WORCESTER CULTURAL ACADEMY
PROGAMMATIC CODE ANALYSIS

81 Plantation Street
Worcester, Massachusetts

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RGB #6803

General Information

The scope of work for this project is to renovate the existing basement through 3rd floor of the classes approximately 25,000 square foot former St. Joseph school building to accommodate Worcester Cultural Academy (WCA) kindergarten through 5th grade with modern classrooms, extended learning spaces, special education, STEAM and makerspaces. Additional spaces for administration and support spaces are also expected. The existing building was constructed in 1914 as a catholic diocese school and was converted to a mental heath facility for period of time. Currently the building has been reverted back to a school for WCA. Worcester Cultural Academy currently occupies part of the first floor with 3rd and 4th grade and administration offices. The building retains much of its original elements, configuration, and time period architecture. Overall, it is a well-maintained building based on general observation and it is now 109 years old. When the building was utilized for mental health offices several updates were made to address some code requirements and help bring the building up to more modern safety and accessibility standards. A fire suppression system, an elevator connecting all floors, restrooms on each floor, fire alarm system and fire enclosure upgrades to the existing stairways were implemented to bring the building up to occupancy and code standards required for office use under this previous use.
These updates are significant for the overall code compliance of the building as an educational facility. Being that the building currently is being used as a school and will continue to be used as a school. All proposed work to update the building to modern educational compliance with the Massachusetts codes for renovations to existing buildings will be applicable. RGB has developed a program analysis to determine viability of grades K-5th in the building. As part of that program analysis a high-level review of the applicable codes and the implications for compliance with those codes.
Until the point where defined and detailed design layouts are developed and very specific code applicability determination can be made however, this level initial follows of analysis will help define major building systems, program affecting requirements and restraints, and general compliance for proposed school functions.

Referenced Codes

Below is a listing of applicable codes for renovations to the existing Worcester Cultural Academy building. The applicability of several of these codes will be based on what the final design for renovations to the building are. For the purposes of this analysis and based on a programmatic layout only we are going to review in specificity the overarching codes that will affect the development of the design and affect major building systems, layout and occupancy.

- 780 CMR The Massachusetts State Building Code, 9th Edition
    - Massachusetts Amendments to the International Building Code (IBC) 2015
- 780 CMR 34.00 Existing Building Code of Massachusetts (IBC 2015)
- 521 CMR Rules and Regulations of the Architectural Access Board
- 2010 ADA Accessibility Guidelines (ADAAG)
- International Mechanical Code (IMC) 2015
- 2020 Massachusetts Energy Code
    - International Energy Conservation Code (IECC) 2018
- 527 CMR Board of Fire Prevention Regulations
    - Massachusetts Amendments to NFPA 1 (Fire Code) 2012

- NFPA 13 (2013) Standard for the Installation of Sprinkler Systems
- NFPA 72 (2022) National Fire Alarm and Signaling Code
- NFPA 70 (2023) National Electric Code (NEC)
- 248 CMR Massachusetts Fuel Gas and Plumbing Code

780 CMR 34.00 Compliance (Massachusetts Existing Building Code)

780CMR 34.00 is the Massachusetts Existing Building Code and is applicable to renovations to existing buildings this serves as an application guide of the Massachusetts building codes relative to the extent of the work related to renovations or changes in use. Based on the building being an existing school and the proposed levels of renovations to achieve this goal, the following sections of the Massachusetts Existing Building Code are applicable.

Chapter 4 – Prescriptive Compliance Methods

- Section 403.1 identifies:
  Except as provided by Section 401.2 or this section, *alterations* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. *Alterations* shall be such that the *existing building* or structure is no less conforming to the provisions of the *International Building Code* than the *existing building* or structure was prior to the *alteration*.

- Section 403.3.1 identifies:
  Where the *alteration* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads approved prior to the *alteration*. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the *alteration* does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.

- Section 410.6 Alterations identifies:
  A *facility* that is altered shall comply with the applicable provisions in Chapter 11 of the *International Building Code*, unless *technically infeasible*. Where compliance with this section is *technically infeasible*, the *alteration* shall provide access to the maximum extent technically feasible.

    - Exception: The altered element or space is not required to be on an accessible route, unless required by Section 410.7.

- Section 410.7 Identifies:
  Where an *alteration* affects the accessibility to, or contains an area of *primary function*, the route to the *primary function* area shall be *accessible*. The accessible route to the *primary function* area shall include toilet facilities and drinking fountains serving the area of *primary function*.

- Exception: The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of primary function.

- Section 410.8 Scoping for Alterations identifies:
  The provisions of Sections 410.8.1 through 410.8.14 shall apply to *alterations* to *existing buildings* and *facilities*.

  - Accessible entrances shall be provided in accordance with Section 1105.

  - Exception: Where an alteration includes alterations to an entrance, and the facility has an accessible entrance, the altered entrance is not required to be accessible, unless required by Section 410.7. Signs complying with Section 1111 of the International Building Code shall be provided.

- Section 410.8.10 Toilet Rooms Identifies:
  Where it is technically infeasible to alter existing toilet and bathing rooms to be accessible, an accessible family or assisted-use toilet or bathing room constructed in accordance with Section 1109.2.1 of the International Building Code is permitted. The family or assisted-use toilet or bathing room shall be located on the same floor and in the same area as the existing toilet or bathing rooms. At the inaccessible toilet and bathing rooms, provide directional signs indicating the location of the nearest family or assisted-use toilet room or bathing room. These directional signs shall include the International Symbol of Accessibility and sign characters shall meet the visual character requirements in accordance with ICC A117.1.

Chapter Summary and Applicability
Chapter 4 identifies basic level compliance requirements that are universally applicable to existing buildings and not necessary based on the extent of renovations, repairs or change of use. The above sections are the applicable sections to this building and specific use. To summarize Chapter 4 applicability to WCA it identifies that the existing load bearing structure is permitted to be maintained as is based on the that there is no increased design live load and the building was designed for classrooms and offices and will continue as such. Alterations must comply with accessibility requirements under chapter 11 of the MA Building Code and CMR 521 Massachusetts Architectural Access Board. So any alterations changing the configuration of the building plan must be accessible unless technically infeasible. Based on the project goals to renovate each level for new classrooms, all new spaces must be accessible and the route to the spaces must be accessible. With an existing elevator all floors are accessible so all new classrooms, offices and toilet rooms must comply with accessibility requirements under CMR 521.

Chapter 5 – Classifications of Work

- Section 505 Alterations – Level 3 : Level 3 alterations apply where the work area exceeds 50 percent of the building area.

- Level 3 alterations shall comply with the provisions of Chapters 7 and 8 for Level 1 and 2 alterations, respectively, as well as the provisions of Chapter 9.

Chapter Summary and Applicability
Chapter 5 defines the level of alteration based on the percentage of overall building area being altered. This then defines the requirements for code compliance for new construction under the building and fire code. In this case the proposed renovations would exceed 50% of the building area and thus would require compliance with Level 3 alterations. Compliance with Level 3 also requires compliance with all applicable requirements of Levels 1 and 2 in Chapters 7 and 8.

Chapter 7 – Alterations Level 1

- Section 702.6 Materials and Methods:
  All new work shall comply with the materials and methods requirements in the International Building Code, International Energy Conservation Code, International Mechanical Code, and International Plumbing Code, as applicable, that specify material standards, detail of installation and connection, joints, penetrations, and continuity of any element, component, or system in the building.

- Section 708.1 Energy Conservation Minimum Requirements:
  Level 1 alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the International Energy Conservation Code or International Residential Code. The alterations shall conform to the energy requirements of the International Energy Conservation Code or International Residential Code as they relate to new construction only.

Chapter Summary and Applicability
Chapter 7 defines that all new materials and elements used in the renovations must be constructed to meet new building code requirements and the only new elements need to be code compliant for energy conservation requirements. Thus all new proposed construction within the building must meet current building code. In the case of WCA the construction of new partition walls, restrooms, office spaces must be constructed to meet current code requirements. This includes all space requirements, lighting, finishes for fire ratings etc. With respects to the energy code requirements the building is not required to meet current energy code requirements only new elements must meet energy code requirements. For WCA this would mean new exterior doors and windows would need to be code compliant as would the installation of new roof, but there is no requirement for exterior walls to comply unless an addition was constructed at which case all new wall construction would be required to be energy code compliant. This also the case for any new HVAC equipment, toilets, sinks, light fixtures etc. Any new equipment would need to be code compliant and installed accordingly. Any existing equipment can remain as is with no requirement to replace if still in operation.

Chapter 8 – Alterations Level 2

- Section 803.2.1 Existing Vertical Openings:
  All existing interior vertical openings connecting two or more floors shall be enclosed with approved assemblies having a fire-resistance rating of not less than 1 hour with approved opening protectives.
  - Exceptions:

- Where vertical opening enclosure is not required by the International Building Code or the International Fire Code.
- Interior vertical openings other than stairways may be blocked at the floor and ceiling of the work area by installation of not less than 2 inches (51 mm) of solid wood or equivalent construction.
  - The enclosure shall not be required where:
  - Connecting the main floor and mezzanines; or All of the following conditions are met:
  - The communicating area has a low hazard occupancy or has a moderate hazard occupancy that is protected throughout by an automatic sprinkler system.
  - The lowest or next to the lowest level is a street floor.
  - The entire area is open and unobstructed in a manner such that it may be assumed that a fire in any part of the interconnected spaces will be readily obvious to all of the occupants.
  - Exit capacity is sufficient to provide egress simultaneously for all occupants of all levels by considering all areas to be a single floor area for the determination of required exit capacity.
  - Each floor level, considered separately, has at least one-half of its individual required exit capacity provided by an exit or exits leading directly out of that level without having to traverse another communicating floor level or be exposed to the smoke or fire spreading from another communicating floor level.

- In Group B occupancies, a minimum 30-minute enclosure shall be provided to protect all vertical openings not exceeding three stories. This enclosure, or the enclosure specified in Section 803.2.1, shall not be required in the following locations:
- Buildings not exceeding 3,000 square feet (279 m2) per floor.
- Buildings protected throughout by an approved automatic fire sprinkler system.
- In Group E occupancies, the enclosure shall not be required for vertical openings not exceeding three stories when the building is protected throughout by an approved automatic fire sprinkler system.

- 803.2.3 Supplemental Stairway Enclosure Requirements:
  Where the work area on any floor exceeds 50 percent of that floor area, stairways that are part of the means of egress serving the work area shall, at a minimum, be enclosed with smoke-tight construction on the highest work area floor and all floors below.

  Exception: Where stairway enclosure is not required by the International Building Code or the International Fire Code.

- Section 803.4 Interior Finish :
  The interior finish of walls and ceilings in exits and corridors in any work area shall comply with the requirements of the International Building Code.
  780 CMR Chapter 8 Section Table 803.1
  Sprinklered buildings E occupancy
  Interior exit Stairways – Class B
  Corridors – Class B
  Rooms and Spaces – Class C

Exception: Existing interior finish materials that do not comply with the interior finish requirements of the International Building Code shall be permitted to be treated with an approved fire-retardant coating in accordance with the manufacturer's instructions to achieve the required rating.

- 803.4.1 Supplemental Interior Finish Requirements:
  Where the work area on any floor exceeds 50 percent of the floor area, Section 803.4 shall also apply to the interior finish in exits and corridors serving the work area throughout the floor.

- 803.6 Fire Resistance Ratings:
  Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the International Building Code has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the International Building Code.

  Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance-ratings. Any special construction features, including fire-resistance-rated assemblies and smoke-resistive assemblies, conditions of occupancy, means-of-egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

- 804.1.1 Corridor Ratings:
  Where an approved automatic sprinkler system is installed throughout the story, the required fire-resistance rating for any corridor located on the story shall be permitted to be reduced in accordance with the International Building Code. In order to be considered for a corridor rating reduction, such a system shall provide coverage for the stairway landings serving the floor and the intermediate landings immediately below.
  780 CMR Chapter 10 Section 1020 Table 1020.1 – E occupancy 0-hour rating with sprinkler system

- 804.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, R-3, R-4, S-1 and S-2
  In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, R-3, R-4, S-1 and S-2, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following conditions occur:
  The work area is required to be provided with automatic sprinkler protection in accordance with the International Building Code as applicable to new construction; and
  The work area exceeds 50 percent of the floor area.

- 804.4.1 Occupancy Requirements

A fire alarm system shall be installed in accordance with Sections 804.4.1.1 through 804.4.1.7. Existing alarm-notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm-notification appliances within the work area shall be provided and automatically activated.
Exceptions:
Occupancies with an existing, previously approved fire alarm system.
Where selective notification is permitted, alarm-notification appliances shall be automatically activated in the areas selected.

- 804.4.1.1 Group E
  A fire alarm system shall be installed in work areas of Group E occupancies as required by the International Fire Code for existing Group E occupancies.

- 805.4.1 Two Egress Doorways Required
  Work areas shall be provided with two egress doorways in accordance with the requirements of Sections 805.4.1.1 and 805.4.1.2.

- 805.4.1.1 Occupant Load and Travel Distance
  In any work area, all rooms and spaces having an occupant load greater than 50 or in which the travel distance to an exit exceeds 75 feet (22 860 mm) shall have a minimum of two egress doorways.
  Exceptions:
  Storage rooms having a maximum occupant load of 10.
  Where the work area is served by a single exit in accordance with Section 805.3.1.1.

- 805.8.1 Work Areas
  Means of egress in all work areas shall be provided with exit signs in accordance with the requirements of the International Building Code.

- 805.9.1 Minimum Requirement
  Every required exit stairway that is part of the means of egress for any work area and that has three or more risers and is not provided with at least one handrail, or in which the existing handrails are judged to be in danger of collapsing, shall be provided with handrails for the full length of the stairway on at least one side. All exit stairways with a required egress width of more than 66 inches (1676 mm) shall have handrails on both sides.

- 805.9.2 Design
  Handrails required in accordance with Section 805.9.1 shall be designed and installed in accordance with the provisions of the International Building Code.

- 805.11 Guards
  The requirements of Sections 805.11.1 and 805.11.2 shall apply to guards from the work area floor to, and including, the level of exit discharge but shall be confined to the egress path of any work area.

- 805.11.1 Minimum Requirement
  Every open portion of a stairway, landing, or balcony that is more than 30 inches (762 mm) above the floor or grade below and is not provided with guards, or those portions in which existing guards are judged to be in danger of collapsing, shall be provided with guards.

- 805.11.2 Design
  Guards required in accordance with Section 805.11.1 shall be designed and installed in accordance with the International Building Code.
  780 CMR Chapter 10 Section 1015 – Guards along stairs or elevated platforms and landings minimum height is 42"

- 807.3 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.

- 807.4 Existing Structural Elements Carrying Gravity Loads
  Alterations shall not reduce the capacity of 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. Existing structural elements supporting any additional gravity loads as a result of the alterations, including the effects of snow drift, shall comply with the International Building Code.
  Exceptions:
  Structural elements whose stress is not increased by more than 5 percent.

- 808.1 New Electrical Installations
  All newly installed electrical equipment and wiring relating to work done in any work area shall comply with all applicable requirements of NFPA 70 except as provided for in Section 808.3.

- 809.1 Reconfigured or Converted Spaces
  All reconfigured spaces intended for occupancy and all spaces converted to habitable or occupiable space in any work area shall be provided with natural or mechanical ventilation in accordance with the International Mechanical Code.
  Exception: Existing mechanical ventilation systems shall comply with the requirements of Section 809.2.

- 809.2 Altered Existing Systems
  In mechanically ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended shall provide not less than 5 cubic feet per minute (cfm) (0.0024 m3/s) per person of outdoor air and not less than 15 cfm (0.0071 m3/s) of ventilation air per person; or not less than the amount of ventilation air determined by the Indoor Air Quality Procedure of ASHRAE 62.

- 809.3 Local Exhaust
  All newly introduced devices, equipment, or operations that produce airborne particulate matter, odors, fumes, vapor, combustion products, gaseous contaminants, pathogenic and

allergenic organisms, and microbial contaminants in such quantities as to affect adversely or impair health or cause discomfort to occupants shall be provided with local exhaust.

- 810.1 Minimum Fixtures
  Where the occupant load of the story is increased by more than 20 percent, plumbing fixtures for the story shall be provided in quantities specified in the International Plumbing Code based on the increased occupant load.

Chapter Summary and Applicability

Chapter 8 is the most extensive section applied as Chapter 9 Level 3 Alterations requires compliance with Chapter 8 as a baseline. Chapter 8 address fire ratings, levels of protection, egress requirements and egress components as well as energy code compliance requirements. In the case of WCA the following points are applicable based on the referenced code sections with respects to the proposed renovations of all the floors based on the initial conceptual plans and a fully sprinklered building:

- The existing stairways are required to be 1hour rated and with the building being fully sprinklered the existing construction may be reviewed with the local code officials for compliance with archaic construction methods to determine compliance. All doors and openings would have to be fire rated accordingly.

- The existing corridors are not required to be fire rated based on the building being fully sprinklered.

- The interior finishes much meet the defined fire classifications for burn and smoke development per the building code for a sprinklered building and an educational use. In this case the existing woodwork would be required to be removed or coated with a clear intumescent coating in the stairways and corridors. The existing wood would be permitted to remain in existing condition within all other spaces in the building.

- The building currently has a full fire alarm system tied into the sprinkler system for notification. This system can remain as long as it can meet any additional requirements for devices based on a new interior layout and all devices are still approved for use under NFPA72.

- The proposed building configuration with new classrooms and support spaces would have two means of egress and the existing building has no less than two means of egress from any floor. Dead end distances and single exit conditions would have to be observed in the development of any suite spaces such as the office administration areas. Any classroom or enclosed learning space with an occupant load greater than 50 would require two exits.

- The guardrails and handrails will require updating to meet the new building code requirements for dimension, profile and height and load capacities. In the case of the lower floors where the children K-2 are located a lower handrail should be provided within the appropriate reach range.

- The proposed renovations to the building maintain the original occupancy and use for which the building was constructed, which was classrooms and teacher/admin offices. This use will continue with the renovations so the existing load bearing structural members are determined

to be acceptable under the code. There is a 5% increase permitted. Based on the proposed use and configuration it is not anticipated that any additional loads within the building will present. If additional HVAC equipment is added to the roof or existing equipment is replaced, then the existing structure will need to be evaluated to ensure it can properly support the loads.

- The HVAC system in the building is a more modern configuration with split system air handlers and roof top equipment. The level of fresh air supply is unknown. Without an extensive analysis of the existing equipment, it should be assumed that not all spaces meet this requirement. This is evident based on the observed conditions of high humidity and mold in the lower level. Contingent upon the extent of reconfiguring the building spaces all HVAC equipment new or used will need to meet the minimum requirements identified. ASHRAE 62 for indoor air quality should be followed as a baseline with best design practices applied.

- The code requires that if the occupant load is increased by 20% then plumbing fixture counts will be required to meet the 248 CMR Massachusetts Plumbing Code. The existing restrooms are also required to be fully accessible to the maximum extent feasible. Each floor currently has an existing two fixture restroom for men and for women. Although by code this would be a compliant number of fixtures the practical need for additional fixtures due to the functional manner of restrooms utilized by elementary school children will be greater. Thus, replacement with new multi-fixture fully compliant restrooms on each floor, including sperate staff restrooms would be recommended solution.

Chapter 9 – Alterations – Level 3

- 905.2 Means-of-Egress Lighting
  Means of egress from the highest work area floor to the floor of exit discharge shall be provided with artificial lighting within the exit enclosure in accordance with the requirements of the International Building Code.

- 907.3 Existing Structural Elements Carrying Gravity Loads
  Existing structural elements carrying gravity loads shall comply with Section 807.4.

- 907.4 Existing Structural Elements Resisting Lateral Loads
  All existing elements of the lateral force-resisting system shall comply with this section.
  Exceptions:
  Buildings of Group R occupancy with no more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light-frame construction methods of the International Building Code or in compliance with the provisions of the International Residential Code.
  Where such alterations involve only the lowest story of a building and the change of occupancy provisions of Chapter 10 do not apply, only the lateral force-resisting components in and below that story need comply with this section.

- 907.4.1 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.

- 907.4.2 Substantial Structural Alteration
  Where more than 30 percent of the total floor and roof areas of the building or structure have been or are proposed to be involved in structural alteration within a 5-year period, the evaluation and analysis shall demonstrate that the lateral load-resisting system of the altered building or structure complies with the International Building Code for wind loading and with reduced International Building Code-level seismic forces in accordance with Section 301.1.4.2. 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 or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

- 907.4.4 Limited Structural Alteration
  Where the work does not involve a substantial structural alteration and the building is not assigned to Seismic Design Category F, the existing elements of the lateral load-resisting system shall comply with Section 807.5.
  Building is Classified as Seismic Design Category B per Section 1613.3.5.1 for a Risk Category III building per 780 CMR so no lateral load resisting system upgrades are required.

- 907.4.5 Wall Anchors for Concrete and Masonry Buildings
  For any building assigned to Seismic Design Category D, E or F with a structural system consisting of concrete or reinforced masonry walls with a flexible roof diaphragm and any building assigned to Seismic Design Category C, D, E or F with a structural system consisting of unreinforced masonry walls with any type of roof diaphragm, the alteration work shall include installation of wall anchors at the roof line to resist the reduced International Building Code-level seismic forces in accordance with Section 301.1.4.2, unless an evaluation demonstrates compliance of existing wall anchorage.
  Building is Classified as Seismic Design Category B per Section 1613.3.5.1 for a Risk Category III building per 780 CMR so no lateral load resisting system upgrades are required.

- 907.4.6 Bracing for Unreinforced Masonry Parapets
  Parapets constructed of unreinforced masonry in buildings assigned to Seismic Design Category C, D, E or F shall have bracing installed as needed to resist the reduced International Building Code-level seismic forces in accordance with Section 301.1.4.2, unless an evaluation demonstrates compliance of such items.
  Building is Classified as Seismic Design Category B per Section 1613.3.5.1 for a Risk Category III building per 780 CMR so no lateral load resisting system upgrades are required.

Chapter Summary and Applicability

Chapter 9, which addresses alterations that exceed 50% of the building area references compliance with Chapter 8 plus additional requirements which for an educational use focuses on structural upgrades. Compliance with lateral loads which are wind and seismic resistance, and the extent of which modifications would trigger upgrades. For WCA the existing use was a school and is remaining a school so there is no occupancy change to trigger any upgrades based on occupancy. Extensive structural changes which make up 30% or more of the floor area then evaluation and potential upgrades could be required based on the requirements of 780 CMR. The current conceptual plans identify structural

modifications for new door openings and opening sections of the corridor to create flexible education spaces, is one path forward. Should the proposed design exceed 30% then lateral load analysis and potential upgrades would be required. If a more conservative configuration was developed that would not modify more than 30% of the structural frame, lateral load upgrades may not be necessary.
With regard to masonry anchored building frame and unreinforced masonry parapets, upgrades to the structure are required for educational use buildings. As education falls under Risk Category III and in seismic zone C, D, E, and F. WCA per the 780 CMR Section 1613.3.5.1 is classified as being a Type B seismic zone for educational use Risk Category III building. Being a Type B seismic zone WCA facility would not require supplemental bracing both inside the building and for any of the roof parapets.

Code Analysis Summary of Determination

Renovations of existing buildings are a combination of existing and new elements and what applicable state, and local regulations determine the combination there of to ensure a safe, healthy, and functional building. In this case WCA has an existing 110-year-old school building with the intent to modernize and fully occupy it as an elementary school with grades K-5. Part of this process will entail the renovation and in many cases the reconfiguration of space to develop spaces functional to 21st century teaching methods. This analysis is based on a broad-brush review of the code requirements for an existing educational use building. Understanding the impacts of meeting code compliance as an existing educational occupancy, helps identify building spaces and elements that are required to be modified and what elements can remain functioning in their current configuration. All newly constructed elements, spaces and equipment are required to comply with the current Massachusetts codes for new construction and for the purposes of this analysis are beyond final determination until a schematic design is developed.

At the end of each chapter of applicable codes, a chapter specific summary identifies the applicability and application of the sections to the building. In an overall consolidation/summary the existing upgrades made to the building prior to WCA's occupancy were significant in bringing the existing 110-year-old building into compliance with many of the code requirements for existing educational use. The addition of sprinklers, fire alarm, an elevator and more modernized HVAC equipment in the past permit more flexibility and reduce the costs of renovation by not needing to add these elements to meet just the basic requirements of compliance with the code.
The existing egress components are functionally compliant with the fact there is sprinkler coverage. There are at least two means of egress remotely located on each floor with the basement and the first floor having 3 egress locations. The corridors on each floor are wider than the minimum width of 60" for new corridors. The stairs flights are 5'-2" wide which exceeds the occupant load minimum requirement of 3'-8" and the stair rise, and run are permitted to remain in the existing configuration of 9,3/4" tread and 7" riser. The stairs will need to meet the 1-hour fire rated enclosure requirements which they do not currently comply with. Fire-rated doors will need to be installed to the 2nd and 3rd floor levels with full fire rated panic hardware to complete the enclosure requirements for the full 4 floors from the basement to the 3rd floor.
The building has one ADA compliant entrance/exit at the basement level which exits to grade and an elevator providing access to all floors. Although the code notes compliance with 521 CMR it also states to the maximum extent feasible. Making the existing stairways ADA accessible is not technically feasible based on the configuration and existing grades. A second two accessible means of entry and egress can be provided and could be accomplished by the addition of a ramp at the front main entry onto the first level off Plantation Street. With all floors and primary function areas accessible via the elevator all new

restrooms will need to be ADA compliant for new construction.

The building envelope which includes the exterior walls, windows, doors, roof and building structural frame are compliant per the Massachusetts Existing Building Code based on the continuance of the educational use. The existing building elements can remain and do not require updating to the current new construction code unless they are modified or replaced. Thus, if windows are replaced all new windows would need to meet new construction code requirements. The exterior walls can remain in their current condition with no requirement to add insulation to current code requirements. Based on building age and construction type it is not recommended that insulation be added to the interior of the exterior walls. Full thickness masonry walls rely on the transfer of heat into the walls from the interior to maintain the integrity of the walls over the long term and to prevent creating a mold favorable condition within the wall system.

In conclusion the existing building will require some code upgrades to address fire ratings, handrails and guardrails at the stairways, interior wood finishes in the stairways and corridors and ADA accessibility at the front entry to the building. The HVAC system may require some upgrades to meet the fresh air and air change requirements per ASHRAE 62 requirements which would require an analysis by a licensed mechanical engineer. The major code upgrades required for educational use in a building of this size and configuration being an elevator, sprinklers and fire alarm are in place and operational. All new renovation work will be required to be compliant with the Massachusetts Building Codes. The extent that those renovations are implemented is contingent on the design process as these proceed forward.

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