchen, w/d, toilet, shower?)							1,200	1	1,200	1,200	1	1,200				
Conference Room							200	2	400	200	2	400				
OT/PT							850	1	850	850	1	850				
SPED Secretary	*100*	*1*	*100*				150	1	150	150	1	150				
Campus Program Classroom	*521*	*3*	*1,563*				500	3	1,500	500	3	1,500				
Campus Program Toilet							60	2	120	60	2	120				
Campus Program Office	*67*	*1*	*67*													
Speech Pathologist	*87*	*1*	*87*													
LABBB Collaborative																
Self contained SPED	*814*	*1*	*814*				850	5	4,250	850	5	4,250				
Self-Contained SPED Toilet	*125*	*1*	*125*				60	5	300	60	5	300				
Classroom with Lifeskills	*240*	*1*	*240*				1,400	1	1,400	1,400	1	1,400				
Ofices							120	2	240	120	2	240				
Resource Rooms							500	2	1,000	500	2	1,000				
Medical Area/ Nurse with Waiting Room							250	2	500	250	2	500				
MIDDLE SCHOOL																
Self-Contained SPED		*4*														
ART & MUSIC			**13,576**			**0**			**16,150**			**16,150**			**9,925**	
Art Classroom - 25 seats	1,573	4	6,290				1,200	5	6,000	1,200	5	6,000	1,200	4	4,800	Assumed use - 25% Population - 5 times/week
Art Workroom w/ Storage & kiln	219	1	219				425	2	850	425	2	850	150	4	600	
Band - 50 - 100 seats	1,910	1	1,910				2,000	2	4,000	2,000	2	4,000	1,500	1	1,500	Assumed use - 25% Population - 5 times/week
Chorus - 50 - 100 seats	1,733	1	1,733				2,000	1	2,000	2,000	1	2,000	1,500	1	1,500	
Ensemble							250	3	750	250	3	750	200	1	200	
Music Practice	98	5	492										75	11	825	
Music Storage	220	4	878				500	1	500	500	1	500	500	1	500	
Orchestra							1,500	1	1,500	1,500	1	1,500				
Dark Room	*247*	*1*	*247*				250	1	250	250	1	250				
Electronic Music Classroom (in vocational)	*770*	*1*	*770*						-			-				
Fine Arts Collaboration	*479*	*1*	*479*													
Fine Arts Conference Room	*369*	*1*	*369*													
Performing Arts Office/ planning area/11.4 teachers	*189*	*1*	*189*				*300*	*1*	300	*300*	*1*	300				
MIDDLE SCHOOL																
Art Classroom		*4*														
Band		*1*														
Chorus		*1*														
Orchestra		*1*														
General Music Classroom		*1*														
VOCATIONS & TECHNOLOGY			**0**			**0**			**17,560**			**17,560**			**25,600**	
Tech Clrm. - (E.G. Drafting, Business)													1,200	8	9,600	Assumed use - 50% Population - 5 times/week
Tech Clrm. - Maker/innovaiton- 7							1,200	1	1,200	1,200	1	1,200				
Tech Clrm. - Maker/ Innovation- 7							1,200	1	1,200	1,200	1	1,200				
Tech Clrm. - Maker/Innovaiton-8							1,200	1	1,200	1,200	1	1,200				
Tech Clrm. - Maker/Innovatoin-8							1,200	1	1,200	1,200	1	1,200				
Tech Clrm. - Digital Arts							1,200	1	1,200	1,200	1	1,200				
Tech Clrm. - Electronic Music Classroom							1,200	1	1,200	1,200	1	1,200				
Tech Clrm. - Coding							1,000	1	1,000	1,000	1	1,000				
Tech Shop - (E.G. Consumer, Wood)													2,000	8	16,000	Assumed use - 50% Population - 5 times/week
Tech Shop -Robodics							1,840	1	1,840	1,840	1	1,840				
Tech Shop - Engineering/ Maker							1,840	1	1,840	1,840	1	1,840				

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				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
Tech Shop - Video Production							1,840	1	1,840	1,840	1	1,840				
Tech Shop - Maker/Physics							1,000	1	1,000	1,000	1	1,000				
Tech Shop - World Language Lab							1,000	1	1,000	1,000	1	1,000				
Tech Shop - Theater Arts							1,840	1	1,840	1,840	1	1,840				
MIDDLE SCHOOL																
Tech Ed		2														
HEALTH & PHYSICAL EDUCATION			**65,007**			**45,217**			**9,725**			**54,942**			**28,604**	
Gymnasium	30,183	1	30,183	30,183	1	30,183				30,183	1	30,183	12,000	1	12,000	
PE Alternatives	1,632	1	1,632				3,000	1	3,000	3,000	1	3,000	3,000	1	3,000	
Gym Storeroom	465	4	1,860				300	2	600	300	2	600	300	1	300	
Locker Rooms - Boys / Girls w/ Toilets	5,396	2	10,792	8,430	1	8,430	3,975	1	3,975	12,405	1	12,405	12,404	1	12,404	5.6 sf/student total
Phys. Ed. Storage	157	11	1,730	900	1	900	100	1	100	1,000	1	1,000	500	1	500	
Athletic Director's Office	467	1	467				150	1	150	150	1	150	150	1	150	
Health Instructor's Office w/ Shower & Toilet	209	3	628				150	4	600	150	4	600	250	1	250	
										0	0	0				
PE Alternatives (Multi-purpose/ dance, yoga, cheer/ taller	1,632	1	1,632						-	0	0	0				
PE Alternatives (Wresteling 1.5 mats)	1,632	1	1,632						-	0	0	0				
Officials Rooms (8 male/8 female / shower locker, toilet							250	2	500	250	2	500				
Trainers Room							800	1	800	800	1	800				
PE Multipurpose (MS) Reuse Small Gym Existing	*5,704*	*1*	*5,704*							0	0	0				
First Aid Office / Pool	*71*	*1*	*71*													
Small Gym/ Reuse for PE Multipurpose (MS)	*5,704*	*1*	*5,704*	*5,704*	*1*	*5,704*				5,704	1	5,704				
Trainer	*228*	*1*	*228*													
Wellness Classroom	*905*	*2*	*1,809*													
Team Uniforms	*555*	*1*	*555*													
Equipment Storage	*380*	*1*	*380*													
White Field House																
Trainer Room	*100*	*1*														
Locker Room	*2,000*	*1*									0					
Storage	*920*	*1*														
Coach Offices	*100*	*2*														
Toilet rooms (men + Women)	*300*	*1*														
MIDDLE SCHOOL																
Health Classroom		2														
MEDIA CENTER			**6,641**			**0**			**13,744**			**13,744**			**13,744**	
Media Center / Reading Room	6,184	1	6,184				13,744	1	13,744	13,744	1	13,744	13,744	1	13,744	
Computer Lab	457	1	457													
AUDITORIUM / DRAMA			**11,447**			**0**			**14,200**			**14,200**			**10,400**	
Auditorium	7,898	1	7,898				7,500	1	7,500	7,500	1	7,500	7,500	1	7,500	2/3 Enrollment @ 10 SF/Seat - 750 seats MAX
Stage	2,762	1	2,762				2,400	1	2,400	2,400	1	2,400	1,600	1	1,600	
Auditorium Storage							500	1	500	500	1	500	500	1	500	
Make-up / Dressing Rooms	385	1	385				300	2	600	300	2	600	300	2	600	
Controls / Lighting / Projection	27	1	27				200	1	200	200	1	200	200	1	200	
Black Box							3,000	1	3,000	3,000	1	3,000				
Auditorium Workshop	*375*	*1*	*375*													
DINING & FOOD SERVICE			**11,687**			**0**			**16,698**			**16,698**			**16,698**	
Cafeteria / Student Lounge / Break-out	7,193	1	7,193				11,075	1	11,075	11,075	1	11,075	11,075	1	11,075	3 seatings - 15SF per seat
Chair / Table Storage							704	1	704	704	1	704	704	1	704	
Scramble Serving Area	1,259	1	1,259				600	1	600	600	1	600	600	1	600	

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ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
Kitchen	2,495	1	2,495				3,515	1	3,515	3,515	1	3,515	3,515	1	3,515	1600 SF for first 300 + 1 SF/student Add'l
Staff Lunch Room	740	1	740				804	1	804	804	1	804	804	1	804	20 SF/Occupant
MEDICAL			**738**			**0**			**2,140**			**2,140**			**1,710**	
Medical Suite Toilet	20	2	39				60	4	240	60	4	240	60	1	60	
Nurses' Office / Waiting Room	103	2	205				250	2	500	250	2	500	250	1	250	
Interview Room							100	5	500	100	5	500	100	5	500	
Examination Room / Resting	494	1	494				100	9	900	100	9	900	100	9	900	
ADMINISTRATION & GUIDANCE			**4,106**			**0**			**10,062**			**10,062**			**7,421**	
General Office / Waiting Room / Toilet	20	2	39				450	2	900	450	2	900	1,108	1	1,108	
Teachers' Mail and Time Room	103	2	205				100	2	200	100	2	200	100	1	100	
Duplicating Room							200	2	400	200	2	400	200	1	200	
Records Room	494	1	494				100	1	100	100	1	100	200	1	200	
Principal's Office w/ Conference Area	20	2	39				375	2	750	375	2	750	375	1	375	
Principal's Secretary / Waiting	103	2	205				125	2	250	125	2	250	125	1	125	
Assistant Principal's Office - AP1							200	3	600	200	3	600	150	1	150	
Assistant Principal's Office - AP2	494	1	494				200	2	400	200	2	400	150	4	600	
Conference Room	103	2	205				225	2	450	225	2	450	450	1	450	
Guidance Office							150	10	1,500	150	10	1,500	150	12	1,800	
Guidance Waiting Room	494	1	494				75	2	150	75	2	150	100	1	100	
Guidance Storeroom	20	2	39				100	2	200	100	2	200	100	1	100	
Career Center	103	2	205				704	1	704	704	1	704	704	1	704	
Records Room							100	2	200	100	2	200	302	1	302	
Teachers' Work Room	494	1	494				1,108	1	1,108	1,108	1	1,108	1,108	1	1,108	
AP Secretary/ MS							100	2	200	100	2	200				
AP Waiting Area/ HS							50	3	150	50	3	150				
Conference Room Guidance/ HS							250	1	250	250	1	250				
Guidance/ Copy area/ HS							100	1	100	100	1	100				
Director's offices							200	6	1,200	200	6	1,200				
Accounting							250	1	250	250	1	250				
School Psychologist	*133*	*2*	*265*													
Assistant Principal's Office - AP3	*139*	*1*	*139*													
Visual Performing Arts Director	*135*	*1*	*135*													
Vault	*113*	*1*	*113*													
School Resource Office	*117*	*1*	*117*													
Director Secretary Office	*118*	*1*	*118*													
Storage	*58*	*2*	*116*													
MODULAR HIGH SCHOOL																
Break / Copy Room	*190*	*1*	*190*													
MIDDLE SCHOOL																
Guidance Office		*2*														
CUSTODIAL & MAINTENANCE			**2,774**			**0**			**3,437**			**3,437**			**3,286**	
Custodian's Office	695	1	695				150	1	150	150	1	150	150	1	150	
Custodian's Workshop							250	1	250	250	1	250	250	1	250	
Custodian's Storage	315	1	315				375	1	375	375	1	375	375	1	375	
Recycling Room / Trash							400	1	400	400	1	400	400	1	400	
Receiving and General Supply	138	1	138				704	1	704	704	1	704	704	1	704	
Storeroom							1,208	1	1,208	1,208	1	1,208	1,208	1	1,208	
Network / Telecom Room							200	1	200	200	1	200	200	1	200	
Maintenance Equipment	*266*	*1*	*266*				150	1	150	150	1	150				
Janitor Closet	*41*	*7*	*286*													
Storage	*262*	*3*	*785*													
Custodial Office / Storage	*289*	*1*	*289*													

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OTHER			**15,853**			**9,067**			**3,345**			**12,412**			**0**	
Other (specify)	*413*	*3*	*1,240*				900	1	900	900	1	900				
District Offices																
Technology Offices	*303*	*1*	*303*				150	1	150	150	1	150				
Technology Director Office	*235*	*1*	*235*				400	1	400	400	1	400				
Technology Conf Room	*262*	*2*	*523*				200	1	200	200	1	200				
Technology Server Room	*215*	*1*	*215*													
A/V Coordinator	*375*	*1*	*375*													
Metco Classroom							850	1	850	850	1	850				
Metco Office	*133*	*2*	*265*				150	1	150	150	1	150				
BEA Office	*423*	*1*	*423*				150	1	150	150	1	150				
Lexington Chinese School	*2,015*	*1*	*2,015*						-			-				
Wood Shop / Office / Storage	*152*	*1*	*152*						-			-				
Food Service Director	*113*	*1*	*113*				*150*	*1*	*150*	*150*	*1*	*150*				
Nurse's Office/ Waiting (1 district off/1nurse school off							150	1	150	150	1	150				
Community Service/Volunteer Office									-			-				
Community Service/ Volunteer Meeting space																
Pool/ Pump Room	*7,447*	*1*	*7,447*	7,447	1	7,447				7,447	1	7,447				
Locker Room / Pool	*810*	*2*	*1,620*	810	2	1,620				810	2	1,620				
School Store	*61*	*1*	*61*				*125*	*1*	125	*125*	*1*	125				
Resource Officer	20	2	39				120	1	120	120	1	120	120	1	120	
MODULAR HIGH SCHOOL	*206*	*2*	*412*													
Town Maintenance Office / Storage	*208*	*2*	*415*													
Belmont Office / Storage																

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				Existing to Remain/Renovated			New			Total						
ROOM TYPE	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	ROOM NFA[1]	# OF RMS	area totals	Comments
Total Building Net Floor Area (NFA)			200,292						246,321			300,605			244,647	
Proposed Student Capacity / Enrollment															2,215	157
NON-PROGRAMMED SPACES					% of GFA			% of GFA			% of GFA					
Other Occupied Rooms (list separately)											0%					Non-Programmed space areas are
											0%					required to be included in the
											0%					following submittals:
											0%					Schematic Design Submittal
Unoccupied MEP/FP Spaces											0%					Design Development Submittal
Unoccupied Closets, Supply Rooms & Storage Rooms											0%					60% Construction Documents
Toilet Rooms											0%					90% Construction Documents
Circulation (corridors, stairs, ramps & elevators)											0%					Final Construction Documents
Remaining[3]											33%	150,303				
Total Modular High School Gross Floor Area (GFA)			7,848													
Total Building Gross Floor Area (GFA)[2]			266,688									450,908			367,755	
Grossing factor (GFA/NFA)			1.33									1.50			1.50	

[1] **Individual Room Net Floor Area (NFA)** Includes the net square footage measured from the inside face of the perimeter walls and includes all specific spaces assigned to a particular program area including such spaces as non-communal toilets and storage rooms.

[2] **Total Building Gross Floor Area (GFA)** Includes the entire building gross square footage measured from the outside face of exterior walls 450,908

[3] **Remaining** Includes exterior walls, interior partitions, chases, and other areas not listed above. Do not calculate this area, it is assumed to equal the difference between the Total Building Gross Floor Area and area not accounted for above.

Architect Certification

I hereby certify that all of the information provided in this "Proposed Space Summary" is true, complete and accurate and, except as agreed to in writing by the Massachusetts School Building Authority, in accordance with the guidelines, rules, regulations and policies of the Massachusetts School Building Authority to the best of my knowledge and belief. A true statement, made under the penalties of perjury.

Name of Architect Firm: Perkins + Will

Name of Principal Architect: Robert Brown

Signature of Principal Architect:

Date: Feb 16th, 2018

3.3.4 - PREFERRED SOLUTION

C. PREFERRED SOLUTION SPACE SUMMARY / COMMENTS

The OPM, Design Team, the office of the Superintendent, faculty, and administration have been conducting an ongoing review of the educational program and space summary in order to ensure efficiencies in as many areas as possible. The discussions include looking at the utilization of all spaces in the space summary to ensure the need relative to the educational program. The below summarizes the spaces that are slated for reuse in the preferred option with the necessary explanation narrative.

PE MULTIPURPOSE (MIDDLE SCHOOL)

The team during the PSR phase determined that it would be more cost effective to reuse the existing small gym. That change is noted in the current space summary and has reduced the required square footage of the PE MULTIPURPOSE ROOM from 6,300 net square feet to 5,704 net square feet. A total reduction of 600 net square feet.

LOCKER ROOMS (BOYS AND GIRLS WITH TOILETS)

The reuse of the existing small gym has triggered available space in the lower level directly below the existing small gym slated for reuse. This space currently accommodates the Boys Locker room and equipment storage. This existing boys locker room and storage area will be repurposed to accommodate the Locker Rooms for Boys and Girls with Toilets. The existing LOCKER ROOMS that are being repurposed below the small gym are totaled at 8,430 net square feet. This 8,430 of renovated area will be combined with 3,975 net square feet of new Locker room space to meet the program requirements of 12,405 net square feet. This renovated space is noted in the Level 2 estimate which reduces the required net square footage of new space for the Boys and Girls Locker Rooms.

PHYSICAL EDUCATION STORAGE

The Physical Education storage space is located in the northeast corner of the main existing large gym to remain. Due to its location it was determined by the team that this space would be renovated to accommodate the new Physical Education Storage needs. The renovated storage area is totaled at 900 net square feet of existing which will be combined with 100 net square feet of new space to meet the program requirements of 1,000 net square feet of PE storage. This renovated space is noted in the Level 2 estimate which reduces the required net square footage of new space for the Physical Education Storage.

C. PREFERRED SOLUTION SPACE SUMMARY / COMMENTS

3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY

Per Project Advisory #41, all MSBA Core Program projects must be registered with USGBC LEED-S Version 4 or MA CHPS. The Belmont School Building Committee has chosen to move forward with LEED-S Version 4 and intends to achieve 2% additional reimbursement by achieving a min. of "certified" within that rating system and by exceeding the level of energy efficiency required in the current Massachusetts (base) energy code by 10%

The Design Team advanced the sustainability goals in the Feasibility Stage in order to allow it equal emphasis with the many other design challenges, and embed the chosen strategies into the overall design to create a more unified whole.

The Design Team needed to first understand was where the Town's priorities lay. To better understand this, a meeting was arranged with members of the Building Committee with sustainable expertise and interest in the sustainability component of the high school design.

In its first presentation to the building committee the Design Team introduced the core concepts of sustainability and showed how they might become integral to student life at the high school, as well as providing long term benefits to the district, defining sustainability as a concept supported by a triad of concerns: the social, the environmental, and the economic.

The idea of sustainability having a social component aligns with the educational programming vision established by the District, whereby creating a shared sense of community and opportunity for curriculum integration parallel the interdisciplinary, shared learning environment the District is creating for the new high school.

The environmental aspects of sustainability are perhaps self evident, addressing CO^2 emissions, natural habitat, responsible resource use, safe materials, and watershed impact.

Economically, sustainability presents a multitude of issues. The up front capital costs of implementing sustainable strategies can add significantly to project budgets while simultaneously providing long term payback in the form of energy and/or water savings. Other issues to be addressed include maintenance costs, space requirements, adaptability, and ease of maintenance.

During the ensuing discussions it came to light that building efficiency was a prime concern for the community, and should be considered among the highest priorities of any sustainable strategy.

The Design Team prioritized energy and water use as those likely to have the most potential payback and relevance to the community, respectively. Material health, ecosystem health, sustainable infrastructure and building resilience were also presented and discussed as project priorities. The strategies for achieving these goals are outlined as follows:

ENERGY

- A LEED V4 ASHRAE 2010 baseline model will be created to set an appropriate benchmark for system evaluation with the understanding that the building form and exact size may evolve through the subsequent design phases.
- A number of alternative building systems will be modeled so that relative energy savings can be compared to system first costs in the upcoming phase of design pricing. Energy use intensities (EUI) and estimated operating costs will be determined for these systems.
- Additional stand-alone energy saving strategies will be evaluated and shortlisted as potentially viable options. Each will be further evaluated against their first cost in the SD phase.

WATER

- A LEED V4 baseline water demand estimate will be created in early schematic design to set an appropriate benchmark for water conservation strategy evaluation with the understanding that the building use and exterior demand may evolve through the subsequent design phases.
- Water conservation strategies were outlined and the percent reduction values were estimated per strategy to set project goals for water use reduction.
- A model will be created in early schematic design to evaluate building water demand vs available rainfall over the course of the year. A cistern size that allows for increased water reduction through a rainfall harvesting system will be evaluated and sized with diminished return considered

The energy modeling will consider four scenarios, divided between high performing, high efficiency systems and more conventional high efficiency systems. a Since the MSBA requires the project to attain LEED-S certification at a minimum, that will be established as the baseline for comparison.

The scenarios are as follows:

D. SUSTAINABILITY

1. LEED BASELINE

- Conventional gas-fired hot water boilers
- Water-cooled chiller with cooling tower
- Variable air volume systems serving the classrooms
- Outside air energy recovery for VAV systems where required by ASHRAE 90.1
- Code whole building lighting watt density or 0.99 w/sf.
- Code wall, roof, and fenestration U-values and SHGC.

3. FAN COIL UNITES (HIGH EFFICIENCY)

- Gas-fired condensing hot water boilers
- High efficiency evaporative-cooled chiller
- Fan coil units in the classrooms
- High efficiency 100% outside air energy recovery ventilation units
- Whole building lighting watt density 0.70 w/sf.
- High efficiency wall, roof, and fenestration U-values and SHGC.

2. GROUND SOURCE HEAT PUMP (HIGH PERFORMANCE)

- Vertical ground loop system
- Central water-to water heat pump chillers
- Displacement induction units in the classrooms
- High efficiency 100% outside air energy recovery ventilation unit
- Whole building lighting watt density 0.20 w/sf.
- High efficiency wall, roof, and fenestration U-values and SHGC.

4. CLASSROOM PARTIAL COOLING

- Gas-fired condensing hot water boilers
- Fan coil units in the classrooms
- High efficiency 100% outside air energy recovery ventilation unit w/DX cooling
- Whole building lighting watt density 0.20 w/sf.
- High efficiency wall, roof, and fenestration U-values and SHGC.

The scenario modeling will result in Building Simulation Reports, which will be used for comparison.

NEXT STEPS

A pricing narrative will be formed for each major conservation strategy and the evaluation matrix illustrated in the presentation will be filled in to help the design team and client make decisions based on the overall sustainable goals. The matrix will be updated as energy models and strategies are refined so that sustainable energy and water strategies are executed efficiently. Non-energy and water related sustainable measures will be a focus of early SD conversations.

01.30.2018 BHS STEERING COMMITTEE

BELMONT HIGH SCHOOL

AGENDA

01 / Civil Engineering
02 / Mechanical
03 / Electrical
04 / Plumbing + FP
05 / IT
06 / NZE PROCESS
07 / CHPS vs. LEED?

01/ CIVIL ENGINEERING

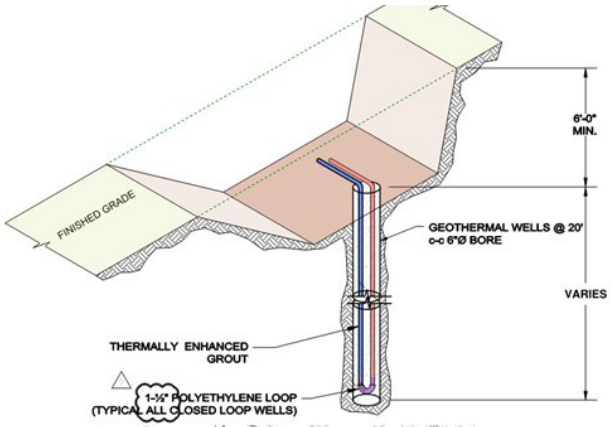
BELMONT HIGH SCHOOL

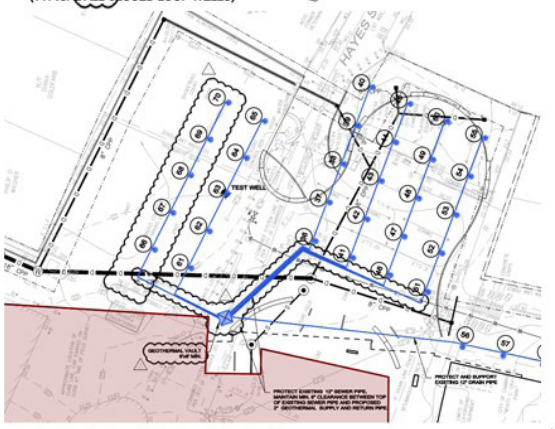
WELL FIELDS CAN BE PLACED UNDER:

- Fields
- Parking
- Roadways
- Landscape areas (No Trees)

WELLHEADS 4'-5' BELOW GRADE

- Coordinate with light pole bases, other utilities, trees
- Spacing and depth determined by geotechnical engineer after test well installed





3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / STORMWATER GOALS

MEET REGULATORY REQUIREMENTS

- Improve quality of stormwater coming off the site
- Decrease any potential for flooding, either on-site or downstream

INTEGRATE STORMWATER INTO LANDSCAPE

- Avoid creating stormwater systems that take away from the areas available for program or that are not also landscape features
- Decentralized systems situated appropriately around site
- Reuse/reclaim stormwater as required for either building or site program
  - i.e. toilet flushing,
  - mechanical make-up water,
  - site irrigation

LOOK TO CREATE A LEARNING ENVIRONMENT/OPPORTUNITY

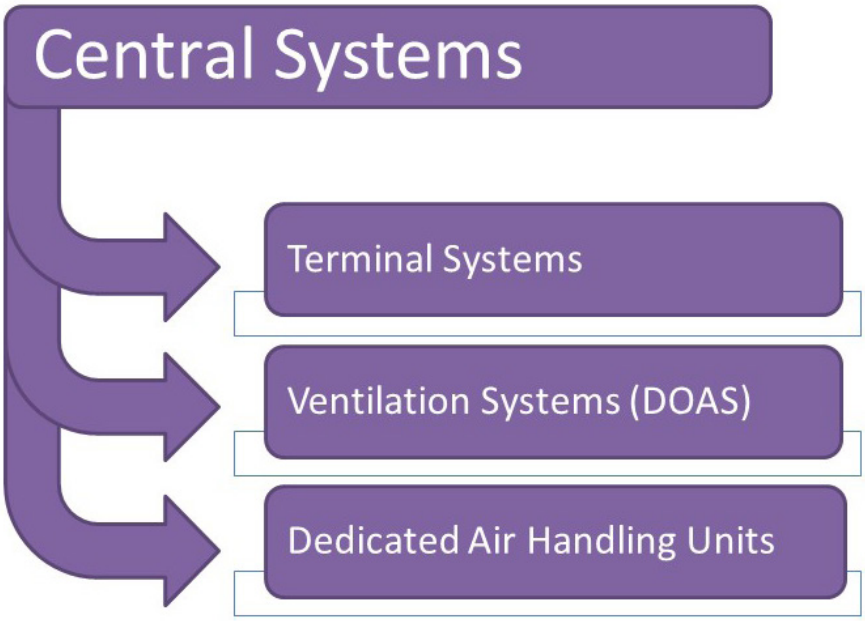
Kroon Hall Water Reuse Feature
Yale University, New Haven, CT

02/ MECHANICAL

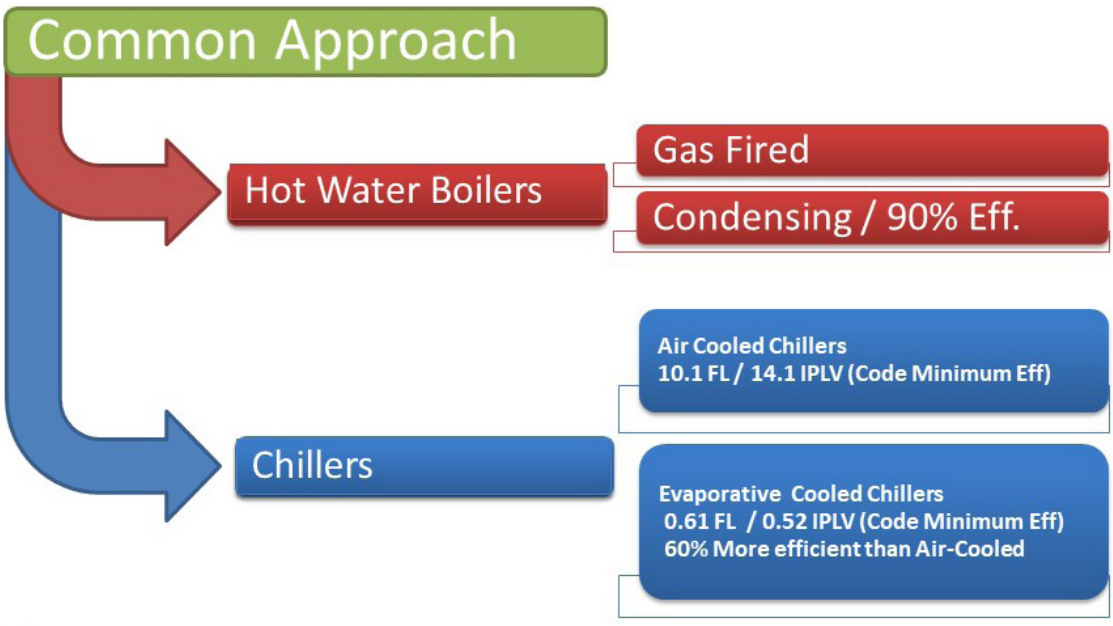
BELMONT HIGH SCHOOL

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / HVAC SYSTEMS COMPONENTS



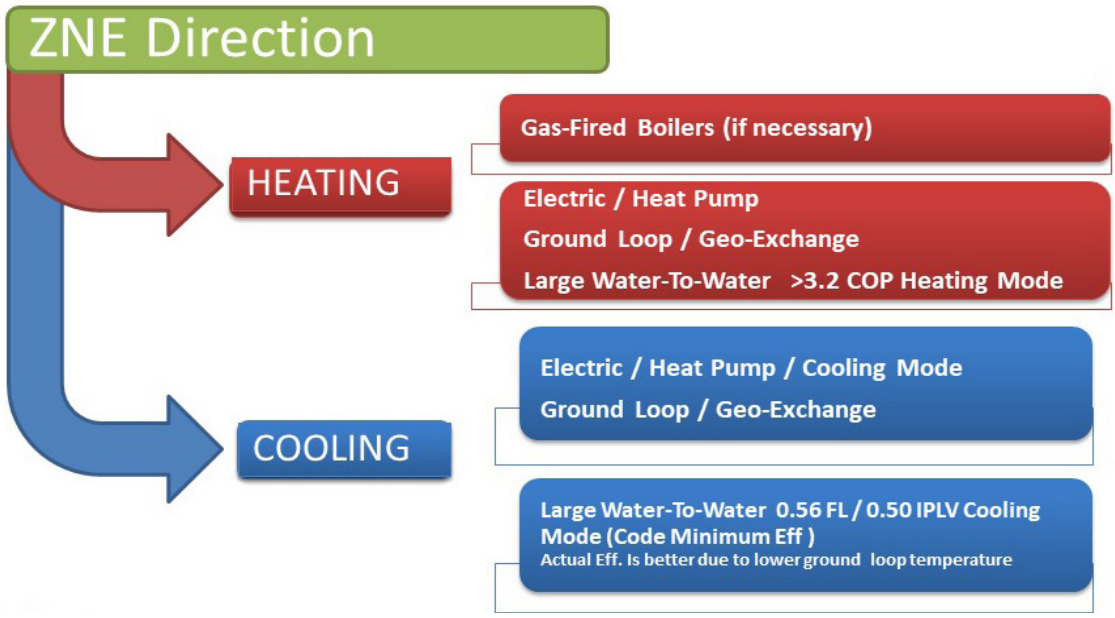
BELMONT HIGH SCHOOL / CENTRAL SYSTEMS



3.3.4 - PREFERRED SOLUTION

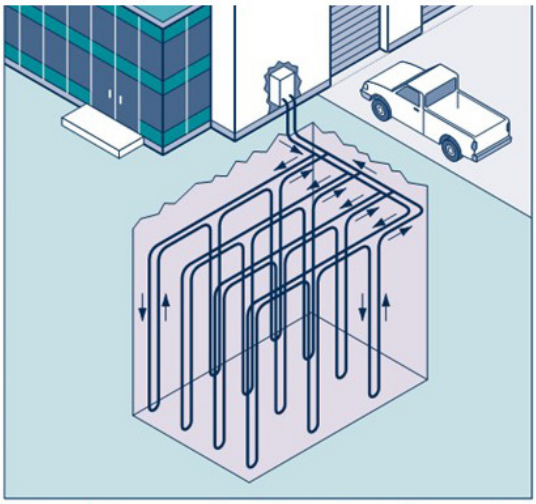
D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / CENTRAL SYSTEMS



BELMONT HIGH SCHOOL / GEOTHERMAL SYSTEMS

Geothermal heat pumps are among the most energy- and cost-efficient heating and cooling systems available today. They use less electricity and produce fewer emissions than conventional systems, reduce air and water pollution, and provide a comfortable indoor environment for building occupants.



Geothermal heat pumps use the stable temperature of the ground (vertical boreholes typically are 100 to 400 feet deep) as a heat source to warm buildings in winter and as a heat sink to cool them in summer.

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / GEOTHERMAL SYSTEMS BENEFITS

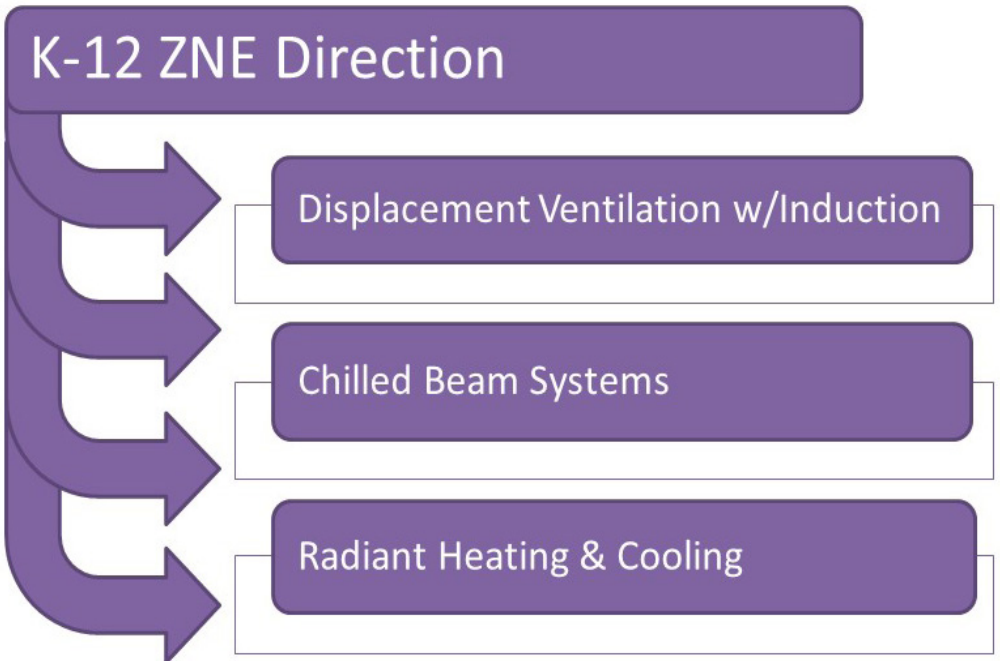
High Efficiency Geothermal heating systems can extract up to six times the heat energy they use in electrical energy. They are at least three and up to six times more efficient..

Renewable Energy – No Pollution Geothermal is a renewable source of energy for heating, cooling, and air conditioning. There is no pollution caused by geothermal systems

Maintenance Geothermal heating and cooling systems have few moving parts, so they are highly reliable. Unlike central air conditioning systems, geothermal cooling systems have no parts outside. There is no wear and tear on an outdoor condenser.

Reliability Geothermal heating systems can last far longer than most heating systems. The polyethylene pipe in most loop fields typically has a 25 or 50 year warranty and estimates are that it can last up to 200 years.

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS

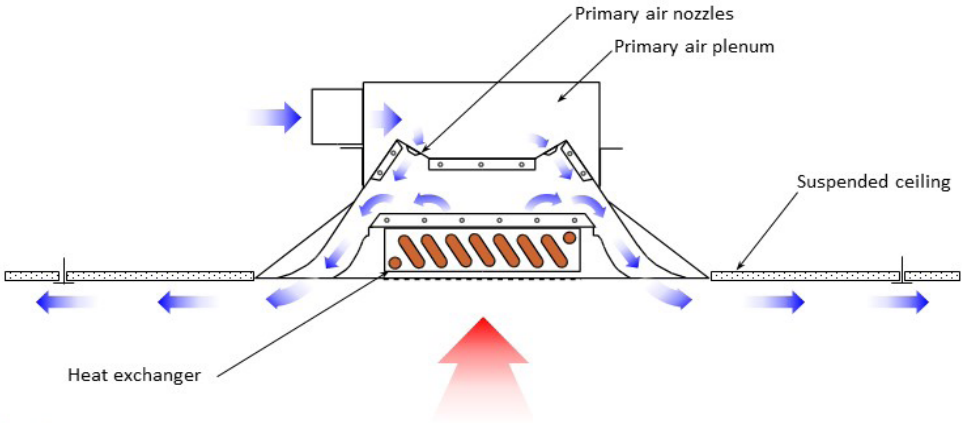


3.3.4 - PREFERRED SOLUTION

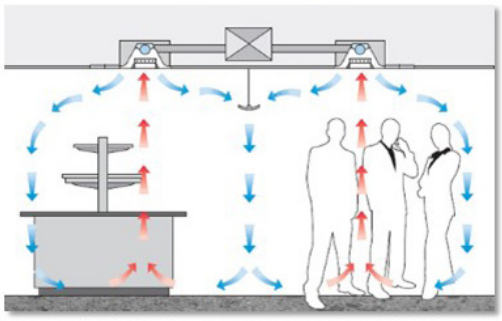
D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - ACTIVE CHILLED BEAM

- What is an Active Chilled Beam and how does it work?



BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - ACTIVE CHILLED BEAM



Benefits For Classrooms

- Acoustics
  - Little or no fan noise
  - Low velocity air
- Maintenance
  - No filter changes in occupied areas
  - Dry coils on Chilled Beams, vacuum off dust

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - ACTIVE CHILLED BEAM

Why Chilled Beams?

- Reduced Energy Consumption
- Decreased Duct Sizes
- Improved Thermal Comfort
- Air Quality
- Low Noise Levels
- Low Maintenance

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - DISPLACEMENT W/ INDUCTION

Benefits

Indoor air quality, silent operation, and thermal comfort are all important design considerations for schools.

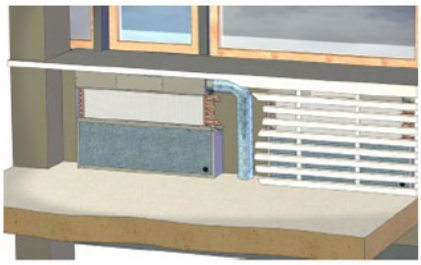
Higher ventilation effectiveness In each unit, outside air is mixed with room air, which is conditioned if required, and directed into the room at floor level and at low velocity. Individual comfort is greatly improved as the upward air flow pattern toward the ceiling exhaust promotes removal of heat-borne contaminants and provides improved IAQ in the occupied zone.

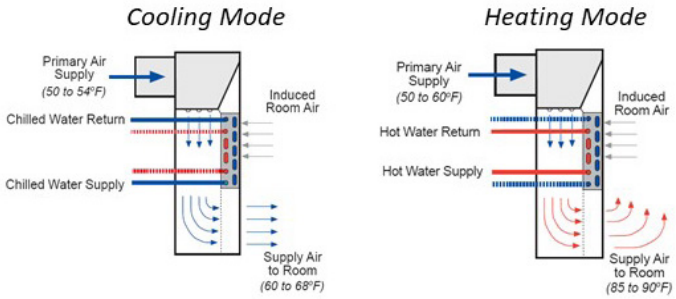
Acoustics DV helps to meet demanding acoustic requirements for classrooms.

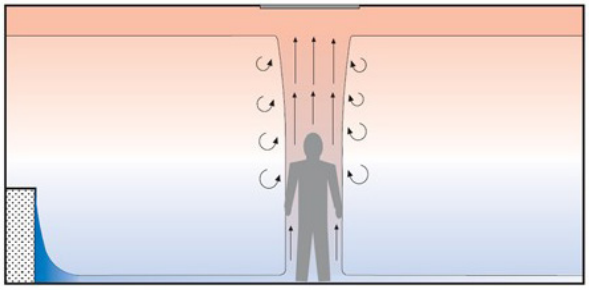
3.3.4 - PREFERRED SOLUTION

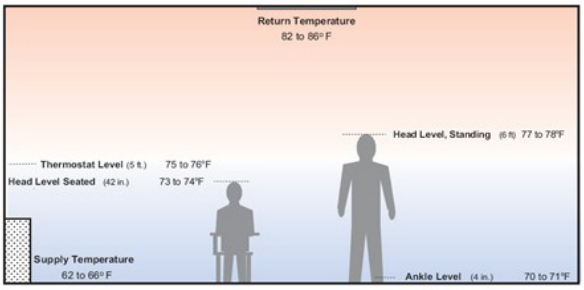
D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - DISPLACEMENT (INDUCTION)





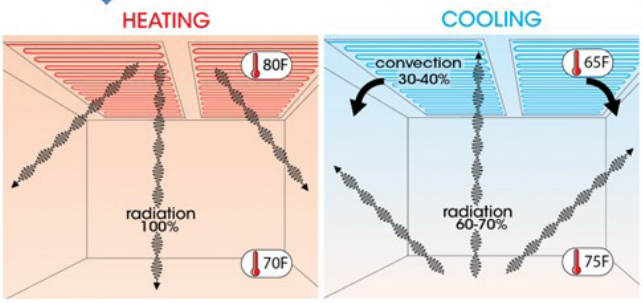


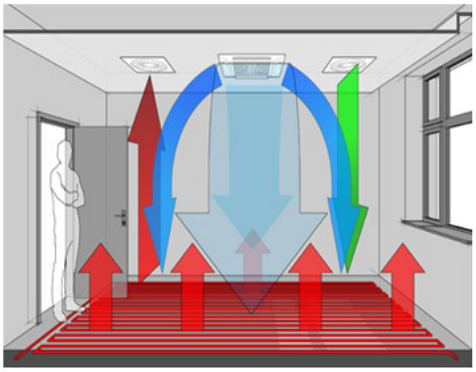


BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - DISPLACEMENT (INDUCTION)

Cool or warm water is piped through panels, ceilings or floors to provide radiant thermal comfort to occupants.

- 100% of ventilation air is provided by a Dedicated Outside Air System (DOAS) which can include energy recovery.
- Pumping water is significantly more efficient than using fans to push air, so fan energy is significantly reduced with this system.
- Compatible with other lower energy cooling systems such as indirect evaporative cooling, ground or water source heat pumps, and high efficiency chillers.



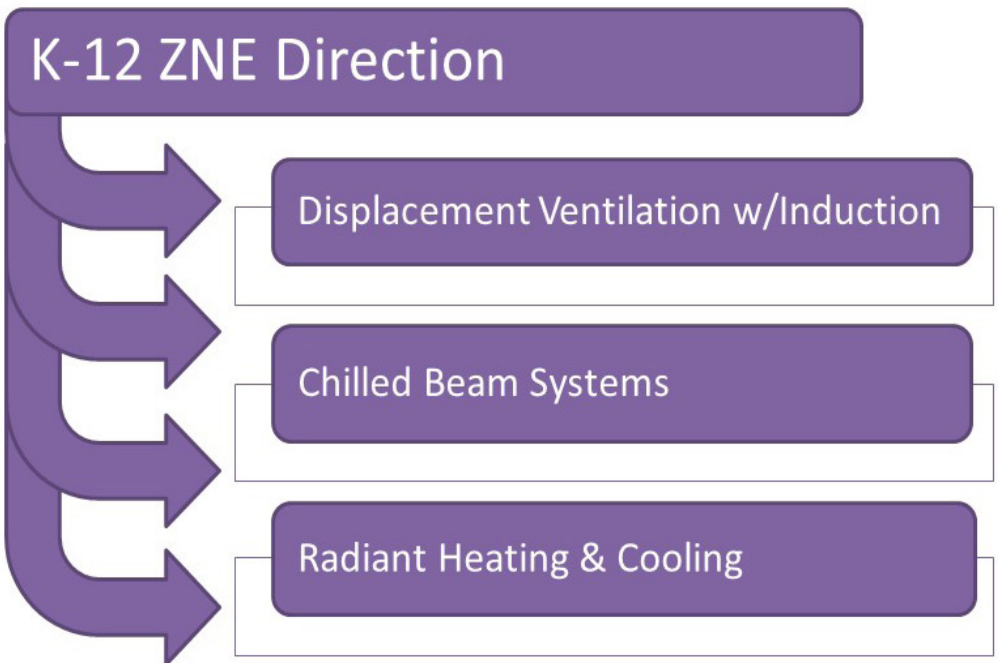


D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS - RADIANT HEATING AND COOLING

- Energy efficiency – Significant fan energy savings / Energy savings on the order of 10 – 40% compared to overhead VAV systems
- High Level of thermal comfort / Responsive Control
- Smaller AHU & Ductwork
- Significant reduction of riser space
- Quiet Operation
- Low maintenance

BELMONT HIGH SCHOOL / TERMINAL SYSTEMS



3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / ELECTRICAL SYSTEMS

- New Main Electric Service
- New Emergency Distribution System
- Fire Alarm - Maintain existing where applicable
- Technology per Technology Section
- Integrated Intrusion, Access Control, CCTV, and Alarm System

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / ELECTRICAL SYSTEMS - SUSTAINABILITY

- Metering and measurement of air conditioning, fans, lighting, and receptacle power
- Plug and process load reductions through the use of vacancy/occupancy sensor controls
- High efficiency lighting systems include LED luminaries throughout the building
- Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting
- Exterior building mounted and pole top luminaries will be LED type with full cut-off distribution.
- Empty conduits and space provisions will be provided for future photovoltaic (PV) installations.
- Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.

04/ PLUMBING + FP

BELMONT HIGH SCHOOL

3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / PLUMBING SYSTEMS

WATER CONSERVATION & REDUCING WATER DEMANDS BY:

- Utilize “low-flow” fixtures throughout (new & existing buildings)
- Dual-flush water closets (1.6 gpf - 1.0 gpf)
- Pint-flush urinals / waterless urinals
- Specifying energy efficient kitchen equipment / fixtures
- Utilize “Grey Water System” - Waste water from sinks, showers and kitchen equipment re-used to supply water closets and urinals
- Capture rainwater for re-use in irrigation systems

BELMONT HIGH SCHOOL / FIRE PROTECTION

FIRE PROTECTIONS SYSTEMS

- New service and systems throughout building
- Wet sprinkler system
- Special systems required? IT Rooms, Records Rooms, Unique Storage
- Types of Special Systems
    - Pre-Action
    - Dry
    - Gaseous (Novec 1230, Inergen)

05/ INFORMATION TECHNOLOGY (IT)

BELMONT HIGH SCHOOL

BELMONT HIGH SCHOOL / INFORMATION TECHNOLOGY SYSTEMS

STRUCTURED CABLING

- District Fiber
- New MDF and IDF Buildout
- Latest Standards : Fiber, Category 6A

DATA AND VOICE COMMUNICATIONS

- VoIP System
- Network Hardware
- WLAN
- District Implications

3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Building System Meeting

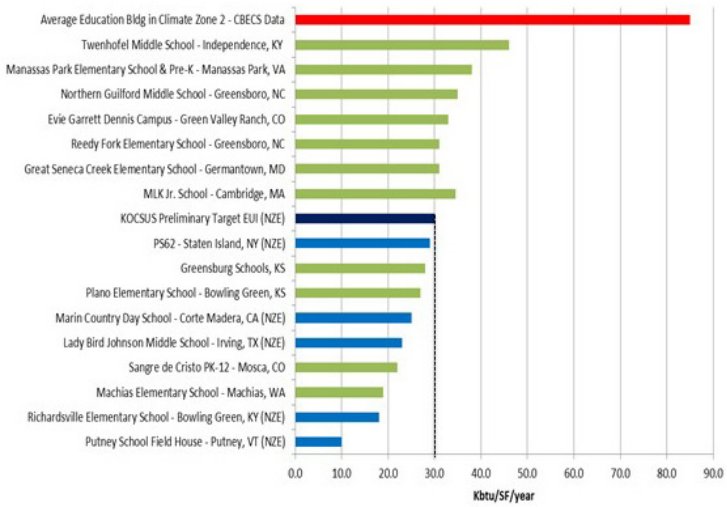
BELMONT HIGH SCHOOL / INFORMATION TECHNOLOGY SYSTEMS

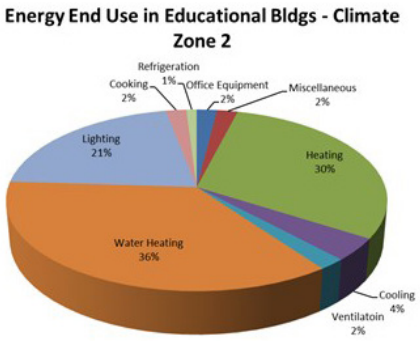
DISTRIBUTED COMMUNICATIONS

- **Building-Wide Intercom System**
- **Classroom Audio Reinforcement**
- **Digital Signage**

D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / NZE PROCESS : SETTING ENERGY TARGETS

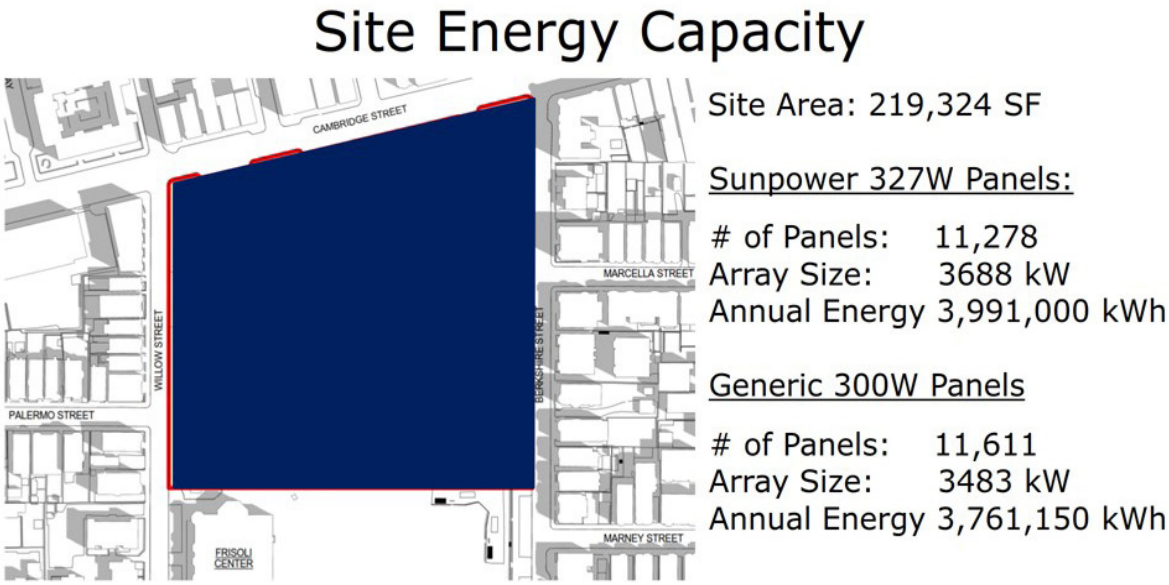




Source: Energy Information Administration

BENCHMARKING EUI AGAINST SIMILAR PROGRAMS

BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS



ENERGY BUDGET

3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Building System Meeting

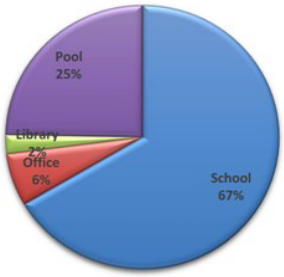
BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS

Energy Budget - High

Enclosed Pool: Maximum Energy

Program	Area (SF)	EUI (kbtu/sf/year)	kbtu/year	kWh/year
School	180,000	30	5,400,000	1,582,186
Office	15,000	35	525,000	153,824
Library	7,500	25	187,500	54,937
Pool	5,000			587,532
Sub-Total	207,500		6,112,500	2,378,478 kWh/year
Contingency	20.0%			475,696 kWh/year
Total	**207,500**	**46.9**	**9,741,295**	**2,854,174 kWh/year**

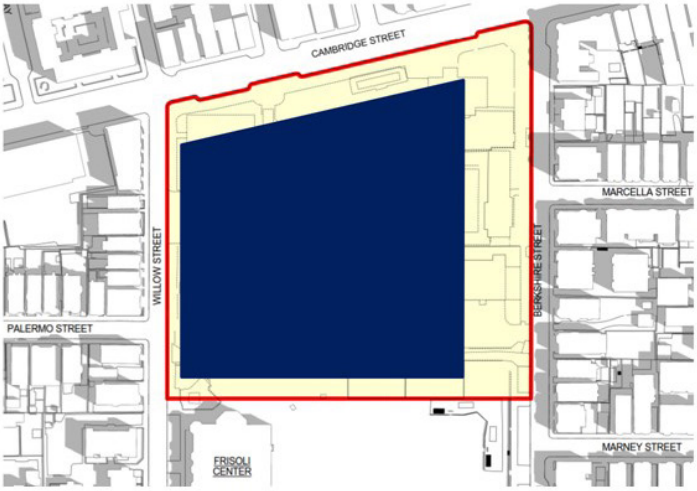
Annual Energy Use Breakdown



ENERGY BUDGET

BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS

Required Capacity



Array Area: **156,900 SF**

Sunpower 327W Panels:

# of Panels: 8,069
Array Size: 2639 kW
Annual Energy 2,855,087 kWh

ENERGY BUDGET

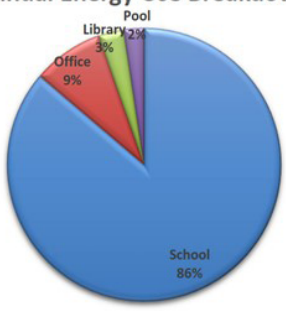
BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS

Energy Budget - Low

Open Pool: Minimum Energy (Not Heated)

Program	Area (SF)	EUI (kbtu/sf/year)	kbtu/year	kWh/year
School	180,000	30	5,400,000	1,582,186
Office	15,000	35	525,000	153,824
Library	7,500	25	187,500	54,937
Pool	5,000			43,506
Sub-Total	207,500		6,112,500	1,834,453 kWh/year
Contingency	20.0%			366,891 kWh/year
Total	**207,500**	**36.2**	**7,513,184**	**2,201,343 kWh/year**

Annual Energy Use Breakdown



ENERGY BUDGET

BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS

Required Capacity

Array Area: **121,000 SF**

Sunpower 327W Panels:

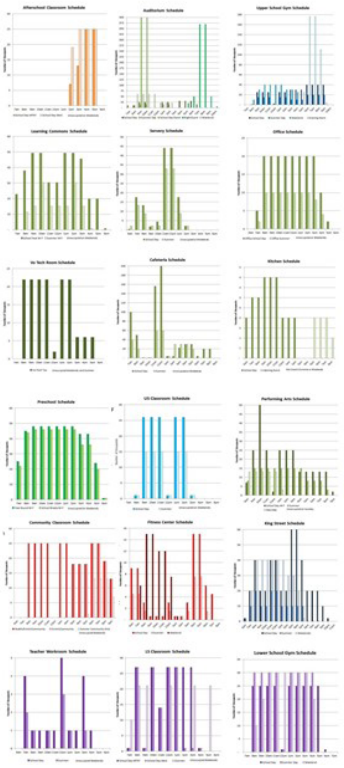
# of Panels: 6,223
Array Size: 2035 kW
Annual Energy 2,201,820 kWh

ENERGY BUDGET

3.3.4 - PREFERRED SOLUTION

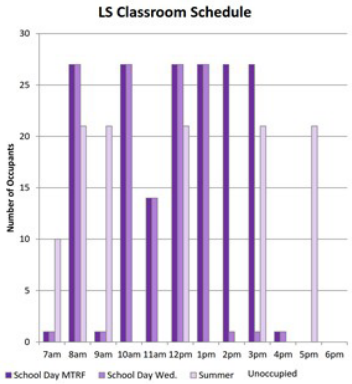
D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS



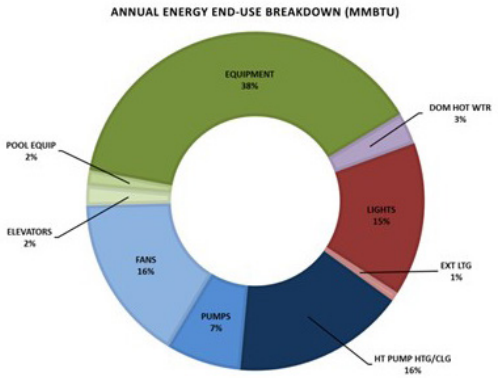
MLK - Lower School Classroom

- General Hours:
  - 7:55am – 3:55pm M,T,R,F
  - 7:55am – 1:55pm Wed.
  - Summer Programs 8am to 5pm but students out of room 50% of time. Only includes 6 classrooms.
- School Year Schedule includes:
  - 30 min lunch (assumed between 11am and 12pm)
  - (1) 45 min out of class period
- No weekend use
- Maximum number of students per room: 25
- Maximum Faculty per room: 2



DETAILED UNDERSTANDING OF PROGRAM & SCHEDULE

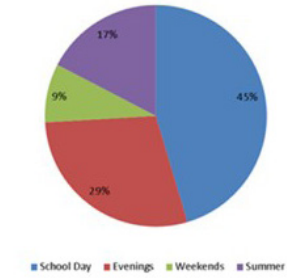
BELMONT HIGH SCHOOL / NZE PROCESS : DETERMINING ENERGY NEEDS



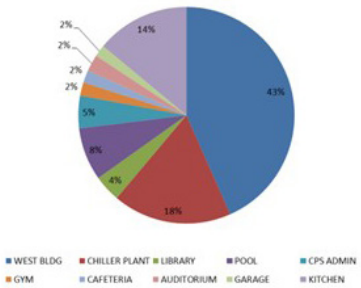
Based on the breakdown of annual energy by end-use, there are four main categories of energy use for the building.

- 42% Equipment, including plug loads, pool pumps and elevators
- 39% HVAC including fans, pumps and heating and cooling energy
- 16% Lighting, including exterior lighting
- 3% Domestic hot water heating.

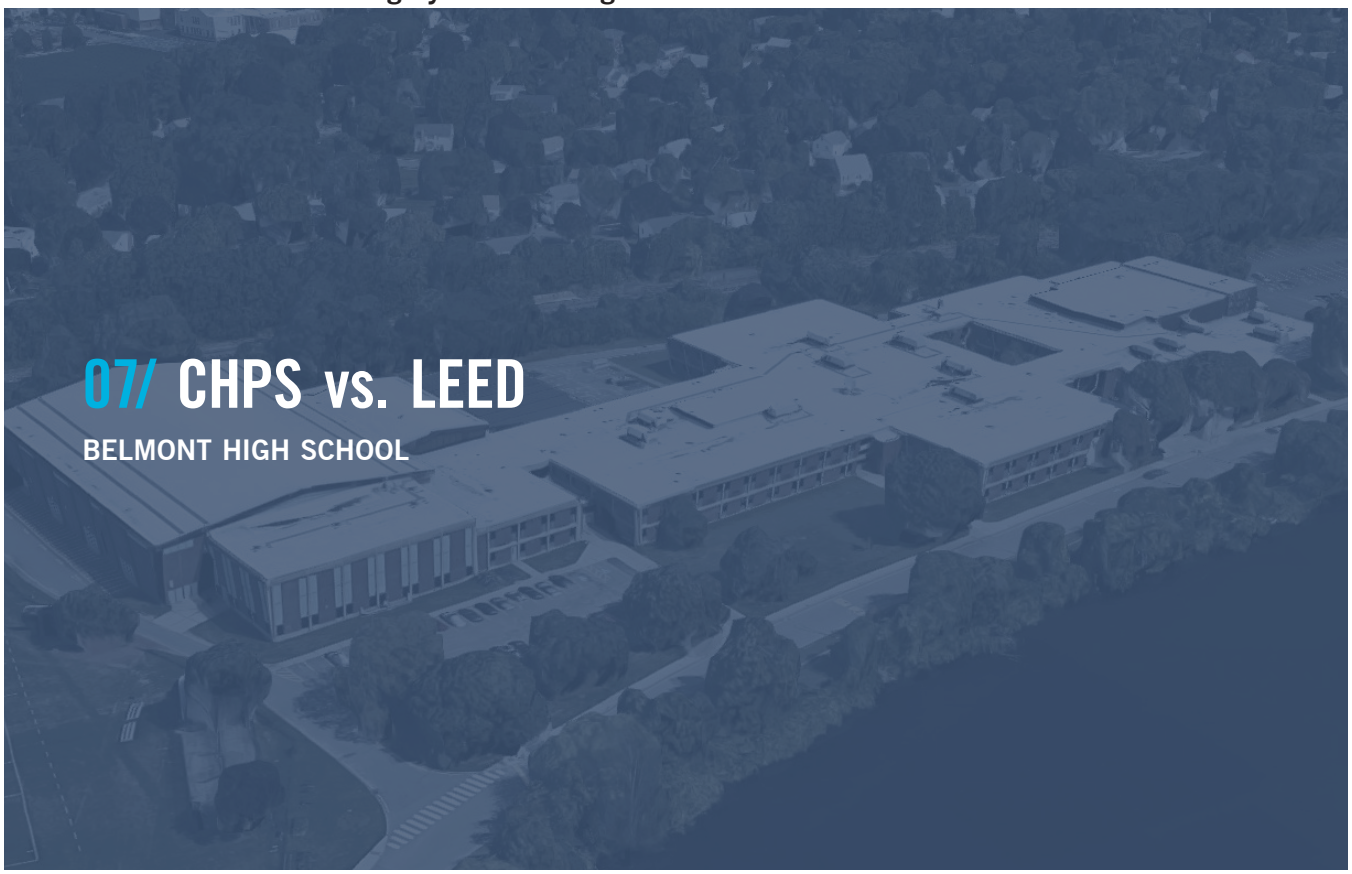
Energy Model Results	MMBTU	kWh	EUI*
Predicted Annual Energy Use:	6,258	1,834,086	26.9



Annual Energy Consumption by Building Type



DETAILED UNDERSTANDING OF PROGRAM & SCHEDULE



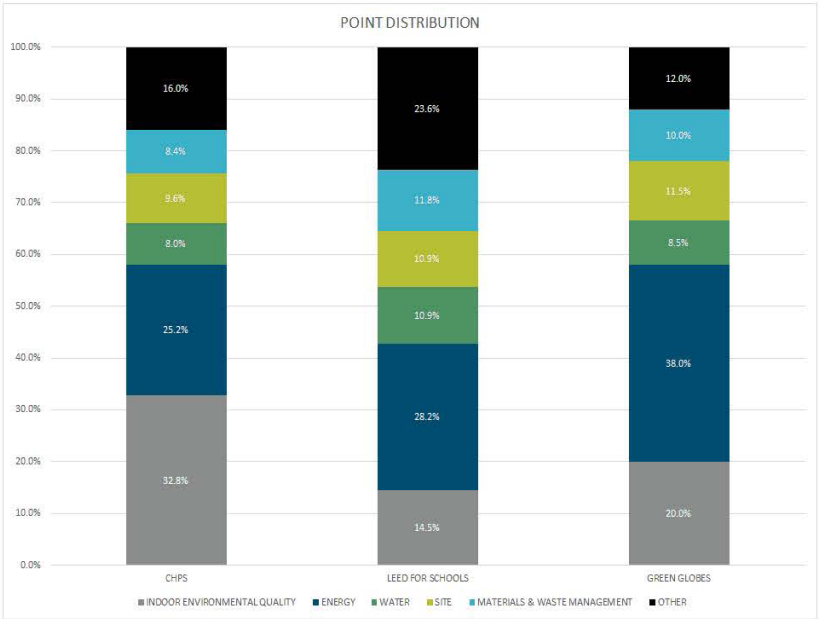
07/ CHPS vs. LEED

BELMONT HIGH SCHOOL

BELMONT HIGH SCHOOL / CHPS vs. LEED

CRITERIA AND ASSOCIATED POINTS

LEED has 9 categories with 110 total points. Green Globes has 7 categories with 1000 total points. CHPS has 7 categories with 250 total points. *The breakdown per program with the associated category weights are shown in the figure below:*



3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Building System Meeting

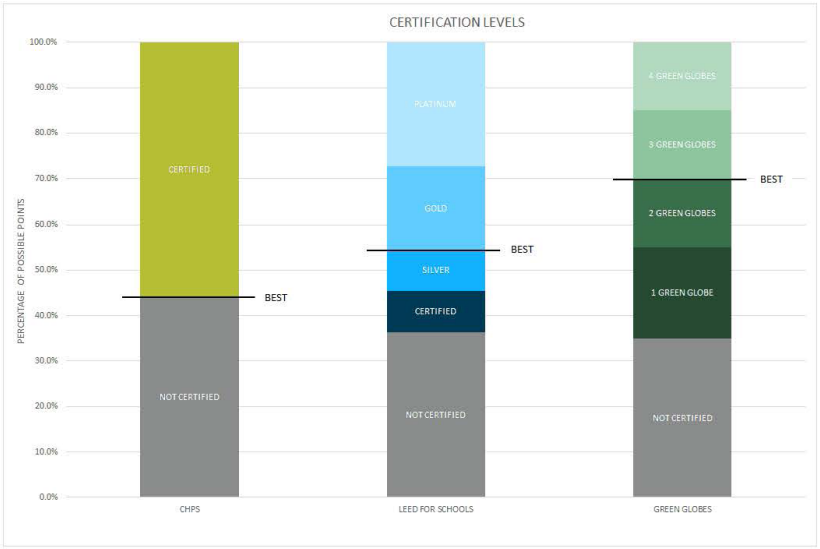
BELMONT HIGH SCHOOL / CHPS vs. LEED

Summary of NE-CHPS, LEED 2009, LEED v4 (new), and ANSI S12.6 (2002 and 2010) – Cavanaugh Tocci Associates, Inc.

Standard	Room Reverberation Limit	Background Sound Limit	Sound Isolation Requirements (Interior Spaces)	Impact isolation Requirements	Additional Requirements (reverberation)	Additional Requirements (site evaluation)	Notes
NE-CHPS 3.0 Prerequisite EQ 14.0	YES ANSI limits based on classroom volume. Calculations required.	YES 35 dBA Core Classrooms. Calculations required.	YES Isolation ratings are generally lower than the ANSI standard.	YES IIC 45 minimum floor to floor, confirmation required.	Core learning spaces greater than 20k cu.ft. to have reverberation of 1.0 second or less.	Site sound measurements required with narrative as to design to meet a 35 dBA (max.) interior sound level.	
NE-CHPS 3.0 Enhanced Performance Credit EQ 14.1	YES ANSI limits based on classroom volume. Calculations required.	YES 35 dBA Core Classrooms Calculations required.	YES Isolation ratings are similar to ANSI requirements	YES IIC 45 minimum floor to floor, confirmation required.	Core learning spaces greater than 20k cu.ft. to have reverberation of 1.0 second or less.	Site sound measurements required with narrative as to design to meet a 35 dBA (max.) interior sound level.	
LEED for Schools 2009 EQ/IEQ3 pre-req	YES ANSI standard, with calculations required (Note 1).	YES 45 dBA Core Classrooms.	NO (not required).	NO (IIC not noted as a requirement).	Core learning spaces greater than 20k cu.ft. reverberation of 1.5 second or less.	NO (not required).	1
LEED for Schools 2009 EQ/IEQ Credit 9	YES ANSI standard, with calculations required (Note 1).	YES 40 dBA Core Classrooms.	YES ANSI (except exterior windows, to meet an STC 35 requirement).	NO (IIC not noted as a requirement).	Core learning spaces greater than 20k cu.ft. reverberation of 1.5 second or less.	NO (not required).	1
New LEED for Schools v4 pre-requisite	YES ANSI standard, with calculations required (Note 1).	YES 40 dBA Core Classrooms.	NO (not required).	NO (IIC not noted as a requirement).	Core learning spaces greater than 20k cu.ft. to conform to NRC/CNRC "Acoustical Design of Rooms for Speech."	Review exterior sound levels at site (based on proximity to major noise sources) – some options would require daytime site sound measurements (Note 3).	1, 2, 3, 4
New LEED for Schools v4 (Credit, 1 point)	YES ANSI standard, with calculations required (Note 1).	YES 35 dBA Core Classrooms.	YES Requiring ANSI 2010 standard for interior isolation.	NO (IIC not noted as a requirement).	Core learning spaces greater than 20k cu.ft. to conform to NRC/CNRC "Acoustical Design of Rooms for Speech."	Review exterior sound levels at site (based on proximity to major noise sources) – some options would require daytime site sound measurements (Note 3).	1, 2, 3, 4
ANSI S12.60-2002 (2002 version used up until now in most standards)	YES Reverberation limits based on classroom volume.	YES 35 dBA Core Classrooms.	YES Varies depending on adjacency.	YES IIC 45 between floors for core classrooms.		YES: Recommended isolation levels for exterior sound control.	
ANSI S12.60-2010 (2010 version referenced in LEED V4	Limits based on classroom volume (no significant revision from the 2002 standard). New provision that classrooms less than 10k cu.ft. shall be readily adaptable to lower reverberation time of 0.3 sec	YES 35 dBA Core Classrooms.	YES Varies depending on adjacency (very slight revisions from the 2002 standard).	YES IIC 45 between floors for core classrooms.		Requires daytime site sound measurements to assess noisiest hour for the average school day, and lists specific requirements for STC/OITC of building envelope	

BELMONT HIGH SCHOOL / CHPS vs. LEED

The amount or percentage of total points awarded to a project determines if that project gets certified, and to what extent. Depending on how many points the school earns in each category, they are able to earn different levels of certification from each program, with the exception of CHPS, which either certifies the building or not. *The table below outlines these different levels of certification, where applicable. In Colorado, the Building Excellence Schools Today (BEST) Program requires the following level of certification: LEED – Gold, Green Globes – 3 globes, and CHPS – Verified Leader. These goals are also noted:*



D. SUSTAINABILITY / Building System Meeting

BELMONT HIGH SCHOOL / CHPS vs. LEED

Post-Design vs. Design Only Points					
	Post-Design Prerequisites	Points Allocated During/After Construction	Points Based on Design Only	Total Points	Percentage of Post-Design Points
LEED	5	13	97	110	12%
Green Globes	0	29	971	1000	3%
CHPS	7	149	101	250	60%
Notes:	*CHPS prerequisites have point values that contribute to the 149 shown above. LEED prerequisites have no point value. Green Globes has no prerequisites.*				
	All Green Globes points are dependent on a site assessment conducted after construction. 29 of the points are for commissioning and training done during/after construction. All other points are based on design, with potential to be denied based on actual construction.				
	LEED has a review stage where certain points are reviewed and awarded after construction.				

3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / LEED Checklist

LEED v4 for BD+C: Schools

Project Checklist

Belmont High School

8-Feb-18

Y	?	N			
1	0	0	Credit 1	Integrative Process	1

7	3	5	**Location and Transportation**		Possible Points: 15
		15	Credit 1	LEED for Neighborhood Development Location	15
1			Credit 2	Sensitive Land Protection	1
		2	Credit 3	High Priority Site	2
2		3	Credit 4	Surrounding Density and Diverse Uses	5
4			Credit 5	Access to Quality Transit	4
	1		Credit 6	Bicycle Facilities	1
	1		Credit 7	Reduced Parking Footprint	1
	1		Credit 8	Green Vehicles	1

3	6	3	**Sustainable Sites**		Possible Points: 12
Y			Prereq 1	Construction Activity Pollution Prevention	Required
Y			Prereq 2	Environmental Site Assessment	Required
1			Credit 1	Site Assessment	1
		2	Credit 2	Site Development--Protect or Restore Habitat	2
1			Credit 3	Open Space	1
	3		Credit 4	Rainwater Management	3
	2		Credit 5	Heat Island Reduction	2
	1		Credit 6	Light Pollution Reduction	1
		1	Credit 7	Site Master Plan	1
1			Credit 8	Joint Use of Facilities	1

5	3	4	**Water Efficiency**		Possible Points: 12
Y			Prereq 1	Outdoor Water Use Reduction	Required
Y			Prereq 2	Indoor Water Use Reduction	Required
Y			Prereq 3	Building-Level Water Metering	Required
1	1		Credit 1	Outdoor Water Use Reduction	2
3		4	Credit 2	Indoor Water Use Reduction	7
1	1		Credit 3	Cooling Tower Water Use	2
	1		Credit 4	Water Metering	1

16	13	2	**Energy and Atmosphere**		Possible Points: 31
Y			Prereq 1	Fundamental Commissioning and Verification	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Building-Level Energy Metering	Required
Y			Prereq 4	Fundamental Refrigerant Management	Required
6			Credit 1	Enhanced Commissioning	6
8	8		Credit 2	Optimize Energy Performance	16
1			Credit 3	Advanced Energy Metering	1
		2	Credit 4	Demand Response	2
	3		Credit 5	Renewable Energy Production	3
	1		Credit 6	Enhanced Refrigerant Management	1
1	1		Credit 7	Green Power and Carbon Offsets	2

D. SUSTAINABILITY / LEED Checklist

LEED v4 for BD+C: Schools

Project Checklist

Belmont High School

8-Feb-18

4	0	9	**Materials and Resources**	Possible Points:	13
Y			Prereq 1	Storage and Collection of Recyclables	Required
Y			Prereq 2	Construction and Demolition Waste Management Planning	Required
		5	Credit 1	Building Life-Cycle Impact Reduction	5
1		1	Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1		1	Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit 5	Construction and Demolition Waste Management	2

9	6	1	**Indoor Environmental Quality**	Possible Points:	16
Y			Prereq 1	Minimum Indoor Air Quality Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke Control	Required
Y			Prereq 3	Minimum Acoustic Performance	Required
2			Credit 1	Enhanced Indoor Air Quality Strategies	2
2	1		Credit 2	Low-Emitting Materials	3
1			Credit 3	Construction Indoor Air Quality Management Plan	1
2			Credit 4	Indoor Air Quality Assessment	2
0	1		Credit 5	Thermal Comfort	1
2			Credit 6	Interior Lighting	2
	3		Credit 7	Daylight	3
	1		Credit 8	Quality Views	1
		1	Credit 9	Acoustic Performance	1

6	3	0	**Innovation**	Possible Points:	9
1	1		Credit 1	Innovation	1
1	1		Credit 2	Innovation	1
	1		Credit 3	Innovation	1
1			Credit 4	Innovation	1
1			Credit 5	Innovation	1
1			Credit *	Innovation	1
				Innovation	1
				Innovation	1
1			Credit 6	LEED Accredited Professional	1

3	0	2	**Regional Priority**		Possible Points:	5
1			Credit 1	Regional Priority: Specific Credit	Optimized Energy (8 points)	1
		1	Credit 2	Regional Priority: Specific Credit	Building Life-cycle Impact (2 points)	1
		1	Credit 3	Regional Priority: Specific Credit	Site Development-protect and restore (2 points	1
1			Credit 4	Regional Priority: Specific Credit	Access to Quality Transit	1
1			Credit 5	Regional Priority: Specific Credit	Renewable Energy Production	1
			Credit 6	Regional Priority: Specific Credit		

54	34	26	**Total**	Possible Points:	114

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

3.3.4 - PREFERRED SOLUTION

D. SUSTAINABILITY / Acknowledgement

PERKINS+WILL

February 8, 2018

Ms. Jess Deleconio
Senior Project Coordinator
Massachusetts School Building Authority
40 Broad Street, Suite 500
Boston, MA 02109

Re: MSBA High Efficiency Green School Program

Dear Ms. Deleconio,

This is an acknowledgement that the Belmont High School District has identified a goal of 2% additional reimbursement from the MSBA High Efficiency Green School Program. As their Designer, I have submitted a completed LEED scorecard showing all prerequisites and 114 attempted points, which will meet that goal.

The scope of work for this project will include the construction elements and performance tasks to achieve that goal, and all subsequent documents, including but not limited to, specifications, drawings, and cost estimates will match the scope of work indicated in the submitted scorecard.

Sincerely,

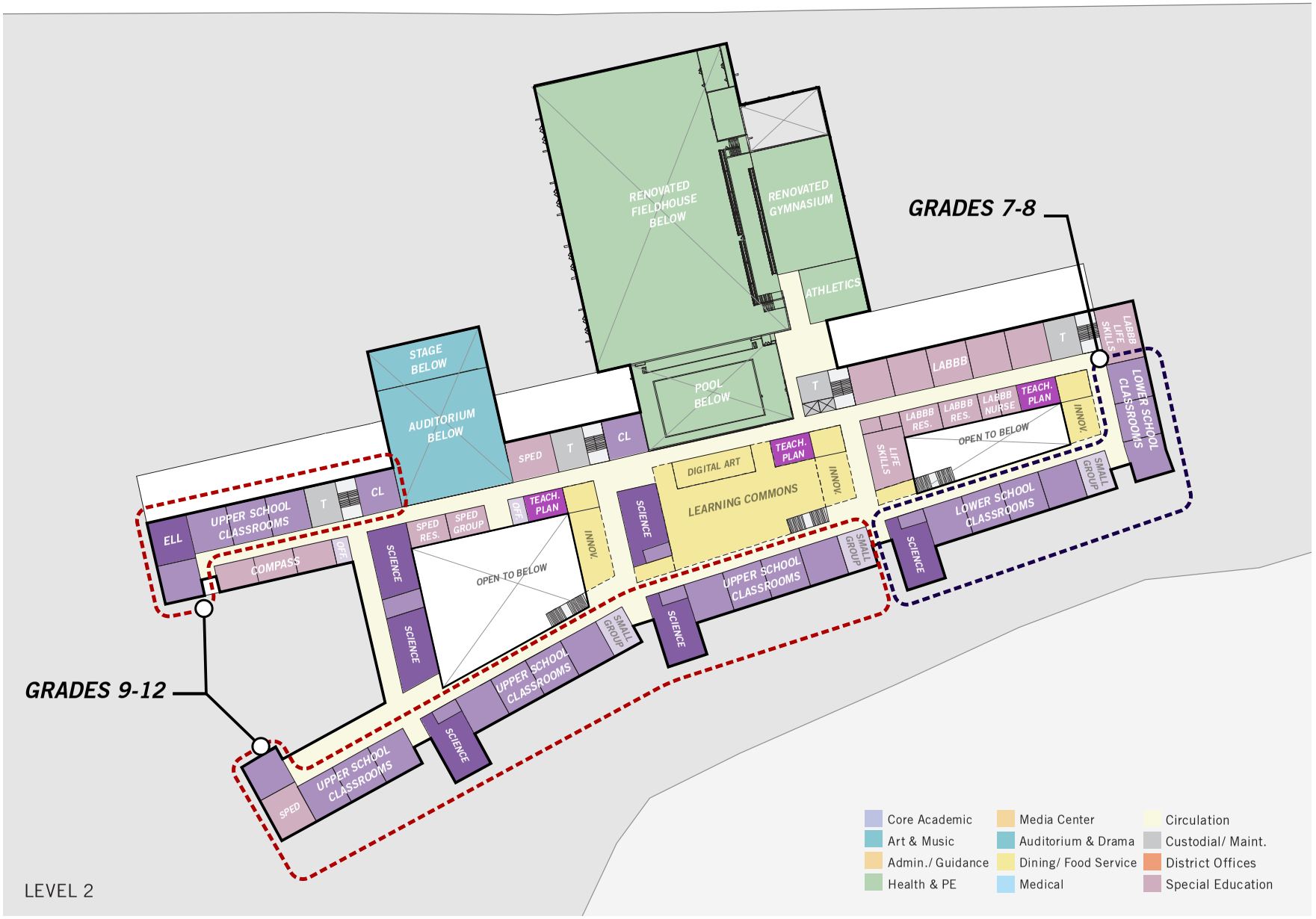
Brooke Trivas

Practice Leader, Principal, Perkins + Will

225 Franklin Street, Suite 1100, Boston, MA 02110 t 617.478.0300 perkinswill.com

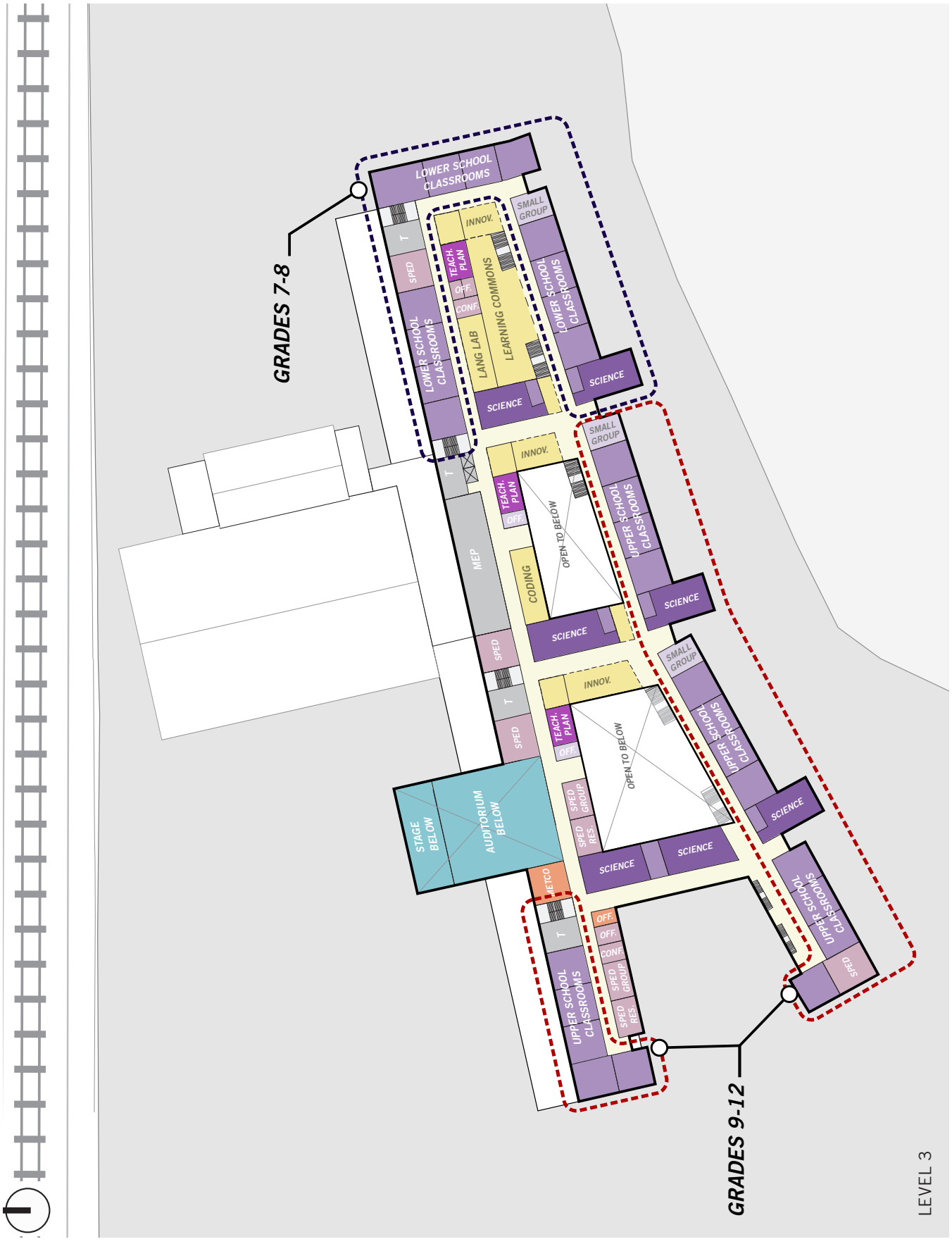
3.3.4 - PREFERRED SOLUTION

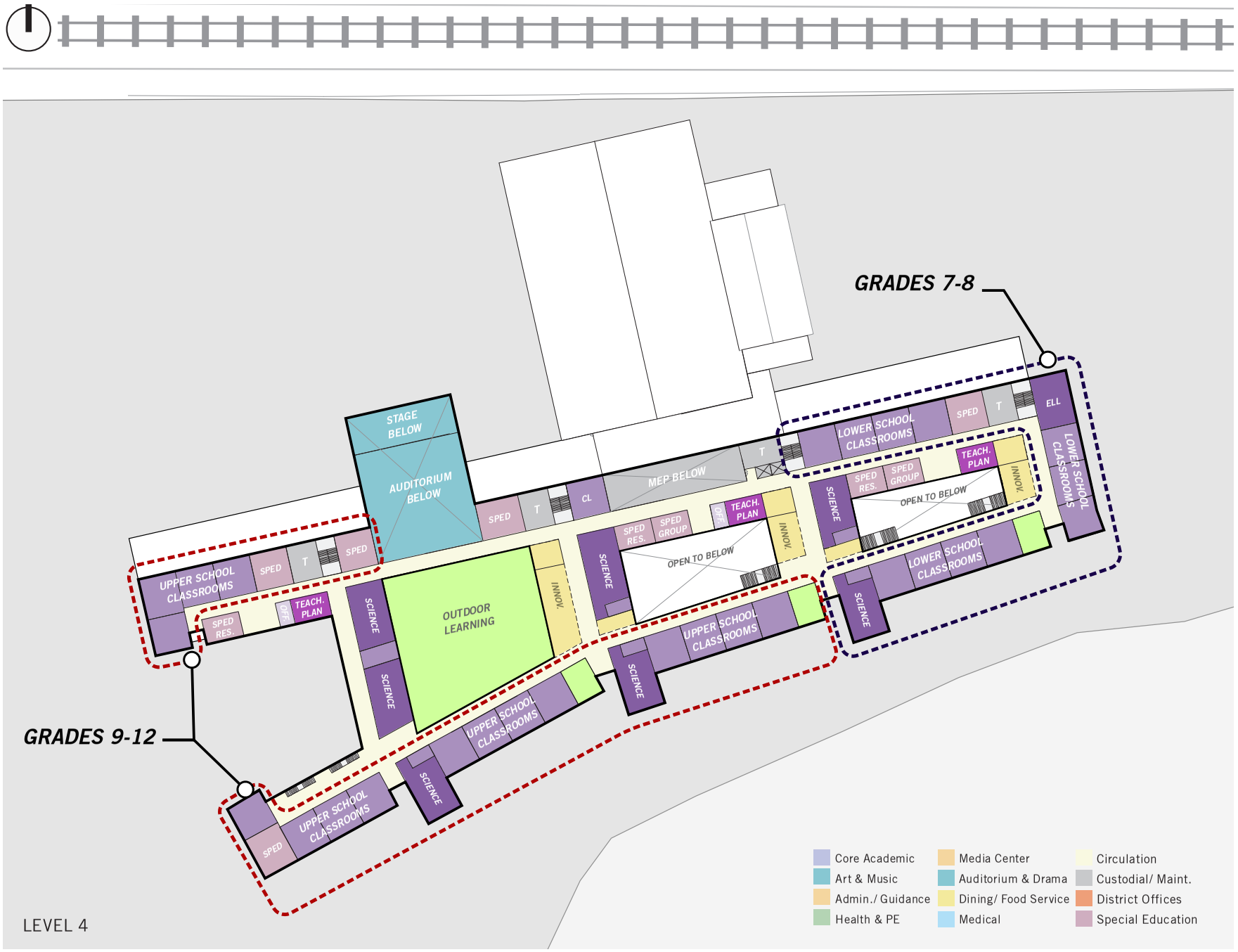
E. BUILDING PLANS / Level 1


RENOVATED FIELDHOUSE BELOW
RENOVATED GYMNASIUM
ATHLETICS
GRADES 7-8
STAGE BELOW
AUDITORIUM BELOW
POOL BELOW
LABBB
LABBB LIFE SKILLS
LOWER SCHOOL CLASSROOMS
LABBB RES.
LABBB NURSE
TEACH. PLAN
INNOV.
OPEN TO BELOW
SPED
T
CL
DIGITAL ART
LEARNING COMMONS
LIFE SKILLS
SMALL GROUP
ELL
UPPER SCHOOL CLASSROOMS
COMPASS
SCIENCE
SPED RES.
SPED GROUP
GRADES 9-12
Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Special Education
LEVEL 2

3.3.4 - PREFERRED SOLUTION

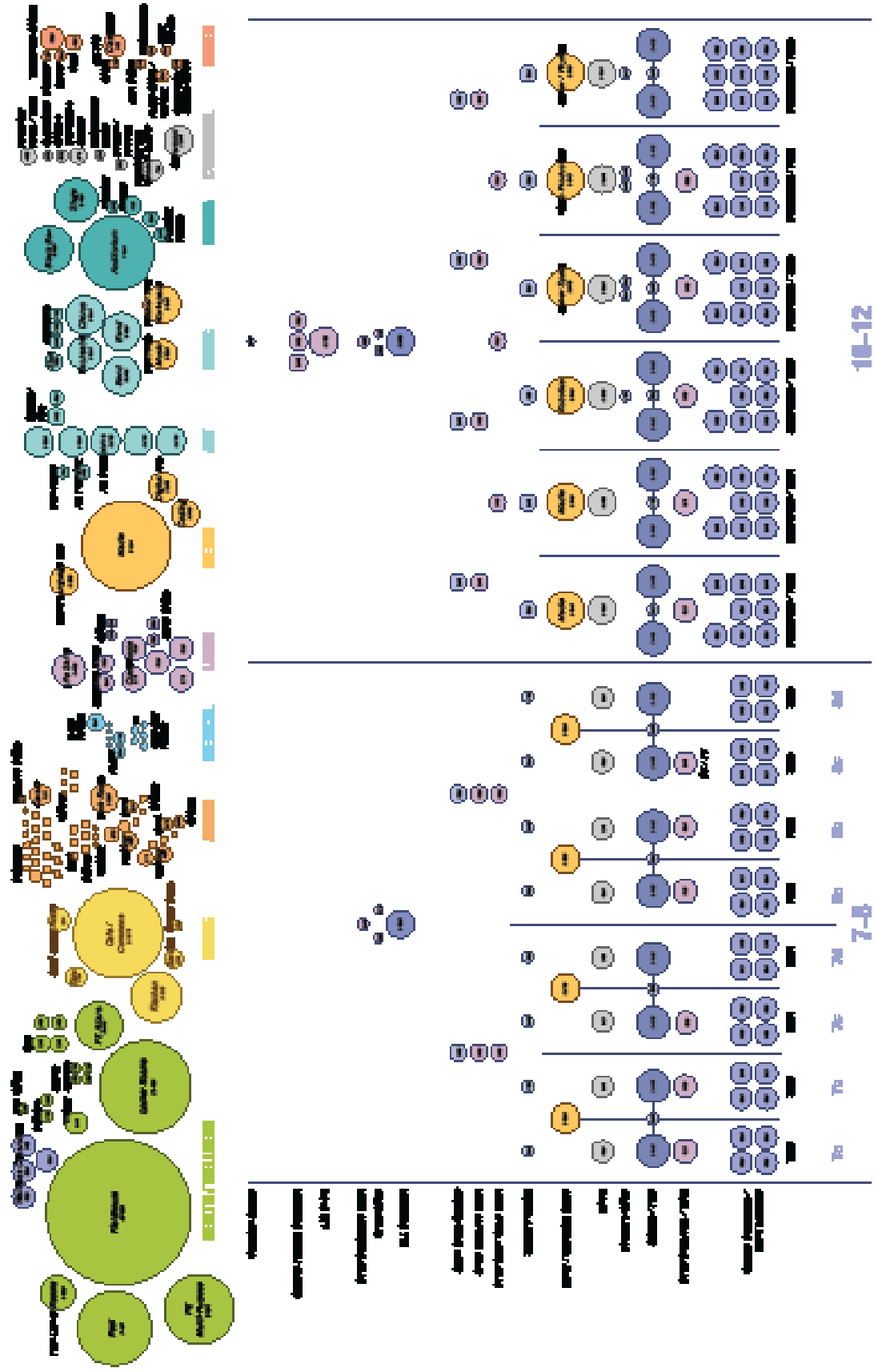
E. BUILDING PLANS / Level 3



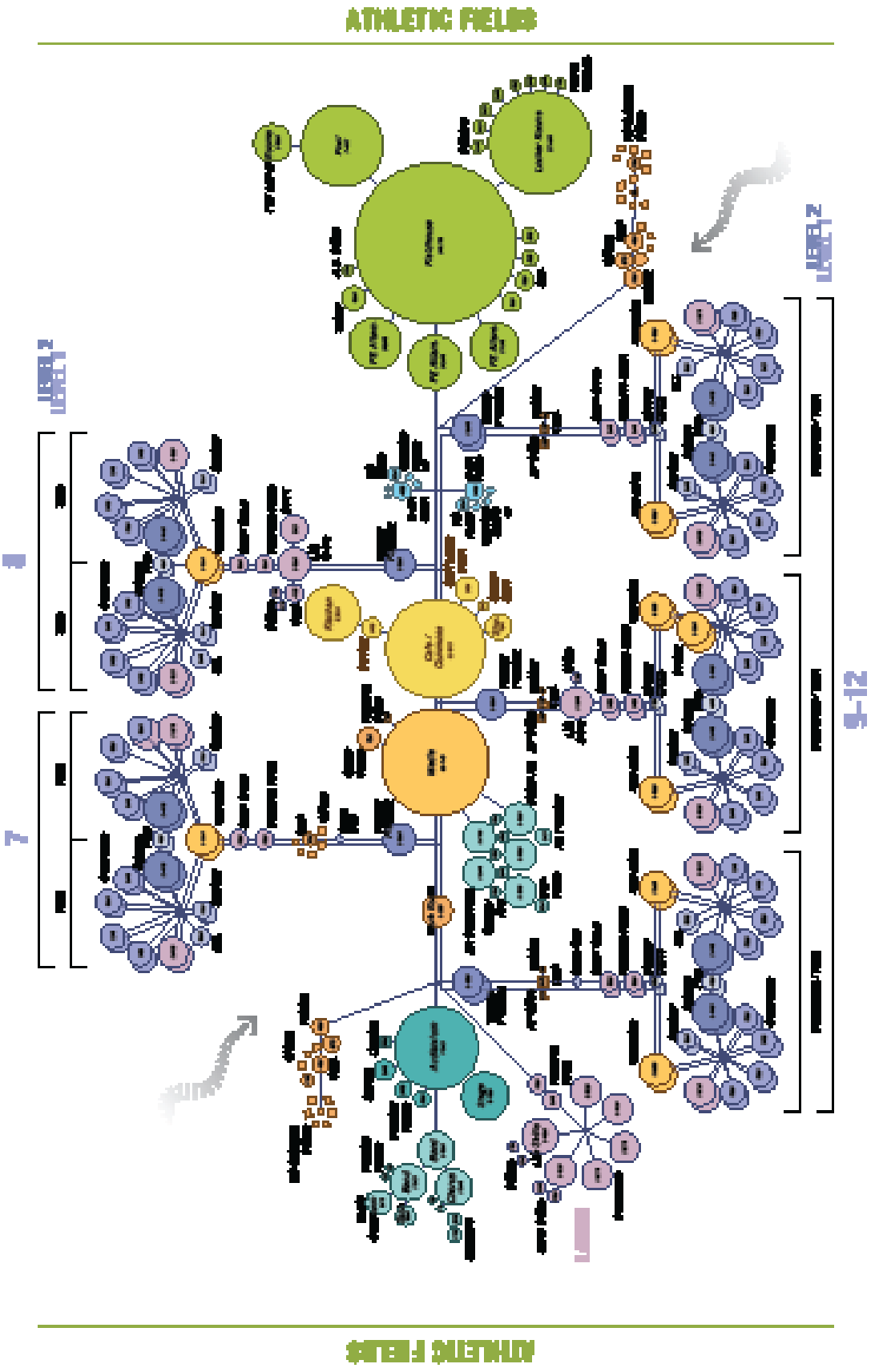

GRADES 7-8
GRADES 9-12
STAGE BELOW
AUDITORIUM BELOW
MEP BELOW
OUTDOOR LEARNING
OPEN TO BELOW
UPPER SCHOOL CLASSROOMS
LOWER SCHOOL CLASSROOMS
SPED
SPED RES.
SPED GROUP
TEACH. PLAN
SCIENCE
INNOV.
ELL
T
CL
OFF.
Core Academic
Art & Music
Admin./ Guidance
Health & PE
Media Center
Auditorium & Drama
Dining/ Food Service
Medical
Circulation
Custodial/ Maint.
District Offices
Special Education
LEVEL 4

3.3.4 - PREFERRED SOLUTION

E. BUILDING PLANS / Program Tree



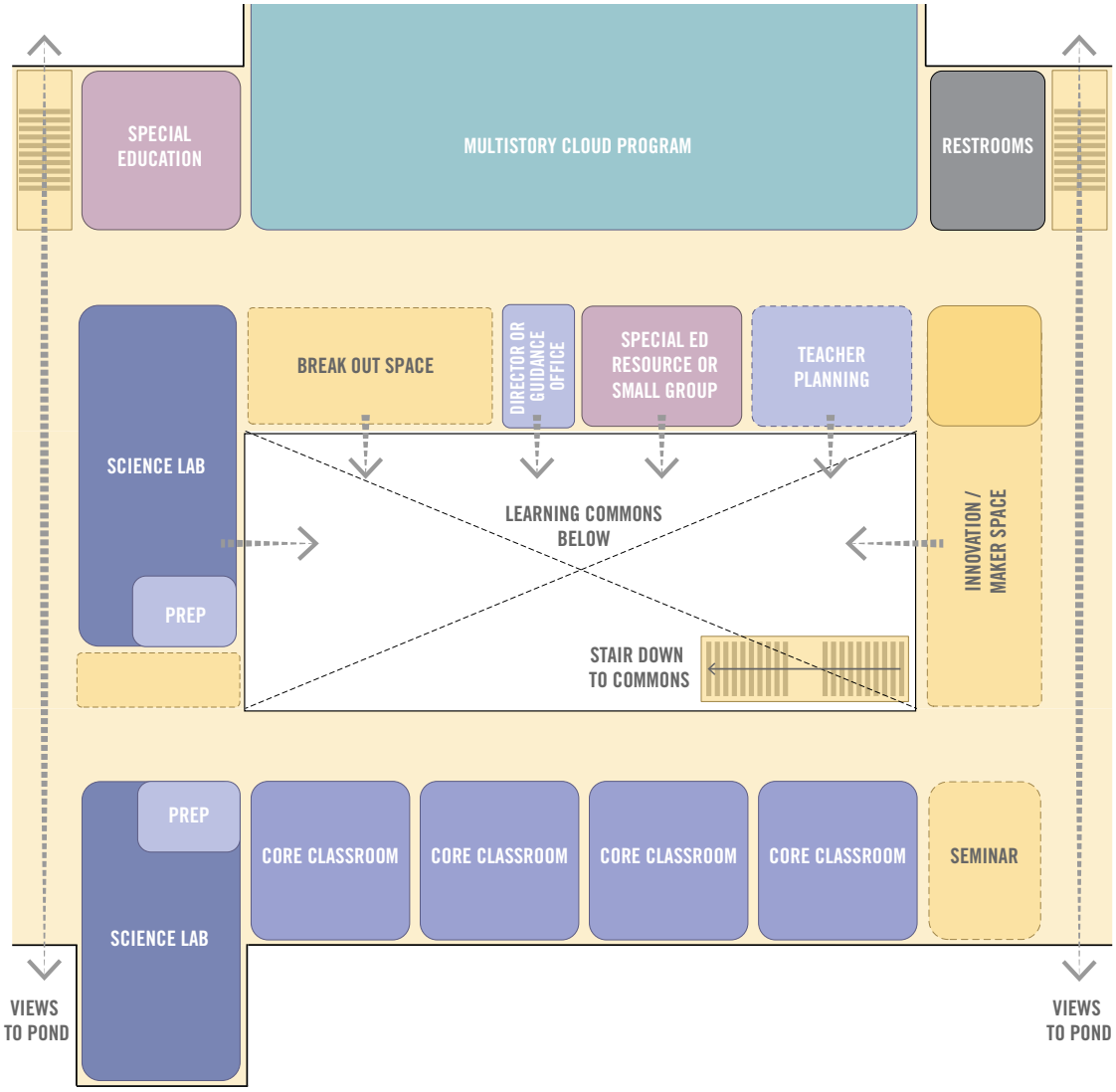
PROGRAM TREE



PROGRAM ADJACENCY

3.3.4 - PREFERRED SOLUTION

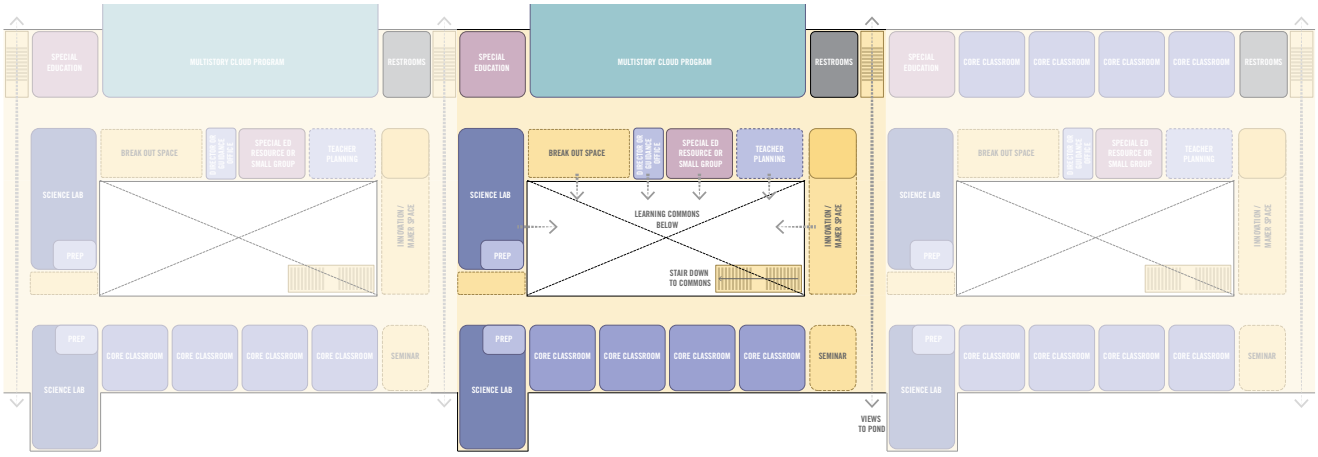
E. BUILDING PLANS / Educational Program Diagrams



ACADEMIC NEIGHBORHOOD

INNOVATION + SCIENCE @ BRIDGES / PERIMETER CLASSROOMS

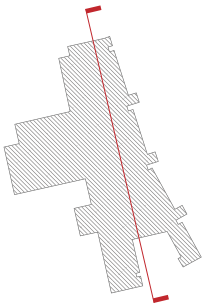
E. BUILDING PLANS / Educational Program Diagrams

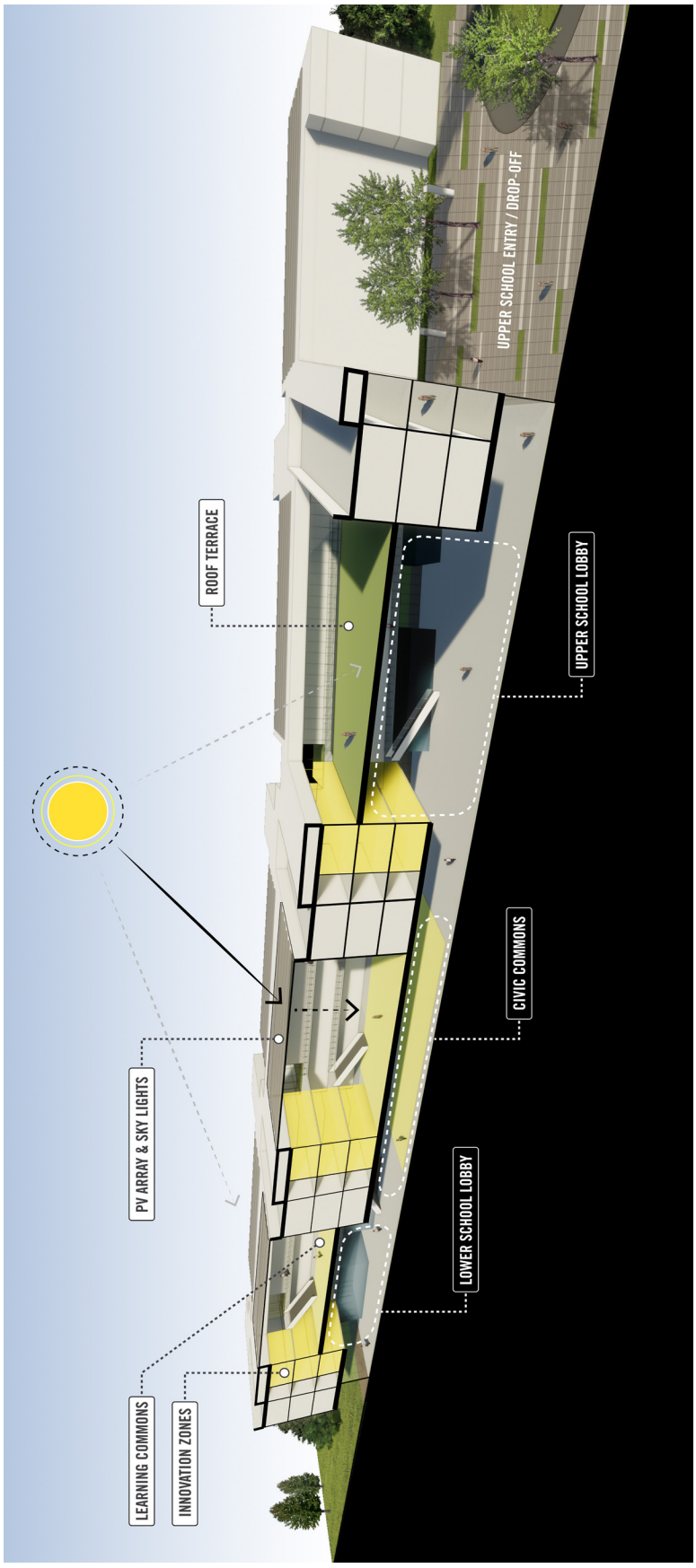


ACADEMIC NEIGHBORHOOD CLUSTERS

3.3.4 - PREFERRED SOLUTION

E. BUILDING PLANS / Section Diagrams





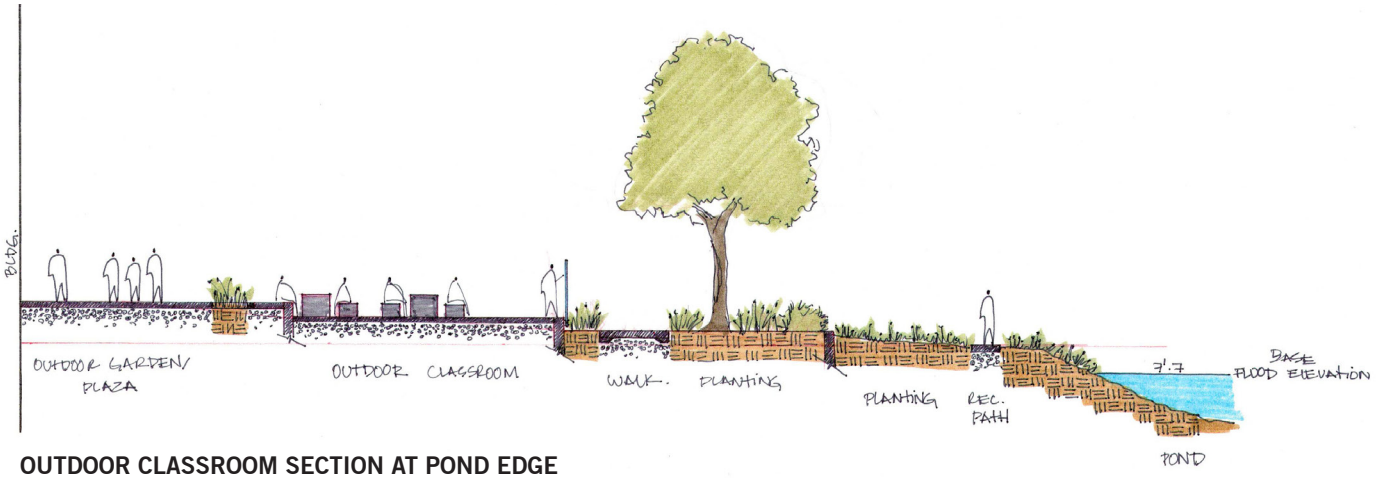
EAST-WEST BUILDING SECTION

E. BUILDING PLANS / Section Diagrams

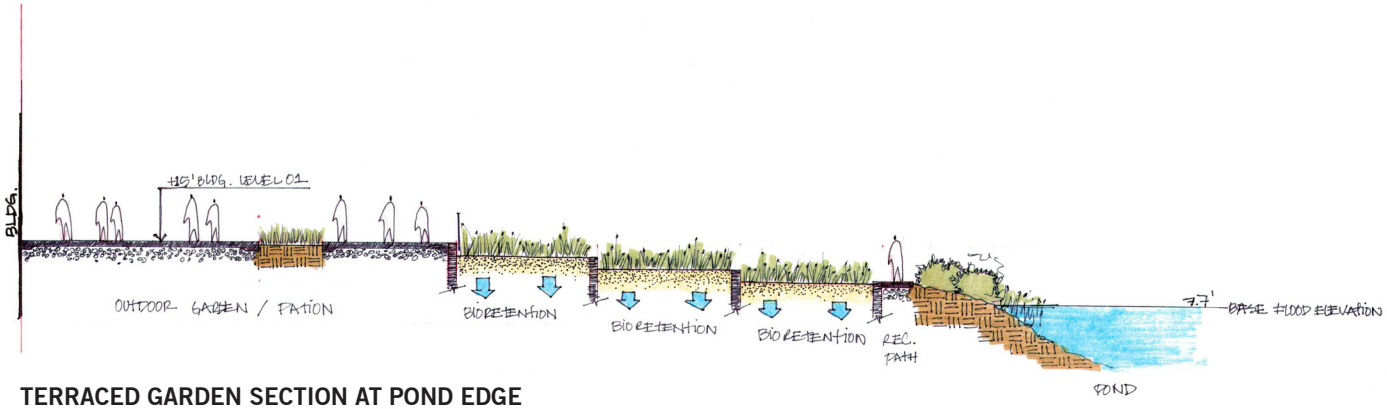
NORTH-SOUTH BUILDING SECTION

3.3.4 - PREFERRED SOLUTION

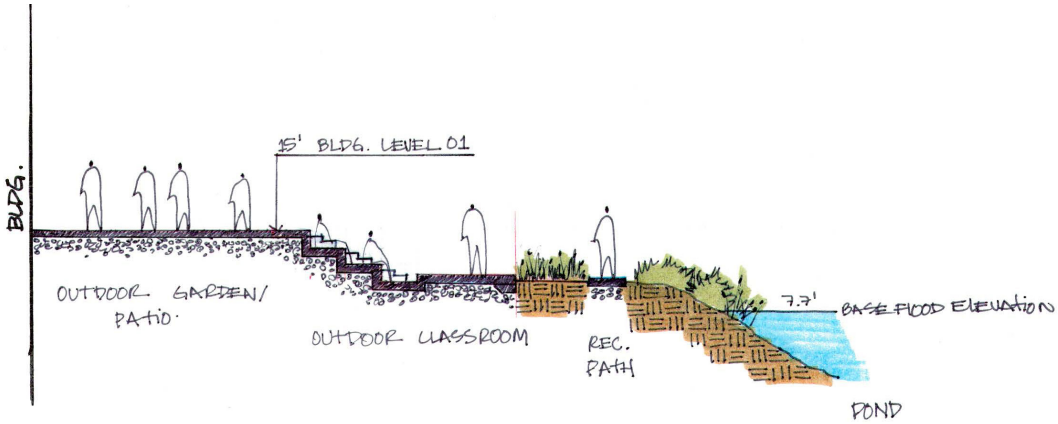
F. SITE PLAN / Site Concept Sections



OUTDOOR CLASSROOM SECTION AT POND EDGE

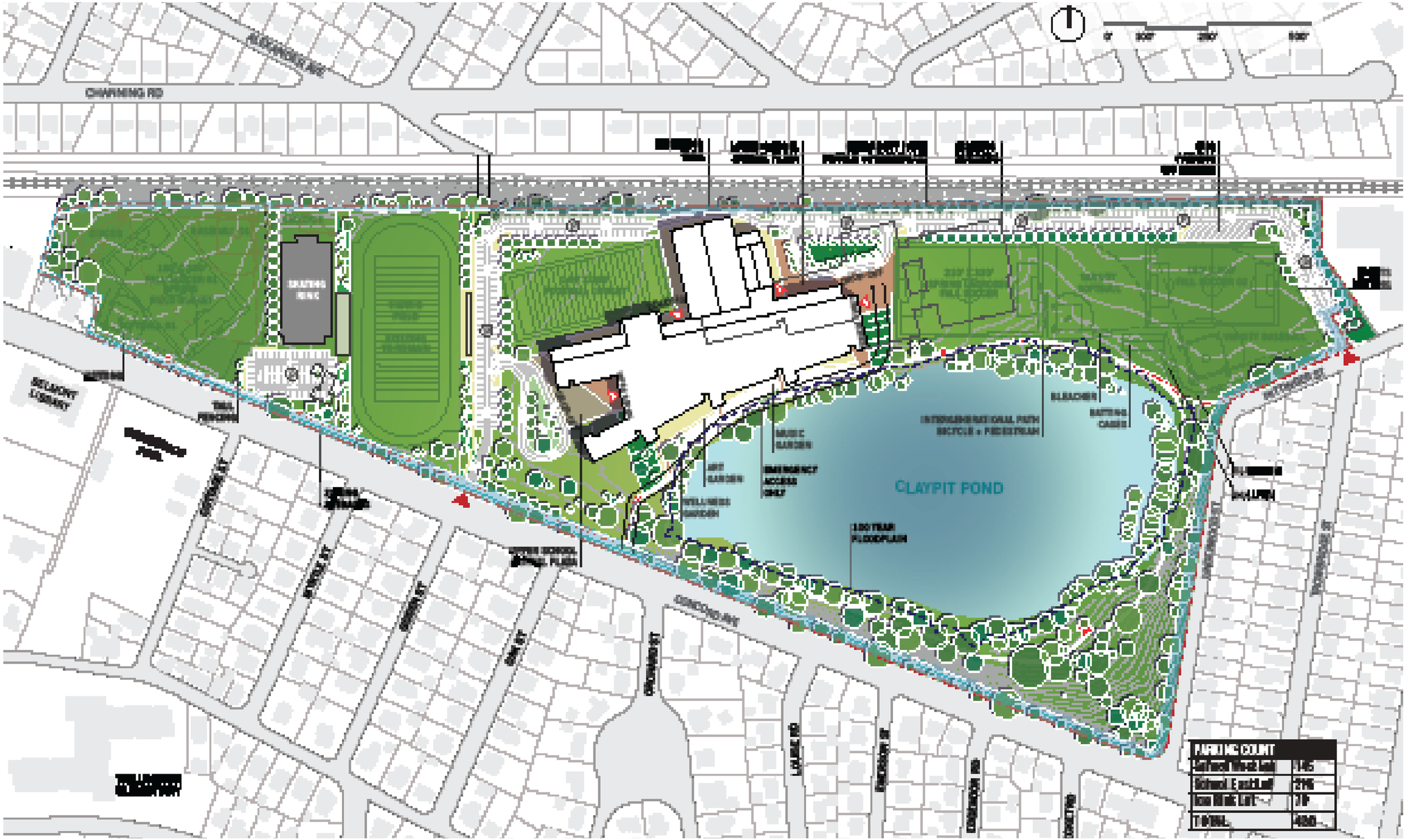


TERRACED GARDEN SECTION AT POND EDGE



STEPPED SEATING SECTION AT POND EDGE

F. SITE PLAN

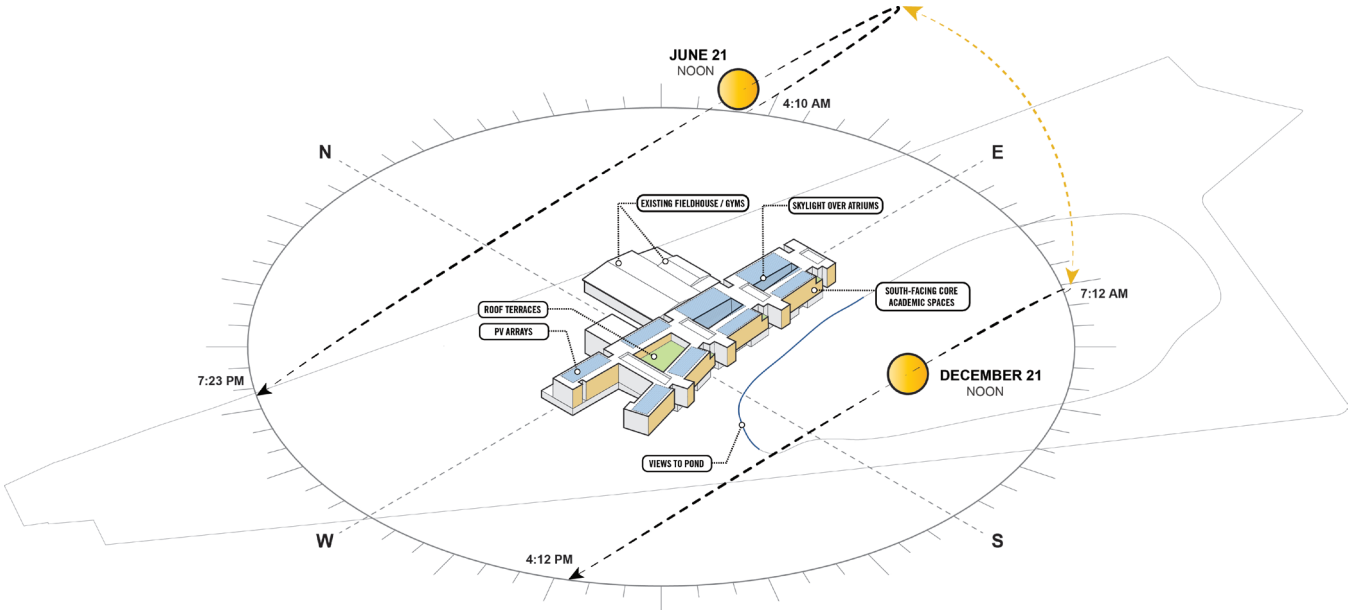


3.3.4 - PREFERRED SOLUTION

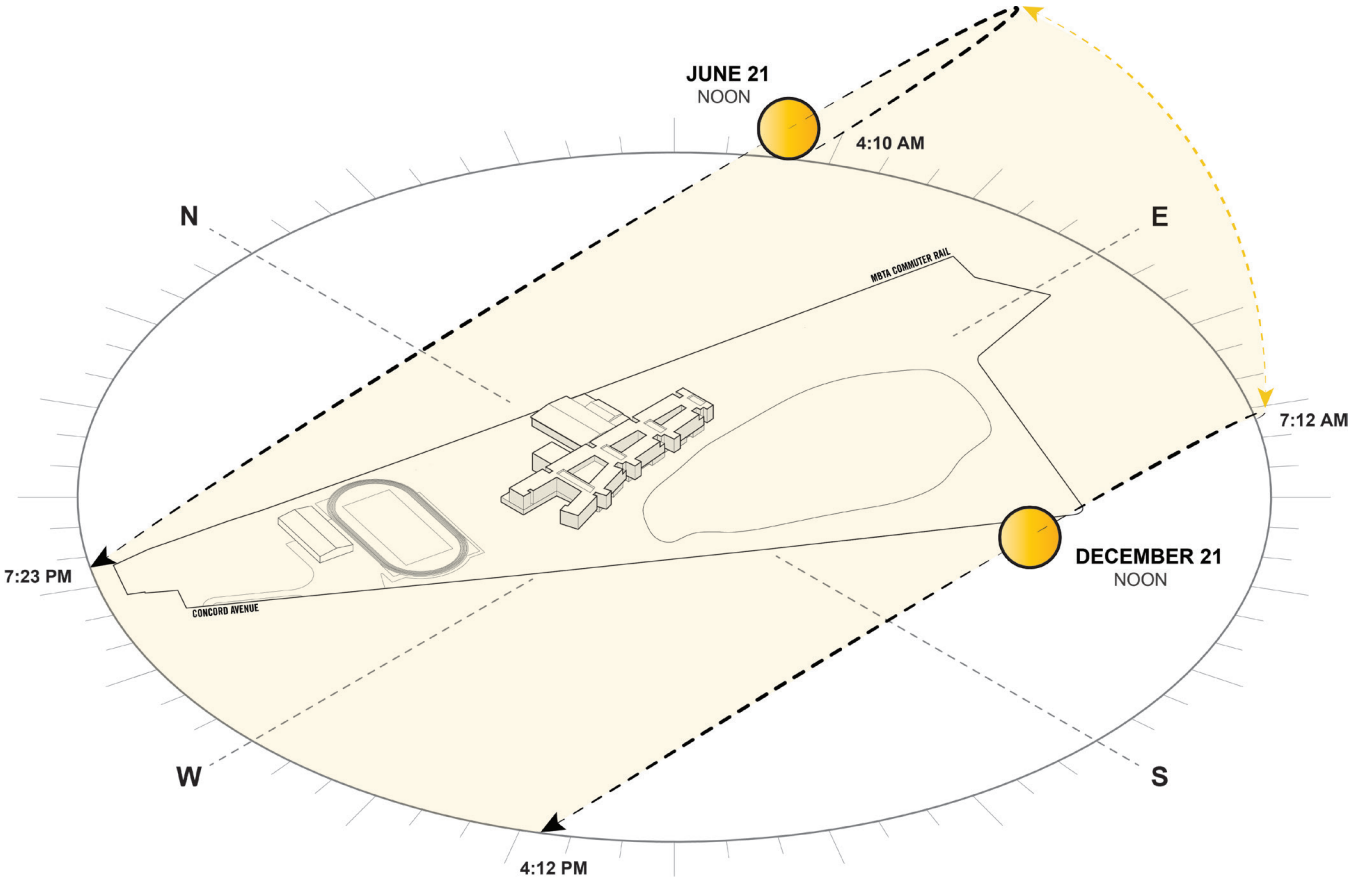
F. SITE PLAN

F. SITE PLAN / Site Diagrams

SUN ORIENTATION / BUILDING



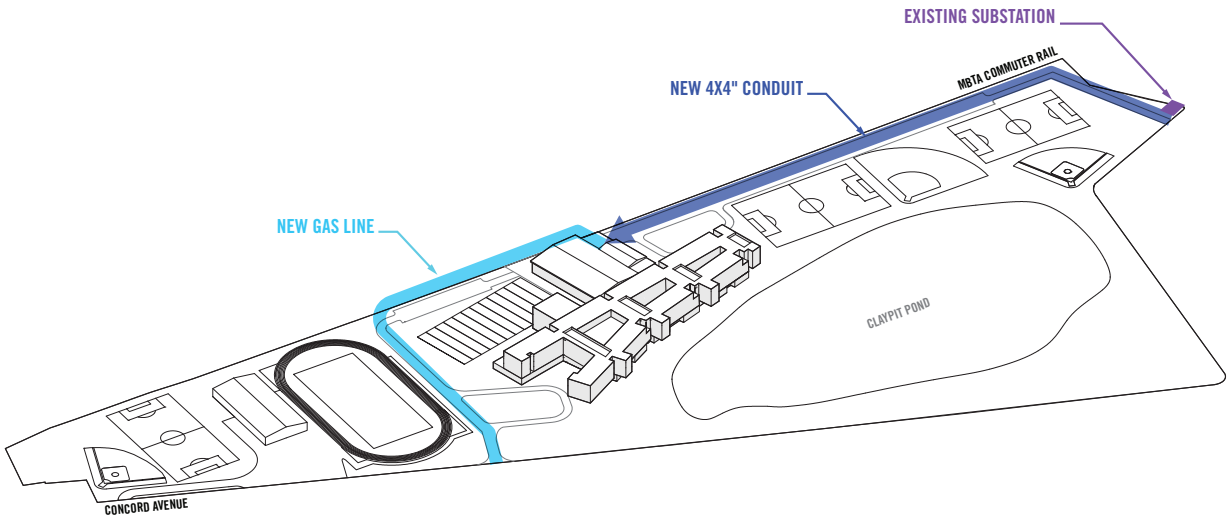
SUN ORIENTATION / SITE



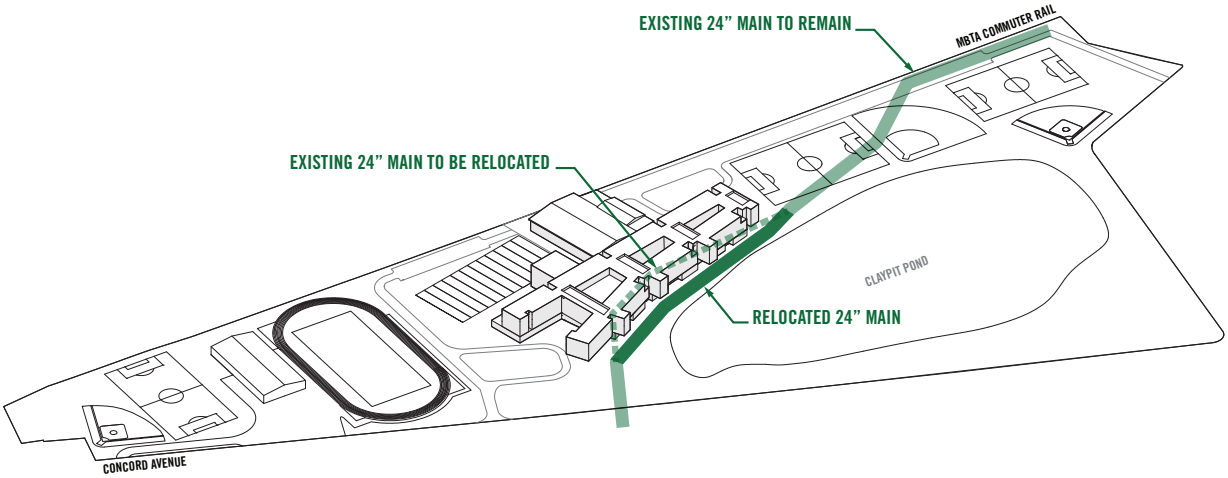
3.3.4 - PREFERRED SOLUTION

F. SITE PLAN / Site Diagrams

UTILITIES / GAS & ELECTRIC

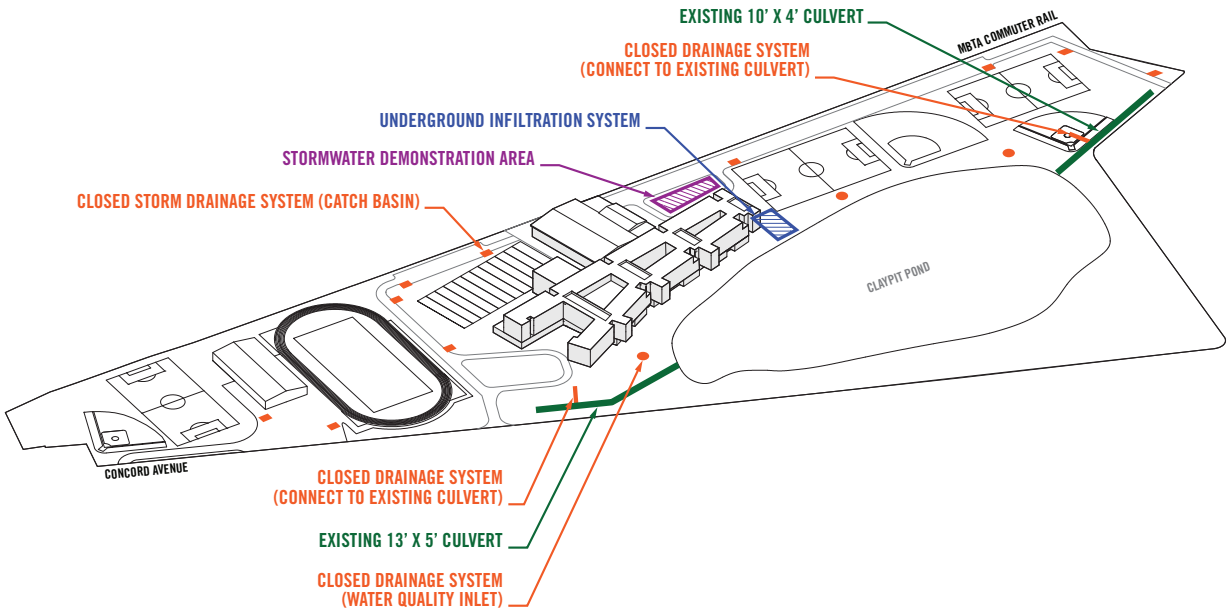


UTILITIES / SEWER

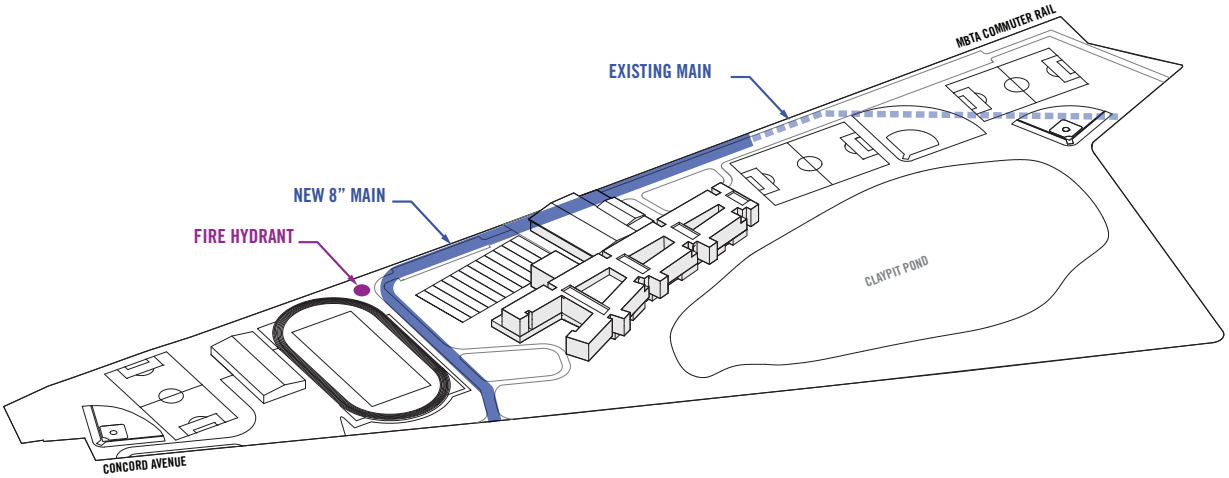


F. SITE PLAN / Site Diagrams

UTILITIES / STORM DRAINAGE



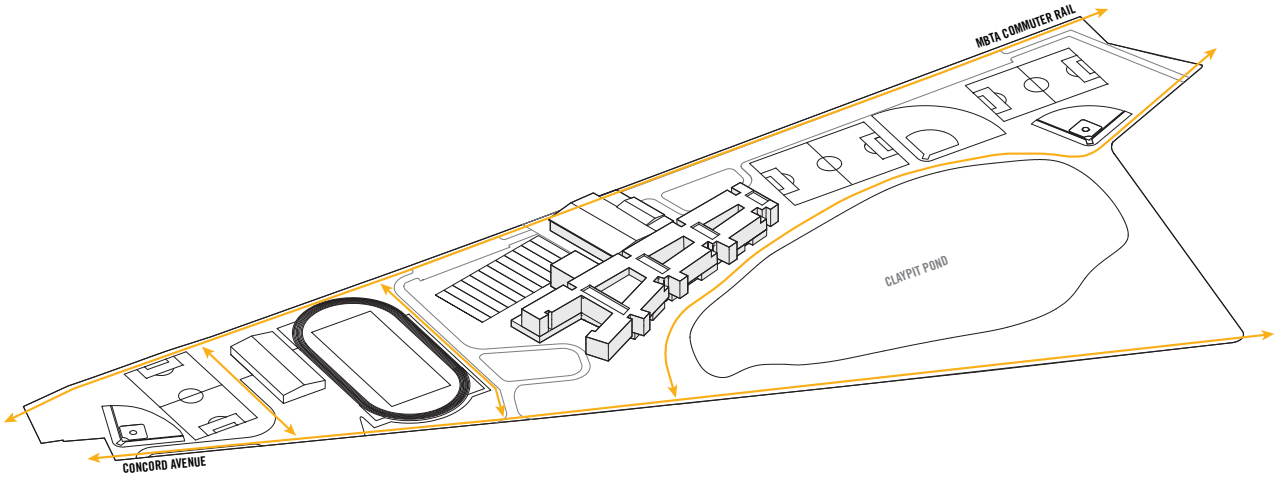
UTILITIES / WATER



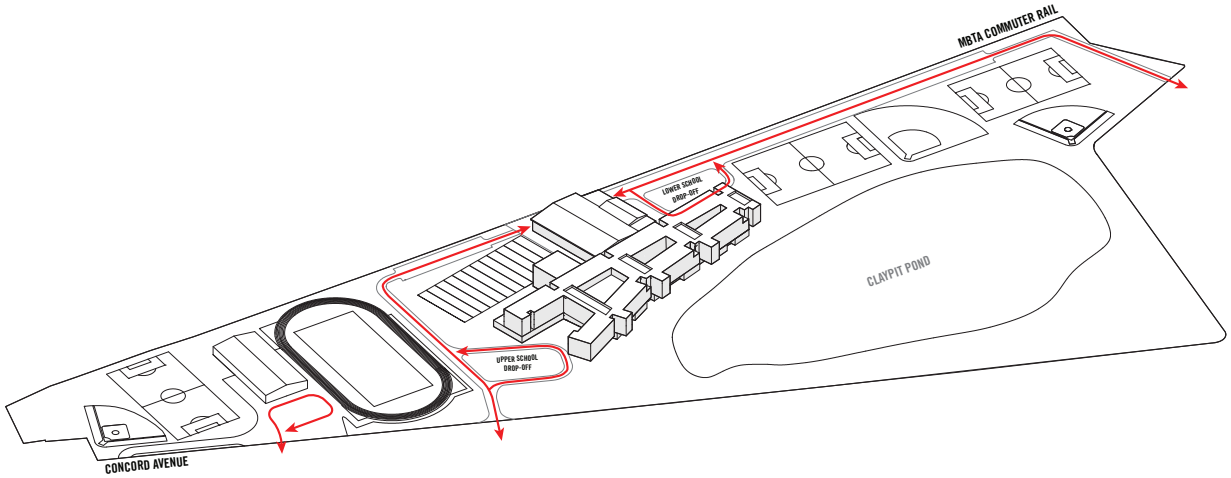
3.3.4 - PREFERRED SOLUTION

F. SITE PLAN / Site Diagrams

BICYCLE CIRCULATION

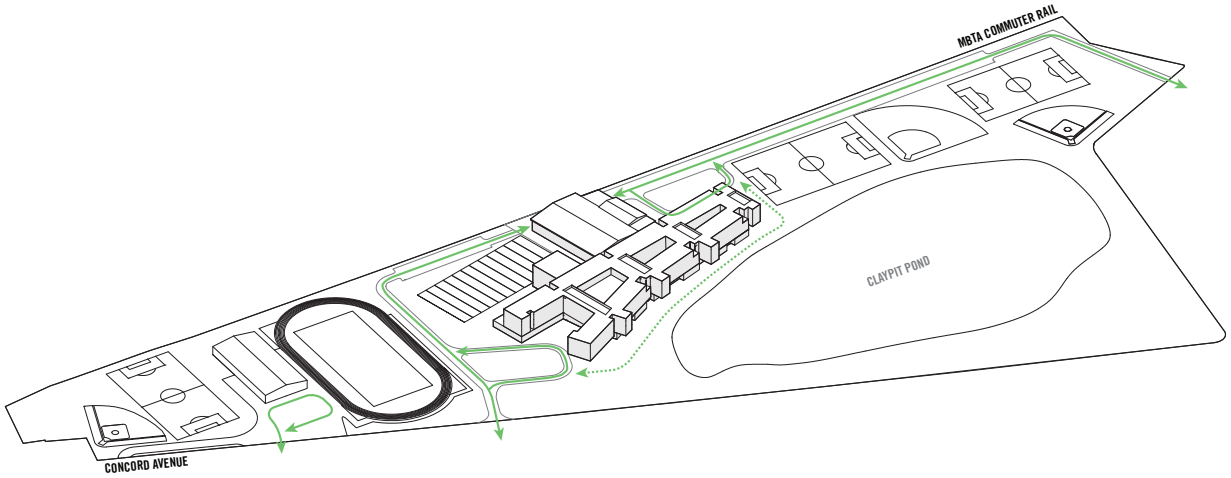


VEHICULAR CIRCULATION

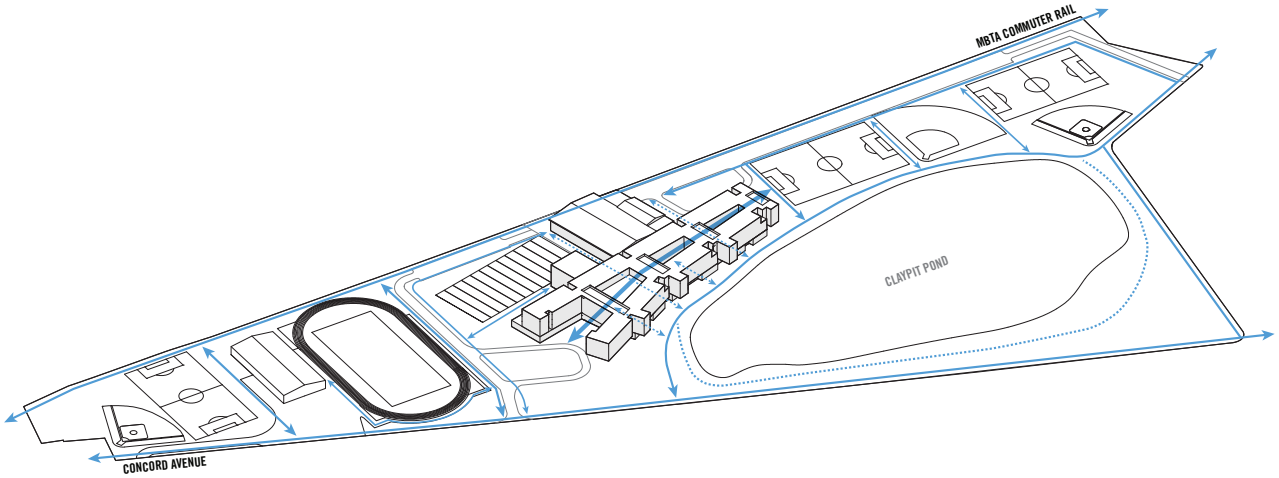


F. SITE PLAN / Site Diagrams

EMERGENCY ACCESS



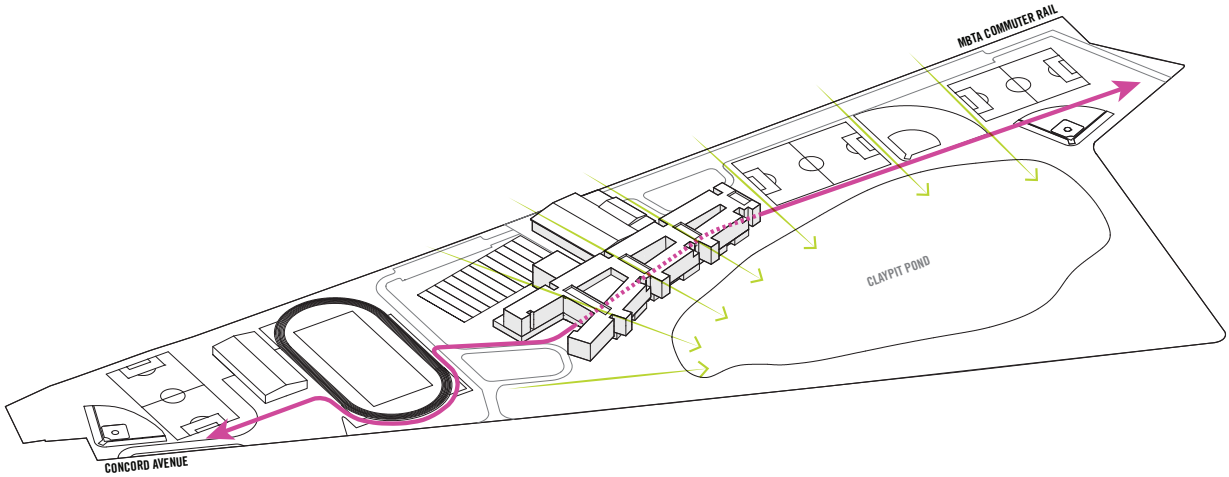
PEDESTRIAN CIRCULATION



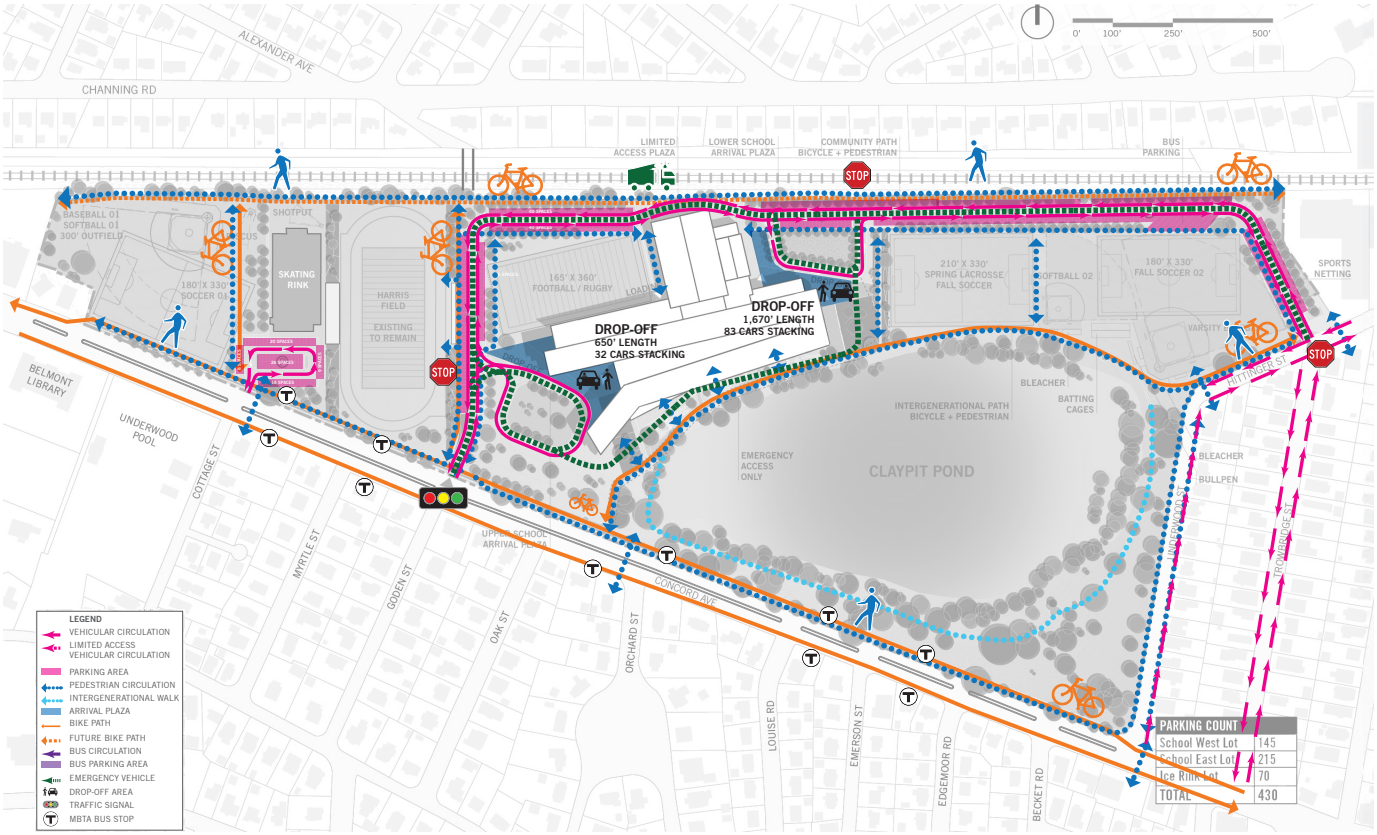
3.3.4 - PREFERRED SOLUTION

F. SITE PLAN / Site Diagrams

SITE PARTI



TRAFFIC SITE PLAN



F. SITE PLAN / Site Diagrams

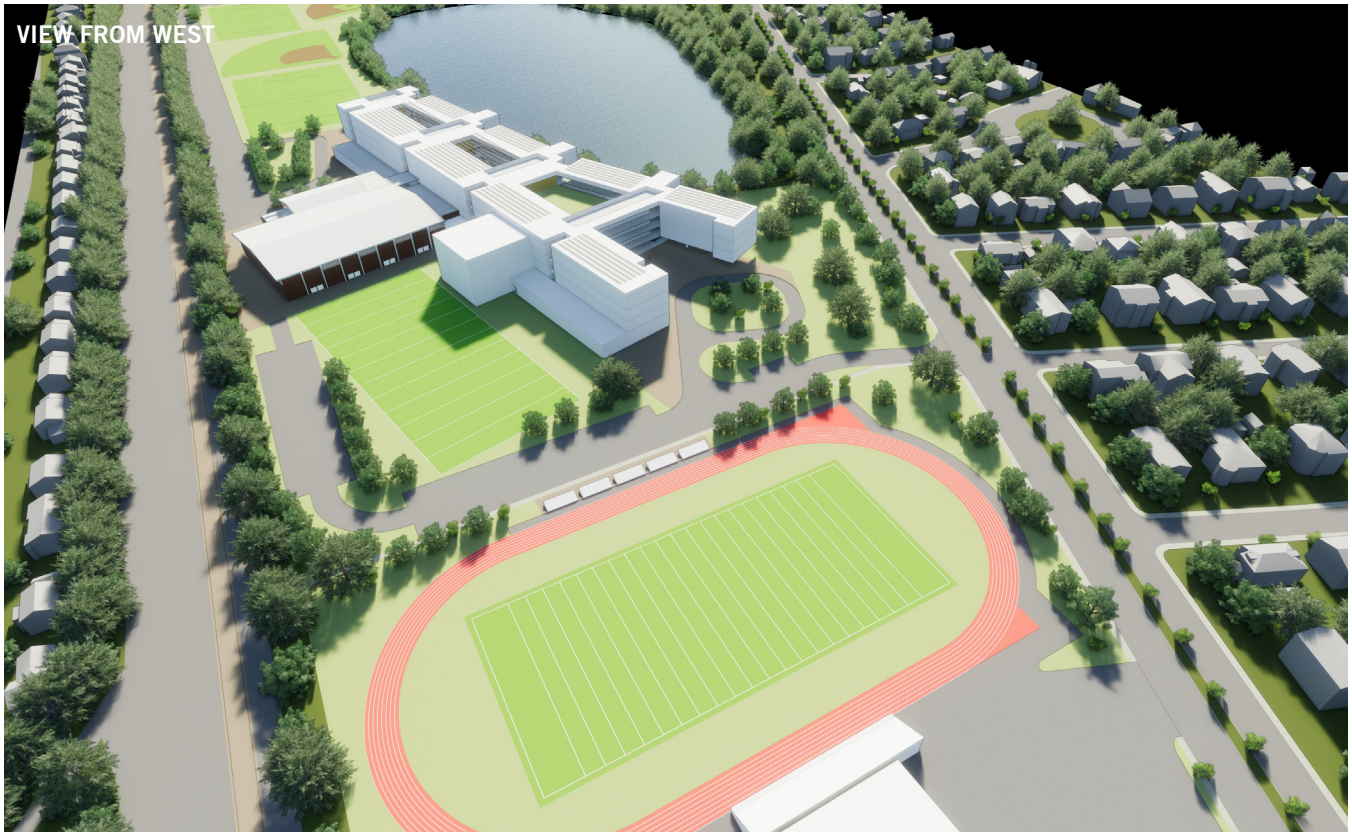
ATHLETIC FIELDS / SPRING

ATHLETIC FIELDS / FALL

3.3.4 - PREFERRED SOLUTION

F. SITE PLAN / Renderings

F. SITE PLAN / Renderings



3.3.4 - PREFERRED SOLUTION

G. BUDGET

PSR 3.3.4 G BUDGET OVERVIEW

Perkins and Will's consultant PM&C prepared a detailed cost estimate for the preferred schematic Option 2.4. Daedalus Projects prepared an independent cost estimate. The spread between these two estimates was less than 1%.

ESTIMATED TOTAL CONSTRUCTION COST

$245.8 M

ESTIMATED TOTAL PROJECT COST

$307.2 M

ESTIMATED FUNDING CAPACITY

The Town of Belmont intends to issue General Obligation Bonds to fund the Town's share of the total project cost for the new school. The Town's debt limit is $325,574,620 based on recently released 2016 EQV amounts. The Town has $79,871,739 in debt outstanding currently, of which $50,803,723 is self-supporting debt funded by user charges not the tax levy. The Town has an additional $4,977,489 in authorized and unissued debt. The Town is operating sufficiently below the debt limit so will be able to adequately cover the anticipated bonding needs resulting from an approved project which will be funded through a voter approved debt exclusion.

LIST OF OTHER MUNICIPAL PROJECTS UNDERWAY

As well as the proposed Belmont High School project the Town's Capital Project List includes the following potential projects: Belmont Public Library, Belmont Police Station, Belmont Department of Public Works and the Hockey Rink. Some of these projects are expected to move in the near future. The Library is in the process of forming a building committee and will have a Schematic Design completed in the summer or fall of 2018. This project will be funded by a combination of private fund raising and a Debt Exclusion (with a target date for construction to begin in 2021 or 2022).

A building committee has been formed to plan for interim renovations to the Police Station and the Department of Public Works. The construction for this should begin in 2019 and will most likely be funded by short term borrowing. A plan for full replacement of both of these facilities is also underway and that construction is planned to happen in about 8 - 10 years (2026 or 2028). The most likely funding source for these two facilities will also be a debt exclusion.

The hockey rink is going to be funded privately and will occur either just before or just after the construction for Belmont High School (both facilities are on the same campus).

DISTRICT'S NOT-TO-EXCEED TOTAL PROJECT BUDGET

It is anticipated that the total project budget for the Preferred Schematic Option 2.4 will be in the range of $300 – 315 M.

The final not to exceed project budget will be established during the Schematic Design Phase prior to the debt exclusion vote.

LOCAL PROCESS FOR FUNDING PROJECT

The borrowing authorization for the new Belmont High School will be through a debt exclusion ballot vote. This debt exclusion ballot is anticipated to occur in November 2018 or April 2019 and requires a simple majority vote for approval.

ESTIMATED IMPACT TO LOCAL PROPERTY TAX

Moody's investment service has assigned an AAA bond rating to the Town of Belmont's outstanding debt.

The Town has provided an analysis of the tax impact to the Residents based on an anticipated Town cost of $231.8 M. The illustration below shows the impact on the real estate property tax based on a 30-year equal principal bond at a rate of 4.0%.

Principal	$231.8M
Rate	4.0%
Term	30 years
Per 100k Assessed Value	$184.00

Cost on $1.0M (average assessed home value) $1,840.00 per year

A more detailed analysis of the tax impact to the Town will be conducted when the Total Project Budget is established.

February 12, 2018

Budget Statement for Preferred Schematic - Expenditures
Belmont High School

As reported on the school district's most recent three end of year information, please updated to the 3 latest fiscal year periods and complete the fields below.

Category	2015-2016 FY2016 Staff (FTE)	2015-2016 FY2016 Budget	2016-2017 FY2017 Staff (FTE)	2016-2017 FY2017 Budget	2017-2018 FY2018 Staff	2017-2018 FY2018 Budget	Change from Previous Year Staff (FTE)	Change from Previous Year Budget	Post-Constuction Budget Staff	Post-Constuction Budget Budget	New Facility vs. Current Staff (FTE)	New Facility vs. Current Budget
Salaries												
Administration												
Admin. Secretary	4.00	176,995	4.00	179,100	4.00	182,738	0.00	3,637	4.00	182,738	0.00	-
Assistant Principal	3.01	338,848	3.01	352,225	3.28	396,254	0.27	44,029	3.28	396,254	0.00	-
Business Office	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Curriculum Director/Coord.	3.68	382,504	3.68	406,462	3.68	423,594	0.00	17,132	3.68	423,594	0.00	-
Custodians/Maintenance Staff	4.75	262,301	4.50	238,244	4.80	254,464	0.30	16,219	8.15	432,014	3.35	177,550
Executive Secretary	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Facilities Manager	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Guidance	8.00	594,770	9.50	731,536	9.50	726,861	0.00	(4,676)	9.50	726,861	0.00	-
Adjustment Counselor	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Guidance Counselors	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Guidance Director	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Legal	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Nurse	2.70	205,482	2.80	228,101	2.80	244,839	0.00	16,738	2.80	244,839	0.00	-
Other	4.88	145,477	4.88	147,965	3.23	110,085	-1.65	(37,880)	3.23	110,085	0.00	-
Principal	0.99	114,299	0.99	118,836	1.12	137,954	0.13	19,117	1.12	137,954	0.00	-
Special Education Admin	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Superintendent/Asst. Superintendent	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Transportation	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Treasurer	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Total Administration	**32.01**	**2,220,673**	**33.36**	**2,402,469**	**32.41**	**2,476,786**	**-0.95**	**74,317**	**35.76**	**2,654,337**	**3.35**	**177,550**
Instruction - Teaching Services												
Arts	6.90	778,380	7.30	822,525	7.05	860,917	-0.25	38,393	7.05	860,917	0.00	-
Business	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Communications	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coping Instructor	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Culinary Arts	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
ELL	4.60	308,772	4.50	294,900	5.00	363,257	0.50	68,357	5.00	363,257	0.00	-
English Language	17.60	1,431,596	18.25	1,491,139	18.00	1,517,475	-0.25	26,336	18.00	1,517,475	0.00	-
Family Consumer Services	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Foreign Language	14.05	1,151,737	14.25	1,216,651	14.25	1,225,258	0.00	8,607	14.25	1,225,258	0.00	-
Health Services	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
History & Social Science	19.60	1,560,684	19.55	1,610,027	19.80	1,702,309	0.25	92,282	19.80	1,702,309	0.00	-
Instructional Assistant/Paraprofessionals	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Library/Media	2.50	135,261	2.65	146,716	2.49	148,230	-0.16	1,513	2.49	148,230	0.00	-
Mathematics	18.60	1,491,366	19.00	1,470,288	19.00	1,538,553	0.00	68,265	19.00	1,538,553	0.00	-
MCAS	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Music	4.92	420,911	4.92	438,007	4.92	455,855	0.00	17,847	4.92	455,855	0.00	-
Other	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Physical Education	4.73	350,227	5.28	386,111	4.43	358,287	-0.85	(27,824)	4.43	358,287	0.00	-
Reading	1.00	92,401	1.00	93,752	1.00	98,319	0.00	4,567	1.00	98,319	0.00	-
School Adjustment Counselor	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Science	18.15	1,532,348	18.35	1,621,057	18.15	1,602,119	-0.20	(18,939)	18.15	1,602,119	0.00	-
Biology	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Botany	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Chemistry	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Geology	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Physics	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Special Education	32.88	1,808,624	36.72	2,077,557	36.23	2,088,011	-0.48	10,454	36.23	2,088,011	0.00	-
Substitute Teachers	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Technology	1.30	112,237	1.40	85,952	1.80	116,690	0.40	30,737	1.80	116,690	0.00	-
Vocational Tech.	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Total Instruction - Teaching Services	**146.82**	**11,174,543**	**153.15**	**11,754,683**	**152.11**	**12,075,276**	**-1.04**	**320,593**	**152.11**	**12,075,276**	**0.00**	**-**
Total Salaries Administration & Instruction	**178.83**	**13,395,216**	**186.51**	**14,157,153**	**184.52**	**14,552,063**	**-1.99**	**394,910**	**187.87**	**14,729,613**	**3.35**	**177,550**
Employee Benefits												
All employee-related fringe (health insurance, retirement etc)	**-**	**1,462,635**		**1,525,700**		**1,679,505**		**153,806**		**1,679,505**		**-**
Materials & Services												
Materials												
Audio-Visual Materials		1,743		1,250		1,000		(250)		1,000		-
Culinary Arts Materials		-		-		-		-		-		-
General Office Supplies		65,894		63,805		63,555		(250)		63,555		-
Information technology		-		-		-		-		-		-
Hardware		-		-		-		-		-		-
Software		-		-		-		-		-		-
Library Materials		-		-		-		-		-		-
Non info-tech equipment		5,000		5,500		5,000		(500)		5,000		-
Testing Materials & Supplies		-		-		-		-		-		-
Textbooks		20,046		33,120		30,950		(2,170)		30,950		-
Vocational Program Materials		-		-		-		-		-		-
Total Materials		**92,683**		**103,675**		**100,505**		**(3,170)**		**100,505**		**-**

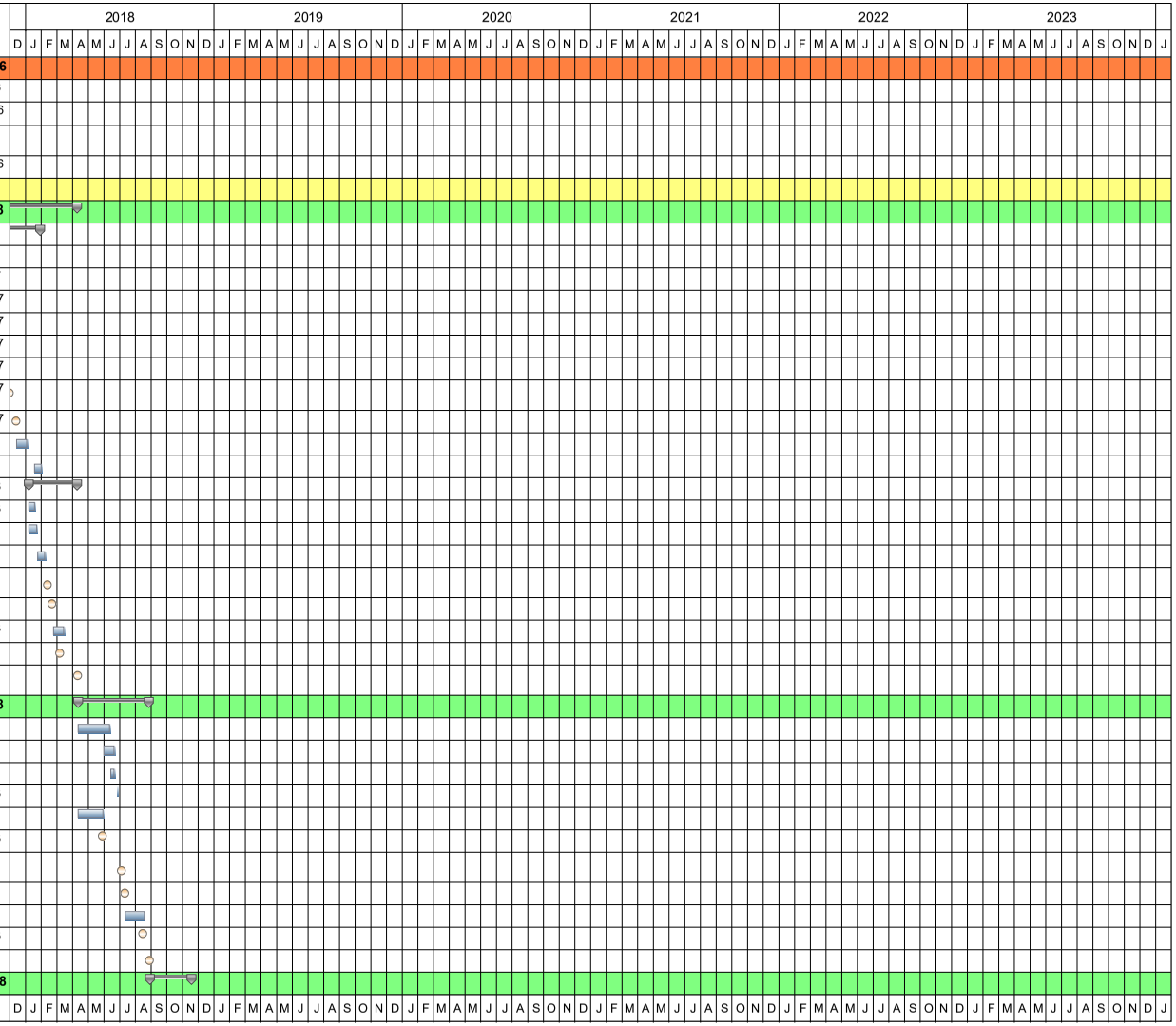
February 12, 2018

Budget Statement for Preferred Schematic - Revenue
Belmont High School

As reported on the school district's most recent three End of Year Pupil and Financial Reports schedule 1, please update to the 3 latest fiscal year periods and report sources of revenue in the fields below.

	FY15 End of Year Financial Report							FY16 End of Year Financial Report							FY17 End of Year Financial Report						
	Regular Day	Special Education	C74 Occupational Day	Adult Education	Other Programs	Un- distributed	Total	Regular Day	Special Education	C74 Occupational Day	Adult Education	Other Programs	Un- distributed	Total	Regular Day	Special Education	C74 Occupational Day	Adult Education	Other Programs	Un-distributed	Total
A. Revenue from Local Sources																					
Assessments received by Regional Schools	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E&D Fund Appropriations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tuition from Individuals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tuition from Other Districts in Comm.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tuition from Districts in Other States	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Previous Year Unexpended Encumbrances (Carry Forward)	-	-	-	-	-	44,995	44,995	-	-	-	-	-	11,545	11,545	-	-	-	-	-	15,873	15,873
Transportation Fees	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Earnings on Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rental of School Facilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Care and Assistance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15,034	-	-	-	-	15,034
Non Revenue Receipts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue From Local Sources	**-**	**-**	**-**	**-**	**-**	**44,995**	**44,995**	**-**	**-**	**-**	**-**	**-**	**11,545**	**11,545**	**-**	**15,034**	**-**	**-**	**-**	**15,873**	**30,908**
B. Revenue from State Aid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School Aid (Chapter 70)	-	-	-	-	-	6,420,104	6,420,104	-	-	-	-	-	6,766,099	6,766,099	-	-	-	-	-	7,111,769	7,111,769
Mass School Building Authority - Construction Aid	-	382,498	-	-	-	-	382,498	-	-	-	-	-	1,036,494	1,036,494	-	-	-	-	-	-	-
Pupil Transportation (Ch. 71, 71A,71B,74)	-	-	-	-	-	22,098	22,098	-	-	-	-	-	14,354	14,354	-	-	-	-	-	6,290	6,290
Charter Tuition Reimbursements & Charter Facilities Aid	-	-	-	-	-	1,786	1,786	-	2,408	-	-	-	1,786	4,194	-	13,032	-	-	-	2,656	15,688
Circuit Breaker	-	-	-	-	-	1,377,754	1,377,754	-	-	-	-	-	1,451,678	1,451,678	-	-	-	-	-	1,687,664	1,687,664
Foundation Reserve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue From State Aid	**-**	**382,498**	**-**	**-**	**-**	**7,821,742**	**8,204,240**	**-**	**2,408**	**-**	**-**	**-**	**9,270,411**	**9,272,819**	**-**	**13,032**	**-**	**-**	**-**	**8,808,379**	**8,821,411**
C. Revenue from Federal Grants																					
ESE Administered Grants	124,633	965,447	-	-	-	103,550	1,193,630	235,019	985,420	-	-	-	103,142	1,323,581	154,025	996,024	-	-		96,678	1,246,727
Direct Federal Grants	-	26,069	-	-	-	-	26,069	-	26,085	-	-	-	-	26,085	-	26,854		-			26,854
Total Revenue Federal Grants	**124,633**	**991,516**	**-**	**-**	**-**	**103,550**	**1,219,699**	**235,019**	**1,011,505**	**-**	**-**	**-**	**103,142**	**1,349,666**	**154,025**	**1,022,878**	**-**	**-**	**-**	**96,678**	**1,273,581**
D. Revenue from State Grants																					
ESE Administered Grants	-	-	-	-	-	629,711	629,711	-	-	-	-	-	689,701	689,701	-	-	-	-	-	547,355	547,355
Other State Grants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue From State Grants	**-**	**-**	**-**	**-**	**-**	**629,711**	**629,711**	**-**	**-**	**-**	**-**	**-**	**689,701**	**689,701**	**-**	**-**	**-**	**-**	**-**	**547,355**	**547,355**
E. Revenue - Revolving & Special Funds																					
School Lunch Receipts	-	-	-	-		955,027	955,027	-	-	-	-		1,144,664	1,144,664				-		1,197,237	1,197,237
Athletic Receipts	-	-	-	-		471,062	471,062	-	-	-	-		475,063	475,063				-		558,833	558,833
Tuition Receipts - School Choice	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-		-	-
Tuition Receipts - Other	735,905	-	-	-	143,560	167,342	1,046,807	1,083,113	-	-	-	119,610	162,964	1,365,687	997,118			-	64,100	118,388	1,179,606
Other Local Receipts	-	-	-	-	-	749,526	749,526	-	-	-	-	-	779,575	779,575				-	66,738	871,990	938,728
Private Grants	-	-	-	-	38,313	66,351	104,664	-	-	-	-	32,720	65,132	97,852	-	-	-	-	-	209,282	209,282
Total Revenue Revolving & Special Funds	**735,905**	**-**	**-**	**-**	**181,873**	**2,409,308**	**3,327,086**	**1,083,113**	**-**	**-**	**-**	**152,330**	**2,627,398**	**3,862,841**	**997,118**	**-**	**-**	**-**	**130,838**	**2,955,730**	**4,083,686**
Total Revenue All Sources	**860,538**	**1,374,014**	**-**	**-**	**181,873**	**11,009,306**	**13,425,731**	**1,318,132**	**1,013,913**	**-**	**-**	**152,330**	**12,702,196**	**15,186,572**	**1,151,143**	**1,050,945**	**-**	**-**	**130,838**	**12,424,016**	**14,756,941**

	Activity Name	Duration (Days)	Start Date	Finish Date
1	**Module 1 - Eligibility Period**	**208.00**	**1/28/16**	**11/15/16**
2	Invitation into Eligibility Period	0.00	1/28/16	1/28/16
3	Enrollment Certification	0.00	10/11/16	10/11/16
4	Invitation by MSBA to Participate in Feasibility Study	0.00	11/9/16	11/9/16
5	Execution of FSA	0.00	11/15/16	11/15/16
6	**Module 2 - Forming the Team...**	**149.00**	**1/11/17**	**8/7/17**
19	**Module 3 - Feasibility Study**	**167.00**	**8/21/17**	**4/10/18**
20	**Preliminary Design Program (PDP)**	**119.00**	**8/21/17**	**2/1/18**
21	Kick off meeting with MSBA	0.00	8/21/17	8/21/17
22	Evaluation of Existing Conditions	20.00	8/21/17	9/15/17
23	Educational Visioning and Program	39.00	9/19/17	11/10/17
24	Initial Space Summary	39.00	9/19/17	11/10/17
25	Site Development Requirements	39.00	9/19/17	11/10/17
26	Preliminary Evaluation of Alternatives	13.00	11/13/17	11/29/17
27	Local Actions and Approvals - SBC meeting to approve PDP Submission	0.00	11/30/17	11/30/17
28	Submit PDP to MSBA	0.00	12/13/17	12/13/17
29	MSBA Staff PDP Review	15.00	12/13/17	1/2/18
30	District Response to MSBA PDP Comments	11.00	1/18/18	2/1/18
31	**Preferred Schematic Report (PSR)**	**67.00**	**1/8/18**	**4/10/18**
32	Update Evaluation of Existing Conditions	10.00	1/8/18	1/19/18
33	Final Evaluation of Alternatives	12.00	1/8/18	1/23/18
34	Develop Preferred Solution	10.00	1/24/18	2/6/18
35	Local Actions and Approvals - SBC meeting to approve PSR Submission	0.00	2/13/18	2/13/18
36	Submit PSR to MSBA (MSBA Deadline 02/21/18)	0.00	2/21/18	2/21/18
37	MSBA Staff PSR Review	15.00	2/22/18	3/14/18
38	Facilities Assessment Sub Committee	0.00	3/7/18	3/7/18
39	MSBA Board Meeting - Approval to proceed to Schematic Design	0.00	4/10/18	4/10/18
40	**Module 4 - Schematic Design (SD)**	**101.00**	**4/11/18**	**8/29/18**
41	Develop Schematic Design	45.00	4/11/18	6/12/18
42	Schematic Design Estimate and Reconciliation	15.00	5/31/18	6/20/18
43	Develop Overall Project Budget	5.00	6/14/18	6/20/18
44	OPM SD Submission Notification to MSBA	1.00	6/27/18	6/27/18
45	Develop DESE submittal	36.00	4/11/18	5/30/18
46	Submit DESE report to MSBA	0.00	5/30/18	5/30/18
47	Local Actions and Approvals - SBC meeting to approve SD Submission	0.00	7/4/18	7/4/18
48	Submit SD to MSBA (MSBA Deadline 07/11/18)	0.00	7/11/18	7/11/18
49	MSBA Staff Review	28.00	7/11/18	8/17/18
50	Project Scope & Budget (PS&BA) Conference	0.00	8/16/18	8/16/18
51	MSBA Board Meeting - PSB Approval	0.00	8/29/18	8/29/18
52	**Module 5 - Funding the Project**	**58.00**	**8/29/18**	**11/19/18**



3.3.4 - PREFERRED SOLUTION

I. UPDATED SCHEDULE

	Activity Name	Duration (Days)	Start Date	Finish Date
53	MSBA Board Meeting - PSB Approval	0.00	8/29/18	8/29/18
54	Debt Exclusion Ballot	0.00	11/6/18	11/6/18
55	Execute Project Funding Agreement (PFA)	10.00	11/6/18	11/19/18
56	**Module 6 - Detailed Design**	**368.00**	**11/19/18**	**4/16/20**
57	**Design Development...**	**125.00**	**11/20/18**	**5/13/19**
63	**Construction Documents...**	**220.00**	**4/9/19**	**2/10/20**
79	**Permitting & Registrations...**			
88	**PreQualification & Bidding...**	**368.00**	**11/19/18**	**4/16/20**
115	**Module 7 - Construction**	**1,014.00**	**12/3/19**	**10/23/23**
116	**Construction**	**1,014.00**	**12/3/19**	**10/23/23**
117	Notice to Proceed - Early Works Packages	120.00	12/3/19	5/18/20
118	Phase 1	440.00	3/2/20	11/5/21
119	Phase 2	440.00	11/8/21	7/14/23
120	Demo and Site/Field Completeion	70.00	7/17/23	10/20/23
121	Substantial Completion	0.00	10/23/23	10/23/23
122	**FF&E Bid and Contract...**			
126	**Module 8 - Project Close Out...**	**276.00**	**2/26/24**	**3/17/25**