City of Somerville

Building Renovation & Department Relocation Master Plan

BROWN SCHOOL - FINAL REPORT VOL. II APPENDICES

MARCH 25, 2022

BEYER
BLINDER
BELLE

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CITY OF SOMERVILLE LEADERSHIP

Katjana Ballantyne*, Mayor*

CITY OF SOMERVILLE BUILDING RENOVATION & DEPARTMENT RELOCATION MASTER PLAN INTERNAL TECHNICAL TEAM

Cortni K. Desir, *Director, SomerStat*
Ralph Henry, *Deputy Director, Capital Projects & Planning*
Erik Larson, *Energy Manager, Office of Sustainability & Environment*
Fred Massaro, Jr., *Director, Capital Projects & Planning (to January 2022)*
Debora Mitrano, *Project Assistant, Capital Projects & Planning*
Rich Raiche, *Director, Infrastructure & Asset Management*
Melissa Woods, *Senior Project Manager (to January 2022); Director, Capital Projects & Planning (from January 2022)*

OWNER'S PROJECT MANAGER

PMA Consultants, LLC

DESIGN TEAM

Beyer Blinder Belle Architects & Planners, *Planning, Architecture, and Historic Preservation*

Studio ENÉE, *Collaborating Architect, Programming & Planning Support*
Silman Engineers, *Structural*
Wiss, Janney, Elstner Associates, *Building Envelope Science*
Nitsch Engineering, *Civil*
BR+A Consulting Engineers, *Mechanical, Electrical, Plumbing, Fire Protection & Fire Alarm*
Haley & Aldrich, *Geotechnical & Hazardous Materials*
Atelier Ten, *Environmental Design & LEED Consulting*
Energysmiths, *Net-Zero Energy Strategy Consulting*
Jensen Hughes Associates, *Code*
Dharam, *Cost Estimating*

CONTENTS

DHARAM
CONSULTING

SOMERVILLE MP - BROWN RENO & EXPANSION

BROWN SCHOOL

October 28, 2021

ONE BEACON STREET
FLOOR 15
BOSTON, 02108

CONSTRUCTION COST
& RISK CONSULTANTS

EXECUTIVE SUMMARY

SOMERVILLE MP - BROWN RENO & EXPANSION

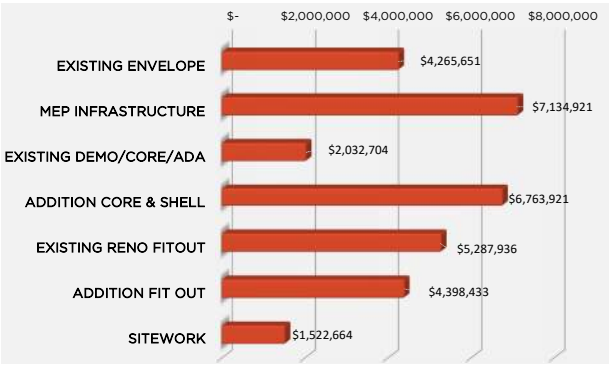
BUDGET MODEL - EDGERLY BUILDING RENOVATION

28-Oct-21

THE FOLLOWING IS THE MASTER PLAN COST MODEL FOR THE CITY OF SOMERVILLE BROWN ELEMENTARY SCHOOL BUILDING RENOVATION AND EXPANSION. THE MODEL SHOWS ALL APPLICABLE RENOVATION AND NEW CONSTRUCTION :MEP INFRASTRUCTURE REPLACEMENT, CORE RENOVATION, AND NEW BUILD WORK . THIS MODEL PREDICTS ALLOWANCES FOR FITOUT TO BUILDINGS BASED ON APPROXIMATE PROGRAM ANTICIPATED AND IS SUBJECT TO THE FINAL MASTERPLAN. ESCALATION IS PRESENTLY EXCLUDED FROM THIS COST MODEL.

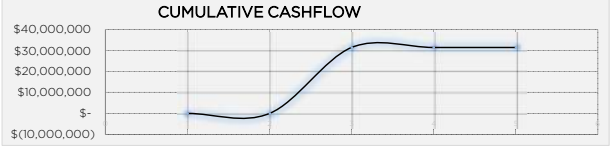
CONSTRUCTION COSTS $ (NOT ESCALATED)

COST ELEMENT	GSF	$/SF	CONST $ (NOT ESCALATED)	PROJECT $ (NOT ESCALATED)
EXISTING ENVELOPE	31,455	$ 136	$ 4,265,651	$ 4,265,651
MEP INFRASTRUCTURE	48,130	$ 148	$ 7,134,921	$ 7,134,921
EXISTING DEMO/CORE/ADA	31,455	$ 65	$ 2,032,704	$ 2,032,704
ADDITION CORE & SHELL	16,675	$ 406	$ 6,763,921	$ 6,763,921
EXISTING RENO FITOUT	31,455	$ 168	$ 5,287,936	$ 5,287,936
ADDITION FIT OUT	16,675	$ 264	$ 4,398,433	$ 4,398,433
SITEWORK	14,496	$ 105	$ 1,522,664	$ 1,522,664
TOTAL CONSTRUCTION COSTS	48,130	$653	$ 31,406,230	$ 31,406,230
SOFT COSTS		0%	$ -	EXCLUDED
OTHER FFE CLIENT COSTS			$ -	EXCLUDED
OWNERS CONTINGENCY		0%	$ -	EXCLUDED
TOTAL CAPITAL EXPENDITURE			$ 31,406,230	$ 31,406,230



BUILDINGS CASHFLOW FORECAST

SPEND TOTALS	ANNUAL	CUMULATIVE
2023	$ -	$ -
2024	$ -	$ -
2025	$ 31,406,230	$ 31,406,230
2026	$ -	$ 31,406,230
2027+	$ -	$ 31,406,230



ALTS & BREAKOUTS

	$	$/SF
ALTERNATES (CONSTRUCTION COST VALUES)		
ENV #1 - FULL REPOINTING	$244,825	$5.09
STRUCT ALT #1: DEDUCT ALT RESUPPORT NE WALL	($207,310)	($4.31)
PLUM ALT #1: DEDUCT RAINWATER REUSE FOR FLUSHING	($99,499)	($2.07)

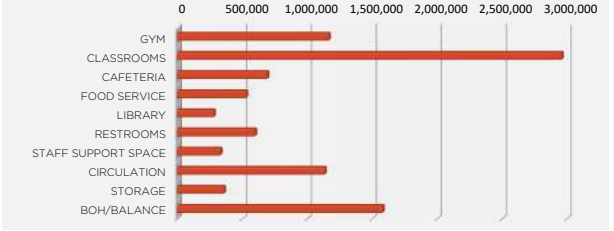
CONTINGENCY & ESCALATION SUMMARY

Design contingency	11.0%
Construction contingency	4.5%
Owners contingency	0.0%
Productivity loss factor	0.0%
GL Insurance & Subguard	2.6%
Bond	1.5%
Escalation carried to Midpoint	EXCLUDED
Project labor assumptions	Union

FITOUT USE TYPE BY COST TOTAL $

	% MIX	CONST $
GYM	12%	1,171,149
CLASSROOMS	38%	2,964,974
CAFETERIA	9%	698,306
FOOD SERVICE	6%	534,675
LIBRARY	4%	286,359
RESTROOMS	8%	603,547
STAFF SUPPORT SPACE	4%	337,430
CIRCULATION	15%	1,140,549
STORAGE	5%	363,530
BOH/BALANCE	20%	1,585,849

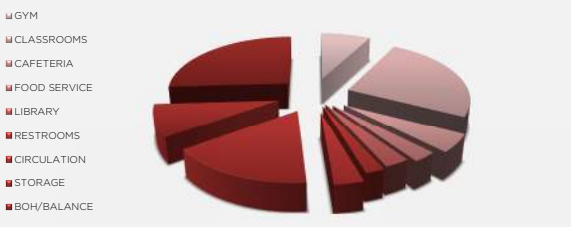
COST BY FITOUT USE TYPE BY SQUARE FOOT



FITOUT USE TYPE BY SQUARE FOOT

	% MIX OF TYPE	AREAS SF
GYM	8%	3,738
CLASSROOMS	25%	11,980
CAFETERIA	5%	2,391
FOOD SERVICE	3%	1,340
LIBRARY	3%	1,365
RESTROOMS	2%	1,042
STAFF SUPPORT SPACE	3%	1,598
CIRCULATION	16%	7,877
STORAGE	9%	4,303
BOH/BALANCE	26%	12,496

FITOUT USE TYPE BY SQUARE FOOT



BUILDING FIT-OUT COST $

	% MIX	CONST $
EXISTING RENO FITOUT	55%	$ 5,287,936
ADDITION FIT OUT	45%	$ 4,398,433

COST SPLIT BY RENO VS ADDITION

EXCLUSIONS & ASSUMPTIONS

1 Escalation has been EXCLUDED from this model as project schedule is not yet known. Monitoring the ongoing escalation outlook we have updated our projections as of Q3 2021 based on recent submissions, near-term pipeline volume in the region and ongoing supply chain issues.

The following multipliers reflect our best projections for escalation moving forward, Due to the continued volatility in the market, these should be reviewed on a regular basis before finalizing project schedules, budgets, and scopes. Beyond 2024 we recommend carrying the typical 10-year rolling average of 4.5% for the purpose of this study.

YR	Projected Escalation % Per Annum	Compounded	Compounded Escalation Multiplier
2021	8.0%	1.3%	1.013 (to end of 2021)
2022	5.0%	6%	1.06
2023	4.0%	11%	1.11
2024	4.5%	16%	1.16
2025	4.5%	21%	1.21
2026	4.5%	26%	1.26
2027	4.5%	32%	1.32
2028	4.5%	38%	1.38
2029	4.5%	44%	1.44

2 We have excluded any cost for phasing of the project.
3 We have included 12% design contingency on trade costs
4 We have included 4.5% construction contingency on trade costs + design contingency
5 We have included 2.6% for GL & Subguard Insurance on cost of work (trade + contingencies + general conditions)
6 We have included 1.5% for a bond on cost of work (trade + contingencies + general conditions)
7 We have included a 3% CM Fee
8 We have excluded permit costs, assumed covered by City
9 General project requirements are carried at 5% of trade costs
10 General conditions are costed per project schedule construction durations provided by PMA. See GC staffing sheet at back of the report
11 Soft costs, FFE & owner's contingency have been excluded
12 All work is priced on regular hours, OT allowances are excluded presently

BASIS OF ESTIMATE

1 03_2875 CoS BMP - PSR Cost Estimating Narrative
2 Brown_A-1 to A-5 Proposed w Addition Massing_20211019
3 Brown_EX-1 to EX-3 Existing Plans_20210609
4 Brown_EX-4 Existing Elevations with Estimating Markups_20211018
5 Brown_Nitsch Proposed Site & Utilities Concept Sketch_20211015
6 Brown_Proposed Site Plan PSR Cost Estimating_20211014 by BBB

Systems Assumptions

General
Please see estimate backup for additional assumptions, qualifications & exclusions

Foundations/Basement Construction
Cost are included to rebuild wall footings at the north side of the building were indicated.
Costs are included for replacement of the foundation slab where shaded on drawing A-1.
Costs to replace the foundation slab at Room B08 are presently excluded.

Superstructure
Rebuilding/re-support of existing structure to remain is included where noted on the plans.
An allowance of $3/SF has been included for structural repairs to the existing building

Exterior Enclosure
Estimate assumes full scaffolding of the existing building in order to complete façade restoration scope
Full window replacement is included, including reinstating infilled openings as indicated in the narratives
Full rebuild of the existing NE wall is included per the drawings and narratives.

The envelope of the addition is assumed to be a curtain wall type glazing system and flat seam metal panels with windows per the narrative and blocking diagrams.

Roofing
Synthetic slate shingles are priced for the existing roof. Low sloped EPDM on insulation is priced for the addition
Costs are included for to replace the existing roofing system, including extensive green roof as called for by the narrative. PV infrastructure is included w/ electrical infrastructure. PV panels and monting to be by owner.
Replacement of skylights is EXCLUDED - not noted on drawings or in narrative.

Interior Construction/Finishes
An allowance of $10/SF for the existing building and $13/SF for the addition has been carried for C&S interior construction requirements, including constructing new shafts, rebuilding masonry walls, etc.
Code required upgrade to add fire rated GWB at all ceilings of the existing building is included within the Core and Shell and ADA upgrade section at $9.5/SF
Fitout costs are modeled based on assumed finishes provided in the narrative.

Stairways/Conveying
Costs for upgrades to existing stairs are included.
Costs associated with the new circulation connecting stair and the BOH stairs in the addition are included.
A new elevator with front and back stops at each floor is included.
A two-stop dumb-waiter is included for food service areas.

Services
Estimate assumes full replacement of all MEP systems with one system to serve both the existing building and addition.
Equipment sizing and pumps are taken from the MEP narrative.
Fitout MEPFP costs are modeled

Furnishings/Equipment
The furnishing and equipment costs carried in this model represent a full gut renovation of interior spaces.
Fixed furnishes included only. Workstations are excluded and assumed part of FFE, power/data to locations is included as required

Demolition & Abatement
Hazmat abatement is included per the Axiom report.
Hazmat abatement beyond the report is EXCLUDED and outside the scope of the project. Reports includes a contingecy and monitoring fee

Site Improvements
Contaminated soil disposal is EXCLUDED

Site Mechanical Utilities
On site storm water mitigation is included per Nitsch narrative and suggested sizing.
Costs assume connection to extg sanitary sewer utilities
Allowances of 100LF have been included for incoming service connections.

Site Electrical Utilities
We have included a 30k allowance for site lighting.
Utilities are carried in the site estimate.

DIVISION SUMMARY	48,130 GFA		28-Oct-21
		$/SF	$ TOTAL
Project Requirements		23.45	1,128,498
PROJECT REQUIREMENTS		23.45	1,128,498
A10. Foundations		27.42	1,319,910
A20. Basement Construction			9,702
A. SUBSTRUCTURE		27.63	1,329,612
B10. Superstructure		20.75	998,565
B20. Exterior Enclosure		83.35	4,011,465
B30. Roofing		18.89	909,193
B. SHELL		122.98	5,919,223
C10. Interior Construction		32.05	1,542,608
C30. Interior Finishes		34.22	1,647,230
C. INTERIORS		66.28	3,189,838
C20. Stairways		3.46	166,390
D10. Conveying Systems		4.99	240,000
VERTICAL TRANSPORTATION		8.44	406,390
D20. Plumbing Systems		26.52	1,276,282
D30. Heating, Ventilating & Air Conditioning		96.44	4,641,590
D40. Fire Protection Systems		7.79	374,954
D50. Electric Lighting, Power & Communications		62.99	3,031,865
D. SERVICES		193.74	9,324,691
E10. Equipment		3.34	160,837
E20. Furnishings		7.09	341,460
E. EQUIPMENT AND FURNISHINGS		10.44	502,297
F10. Special Construction (Sustainability allowance)		3.64	175,000
F20. Selective Demolition		12.84	618,004
F. SPECIAL CONSTRUCTION AND DEMOLITION		16.48	793,004
TOTAL BUILDING CONSTRUCTION		469.43	22,593,553
G10. Site Preparation		1.57	75,681
G20. Site Improvements		17.44	839,226
G30. Site Civil/Mechanical Utilities		3.80	182,900
G40. Site Electrical Utilities		0.62	30,000
G90. Other Site Construction		0.00	0
TOTAL SITE CONSTRUCTION		23.43	1,127,808
TOTAL TRADE COSTS		492.86	23,721,360
a. Design Contingency	11.0%	54.21	2,609,350
b. Phasing Allowance	0.0%	0.00	0
c. Construction Contingency	4.5%	24.62	1,184,882
d. General Conditions	6.45%	36.88	1,774,980
SUBTOTAL		608.57	29,290,572
e. Permits	0.0%	0.00	0
f. Insurances	2.6%	15.82	761,555
g. Bond	1.5%	9.13	439,359
h. Fee	3.0%	19.01	914,745
TOTAL COST TODAY		652.53	31,406,230
i. Escalation	EXCLUDED	0.00	0
TOTAL ANTICIPATED CONSTRUCTION COST		$653	31,406,230

ESTIMATE SUMMARY
BROWN SCHOOL

SOMERVILLE MP - BROWN RENO & EXPANSION
28-Oct-21

SUMMARY BY PROGRAM

DHARAM CONSULTING

		48,130 GFA						48,130		31,455		31,455		16,675		14,496	
								MEP INFRA		RENOVATION C&S				ADDITION C&S		SITE	
								MEP INFRASTRUCTURE		EXISTING ENVELOPE		EXISTING DEMO/CORE/ADA		ADDITION CORE & SHELL		SITEWORK	
TRADE		CORE & SHELL	/ SF	COMBINED FIT-OUT PROJECTS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF
DEMOLITION/ENABLING		$ 430,668	$ 8.95	$ 187,336	$ 3.89	$ 618,004	$ 12.84	$ 94,365	$ 1.96	$ -	$ -	$ 313,407	$ 9.96	$ -	$ -	$ 22,896	$ 1.58
FOUNDATIONS		$ 1,319,910	$ 27.42	$ -	$ -	$ 1,319,910	$ 27.42	$ -	$ -	$ -	$ -	$ 111,259	$ 3.54	$ 1,208,652	$ 72.48	$ -	$ -
BASEMENT CONSTRUCTION		$ 9,702	$ 0.20	$ -	$ -	$ 9,702	$ 0.20	$ -	$ -	$ -	$ -	$ 9,702	$ 0.31	$ -	$ -	$ -	$ -
		$ -				$ -	$ -										
SUPERSTRUCTURE		$ 998,565	$ 20.75	$ -	$ -	$ 998,565	$ 20.75	$ -	$ -	$ -	$ -	$ 272,550	$ 8.66	$ 726,015	$ 43.54	$ -	$ -
EXTERIOR ENCLOSURE		$ 4,011,465	$ 83.35	$ -	$ -	$ 4,011,465	$ 83.35	$ -	$ -	$ 2,398,311	$ 76.25	$ -	$ -	$ 1,613,154	$ 96.74	$ -	$ -
ROOFING		$ 909,193	$ 18.89	$ -	$ -	$ 909,193	$ 18.89	$ -	$ -	$ 669,118	$ 21.27	$ -	$ -	$ 240,075	$ 14.40	$ -	$ -
		$ -				$ -	$ -										
INTERIOR CONSTRUCTION		$ 830,148	$ 17.25	$ 712,460	$ 14.80	$ 1,542,608	$ 32.05	$ -	$ -	$ -	$ -	$ 613,373	$ 19.50	$ 216,775	$ 13.00	$ -	$ -
INTERIOR FINISHES		$ 83,375	$ 1.73	$ 1,563,855	$ 32.49	$ 1,647,230	$ 34.22	$ -	$ -	$ -	$ -	$ -	$ -	$ 83,375	$ 5.00	$ -	$ -
		$ -				$ -	$ -										
STAIRWAYS		$ 166,390	$ 3.46	$ -	$ -	$ 166,390	$ 3.46	$ -	$ -	$ 14,890	$ 0.47	$ 51,000	$ 1.62	$ 100,500	$ 6.03	$ -	$ -
CONVEYING SYSTEMS		$ 240,000	$ 4.99	$ -	$ -	$ 240,000	$ 4.99	$ -	$ -	$ -	$ -	$ -	$ -	$ 240,000	$ 14.39	$ -	$ -
		$ -				$ -	$ -										
PLUMBING		$ 590,975	$ 12.28	$ 685,307	$ 14.24	$ 1,276,282	$ 26.52	$ 575,975	$ 11.97	$ -	$ -	$ -	$ -	$ 15,000	$ 0.90	$ -	$ -
HVAC		$ 2,841,915	$ 59.05	$ 1,799,675	$ 37.39	$ 4,641,590	$ 96.44	$ 2,841,915	$ 59.05	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FIRE PROTECTION		$ 192,520	$ 4.00	$ 182,434	$ 3.79	$ 374,954	$ 7.79	$ 192,520	$ 4.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
ELECTRICAL		$ 1,528,651	$ 31.76	$ 1,503,214	$ 31.23	$ 3,031,865	$ 62.99	$ 1,528,651	$ 31.76	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		$ -				$ -	$ -										
EQUIPMENT		$ -	$ -	$ 160,837	$ 3.34	$ 160,837	$ 3.34	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FURNISHINGS		$ 72,195	$ 1.50	$ 269,265	$ 5.59	$ 341,460	$ 7.09	$ -	$ -	$ -	$ -	$ 47,183	$ 1.50	$ 25,013	$ 1.50	$ -	$ -
		$ -				$ -	$ -										
SUSTAINABILITY ALLOWANCE		$ 175,000	$ 3.64	$ -	$ -	$ 175,000	$ 3.64	$ -	$ -	$ -	$ -	$ -	$ -	$ 175,000	$ 10.49	$ -	$ -
SELECTIVE DEMOLITION		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		$ -				$ -	$ -										
		$ -				$ -	$ -										
SITE PREP		$ 75,681	$ 1.57	$ -	$ -	$ 75,681	$ 1.57	$ -	$ -	$ -	$ -	$ -	$ -	$ 75,681	$ 4.54	$ -	$ -
SITE IMPROVEMENTS		$ 839,226	$ 17.44	$ -	$ -	$ 839,226	$ 17.44	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 839,226	$ 57.89
SITE CIVIL / MECHANICAL		$ 182,900	$ 3.80	$ -	$ -	$ 182,900	$ 3.80	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 182,900	$ 12.62
SITE ELECTRICAL		$ 30,000	$ 0.62	$ -	$ -	$ 30,000	$ 0.62	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 2.07
OTHER SITE		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL DIRECT COSTS		$ 15,528,479	$ 322.64	$ 7,064,383	$ 146.78	$ 22,592,862	$ 469.41	$ 5,233,426	$ 108.74	$ 3,082,319	$ 97.99	$ 1,418,473	$ 45.10	$ 4,719,239	$ 283.01	$ 1,075,022	$ 74.16
Design Contingency	11.00%	$ 1,793,413	$ 37.26	$ 815,936	$ 16.95	$ 2,609,350	$ 54.21	$ 604,461	$ 12.56	$ 356,008	$ 11.32	$ 163,834	$ 5.21	$ 545,072	$ 32.69	$ 124,039	$ 8.56
Phasing Allowance	0.00%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction Contingency	4.50%	$ 814,373	$ 16.92	$ 370,509	$ 7.70	$ 1,184,882	$ 24.62	$ 274,480	$ 5.70	$ 161,660	$ 5.14	$ 74,395	$ 2.37	$ 247,512	$ 14.84	$ 56,325	$ 4
General Conditions	6.45%	$ 1,345,173	$ 27.95	$ 429,807	$ 8.93	$ 1,774,980	$ 36.88	$ 280,244	$ 5.82	$ 224,196	$ 7.13	$ 168,147	$ 5.35	$ 560,489	$ 33.61	$ 112,098	$ 8
Project Requirements	4.99%	$ 775,279	$ 16.11	$ 353,219	$ 7.34	$ 1,128,498	$ 23.45	$ 261,671	$ 5.44	$ 154,116	$ 4.90	$ 70,924	$ 2.25	$ 235,962	$ 14.15	$ 52,606	$ 4
SUBTOTAL		$ 20,256,718	$ 420.88	$ 9,033,854	$ 187.70	$ 29,290,572	$ 608.57	$ 6,654,282	$ 138.26	$ 3,978,298	$ 126.48	$ 1,895,772	$ 60.27	$ 6,308,275	$ 378.31	$ 1,420,090.53	$ 97.96
Permits	0.00%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
GL Insurance & Subguard	2.60%	$ 526,675	$ 10.94	$ 234,880	$ 4.88	$ 761,555	$ 15.82	$ 173,011	$ 3.59	$ 103,436	$ 3.29	$ 49,290	$ 1.57	$ 164,015	$ 9.84	$ 36,922	$ 2.55
Bond	1.50%	$ 303,851	$ 6.31	$ 135,508	$ 2.82	$ 439,359	$ 9.13	$ 99,814	$ 2.07	$ 59,674	$ 1.90	$ 28,437	$ 0.90	$ 94,624	$ 5.67	$ 21,301	$ 1.47
CM Fee	3.00%	$ 632,617	$ 13.14	$ 282,127	$ 5.86	$ 914,745	$ 19.01	$ 207,813	$ 4.32	$ 124,242	$ 3.95	$ 59,205	$ 1.88	$ 197,007	$ 11.81	$ 44,349	$ 3.06
SUBTOTAL		$ 21,719,860	$ 451.27	$ 9,686,370	$ 201.25	$ 31,406,230	$ 652.53	$ 7,134,921	$ 148.24	$ 4,265,651	$ 135.61	$ 2,032,704	$ 64.62	$ 6,763,921	$ 405.63	$ 1,522,664	$105.04
Escalation	0.00%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL		$ 21,719,860	$ 451.27	$ 9,686,370	$ 201.25	$ 31,406,230	$ 652.53	$ 7,134,921	$ 148.24	$ 4,265,651	$ 135.61	$ 2,032,704	$ 64.62	$ 6,763,921	$ 405.63	$ 1,522,664	$105.04

ESTIMATE SUMMARY
BROWN SCHOOL

SOMERVILLE MP - BROWN RENO & EXPANSION
28-Oct-21

SUMMARY BY PROGRAM

DHARAM CONSULTING

	3,738		11,980		2,391		1,340		1,365	
	RENOVATION FIT-OUT MODEL									
	GYM		CLASSROOMS		CAFETERIA		FOOD SERVICE		LIBRARY	
TRADE	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF
DEMOLITION/ENABLING	$ -	$ -	$ 59,900	$ 5.00	$ -	$ -	$ 525	$ 0.39	$ 5,460	$ 4.00
FOUNDATIONS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
BASEMENT CONSTRUCTION	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SUPERSTRUCTURE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
EXTERIOR ENCLOSURE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
ROOFING	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
INTERIOR CONSTRUCTION	$ 74,760	$ 20.00	$ 179,700	$ 15.00	$ 47,820	$ 20.00	$ 32,750	$ 24.44	$ 27,300	$ 20.00
INTERIOR FINISHES	$ 317,730	$ 85.00	$ 419,300	$ 35.00	$ 143,460	$ 60.00	$ 66,250	$ 49.44	$ 47,775	$ 35.00
STAIRWAYS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CONVEYING SYSTEMS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PLUMBING	$ 56,070	$ 15.00	$ 239,600	$ 20.00	$ 35,865	$ 15.00	$ 89,675	$ 66.92	$ -	$ -
HVAC	$ 186,900	$ 50.00	$ 599,000	$ 50.00	$ 119,550	$ 50.00	$ 98,625	$ 73.60	$ 68,250	$ 50.00
FIRE PROTECTION	$ 13,083	$ 3.50	$ 29,950	$ 2.50	$ 7,173	$ 3.00	$ 6,625	$ 4.94	$ 5,460	$ 4.00
ELECTRICAL	$ 149,520	$ 40.00	$ 539,100	$ 45.00	$ 107,595	$ 45.00	$ 52,850	$ 39.44	$ 47,775	$ 35.00
EQUIPMENT	$ 37,380	$ 10.00	$ -	$ -	$ 23,910	$ 10.00	$ 32,000	$ 23.88	$ -	$ -
FURNISHINGS	$ 18,690	$ 5.00	$ 95,840	$ 8.00	$ 23,910	$ 10.00	$ 10,645	$ 7.94	$ 6,825	$ 5.00
SUSTAINABILITY ALLOWANCE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SELECTIVE DEMOLITION	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE PREP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE IMPROVEMENTS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE CIVIL / MECHANICAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE ELECTRICAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
OTHER SITE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL DIRECT COSTS	**$ 854,133**	**$ 228.50**	**$ 2,162,390**	**$ 180.50**	**$ 509,283**	**$ 213.00**	**$ 389,945**	**$ 291.00**	**$ 208,845**	**$ 153.00**
Design Contingency	$ 98,652	$ 26.39	$ 249,756	$ 20.85	$ 58,822	$ 24.60	$ 45,039	$ 33.61	$ 24,122	$ 17.67
Phasing Allowance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction Contingency	$ 44,797	$ 11.98	$ 113,412	$ 9.47	$ 26,711	$ 11.17	$ 20,452	$ 15.26	$ 10,953	$ 8.02
General Conditions	$ 52,098	$ 13.94	$ 104,196	$ 8.70	$ 39,073	$ 16.34	$ 39,073	$ 29.16	$ 26,049	$ 19.08
Project Requirements	$ 42,707	$ 11.43	$ 108,120	$ 9.03	$ 25,464	$ 10.65	$ 19,497	$ 14.55	$ 10,442	$ 7.65
SUBTOTAL	**$ 1,092,387**	**$ 292.24**	**$ 2,737,873**	**$ 228.54**	**$ 659,353**	**$ 275.76**	**$ 514,006**	**$ 383.59**	**$ 280,411**	**$ 205.43**
Permits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
GL Insurance & Subguard	$ 28,402	$ 7.60	$ 71,185	$ 5.94	$ 17,143	$ 7.17	$ 13,364	$ 9.97	$ 7,291	$ 5.34
Bond	$ 16,386	$ 4.38	$ 41,068	$ 3.43	$ 9,890	$ 4.14	$ 7,710	$ 5.75	$ 4,206	$ 3.08
CM Fee	$ 34,115	$ 9.13	$ 85,504	$ 7.14	$ 20,592	$ 8.61	$ 16,052	$ 11.98	$ 8,757	$ 6.42
SUBTOTAL	**$ 1,171,290**	**$ 313.35**	**$ 2,935,630**	**$ 245.04**	**$ 706,978**	**$ 295.68**	**$ 551,133**	**$ 411.29**	**$ 300,665**	**$ 220.27**
Escalation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL	**$ 1,171,290**	**$ 313.35**	**$ 2,935,630**	**$ 245.04**	**$ 706,978**	**$ 295.68**	**$ 551,133**	**$ 411.29**	**$ 300,665**	**$ 220.27**

ESTIMATE SUMMARY
BROWN SCHOOL

SOMERVILLE MP - BROWN RENO & EXPANSION
28-Oct-21

SUMMARY BY PROGRAM

DHARAM CONSULTING

	1,042		1,598		7,877		4,303		12,496	
	RENOVATION FIT-OUT MODEL									
	RESTROOMS		STAFF SUPPORT SPACE		CIRCULATION		STORAGE		BOH/BALANCE	
TRADE	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF	TOTALS	/ SF
DEMOLITION/ENABLING	$ 1,491	$ 1.43	$ 6,392	$ 4.00	$ 37,324	$ 4.74	$ 28,546	$ 6.63	$ 47,698	$ 3.82
FOUNDATIONS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
BASEMENT CONSTRUCTION	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SUPERSTRUCTURE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
EXTERIOR ENCLOSURE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
ROOFING	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
INTERIOR CONSTRUCTION	$ 57,080	$ 54.78	$ 23,970	$ 15.00	$ 125,790	$ 15.97	$ 23,990	$ 5.58	$ 119,300	$ 9.55
INTERIOR FINISHES	$ 122,680	$ 117.74	$ 55,930	$ 35.00	$ 167,478	$ 21.26	$ 26,690	$ 6.20	$ 196,562	$ 15.73
STAIRWAYS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CONVEYING SYSTEMS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PLUMBING	$ 123,745	$ 118.76	$ 23,970	$ 15.00	$ 54,171	$ 6.88	$ 13,359	$ 3.10	$ 48,852	$ 3.91
HVAC	$ 51,035	$ 48.98	$ 55,930	$ 35.00	$ 196,925	$ 25.00	$ 88,310	$ 20.52	$ 335,150	$ 26.82
FIRE PROTECTION	$ 4,997	$ 4.80	$ 7,990	$ 5.00	$ 34,053	$ 4.32	$ 17,437	$ 4.05	$ 55,666	$ 4.45
ELECTRICAL	$ 35,405	$ 33.98	$ 39,950	$ 25.00	$ 156,330	$ 19.85	$ 66,795	$ 15.52	$ 307,894	$ 24.64
EQUIPMENT	$ 3,126	$ 3.00	$ 7,990	$ 5.00	$ 39,385	$ 5.00	$ -	$ -	$ 17,046	$ 1.36
FURNISHINGS	$ 40,615	$ 38.98	$ 23,970	$ 15.00	$ 20,360	$ 2.58	$ -	$ -	$ 28,410	$ 2.27
SUSTAINABILITY ALLOWANCE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SELECTIVE DEMOLITION	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE PREP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE IMPROVEMENTS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE CIVIL / MECHANICAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SITE ELECTRICAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
OTHER SITE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL DIRECT COSTS	**$ 440,174**	**$ 422.43**	**$ 246,092**	**$ 154.00**	**$ 831,816**	**$ 105.60**	**$ 265,127**	**$ 61.61**	**$ 1,156,578**	**$ 92.56**
Design Contingency	$ 50,840	$ 48.79	$ 28,424	$ 17.79	$ 96,075	$ 12.20	$ 30,622	$ 7.12	$ 133,585	$ 10.69
Phasing Allowance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction Contingency	$ 23,086	$ 22.16	$ 12,907	$ 8.08	$ 43,627	$ 5.54	$ 13,905	$ 3.23	$ 60,660	$ 4.85
General Conditions	$ 52,098	$ 50.00	$ 26,049	$ 16.30	$ 39,073	$ 4.96	$ 13,024	$ 3.03	$ 39,073	$ 3.13
Project Requirements	$ 22,009	$ 21.12	$ 12,305	$ 7.70	$ 41,591	$ 5.28	$ 13,256	$ 3.08	$ 57,829	$ 4.63
SUBTOTAL	**$ 588,207**	**$ 564.50**	**$ 325,776**	**$ 203.86**	**$ 1,052,182**	**$ 133.58**	**$ 335,935**	**$ 78.07**	**$ 1,447,725**	**$ 115.86**
Permits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
GL Insurance & Subguard	$ 15,293	$ 14.68	$ 8,470	$ 5.30	$ 27,357	$ 3.47	$ 8,734	$ 2.03	$ 37,641	$ 3.01
Bond	$ 8,823	$ 8.47	$ 4,887	$ 3.06	$ 15,783	$ 2.00	$ 5,039	$ 1.17	$ 21,716	$ 1.74
CM Fee	$ 18,370	$ 17.63	$ 10,174	$ 6.37	$ 32,860	$ 4.17	$ 10,491	$ 2.44	$ 45,212	$ 3.62
SUBTOTAL	**$ 630,693**	**$ 605.27**	**$ 349,307**	**$ 218.59**	**$ 1,128,181**	**$ 143.22**	**$ 360,200**	**$ 83.71**	**$ 1,552,294**	**$ 124.22**
Escalation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL	**$ 630,693**	**$ 605.27**	**$ 349,307**	**$ 218.59**	**$ 1,128,181**	**$ 143.22**	**$ 360,200**	**$ 83.71**	**$ 1,552,294**	**$ 124.22**

TRADE	QTY	UNIT	RATE	TOTAL
DEMOLITION/ENABLING	48,130			94,365
Demolition of extg MEP systems	31,455	SF	3.00	94,365
PLUMBING	48,130			575,975
Plumbing infrastructure	48,130	SF	7.50	360,975
Greywater system				Excluded
Rainwater storage & reuse - allow				-
Rainwater treatment skid	1	LS	100,000.00	100,000
Exterior storage tank - 5000Gal, day storage	1	LS	15,000.00	15,000
Makeup water connection w/ backflow preventer	1	LS	10,000.00	10,000
Rainwater reuse for flushing - risers, piping distribution, pumps etc.	1	LS	65,000.00	65,000
Misc. harvesting scope required	1	LS	25,000.00	25,000
HVAC	48,130			2,841,915
HVAC Infrastructure			Option 1 Included as Base	
Heating/cooling equipment				-
ASHP - 30 TON, 2 pipe consisting of 7 nominal modules	7	EA	80,000.00	560,000
HX plate and frame - 300 gmp each	2	EA	45,000.00	90,000
Pumps				
- 5 hp GWP - vertical inline close coupled ECM	2	EA	10,000.00	20,000
- 5 hp HWP - vertical inline close coupled ECM	2	EA	10,000.00	20,000
- 5 hp CHWP - vertical inline close coupled ECM	2	EA	10,000.00	20,000
600 gal buffer tank	1	EA	6,000.00	6,000
Heat recovery chiller modules - 30 Ton modules (2). Multiskack DHRC BOD.	60	TON	2,500.00	150,000
Pumps				
- 2 hp HWP - vertical inline close coupled ECM	2	EA	5,000.00	10,000
- 2 hp CHWP - vertical inline close coupled ECM	2	EA	5,000.00	10,000
400 gal buffer tank	1	EA	4,500.00	4,500
Expansion, air separation , shot feed, pressurization, filtration (assumed)	1	EA	25,000.00	25,000
Heat Recovery Systems				-
New glycol system/ feed	1	LS	20,000.00	20,000
Air Distribution				-
AHU - 12,500 CFM, 100% OA, dual core heat recovery, MERV filters, supply and exhaust ECM fan arrays, CHW cooling coil, located on room of new addition	12,500	CFM	17.00	212,500
Exhaust				-
Kitchen Exhaust Fan (3) 500 CFM fans	3	EA	2,000.00	6,000
General exhaust - allow	1	LS	5,000.00	5,000
Smoke extract			Excluded, assume not required	
Energy Performance				-
Variable Frequency Drives				-
AHUs - ECM fans				VFDs Not Req.
Pumps - 5 hp	6	EA	3,500.00	21,000
Pumps - 2 hp	4	EA	2,000.00	8,000
VFD's for exhaust fans, allow	4	EA	1,500.00	6,000
Energy Metering Allowance	1	LS	30,000.00	30,000
Terminal Units				w/ Fitout
Pipe, Valves & Connections				-

TRADE	QTY	UNIT	RATE	TOTAL
Steam Piping			Excluded, assume not required	
Heating/Cooling piping				-
- CHW/HW mains & risers, runouts to equipment	1,278	LF	80.00	102,203
- Piping on floor loops	7,722	LF	40.00	308,895
Control valves on main equipment	10	EA	3,500.00	35,000
Sheetmetal & Accessories				-
Primary ductwork galvanized sheetmetal tying	11,250	LBS	15.50	174,375
General bathroom & exhaust ductwork	2,083	LBS	15.50	32,292
Accessories				-
Fire dampers for main supply extract risers	4	EA	2,250.00	9,000
Volume dampers, control dampers & access Panels	1	LS	32,350.00	32,350
Exhaust intake actuators for smoke				Excluded
Ductwork for smoke/atrium exhaust systems				Excluded
Insulation				-
Piping insulation	9,000	LF	10.00	89,999
Ductwork insulation	8,654	SF	5.00	43,269
Fuel Systems			Excluded, assume not required	
Data room cooling	1	LS	15,000.00	15,000
Building Management System				-
Head end allowance	1	LS	35,000.00	35,000
ASHP	100	PTS	1,200.00	120,000
Chiller	25	PTS	1,200.00	30,000
Pumps	40	PTS	1,200.00	48,000
AHUs - assume 40pts ea average	40	PTS	1,200.00	48,000
Fans	4	PTS	1,200.00	4,800
Misc.	20	PTS	1,200.00	24,000
Testing, balancing & commissioning support	1	LS	95,047.33	95,047
Co-ordination, rigging, CAD, Sub-trade temp	1	LS	370,684.57	370,685
FIRE PROTECTION	48,130			192,520
Fire protection infrastructure	48,130	SF	4.00	192,520
ELECTRICAL	48,130			1,528,651
Normal Service Distribution				-
1000KVA pad mounted xfmr	1	LS	110,000.00	110,000
1600A swbd, CT cab	1	LS	56,000.00	56,000
45kva step down xfmr	2	EA	5,000.00	10,000
150A power panel - 84 ckts	3	EA	7,650.00	22,950
100A site lighting panel - size assumed	1	EA	3,000.00	3,000
100A lighting panels - 1 per floor	4	EA	3,000.00	12,000
Mechanical panel - 400A	1	EA	8,000.00	8,000
Mechanical panel - 150A	1	EA	4,500.00	4,500
ATS Switches				-
ATS-LS, OP	2	EA	25,000.00	50,000
Energy Metering				-
Energy meters	15	EA	3,500.00	52,500
Normal Feeders	48,130	SF	3.00	144,390
Emergency Power Distribution				See Add Alt #4
Battery packs for EM lighting - allowance	1	LS	20,000.00	20,000
Mechanical / Equipment Power	48,130	SF	2.50	120,325
Lighting, inclusive of conduit, fitting and wiring				w/ fitout
Lighting controls				w/ fitout
Receptacle power				w/ fitout
Fire Alarm				-
Fire Alarm - complete system	48,130	SF	7.00	336,910

TRADE	QTY	UNIT	RATE	TOTAL
Temp fire alarm	48,130	SF	1.50	72,195
BDA			Excluded, assume not required	
Tel/Data, inclusive of rough-in and Cat 6 (allow for shell and core)	48,130	SF	3.00	144,390
Audio visual				w/ fitout
Security systems allowance (head-end and backbone)	48,130	SF	1.00	48,130
Lightning protection - assumed at addition only	16,675	SF	0.85	14,174
Rooftop PV (60 kW per narrative) - including mounting system, etc.	60	kW	800.00	48,000
PV infrastructure allowance	1	LS	63,000	63,000
Testing & bonding	1	LS	49,218.55	49,219
Sub-trade temps/ gcs	1	LS	138,968.23	138,968
PROJECT REQUIREMENTS	48,130			261,671
Trade overtime allowance				Excluded
General project requirements	5.0%	TOTAL	5,233,426	261,671
TOTAL DIRECT COSTS				5,495,097
ALLOCATIONS				1,639,824
General Conditions	10.0	28,024	wks	280,244
Permits	0.0 %			-
Insurances	2.6 %			173,011
Design Contingency	11.0 %			604,461
Phasing Allowance	0.0 %			-
Construction Contingency	4.5 %			274,480
Bond	1.5 %			99,814
Fee	3.0 %			207,813
Escalation	Excluded			-
TOTAL CONSTRUCTION COST				7,134,921

TRADE	QTY	UNIT	RATE	TOTAL
EXTERIOR ENCLOSURE	31,455			2,398,311
Scaffolding - assume scaffolding @ entire enclosure	16,000	SF		*For reference only*
Scaffolding	16,000	SF	13.00	208,000
Scrim	16,000	SF	4.50	72,000
Misc. setup/tear down	40	MD	800.00	32,000
Façade Demo				-
Remove mechanical anchors per narrative	150	EA	50.00	7,500
Remove mechanical louvers at mechancial penetrations	2	EA	250.00	500
Remove enclosed ramp in entirety at north side of building	148	SF	75.00	11,100
Remove south entry/weather vestibule at south side	50	SF	75.00	3,750
- masonry infill and windows are demo'd entry			See masonry & window sections	
Rebuild NE face				-
Foundations rebuild				See Core Renovations
Shoring - three levels supported	1	LS	45,000.00	45,000
Demo existing masonry wall in full	1,900	SF	60.00	114,000
Full depth masonry wall - replace	1,900	SF	85.00	161,500
- CMU Back up	1,900	SF		Incl Above
- Brick facing out wyth to match existing	1,900	SF		Incl Above
Reinstall window masonry openings to match existing	12	EA	5,000.00	60,000
Window replacements			Included in window replacement	
Window Replacement				-
Remove extg windows/temp weatherproofing @ openings	97	LOC	650.00	63,050
Masonry repairs	97	LOC	800.00	77,600
Waterproofing	97	LOC	275.00	26,675
Grouting/insulation	97	LOC	180.00	17,460
New windows - thermally broken aluminum, triple pane, Glass up to M.O. arches instead of aluminum infill panels per narrative	2,960	SF	180.00	532,800
New Windows replacing removed doors - 4'x5' assumed, triple pane aluminum	40	SF	180.00	7,200
Re-establish windows in extg infilled masonry window openings				-
Headers existing, no shoring required				Not Req.
Create new openings	4	LOC	2,880.00	11,520
Grouting/insulation	4	LOC	250.00	1,000
New window	80	SF	200.00	16,000
Masonry repairs	4	LOC	1,200.00	4,800
Waterproofing	4	LOC	300.00	1,200
Masonry Cleaning and Paint Stripping				-
100% masonry cleaning - brick	12,920	SF	5.00	64,600
Efflorescence cleaning - allowance per narrative	10	SF	25.00	250
Remove graffiti - 4 locations	50	SF	45.00	2,250
Remove vegetation	40	SF	30.00	1,200
Strip Paint from granite foundation sill to limestone water table - sand blast assumed	4,315	SF	15.00	64,725
Masonry Repoint, Repair, Refinish				-
100% repointing per drawing diagrams	2,400	SF	35.00	84,000
100% Repoint of ashlar masonry on exterior	325	SF	35.00	11,375
100% repoint at all jack arches	38	EA	600.00	22,800

TRADE	QTY	UNIT	RATE	TOTAL
25% repoint assumed for painted brick to be refinished and sealed	1,079	SF	35.00	37,756
25% of remaining brick above water table select repoint - allowance per narrative	2,240	SF	35.00	78,400
100% Repoint of 2 courses below sills on west façade face - per narrative	106	LF	50.00	5,300
Allowance - 20 SF areas at 5 locations full repoint	100	SF	35.00	3,500
Stich bricks - per drawing diagrams	100	LF	100.00	10,000
Crack Repairs - per narrative	50	LF	75.00	3,750
Brick replacement - per narrative	180	EA	45.00	8,100
Allowance - 1 SF patches at 30 loc per narrative	30	LOC	250.00	7,500
Stone trimmings: entry surrounds, water table, window sills, window keystones to receive full micro abrasion cleaning and full repoint at all locations	1	LS	19,200.00	19,200
Anti-graffiti coating at entry surrounds	1	LS	10,000.00	10,000
Anti-graffiti coating at previously painted brick areas	4,315	SF	6.00	25,890
Masonry Misc. Rebuild				-
Rebuild masonry chimney - 50% req. rebuild assumed	400	SF	250.00	100,000
Full repoint on other 50% of chimney	400	SF	35.00	14,000
Retool bottom limestone entry surrounds from salt damage at West Entrance	20	SF	80.00	1,600
Scrape, prime, paint (2) exposed steel lintels per elevation	2	LOC	2,000.00	4,000
Misc. sealants, finishes, etc	16,000	SF	2.00	32,000
Replace Façade/Entrances				-
Remove existing entry doors, sidelights, transoms	130	SF	250.00	32,500
New glass side lights and transoms, aluminum frame, triple paned assumed	66	SF	210.00	13,860
New entrance Wood doors with lites assumed - single	3	LVS	2,800.00	8,400
Automatic door openers - Assumed	3	LOC	3,500.00	10,500
Replace gutters and Downspouts				-
Remove existing entry doors, sidelights, transoms	1	LS	18,000.00	18,000
Interior Side				-
Furring - 2.5" stud, 1 layer drywall, smart AVB	13,040	SF	11.00	143,440
5" open cell spray foam	13,040	SF	5.00	65,200
Allowance - detailing around wood joists/beams	13,040	SF	1.50	19,560
ROOFING	31,455			669,118
Roof Planes				-
Remove all shingles at existing sloped roof	10,858	SF	5.00	54,291
Replace 20% wood plank sheathing	2,172	SF	15.00	32,575
New Sythetic Slate Shingles	10,858	SF	30.00	325,745
Insulation: R-38 min closed cell spary foam insulation at underside of roof deck	10,858	SF	7.00	76,007
Replace all step and cap flashing with stainless	1,200	SF	80.00	96,000
Replace existing skylights			Excluded, assumed not req.	
Roof Eaves: Exposed Rafter Tails & Fascias				-

TRADE	QTY	UNIT	RATE	TOTAL
Full replacement of 100% of vertical Fascia boards to be clad with powder coated aluminum	1	LS	30,000.00	30,000
10% replacement of rafter tails	20	EA	1,000.00	20,000
100% wood restained and recaulked	690	LF	50.00	34,500
STAIRWAYS	31,455			14,890
West Entry Stairs Repairs				-
Hone and Seal lower step	15	LF	30.00	450
Demo middle concrete step - jack and haul away	12	LF	35.00	420
Replace middle concrete step with granit	12	LF	110.00	1,320
East Entry Steps Rebuild				-
Demo existing 6 steaps and lower landing	1	LS	5,000.00	5,000
Replace with granite	70	LF	110.00	7,700
PROJECT REQUIREMENTS	31,455			154,116
Trade overtime allowance				Excluded
General project requirements - renovation	5.0%	TOTAL	3,082,318.90	154,116
TOTAL DIRECT COSTS				3,236,435
ALLOCATIONS				1,029,216
General Conditions	8.0	28,024	wks	224,196
Permits	0.0 %			-
Insurances	2.6 %			103,436
Design Contingency	11.0 %			356,008
Phasing Allowance	0.0 %			-
Construction Contingency	4.5 %			161,660
Bond	1.5 %			59,674
Fee	3.0 %			124,242
Escalation	Excluded			-
TOTAL CONSTRUCTION COST				4,265,651

TRADE	QTY	UNIT	RATE	TOTAL
DEMOLITION	31,455			313,407
HAZMAT Abatement - Per Axiom Report	31,455	SF		-
Exterior Window Caulking	110	EA	125.00	13,750
Exterior Door caulking	6	EA	125.00	750
Roof Cement a/w OverhandRoof	32	SF	10.00	320
Sprinkler Pipe Dope	550	EA	4.00	2,200
12"x12" Cloor Floor Tile Mastic	400	SF	5.00	2,000
9"x9" Tan Floor Tile	3,900	SF	8.00	31,200
12"x12" Beige Floor Tile	250	SF	5.00	1,250
12"x12" Beige w Gray Streaks Floor Tile & Mastic	6,800	SF	5.00	34,000
Safety Glass Glazing	30	EA	100.00	3,000
Roof Cement at Mechancial Room	75	SF	10.00	750
Asphaltic Damp Proofing	5,700	SF	17.54	100,000
Blackboard Adhesives	3,200	SF	5.00	16,000
Buried Pipes - Scope TBD				TBD
Concealed pipe/fitting insulation behind or above hard wall and ceiling surfaces and inaccessible crawlspaces and trenches under building				TBD
Varios ceramic and quarry tile thin sets	2,200	SF	5.00	11,000
Interior Components w/ boiler unit	4	EA	750.00	3,000
Misc Hazardous Building Materials	1	LS	10,000.00	10,000
5.5% Contingency (4.5% carried below line)	1	LS	12,607.10	12,607
Bid monitoring fee	1	LS	30,000.00	30,000
Demo of Exisiting				
Remove doors	2	EA	250.00	500
Demo existing walls at basement - masonry and loadbearing assumed	270	SF	50.00	13,475
Demo existing partitions at stairwells	240	SF	8.00	1,920
Demo existing floor/subfloor at NE corner to be replaced - existing joists to remain	2,335	SF	11.00	25,685
FOUNDATIONS	31,455			111,259
Existing Foundations				-
Removal/replacement of extg basement foundation slab on grade - assume 6"	225	SF		Ref only
Chop/remove extg slab	225	SF	12.00	2,700
Pour new reinforced 16" slab	225	SF	15.00	3,375
Removal/Replacement Wall footings and strip foundation at north face	50	LF		Ref only
Temporary Shoring & Underpinning of surrounding foundations and walls	1	LS	35,000.00	35,000
Excavate minimum 8' of soil - assumed 8'x8' (pren	119	CY	100.00	11,852
Jack/chop/remove existing foundation wall and footings	50	LF	360.00	18,000
Backfill with suitable fill	119	CY	60.00	7,111
Install new footings (assume 4'W x 2'D, with 18" thick wall extending ~4' to slab)	50	LF		Ref only
- Form work	416	SF	30.00	12,480
- Concrete	26	CY	600.00	15,556
- Rebar	2,593	LBS	2.00	5,185
BASEMENT CONSTRUCTION	31,455			9,702
Raise Floors in existing basement - lightweight concrete fill assumed	441	SF	22.00	9,702

TRADE	QTY	UNIT	RATE	TOTAL
SUPERSTRUCTURE	31,455			272,550
Rebuild and Level NE subfloor at L1 & L2	2,335	SF		Ref only
Select sistering of existing joists to level	2,335	SF	5.00	11,675
Shimming to level floor	2,335	SF	3.50	8,173
Subfloor - New, plywood assumed	2,335	SF	6.50	15,178
Masonry Scope				-
Rebuild/Infill internal masonry walls (type assumed for existing load bearing system)	495	SF	50.00	24,750
Infill of windows abutting addition	110	SF	50.00	5,500
Misc. masonry modifications for addition connections	1	LS	50,000.00	50,000
Allowance - framing risers/mechanical penetrations for new MEPFP systems	31,455	SF	2.00	62,910
Misc. structural allowance for repairs	31,455	SF	3.00	94,365
INTERIOR CONSTRUCTION	31,455			613,373
Core & shell interior construction allowance	31,455	SF	10.00	314,550
Code Required Fire Rated GWB Ceiling at underside of all joist assemblies in existing building	31,455	SF	9.50	298,823
STAIRWAYS	31,455			51,000
Oversurfacing treads, risers, and landings with resilient treat material - 4'6" W	12	FLT	3,000.00	36,000
Misc. handrail/guardrail scope throughout	1	LS	15,000.00	15,000
FURNISHINGS	31,455			47,183
Accessibility Signage - allowance	31,455	SF	1.00	31,455
Wayfinding Signage & Departmental Graphics	31,455	SF	0.50	15,728
PROJECT REQUIREMENTS	31,455			70,924
Trade overtime allowance				Excluded
General project requirements	5.0%	TOTAL	1,418,473	70,924
TOTAL DIRECT COSTS				1,489,396
ALLOCATIONS				543,307
General Conditions	6.0	28,024	wks	168,147
Permits	0.0 %			-
Insurances	2.6 %			49,290
Design Contingency	11.0 %			163,834
Phasing Allowance	0.0 %			-
Construction Contingency	4.5 %			74,395
Bond	1.5 %			28,437
Fee	3.0 %			59,205
Escalation	Excluded			-
TOTAL CONSTRUCTION COST				2,032,704

TRADE	QTY	UNIT	RATE	TOTAL
FOUNDATIONS	16,675			1,208,652
Excavation Prep				-
Underpin existing building - (2) Locations of 30' each per narrative	60	LF	1,500.00	90,000
Ongoing monitoring of existing structure	1	LS	25,000.00	25,000
New Building Foundations				-
Dewatering - allowance	5,510	SF	5.00	27,550
Excavation for SOG and subbase	306	CY	60.00	18,367
Gravel subbase - assume 6"	102	CY	60.00	6,122
Excavation for underslab MEPs	5,510	SF	3.00	16,530
Rough grading	5,510	SF	2.00	11,020
Fine grading	5,510	SF	2.00	11,020
Footing and frost wall excavation	418	CY	75.00	31,333
Basement deep excavation	2,229	CY	50.00	111,467
Backfill - assume imported backfill	188	CY	75.00	14,136
Dispose of excess material (Excludes contaminatior	2,459	CY	160.00	393,382
Strip Footing - assume 6'x1.5'	157	CY	750.00	117,500
Spread Footing - allow 1 per 500 SF - assume 5'x5'x	20	CY	850.00	17,346
Frost Wall/Grade Beam - assume 3'H x 1' W	52	CY	950.00	49,611
High foundation wall at basement	141	CY	1,200.00	168,667
Structural SOG - assume 6"	5,510	SF	15.00	82,650
Excavate for elevator pit	30	CY	85.00	2,550
Elevator pit walls	7	CY	1,200.00	8,400
Elevator pit slab and sump	100	SF	30.00	3,000
Elevator Pit Waterproofing	200	SF	15.00	3,000
SUPERSTRUCTURE	16,675			726,015
Structural Steel Floor Framing Including Beams, Columns and Bracing - allow 12PSF for floors per narrative	33	TONS	6,000.00	198,360
Structural Steel Roof Framing Including Beams, Columns and Bracing - allow 12PSF for roof	32	TONS	6,000.00	192,060
Connections - allow 10%	7	TONS	6,000.00	39,042
Shear studs - allow 20ea per 100sf	2,169	EA	4.50	9,761
Metal Floor Deck - 2" Gage composite	5,510	SF	8.00	44,080
Metal Roof Deck	5,335	SF	10.00	53,350
Concrete fill on metal floor deck - 3 1/4" lightweight concrete	5,510	SF	7.00	38,570
Misc. concrete requirements - allowance	16,675	SF	3.00	50,025
Spray on fireproofing at exposed steel	5,510	SF	8.00	44,080
Misc. metals allowance	16,675	SF	2.50	41,688
Dunnage for Mech Equipment - Allowance	1	LS	15,000.00	15,000
EXTERIOR ENCLOSURE	16,675			1,613,154
LGMF & FURR OF EXTERIOR	6,738	SF	16.00	107,804
Insulation	6,738	SF	6.00	40,426
Vapor Barrrier	6,738	SF	4.00	26,951
Flat Seam Metal Panel	6,249	SF	100.00	624,900
Windows	1,562	SF	210.00	328,073
Storefront/Curtainwall	2,425	SF	200.00	485,000
ROOFING	16,675			240,075
Roofing System Complete - EPDM Low Slope Memb	5,335	SF	45.00	240,075
INTERIOR CONSTRUCTION	16,675			216,775
Interior Construction	16,675	SF	13.00	216,775

TRADE	QTY	UNIT	RATE	TOTAL
INTERIOR FINISHES	16,675			83,375
Interior Finishes	16,675	SF	5.00	83,375
STAIRWAYS	16,675			100,500
Connecting Stair - Metal Pan Stair w' Precast Terrazo tile ovrlay, painted metal handrail & guardrail	6	FLIGHTS	11,000.00	66,000
Gym egress and Food Service Stairs - metal pan stair with concrete tread inlay, painted metal handrail/guardrail	3	FLIGHTS	6,500.00	19,500
Exterior Egress stair	1	FLIGHTS	15,000.00	15,000
CONVEYING SYSTEMS	16,675			240,000
Elevators - Front and back opening per floor	6	STOPS	35,000.00	210,000
Dumbwaiter	2	STOPS	15,000.00	30,000
PLUMBING	16,675			15,000
Sewer Grease Trap for Cafeteria	1	EA	15,000.00	15,000
FURNISHINGS	16,675			25,013
Accessibility Signage - allowance	16,675	SF	1.00	16,675
Wayfinding Signage & Departmental Graphics	16,675	SF	0.50	8,338
SUSTAINABILITY ALLOWANCE	16,675			175,000
50% Rooftop coverage - extensive green roof - 8" media depth	2,500	SF	70.00	175,000
SITE PREP	16,675			75,681
Site Perimeter Fence	300	LF	75.00	22,500
Silt Barrier and Erosion protection - allowance	16,675	SF	0.25	4,169
Allowance - existing tree protection, 5 assumed	5	EA	800.00	4,000
Site demolition	16,675	SF	1.50	25,013
Construction Vehicle access/wheel wash - one location assumed	1	EA	20,000.00	20,000
Site Improvement Scope				See Site Breakout
PROJECT REQUIREMENTS	16,675			235,962
Trade overtime allowance				Excluded
General project requirements - renovation	5.0%	TOTAL	4,719,239	235,962
TOTAL DIRECT COSTS				4,955,201
ALLOCATIONS				1,808,720
General Conditions	20.0	28,024	wks	560,489
Permits	0.0 %			-
Insurances	2.6 %			164,015
Design Contingency	11.0 %			545,072
Phasing Allowance	0.0 %			-
Construction Contingency	4.5 %			247,512
Bond	1.5 %			94,624
Fee	3.0 %			197,007
Escalation	Excluded			-
TOTAL CONSTRUCTION COST				6,763,921

TRADE	QTY	UNIT	RATE	TOTAL
DEMOLITION	14,496			22,896
Site demo and prep - allowance	14,496	SF	1.00	14,496
Site fence	680	LF	5.00	3,400
Inlet protection	1	LS	5,000.00	5,000
HAZMAT			Soil Abatement, Excluded	
SITE IMPROVEMENTS	14,496			839,226
Grading				-
Fine grading	12,145	SF	1.25	15,181
Excavation for site features - allowance	30	CY	75.00	2,250
Site Retaining Walls				-
Stair well - retaining wall assumed	250	SF	150.00	37,500
Hardscape				-
Pedestrian Sidewalks/Curbs - Brushed concrete CIP pitched to permeable pavers along curb	2,865	SF	30.00	85,950
Permeable pavers along curb with underdrains	955	SF	65.00	62,075
Replace curb - allowance	500	LF	50.00	25,000
Permeable Pavers at entries - locally sourced	404	SF	55.00	22,220
Permeable asphalt at forecourt	3,600	SF	40.00	144,000
Permeable playsurface, recycled rubber	2,925	SF	50.00	146,250
Landscaping & Plantings				-
Trees- allowance	12	EA	1,200.00	14,400
Grass cover assumed near egress stair from basement	175	SF	4.00	700
Plantings at forecourt	900	SF	25.00	22,500
Bioretention with underdrains - allowance 50% of area surrounding building per narrative: inclusive of 24" soil media and 12" crushed stone	2,650	SF	35.00	92,750
Grass and ground cover around bioretention areas	2,650	SF	4.00	10,600
Irrigation - reuse of storm water per Nitsch narrative	6,375	SF	4.00	25,500
Misc. Site Furnishings				-
100% Scrape & Prime existing wrought iron fence	365	LF	50.00	18,250
- straighten pickets - allowance	40	LOC	200.00	8,000
- replace pickets - allowance	10	LOC	650.00	6,500
- reset posts	5	LOC	800.00	4,000
- replace latch hardware at 3 gates	3	LOC	200.00	600
New Painted metal ornamental fence to match historic existing	100	LF	500.00	50,000
Chain-link metal fence	200	LF	25.00	5,000
Allowance - General Site furnishings	1	LS	40,000.00	40,000
Play yard structures			EXCLUDED - Assumed by Owner	
SITE CIVIL / MECHANICAL	14,496			182,900
Storm Water Management				-
16,000 gal detention tanks for storm water and rainwater reuse system	1	LS	65,000.00	65,000
Storm piping & associated infrastructure - allowance	500	LF	150.00	75,000

TRADE	QTY	UNIT	RATE	TOTAL
Storm Water Reuse system to plumbing flush fixtures				W/ Plumbing
Sewer Grease Trap for Cafeteria				W/ Addition Plumbing
Incoming utility services				-
8" Sewer Service - length assumed	65	LF	175.00	11,375
- Excavation and backfill	36	CY	120.00	4,333
8" Fire Service - length assumed	65	LF	175.00	11,375
- Excavation and backfill	36	CY	120.00	4,333
3" Water Service - length assumed	65	LF	110.00	7,150
- Excavation and backfill	36	CY	120.00	4,333
SITE ELECTRICAL	14,496			30,000
Site Electrical & lighting - allowance	1	LS	30,000.00	30,000
Electrical Service				-
Incoming electrical ductbank				Excluded, assume ETR
PROJECT REQUIREMENTS	14,496			52,606
General project requirements - renovation	5.0%	TOTAL	1,052,126	52,606
TOTAL DIRECT COSTS				1,127,629
ALLOCATIONS				395,035
General Conditions	4.0	28,024	wks	112,098
Permits	0.0 %			-
GL Insurance	2.6 %			36,922
Design Contingency	11.0 %			124,039
Design build fee	0.0 %			-
Construction Contingency	4.5 %			56,325
Bond	1.5 %			21,301
Fee	3.0 %			44,349
Escalation	Excluded			-
TOTAL CONSTRUCTION COST				1,522,664

TRADE	QTY	UNIT	RATE	TOTAL
DEMOLITION/ENABLING	31,455			187,336
CLASSROOMS	11,980	SF	5.00	59,900
FOOD SERVICE	75	SF	7.00	525
LIBRARY	1,365	SF	4.00	5,460
RESTROOMS	213	SF	7.00	1,491
STAFF SUPPORT SPACE	1,598	SF	4.00	6,392
CIRCULATION	5,332	SF	7.00	37,324
STORAGE	4,078	SF	7.00	28,546
BOH/BALANCE	6,814	SF	7.00	47,698
INTERIOR CONSTRUCTION	31,455			369,730
CLASSROOMS	11,980	SF	15.00	179,700
FOOD SERVICE	75	SF	15.00	1,125
LIBRARY	1,365	SF	20.00	27,300
RESTROOMS	213	SF	15.00	3,195
` STAFF SUPPORT SPACE	1,598	SF	15.00	23,970
CIRCULATION	5,332	SF	15.00	79,980
STORAGE	4,078	SF	5.00	20,390
BOH/BALANCE	6,814	SF	5.00	34,070
INTERIOR FINISHES	31,455			717,125
CLASSROOMS	11,980	SF	35.00	419,300
FOOD SERVICE	75	SF	40.00	3,000
LIBRARY	1,365	SF	35.00	47,775
RESTROOMS	213	SF	70.00	14,910
STAFF SUPPORT SPACE	1,598	SF	35.00	55,930
CIRCULATION	5,332	SF	19.00	101,308
STORAGE	4,078	SF	5.00	20,390
BOH/BALANCE	6,814	SF	8.00	54,512
PLUMBING	31,455			329,342
CLASSROOMS	11,980	SF	20.00	239,600
FOOD SERVICE	75	SF	15.00	1,125
RESTROOMS	213	SF	75.00	15,975
STAFF SUPPORT SPACE	1,598	SF	15.00	23,970
CIRCULATION	5,332	SF	3.00	15,996
STORAGE	4,078	SF	3.00	12,234
BOH/BALANCE	6,814	SF	3.00	20,442
HVAC	31,455			1,087,655
CLASSROOMS	11,980	SF	50.00	599,000
FOOD SERVICE	75	SF	50.00	3,750
LIBRARY	1,365	SF	50.00	68,250
RESTROOMS	213	SF	45.00	9,585
STAFF SUPPORT SPACE	1,598	SF	35.00	55,930
CIRCULATION	5,332	SF	25.00	133,300
STORAGE	4,078	SF	20.00	81,560
BOH/BALANCE	6,814	SF	20.00	136,280
FIRE PROTECTION	31,455			109,448
CLASSROOMS	11,980	SF	2.50	29,950
FOOD SERVICE	75	SF	4.00	300
LIBRARY	1,365	SF	4.00	5,460
RESTROOMS	213	SF	4.00	852
STAFF SUPPORT SPACE	1,598	SF	5.00	7,990
CIRCULATION	5,332	SF	4.00	21,328

TRADE	QTY	UNIT	RATE	TOTAL
STORAGE	4,078	SF	4.00	16,312
BOH/BALANCE	6,814	SF	4.00	27,256
ELECTRICAL	31,455			885,639
CLASSROOMS	11,980	SF	45.00	539,100
FOOD SERVICE	75	SF	30.00	2,250
LIBRARY	1,365	SF	35.00	47,775
RESTROOMS	213	SF	30.00	6,390
STAFF SUPPORT SPACE	1,598	SF	25.00	39,950
CIRCULATION	5,332	SF	15.00	79,980
STORAGE	4,078	SF	15.00	61,170
BOH/BALANCE	6,814	SF	16.00	109,024
EQUIPMENT	31,455			35,664
FOOD SERVICE	75	SF	5.00	375
RESTROOMS	213	SF	3.00	639
STAFF SUPPORT SPACE	1,598	SF	5.00	7,990
CIRCULATION	5,332	SF	5.00	26,660
FURNISHINGS	31,455			134,615
CLASSROOMS	11,980	SF	8.00	95,840
FOOD SERVICE	75	SF	7.00	525
LIBRARY	1,365	SF	5.00	6,825
RESTROOMS	213	SF	35.00	7,455
STAFF SUPPORT SPACE	1,598	SF	15.00	23,970
PROJECT REQUIREMENTS	31,455			192,828
Trade overtime allowance				Excluded
General project requirements - renovation	5.0%	TOTAL	3,856,554	192,828
TOTAL DIRECT COSTS				4,049,382
ALLOCATIONS				1,238,555
General Conditions	18.0	wks	13,024	234,638
Permits	0.0 %			-
Insurances	2.6 %			128,225
Design Contingency	11.0 %			445,432
Phasing Allowance	0.0 %			-
Construction Contingency	4.5 %			202,267
Bond	1.5 %			73,976
Fee	3.0 %			154,018
Escalation	Excluded			-
TOTAL CONSTRUCTION COST				5,287,936

TRADE	QTY	UNIT	RATE	TOTAL
INTERIOR CONSTRUCTION	16,675			342,730
GYM	3,738	SF	20.00	74,760
CAFETERIA	2,391	SF	20.00	47,820
FOOD SERVICE	1,265	SF	25.00	31,625
RESTROOMS	829	SF	65.00	53,885
CIRCULATION	2,545	SF	18.00	45,810
STORAGE	225	SF	16.00	3,600
BOH/BALANCE	5,682	SF	15.00	85,230
INTERIOR FINISHES	16,675			846,730
GYM	3,738	SF	85.00	317,730
CAFETERIA	2,391	SF	60.00	143,460
FOOD SERVICE	1,265	SF	50.00	63,250
RESTROOMS	829	SF	130.00	107,770
CIRCULATION	2,545	SF	26.00	66,170
STORAGE	225	SF	28.00	6,300
BOH/BALANCE	5,682	SF	25.00	142,050
PLUMBING	16,675			355,965
GYM	3,738	SF	15.00	56,070
CAFETERIA	2,391	SF	15.00	35,865
FOOD SERVICE	1,265	SF	70.00	88,550
RESTROOMS	829	SF	130.00	107,770
CIRCULATION	2,545	SF	15.00	38,175
STORAGE	225	SF	5.00	1,125
BOH/BALANCE	5,682	SF	5.00	28,410
HVAC	16,675			712,020
GYM	3,738	SF	50.00	186,900
CAFETERIA	2,391	SF	50.00	119,550
FOOD SERVICE	1,265	SF	75.00	94,875
RESTROOMS	829	SF	50.00	41,450
CIRCULATION	2,545	SF	25.00	63,625
STORAGE	225	SF	30.00	6,750
BOH/BALANCE	5,682	SF	35.00	198,870
FIRE PROTECTION	16,675			72,986
GYM	3,738	SF	3.50	13,083
CAFETERIA	2,391	SF	3.00	7,173
FOOD SERVICE	1,265	SF	5.00	6,325
RESTROOMS	829	SF	5.00	4,145
CIRCULATION	2,545	SF	5.00	12,725
STORAGE	225	SF	5.00	1,125
BOH/BALANCE	5,682	SF	5.00	28,410
ELECTRICAL	16,675			617,575
GYM	3,738	SF	40.00	149,520
CAFETERIA	2,391	SF	45.00	107,595
FOOD SERVICE	1,265	SF	40.00	50,600
RESTROOMS	829	SF	35.00	29,015
CIRCULATION	2,545	SF	30.00	76,350
STORAGE	225	SF	25.00	5,625
BOH/BALANCE	5,682	SF	35.00	198,870
EQUIPMENT	16,675			125,173
GYM	3,738	SF	10.00	37,380
CAFETERIA	2,391	SF	10.00	23,910

TRADE	QTY	UNIT	RATE	TOTAL
FOOD SERVICE	1,265	SF	25.00	31,625
RESTROOMS	829	SF	3.00	2,487
CIRCULATION	2,545	SF	5.00	12,725
BOH/BALANCE	5,682	SF	3.00	17,046
FURNISHINGS	16,675			134,650
GYM	3,738	SF	5.00	18,690
CAFETERIA	2,391	SF	10.00	23,910
FOOD SERVICE	1,265	SF	8.00	10,120
RESTROOMS	829	SF	40.00	33,160
CIRCULATION	2,545	SF	8.00	20,360
BOH/BALANCE	5,682	SF	5.00	28,410
PROJECT REQUIREMENTS	16,675			160,391
Trade overtime allowance				Excluded
General project requirements - renovation	5.0%	TOTAL	3,207,829	160,391
TOTAL DIRECT COSTS				3,368,220
ALLOCATIONS				1,030,213
General Conditions	15.0	wks	13,024	195,169
GL Insurance	2.6 %			106,656
Design Contingency	11.0 %			370,504
Construction Contingency	4.5 %			168,243
Bond	1.5 %			61,532
Fee	3.0 %			128,110
TOTAL CONSTRUCTION COST				4,398,433

#	ALTERNATE	QTY	UNIT	RATE	TOTAL
1	**ENV #1 - FULL REPOINTING** *Add alternate - full repointing of 100% of existing masonry*				**244,825**
	Deduct all repointing scope from base	(1)	LS	220,331.25	(220,331)
	Repoint 100% of existing Masonry	12,920	SF	35.00	452,200
	Total Direct Costs				231,869
	Allocations				(90,699)
	General Conditions	2.00	WK	28,024.44	56,049
	Permits	0.0 %			-
	Insurances	2.6 %			8,450
	Design Contingency	11.0 %			25,506
	Phasing Allowance	0.0 %			-
	Construction Contingency	4.5 %			11,582
	Bond	1.5 %			4,875
	Fee	3.0 %			10,150
	Escalation	Excluded			-
2	**STRUCT ALT #1: DEDUCT ALT RESUPPORT NE WALL** *Retain existing deteriorated east wing north elevation and use micropiles to resupport existing foudnations/footings*				**(207,310)**
	Deduct Full Rebuild of NE corner	(1)	LS	380,500	(380,500)
	Deduct Rebuild of Foundations and excavation to suitable bearing material	(1)	LS	105,183.70	(105,184)
	Add - Micropiles (assume 1 per 5LF of wall perimeter, assume 50 lf deep)	500	LF	350.00	175,000
	Add - Grade Beam	50	LF	1,200.00	60,000
	Add - Grouted dowels connections to existing footings	1	LS	25,000.00	25,000
	Add- Brick stiching and local rebuilding	800	SF	30.00	24,000
	Floor leveling			Incl. in base, joists to remain	
	Add - allowance improved structural reinforcement	1	LS	35,000.00	35,000
	Total Direct Costs				(166,684)
	Allocations				(40,626)
	General Conditions				Included in base
	Permits	0.0 %			-
	Insurances	2.6 %			(5,027)
	Design Contingency	11.0 %			(18,335)
	Phasing Allowance	0.0 %			-
	Construction Contingency	4.5 %			(8,326)
	Bond	1.5 %			(2,900)
	Fee	3.0 %			(6,038)
	Escalation	Excluded			-

#	ALTERNATE	QTY	UNIT	RATE	TOTAL
3	PLUM ALT #1: DEDUCT RAINWATER REUSE FOR FLUSHING				(99,499)
	Use rainwater for irrigation only, deduct plumbing fixture flushing				
	Deduct rainwater reuse allowance	(1)	LS	80,000.00	(80,000)
	Total Direct Costs				(80,000)
	Allocations				(19,499)
	General Conditions				Included in base
	Permits	0.0 %			-
	Insurances	2.6 %			(2,413)
	Design Contingency	11.0 %			(8,800)
	Phasing Allowance	0.0 %			-
	Construction Contingency	4.5 %			(3,996)
	Bond	1.5 %			(1,392)
	Fee	3.0 %			(2,898)
	Escalation	Excluded			-

CONSTRUCTION SCHEDULE DURATIONS:	MONTHS	DAYS - X 20	WEEKLY RATE
	12	240	$28,024.44

STAFF	PROJECT % ALLOCATION	NUMBER OF DAYS	NUMBER OF MONTHS	DAY RATE	TOTALS
General Superintendent	0%	0	0	$ 2,400	$ -
Project Executive	0%	0	0	$ 2,400	$ -
Project Superintendent	100%	240	12	$ 1,500	$ 360,000
Sr. Project Manager	100%	240	12	$ 1,500	$ 360,000
Project Manager	100%	240	12	$ 1,200	$ 288,000
Assistant Project Manager	50%	120	6	$ 900	$ 108,000
Assistant Superintendent	0%	0	0	$ 1,100	$ -
Senior Estimator	30%	72	4	$ 1,500	$ 108,000
Purchasing	5%	12	1	$ 1,500	$ 18,000
MEP Coordinator	15%	36	2	$ 1,300	$ 46,800
Safety	10%	25	1	$ 1,800	$ 45,333
Project Accountant	2%	5	0	$ 700	$ 3,360
Project Administration	2%	5	0	$ 500	$ 2,400
Project Expeditor	2%	5	0	$ 1,100	$ 5,280
TOTALS					$ 1,345,173

CONSTRUCTION SCHEDULE DURATIONS:	MONTHS	DAYS - X 20	WEEKLY RATE
	8.25	165	$13,024.44

STAFF	PROJECT % ALLOCATION	NUMBER OF DAYS	NUMBER OF MONTHS	DAY RATE	TOTALS
General Superintendent	0%	0	0	$ 2,400	$ -
Project Executive	0%	0	0	$ 2,400	$ -
Project Superintendent	0%	0	0	$ 1,500	$ -
Sr. Project Manager	25%	41	2	$ 1,500	$ 61,875
Project Manager	100%	165	8	$ 1,200	$ 198,000
Assistant Project Manager	50%	83	4	$ 900	$ 74,250
Assistant Superintendent	0%	0	0	$ 1,100	$ -
Senior Estimator	5%	8	0	$ 1,500	$ 12,375
Purchasing	5%	8	0	$ 1,500	$ 12,375
MEP Coordinator	15%	25	1	$ 1,300	$ 32,175
Safety	10%	17	1	$ 1,800	$ 31,167
Project Accountant	2%	3	0	$ 700	$ 2,310
Project Administration	2%	3	0	$ 500	$ 1,650
Project Expeditor	2%	3	0	$ 1,100	$ 3,630
TOTALS					$ 429,807

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PROJECT:	Somerville Building Master Plan – Brown School
BBB REF#	2875
DATE:	Oct 2021 (Specific notes added January 28, 2022)
SUBJECT:	**Preferred Schematic Report – Cost Estimate Narrative**

List of Alternates

Brown School

- **ENV Alternate 1: Add Alt – Full repointing**
  Instead of repoint as noted in narrative and elevations, allow for 100% repoint all masonry
- **STRUCT Alternate 1: Deduct Alt to Retain exg displaced settled wall and foundation**
  Retain existing deteriorated east wing north elevation three story masonry wall and use micro-piles to re-support existing foundations/footings (areas of brick stitching required)
- **PLUM Alternate 1: Deduct Alt - rainwater for flushing vs. irrigation only**
  ILO rainwater reclamation for irrigation and plumbing fixture flushing (base), utilize rainwater reclamation system for irrigation only; no toilet flushing (alt-deduct)

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Brown School

Existing Conditions, Demolition, & Logistics (BBB/H&A)

Hazardous Materials Removal

- ***Axiom report sent to Dharam by email, 10/13***

Geotechnical Considerations (H&A)

- Consideration is given to maintaining portions of the existing school building and constructing a new building wing. Signs of distress are visible on the north façade of the existing building (facing toward Kidder Ave.), suggesting possibility of footing settlements and/or poor performance of the foundation walls.
- A test pit exploration program was recently completed along the existing building north and east walls. The test pits revealed that the existing building is supported on shallow footings on natural soils and some deterioration of the foundation wall.
- It is assumed that the new building wing will have one level below-grade space and the footings for the new building wing will be founded at a depth of approximately 12 ft below the existing site grade. It is assumed that consideration will be given to supporting the new building wing on shallow footings supported on natural soils at the proposed excavation depth required for the below-grade space. The lowest floor slab may be designed as a slab-on-grade. An under-slab drainage system and a vapor barrier will be required. Further, below-grade walls should be waterproofed. A support of excavation (SOE) system comprised of soldier piles and lagging will be required to facilitate the excavation for the below-grade space and construction of new footings. A test boring exploration program is scheduled to obtain subsurface data at and below the proposed excavation depth for the below-grade space and to confirm the provided preliminary/feasibility foundations recommendations.

Other Construction Considerations

- See shell and core narratives for scope of rebuild at northwest corner, east wing

Sustainability & Net Zero Energy (A10/Energysmiths)

Overview

- The Brown School will be renovated in compliance with the City of Somerville's Zoning Ordinance which represents the minimum expectations for aligning with City-wide goals. As such, the project will be designed to achieve **Leadership in Energy and Environmental Design (LEED) Platinum** certification under LEED v4 Building Design and Construction (BD+C): New Construction (NC) and Major Renovation Program.
- The project strives to be an exemplar of high-performance, sustainable design by reducing energy use, greenhouse gas emissions, and potable water use to the greatest extent possible. To align with these goals, the building will be designed to be an **all-electric Net Zero Emissions building** in which all emissions from energy used in the building will be offset by a combination of on-site and off-site renewable energy on an annual basis. (See Energy Efficiency sub-section).

Site and Landscape

- The targets for site design are to enhance the ecological function of the site, infiltrate water on-site, minimize the urban heat island effect, minimize light pollution, and create a comfortable outdoor microclimate. Site landscaping that promotes sustainable land development and management practices will also be considered.
    - Reduce existing impervious hardscape surfaces. The renovated play yard will be permeable to increase stormwater infiltration and will prioritize the use of light-colored, high-albedo paving materials.
    - Where landscaping is replanted, the design will use native and drought-resistant vegetation to preserve natural habitat, promote biodiversity, and mitigate the need for irrigation water
    - Specify and locate trees to shade paved areas and reduce urban heat island effect as well as reduce energy consumption associated with indoor climate control of surrounding buildings
    - Specify locally sourced pavers and hardscape materials
    - Design exterior lighting to minimize light trespass from the site boundary while providing sufficient lighting for security

Stormwater Management / Water Efficiency

- The site design will strive to reduce, harvest, slow, and enhance stormwater management through strategies such as reduced impervious areas, permeable pavement, stormwater bio-retention or subsurface detention, and water conservation and reuse.
- The project will include subsurface bio-retention and on-site stormwater collection cistern sized to manage 100% of the stormwater runoff for the 90th percentile storm event.
- In addition, costing to assume a separate supply pipe to all flush fixtures that will be connected to an on-site stormwater cistern which will filter and reuse collected stormwater for toilet and urinal flushing as well as all on-site irrigation.
- Conservation of potable water is an important criterion that will be prioritized by selecting low flow plumbing fixtures and through the reuse of stormwater.

High Performance Envelope

- A high-performance envelope is critical to meeting the project's energy efficiency and Net Zero Emissions goals. As such, the project will insulate existing exterior walls to reduce infiltration of outside air and provide a well-insulated envelope. In addition, the existing glazing will be replaced with triple-pane glazing and the roof will be insulated to reduce heat gains and losses to the building. Please see the *Shell Improvements* section for additional detail about proposed envelope improvements.

Energy Efficiency

- The renovation of the Brown School aims to use the least amount of energy feasible by designing efficient HVAC systems. By implementing a mix of both passive and active conditioning strategies, including system selection and advanced control mechanisms, the

project will dramatically reduce the amount of energy spent on heating, cooling, fans, and pumping. The building will include decoupled mechanical systems served by dedicated outdoor air systems with enthalpy heat recovery. Chilled water and heating hot water will be generated by **all-electric heat pumps**. Please refer to the *Mechanical Infrastructure/Systems* section for additional detail about the proposed mechanical systems.

- Renewable energy will be generated through a combination of **roof mounted PV on the roof of the addition and existing building as well as the purchase of off-site renewable energy credits** due to site limitations. Please refer to the *Electrical Infrastructure* section for additional information.
- To guarantee that the design intent of the project is being met, the Brown School performance will be measured and verified both during construction and occupancy through Enhanced Commissioning and Measurement and Verification. These programs, whose scope will be further defined later in the project, will require the use of submeters to break down the building energy and water consumption into different end-uses. To facilitate these programs, the Brown Building will include, at a minimum, the following **submeters for energy and water use**. These submeters should be combined with a digital dashboard or online interface to simplify the review of energy and water measurements:
    - Energy submeters that record both energy consumption and demand for each energy end-use accounting for 10% or more of the total energy consumption of the building
    - Water submeters for irrigation, indoor plumbing fixtures and fittings, domestic hot water, and reclaimed stormwater
    - Note additional submeters will likely be required depending on the scope of Enhanced Commissioning and Measurement and Verification.

Lighting

- The design will enhance lighting with a focus on visual quality, energy efficiency, and sustainability. By providing **LED lighting fixtures and advanced lighting controls**, this project intends to create high quality, energy efficient spaces that will improve the health satisfaction and productivity of the building occupants. Targets and strategies for lighting sustainability have been listed below
    - High efficiency lighting: 20% reduction from ASHRAE 90.1-2016
        - Lighting to be a combination of high-efficiency LED downlights, recessed slot lights, and linear pendants to achieve lighting target
    - Vacancy sensors in classrooms, offices, break rooms, and meeting rooms
    - Occupancy sensors in corridors, lobbies, restrooms and storage rooms
    - Daylight dimming sensors with continuous control in all daylit/perimeter spaces
    - All site and exterior architectural lighting to be on a separate control circuit and controlled by astronomical schedule or by a photocell

Indoor Environmental Quality

- The project's materials selection and installation methodology strategy will contribute to a high indoor environmental quality. Interior product selection criteria will focus on low toxicity, low emitting products to safeguard the health not only of building occupants, but also of anyone

associated with the building throughout its life cycle from product manufacturing through on-site construction and ultimately demolition and disposal.

Carbon Emissions

- The project will source materials from appropriate distances for each specific material type to minimize carbon emissions from material transport and to contribute to the local materials economy. Wood products will come from forests where responsible forestry is practiced, and whenever possible, from local or regional forests. At least 75% of construction waste will be diverted from landfills towards recycling or re-use. This criterion is aligned with LEED NC-v4 credit requirements.
- The reuse of buildings is the foremost strategy to reduce the overall embodied carbon of a project. When specifying new materials for the project, selection of products which disclose embodied carbon through product-specific Environmental Product Declarations (EPDs) and minimize embodied carbon will be prioritized. The embodied carbon associated with the construction and materials installed in the project will not exceed 500 kg CO_2e/m^2. This criterion is aligned with the ILFI Zero Carbon certification requirements.

Site Improvements (Nitsch & BBB)

Utilities / Civil Infrastructure

- 16,000 gallon detention tank for stormwater detention and rainwater reuse system (See Sustainability and Plumbing Sections) incl. new irrigation lines for establishing landscape plants
- All new subgrade drainage infrastructure (pipes, structures, grates)
- New building laterals for water and sewer
- 50% of landscape areas bioretention with underdrains, including interactive demonstration gardens and educational signage; bioretention basins shall include 24" soil media and 12" crushed stone reservoir, as noted on plan.
- Non-vehicular pavement to be permeable asphalt, permeable pavers or pitched to permeable pavers with underdrains (approx. 25% of pavement area), where shown on plan. Permeable paving section shall include 18" bank-run gravel filter course and 12" crushed stone reservoir.
- Pedestrian forecourt to incorporate 10-20% of area as landscape planting
- Play yard area to be surfaced with permeable rubber play surfacing
- Building addition:
    - Portion of new rooftop area to be extensive green roof (shallow depth); refer to Envelope for New Addition
    - Provide new sewer grease trap for cafeteria

Landscape & Hardscape (BBB)

- Refer to Nitsch plan sketch

Shell Improvements (BBB)

Existing Building Envelope & Roof Upgrades

- Above-Grade Walls (All Floors)

        - Existing multi-wythe load-bearing brick masonry
    - Provide 5” of low-GWP open-cell spray-foam insulation; exterior furring with continuous “smart” vapor barrier and single 5/8” layer GWB on 16” OC, 20-ga, 2.5” studs. Set interior face of drywall 8” from interior face of masonry. Allowance for detailing around wood joists/beams to make insulation more continuous and prevent wood decay from insulation
- Windows
    - BBB assumes existing windows are aluminum frame-within-frame with some concealed wood still extant beneath from original wood windows
    - Assume complete removal of all extant window elements (wood, aluminum, etc.) leaving only masonry opening to remain
    - Provide full window replacement (not inserts) to full height of M.O., assume soffit drops at interior ceilings within:
        - Assume thermally-broken aluminum window units, double-hung sash style, triple-glazed IGUs with modified low-e coating, half-height screens.
        - Provide arch-headed windows as well as rectilinear windows (two types of arch-headed windows, per elevations)
        - Provide full perimeter AVB at each window masonry opening; fill void between window frame and M.O. with spray-foam insulation
- Existing Roof Areas
    - Roof Planes
        - Existing is mix of slate and asphalt shingle on wood plank sheathing; allow for replacement of 20% of sheathing and full replacement slate and shingle with <u>single synthetic slate system</u>
        - Insulation: Provide continuous minimum R-38 minimum low-GWP closed-cell spray foam insulation at underside of roof deck
        - Scope to allow for replacement of all step and cap flashing with stainless
    - Eaves: Exposed Rafter Tails and Fascias
        - Assume full replacement of 100% vertical fascia boards, to be clad with powder-coated aluminum, and full replacement of 10% of rafter tails/decking at eaves;
        - 100% of wood to be re-stained with opaque dark brown stain, and 100% re-caulking of element intersections (as typical)

Envelope Restoration / Rehabilitation of Existing

- *All facades*
    - General masonry light restoration cleaning unless otherwise noted; see specific areas for repoint scope
    - **<u>ENV ALTERNATE 1</u>: Allow for 100% repoint of all masonry, all facades** since insulation at interior walls is being proposed and inspection openings were not completed to better assess condition of exterior walls.
- *West Façade*
    - General

        - Allow for removal of (30) mechanical anchors;
    - Exposed Granite
        - Granite ashlar: 100% repoint
        - Entry steps: bottom step: hone and seal; middle step, replace concrete with new granite step;
    - Stone Trimmings (entry surrounds, water table, window sills, window keystones)
        - Full micro-abrasion cleaning and full repoint at all; add breathable anti-graffiti coating at entry surrounds
        - 20 SF of retooling at bottom of limestone entry surrounds due to salts deterioration
        - Allow for (5) 1 SF patches and 10 LF of crack repair
    - Brick Masonry:
        - Allow for replacement of (10) bricks beyond stitching as noted
        - 10% repoint overall for all brick from water table up, except:
          (NOTE: This is BOD, also see ENV ALTERNATE 1)
            - Below all sills: full repoint of two brick courses
            - Allow for additional (5) 20 SF areas of full repoint
        - Allow for 10 SF of efflorescence cleaning above entry way
        - Brick from granite foundation sill to limestone water table: all brick to have paint stripped and clear breathable anti-graffiti coating applied.
            - Allow for 25% repoint of brick in this area (condition concealed by paint)
- *North Façade*
    - General
        - Allow for removal of (40) mechanical anchors;
    - Exposed Granite
        - Granite ashlar: 100% repoint
    - Stone Trimmings (entry surrounds, water table, window sills, window keystones)
        - Full micro-abrasion cleaning and full repoint at all
        - Allow for (5) 1 SF patches and 10 LF of crack repair
    - Brick masonry
        - Allow for replacement of (10) bricks beyond stitching as noted
        - Brick stitching at diagonal step-cracking of masonry per locations noted on elevations
        - 25% repoint overall above water table, except for specific areas noted in elevations where 100% repoint called for (NOTE: This is base, also see ENV ALTERNATE 1)
        - Brick from granite foundation sill to limestone water table: all brick to have paint stripped and clear breathable anti-graffiti coating applied.
            - Allow for 25% repoint of brick in this area (condition concealed by paint)
    - East Wing: Partial façade rebuilding
        - Eastern portion of North façade, from wing return running east, rebuilding called for. See elevations and structural narrative, plus base and deduct-alt.

    - Misc.:
        - Scrape prime and paint (2) exposed steel lintels per elevation drawings
        - Remove 40 SF of vegetation from brick
- *East Façade*
    - General
        - Allow for removal of (20) mechanical anchors;
    - Exposed Granite
        - Granite ashlar: 100% repoint
        - Entry steps: full rebuild (6) steps and lower landing with full replacement of granite
    - Stone Trimmings (entry entablature, water table, window sills, window keystones)
        - Full micro-abrasion cleaning and full repoint at all
        - Allow for (15) 1 SF patches and 20 LF of crack repair and include (2) 3' dutchmans
    - Brick masonry
        - Allow for replacement of (80) bricks beyond stitching as noted
        - Brick stitching at diagonal step-cracking of masonry per locations noted on elevations
        - 25% repoint overall above water table, except for specific areas noted in elevations where 100% repoint called for (NOTE: This is base, also see ENV ALTERNATE 1)
        - Brick from granite foundation sill to limestone water table: all brick to have paint stripped and clear breathable anti-graffiti coating applied.
            - Allow for 25% repoint of brick in this area (condition concealed by paint)
- *South Façade: Note due to addition, areas of south façade will be enclosed and not visible; see basement plan notes for extent*
    - General
        - Allow for removal of (60) mechanical anchors;
    - Exposed Granite
        - Granite ashlar: 100% repoint
    - Stone Trimmings (water table, window sills, window keystones)
        - Full micro-abrasion cleaning and full repoint at all
        - Allow for (5) 1 SF patches and 10 LF of crack repair
    - Brick masonry
        - Allow for replacement of (80) bricks beyond stitching as noted
        - 50 SF of graffiti removal in (4) separate locations
        - Brick stitching at diagonal step-cracking of masonry per locations noted on elevations
        - 10% repoint overall above water table, except for specific areas noted in elevations where 100% repoint called for (NOTE: This is base, also see ENV ALTERNATE 1)

        - Brick from granite foundation sill to limestone water table: all brick to have paint stripped and clear breathable anti-graffiti coating applied.
            - Allow for 25% repoint of brick in this area (condition concealed by paint)
- Perimeter Wrought-Iron Fence
    - 100% Scrape prime and paint, allow for 40 picket to be straightened and 10 picket replacements, 5 post re-setting
    - Allow for replacement of hinges and latch hardware at (3) gate locations
- Entry Systems
    - Full replacement (entry doors, sidelights, transom) at two locations; see east and west elevations
    - New metal handrails at all entries
- Chimneys
    - 5 existing chimneys total to remain: allow for 50% rebuild of each; full repoint on balance of masonry to remain; provide new zinc-coated copper or stainless steel caps
- Gutters, Leaders, Downspouts
    - All new gutters and downspouts; powder-coated aluminum. Provide new cast-iron boots from 3' above grade down into grade to integrate into civil scope for rainwater

Shell: New Addition

- Exterior Walls – below-grade
    - Concrete foundation walls with fire-***rated taped and sealed Thermax would allow a smooth with finish and no requirement for ignition barrier***
- Exterior Walls – above grade
    - See elevations for two tones of material: dark tone is continuous exterior glazing system and light-tone area is flat-seam metal panel with 20% glazing (individual windows)
- Roof
    - EPDM low-slope membrane roof on tapered insulation with interior area drains/leaders
    - 50% of new rooftop area to be extensive green roof (shallow depth) with walking pads
    - See Electrical narrative for size of photovoltaic array
- Entry Systems
    - Integrated into exterior glazing system; ADOs at all entry doors

Core Improvements (Multiple)

Structure Upgrades or Modifications (BBB, with Silman)

- General structural system
    - Existing structure is masonry bearing walls that support wood floor joists and roof rafters. Based on room sizes and typical wood joist spanning limits, there are likely intermediate steel beams that span wall to wall, or perhaps to interior steel columns. and masonry pier, with indeterminate system of steel girders or beams for longer spans supporting wood joist and wood subfloor.
- East Wing, north zone

- **Floors:** The northeast quadrant of the building has experienced significant settlement and as a result the slab on grade at the lower level, and the elevated floors at first and second floors are significantly uneven. **Refer to plans for extent of work in this area.**
- **Walls:** Two lengths of the exterior masonry wall in the northwest corner of the northeast quadrant top to bottom reconstruction
  NOTE (1/28/22): BBB and Silman reviewed the H&A Geotechnical memo which incorporates findings from the borings and test pits executed in late fall 2021 to verify if the proposed scope should be updated in light of these findings. At this early stage of pre-design, both firms agreed that the new information does not change the fundamental approach – at this stage, the same scope should still be held for top-to-bottom reconstruction of these areas of walls. The deduct below is still an option.
  - BOD: Full rebuild of wall footings, foundation wall and masonry wall per drawings, refer to plans; footings founded on good soils after removal of unsuitable materials. Estimator to assume a minimum 8 ft deep excavation to reach natural soil for new footings in the area of past settlement but making sure to qualify that this is contingent on the upcoming explorations.
  - Assume roof framing would need to be temporarily shored for the work and re-supported on new masonry bearing wall construction
  - New wall to be solid masonry consisting of face brick for outer wythe and CMU backup; allow for 12" of CMU backup to match historic wall depth
- **STRUCT Alternate 1 (Deduct)**: Deploy micropiles and utilize brackets to re-found existing footings/foundation walls, OR pour concrete grade beam on top of micropiles and connect to existing wall footing with drilled and grouted dowels.
  - Foundation wall to be grouted / patched, and the brick wall above stitched, or locally reconstructed as required.

- New Addition – Structure
  - The new addition will consist of a steel frame supporting a concrete on metal deck floor system. For pricing assume 12 psf of steel for elevated floors and a 3-¼" lightweight concrete slab on 2" 18 gage composite floor deck.
  - Foundations for the new building are anticipated to be shallow spread footings.
  - New basement is set below the existing basement; while an effort has been made to minimize underpinning, the new addition will still require an at-grade entrance with mechanical basement below. Allow for underpinning as indicated in drawings at existing building south façade (open-sided courtyard).
  - The lateral system will consist of steel braced frames sized to carry the load of the new addition. It is not anticipated that we will upgrading the existing building for new lateral loads. (BBB – please note that we should discuss a lateral separation or not to avoid imparting loads on the existing).

Life Safety & Accessibility Improvements (BBB)

- Existing pair of wood stairwells

  - Assume full over-surfacing of treads, risers, landings with resilient tread/riser material (e.g. Tarkett stairwell management)
  - New lighting, graphics, signage, etc.
- For each stairwell, assume replacement of inboard wall on each floor, with new painted metal flush panel hold-open fire door with vision lite
- New Addition
  - Connecting Stair between old and new buildings
    - Metal pan stair with precast terrazzo tile overlay
    - Painted metal handrail/guardrail
    - Painted hollow metal doors and frames with rated full-height vision panel on mag-lock hold-opens connecting to FA system
  - Gym egress and Food Service Stairs
    - Metal pan stair with concrete tread inlay (typ back of house)
    - Painted metal handrail/guardrail
    - Painted hollow metal doors and frames
  - Assume all accessibility signage for public buildings per 521 CMR, and nicer graphics/lighting in Connecting Stair

Vertical Conveyance Systems

- See plans for new elevator and two-stop food service dumbwaiter:
  - Elevator: New MRL elevator, e.g. Otis Gen2 MRL or equal; 3500# each, 200 feet per minute (FPM), front-and-back openings (6 total). Cab and landing finishes to be selected from manufacturer's standard finishes.
  - Dumbwaiter: two-stop dumbwaiter for food service use

Mechanical Infrastructure/Systems (BR+A)

- Mechanical system shall prioritize load reduction strategies, such as advanced ventilation energy recovery, and use a decoupled hydronic heating and cooling system. There will be no on-site fossil fuel combustion for heating. The air-side and water-side systems are described below. Air-side system
  - (1) 12,500 cfm semi-custom 100% outside air AHU, including dual core regenerative heat recovery, similar to Tempeff or Bousquet. Unit shall include the following components: MERV-8/MERV-14 combination filter rack, supply and exhaust ECM fan arrays, electric resistance heating coil (backup use only), chilled water cooling coil with wraparound heat pipe, supply and exhaust sound attenuators (pending acoustical analysis). Provide bypass dampers for cooling coil. Unit shall be located on roof of new addition.
  - (3) 500 cfm kitchen exhaust fans. Exhaust fan systems shall include serviceable energy recovery coils.
  - All zones to have decoupled hydronic terminal units:
    - Classrooms: low-wall displacement ventilation, ceiling exhaust. Provide supplemental vertical concealed fan coil units in furred walls.
    - Storage areas: 4-pipe cassette-style fan coil units

        - Cafeteria: low-wall displacement ventilation, ceiling exhaust. Provide supplemental vertical concealed fan coil units in furred walls.
        - Gym: low-wall displacement ventilation, ceiling exhaust. Provide supplemental vertical concealed fan coil units in furred walls. Provide operable window switch interlock.
        - Library: 4-pipe cassette-style fan coil units. Duct ventilation to fan coil unit knock-out with VAV inlet damper.
        - Meeting rooms: 4-pipe ducted fan coil units. Duct ventilation to fan coil unit return with VAV inlet damper.
        - Provide desk fans for all multi-occupant work areas
        - Provide CO2-based demand control ventilation in all classrooms, cafeteria, gym, meeting rooms, and library
        - Provide occupancy-based ventilation in single-occupant spaces
        - Provide window sensors with HVAC interlock and dewpoint sensor for all operable windows
    - (3) Medium pressure supply and exhaust duct risers. Plenum return via (3) VAV return boxes per floor.
    - Assumes no dedicated perimeter heating system
- Water-side systems – hot water (110F) and chilled water (44F) distribution
    - Air-source heat pump
        - 2-pipe ASHP consisting of (7) 30 ton (nominal) modules, similar to Multistack ARP-30. Actual heating output is 215 MBH per module at 12°F.
            - Heat pump shall contain glycol and be separated from hydronic distribution loops with HX. Provide glycol tank and feed pump.
            - Provide (2) 300 gpm plate and frame HX
            - Provide (2) 5 hp GWP (vertical in-line close coupled ECM)
            - Provide (2) 5 hp HWP (vertical in-line close coupled ECM)
            - Provide (2) 5 hp CHWP (vertical in-line close coupled ECM)
            - Provide (1) 600 gal buffer tank
            - Heat pumps shall be located on roof of gym with hydronic pumps and accessories located in basement mechanical room or mechanical doghouse.
        - <u>(2) 30 ton heat recovery chiller modules with dual refrigeration circuits and VFD compressors. Similar to Multistack DHRC.</u>
            - <u>Provide (2) 2 hp HWP (vertical in-line close coupled ECM)</u>
            - <u>Provide (2) 2 hp CHWP (vertical in-line close coupled ECM)</u>
            - <u>Provide (2) 400 gallon buffer tanks</u>
            - <u>Heat recovery chiller shall be located in mechanical room.</u>
        - <u>Provide plant controller by chiller manufacturer similar to MultiPro</u>

Electrical & Fire Alarm Infrastructure/Systems (BR+A, A10)

- Electrical:

  - Provide 1000 KVA pad mounted utility transformer located on the site. Transformer shall feed 1600A main switchboard (480/277V, 3PH, 4W) located within an electrical room. The switchboard shall have a utility metering CT cabinet. Switchboard breakers shall have built in metering capabilities.
  - Provide a lighting panel (100A, 480/277V, 3PH, 4W) on each floor.
  - Provide a panel for site lighting
  - Provide a 84 pole panelboard (150A, 480/277V, 3PH, 4W), fed from a 45KVA step down transformer on each floor to serve receptacle loads.
  - Provide a panelboard (400A, 480/277V, 3PH, 4W) to serve mechanical loads, and a 45 KVA step down transformer to serve a 84 pole panelboard (150A, 480/277V, 3PH, 4W) for mechanical loads.
  - Provide branch circuits to all lighting fixtures fed from central lighting control system, consisting of time of day control and occupancy sensing.
  - Provide battery powered emergency egress lighting.
- Fire alarm:
  - The building will be provided with a complete fire alarm system to include automatic and manual initiating devices, occupant notification, fire safety functions and off-premises reporting in accordance with all applicable codes.
  - The system will consist of a distributed analog/addressable, microprocessor-based control panel with power supplies, operator's controls, automatic and manual initiating devices, notification appliances, primary and secondary power, and off-premises event reporting as shown and required. Occupant notification shall consist of general evacuation audio/visual signals throughout the building.
  - The system shall be integrated with the city reporting system to provide uniform event reporting and annunciation.
- Renewable energy:
  - Provide infrastructure to support 60 kW on-site PV array, consisting roof panels. Provide central inverters with DC optimizers. The panel board breaker fed from the PV array shall be individually metered.
  - Provide battery storage (size TBD) for resiliency and to maximize SMART solar incentive. Batteries to be located in outdoor enclosure.
- Lighting – refer to Sustainability Section.
- Metering – refer to metering/submetering section in **Sustainability**

Plumbing & Fire Protection Infrastructure/Systems (BR+A)

- New 8 inch fire protection service into the building. Complete wet sprinkler and standpipe system. New fire department connection and accessories.
- New 3 inch water service to the building complete with backflow preventer and meter for building and separate backflow for irrigation.
- Water heaters (Duplex air source heat pump 7kW with 100 gallon tanks)

- Onsite rainwater holding tank and rainwater reuse system with day tank, UV recirculating system. (See **Civil Infrastructure section)** Water used for toilet flushing and irrigation. Rainwater reclamation system is anticipated to be sufficient for toilet flushing and irrigation system needs.
- **PLUM ALTERNATE 1**: Rainwater reclamation system for irrigation only. No toilet flushing.

Technology, Communications, & Security (TCS) Infrastructure/Systems (BBB, with BR+A)

- TECH/COMM
    - Combined IDF/MDF in basement with (2) 4" conduits
    - IDF: One closet on upper floor
    - Wiring Assumption: Cat6
    - Data Drops:
        - Two per classroom, two per office, allow 20 extra for other misc. use
    - WIRELESS: Provide Distributed Wireless Access Points throughout building
    - Other Communications: Phone drop for elevator cab
- Security
    - Provide Siemens-type or similar Keycard Access Control System for building entries, IDF/MDF rooms
    - Provide ethernet surveillance camera drops at each entry door; video intercom/remote buzzer at main entry

Fit-Out (BBB)

General Fit-Out Notes

- Walls
    - Typical partition construction is 5/8" GWB on metal stud
- Ceilings
    - Provide rated GWB ceiling at underside of all joist assemblies in existing building; all systems go below this layer and are either exposed (and painted out) or concealed behind ACT or second GWB ceiling
- Other Finish Notes:
    - $ for environmental graphics, slightly nicer details at entry lobby and key common spaces
    - Allow for room-darkening shading at all windows

Fit Out Space Types and Scope Allowances

- GYM
    - Floor: Floating wood strip gym flooring system
    - Walls: Padding to 8' AFF and Tectum acoustic panels above
    - Ceiling: perforated metal panel with acoustic backing
    - Lighting: typical school gym
- CAFETERIA
    - Floor: precast terrazzo tile
    - Walls: Painted GWB up to 6' AFF with acoustic plaster above
    - Ceiling: acoustic plaster with acoustic isolation

- FOOD SERVICE
  - Floor: Altro Stronghold 30 safety flooring with integral cove base
  - Walls: Acrovyn to full height
  - Ceiling: Sanitary ACT (per health code)
  - Lighting: LED downlights integrated into ACT
- TOILET ROOMS (Addition)
  - Finishes – typical elementary school for students
- RESTROOMS (Existing Building – Teachers)
  - Finishes – typical for teachers
- CLASSROOMS (all in existing building)
  - Assume replacement of all flooring with new linoleum tile and rubber base
  - 100% repaint and allow for patching associated with new MEP systems
  - New drop ceiling for MEPFP with all new lighting and FP
- LOBBIES/CORRIDORS/CIRCULATION **(As indicated)**
  - Flooring: linoleum tile with rubber base
  - Lighting: Decorative pendants and decorative wall lighting, also allow for track monopoints along one side of walls
- BOH/STORAGE/MECH (As indicated)

Floors: At basement level, floor finish to be sealed concrete foundation slab; on upper floors, provide sheet-good resilient floor

Precedent Image - MIT Campus
Bioretention landscape retains stormwater subgrade, instead of ponding at the surface; landscape grade is even with surrounding area

Precedent Image - Hernandez Elementary School Roxbury
Stormwater routed to interactive bioretention landscape

Precedent Image - City of Boston
Conventional concrete sidewalk pitches to permeable paver strip with underdrains

Bioretention landscape area

Locate underdrains throughout bioretention and permeable paving. Connection locations to mains to be determined.

Replace domestic water and fire protection lines, location to be determined

Permeable asphalt pedestrian forecourt with landscape planting

Pedestrian pavement pitched to permeable paver strip along curb (see image)

Replace sewer line, location to be confirmed

Permeable pavers at building egress

Permeable play surface

16,000 gallon rainwater reuse tank

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Brown School
Somerville, MA

Conceptual Site Plan Sketch - DRAFT
Brown School
Prepared by Nitsch Engineering
10/15/21

0 40 80 Feet

NOTES

1) ELEVATIONS REFER TO MEAN LOW WATER, BENCHMARK USED: SEWER MANHOLE NORTH OF THE INTERSECTION OF JOSEPHINE AVENUE AND KIDDER AVENUE. ELEV = 45.08.

2) THE PARCEL IS LOCATED IN ZONE C AS SHOWN ON FLOOD INSURANCE RATE MAP, CITY OF SOMERVILLE, MASSACHUSETTS, COMMUNITY PANEL NUMBER 250214 0001 B, EFFECTIVE DATE JULY 17, 1986, ZONE C = AREAS OF MINIMAL FLOODING.

3) ZONING DISTRICT: RESIDENCE A (RA)
SETBACK REQUIREMENTS
FRONT = 15'

	STORIES	SIDE YARD	SUM SIDE YARDS
SIDE =	1 OR 1½	6'	14'
	2 OR 2½	8'	17'
	3	10'	20'
	4 & OVER	1/3 bldg ht	2/3 bldg ht

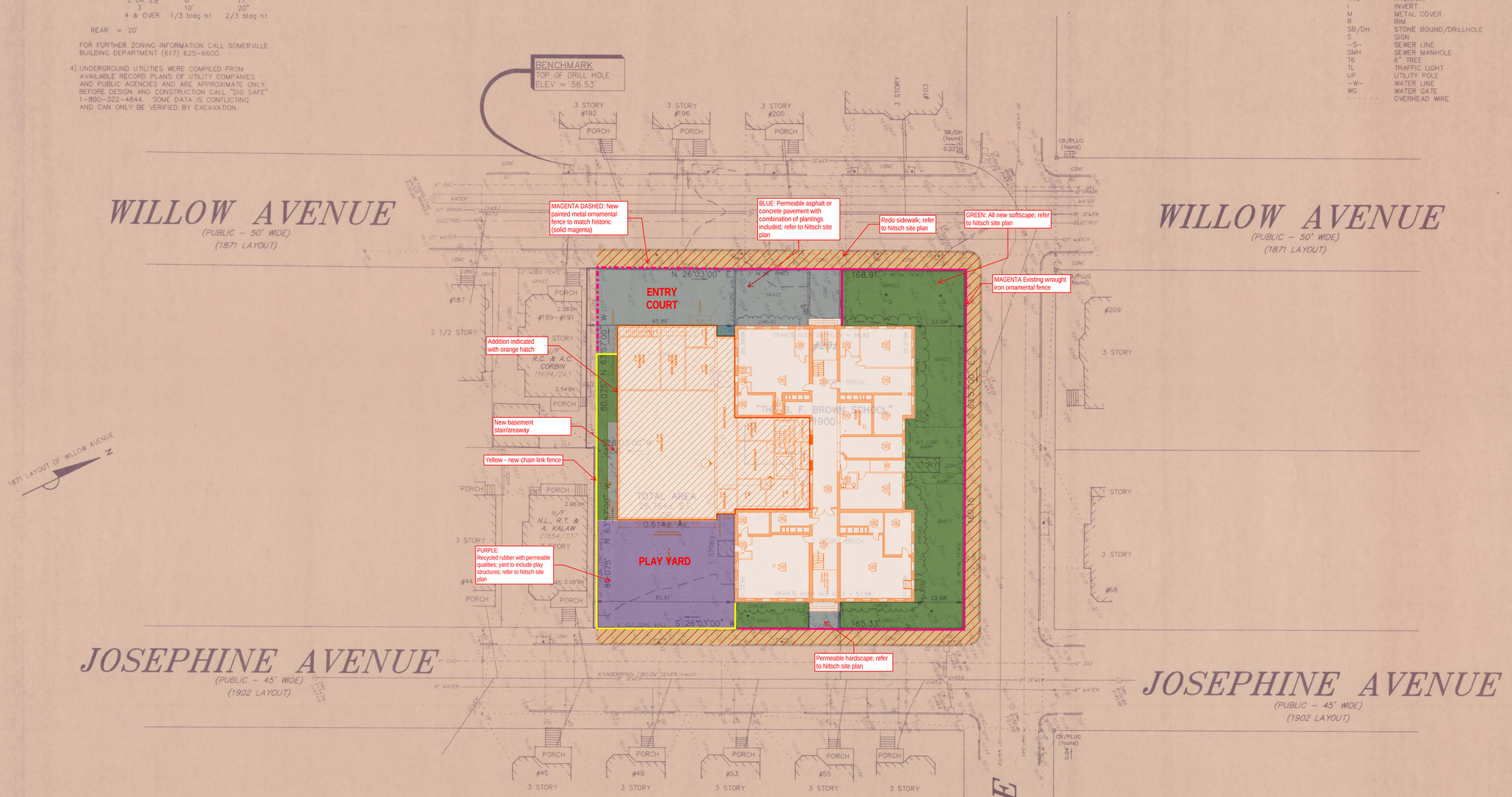
REAR = 20'

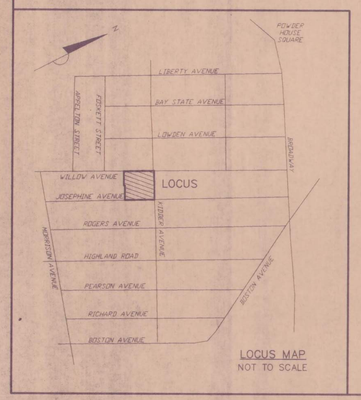
FOR FURTHER ZONING INFORMATION CALL SOMERVILLE BUILDING DEPARTMENT (617) 625-6600.

4) UNDERGROUND UTILITIES WERE COMPILED FROM AVAILABLE RECORD PLANS OF UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. BEFORE DESIGN AND CONSTRUCTION CALL "DIG SAFE" 1-800-322-4844. SOME DATA IS CONFLICTING AND CAN ONLY BE VERIFIED BY EXCAVATION.

LEGEND

BIT CONC	BITUMINOUS CONCRETE
CB	CATCHBASIN
CB/PLUG	CONCRETE BOUND/PLUG
CC	CONCRETE CURB
CLF	CHAIN LINK FENCE
CONC	CONCRETE
EMH	ELECTRIC MANHOLE
-G-	GAS LINE
GC	GRANITE CURB
GG	GAS GATE
HYD	HYDRANT
I	INVERT
M	METAL COVER
R	RIM
SB/DH	STONE BOUND/DRILLHOLE
S	SIGN
-S-	SEWER LINE
SMH	SEWER MANHOLE
T6	6" TREE
TL	TRAFFIC LIGHT
UP	UTILITY POLE
-W-	WATER LINE
WG	WATER GATE
- - - -	OVERHEAD WIRE





LOCUS MAP
NOT TO SCALE

REFERENCES

MIDDLESEX COUNTY REGISTRY OF DEEDS
DEED BOOK 3492 PAGE 214 (LOCUS PLAN)
PLAN BOOK 183 PLAN 14 (LOCUS PLAN)
" " 211 " 14
" " 153 " 18
" " 127 " 40
" " 123 " 13

CITY OF SOMERVILLE DEPT. OF PUBLIC WORKS
VOLUME X, PLAN 10 JOSEPHINE AVE. SEWER
VOLUME T, PLAN 3 WILLOW AVE. SEWER
"WILLOW AVENUE SURVEY" APRIL 1871
"FREDERICK AVENUE FOR ACCEPTANCE" MARCH 1912
"JOSEPHINE AVENUE FOR ACCEPTANCE" APRIL 1902
WATER DISTRICT SHEET 1
"MAP OF EXISTING SEWER AND DRAIN SYSTEMS" FIG I-1
"WILLOW AVENUE PROPOSED 12" WATER MAIN", 2/1/1985

FIELD NOTE BOOK 225 PG(S). 66-69
" " " 222 " 64-65
" " " 181 " 72-87
" " " 174 " 66-69
" " " 136 " 214-223

COMMONWEALTH GAS COMPANY
SOMERVILLE PLATE 12

BOSTON EDISON COMPANY
NONE SUPPLIED

0 20 40 60 80 ft
SCALE: 1" = 20'

KEVIN W. HINDS PLS No. 30327 4/22/97

HMFH Architects

HMFH Architects, Inc.
Architecture & Planning
130 Bishop Allen Drive
Cambridge, MA 02139
Telephone: (617) 492-2200 FAX: (617) 876-9775

COMMONWEALTH OF MASSACHUSETTS
KEVIN W. HINDS
No. 30327
REGISTERED LAND SURVEYOR
4/22/97

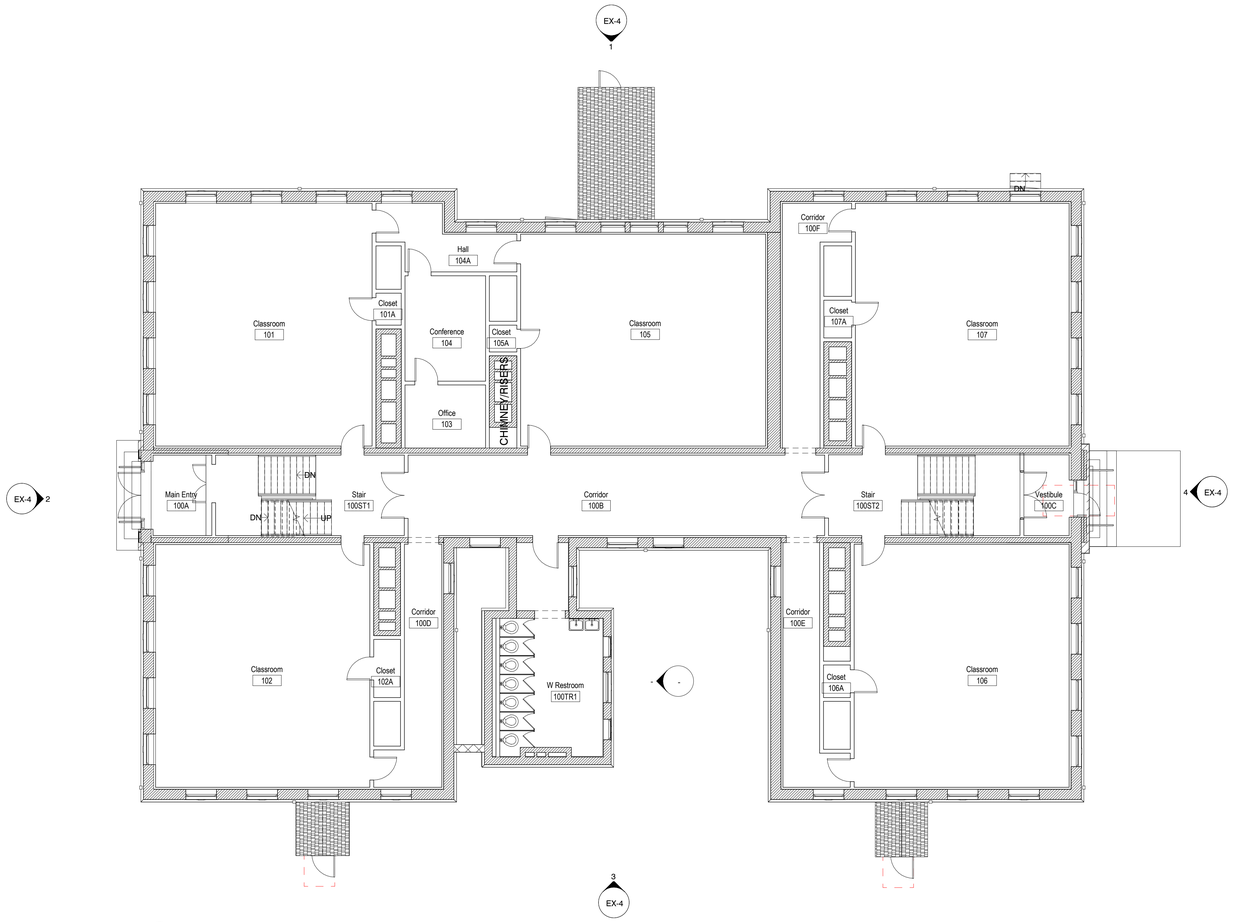
H & R SURVEY
1068A MASSACHUSETTS AVENUE
ARLINGTON, MA 02174
(617) 648-5533
1373TP1.DWG SHEET 1 OF 1

Revision No.	Date	Remarks	By

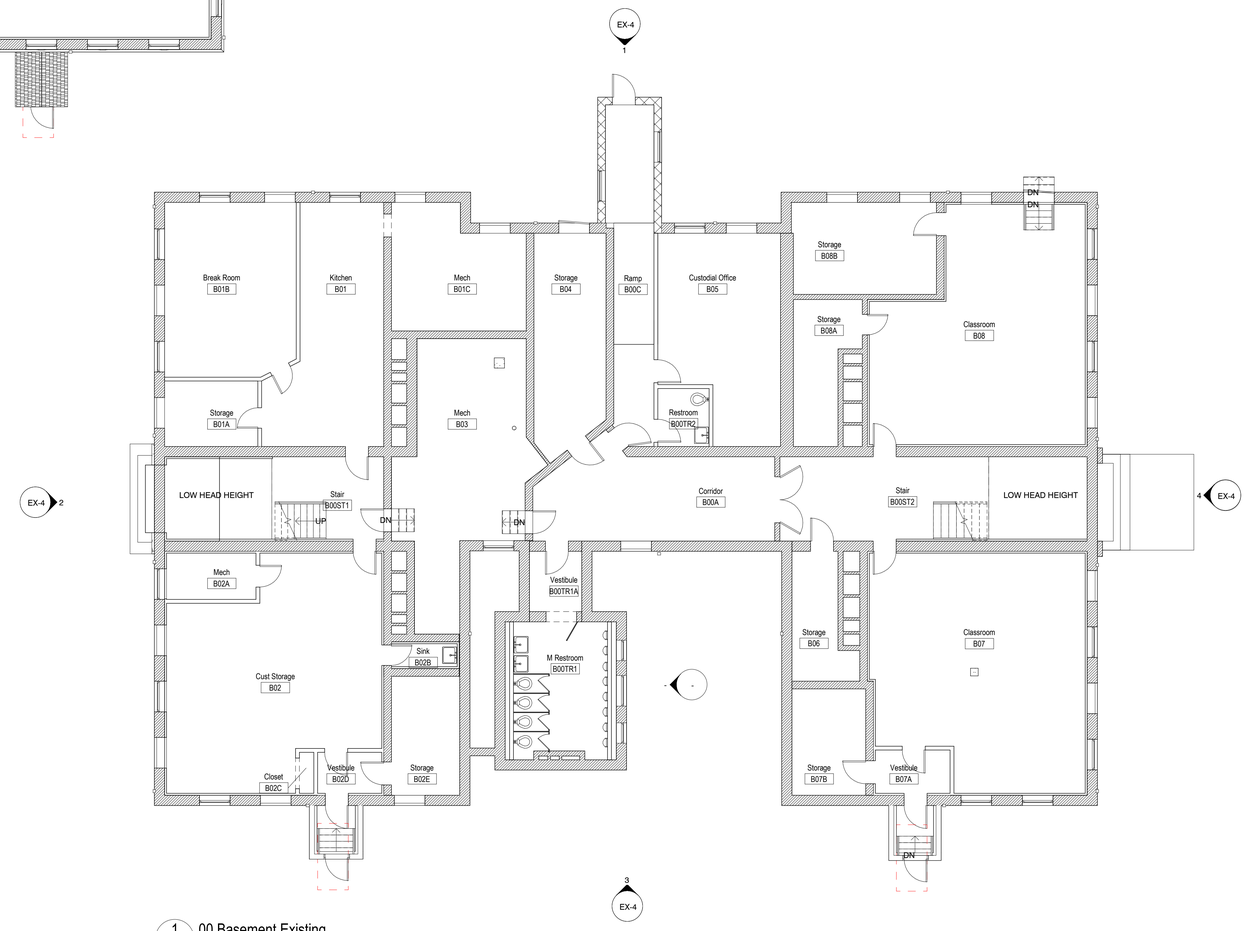
THE B. F. BROWN SCHOOL
Somerville, Massachusetts
Topographic Plan
Scale: 1"=20' Date: 4/22/1997 Drawn: M.A.P. Checked: K.W.H.

Drawing Number
X1

Job Number:



2 EX-1 01 First Floor Existing
1/8" = 1'-0"



1 EX-1 00 Basement Existing
1/8" = 1'-0"

NOTE IF THIS SHEET IS NOT 30"W x 42"L THEN IT IS NOT THE INTENDED SIZE. IN ALL CASES, WORK TO FIGURED DIMENSIONS.

0 1" 2"

8/5/2021 4:17:43 PM

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KEY PLAN

STAMP

NO	DATE	DESCRIPTION

REVISIONS

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Exploratory
NOT FOR CONSTRUCTION

DRAWING TITLE

Existing Plans - Lower Level & First Floor

SCALE	1/8" = 1'-0"
DATE	06/09/21
PROJECT NUMBER	2875
DRAWING NUMBER	

EX-1

of

NOTE IF THIS SHEET IS NOT 30"W x 42"L THEN IT IS NOT THE INTENDED SIZE. IN ALL CASES, WORK TO FIGURED DIMENSIONS.

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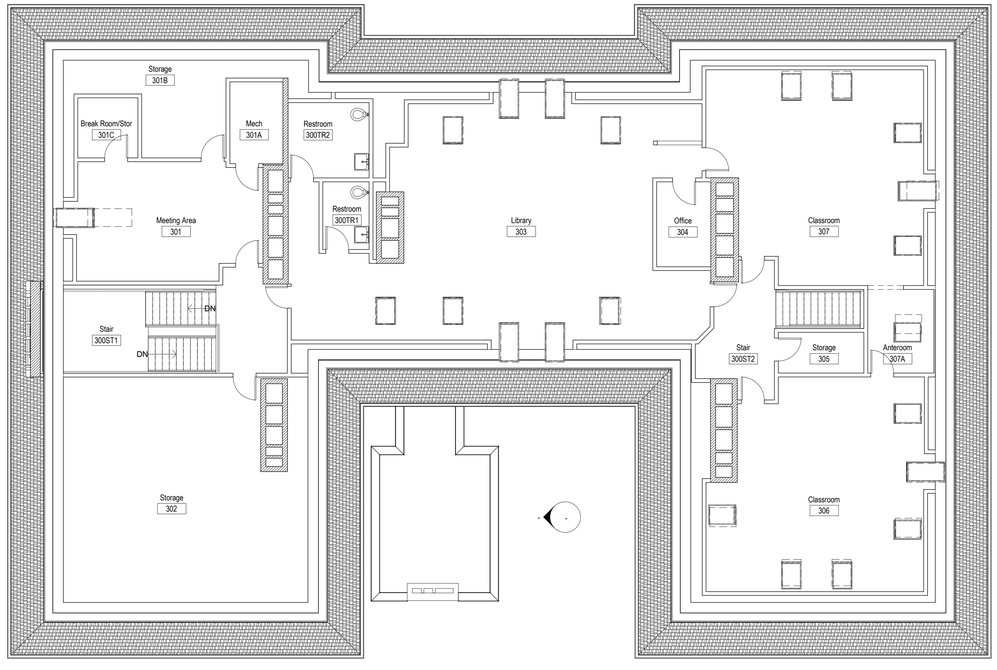
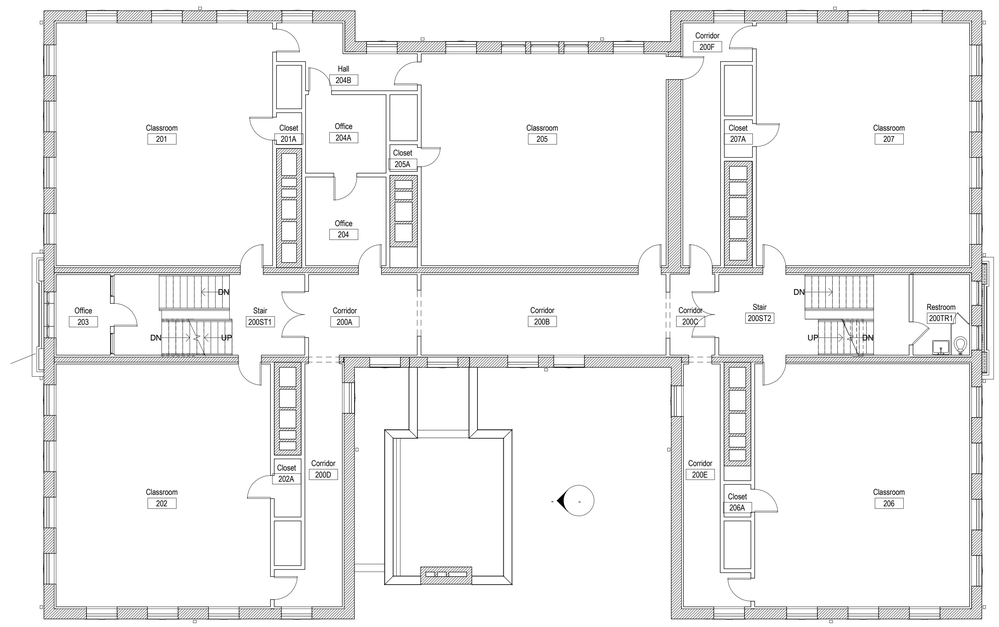


2 03 Third Floor Existing
EX-2 1/8" = 1'-0"



1 02 Second Floor Existing
EX-2 1/8" = 1'-0"

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Existing Plans - Second & Third Floors

SCALE	1/8" = 1'-0"
DATE	06/09/21
PROJECT NUMBER	2875
DRAWING NUMBER	

EX-2

of

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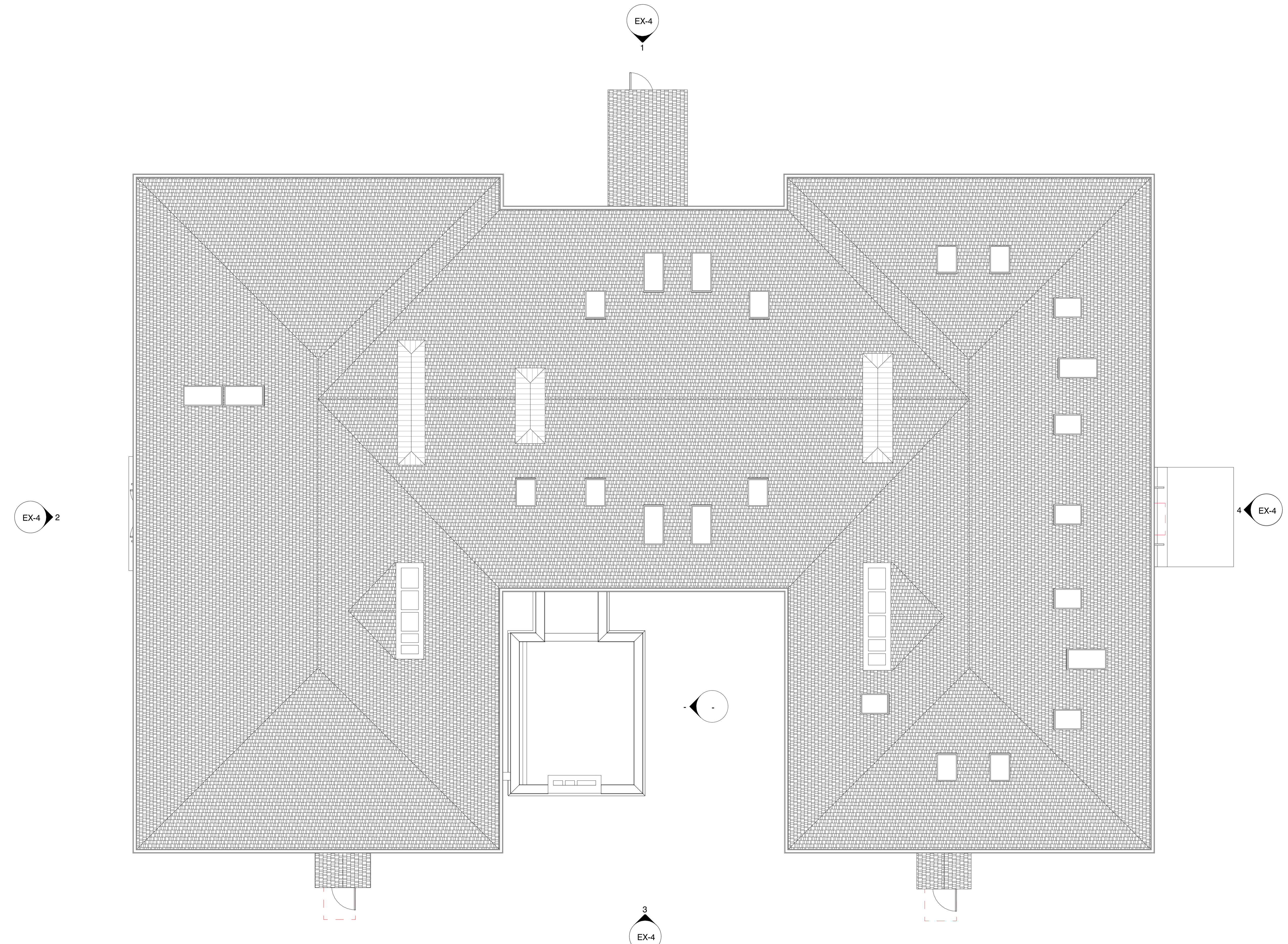
1 EX-3 Axonometric View - SE Corner

2 EX-3 Axonometric View - NW Corner



3 EX-3 04 Roof Existing
1/8" = 1'-0"

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DRAWING TITLE

Roof Plan & Axonometric Views

SCALE	1/8" = 1'-0"
DATE	06/09/21
PROJECT NUMBER	2875
DRAWING NUMBER	

EX-3
of

0 1" 2"

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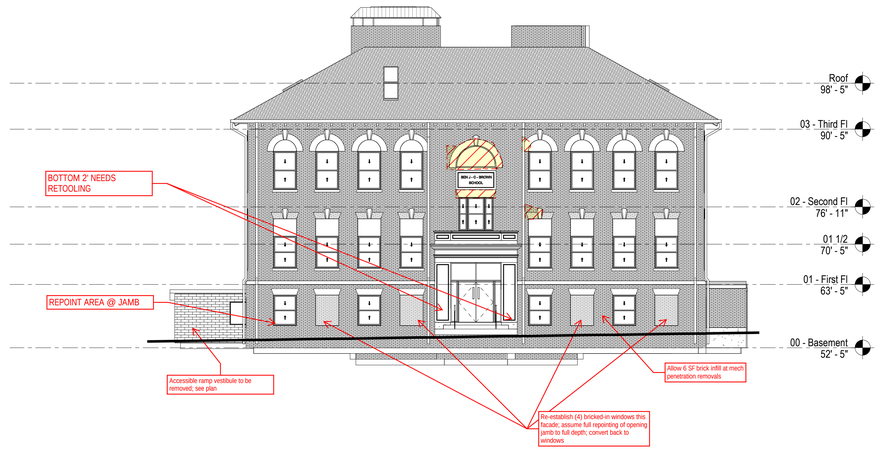

2 EX-4 Elevation West_Existing
3/32" = 1'-0"

4 EX-4 Elevation East_Existing
3/32" = 1'-0"

This is part of BOD, but also see ENV Alternate (add-alt) for 100% re-point across the board

1 EX-4 Elevation North_Existing
3/32" = 1'-0"

3 EX-4 Elevation South_Existing
3/32" = 1'-0"

KEY NOTES

- BRICK REQUIRING 100% REPOINTING - TYP
- CRACK REQUIRING BRICK STITCHING - TYP
- REPLACE X# BRICKS IN THIS AREA
- *ALL STONE ELEMENTS TYPICAL CLEAN & REPOINT
- * 100% REPOINT ALL JACK ARCHES

Content updated since PDP as noted in BLUE

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Existing Elevations

SCALE	3/32" = 1'-0"
DATE	06/09/21
PROJECT NUMBER	2875
DRAWING NUMBER	EX-4

of

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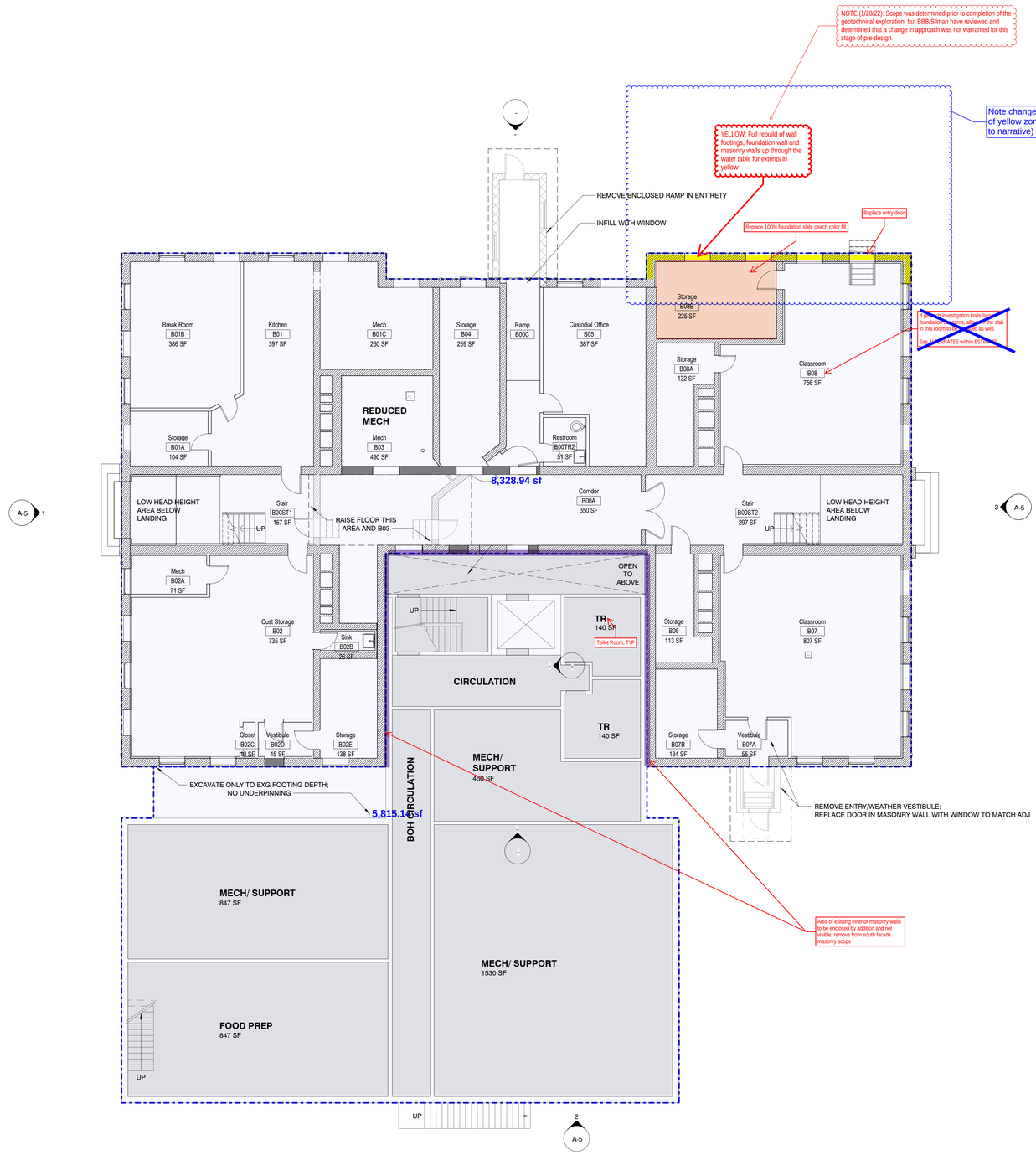

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Preliminary Design Program
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DRAWING TITLE

Proposed Basement Plan - Addition Blocking

SCALE	1/8" = 1'-0"
DATE	06/17/21
PROJECT NUMBER	2875
DRAWING NUMBER	A-1

of

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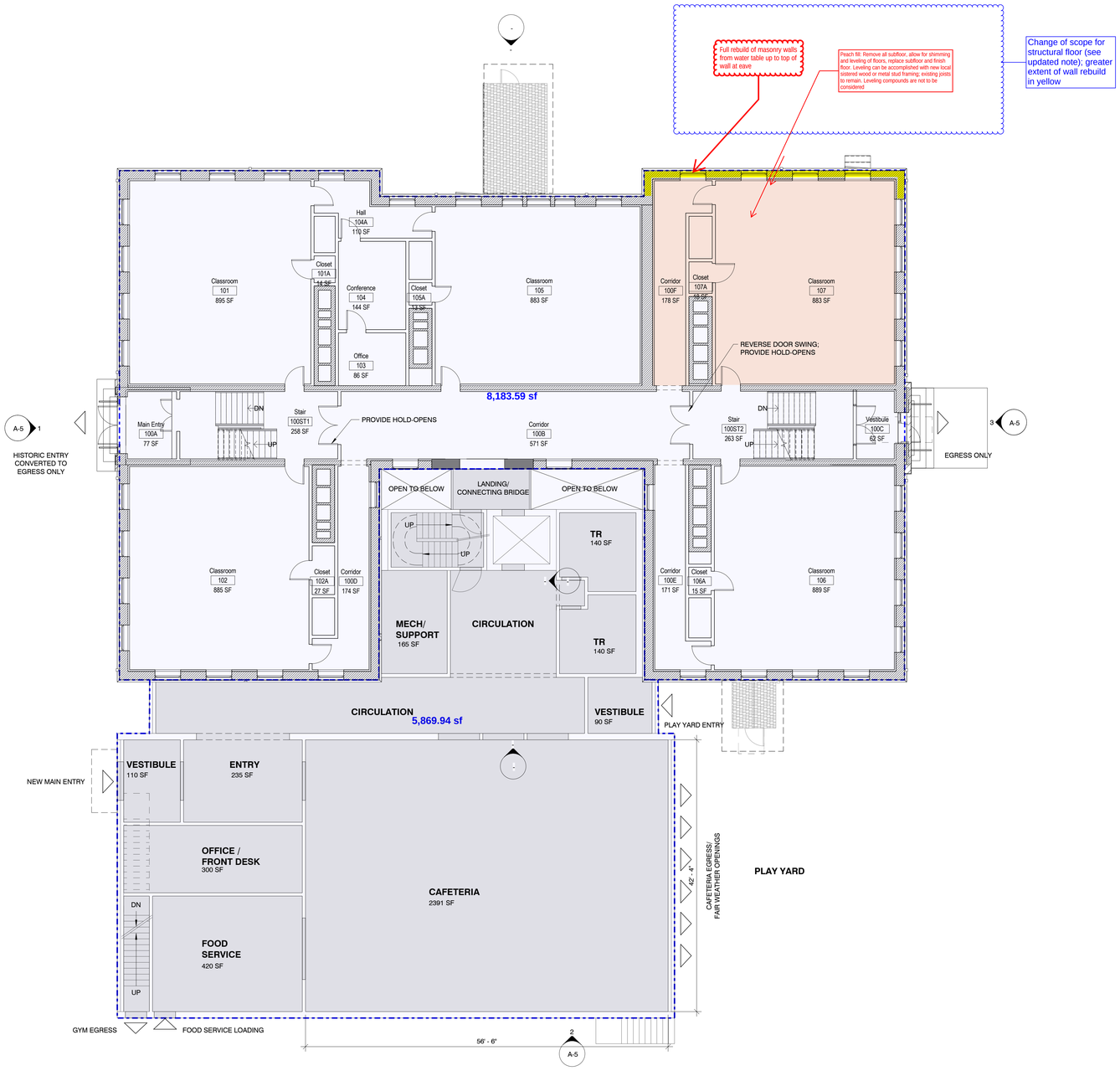

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Preliminary Design Program
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DRAWING TITLE

Proposed First Floor Plan - Addition Blocking

SCALE	1/8" = 1'-0"
DATE	06/17/21
PROJECT NUMBER	2875
DRAWING NUMBER	A-2

of

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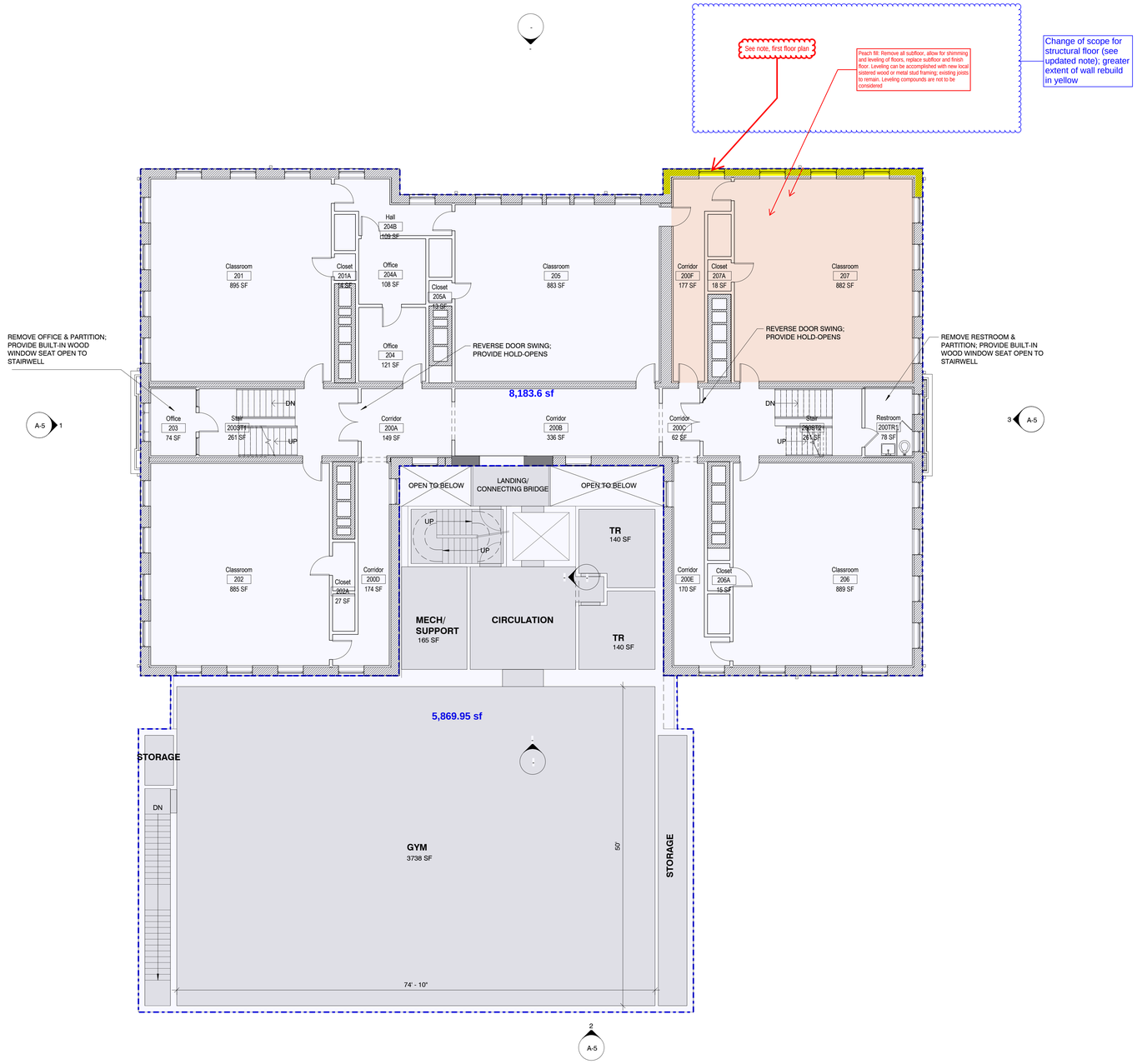

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KEY PLAN

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NO	DATE	DESCRIPTION

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Preliminary Design Program
NOT FOR CONSTRUCTION

DRAWING TITLE

Proposed Second Floor Plan - Addition Blocking

SCALE	1/8" = 1'-0"
DATE	06/17/21
PROJECT NUMBER	2875
DRAWING NUMBER	A-3

of

6/23/2021 7:19:59 PM BIM 360://2875 Somerville MA-Somerville Brown School Exp-ED1_33-Development.rvt

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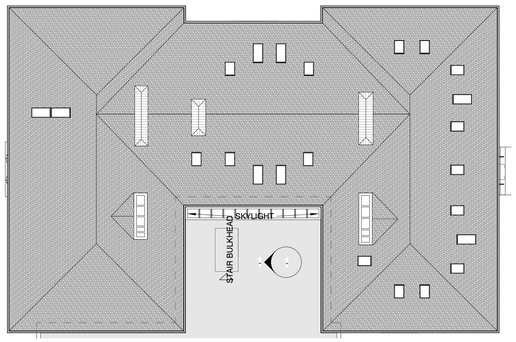
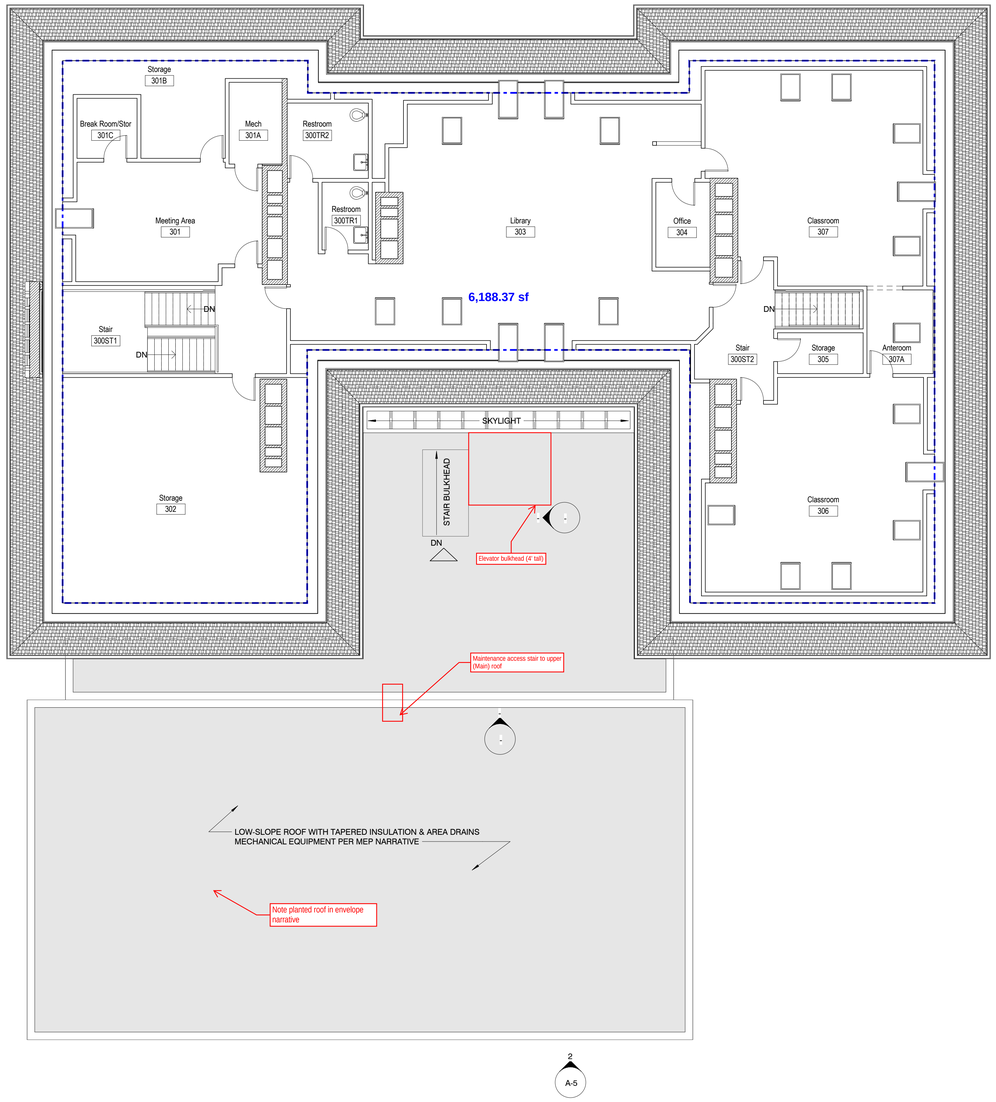


1 A-4 Proposed Roof Plan - Existing Building Only
1/16" = 1'-0"



2 A-4 Proposed Third Floor - Addition Blocking
1/8" = 1'-0"

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KEY PLAN

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NO	DATE	DESCRIPTION

REVISIONS

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Preliminary Design Program
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DRAWING TITLE

Proposed Third Floor & Roof Plan - Addition Blocking

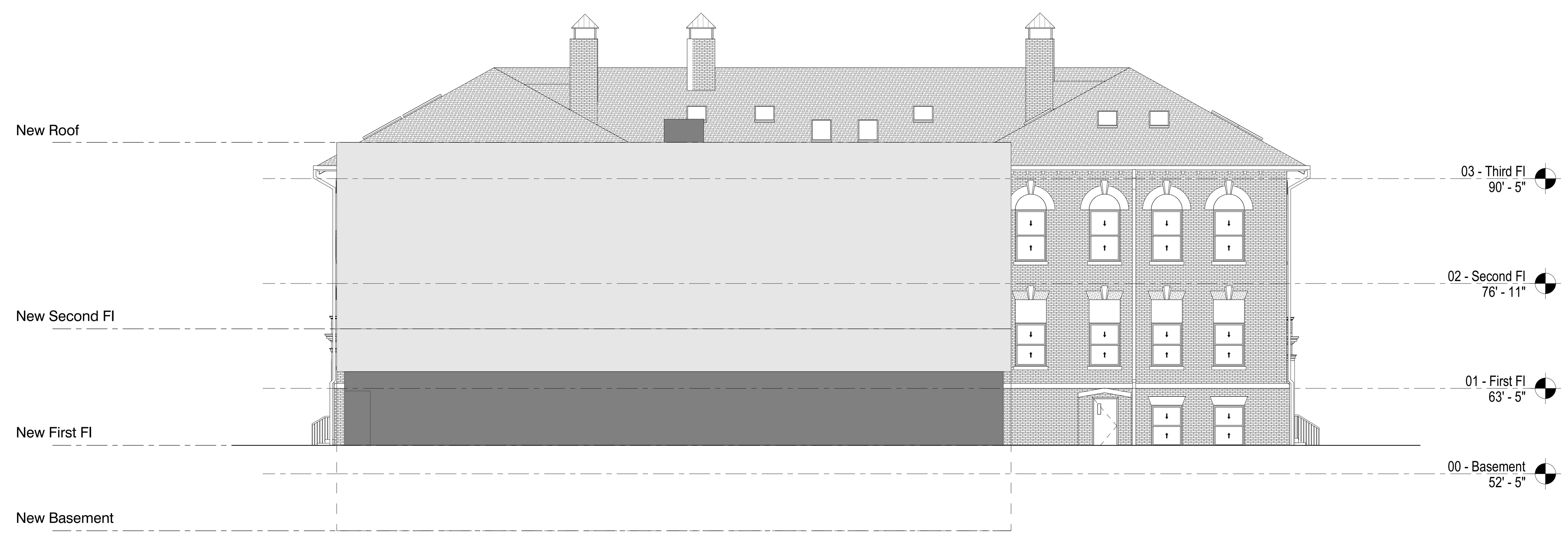
SCALE	As indicated
DATE	06/17/21
PROJECT NUMBER	2875
DRAWING NUMBER	A-4

of

6/23/2021 7:29:11 PM BIM 360://2875 Somerville/VA-Somerville-BrownSchool-Eng-R21_3D-Development.rvt

3
A-5
Proposed East Elevation - with Addition Massing
3/32" = 1'-0"

Note - refer to these elevations for dimensions and design of the new addition and relationship to existing building. See Exploratory Base drawings for Existing Building facade rehab



2
A-5
Proposed South Elevation - with Addition Massing
3/32" = 1'-0"

1
A-5
Proposed West Elevation - with Addition Massing
3/32" = 1'-0"

NOTE IF THIS SHEET IS NOT 30"W x 42"L THEN IT IS NOT THE INTENDED SIZE. IN ALL CASES, WORK TO FIGURED DIMENSIONS.

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KEY PLAN

STAMP

NO DATE DESCRIPTION

REVISIONS

SUBMITTAL

Preliminary Design Program
NOT FOR CONSTRUCTION

DRAWING TITLE

Proposed Elevations - Addition Massing

SCALE	3/32" = 1'-0"
DATE	06/23/21
PROJECT NUMBER	2875
DRAWING NUMBER	

A-5

of

CITY OF SOMERVILLE – BROWN SCHOOL
CODE COMPLIANCE APPROACH REPORT

Schematic Design

PREPARED FOR

Beyer Blinder Belle Architects & Planners
33 Arch Street, 17th Floor
Boston, MA 02110

Project #: 1KTC00950
Report #: REV 0
Date: 11/24/2021

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1.0 Executive Summary

The proposed renovations and addition to the existing Brown School at 201 Willow Avenue in Somerville, MA include alterations and horizontal addition to accommodate a change of occupancy that incorporates assembly spaces into the educational building.

+ Applicable Building Code: Massachusetts State Building Code (780 CMR) 9th Edition (amended version of the 2015 International Building Code (IBC)), including 780 CMR Chapter 34, Existing Structures (amended 2015 International Existing Building Code (IEBC)).

+ The project work is classified by the following types according to the Work Area Compliance Method of 780 CMR Ch. 34:

☒ Repairs	☒ Addition
☒ Level 1 Alterations	☒ Change of Occupancy
☒ Level 2 Alterations	☐ Historic Building
☐ Level 3 Alterations	☐ Relocated Building

+ Applicable Fire Code: 527 CMR 1.00 Massachusetts Comprehensive Fire Safety Code (amended version on 2015 Edition of NFPA 1 Fire Code)

+ Proposed Building Height: Approximately 44.5 feet (measured from grade plane to average of highest roof surface)

+ Number of Stories: 4 stories above grade plane

+ High-rise: ☐Yes ☒No

+ Area: Approximately 46,200 gross square feet (not more than 13,400 square feet per story)

+ Construction Type: Type IIIB

+ The building will contain (may contain) the following Occupancy Classifications as a result of the proposed renovations:

☐ A-1	☐ F-1	☐ I-1 Condition 1	☐ I-3 Condition 4	☐ R-4
☒ A-2	☐ F-2	☐ I-1 Condition 2	☐ I-3 Condition 5	☒ S-1 (Accessory)
☒ A-3	☐ H-1	☐ I-2 Condition 1	☐ I-4	☒ S-2 (Accessory)
☒ A-4	☐ H-2	☐ I-2 Condition 2	☐ M	☐ U
☐ A-5	☐ H-3	☐ I-3 Condition 1	☐ R-1	
☐ B	☐ H-4	☐ I-3 Condition 2	☐ R-2	
☒ E	☐ H-5	☐ I-3 Condition 3	☐ R-3	

+ Fire Protection Systems:
  - Automatic Sprinkler Protection System(s): ☒Yes ☐No
  - Fire Pump(s): ☐Yes ☒No
  - Standpipe System(s): ☐Class I ☐ Class II ☐ Class III
  - Alternative Fire Suppression System(s): ☐Yes ☒No
  - Fire Alarm System: ☒Yes ☐No
  - Emergency Voice/Alarm Communication: ☒Yes ☐No
  - Emergency Responder Communication System: ☐Yes ☒No
  - Fire Extinguishers ☒Yes ☐No
  - Smoke Control Systems:
    - Atrium Exhaust ☐Yes ☒No
    - Stair Pressurization ☐Yes ☒No
    - Elevator Pressurization ☐Yes ☒No

+ Proposed Code Alternatives:
  - No alternatives are proposed at this time.

2.0 Introduction

The proposed renovations and addition to the existing Brown School at 201 Willow Avenue in Somerville, MA include alterations and horizontal addition to accommodate a change of occupancy that incorporates assembly spaces into the educational building.

The existing building contains approximately 46,200 gross square feet (not more than 13,400 square feet per story) on 4 stories above grade[1]. The building is an existing K-6 grade educational building, consisting of multiple classrooms, accessory break rooms, a library, support rooms, and accessory storage/MEP space. The project will position the building to be maintained as an educational building, including a new cafeteria, kitchen, gymnasium, and additional mechanical space in the new addition. The one-story horizontal addition will result in an increase in building area.

The building's existing structural members consist of unprotected noncombustible and combustible elements including beams, columns, and floor/ceiling systems and noncombustible load bearing exterior walls. The existing building is equipped with a fire alarm system and is partially protected by an automatic sprinkler system.

This report is intended to serve as a reference for the design team and code enforcement officials to understand the major building code stipulations (pertaining to fire / life safety and accessibility) associated with the project. Specific trades such as structural, plumbing, electrical, mechanical, etc. and matters pertaining to energy conservation, flood hazard, and zoning compliance are not intended to be addressed by this report in detail. The information in this report is based on the following:

+ Preliminary drawings dated 06/17/2021.
+ Site inspection conducted on 02/23/2021.
+ Project related discussions with the design team.

Throughout the report, code references are provided in parentheses, following requirements, to facilitate review of the provisions in detail.

As discussed below, the building will require complete automatic sprinkler protection as a result of the project. The remainder of this report assumes that the building will be fully sprinklered.

3.0 Applicable Codes

The Commonwealth of Massachusetts currently adopts the following codes applicable to the fire protection, life safety, and accessibility scopes of work:

+ Accessibility – Massachusetts Architectural Access Board Regulations (521 CMR) and the Americans with Disabilities Act (ADA) 2010 Standards for Accessible Design.
+ Building – Massachusetts State Building Code (780 CMR) 9th Edition (amended version of the 2015 International Building Code (IBC)) including references to 780 CMR Chapter 34 (amended version of the 2015 International Existing Building Code (IEBC)).
+ Electrical – Massachusetts Electrical Code, 527 CMR 12.00 (amended version of the 2020 National Electrical Code, NFPA 70, effective January 1, 2017).
+ Elevators – Massachusetts Elevator Regulations, 524 CMR (amended version of the 2013 Edition of ASME A17.1, Safety Code for Elevators and Escalators).
+ Fire Prevention – Massachusetts Comprehensive Fire Safety Code, 527 CMR 1.00 (based on the 2015 and 2018 Editions of NFPA 1, Fire Code).
+ Mechanical – International Mechanical Code (IMC), 2015, as adopted and amended by 780 CMR.
+ Plumbing – Massachusetts Fuel Gas and Plumbing Codes, 248 CMR.
+ Energy – 780 CMR Chapter 13, which references and amends the 2018 International Energy Conservation Code (IECC) and ASHRAE 90.1-2016 and 780 CMR Appendix AA, Stretch Energy Code.

[1] Based on assumption that the finished floor elevation of the First Floor is more than 6-feet above grade plane (780 CMR §202).

+ Other – Selected National Fire Protection Association (NFPA) Standards as referenced by 780 CMR and 527 CMR, including but not limited to:
  - NFPA 10, 2013 Edition, Standard for Portable Fire Extinguishers.
  - NFPA 13, 2013 Edition, Standard for the Installation of Sprinkler Systems.
  - NFPA 72, 2013 Edition, National Fire Alarm Code.

This report focuses on the key issues relative to compliance with the fire protection, life safety, and accessibility provisions of the applicable codes. Other provisions of the applicable codes are noted only where pertinent to matters related to fire / life safety and accessibility.

4.0 Building Code Requirements for Existing Buildings

4.1 GENERAL REQUIREMENTS

Existing buildings are subject to the requirements of 780 CMR, as outlined below:

+ The legal occupancy of any structure existing on the date of adoption of the code (780 CMR) shall be permitted to continue, without change, except as is specifically covered in 780 CMR or as is deemed necessary by the Building Official for the general safety and welfare of the occupants and the public (780 CMR §102.6).

+ Unless specifically provided otherwise in this code (780 CMR), and narrow to the provisions of 780 CMR, any existing building or structure shall meet and shall be presumed to meet the provisions of the applicable laws, codes, rules or regulations, bylaws or ordinances in effect at the time such building or structure was constructed or altered and shall be allowed to continue to be occupied pursuant to its use and occupancy, provided that the building or structure shall be maintained by the Owner in accordance with 780 CMR (780 CMR §102.6.2).

+ Means of egress, lighting, and ventilation in existing buildings, whether or not undergoing repairs, alterations, changes of occupancy, are subject to the provisions of 780 CMR §102.6.4. When applicable, the following conditions of (780 CMR §102.6.4) are susceptible to citation from the Building Official and should be corrected in all existing buildings.
  - Inadequate number of means of egress;
  - Egress components with insufficient width or so arranged to be inadequate, including signage and lighting;
  - Inadequate lighting and ventilation.

  Where full compliance is not practical, the Building Official may accept compliance alternatives, engineering, or other evaluations that adequately address the deficiency.

  Jensen Hughes is not aware of any outstanding Abatement Orders or Notices of Violation issued against the building; therefore, the existing conditions are assumed to have been acceptable to the Building Official upon their last inspection.

+ All buildings and structures and all parts thereof, both existing and new, and all systems and equipment therein which are regulated by 780 CMR shall be maintained in a safe, operable and sanitary condition. All service equipment, means of egress, devices and safeguards which are required in a building or structure, or which were required by a previous statute in a building or structure, when erected, altered or repaired, shall be maintained in good working order (780 CMR §102.8). The owner shall be responsible for compliance with 780 CMR (780 CMR §102.8.1).

  Jensen Hughes is not aware of any outstanding preventative or corrective maintenance items for life safety systems. The working condition of existing life safety systems including fire alarm systems, means of egress components, and fire-rated compartmentalization must be maintained in proper working condition.

+ The provisions of 780 CMR Chapter 34 shall apply to the repair, alteration, change of occupancy, addition to and relocation of existing buildings (780 CMR 34 §101.2).

4.2 CLASSIFICATION OF PROJECT WORK

The project involves the following work which has been classified by type according to the Work Area Compliance Method of 780 CMR 34 Chapter 5:

+ The project includes repairs (780 CMR 34 §502); reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

+ The project includes removal or replacement of existing materials, elements, equipment, and/or fixtures using new materials, equipment, and/or fixtures that serve the same purpose; therefore, the requirements for Level 1 Alterations will apply in those instances (780 CMR 34 §503).
+ The project includes reconfiguration of space in specific locations throughout the building. The area of reconfiguration will not exceed 50 percent of the building area; therefore, the requirements for Level 2 Alterations will apply (780 CMR 34 §504). The work areas on each floor level do not appear to exceed 50 percent of the respective floor area.
+ The project includes selective upgrades and/or replacement of existing mechanical, electrical, and plumbing systems. Reconfigured systems will comply with the requirements of Level 2 Alterations (780 CMR §504). Note: The reconfiguration or extension of any system, or the installation of any additional equipment does not in and of itself a Create a Work Area.
+ The project includes a Change of Occupancy classification to include Groups A-2, A-3, and A-4 occupancies to the existing Group E, Educational building (780 CMR 34 §506).
+ The project includes a horizontal addition to increase the total building area (780 CMR 34 §507).
+ The building is assumed to not be a listed historic building.

5.0 Use and Occupancy Classifications

The building appears to contain the following occupancy classifications and specific uses (780 CMR §302.1):

Table 1 – Occupancy Classification

Occupancy Classification	Uses
Group A-2, Assembly	Cafeteria
Group A-3, Assembly	Gymnasium without spectator seating, library space
Group A-4, Assembly	Gymnasium with spectator seating
Group E, Educational	Classroom space
Group S-1/S-2 Storage (Accessory)	Low/Moderate-hazard storage

While a room or space used for assembly purposes that is associated with a Group E occupancy (i.e., gymnasium, auditorium, cafeteria) may not be considered a separate occupancy per 780 CMR §303.1.3, the building is understood to have new assembly functions within such spaces that are not ancillary and supportive to the educational operation of the building. Therefore, these spaces fall outside the intent of 780 CMR §303.1.3 and are classified according to their respective assembly group as new occupancies within the building.

The occupancy classification(s) assumptions stated above inform the balance of the report and should be confirmed through review of existing documentation on record with the City of Somerville.

6.0 Allowable Height and Area

The height and area of the existing building are required to be analyzed for compliance with 780 CMR Chapter 5 as the project includes a Change of Occupancy to a higher hazard category and an Addition.

As a result of the proposed addition, the existing area of the building will be increased by a total of approximately 16,700 gross square feet (not more than 5,700 square feet added to the Basement, First Floor, and Second Floor). Each story will not exceed 13,400 square feet.

The existing building construction most closely resembles Type IIIB, unprotected construction. The building will be a separated, mixed-use facility[2] that will include Group A-2, A-3, A-4, and E occupancies. Of the listed occupancies, buildings

[2] No separation required between Group A and Group E occupancies per 780 CMR Table 508.4. Should the aggregate of any rooms containing combustible storage exceed 10% of the floor area of the story in which they are located such that a Group S-1 occupancy is created, minimum 1-hour separation will be required between the Group A/E occupancies and the Group S-1 occupancy.

of Type IIIB construction that are protected throughout by an automatic sprinkler system are limited to a maximum allowable area of 28,500 square feet per story for Group A-2, A-3, A-4 occupancies (780 CMR Table 506.2).[3]

The area of the mixed-use building will comply with the maximum allowable area requirements for the applicable occupancies.

As a result of the proposed addition, the existing height of the building in feet and number of stories will not change.

Of the listed occupancies, separated mixed-use[2] buildings of Type IIIB construction that are protected throughout by an automatic sprinkler system are limited to a maximum allowable height of 75 feet and three (3) stories for Group A-2, A-3, A-4, and E occupancies (780 CMR Tables 504.3, 504.4).

While the existing building has a nonconforming height with Group E space on the Fourth story above grade, this is not a change from the existing condition and is permitted to remain. The addition will be a conforming 3-story addition that includes the Group A occupancies.

7.0 Fire Resistance

7.1 STRUCTURAL FIRE RESISTANCE

The existing building construction most closely resembles Type IIIB unprotected construction.

New structural members must be constructed with a fire-resistance rating consistent with Type IIIB (unprotected noncombustible or combustible floors and columns and noncombustible exterior walls) construction, as outlined below (780 CMR Table 601).

Table 2 – Structural Fire-Resistance Rating

Structural Element		Hours
Primary Structural Frame	Columns Supporting Floors	0
	Columns Supporting Roofs Only	0
	Other Primary Structural Frame Supporting Floors	0
	Other Primary Structural Frame Supporting Roofs Only	0
Bearing Walls	Exterior [4]	2
	Interior – Supporting Floors	0
	Interior – Supporting Roofs Only	0
Nonbearing Exterior Walls (FSD = Fire Separation Distance in feet)	FSD < 5	2 (Group S-1), 1 (Group A, E, S-2)
	5 ≤ FSD < 10	1
	10 ≤ FSD < 30	1
	FSD ≥ 30	0
Floor Construction and Secondary Members		0
Roof Construction and Secondary Members		0

The primary structural frame includes all of the following structural members (780 CMR §202):

+ The columns;
+ Structural members having direct connections to columns, including girders, beams, trusses and spandrels;
+ Members of the floor construction and roof construction and roof construction having direct connections to columns; and
+ Bracing members that are essential to the vertical stability of the primary structural frame under gravity loading, whether

[3] Maximum allowable area does not take into consideration increases due to frontage per 780 CMR §506.2.4.
[4] Not less than fire-resistance rating required based on fire separation distance for non-load bearing exterior walls.

or not the bracing member carries gravity loads.

Secondary members include the following structural members that are not part of the primary structural frame (780 CMR §202):

+ Structural members not having direct connections to the columns;
+ Members of the floor construction and roof construction not having direct connection to the columns; and
+ Bracing members other than those that are part of the primary structural frame.

7.2 FIRE-RESISTANCE RATED SEPARATIONS

New or reconfigured rooms and spaces listed in the following table are required to be enclosed / separated by fire barriers (FB).

Table 3 – Fire-Resistance Rated Separations

Room or Space	Code Reference	Enclosure Fire Resistance
Shafts connecting three stories or less	780 CMR §713.4	1-Hour FB
Stair enclosures connecting three stories or less	780 CMR §1023.2	1-Hour FB
Shafts connecting four or more stories	780 CMR §713.4	2-hour FB
Stair enclosures connecting four or more stories	780 CMR §1023.2	2-Hour FB
Non-sprinklered electrical rooms	NFPA 13 §8.15.11.3	2-Hour FB
Furnace room where any piece of equipment is over 400,000 BTU/hour input	780 CMR Table 509	1-Hour FB
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	780 CMR Table 509	1-Hour FB
Emergency electrical room	NFPA 70, 700-10(D)(2)	2-Hour FB
Elevator machine rooms, control rooms, control spaces and machinery spaces	780 CMR §3005.4	Rating of hoistway[5]
Electrical room containing a transformer		
- Transformer < 112 ½ kV	NFPA 70 §450.22	Noncombustible
- Transformer > 112 ½ kV	NFPA 70 §450.22	1-Hour FB
- Transformer > 35,000 volts	NFPA 70 §450.42	3-Hour FB[6]
- Eversource transformer vault	Eversource Specification	3-Hour vault

7.3 OPENING PROTECTIVES

Doors or other openings in enclosures/separations are required to be protected as follows (780 CMR §716):

+ 1-hour Fire Barrier – Listed, labeled, self-closing or automatic-closing on smoke detection, positive latching, 45-minute fire protection rating (1-hour fire protection rating when used in 1-hour shaft and exit enclosures).
+ 2-hour Fire Barrier – Listed, labeled, self-closing or automatic-closing on smoke detection, positive latching, 90-minute fire protection rating.
+ 3-hour Fire Barrier – Listed, labeled, self-closing or automatic-closing on smoke detection, positive latching, 180-minute rated.

[5] If the machine room has no openings to and does not abut the hoistway, the machine room fire resistance rating need not be more than 1-hour.
[6] Where transformers are protected with automatic sprinklers, water spray, or carbon dioxide, this rating may be reduced to 1-hour with ¾-hour opening protectives (NFPA 70, 450.42 Exception).

7.4 DUCT AND AIR TRANSFER OPENINGS

New duct and air transfer openings through rated elements or existing openings through extended shaft enclosures must comply with 780 CMR §717.

8.0 Vertical Openings

All existing vertical openings are required to comply with 780 CMR 34 §701.2, §801.3, §803.2, §903.1 and all new vertical openings are required to comply with 780 CMR §712.1. The following sections outline the significant vertical openings located in the building.

8.1 EXISTING VERTICAL OPENINGS

All existing interior vertical openings connecting two or more floors must be enclosed with approved assemblies having a fire-resistance rating of not less than 1 hour with approved opening protectives, unless vertical opening enclosure is not required by 780 CMR. Existing exit stairways that are part of the means of egress must be enclosed from the highest work area floor to, and including, the level of exit discharge and all floors below.

8.2 NEW VERTICAL OPENINGS

Any new openings through a floor/ceiling assembly must be protected by a shaft enclosure as required by 780 CMR §712.1, unless one of several alternatives (exceptions) are employed according to 780 CMR §712.1.2 through §712.1.16.

Two-story, unenclosed vertical openings are permitted as follows (780 CMR §712.1.9):

+ Does not connect more than two stories;
+ Does not penetrate a horizontal assembly that separates fire areas or smoke barriers that separate smoke compartments;
+ Is not concealed within the construction of a wall or a floor/ceiling assembly; and
+ Is separated from floor openings and air transfer openings serving other floors by construction conforming to required shaft enclosures.

Vertical openings containing unenclosed exit access stairways and ramps are permitted according to 780 CMR §712.1.12 and §1019.3, Ex. 1, as follows:

+ Exit access stairways and ramps that serve or atmospherically communicate between only two stories. Such interconnected stories must not be open to other stories (780 CMR §1019.3, Ex. 1).

Otherwise, the vertical opening(s) is required to be designed as an atrium or protected by a shaft enclosure.

Any new vertical openings will comply with one of the allowances above or will be designed as shaft enclosures complying with 780 CMR §712.1.

9.0 Exterior Walls

The change of occupancy to include Groups A-2, A-3, and A-4 results in a change to an equal or lesser risk category, assuming a separated mixed-use approach. The result is that existing exterior walls, including openings are permitted to remain. Any new exterior walls must comply with the opening limitations in 780 CMR. Should a Group S-1 occupancy be introduced, the change of occupancy will result in a change to a higher risk category and existing exterior walls must have ratings and openings in accordance with the new construction provisions of 780 CMR (780 CMR 34 §1012.6.1).

780 CMR regulates the extent to which protected and unprotected openings are permitted in the exterior walls of a building's façade based on the fire separation distance (780 CMR §602 and 780 CMR §705.8). The fire separation distance (FSD) is measured perpendicularly from the exterior wall to the centerline of a public street, an interior lot line, or an imaginary lot line between two buildings on the same lot (780 CMR §202.1). The table below lists the permissible percentage of unprotected openings in a fully sprinklered building, based on the fire separation distance measured along each exterior wall. The percentage of openings are shown as a percentage of the total area of the exterior wall, evaluated per story.

Table 4 – Limits for Openings in Exterior Walls

Fire Separation Distance (ft)	% of Allowable Openings
0 to < 3	Not Permitted
3 to < 5	15%
5 to < 10	25%
10 to < 15	45%
15 to < 20	75%
20 or greater	Unlimited

10.0 Interior Finish

10.1 INTERIOR WALL AND CEILING FINISH

All interior wall and ceiling finishes (new and existing) must comply with 780 CMR §803 for new construction (780 CMR 34 §1012.3, 780 CMR §803).

Where interior wall and ceiling finishes are required to comply with the requirements of 780 CMR §803, the requirements are determined by the occupancy use classification of the space. The classification requirements for interior wall and ceiling finish, when tested in accordance with ASTM E84 or UL 723 are as follows (780 CMR §803.1.1):

Table 5 – Interior Finish Classifications

Interior Finish Classification	Flame Spread Index	Smoke Developed Index
Class A	0 – 25	0 – 450
Class B	26 – 75	0 – 450
Class C	76 – 200	0 – 450

The following table summarizes the interior finish requirements applicable to this project (780 CMR Table 803.11).

Table 6 – Interior Finish Requirements for Fully Sprinklered Building

Group	Exit Enclosures and Exit Passageways	Corridors	Rooms and Enclosed Spaces
Group A, Assembly	Class A or B	Class A or B	Class A, B or C
Group E, Educational	Class A or B	Class A, B or C	Class A, B or C
Group S-1/S-2, Storage	Class A, B or C	Class A, B or C	Class A, B or C

Class C interior finish materials are permitted for wainscoting or paneling of not more than 1,000 square feet of applied surface area in the grade lobby where applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fire blocked as required by 780 CMR §803.13.1 (780 CMR Table 803.11 Note a).

10.2 INTERIOR FLOOR FINISH

New interior floor finish, including new carpeting used as an interior floor finish material, must comply with 780 CMR §804 (780 CMR 34 §702.2).

New traditional floor coverings such as wood, vinyl, terrazzo, and other resilient floor coverings (not comprised of fibers) are allowed throughout the building (780 CMR §804.1, Exception).

New interior floor finish and floor covering materials in exit enclosures, exit passageways, corridors and rooms or spaces not separated from corridors by partitions extending from the floor to the underside of the ceiling must withstand a minimum critical radiant flux not less than Class II, 0.22 watts/cm^2 or greater (780 CMR §804.4.2). Interior floor finishes are not required to be tested in accordance with NFPA 253 (780 CMR §804.3).

10.3 DECORATIVE MATERIALS AND TRIM

All newly installed decorative materials and trim must comply with 780 CMR §806 (780 CMR 34 §702.3).

Note that fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes must be considered interior finish and cannot be considered decorative materials or furnishings (780 CMR §806.3).

The permissible amount of noncombustible decorative materials and trim is not limited (780 CMR §806.2).

Curtains, draperies, fabric hangings and similar combustible decorative materials suspended from walls or ceilings must meet the criteria of 780 CMR §806.4 and 527 CMR / NFPA 1 §12.6.2 when tested in accordance with NFPA 701 and must not exceed 10 percent of the specific wall or ceiling area to which such materials are attached (780 CMR §806.3; 527 CMR / NFPA 1 §12.6.2).

Foam plastics, whether exposed or used in conjunction with a textile or vinyl facing or cover, must not be used as interior trim except as provided in 780 CMR §806.5 or §2604.2 (780 CMR §801.8, §806.5).

Material used as interior trim, other than foam plastic, must have a minimum Class C flame spread and smoke-developed rating index when tested in accordance with ASTM E84 or UL 723 as described in 780 CMR §803.1.1 (780 CMR §806.7).

Combustible trim, excluding handrails and guardrails, must not exceed 10 percent of the specific wall or ceiling area in which it is attached (780 CMR §806.7).

Note that alternatively the interior floor-wall base that is 6 inches or less in height is be permitted to be Class II material tested in accordance with NFPA 253 (ASTM E648) (780 CMR §806.8).

11.0 Means of Egress

To date, Jensen Hughes is not aware of any active citations or abatement orders that have been issued for the building. As a result, continued use of the facility is permitted so long as the means of egress, lighting and ventilation systems are maintained appropriately throughout the building per 780 CMR §102.6.4. Additionally, areas undergoing renovations and change of occupancy are subject to compliance with the means of egress provisions of 780 CMR 34, where applicable. **Means of egress from the newly created horizontal addition must comply fully with the provisions of 780 CMR.**

The following key requirements are provided as a reference to ensure the building's means of egress are properly maintained or modified.

11.1 OCCUPANT LOAD

In the absence of fixed seating, the occupant load of each space and each story of the building is determined using the greater of the following (780 CMR §1004.1.2):

+ Occupant load calculations using factors prescribed by 780 CMR Table 1004.1.2 (refer to following table), or
+ The actual number of occupants who will use each space.

Where approved by the building official, the actual number of occupants for whom each occupied space, floor or building is designed, although less than those determined by calculation, is permitted to be used in the determination of the design occupant load (i.e., posted occupant load) (780 CMR §1004.1.2, Exception).

The table below details the occupant load factors used within the building (780 CMR Table 1004.1.2).

Table 7 – Occupant Load Densities

Use / Function	ft² per occupant
Assembly (Standing Room)	5 net
Assembly (Chairs)	7 net
Assembly without fixed seats (Tables and Chairs)	15 net
Educational (Classrooms)	20 net
Library (Reading Rooms)	50 net
Library (Stack Area)	100 gross

Use / Function	ft² per occupant
Office areas	100 gross
Industrial areas	100 gross
Kitchens, commercial	200 gross
Accessory storage / MEP	300 gross

Where the actual number of occupants in a room, space or floor exceeds the calculated occupant load from the factors in the table above, the actual number of occupants must be used. Where the actual number of occupants in a room, space or floor is less than the calculated occupant load, that lower occupant load may only be used where approved by the building official (780 CMR §1004.2).

The occupant load will be determined in accordance with above.

11.2 EGRESS CAPACITY

The required egress capacity for the building and rooms/areas is determined using egress capacity factors and the occupant load being served. The following egress capacity factors are applicable to this project as the building is expected to include an emergency voice/alarm communication system (780 CMR §1005.3):

+ Level egress elements, including ramps: 0.15 inch per occupant
+ Exit stairways: 0.20 inch per occupant

Where egress from floors above and below converge at an intermediate story or landing, the capacity of the means of egress from the point of convergence will not be less than that calculated by the sum of the two floors (780 CMR §1005.6). Multiple means of egress must be sized such that the loss of any one means of egress will not reduce the available capacity or width to less than 50 percent of the required capacity or width (780 CMR §1005.5).

Each floor of the existing portion of the building is served by two (2) exit stairway enclosures, East and West stairs. The West stair has a calculated exit capacity of 270-people, limited by the 54-inch stair width. The East stair as a calculated exit capacity of 220-people, limited by the exterior discharge door. Per 780 CMR §1005.5, the overall egress capacity from the existing portion of each floor is limited by East stair; therefore, the total egress capacity is 440 persons.

The Basement, First Floor, and Second Floor of the addition are also served by two (2) new exit stairways, one of which leads directly to the exterior. The result is a total provided exit capacity of 480-people for the addition for the Basement, First Floor, and Second Floor.

It should be noted that the Basement and First Floor are also served by separate doors to the exterior. In addition, the exit discharge doors for the existing East and West exit stairs are located at the half-level landing between the Basement and First Floor. Convergence of the Basement and First Floor occupants in these stairs must be considered when evaluating the means of egress system for those levels. Convergence at the First Floor must also be considered in the two exit stairs located in the addition when evaluating the means of egress system from the Basement and Second Floor.

11.3 NUMBER OF EXITS

Each space in the building is required to have access to at least two exits or exit access doorways where either the design occupant load exceeds a set maximum value based on occupancy (refer to table below) or the common path of travel limit for that occupancy is exceeded (780 CMR Table 1006.2.1). Where these values are exceeded, at least two exits or exit access doorways are required to serve a space.

Table 8 – Maximum Occupant Load for Single Means of Egress

Occupancy	Maximum Occupant Load
Group A	49
Group E	49
Group S-1/S-2	29

Each story of the building must have access to the number of exits outlined in the following table. If the occupant load of a story exceeds 500 occupants, access to three exits is required (780 CMR Table 1006.3.1).

Table 9 – Exits Per Story

Number of Occupants	Minimum Required Number of Exits
500 or less	2
501 to 1,000	3
Greater than 1,000	4

The required exits (i.e., exit or exit access doors) must be separated by a distance not less than one-third of the length of the maximum overall diagonal dimension of the building or area to be served (780 CMR §1007.1.1, Ex. 2). This dimension is measured in a straight line between exit doors or exit access doorways.

11.4 EXIT DISCHARGE

Exits are required to discharge directly to the exterior either at grade or at a point that will provide direct path of egress travel to grade. The exit discharge is not permitted to reenter the building (780 CMR §1028.1), except:

+ Not more than 50% of the number and required capacity of interior exit stairways is permitted to egress through areas on the level of exit discharge provided the following conditions are met:
  - Discharge from the interior exit stairway enclosure is provided with a free unobstructed path of travel to an exterior exit door such that the exit door is readily visable and identifiable from the point of termination of the exit enclosure;
  - The entire area of the level of exit dsicharge is separated from the areas below by construction conforming to the fire resistance rating of the enclosure; and
  - The egress path is protected by an approved automatic sprinkler system.

Three (3) interior exit enclosures discharge directly to the exterior. One (1) of the new exit stairs in the addition will discharge to the building interior and must comply with 780 CMR §1028.1, Ex. 1.

11.5 EXIT ACCESS TRAVEL DISTANCE

The travel distance from all rooms and spaces within the building to an exit must comply with the following table, based on the occupancy classification of the room or space (780 CMR Table 1017.2).

The measurement along stairways must be made on a plane parallel and tangent to the stair tread nosings in the center of the stair and landings (780 CMR §1017.3.1).

Table 10 – Exit Travel Distance Limitations

Occupancy	Maximum Travel Distance (ft)
Groups A, E, S-1	250
Group S-2	400

11.6 COMMON PATH OF TRAVEL

The maximum allowable common path of egress travel will comply with the table below (780 CMR Table 1006.2.1).

Table 11 – Common Path of Travel Limitations

Occupancy	Maximum Common Path of Travel (ft)
Groups A, E	75
Groups S-1/S-2	100

11.7 DEAD-END CORRIDORS

Where more than one exit or exit access doorway is required, the exit access will be arranged such that there are no dead-ends in corridors more than as shown in the table below (780 CMR §1020.4).

Table 12 – Dead End Corridor Limitations

Occupancy	Maximum Dead End (ft)
Group A	20
Groups E, S-1/S-2	50

A dead-end corridor can be increased beyond the prescribed values where the length of the dead-end corridor is less than 2.5 times the least width of the dead-end corridor (780 CMR §1020.4, Ex. 3).

11.8 DOORS

Doors must provide a minimum clear width sufficient for the occupant load thereof and not less than 32 inches and a minimum height of 80 inches (780 CMR §1010.1.1). When two door leaves are provided without a mullion, one leaf must provide a clear width opening of at least 32 inches.

Egress doors are required to be pivoted or side-hinged swinging type except as follows (780 CMR §1010.1.2):

+ Office areas and storage areas with an occupant load of 10 or less;
+ Revolving doors complying with 780 CMR §1010.1.4.1;
+ Power-operated doors in accordance with 780 CMR §1010.1.4.2;
+ Special purpose horizontal sliding, accordion, or folding doors complying with 780 CMR §1010.1.4.3; and
+ Manually operated horizontal sliding doors are permitted from rooms or spaces with an occupant load of 10 or less.

Doors serving the following rooms or spaces are required to swing in the direction of egress travel (780 CMR §1006.2.2.2, §1010.1.2.1, §1010.1.10):

+ Rooms or spaces with an occupant load of 50 or more;
+ Transformer vaults and electrical rooms with equipment rated 1,200 amperes or more and over 6 feet wide that contain overcurrent devices, switching devices or control devices; and
+ Refrigeration machinery rooms.

Doors equipped with a latch or lock serving the following rooms or spaces are required to be provided with panic hardware or fire exit hardware (780 CMR §1010.1.10):

+ Group A occupancy rooms or spaces with an occupant load of 50 or more; and
+ Transformer vaults and electrical rooms with equipment rated 1,200 amperes or more and over 6 feet wide that contain overcurrent devices, switching devices or control devices.

11.9 CORRIDORS

In Group E, Educational occupancies, new corridors are required to be a minimum of 72 inches in clear width (780 CMR Table 1020.2).

11.10 STAIRWAYS

The width of new stairways must not be less than 44 inches and must be at least wide enough to provide the required capacity to accommodate each floor's occupant load (except that stairways serving less than 50 occupants are permitted to be no less than 36 inches wide). The stair width must not decrease in the direction of travel. Exit stairs must not be used for any purpose other than egress (780 CMR §1011.2). The headroom on stairs is required to be not less than 80 inches (780 CMR §1011.3).

The treads of new stairs are required to have a minimum depth of 11 inches. New stair risers are required to have a minimum height of 4 inches and maximum height of 7 inches (780 CMR §1009.5.2). Stair dimensions will be uniform. The tolerance between the largest and the smallest treads will not exceed 3/8 inch in any flight of stairs (780 CMR §1009.5.4).

New stair tread nosing must have a curvature or bevel of not less than 1/16-inch but not more than 1/2-inch from the foremost projection of the tread. The undersides of nosings must not be abrupt. Risers must be solid and vertical or sloped under the tread above from the underside of the nosing above at an angle of not more than 30 degrees from the vertical (60 degrees from the horizontal) (780 CMR §1011.5.5; 521 CMR §27.3). Nosings must not project more than 1¼-inches beyond

the tread below (780 CMR §1011.5.5.1; 521 CMR §27.3). Nosing projections of the leading edges of treads must be of uniform size, including the projections of the nosing's leading edge of the floor at the top of the flight (780 CMR §1011.5.5.2).

The minimum dimension of landings and platforms in new stairways must be at least the width of the stairway served. The landing dimension in the direction of travel is not required to exceed 4 feet when travel from one flight to the next flight is a straight run. Landings must have a width equal to the width of the stair or a door opening onto a landing, whichever is greater. Doors opening onto landings must not reduce the required landing width by more than one half at any point during the door's swing and not more than 7 inches when fully open (780 CMR §1011.6). The maximum vertical height between landings is 12 feet (780 CMR §1011.8).

11.11 RAMPS

The clear width of ramps must not be less than 36 inches and must be a minimum width of 44 inches where serving an occupant load of greater than 50 occupants, but not less than the width required for egress capacity (780 CMR §1012.5.1, §1020.2). The ramp may not reduce in width in the direction of egress travel (780 CMR §1012.5.3).

The maximum slope of a ramp must be 1 unit vertical to 12 units horizontal, equivalent to an 8.3 percent slope. The cross slope of a ramp must not exceed 1 to 48, or a 2 percent slope (780 CMR §1012.3). Ramps are required to have slip-resistant surfaces (780 CMR §1012.7.1). The maximum rise of a ramp between landings or level surfaces is 30 inches (780 CMR §1012.4).

The minimum ramp landing length and headroom must be 60 inches and 80 inches, respectively (780 CMR §1012.5.2, §1012.6.3). The slope of a ramp landing must not be more than 1 to 48 in any direction. Changes in level are not permitted (780 CMR §1012.6.1). Where changes in direction of travel occur at landings between ramp runs, the landing must have minimum dimensions of 60 inches by 60 inches (780 CMR §1012.6.4).

11.12 MEANS OF EGRESS LIGHTING

In normal, non-emergency conditions, means of egress must be equipped with artificial lighting facilities to provide one (1) foot-candle intensity floor lighting continuously during the time that the building, or portion thereof, is occupied (780 CMR §1008.2).

Means of egress must be provided with artificial lighting throughout the building in accordance with the requirements of 780 CMR (780 CMR §1008.1). In the event of power supply failure, an emergency electrical system must automatically illuminate the following areas (780 CMR §1008.3.1, §1008.3.2, §1013.1.1):

+ Exit access aisles in rooms and spaces which require two or more means of egress;
+ Electrical equipment rooms;
+ Fire pump room(s);
+ Generator room(s);
+ Public restrooms with an area greater than 300 square feet;
+ Transformer vaults;
+ Exit access corridors, exit access stairways and ramps;
+ Exit stairways and exit passageways;
+ Exterior egress components at other than the level of exit discharge until exit discharge is accomplished;
+ Interior exit discharge elements, as permitted in 780 CMR §1028.1; and
+ The portion of the exterior exit discharge immediately adjacent to exit discharge doorways.

In emergency conditions, emergency power must be provided for a minimum of 120 minutes (780 CMR §1008.3, §2702.1.4). Emergency lighting facilities must provide an average initial illumination of one (1) foot-candle and a minimum at any point of 0.1 foot-candle measured at any point along the path of egress at floor level. Illumination levels are permitted to decline to 60 percent of the initial illumination levels at the end of 90-minutes. A maximum to minimum illumination ratio of 40:1 must not be exceeded (780 CMR §1008.3.4).

11.13 EXIT SIGNAGE

Exits and exit access doors must be marked by an approved exit sign readily visible from any direction of egress travel. The path of egress travel to exits and within exits must be marked by readily visible exit signs to clearly indicate the direction of egress travel in cases where the exit or the path of egress travel is not immediately visible to the occupants. Intervening

means of egress doors within exits must be marked by exit signs. Exit sign placement must be such that no point in an exit access corridor or exit passageway is more than 100 feet or the listed viewing distance for the sign, whichever is less, from the nearest visible exit sign. Exit signs are not required in rooms or areas that require only one exit or exit access. Exit signs must be internally or externally illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the sign illumination means must be connected to an emergency power system provided from storage batteries, unit equipment or an on-site generator (780 CMR §1013).

Additionally, a sign stating EXIT in visual characters, raised characters and braille and complying with ICC A117.1 must be provided adjacent to each door to an area of refuge, an exterior area for assisted rescue, an exit stairway or ramp, an exit passageway and the exit discharge (780 CMR §1013.4).

Transformer vaults must have additional exit signage such that the top of the sign is within 18 inches of the floor and adjacent to the opening side of the door (780 CMR §1013.1.1).

11.14 LARGE ASSEMBLY SPACES

Group A, Assembly occupancies which contain seats, tables, displays, equipment or other material must comply with 780 CMR §1029.

12.0 Fire Protection Systems

12.1 AUTOMATIC SPRINKLER SYSTEM

The building is currently partially sprinklered. The project Addition necessitates extending (and bolstering as needed) sprinkler protection to meet the provisions of 780 CMR 903.3.1.1 and NFPA 13.

The project will include providing automatic sprinkler protection throughout the building. Further evaluation of the existing sprinkler system will be required to determine if it can support the new scope of work.

12.2 STANDPIPE SYSTEM

The existing building is not anticipated to be equipped with a standpipe hose system. Where a work area is located more than 50 feet above or below the lowest level of fire department access, a standpipe system must be provided. Standpipes are required to have an approved fire department connection with hose connections at each floor level above or below the lowest level of fire department access (780 CMR 34 §804.3).

The new addition is not anticipated to be equipped with a standpipe hose system. Class I[7] standpipe systems must be installed where the floor level of the highest story is more than 30-feet above the lowest level of fire department vehicle access.

All work areas are positioned less than 50 feet above the lowest level of fire department vehicle access and the floor level of the highest story in the new addition will not be located more than 30 feet above the lowest level of fire department vehicle access; therefore, a standpipe system is not required to be installed.

12.3 PORTABLE FIRE EXTINGUISHERS

Fire extinguishers must be provided throughout the building in accordance with NFPA 10, Standard for Portable Fire Extinguishers and 780 CMR §906. Extinguishers must be selected based on the anticipated hazard and classified for protection of that hazard. Fire extinguishers must be conspicuously located and readily accessible to building occupants.

12.4 FIRE DETECTION AND ALARM

The building is provided with a fire alarm system; however, based on its condition and apparent age of its components, a full replacement is recommended. Activation of the fire sprinkler system must activate a fire alarm system in accordance with 780 CMR §907 (780 CMR §903.4.2).

The new fire alarm system must be designed in accordance with 780 CMR §907 and NFPA 72 and provided throughout the building. The fire alarm system must initiate the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of 780 CMR §907.5.2.2. (780 CMR §907.2.3).

[7] Permitted where the building is fully sprinklered.

13.0 Emergency and Standby Power Systems

If the building is equipped with existing emergency and/or standby power systems, they should be maintained.

Emergency power systems and standby power systems are required to be installed in accordance with 780 CMR Chapter 27 and NFPA 70, NFPA 110, and NFPA 111 (780 CMR §2701.1.2).

Where the emergency/standby power system includes a generator set inside the building, the system must be located in a separate room enclosed with 2-hour fire barriers and/or horizontal assemblies (NFPA 110). Stationary emergency and standby power generators must be listed in accordance with UL 2200 (780 CMR §2702.1.1).

Emergency power systems automatically provide secondary power within ten (10) seconds after primary power is lost. Standby power systems automatically provide secondary power within 60 seconds after primary power is lost (780 CMR §2702.1.3).

Emergency power systems and standby power systems must provide the required power for a minimum duration of 2 hours without being refueled or recharged (780 CMR §2702.1.4).

The following features/systems are required to be provided with emergency power:

+ Fire detection and alarm systems (780 CMR §907.6.2, NFPA 72)
+ Exit signs (780 CMR §1013.6.3, §2702.2.5)
+ Means of egress illumination (780 CMR §1008.3, §2702.2.11)

The following features/systems are required to be provided with standby power:

+ Elevators if serving as a component of the accessible means of egress (780 CMR §1009.4).

14.0 Elevators

It should be noted that the following requirements pertaining to elevators require all floors of the building to be accessed by elevator(s) satisfying the noted requirements.

14.1 PASSENGER ELEVATORS

New elevators are required to comply with ASME A17.1, *Safety Code for Elevators and Escalators*, 2013 as adopted by 524 CMR Chapter 35.

All elevators must be equipped with Phase I and II automatic recall and Fire Department control features (780 CMR §30.00; 524 CMR 35-ASME A17.1 §2.27.3).

A two-way communication system is required at the elevator landing on each accessible floor that is one (1) or more stories above or below the level of exit discharge. The system must provide communication between each required location and a central control point location approved by the fire department. Additionally, where the central control point is not constantly attended, the system must have timed automatic telephone dial-out capability to a monitoring location or 9-1-1. The two-way communication system(s) is required to include both audible and visual signals. Directions for use of the system and other required information are required to be posted adjacent to each device (780 CMR §1009.8).

A permanent sign is required to be mounted on the head jamb of the main floor elevator entrance, which will read “MRL-CONTROL ROOM LOCATED ON --- FLOOR.” The sign is to be a minimum of ¾ inch high letters and be of a contrasting color with that of the background (524 CMR 13.03(15)).

15.0 Plumbing Fixtures

The Massachusetts Plumbing Code (248 CMR) regulates the number of plumbing fixtures required in buildings. The minimum number of plumbing fixtures is established by 248 CMR 10.10(18) Table 1 based on the building use and the expected population as established by the local Plumbing Inspector per 248 CMR 10.10(18)(a)(2). Typically, this population is based on the designer’s determination of the actual number of people expected within the building and such established population must not be exceeded.

The following table summarizes the plumbing fixture requirements based on 248 CMR for expected occupancies within the building:

Table 13 – Plumbing Requirements

Occupancy Clarification	Female Toilets	Male Toilets	Urinals	Lavatories (Sinks) Each Gender	Drinking Water Stations	Service Sink
Assembly (conference/waiting)	1 per 50	1 per 100	Up to 50% substitution	1 per 200	-	-
Educational (Kindergarten)	1 per 20	1 per 20	-	1 per 20	1 per 75	1 per floor
Educational (Elementary)	1 per 30	1 per 60	1 per 60	1 per 60	1 per 75	1 per floor

16.0 Accessibility

The requirements of the 2010 ADA Standards and 521 CMR Regulations are applicable. Specific areas of the building that strictly limit access to employees only, are exempt from compliance with 521 CMR. However, these areas are still subject to the 2010 ADA Standards.

New construction, alterations, and additions are required to comply with the scoping and technical specifications of all applicable regulations, codes, and standards. In cases where there is a disparity in the scoping or technical criteria among the applicable codes and standards, the most stringent requirements shall prevail as long as these do not conflict with or provide a lower level of accessibility than is required by the other codes and standards. This section summarizes scoping criteria of each applicable code.

16.1 MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (521 CMR)

In order to determine the 521 CMR accessibility compliance obligations stipulated by the proposed project work, the full and fair cash value of the existing building (building value only, exclusive of land value), must be established and compared to the construction cost of the Project work and any other work performed in the building in the previous or subsequent 36 months from the project permit date.[8]

According to 521 CMR, the full and fair cash value of a building is defined as:

> *"The assessed valuation of a building (not including the land) as recorded in the Assessor's Office of the municipality at the time the building permit is issued equalized at 100 percent valuation. The 100 percent equalized assessed valuation shall be based upon Massachusetts Department of Revenue's determination of the particular city's or town's assessment ratio."*

The construction cost of the renovations, plus the cost of construction from work performed in the building within the previous or next three years (if applicable), is expected to be more than 30 percent of the full and fair cash value of the building. As a result, the entire building, exclusive of employee only work areas and other tenant spaces, is required to comply fully with the new construction accessibility requirements of 521 CMR (521 CMR §3.3.2). Otherwise, variances for specific nonconforming features of accessibility to remain noncompliant may be applied for where repairs are determined by the Massachusetts Architectural Access Board (MAAB) to be impractical ("excessive cost with little benefit" or "technologically infeasible") (521 CMR §4.1). Note that such variances granted by MAAB do not necessarily relieve the owner of their obligations to comply with applicable federal requirements, such as those found under the ADA.

It is expected that the project costs will exceed 30% of the full and fair cash value of the building; therefore, the entire building (existing and new) must comply fully with 521 CMR. Jensen Hughes recommends that a detailed accessibility assessment of the existing building be conducted to understand inventory of required upgrades. Evaluation of this inventory will inform whether variances from the Massachusetts Architectural Access Board are necessary.

[8] When the work performed on a building is divided into separate phases or projects or is under separate building permits, the total cost of such work in any 36-month period shall be added together in applying 521 CMR 3.3, Existing Buildings.

16.2 ADA

Alterations to existing buildings and facilities are required to comply with the Americans with Disabilities Act (ADA). With the exception of alterations to areas of primary function, the ADA does not utilize cost thresholds as part of the scoping criteria. The ADA contains the following scoping requirements:

+ Where existing elements or spaces are altered, each altered element or space must comply with the applicable provisions.
+ Although limiting the scope of an alteration to individual elements is permitted, it should be noted that the alteration of multiple elements within a room or space might provide a cost-effective opportunity to make the entire room or space accessible.
  - Altered elements or spaces are not required to be located on an accessible route unless they are associated with a primary function area.
  - In alterations where compliance is technically infeasible, the alteration must provide accessibility to the maximum extent feasible. Any elements or spaces of the building or facility that are being altered and can be made accessible must be made accessible within the scope of the alteration.
+ An alteration that decreases or has the effect of decreasing the accessibility of a building or facility below the requirement for new construction at the time of the alteration is prohibited.
+ An alteration of an existing element, space, or area of a building or facility must not impose a requirement for accessibility greater than required for new construction.

Note that the building may include features that were constructed and potentially renovated or altered at various dates; which may have been designed under current or previous versions of ADA Standards, including the 2010 and 1991 versions. Accessible elements designed and constructed after the applicable dates of these standards that are not compliant with the applicable standard(s) at the time of construction are considered barriers to access and are a liability for the property. The ADA prohibits alterations that decrease, or have the effect of decreasing, the accessibility of a building below the requirements for new construction. Therefore, even spaces which are out of the scope of work for the proposed project, if not constructed in accordance with applicable ADA regulations and standards at the time of construction are considered barriers to access and are a liability for the property.

To date, Jensen Hughes only surveyed existing spaces within the scope of work and as affected by the scope of work to assess the general condition of the building as related to accessibility using the 2010 ADA Standards.

All new work must comply with ADA.

16.2.1 Alteration to an Area of Primary Function

An alteration that affects or could affect the usability of or access to an area of a facility that contains a primary function shall be made so as to ensure that, to the maximum extent feasible, the path of travel to the altered area and the restrooms, telephones, and drinking fountains serving the altered area, are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, unless the cost and scope of such alterations is disproportionate to the cost of the overall alteration. [ADA §36.403 and ADA §35.151(b)(4)]

Per the ADA regulations, a primary function is a major activity for which the facility is intended. Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, corridors, restrooms, and parking areas are examples of areas that are not considered primary function. [ADA §36.403(a) and (b) and ADA §35.151(b)(4)(i)]

A "path of travel" as defined by ADA includes a continuous, unobstructed way of pedestrian passage by means of which the altered area may be approached, entered, and exited, and which connects the altered area with an exterior approach (including sidewalks, streets, and parking areas), an entrance to the facility, and other parts of the facility. An accessible path of travel may consist of walks and sidewalks, curb ramps and other interior or exterior pedestrian ramps; clear floor paths through lobbies, corridors, rooms, and other improved areas; parking access aisles; elevators and lifts; or a combination of these elements. For the purposes of this ADA requirement, the term "path of travel" also includes the restrooms, telephones, and drinking fountains serving the altered area. [ADA §36.403(e) and ADA §35.151(b)(4)]

ADA §36.403(f) and (g) and ADA §35.151(b)(4)(iii) and (iv) state that alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall alteration when the cost exceeds 20 percent of the cost of

the alteration to the primary function area; and costs that may be counted as expenditures required to provide an accessible path of travel may include:

1. Costs associated with providing an accessible entrance and an accessible route to the altered area, for example, the cost of widening doorways or installing ramps;
2. Costs associated with making restrooms accessible, such as installing grab bars, enlarging toilet stalls, insulating pipes, or installing accessible faucet controls;
3. Costs associated with providing accessible telephones, such as relocating the telephone to an accessible height, installing amplification devices, or installing a text telephone;
4. Costs associated with relocating an inaccessible drinking fountain.

To determine the threshold of disproportionality for expenditures to provide an accessible path of travel, calculate the cost to alter the primary function area not including the above items, and multiply that alteration cost by 20 percent. When the cost of alterations necessary to make the path of travel to the altered area fully accessible is disproportionate to the cost of the overall alteration, the path of travel shall be made accessible to the extent that it can be made accessible without incurring disproportionate costs (in other words, the full 20 percent must be spent on path of travel upgrades unless there happen to be no, or not enough, issues requiring correction). In choosing which accessible elements to provide, priority should be given to those elements that will provide the greatest access, in the following order:

1. An accessible entrance;
2. An accessible route to the altered area;
3. At least one accessible restroom for each sex or a single unisex restroom;
4. Accessible telephones;
5. Accessible drinking fountains; and
6. When possible, additional accessible elements such as parking, storage, and alarms.

It is Jensen Hughes' understanding that the scope of work of the project will address path of travel requirements.

16.2.2 Readily Achievable Barrier Removal

ADA Title III regulations, Part 36, Subpart B, §36.304, Removal of Barriers, requires removal of architectural barriers in existing places of public accommodation constructed or altered prior to the ADA, including communication barriers that are structural in nature, where such removal is readily achievable. This means that at places of public accommodation, non-compliant elements that were installed prior to the effective date of ADA, or elements that were not regulated by the 1991 Standards but which are now regulated by current ADA Standards, are subject to the requirement for readily achievable barrier removal – whether or not alterations or additions are otherwise being undertaken at the facilities. Readily achievable is defined as "easily accomplishable and able to be carried out without much difficulty or expense." Jensen Hughes has not made a determination of what actions are readily achievable – this is the responsibility of the public accommodation.

Although all accessibility deficiencies should be considered critical, it is understood that the public accommodation's finances or business operations may result in the need to prioritize and phase the removal of barriers. ADA Title III regulations, Part 36, Subpart B, §36.304 prioritizes the measures potentially taken to comply with barrier removal. Accessible approach and entrance (providing access to a place of public accommodation from public sidewalks and parking) is the highest priority; access to goods and services is the second highest priority; Access to public toilet rooms is the third highest priority; and the fourth highest priority are those other measures necessary to provide access to the other facilities, privileges, advantages, or accommodations of the place of public accommodation. Per §36.104, "Readily achievable means easily accomplishable and able to be carried out without much difficulty or expense." Please note that it is the facility owner's/operator's responsibility to determine on a case-by-case basis whether removal of a barrier is readily achievable. In determining whether an action is readily achievable, factors to be considered include [§36.301]:

+ The nature and cost of the action;
+ The overall financial resources of the site or sites involved; the number of persons employed at the site; the effect on expenses and resources; legitimate safety requirements necessary for safe operation, including crime prevention measures; or any other impact of the action on the operation of the site;
+ The geographic separateness, and the administrative or fiscal relationship of the site or sites in question to any parent corporation or entity;

+ If applicable, the overall financial resources of any parent corporation or entity; the overall size of the parent corporation or entity with respect to the number of its employees; the number, type, and location of its facilities; and
+ If applicable, the type of operation or operations of any parent corporation or entity, including the composition, structure, and functions of the workforce of the parent corporation or entity."

If it is determined that the measures required to remove a barrier and create full compliance would not be readily achievable, then a public accommodation may take other readily achievable measures to remove the barrier that do not fully comply with the specified requirements.

Commentary found in the Title III Regulations notes that there is no given or expected time frame associated with barrier removal, however there is an expectation that a good faith and ongoing effort will be made to remove existing barriers to accessibility.

It is Jensen Hughes' understanding that the scope of work will address existing barriers. However, in the case that the scope of work does not include all spaces and elements of the building, Jensen Hughes recommends that the facility owner/operator create an "implementation plan" which lists existing barriers in the facility, estimates the cost associated with removing each barrier, and states a time frame in which the facility expects it will be readily achievable to remove each barrier. Having such a document on file and actually following through with the phased implementation of barrier removal would help to demonstrate that the facility is making a good faith effort to improve accessibility over time.

17.0 Alternative Compliance

17.1 PROPOSED ALTERNATE METHODS OF COMPLIANCE FOR 780 CMR

Pursuant to 780 CMR §104.10, the following alternative(s) to prescriptive compliance with 780 CMR will be presented to the Authority Having Jurisdiction for approval:

+ None identified at this time.

HALEY & ALDRICH, INC.
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MEMORANDUM

11 January 2022
File No. 0200460-001

TO: Beyer Blinder Belle Architects & Planners LLP
Mr. Aaron Lamport, AIA, LEED AP Principal

FROM: Haley & Aldrich, Inc.
Al Varshoi, P.E. (TX)
Damian R. Siebert, P.E. (MA)

SUBJECT: Preliminary Geotechnical Evaluations
201 Willow Avenue
Somerville, Massachusetts

This memorandum presents the results of a subsurface investigation program carried out at Benjamin G. Brown School located at 201 Willow Avenue, Somerville, Massachusetts and provides preliminary geotechnical recommendations in support of the proposed renovation and proposed addition at the site. The site is shown on project locus in Figure 1.

Haley & Aldrich, Inc.'s (Haley & Aldrich) scope of work is outlined in our proposal dated 5 August 2021 and Beyer Blinder Belle Architects and Planners LLP's (BBB) authorization.

PROPOSED DEVELOPMENT

Based on the drawing set titled "Preliminary Design Program", dated 17 June 2021, it is understood that the City of Somerville plans to maintain and repair the existing school building and construct a new building wing to the south of the existing school building. The new building wing will have one level of below grade spaces.

It is anticipated that any repairs required for the footing and/or foundations wall of the existing building will be carried out as part of this project. It is also understood that the "ramp" on the north side will be demolished.

SITE LOCATION AND CONDITIONS

The site is located at 201 Willow Avenue, Somerville, Massachusetts. Residential dwellings, assumed to be supported on shallow spread footings, are present in the area surrounding the school. The existing school is a brick building with a total of four stories one of which is a half level of below grade. The

construction of the building was completed in 1901 with an addition (northeastern portion) constructed in 1907. In the 1980's, the "attic" was converted to the third above grade floor for classroom space making the building four (4) total floors. A bituminous asphalt-paved play space/parking area is present on the south side of the site. The site is relatively flat with ground surface elevations around the building ranging from elevation (El.) 54 to El. 55 referenced to mean low water datum (MLW).

Large cracks and signs of building settlement are visible on the north and east walls of the structure. The potential cause of the cracking/settlement was a focus of the subsurface investigation and is discussed below.

SUBSURFACE EXPLORATION AND CONDITIONS

Subsurface Exploration Program

A subsurface exploration program comprised of five (5) test pits and four (4) test borings was completed at the site. The locations of the explorations are shown on Figure 2.

The test pits, designated as TP-1 to TP-5, were excavated adjacent to the northern and eastern walls of the building on 28 and 29 September 2021 by Earthwork Industries, Inc. of Plainville, Massachusetts to depths ranging from 4.0 to 6.8 feet (ft).

Four test borings (TB-1, 2, 2A and 3) were advanced at the site at depths ranging from 7.7 to 26.0 ft. The test borings were drilled on 1 and 2 November 2021 by Northern Drill Service, Inc. of Northborough, Massachusetts.

Logs of test pits and test borings are attached to this memorandum.

Subsurface Conditions

In general, the subsurface conditions consisted of up to approximately 2 to 3 ft of fill underlain by natural soils. The fill was noted to be heterogenous and graded from cohesive sandy lean clay to clayey sand to non-cohesive silty sand. Construction debris, brick fragments, roots and rootlets were noted within the fill layer. The natural soils were glacially derived soils and were noted to range from cohesive sandy lean clay to clayey sand to non-cohesive sandy silt to silty sand. The SPT "N"-values measured within the glacial till layer suggest stiff to hard consistency / medium dense to very dense relative density. Presence of cobbles and/or boulders within the glacial till was inferred from relatively high "N"-values and split-spoon refusal at variable depth within the glacial till layer. Test Borings 2A and 3 penetrated medium dense glaciofluvial and hard glaciomarine deposits below the glacial till layer, respectively.

Groundwater was not encountered in the test pits (up to 6.8 ft deep) and could not be determined in the test borings due to the drilling technique that required addition of water during drilling.

In general, the samples were noted to be wet below a depth of approximately 15 ft. A previous report suggested that the average depth to groundwater was 8.5 ft in August 2009.[1] Perched groundwater should be expected in dense glacial soils with a high fines content such as those encountered at the site.

Groundwater levels should be expected fluctuate with time, temperature, season, precipitation, snowmelt, nearby construction activities, leakage into and out of below-grade structures and utilities in the area, the infiltration of surface water runoff, and other factors.

Existing Foundation Conditions / Foundation Walls

It is inferred from the test pit observations that the below grade walls are acting as a continuous strip footing founded on the firm, stable natural glacial soils that are suitable for supporting foundation loads. Enlarged footings outside of the foundation walls were not encountered within the excavated test pits depths.

Observations from the test pits completed near the area where cracks are visible suggest that the existing foundation wall, comprised of 1 to 4 in. of stacked field stones, has experienced outward movements (i.e., bulging). Presence of mortar could not be confirmed between the gaps and roots and rootlets have grown in the gaps, suggesting that the stones were either constructed with lightly-cemented mortar or laid dry (without mortar). At the northeast corner of the exterior wall and eastern wall, some field stones were noted to be dislocated and voids were observed between the stones.

Six (6) crack gages were installed in 2010 to monitor crack movement and read by the Maguire Group until 2012. During that time negligible movement was observed. An additional set of readings was obtained by Haley & Aldrich on 8 December 2021. The below table summarizes the results of the recent readings.

Crack Gauge Designation	Location	Change in crack width since 2010
1A	Basement storage area north wall facing Kidder Street	+ 9 mm (0.35 in.)
1B	Basement storage area west wall	+ 3 mm (0.12 in.)
2A	1st Floor below window facing Kidder St.	+ 1.5 mm (0.06 in.)
2B	1st Floor inside classroom storage closet	+ 1 mm (0.04 in.)
3A	2nd Floor below window facing Kidder St.	+ 2 mm (0.08 in.)
3B	2nd Floor above door in hallway	+ 2 mm (0.08 in.)

Note: + indicates crack widening

PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

The recommendations below are intended for use in the development of a preliminary foundation design and should be reviewed and confirmed or updated during the final design. At the time of preparing this memorandum neither existing nor proposed building column/exterior wall loads and

[1] Maguire Group, Building Façade Crack Investigation Report, October 2009.

footings configurations were available. Foundation recommendations are based on our experience with similar building heights/types and should be confirmed during final design once loading footing configurations are developed.

Building foundation design and construction must conform to the applicable provisions of the current Massachusetts State Building Code (Building Code). The recommendations herein are intended to be consistent with the 9th Edition of the Building Code, as amended.

Existing Foundations / Foundation Walls

A definitive cause of the building movement is not known. We understand that the movement has occurred over 50 years ago based on anecdotal evidence noted in the Maguire memorandum dated 21 November 2012.[2] The test pit observations suggest that a combination of sub-standard construction practices in early 1900's (small ungrouted or poorly grouted blocks), deterioration of the foundation wall, deterioration/leakage from pipes installed through the wall, and presence of a large oak tree (with a substantial root system) contributed to the localized settlement of the addition that was placed on the building in 1907. Test pit and borings indicated that the wall is founded on glacial soils capable of providing adequate bearing capacity and as such settlement or compression of the foundation soils are not likely a cause of the building movement.

Since the settlement occurred, and based on the observations in the test pits and recent crack gauge readings, the building movements remain stable with no imminent risk of instability to the structure. The minor movements since the last reading (approximately 9.5 years ago) could be attributed to temperature and humidity changes common with seasonal variation. The cause of movement in Gauge 1A that exhibited approximately 0.3 inches (in.) could be from any number causes such as root growth in the area immediately around the gauge (west wall). If the movement was global in nature additional distress to the structure and movement of the other crack gauges would have been expected, which was not observed.

We recommend that a building façade repair program be developed as part of the planned renovation work. Specific repairs to the foundation wall in the area of the building that has exhibited settlement (northeast corner) should be developed in coordination with the structural engineer especially if additional load is planned on the wall. Careful consideration and planning are necessary for any repair given the age (approximately 120 years old), material (unmortared stones), and condition of the foundation wall.

In addition, removal of the large trees in proximity (approximately 15 ft from the building exterior walls) of the foundation wall should be considered, specifically in the area of previous building settlement and cracking.

[2] Maguire Group, Building Façade Crack Investigation and Monitoring, Relevant Documents, Summary, and Conclusion, November 21, 2012.

Foundations for Addition

Foundation Design Recommendations

We recommend that columns, walls and other structural elements of the proposed addition be supported on reinforced concrete spread footing foundations bearing in the natural glacial soils. Specific foundation design criteria are recommended below:

- Footings should bear in undisturbed, naturally-deposited glacial soils or on Compacted Granular Fill placed following removal of the unsuitable materials. Any fill, loam, loess subsoil, bituminous pavements, debris, vegetation, and similar materials are unsuitable for foundation bearing, and must be removed from within the Zone of Influence (ZoI) beneath foundations. The ZoI is defined as the zone beneath the footings and beneath imaginary lines extending 1 ft laterally beyond the footing outer bottom edges and down and out on a one horizontal to one vertical (1H:1V) slope to the glacial till bearing stratum.
- We recommend footings be designed using a maximum allowable bearing pressure in tons per square foot (tsf) equal to the least lateral dimension (width) of the footing in feet, to a maximum of 3.0 tsf for footings constructed accordance with the recommendations herein.
- The least lateral dimension of any footing should be 1.5 ft.
- Footings should be founded a minimum of 4 ft below the lowest adjacent ground surface level exposed to freezing temperatures and a minimum of 1.5 ft below the top of adjacent slabs in interior heated areas of the building.
- Compacted Granular Fill should be used to backfill or raise the grade within the ZoI beneath footings.
- Position tops of footings a minimum of 4 in. below the underside of the overlying floor slab or bituminous pavement. This space should be filled with granular soil having a maximum particle size of 2 in.
- Footings should bear below a reference line drawn upward on 1.5H:1V slope from the bottom of any new or existing utility pipes, or other planned localized excavations. Where possible, footing elevations should be coordinated with utility elevations to allow utilities to pass through the foundation wall (rather than through or beneath the footing). Footing bearing may locally need to be lowered or stepped to achieve this criterion.

We anticipate that the settlement of individual footings under static loading conditions, designed and constructed as recommended herein, will not exceed about ¾ in., with differential settlements between adjacent footings or over a 30-ft distance along strip footings not exceeding about ½ in. Most of the settlement will likely occur during construction as structure dead loads are placed on the foundations and during the initial snow loading of the roof. Control of footing settlements will depend on proper fill placement and footing subgrade preparation. Differential settlements between the existing and proposed building are dependent on repairs to the existing foundation walls at the connections. Assuming necessary repairs are performed the differential numbers provided above may be used.

Lowest Level Floor Slab

The lowest level floor slab in finished building areas can be designed and constructed as conventional soil-supported, concrete slabs-on-grade bearing on a minimum 8-in. thick layer of ¾-in. crushed stone placed over a properly-prepared subgrade. A minimum 4-in. thickness should be provided between the tops of footings and the bottom of slabs.

Ideally, all materials should be removed beneath slabs-on-grade down to the naturally-deposited glacial soils and be replaced with ¾-in. crushed stone or other suitable backfill. Although the performance cannot be predicted with certainty, we recommend for design and decision-making purposes that slab differential settlements could be on the order of ¼ to ½ in. if recommendations provided herein are implemented. Actual settlements could be less or slightly greater than these amounts.

After appropriate subgrade preparation, slabs may be designed using an unfactored modulus of subgrade reaction (modulus for 1 ft by 1 ft plate) of 200 lbs. per cu. in. (pci). This value should be reduced to a value equal to 50 pci for loaded areas exceeding 6 ft in lateral dimension. Linear interpolation may be used to calculate values for intermediate loaded area dimensions.

Foundation and Floor Drainage

The lowest level floor is planned below future exterior grades. While groundwater is not anticipated to be present at all times of the year at the depth of the floor slab perched and storm related water could develop above the floor slab and on the basement walls during the wettest periods of the year. To eliminate hydrostatic pressures on below-grade exterior walls and the floor slab, we recommend that a permanent hydrostatic pressure relief system be provided. The system should consist of the following elements:

- A foundation drain system along the perimeter building walls where the lowest floor slab is positioned 2 ft or lower below the adjacent, exterior finished grade. The perimeter drain should consist of 4-in. diameter continuous, perforated PVC or slotted, corrugated polyethylene drain pipe completely surrounded by a 6 in. zone of drainage fill (3/4 in. size crushed stone) which is in turn completely surrounded by a non-woven filter fabric such as Mirafi 140N or equivalent. A pre-fabricated geocomposite drainage board such as Amerdrain 200/220 should be placed against the backfilled side of the wall up from the drain pipe to points 12 in. below finished grade.
- An underslab drainage system consisting of an 8-in. thick layer of ¾-in. crushed stone placed directly beneath the lowest slab, bearing on a non-woven filter fabric such as Mirafi 140N or equivalent. A network of drain pipes should be positioned within the crushed stone layer approximately 30 ft on center. The pipe should be 4-in. diameter perforated PVC or slotted, corrugated polyethylene drain pipe surrounded by a 4-in. zone of drainage fill (3/4 in. size crushed stone) which is in turn completely surrounded by a non-woven filter fabric such as Mirafi 140N or equivalent. A slight over-excavation will be needed at the underslab drain pipe to provide the 4 in. of drainage fill all around the pipe. The ends of the underslab drain pipe should be connected to the perimeter drain through the foundation wall, and the invert of the sub-slab pipe should be at least six in. above the foundation drain pipe.

Each of the drain system sections (perimeter and underslab) should be designed and constructed to provide each point in the system with redundant flow paths to the system discharge point(s). The system should be designed with a reliable outlet, with discharge directed to the site stormwater recharge system. The systems should be designed to prevent backflow or backup from the site stormwater system into the foundation drain, and such that system discharge will occur reliably even if the municipal system becomes inundated or surcharged. This may require the discharge to be pumped from a sump using redundant pumps and reliable backup power. Cleanouts should be installed in the system to facilitate maintenance.

Given the soil density and grain size, we recommend that the underslab and perimeter drainage system be designed for 5 gallons per minute (gpm) flow rate with the potential of surcharges during storm events of up to 15 gpm.

Slab and Wall Damp-proofing and Water-proofing

Waterproofing of the ground floor slabs is not required. We recommend that a moisture vapor retarder membrane be provided directly beneath the ground floor slabs in occupied and finished spaces, in accordance with ACI 302.2R-06, especially if humidity control is desired or relatively vapor-tight coverings will be used on the floors. Water vapor pressures, that can adversely impact highly vapor-tight or vapor-sensitive floor coverings, or adversely affect interior space humidity, can be present even when groundwater is at significant depths. An example retarder would be a 10-mil virgin HDPE membrane having a water permeance of 0.1 perms or lower. The slab concrete design and construction procedures should consider the impacts of the presence of the vapor retarder.

Foundation walls should be carefully damp-proofed and insulated per the Building Code. Construction joints in walls should be sealed or be provided with water-stops. Subslab structures, such as elevator pits if proposed, should be waterproofed and designed to resist hydrostatic pressures corresponding to water at a depth of 2 ft below the finished elevation of the lowest floor.

To limit water infiltration into the ground next to the building, it is recommended that the upper 12 inches of backfill within approximately 10 ft of the building, in unpaved areas, should consist of clayey topsoil or other soil having relatively low permeability. As an additional measure, surface runoff should be diverted away from the building, especially from uphill portions of the site. In general, the ground surface immediately around the building should be sloped downward away from the structure to direct the surface runoff.

Underpinning of Existing Building Footings

It is understood that the new building wing will have one level of below grade space that will extend below the existing building lowest floor level and foundations in a portion of the southern area of the site, refer to Drawing A-1 (attached) for approximate location of underpinning. Most of the addition will extend to the existing footing level to avoid underpinning. In the select areas indicated on the current plans where the addition will extend below the existing footings, we recommend using conventional pit underpinning methods to replicate the bearing pressures of the existing footings.

Concrete underpinning should bear directly on a properly prepared soil subgrade and not be constructed on crushed stone or other permeable material to reduce the risk of water infiltration below the footings. We recommend that backfill against new footing foundations, foundation walls, and completed underpinning be with low permeability soils to reduce the potential for water infiltrating below footings and below grade space.

Pit underpinning should be carried out continuously with underpinning pits extend a minimum of 1 ft below the subgrade of the addition's new footings. We recommend that survey settlement monitoring points be installed on the existing foundation walls to be underpinned to monitor performance during the work. Performance requirements for the contractor designed system should be provided in the Contract Documents during final design.

Seismic Design

For planning purposes, we recommend Site Classification D for this project.

The soils at the site are not considered susceptible to liquefaction.

Lateral Earth Pressures for Below Grade Walls

Recommended lateral pressures for design of building foundations walls that act as retaining walls are provided below, for the permanent condition. The pressures do not include hydrostatic loads, as the retained soil will be above exterior grades or wall drainage will be provided. For seismic loading conditions, walls should be designed to resist static plus seismic earth pressures. Surcharge loading does not need to be included for seismic design case unless the surcharge will be applied over an extended period of time.

- **Static Soil Pressure:** Calculate using an equivalent unit weight of retained earth equal to 60 pounds per cubic foot (pcf) with a triangular distribution from site grades to the base of the below-grade wall.
- **Seismic Pressure:** Calculate using an inversed triangular distribution starting from 8.5 x height of the wall to zero at the base of the below-grade walls.
- **Surcharges:** Calculate based on a uniform lateral pressure equal to 0.5 times the vertical surcharge pressure acting on the backfilled side of the wall and applied over the full height of the wall.

PRELIMINARY CONSTRUCTION CONSIDERATIONS NEW WING

Excavation and Temporary Support of Excavation

We anticipate that excavation for foundation construction and site grading can be conducted using normal mechanized earth-moving equipment. However, the glacial till soils are dense in-situ, and may contain numerous cobbles and boulders, which could make excavation with small equipment difficult. Boulders, utilities, rubble fill and remnants of the former building foundations should be anticipated.

Temporary cut slopes in the glacial till should be stable if excavated no steeper than about 1H:1V above the groundwater. Some sloughing and raveling should be anticipated in temporary slopes. In areas where the property line does not allow for open cutting a lateral excavation support system consisting of a cantilevered soldier pile and lagging should be used. The need for a temporary support system during the repair of the foundation wall should be determined by the contractor performing the work.

In general, we anticipate that most excavation will be above "normal" groundwater levels and some minimal dewatering is anticipated during foundation construction. Groundwater or perched water may be encountered during wet periods. Groundwater and surface water must be controlled as necessary to enable excavation and foundation construction to be conducted in the dry. All filling, final excavation, subgrade preparation and soil-bearing foundation construction should be conducted "in-the-dry".

When dewatering is required, we anticipate that it could be accomplished using shallow sumps and drainage ditches. Dewatering should be performed to achieve and maintain water levels below the exposed subgrade elevation, and in such a manner to avoid pumping fine soil particles and disturbance to foundation subgrades. We recommend that the details of the dewatering be left to the contractor, with proposed methods and systems submitted for review by the engineer before the work proceeds.

Dewatering effluent must be discharged in accordance with all regulatory requirements. Significant infiltration or recharge of dewatering effluent into the ground on-site is anticipated to be very difficult or infeasible. Any effluent discharged to municipal systems would be subject to regulatory requirements, and would require a discharge permit (NPDES or MWRA). Obtaining these permits can take 4 to 6 months and we recommend that project plan to obtain these well in advance of construction to note delay construction.

Footing Preparation

Excavation work for footing bearing surfaces should be conducted in a manner that minimizes disturbance to the bearing soils. The exposed naturally-deposited glacial soil subgrades should be observed in the field by a geotechnical engineer to confirm the assumed foundation bearing conditions. It will be necessary to over-excavate and replace weak, disturbed or otherwise unacceptable foundation bearing soils.

Following excavation to required grades in natural soils, the exposed surfaces should be recompacted with a minimum of two passes with a vibratory roller or other heavy vibratory compaction equipment prior to placing Compacted Granular Fill or constructing foundations. If weaving or other disturbance due to shallow depth to water is noticed during recompaction, vibratory recompaction should be discontinued.

The glacial soils are susceptible to disturbance by water and worker traffic. Care should be taken to prevent surface water from collecting on exposed bearing surfaces. Worker and equipment traffic over bearing surfaces should be minimized.

Once exposed, it may be difficult to prepare soil subgrades in cold or wet weather. If subgrade protection difficulties are encountered, various methods can be utilized, such as:

- Leave subgrades high until immediately before forming and concreting to minimize the time the subgrade is exposed.
- Place a lean concrete mud mat on the exposed glacial soil surface at footing locations after the subgrade has been prepared.
- Over-excavate footings 6 in. using a smooth-edged bucket, place non-woven filter fabric over the exposed stable soil subgrade, and backfill to the design bearing elevation using ¾-in. crushed stone. The crushed stone should be entirely encapsulated (bottom, top and sides) with non-woven filter fabric to prevent migration of fines. Thicknesses of less than 3 in. of ¾-in. crushed stone can be placed without a geotextile, under monitoring by experienced personnel.

Final judgments regarding footing subgrade preparation should be made by a Geotechnical Engineer or experienced technician in the field based on actual conditions.

Reuse of On-Site Soils

On-site glacial soils are considered moisture and frost susceptible materials. The other on-site soil materials have variable frost susceptibility.

The existing natural glacial soils can be re-used as common fill outside the building after removal of oversize particles. The glacial till soils may also be suitable for use as an alternate to Compacted Granular Fill beneath footings and slabs (except the uppermost 8 in. below slabs) during favorable (warm and dry) weather conditions provided the moisture content is close to optimum and the required compaction can be achieved.

Careful control of moisture content will be required to achieve the necessary compaction of the silty glacial soils. Moisture conditioning by drying or adding water may be necessary. Proper placement of glacial soils as compacted fill may be difficult or impossible during cold or wet weather periods, often from about 1 October through 1 May in this area.

Rainfall or melting snow can readily saturate stockpiled glacial till. Providing drainage from or covering a stockpile can help limit this potential problem.

If the glacial soils are to be used below footings, slabs or pavements, it is recommended that the placement and compaction of the material be observed and documented in the field by experienced personnel. Our recommendations related to reuse of glacial till as structural fill beneath foundations are contingent upon Haley & Aldrich personnel observing its placement.

It is likely that other site fill materials can be re-used as common fill outside the building after processing to remove over-size or unsuitable materials. Topsoil or loess may be re-usable in landscape areas subject to planting and landscaping requirements.

Final determination of suitability of on-site materials for reuse will have to be made when the materials are exposed during excavation.

FUTURE WORK

Final Foundation Design

The recommendations herein should be reviewed prior to construction once the column and wall loads and other design details including repair of the existing foundation walls become available.

Excavated Soil Management

We anticipate that the site development will generate excess soil that requires off-site disposal, the management of the excess soils must be performed in accordance with all applicable federal, state, and local laws and regulations, including the requirements of the Massachusetts Contingency Plan (MCP, 310 CMR 40.000). Excess soil designated for off-site disposal will require analytical testing. If reportable concentrations of contaminants are detected in the soils, regulatory compliance may be required in accordance with the timelines established in the MCP. We recommend a soil precharacterization program be performed prior to final design to assist with this evaluation.

CLOSURE

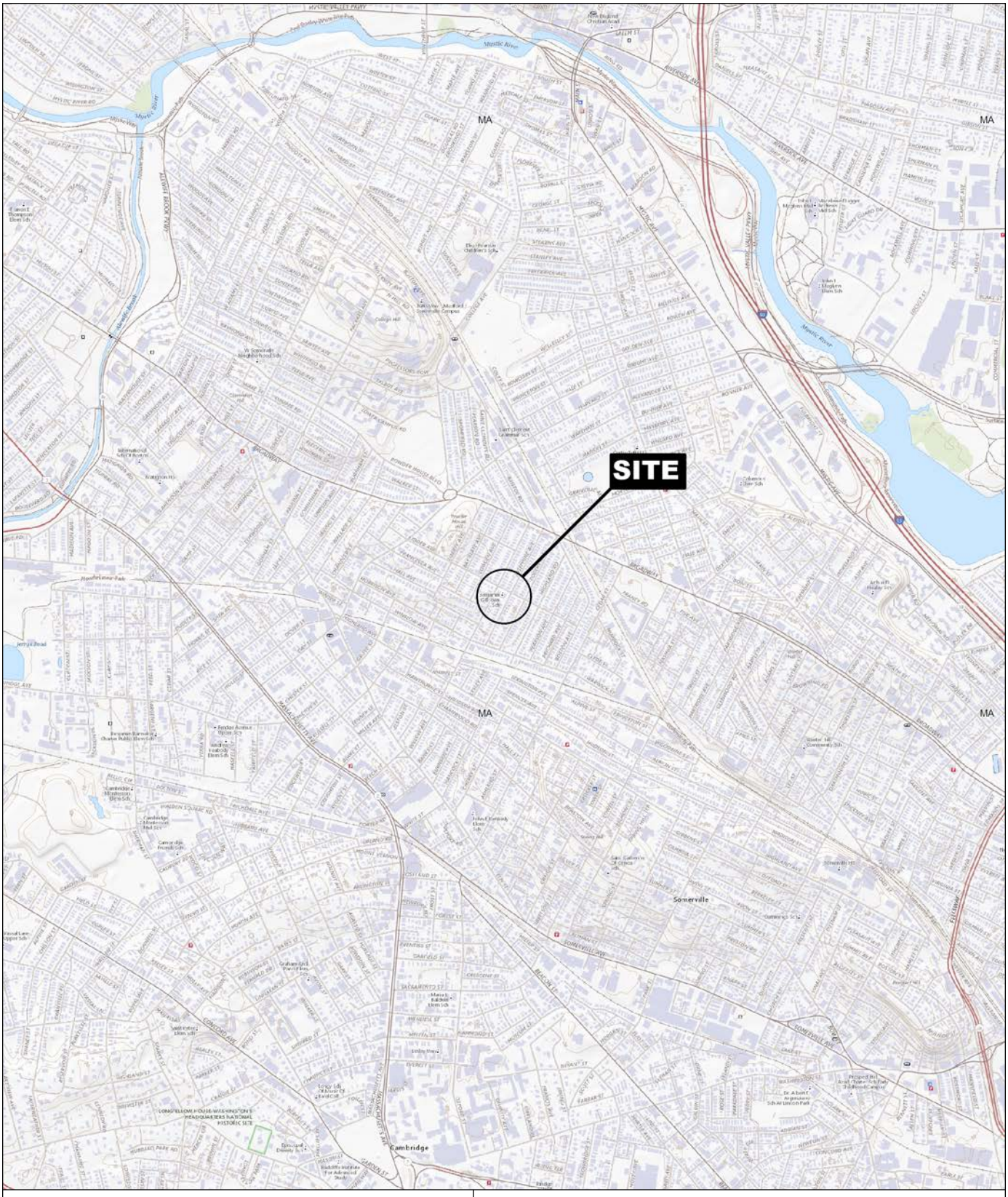
We trust this information is adequate for your current needs. Should you have any questions or require additional information, please do not hesitate to contact our office.

Attachments:

Figure 1 - Project Locus
Figure 2 - Site and Subsurface Exploration Location Plan
Drawing A-1
Test Borings Logs TB-1, TB-2, TB-2A, TB-3
Test Pit Logs TP-1 to TP-5

\\haleyaldrich.com\share\CF\Projects\0200460\9. Deliverables\Geotechnical\Brown - 201 Willow Ave\Geotechnical Memorandum\Final Submission\2022-0111-HAI_201 Willow Ave Geot Memo.-F.docx

FIGURES



SITE COORDINATES: 42°23'50"N, 71°06'50"W

MAP SOURCE: USGS

HALEY ALDRICH

201 WILLOW AVENUE
SOMERVILLE, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 INCH = 2,000 FEET
JANUARY 2022

FIGURE 1

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LEGEND

TB-1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY NEW ENGLAND BORING CONTRACTORS ON 1 AND 2 NOVEMBER 2021

TP-1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST PIT EXCAVATED BY EARTHWORK INDUSTRIES ON 28 AND 29 SEPTEMBER 2021

NOTE

1. IMAGE, DATED 3 SEPTEMBER 2020, TAKEN ELECTRONICALLY FROM GOOGLE EARTH PRO.

0 30 60
APPROXIMATE SCALE IN FEET

HALEY ALDRICH

THE BENJAMIN G. BROWN SCHOOL
201 WILLOW AVENUE
SOMERVILLE, MASSACHUSETTS

SITE AND SUBSURFACE EXPLORATION LOCATION PLAN

SCALE: AS SHOWN
JANUARY 2022

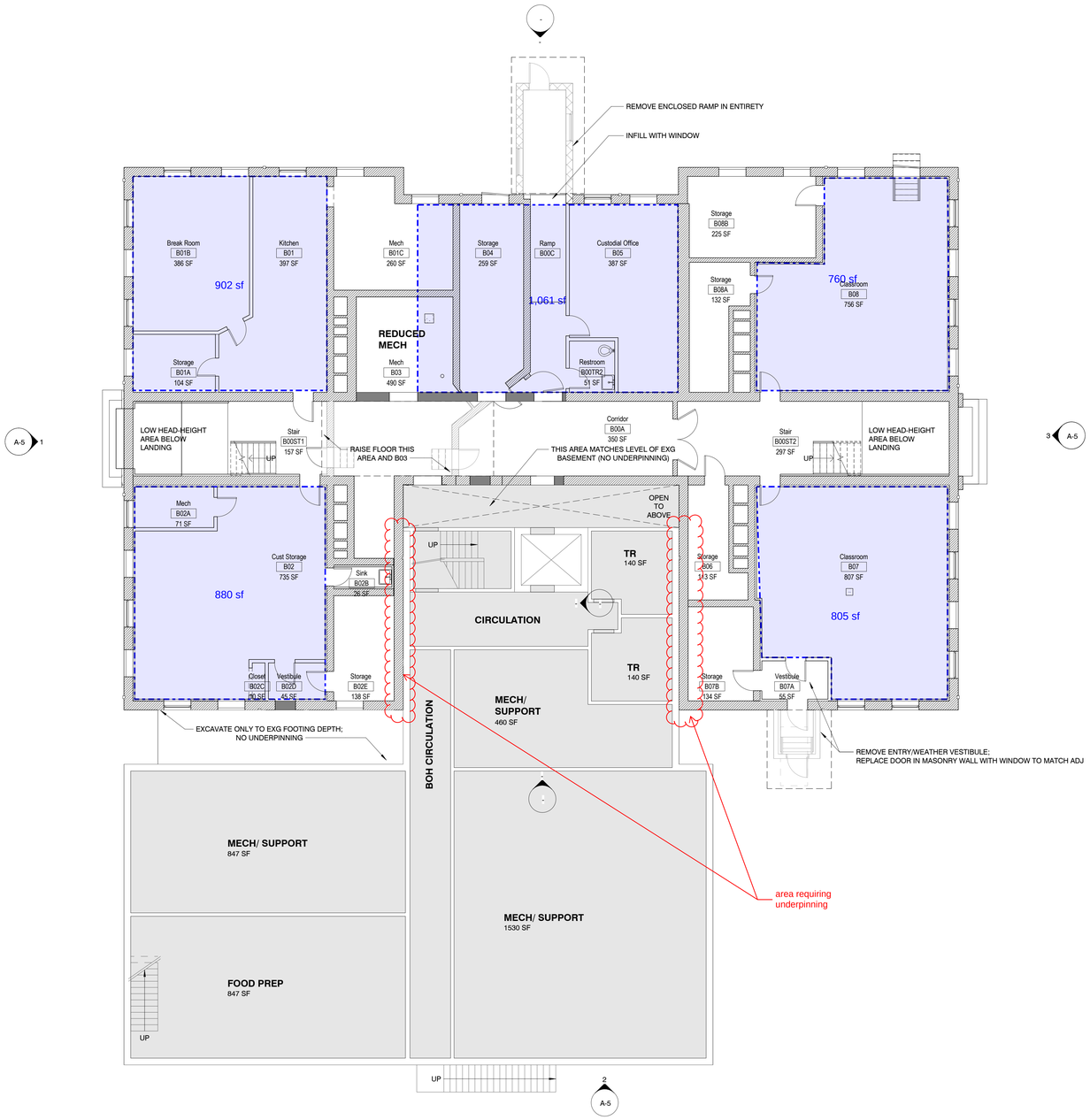
FIGURE 2

Saved by: ERVIN, DAYNA Printed: 11/9/2021 11:24 AM Sheet: A010
J:\GRAPHICS\200460\200460-001-A010.DWG

Drawing A-1

NOTE IF THIS SHEET IS NOT 30"W x 42"L THEN IT IS NOT THE INTENDED SIZE. IN ALL CASES, WORK TO FIGURED DIMENSIONS.

0 1" 2"



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BIM 360://2015 Somerville Brown School Eng-R21_3D Development.rvt

Brown School
201 Willow Ave
Somerville, MA 02144

BEYER BLINDER BELLE
120 Broadway, 20th Floor
New York, NY, 10271
212 777 7800

KEY PLAN

STAMP

NO	DATE	DESCRIPTION

REVISIONS

SUBMITTAL

Preliminary Design Program
NOT FOR CONSTRUCTION

DRAWING TITLE

Proposed Basement Plan - Addition Blocking

SCALE	1/8" = 1'-0"
DATE	06/17/21
PROJECT NUMBER	2875
DRAWING NUMBER	A-1

of

Test Borings Logs TB-1, TB-2, TB-2A, TB-3

TEST BORING REPORT

Boring No. TB-1

Project	BROWN SCHOOL, 201 WILLOW AVENUE, SOMERVILLE, MA
Client	BEYER BLINDER BELLE ARCHITECTS & PLANNERS LLP
Contractor	NORTHERN DRILL SERVICE, INC.

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S		Rig Make & Model: Mobile Rig B-48
Inside Diameter (in.)	4	1.4		Bit Type: Cutting Head
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Drive and wash
				Hoist/Hammer: Winch / Automatic hammer
				PID Make & Model: Not used

File No.	0200460-001
Sheet No.	1 of 1
Start	2 November 2021
Finish	2 November 2021
Driller	P. Schofield
H&A Rep.	C. Romero
Elevation	56.7
Datum	MLW
Location	See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						-ASPHALT-										
	- 6 5 8	S1 7	0.5 2.0	SM		Brown silty SAND with gravel (SM), no structure, no odor, dry	10	5	15	15	20	35				
					54.7	-FILL-										
	12 14 10 12	S2 15	2.0 4.0	ML	2.0	Medium dense brown silty SAND with gravel (SM), no structure, no odor, dry	5	10	10	15	20	40				
5	12 13 15 19	S3 6	4.0 6.0	SM-SC		Medium dense to very stiff brown silty SAND (SM) to lean clayey SAND (SC), no structure, no odor, dry to moist	5	10	10	15	20	40				
	26 30 28 48	S4 12	6.0 8.0	SM		Very dense brown silty SAND (SM) with gravel, no structure, no odor, dry to moist	5	10	10	15	20	40				
	14 25 23 21	S5 17	8.0 10.0	ML		Dense to hard brown silty SAND (SM) with gravel, no structure, no odor, dry to moist	5	10	10	15	20	40				
10						-GLACIAL TILL-										
15	22 100/4"	S6 10	14.0 14.8	ML	41.5 15.2	Very dense brown silty SAND (SM) with gravel, no structure, no odor, dry to moist	5	10	10	15	20	40				
						BOTTOM OF EXPLORATION 15.2 FT -ROLLER BIT AND SPLIT SPOON REFUSAL-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft)	15.2
Rock Cored (ft)	-
Samples	S6

Boring No. TB-1

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-09 REV PLOG-HA-LIB09-BOS STANDARD ONLY.GLB GREAT PYRAMID H&A.GPJ \\HALEYALDRICH.COM\SHARE\CF\PROJECTS\02004608. PROJECT_DATA\FIELD_DATA\04_GINT\0200460-001-TB.GPJ 11 Jan 22

TEST BORING REPORT

Boring No. TB-2

Project	BROWN SCHOOL, 201 WILLOW AVENUE, SOMERVILLE, MA
Client	BEYER BLINDER BELLE ARCHITECTS & PLANNERS LLP
Contractor	NORTHERN DRILL SERVICE, INC.

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S		Rig Make & Model: Mobile Rig B-48
Inside Diameter (in.)	4	1.4		Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None Casing: Wash and Drive
Hammer Fall (in.)	30	30	-	Hoist/Hammer: Winch / Automatic hammer PID Make & Model: Not used

File No.	0200460-001
Sheet No.	1 of 1
Start	2 November 2021
Finish	2 November 2021
Driller	P. Schofield
H&A Rep.	C. Romero
Elevation	56.3
Datum	MLW
Location	See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						-ASPHALT-										
	- 7 10	S1 0	0.5 1.5	SM		Brown silty SAND with gravel (SM)										
					54.6 1.8	-FILL-										
	14 16 16 20	S2 16	2.0 4.0	SM		Dense light brown silty SAND with gavel (SM), no structure, dry	5	5	15	15	20	40				
5	14 20 19 18	S3 13	4.0 6.0	SM-SC		Dense to hard light-brown silty sand (SM) with gravel to lean clayey SAND (SC), no structure, dry	5	5	15	15	20	40				
	87 23 22 100/2"	S4 13	6.0 7.7	SM-SC		Dense to hard light-brown silty SAND (SM) with gravel to lean clayey SAND (SC), no structure, dry	5	5	15	15	20	40				
					48.6 7.7	-GLACIAL TILL-										
						BOTTOM OF EXPLORATION 7.7 FT -ROLLER BIT AND SPLIT SPOON REFUSAL-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft)	7.7
Rock Cored (ft)	-
Samples	S4

Boring No. TB-2

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

H&A-TEST BORING-09 REV PLOG-HA-LIB09-BOS STANDARD ONLY.GLB GREAT PYRAMID H&A.GPJ \\HALEYALDRICH.COM\SHARE\CF\PROJECTS\02004608. PROJECT_DATA\FIELD_DATA\04_GINT\0200460-001-TB.GPJ 11 Jan 22

TEST BORING REPORT

Boring No. TB-2A

Project	BROWN SCHOOL, 201 WILLOW AVENUE, SOMERVILLE, MA
Client	BEYER BLINDER BELLE ARCHITECTS & PLANNERS LLP
Contractor	NORTHERN DRILL SERVICE, INC.

File No.	0200460-001
Sheet No.	1 of 1
Start	2 November 2021
Finish	2 November 2021
Driller	P. Schofield
H&A Rep.	C. Romero
Elevation	55.4
Datum	MLW
Location	See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S		Rig Make & Model: Mobile Rig B-48
Inside Diameter (in.)	4	1.4		Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None Casing: Wash and Drive
Hammer Fall (in.)	30	30	-	Hoist/Hammer: Winch / Automatic hammer PID Make & Model: Not used

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						-ASPHALT-										
	2 2 4	S1 0	0.5 2.0	SM		Loose dark brown to black silty SAND (SM)	10	5	25	20	20	20				
	2 2 5 10	S2 16	2.0 4.0	SM	52.4 3.0	-FILL- Loose brown with oxidation stains silty SAND with gravel (SM), no structure, no odor	10	5	15	10	20	40				
						-COHESIVE FILL-										
5	9 12 15 17	S3 12	4.0 6.0	SC		Very stiff brown with oxidation stains clayey SAND with gravel (SC), no structure, no odor	10	5	15	10	25	35				
	12 15 16 10	S4 24	6.0 8.0	SC		Hard brown with oxidation stains clayey SAND with gravel (SC)	10	5	15	10	20	40				
	5 7 7 12	S5 18	8.0 10.0	SC		Stiff brown with oxidation stains clayey SAND with gravel (SC)	10	5	15	10	20	40				
10																
						-GLACIAL TILL-										
	20 44 41 32	S6 12	14.0 16.0	ML		Very dense to hard brown silty SAND (SM) with gravel to clayey sand (SC), no structure, no odor, moist to wet	5	10	10	15	20	40				
15					37.9 17.5											
	11 12 12 15	S7 13	19.0 21.0	SW		Medium dense light-brown to brown well-graded SAND with gravel (SW), moist to wet	10	10	30	20	25	5				
20						-GLACIOFLUVIAL DEPOSITS-										
					34.4 21.0	BOTTOM OF EXPLORATION 21.0 FT										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft)	21
Rock Cored (ft)	-
Samples	S7

Boring No. TB-2A

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

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TEST BORING REPORT

Boring No. TB-3

Project	BROWN SCHOOL, 201 WILLOW AVENUE, SOMERVILLE, MA
Client	BEYER BLINDER BELLE ARCHITECTS & PLANNERS LLP
Contractor	NORTHERN DRILL SERVICE, INC.

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S		Rig Make & Model: M2
Inside Diameter (in.)	4	1.4		Bit Type: Roller Bit
Hammer Weight (lb)	140	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Drive wash
				Hoist/Hammer: Winch / Donut hammer
				PID Make & Model: Not used

File No.	0200460-001
Sheet No.	1 of 2
Start	1 November 2021
Finish	1 November 2021
Driller	P. Schofield
H&A Rep.	C. Romero
Elevation	54.5
Datum	MLW
Location	See Plan

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0		2	0.0 2.0		53.5 1.0	-TOPSOIL (approximately 1 ft)-										
				CL		Brown sandy lean CLAY (CL) -FILL-										
	10 7 6 10	S2 14	3.0 5.0	ML	51.5 3.0	Medium dense brown to dark brown sandy SILT with gravel (ML), no structure, no odor, moist	10	5	10	10	10	55				
5	8 13 11 8	S3 6	5.0 7.0	ML		Medium dense brown to dark brown sandy SILT with gravel (ML), no structure, no odor, moist	10	5	10	10	10	55				
				ML		Stiff brown to dark brown sandy SILT with gravel (ML), no structure, no odor, moist	10	5	10	10	10	55				
	6 7 10 7	S4 0	8.0 10.0													
10	19 28 40 42	S5 14	10.0 12.0	ML- CL		Hard brown to dark brown sandy SILT with gravel (ML) to sandy lean CLAY (CL) with gravel, no structure, no odor, moist -GLACIAL TILL-	10	5	10	10	10	55				
					42.5 12.0											
15	7 12 20 20	S6 20	15.0 17.0	CL		Hard gray lean CLAY (CL), no structure, no odor, wet -GLACIOMARINE DEPOSITS-						100				
20																

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
- O - Open End Rod
- T - Thin Wall Tube
- U - Undisturbed Sample
- S - Split Spoon Sample

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (ft)	26.0
Rock Cored (ft)	-
Samples	S8

Boring No. TB-3

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

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TEST BORING REPORT

Boring No. TB-3
File No. 0200460-001
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20	9 15 17 19	S7 21	20.0 22.0	CL		Hard gray lean CLAY (CL), no structure, no odor, wet -GLACIOMARINE DEPOSITS-						100				
25	15	S8 10	25.0 25.5	CL	28.5 26.0	Hard gray lean CLAY (CL), no structure, no odor, wet, spoon refusal at 25.5 ft BOTTOM OF EXPLORATION 26.0 FT -ROLLER BIT AND SPLIT SPOON REFUSAL-					5	95				

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

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Test Pit Logs TP-1 to TP-5

Test Pit 1 (TP-1)

Photographs:

By Haley & Aldrich, Inc.

Test Pit 1 (TP-1)

Summary of observations:

An approximately 3 in. thick layer of unreinforced concrete was encountered at the ground surface adjacent to the exterior wall at the test pit location, extending approximately 1 ft in a northerly direction. The rest of the test pit footprint was covered by approximately 6 in. of topsoil.

Below the concrete and topsoil, an approximately 2.5 ft thick layer of mottled brown and grey fill was encountered. The fill was divided into an upper portion of silty sand and a lower portion of sandy lean clay with varying amounts of roots and brick fragments. The fill was underlain by natural, glacially-derived soils comprised of grey silty sand to clayey sand with occasional rootlets, extending to the test pit termination depth of 6.1 ft.

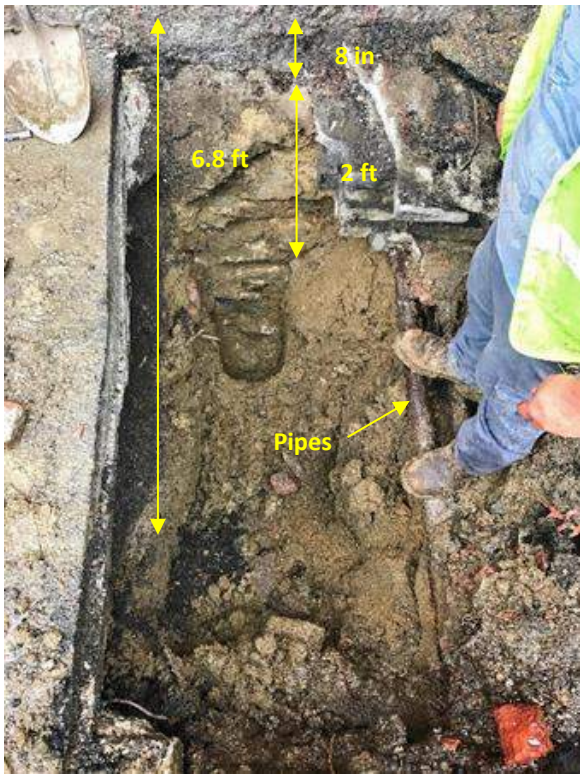
Groundwater was not encountered in the test pit, and soils were generally noted to be moist.

The foundation wall was noted to be comprised of stacked field stones. The stones were estimated to be approximately 2 to 4 in. in height. Gaps between the stones were generally noted to be filled with soil and the presence of mortar could not be confirmed. Some roots and rootlets were observed within the foundation wall gaps. The foundation wall does not exhibit visible signs of distress (i.e., dislocation of stones or voids).

By Haley & Aldrich, Inc.

Test Pit 2 (TP-2)

Photographs:



By Haley & Aldrich, Inc.

Test Pit 2 (TP-2)

Summary of observations:

An approximately 8 in. thick layer of concrete and/or asphaltic concrete was encountered at the ground surface adjacent to the exterior wall. Below the concrete/asphaltic concrete layer, an approximately 2 ft thick layer of fill, divided into approximately 1 ft thick generally non-cohesive black to brown silty sand with gravel and approximately 1 ft thick cohesive lean clay with sand, was encountered. The fill was noted to contain construction debris and up to a 5 in. thick layer of brick. Natural, glacially derived soils consisting of clayey sand to lean clay with sand were encountered below the fill and extended to the test pit termination depth (approximately 6.8 ft).

Groundwater was not observed in the test pit. The soils were generally noted to be moist to wet. The moisture content of the soil was likely impacted by the rain event during the test pit excavation.

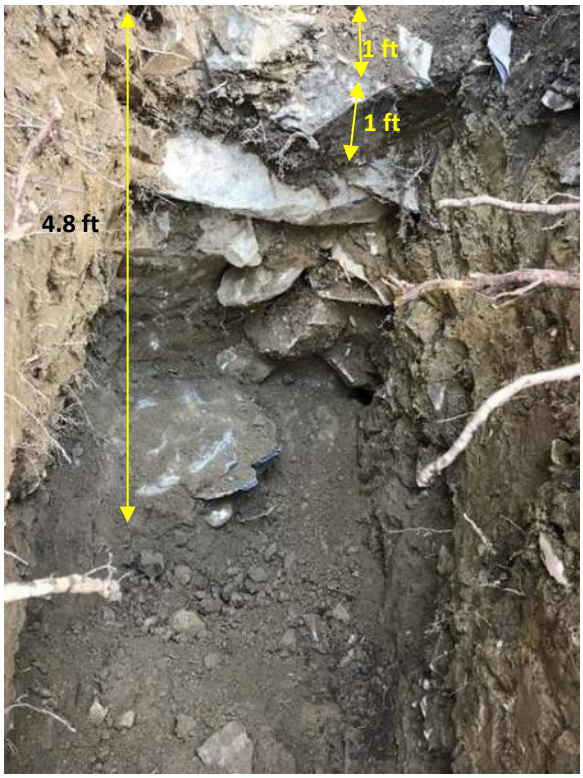
Two pipes, running in a south-north direction were exposed at approximately 1.3 ft depth on the west side of the test pit (approximately 1 ft away from the western edge of the test pit). The pipes outside diameters are estimated to be approximately 2.5 and 3.25 in. Both pipes exhibited a relatively high level of oxidation and rust on the exterior surface. Pipe bedding material was not present.

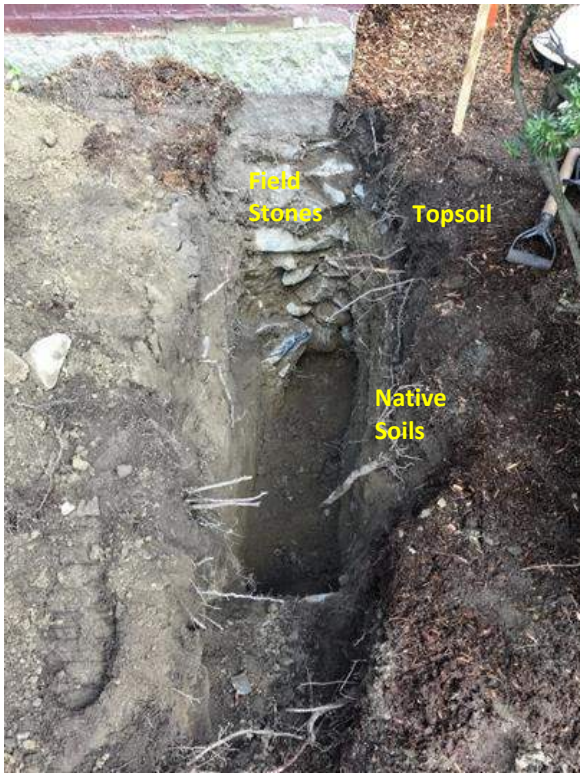
The foundation wall was comprised of stacked field stones. The height of the stones was estimated to be 1 to 4 in. The gaps between the stones are generally filled with soils, and the presence of mortar could not be confirmed. The foundation wall does not exhibit signs of distress (i.e., dislocation of stones or voids).

By Haley & Aldrich, Inc.

Test Pit 3 (TP-3)

Photographs:





By Haley & Aldrich, Inc.

Test Pit 3 (TP-3)

Summary of Observations:

The test pit encountered an approximately 1 ft thick layer of topsoil with roots and rootlets at the ground surface. The topsoil is underlain by an approximately 1 ft thick layer of fill comprised of brown sandy lean clay, with gravel and rootlets. The natural soils – inferred to be glacially-derived - were generally comprised of brown and grey silty sand to clayey sand with gravel extending to the test pit termination depth (approximately 4.8 ft). The natural soils were noted to contain rootlets.

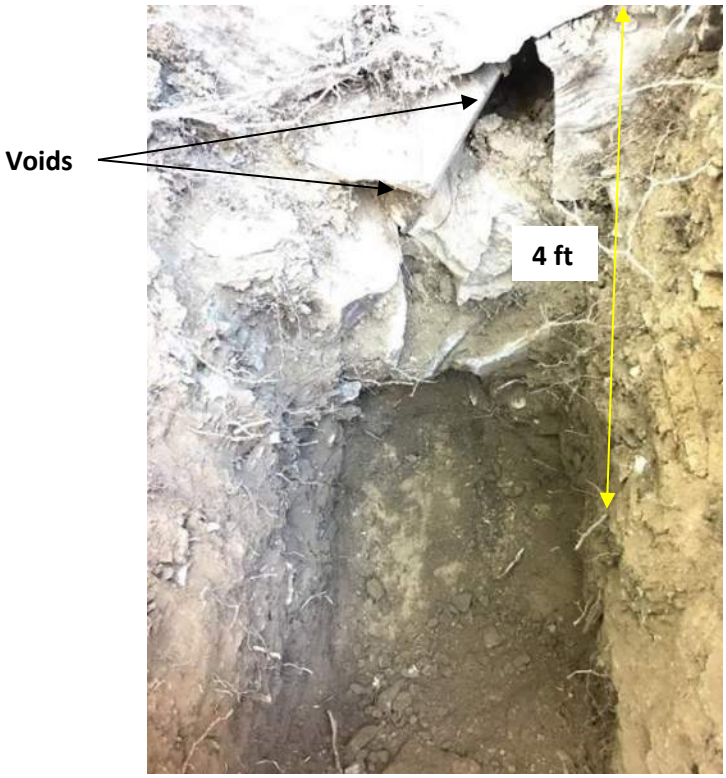
Groundwater was not encountered in the test pits, and the soils were generally noted to be moist.

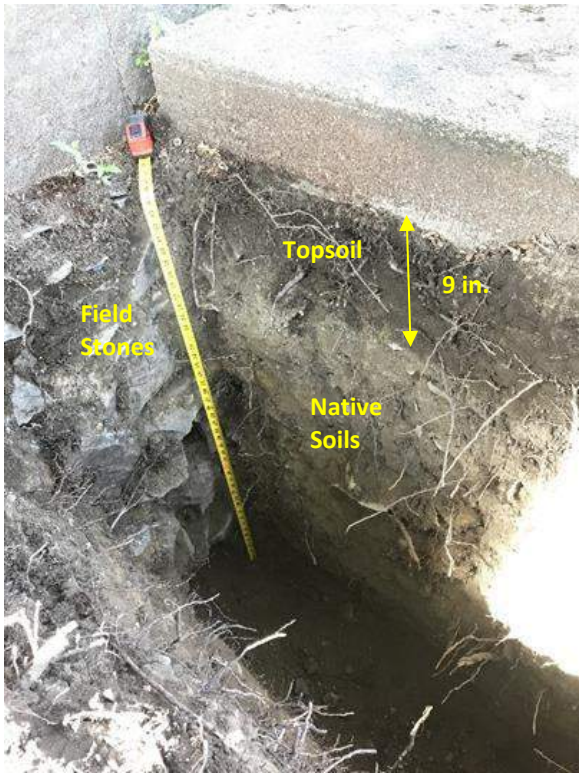
The foundation wall consisted of stacked field stones. The sizes of the field stones were variable with the maximum height of approximately 4 in. Gaps between the stones are filled with soils, and roots and rootlets were noted within the wall. The presence of mortar could not be confirmed. Cracking of some of the stones was observed. Several stones were dislocated, and presence of void(s) was noted on the exterior face of the foundation wall near the bottom of the test pit.

By Haley & Aldrich, Inc.

Test Pit 4 (TP-4)

Photographs:





By Haley & Aldrich, Inc.

Test Pit 4 (TP-4)

Summary of Observations:

The test pit encountered an approximately 9-in.-thick layer of dark brown topsoil at the ground surface. Roots and rootlets were noted in the topsoil layer. The topsoil is underlain by an approximately 0.5-ft-thick layer of light gray cohesive sandy silty clay fill. The fill contains pockets of light brown (orange) fine sand. The fill is underlain by natural soils consisting of brown sandy lean clay to silty sand and extending to the test pit termination depth (approximately 4 ft).

Groundwater was not encountered in the test pit, and soils were noted to be generally dry to moist.

The foundation wall was comprised of stacked field stones. Gaps between the stones were filled with soils with rootlets. The presence of mortar could not be confirmed. The stones exposed at this test pit location generally exhibited visible signs of distress such as dislocated stones and voids were noted between the stones.

By Haley & Aldrich, Inc.

Test Pit 5 (TP-5)

Photographs:

By Haley & Aldrich, Inc.

Test Pit 5 (TP-5)

Summary of Observations:

An approximately 1 ft of brown topsoil with roots and rootlets was encountered at the ground surface. The topsoil is underlain by a 1 ft thick layer of brown non-cohesive fill comprised of silty sand with gravel and cobbles (approximately larger than 3 in. in diameter) particles. The fill is underlain by natural glacially-derived soils grading from cohesive sandy lean clay to non-cohesive silty sand with gravel. The test pit was terminated at a depth of approximately 4 ft.

Groundwater was not encountered in the test pit, and the soils were generally noted to be dry.

The foundation wall consisted of stacked field stones. Gaps were generally filled with soils with considerable amounts of roots and rootlets. Disintegrated mortar was observed between the stones. Some stones were observed to have cracks and the foundation wall exhibited some signs of distress such as bulging.

By Haley & Aldrich, Inc.

WJE

Somerville Master Plan

Infrared Drone Survey

March 24, 2021
WJE No. 20220.6134

PREPARED FOR:
BEYER BLINDER BELLE
ARCHITECTS & PLANNERS LLP
120 Broadway, 20th Floor
New York, New York 10271

PREPARED BY:
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WJE

Somerville Master Plan

Infrared Drone Survey

David Fagan
Project Associate, Level 1 sUAS Thermographer

Anita Simon, AIA
Project Manager

March 24, 2021
WJE No. 20220.6134

PREPARED FOR:
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CONTENTS

INFRARED THERMOGRAPHY (IR) SURVEY

On March 11, 2021, David Fagan and Anita Simon (WJE) visited five buildings in Somerville, Massachusetts:

- 33 Cross Street (Edgerly) (Figure 1)
- 93 Highland Avenue (City Hall) (Figure 2)
- 81 Highland Avenue (1895) (Figure 3)
- 201 Willow Avenue (Brown) (Figure 4)
- 45 College Avenue (Church) (Figure 5)

Qualitative infrared (IR) surveys were completed of all extant roofing systems. The purpose of the survey was to identify potential areas of entrapped moisture within the roofing systems. The IR survey was performed in general conformance with ASTM C1153-10, *Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging*.

Prior to performing the IR surveys, visible light photographic surveys were performed to provide context and capture reference images of the roof surfaces before sunset.

Methodology of Infrared Survey (ASTM C1153-10)

IR thermography scanning is a non-invasive method that can be used to locate possible anomalies within a structure. IR, or heat energy, are light waves that are not visible to the human eye. These light waves are the portion of the electromagnetic spectrum between 0.75 to 13 micrometers. An IR camera detects heat energy that is emitted and reflected from an object or material. Different objects or materials will absorb, conduct, or emit heat energy differently. Additionally, materials resist thermal energy to varying degrees. When imaging a surface, the IR camera assigns a relative temperature reading based on emitted heat energy from each object or material.

Moisture laden roof components have a larger thermal mass and retain heat longer than adjacent dry roof components. After the sun sets and the roof begins to discharge heat to the environment, the moisture laden roof components rate of temperature reduction is slower than that of the dry roof components. Subsequently, the wet components remain warmer for a longer period of time which results in thermal differences, which are graphically depicted by the IR camera by different colors in the IR image. The temperature differential will gradually dissipate as both wet and dry components reach a new equilibrium temperature equal to the ambient air temperature. The time between sunset and when both wet and dry components reach equilibrium temperature is the time in which this scan was completed Images that show differential temperatures were captured in the evening hours following sunset to maximize the temperature differences between wet and dry roof insulation.

The equipment utilized in the scans were:

- An aerial drone, DJI Mavic 2 Enterprise Dual (Serial Number 298CGBKR0A09NK/FAA Certificate Number FA37EXM439) was used to perform the visible light photographic surveys at all five buildings and the IR surveys at Edgerly and Church.

- An aerial drone, DJI Inspire 1 equipped with a Zenmuse XT Infrared Camera (Serial Number W13DFD12060784/FAA Certificate Number FA3EM79R94) was used to perform the IR surveys at City Hall, 1895, and Brown.

33 CROSS STREET (EDGERLY CENTER)

The Edgerly Center is generally U-shaped in plan with a low-slope roof system. The roof is covered with and EPDM roofing that slopes to internal drains. EPDM is installed over rectangular rooftop projections that are presumed to be abandoned equipment curbs from former mechanical equipment.

The IR survey at the Edgerly Center occurred between 8:41PM and 8:49PM. The weather conditions during the survey were as follows:

- Partly Cloudy
- Air Temperature: 59 degrees Fahrenheit
- Humidity: 43%
- Dew Point: 37 degrees Fahrenheit
- Wind: SSW at 16 miles per hour

The following thermal anomalies were noted at Edgerly:

- Location 1 - There is a thermal anomaly (approximately 9 square feet) at the northeast corner of one roof curb (Figure 6).
- Location 2 - There is a thermal anomaly (approximately 16 square feet) at the southeast corner of the west wing (Figure 7).
- Location 3 - There is a thermal anomaly (approximately 9 square feet) in the field of the roof in the south half of the west wing (Figure 8).

An overall photo showing the locations of the thermal anomalies at 33 Cross Street is included (Figure 9).

93 HIGHLAND AVENUE (CITY HALL)

City Hall is generally rectangular in plan and oriented in a north/south direction. The central portion of the building is covered with a low-slope EPDM roofing system that is flanked on its north and south sides with steep-slope slate tile roofs. A clock tower is located within the center of the low-slope roof. Internal drains are located at each corner of the central low-slope roof and gutters with downspouts provide drainage for the slate roofs. Mechanical equipment on the roof is limited to the west side of the clock tower.

The IR survey at City Hall occurred between 7:53PM and 8:05PM. The weather conditions during the survey were as follows:

- Partly Cloudy
- Air Temperature: 61 degrees Fahrenheit
- Humidity: 40%
- Dew Point: 36 degrees Fahrenheit
- Wind: SSW at 15 miles per hour

The following thermal anomalies were noted at City Hall:

- Location 1 - There is an area of thermal anomaly (approximately 30 square feet) at the south end of the south slate roof adjacent to the roof ridge (Figure 10).
- Location 2 - There is an area of thermal anomaly (approximately 50 square feet) at the north slate roof adjacent the stepped flashing at the rising brick wall (Figure 11).

An overall photo showing the locations of the thermal anomalies at 93 Highland Avenue (City Hall) is included (Figure 12).

81 HIGHLAND AVENUE (1895 HIGH SCHOOL)

The 1895 portion of the High School building is rectangular in plan and oriented in an east/west direction with three bays projecting to the north. Adjoining wings on the west, north, and east ends of the building were demolished as part of the construction of the adjacent new Somerville High School. The extant portion of the building is covered with a low-slope EPDM roofing that slope to internal drains. Mechanical equipment are located throughout the roof. The building is currently unoccupied.

The IR survey at High School occurred between 7:37PM and 7:49PM. The weather conditions during the survey were as follows:

- Partly Cloudy
- Air Temperature: 61 degrees Fahrenheit
- Humidity: 40%
- Dew Point: 36 degrees Fahrenheit
- Wind: SSW at 15 miles per hour

EPDM roofing along the edges of both outer north-facing bays is detached from the structure. The roofing edge is loose and peeled backward; the underlying insulation along the building edge is exposed.

The following thermal anomalies were noted at High School:

- Location 1 - There is an area of thermal anomaly near the demolished building edge where the roofing membrane is loose/peeled back and the insulation is exposed (Figure 13).
- Location 2 - There is an area of thermal anomaly surrounding one of the drains near the demolished building at the north edge of the roof (Figure 14).
- Location 3 - There is an area of thermal anomaly near the demolished building edge where the roof membrane is loose/peeled back and the insulation is exposed (Figure 14).

An overall photo showing the locations of the thermal anomalies at 81 Highland Avenue (High School) is included (Figure 15).

201 WILLOW AVENUE (BROWN SCHOOL)

The Brown school is U-shaped in plan with a steep-slope roof system. The west wing of the roof is covered with slate shingles. The central and east wings are covered with composite asphalt shingles. Skylights and brick masonry chimneys are located at each wing. Gutters are present at the perimeter of each roof area and discharge to externally-mounted downspouts. A snow fence is located along the west slope of the west wing, above the Willow Avenue entrance.

The IR survey at Brown occurred between 6:55PM and 7:49PM. The weather conditions during the survey were as follows:

- Partly Cloudy
- Air Temperature: 64 degrees Fahrenheit
- Humidity: 35%
- Dew Point: 36 degrees Fahrenheit
- Wind: SSW at 15 miles per hour

No thermal anomalies were noted at the Brown School. Refer to Figure 16 through Figure 18 for overall photos of the roof.

45 COLLEGE AVENUE (CHURCH)

The roof at the Church is a steep-slope with a primary ridge oriented in the east/west directly. The primary entrance is located at the west end of the building at the base of a tower. A short wing and secondary entrance projects southward at the west end of the building. Gutters are present at the perimeter of each roof area and discharge to externally-mounted downspouts. The building is currently unoccupied.

The IR survey at the Church occurred between 6:34PM and 7:13PM. The weather conditions during the survey were as follows:

- Partly Cloudy
- Air Temperature: 64 degrees Fahrenheit
- Humidity: 35%
- Dew Point: 35 degrees Fahrenheit
- Wind: SSW at 15 miles per hour

No thermal anomalies were noted at the Church building. Refer to Figure 19 for an overall photo of the roof.

DISCUSSION/RECOMMENDATIONS

No probes were made at any of the identified areas of thermal anomalies during WJE's site visit on March 11, 2021. Probes at each thermal anomaly are recommended to confirm the condition of the roofing assembly and to determine if there are roofing components with elevated moisture contents. While making inspection probes, the roofing can be reviewed and an attempt made to find the cause and origin of leakage that caused the elevated moisture content of roofing materials.

Prior to March 11, 2021, the last day with recorded precipitation in Somerville, MA was March 2, 2021. The lack of precipitation could have reduced the effectiveness of the IR scans based on the relative prevalence of water that would have normally become trapped within the insulation. Additionally, the sustained winds during the IR survey exceeded 16 MPH at City Hall and the 1895 Building due to the exposure on a ridge and lack of surrounding obstructions. Wind reduces the heat delta between two surfaces and when in excess of 10 MPH can reduce the temperature delta by 50% or more leading to slight thermal anomalies not appearing on IR scans. The winds present during the IR survey likely reduced the effectiveness of the IR scans by making small thermal anomalies even smaller or imperceptible at the time of the scan.

FIGURES

Figure 1. 33 Cross Street (Edgerly)

Figure 2. 93 Highland Avenue (City Hall)

Figure 3. 81 Highland Avenue (High School)

Figure 4. 201 Willow Avenue (Brown)

Figure 5. 45 College Avenue (Church)

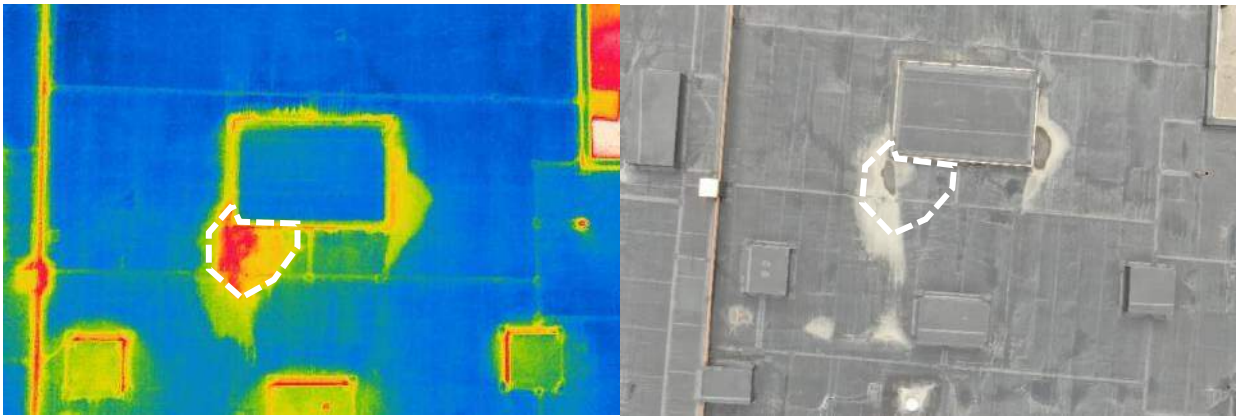

Figure 6. IR image (left) and visual light reference image (right) of thermal anomaly at corner of roof curb (dashed white area).

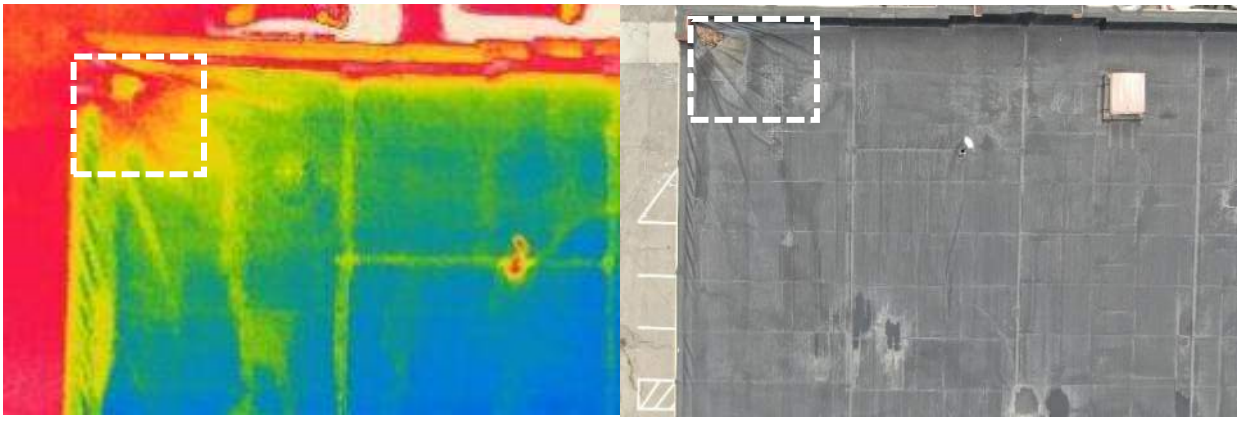

Figure 7. IR image (left) and visual light reference image (right) of thermal anomaly at corner of roof (dashed white area).

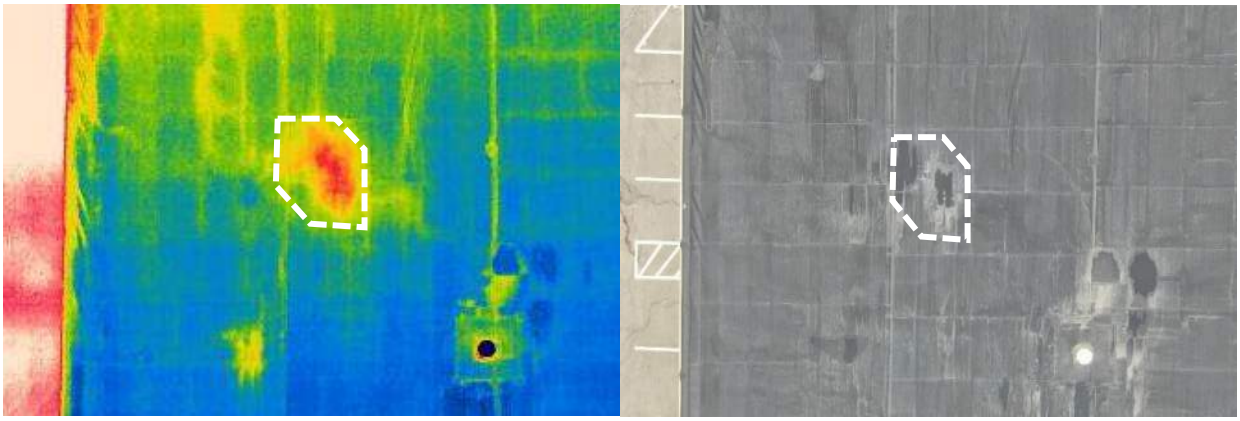

Figure 8. IR image (left) and visual light reference image (right) of thermal anomaly at field of roof (dashed white area).

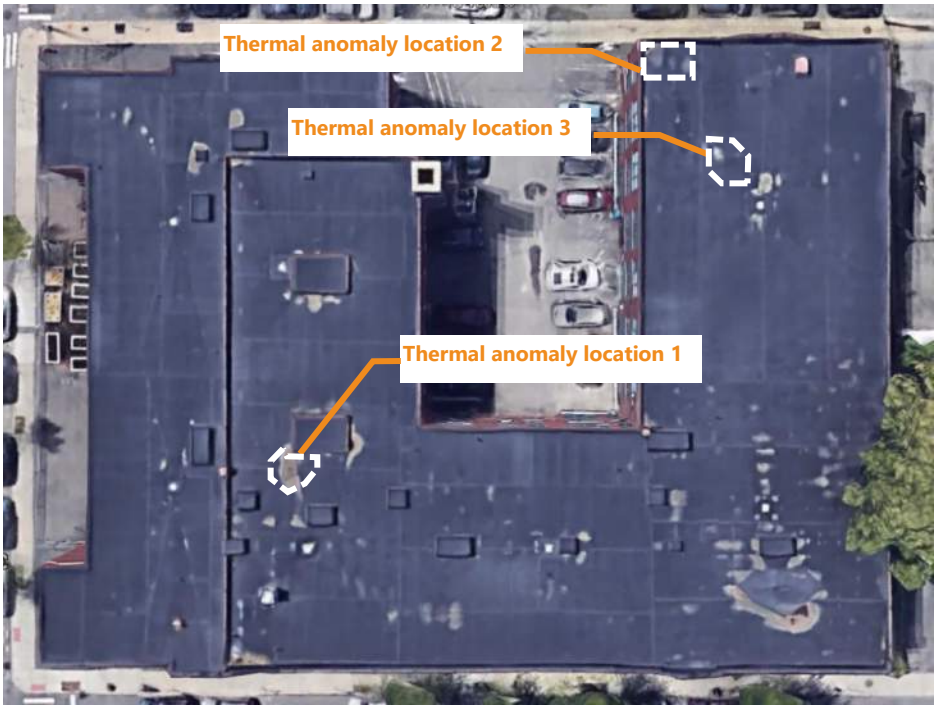

Figure 9. Thermal anomaly locations at the Edgerly Center.

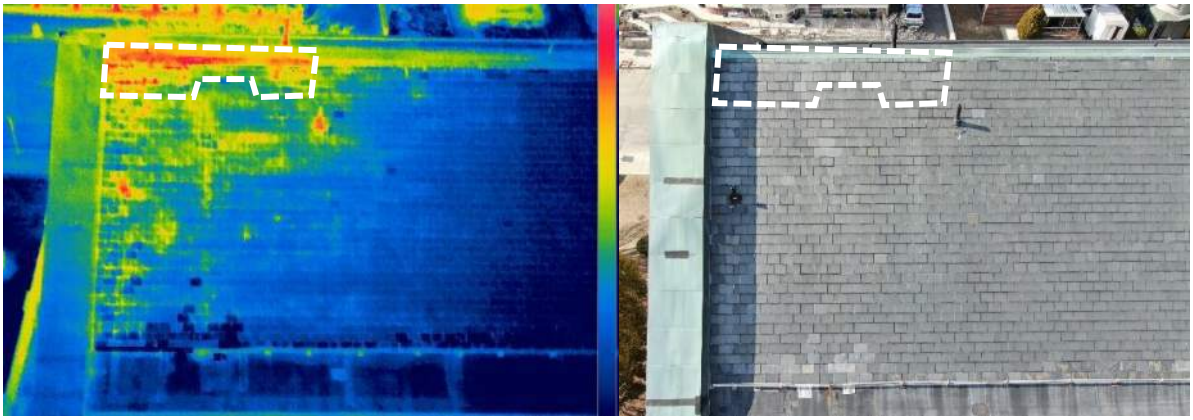
Figure 10. IR image (left) and visual light reference image (right) of thermal anomaly at ridge of slate roof (dashed white area).

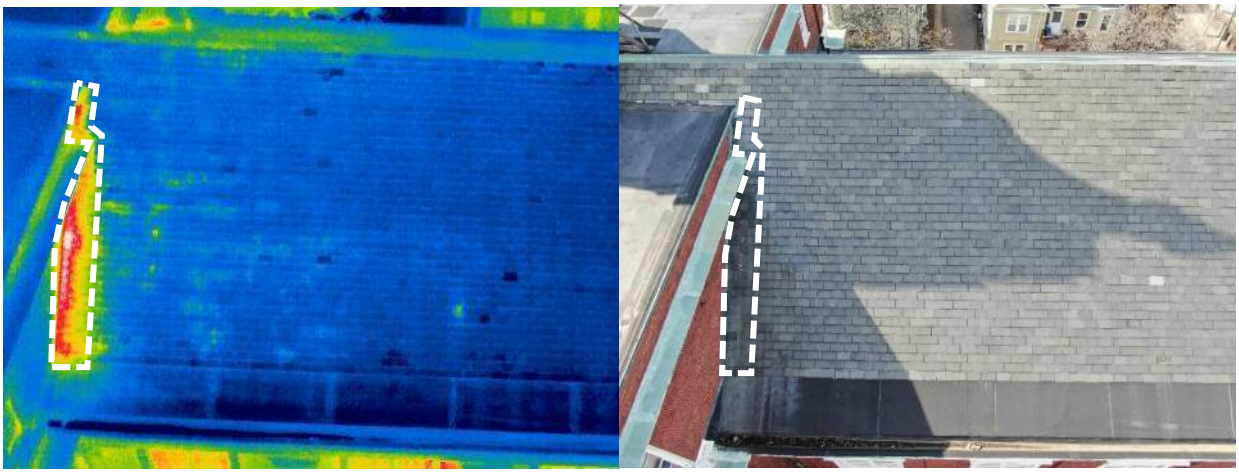

Figure 11. IR image (left) and visual light reference image (right) of thermal anomaly near intersection of slate and brick wall (dashed white area).

Figure 12. Thermal anomaly locations at City Hall.

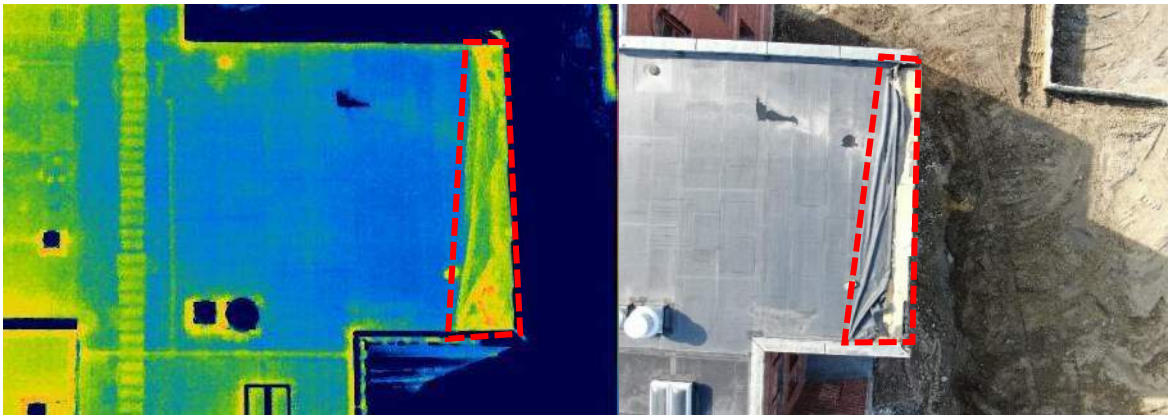

Figure 13. IR image (left) and visual light reference image (right) of thermal anomaly at northwest roof edge where the roofing membrane is loose and peeled back (dashed red areas).

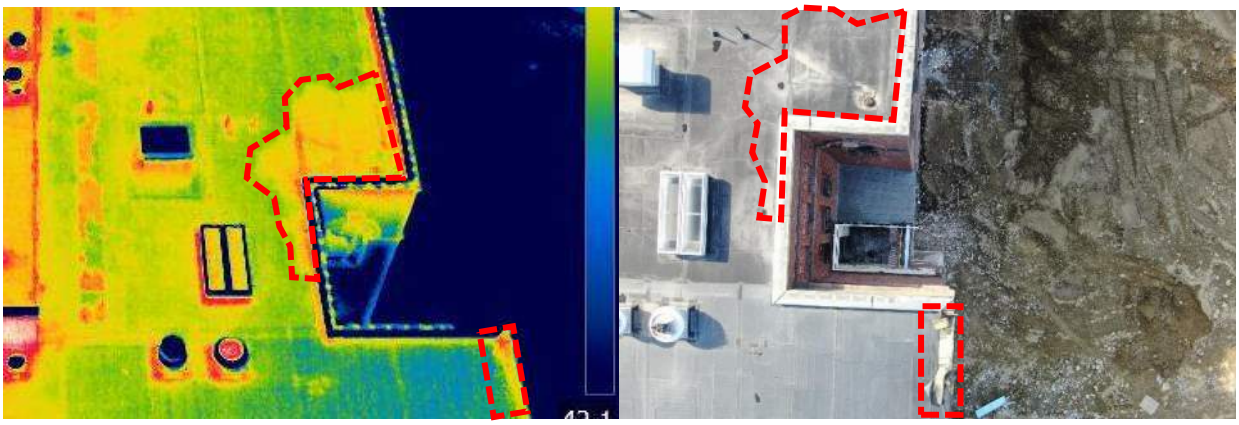

Figure 14. IR image (left) and visual light reference image (right) of thermal anomalies near drain and northeast roof edge where the roofing membrane is loose and peeled back (dashed red areas).

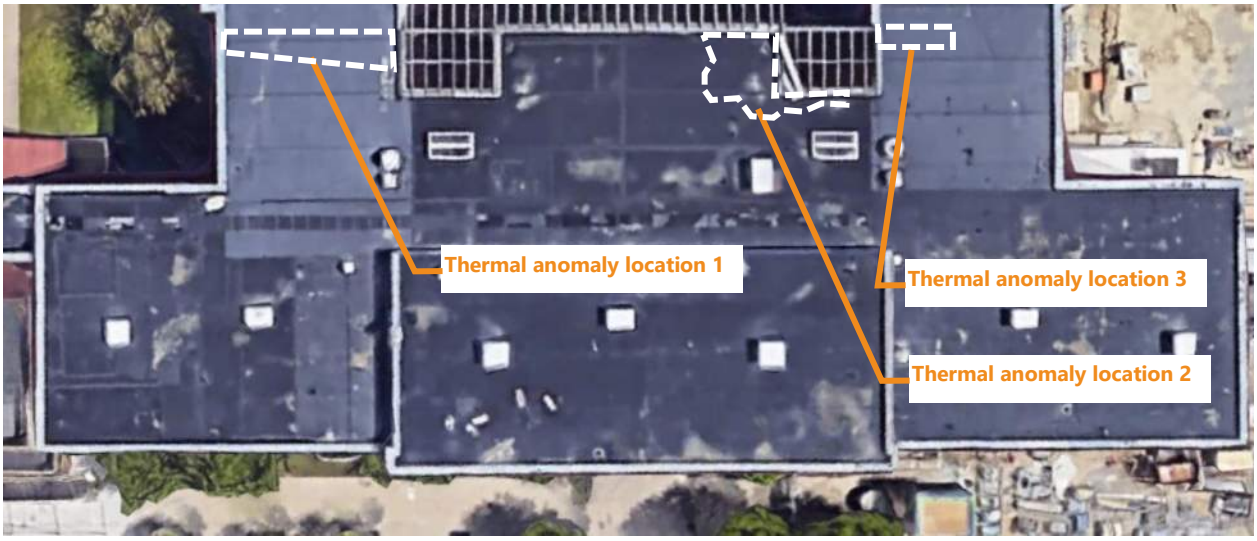

Figure 15. Thermal anomaly locations at the High School.

Figure 16. Overall view of the Brown School (west side)

Figure 17. Overall view of the Brown School (central portion)

Figure 18. Overall view of the Brown School (east end)

Figure 19. Overall view of the Church

HAZARDOUS BUILDING MATERIALS SURVEY REPORT
BROWN SCHOOL BUILDING
201 WILLOW AVENUE, SOMERVILLE, MA

PREPARED FOR:

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OCTOBER 4, 2021

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Appendix B	Lead Paint Testing Results
Appendix C	Hazardous Building Materials Tables
Appendix D	Non-ACMs Tables
Appendix E	Photographs
Appendix F	Hazardous Building Materials Abatement Cost Estimate
Appendix G	Former Testing Report - 2015

CERTIFICATION OF RESULTS

This report has been prepared for the exclusive use of AXIOM's Client, Haley & Aldrich, Inc. Photocopying of this document by parties other than those designated by the Client or use of this document for purposes other than it is intended, is strictly prohibited.

Respectfully submitted this 4th day of October 2021

Prepared by:

Geoff Gerace
Asbestos Inspector/Project Manager

Reviewed by:

Edward Kearney
Project Manager/Principal

1.0 PURPOSE AND SCOPE OF WORK

Axiom Partners, Inc. (AXIOM) was retained by Haley & Aldrich, Inc. to perform an inspection of the referenced building in advance of planned property renovation work.

The purpose of this investigation was to identify Asbestos-Containing Materials (ACMs), Lead-Containing Paint (LCP), Polychlorinated Biphenyls (PCBs), Mercury (Hg), Chlorofluorocarbons (CFCs) and other miscellaneous hazardous materials and wastes for abatement prior to or in conjunction with planned property redevelopment activities.

2.0 SITE DESCRIPTION

The building is an occupied three-story building with a basement and a footprint of approximately 29,000 square feet. The building was occupied by Brown School. The floors are designated as basement, first floor, second floor, and third floor. The building was constructed in 1900 and was reportedly renovated over many years to the present day. It is constructed of steel and masonry, concrete and wood. Most notably, the building's areas consist of classrooms, hallways, offices, a boiler room, storage rooms, bathrooms, and mechanical rooms. The exterior walls are brick façade over CMU block. Interior walls are a combination of concrete, plaster and painted drywall. The vast majority of the floors have carpeting and vinyl flooring as well as some ceramic floor tile coverings. The majority of spaces have plaster and/or drywall walls and ceilings covering wood decking. The building has both an asphaltic shingle roof and slate roof.

3.0 INSPECTION PERSONNEL, METHODS AND LABORATORY

3.1 Inspection Personnel and Process

3.1.1 Inspection Personnel

The investigative survey was conducted from August 18-19th and October 4, 2021 by experienced and Massachusetts Department of Labor Standards (DLS) licensed Asbestos Inspector, Geoff Gerace and Jesse DeGeorge (Massachusetts Asbestos Inspector License Number AI034620 and A1031684, respectively).

3.1.2 Inspection Process

The inspection for ACMs and hazardous building materials (HBMs) was conducted in a systematic manner using AXIOM's standard safety procedures and inspection protocols including:

1. A visual inspection of the building' interiors, exteriors and roofs to locate, quantify and assess the condition of materials suspected to contain asbestos, lead, PCBs, CFCs, Mercury and other hazardous chemicals, materials and wastes.

2. Collection and analysis of materials as described herein to determine their composition.

3. Review of previous asbestos survey and post-abatement reports, sampling reports and laboratory analysis for ACMs. Reports or related testing data were provided to AXIOM during this investigation and there was related historical knowledge regarding ACMs in the building.

None of the data provided had lab results to back up the report findings, and therefore was disregarded. This report and its findings can be found in Appendix G.

3.2 Asbestos-Containing Materials (ACM) Investigation

3.2.1 Methodology

The inspection for suspect ACMs included:

1. Collection of representative bulk samples of each homogeneous application of suspect material in sufficient numbers to comply with EPA/AHERA criteria (see Chart A below).

2. To prevent release of any airborne asbestos, samples of suspect friable materials were collected by wetting the suspect materials and then removing a small full-thickness sample and placing it in a sealed plastic bag labeled with a unique sample identification number.

3. Chain-of-custody documentation was used to ensure sample integrity.

4. Analysis of the bulk samples by an accredited laboratory using the EPA-approved Polarized Light Microscopy (PLM) method.

5. A review of the inspection findings and lab results to ensure proper and consistent identification and characterization of all confirmed and presumed ACMs.

Chart A

Minimum Asbestos Bulk Sampling Criteria

Type of Suspect Material[1]	Minimum Sampling Criteria
Surfacing	EPA/AHERA mandated statistically random criteria (Min. of 3 samples; Max. of 7 samples)
Miscellaneous	A sufficient number of samples to determine if material is an ACM (typically 2 samples of each homogeneous application)
Thermal System Insulations	Three random samples of each homogeneous material

3.2.2 *Definition of Key Inspection Terms*

Given the specific purposes and objectives of this inspection, the following definitions were used for the terms: Suspect Materials, Non-Suspect Materials, Homogeneous Applications or Areas, Inaccessible Building Areas, and Confirmed ACMs:

1. Suspect Materials: Installed building materials that either were pre-formed (i.e., manufactured off-site) or were prepared and installed on-site. All building materials are considered to be suspect ACMs except as noted in #2 below.

[1] Per homogeneous material or area

2. Non-Suspect Materials: For the purposes of this inspection, the following materials were considered non-suspect and were not assessed or sampled if observed:

- Plastic
- Glass
- Wood or Wood Composite Materials
- Brick, Granite, Marble, or Other Stonework
- Pink or Yellow Fiberglass Insulation on Pipes or Other Mechanical Components
- Clay or Ceramic Tiles
- Rubber or Synthetic Foam
- Paint (unless textured)
- Concrete or Mortar (except Gypcrete)
- Carpeting, Curtains, Wallpaper, and Other Paper/Natural Fiber, Fabric, or Synthetics

3. Homogeneous Applications or Areas: Are suspect materials which serve the same function or purpose (e.g., floor or ceiling tiles) have similar color and texture and were likely installed at or near the same time. Note that the homogeneity of certain materials such as wall and ceiling plaster at times cannot be readily determined.

4. Inaccessible Building Areas: Areas that AXIOM could not survey because it was unsafe or impractical to disassemble or remove systems or coverings or because a human being cannot physically enter or observe the area or components. These areas include, but are not limited to, Transite pipes coming on to the site from municipal utilities mains from the surrounding streets, underground trenches, boilers, vessels, storage tanks and mechanical systems.

5. Confirmed ACMs: Suspect materials where at least one of the bulk samples contains an asbestos concentration greater than 1%. According to the EPA/AHERA criteria, if all bulk samples of a homogeneous area of material are found to contain less than 1% asbestos, the material may be classified as a non-asbestos material.

6. Friable and Non-Friable ACMs: An ACM that can be crumbled, crushed or otherwise reduced to powder by hand pressure is a friable material; non-friable ACMs cannot. This is important with respect to managing ACMs. Additionally, some non-friable ACMs are regulated differently.

3.3 Asbestos Laboratory Services

3.3.1 PLM Bulk Sample Analysis

Bulk samples collected during the inspection were submitted to and analyzed by EMSL Analytical, Inc. (EMSL) located in Woburn, Massachusetts. EMSL is a Massachusetts-licensed asbestos bulk sample laboratory (License #AA000188). Bulk samples were analyzed for asbestos content using EPA Method 600/R-93/116. A chain-of-custody form was used to ensure sample integrity.

The entire inventory of collected samples may not have required analysis. Initially, one sample per material was analyzed. If the first sample was found to contain asbestos, the remaining samples were not analyzed (*Positive Stop* protocol). If the first sample was determined not to contain asbestos, however, the remaining samples were analyzed until >1% asbestos was detected or until the entire sample set was analyzed.

3.4 Lead Containing Paint (LCP) Investigation

Representative testing of paints for the presence of lead was performed in the building as part of AXIOM's scope of work.

3.4.1 Introduction

Historically, lead was added to paint because its color stability properties made it a desirable pigment and because it enhances durability. Lead-Containing Paint (LCP) becomes harmful when ingested or inhaled as dust or fumes. Once lead was proven to be a health hazard, it was officially banned in 1978 from paints used in residences.

In an occupational setting, if lead-based painted surfaces are to be impacted by renovation or demolition activities, contractor personnel exposure (per OSHA compliance) and waste disposal (per EPA compliance) issues must be addressed and factored into the cost of the project.

3.4.2 Testing Methodology

AXIOM utilized a Portable X-Ray Fluorescence Analyzer (XRF) to perform the lead paint survey. The XRF is a hand-held instrument that contains a radioisotopic source and operates on the principle of X-ray fluorescence. The depression of a spring-loaded trigger mechanism on the XRF unit opens a shutter in the faceplate that allows radiation from an isotopic source to stimulate the lead atoms in the paint. This stimulation causes the atoms to emit (fluoresce) X-rays which the unit detects and converts into electrical pulses which are then processed, and the result is read through a digital display on the instrument.

AXIOM used a NITON Model XLp300 which analyzes surfaces quickly, accurately, and non-destructively. Surface levels of lead are measured in milligrams per square centimeter (mg/cm^2). This unit can measure the concentration of LCP on surfaces as little as 0.01 mg of $lead/cm^2$.

3.4.3 XRF Testing Procedures

Upon arrival at the site, a "validation test" was performed to ensure that the XRF instrument was operating properly. The validation test was performed on a calibration test sheet supplied by the manufacturer to determine if the instrument is consistently measuring lead content. During this survey, the XRF was functioning properly as defined by the manufacturer.

In conducting the LCP survey representative tests were performed on homogeneous (similar color and use) painted surfaces. Results were related to other surfaces possessing similar homogeneous characteristics. By following this sampling protocol, every painted surface did not have to be tested. Representative testing was performed for the presence of lead-based paint (LBP) and lead-containing paint (LCP) on accessible interior and exterior painted surfaces.

3.5 Polychlorinated Biphenyls (PCBs) Investigation

AXIOM conducted an inspection of the building and grounds to identify suspect PCB-containing fluorescent light fixture ballasts, electrical transformers and bulk products. The survey was conducted in a systematic manner that included:

1. Performing a detailed walk-through to inspect and categorize the various types of accessible fluorescent light fixtures and electrical transformers.

2. Preparing an inventory of electrical light ballasts and transformers known or suspected to contain PCBs. Nameplate data was recorded if it was present and legible.

3. AXIOM inspected the building to identify suspect PCB-containing caulking. The survey included identifying and testing representative caulking compounds materials for PCBs. The bulk samples were collected using hand tools and placed into seal containers (glass sample jars) which were promptly labeled and placed into a cooler with ice. Samples were picked up at the site by a courier and hand delivered to Alpha Analytical Laboratory located in Westborough, MA for analysis. The samples were prepared using the Soxhlet extraction method and analyzed for PCBs by the Environmental Protection Agency (EPA) Methods 3540C and 8082. The complete laboratory reports can be found in Appendix A.

3.6 Mercury Light Tube and Thermostat Investigation

AXIOM inspected the building to identify suspect Mercury-containing equipment as follows:

1. Preparing an inventory of fluorescent light bulbs that contain Mercury vapor in conjunction with the light ballast inspection described in Section 3.5.

2. Performing a walkthrough to identify and inventory thermostats, switches, actuators and other equipment that contain liquid Mercury.

3.7 Chlorofluorocarbons (CFCs) Investigation

AXIOM inspected the building to identify suspect chlorofluorocarbons (CFCs) associated with refrigeration and air conditioning equipment and prepared an inventory of equipment including an estimate of CFC quantities. Nameplate data was recorded if it was present and legible. Assumptions were made if the unit was inaccessible or if the nameplate was not present or illegible.

3.8 Miscellaneous Hazardous Building Materials

AXIOM inspected the building for miscellaneous hazardous building materials and chemical wastes including oil-containing devices (e.g. boilers, generators, elevators, motors, grease traps, etc.) and miscellaneous items such as lead acid batteries, paints, cleaners and other chemicals.

4.0 FINDINGS AND RECOMMENDATIONS

4.1 Asbestos-Containing Materials

4.1.1 Asbestos-Containing Materials (ACMs)

Materials **confirmed** to contain >1% asbestos for the survey are as follows:

TABLE 1A - CONFIRMED ACMS
BROWN SCHOOL BUILDING, 201 WILLOW AVENUE, SOMERVILLE, MA

Sample Reference	Sample Description	Sample Location	Estimated Quantity[2]	Results
081821-57-02A-02D	Exterior Window Caulking	Exterior	110 Each	2% CHR
081821-57-04A&B	Exterior Door Caulking	Exterior	6 Each	2% CHR
081821-57-05A&B	Roof Cement a/w Overhang Roof	Exterior Parking Lot Area	16 SF	10% CHR
081821-57-08A-08C	Sprinkler Pipe Dope	Throughout	550 Each	5% CHR
081821-57-11A&B	12" x 12" Blue Floor Tile Mastic	Teachers Dining Room	400 SF	10% CHR
081821-57-16A&B	9" x 9" Tan Floor Tile	Rooms B02, 301, 302	3,900 SF	5% CHR
081821-57-23A&B	12" x 12" Beige Floor Tile	Stairwells	250 SF	2% CHR
081821-57-36A-36C	12" x 12" Beige w Gray Streaks Floor Tile	Rooms 101, 103,105, 1st Floor Hallway, 201, 203, 204, 2nd Floor Hallway	6,800 SF	5% CHR
081821-57-37A-37C	12" x 12" Beige w Gray Streaks Floor Tile Mastic	Rooms 101, 103,105, 1st Floor Hallway, 201, 203, 204, 2nd Floor Hallway	6,800 SF	10% CHR
081821-57-40A&B	Safety Glass Glazing	1st and 2nd Floor Corridors	30 Each	3% CHR
081821-57-50A&B	Roof Cement	Mechanical Room Roof	75 SF	10% CHR

4.1.2 Presumed Asbestos-Containing Materials (PACMs)

The following presumed ACMs (PACMs) may be present in or on the building or at the site that could not be investigated or tested due to inaccessibility:

TABLE 2
PRESUMED ACMS

Material	Location	Estimated Quantity	Friability
Asphaltic Damp Proofing	On Foundations, Footings	5,000 SF	Non-Friable

[2] SF = Square Feet; LF = Linear Feet; EA = Each; TR= Trace Asbestos (<1%); CHR = Chrysotile Asbestos

Material	Location	Estimated Quantity	Friability
Blackboard Adhesives	Classrooms	TBD	Non-Friable
Buried Pipes	Beneath Building or at Site	TBD	TBD
Concealed Pipe/Fitting Insulation Behind and/or Above Hard Wall/Ceiling Surfaces & Inaccessible Crawlspaces/Trenches under Building	Various Areas Building's Interiors	TBD	Friable
Various Ceramic and Quarry Tile Thin sets	Bathrooms Throughout	TBD	Non-Friable
Interior Components w/ Boiler Unit	Basement, Boiler Room	4 Units	Friable

4.1.3 Non-Asbestos-Containing Materials

Materials **confirmed** to be Non-ACMs for the survey can be found in Appendix D.

4.1.4 Discussion and Recommendations

The mere presence of asbestos in a building does not mean that the health of building occupants is necessarily at risk. As long as the ACMs remain in good condition and are not disturbed, exposure is unlikely. However, when building maintenance, repair, renovation, demolition or other activities disturb ACMs, or if ACMs are damaged, asbestos fibers are released creating a potential hazard to building occupants.

ACMs associated with the subject building are friable and were in fair to good condition. Since the subject building will be demolished and/or renovated, all ACMs must be removed by a Massachusetts-licensed Asbestos Removal Contractor prior to or in conjunction with the demolition work. As required by governing regulations, completion of each asbestos removal task must include a visual inspection by a Massachusetts-licensed Asbestos Project Monitor and final clearance air testing if asbestos removal is performed inside a negative pressure enclosure (containment).

Regulations require that all ACMs be included in a site-specific asbestos operations and maintenance (O&M) program designed, at a minimum, to comply with 29 CFR 1910.1001 and 1926.1101, incorporating the basic components in the EPA's *Guide to Managing Asbestos in Building*.

PACMs that may be present are identified in Table 2.

Removal of ACMs, PACMs and other HBMs should be clearly defined in a project specification which is used to obtain competitive bids for the work. A detailed cost estimate for removal of ACMs is present in Appendix F and includes an allowance for the removal of PACMs and HBMs.

4.2 Lead–Containing Paints (LCP)

The HUD[3] lead paint standard classifies Lead Based Paint (LBP) as paint having $\geq$1.0 mg/cm^2 as measured by the XRF or $\geq$0.5% of lead by weight as analyzed by Atomic Absorption. With respect

[3] U.S. Department of Housing and Urban Development

to renovation and demolition work, OSHA defines a lead-containing paint (LCP) as paint containing detectable amounts of lead.

Testing revealed three paints at the subject building are LBPs. A complete listing of the testing results can be found in Appendix B; however, Table 3 provides a summary of the LBPs at the site.

TABLE 3
SUMMARY OF LBP RESULTS

Description	Location	XRF Reading (mg/cm^2)
White Wood Window Sill	Basement	1.0
Tan Metal Door	Basement	1.2
Light Blue Wood Door	1st Floor	1.4

Based on analytical results, several the paint samples contained lead in detectable quantities. The most elevated levels of lead were detected in the doors in the basement and first floors. The other levels were non-detectable and substantially below the regulatory limit for lead toxicity.

Contractors should be made aware of the presence of lead paint testing results to satisfy the hazard communication requirements set forth by OSHA regulations. Specifically, contractors and subcontractors should be required to comply with OSHA regulation 29 CFR 1926.62 and Massachusetts regulation 453 CMR 22.11 for lead exposure in construction and 29 CFR 1926.59, *Hazard Communication for the Construction Industry*. This could be accomplished by providing the affected contractors with a copy of this report. The General Contractor is responsible for informing and managing their employees and subcontractors.

The current interpretation of the EPA's Resource Conservation and Recovery Act (RCRA) requires that waste generated during projects where LCPs are present and will be disposed of is tested for the toxicity characteristic of lead in the waste stream. TCLP[4] testing is performed to determine whether waste (construction/demolition debris) must be classified as hazardous because of its lead content or if it can be disposed in a conventional construction and demolition (C&D) landfill. The regulatory limit for lead toxicity is 5.0 milligrams per liter (mg/L) using the EPA Method SW846-7420 for Atomic Absorption Spectroscopy (AAS). Since the need for TCLP testing is typically determine by the disposal facility/landfill, AXIOM recommends that pre-disposal testing is the contractor's responsibility.

4.3 Polychlorinated Biphenyls (PCBs) and Mercury in Electrical Equipment

4.3.1 Fluorescent Light Fixtures

AXIOM identified one (1) type of fluorescent light fixture in the subject building. AXIOM was unable to dismantle and inspect the light fixtures due to height restraints and occupied spaces. Therefore, the ballasts are presumed to contain PCBs. If there were ballasts labeled "No PCBs" they would be presumed to contain di (2-ethylhexyl) phthalate (DEHP). A summary of fluorescent light fixtures is provided in Appendix C.

[4] Toxicity Characteristic Leachate Procedure (TCLP)

Handling and disposal of fluorescent light ballasts that contain PCBs should be performed in accordance with the Massachusetts Universal Waste Management Standard (310 CMR 30.1034) and EPA's Resource Conservation and Recovery Act (RCRA) and other governing regulations and requirements. There are two methods currently available for disposal of PCB-containing ballasts including incineration and disposal. Incineration is typically more expensive. Regardless of the method, documentation must be provided that verifies the proper removal, transportation, and disposal (destruction/incineration) at an approved facility. In general, PCB ballasts must be placed in 55-gallon drums which once filled, the drums must be closed and properly labeled for temporary storage, transport, and disposal in accordance with all applicable regulations. Drums containing PCB ballasts must be transported to an EPA-approved disposal facility (landfill or incinerator). Documentation must be provided that verifies the proper removal, transportation, and disposal (or destruction/incineration) at the approved facility. Drums containing non-PCB fluids, ballasts or capacitors shall be disposed of at a legally permitted disposal facility. There is presently no regulatory mandate for special handling and disposal of DEHP-containing ballasts, however, since there are a number of regulations that may be indirectly applicable[5] and since the disposal cost is not significant, AXIOM recommends disposing of DEHP-containing ballasts similarly.

4.3.2 Transformers

AXIOM did observe one transformer in the subject building and/or on the site.

4.3.3 Mercury-Containing Items

There are approximately three hundred fifty (350) fluorescent light bulbs associated with actual light fixtures at the subject building. A summary of mercury-containing items is provided in Appendix C.

Handling and disposal of fluorescent light bulbs that contain Mercury should be performed in accordance with the Massachusetts Universal Waste Management Standard (310 CMR 30.1034) and EPA's Resource Conservation and Recovery Act (RCRA) and other governing regulations and requirements. Guidance documents are also available from the EPA (e.g. the 1994 Green Lights Program for Lighting Waste Disposal). If fluorescent lamps become broken or damaged during removal, the broken lamps should be managed as hazardous waste. Note that fluorescent light tubes may be reused.

Mercury-containing devices must be properly recycled in accordance with 310 CMR 30.1034.

4.4 Chlorofluorocarbons (CFCs)

AXIOM identified thirty-one (31) air conditioners at the site. AXIOM identified several water fountains and refrigerators units at the subject building. A summary of CFC-Containing items is provided in Appendix C.

4.5 Polychlorinated Biphenyls (PCBs) Testing

[5] Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund"), Solid Waste Disposal Act, the Clean Water Act, Safe Drinking Water Act and the Toxic Substances Control Act.

4.5.1 Summary of PCB Bulk Product Testing Results

The following table provide the laboratory results of analysis of caulking for PCBs. The laboratory reports are in Appendix A.

TABLE 4
SUMMARY OF PCBS IN CAULKING COMPOUND RESULTS

Sample Number	Description	Location	Analysis Results[6]
PCB-01	Exterior Door Caulking	Exterior Front Side of Building	ND
PCB-02	Exterior Window Caulking (w/ wood double hung window)	Exterior Throughout	ND

Laboratory results are reported in micrograms per kilograms (*u*g/kg) which AXIOM converted to milligrams per kilograms (mg/kg) which is equivalent to parts per million (ppm) for comparison to EPA definitions.

4.5.2 Discussion

According to 40 CFR 761, the EPA specifies that products and materials containing greater than 50 ppm are PCB bulk products. Based on the result of this investigation, **none** of the caulking are considered a PCB bulk product.

4.6 Miscellaneous Hazardous Wastes

4.6.1 Miscellaneous Hazardous Materials/Wastes

AXIOM identified other hazardous materials/wastes including batteries associated with exit signs, batteries associated with emergency lighting, fire extinguishers and chemicals. These items are also listed in Appendix C.

The above listed materials/components are not typically considered hazardous wastes while in use. However, those that are left behind must be properly characterized and disposed of in compliance with governing regulations.

Intact, non-leaking batteries should be handled and disposed of in accordance with the Universal Waste Management Standard 310 CMR 30.1034. If batteries are damaged or become damaged or leak during removal and/or handling, they should be managed as hazardous waste.

5.0 LIMITATIONS AND EXCLUSIONS

[6] ND = PCBs not detected at the Reporting Limit (RL) for the specific samples. Refer to lab report for PCB Reporting Limits; Results are reported in milligrams per kilogram (mg/kg) which is equivalent to parts per million (ppm); all ND results include Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262 and 1268 unless specifically noted otherwise.

5.1 Limitations and Conditions of This Investigation

5.1.1 NESHAPs Asbestos Survey

This NESHAPs survey involved an investigation for ACMs in preparation for building demolition. Although this investigation attempted to identify and sample inaccessible building materials, some materials were inaccessible, and the potential remains that concealed ACMs may be encountered in the building or at the site.

5.1.2 Inaccessible Materials and Locations

Inaccessible building areas, systems, structural components, or surfaces which may not have been observed because it was unsafe or impractical to demolish, disassemble, or remove systems or coverings, or because a human being cannot physically enter or observe the area or component. Unless specifically noted, inaccessible materials or areas may include:

- buried or otherwise concealed pipe trenches and utility vaults/corridors;
- buried foundations;
- enclosed wall and ceiling cavities;
- electrical equipment/wire;
- concealed mechanical materials;
- concealed pipe/fitting insulation;
- ceramic tile thin sets/adhesives

AXIOM made every reasonable effort to address these potential ACMs. However, the potential remains that concealed ACMs could be encountered during renovation or demolition work.

5.1.3 Other Environmental Exclusions

1. This investigation did not include an assessment of air quality or analysis of soil, surface water or groundwater. Furthermore, this study did not include any subsurface exploration, testing or assessment for wetlands.

2. This investigation did not include assessments for the presence of pesticides, herbicides, urea-formaldehyde or Radon, nor any air quality monitoring, or any chemical analysis of soil, surface water, or groundwater at the Site.

3. No attempt was made to check the compliance of present or past owners of the Site with Federal, State, or local laws.

4. The testing for lead paint was performed by an experienced Industrial Hygienist. It is intended only to satisfy the requirements of OSHA regulations including 29 CFR 1926.62, *Lead Exposure in Construction: Interim Final Rule* and 29 CFR 1926.59, *Hazard Communication for the Construction Industry*. This investigation was not performed by an EPA HUD[7] or state accredited/licensed Lead Inspector which is often required for residential structures where children under the age of six live.

[7] US Department of Housing and Urban Development

. *5.1.4 Project Specifications*

Users are cautioned that this document is an inspection report, not a project specification. Although it is often feasible to use a report such as this to obtain bids for asbestos and related abatement work, it does not provide a proper and/or complete document for defining the scope of work and specifying contractual obligations.

APPENDIX A

Asbestos Bulk and PCB Bulk Sample Results

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

http://www.EMSL.com / bostonlab@emsl.com

EMSL Order:	132106144
Customer ID:	AXIO80
Customer PO:	
Project ID:	

Attention:	Geoff Gerace	**Phone:**	(781) 213-9198
	Axiom Partners, Inc.	**Fax:**	(781) 213-6992
	50B Salem Street, Suite 103	**Received Date:**	08/19/2021 3:40 PM
	Lynnfield, MA 01940	**Analysis Date:**	08/26/2021
		Collected Date:	08/18/2021

Project: 01164.117 - Haley & Aldrich-Brown School; 201 Willow Avenue; Somerville, MA

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-01A *132106144-0001*	Exterior NW Corner - Brick Mortar	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-01B *132106144-0002*	Exterior South - Brick Mortar	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-02A *132106144-0003*	Exterior NW Corner 1st Floor - Exterior Window Caulking	Brown/Red Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
081821-57-02B *132106144-0004*	Exterior South Basement - Exterior Window Caulking				Positive Stop (Not Analyzed)
081821-57-02C *132106144-0005*	Exterior E Side 1st Floor - Exterior Window Caulking				Positive Stop (Not Analyzed)
081821-57-02D *132106144-0006*	Exterior West 2nd Floor - Exterior Window Caulking				Positive Stop (Not Analyzed)
081821-57-03A *132106144-0007*	Exterior NW - Mortar Assoc. w/ Limestone Cap	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-03B *132106144-0008*	Exterior N - Mortar Assoc. w/ Limestone Cap	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-04A *132106144-0009*	Exterior W - Exterior Door Caulking	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-04B *132106144-0010*	Exterior N - Exterior Door Caulking	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
081821-57-05A *132106144-0011*	Exterior NW - Roof Cement Assoc. w/ Overhang Roof	Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
081821-57-05B *132106144-0012*	Exterior SW - Roof Cement Assoc. w/ Overhang Roof				Positive Stop (Not Analyzed)
081821-57-08A *132106144-0013*	Room B02 - Sprinkler Pipe Dope	Brown/Silver Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
081821-57-08B *132106144-0014*	1st Floor Corridor - Sprinkler Pipe Dope				Positive Stop (Not Analyzed)
081821-57-08C *132106144-0015*	Room 302 - Sprinkler Pipe Dope				Positive Stop (Not Analyzed)
081821-57-09A *132106144-0016*	Basement Hallway - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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EMSL Order: 132106144
Customer ID: AXIO80
Customer PO:
Project ID:

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-09B *132106144-0017*	Room B01A Storage - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-09C *132106144-0018*	Room B01B - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-09D *132106144-0019*	1st Floor Corridor - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-09E *132106144-0020*	Stairwell South - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-09F *132106144-0021*	1st Floor Rear Corridor - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-09G *132106144-0022*	102 Classroom - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-09H *132106144-0023*	2nd Floor Corridor - Textured Ceiling Coating	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-10A *132106144-0024*	Teachers Dining Room - 12"x12" Blue Floor Tile	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-10B *132106144-0025*	Teachers Dining Room - 12"x12" Blue Floor Tile	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-11A *132106144-0026*	Teachers Dining Room - 12"x12" Blue Floor Tile Mastic	Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
081821-57-11B *132106144-0027*	Teachers Dining Room - 12"x12" Blue Floor Tile Mastic				Positive Stop (Not Analyzed)
081821-57-12A *132106144-0028*	Teachers Dining Room - 4" Cove Base Mastic	Brown/Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-12B *132106144-0029*	B07 Classroom - 4" Cove Base Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-13A *132106144-0030*	B01 Mechanical Room - Ceiling Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected
081821-57-13B *132106144-0031*	B06 Storage - Ceiling Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected
081821-57-13C *132106144-0032*	Boys Bathroom - Ceiling Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected
081821-57-14A *132106144-0033*	B02 Storage - Gypsum Wall Board	Gray/Tan Fibrous Homogeneous	10% Cellulose 2% Glass	88% Non-fibrous (Other)	None Detected
081821-57-14B *132106144-0034*	B07 Classroom - Gypsum Wall Board	Gray/Tan Fibrous Homogeneous	10% Cellulose 2% Glass	88% Non-fibrous (Other)	None Detected
081821-57-14C *132106144-0035*	3rd Floor Stairwell - Gypsum Wall Board	Tan/White Fibrous Homogeneous	10% Cellulose 2% Glass	88% Non-fibrous (Other)	None Detected

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-14D *132106144-0036*	3rd Floor Library - Gypsum Wall Board	Tan/White Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
081821-57-15A *132106144-0037*	B02 Storage - Joint Compound Assoc.. w/ Gypsum Board	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-15B *132106144-0038*	B07 Classroom - Joint Compound Assoc.. w/ Gypsum Board	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-15C *132106144-0039*	3rd Floor Stairwell - Joint Compound Assoc.. w/ Gypsum Board	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-15D *132106144-0040*	3rd Floor Library - Joint Compound Assoc.. w/ Gypsum Board	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-16A *132106144-0041*	B02 Classroom - 9"x9" Tan Floor Tile	Brown Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
081821-57-16B *132106144-0042*	B02 Mechanical Closet - 9"x9" Tan Floor Tile				Positive Stop (Not Analyzed)
081821-57-17A *132106144-0043*	B02 Classroom - 9"x9" Tan Floor Tile Mastic	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-17B *132106144-0044*	B02 Mechanical Closet - 9"x9" Tan Floor Tile Mastic	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-18A *132106144-0045*	B02 Art Room - 12"x12" Tan Mottled Floor Tile	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-18B *132106144-0046*	B07 Classroom - 12"x12" Tan Mottled Floor Tile	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-19A *132106144-0047*	B02 Art Room - 12"x12" Tan Mottled Floor Tile Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-19B *132106144-0048*	B07 Classroom - 12"x12" Tan Mottled Floor Tile Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-21A *132106144-0049*	Stairwell N 1st Floor - Tan Stone Pattern Linoleum	Gray/Tan Fibrous Homogeneous	15% Cellulose 5% Glass	80% Non-fibrous (Other)	None Detected
081821-57-21B *132106144-0050*	Stairwell N 2nd Floor - Tan Stone Pattern Linoleum	Tan Fibrous Homogeneous	15% Cellulose 5% Glass	80% Non-fibrous (Other)	None Detected
081821-57-22A *132106144-0051*	Stairwell N 1st Floor - Tan Stone Pattern Linoleum Mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-22B *132106144-0052*	Stairwell N 2nd Floor - Tan Stone Pattern Linoleum Mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-23A *132106144-0053*	Stairwell S - 12"x12" Beige Floor Tile	Beige Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-23B *132106144-0054*	Stairwell N 1st Floor - 12"x12" Beige Floor Tile				Positive Stop (Not Analyzed)
081821-57-24A *132106144-0055*	Stairwell S - 12"x12" Beige Floor Tile Mastic	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-24B *132106144-0056*	Stairwell N 1st Floor - 12"x12" Beige Floor Tile Mastic	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-28A *132106144-0057*	Basement Bathroom - 2'x4' White Ceiling Tile	Gray/White Fibrous Homogeneous	60% Cellulose 20% Min. Wool	20% Non-fibrous (Other)	None Detected
081821-57-28B *132106144-0058*	B07 Classroom - 2'x4' White Ceiling Tile	Gray/White Fibrous Homogeneous	60% Cellulose 20% Min. Wool	20% Non-fibrous (Other)	None Detected
081821-57-28C *132106144-0059*	B01 Classroom - 2'x4' White Ceiling Tile	Gray/White Fibrous Homogeneous	60% Cellulose 20% Min. Wool	20% Non-fibrous (Other)	None Detected
081821-57-30A *132106144-0060*	Front Entrance - Mosaic Tile Mortar	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-30B *132106144-0061*	Front Entrance - Mosaic Tile Mortar	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-31A *132106144-0062*	Front Entrance - Interior Window Glazing	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-31B *132106144-0063*	Front Entrance - Interior Window Glazing	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-32A *132106144-0064*	Front Entrance - Interior Door Caulking	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-32B *132106144-0065*	Front Entrance - Interior Door Caulking	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-33A *132106144-0066*	Front Entrance - Interior Window Caulking	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-33B *132106144-0067*	Front Entrance - Interior Window Caulking	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-34A *132106144-0068*	101 Classroom - 12"x12" Gray Mottled Floor Tile	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-34B *132106144-0069*	106 Classroom - 12"x12" Gray Mottled Floor Tile	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-35A *132106144-0070*	101 Classroom - 12"x12" Gray Mottled Floor Tile Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-35B *132106144-0071*	106 Classroom - 12"x12" Gray Mottled Floor Tile Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-36A *132106144-0072*	203 Principal Office - 12"x12" Beige w/ Gray Streaks Floor Tile	Beige Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-36B *132106144-0073*	1st Floor Corridor - 12"x12" Beige w/ Gray Streaks Floor Tile				Positive Stop (Not Analyzed)
081821-57-36C *132106144-0074*	2nd Floor Corridor - 12"x12" Beige w/ Gray Streaks Floor Tile				Positive Stop (Not Analyzed)
081821-57-37A *132106144-0075*	203 Principal Office - 12"x12" Beige w/ Gray Streaks Floor Tile Mastic	Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
081821-57-37B *132106144-0076*	1st Floor Corridor - 12"x12" Beige w/ Gray Streaks Floor Tile Mastic				Positive Stop (Not Analyzed)
081821-57-37C *132106144-0077*	2nd Floor Corridor - 12"x12" Beige w/ Gray Streaks Floor Tile Mastic				Positive Stop (Not Analyzed)
081821-57-38A *132106144-0078*	102 Classroom - 12"x12" Blue Floor Tile	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-38B *132106144-0079*	106 Classroom - 12"x12" Blue Floor Tile	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-39A *132106144-0080*	102 Classroom - 12"x12" Blue Floor Tile Mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-39B *132106144-0081*	106 Classroom - 12"x12" Blue Floor Tile Mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-40A *132106144-0082*	1st Floor Corridor - Safety Glass Glazing	Tan Non-Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile
081821-57-40B *132106144-0083*	2nd Floor Corridor - Safety Glass Glazing				Positive Stop (Not Analyzed)
081821-57-41A *132106144-0084*	203 Principal Office - Green Floor Tile	Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-41B *132106144-0085*	203 Principal Office - Green Floor Tile	Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-42A *132106144-0086*	203 Principal Office - Green Floor Tile Mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-42B *132106144-0087*	203 Principal Office - Green Floor Tile Mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-43A *132106144-0088*	B02 Art Room - FRP Paneling Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-43B *132106144-0089*	Corridor 2nd Floor - FRP Paneling Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-44A *132106144-0090*	2nd Floor Stairwell Landing - Carpet Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-44B *132106144-0091*	301 Classroom - Carpet Mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-45A *132106144-0092*	303 Library N - Carpet Square Mastic	Yellow/Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-45B *132106144-0093*	303 Library S - Carpet Square Mastic	Yellow/Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-46A *132106144-0094*	Library Men's Room - 12"x12" Brown Ceramic Tile Grout	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-46B *132106144-0095*	Library Women's Room - 12"x12" Brown Ceramic Tile Grout	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-48A *132106144-0096*	Library Men's Room - 4"x4" White Ceramic Tile Grout	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-48B *132106144-0097*	Library Women's Room - 4"x4" White Ceramic Tile Grout	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-50A *132106144-0098*	Mechanical Room - Roof Cement	Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
081821-57-50B *132106144-0099*	Mechanical Room - Roof Cement				Positive Stop (Not Analyzed)

Analyst(s)
Elizabeth Stutts (84)

Steve Grise, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA NVLAP Lab Code 101147-0, CT PH-0315, MA AA000188, RI AAL-139, VT AL998919, ME LB-0039

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OrderID: 132106144

AXIOM PARTNERS
ONE PLEASURE ISLAND RD
WAKEFIELD, MA 01880
PHONE: 781.213.9198

EMSL LABORATORY ORDER #: 132106144
Sample(s) received in good condition? [Y] [N]
Discernable field blank submitted? [Y] [N]

Asbestos Analysis – Chain of Custody Form

Sampled by:	Geoff Gerace **Date Collected:** 8/19/2021
Project Name:	Asbestos-Containing Materials Survey-Haley & Aldrich-Brown School
Project Site:	201 Willow Ave, Somerville, MA
Project ID/Number:	01164.117
Special Lab Instructions:	Positive Stop, E-Mail Results to ggerace@axiomenv.com

TURNAROUND TIME – If turn around time is not chosen standard turnaround time applies (6 + Days)

3 Hours	6 Hours	2 Hours	24 Hours	48 Hours	72 Hours	4 Days	☐ 5 Days	6-10 Days

TYPE OF ASBESTOS ANALYSIS

PCM – Air
- ☐ NIOSH 7400 (A) Issue 2: August 1994
- ☐ OSHA w/TWA

PLM – Bulk
- ☑ **EPA 600/R-93/116**
- ☐ California Air Resource Board (CARB) 435
- ☐ **NY Stratified Point Count**
- ☐ NIOSH 9002
- ☐ PLM NOB (Gravimetric) NYS 198.1
- ☐ EPA Point Count (400 Points)
- ☐ EPA Point Count (1,000 Points)
- ☐ **Standard Addition Point Count**

SOILS
- ☐ **EPA Protocol Qualitative**
- ☐ **EPA Protocol Quantitative**
- ☐ EMSL MSD 9000 Method fibers/gram
- ☐ Superfund EPA 540-R097-028 (dust generation)

TEM AIR
- ☐ **AHERA 40 CFR, Part 763 Subpart E**
- ☐ NIOSH 7402 Issue 2
- ☐ EPA Level II

TEM WIPE
- ☐ **ASTM D-6480-99**
- ☐ Qualitative

TEM MICROVAC
- ☐ ASTM D 5755-95 (Quantitative)

TEM BULK
- ☐ **Drop Mount (Qualitative)**
- ☐ Chatfield SOP-1988-02
- ☐ TEM NOB (Gravimetric) NY 198.4

TEM WATER
- ☐ EPA 100.1
- ☐ EPA 100.2
- ☐ **NYS 198.2**
- ☐ **Other: Page 2 of 2**

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-01A	Brick Mortar	Exterior NW Corner
081821-57-01B	Brick Mortar	Exterior South
081821-57-02A	Exterior Window Caulking	Exterior NW Corner 1st Floor
081821-57-02B	Exterior Window Caulking	Exterior South Basement
081821-57-02C	Exterior Window Caulking	Exterior E Side 1st Floor
081821-57-02D	Exterior Window Caulking	Exterior West 2nd Floor
081821-57-03A	Mortar a/w Limestone Cap	Exterior NW
081821-57-03B	Mortar a/w Limestone Cap	Exterior N
081821-57-04A	Exterior Door Caulking	Exterior W
081821-57-04B	Exterior Door Caulking	Exterior N
081821-57-05A	Roof Cement a/w Overhang Roof	Exterior NW
081821-57-05B	Roof Cement a/w Overhang Roof	Exterior SW
081821-57-08A	Sprinkler Pipe Dope	Room BO2
081821-57-08B	Sprinkler Pipe Dope	1st Floor Corridor

RECD EMSL-BOSTON AUG 19 2021

OrderID: 132106144

AXIOM PARTNERS
ONE PLEASURE ISLAND RD
WAKEFIELD, MA 01880
PHONE: 781.213.9198

EMSL LABORATORY ORDER #: 132106144
Sample(s) received in good condition? [Y] [N]
Discernable field blank submitted? [Y] [N]

Asbestos Analysis – Chain of Custody Form

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-08C	Sprinkler Pipe Dope	Room 302
081821-57-09A	Textured Ceiling Coating	Basement Hallway
081821-57-09B	Textured Ceiling Coating	Room B01A Storage
081821-57-09C	Textured Ceiling Coating	Room B01B
081821-57-09D	Textured Ceiling Coating	1st Floor Corridor
081821-57-09E	Textured Ceiling Coating	Stairwell South
081821-57-09F	Textured Ceiling Coating	1st Floor Rear Corridor
081821-57-09G	Textured Ceiling Coating	102 Classroom
081821-57-09H	Textured Ceiling Coating	2nd Floor Corridor
081821-57-10A	12" x 12" Blue Floor Tile	Teachers Dining Room
081821-57-10B	12" x 12" Blue Floor Tile	Teachers Dining Room
081821-57-11A	12" x 12" Blue Floor Tile Mastic	Teachers Dining Room
081821-57-11B	12" x 12" Blue Floor Tile Mastic	Teachers Dining Room
081821-57-12A	4" Covebase Mastic	Teachers Dining Room
081821-57-12B	4" Covebase Mastic	B07 Classroom
081821-57-13A	Ceiling Plaster	B01 Mechanical Room
081821-57-13B	Ceiling Plaster	B06 Storage
081821-57-13C	Ceiling Plaster	Boys Bathroom
081821-57-14A	Gypsum Wall Board	B02 Storage
081821-57-14B	Gypsum Wall Board	B07 Classroom
081821-57-14C	Gypsum Wall Board	3rd Floor Stairwell
081821-57-14D	Gypsum Wall Board	3rd Floor Library
081821-57-15A	Joint Compound a/w Gypsum board	B02 Storage
081821-57-15B	Joint Compound a/w Gypsum board	B07 Classroom
081821-57-15C	Joint Compound a/w Gypsum board	3rd Floor Stairwell

RECD EMSL-BOSTON AUG 19 2021

OrderID: 132106144

AXIOM PARTNERS
ONE PLEASURE ISLAND RD
WAKEFIELD, MA 01880
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EMSL LABORATORY ORDER #: 132106144
Sample(s) received in good condition? [Y] [N]
Discernable field blank submitted? [Y] [N]

Asbestos Analysis – Chain of Custody Form

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-15D	Joint Compound a/w Gypsum board	3rd Floor Library
081821-57-16A	9" x 9" Tan Floor Tile	B02 Classroom
081821-57-16B	9" x 9" Tan Floor Tile	B02 Mechanical Closet
081821-57-17A	9" x 9" Tan Floor Tile Mastic	B02 Classroom
081821-57-17B	9" x 9" Tan Floor Tile Mastic	B02 Mechanical Closet
081821-57-18A	12" x 12" Tan Mottled Floor Tile	B02 Art Room
081821-57-18B	12" x 12" Tan Mottled Floor Tile	B07 Classroom
081821-57-19A	12" x 12" Tan Mottled Floor Tile Mastic	B02 Art Room
081821-57-19B	12" x 12" Tan Mottled Floor Tile Mastic	B07 Classroom
081821-57-21A	Tan Stone Pattern Linoleum	Stairwell N 1st Floor
081821-57-21B	Tan Stone Pattern Linoleum	Stairwell N 2nd Floor
081821-57-22A	Tan Stone Pattern Linoleum Mastic	Stairwell N 1st Floor
081821-57-22B	Tan Stone Pattern Linoleum Mastic	Stairwell N 2nd Floor
081821-57-23A	12" x 12" Beige Floor Tile	Stairwell S
081821-57-23B	12" x 12" Beige Floor Tile	Stairwell N 1st Floor
081821-57-24A	12" x 12" Beige Floor Tile Mastic	Stairwell S
081821-57-24B	12" x 12" Beige Floor Tile Mastic	Stairwell N 1st Floor
081821-57-28A	2' x 4' White Ceiling Tile	Basement Bathroom
081821-57-28B	2' x 4' White Ceiling Tile	B07 Classroom
081821-57-28C	2' x 4' White Ceiling Tile	B01 Classroom

REC'D EMSL-BOSTON AUG 19 2021

OrderID: 132106144

AXIOM PARTNERS
ONE PLEASURE ISLAND RD
WAKEFIELD, MA 01880
PHONE: 781.213.9198

EMSL LABORATORY ORDER #: 132106144

Sample(s) received in good condition? [Y] [N]
Discernable field blank submitted? [Y] [N]

Asbestos Analysis – Chain of Custody Form

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-30A	Mosaic Tile Mortar	Front Entrance
081821-57-30B	Mosaic Tile Mortar	Front Entrance
081821-57-31A	Interior Window Glazing	Front Entrance
081821-57-31B	Interior Window Glazing	Front Entrance
081821-57-32A	Interior Door Caulking	Front Entrance
081821-57-32B	Interior Door Caulking	Front Entrance
081821-57-33A	Interior Window Caulking	Front Entrance
081821-57-33B	Interior Window Caulking	Front Entrance
081821-57-34A	12" x 12" Gray Mottled Floor Tile	101 Classroom
081821-57-34B	12" x 12" Gray Mottled Floor Tile	106 Classroom
081821-57-35A	12" x 12" Gray Mottled Floor Tile Mastic	101 Classroom
081821-57-35B	12" x 12" Gray Mottled Floor Tile Mastic	106 Classroom
081821-57-36A	12" x 12" Beige w Gray Streaks Floor Tile	203 Principal Office
081821-57-36B	12" x 12" Beige w Gray Streaks Floor Tile	1st Floor Corridor
081821-57-36C	12" x 12" Beige w Gray Streaks Floor Tile	2nd Floor Corridor
081821-57-37A	12" x 12" Beige w Gray Streaks Floor Tile Mastic	203 Principal Office
081821-57-37B	12" x 12" Beige w Gray Streaks Floor Tile Mastic	1st Floor Corridor
081821-57-37C	12" x 12" Beige w Gray Streaks Floor Tile Mastic	2nd Floor Corridor
081821-57-38A	12" x 12" Blue Floor Tile	102 Classroom
081821-57-38B	12" x 12" Blue Floor Tile	106 Classroom

REC'D EMSL-BOSTON AUG 19 2021

OrderID: 132106144

AXIOM PARTNERS
ONE PLEASURE ISLAND RD
WAKEFIELD, MA 01880
PHONE: 781.213.9198

EMSL LABORATORY ORDER #: 132106144

Sample(s) received in good condition? [Y] [N]

Discernable field blank submitted? [Y] [N]

Asbestos Analysis – Chain of Custody Form

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-39A	12" x 12" Blue Floor Tile Mastic	102 Classroom
081821-57-39B	12" x 12" Blue Floor Tile Mastic	106 Classroom
081821-57-40A	Safety Glass Glazing	1st Floor Corridor
081821-57-40B	Safety Glass Glazing	2nd Floor Corridor
081821-57-41A	Green Floor Tile	203 Principals Office
081821-57-41B	Green Floor Tile	203 Principals Office
081821-57-42A	Green Floor Tile Mastic	203 Principals Office
081821-57-42B	Green Floor Tile Mastic	203 Principals Office
081821-57-43A	FRP Paneling Mastic	B02 Art Room
081821-57-43B	FRP Paneling Mastic	Corridor 2nd Floor
081821-57-44A	Carpet Mastic	2nd Floor Stairwell Landing
081821-57-44B	Carpet Mastic	301 Classroom
081821-57-45A	Carpet Square Mastic	303 Library N
081821-57-45B	Carpet Square Mastic	303 Library S
081821-57-46A	12" x 12" Brown Ceramic Tile Grout	Library Mens Room
081821-57-46B	12" x 12" Brown Ceramic Tile Grout	Library WoMens Room
081821-57-48A	4" x 4" White Ceramic Tile Grout	Library Mens Room
081821-57-48B	4" x 4" White Ceramic Tile Grout	Library WoMens Room
081821-57-50A	Roof Cement	Mechanical Room
081821-57-50B	Roof Cement	Mechanical Room

REC'D EMSL-BOSTON AUG 19 2021

OrderID: 132106144

AXIOM PARTNERS
ONE PLEASURE ISLAND RD
WAKEFIELD, MA 01880
PHONE: 781.213.9198

EMSL LABORATORY ORDER #: 132106144

Sample(s) received in good condition? [Y] [N]

Discernable field blank submitted? [Y] [N]

Asbestos Analysis – Chain of Custody Form

Relinquished:	Geoff Gerace	Date:	8-19-21	Time	12:00
Received:		Date:		Time:	

REC'D EMSL-BOSTON AUG 19 2021

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 132105924
Customer ID: AXIO80
Customer PO:
Project ID:

Attention: Stephen Minassian
Axiom Partners, Inc.
50B Salem Street, Suite 103
Lynnfield, MA 01940

Project: 01164.117 - Somerville Brown School

Phone: (781) 213-9198
Fax: (781) 213-6992
Received Date: 08/18/2021 2:30 PM
Analysis Date: 08/19/2021 - 08/23/2021
Collected Date: 08/18/2021

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
081821-57-06A *132105924-0001*	B01B Teachers Room - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-06B *132105924-0002*	B02 Art Room - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-06C *132105924-0003*	Basement Corridor Closet - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-06D *132105924-0004*	101 Closet - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-06E *132105924-0005*	101 Corridor - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-06F *132105924-0006*	Corridor Near 206 - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-06G *132105924-0007*	Classroom 202 Closet - White Skim Coat Plaster	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-07A *132105924-0008*	B01B Teachers Room - Gray Base Coat Plaster	Gray Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
081821-57-07B *132105924-0009*	B02 Art Room - Gray Base Coat Plaster	Gray Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
081821-57-07C *132105924-0010*	Basement Corridor Closet - Gray Base Coat Plaster	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081821-57-07D *132105924-0011*	101 Closet - Gray Base Coat Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected
081821-57-07E *132105924-0012*	101 Corridor - Gray Base Coat Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected
081821-57-07F *132105924-0013*	Corridor Near 206 - Gray Base Coat Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected
081821-57-07G *132105924-0014*	Classroom 202 Closet - Gray Base Coat Plaster	Gray Fibrous Homogeneous	2% Hair	98% Non-fibrous (Other)	None Detected

Initial report from: 08/19/2021 08:57:57

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

EMSL Order:	132105924
Customer ID:	AXIO80
Customer PO:	
Project ID:	

Analyst(s)

Elizabeth Stutts (7)
Kevin Pine (7)

Steve Grise, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA NVLAP Lab Code 101147-0, CT PH-0315, MA AA000188, RI AAL-139, VT AL998919, ME LB-0039

Initial report from: 08/19/2021 08:57:57

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

EMSL Order: 132107509
Customer ID: AXIO80
Customer PO:
Project ID:

Attention: Geoff Gerace
Axiom Partners, Inc.
50B Salem Street, Suite 103
Lynnfield, MA 01940

Phone: (781) 213-9198
Fax: (781) 213-6992
Received Date: 10/06/2021 2:30 PM
Analysis Date: 10/08/2021
Collected Date: 10/06/2021

Project: 01164.117 - Brown School; 201 Willow Avenue; Somerville, MA

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

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
100621-57-51A *132107509-0001*	Roof SW - Gray Asphalt Shingle	Gray/Black Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (Other)	None Detected
100621-57-51B *132107509-0002*	Roof S - Gray Asphalt Shingle	Gray/Black Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (Other)	None Detected
100621-57-51C *132107509-0003*	Roof W - Gray Asphalt Shingle	Gray/Black Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected
100621-57-52A *132107509-0004*	Roof SE - Tar Paper Assoc. w/ Slate Roof	Black Fibrous Homogeneous	40% Cellulose	60% Non-fibrous (Other)	None Detected
100621-57-52B *132107509-0005*	Roof S - Tar Paper Assoc. w/ Slate Roof	Black Fibrous Homogeneous	40% Cellulose	60% Non-fibrous (Other)	None Detected
100621-57-53A *132107509-0006*	Roof SE - Slaters Cement	Black Non-Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
100621-57-53B *132107509-0007*	Roof S - Slaters Cement	Black Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected

Analyst(s)
Elizabeth Stutts (4)
Kevin McKenzie (3)

Steve Grise, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA NVLAP Lab Code 101147-0, CT PH-0315, MA AA000188, RI AAL-139, VT AL998919, ME LB-0039

Initial report from: 10/08/2021 11:36:13

OrderID: 132107509

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only

132107509

EMSL Analytical, Inc.
5 Constitution Way, Unit A
Woburn, MA 01801
PHONE: (781) 933-8411
EMAIL: bostonlab@emsl.com

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name:	Axiom Partners, Inc.	Company Name:	Axiom Partners, Inc.
Contact Name:	Geoff Gerace	Billing Contact:	Geoff Gerace
Street Address:	50B Salem Street, Suite 103	Street Address:	50B Salem Street, Suite 103
City, State, Zip:	Lynnfield MA 01940 Country: US	City, State, Zip:	Lynnfield MA Country: US
Phone:	781-213-9198	Phone:	781-213-9198
Email(s) for Report:	ggerace@axiomenv.com	Email(s) for Invoice:	

Project Information

Project Name/No:	Brown School 01164.117, 201 Willow Ave Somerville MA	Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)		US State where samples collected: MA	State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)
Sampled By Name:	Geoff Gerace	Sampled By Signature:	Date Sampled: 10/06/21
No. of Samples in Shipment			

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☑ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PLM - Bulk (reporting limit)

- ☑ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)
- ☐ POINT COUNT
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ POINT COUNT w/ GRAVIMETRIC
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ NIOSH 9002 (<1%)
- ☐ NYS 198.1 (Friable - NY)
- ☐ NYS 198.6 NOB (Non-Friable - NY)
- ☐ NYS 198.8 (Vermiculite SM-V)

TEM - Bulk

- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (Non-Friable - NY)
- ☐ TEM EPA 600/R-93/116 w Milling Prep (0.1%)

Other Tests (please specify)

☑ Positive Stop - Clearly Identified Homogeneous Areas (HA)

Sample Number	HA Number	Sample Location	Material Description
100021-57-	51A	Roof SW	GRAY ASPHALT SHINGLE
	51B	Roof S	↓
	51C	Roof W	↓
	52A	Roof SE	Tar Paper 4/w SLATE ROOF
	52B	Roof S	↓
	53A	Roof SE	SLATERS CEMENT
	53B	Roof S	↓

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

11:30

REC'D EMSL-BOSTON OCT 06 2021

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by:	Date/Time: 10/06/21 2:30	Received by:	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document - Asbestos Bulk R7 9/14/2021

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

ANALYTICAL REPORT

Lab Number:	L2144351
Client:	Axiom Partners, Inc. 50B Salem St Lynnfield, MA 01940
ATTN:	Geoff Gerace
Phone:	(781) 995-5101
Project Name:	BROWN SCHOOL
Project Number:	01164.112
Report Date:	08/25/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: BROWN SCHOOL
Project Number: 01164.112

Lab Number: L2144351
Report Date: 08/25/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2144351-01	PCB-01, EXTERIOR DOOR CAULKING	CAULK	201 WILLOW AVE, SOMERVILLE, MA	08/18/21 09:09	08/18/21
L2144351-02	PCB-02, EXTERIOR WINDOW CAULKING	CAULK	201 WILLOW AVE, SOMERVILLE, MA	08/18/21 09:21	08/18/21

Project Name:	BROWN SCHOOL	**Lab Number:**	L2144351
Project Number:	01164.112	**Report Date:**	08/25/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Sturgis Melissa Sturgis

Title: Technical Director/Representative Date: 08/25/21

ORGANICS

PCBS

Project Name: BROWN SCHOOL
Project Number: 01164.112
Lab Number: L2144351
Report Date: 08/25/21

SAMPLE RESULTS

Lab ID: L2144351-01
Client ID: PCB-01, EXTERIOR DOOR CAULKING
Sample Location: 201 WILLOW AVE, SOMERVILLE, MA

Date Collected: 08/18/21 09:09
Date Received: 08/18/21
Field Prep: Not Specified

Sample Depth:
Matrix: Caulk
Analytical Method: 1,8082A
Analytical Date: 08/24/21 21:23
Analyst: JAW
Percent Solids: Results reported on an 'AS RECEIVED' basis.

Extraction Method: EPA 3540C
Extraction Date: 08/23/21 11:45
Cleanup Method: EPA 3630
Cleanup Date: 08/24/21
Cleanup Method: EPA 3665A
Cleanup Date: 08/24/21
Cleanup Method: EPA 3660B
Cleanup Date: 08/24/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/kg	597	--	1	A
Aroclor 1221	ND		ug/kg	597	--	1	A
Aroclor 1232	ND		ug/kg	597	--	1	A
Aroclor 1242	ND		ug/kg	298	--	1	A
Aroclor 1248	ND		ug/kg	597	--	1	A
Aroclor 1254	ND		ug/kg	597	--	1	A
Aroclor 1260	ND		ug/kg	597	--	1	A
Aroclor 1262	ND		ug/kg	597	--	1	A
Aroclor 1268	ND		ug/kg	298	--	1	A
PCBs, Total	ND		ug/kg	298	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	75		30-150	A
Decachlorobiphenyl	85		30-150	A
2,4,5,6-Tetrachloro-m-xylene	75		30-150	B
Decachlorobiphenyl	83		30-150	B

Project Name: BROWN SCHOOL **Lab Number:** L2144351

Project Number: 01164.112 **Report Date:** 08/25/21

SAMPLE RESULTS

Lab ID: L2144351-02
Client ID: PCB-02, EXTERIOR WINDOW CAULKING
Sample Location: 201 WILLOW AVE, SOMERVILLE, MA

Date Collected: 08/18/21 09:21
Date Received: 08/18/21
Field Prep: Not Specified

Sample Depth:
Matrix: Caulk
Analytical Method: 1,8082A
Analytical Date: 08/24/21 21:30
Analyst: JAW
Percent Solids: Results reported on an 'AS RECEIVED' basis.

Extraction Method: EPA 3540C
Extraction Date: 08/23/21 11:45
Cleanup Method: EPA 3630
Cleanup Date: 08/24/21
Cleanup Method: EPA 3665A
Cleanup Date: 08/24/21
Cleanup Method: EPA 3660B
Cleanup Date: 08/24/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/kg	629	--	1	A
Aroclor 1221	ND		ug/kg	629	--	1	A
Aroclor 1232	ND		ug/kg	629	--	1	A
Aroclor 1242	ND		ug/kg	314	--	1	A
Aroclor 1248	ND		ug/kg	629	--	1	A
Aroclor 1254	ND		ug/kg	629	--	1	A
Aroclor 1260	ND		ug/kg	629	--	1	A
Aroclor 1262	ND		ug/kg	629	--	1	A
Aroclor 1268	ND		ug/kg	314	--	1	A
PCBs, Total	ND		ug/kg	314	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	77		30-150	A
Decachlorobiphenyl	84		30-150	A
2,4,5,6-Tetrachloro-m-xylene	76		30-150	B
Decachlorobiphenyl	84		30-150	B

Project Name: BROWN SCHOOL
Project Number: 01164.112
Lab Number: L2144351
Report Date: 08/25/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8082A
Analytical Date: 08/24/21 21:01
Analyst: JAW

Extraction Method: EPA 3540C
Extraction Date: 08/23/21 11:45
Cleanup Method: EPA 3630
Cleanup Date: 08/24/21
Cleanup Method: EPA 3665A
Cleanup Date: 08/24/21
Cleanup Method: EPA 3660B
Cleanup Date: 08/24/21

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01-02 Batch: WG1538022-1						
Aroclor 1016	ND		ug/kg	525	--	A
Aroclor 1221	ND		ug/kg	525	--	A
Aroclor 1232	ND		ug/kg	525	--	A
Aroclor 1242	ND		ug/kg	262	--	A
Aroclor 1248	ND		ug/kg	525	--	A
Aroclor 1254	ND		ug/kg	525	--	A
Aroclor 1260	ND		ug/kg	525	--	A
Aroclor 1262	ND		ug/kg	525	--	A
Aroclor 1268	ND		ug/kg	262	--	A
PCBs, Total	ND		ug/kg	262	--	A

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	67		30-150	A
Decachlorobiphenyl	73		30-150	A
2,4,5,6-Tetrachloro-m-xylene	66		30-150	B
Decachlorobiphenyl	74		30-150	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: BROWN SCHOOL

Project Number: 01164.112

Lab Number: L2144351

Report Date: 08/25/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01-02 Batch: WG1538022-2 WG1538022-3									
Aroclor 1016	57		66		40-140	15		50	A
Aroclor 1260	58		67		40-140	14		50	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	64		71		30-150	A
Decachlorobiphenyl	67		77		30-150	A
2,4,5,6-Tetrachloro-m-xylene	62		68		30-150	B
Decachlorobiphenyl	66		77		30-150	B

Project Name: BROWN SCHOOL
Project Number: 01164.112

Lab Number: L2144351
Report Date: 08/25/21

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	*Custody Seal*
A	Absent

Container Information

Container ID	*Container Type*	*Cooler*	*Initial pH*	*Final pH*	*Temp deg C*	*Pres*	*Seal*	*Frozen Date/Time*	*Analysis(*)*
L2144351-01A	Glass 120ml/4oz unpreserved	A	NA		2.0	Y	Absent		PCB-8082-CAULK(365)
L2144351-02A	Glass 120ml/4oz unpreserved	A	NA		2.0	Y	Absent		PCB-8082-CAULK(365)

*Values in parentheses indicate holding time in days

Project Name:	BROWN SCHOOL	**Lab Number:**	L2144351
Project Number:	01164.112	**Report Date:**	08/25/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	BROWN SCHOOL	**Lab Number:**	L2144351
Project Number:	01164.112	**Report Date:**	08/25/21

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report

Project Name:	BROWN SCHOOL	**Lab Number:**	L2144351
Project Number:	01164.112	**Report Date:**	08/25/21

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	BROWN SCHOOL	**Lab Number:**	L2144351
Project Number:	01164.112	**Report Date:**	08/25/21

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 8/18/21

ALPHA Job #: L2144351

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: AKRIOM Partners, Inc.
Address: 508 Salem St., Ste 103, Lynnfield, MA
Phone: 603-970-1135
Email: jesse.degeorge@akriom.com

Project Information

Project Name: Brown School
Project Location: 201 Willow Ave. Somerville, MA
Project #: 01164.117
Project Manager: Geoff Gerace
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Report Information - Data Deliverables

☐ ADEx ☒ EMAIL

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:

Email results to Jesse DeGeorge & Geoff Gerace

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15
METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☐ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint
PCBs Soxhlet Method via 8082A

SAMPLE INFO
Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Sample Comments	TOTAL # BOTTLES
44351-01	PCB-01, Exterior Door Caulking	8-18-21	0909	S	JAD	X	1
-02	PCB-02, Exterior Window Caulking	8-18-21	0921	S	JAD	X	1
	Container Type					A	
	Preservative					O	

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
Jesse DeGeorge	8-18-21 1358	Rob Maestas FSA	8/18/21 1355
Rob Maestas	8/18/21 1830		

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

APPENDIX B

Lead Paint Testing Results

XRF PAINT TESTING RESULTS

Brown School Building
201 Willow Avenue
Somerville, MA

LOCATION	SAMPLE CODE	SUBSTRATE TYPE	PAINT CONDITION	XRF READING (mg/cm^2)	COLOR/ COMMENTS
Exterior, Right Side of Building	LW	B	1 - 2	0.03	Brown
"	Security Window Guard	M	1	0.07 – 0.4	Brown
"	DC	M	1	0.01	Brown
"	WSL	C	1 - 2	0.04	Brown
Exterior, Rear Side of Building	LW	B	1 - 2	0.02	Brown
"	Security Window Guard	M	1 - 2	0.17	Brown
"	D	M	1	0.04	Brown
"	DC	M	1	0.02	Brown
Exterior, Front Side of Building	LW	B	1	0.04	Brown
Basement, Cafeteria, Classrooms, Boiler Room, Storage Rooms, Offices, Teacher's Dining Room, Janitor's Office, Hallways, Stairwells, Bathrooms, Etc.	W	B	1 – 2	0.01	White
"	W	B	1 – 2	0.03	Yellow
"	W	G	1	0.01	Yellow
"	W	CMU	1 – 2	0.21	Beige
"	D	W	1 – 2	0.05	Lt. Blue
"	DC	W	1 – 2	0.01	Lt. Blue
"	Wall Molding	W	1	0.10	White
"	**WSL**	**W**	**1 - 2**	**1.0**	**White**
"	WC	W	1 - 2	0.5	White

SAMPLE CODE:
BB-Baseboard; B-Bollards/Bumpers; C/T-Casing/Trim; CL-Ceiling; CR-Chair Rail; D-Door; DC-Door Casing; DJ-Door Jamb; DW-Duct Work; E-Equipment; FL-Floor; HR- Handrail; HVAC-Fans/Air Handlers; P-Piping; R-Railing; RD-Radiator; RC-Radiator Cover; SB-Stair Balusters; SH-Shingles/Siding; SR-Stair Riser; SS-Stair Stringer; SR-Stair Railing; ST, Stair Tread; STC-Structural Column; STB-Structural Beam; STM-Structure Misc; W-Wall; UW-Upper Wall; LW-Lower Wall; WSH-Window Sash; WC-Window Casing; WSL-Window Sill

SUBSTRATE TYPE:
W-Wood; G-Gypsum Board; P-Plaster; C-Concrete; CB- Concrete Block; PA-Paneling: T-Tile; M-Metal; B-Brick; U-Unknown

PAINT CONDITION:
1 to 5; 1 = Undamaged (< 5% damage) ; 2 = Slight Damage (6-15% Damage) ; 3 = Moderate Damage (16-25% Damage) ; 4 = Extensive Damage (26-50% Damage) ; 5 = Severe Damage (>50% Damage)

axiom PARTNERS environmental engineers

XRF PAINT TESTING RESULTS

Brown School Building
201 Willow Avenue
Somerville, MA

LOCATION	SAMPLE CODE	SUBSTRATE TYPE	PAINT CONDITION	XRF READING (mg/cm^2)	COLOR/ COMMENTS
“	**D**	**M**	**1 – 2**	**1.2**	**Tan**
“	DC	M	1 – 2	0.08	Tan
“	SS	W	1 – 2	0.30	Lt. Blue
“	HVAC	M	1	0.08	White
1st Floor, Classrooms, Storage Rooms, Offices, Hallways, Stairwells, Bathrooms, Main Office, Etc.	W	B	1 – 2	0.11	White
“	W	P	1 – 2	0.00 – 0.02	Lt Blue
“	W	G	1	0.01	White
“	W	W	1 – 2	0.03	Lt. Blue
“	**D**	**W**	**1 – 2**	**1.4**	**Lt. Blue**
“	DC	W	1 – 2	0.16	Lt. Blue
“	NP	W	1 - 2	0.04	Lt. Blue
“	HR	W	1 - 2	0.02	Lt. Blue
“	SS	W	1 - 2	0.25	Lt. Blue
“	WSL	W	1 - 2	0.15	Lt. Blue
“	WC	W	1 - 2	0.30	Lt. Blue
“	BB	W	1 - 2	0.20	Lt. Blue
2nd Floor, Classrooms, Storage Rooms, Offices, Hallways, Stairwells, Bathrooms, Nurse’s Office, Principal’s Office, Etc.	W	B	1 – 2	0.11	White
“	W	G	1	0.01	White
“	D	W	1 – 2	0.4	Tan
“	DC	W	1 – 2	0.16	Tan

SAMPLE CODE:
BB-Baseboard; B-Bollards/Bumpers; C/T-Casing/Trim; CL-Ceiling; CR-Chair Rail; D-Door; DC-Door Casing; DJ-Door Jamb; DW-Duct Work; E-Equipment; FL-Floor; HR- Handrail; HVAC-Fans/Air Handlers; P-Piping; R-Railing; RD-Radiator; RC-Radiator Cover; SB-Stair Balusters; SH-Shingles/Siding; SR-Stair Riser; SS-Stair Stringer; SR-Stair Railing; ST, Stair Tread; STC-Structural Column; STB-Structural Beam; STM-Structure Misc; W-Wall; UW-Upper Wall; LW-Lower Wall; WSH-Window Sash; WC-Window Casing; WSL-Window Sill

SUBSTRATE TYPE:
W-Wood; G-Gypsum Board; P-Plaster; C-Concrete; CB- Concrete Block; PA-Paneling: T-Tile; M-Metal; B-Brick; U-Unknown

PAINT CONDITION:
1 to 5; 1 = Undamaged (< 5% damage) ; 2 = Slight Damage (6-15% Damage) ; 3 = Moderate Damage (16-25% Damage) ; 4 = Extensive Damage (26-50% Damage) ; 5 = Severe Damage (>50% Damage)

axiom PARTNERS environmental engineers

XRF PAINT TESTING RESULTS

Brown School Building
201 Willow Avenue
Somerville, MA

LOCATION	SAMPLE CODE	SUBSTRATE TYPE	PAINT CONDITION	XRF READING (mg/cm^2)	COLOR/ COMMENTS
"	NP	W	1 - 2	0.07	Lt. Blue
"	HR	W	1 - 2	0.04	Lt. Blue
"	SS	W	1 - 2	0.28	Lt. Blue
"	WSL	W	1 - 2	0.14	Tan
"	WC	W	1 - 2	0.22	Tan
"	BB	W	1 - 2	0.20	Tan
3rd Floor, Classrooms, Storage Rooms, Offices, Hallways, Stairwells, Bathrooms, Library, Etc.	W	G	1	0.01	White
"	W	G	1	0.00	Lt. Blue
"	D	M	1	0.00	Lt. Blue
"	DC	M	1	0.00	Lt. Blue
"	CL	G	1	0.00	White

SAMPLE CODE:
BB-Baseboard; B-Bollards/Bumpers; C/T-Casing/Trim; CL-Ceiling; CR-Chair Rail; D-Door; DC-Door Casing; DJ-Door Jamb; DW-Duct Work; E-Equipment; FL-Floor; HR- Handrail; HVAC-Fans/Air Handlers; P-Piping; R-Railing; RD-Radiator; RC-Radiator Cover; SB-Stair Balusters; SH-Shingles/Siding; SR-Stair Riser; SS-Stair Stringer; SR-Stair Railing; ST, Stair Tread; STC-Structural Column; STB-Structural Beam; STM-Structure Misc; W-Wall; UW-Upper Wall; LW-Lower Wall; WSH-Window Sash; WC-Window Casing; WSL-Window Sill

SUBSTRATE TYPE:
W-Wood; G-Gypsum Board; P-Plaster; C-Concrete; CB- Concrete Block; PA-Paneling: T-Tile; M-Metal; B-Brick; U-Unknown

PAINT CONDITION:
1 to 5; 1 = Undamaged (< 5% damage) ; 2 = Slight Damage (6-15% Damage) ; 3 = Moderate Damage (16-25% Damage) ; 4 = Extensive Damage (26-50% Damage) ; 5 = Severe Damage (>50% Damage)

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APPENDIX C

Hazardous Building Materials
Summary Tables

MISCELLANEOUS HAZARDOUS BUILDING MATERIALS INVENTORY

Brown School Building
201 Willow Avenue
Somerville, MA

Bulbs & Ballasts

Description	Location	Mfg./Model	Quantity	PCB Content
4' x 2 Bulb Suspended	Basement Throughout	Unknown	45	Assumed PCBs
4' x 2 Bulb Suspended	1st Floor Throughout	Unknown	115	Assumed PCBs
4' x 2 Bulb Suspended	2nd Floor Throughout	Unknown	110	Assumed PCBs
4' x 2 Bulb Suspended	3rd Floor Throughout	Unknown	80	Assumed PCBs

CFC-Containing Items

Description/Location	HVAC Manufacturer	Number of Units	Amount/Type of RCFCs
Air Conditioners (floor-mounted) / Flat Roof, Right Side of Building	Fujitsu	5	~4-8 lbs. / R-410A
Air Conditioners (window-mounted) / 1st & 2nd Floors, Classrooms	Frigidaire	14	~1-2 lbs. / R-410A
Air Conditioners (wall-mounted) / 3rd Floor, Classrooms, Library & Offices	Fujitsu	10	~1-2 lbs. / R-410A
Refrigerators / Basement - 3rd Floor Throughout	Various Brands	20	~1-2 lbs. / Freon
Coolers / Basement, Teacher's Dining Room & Cafeteria	Victory & Traulsen	3	~3-5 lbs. / Freon

PCB-Containing Items

Description/Location	Manufacturer	Number of Units	PCBs
Transformer (pad-mounted) / Exterior Front Side of Building	Howard Industries	1	Assumed PCBs[1]

Mercury-Containing Items

Description	Location	Manufacturer	Number of Units
Halogen Light Fixtures (w/ 1 mercury bulb)	Exterior, Right Side of Building	Unknown	4
Thermostats	3rd Floor, Classrooms, Offices & Storage Room	Honeywell	4

Miscellaneous Items

Description	Location	Approx. Quantity

[1] A label indicating "No PCBs (<2 PPM)" was observed on the transformer. Since the unit still could have PCBs at low levels, AXIOM assumed it to contain this constituent.

Description	Location	Approx. Quantity
Batteries w/ Exit Signs	Basement Throughout	6
Batteries w/ Emergency Lighting	“	8
Fire Extinguishers	“	10
Computer Monitors	“	10
Water Fountains	“	4
Miscellaneous Painting Supplies	Basement, Janitor’s Office	25
Miscellaneous Cleaning Supplies	“	25
Batteries w/ Exit Signs	1st Floor Throughout	18
Batteries w/ Emergency Lighting	“	8
Fire Extinguishers	“	18
Computer Monitors	“	10
Water Fountains	“	4
Batteries w/ Exit Signs	2nd Floor Throughout	22
Batteries w/ Emergency Lighting	“	10
Fire Extinguishers	“	20
Computer Monitors	“	20
Water Fountains	“	4
Batteries w/ Exit Signs	3rd Floor Throughout	12
Batteries w/ Emergency Lighting	“	10
Fire Extinguishers	“	8
Computer Monitors	“	8

APPENDIX D

Non-ACMs Tables

Non-ACM Table

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-01A&B	Brick Mortar	Exterior NW Corner
081821-57-03A&B	Mortar a/w Limestone Cap	Exterior NW
081821-57-09A-09H	Textured Ceiling Coating	2nd Floor Corridor
081821-57-10A&B	12” x 12” Blue Floor Tile	Teachers Dining Room
081821-57-12A&B	4” Covebase Mastic	B07 Classroom
081821-57-13A-13C	Ceiling Plaster	B01 Mechanical Room
081821-57-14A-14D	Gypsum Wall Board	3rd Floor Library
081821-57-15A-15D	Joint Compound a/w Gypsum board	B02 Storage
081821-57-17A&B	9” x 9” Tan Floor Tile Mastic	B02 Mechanical Closet
081821-57-18A&B	12” x 12” Tan Mottled Floor Tile	B02 Art Room
081821-57-19A&B	12” x 12” Tan Mottled Floor Tile Mastic	B07 Classroom
081821-57-21A&B	Tan Stone Pattern Linoleum	Stairwell N 1st Floor
081821-57-22A&B	Tan Stone Pattern Linoleum Mastic	Stairwell N 2nd Floor
081821-57-24A&B	12” x 12” Beige Floor Tile Mastic	Stairwell N 1st Floor
081821-57-28A-28C	2’ x 4’ White Ceiling Tile	Basement Bathroom
081821-57-30A&B	Mosaic Tile Mortar	Front Entrance
081821-57-31A&B	Interior Window Glazing	Front Entrance
081821-57-32A&B	Interior Door Caulking	Front Entrance
081821-57-33A&B	Interior Window Caulking	Front Entrance
081821-57-34A&B	12” x 12” Gray Mottled Floor Tile	106 Classroom
081821-57-35A&B	12” x 12” Gray Mottled Floor Tile Mastic	101 Classroom
081821-57-38A&B	12” x 12” Blue Floor Tile	106 Classroom
081821-57-39A&B	12” x 12” Blue Floor Tile Mastic	102 Classroom

Non-ACM Table

SAMPLE NUMBER	SAMPLE DESCRIPTION	SAMPLE LOCATION
081821-57-41A&B	Green Floor Tile	203 Principals Office
081821-57-42A&B	Green Floor Tile Mastic	203 Principals Office
081821-57-43A&B	FRP Paneling Mastic	Corridor 2nd Floor
081821-57-44A&B	Carpet Mastic	Stairwell Landings
081821-57-45A&B	Carpet Square Mastic	Library
081821-57-46A&B	12” x 12” Brown Ceramic Tile Grout	Library Bathrooms
081821-57-48A&B	4” x 4” White Ceramic Tile Grout	Library Bathrooms
081821-57-06A-06G	White Skimcoat Plaster	Throughout
081821-57-07A-07G	Gray Basecoat Plaster	Throughout
100621-57-51A-51C	Gray Asphalt Shingle	Shingled Roof
100621-57-52&B	Tar Paper associated with Slate Roof	Slate Roof
100621-57-53A&B	Slaters Cement	Slate Roof

APPENDIX E

Photographs

Photo 1

View of Asbestos-Containing Exterior Window Caulking

Photo 2

View of Asbestos-Containing Exterior Door Caulking

Photo 3

View of Asbestos-Containing Roof Cement Overhang Roof

Photo 4

View of Asbestos-Containing Sprinkler Pipe Dope

Photo 5

View of Asbestos-Containing 12” x 12” Blue Floor Tile Teachers lounge

Photo 6

View of Asbestos-Containing 9” x 9” Green/Tan Floor Tile Bottom Layer

Photo 7

View of Asbestos-Containing 12” x 12” Beige Vinyl Floor Tile Stairwell

Photo 8

View of Asbestos-Containing 12” x 12” Beige w/Gray Streaks Floor Tile

Photo 9

View of Asbestos-Containing Safety Glass

Photo 10

View of Asbestos-Containing Roof Cement

APPENDIX F

Asbestos and Hazardous Building Materials Abatement Cost Estimate

Asbestos & Hazardous Building Materials Abatement Cost Estimate
Brown School Building
201 Willow Avenue, Somerville, MA

Asbestos Removal, ACMs

Material	Location(s)	Estimated Quantity	Estimated Removal Cost
Exterior Window Caulking	Exterior	110 Each	$13,750
Exterior Door Caulking	Exterior	6 Each	$750
Roof Cement a/w Overhang Roof	Exterior Parking Lot Area	32 SF	$320
Sprinkler Pipe Dope	Throughout	550 Each	$2,200
12" x 12" Blue Floor Tile Mastic	Teachers Dining Room	400 SF	$2,000
9" x 9" Tan Floor Tile	Rooms B02, 301, 302	3,900 SF	$31,200
12" x 12" Beige Floor Tile	Stairwells	250 SF	$1,250
12" x 12" Beige w Gray Streaks Floor Tile	Rooms 101, 103,105, 1st Floor Hallway, 201, 203, 204, 2nd Floor Hallway	6,800 SF	$34,000
12" x 12" Beige w Gray Streaks Floor Tile Mastic	Rooms 101, 103,105, 1st Floor Hallway, 201, 203, 204, 2nd Floor Hallway	6,800 SF	Included Above
Safety Glass Glazing	1st and 2nd Floor Corridors	30 Each	$3,000
Roof Cement	Mechanical Room Roof	75 SF	$750
		Subtotal, Asbestos Removal (Confirmed ACMs)	**$ 89,220**

Asbestos Removal, PACMs

Material	Location	Quantity	Removal Cost
Asphaltic Damp Proofing	On Foundations, Footings	5,700 SF	$100,000
Blackboard Adhesives	Classrooms	3,200 SF	$16,000
Buried Pipes	Beneath Building or at Site	TBD	NA*
Concealed Pipe/Fitting Insulation Behind and/or Above Hard Wall/Ceiling Surfaces & Inaccessible Crawlspaces/Trenches under Building	Various Areas Building's Interiors	TBD	NA*
Various Ceramic and Quarry Tile Thin sets	Bathrooms Throughout	2,200 SF	$11,000
Interior Components w/ Boiler Unit	Basement, Boiler Room	4 Units	$3,000

Asbestos & Hazardous Building Materials Abatement Cost Estimate
Brown School Building
201 Willow Avenue, Somerville, MA

Material	Location	Quantity	Removal Cost
Subtotal, PACM Removal (Recommended Allowance)			**$ 130,000**

*N/A – Not applicable at this time

Abatement Cost Estimate Summary

Description	Estimated Removal Cost
Asbestos Removal, Confirmed ACMs	$ 89,220
Asbestos Removal, Presumed ACMs	$ 130,000
Miscellaneous Hazardous Building Materials	$ 10,000
~10% Contingency	$ 22,922
Estimated Abatement Design/Bid & Monitoring Fee	$ 30,000
Total Hazardous Building Materials Abatement	**$ 282,142**

Cost Estimate Assumptions

- Based on current market conditions by a non-union contractor.
- Power, water and heat provided by the Owner.
- Does not include demolition to access concealed ACMs.
- Includes materials, labor, equipment, notifications/permits, transportation and disposal.
- Excludes the cost for removal of any other hazardous materials or conditions not identified herein.

APPENDIX G

Former Report-2015

6 MONTH INSPECTION
Brown Elementary School
May, 2015

ASSUMED AND PROVEN ASBESTOS-CONTAINING MATERIALS

Material & Amount	Location	Type & Friability	Physical Assessment Category	Type/% Asbestos & # of Samples	Comment	Six Month Surveillances & Re-inspections					
						6-mo.	12-mo.	18-mo.	24-mo.	30-mo.	3-YR
Pipe insulation	Behind all walls and ceilings throughout	TSI, F	Not accessible		Exposed insulation on the 1st floor, 2nd floor and 3rd floor is either fiberglass or not insulated.	√					
Boiler insulation	2 package style boilers located on 3rd floors in closet and principals office (Weil McLain). 2 more boilers in boiler room, large package style (HB Smith 28 High Efficiency)	TSI, F	5			√					
Golden/tan speckled linoleum (≈ 600 SF)	Stair treads and risers 1st to 2nd floors	M, NF			Material is damaged as cracks are noted.	√					
9 x 9 Tan floor tile (≈ 960 SF)	Basement classroom by boy's bathroom	M, NF		Tile: 22869-12 3% Chrysotile	The basement classroom now has carpet assume over floor tiles.	√					
Associated mastic		M, NF		Mastic: 22869-13 5% Chrysotile		√					
12 x 12 Tan floor tile (orange & brown) (≈ 3500 SF)	Resource room, food service area, Nurse's office, 1st and 2nd floor halls, halls going to classroom (D Side) and landing of stairs	M, NF			Material is damaged. In some locations this material appears to be laid over plywood.	√					
Associated mastic		M, NF				√					
12 x 12 Gray mottled floor tile (336 SF)	Teacher's room	M, NF			Appears newer	√					
Associated mastic		M, NF				√					

Key

Type	*Amount*	*Friability*
T-TSI	SF-Square feet	F-Friable
S-Surfacing	LF-Linear feet	NF-Non-friable

Physical Assessment

Assessment Categories for Friable Materials

1. Damaged or significantly damaged TSI
2. Damaged (D) surfacing
3: Significantly damaged (SD) surfacing
4: Damaged or significantly damaged misc.
5: Suspect or proven ABCM with the potential for D (*one moderate)
6: Suspect or proven ABCM with the potential for SD (*one high)
7. Any remaining suspect or proven ACBM (*all low)

**Potential for future disturbance for categories 5, 6, & 7*
Access, Vibration, Air Erosion: L-low M-medium H-high

Comments: _____

_____

Six Month Surveillance & Re-inspections

*Fill in the corresponding box with a √ for no change in condition or a **C** for a change in the status of a material. Write details about changes in the comment area below the chart on the same page. The person conducting the surveillance must sign and date below.*

6-mo. Date: Signature: ***18-mo.*** Date: Signature:

12-mo. Date: Signature: ***24-mo.*** Date: Signature:

30-mo. Date: Signature: ***3-YR Re-inspect:*** Date: Signature:

6 MONTH INSPECTION
Brown Elementary School
May, 2015

ASSUMED AND PROVEN ASBESTOS-CONTAINING MATERIALS

Material & Amount	Location	Type & Friability	Physical Assessment Category	Type/% Asbestos & # of Samples	Comment	Six Month Surveillances & Re-inspections					
						6-mo.	12-mo.	18-mo.	24-mo.	30-mo.	3-YR
12 x 12 Blue floor tile w/white & dark blue splotches (≈ 896 SF)	Room 2	M, NF			Material is damaged and appears to be laid over wood floors.	√					
Associated mastic		M, NF				√					
12 x 12 Gray floor tile w/dark gray (≈ 100 SF per room)	Library, room between room 11 and computer room, side C stairs 2nd and 3rd floor, Room 8 & Room 9	M, NF			**Tape was noted to be covering some floor tile which is presumed to be damaged in room 8**	***C***					
Associated mastic		M, NF				√					
12 x 12 Black floor tile (336 SF)	Custodian's room	M, NF			Appears newer	√					
Associated mastic		M, NF				√					
Mosaic ceramic floor tile 100 SF	At front entry	M, NF			Minor damage noted.	√					
1 x 1 Granite floor tile (grout/adhesive) (150 SF)	Men's & women's restroom 3rd floor	M, NF			In pattern with 3x3 granite tile	√					

Key

Type
T-TSI
S-Surfacing

Amount
SF-Square feet
LF-Linear feet

Friability
F-Friable
NF-Non-friable

Physical Assessment

Assessment Categories for Friable Materials
1. Damaged or significantly damaged TSI
2. Damaged (D) surfacing
3: Significantly damaged (SD) surfacing
4: Damaged or significantly damaged misc.
5: Suspect or proven ABCM with the potential for D (*one moderate)
6: Suspect or proven ABCM with the potential for SD (*one high)
7. Any remaining suspect or proven ACBM (*all low)

**Potential for future disturbance* *for categories 5, 6, & 7*
Access, Vibration, Air Erosion: L-low M-medium H-high

Comments: _____

_____

Six Month Surveillance & Re-inspections

*Fill in the corresponding box with a √ for no change in condition or a **C** for a change in the status of a material. Write details about changes in the comment area below the chart on the same page. The person conducting the surveillance must sign and date below.*

6-mo. Date: Signature: ***18-mo.*** Date: Signature:

12-mo. Date: Signature: ***24-mo.*** Date: Signature:

30-mo. Date: Signature: ***3-YR Re-inspect:*** Date: Signature:

6 MONTH INSPECTION
Brown Elementary School
May, 2015

ASSUMED AND PROVEN ASBESTOS-CONTAINING MATERIALS

Material & Amount	Location	Type & Friability	Physical Assessment Category	Type/% Asbestos & # of Samples	Comment	Six Month Surveillances & Re-inspections					
						6-mo.	12-mo.	18-mo.	24-mo.	30-mo.	3-YR
3 x 3 Granite floor tile (grout/adhesive)	Men's & women's restroom 3rd floor	M, NF			In pattern with 1x1 granite tile	√					
4 x 4 Ceramic wall tile (grout/adhesive) (340 SF)	Men's and women's bathroom on 3rd floor	M, NF			Appears new	√					
6 x 6 Red ceramic floor tile (grout/adhesive) (750 SF)	Girls and boys bathrooms	M, NF				√					
Ceramic tile cove base (grout/adhesive) (150 SF)	Boys and girls bathrooms	M, NF				√					
2 x 4 Ceiling tile	1st floor girls bathroom (375 SF), 2nd floor nurse's office (300 SF), basement boys bathroom (300 SF), handicap bathroom and ramp in basement (300 SF)	M, F	4		Random tiles mixed throughout - small fissure with dots, rough large fissure with dots, patterned fissure with dots. 6/14: Water damage present in girls' bathroom. **5/15: New tiles noted**	***C***					
2 x 2 Rough fissure ceiling tile with dots	3rd floor bathrooms	M, F	4		Water damage present in girls' bathroom.	√					
2 x 2 Small rough fissures ceiling tile with dots	Library, Computer room & Room 11	M, F	4		Water damaged in multiple locations	√					

Key

Type
T-TSI
S-Surfacing

Amount
SF-Square feet
LF-Linear feet

Friability
F-Friable
NF-Non-friable

Physical Assessment

Assessment Categories for Friable Materials
1. Damaged or significantly damaged TSI
2. Damaged (D) surfacing
3: Significantly damaged (SD) surfacing
4: Damaged or significantly damaged misc.
5: Suspect or proven ABCM with the potential for D (*one moderate)
6: Suspect or proven ABCM with the potential for SD (*one high)
7. Any remaining suspect or proven ACBM (*all low)

**Potential for future disturbance for categories 5, 6, & 7*
Access, Vibration, Air Erosion: L-low M-medium H-high

Comments: _____

_____

Six Month Surveillance & Re-inspections

*Fill in the corresponding box with a √ for no change in condition or a **C** for a change in the status of a material. Write details about changes in the comment area below the chart on the same page. The person conducting the surveillance must sign and date below.*

6-mo. Date: Signature: ***18-mo.*** Date: Signature:

12-mo. Date: Signature: ***24-mo.*** Date: Signature:

30-mo. Date: Signature: ***3-YR Re-inspect:*** Date: Signature:

6 MONTH INSPECTION
Brown Elementary School
May, 2015

ASSUMED AND PROVEN ASBESTOS-CONTAINING MATERIALS

Material & Amount	Location	Type & Friability	Physical Assessment Category	Type/% Asbestos & # of Samples	Comment	Six Month Surveillances & Re-inspections					
						6-mo.	12-mo.	18-mo.	24-mo.	30-mo.	3-YR
Old horsehair plaster	Walls throughout, except where drywall noted (mainly 3rd floor)	M, F	4		Water damaged in multiple locations. ***Repairs in Hallway behind Nurse.**	***C***					
Textured ceilings	Throughout 1st and 2nd, some halls 1st and 2nd, in basement, 3rd where no CT's	S, F	2		Water damaged in multiple locations	√					
Drywall 160 SF	Wall between nurse's room	M, NF				√					
Associated joint compound		M, NF				√					
Old drywall	Ceiling of boiler room, wall at teacher's room and classrooms, walls at handicap ramp and bath. Painted and exposed in some areas.	M, NF			Basement classrooms were sampled and did not indicate the presence of asbestos. Further sampling should be performed to comply with AHERA regulations	√					
Associated joint compound		M, NF				√					
Brown wall plaster ≈ 25,000 SF	1st Floor and stairways	S, F	5			√					
Light blue wall plaster ≈ 24,000 SF	2nd Floor	S, F	5			√					

Key

Type	*Amount*	*Friability*
T-TSI	SF-Square feet	F-Friable
S-Surfacing	LF-Linear feet	NF-Non-friable

Physical Assessment

Assessment Categories for Friable Materials

1. Damaged or significantly damaged TSI
2. Damaged (D) surfacing
3: Significantly damaged (SD) surfacing
4: Damaged or significantly damaged misc.
5: Suspect or proven ABCM with the potential for D (*one moderate)
6: Suspect or proven ABCM with the potential for SD (*one high)
7. Any remaining suspect or proven ACBM (*all low)

**Potential for future disturbance for categories 5, 6, & 7*
Access, Vibration, Air Erosion: L-low M-medium H-high

Comments: _____

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Six Month Surveillance & Re-inspections

*Fill in the corresponding box with a √ for no change in condition or a **C** for a change in the status of a material. Write details about changes in the comment area below the chart on the same page. The person conducting the surveillance must sign and date below.*

6-mo.	Date:	Signature:	***18-mo.***	Date:	Signature:
12-mo.	Date:	Signature:	***24-mo.***	Date:	Signature:
30-mo.	Date:	Signature:	***3-YR Re-inspect:***	Date:	Signature:

6 MONTH INSPECTION
Brown Elementary School
May, 2015

ASSUMED AND PROVEN ASBESTOS-CONTAINING MATERIALS

Material & Amount	Location	Type & Friability	Physical Assessment Category	Type/% Asbestos & # of Samples	Comment	Six Month Surveillances & Re-inspections					
						6-mo.	12-mo.	18-mo.	24-mo.	30-mo.	3-YR
Brick and associated mortar	Chimney stack walls, exposed on 3rd floor	M, NF			Walls of old chimney stack, exposed for architectural purposes on 3rd floor.	√					
Exterior transite panels	Exterior windows	M, NF				√					
Paneling adhesive	Nurse's room	M, NF			Assumed to be behind paneling	√					

Key

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**Potential for future disturbance for categories 5, 6, & 7*
Access, Vibration, Air Erosion: L-low M-medium H-high

Comments: _____

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Six Month Surveillance & Re-inspections

Fill in the corresponding box with a ***√*** *for no change in condition or a* ***C*** *for a change in the status of a material. Write details about changes in the comment area below the chart on the same page. The person conducting the surveillance must sign and date below.*

6-mo.	Date:	Signature:	***18-mo.***	Date:	Signature:
12-mo.	Date:	Signature:	***24-mo.***	Date:	Signature:
30-mo.	Date:	Signature:	***3-YR Re-inspect:***	Date:	Signature:

6 MONTH INSPECTION
Brown Elementary School
May, 2015

MATERIALS THAT HAVE BEEN ABATED/REMOVED OR PROVEN TO NOT CONTAIN ASBESTOS

Material	Location	Samples	Comment
Carpet adhesive	1, 3, 4, 5, 6, 7, 8, 9, 9-A, 11, computer room (12), library and office	22869-1 thru 22869-9	Sampled and proven not to contain asbestos. Carpet has since been replaced with new VCT.
9x9 Tan floor tile	Basement classrooms (Josephine side and Willow side)		Abated during 8/2012 and replaced with new 12 x 12 beige mottled floor tile
Associated mastic			
Gray leveling agent	Room 6 & 8	22869-14 & 22869-15	Sampled and proven not to contain asbestos.
Red leveling agent	Room 9 & 12	22869-16 & 22869-17	Sampled and proven not to contain asbestos.
Drywall	Basement classrooms (Josephine side and Willow side)	22898-SR-1A, 1B, 1C 22898-SR-2A, 2B, 2C	Sampled and proven not to contain asbestos.
Joint compound associated with above drywall		22898-DJC-1A, 1B, 1C	Sampled and proven not to contain asbestos.
HVAC ducts	Exposed in basement, part of gravity system for upper floors.		Uninsulated
2 x 4 Tectum ceiling tile	2 kindergarten classrooms in basement		Tiles removed and replaced with 2x4 ceiling tiles with small fissures and lots of dots in 8/2012.
Roofing membrane	In roof above girl's room on 1st Floor		Abated on March 18th 2015.

Key

Type	*Amount*	*Friability*
T-TSI	SF-Square feet	F-Friable
S-Surfacing	LF-Linear feet	NF-Non-friable

Physical Assessment

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**Potential for future disturbance for categories 5, 6, & 7*
Access, Vibration, Air Erosion: L-low M-medium H-high

Comments: _____
_____

Six Month Surveillance & Re-inspections

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6-mo.	Date:	Signature:	***18-mo.***	Date:	Signature:
12-mo.	Date:	Signature:	***24-mo.***	Date:	Signature:
30-mo.	Date:	Signature:	***3-YR Re-inspect:***	Date:	Signature: