Beal Early Childhood Center

1 Maple Avenue, Shrewsbury, MA 01545

Existing Conditions Report

DECEMBER 18, 2017

MSBA
Massachusetts School Building Authority
40 Broad Street, Suite 500, Boston, MA 02111

OWNER
Town of Shrewsbury, MA
100 Maple Avenue, Shrewsbury, MA 01545

OPM
PMA Consultants, LLC
35 Braintree Hill Office Park, Suite 300, Braintree, MA 02184

DESIGNER
Lamoureux Pagano & Associates, Inc.
108 Grove Street, Suite 300, Worcester, MA 01605

Prepared by:

LAMOUREUX · PAGANO
ARCHITECTS PROJECT MANAGERS

1. Architectural
2. Site
3. Structural
4. Fire Protection
5. Mechanical
6. Electrical
7. Hazardous Materials

EXECUTIVE SUMMARY

The Major Howard W. Beal School, prominently located in the center of Shrewsbury, has been used by the town for educational purposes since it was opened in 1922. While the 33,000-sf building situated on 3.8 acres was no doubt the epitome of contemporary standards for a high school when it was built, it is now extremely deficient to support the needs of a large contemporary elementary school with an enrollment of 790 students. Based on the preliminary program developed for the proposed project, it is anticipated that the floor plate of the school may be 80,000sf. Additionally, separate circulation for busses and parent pick up/drop off vehicles is required.

The Beal School site at 3.8 acres is the equivalent of slightly over 165,500 sf. It would be exceptionally challenging to accommodate the required program on the existing site without further exacerbating the current traffic problems experienced on the neighboring streets, acquiring neighboring property or developing a multi-story building of a scale inappropriate for welcoming young learners. For reference, our design team recommends a site of 12 – 14 acres to support the building and site requirements for the proposed school.

Although the building and site are not reasonable candidates for the 790 student elementary school program, the building itself is iconic in town and may well be suitable for adaptive reuse as housing, offices, or other similar use groups.

While most of the building systems have lived beyond their expected service period, the structure is generally sound, features high ceilings and window openings, and has a spatial scale suitable for adaptability to many uses other than an elementary school. Additionally, upgrades by the town of Shrewsbury including the installation of an elevator and ramps have added value for other use groups.

Developed according to Massachusetts School Building Authority guidelines, the following is a detailed assessment of the architectural, site, and systems features of the property specifically as they relate to an elementary school program.

INTRODUCTION

The following Existing Conditions report was developed to meet the requirements of an MSBA funded public school project. The major objective of this study is to determine the suitability for the existing Beal School building and site for a public school large enough to support 750 K-1 students or 790 K-4 students.

The following documents were made available to the design team and were used as the basis for the majority of the historical narrative, combined with site visits to view the existing conditions, and interviews with Town of Shrewsbury department representatives as appropriate:

- Copies of the original architectural drawings dated 1922 consisting of exterior elevations, floor plans, and structural plans, J William Beal Sons Architect, Boston
- Ramp details by Nault Architects, Worcester
- Site plan for parking and drainage improvements
- Microbial Evaluation report, ATC, 3 January 2006
- Indoor Air Quality Evaluation, MA DPH, 29 August 2006
- Indoor Air Quality Evaluation, ATC, 5 April 2010
- MSBA Statement of Interest document, 8 April 2015

The following Beal School design team firms conducted the evaluations:

- Lamoureux Pagano Associates, Architects
- Nitsch Engineering, civil engineers
- Bolton Dimartino, structural engineers
- Seaman Engineering, mechanical engineers
- ART Engineering, electrical engineers
- UEC, hazardous material assessment

Following the architectural narrative portion of this report, each engineering report is included for further reference.

HISTORY

The Major Howard W. Beal School was originally constructed in 1922 as Shrewsbury's High School on an approximately 3.8-acre site centrally located in the community. The architect was J. Williams Beal Sons, Boston and the builder was J. J. Power of Worcester. The structure is built into a slightly terraced area with 2 stories above a finished ground level floor for a total of about 33,000 square feet.

Built after World War I when students would not typically have had their own cars, lunch was probably either eaten at home or brought to school. The manufacturing industry was still strong in New England and it appears that the high school was built with some of the most contemporary features of the time. Copies of original plans show spaces identified for manual training, bookkeeping, typing, domestic science, a centralized library and multipurpose assembly hall with projection capabilities. While small by today's standards, the classrooms were probably quite sufficient for the simply appointed instructional spaces of the time. As was typical, there was no cafeteria space in the original plan. The building's central town location must have been critical as most of students probably walked to school at the time.

The Beal School was used as the town's high school until 1957 when the new Junior Senior High School was opened on Oak Street. During the 1990's the Beal School was developed as a progressive early childhood education center serving the entire district. Subsequently, the town's population had grown tremendously and the school currently houses some of the early childhood classrooms, but others are assigned to elementary schools that serve up to grade four.

Subsequent to original construction, the following renovations to the building were completed:

- 2012: selective roof repair
- 2007: EPDM roof was re-seamed
- 2001: Elevator and interior and exterior ramps installed
- 1988: the original tar and gravel roof was replaced with an EPDM roofing system including 2" of insulation
- 1980's: boilers replaced
- 1980's (estimated): upper window sashes were faced with solid panels and suspended ceilings installed
- Various undated modifications/upgrades were made over the years to provide electrical/telecommunications systems as required, toilet partition replacement, flooring and millwork replacement. These changes appear to be part of typical annual capital improvements in an effort to meet current curriculum and selective code requirements.
- See individual engineering reports for further details about systems and site upgrades

EXTERIOR

General

The Beal school is a masonry bearing wall construction with wood framed floors and roof, original single paned wood frame windows, and EPDM roof. All except the roof appear to be primarily original construction with few changes.

Masonry walls: generally in good condition with selective repointing, concrete foundation repair recommended. From visual inspection only, most of the stone banding and detailing including the main entry column portico and school name entablature appear to be in good condition raking and caulking of joints recommended. Uninsulated exterior masonry walls are deficient by contemporary standards for energy efficiency.

Windows: original wood frame, single pane glazed, divided lite, painted windows, with upper sash faced with painted wood panels (presumed late 20th century). Regular maintenance work has been conducted to address putty and paint needs, but the windows are extremely inefficient by contemporary standards and replacement would be recommended. New windows should be insulated glazing with appropriate solar control attributes for each elevation, full sealant and tie-ins with any added proposed exterior wall insulation installation.

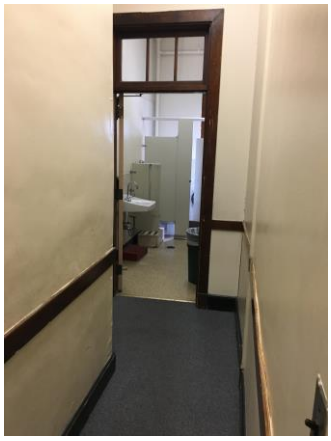
Roof: the original tar and gravel roof was reportedly replaced in 1988 with EPDM membrane system including 2"of insulation. Membrane re-seaming was performed in 2007 and repairs were completed in 2012 to address snow removal damage at the time. Since membrane roofs of this type typically have an expected usefulness of 20-30 years, replacement of the roof is recommended.

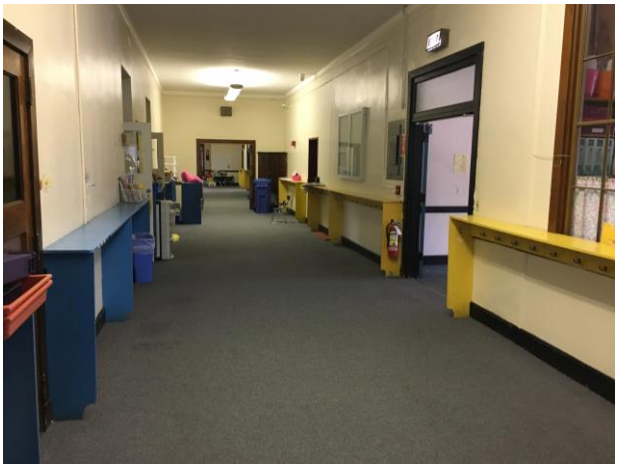
Exterior access: the main entrance is serviced by concrete stairs that are spalling, showing some exposed rebar and have been patched over the years. These are in fair condition and would be recommended for replacement in any major renovation project. The exterior ramp to the entrance was is under 20 years old and in good condition. See accessibility section for comments about the handrail extensions. Other ground level egress points are accessed through cast in place concrete areaways and steps without current code compliant landings or handrails and complete replacement would be recommended if these were to be maintained in a major renovation project.

INTERIOR - MATERIALS

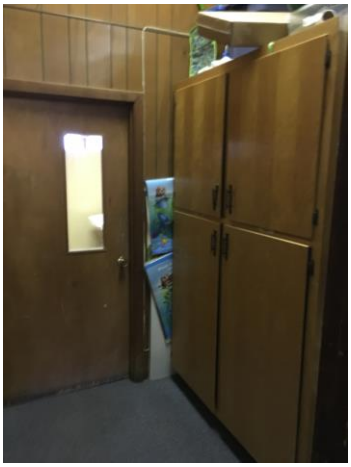
General: much of the original layout and original construction remains including: corridor load bearing partitions, stairs, and some millwork. Replacement acoustic tile ceilings, some partition changes, toilet room improvements, replacement millwork, and systems upgrades have been installed.

Partitions: Original masonry bearing corridor partitions largely remain with lath and plaster painted finish on the upper levels and painted masonry walls on the ground level. Newer partitions appear to be wood frame/gypsum board construction with painted finish. Many of the wall surfaces are not currently visible due to the classroom furniture and millwork obscuring the view of them. Reportedly, plaster has delaminated in some places and repair is required. Most of the newer partitions are in fair condition due to economical construction techniques and finishes used.
Exterior partitions are not insulated. For any major renovation, a carefully engineering interior insulation system would be recommended for energy efficiency. It would be important to design a system that would continue to allow the exterior masonry to breathe as originally designed. New finish systems, tie-in to any proposed replacement window system, and other details would be recommended as part of the exterior wall system improvements.





Doors: are a mix of original and replacement wood doors, some of the original doors with transoms above. Much of the operating hardware has been changed to lever style accessible hardware, but there are some remaining non-accessible compliant door handles in place. Doors range from fair to good condition and would need to be evaluated on an individual basis for a major renovation project. Due to the original exhaust chase design of the school, a large percentage of the corridor doors do not meet accessibility clearance requirements due to the depth of the wall cavities.



Ceilings: The upper floor classrooms primarily feature 2′ x 4′ suspended acoustic ceiling tile (ACT) systems that appear to have been installed in the 1980's and are in fair condition with sagging and discoloration evident. Especially since sprinkler protection installation and upgraded lighting would typically be featured for any major renovation project, it is expected that the ACT ceilings would be replaced. In corridors, the original painted plaster ceiling appears to be in place in the majority of the area. At a minimum, some repair work to ensure finish soundness would be recommended due to water leaks over the years. The basement ceiling is typically exposed structure painted.

Flooring: It is assumed that original wood finish flooring has been covered (except in the gymnasium) by a variety of finishes including: asbestos composition tile, vinyl composition tile, and carpet over the years. Refer to the hazardous material report for estimated quantities of asbestos tile. All flooring is in poor to fair condition and full replacement would be recommended. The condition/existence of the original wood flooring is unknown with the exception of the gym floor.

Windows: Original wood sash, single paned with drafty conditions and full replacement is recommended (see notes on exterior materials) including sills. New window shades have been installed and are in fair condition.

Hazardous Materials: See attached testing report and recommended budget for abatement of asbestos materials within the building. Any major renovation of the building would require abatement or encapsulation of the hazardous materials.

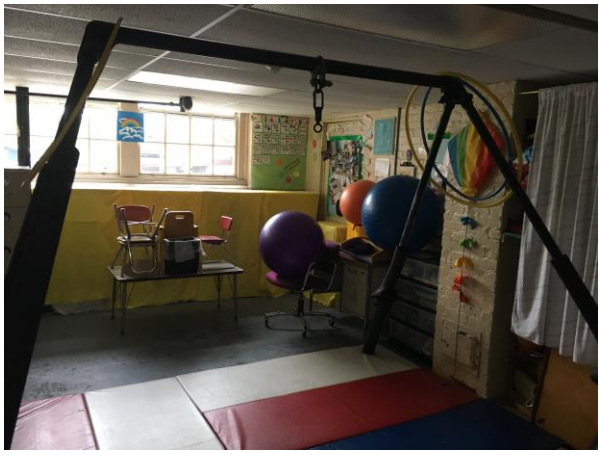
INTERIOR – SPACES

General: Spatially, most of the interior spaces are significantly undersized to serve contemporary educational standards. For example, classrooms range from 645 – 780 square feet (sf) each while MSBA guidelines call for elementary classrooms to range from a minimum of 900 – 1100sf. The cafeteria is 940 sf, sized for a maximum of 62 seats and the gymnasium is about half the current recommended size. Due to the position of the masonry bearing partitions, significant modifications to the spaces would challenging and prohibitively expensive.

The following is a general description of the features of each of the major components of the building.

Main Entry Vestibule: features a WW1 commemorative plaster relief sculpture with bronze metallic finish that is well complemented by the recent site memorial positioned close to the street within view of the main entrance.

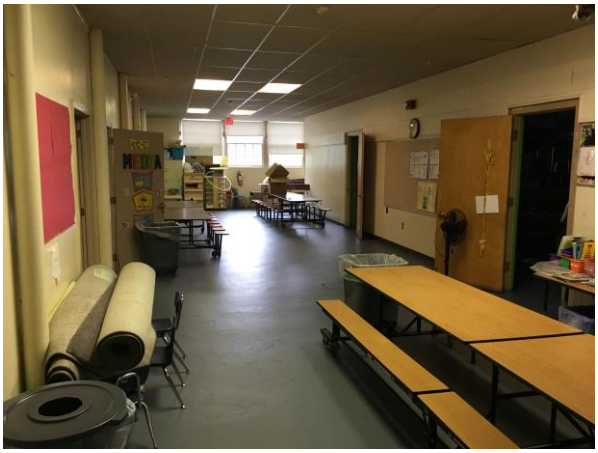
Classrooms: upper floor classrooms feature painted walls with a combination of plaster and gypsum board finish. Some have original high school millwork while most have replacement fixed and modular wood millwork in fair condition. The replacement millwork does not feature accessible sink units. Classroom finishes include, ACT ceilings, carpet and resilient flooring. While the high window sills provide more wall space for materials storage, they are not well suited for young children to have views of the exterior. Lower level classrooms are similarly appointed but have painted brick walls.



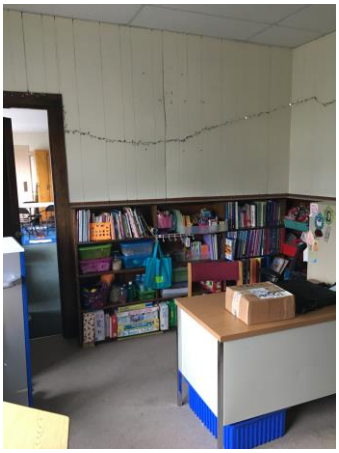
Corridors: designed originally with a wide configuration, the corridors have high plaster ceilings and an airy appearance. Currently, the extra width is reduced by the use of the corridors for cubby storage, equipment, and sinks.

Gymnasium: features a hardwood athletic floor of undetermined age with sanding and refinishing recommended if it is to be maintained. Thickness testing is recommended to determine if it is sufficient for additional refinishing. Suspended acoustical ceiling of fair condition probably covers an original plaster ceiling. Walls are plaster with some infill and panelized painted trim that may be original. Various additions have been made to accommodate storage needs and the elevator installation. Egress from this space is facilitated by exterior uncovered stairs that would not meet current code for an educational use.

Cafeteria/Kitchen: the original manual training space was subdivided into a Cafeteria/Kitchen, Library, Art and Music space and egress ramp. Two rows of columns supporting the gymnasium space above have been integrated into the newer partitions. The ramp has been incorporated to provide egress to the grade level of the parking area. The kitchen features commercial grade stainless steel equipment and serving areas. The cafeteria space is long and narrow and more resembles a corridor than a cafeteria in configuration.



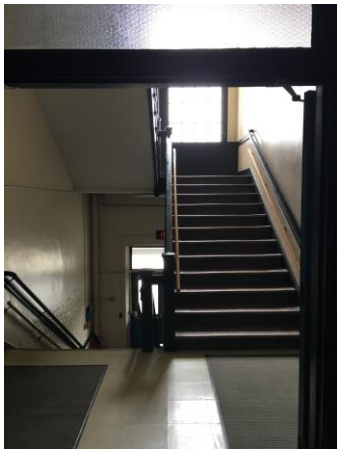
Library: located on the lowest level accessed through the cafeteria, the library is carpeted and use of the limited space is maximized by careful layout.



Offices: are located off of the main entrance but do not feature a direct view of the door. Finishes vary from asbestos tile to carpet and wall finishes that have been applied over the years.

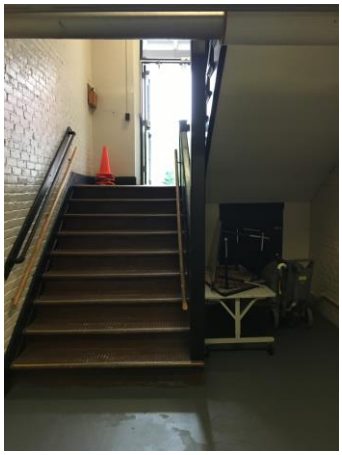
Toilet Rooms: some original marble wall finishes are in place, but most toilet partitions have been replaced with solid plastic partitions in good condition. Lowest level toilet rooms feature painted floors and walls. None of the existing kindergarten toilet rooms have adjacent toilet rooms. See the mechanical report for more information regarding the plumbing systems.

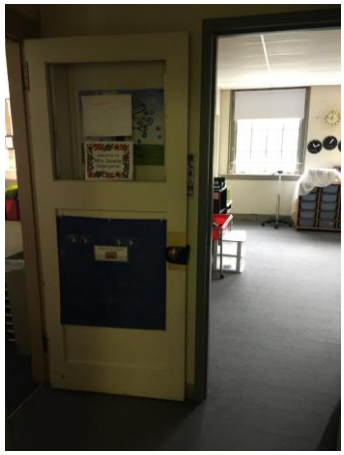
Stairs: original stairs have been covered with rubber treads and resilient landings. Walls are painted brick and plaster. One lower level classroom has steps that lead to an egress door which do not meet code as they do not have handrails or adequate landing space at the door.



Accessibility: Since the building was constructed in 1922, accessibility requirements have changed significantly. Many renovations to the building have been made to upgrade to accessible standards including: exterior and interior ramps, toilet room renovations including accessible stalls, installation of lever door hardware. Accessibility deficiencies noted include:

- Exterior ramp does not include handrail extension at the end as required by current code
- Stairs do not have tapered nosings or handrail extensions
- Some doors do not have lever hardware
- Door clearances at corridor do not meet requirements in many cases (see Interior Materials – Doors narrative above). Depending on the building use for a major renovation, this might be a reasonable condition to petition for variance approval through the Architectural Access Board (AAB).





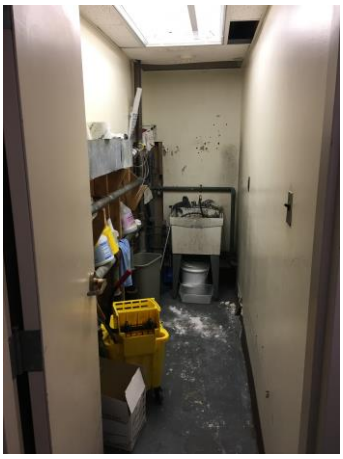
Indoor Air Quality: Several indoor air quality testing reports were issued in 2006 and 2010. Recommendations for improvements included rigorous cleaning practices and providing adequate air changes in the spaces. The original exhaust system through shafts adjacent to the corridors has been abandoned and the only method for ventilation is currently through operable windows.

INTERIOR – SYSTEMS

Most of the existing building systems are outdated and/or inadequate for contemporary use as an educational facility. See the following systems narratives for more details. Some of the more salient items referenced in the reports include:

- Original shaft system exhaust was disabled at some point leaving operable windows as the only ventilation method
- The 1980's vintage boilers have been in use beyond their expected life span
- Electrical systems including technology have been installed over time including: fire alarm system, interactive whiteboard projectors, and the support the elevator system. A full renovation education project would require replacement of all systems

There is no existing sprinkler protection system in the building. Particularly with the wood frame floor and roof system, installation of fire protection would be required for any significant educational renovation project.



SITE

Refer to the Nitsch Engineering report for comments on the site features including topography, site features, and utilities.

Of the 3.8 acre site, 2 acres is dedicated to a community ballfield that is reportedly heavily used. The balance of the site includes the school building, associated parking and driveways, and a fenced play area. The limited onsite paved areas have led to significant congestion in the central town location during the pick-up and drop off periods of the school day. In addition to special education and general bus traffic, many parents pick up and drop off their students.

Site: 3.86 Acres

Town Wide Map

1 WWI Monument
2 Play Area
3 Recreational Ballfield

1 Basement Floor Plan
1/16" = 1'-0"

LEGEND

- Core Academic
- Special Education
- Art & Music
- Health & Physical Education
- Media Center
- Dining & Food Service
- Administration, Guidance
- Medical
- Custodial & Maintenance
- Other
- Mechanical / Electrical
- Circulation

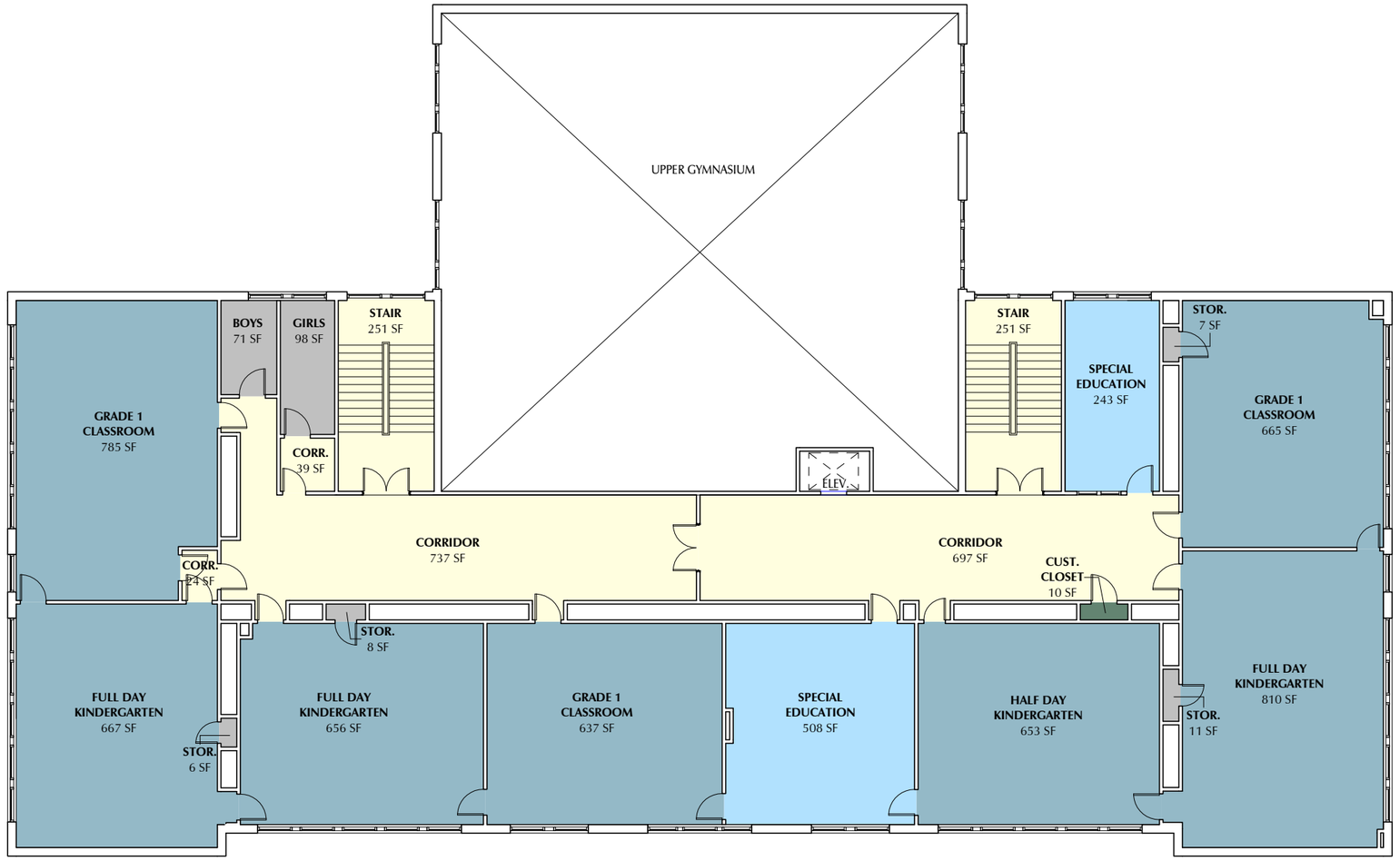
TOTAL SQUARE FOOTAGE:
12,400 GSF

2 First Floor Plan
1/16" = 1'-0"

LEGEND

- Core Academic
- Special Education
- Art & Music
- Health & Physical Education
- Media Center
- Dining & Food Service
- Administration, Guidance
- Medical
- Custodial & Maintenance
- Other
- Mechanical / Electrical
- Circulation

TOTAL SQUARE FOOTAGE:
12,400 GSF



3 Second Floor Plan
1/16" = 1'-0"

LEGEND

- Core Academic
- Special Education
- Art & Music
- Health & Physical Education
- Media Center
- Dining & Food Service
- Administration, Guidance
- Medical
- Custodial & Maintenance
- Other
- Mechanical / Electrical
- Circulation

TOTAL SQUARE FOOTAGE:
9,000 GSF

Nitsch Engineering

October 20, 2017

ASSESSMENT OF EXISTING SITE CONDITIONS

For

THE BEAL EARLY CHILDHOOD CENTER SCHOOL
1-7 Maple Street
Shrewsbury, MA

Prepared for:

LAMOUREUX PAGANO
108 Grove Street
Suite 300
Worcester, MA 01605

Prepared by:

NITSCH ENGINEERING, INC.
120 Front Street, Suite 820
Worcester, MA 01608

Nitsch Project #12345

Nitsch Engineering conducted an existing site conditions assessment for the Beal Early Childhood Center School in Shrewsbury, MA. The purpose of the assessment was to evaluate to site features and characteristics that may affect redevelopment alternatives. The following information is based on record information provided by the Town of Shrewsbury, the Town of Shrewsbury's graphic information system (GIS) database, other record data, and on visual site observations made on August 9, 2017 by Nitsch Engineering personnel.

SITE CHARACTERISTICS

PROPERTY LOCATION & CONFIGURATION

The subject site (Site) is located at 1-7 Maple Avenue in Shrewsbury, MA. The associated parcel is listed as Shrewsbury Assessor's Office Parcel Number 22-15800 and includes approximately 3.86 acres (based on Assessor's data), and is owned by the Town of Shrewsbury Howard Beal High School.

The Site is situated on the south side of Maple Street, at the intersection of Maple Avenue and Main Street. The Site is bounded to the east by residential lots with frontage on Chase Terrace, to the west by Hascall Street, and to the south by Wesleyan Street.

The configuration of the Site is generally rectilinear, with an average width of approximately 250FT (east / west), and an average length of 650FT (north south). The parcel frontage is 330FT+/- along Maple/Main Street, 550FT+/- along Hascall Street, and 185FT+/- along Wesleyan Street.

ZONING CONDITIONS

Most of the Site is located within the Limited Business zoning district. A portion of the Site extending parallel to and approximately 150FT from the Wesleyan Street frontage is within the Residence B-2 zoning district. No portion of the Site appears to be located within other districts or overlay districts.

EASEMENTS AND OTHER PROPERTY LIMITATIONS

An electrical easement is located on the northeast portion of the Site and runs from Maple Ave southerly, parallel with Chase Terrace. The purpose for, contents of, and rights related to this easement are unknown.

There do not appear to be any other easements, rights of way, or related encumbrances on the Site, based on Town of Shrewsbury Assessor's data. This should be confirmed by the topographic and boundary survey procured by the Town. Although it does not appear to be located within an easement, a war memorial is centrally located on the Maple/Main Street frontage and presumably represents a spatial constraint relative to redevelopment of the Site.

EXISTING DEVELOPMENT

The Site is completely developed with the existing Beal School, vehicle parking and access areas, pedestrian walks, an athletic field, and playground. The pavements and bituminous curbs in nearly all areas of the Site are in a deteriorated condition and exhibit signs of failure, including significant cracking, raveling, and missing sections. The lower parking lot (see Site Access section below) is in somewhat better condition than the pavements immediately surrounding the school.

Picture 1: Pavement Deterioration

Picture 2: Pavement Deterioration

Picture 3: Pavement Deterioration

Picture 4: Pavement Deterioration

Picture 5: Pavement Deterioration

Picture 6: Pavement Deterioration

SITE ACCESS

The Site is accessed by several curb cuts. Two curb cuts on Maple/Main Street connect to a semi-circular drive that passes by the front entrance to the school and also connects to a series of parking spaces and access drive on the east side of the building. This drive continues onto a paved parking area on the south side of the building and connects to Hascall Street via a relatively large (50FT+/-) curb cut. An additional parking area is located further south on Hascall Street, accessed by two smaller curb cuts. The parking areas have been striped to accommodate approximately 97 vehicles.

TOPOGRAPHY

The Site generally slopes down from north to south and consists of two plateau areas. The existing school building is located on the "upper plateau" which drops roughly 6-8FT from front to back. The Site abruptly drops about 6FT to a "lower plateau" which includes the playground and athletic field. This area drops another 6-8FT toward Wesleyan Street, which is separated from the fields by another abrupt drop of about 4FT. The total grade change across the Site is approximately 26FT from EL. 660 at Main Street to EL. 634 at Wesleyan Street. The upper and lower areas are currently connected via a handicap ramp and railing system. The ramp system appears to be in good condition, although Nitsch Engineering did not verify ADA/AAB regulatory compliance.

TREE COVER AND VEGETATION

The Site is completely cleared for lawn and turf, except for minor landscaped areas, and tree growth along the eastern property line. Open areas are generally vegetated with mown grass.

SOILS

Based on National Resources Conservation Service (NRCS) data, the soils on the Site consist disturbed soil designated as Urban Land and Udorthents. Adjacent, off-site areas are mapped with Paxton and Woodbridge soils, which tend to have relatively high groundwater tables and may present issues related to groundwater and permeability.

In general, the soils are not likely to represent a significant development constraint in terms of bearing capacity, workability, groundwater management, or erosion.

ENVIRONMENTAL RESOURCES AND HYDROLOGY

There do not appear to be any wetland resource areas or other environmentally sensitive areas on or within close proximity to the Site. The Site also appears to be generally self-draining insofar as stormwater runoff does not appear to cross onto or pass over the Site. There are no rare species (NHESP designated) habitats, or vernal pools on or directly adjacent to the Site. The Site is not within nor directly adjacent to any FEMA flood hazard areas.

EXISTING SITE UTILITIES

STORM DRAINAGE

The portion of the Site surrounding the existing building does not appear to include any stormwater management infrastructure. All paved areas surrounding the school drain toward adjacent streets where runoff is collected by the municipal drainage system. A record document provided by the Town (a partial site plan that was presumably prepared for the construction of the lower parking lot) shows what appears to be a drainage pipe connection between the southern-most corner of the building and the drainage infrastructure in Hascall Street. The record document shows that the pipe connection also includes a drain manhole located just inside the property line on Hascall Street, between the upper and lower sections of the property. The manhole was not observed at the time of Nitsch Engineering's site visit.

A drain pipe crosses the Site under the existing athletic field on the southerly end of the property. The pipe appears to extend from the end of Chase Terrace via an easement through the residential parcels

to the east. The drain appears to connect to the municipal drainage system in Hascall Street. The record site plan provided by the Town does not indicate an easement associated with this pipe.

Based on information provided by the Shrewsbury Engineering Department, there may be a subsurface stormwater retention/infiltration system owned by the Massachusetts Department of Transportation (MassDOT) located on the northeast corner of the Site. The system receives runoff collected in the Maple Avenue right of way. The system may be non-functional as exhibited by reported ponding of stormwater at connected catch basin inlets in Maple Avenue. The size, configuration, and composition of the system is unknown.

What appears to be a capped cast iron downspout connection was also observed at grade at the center of the gymnasium wall. The record drawings to not include a drain pipe in this area.

Runoff generated by the lower parking lot is collected by a double catch basin which appears to connect to the municipal drainage system in Hascall Street.

SANITARY SEWERAGE

The record document referenced above shows a 6” AC sewer service pipe exiting from the eastern-most corner of the building and running south to a sewer manhole located between the upper & lower plateaus. The plan shows an 8” AC pipe running form the sewer manhole to the municipal sewerage infrastructure in Hascall Street. Based on the direction of the 6” AC pipe, it may have originally connected to a “cesspool” on the portion of the Site where the playground is situated. The construction plan for the parking lot / playground indicates that the cesspool was to be filled with sand. It is likely that the cesspool connection was eliminated and replaced with the connection to the municipal system.

WATER

Record documents indicating the location and connection point of the water service for the building are not available. A water gate valve is apparent on the Maple/Main Street frontage, indicating that a domestic water service connection for the building is derived from the municipal water system in Maple/Main Street. A fire protection pipe connection or fire department connection was not observed. No hydrants were observed on the Site, although a hydrant is in close proximity at the southwesterly corner of the Maple Street / Hascall Street intersection.

NATURAL GAS

A natural gas meter was observed at the northeast corner of the building facing Main Street, and gas service is presumably derived from a gas main in Main Street.

ELECTRICAL

Electrical equipment is present at the rear southwest corner of the building. The location of the underground electrical connection is not known.

TELECOM

Not known.

DEVELOPMENT CONSTRAINTS

Certain characteristics of the Site represent development constraints and/or significant redevelopment cost factors including the following:

EASEMENTS AND INCUMBRANCES

The existing electrical easement, the MassDOT drainage system, and the drain pipe from Chase Terrace referenced above should all be further investigated to determine easement conditions and infrastructure conditions to fully evaluate the extent to which they could affect future development of the Site.

ACCESS

The existing site is currently accessed by numerous, and somewhat large curb cuts onto Maple Avenue and Hascall Street. It is likely that redevelopment or reuse of the Site would require a comprehensive pedestrian and vehicular access design that would reduce the total number and size of the existing curb cuts and improve pedestrian access and circulation.

PAVEMENTS

Nearly all of the bituminous pavement on the Site is in a poor/failing condition. Under any redevelopment scenario, all paved areas and curbs affected by the project are likely to require replacement.

TOPOGRAPHY

Any redevelopment or reuse scenario for the Site would need to consider the implications of the existing topography. The existing dual plateau condition of the Site will require either a development program that is divided across these two areas, or a program that includes relatively substantial earth moving component to modify the existing site condition.

STORMWATER MANAGEMENT SYSTEM

The reported MassDOT subsurface stormwater system at the northeast corner of the Site may represent a construction constraint as it may affect the design of a stormwater management system that may accompany future development of the Site. An investigation of its type, components, and condition of the system should be included in future redevelopment planning efforts.

The disposition of the existing drain pipe extending from Chase Terrace should be evaluated. Maintenance of flow carried by this pipe across the Site may affect future development scenarios and the configuration of associated stormwater management systems.

The existing stormwater runoff and management conditions do not generally comply with currently accepted standards in terms of treatment of runoff prior to discharge. Any substantial reconfiguration and/or rehabilitation of the Site should be accompanied by the installation of a stormwater management system that complies with the current Massachusetts Department of Environmental Protection Stormwater Standards (per municipal requirements). At minimum, the system will include a water quality treatment component in the form of treatment chamber(s) and/or other Best Management Practices that address sediment/pollutant removal. Additionally, any redevelopment scheme that represents a net increase in impervious cover must include mitigation measures addressing control of peak runoff rates, and provision of groundwater recharge. Based on the relatively small size of the Site, this mitigation is likely to be in the form of a subsurface retention/detention system. The type and extent of the system(s) will be contingent on the selected redevelopment alternative.

SANITARY SEWER SERVICE

The record documents indicate that the existing sanitary sewer service connection consists of “AC” pipe. This designation typically refers to “Asbestos Concrete” pipe, commonly known as “Transite” pipe. The presence of this AC pipe represents two separate potential redevelopment constraints.

1. Due to the age of the building it is likely that the existing sewer service will need to be replaced to accommodate any redevelopment of the site or reuse of the building.
2. The topography of the site (dual plateaus) may necessitate earth moving under a redevelopment scenario that would require removal or the AC pipe.

In both cases, the AC pipe could be designated as a hazardous waste item, depending on how much of the pipe was disturbed/removed as part of the construction.

The record cesspool is not likely to represent any sort of material hazard, although it is likely to require removal under any significant redevelopment scenario that requires earth moving or new construction in that area.

WATER SERVICES

Unless the existing water supply service has been recently replaced, it is likely that the service will need to be upgraded under any redevelopment or re-use scenario. Redevelopment of the Site or reuse of the building is also likely to require installation of a fire protection service.

Beal Early Childhood Center School
Existing Structural Conditions
Shrewsbury, Massachusetts

1.1 Introduction:

The Beal Early Childhood School is a 33,000 ft^2 masonry veneered building that is being investigated for possible renovation and addition to support an increasing student population, as well as address the aging condition of the building. The wood and masonry building was constructed in 1922 and has remained relatively unchanged since original construction. The renovation and addition option being investigated includes updating the existing school building, and constructing a new structurally isolated addition on the existing site to support an increased student population.

Another option being considered is to abandon this school, and build a new school on an alternate site to accommodate the required student population. Should an entirely new school be constructed, the building will be designed in accordance to the Massachusetts State Building Code requirements for new construction. This report will describe the general conditions of the existing structure, as well as establish structural guidelines, in accordance with the Massachusetts State Building Code, that must be followed during a building renovation and/or addition to the existing building.

2.1 General Report Information:

This report presents the results of our Massachusetts State Building Code (MSBC) Structural review of the Beal Early Childhood School in Shrewsbury, Massachusetts. Our review has been completed in conformance with Chapter 34 of the Eighth Edition of the Massachusetts State Building Code, which became effective August 6, 2010 and the International Existing Building Code, 2009 Edition.

3.1 Basis of the Report:

- This report is based on the visible observations during our site visit on August 9, 2017.
- Original Construction Drawings (no foundation drawings available), "J. Williams Beal, Sons Architects" dated August 24, 1922.

Our observations of the existing building were limited to what was readily visible. We did not evaluate strengths of materials, remove finishes, or take measurements; therefore, we are unable to comment on any structural capacities or deficiencies of the existing structural systems beyond what was readily visible or shown on the existing drawings.

4.1 General Building Description:

The Beal Early Childhood School is a 1920's era, two-story, brick veneered building with a daylight basement that provides classes for Pre-K through 1st Grade. The school building has remained relatively unchanged since construction with exception to general interior updates and room changes at the basement level.

The original 1922 building was constructed with masonry bearing walls (brick and terra cotta tile), wood framed floors, steel beam girders, steel roof trusses, and wood roof framing pitched to interior drains. Regular maintenance has included re-roofing the building and general maintenance.

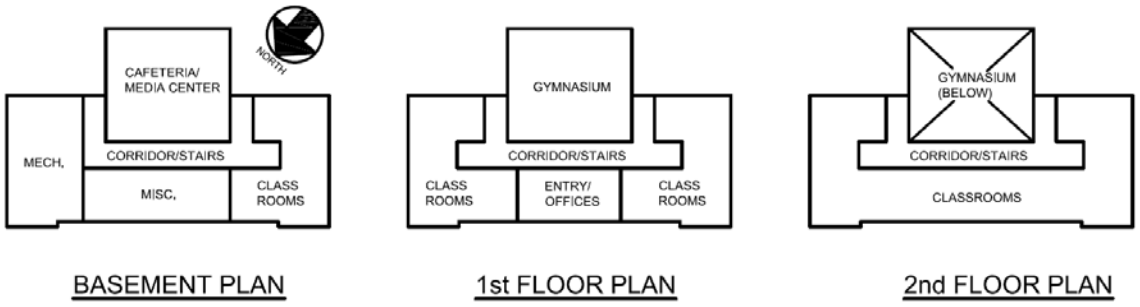


Figure 1-Floor Plans

5.1 General Existing Conditions:

***General Exterior**:*
In general, the exterior walls of the building are 4" brick veneer backed up by unreinforced terra cotta tiles with no airspace between the veneer and backup. The south-east exterior wall of the gymnasium wing is 8" terra cotta tile, without the brick veneer. The exterior walls appear to bear on continuous concrete frost walls.

The exterior walls show signs of typical deterioration (minor thermal cracking, deteriorated mortar joints, and deterioration at steel lintels) due to the age of the building and will require attention during any renovation. There are signs that portions of the exterior veneer has been re-built, or patched due to general deterioration at the east face of the building. Exterior concrete foundation walls are in generally good condition, but there are a few areas that will need attention to seal cracks at the rear of the building to reduce the possibility of water infiltration.

General Interior:
The interior of the buildings appears to be in average condition for a building of this age. The basement level is typically exposed concrete floors and masonry interior bearing walls. The walls and floors appear to be in generally good condition with noticeable wear and tear. The first and second floors are wood framed (rough 2x14 joists, typically) with interior/exterior bearing walls. The drawings note the bearing walls are to be 2x5 wood members, but there are signs that masonry walls were installed. The wood framed floors are in good condition with some signs of creep due to age, but generally appear to be holding up. The plaster walls have some noticeable cracking, likely due to age, but generally appear to be in good condition.

6.1 Building Structure

The two-story building, with a basement, consists of:

- Foundations:
  - Concrete foundation walls with continuous spread footings (based on Architectural sections, no foundation plan provided).
  - Interior spread footings (assumed).
  - Concrete slab on grade.
- Columns:
  - Lally columns (5" dia) in Cafeteria space below Gymnasium.

    - 8” Steel H columns below steel trusses at Gymnasium.
- Walls:
    - Brick and terra cotta masonry interior bearing walls.
    - 8”, 12”, & 16” masonry exterior bearing walls. Terra cotta tile with brick veneer, typical.
- Floors:
    - First and Second Floor classrooms and gymnasium are wood framed with 2”x14” H.P. joists at 16” o.c.
    - Corridors are wood framed with 2”x10” Spruce joists at 15” o.c.
    - Wood sub-floor over wood framing.
- Roof:
    - Flat roof is framed with 2”x10” Spruce rafters at corridors and 2”x14” H.P. rafters at Classrooms and Gymnasium. Roof is pitched locally to internal drains.
    - Steel trusses span the Gymnasium space to support the wood rafters. Truss members are typically double angles at the chords and webs.
    - Wood board sheathing.

Figure 2-Front Elevation

The building structure is fairly typical for 1920’s construction, consisting of wood framing and masonry bearing walls. The masonry walls consist of brick veneer backed up by brick or terra cotta tiles, which was typical in the 1920’s but is rare today due to the lack of reinforcing and lack of ductility with the terra cotta tiles. The wood joists are typically rough sized lumber spanning from the interior bearing walls to the exterior bearing walls. The plans typically note double joists below walls that are parallel to the framing. The interior walls are typically plaster over wood or masonry backup. The floor finishes are a mix of concrete slabs, wood flooring in the gymnasium, and carpet throughout the remainder of the building.

In general, the interior of the building appears to be in average condition for a building of its age with general wear and tear showing in the flooring, walls, and ceilings. There is general cracking in the plaster walls, but the cracks appear to be due to the general age of the walls. The framed floors are typically covered in carpet, so we were not able to notice if the subfloor is showing signs of distress. The exterior bearing walls show some signs of previous repair efforts to address general aging to the

mortar joints and possible water infiltration. There are some newer signs of deterioration that will need to be addressed during a renovation. The deterioration includes lintels that are rusting or have water infiltration issues (north side of gymnasium veneer), mortar joints that need to be repointed, and concrete foundation wall cracks that should be sealed to avoid water infiltration. The tops of the masonry walls at the roof level are capped with limestone, which require general repointing due to their age and requirement for regular upkeep. Several of the top mortar joints appear to have been sealed with a mastic material to keep the water out and should be repointed to maintain integrity.

Snow loads for the original design are not noted on the original construction drawings, but rough calculations indicate that the design snow load was no more than 30 pounds per square foot (psf), which is less than the current Building Code load of approximately 40 psf for school buildings. If the renovation option is chosen, and the roof structure is altered, the existing members in the areas of the alteration will need to be reviewed with modified current snow loads to verify their adequacy. Typically, renovations to roof structures similar to this roof will require supplemental framing at any new modifications or fire protection systems. New roof mounted mechanical units should not be considered for this building, unless strengthening of the roof framing is proposed. Our view of the roof framing was limited to the area near the roof hatch during the site visit, and we did not notice distressed framing, but did notice some disconnected bridging (See Figure 3). Due to the age of the wood framing, and the light design snow load, we would anticipate that some roof framing may need to be repaired or strengthened during a full renovation and a more thorough review of the framing should be completed during the design phase.

Lateral loads (wind & seismic) are resisted by unreinforced masonry walls. The walls would not be adequate for new construction, but may remain unchanged as long as the building does not undergo substantial renovation. Under a substantial renovation, new walls or bracing systems would need to be installed to adequately brace Code mandated loads. It should be understood that due to the tight layout of the building, new walls or braces will likely not be possible, or cost effective.

Figure 3-Roof Framing at Interior Bearing Wall

7.1 Building Code Review- Structural:

This review presents our interpretation of the structural requirements of the International Existing Building Code, as modified by the Massachusetts State Building Code. In general, the provisions of The International Existing Building Code are intended to maintain or increase public safety, health, and general welfare in existing buildings by permitting repair, alteration, addition, and/or change of use without requiring full compliance with the code for new construction except where otherwise specified.

Assumptions:
In order to review the requirements of the Building Code for a renovation to the Beal Early Childhood Center School, the scope of the project must be defined. For this review we are assuming that a Renovation/Addition would include:

- Complete renovation to interior finishes (Painting, flooring, wall finishes, etc.) of existing building.
- New mechanical systems throughout building, including new mechanical rooftop units if the roof is capable of supporting the loads.
- Reroof the entire building.
- Construct a new structurally isolated addition (approximately 90,000-100,000 ft^2) to support added student population and new MSBA space requirements.

Building Codes:

- Massachusetts State Building Code, 8^{th} Edition.
- International Building Code, 2009 Edition (IBC).
- International Existing Building Code, 2009 Edition (IEBC).

Classification of Work: Level 3 (IEBC Section 405) Work area will exceed 50% of the aggregate area of the building.

Structural Requirements associate with Level 3 Work:

Level 3 Work is the highest level of Alteration and the Work must conform to the Structural requirements of Levels 1, 2, & 3.

Level 1 Structural Requirements:

606.2 Addition or replacement of roofing or replacement of equipment: Where addition or replacement of equipment results in additional dead loads, structural components supporting such reroofing or equipment shall comply with the gravity load requirements of the International Building Code.

- There are several exceptions that are permitted by the IEBC. One exception is "Structural elements where the additional dead load from roofing or equipment does not increase the force in the element by more than 5 percent." Based on our initial review, general reroofing work will not increase the force in the element by more than 5 percent since the original roof was designed with a tar and gravel roof, which has appears to have been removed. But, new equipment or modification of roof openings will increase the forces in elements by more than 5 percent and will require a review the element in accordance with the IBC. Adding new members will be difficult with the wood roof framing of the 1922 Building. We recommend avoiding any new equipment on the 1922 Building roof, and assume any new equipment will be supported on new framing.

606.2.1 Wall anchors for concrete and masonry buildings: Where a permit is issued for reroofing more than 25 percent of the roof area of a building assigned to Seismic Design Category B, C, D, E or F with a structural system consisting of concrete or reinforced masonry walls with a flexible roof diaphragm or unreinforced masonry walls with any type of roof diaphragms, the work shall include installation of wall anchors at the roof line to resist the reduced International Building Code level seismic forces as specified in the IEBC.

- The existing walls throughout the building are unreinforced masonry walls and will need to conform to the requirements of this section. Based on our review, some of the walls of the 1922 Building are anchored to wood sill plates, but will need to be reviewed to check the condition of the sills and anchors. Interior bearing walls at the roof level appear to be short cripple walls over the masonry bearing walls. The cripple walls and roof framing do not appear to be anchored to the diaphragm in accordance with the Code and will need to be updated as part of the review.

606.3.1 Bracing for unreinforced masonry bearing wall parapets: Where a permit is issued for reroofing for more than 25 percent of the roof area of a building that is assigned to Seismic Design Category B, C, D, E or F that has parapets constructed of unreinforced masonry, the work shall include the installation of parapet bracing to resist the reduced International Building Code seismic forces specified.

- Work area exceeds 25 percent of the roof area, so the roof parapets will need to be braced. Most roof parapets are less than 16”-24” and will not need additional bracing, but the parapet at the front entrance exceed the limits (width-to-height ratio of 2.5) for unreinforced masonry and will need to be braced.

606.3.2 Roof diaphragms resisting wind loads in high wind regions: Where roofing materials are removed from more than 50 percent of the roof diaphragm of a building or section of a building located where the basic wind speed is greater than 90 mph or in a special wind region, as defined in Section 1609 of the International Building Code, roof diaphragms and connections that are part of the main wind-force resisting system shall be evaluated for the wind loads specified in the International Building Code, including wind uplift. If the diaphragms and connections in their current condition do not comply with these wind provisions, they shall be replaced or strengthened in accordance with the loads specified in the International Building Code.

- Roof diaphragm connections will need to be reviewed as part of the reroofing work. Based on our site review, the roof was sheathed with diagonal board framing, which would not be an adequate diaphragm and the connections do no appear to be adequate to conform resist mandated wind loads. Previous reroofing drawings were not available for review, so we are not aware if plywood was added during previous reroofing projects. We anticipate adding plywood to the existing roof diaphragm and installing additional roof anchorage as part of any substantial renovation project.

Level 2 Structural Requirements:

707.2 New structural elements: New structural elements in alterations, including connections and anchorage, shall comply with the International Building Code (IBC).

- New structural elements will comply with the IBC.

707.3 Minimum design loads: The minimum design loads on existing elements of a structure that do not support additional loads as a result of an alteration shall be the loads applicable at the time the building was constructed.

- Renovation will not change the minimum design loads on the structure. Existing design loads are not noted on existing drawings and will need to be computed prior to modifying existing elements.

707.4 Existing structural elements carrying gravity loads: Alterations shall not reduce the capacity of the existing gravity load-carrying structural elements unless it is demonstrated that the elements have the capacity to carry the applicable design gravity loads required by the International Building Code. Exceptions include structural elements whose stress is not increased by more than 5 percent.

- Design loads will be reviewed, but should remain unchanged at the existing structure.

707.5 Existing structural elements resisting lateral loads: Any existing lateral load-resisting structural element whose demand-capacity ratio with the alteration considered is more than 10 percent greater that its demand-capacity ratio with the alteration ignored shall comply with the structural requirements specified in Section 807.4.

- The existing unreinforced concrete masonry walls provide lateral support for the building. Modifications to the existing building to change wall locations or details will likely increase the demand capacity of the walls by more than 10% and will require an analysis and most likely new structural elements to resist the Code mandated loads.

707.6 Voluntary improvement of the seismic force-resisting system: Alterations to existing structural elements or addition of new structural elements that are not otherwise required by this chapter and are initiated for the purpose of improving the performance of the seismic force-resisting system of an existing structure or the performance of seismic bracing or anchorage of existing nonstructural elements shall be permitted, providing that an engineering analysis is submitted demonstrating the following:

  - The altered structure and the altered nonstructural elements are no less conforming with the provisions of this code with respect to earthquake design than they were prior to the alteration.
  - New structural elements are detailed and connected to the existing structural elements as required by Chapter 16 of the International Building Code.
  - New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by Chapter 16 of the International Building Code.
  - The alterations do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severs.

- It would be our intention to present improvement options to the Owner as part of a renovation to be included in future work. Existing unreinforced masonry walls do not conform to the current Building Code and should be replaced with a dedicated seismic force-resisting system, if feasible. Due to cost implications, replacing the unreinforced walls with a new system will likely not be feasible.

Level 3 Structural Requirements:

807.2 New structural elements: New structural elements shall comply with Section 707.2.

- New structural elements will comply with the IBC, per 707.2.

807.3 Existing structural elements carrying gravity loads: Existing structural elements carrying gravity loads shall comply with 707.4.

- Design loads will be reviewed, but should remain unchanged at the existing structure.

807.4 Structural alterations: All structural elements of the lateral-force-resisting system undergoing Level 3 structural alterations or buildings undergoing Level 2 alterations as triggered by Section 707.5 shall comply with this section.

- Alterations to the building structure will be reviewed for conformance to this section. If the building undergoes a renovation/addition that includes demolition and modification of

the existing structure, the building will need to be analyzed to support the code mandated loads.

807.4.1 Evaluation and analysis: An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the code official.

- Renovation to the interior finishes and systems is acceptable without a detailed analysis, but if interior partitions or portions of the building are subject to demolition, an analysis will need to be completed. It should be understood that the existing lateral force resisting system was not designed or detailed In accordance with the current seismic code in mind. Any substantial renovation will likely require a new seismic system of reinforced CMU shear walls.

807.4.2 Substantial structural alteration: Where more than 30 percent of the total floor area and roof areas of the building or structure have been or are proposed to be involved in structural alterations within a 12-month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the International Building Code for wind loading and with the reduced International Building Code level seismic forces as specified in Section 101.5.4.2 for seismic loading. For seismic considerations, the analysis shall be based on one of the procedures specified in Section 101.5.4. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

- The existing building would not conform to mandated loads and detailing requirements and would need to be significantly updated, if the renovation included a significant structural alteration. Due to the age of the building, we recommend limiting alterations to the architectural finishes and select structural modifications. This building is not a good candidate for significant structural alterations.

807.4.3 Limited structural alteration: Where not more than 30 percent of the total floor and roof areas of the building are involved in structural alteration within a 12-month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads applicable at the time of the original construction or of the most recent substantial structural alteration as defined by Section 807.4.2. Any existing structural element whose demand-capacity ratio with the alteration considered is more than 10 percent greater than its demand-capacity ratio with the alteration ignored shall comply with the reduced International Building Code level seismic forces as specified in Section 101.5.4.2. For the purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with sections 1609 and 1613 of the International Building Code with Massachusetts Amendments. For purposes of this section, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of additions and alterations since original construction.

- With structural upgrades that would be required as part of the renovation, and the limited structural alteration, the buildings could be reviewed to support loads applicable at time of original construction. Structural upgrade requirements would be established during the design, but we would expect the seismic force-resisting system would need to be upgraded throughout the building by replacing existing partitions with dedicated masonry shear walls.

8.1 Conclusions and Recommendations:

The purpose of this report is to identify any structural deficiencies and liabilities that will need to be addressed during any substantial renovation, which we understand, is being considered. The report is based on the premise that the existing building will remain in use as a school, and room live loads will not change. We have reviewed the existing Beal Early Childhood Center School in accordance to Chapter 34 of the Massachusetts State Building Code, Eighth Edition and the International Existing Building Code, 2009 Edition. We have reviewed the general conditions of the building, as well as the structural modifications that will need to be addressed as part of the renovation to increase the public safety of the building. This report, in its entirety, shall be used as the basis for the renovation. The following items are meant to highlight conditions or deficiencies noted in the report, but do not limit the work required.

General Information:

- Existing building area is 33,000 ft^2.
- The proposed renovation/addition will produce a finished building of approximately 120,000-130,000 ft^2 (to be verified with final student population and MSBA space requirements).
- The existing roof membrane should be reviewed for regular maintenance or replacement.
- Any structural work associated with the renovation/addition shall conform to the International Existing Building Code, as amended by the Massachusetts State Building Code, and specifically any additional requirements for Level 3 work.
- Should the renovation project be abandoned and an entirely new building be considered, the new building design shall be in accordance with the Massachusetts State Building Code, current edition.

1922 Building Existing Conditions:

- Exterior veneer in average condition and requires general maintenance, including repointing and repair of deteriorating lintels.
- Masonry bearing walls are unreinforced terra cotta tiles, and/or unreinforced brick, and appear to be in generally good condition. Walls appear adequate for existing layout, but would not be easy to modify, or adjust for differing loading conditions.
- Concrete foundation walls at daylight basement area require repairs of a few cracks to limit water infiltration.
- Wood floor framing was not exposed to view, but ceilings and floors appeared to be in generally good condition. Floor joist bending stresses appear to be approximately 1,200-1,400 psi assuming a live load of 50 psf and dead load of 25 psf.
- Roof appears to be designed to support snow loads of 30 psf, or less, which is less than the 38.5 psf current snow load in Shrewsbury, and will need to be reinforced at renovations that affect the roof framing.

Structural Requirements for Renovation/Addition:

- Geotechnical exploration will be required for any new construction, as well as any structural foundation work to the existing building.
- Roof snow loads:
    - Original: Unknown, computations of existing framing estimate at 30 psf.
    - Renovation: 38.5 psf plus drift caused by any additions or new roof elements.
    - Additions: In accordance with Massachusetts State Building Code.
- Lateral load resisting system requires significant modification to conform to current Code requirements if the existing structure is modified to create new openings in masonry walls.
    - New shear walls or bracing systems are required to provide a regularly spaced and organized system layout, in accordance with accepted engineering practices.

    - Existing interior and exterior bearing walls can remain in service as unreinforced masonry shear walls, but will need to be adequately connected to the roof diaphragm to avoid being a seismic hazard.
- Unreinforced masonry partitions (interior) are built-up to the ceiling framing, but are not adequately connected to the roof diaphragms to resist seismic loads. We recommend remedial action be taken during the construction phase to install new anchors and sheathing to adequately create a load path from the roof to the masonry partitions.
- The adequacy of the roof diaphragm is unknown and will need to be reviewed as part of further investigation during the design phase. The original roof structure consisted of wood boards, and should be reinforced with rated plywood sheathing, assuming that plywood sheathing was not installed during previous renovations.
- Additions should be structurally isolated from the existing building to reduce the seismic upgrade requirements of the existing building, if possible. Also, additions should be situated to avoid causing snow drifts on the existing building; otherwise reinforcement of the existing roof will be required.

Based on our review of the existing conditions and the proposed renovation work, it is our professional opinion that the existing building would require significant structural upgrades to be reused as a school that conforms to current MSBA space requirements. Reuse of the existing building for the proposed space requirements will require relocating bearing walls, strengthening existing framing, and installing new seismic force-resisting systems (new CMU shear walls).

While it may be structurally possible to renovate the building, it will not likely be financially feasible due to the extent of the renovations required. Should the Town of Shrewsbury choose to renovate the building, it should be done with the understanding that structural upgrades noted in this report will only bring the building up to the minimum standards of the Building Code for existing buildings, and will not meet the Building Code requirements for new buildings. The requirements noted in this report will <u>not</u> increase the gravity load capacity of the structure, which will limit the flexibility of any renovation.

Beal Early Childhood School - Shrewsbury, Ma.
FP Existing Conditions – 9-29-17

BUILDING DESCRIPTION

General:

The Beal Early Childhood School (Beal) is located at 1 Maple Ave, Shrewsbury, Ma. 01545. The building was constructed in 1922 as a junior / senior high school.

It is block and brick exterior-walled-building with wood framed floor and roof structure. Interior finishes are in general non-combustible, though the original construction documents (OCDs) show the building interior-wall framing is wood, combustible construction,

Spaces containing combustible interior finishes include the gym, (which has wood-paneling to various heights along the walls and a wood floor), the 2, wooden, interior stairways, a wooden basement exit ramp, a wood-lined, 1st-floor custodial closet, and a raised wood-platform in the SE corner kindergarten class on the 1st floor. The interior stairs, basement exit ramp, and the raised kindergarten platform also contain combustible, concealed spaces below.

There are also 2 wooden, exterior fire-escapes,

The building has a basement plus a 1st and 2nd floor above. The basement is mostly below-grade-with-window-wells in the front of the building, and mostly above grade in the rear. The wood-framed attic is un-used, and accessible only thru 1 small stairwell hatch. There are ventilation shafts running full height of the building in every classroom. Though the OCDs show these as metal lined, it is likely they contain some exposed wood.

NFPA 13 would consider all concealed spaces containing any exposed wood as "combustible concealed spaces" requiring sprinkler protection.

Current total building area is approximately 32,000 gross square feet.

The highest floor level (2nd floor) is well under 30' above the lowest fire department access. The peak of the mostly flat roof is approximately 35 ft above grade. The building's main entrance is about 350 feet from the closest hydrant located at the corner of Maple Ave and Hascall St.

Fire Protection:

According to Bob Tozeski, City Water Dept. Supervisor, the Maple Ave. main is an 8" line, fed off of a 16" Main St. main. There are no drawings showing the water feed to the school,

Bob Tozeski also stated the flow test done on 10-24-14 for the construction of the new (nearby) Shrewsbury library is the most recent flow test for that area. That test showed a

static pressure of 51 psi, with a residual pressure of 46 psi with 1126 gpm flowing. The library site is at a higher elevation than the Beal school, so available pressure at Beal can be expected to be slightly better than this. These are sufficient to service a new FP system for the existing building

Other than the 1 near-by city hydrant, there is no existing fire protection in the building. The existing water service into the building serves only the plumbing system and is undersized for a dual plumbing / FP service.

If the building is renovated or newly constructed, sprinklers will be required through-out, and a new, FP service will be required into the building. Standpipes would not be required in the original building, due to the low height of the highest floor.

Ceilings:

In most classrooms and corridors, hung acoustical ceilings have been added below the original plaster ceilings. In many cases, the plaster above the hung ceiling is partially missing or completely removed, leaving the wood-lathed exposed. Classroom closets, restrooms, the kitchen, locker rooms, etc. all have inaccessible hard ceilings.

New FP piping could be readily run above the hung ceilings. Where ceilings are plaster, FP piping would either have to be run exposed, or new ceilings installed.

Due to the exposed wood lathe above all hung ceilings we checked, sprinklers would be required both above and below the ceilings.

Special Protection:

There are several wood-construction exterior canopies. 1 canopy extends just over 4' from the building, so would require dry sidewall sprinklers (piped off of the main wet sprinkler system) to protect the area underneath.

The main entrance vestibule appears to have no heat, so that would also need to be protected by dry sidewall sprinklers, or have heat added.

The exposed-wood-framed attic would require a dry-sprinkler-system through-out.

The 1st floor, wood-lined, custodial closet also has no ceiling, so is open to the above ceiling area. That space would require additional sprinklers above it's open top.

Other areas requiring 2 levels of sprinkler protection include (at minimum): above and under the wood basement exit ramp, above and under the classroom raised-wood-platform(s), above and under the 2 wood stairwells, and above and under a small wood platform in the custodial area.

Hazard Levels:

Classrooms, offices, hallways, gymnasiums, and cafeterias are generally considered "Light hazard" relative to fire-suppression. Light Hazard areas require the lowest level of sprinkler protection. Being an elementary school, there are no science-room gas supplies.

Many rooms designated as "storage rooms" on the OCDs have since been converted to other uses such as classrooms or meeting rooms. The storage rooms that still exist are generally small (well under 1,000 sqft), with materials stored under 12' high. Most of these areas would be considered "miscellaneous storage", and designed as an OH2 occupancy. Storage rooms with shelving over 30" deep (aisle to aisle), have a higher hazard rating – which depends on the type of materials stored. .

Other "Ordinary hazard" areas would include (group 1) the main kitchen, kitchen service areas, and (group 2) mechanical and electrical rooms, and densely packed storage-areas.

Storage:

Storage is a critical issue that should be addressed as part of any renovation or new construction. When a building has insufficient storage space, other spaces not intended or designed for storage can end up being used for storage. The current staff appears to be diligent in keeping most storage rooms well-organized and neat. There seems to be insufficient storage space, however, as we also noted storage under stairs and in mechanical spaces. Storage leaking into such areas violates code. Storage in the basement mechanical spaces is not well organized, and appears to be "spill-over" from already full storage rooms.

Storage height is another important aspect of the storage issue. Sprinklers require between 18" and 3' clearance between the sprinkler deflector and the top of storage (depending on the type of sprinkler and type of stored material). When storage space is insufficient, storage often extends right up to the ceiling or roof deck. Materials stored in this way would obstruct a sprinkler's water flow, potentially keeping it from reaching the fire. This would also be a code violation.

If a new Fire Protection system is installed, it is important that the use of every room to be sprinkled be clearly defined. Storage rooms require a higher level of sprinkler protection than offices, classrooms, electrical rooms or non-combustible mechanical spaces, so it is important that storage be confined to designated storage rooms, and not leak into other spaces having a lesser level of protection.

A storage plan should both include an assessment of "who needs to store what" and "how much should be stored", as well as an assessment of available storage areas, and the maximum storage height permitted in each space.

On our 8-9-17 site visit, we looked at every room, and did not observe any storage extending up over 12' in height. This is good, and will help minimize FP hazard levels and costs.

We did not observe any flammable or combustible liquids stored in the school – which will also help minimize FP hazard levels and costs..

One storage issue of concern is the amount of stored plastic materials. Foam and plastic are made from oil, so are, generally speaking, highly flammable. Plastic storage must be kept below 5' in height to be considered an "ordinary hazard". When plastics are stored above 5' in height, the storage area becomes an "extra hazard" (EH) level room. EH protection requires approximately twice the total design water flow as OH protection, increasing piping and equipment costs.

2 storage rooms off of the gym contain stored plastic materials to 9 ft and 10 ft in height. In addition, most classroom teachers are using numerous small plastic bins to organize their teaching materials. In some rooms these were kept below the 5 ft height limit. In some rooms plastic bins are also stacked on top of other furniture, so extend almost to the ceiling. These are the only spaces we saw that might be considered "Extra hazard".

Flammability standards:

527 CMR (State Fire prevention code) sets flammability requirements for furniture, and window coverings (drapes, blinds, etc). We noted a few rooms with curtains covering the front of open shelving that appeared to be "home-made". These would likely not meet any flammability standards.

Local Requirements:

According to the Shrewsbury Fire Department's fire prevention officer Deputy Chief Bruce Card, the city has no special fire protection requirements beyond State and NFPA requirements.

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September 11, 2017

Ms. Kathryn Crockett, AIA, LEED® AP
Lamoureux • Pagano Assoc., Arch.
108 Grove Street, Suite 300
Worcester, MA 01605

Re: Mechanical Systems Survey and Recommendations at the Beal School in Shrewsbury, MA

Dear Ms. Crockett:

The following is a summary report outlining our preliminary observations and comments regarding the status of the existing HVAC, plumbing and fire suppression systems at the Beal School in Shrewsbury, MA. In addition, we have made preliminary general recommendations for further consideration as part of a general renovation project.

EXISTING CONDITIONS INSPECTION & RECCOMMENDATIONS

Several weeks ago we performed a brief site inspection of the existing building. Our visual observations along with information provided by facility personnel, when applicable regarding the current building systems operating status were used extensively in assembling this report.

Condition of existing system segments has been classified in three (3) ways as follows:

Rating - Good: System segment appears to be in good operational condition and complies with most current codes and standards and well suited for present and future use.

Rating - Fair: System segment appears to be in fair operational condition with some aspects which may not comply with current codes and/or standards and may not be well suited for present and future use.

Rating - Poor: System segment appears to be in poor operational condition, may not comply with many current codes and standards and is not suited for present and future use. In general these systems have exceeded their useful expected service life.

<u>FIRE PROTECTION</u> Rating = Poor

Existing Conditions and Deficiencies:

There is no fire suppression system serving the building.

Recommendations:

A building wide fire suppression system should be installed during any renovation project.

PLUMBING

Fixtures: Rating = Poor

The existing buildings plumbing systems do not appear adequate in quantity for the current occupancy use and are of varying age. However, several of the fixtures did comply to some extent with ADA/MAAB guidelines for accessible fixtures.

Existing water closets are a mix of floor mount flush valve type and tank type with a majority of the student fixtures on the basement and 1st floor being flush valve type and student fixtures on the 2nd floor as well as a staff restroom on the 1st floor being tank type. The single staff restroom on the 1st floor had a tank style toilet which had been removed from it outlet flange and was out of service. Urinals are of the wall hung type and lavatories are of the wall hung style with 2 handle lever faucet. Many of the fixtures do not comply with current low water use codes and standards.

Although some of the restrooms attempted to comply with accessibility regulations to some degree many failed. Potential compliance deficiencies as well as some general restroom fixture count deficiencies were noted were as follows:

1. On the basement level, the girls and boys accessible water closets were too close to the wall at 16.5” to fixture centerline as opposed to the required 18”.

2. On the basement level, the girls and boys accessible water closets were too high complying with adult handicap height of 19” but not elementary school height which would be lower.

3. On the basement level, the girls and boys accessible water closets were too high even exceeding adult handicap height at over 19”. Elementary school handicap height would be lower

4. Staff restroom in basement level had an accessible water closets which was too far from the wall at 25” to fixture centerline as opposed to the required 18”.

5. One of the two first-floor staff restrooms had its water closet removed and was out of service.

6. All staff toilets were of the unisex type with only one on the basement level and one on the first floor. Uni-sex toilets do not count towards the required men’s and woman’s fixture counts and as such to comply with code the two (2) first floor staff restrooms

should be labeled as men's and woman's and be made accessible. Their location on the first floor would place them within two floor intervals of the basement level and the second levcl thereby satisfying code requirements. Any additional staff restrooms such as the one on the basement level could then be listed as uni-sex.

Many of the public use lavatory sinks do not have metered (self-closing) faucets as generally required by code. In addition, public lavatory faucets do not have limit stops or tempering valves to insure hot water does not exceed 110°F for scald prevention.

Most classrooms have stainless steel sinks for hand washing. Many of these sinks are fitted with deck faucets and many a drinking bubbler attachment. The sink height varied throughout the building however none appeared to be fully compliant with accessibility codes. If the sinks are used by students proper tempering control for scald prevention is essential.

There is an electric water cooling drinking fountain located on both the first and second floor. Neither of these fixtures comply fully with accessibility requirements.

The kitchen in the building is very limited with only a 3-bay scullery sink and a hand wash sink. Typically, board of health regulations would require a 2-bay food prep. sink as well. The 3-bay sink has no grease trap which would be required by the plumbing code. Future major renovations may also mandate the need for an exterior grease trap.

We noted two Janitors use type sinks both in the basement level. One is located in the boiler room and has cold and hot water faucets with vacuum breakers. The other sink located adjacent to the basement bathrooms was a fiberglass style unit which had a faucet with hose in the sink without a vacuum breaker. A vacuum breaker would be required to minimize the possibility of siphon through the hose. Current code would require a Janitors sink on each floor.

Fixtures vary in age many being of the older non-water saving type and some meeting the 1.6 GPF req. of water closets. Apparently maintenance is routinely performed on faucets, toilet fill valves, etc.. as needed. If a renovation requires removal of the fixtures, upgrade of these fixtures to water conserving type shall be required.

Cold Water Service: Rating = Fair

A 2" cold water line enters the building in the area of the basement level teachers lounge. The service runs through a 2" compound style water meter prior to feeding the buildings domestic water loads. There is no backflow preventer or pressure reducing valve installed on the incoming water service. In facilities such as this where there could be various potential sources of cross contamination, a backflow preventer may be required to protect the municipal water supply. A pressure reducer would be required if the incoming water supply pressure exceeded 80 psi. Local requirements should be confirmed with the water department and plumbing inspector.

The only backflow preventer we noticed was a 1" reduced pressure zone style unit located in

the boiler room. The backflow preventer is piped to the boiler feed tank as well as each of the two boilers.

We noted most of the piping in the building appears to be copper. Due to the age of the building there is a high probability that the water service could have lead containing solder in the fittings as well as drinking fountains that may have lead containing components. Although not a large source of lead contamination it should be tested and monitored and if found to be a problem, components should be replaced. In general, there were no outward signs of failure during the day of our site inspection.

Domestic Hot Water Service: Rating = Fair

The domestic hot water needs of the building are supported by one (1) A.O. Smith #BT-80-300 gas-fired water heater. The water heater has a rated input capacity of 75,100 BTUH and a tank capacity of 80-gallons. The unit is in good condition with an estimated age of 5 years. Reuse of this unit could be considered during a renovation project however we suspect its capacity may be lower than required especially if all classroom fixtures are to have working sinks.

Current code would require differing water temperatures at different types of fixtures. Lavatory sinks and sinks for young student use must not discharge hot water at a temperature exceeding 110-112°F for safety reasons, whereas service fixtures (janitor's sinks) are required to have hot water temperatures in excess of 120°F for sanitation reasons. The current system appears to supply a single temperature water to the building which, with the absence of lavatory and student use fixture mixing valves, should be 110°F +/- however this would not properly support the service sinks or the 3-bay sink. Any upgrade must consider a central duel mixing valve station or local mixing at lavatory sinks. Lavatory sinks with limit stops and/or local mixing for lavatory sinks is the favored approach. Storage tanks should be kept at temperatures of 135° F to 140°F so as to prevent the possibility of bacteria growth within the tanks.

Drainage Systems: Rating = Fair

Most of the sanitary drainage piping is concealed from view, however what we were able to see was primarily of the no-hub cast iron type. The sanitary sewer lines run below the slab and exit the building to a municipal sewer system.

We were unable to access the roof during our site inspection however it would appear that the roof storm water is drained via roof drains connecting to internal leaders. The lines presumably exit the building and connect to a municipal storm water system. Emergency overflow drains may need to be added if the roof has a parapet or cannot otherwise support the weight of water due to a blocked primary roof drain.

Besides those items noted herein and elsewhere in this report, we noticed no other outward signs of failure in either the sanitary sewer system or the storm drainage system during our site inspection.

Natural Gas Service: Rating = Good

A natural gas service is located at the front corner of the building and enters the basement level through a storage room into the buildings boiler room. The exterior service entrance consists of a 1.5" elevated pressure gas line increasing to a 2" and running through a gas meter then a pressure reducer prior to increasing in size to 4" and entering the building. The 4" service feeds the gas loads in the building which include the heating boilers and the domestic hot water heater. The gas is distributed to the building by Eversource.

Recommendations:

Pending final master plan programming the proposed recommendations are as follows:

1. Provide tempering mixing valves on lavatory sinks and student use sinks as needed to insure occupant safety.
2. Replace water coolers with new ADA compliant type providing additional coolers where needed. High consideration should be given to coolers with bottle fill capabilities.
3. Where restrooms are renovated, replace original vintage water closet fixtures with new ultra low flush (1.28 GPF) water conserving units with automatic battery-powered flush valves.
4. During renovations, replace original vintage cold water and hot water piping with new type with 0 lead materials.
5. Where restrooms are renovated, Replace original vintage urinals with new ultra low flush (0.125 GPF) water conserving units with automatic battery-powered flush valves.
6. Where restrooms are renovated, replace original vintage lavatories with low flow style with automatic battery-powered faucets with mixing adjustment (tempering valves noted in #1 may not be required if this options is taken pending proper fixture selection).
7. Provide accessible staff restrooms on the 1st floor.
8. Provide Janitors sink on the 1st and 2nd floors.
9. Provide backflow prevention on building water service, Janitor sinks and at other fixtures requiring such.

<u>HVAC</u>

Boiler Plant: Rating = Poor

The heating needs for the building are supported by two (2) HB Smith model #350 Mills cast iron sectional low-pressure steam boilers. The boilers are over 30-years of age and have exceeded their useful service life as defined by the ASHRAE. As such, any future renovation should consider their replacement.

Each boiler is fitted with a dual fuel oil/gas Powerflame burner with a rated maximum input

capacity of 4,650,000 BTUH however the boilers rated input capacity of 2,954,000 BTUH which limits the capacity of the burner. The burners currently are fueled only by natural gas with oil supply being capped off.

According to facility personnel, the building was once supported by an underground fuel oil tank which has since been removed. Old caped oil lines were noted protruding through the foundation wall. There are also two (2) 330-gallon oil tanks located within the boiler room. These tanks appear to have no oil in them and have been capped and abandoned in their current location.

Much of the steam condensate from the building discharges to a duplex style condensate pump. This pump then discharges to an elevated boiler feed tank with duplex pumps. Each pump is piped to a respective boiler to support its water feed needs.

Each boiler is flue vented to a masonry chimney. The condition of the masonry chimney is unknown. The gas water heater is also vented to this chimney.

Combustion air for the boiler room is supplied from a ducted wall louver arrangement with low duct in room. There are no motorized dampers on the duct which would be required by current energy codes. A high louver section appears to have been boarded off.

The boilers, boiler feed pump and nearby piping appear to be relatively old and although in workable condition would be prime candidates for replacement during any substantial renovation.

Piping Distribution System: Rating = Fair/Poor

Steam and steam condensate from the boiler plant is distributed throughout the building via a 2-pipe distribution system. The system primarily supports steam fin-tube radiation located throughout the building. Traps appear to be of the thermostatic type and the float and thermostatic type depending on what they service. Many traps show limited signs of maintenance. Inadequate trap maintenance results in inefficient system operation allowing active steam to discharge into the condensate system which can also result in noisy steam hammer.

Ventilation & Misc. HVAC: Rating = Poor

Ventilation to most areas of the building is extremely limited. An old abandoned 100% outdoor air system located in the basement. The system consisted of a large fan which has since been removed along with a steam radiator connecting to ductwork routed throughout the basement which connects to numerous vertical chases leading to wall grilles in classrooms within the building. In addition, exhaust grilles in most rooms are ducted to passive air shafts which at one time had active steam radiators to induce airflow out of the building. These shafts, had at one time exited the roof however, according to facility personnel these shafts have since been sealed off at the roof level. The entire system in inactive and has been

abandoned in place.

As such most rooms are limited to natural ventilation via windows. The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Ventilation Standard 62 along with the building code, requires outdoor air levels of between 11 to 20 cfm per person dependent on occupancy classification and space use. Technically, operable windows in certain areas may satisfy the natural ventilation requirements of the Commonwealth of Massachusetts State Building Code. However, although this may be adequate for lightly populated areas, we feel that for spaces such as classrooms, proper indoor air quality can only be achieved through positive outdoor air ventilation. Natural ventilation relies on occupants to control their air quality levels manually by opening and closing windows. Since most space pollutants are odorless, we feel it is unrealistic to expect occupants to gauge the contamination level of the indoor air and open a window in the cold of winter to obtain proper air quality.

The basement level boys and girls restrooms have a ducted exhaust system however it was unclear if this system was operational. Staff restrooms on the basement and 1st floor had no exhaust ventilation which is required by code. Boys restroom on the 1st floor had an in ceiling exhaust fan ducted to the exterior however the girls restroom had none. Regardless of whether the restroom has an operable exterior window, active exhaust ventilation is required in all restrooms.

The kitchen hood exhaust system is does not comply with the Mechanical code or NFPA 96 for use as a grease type hood. Its primary deficiencies in this regarded is that the exhaust duct is not welded the hood has no suppression system and the sidewall fan is in a wooden box. There are no grease making appliances or cooking appliance of any type under the hood at the time of our walkthrough and as such some of this may not be required. The hood may be effective as a heat capture and rejection hood for sealed ovens in it current configuration otherwise it would require upgrade.

Controls: Rating = Poor

There is limited controls within the building. The steam plant is controlled by a Heat Timer controller which typically looks at outdoor air temperature, indoor air temperature as well as return condensate temperature to optimize the boiler plant to support the building load. Otherwise much of the system operates utilizing local controls such as non-electric thermostatic valves for the fin-tube radiation.

Recommendations:

The radiators as well as the buildings piping distribution system have exceeded their useful service life the entire heating distribution system should be replaced during a renovation project.

The building should be provided with a central ventilation system to provide the code required outdoor ventilation air to each space. We recommend the building be converted to a hot water

based hydronic distribution system consisting of new fin-tube radiation and piping supported by pumps on energy saving variable speed drives.

Also, all new systems should be tied to a complete building wide energy management system incorporating energy saving routines such as demand ventilation reset, room by room occupancy control, intelligent start/stop, etc… should be implemented.

If you have any questions regarding this report please do not hesitate to call.

Sincerely,
Seaman Engineering Corporation

Kevin R. Seaman P.E., LEED® AP
President

ART Engineering
we build the future.
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12 September 2017

Beal Early Childhood Center School

1 Maple Avenue
Shrewsbury, MA 01545

RE: Existing Electrical Systems Review

Prepared by: Thomas F. Lutynski

SUMMARY

ART has completed site surveys and reviewed available drawings for the existing Beal Early Childhood Center School in Shrewsbury, Massachusetts, built in 1922. We have developed a Good/Fair/Poor rating system for the various electrical systems.

The rating system was developed to give a concise, overall assessment for each system. In general, a system rated "Good" typically is up to date with current codes and well suited for current and future space intent. A "Fair" rated system may have some equipment in need of replacement or portions not suited for current or future space programming. Systems that are rated "Poor," are not well served for current or future space programming, and are outdated or obsolete. There are many reasons fair or poor ratings, including but not limited to age, current code compliance and maintenance.

The Massachusetts State Building Code 780 CMR requires all buildings and structures and all parts thereof, both existing and new, and all systems and equipment therein which are regulated by the State Building Code to be maintained in a safe, operable and sanitary condition. All service equipment, means of egress, devices and safeguards which are required by the State Building Code 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. It is unknown whether any of the existing systems have been maintained or tested per the manufacturer's recommendations or system standards over the years they have been in service.

BUILDING ELECTRICAL SYSTEMS

1. Electrical Service:

The existing electrical service is rated 400 Amperes, 208/120 Volt, 3-phase, 4-wire. The primary electrical service originates at the riser pole on the street and runs underground to a padmount transformer outside the building. The service conductors are installed in a 4-inch conduit and terminate into a fusible main disconnect switch. The main disconnect switch feeds a distribution panelboard consisting of thirteen (13) switch and fuse units with no spare capacity. The service equipment is by Westinghouse and original to the building. The service equipment is past its useful working life.

Rating: Poor

2. Normal Distribution

Most panelboards in the building are by Bryant and GE, some original and some installed during various renovations. The panelboards are located throughout the building in electrical rooms and hallways, and are circuit breaker type. The branch circuit panelboards are past their useful life. Several different types of wiring methods were observed namely wires in raceway, metal clad (MC) cable, and armored cable (AC). It appears that some of the feeder and branch circuits utilize the conduit as the grounding path and do not have a dedicated grounding conductor. The grounding can become ineffective due to rust and bad connections between conduits and boxes over time. It is recommended that the electrical distribution equipment be replaced together with all branch circuit wiring due to age.

Rating: Poor

3. General Purpose Power

The general-purpose power in the building is inadequate. The classrooms have inadequate number of receptacle outlets. Additional outlets have been installed in some rooms over the years in surface raceways. The branch circuits most likely utilize the conduit as the grounding path and do not have a dedicated equipment grounding conductor. The grounding can become ineffective due to rust and bad connections between conduits and boxes over time. New wiring devices and branch wiring is recommended.

Rating: Poor

4. Emergency /Standby Power

The building is not equipped with an emergency generator.

Rating: N/A

5. Egress & Exit Lighting

The egress and exit lighting is provided via self-contained battery backup units. The overall coverage of exit signs appears to be adequate, though none exist in the classrooms. Exit signs are a combination of both original to the building and some newer types. New code compliant egress and exit lighting is recommended.

Rating: Inadequate

6. Lighting & Controls

The lighting in the building is a mixture of various fluorescent fixtures (recessed, surface, pendant, etc.) with both T8 and T12 fluorescent lamps. The lighting system is inefficient and does not meet current energy codes. Lighting control is by wall mounted switches in classrooms and common areas. More than any other parts of the building, classrooms have been renovated with new but outdated recessed fluorescent flat prismatic lense troffers. Network control of lighting is not provided.

Rating: Poor

7. Telecommunications Cabling Infrastructure/Equipment

An underground multi-strand fiber optic cable from a street utility pole enters the basement mechanical space and terminates in a fiber optic cable patch panel. Several strands of the fiber optic cable are routed from this patch panel to a first-floor telecom room consisting of a single, floor mounted rack with patch panels and an UPS system. This room neither complies with clearances required by BICSI (Building Industry Consulting Service International) nor does the room have adequate HVAC services. The outgoing cables are CAT 5 for data and voice communications. Wi-Fi access points (WAPS) are located throughout the building comprising the wireless data network.

An underground multi-conductor telephone cable feeds a first floor 66-block punch down point in the same telecom room, and is distributed by CAT 5 cable to telephone jacks throughout the building.

Rating: Fair

8. Fire Alarm System

The fire alarm control panel is a Simplex 4002 eight-zone (6 active) panel with a radio master box connection to the Shrewsbury Fire Department. The system is tone-visual type. The fire alarm control panel is located at the main entrance. The fire alarm panel is in good condition but current codes require a voice evac type system instead of a tone-visual type. The visual signaling devices are

inadequate and do not comply with NFPA-72 standards for visual notification. Overall coverage of the automatic fire detection devices appears to be good. A new code compliant fire alarm system is recommended.

Rating: Fair

9. Public Address (PA) and Clock Systems

The PA system is a Bogen with a model CA-21 (privacy/talk/press to call) switch and speaker in each classroom, and head end equipment in the main office.

A general PA system does not exist.

The clock system is comprised of individual battery operated clocks with no system functions.

Rating: Poor

10. Audio-Video Systems

Each classroom has an Epson BrightLink 485Wi interactive projector which model has since been discontinued. Future programming needs will require upgrades to the projectors and interactive boards.

Rating: Fair

11. Video Surveillance, Access Control & Intrusion Detection Systems

The intrusion detection system is by Brivo. The system comprises an alarm panel and door contacts. The system monitors some door contacts, but the coverage is inadequate for the entire building.

The video surveillance system is comprised of one ceiling mounted indoor camera at the first-floor main corridor intersection, and one exterior camera at the rear corner of the building. Additional video surveillance cameras and motion sensors in all rooms with widows accessible on the ground level are recommended.

Rating: Poor

FINAL REPORT
FOR
HAZARDOUS MATERIALS IDENTIFICATION
STUDY
AT THE
BEAL EARLY CHILDHOOD CENTER
SHREWSBURY, MASSACHUSETTS

PROJECT NO: 217 312.00

Survey Dates:
September 1-8, 2017

CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 Brewster Road
Framingham, MA 01702

UEC universal environmental consultants

September 11, 2017

Mr. Sean Brennan
Lamoureux Pagano Associates
108 Grove Street
Worcester, MA 01605

Reference: Report for Hazardous Materials Identification Study
Beal Early Childhood Center, Shrewsbury, MA

Dear Mr. Brennan:

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

Enclosed please find the report for the hazardous materials identification study at the Beal Early Childhood Center, Shrewsbury, MA.

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

Very truly yours,

Universal Environmental Consultants

Ammar M. Dieb
President

UEC:\217 312.00\Report.DOC

Enclosure

1.0 INTRODUCTION:

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

UEC was contracted by Lamoureux Pagano Associates to conduct the following services at the Beal Early Childhood Center, Shrewsbury, Massachusetts:

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

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

Bulk samples analyses for asbestos were performed using the standard Polarized Light Microscopy (PLM) Method in accordance with EPA standard. Bulk samples were collected by a Massachusetts licensed asbestos inspector Mr. Leonard J. Busa (AI-030673) and analyzed by a Massachusetts licensed laboratory Asbestos Identification Laboratory, Woburn, MA.

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

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

Samples results are attached.

2.0 FINDINGS:

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

All suspect materials were grouped into homogenous areas. By definition a homogenous area is one in which the materials are evenly mixed and similar in appearance and texture throughout. A homogeneous area shall be determined to contain asbestos based on findings that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent in accordance with EPA regulations. Per the Department of Environmental Protection (DEP) any amount of asbestos found must be disposed as asbestos.

No additional suspect or accessible ACM were found during this survey. Hidden ACM may be found during the renovation and demolition activities.

Number of Samples Collected:
Thirty three (33) bulk samples were collected from materials suspected of containing asbestos, including:

Type and Location of Suspect Material

1. Vinyl floor tile at first floor hallway closet
2. Mastic for vinyl floor tile at first floor hallway closet
3. 9” x 9” Vinyl floor tile at main office closet
4. Mastic for 9” x 9” vinyl floor tile at main office closet
5. Vinyl floor tile under carpet at classroom 2
6. Mastic for vinyl floor tile under carpet at classroom 2
7. Carpet glue at classroom 2
8. 1’ x 1’ Acoustical wall tile above ceiling type I at classroom 2
9. 1’ x 1’ Acoustical wall tile type I at library
10. 1’ x 1’ Acoustical wall tile above ceiling type II at classroom 10
11. 1’ x 1’ Acoustical wall tile above ceiling type II at classroom 5
12. Wall joint compound at bathroom by classroom 7
13. Wall joint compound at classroom 10
14. Ceiling plaster at basement hallway by cafeteria
15. Ceiling plaster at basement ramp
16. Ceiling plaster at stairwell
17. Wall plaster at first floor hallway janitor closet
18. Wall plaster at first floor hallway by classroom 7
19. Ceiling plaster at basement custodian office
20. Black sink coating at basement hallway
21. Old linoleum floor covering at second floor bathroom
22. Glazing caulking for window in metal door at basement stairwell
23. Interior window glazing caulking at main office
24. Mud on boiler# 1 behind metal jacket at boiler room
25. Mud on boiler# 2 behind metal jacket at boiler room
26. Exterior window framing caulking
27. Exterior window framing caulking
28. Glazing caulking for exterior window
29. Glazing caulking for exterior window
30. Glazing caulking for exterior window
31. Suspended acoustical ceiling tile at classroom 6
32. Suspended acoustical ceiling tile at classroom 4
33. Glazing caulking for window in wood door at copy room

Sample Results:

Type and Location of Suspect Material	**Sample Result**
1. Vinyl floor tile at first floor hallway closet	15% Asbestos
2. Mastic for vinyl floor tile at first floor hallway closet	10% Asbestos
3. 9” x 9” Vinyl floor tile at main office closet	20% Asbestos
4. Mastic for 9” x 9” vinyl floor tile at main office closet	No Asbestos Detected
5. Vinyl floor tile under carpet at classroom 2	10% Asbestos
6. Mastic for vinyl floor tile under carpet at classroom 2	10% Asbestos
7. Carpet glue at classroom 2	No Asbestos Detected
8. 1’ x 1’ Acoustical wall tile above ceiling type I at classroom 2	No Asbestos Detected
9. 1’ x 1’ Acoustical wall tile type I at library	No Asbestos Detected
10. 1’ x 1’ Acoustical wall tile above ceiling type II at classroom 10	No Asbestos Detected
11. 1’ x 1’ Acoustical wall tile above ceiling type II at classroom 5	No Asbestos Detected
12. Wall joint compound at bathroom by classroom 7	No Asbestos Detected
13. Wall joint compound at classroom 10	No Asbestos Detected
14. Ceiling plaster at basement hallway by cafeteria	No Asbestos Detected
15. Ceiling plaster at basement ramp	No Asbestos Detected

16. Ceiling plaster at stairwell	No Asbestos Detected
17. Wall plaster at first floor hallway janitor closet	No Asbestos Detected
18. Wall plaster at first floor hallway by classroom 7	No Asbestos Detected
19. Ceiling plaster at basement custodian office	No Asbestos Detected
20. Black sink coating at basement hallway	2% Asbestos
21. Old linoleum floor covering at second floor bathroom	No Asbestos Detected
22. Glazing caulking for window in metal door at basement stairwell	No Asbestos Detected
23. Interior window glazing caulking at main office	No Asbestos Detected
24. Mud on boiler# 1 behind metal jacket at boiler room	No Asbestos Detected
25. Mud on boiler# 2 behind metal jacket at boiler room	No Asbestos Detected
26. Exterior window framing caulking	5% Asbestos
27. Exterior window framing caulking	5% Asbestos
28. Glazing caulking for exterior window	No Asbestos Detected
29. Glazing caulking for exterior window	2% Asbestos
30. Glazing caulking for exterior window	No Asbestos Detected
31. Suspended acoustical ceiling tile at classroom 6	No Asbestos Detected
32. Suspended acoustical ceiling tile at classroom 4	No Asbestos Detected
33. Glazing caulking for window in wood door at copy room	No Asbestos Detected

Observations and Conclusions:

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

Refer to the AHERA Management Plan for condition of ACM.

1. Pipe insulation was previously found to contain asbestos.
2. Hard joint insulation was previously found to contain asbestos.
3. Tank insulation was previously found to contain asbestos.
4. Duct insulation was previously found to contain asbestos.
5. Insulation/rope inside boilers was assumed to contain asbestos.
6. Vinyl floor tile at first floor was found to contain asbestos.
7. Mastic for vinyl floor tile was found to contain asbestos.
8. 9” x 9” Vinyl floor tile was found to contain asbestos.
9. Vinyl floor tile under carpet was found to contain asbestos.
10. Mastic for vinyl floor tile under carpet was found to contain asbestos.
11. Black sink coating was found to contain asbestos.
12. Exterior window framing caulking was found to contain asbestos.
13. Glazing caulking for exterior window was found to contain asbestos.
14. Door framing caulking was assumed to contain asbestos.
15. Paper/glue under hardwood floor was assumed to contain asbestos.
16. Glue holding blackboard was assumed to contain asbestos.
17. Roofing material was assumed to contain asbestos. Roofing material does not have to be removed by a licensed asbestos contractor. However, the Demolition/Roofing Contractor must comply with OSHA regulation during demolition and with state regulations for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval
18. Damproofing on foundation/exterior walls was assumed to contain asbestos. The demolition contractor will have to segregate the ACM from non-ACM building surfaces for proper disposal. A non-traditional abatement plan would have to be prepared and submitted to the DEP for approval.
19. Underground sewer pipes were assumed to contain asbestos.
20. All other suspect materials were found not to contain asbestos. Hidden ACM may be found during renovation and demolition activities.

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

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

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

Mercury in Rubber Flooring:
Observations and Conclusions:
No rubber flooring exists in the school.

Airborne Mold:
Airborne mold testing was performed utilizing Zefon International Incorporated's Air-O-Cell® sampling device following all manufacturer supplied recommended sampling procedures. Air-O-Cell® is a direct read total particulate air sampling device. It works using the inertial impaction principle similar to other spore trap devices. It is designed for the rapid collection and analysis of airborne particulate including bioaerosols. The particulate includes fibers (e.g. asbestos, fiberglass, cellulose, clothing fibers) opaque particles (e.g. fly ash, combustion particles, copy toner, oil droplets, paint), and bioaerosols (e.g. mold spores, pollen, insect parts, skin cell fragments).[1]

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

AIRBORNE MOLD and PARTICULATE

Lab ID #	Location	Total Mold Counts/M^3	Pollen	Insect Fragment	Hyphal Fragments
131704027-0001	Curriculum Coordinator	3,124	ND	ND	ND

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

Lab ID #	Location	Total Mold Counts/M^3	Pollen	Insect Fragment	Hyphal Fragments
131704027-0002	Teacher's Lounge	3,697	ND	40	ND
131704027-0003	OP/PT Room	3,940	ND	ND	ND
131704027-0004	Basement Half-Day K	5,124	ND	7	ND
131704027-0005	Basement Full-Day K	4,227	20	20	ND
131704027-0006	First floor Girl's Room	4,024	ND	ND	ND
131704027-0007	Nurse Office	2,924	ND	ND	ND
131704027-0008	Second Floor Grade 1	3,041	ND	ND	20
131704027-0009	Second Floor Grade 1	1,760	ND	ND	ND
131704027-0010	Second Floor Grade 1	1,707	ND	ND	20
131704027-0011	Outside*	40	ND	ND	ND

AIRBORNE MOLD and PARTICULATE
(Subjective Scales)

Lab ID #	Location	Skin Fragment Density (SFD)	Fibrous Particulates (FP)	Total Background Particulate (TBP)
131704027-0001	Curriculum Coordinator	2	1	2
131704027-0002	Teacher's Lounge	2	1	2
131704027-0003	OP/PT Room	1	1	2
131704027-0004	Basement Half-Day K	2	1	2
131704027-0005	Basement Full-Day K	1	1	2
131704027-0006	First floor Girl's Room	2	1	2
131704027-0007	Nurse Office	2	1	2
131704027-0008	Second Floor Grade 1	2	1	2
131704027-0009	Second Floor Grade 1	1	1	2
131704027-0010	Second Floor Grade 1	2	1	2
131704027-0011	Outside*	1	1	1

Legend:

ND - Not Detected

*: Rainy and cloudy weather.

Observations and Conclusions:

There are currently no guidelines or standards promulgated by a government agency or widely recognized scientific organizations for the interpretation of airborne mold spore levels. The most commonly employed tool used to assess if mold growth is occurring and there is amplification in a structure is to evaluate the indoor levels and species as well as to compare levels and species of mold outdoors to indoors. Typically, if there were more molds indoors, and/or if species were present indoors which were not present outdoors, then growth and amplification is likely occurring and further evaluation and perhaps remediation is recommended.

The indoor airborne mold spore concentrations were higher than the outside sample. However, based on comparisons with historical data from projects of similar type, building utilization, geographic location and season, the indoor airborne levels are considered average. Indoor mold spore counts in the summer are typically in the 3,500-7,500-spores/cubic meter range.

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

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

No visible mold growth was found during the survey.

Radon:

Number of Samples Collected
Ten (10) air samples were collected at the following locations:

Location of Material

1. Cafeteria
2. Special Education Room
3. Media Library
4. Teacher's Lounge
5. Teacher's Work Room
6. Curriculum Coordinator Room
7. Storage Room
8. PO/PT Room
9. Half Day K
10. Full Day K

Location of Material	**Sample Result**
1. Cafeteria	0.6 pCi/L
2. Special Education Room	1.6 pCi/L
3. Media Library	0.4 pCi/L
4. Teacher's Lounge	0.4 pCi/L
5. Teacher's Work Room	0.9 pCi/L
6. Curriculum Coordinator Room	1.2 pCi/L
7. Storage Room	1.2 pCi/L
8. PO/PT Room	1.7 pCi/L
9. Half Day K	0.7 pCi/L
10. Full Day K	0.8 pCi/L

Observations and Conclusions:
The measured radon concentrations were found to be much lower than the EPA guideline of 4.0-pCi/L.

No further action is required.

3.0 COST ESTIMATES:

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

Location	Material	Approximate Quantity	Cost Estimate ($)
Throughout	Various Types of Flooring and Mastic	15,000 SF	75,000.00
	Blackboards/Tackboards	70 Total	14,000.00
	Sinks	10 Total	1,000.00
	Pipe and Hard Joint Insulation	300 LF	6,000.00
	Hidden Pipe and Hard Joint Insulation	Unknown	15,000.00
	Miscellaneous Hazardous Materials	Unknown	5,000.00
	Light Fixtures	Unknown	25,000.00
Gymnasium	Hardwood Floor and Paper	3,600 SF	36,000.00
Boiler Room	Pipe and Hard Joint Insulation	280 LF	5,600.00
	Boiler Insulation	200 SF	4,000.00
	Duct Insulation	230 SF	4,600.00
	Tank Insulation	60 SF	1,200.00
	Boilers	2 Total	15,000.00
Exterior	Windows	267 Total	66,750.00
	Doors	9 Total	1,800.00
Estimated costs for NESHAP Inspection and Testing Services			8,500.00
Estimated costs for Design, Construction Monitoring and Air Sampling Services			27,170.00
		TOTAL:	**$ 310,000.00**

4.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

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

The samples were analyzed by a Massachusetts licensed laboratory Asbestos Identification Laboratory, Woburn, MA.

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

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

5.0 LIMITATIONS AND CONDITIONS:

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

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

Inspected By:

Leonard J. Busa
Asbestos Inspector

Asbestos Identification Laboratory

165 New Boston St., Ste 227
Woburn, MA 01801
781-932-9600

Web: www.asbestosidentificationlab.com
Email: mikemanning@asbestosidentificationlab.com

Batch: 25640

NVLAP®
Lab Code: 200919-0

September 07, 2017

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

Project Number:
Project Name: Beal Early Childhood Center, Shrewsbury MA
Date Sampled: 2017-09-01
Work Received: 2017-09-05
Work Analyzed: 2017-09-06

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

Dear Ammar Dieb,

Asbestos Identification Laboratory has completed the analysis of the samples from your office for the above referenced project .

The information and analysis contained in this report have been generated using the EPA /600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials. Materials or products that contain more than 1% of any kind or combination of asbestos are considered an asbestos containing building material as determined by the EPA. This Polarized Light Microscope (PLM) technique may be performed either by visual estimation or point counting. Point counting provides a determination of the area percentage of asbestos in a sample. If the asbestos is estimated to be less than 10% by visual estimation of friable material, the determination may be repeated using the point counting technique. The results of the point counting supersede visual PLM results. Results in this report only relate to the items tested. This report may not be used by the customer to claim product endorsement by NVLAP or any other U.S. Government Agency.

Laboratory results represent the analysis of samples as submitted by the customer. Information regarding sample location, description, area, volume, etc., was provided by the customer. Asbestos Identification Laboratory is not responsible for sample collection activities or analytical method limitations. Unless notified in writing to return samples, Asbestos Identification Laboratory discards customer samples after 30 days. Samples containing subsamples or layers will be analyzed separately when applicable. Reports are kept at Asbestos Identification Laboratory for three years. This report shall not be reproduced, except in full, without the written consent of Asbestos Identification Laboratory.

- NVLAP Lab Code: 200919-0
- Massachusetts Certification License: AA000208
- State of Connecticut, Department of Public Health Approved Environmental Laboratory Registration Number: PH-0142
- State of Maine, Department of Environmental Protection Asbestos Analytical Laboratory License Number: LB-0078(Bulk) LA-0087(Air)
- State of Rhode Island and Providence Plantations. Department of Health Certification: AAL-121
- State of Vermont, Department of Health Environmental Health License AL934461

Thank you Ammar Dieb for your business.

Michael Manning
Owner/Director

September 07, 2017

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

Project Number:
Project Name: Beal Early Childhood Center, Shrewsbury MA
Date Sampled: 2017-09-01
Work Received: 2017-09-05
Work Analyzed: 2017-09-06

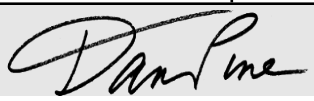
Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
1 / 289365	Floor Tile	1st Floor Hall Closet	tan	Non-Fibrous 85	**Detected** Chrysotile 15
2 / 289366	Black Mastic # 1	1st Floor Hall Closet	black	Non-Fibrous 90	**Detected** Chrysotile 10
3 / 289367	9" Floor Tile	Main Office Closet	black	Non-Fibrous 80	**Detected** Chrysotile 20
4 / 289368	BL (M) # 3	Main Office Closet	black	Non-Fibrous 100	None Detected
5 / 289369	Floor Tile under Carpet	Classroom # 2	tan	Non-Fibrous 90	**Detected** Chrysotile 10
6 / 289370	BL (M) # 5	Classroom # 2	black	Non-Fibrous 90	**Detected** Chrysotile 10
7 / 289371	Carpet Glue on # 5	Classroom # 2	yellow	Non-Fibrous 100	None Detected
8 / 289372	Non-Susp. 1 X 1 PW at Wall	Classroom # 2 (AC)	multi	Cellulose 90 Non-Fibrous 10	None Detected
9 / 289373	Non-Susp. 1 X 1 PW at Wall	Library	multi	Cellulose 90 Non-Fibrous 10	None Detected
10 / 289374	Suspect 1 X 1 at Wall	Classroom # 10 (AC)	multi	Mineral Wool 75 Non-Fibrous 25	None Detected
11 / 289375	Suspect 1 X 1 at Wall	Classroom # 5 (AC)	multi	Mineral Wool 75 Non-Fibrous 25	None Detected
12 / 289376	Joint Compound (JC)	Bathroom Wall by Classroom # 7	white	Non-Fibrous 100	None Detected
13 / 289377	JC	Classroom 10 Wall (from AC)	white	Non-Fibrous 100	None Detected
14 / 289378	Ceiling Plaster (CP)	Basement Hall by Cafe	white	Non-Fibrous 100	None Detected

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
15 / 289379	CP	Basement Ramp	multi	Non-Fibrous 100	None Detected
16 / 289380	CP	Stairwell @ underside of Stairs by # 13	white	Non-Fibrous 100	None Detected
17 / 289381	Wall Plaster (WP)	1st Floor Hall Janitor's Closet	multi	Non-Fibrous 100	None Detected
18 / 289382	WP	1st Floor Hall by Classroom 7	gray	Non-Fibrous 100	None Detected
19 / 289383	CP	Basement Cust. Office	white	Non-Fibrous 100	None Detected
20 / 289384	Black Sink dp	Basement Hall	black	Cellulose 10 Non-Fibrous 88	**Detected** **Chrysotile 2**
21 / 289385	Old Linoleum	2nd Floor Bathroom	tan	Cellulose 10 Synthetic 5 Non-Fibrous 85	None Detected
22 / 289386	Glaze for Window in Metal Door	Basement Stairwell by Teacher's Lounge	white	Other 2 Non-Fibrous 98	None Detected
23 / 289387	Int. Window Glaze	Main Office Window	tan	Non-Fibrous 100	None Detected
24 / 289388	Mud on Boiler, behind Metal Jacketing	Boiler # 2	gray	Mineral Wool 20 Non-Fibrous 80	None Detected
25 / 289389	Mud on Boiler, behind Metal Jacketing	Boiler # 1	tan	Mineral Wool 50 Non-Fibrous 50	None Detected
26 / 289390	Window Frame Caulk	Rear of School, Exterior	multi	Non-Fibrous 95	**Detected** **Chrysotile 5**
27 / 289391	Window Frame	Lunch Side Tables, Exterior	multi	Non-Fibrous 95	**Detected** **Chrysotile 5**
28 / 289392	Glaze for Exterior Window	1st Floor Classroom, Exterior	white	Non-Fibrous 100	None Detected
29 / 289393	Glaze for Exterior Window	Rear of School, Exterior	white	Non-Fibrous 98	**Detected** **Chrysotile 2**
30 / 289394	Glaze for Exterior Window	Lunch Side, Exterior	white	Non-Fibrous 100	None Detected
31 / 289395	(New) SAT	Classroom # 6	multi	Mineral Wool 30 Cellulose 50 Non-Fibrous 20	None Detected
32 / 289396	(New) SAT	Classroom # 4	multi	Mineral Wool 30 Cellulose 50 Non-Fibrous 20	None Detected

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
33 / 289397	Glaze for Window in Wood Door	Copy Room	brown	Non-Fibrous 100	None Detected

Thursday 07

Analyzed by: 

End of Report

Batch: 25640

CHAIN OF CUSTODY

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

Town/City: Shrewsbury, ma Building Name Beal Early Childhood Center

Sample	Result	Description of Material	Sample Location
1		Floor tile	1st FL hall closet
2		Black mastic #1	" "
3		9" Floor tile	main office closet
4		BL (m) #3	" " "
5		Floor tile under carpet	cim #2
6		BL (m) #5	" "
7		carpet glue on #5	" "
8		non-susp 1x1 pw [AT] wall	cim #2 (ac)
9		non-susp. 1x1 pw [AT] wall	Library
10		suspect 1x1 [redacted] [AT] wall	cim #10 (ac)
11		suspect 1x1 wall [AT]	cim #5 (ac)
12		Joint Compound (JC)	Bathrm wall by cim #7
13		JC	cim 10 wall (from ac)
14		ceiling plaster (CP)	Bsmt hall by cafe
15		CP	Bsmt ramp
16		CP	stairwell @ underside of stairs by #13
17		wall plaster (WP)	1st FL hall jan closet
18		WP	1st FL hall by cim 7
19		CP	Bsmt cust office
20		Black sink dp	Bsmt hall

Reported By: [redacted] Date: 9-1-17 Due Date: 48 hr

Received By: [redacted] Date: 9/5/17

CHAIN OF CUSTODY

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

Town/City: Shrewsbury, ma Building Name Bank Early Childhood Center

Sample	Result	Description of Material	Sample Location
21		old linoleum	2nd Fl bathroom
22		glaze for win in metal door	Bsmt stairwell b. Teach. Lounge
23		ext. window	main office window
24		mud on boiler, behind metal jacketing,	Boiler #2
25		mud on boiler, behind metal jacketing,	Boiler #1
26		window frame caulk	rear of school exterior
27		win fr	Lunch side Doors
28		glaze for exterior win	1ST Fl. clrm
29		gl for ext. win	rear of school
30		gl for ext. win	Lunch side
31		(new) SAT	clrm - 6
32		(new) SAT	clrm - 4
33		glaze for win in wood door	copy rm

Reported By: Laura K Bass Date: 9-1-17 Due Date: 48-hr

Received By: ---------- Date: ----------

131704027

24hr TAT

AIR SAMPLING DATA SHEET

Date: 9.5.17 Project Number: – Project Location: Beal Early Childhood Center

Work Area: throughout school Contractor: –

Project Monitor Name[1]: Colleen Canning License Number: am900506 Type of Sampling: Mold

Project Monitor Signature: Colleen Canning Samples Analysis By[2]: License Number:

Sample #	Type B, G, C	Location of Sample	Start Time	Stop Time	Run Time (Total Min)	Flow Rates Start	Flow Rates Stop	Flow Rates Ave.	Volume (Liters)	Fibers/Field	Distribution (F/mm²)	Concentration (F/CC)
1		23561043 curriculum cordinator	15:42	15:52	10	15	15	15	150			
2		23560686 teacher's lounge	15:49	15:59	10	15	15	15	150			
3		op/pt 23561160	15:54	16:04	10	15	15	15	150			
4		basement half day K 23561052	16:00	16:10	10	15	15	15	150			
5		basement full day K 23560983	16:05	16:15	10	15	15	15	150			
6		1st floor 23561057 girls room	16:22	16:32	10	15	15	15	150			
7		nurse office 23560895	16:25	16:35	10	15	15	15	150			
8		2nd floor - 23561157 Grade 1	16:37	16:47	10	15	15	15	150			
9		2nd floor - 23560885 Grade 1	16:42	16:52	10	15	15	15	150			
10		2nd floor - 23561107 Grade 1	16:49	16:59	10	15	15	15	150			

Type: **B:** Background; **G:** General Area; **C:** Clearance.
Flow Rates: **PCM:** Up to 16; **TEM:** Up to 9.5.
Distribution: (Fibers/Field)/0.00785. If results less than 7 F/mm², then write < LOD

[1]: I certify that the above samples were collected in accordance with all applicable guidelines.
[2]: I certify that the above samples were analyzed in accordance with all applicable guidelines.

RECEIVED SEP 06 2017 By dl 14:12

WI

Universal Environmental Consultants

Page 1 Of 2

OrderID: 131704027

131704027

AIR SAMPLING DATA SHEET

Date: 9.5.17 Project Number: — Project Location: Beal Early Childhood Center

Work Area: through out school Contractor: —

Project Monitor Name[1]: Colleen Canning License Number: am900506 Type of Sampling: mold

Project Monitor Signature: Colleen Canning Samples Analysis By[2]: _____ License Number: _____

Sample #	Type B, G, C	Location of Sample	Start Time	Stop Time	Run Time (Total Min)	Flow Rates Start	Flow Rates Stop	Flow Rates Ave.	Volume (Liters)	Fibers/Field	Distribution (F/mm²)	Concentration (F/CC)
11		outside 23560949	17:02	17:12	10	15	15	15	150			

Page 2 of 2

Type: **B:** Background; **G:** General Area; **C:** Clearance.
Flow Rates: **PCM:** Up to 16; **TEM:** Up to 9.5.
Distribution: (Fibers/Field)/0.00785. If results less than 7 F/mm², then write < LOD

[1]: I certify that the above samples were collected in accordance with all applicable guidelines.
[2]: I certify that the above samples were analyzed in accordance with all applicable guidelines.

RECEIVED
SEP 06 2017
By 1412

Universal Environmental Consultants

OrderID: 131704027

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: 131704027
Customer ID: UEC63
Customer PO:
Project ID:

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

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/05/2017
Received: 09/06/2017
Analyzed: 09/07/2017

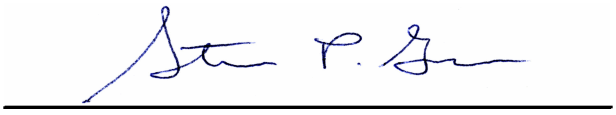
Project: Beal Early Childhood Center

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

Lab Sample Number:	131704027-0001			131704027-0002			131704027-0003		
Client Sample ID:	1			2			3		
Volume (L):	150			150			150		
Sample Location	Curriculum Cordinator			Teacher's Lounge			OP/PT		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	1	20	0.6	-	-	-	2	40	1
Ascospores	11	240	7.7	4	90	2.4	5	100	2.5
Aspergillus/Penicillium	-	-	-	6	100	2.7	8	200	5.1
Basidiospores	90	2000	64	81	1800	48.7	118	2580	65.5
Bipolaris++	1*	7*	0.2	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	37	810	25.9	75	1600	43.3	41	900	22.8
Curvularia	-	-	-	-	-	-	1	20	0.5
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	2	40	1.3	3	70	1.9	5	100	2.5
Myxomycetes++	-	-	-	1	20	0.5	-	-	-
Pithomyces	-	-	-	1*	7*	0.2	-	-	-
Rust	1*	7*	0.2	2*	10*	0.3	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Bispora	-	-	-	-	-	-	-	-	-
Botrytis	-	-	-	-	-	-	-	-	-
Cercospora	-	-	-	-	-	-	-	-	-
Nigrospora	-	-	-	-	-	-	-	-	-
Oidium	-	-	-	-	-	-	-	-	-
Total Fungi	**143**	**3124**	**100**	**173**	**3697**	**100**	**180**	**3940**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	2	-	-	2	-

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

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



Steve Grise, Laboratory Manager
or other approved signatory

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

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

Initial report from: 09/07/2017 11:25:04

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Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 131704027
Customer ID: UEC63
Customer PO:
Project ID:

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

Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/05/2017
Received: 09/06/2017
Analyzed: 09/07/2017

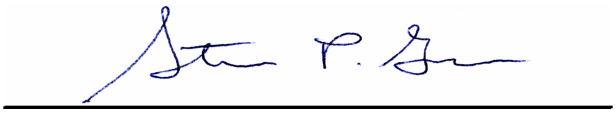
Project: Beal Early Childhood Center

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

Lab Sample Number:	131704027-0004			131704027-0005			131704027-0006		
Client Sample ID:	4			5			6		
Volume (L):	150			150			150		
Sample Location	Basement Half-Day K			Basement Full-Day K			1st Floor Girls Room		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	-	-	-	1*	7*	0.2	-	-	-
Ascospores	7	200	3.9	11	240	5.7	11	240	6
Aspergillus/Penicillium	-	-	-	1	20	0.5	-	-	-
Basidiospores	122	2660	51.9	72	1600	37.9	112	2440	60.6
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	98	2100	41	103	2250	53.2	56	1200	29.8
Curvularia	-	-	-	-	-	-	1*	7*	0.2
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	4	90	1.8	6	100	2.4	3	70	1.7
Myxomycetes++	1	20	0.4	2*	10*	0.2	-	-	-
Pithomyces	1*	7*	0.1	-	-	-	1*	7*	0.2
Rust	1*	7*	0.1	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Bispora	-	-	-	-	-	-	-	-	-
Botrytis	1	20	0.4	-	-	-	-	-	-
Cercospora	1	20	0.4	-	-	-	1	20	0.5
Nigrospora	-	-	-	-	-	-	2	40	1
Oidium	-	-	-	-	-	-	-	-	-
Total Fungi	**236**	**5124**	**100**	**196**	**4227**	**100**	**187**	**4024**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	1*	7*	-	1	20	-	-	-	-
Pollen	-	-	-	1	20	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	1	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	2	-	-	2	-

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

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



Steve Grise, Laboratory Manager
or other approved signatory

Initial report from: 09/07/2017 11:25:04

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EMSL Order: 131704027
Customer ID: UEC63
Customer PO:
Project ID:

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

Project: Beal Early Childhood Center

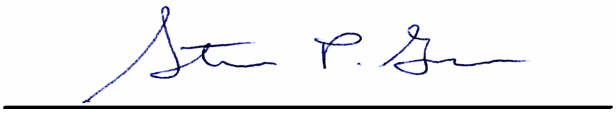
Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/05/2017
Received: 09/06/2017
Analyzed: 09/07/2017

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

Lab Sample Number:	131704027-0007			131704027-0008			131704027-0009		
Client Sample ID:	7			8			9		
Volume (L):	150			150			150		
Sample Location	Nurse Office			2nd Floor - Grade 1			2nd Floor - Grade 1		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	1*	7*	0.2	-	-	-	-	-	-
Ascospores	5	100	3.4	5	100	3.3	1	20	1.1
Aspergillus/Penicillium	-	-	-	9	200	6.6	-	-	-
Basidiospores	72	1600	54.7	66	1400	46	56	1200	68.2
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	52	1100	37.6	53	1200	39.5	24	520	29.5
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	1	20	0.7	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	4	90	3.1	1	20	0.7	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces	1	20	0.7	1*	7*	0.2	1	20	1.1
Rust	1*	7*	0.2	1*	7*	0.2	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Bispora	-	-	-	2	40	1.3	-	-	-
Botrytis	-	-	-	1	20	0.7	-	-	-
Cercospora	-	-	-	1*	7*	0.2	-	-	-
Nigrospora	-	-	-	-	-	-	-	-	-
Oidium	-	-	-	1	20	0.7	-	-	-
Total Fungi	**136**	**2924**	**100**	**142**	**3041**	**100**	**82**	**1760**	**100**
Hyphal Fragment	-	-	-	1	20	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	2	-	-	2	-

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

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



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or other approved signatory

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Phone: (617) 984-9772
Fax: (508) 628-5488
Collected: 09/05/2017
Received: 09/06/2017
Analyzed: 09/07/2017

Project: Beal Early Childhood Center

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

Lab Sample Number:	131704027-0010			131704027-0011		
Client Sample ID:	10			11		
Volume (L):	150			150		
Sample Location	2nd Floor - Grade 1			Outside		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	1*	7*	0.4	-	-	-
Ascospores	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-
Basidiospores	46	1000	58.6	1	20	50
Bipolaris++	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-
Cladosporium	31	680	39.8	-	-	-
Curvularia	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-
Myxomycetes++	1	20	1.2	1	20	50
Pithomyces	-	-	-	-	-	-
Rust	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-
Torula	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-
Bispora	-	-	-	-	-	-
Botrytis	-	-	-	-	-	-
Cercospora	-	-	-	-	-	-
Nigrospora	-	-	-	-	-	-
Oidium	-	-	-	-	-	-
Total Fungi	**79**	**1707**	**100**	**2**	**40**	**100**
Hyphal Fragment	1	20	-	-	-	-
Insect Fragment	-	-	-	-	-	-
Pollen	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	2	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-
Background (1-5)	-	2	-	-	1	-

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

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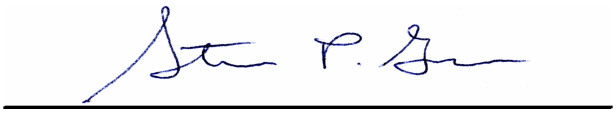

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AccuStar
Laboratoire Professionnel D'analyses du Radon Depuis 1984

Radon in Air

NELAC NY 11769
NRPP 101193 AL
NRSB ARL0017

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

Laboratory Report for:

Universal Environmental Consultant
12 Brewster Road
Framingham MA 01702

Property Tested:

Beal Early Childhood Center
1 Maple Avenue
Shrewsbury MA

Log Number	Device Number	Test Exposure Duration:		Area Tested	Result (pCi/L)
2162154	3486318	09/05/2017 3:07 pm	09/08/2017 6:57 am	Basement Cafeteria	0.6
2162155	3486317	09/05/2017 3:09 pm	09/08/2017 6:58 am	Basement Special Education	1.6
2162156	3486316	09/05/2017 3:11 pm	09/08/2017 6:59 am	Basement Media Library	0.4
2162157	3486319	09/05/2017 3:13 pm	09/08/2017 7:00 am	Basement Teacher's Lounge	0.4
2162158	3486314	09/05/2017 3:15 pm	09/08/2017 7:02 am	Basement Teacher's Workroom	0.9
2162159	3486320	09/05/2017 3:18 pm	09/08/2017 7:03 am	Basement Curriculum Coordinator	1.2
2162160	3486315	09/05/2017 3:19 pm	09/08/2017 7:05 am	Basement Storage	1.2
2162161	3486312	09/05/2017 3:22 pm	09/08/2017 7:07 am	Basement OP/PT	1.7
2162162	3486311	09/05/2017 3:25 pm	09/08/2017 7:09 am	Basement Half Day K	0.7
2162163	3486313	09/05/2017 3:27 pm	09/08/2017 7:10 am	Basement Full Day K	0.8

Comment: Universal Environmental Consultant was emailed a copy of this report.

Test Performed By: Colleen Canning

Distributed by: Universal Environmental Consultant

Date Received: 09/08/2017 Date Logged: 09/08/2017 Date Analyzed: 09/11/2017 Date Reported: 09/11/2017

Report Reviewed By: Michele Cleveland Report Approved By:

Shawn Price, Director of Laboratory Operations, AccuStar Labs

Disclaimer:

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

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

11 Awl Street Medway MA 02053 888-480-8812 FAX 508-533-8831