A. INTRODUCTION / MSBA PSR Report Response Appendix 3

BELMONT HIGH SCHOOL, 221 CONCORD AVE, BELMONT MA

7/1/93

950 CMR - 276

4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 3

BELMONT HIGH SCHOOL, 221 CONCORD AVE, BELMONT MA

7/1/93 950 CMR - 276

A. INTRODUCTION / MSBA PSR Report Response Appendix 3

BELMONT HIGH SCHOOL, 221 CONCORD AVE, BELMONT MA

7/1/93

950 CMR - 276

4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 3

BELMONT HIGH SCHOOL, 221 CONCORD AVE, BELMONT MA

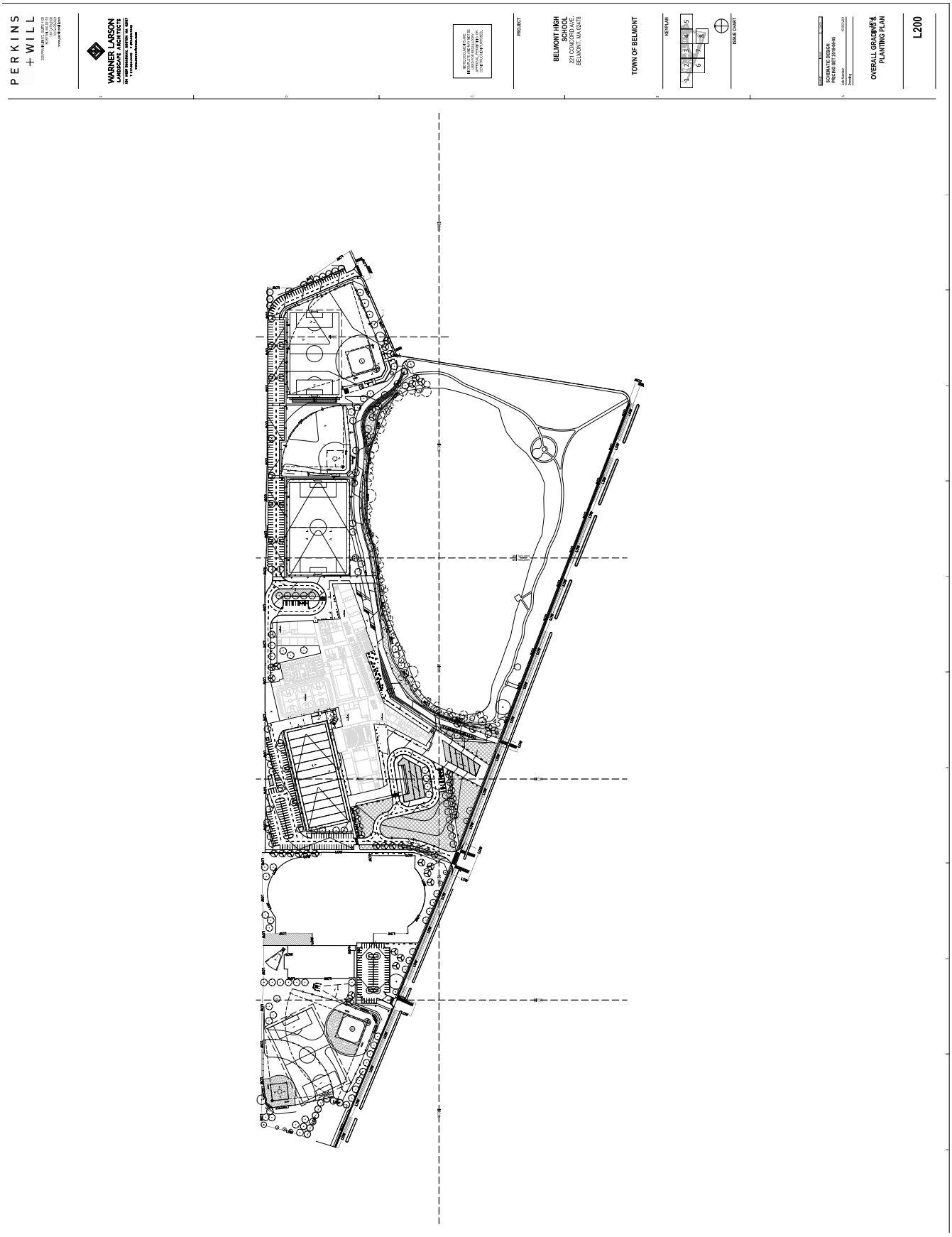
7/1/93 950 CMR - 276

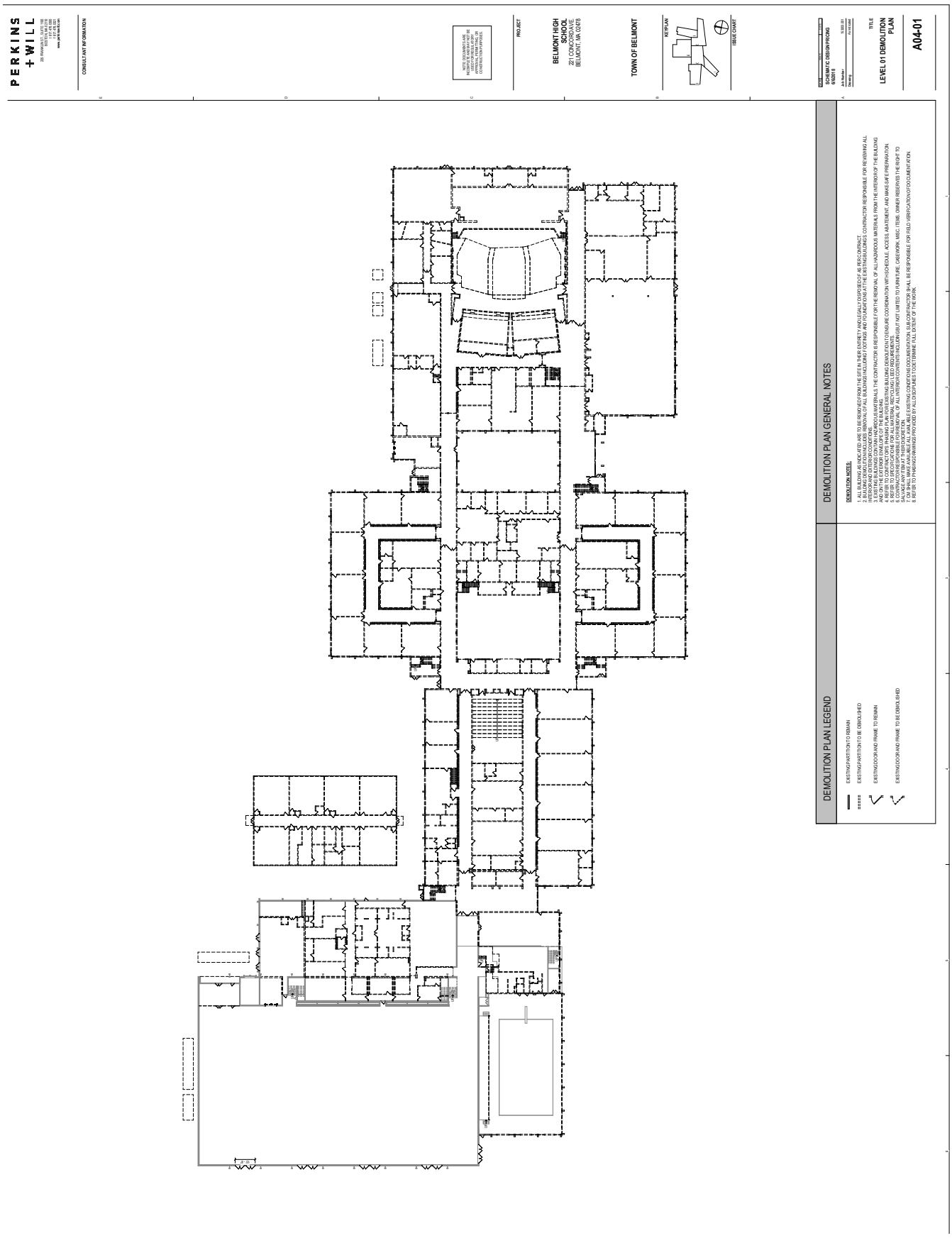
A. INTRODUCTION / MSBA PSR Report Response Appendix 3

WHITE MEMORIAL FIELD HOUSE, 291 CONCORD AVE, BELMONT MA

4.1.2 SCHEMATIC DESIGN BINDER

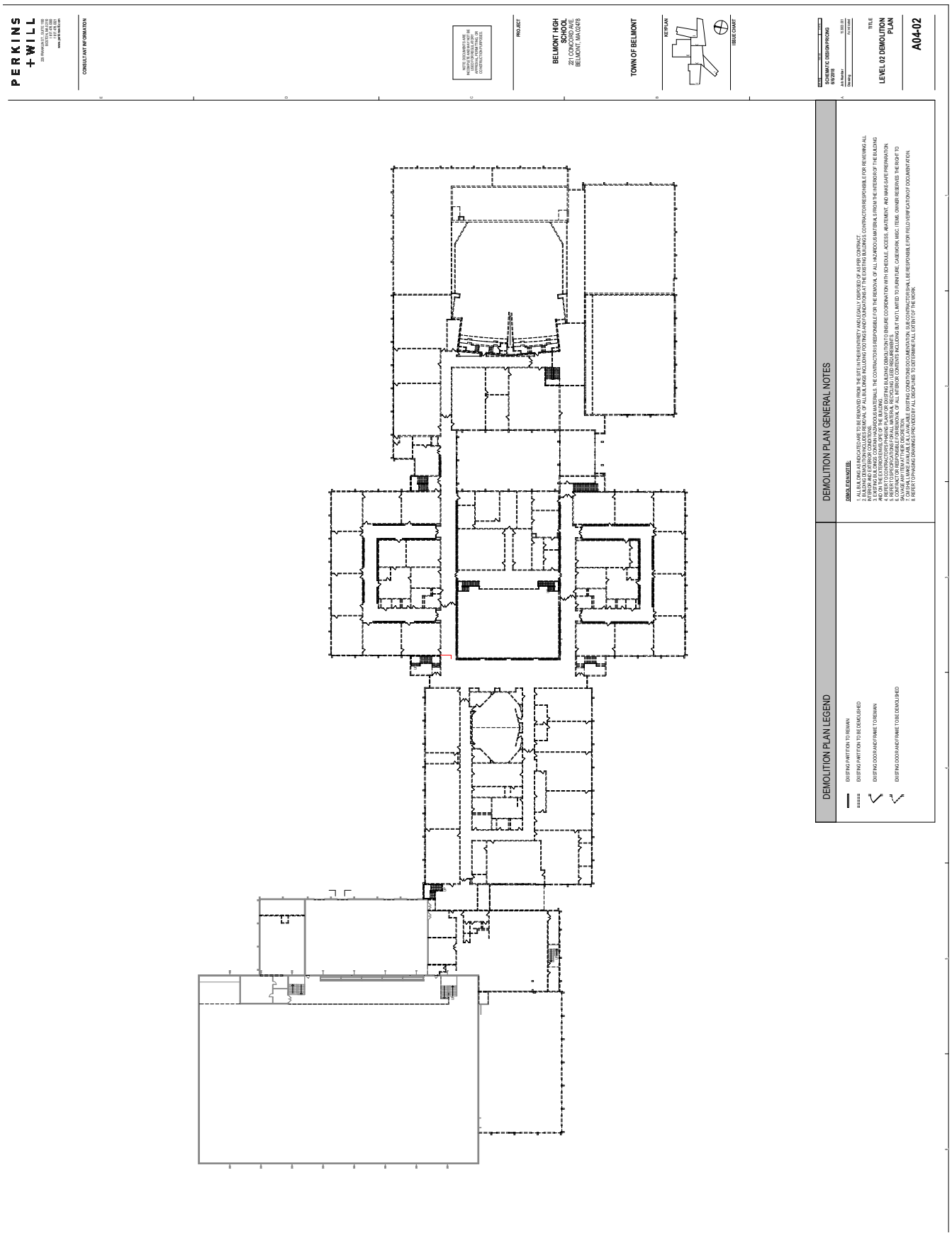
A. INTRODUCTION / MSBA PSR Report Response Appendix 3

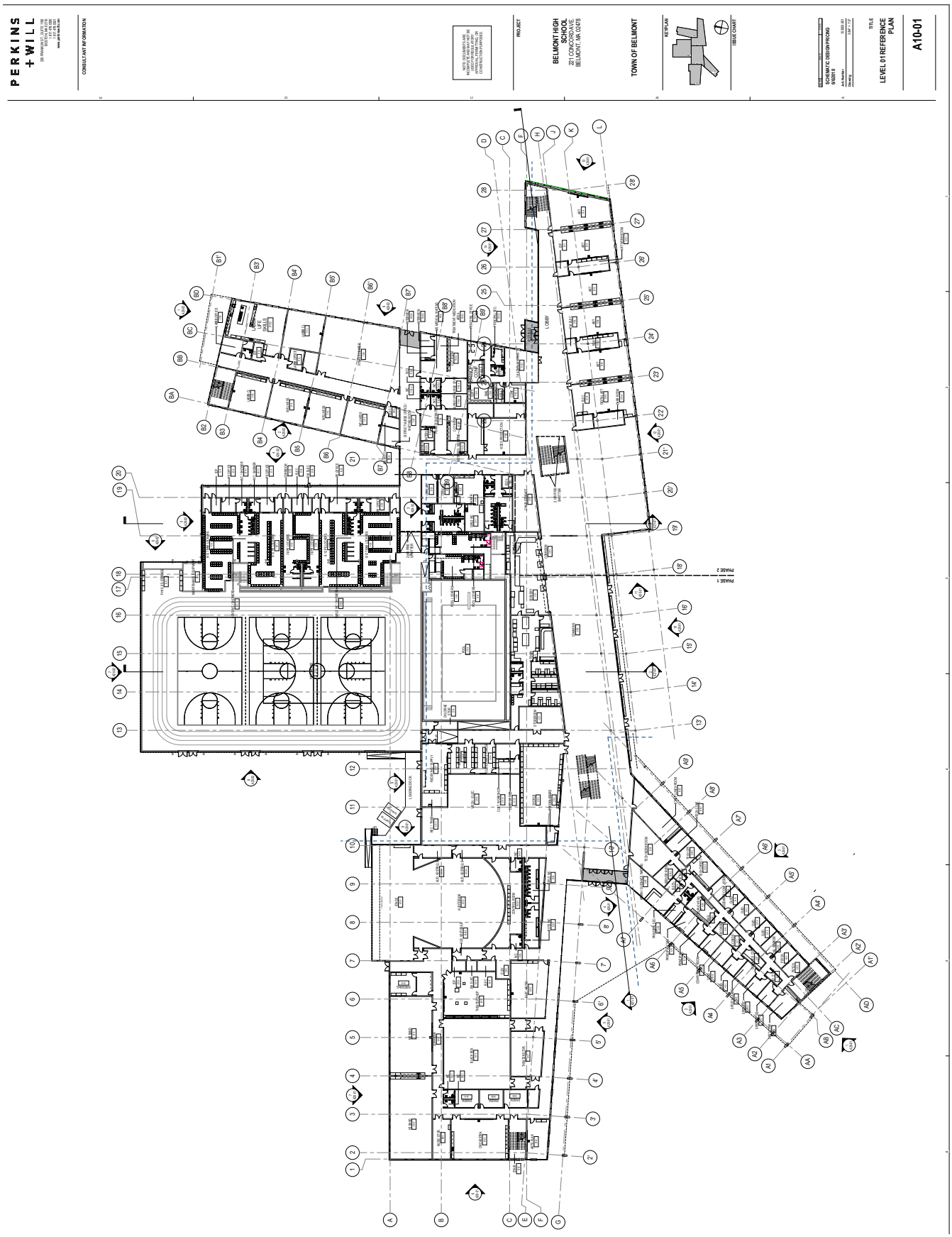



PERKINS + WILL
CONSULTANT INFORMATION
PROJECT
BELMONT HIGH SCHOOL
221 CONCORD AVE
BELMONT, MA 02478
TOWN OF BELMONT
KEYPLAN
ISSUE CHART
SCHEMATIC DESIGN/PHASING
TITLE
LEVEL 01 DEMOLITION PLAN
A04-01
DEMOLITION PLAN LEGEND
EXISTING PARTITION TO REMAIN
EXISTING PARTITION TO BE DEMOLISHED
EXISTING DOOR AND FRAME TO REMAIN
EXISTING DOOR AND FRAME TO BE DEMOLISHED
DEMOLITION PLAN GENERAL NOTES
DEMOLITION NOTES:

4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 3





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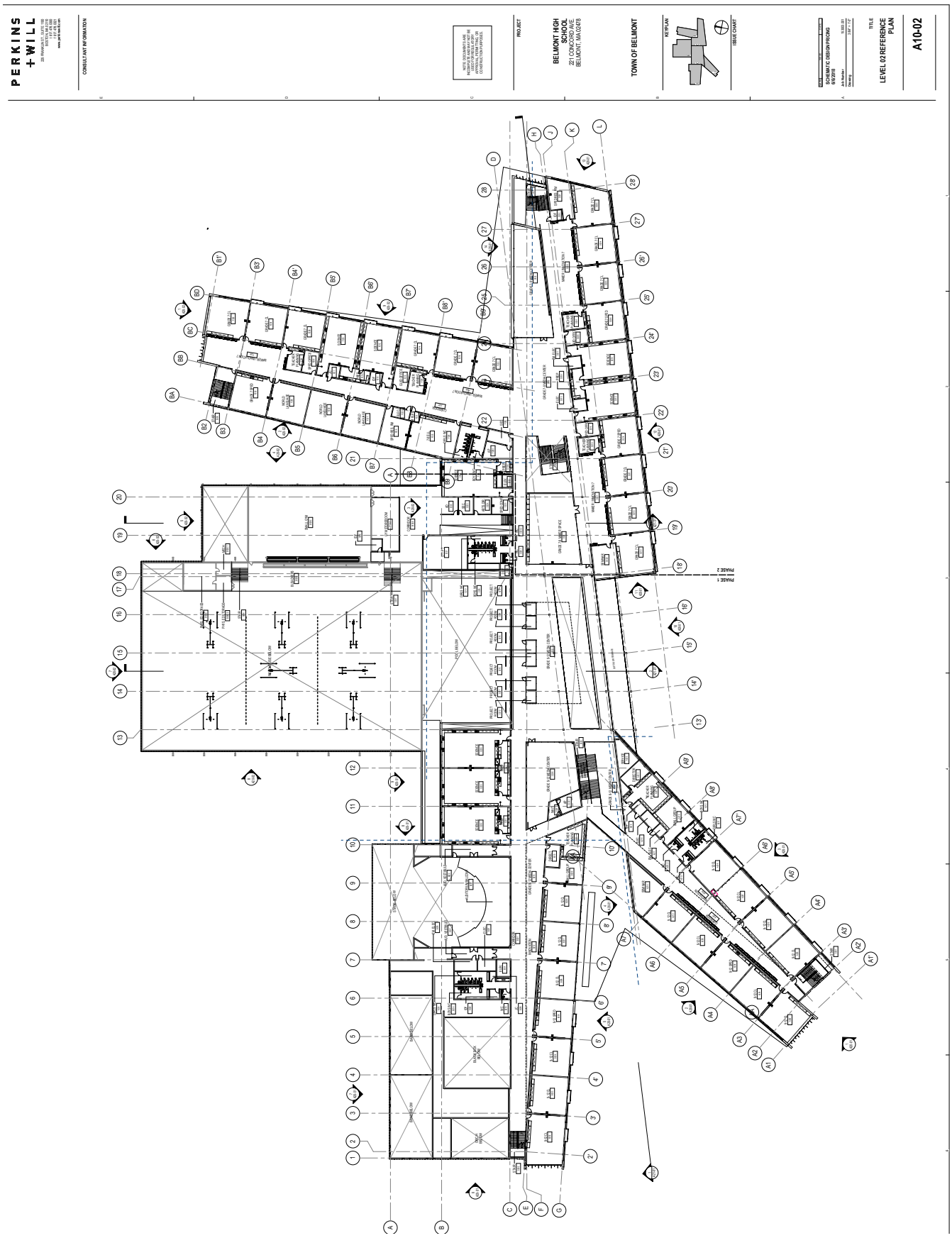
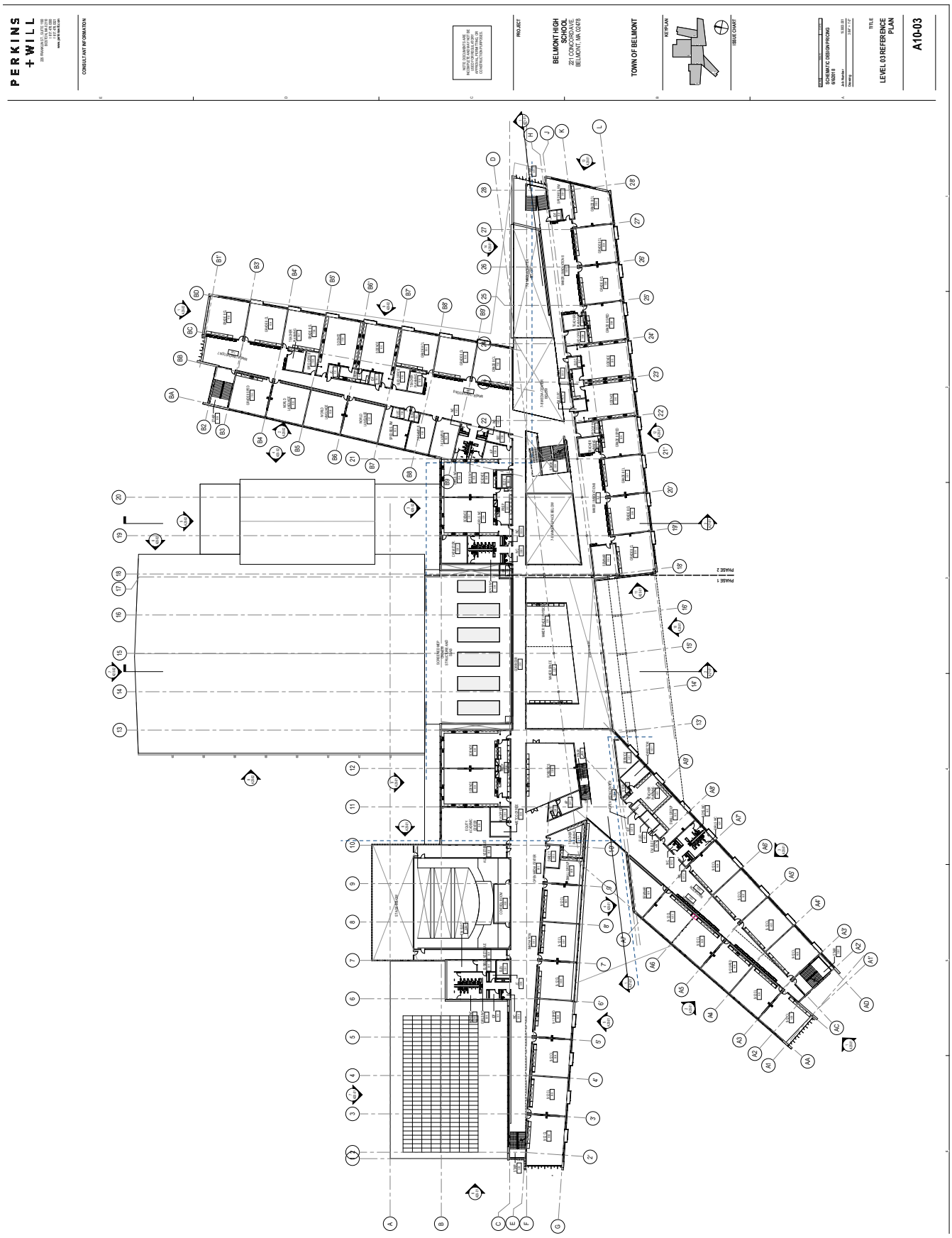
SCHEMATIC DESIGN PROJECT MANUAL 4.1.3
SCHEMATIC DESIGN DRAWING 4.1.4

4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 3




PERKINS + WILL
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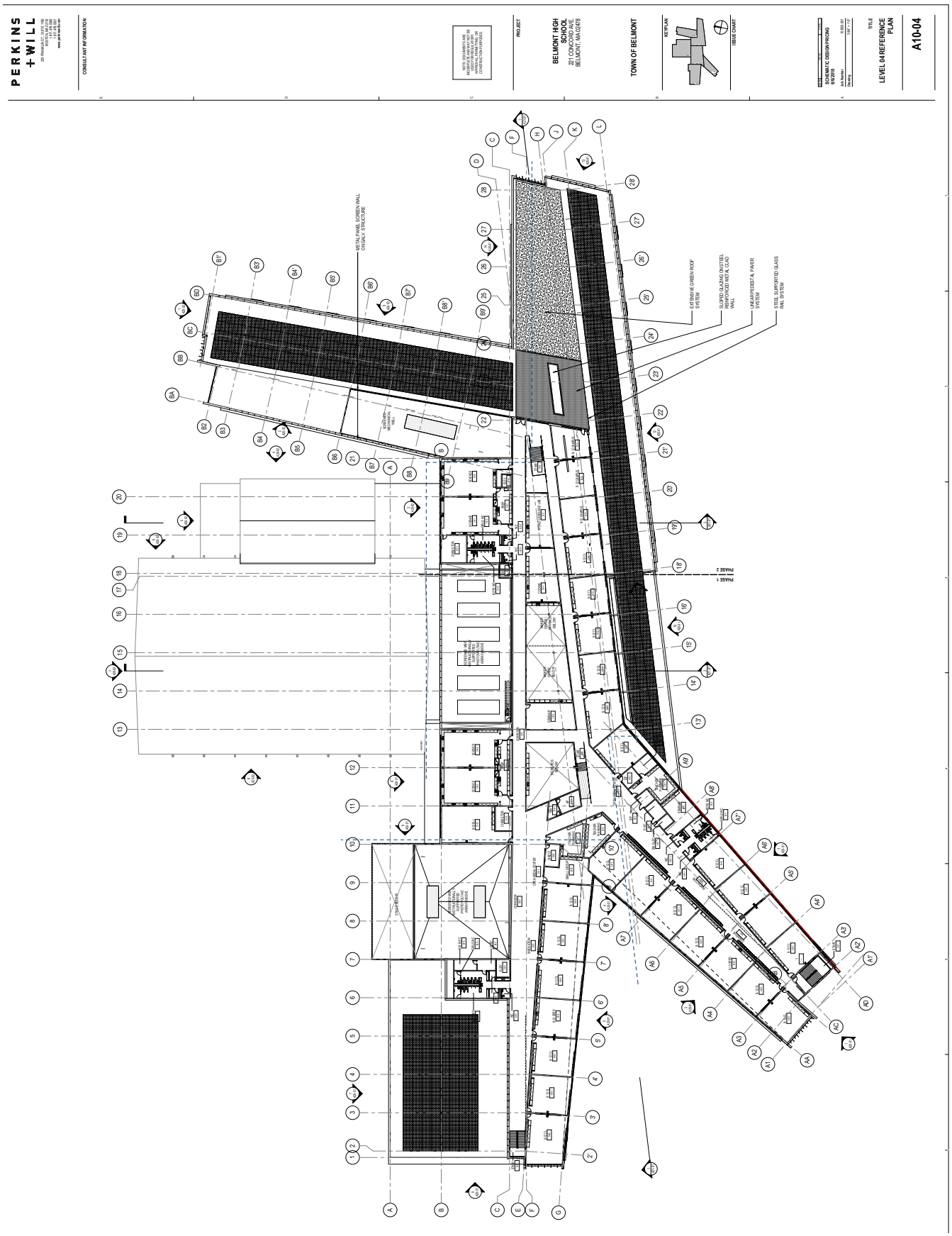
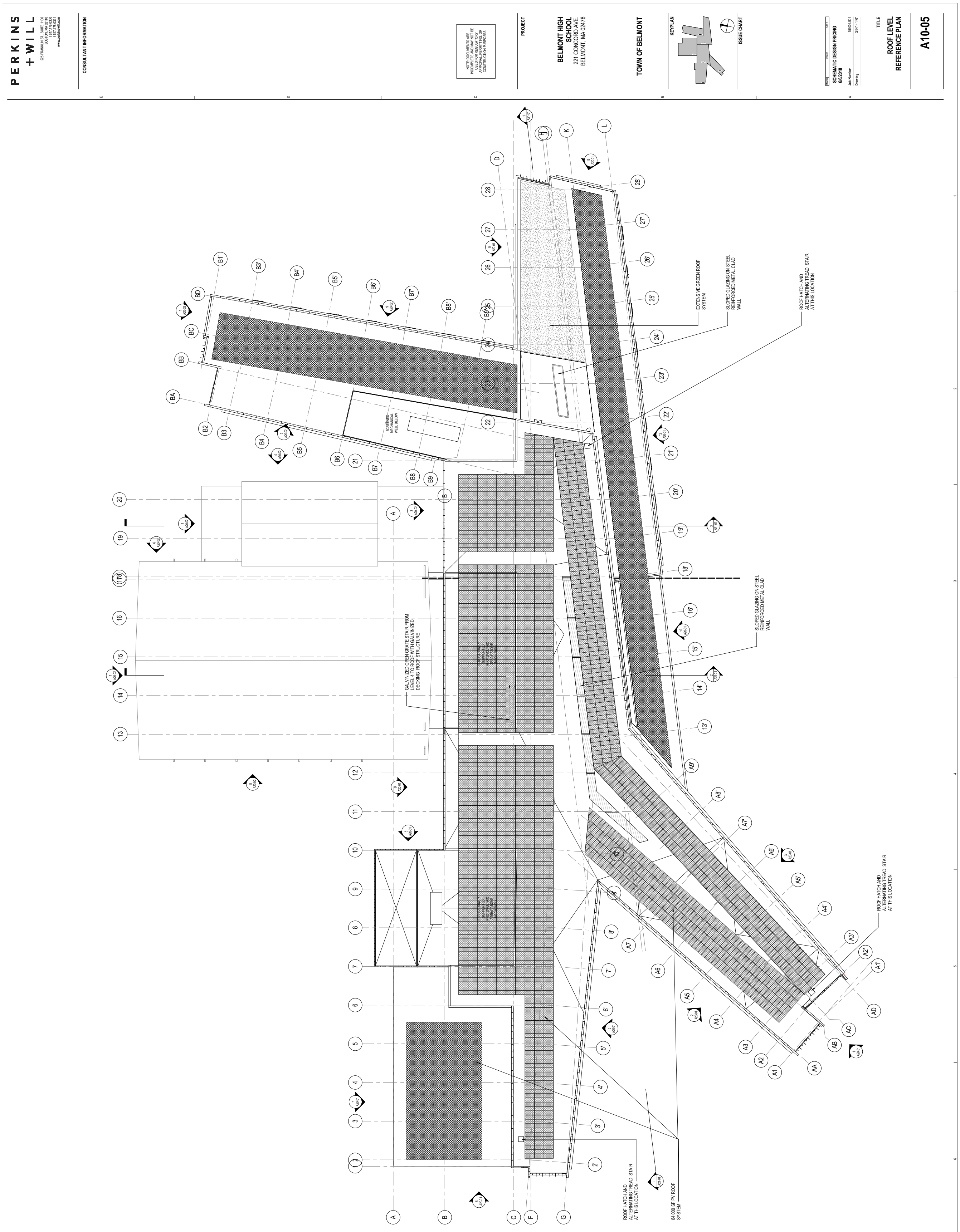
PROJECT
BELMONT HIGH SCHOOL
221 CONCORD AVE
BELMONT, MA 02478
TOWN OF BELMONT
KEYPLAN
ISSUE CHART
SCHEMATIC DESIGN/PHASING
TITLE
LEVEL 03 REFERENCE PLAN
A10-03
PHASE 1
PHASE 2

4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 3

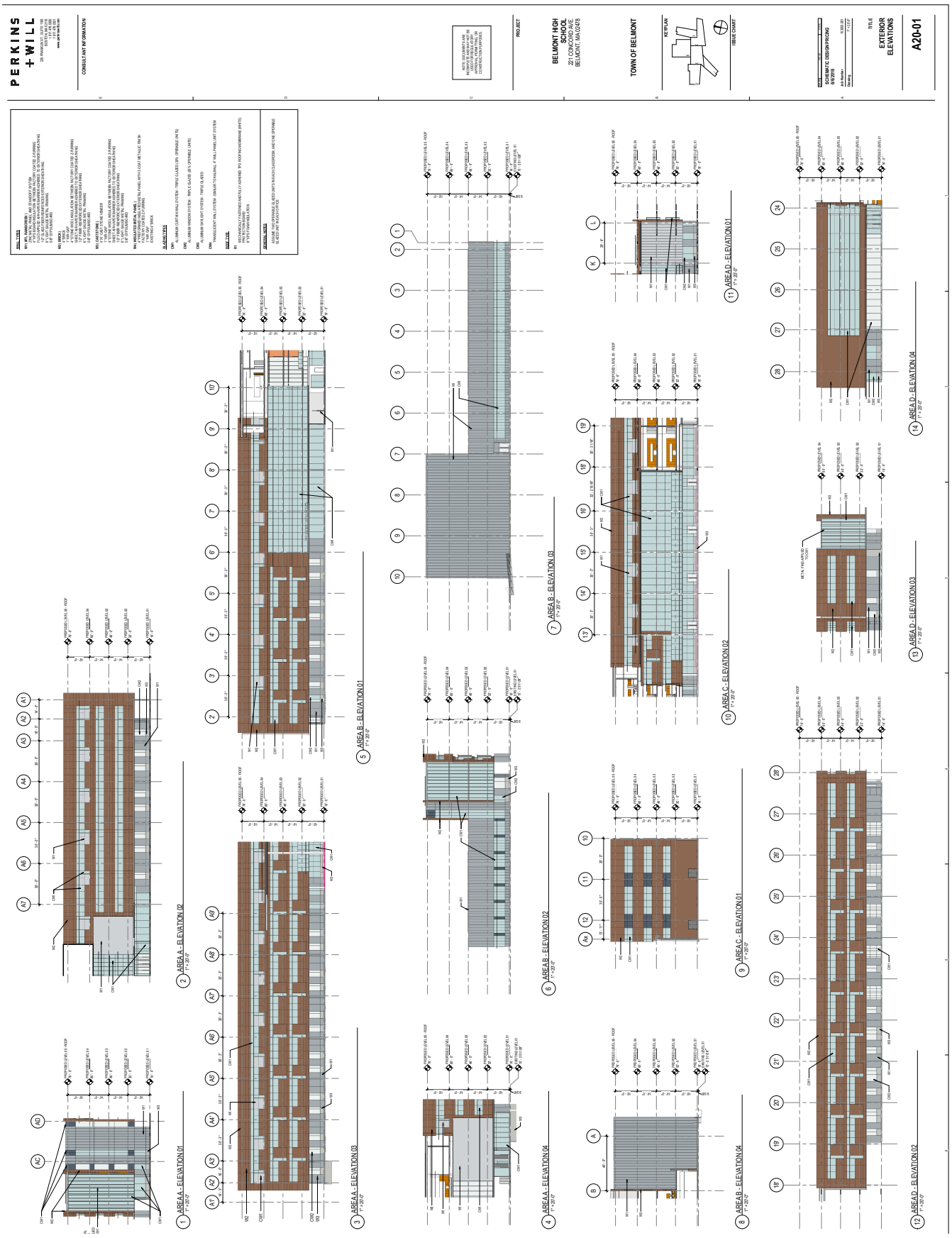


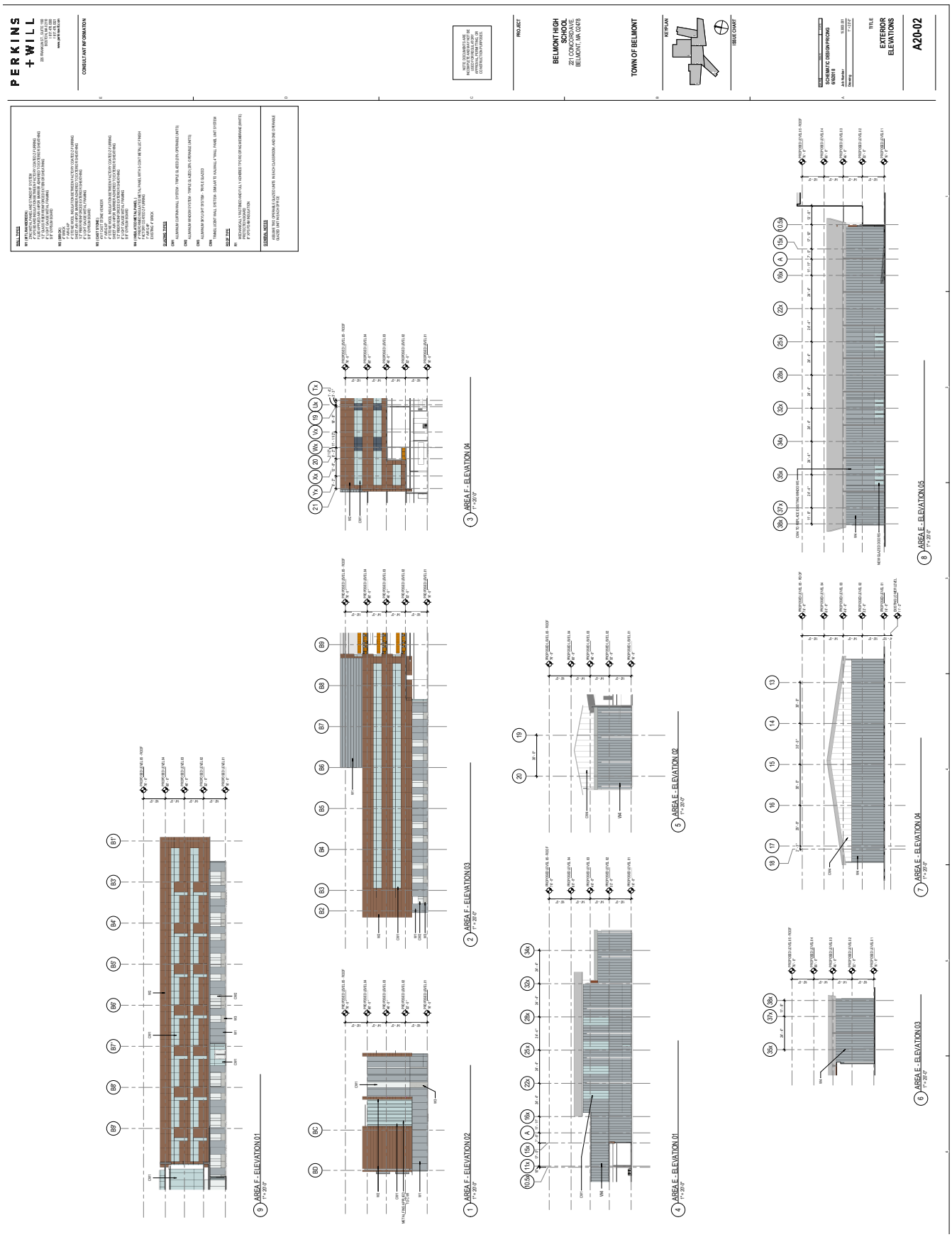


PERKINS + WILL
CONSULTANT INFORMATION
PROJECT
BELMONT HIGH SCHOOL
221 CONCORD AVE
BELMONT, MA 02478
TOWN OF BELMONT
KEYPLAN
ISSUE CHART
SCHEMATIC DESIGN PRICING
TITLE
ROOF LEVEL REFERENCE PLAN
A10-05
EXTENSIVE GREEN ROOF SYSTEM
SLOPED GLAZING ON STEEL REINFORCED METAL CLAD WALL
ROOF HATCH AND ALTERNATING TREAD STAIR AT THIS LOCATION
GALVANIZED OPEN GRATE STAIR FROM LEVEL 4 TO ROOF WITH GALVANIZED DECKING ROOF STRUCTURE
84,000 SF PV ROOF SYSTEM

4.1.2 SCHEMATIC DESIGN BINDER

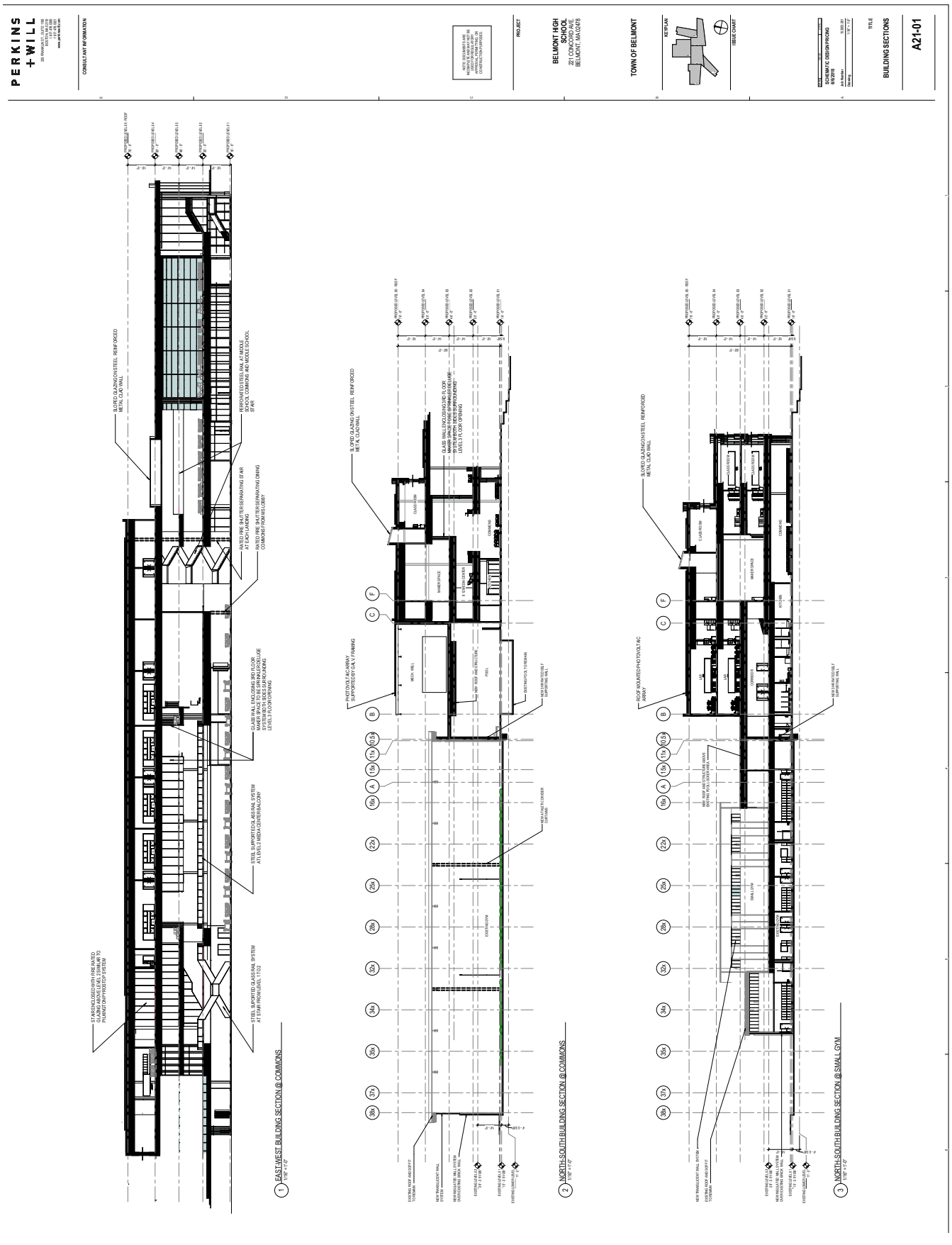
A. INTRODUCTION / MSBA PSR Report Response Appendix 3




PERKINS + WILL
CONSULTANT INFORMATION
PROJECT
BELMONT HIGH SCHOOL
221 CONCORD AVE
BELMONT, MA 02478
TOWN OF BELMONT
KEYPLAN
ISSUE CHART
SCHEMATIC DESIGN/PERMIT
TITLE
EXTERIOR ELEVATIONS
A20-02
1 AREA F - ELEVATION 02
2 AREA F - ELEVATION 03
3 AREA F - ELEVATION 04
4 AREA F - ELEVATION 01
5 AREA F - ELEVATION 02
6 AREA F - ELEVATION 03
7 AREA F - ELEVATION 04
8 AREA F - ELEVATION 05
9 AREA F - ELEVATION 01

4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 3

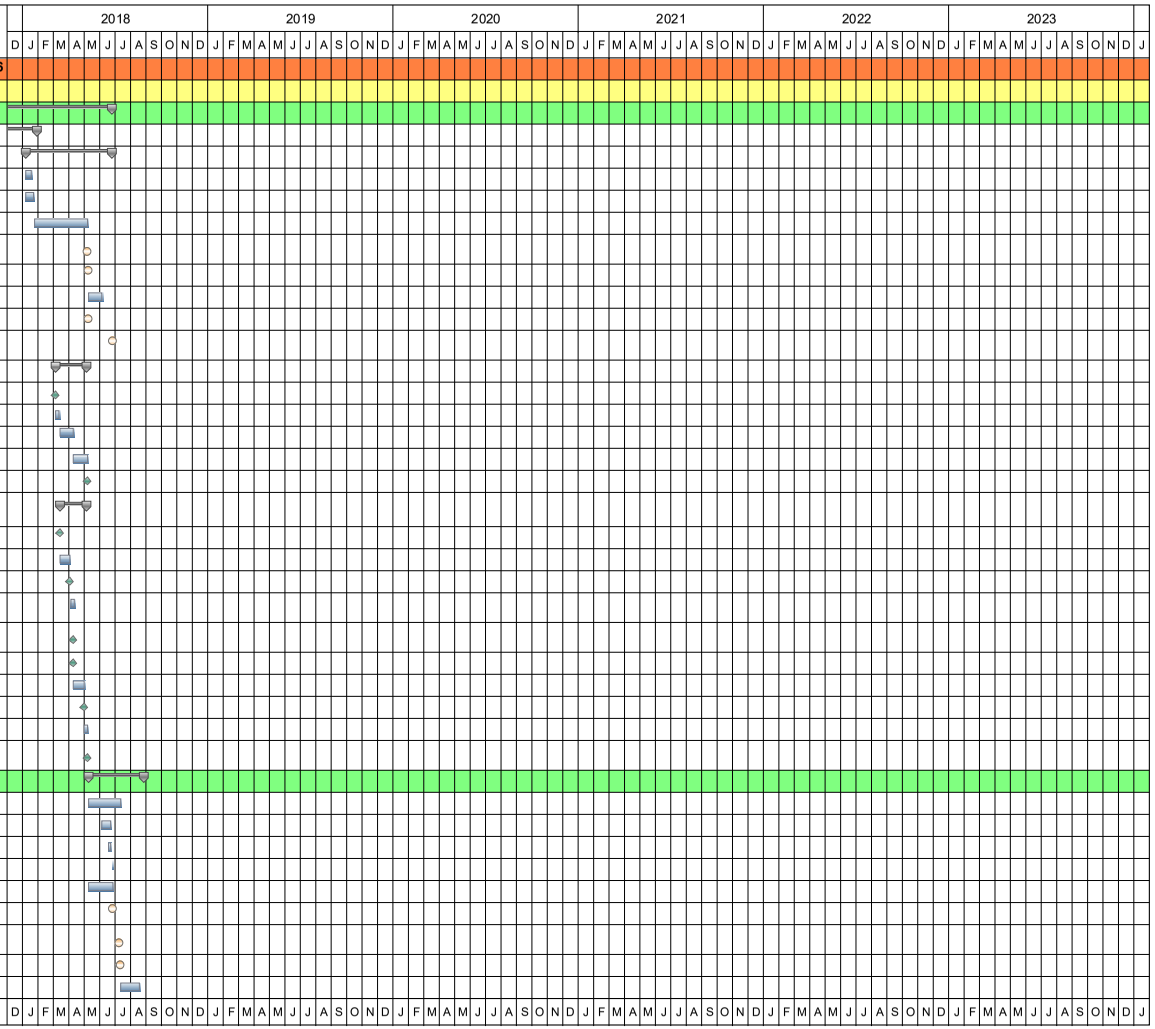


APPENDIX 4

SCHEDULE

BELMONT HIGH SCHOOL — **Updated June 20, 2018**

	Activity Name	Duration (Days)	Start Date	Finish Date
1	**Module 1 - Eligibility Period...**	**208.00**	**1/28/16**	**11/15/16**
6	**Module 2 - Forming the Team...**	**149.00**	**1/11/17**	**8/7/17**
19	**Module 3 - Feasibility Study**	**223.00**	**8/21/17**	**6/27/18**
20	**Preliminary Design Program (PDP)...**	**119.00**	**8/21/17**	**2/1/18**
31	**Preferred Schematic Report (PSR)**	**123.00**	**1/8/18**	**6/27/18**
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	74.00	1/24/18	5/7/18
35	Local Actions and Approvals - SBC meeting to approve PSR Submission	0.00	5/8/18	5/8/18
36	Submit PSR (R2) to MSBA	0.00	5/9/18	5/9/18
37	MSBA Staff PSR Review	20.00	5/9/18	6/5/18
38	Facilities Assessment Sub Committee	0.00	5/9/18	5/9/18
39	MSBA Board Meeting - Approval to proceed to Schematic Design	0.00	6/27/18	6/27/18
40	**CM at Risk Application**	**45.00**	**3/6/18**	**5/7/18**
41	Building Committee Approval of CMR Application	0.00	3/6/18	3/6/18
42	Prepare and Submit CM at Risk Application to OIG	5.00	3/6/18	3/12/18
43	OIG Initial Review of CMR Application	20.00	3/13/18	4/9/18
44	OIG complete of CMR Application	20.00	4/10/18	5/7/18
45	Decision on CMR from OIG	0.00	5/7/18	5/7/18
46	**Construction Manager PreQualification & Selection**	**39.00**	**3/14/18**	**5/7/18**
47	Advertise CMR Request for Qualification	0.00	3/14/18	3/14/18
48	CM prepares Qualifications	15.00	3/14/18	4/3/18
49	CM's submit Qualifications	0.00	4/3/18	4/3/18
50	Pre Qualification Committee review CM submissions	5.00	4/4/18	4/10/18
51	Pre Qualification Committee Meeting & CM Selection	0.00	4/10/18	4/10/18
52	Notify CM firms of Pre Qualification decision	0.00	4/10/18	4/10/18
53	Pre Qualified CM's prepare Proposals	15.00	4/10/18	4/30/18
54	CM's Submit Proposals	0.00	4/30/18	4/30/18
55	CM Selection Committee review CM submissions	5.00	5/1/18	5/7/18
56	CM Selection Committee Interview CM's and & CM Selection	0.00	5/7/18	5/7/18
57	**Module 4 - Schematic Design (SD)**	**80.00**	**5/10/18**	**8/29/18**
58	Develop Schematic Design	45.00	5/10/18	7/11/18
59	Schematic Design Estimate and Reconciliation	14.00	6/5/18	6/22/18
60	Develop Overall Project Budget	5.00	6/18/18	6/22/18
61	OPM SD Submission Notification to MSBA	1.00	6/27/18	6/27/18
62	Develop DESE submittal	35.00	5/10/18	6/27/18
63	Submit DESE report to MSBA	0.00	6/27/18	6/27/18
64	Local Actions and Approvals - SBC meeting to approve SD Submission	0.00	7/9/18	7/9/18
65	Submit SD to MSBA (MSBA Deadline 07/11/18)	0.00	7/11/18	7/11/18
66	MSBA Staff Review	28.00	7/11/18	8/17/18



4.1.2 SCHEMATIC DESIGN BINDER

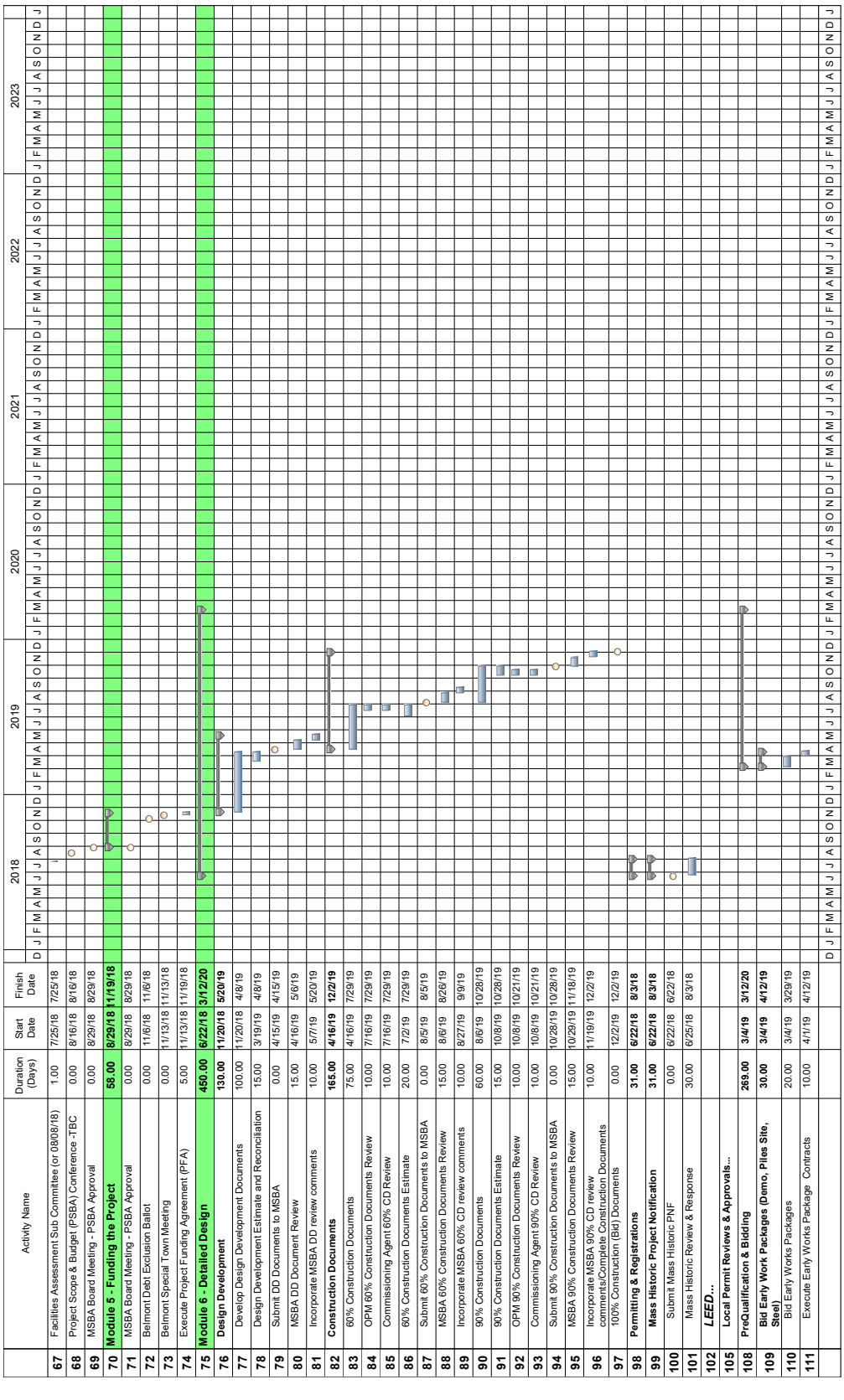
A. INTRODUCTION / MSBA PSR Report Response Appendix 4

Daedalus Projects Inc

BELMONT HIGH SCHOOL

Updated June 20, 2018

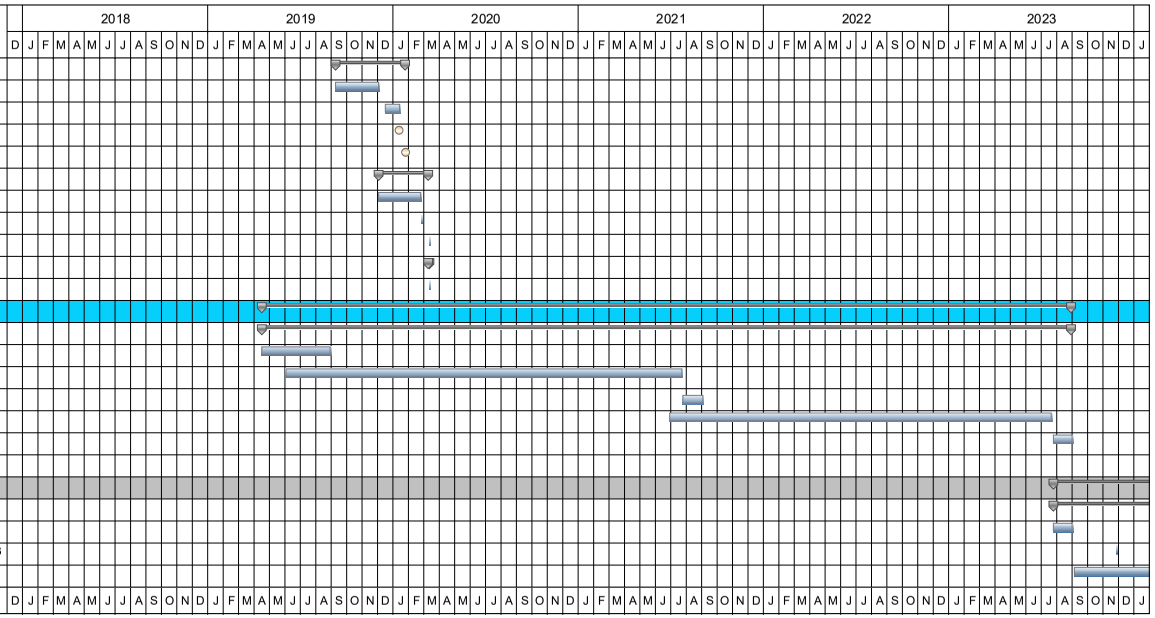
	Activity Name	Duration (Days)	Start Date	Finish Date
67	Facilities Assessment Sub Committee (or 08/08/18)	1.00	7/25/18	7/25/18
68	Project Scope & Budget (PSBA) Conference -TBC	0.00	8/16/18	8/16/18
69	MSBA Board Meeting - PSBA Approval	0.00	8/29/18	8/29/18
70	**Module 5 - Funding the Project**	**58.00**	**8/29/18**	**11/19/18**
71	MSBA Board Meeting - PSBA Approval	0.00	8/29/18	8/29/18
72	Belmont Debt Exclusion Ballot	0.00	11/6/18	11/6/18
73	Belmont Special Town Meeting	0.00	11/13/18	11/13/18
74	Execute Project Funding Agreement (PFA)	5.00	11/13/18	11/19/18
75	**Module 6 - Detailed Design**	**450.00**	**6/22/18**	**3/12/20**
76	**Design Development**	**130.00**	**11/20/18**	**5/20/19**
77	Develop Design Development Documents	100.00	11/20/18	4/8/19
78	Design Development Estimate and Reconciliation	15.00	3/19/19	4/8/19
79	Submit DD Documents to MSBA	0.00	4/15/19	4/15/19
80	MSBA DD Document Review	15.00	4/16/19	5/6/19
81	Incorporate MSBA DD review comments	10.00	5/7/19	5/20/19
82	**Construction Documents**	**165.00**	**4/16/19**	**12/2/19**
83	60% Construction Documents	75.00	4/16/19	7/29/19
84	OPM 60% Construction Documents Review	10.00	7/16/19	7/29/19
85	Commissioning Agent 60% CD Review	10.00	7/16/19	7/29/19
86	60% Construction Documents Estimate	20.00	7/2/19	7/29/19
87	Submit 60% Construction Documents to MSBA	0.00	8/5/19	8/5/19
88	MSBA 60% Construction Documents Review	15.00	8/6/19	8/26/19
89	Incorporate MSBA 60% CD review comments	10.00	8/27/19	9/9/19
90	90% Construction Documents	60.00	8/6/19	10/28/19
91	90% Construction Documents Estimate	15.00	10/8/19	10/28/19
92	OPM 90% Construction Documents Review	10.00	10/8/19	10/21/19
93	Commissioning Agent 90% CD Review	10.00	10/8/19	10/21/19
94	Submit 90% Construction Documents to MSBA	0.00	10/28/19	10/28/19
95	MSBA 90% Construction Documents Review	15.00	10/29/19	11/18/19
96	Incorporate MSBA 90% CD review comments/Complete Construction Documents	10.00	11/19/19	12/2/19
97	100% Construction (Bid) Documents	0.00	12/2/19	12/2/19
98	**Permitting & Registrations**	**31.00**	**6/22/18**	**8/3/18**
99	**Mass Historic Project Notification**	**31.00**	**6/22/18**	**8/3/18**
100	Submit Mass Historic PNF	0.00	6/22/18	6/22/18
101	Mass Historic Review & Response	30.00	6/25/18	8/3/18
102	***LEED...***			
105	**Local Permit Reviews & Approvals...**			
108	**PreQualification & Bidding**	**269.00**	**3/4/19**	**3/12/20**
109	**Bid Early Work Packages (Demo, Piles Site, Steel)**	**30.00**	**3/4/19**	**4/12/19**
110	Bid Early Works Packages	20.00	3/4/19	3/29/19
111	Execute Early Works Package Contracts	10.00	4/1/19	4/12/19



Page 2 of 3

Daedalus Projects Inc | **BELMONT HIGH SCHOOL** | **Updated June 20, 2018**

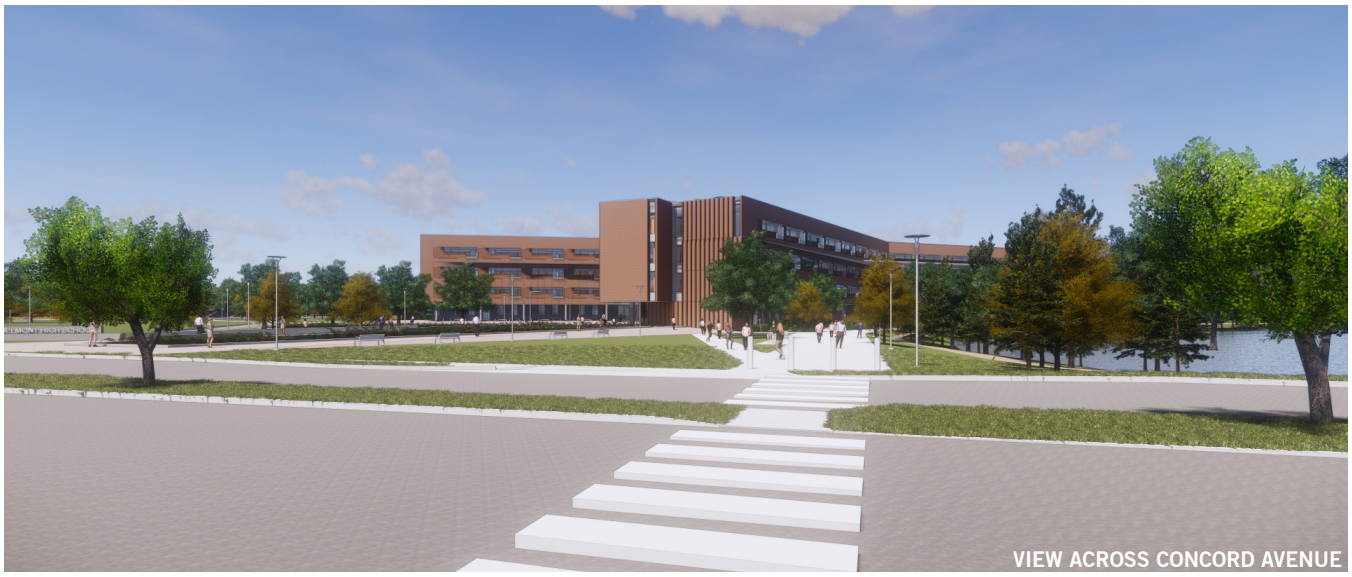
	Activity Name	Duration (Days)	Start Date	Finish Date
112	**Trade Sub Contractors PreQual and Bid**	**100.00**	**9/10/19**	**1/28/20**
113	PreQualification of Trade Sub Contractors	60.00	9/10/19	12/2/19
114	Bid Trade Sub Contractors	20.00	12/17/19	1/13/20
115	Received Trade Sub Contractor Bids	0.00	1/13/20	1/13/20
116	Execute Trade Sub Contractor Contracts	0.00	1/28/20	1/28/20
117	**Non Trade Sub Contractors Selection & Bid**	**72.00**	**12/3/19**	**3/11/20**
118	Bid Non Trade Sub Contractors	60.00	12/3/19	2/24/20
119	Received Non Trade Sub Contractor Bids	1.00	2/25/20	2/25/20
120	Execute Non Trade Sub Contractor Contracts	1.00	3/11/20	3/11/20
121	**Guaranteed Maximum Price (GMP)**	**1.00**	**3/12/20**	**3/12/20**
122	Execute GMP with CM-R	1.00	3/12/20	3/12/20
123	**Module 7 - Construction**	**1,145.00**	**4/15/19**	**9/1/23**
124	**Construction**	**1,145.00**	**4/15/19**	**9/1/23**
125	Notice to Proceed - Early Works Packages	100.00	4/15/19	8/30/19
126	Phase 1 - Construction	560.00	6/3/19	7/23/21
127	Phase 1 - Substantial Completion & Move in	30.00	7/26/21	9/3/21
128	Phase 2 - Construction	540.00	6/28/21	7/21/23
129	Phase 2 - Substantial Completion & Move in	30.00	7/24/23	9/1/23
130	**FF&E Bid and Contract...**			
134	**Module 8 - Project Close Out**	**294.00**	**7/24/23**	**9/5/24**
135	**Occupancy and Close Out**	**294.00**	**7/24/23**	**9/5/24**
136	Final Commissioning	30.00	7/24/23	9/1/23
137	Final Completion	1.00	11/27/23	11/27/23
138	Project Close Out	263.00	9/5/23	9/5/24



4.1.2 SCHEMATIC DESIGN BINDER

A. INTRODUCTION / MSBA PSR Report Response Appendix 5

VIEW FROM CONCORD AVENUE



VIEW ACROSS CONCORD AVENUE

VIEW UPON APPROACH UPPER SCHOOL ENTRANCE

A. INTRODUCTION / MSBA PSR Report Response Appendix 5

EAST VIEW TOWARDS COMMEN FROM UPPER SCHOOL

VIEW TOWARDS COMMON EXTERIOR

WEST VIEW FROM LOWER SCHOOL

ACENTECH

33 Moulton Street
Cambridge MA 02138
617 499 8000
acentech.com

May 30, 2018

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

Via email: brooke.trivas@perkinswill.com

Subject **Schematic Design Acoustics Narrative**
Belmont Middle / High School
Belmont, MA
Acentech Project No. 629341

Dear Ms. Trivas:

This report presents our acoustic narrative for Belmont Middle / High School. Our narrative is based on the provided drawings and our recent meetings with your design team and the project client.

ACOUSTICAL DESIGN GOALS

The American National Standards Institute's ANSI 12.60-2010: *Acoustical Performance Criteria, Design, Requirements and Guidelines for Schools* is the most referenced guideline for classroom acoustics and generally consistent with Acentech's recommendations. The acoustic prerequisite and credit for LEED v4 Schools BD+C also reference the same ANSI standard. **Core learning spaces are defined as classrooms, media centers, and other spaces where formal instructions are provided.**

The detailed design goals based on LEED, ANSI, ASHRAE and the state and local noise ordinances are under **Appendix A** of this report.

ACOUSTICAL DESIGN RECOMMENDATIONS

Based on the acoustical design goals in **Appendix A**, the following are our recommendations:

TRAIN NOISE TO THE SCHOOL AND THE ENVIRONMENTAL NOISE IMPACT FROM THE SCHOOL

Train Noise to the School

We have collected background sound levels continuously at the project site and confirmed that it is defined by LEED as a high-noise site (refer to page 12 of this report for this definition). **Appendix B** at the end of this report shows the detailed exterior noise measurement levels. This will require coordination with the structural engineer. Based on our findings, we recommend the following for façade and roof design:

1. Avoid locating core learning spaces and performing arts classroom windows facing the train tracks (including the closest classrooms at the two long ends of the school campus). If this cannot be avoided, then we recommend these be acoustically rated windows (with high STC/OITC ratings of 40 or higher) to achieve low interior background sound levels.

2. Typical classrooms with a suspended mineral fiber acoustical panel ceiling with EPDM metal deck roof will be sufficient to achieve the goal interior background sound levels. In these cases, the window will be the weakest sound path for train noise.

3. For the performing arts wing (that requires the lowest interior background sound levels), including the black box theater, auditorium, stage, band rooms, orchestra, and choir, provide concrete roof topping to help mitigate train noise into the spaces. This allows us to maximize the floor to deck height on the interior while providing a high level of sound isolation to block noise from the exterior.

4. Solid façade walls with substantial mass (such as a CMU exterior and framed interior stud wall) on the inside will be the most effective method to help block train noise for the performing arts wing and the classrooms facing the train tracks.

Environmental Noise Impact from the School to the Community

The new rooftop and outdoor mechanical equipment will be the biggest community noise contributor from Belmont Middle / High School to the community. Although the school is located at a relatively noisy site during the day, during the nighttime hours the background sound level drops substantially. **Appendix C** includes examples of the noise control elements needed for mitigating noise to the community. This should be provided to the MEP and structural engineer.

1. We expect the need to provide solid acoustical barriers around most of the rooftop equipment to help mitigate noise. The barrier must be at least a foot above the top of the RTU installed height and extended as close to the roof level as possible. Alternatively, you can locate rooftop equipment on roof wells.

2. Provide emergency generators with an acoustical enclosure.

HVAC Interior Noise and Vibration Control

We have included recommended MEP noise and vibration control products under **Appendix C**, which should be provided to the MEP engineer.

Energy Recovery Units, Rooftop Units, Air Handling Units, and Heating and Ventilation Units

1. Do not locate RTUs and ERUs over the music rehearsal and performance spaces, even if there is concrete on the roof. The RTUs and ERUs should be located over corridors and other less sound-critical spaces.

2. Avoid locating RTUs and ERUs over core learning classrooms. If this cannot be avoided, noise can be mitigated architecturally, but it is not ideal.

3. ERU, RTU, HV casings should be constructed with double-wall (solid-solid) construction to provide a higher level of sound isolation compared to a standard casing construction.

4. 4" thick concrete housekeeping pads should be provided at the base of each RTU and ERU located on the roof where it is an EPDM metal deck roof. The concrete pad should extend at least 5 ft. around the footprint of each RTU/ERU. The only openings should occur at the duct penetrations through the roof, rather than the entire base of the RTU/ERU.

5. All fans within the AHU/ERU/RTU/HV should be internally vibration isolated on springs that achieve minimum static deflection of 1-1/2".

   For the indoor units (HVs, AHUs), the casing of the unit should be vibration isolated on glass fiber or neoprene pads that achieve a minimum static deflection of 0.2".

   For outdoor units, the entire casing should be mounted on spring curbs in addition to the internal fan springs. The springs should achieve minimum static deflection of 1-1/2".

6. For controlling duct-borne noise transmission, we anticipate the need for medium-pressure sound attenuators at the supply and return air ducts of each unit. Elbow-shaped sound attenuators are preferred if the supply and return ducts drop directly down into the interiors, to help reduce duct breakout noise as well as fan noise. The elbow sound attenuators should have a centerline length of about 72" to 96".

7. Sound attenuators serving standard classrooms should have standard metal casing available from the manufacturer. For the fine arts spaces where the ducts are more likely to be exposed, we recommend the use of the High Transmission Loss (HTL, 16 ga) casing for the silencers.

8. For more noise sensitive spaces, such as the fine arts wing, plan on longer (7' to 9' rectangular) sound attenuators with higher dynamic insertion loss values, and typically higher pressure drops.

Terminal Boxes

1. Conventional VAV terminal boxes typically generate very low noise and are generally not a concern even when located within the ceiling plenum above the classroom (provided that a mineral fiber ceiling is used). With adequate duct length, preferably acoustically lined for the first 8-ft, or the integral sound attenuator provided by the terminal box manufacturer, sound levels will achieve 40 dBA or lower.

2. To achieve 35 dBA, the terminal box should be located outside of the classroom and 36" external (non-integral) sound attenuators or 10' of lining will need to be provided.

3. Ductwork serving spaces with the lowest background sound level goals should be acoustically lined for the entire supply and return ducts. In addition, the duct layout should be carefully coordinated , with duct penetrations over entry (rather than demising walls) and locating all noise producing boxes outside of the space.

Duct Airflow Velocities and Layout

1. For the auditorium, black box theater, and all performing arts rehearsal spaces, we expect the low pressure ductwork to be fully acoustically lined for both the supply and return air sides (as mentioned above). The air distribution ducts within these spaces should be designed with a friction rate of 0.02"/100' or less. Avoid the use of air volume dampers for the performing arts spaces, the ductwork serving these spaces should be well balanced and symmetric with smooth turns to avoid air turbulence.

2. The use of opposed blade dampers is not recommended for core learning spaces or performing arts spaces. OBDs are acceptable for the gymnasium.

3. All ducts downstream of the terminal boxes located within the core learning spaces should be sized with low friction rates (0.06"/100' at the main duct downstream of the VAV, and 0.04"/100' or lower at the branches) to reduce airflow and air turbulence noise within the duct system.

4. For laboratory classroom exhaust ducts, we understand that it is necessary to keep the duct airflow velocities higher for the air exhaust demand. These ducts should be sized to have maximum duct airflow velocity of 1200 fpm. If possible, lab exhaust fans should have power switches or sensors to minimize noise when not in use.

5. The diffusers, grilles, and registers selected for the classrooms should be rated at NC-25 or lower. The performing arts and studio spaces should have diffusers that are rated at NC-15 or lower.

6. All duct and pipe penetrations through the walls should be well sealed with insulation and caulk. Where possible, the main piping and duct lines should run over the corridors and penetrate only through the classroom corridor walls.

Vibration Isolation

In addition to the RTU/AHU/ERU vibration isolation described above, we expect vibration isolation of all piping within MEP rooms. All rotating equipment such as pumps, chillers, heat pumps, and fans must be vibration isolated. We provide vibration isolation guide spec and will review the MEP specs during the DD phase to confirm that these are included in the design.

ROOM ACOUSTICS & SOUND ISOLATION

We have included recommended products to meet our for room acoustics and sound isolation goals under **Appendix D** and **Appendix E** of this report.

Classrooms with a Fully Suspended Acoustical Panel Ceiling

1. For typical classroom spaces, we recommend providing a continuous sound absorptive ceiling throughout. This can be best accomplished by the use of mineral fiber acoustical ceiling panels. The selected acoustical ceiling should have a minimum Noise Reduction Coefficient (NRC) of 0.70 and a minimum Ceiling Attenuation Class (CAC) of 35. Please refer to **Appendix D** for a list of recommended products.

2. Based on the STC requirements as described in the design goal, **Appendix E** shows typical wall constructions to achieve the recommended goals for the walls. We will be glad to review alternative wall types to make sure the selected wall construction will meet the desired STC. In general, we do not like to include the STC ratings in the partition schedule to avoid the contractor from substituting one wall type for another.

3. Classrooms doors should be solid core with perimeter gaskets, fixed sweeps, and a threshold to seal the bottom. Alternately, automatic door bottoms can be used without a threshold. Viewing lites should be 10 sf or less if the project plans to pursue IEQc9.

4. Classrooms should be provided with felt tip chair and table gliders to reduce chair-scraping noise.

5. **Appendix E** shows typical floor-ceiling assemblies to achieve the recommended goals. In general, VCT on standard composite metal deck floor construction (4-1/2" average thickness) with a suspended mineral fiber acoustical ceiling on wire hangers and at least 12" of plenum space should meet STC 50 and IIC 45. We prefer normal weight concrete for a higher level of sound isolation, although lightweight concrete is sufficient for typical adjacencies with a suspended ceiling.

6. If there are mechanical rooms below or above classrooms, we recommend providing a gypsum board barrier ceiling between the two spaces to achieve STC 60. This would consist of two layers of GWB supported on spring hangers with at least 12" of cavity. This detail requires complicated coordination between the trades and should be avoided.

Speech and Language Pathology, Speech Therapy, Sensory Room, and Special Education Rooms

1. For all of these rooms, we recommend providing a continuous sound absorptive ceiling with a minimum NRC of 0.90 and CAC rating of 35.

2. Two adjacent walls should be provided with 1" thick sound absorptive wall panels from 3 ft. AFF to the ceiling. The acoustical wall panels should achieve a minimum NRC 0.90 rating.

3. The special education learning classroom floors should be carpeted to reduce chair scraping and footfall noise within the space.

4. Consider an upgraded floor/ceiling system in spaces over special education classrooms to achieve IIC 50 or higher, such as a resilient underlayment layer (typically ½" thickness) under the finish VCT flooring, or carpeting.

Classrooms with Exposed Structure

1. Classrooms with exposed structure must be supplemented with direct-applied sound absorptive finishes at the exposed structure or the walls equivalent to approximately 100% of the floor area. The selected material must achieve NRC 0.90 or higher.

2. If there are classrooms located over other classrooms with exposed structures, these will only perform at best around STC 45 with the 4-1/2"-thick lightweight concrete. To achieve STC 50 between stacked classrooms with exposed deck, normal-weight concrete must be used. STC 55+ is possible by thickening the slab to address specific challenging adjacencies.

3. Similarly, due to the school being a high noise site, classrooms with exposed deck on the top floor should be provided with a concrete topping or treated with a gypsum board barrier ceiling (inserted between the beams).

Media Center / Maker Spaces

1. For the enclosed media center areas, the majority of the ceiling should be sound absorptive ceiling with a minimum NRC 0.70 finish. The walls for the media center should be treated like a typical classroom.

2. If a glass corridor wall is desired, then it is not possible to pursue IEQc9. With typical ½" tempered glazing for the media center (and classrooms) overlooking the dining commons, we expect sound levels during peak times (300-400 students) to be around 50 dBA within the media center, far exceeding the required background sound level of 35-40 dBA. We do not recommend having open balconies with media center programs overlooking an open cafeteria.

3. Acoustically rated windows are possible to mitigate student activity noise to the media center, but they are expensive and will not perform as well as solid drywall construction. Typical acoustically-rated windows are in the range of STC 40 to about 50.

4. Areas defined as media centers must also achieve a relatively low RT. If the atrium of the school is part of the open portion of the media center, it will be difficult to achieve the recommended RT that is required for IEQp3.

5. Maker spaces are considered core learning spaces (typically under media center and should be treated acoustically like one. If noisy equipment such as CNC routers are planned, more substantial sound isolation will be needed around these rooms.

Dining Commons

1. Budget for at least 2,500 SF of sound absorptive wall finishes (NRC 0.90) in addition to providing sound absorptive ceiling finishes (NRC 0.90), for the entire ceiling area.

2. Dining areas are programmed to have up to 400 students at once. This will generate a significant amount of activity noise that can impact the adjacent core learning spaces. If there are any balcony areas that are open to the atrium, activity noise from the dining area will impact these areas. Even spaces that are not directly open to the atrium (but are adjacent) must be carefully reviewed to provide a high level of sound isolation.

3. We recommend fully enclosing the dining commons with stud walls to mitigate noise to the adjacent spaces as much as possible. The walls should be designed for STC 60, and avoid glazing overlooking the atrium that is connected to the dining common. Another option is to fully enclose the dining commons with glazed walls to the atrium, and have glazing in the enclosed learning spaces overlooking the atrium. This avoids the need to provide acoustically rated windows.

4. Some of the music classrooms and the video production classroom are adjacent to the dining commons. You must provide acoustically rated doors (STC 55) and STC 60 walls here.

5. Art classrooms on the first floor will be impacted by the open dining commons. The digital art classroom in particular should have STC 60 walls, including the corridor walls. The doors should be acoustically rated (STC 45+). Another option is to separate the art area from the dining area by adding additional walls or glazing walls.

Video Production Classroom

1. The ceiling should be acoustically absorptive with a minimum NRC of 0.7 direct-applied finish. The walls should be treated with impact-resistant acoustical treatment. Please refer to **Appendix D** for suggested treatments.

2. As mentioned above, the video production classroom is right next to the dining commons, and must have an acoustically rated door (STC 55) and STC 60 walls all around.

3. The floor/ceiling construction should be designed to achieve STC 60, which can be accomplished with a gypsum board barrier ceiling with 2 layers of GWB as described earlier in the report.

Fieldhouse & Gym

1. The ceiling of the fieldhouse and the gym should be sound absorptive, and the existing fieldhouse appears to be. The simplest method is to use acoustical deck if a new deck is planned. Another option is to direct-apply sound absorptive materials to the underside of the standard metal deck. The selected product should achieve NRC 0.80 or higher.

2. In addition to overhead sound absorptive treatment, we expect the need to provide at least 5,000 SF of abuse-resistant acoustical wall panels in the fieldhouse and at least 2,000 SF in the gym to help reduce reverberation. Whichever finish you choose, the selected wall treatment should have a minimum NRC of 0.80.

Fitness Center

1. The entire ceiling area of the fitness center should be treated with an acoustically absorptive product that achieves NRC 0.70 or greater. Because this space is located below some classrooms, we recommended a more conventional suspended mineral fiber acoustical ceiling to provide a higher level of sound isolation. If amplified music is expected in this space, then a gypsum board barrier ceiling is needed to achieve STC 60.

2. This fitness center is located adjacent to core learning spaces (both vertically and horizontally). The fitness center wall to the LABB spaces should be STC 60.

3. To mitigate weight drop noise from transmitting through the structure, a thicker than typical rubber flooring must be provided. Budget for about 2" thickness of rubber flooring (such as Pliteq FIT35), which can be recessed in the slab if coordinated ahead of time.

Private Offices and Work Areas

1. The entire ceiling area of the private offices, and the counselor, psychologist and social worker offices should be treated with an acoustically absorptive product with a minimum NRC of 0.70.

2. Walls between offices and conference rooms should be STC 50 or higher.

3. Doors to rooms that require speech privacy should be solid core with full perimeter gaskets, door sweeps and thresholds.

4. Glass walls to the circulation spaces (if any) should be at least ½" tempered glazing.

Conference Rooms

1. The entire ceiling area of standard conference rooms should be treated with an acoustically absorptive product with a minimum NRC of 0.70.

2. At least one of the long walls should be provided with a band of 1" thick sound absorptive wall panels.

3. The doors should be solid core with full perimeter gaskets, automatic door drops and thresholds.

4. Glass walls to the circulation spaces (if any) should be at least ½" tempered glazing.

Exam Rooms

1. The entire ceiling area of the exam rooms should be treated with an acoustically absorptive suspended ceiling with a minimum NRC of 0.70.

2. The walls and door construction should be treated similarly to private offices (described above)a.

Auditorium

The design team presented 3 options to the school during our May 16 programming meeting, and has confirmed the programmed uses of the auditorium. Based on this information, we are continuing to work with the team to develop the preferred option for the auditorium. We have already issued a separate meeting minutes document for the school's use. The following are key architectural / structural / mechanical items that need to be coordinated in preparation for the SD package. We have included some of the more standard items in **Appendix D**

1. Due to the site's proximity to the commuter train tracks, the roof of the entire auditorium including the stage should have at least 4-1/2" average thickness concrete topping (normal weight).
2. The exhaust hatch for the stage should be acoustically rated for STC 45 or higher.
3. Exterior walls of the auditorium should be CMU block, preferably grouted. We have budgeted for the house to be 50 ft. tall to the underside of the deck. Absolutely no clerestory windows.
4. We expect a secondary interior wall framed from the exterior CMU block wall. This wall can be constructed with gypsum board (2 layers of 5/8" board) or with GFRG of similar surface weight.
5. We understand the ceiling profile of the auditorium house will be exposed at least by 50% to maximize the volume of the house. Contoured overhead ceiling reflectors will be at fixed locations for the house.
6. Plan for stage acoustical towers (portable) with storage area dedicated to the towers on stage. The newer towers would replace their existing ones that are heavily in use, which are old and require updating. At least two rows of retractable overhead acoustical reflectors should be budgeted.
7. There is currently a rooftop unit planned over the auditorium/stage. This must be relocated to less noise sensitive spaces.
8. As stated in the HVAC Background Sound section above, ductwork within the auditorium will be exposed if located overhead, and thus must be designed with low friction rate of 0.02"/100' or lower. Budget for acoustically lined ductwork. We do not have a preference for rectangular or circular ductwork, although we understand rectangular ductwork would be more cost effective. An underfloor supply system is another good, low pressure system that is quiet.
9. We have discussed with the school the benefit of having an orchestra pit based on their current issues when playing in their existing auditorium. This was discussed in our performing arts memo with the school. Without a pit, the new auditorium will have very similar sound balance issues as before during musicals.
10. All entries into the auditorium should be through a vestibule with two sets of doors and automatic door drops on the outside doors. Entries onto the stage (if the auditorium directly connects to the band room or other back of house spaces) will need to be specialty acoustical doors with a minimum STC 55 rating.
11. Carpet should be provided at all aisles and entry vestibules to minimize footfall noise.

Black Box Theater & Shop

1. For proper speech intelligibility of drama performances, we recommend 100% of the ceiling to be sound absorptive with minimum NRC 0.90 finish directly applied to the underside of the structure.
2. The walls will require 2" thick sound absorptive wall panels or retractable velour curtains with 100% fullness when extended. The wall panels / velour curtains will need to cover at least 80% of the wall surfaces below the pipe grid elevation. The velour curtains should have 100% fullness when extended to be effective for sound absorption.
3. The theater shop should have a sound absorptive ceiling for the comfort of the occupants. This can be a product similar to what is used for the Black Box with NRC 0.70 or higher.

4. The wall between the black box theater and the theater shop should consist of CMU and a separate stud wall framed at least 1" from the CMU wall (STC 60+). The design team agreed not to have doors between the theater shop and the black box in our programming meeting. The rest of the walls surrounding the theater should also be STC 60, either with the same construction or other similar double-wall constructions as listed in **Appendix E.**

5. The door of the theater shop should be a modest acoustically-rated door that is about STC 45 to mitigate shop noise from interfering with the band room and the auditorium nearby. This assumes the other classroom doors are also acoustically-rated or provided with entry vestibules.

6. All entries into the black box theater should be through a vestibule with two sets of doors and automatic door drops on the outside doors.

7. Plan for concrete roof deck as discussed in the "Auditorium" section above to mitigate train noise.

Middle School and High School Band Rooms

Please refer to **Appendix D** for the recommended finish products.

1. Both band rooms are about the same footprint and will handle approximately 60 musicians comfortably. Additional performers expected would require the spaces to be more sound absorptive.

2. The height of the band rooms should be at least 25 ft. tall. The ceiling should be sprayed with at least 1" thick acoustical cellulose or treated with acoustical duct liner board over the entire area.

3. About 30% to 40% of the total ceiling area will also have suspended sound reflecting clouds (either 2 layers of gypsum board or pre-manufactured diffuser panels) over the musicians.

4. Based on this height, there should be about 900-1,100 SF of 3" thick sound absorptive wall panels budgeted to meet the required RT. Additional wall panels will be needed if the height increases.

5. Budget for at least 500 SF of sound diffusers on the walls. They are helpful acoustically, but are not required for LEED.

6. If storage is desired within the band rooms, we recommend open face storage cabinets (such as available by Wenger) to avoid unwanted reflective surfaces.

7. Provide acoustically rated doors of STC 50 or higher. Locate the band room doors as far as feasible from each other to reduce sound flanking via the corridor and doors.

8. Walls around the band room should be STC 60. The corridor wall should be at least STC 55.

9. Plan for concrete roof deck should as discussed in the "Auditorium" section above to mitigate train noise. Absolutely no windows facing the train tracks or the two shorter ends of the room. Clerestory windows with laminated IGU are acceptable if facing Concord Ave, however we expect that there will probably be rooftop equipment nearby, which is not ideal.

Orchestra

1. Based on the footprint the room can handle approximately 44 musicians comfortably.

2. The height of the orchestra room should be at least 25 ft. tall, sprayed with at least 1" thick acoustical cellulose or acoustical duct liner board for the entire area.

3. About 30% to 40% of the total ceiling area will also have suspended sound reflecting clouds over the musicians.

4. Based on this height, there should be about 600-700 SF of 3" thick sound absorptive wall panels budgeted to meet the required RT. Another option is to have retractable velour curtains of equivalent area that is 100% fullness when extended (this will provide more variable acoustics). Additional wall panels will be needed if the height increases.

5. Budget for at least 300 SF of sound diffusers on the walls. They are helpful acoustically, but are not required for LEED.

6. If storage is desired within the orchestra room, we recommend open face storage cabinets.

7. Provide acoustically rated doors of STC 50 or higher. Locate the doors as far as feasible from other music rehearsal spaces to reduce sound flanking via the corridor and doors.

8. Walls around the orchestra room should be STC 60. The corridor wall should be at least STC 55.

9. Concrete roof deck should be included as discussed earlier to mitigate train noise. Absolutely no windows facing the train tracks or the west side of the room. It may be possible to provide clearstory windows as previously discussed facing Concord Ave and possibly on the east wall if it is shielded from the train tracks.

Choir Room

1. Based on the footprint the room can handle approximately 124 choristers comfortably. This means that when all 160 choristers rehearse together, they should rehearse on the stage of the auditorium with the stage towers.

2. The height of the chorus room is limited due to the location of the space with classroom above. The floor to deck height should be at least 18' tall, with 2' budgeted for the addition of a gypsum board barrier ceiling to meet STC 60 to the classroom above (i.e. the finish ceiling height should be no less than 16').

3. About 35% to 40% (650 SF to 750 SF) of the total ceiling area will be direct applied 3" thick acoustical panels (around the perimeter). The rest will remain as gypsum board (over the choristers).

4. Based on this height, there should be about 500 SF of 3" thick sound absorptive wall panels (or additional at the ceiling) budgeted plus approximately 1,000 SF of retractable velour curtains (with 100% fullness when extended) to meet the required RT. The amount of wall panels will be adjusted if the height changes.

5. Budget for at least 500 SF of sound diffusers on the walls. They are helpful acoustically, but are not required for LEED.

6. Provide acoustically rated doors of STC 55 or higher. Locate the doors as far from the dining commons as possible.

7. Walls around the choir room should be STC 60. The corridor wall should also be STC 60 due to the proximity to the dining commons.

8. We do not recommend glass walls, which will not perform as well as stud walls. If glass walls are to remain, budget for acoustically rated glazing of STC 60. This will most likely be a double acoustical window system.

Electronic Music

1. We expect the height of this space to be relatively standard, somewhere between 10' to 14' with suspended mineral fiber ACT with NRC 0.70.

2. If the music is expected to be amplified within the classroom over loudspeakers, then include a gypsum board barrier ceiling (similar to the choir room) above the ACT. Otherwise, a mineral fiber ceiling will suffice.

3. Provide acoustically rated doors of STC 55 or higher. Locate the doors as far from the dining commons as possible.

4. Walls around the room should be STC 60. The corridor wall and glazing should also be STC 60 due to the proximity to the dining commons. This can be adjusted to a lower STC rating if the dining common will be enclosed.

Music Ensemble Rooms

1. The ceiling should treated with an acoustically absorbent material with a minimum NRC of 0.7 or higher (such as mineral fiber ACT) at 9' AFF minimum.

2. The roof of this portion does not need to have concrete as long as there is a suspended mineral fiber ACT.

3. Two adjacent walls should be treated with 2" thick acoustical panel with a minimum NRC of 0.9 from floor to the underside of the finish ceiling.

4. Provide acoustically rated doors of STC 50 or higher. Locate the doors as far from the dining commons as possible.

5. Walls around the room should be STC 60 between ensemble rooms. The corridor wall can be STC 55.

* * * * *

I trust this provides you with the information that you need at this time.

Sincerely,

Rose Mary Su
Principal Consultant

cc: Brian Masiello, Kristen Murphy
Encl: Appendices A, B, C D, and E

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APPENDIX A – ACOUSTICAL DESIGN GOALS & LEED REQUIREMENTS

HVAC Background Sound Level

LEED IEQp3 and IEQc9

The following table shows maximum sound levels in the core learning spaces associated with the HVAC system for this project.

Learning Space	Maximum steady background sound level for IEQp3 prerequisite	Maximum steady background sound level for IEQc9 enhanced credit
Core learning space with enclosed volume (<10,000 ft^3)	40 dBA	35 dBA
Core learning space with enclosed volume (>10,000 ft^3 and ≤ 20,000 ft^3)	40 dBA	35 dBA
Core learning spaces with enclosed volumes (>20,000 ft^3)	40 dBA	35 dBA

Additional Design Goals (outside of LEED)

For best acoustical practice, we recommend designing for the following background sound levels for the following spaces that are either specialty spaces or not considered core-learning spaces:

Type Space (Specialty)	Maximum Background Sound Levels (dBA/NC)
Auditorium	25 dBA / NC-20
Black Box Theater	25 dBA / NC-20
Video Production Studio	25 dBA / NC-20
Speech and Language Pathology/Speech Therapy	25 dBA / NC-20
Band/Orchestra/Choir Rehearsal Rooms	30 dBA / NC-25
Keyboard Room	30 dBA / NC-25
Small Music Practice Rooms	35 dBA / NC-30
Dining Commons	40 dBA / NC-35
Kitchen / Servery	50 dBA / NC-45

Type Space (Admin)	Maximum Background Sound Levels (dBA/NC)
Administrative *Private Offices and Work Areas* *Conference Rooms*	 35 dBA / NC-30 35 dBA / NC-30
Counselor, Psychologist, and Social Worker Offices	35 dBA / NC-30
Exam Rooms	35 dBA / NC-30

Type Space (Ancillary)	Maximum Background Sound Levels (dBA/NC)
Gymnasium / Fieldhouse	45 dBA / NC-40
Fitness Center	45 dBA / NC-40
Support Spaces	45 dBA / NC-40
Pool	50 dBA / NC-45

EXTERIOR NOISE

Prerequisite IEQp3

For high-noise sites (peak-hour Leq above 60 dBA during school hours), implement acoustic treatment and other measures to minimize noise intrusion from exterior sources and control sound transmission between classrooms and other core learning spaces.

Pilot Credit

Perform qualitative assessments of nearby noise sources and noise-sensitive receivers, and/or a quantitative measurement of site noise in at least one location for at least 24-hours. Design and locate exterior noise sources so that the following project noise levels are not exceeded at the project boundary:

Type of Receiver	Sound Limits (dBA)
Residential	45 dBA (Leq, 8h), 60 dBA (Lmax)
Non-residential	60 dBA (Ldn)

Town and State Noise Regulation (outside of LEED)

Separate from the LEED requirements, noise emissions from the new rooftop equipment to the neighboring receivers must meet the Town of Belmont and MA Department of Environmental Protection noise regulations. We will discuss outdoor noise in a separate report once we receive information on the baseline mechanical drawings and selections.

REVERBERATION TIME

Prerequisite IEQp3

CLASSROOMS AND CORE LEARNING SPACES < 20,000 CUBIC FEET

Design classrooms and other core learning spaces to include sufficient sound-absorptive finishes with one of the options described below:

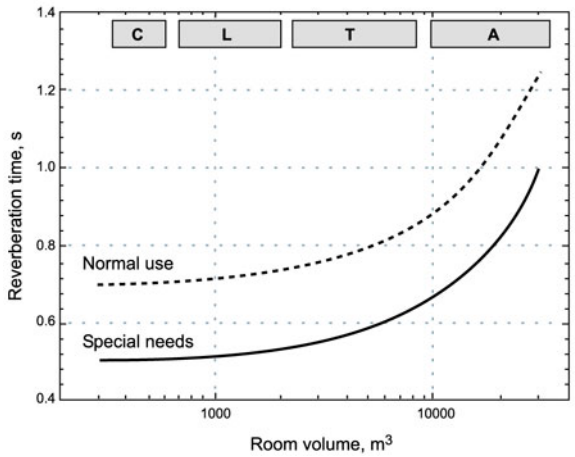
Option 1 For each room, confirm that the total surface area of acoustic wall panels, ceiling finishes, and other sound-absorbent finishes equals or exceeds the total ceiling area of the room (excluding lights, diffusers, and grilles). Materials must have an NRC of 0.70 or higher to be included in the calculation.

Option 2 Confirm through calculations described in ANSI Standard S12.60-2010 that rooms are designed to meet reverberation time (RT) requirements as specified in that standard. Shown in the table below:

Learning Space	Maximum reverberation time for 500, 1000, and 2000 Hz (s)
Core learning space with enclosed volume (<10,000 ft^3)	0.6
Core learning space with enclosed volume (>10,000 ft^3 and ≤ 20,000 ft^3)	0.7

CLASSROOMS AND CORE LEARNING SPACES ≥ 20,000 CUBIC FEET (566 CUBIC METERS)

Meet the recommended reverberation times for classrooms and core learning spaces described in the NRC-CNRC Construction Technology Update No. 51, Acoustical Design of Rooms for Speech (2002), summarized in the figure below. Please note that this is in cubic meters. From our experience larger volume core learning spaces such as the media center will require substantial sound absorptive surfaces at the ceiling and sometimes at the walls to achieve 0.7 seconds.



C = classrooms, L = lecture halls, T = theaters, A = large auditoriums

Recommendations for Specialty and Ancillary Spaces (outside of LEED)

The following are the recommended best practice RTs for the following specialty, and administrative spaces beyond the requirements for LEED / ANSI S12.60.

Type of Space	Maximum reverberation time for 500, 1000, and 2000 Hz (s)
Auditorium	0.9 – 1.1
Black Box Theater	0.7
Band and Orchestra	Around 0.7 based on volume
Chorus	Around 0.7 based on volume with variable acoustics for up to 1.0
Small Music Practice Rooms	0.5
Video Production Room	0.5
Gymnasium and Field House	1.2 – 1.5
Pool	<2.0
Fitness Center	1.0
Speech and Language	0.3 – 0.5
Special Education	0.3 – 0.5

SOUND TRANSMISSION

IEQc9 Exterior Windows

Exterior windows must have an STC rating of at least 35, unless outdoor and indoor noise levels can be verified to justify a lower rating.

IEQc9 Interior Partitions

Design classrooms and other core learning spaces to meet the sound transmission class (STC) requirements of ANSI S12.60–2010. These are requirements applicable to wall types and floor/ceiling constructions for core learning spaces. The table below shows the ANSI sound transmission class guidelines for core learning spaces:

Minimum STC ratings required for single or composite wall, floor-ceiling, and roof-ceiling assemblies that separate an enclosed core learning space from an adjacent space			
Other enclosed or open plan core learning space, speech clinic, healthcare room and outdoors	Common use and public use toilet room and bathing room	Corridor, staircase, office or conference room	Music room, mechanical equipment room, cafeteria, and gymnasium
50	53	45	60

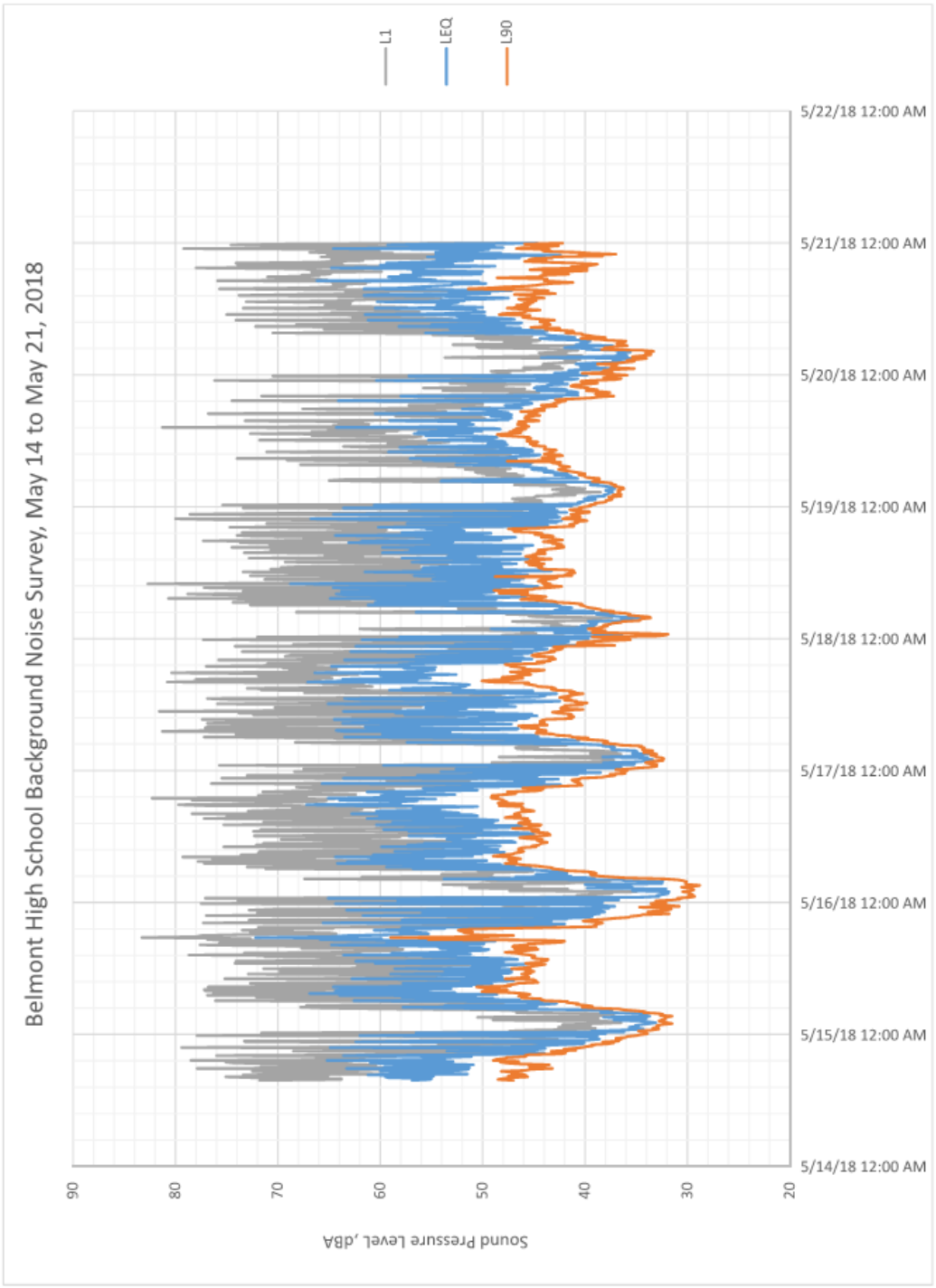
Other important sound isolation notes about this credit include:

- Interior door assemblies and up to 10 sf of window glazing area immediately adjacent to the door opening into core learning spaces from corridors, stairways, offices, or conference rooms shall achieve a STC 30 rating or greater in their operable condition.

IEQc9 Floor/Ceiling Impact Sound Isolation

The floor-ceiling assembly of normally occupied rooms located above learning space should be designed for at least IIC 45 (Impact Insulation Class) if they are located above core learning spaces and IIC 40 if they are located above ancillary spaces.

APPENDIX B – EXISTING BACKGROUND SOUND LEVELS AT BELMONT HS



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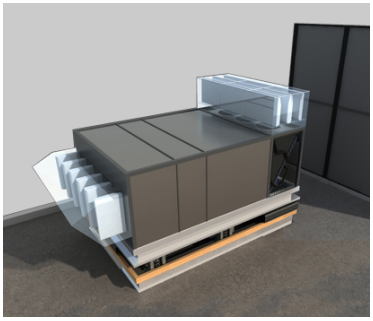
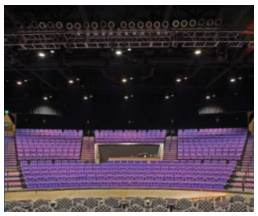
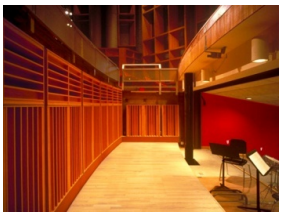
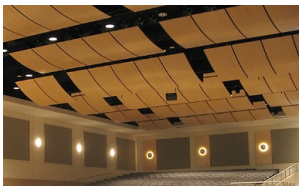
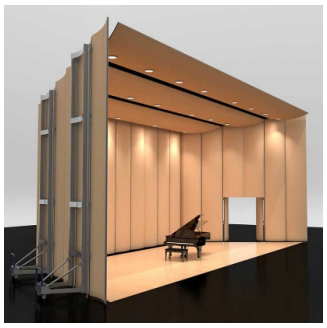
APPENDIX C - MEP NOISE AND VIBRATION CONTROL

Component	Product Recommendations	Image
Noise Barriers	Empire Acoustical Systems Noise Barriers George Koch Sons AIL Sound Wall	
Generator Acoustic Enclosures	Pritchard Brown Sound Attenuated Enclosure Cummins Sound-Attenuated Enclosure Kohler Sound-Attenuated Enclosure	
Sound Attenuators	Vibro-Acoustics Price VAW Pottorff Kinetics Noise Control	
Vibration Isolation (spring mounts, hangers, spring curbs)	Kinetics Noise Control Mason Industries The VMC Group Vibro-Acoustics	
Acoustical Duct Liner	Johns Manville Linacoustic R-300, Linacoustic RC-HP and Spiracoustic Plus Owens Corning Quiet R CertainTeed Toughgard Ultra Round and ToughGard T Textile Duct Liner	

APPENDIX D - ACOUSTICAL FINISHES AND SPECIALTY ITEMS

Finish Type	Product Recommendations	Image
Acoustical Panel Ceilings	**NRC 0.7 CAC 35**: Armstron Ultima; CertainTeed Ecophon Symphony m, USG Mars **NRC 0.9**: Armstrong Optima; CertainTeed Ecophon Focus	
Perforated Wood/Metal Ceilings	Armstrong Woodworks, Metalworks; Rulon Linear, Aluratone; USG Ceilings Plus Illusions	
Direct-Applied Acoustical Ceiling Treatment	International Cellulose Corporation K-13; Johns Manville Insul-SHIELD; Owens Corning SelectSound Black Acoustic Board	
Sound Absorptive Wall Panels	**Glass Fiber**: RPG Absorbor; Kinetics HardSide; Conwed Designscape Respond A Series; Decoustics Wall Panels; **Tackable**: Armstrong Tectum Fabric; Decoustics H.I.R. #1; Kinetics High Impact HardSide	
Diffusive Panels	Wenger Diffuser Panels RPG QRD, Omniffusor RealAcoustix 1D QRD, 2D QRD, ReDirectors Kinetics Geomemetric Diffusers	
Variable Acoustical Finishes	Rose Brand Fabrics Wenger Tunable Acoustical Panels	
Acoustical Metal Deck	Epic Metal Epicore Metal Dek N-Dek and Versa-Dek	

Auditorium Overhead Sound Reflectors	Kinetics Ovation RealAcoustix Wave Wenger	
Auditorium Stage Portable Acoustical Towers and Stage Reflectors	Staging Concepts Bravado Wenger Maestro, Diva Stage Right Opus II	

APPENDIX E – TYPICAL ACOUTICALLY-RATED CONSTRUCTIONS

STC 45 Walls

- Single row of metal studs
- (1) layer one side 5/8” Type X GWB, full height to structure above
- (2) layers opposite side 5/8” Type X GWB, full height to structure above, overlap seams (finish layer installation)
- Single 3-1/2” batt of glass fiber insulation in cavity
- Cut GWB at wall head to match deck profile and fill voids with batt insulation
- Seal at floor track and wall head with non-hardening acoustical sealant such as USG model Sheetrock Acoustical Sealant
- Seal around all through penetrations by pipes and ductwork

STC 50 Walls

- Single row of metal studs
- (2) layers each side 5/8” Type X GWB, full height to structure above, overlap seams (finish layer installation)
- Single 3-1/2” batt of glass fiber insulation
- Cut GWB at wall head to match deck profile and fill voids with batt insulation
- Seal at floor track and wall head with non-hardening acoustical sealant such as USG model Sheetrock Acoustical Sealant
- Seal around all through penetrations by pipes and ductwork
- No back-to-back outlet boxes. Boxes to have at least one stud spacing distance between them (i.e., 24”)

OR

- 8” normal CMU block having surface weight density of at least 38 lbs/ft^2 painted and sealed on both sides, full height to structure above
- 8” normal CMU block with 1 layer of GWB furred on one side.
- Seal around perimeter with non-hardening acoustical sealant such as USG model Sheetrock Acoustical Sealant
- Seal around all through penetrations by pipes and ductwork
- No back-to-back outlet boxes.

STC 53 Walls

- Single row of metal studs
- (2) layers 5/8” Type X GWB, full height to structure above, overlap seams (finish layer installation), one side
- (1) layer 5/8" Type X GWB, full height to structure above, attached to resilient clips similar to PAC International RSIC-1, opposite side
- Single 3-1/2” batt of glass fiber insulation
- Cut GWB at wall head to match deck profile and fill voids with batt insulation
- Seal at floor track and wall head with non-hardening acoustical sealant such as USG model Sheetrock Acoustical Sealant
- Seal around all through penetrations by pipes and ductwork
- No back-to-back outlet boxes. Boxes to have at least one stud spacing distance between them (i.e., 24”)

STC 60+ Walls

- Two rows of metal studs, in parallel floor tracks with min 1/2" separation.
- (2) layers each side 5/8" Type X GWB, full height to structure above, overlap seams (finish layer installation)
- Two 3-1/2" batts of glass fiber insulation
- Cut GWB at wall head to match deck profile and fill voids with batt insulation
- Seal at floor track and wall head with non-hardening acoustical sealant such as USG model Sheetrock Acoustical Sealant
- Seal around all through penetrations by pipes and ductwork
- No back-to-back outlet boxes. Boxes to have at least one stud spacing distance between them (i.e., 24")

OR

- 8" normal weight CMU block wall
- (1) layer of 5/8" GWB on furring on one side of the CMU
- (2) layers of 5/8" GWB on separate 2-1/2" stud wall with batt insulation in the cavity spaced 1/2" min. apart from the CMU wall on the opposite side

STC 45 Floor/Ceiling

- 4-1/2" average lightweight concrete deck with exposed deck below
- 4-1/2" average lightweight concrete deck with glass fiber ACT below, or a perforated metal or wood ceiling below

STC 50 Floor/Ceiling

- 4-1/2" average normal weight concrete deck with exposed deck below
- 4-1/2" average normal weight concrete deck with glass fiber ACT below, or a perforated metal or wood ceiling
- 4-1/2" average lightweight concrete deck with a full mineral fiber ACT suspended below at least 24" from structure
-

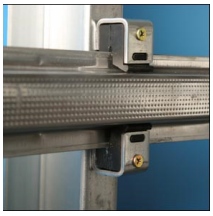
STC 53-55 Floor/Ceiling

- 4-1/2" average normal weight concrete deck with mineral fiber ACT suspended below at least 24" from structure
- 4-1/2" average lightweight concrete deck with a layer of GWB suspended below at least 24" from structure and 6" batt insulation in the cavity

STC 60+ Floor/Ceiling

- 4-1/2" average lightweight or normal weight concrete deck with 2 layers of 5/8" GWB suspended on spring or neoprene hangers at least 24" from structure and 6" batt insulation in the cavity

APPENDIX E CONT. - SOUND ISOLATION ITEMS FOR CONSIDERATION

Finish Type	Product Recommendations	Image
STC rated wall construction elements	**Sealant**: USG Sheetrock Acoustical Sealant **Resilient Clips**: Kinetics IsoMax; PAC International RSIC-1	
Acoustical Doors	IAC Acoustical Doors; Noise Barriers Acoustical Doors; Wenger Acoustical Doors; Clark Doors	
Acoustical Windows	IAC Noise-Lock; St Cloud Window Acoustic; Overly Manufacturing Acoustical Metal Windows	
Door Seals	Zero International 770, 53, 544, 328 Or equivalent in National Guard Products and Pemko	
GWB Sound Barrier Ceiling Hangers	Mason Industries 30N Kinetics KSCH PAC International RSIC	

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Architectural Characteristics

ARCHITECTURAL CHARACTERISTICS

The development of the Architectural Characteristics of the Belmont High School is a result of a process which embodies key components such as: the **context** of the site, **program, budget, design inspiration, and sustainability**. These are the forces that ultimately inform every aspect of the building.

The **contextual** studies includes both the adjacent sites, overall neighborhood and entire town, all helping to inform the characteristics of the exterior. The building mass is placed away from the existing rail bed with most academic teaching spaces overlooking the pond with optimal orientation for daylighting. It 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. for the site design many of the athletic fields become co-located on the eastern half of the site allowing for more overlap and as a result higher use of the site. This co-location also helps in both the efficiency of maintenance and the ability to manage storm water in a sustainable, cost effective manner.

The pedestrian promenade linking to the pond creates a space human in scale and detail with memorable experiences along the journey. The planting, access points to the field, building entries, commons, bleachers, stadium swimming pool and ice rink all create visual, audio and olfactory experiences. The exterior promenade and metaphorically parallels the interior academic neighborhood street. The importance of creating a sense of place at the exterior green commons through the outside seating café, gathering and thinking was essential.

Each community brings to the process their **inspiration on design** and through a collaborative and integrated process those ideas are realized. The importance of place making, creating collective memories and developing a civic presence were all significant factors in the development of the site plan and architecture. The design creates an elongated building footprint (in the East-West direction) that organizes the program around a daylight multi-story internal ‘street’. The design proposes a substantial addition and phased renovation to the existing high school, creating a new 7-12 high school. 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.

Sustainability is an essential ingredient to the development of the BMHS from its inception through occupancy. The following sustainability and resiliency attributes have been considered during the design process

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.

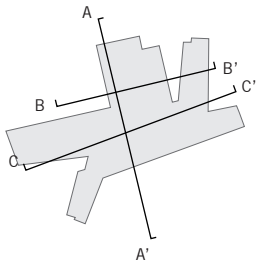
WINDOW TO WALL RATIO-The window to wall ratio of the scheme will attempt to achieve 30-40 glazing balancing heat gain with effective daylighting.

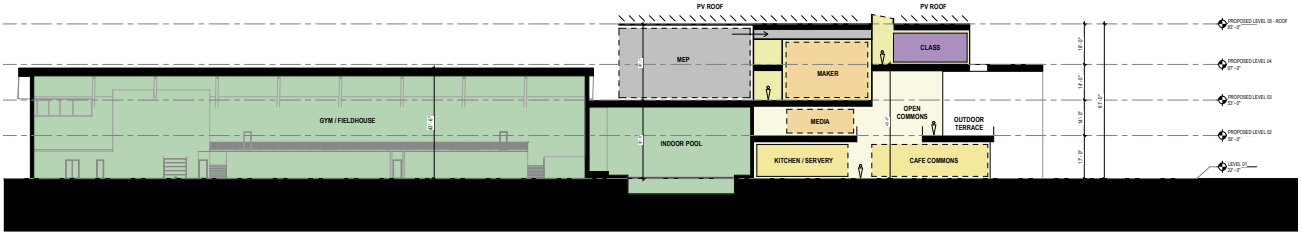
PV POTENTIAL- This scheme creates a simple continuous roof surface that does not shade its selves and optimizes roof top yield by orienting itself in the east-west direction.

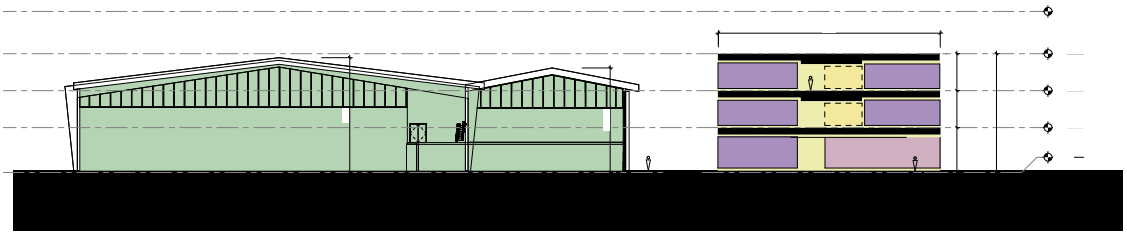
SITE ENVIRONMENTAL PERFORMANCE- This scheme allows for one contiguous large geo-exchange field and allows for more performative landscape adjacent to the pond allowing outdoor teaching space to overlap with site sustainable strategies at the water edge.

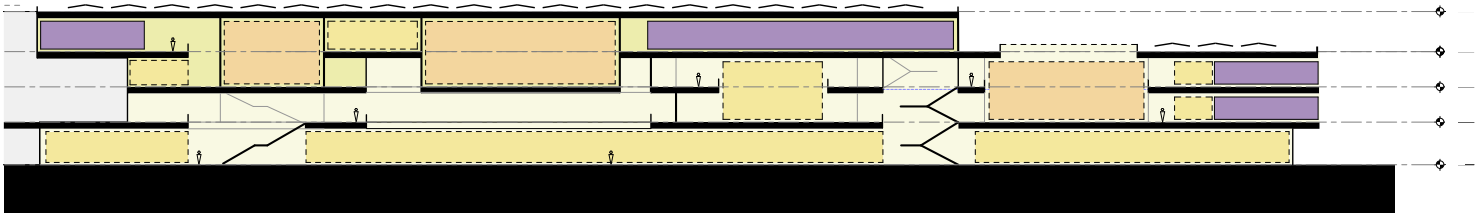
4.1.2 SCHEMATIC DESIGN BINDER

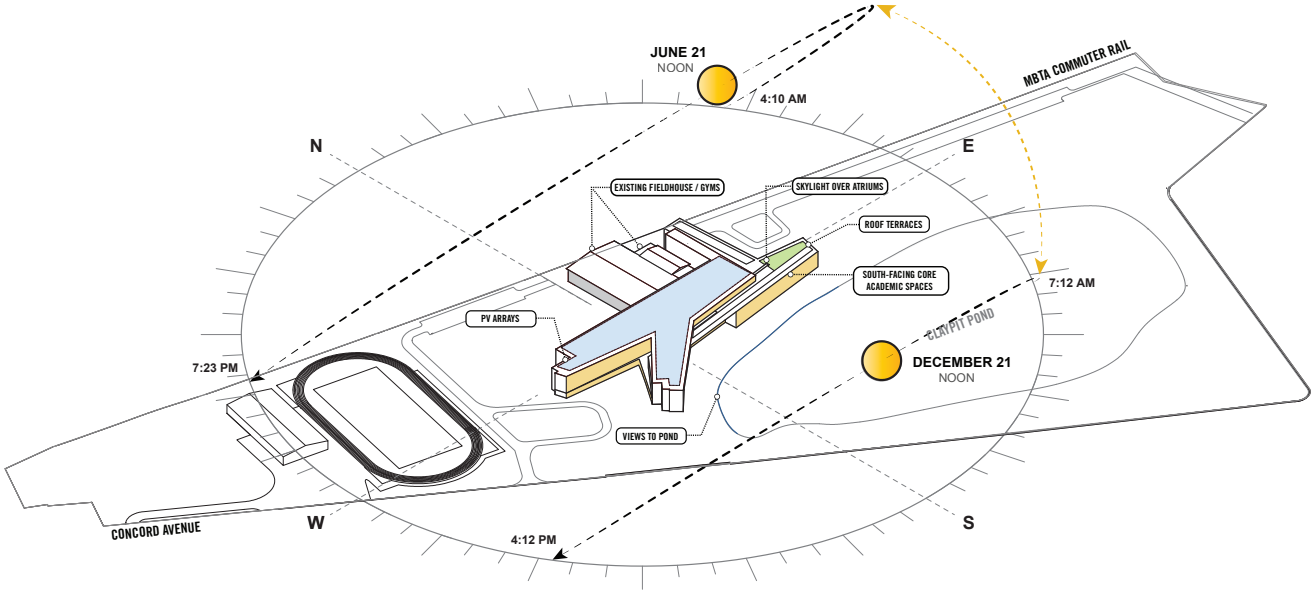
B. FINAL DESIGN PROGRAM / Architectural Characteristics











GRADES 7-12/ 2,215 STUDENTS

Date: 7/11/2018 Schematic Design Submittal

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**			**111,280**			**111,280**			**105,110**	
(List classrooms of different sizes separately)																
Classroom (MS: 26 CR/ 4 World Language - HS: 50 CR/ 3 Wellness)	690	53	36,571				850	83	70,550	850	83	70,550	850	75	63,750	825 SF min - 950 SF max
Teacher Planning (MS: 8@200 SF, HS: 7@500 SF)	423	12	5,072										100	75	7,500	
Middle School Teacher Planning							200	8	1,600	200	8	1,600				
High School Teacher Planning (77 stations)							550	7	3,850	550	7	3,850				
Small Group Seminar (20-30 seats)							500	6	3,000	500	6	3,000	500	5	2,500	
Middle School Science Classroom/Lab							1,200	8	9,600	1,200	8	9,600				
High School Science Classroom / Lab	1,075	10	10,750				1,440	12	17,280	1,440	12	17,280	1,440	19	27,360	3 x85% ut=20 Seats-1 per /day/student
Middle School Prep Room	0	6					200	4	800	200	4	800	200	19	3,800	
High School Prep Room	184	6	1,101				400	6	2,400	400	6	2,400				
Central Chemical Storage Rm							200	1	200	200	1	200	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*														

Version
10.30.2017

GRADES 7-12/ 2,215 STUDENTS

Date: 7/11/2018 Schematic Design Submittal

BELMONT HIGH SCHOOL

ROOM TYPE	Existing Conditions			PROPOSED/ GRADES 7-12									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
	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
SPECIAL EDUCATION			**14,010**			**0**			**24,310**			**24,310**			**22,150**	
(List classrooms of different sizes separately)																
Self-Contained SPED (Learning Center: 4 @ MS / 6 @ HS, Key Classroom Autism: 1 @ MS, Key Classroom Social Emotional: 1 @ MS)	794	4	3,176				850	12	10,200	850	12	10,200	950	15	14,250	825-950 SF equal to surrounding classrooms
Self-Contained SPED Toilet													60	15	900	
Resource Room (Resource/ Learning Center: 4 @ MS)							500	4	2,000	500	4	2,000	500	7	3,500	1/2 size Genl. Clrm.
Small Group Room (School Psychology Group / Testing Room: 5 @ HS)							500	5	2,500	500	5	2,500	500	7	3,500	1/2 size Genl. Clrm.
Offices (Speech/Lang: 1 @ MS / 1 @ HS, Psychologist: 1 @ MS / 2 @ HS, Office: 1 @ HS, Social Worker: 1 @ MS / 1 @ HS)							150	8	1,200	150	8	1,200				
Special Education Conference Room (1 @ MS / 1 @ HS)							200	2	400	200	2	400				
OT/PT (1 @ MS)							850	1	850	850	1	850				
SPED Secretary Office (1 @ HS)	*100*	*1*	*100*				150	1	150	150	1	150				
Campus Learning Center (3 @ MS)	*521*	*3*	*1,563*				500	2	1,000	500	2	1,000				
Campus Learning Center (3 @ HS)	*521*	*3*	*1,563*				850	3	2,550	850	3	2,550				
Campus Program Office	*67*	*1*	*67*													
Speech Pathologist/ SL office see above office	*87*	*1*	*87*													
LABBB Collaborative																
LABBB Classroom: 2 @ HS	*814*	*1*	*814*				850	2	1,700	850	2	1,700				
Toilet inside LABBB CR	*125*	*1*	*125*													
Classroom with Lifeskills: 1 @ HS	*240*	*1*	*240*				1,400	1	1,400	1,400	1	1,400				
Life skills Toilets	*125*	*1*	*125*				60	2	120	60	2	120				
Offices: 2 @ HS							120	2	240	120	2	240				
MIDDLE SCHOOL																
Self-Contained SPED	*850*	*4*	3,400													
OT/PT Classroom	*500*	*1*	500													
Speech + Language Classroom	*500*	*2*	1,000													
Direct Service Classroom	*850*	*1*	850													
Counceling Space for Social Worker	*250*	*1*	250													
Testing and Office Space	*150*	*1*	150													
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 (next to digital arts)	*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*														

GRADES 7-12/ 2,215 STUDENTS

Date: 7/11/2018 Schematic Design Submittal

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
VOCATIONS & TECHNOLOGY			**0**			**0**			**19,400**			**19,400**			**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 @ MS / 1 @ HS)							1,840	2	3,680	1,840	2	3,680				
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**			**9,425**			**54,642**			**28,604**	
Gymnasium (4 teaching stations and full size competition court)	30,183	1	30,183	30,183	1	30,183				30,183	1	30,183	12,000	1	12,000	
PE Alternatives (Fitness Center)	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 (2 PE Offices in Locker Room @ MS)	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 (1 Male @ HS / 1 Female @ HS)	209	3	628				150	2	300	150	2	300	250	1	250	
										0	0	0				
PE Alternatives (Multi-purpose/ dance, yoga, cheer/ taller	1,632	1	1,632						-	0	0	0				
PE Alternatives (Wrestling 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) (2 teaching stations)	*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				

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GRADES 7-12/ 2,215 STUDENTS

Date: 7/11/2018 Schematic Design Submittal

BELMONT HIGH SCHOOL

ROOM TYPE	Existing Conditions			PROPOSED/ GRADES 7-12									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
	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
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	
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 (1 room used for Migrane / Mothers Room)							100	5	500	100	5	500	100	5	500	
Examination Room / Resting (1 @ MS / 1 @ HS)	494	1	494				450	2	900	450	2	900	100	9	900	
ADMINISTRATION & GUIDANCE			**4,106**			**0**			**8,200**			**8,200**			**7,541**	
General Office / Waiting Room / Toilet (1 MS + 1 HS)	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	
Supervisory / Spare Office													120	1	120	
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 (Place in SF in Learning Commons)	103	2	205				704	0	-	704	0	-	704	1	704	
Records Room							100	2	200	100	2	200	302	1	302	
Teachers' Work Room (Distribute SF to 7 teacher planning areas)	494	1	494				1,108	0	-	1,108	0	-	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	7	1,400	200	7	1,400				
Accounting							250	0	-	250	0	-				
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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GRADES 7-12/ 2,215 STUDENTS

Date: 7/11/2018 Schematic Design Submittal

BELMONT HIGH SCHOOL

ROOM TYPE	Existing Conditions			PROPOSED/ GRADES 7-12									MSBA Guidelines (refer to MSBA Educational Program & Space Standard Guidelines)			
				Existing to Remain/Renovated			New			Total						
	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
OTHER			**15,853**			**9,067**			**3,465**			**12,532**			**0**	
District Offices																
Technology Work Room	*413*	*3*	*1,240*				900	1	900	900	1	900				
Technology Offices							150	1	150	150	1	150				
Technology Director Office	*303*	*1*	*303*				400	1	400	400	1	400				
Technology Conf Room	*235*	*1*	*235*				200	1	200	200	1	200				
Technology Server Room	*262*	*2*	*523*													
A/V Coordinator	*215*	*1*	*215*													
Equity Academic Center	*298*	*1*	*298*				850	1	850	850	1	850				
Metco Office	*77*	*1*	*77*				150	1	150	150	1	150				
BEA Office	*133*	*2*	*265*				150	1	150	150	1	150				
Lexington Chinese School	*423*	*1*	*423*						-			-				
Wood Shop / Office / Storage	*2,015*	*1*	*2,015*						-			-				
Food Service Director	*152*	*1*	*152*				150	1	150	150	1	150				
Accounting	*113*	*1*	*113*													
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				
Storage for Emergency Center							120	1	120	120	1	120				
MODULAR HIGH SCHOOL																
Town Maintenance Office / Storage	*206*	*2*	*412*													
Belmont Office / Storage	*208*	*2*	*415*													
Total Building Net Floor Area (NFA)			**208,130**						**242,449**			**296,733**			**244,767**	
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
AP Secretary (AD and Arts Director)											0%	150				required to be included in the
HS Medical Waiting											0%	250				following submittals:
MS Medical Waiting											0%	250				Schematic Design Submittal
Unoccupied MEP/FP Spaces											2%	8,710				Design Development Submittal
Unoccupied Closets, Supply Rooms & Storage Rooms											1%	3,015				60% Construction Documents
Toilet Rooms											2%	8,405				90% Construction Documents
Circulation (corridors, stairs, ramps & elevators)											23%	101,900				Final Construction Documents
Remaining[3]											6%	**25,687**				
Total Modular High School Gross Floor Area (GFA)			7,848													
Total Building Gross Floor Area (GFA)[2]			**266,688**									**445,100**			**367,755**	
Grossing factor (GFA/NFA)												**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

[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: July 11,2018

Version
10.30.2017

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Narrative Deviations from Space Summary

The Town of Belmont, Daedalus Projects, and Perkins+Will have worked diligently to determine the educational program in conformance with the MSBA guidelines.

The Town of Belmont and the Design Team have not made any changes to the major program categories or individual space square footages, with the exception of the following:

In the medical suite, the examination room / resting is a total of 2 rooms at 450 SF each (900 SF total). 2 Middle School Health Instructor's Offices have been incorporated into the total locker room square footage, while 2 High School Health Instructor's offices are defined separately as listed in the Educational Space Summary.

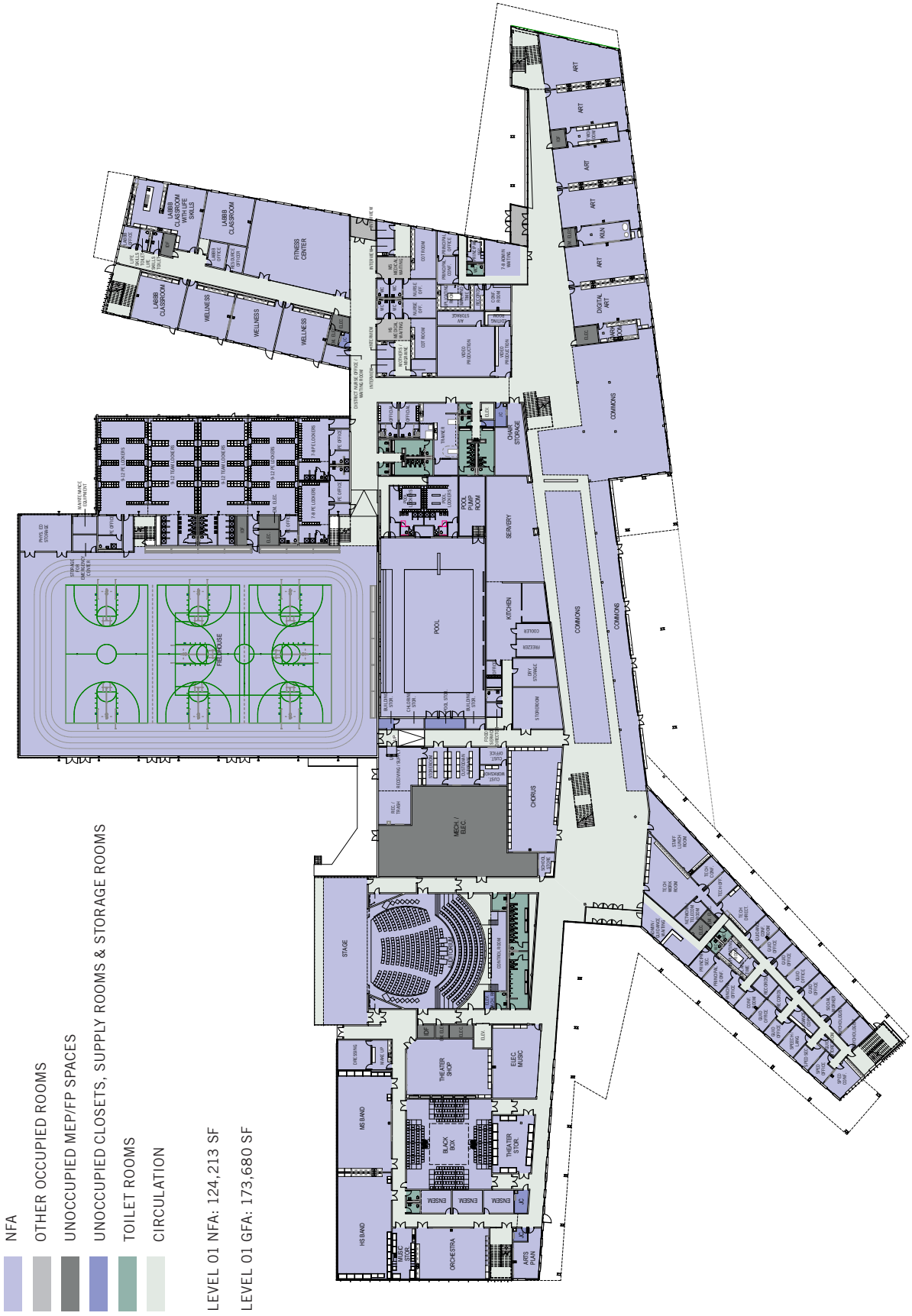
B. FINAL DESIGN PROGRAM / Space Measurement Analysis

We have included a tabulation of the net floor area and gross floor area of Belmont High School by level, shown in the below table and plan diagrams on the following pages. Perkins+Will verifies that the net and gross floor areas fall within the MSBA requirements as provided in the Educational Space Summary.

	Level 1	Level 2	Level 3	Level 4	Total
New GFA	121,130	105,090	92,450	61,920	**380,590**
Existing GFA	52,550	11,960	0	0	**64,510**
NFA	124,213	76,245	58,065	38,210	**296,733**
Other Occupied Rooms	500	150	0	0	**650**
Unoccupied MEP/FP Spaces	5,400	1,400	1,225	685	**8,710**
Unoccupied Closets, Supply Rooms & Storage Rooms	640	590	1,050	735	**3,015**
Toilet Rooms	2,350	2,185	2,225	1,645	**8,405**
Circulation (corridors, stairs, ramps & elevators)	33,910	27,540	24,765	15,685	**101,900**
Remaining	6,667	8,940	5,120	4,960	**25,687**
Total Building Gross Floor Area					**445,100**
Grossing Factor	1.40	1.54	1.59	1.62	**1.50**

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Space Measurement Analysis

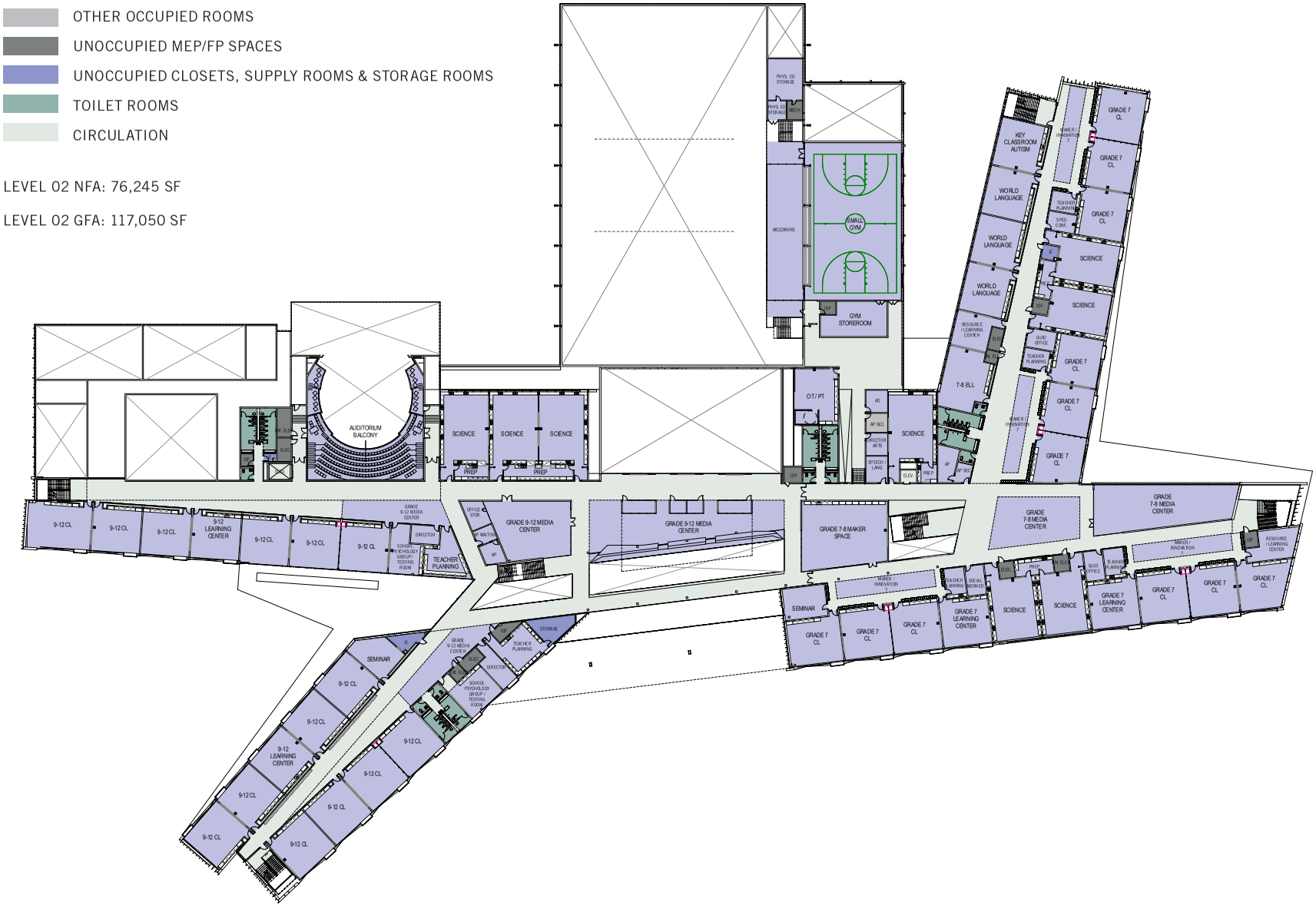


LEVEL 02 FLOOR PLAN

- NFA
- OTHER OCCUPIED ROOMS
- UNOCCUPIED MEP/FP SPACES
- UNOCCUPIED CLOSETS, SUPPLY ROOMS & STORAGE ROOMS
- TOILET ROOMS
- CIRCULATION

LEVEL 02 NFA: 76,245 SF

LEVEL 02 GFA: 117,050 SF



4.1.2 SCHEMATIC DESIGN BINDER

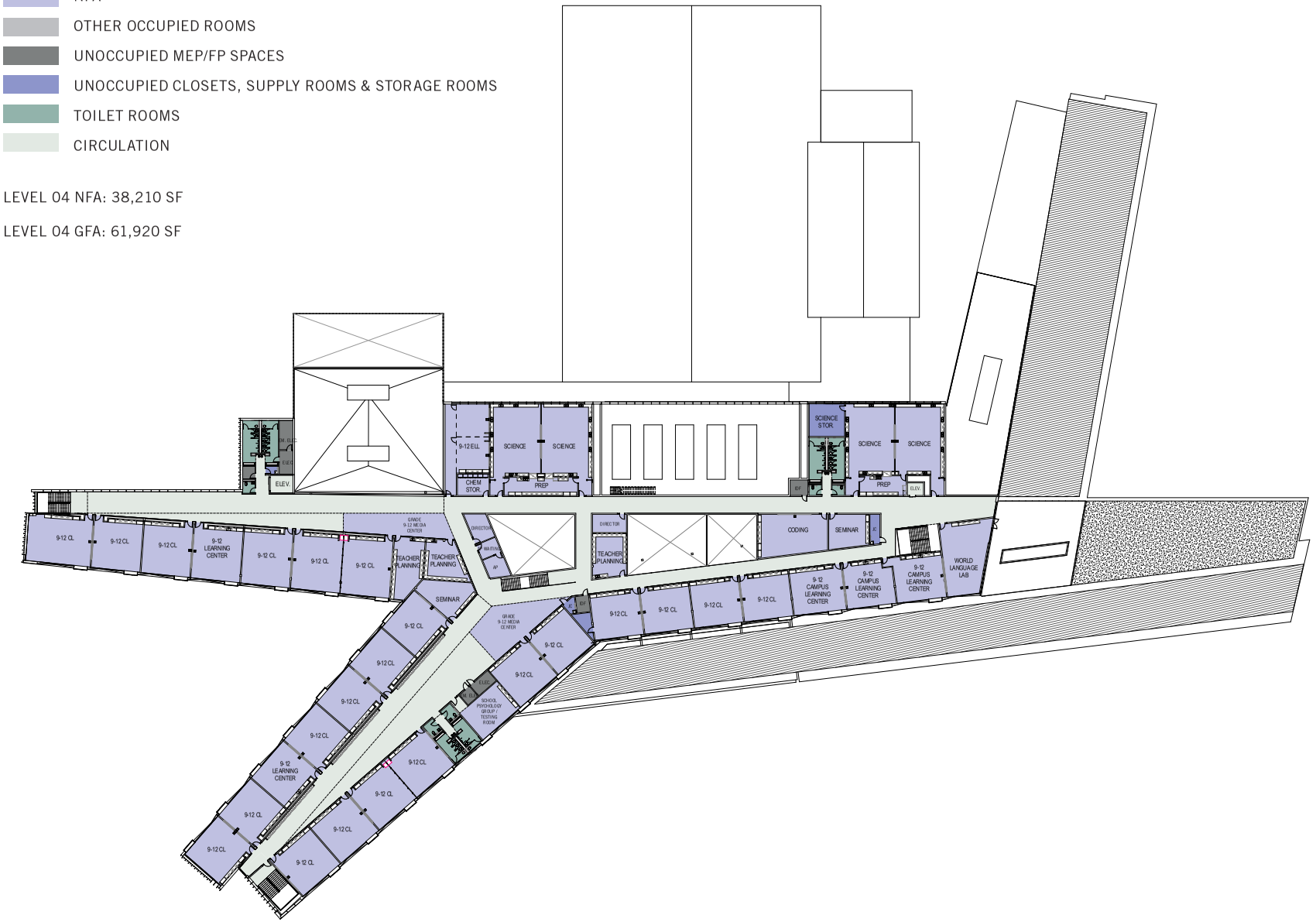
B. FINAL DESIGN PROGRAM / Space Measurement Analysis

LEVEL 04 FLOOR PLAN

- NFA
- OTHER OCCUPIED ROOMS
- UNOCCUPIED MEP/FP SPACES
- UNOCCUPIED CLOSETS, SUPPLY ROOMS & STORAGE ROOMS
- TOILET ROOMS
- CIRCULATION

LEVEL 04 NFA: 38,210 SF

LEVEL 04 GFA: 61,920 SF



4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Project Support of Educational Program

PROJECT SUPPORT OF EDUCATIONAL PROGRAM

Planning sessions, working groups, visioning sessions with students, faculty and staff facilitated initiation by Dr. Frank Locker and later by Stephen Turkes Brooke Trivas from Perkins + Will, along with other members of the design team, all played a role in informing the educational principals and in turn the ultimate layout and design of the New Belmont High School Facility.

The school is anticipated to operate as two distinct "schools within a school," one for Grades 7-8 and one for grades 9-12. There will be separate entrances and administrations for the two schools. All students will share the pool, fieldhouse, nursing, music, technology, and commons areas. The two schools will have separate bell schedules. The High School students will have an open campus approach, as they do now, while the 7-8 students will not. The School Committee voted unanimously to support the 7-12 grade configuration. During the 7 full day Visioning sessions with educators and community members (including students), discussions took place regarding the clear need for careful separation of 7/8 and 9-12 students while allowing opportunities to take advantage of the unique connections that can be achieved with teacher to teacher planning across grades and scheduling and utilizing specialized spaces for students to use. This is the special aspect of the 7-12 program, if not for this combination of grades, 7/8 students may not have access to some of these great teaching spaces and programs. Also, the 7-12 building is a great opportunity to have educators collaborate across grade levels and across disciplines as they reside in the same building.

The 7/8 grade core academic model is a traditional middle school team model. Science, Social Studies, English and Math are all core classes. World language is within the 7/8 side but not scheduled "on Team.". All electives are off Team. Special education is embedded in and around each Team and grade. The District is planning a hybrid model for grade 9 where this cohort of students is positioned in a manner that allows for deeper personal relationships to be formed and where all students are "known" to at least one adult. The District will maintain the 9th grade students' ability to access higher level classes and programming. The 10-12 students will be served by Departments that are located strategically allowing educators to continue to explore cross disciplinary work and projects. This work has been ongoing at Belmont High School and the goal and desire is to use the building, the space and its adjacencies as a tool in the teaching, learning and collaborating of both teachers and students.

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 per the MSBA, and 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. The design uses the High School Science Classroom Standard of 1,440 sf and Middle School Science Classroom Standard of 1,200. The Prep Rooms associated with the High School Science Classrooms are adjusted to 400 sf per two Science Classrooms. The Middle School Prep Rooms will remain at 200 sf per two Science 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. The District and its consultants will continue to review the proposed schedules to ensure a 85% utilization rate.

The guidance areas for 7/8 will be embedded in the grade / Team areas. The guidance counselor moves to the grade with the students and will change offices after each year to follow the grade cohort of students. The guidance staff in grades 9-12 will remain in a traditional department-based model. The mental health spaces will be provided to current employees who provide psychological testing and services.

Technology integration will be a key aspect of modernizing the classroom design . 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.

9-12 students have been surveyed about lockers. We found that 50% of Belmont's High School students state they would like to have lockers for the following needs: coats, book bags, storing items of value such as musical instruments, sports equipment, texts and school supplies. Lockers will therefore be provided for 50% of the High School population. The middle schoolers grades 7 to 8 will have a 1 to 1 locker ratio.

The Commons located in the most central location of the High School on the lowest level of the plan connected to an outside café and green public commons and view to the pond, used as a gathering, meeting and dining area. The dining area provides 400 seats for grades 7-8 as well as 400 seats for grades 9-12, which accommodates one third of the student population. The interior Commons will service lunch, act as pre-function for the gymnasium and auditorium, which will service the students all day.The commons is placed in an area of the facility which visually connects to the exterior and creates a visual linking from the main entry to the floor above. There will be two lunches session for 7/8 and up to three for 9-12 students. Kitchen and serving space continues to be reviewed with the Food Service Director. The kitchen will have 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 are available to allow for multiple uses of the cafeteria space.

The lowest level floor wings are designed to accommodate, District Offices, Medical and Arts and Athletic programs. The location of these programs on the lowest level allows for direct access to a reception area from separated parking from the main facility and the ability for these programs to function independently from the High School while sharing resources when appropriate. In the expanded school, five 1,200 sf art rooms will be provided to allow instruction in the Arts and ceramics. 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.

The larger civic spaces are designed to be as flexible as possible. The gymnasium was developed to hold a formal game while also accommodating a school practice.

The distribution of Robotics, Engineering and Maker spaces allows students at a variety of grade levels to experience hands on learning within their academic neighborhoods. These programs will be integrated into the core programs to create project based programs.

The Visioning Workshop imagined a dynamic Media Center having a prominent position, this is realized in design with the multi-height space on the above floors The Media Center has aspects that are open and active, overlooking both the school commons and pond, while maintaining a prominent position above.

The distribution of Robotics, Engineering and Maker spaces allows students at a variety of grade levels to experience hands on learning within their academic neighborhoods. These programs will be integrated into the core programs to create project based programs.

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Instructional Technology

Instructional Technology:

OVERVIEW:

The focus for the Belmont High School project will be on providing instructional technology that will allow and encourage continued integration of technology into the curriculum and foster a culture of innovation and curiosity for students. Special attention will be given to the design of technology systems to help ensure that there is sufficient infrastructure to support a wireless solution that provides full coverage of the facility with sufficient bandwidth to enhance an already successful one-to-one computing environment for students. Instruction will be reinforced with interactive audio-visual technology that will optimize flexibility and support collaboration.

The existing network and WLAN hardware at the Belmont High School is based on the Alcatel-Lucent platform. The WLAN controller is at the high school with a backup controller at Chenery Middle School. Most existing APs within the school are located based on availability of data outlets because of the difficulty in adding cabling due to building/ceiling conditions. Many are in less than ideal locations. The project will include updated network and WLAN hardware, and cabling infrastructure to support a robust wireless network. Alactel-Lucent will remain the hardware platform to help ensure compatibility across the district network and for streamlined management.

The Town of Belmont has a community-wide fiber backbone connecting all facilities. The School Department is responsible for the fiber network for both the schools and the Town (including the light department and Town's 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 backbone – the current high school MDF, Chenery Middle School, and the Belmont Public Library. The high school MDF is currently located off the Tech Office on the second floor of the high school. The fiber enters the building underground on the Theater/parking lot side of the building and is routed internally to the MDF. The MDF is a dedicated space with a split cooling system that requires regular maintenance due to its age. There are a total of ten IDFs. The IDFs are not dedicated spaces. They consist mostly of wall mounted racks and/or cabinets in existing classrooms and storage spaces. The MDF and IDFs are connected via 6 strand MM fiber 1GbE backbone. Horizontal cabling from the MDF and IDFs to endpoint is mostly Category 5. The Cat5 and cabling represents a bottleneck on the existing network and has reached the end of its serviceable life. The project will include relocating the district fiber a new MDF located within the new IT Department area and updating network hardware in the MDF and IDFs based on current technology. Special attention will be given to maintaining the functionality of the school-district and town-wide network and services. IDFs will be dedicated spaces, with proper power (emergency backup) and environmental treatment.

TELCO lines currently enter the Belmont High School underground at the front of the building, near the flagpole. Services are routed internally to a demarcation point near the main office. The demarcation point consists of several 110-blocks and cross connects on two wallboards on adjoining walls. There are also some older, abandoned service risers and termination points at this location. Conduit enters from the floor to just below the voice termination wallboards. The demarcation point is also used as an office and storage area. Voice riser cables extend the TELCO lines to the second floor MDF, where they terminate on blocks and connect to an NEC SV8300 phone system. The system is 10-12 years old. Notably, four elementary schools in the district utilize the high school VoIP system for their services. The district is in the process of planning a district-wide VoIP upgrade. The project will include new VoIP equipment and hardware that is consistent with the ultimate district-wide system implemented. Four Internet services from Verizon and Comcast are used.

The existing intercom system at the Belmont High School is an older version of a Simplex 5100 Series Building Communication System. The master clock system is a Simplex 2350 Master Time System. The intercom main equipment for both of these systems is located in the Main Office. The master clock system is located in the TELCO demark, mounted on the voice termination wallboard. Classrooms are currently equipped with two-way speakers, secondary clocks and call buttons. A good portion of the equipment is no longer functional. The project will include new distributed communication system.

Every teacher at the Belmont High School is currently equipped with an iPad and each classroom has a fixed Dell computer workstation for teacher/classroom use. Teachers are well trained and many are self-reliant when it comes to operating classroom technology. Some teachers utilize their own Macbooks, PC laptops and Chromebooks. Every classroom has a projector and a Smartboard. Smartboard and projector technology is >10 years old in most cases. Smart notebook software is used

regularly. Classrooms are currently equipped with two-way speakers, secondary clocks and call buttons. Some of the equipment is no longer functional and has reached the end of their serviceable life. Many spaces are using battery operated clocks that are not synchronized. Bell system in not functional. The project will include new components based on current technology. SPED classrooms have some audio reinforcement for special accommodations. General classrooms do not have audio reinforcement. All classrooms have an AppleTV connected to the projector. The project will provide updated technology for all classrooms, labs, teachers and students. There are currently five Computer Labs at the high school. Computer Labs are equipped with fixed desktop computers (hardwired), projectors and Smartboards.

Typical Learning Spaces:

Classrooms and other typical learning spaces will be equipped with a public address speaker, call switch, VoIP handset, secondary clock, (2) hardwired data outlets in the ceiling for wireless access, (4) hardwired data outlets for teacher use, (2) hardwired data outlets for connecting audio-visual system, boxes and conduits for display devices (tech equipment), and a local audio reinforcement system.

Tech Labs (Maker Spaces, Robotics, Electronic Music, World Language):

New Tech Lab areas will be equipped with a public address speaker, telephone (equipment), secondary clock, (2) ceiling data outlets for wireless access, approximately (30) hardwired data outlets for teacher and student use, boxes and conduits for projectors/interactive displays (tech equipment), and enhanced audio.

Administrative Office and Areas:

Offices and Planning Areas will be equipped with a minimum of (4) data outlet locations per workstation and a VoIP handset (tech equipment) per workstation. Additional convenience outlets will be provided for flexibility. Offices will also be equipped with a public address speaker with built-in volume adjustment. Conference Rooms will be equipped with displays (equipment) for presentations.

Corridors:

Corridors will be equipped with public address speakers and data outlets for wireless access points (tech equipment). Digital displays connected to a digital messaging system will be located in gathering areas.

Media Centers:

The Media Centers will be equipped with public address speakers, VoIP (tech equipment), (2) secondary clocks, ceiling data outlets for wireless access, (20) hardwired convenience data outlets for staff and student use; and boxes and conduits for projectors/ interactive displays (tech equipment). Access to CATV will be provided. Video Production tie-lines will be installed where required.

Dining Commons:

The Dining Commons will be equipped with public address speakers, VoIP (tech equipment), secondary clock, and data outlets for wired and wireless access. Data outlets will be provided for the POS system in the Kitchen/Servery. Access to CATV will be provided. Digital displays connected to a digital messaging system will be located in gathering areas. Video Production tie-lines will be installed where required.

Field House and Gym:

The Field House and Gym will be equipped with public address speakers, VoIP (tech equipment), secondary clock, and data outlets for wired and wireless access. Access to CATV will be provided. Digital displays will be strategically located. Video Production tie-lines will be installed where required. See also audio-visual communication systems description.

Pool:

The Pool will be equipped with public address speakers, VoIP (tech equipment), secondary clock, and data outlets for wireless access. Access to CATV will be provided. Video Production tie-lines will be installed where required.

Auditorium:

The Auditorium will be equipped with public address speakers, VoIP (tech equipment), secondary clock, and data outlets for wired and wireless access. Access to CATV will be provided. Digital displays will be strategically located. Video Production tie-lines will be installed where required.

Fields/Outbuildings:

Press boxes and other outbuildings will be equipped with fiber homeruns to the nearest MDF/IDF for data, VoIP and Wi-Fi

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Instructional Technology

connectivity.

Technology Equipment Summary, Scope + Budget:

The following technology will be procured and installed with technology equipment funds. The design team will consult with the Owner for the purpose of identifying new technology equipment to be purchased during the "Furnishings and Equipment" phase of the project, including but not limited to:

- Wireless LAN Equipment
- Network Servers, Storage and Backup
- Student Devices (Tablets, Laptops, Desktops)
- Teacher and Admin Devices (Tablets, Laptops, Desktops)
- Printers (Workgroup, Specialized)
- Classroom Video Display Technology
- Document Cameras and other Peripherals
- Equipment Setup, Imaging, Installation and Configuration

During the "Furnishings and Equipment" phase of the project, the design team will provide the following technology equipment related services:

- Prepare recommendations and budgets to assist the Owner in the selection of appropriate technology within the context of the project;
- Prepare recommendations and budgets for network installation and integration support services to be provided within the context of the project;
- Assist the Owner with the development of a detailed technology equipment list for the project and coordinate with the furniture and other equipment;
- Generate detailed equipment schedules and budgets of the equipment to be purchased and submit to the Owner for comment and concurrence;
- Make revisions and modifications to the equipment schedules as necessary to accurately reflect the requirements of the technology equipment for the project.

After the equipment list has been finalized, detailed procurement specifications are generated where required and issued for procurement purposes via state contract. Evaluation of vendor proposals will be conducted and a contract(s) will be awarded so that the installation can begin. As such, the design team will provide the following services:

- Prepare functional and detailed specifications for the technology equipment to be procured. Specifications will be prepared for each major group of equipment to be procured
- Prepare detailed equipment schedules indicating where various technology equipment is to be located during installation;
- Prepare equipment specifications and submit for review and comment by Owner representatives;
- Revise documents as required, including but not limited to specifications, budgets, installation schedules, etc.
- Coordinate technology procurement with the furniture procurement and delivery schedule;
- Coordinate procurement process with state contract vendors for each major category of equipment, including the distribution of request for bid documents and site walk-through with prospective bidders;
- Prepare addenda as required;
- Prepare clarifications to requests for information from prospective vendors;
- Coordinate and participate in vendor conference;
- Review all proposals for compliance with specifications;
- Obtain clarifications from vendors when necessary;
- Provide detailed evaluations of proposals for the Owner so that the award of equipment contracts can be made;
- Summarize all awards by category and by successful vendor.

Once contracts are awarded, delivery and installation can begin. The purpose of this final phase is to ensure that all technology equipment specified is properly installed. As such, the design team will provide the following services:

- Coordinate project schedule with vendors;
- Update vendors as to scheduling changes and/or conflicts;
- Coordinate installation with the Owner;
- Make periodic field inspections of work in process and

B. FINAL DESIGN PROGRAM / Instructional Technology

monitor vendor progress;

- Advise the Owner periodically with regard to the project status;
- Notify the Owner with regard to any deficiencies or failure on the part of vendors to comply with project requirements;
- Review and approve all required or necessary guarantees, manuals, manufacturer's instructions, signed certificates of compliance;
- Advise the Owner with regard to project closeout and punch list items.

Item	Educational Technology Equipment Category	Equipment Estimates
A.	*Core Equipment*	$ *425,000.00*
	Network Server(s), Related Hardware	$ 125,000.00
	VoIP Hardware	$ 100,000.00
	WLAN	$ 200,000.00
B.	*Classroom/Admin Computing Devices*	$ *356,900.00*
	Admin Computing Devices	$ 91,300.00
	Teacher Computing Devices	$ 265,600.00
C.	*Student Computer and One to One Devices*	$ *1,305,500.00*
	Fixed Computer Workstations	$ 198,000.00
	Student one-one-devices	$ 1,107,500.00
D.	*Audio Visual*	$ *1,162,000.00*
	Interactive Display Equipment	$ 1,162,000.00
	Misc Displays	$ 100,000.00
E.	*Printers*	$ *50,000.00*
	Workgroup Printers	$ 50,000.00
F.	*Misc. Equipment*	$ *270,000.00*
	Servery/Commons POS Equipment	$ 50,000.00
	Electronic Music Lab	$ 30,000.00
	Digital Art	$ 30,000.00
	GR 7-8 Maker Spaces	$ 50,000.00
	Robotics	$ 30,000.00
	GR 9-12 Maker Spaces	$ 50,000.00
	World Language	$ 30,000.00
G.	*Installation, Documentation, Training*	$ *306,850.00*
H.	*Total*	$ *3,876,250.00*

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Functional Relationships and Critical Adjacencies

The organizing principals of Belmont High School center around a flexible, adaptable, 21st century learning environment that considers the thoughtful integration and careful separation of the 7-8th and 9-12th grades. Classroom wings extend out from a central spine, within which the common spaces such as the Dining Commons, Media Center, Robotics, Engineering, and Maker Spaces form a link between the 7-8th and 9-12th grade classrooms. This interior spine allows both the upper grades and lower grades to access the common/shared spaces with ease.

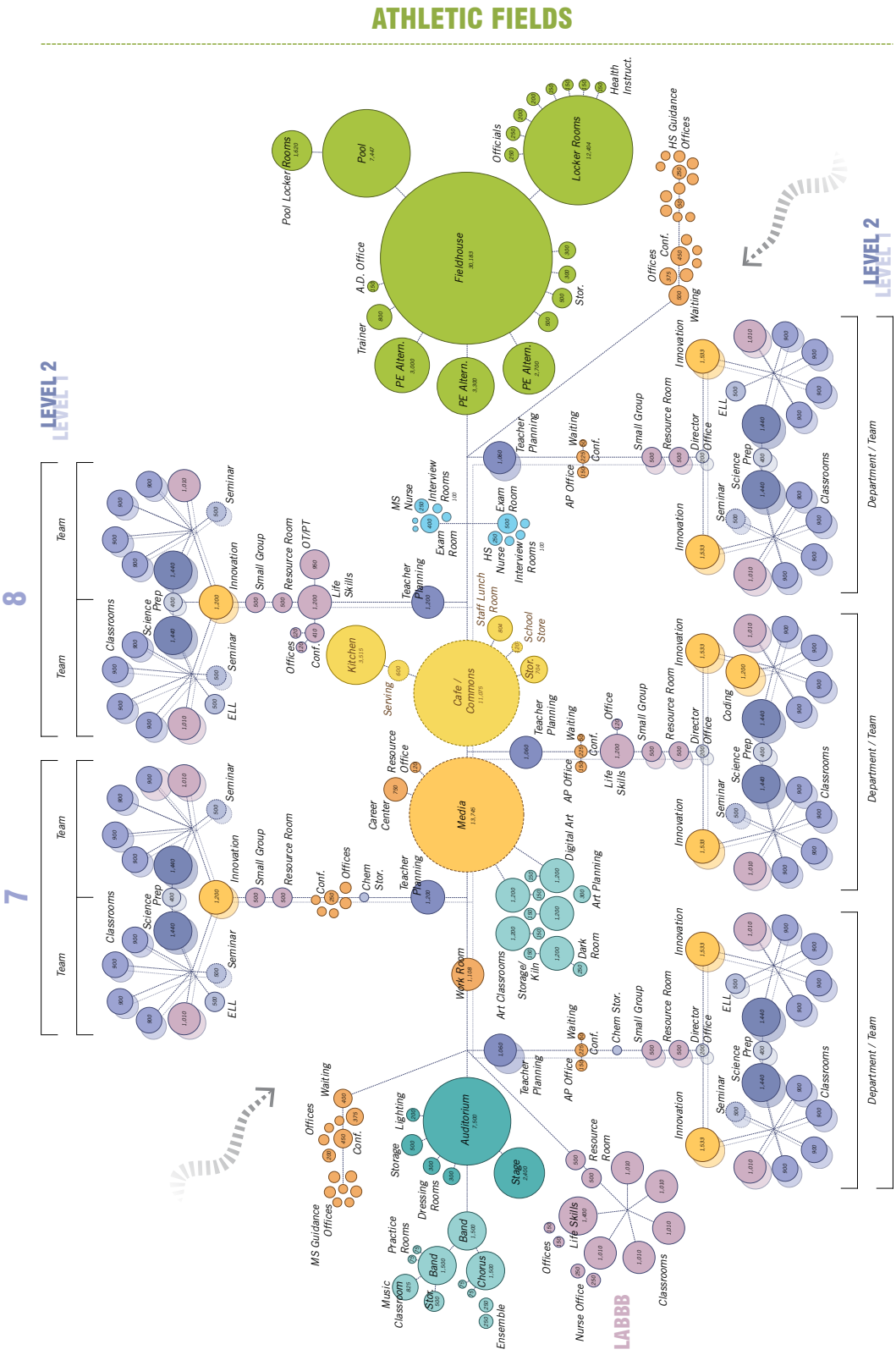
The open Dining Commons sits on the first floor, south of the kitchen and servery, where it can also serve as pre-function for events in the Auditorium, Black Box, Pool, and Gymnasium. In addition to pre-function and dining the large open space can be for a variety of uses such as project based learning, cheerleading, robotic events, large group meetings, study areas, community uses, dances, for example. The Media Center above overlooks the Dining Commons and out onto Claypit Pond. It is not a single isolated space; rather, the Media Center consists of several spaces of various scales along the central spine of the building. The 7-8th grade and 9-12th grade have both an open and closed media center and project rooms that allow for small group study. Robotics, Maker, Physics and Engineering spaces are visible along the central spine of the building, creating a hub for making and project based learning.

The classrooms for the 7-8th grade are configured around central innovation / break out spaces and emphasize a team-focused approach. The 9-12th grade classrooms have adjacent innovation / distributed media spaces to allow for small group study and classroom break out space.

There are two main entries, one on the west side of the building for grades 9-12th and one on the east side of the building for grades 7-8th, each with a stair that leads up to the academic areas. At each entry, administration offices can be accessed directly via a vestibule to provide an important level of security. Assistant Principal, Director, Guidance, and Special Education offices are also distributed in the classroom wings along with teacher planning rooms to allow for administrative supervision on all floors.

The music spaces are located adjacent to the Auditorium and Black Box on the west side of the building, not only to isolate the sound of these spaces from classrooms above, but also to allow these music rooms to double function as “green rooms” during a performance. Art classrooms are also located on the first floor near the 7-8th grade entrance, with direct access to the outside. Athletic spaces also have direct access to outside fields and their own primary gymnasium entry. The Special Education LABBB program is located on the first floor near the primary entry to the gymnasium, which allows easier movement for students with ambulatory difficulties.

B. FINAL DESIGN PROGRAM / Functional Relationships and Critical Adjacencies



4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Security and Visual Requirements

SAFETY AND SECURITY PROTOCOLS AND STANDARDS:

The Belmont community has engaged in ongoing conversations with local police, fire, faculty director, Building Committee, Superintendent, School Committee, OPM, Middle School and High School Principals, Security Consultant and Design Team members, during the Feasibility and Schematic Design Phase around ensuring a safe and secure High School learning environment that meets the districts standards and procedures.

The insurance of physical, emotional and academic safety is key to the success of each student. Crime Prevention through Environmental Design (CPTED) principals are being used in the conversations and planning strategies. CPTED principals fall into two distinct categories: active or passive approaches. Active approaches generally focus on the symptoms of security issues and passive approaches attempt to alleviate their causes. Passive security measures have proven effective in decreasing fear and incidence of crime while improving the quality and use of space. CPTED's three basic principals are: 1) natural surveillance, 2) natural access control, and 3) territorial reinforcement. To support passive design the Belmont High School is designing to ensure: appropriate lighting levels for the interior and exterior spaces, unobstructed site lines throughout the site, administrative spaces located near the front entries for both the Upper School and Lower School entries, clearly marked entrances, appropriate signage used for directional assistance, and a layout for the school that fosters clear unobstructed sidelines while avoiding toilet rooms near exists and zoning in the best way possible for after-hours community use. In addition to the passive design measures the team has looked at active measure creating a multi-dimensional design approach. The safety design elements can be enhanced with the following methods: Motion sensor will be provided in all rooms at grade level where access from grade is possible, first floor corridors and corridors only at all upper levels. System based on Kantech due to ease of use in school environments and certification use as an integrated product with the camera and intrusion system, where cameras located inside and out. Panic buttons connecting to the police station located in key areas both inside and out. Card readers will be located at all entry doors. Where there are multiple entries to one space (ie Field House, Café) one or two door locations will be provided with a card reader). School wide communication system, provisions for possible metal detectors, secure vestibules, exterior door contact display panel indicating if any exterior door and overhead door are left ajar. In addition, it was determined that the school would have card access at key exterior and interior doors.

Organizing the lower school around a team neighborhood model and the upper school around academic spokes with staff located at the beginning of each area allows students to feel a reduction of the scale of the building while fostering a relationship with an adult to foster an important Belmont High School value around Social Emotional Learning (SEL). In addition, adults will be located throughout the building to ensure eyes are on students. These locations are programmed to include guidance offices and conference rooms, administrative staff, director offices, teacher planning areas, and adult planning rooms.

It was important to Belmont to ensure that the community use could be separated from the academic neighborhoods in order to control access and provide an environment which can segregate the public from the academic use.

MAIN ENTRANCE DESIGN CONSIDERATIONS:

The Belmont High School building entry design sequence was carefully reviewed by all district key personal (noted above) to ensure a structure that would foster the greatest safety for the occupants. Before the start of school the two primary entries located at the upper school and lower school, adjacent to the administration area, will be open and in full use by staff and students. Occupants during the pre-start school hours can flow freely through the unlocked doors. After the start of school any visitor or student who is entering the school will be required to buzz the main exterior vestibule doors. At the exterior vestibule location a visitor will be expected to use the camera/buzzer in order to allow the visitor to gain entry into the locked vestibule. After the person is admitted into the locked vestibule a second buzz is required at that interior vestibule location in order to enter into the administration area (see diagrams below). After entry into the administration area the visitor can be identified and at that time determined if the visitor can gain access into the faculty. A panic button will be located at the administration desk in the event of a serious incident. This button will be directly connected to the Belmont police and to the Security Company for real time response.

CLASSROOM LOCKSET HARDWARE:

The security working group weighed the pros and cons of different lock set configurations relative to all protocols around the districts classroom lockdown procedures. It was determined that a thumb latch would be used for all interior classroom hardware.

B. FINAL DESIGN PROGRAM / Security and Visual Requirements

The standardization of the classrooms is important for ease of implementation and use. This hardware will allow for a teacher or student to quickly and easily lock the classroom door to ensure that an intruder cannot easily enter the classroom. In general, it was discussed that keys would be limited and the distribution of Grandmasters would be highly selective.

CLASSROOM/ INSTRUCTION SPACES VISIBILITY:

The working group determined that the use of a thumb latch for the classroom hardware lockset was integral to the discussions around classroom glazing. The group debated whether glazing would be better in the classroom doors or sidelights in order to serve both the educational environment and security needs. Having some glazing into the classrooms was essential to bring light into the corridor and allow the administration and teachers to have views in and out of the classrooms. It was determined that the general classroom doors would not have glazing in the door due to the installation of the thumb latch on the interior classroom lockset. The working group thought that an intruder could gain entry into a locked classroom by breaking the classroom door glazing to open the thumb latch. The use of a side light was preferred. It was essential that the side light was located on the side opposite to the location of the thumb latch. This location would not allow an intruder to reach the interior thumb latch if they broke the side light to try and gain entry. All specialty classrooms with larger amounts of glazing in order to make learning visible would have vision control measures such as shades to ensure that the classroom could be locked down and the students could be placed in a location which was not visible to any intruder.

ENTRY LOCATIONS/ BUILDING SIGNAGE:

All entries to the upper and lower school will be clearly marked and noted. Both major entries to the Belmont High School will have access close to the front door to accommodate emergency vehicles. It was determined by the working group that the Upper School entry would serve as the primary emergency entrance for police and fire.

The group discussed the use of building exterior numbering at doors and possibly windows to help police, fire and emergency personal with wayfinding. Knox box locations will be determined by Belmont Regulatory personal. The Belmont Community is engaged in S.A.F.E protocol which is a student awareness of Fire Education program designed to put trained fire and life safety educations in the classroom to conduct fire safely education programs in grades K-12.

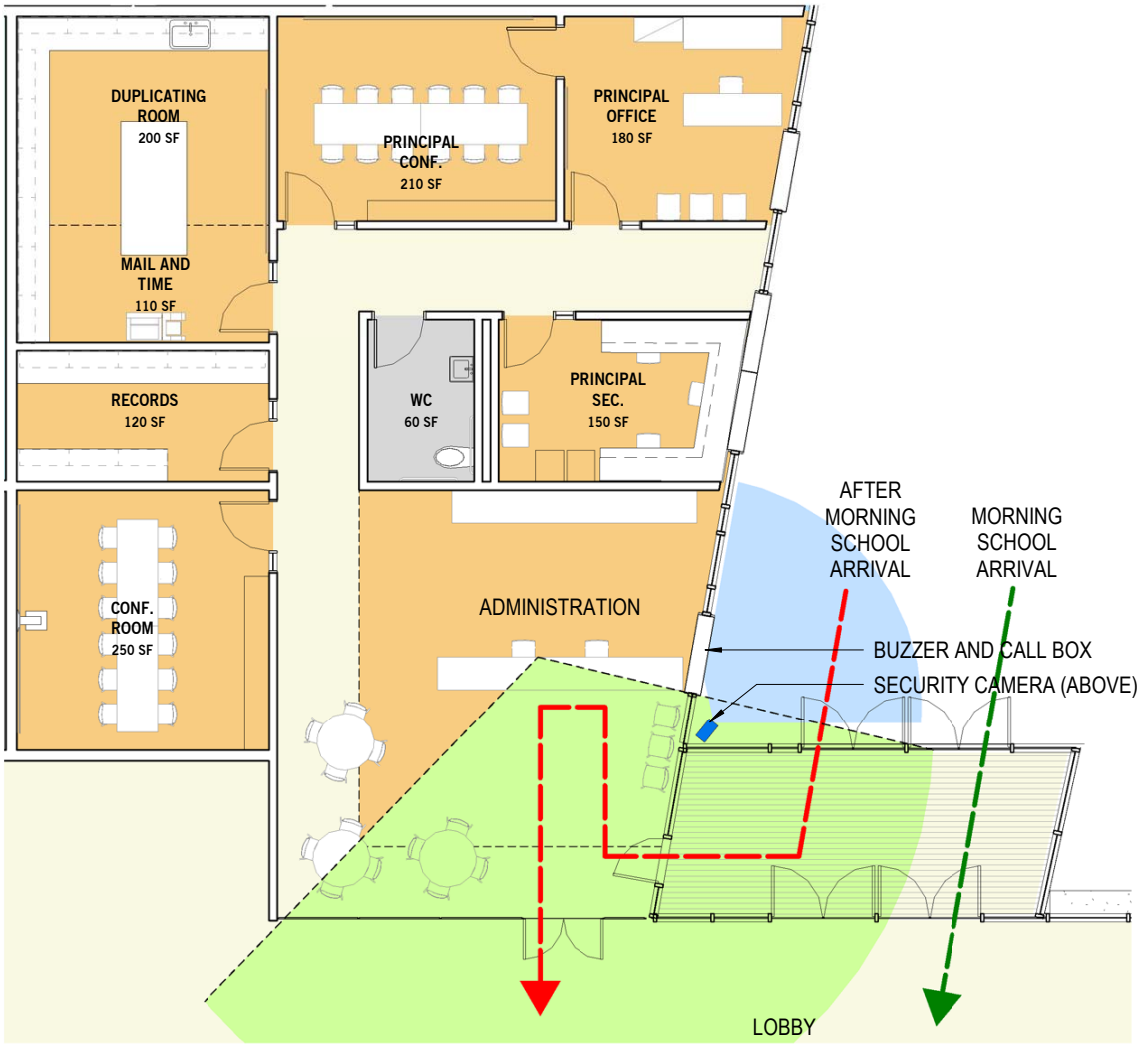
CONFIRM OPTIONAL SURVEILLANCE OF BUILDING AND SITE.

Detailed conversations took place around the location of interior and exterior surveillance cameras, access to footage and the storage for such video footage. The schematic design documents allows for cameras in corridors, stairs, exterior door locations in order to see who enters and exists the facilities, entries into toilets and locker rooms but no cameras in the interior of toilet rooms or locker room areas and not inside general classroom spaces. The exterior would have a full range of visibility from cameras mounted on the building and exterior poles. The police and fire requested that there would be 7'-0' of visibility below landscape canopies in order to increase sightlines and camera viewpoints. Interior cameras will primarily be flush ceiling mounted with 3megapixel of resolution. Exterior cameras will be domed wall mounted and bracket mounted where required, resolution will be 5megpixels. Remote exterior site cameras will have fiber feeds to integral fiber converters at camera locations. Interior cameras will primarily be flush ceiling mounted with 3megapixel of resolution. Exterior cameras will be domed wall mounted and bracket mounted where required, resolution will be 5megpixels. Remote exterior site cameras will have fiber feeds to integral fiber converters at camera locations. Storage will provide 30 days of recording. At this time it is determined that storage will be based on an Exacq server with integral access control software.

Belmont participates in the BeSafe Safety Portal. This program updates and maintains information integrity and ensures effectiveness of safety related policies and programs. This program helps first Responders in the development of Incident Management Plans, emergency and safety procedures, preparedness plans as required by the National Incident Management System.

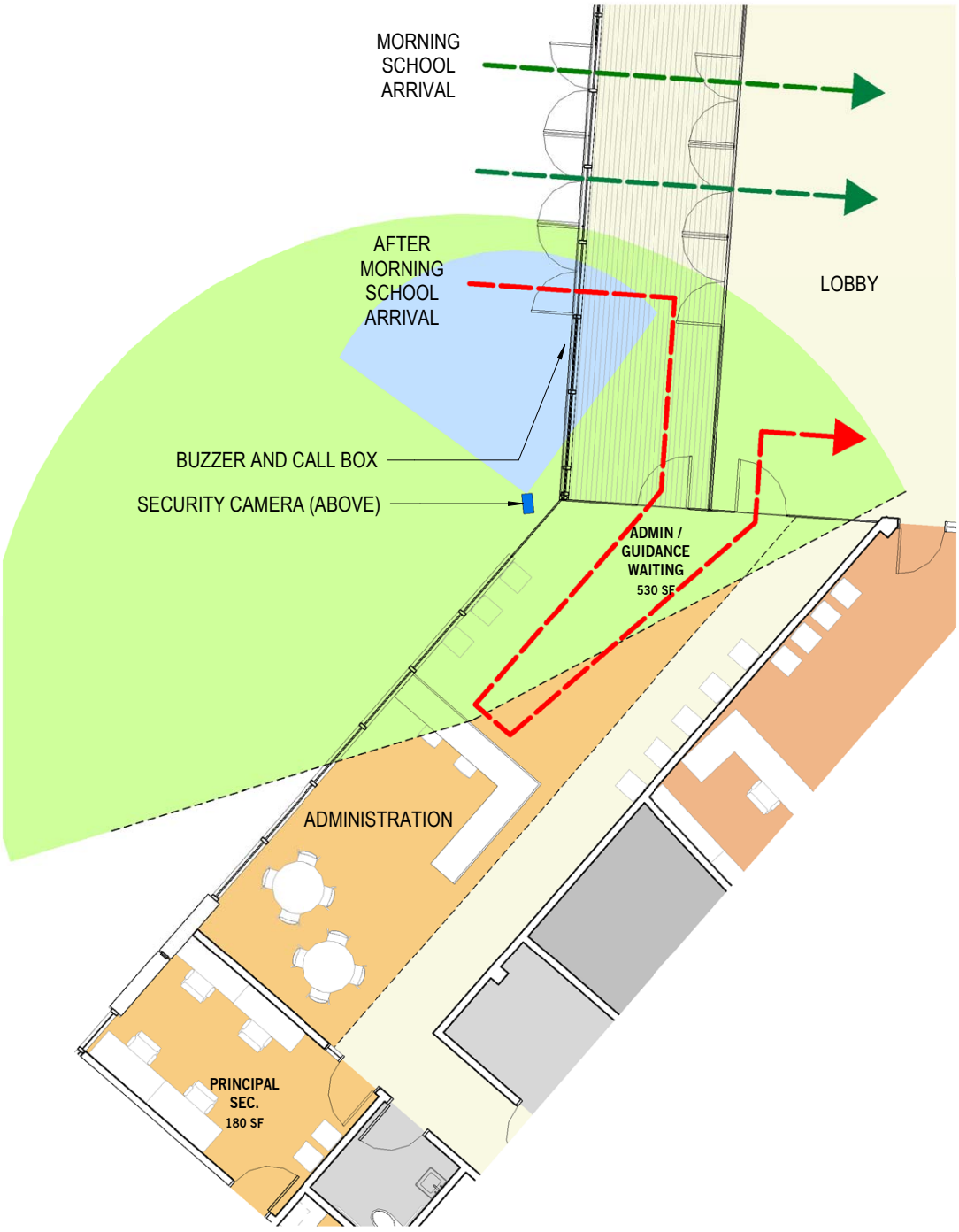
4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Security and Visual Requirements



LOWER SCHOOL ENTRY SEQUENCE

B. FINAL DESIGN PROGRAM / Security and Visual Requirements



UPPER SCHOOL ENTRY SEQUENCE

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Site Development

PARKING DESCRIPTION

The proposed site design includes 430 parking spaces the majority of which are located along the campus driveway that follows the rear perimeter of the school site. Accessible parking spaces within the two drop off loops and 70 parking spaces west of Harris Field are included in the total 430 space count. See attached summary of existing and proposed parking. The 430 spaces is a net neutral parking quantity for the high school while adding in the parking required for the added middle school staff.

TRAFFIC COUNTS

Existing Striped parking for school use		
Existing parking east of school	284	
Existing parking behind school	21	
Existing parking at field house	38	
Total parking for use by school	343	(284+21+38)
Additional site parking not striped		
Along ring road	85	
At ice rink	19	
Total civic event parking	428	(343+85)
Total site parking	447	(343+85+19)
Existing staff and visitor parking needs	162	
Remaining spaces for student parking	181	(343-162)
Added staff and visitor parking for 7-8	86	
Minimum staff and visitor parking for 7-8	248	(162+86)
Minimum parking needs 7-12	429	(248+181)
No change to student parking		
Proposed school parking totals	430	Change to student parking (+1)
Proposed school civic parking	430	Change to civic event parking (+2)
Proposed site parking totals	430	Change to total parking (-17)
Bus parking on site		
Current needs	9	
Future needs	10	
Student parking permits currently issued		
September start with	60	
June end of year end with	300	

Clearly not all students with parking permits are parking on campus

New school changes for large civic events

Field House – same
New Theater – same size
Graduation – same size event
Bandorama – same size event
Town Meeting – same size event

4.1.2 SCHEMATIC DESIGN BINDER

B. FINAL DESIGN PROGRAM / Visual, Aesthetic Focal Point or Features

The following are the major architectural character defining features that will be built upon in the design development phase:

SITE POSITION AND LANDSCAPING-

The building is positioned as deep into the site as possible allowing for a park-like setting and helps to buffer the building mass from its neighbors. Landscaped paths reach out from the building to the natural crossing points on Concord Avenue allowing for both safe and welcoming approach to the school.

MASSING-

The design takes great care to sensitively mitigate the buildings overall size. The building takes the shape of two interlocking "Y"s. In doing so it masks its overall length reducing the perceived size of the building, responds to the triangular geometry of the site and reinforces the curve of Clay Pit Pond. The building further masks its size by stepping down to a three-story expression over its east-west axis. Major entries as well as the building's interior-exterior connection to the Clap Pit Pond are emphasized by large voids in the dynamic, plastic form the building.

MATERIALITY-

The town of Belmont has a consistency to both its main street as well as its civic buildings, all are a blend of red brick. The unique history of the site itself as a manufacturing location of red bricks gives further meaning to the choice of the building's primary material. The Clay Pit Pond, a defining site feature, gets its name from the excavation that gave it its form. Many of the town's civic buildings are articulated with a darker terra cotta paneling as an accent. The design team has been developing a contemporary but highly contextual material palette that is grounded with the same red brick that gives the town its consistency. Areas of focus at the ends of the building's wings, its base and its windows will be articulated with a durable pre-cast concrete rainscreen in

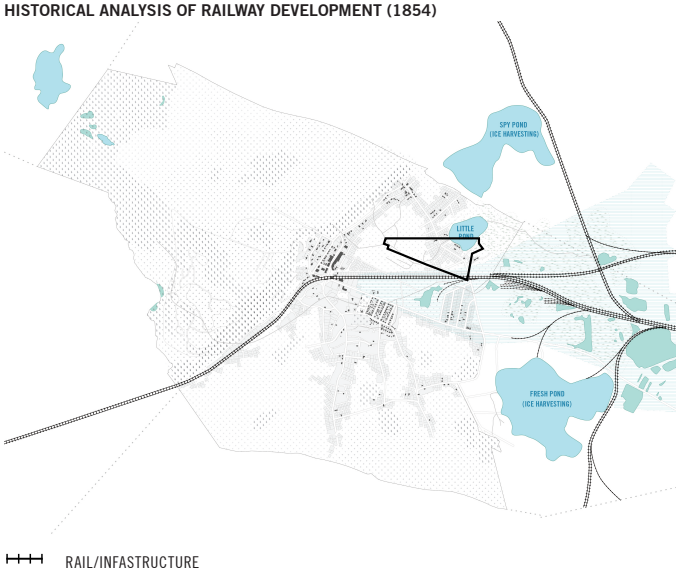
GREEN SPACE

a deeper, sympathetic tone that is similar to that of traditional terracotta.

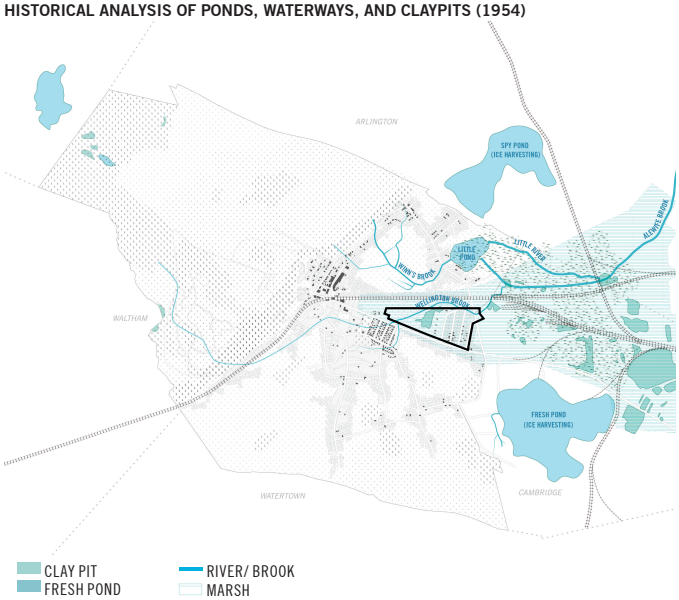
FENESTRATION-

The design is further articulated by the typical classroom fenestration. The grouping of windows allow daylight to be thoughtfully brought into the learning environment while "bay" like projections relate to the residential scale of neighboring buildings. All these attributes in concert create a language that look to the town's future and are reflective of the building's time yet respectfully relate to the town's rich history.

HISTORICAL ANALYSIS OF RAILWAY DEVELOPMENT (1854)

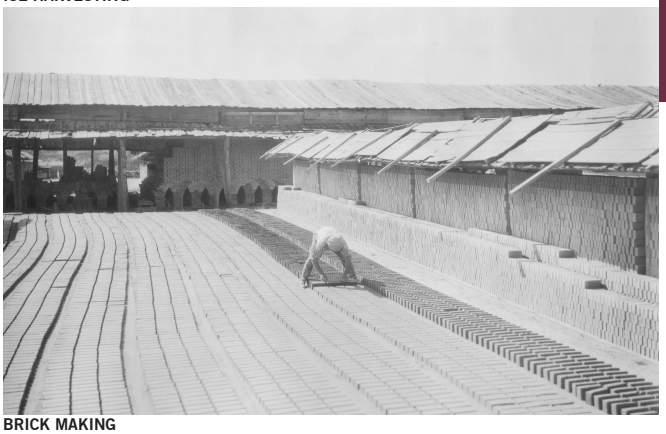


HISTORICAL ANALYSIS OF PONDS, WATERWAYS, AND CLAYPITS (1954)



CLAY PIT

ICE HARVESTING



BRICK MAKING

MATERIALITY INSPIRATION FROM LOCAL ARCHITECTURE

4.1.2 SCHEMATIC DESIGN BINDER