BASIC CODE DATA – Sylvester Elementary School

14 January 2001

Building Code Summary:

Upon review of the Code Analysis below, the deficiencies of the Sylvester Elementary School building become readily apparent. The most glaring discrepancies are that the building has floor and roof wood framing, the story height exceed code limitations for a non-sprinklered building with Type 3B construction, and the basement level windows are 2 ft too high above finish floor maximum height permitted for classroom spaces. Any renovation or addition considered will trigger a requirement to conform to the code as if we had built it that way. Installing a fire protection system in the building may address the height limitations, but discussion with code officials is needed to determine what actions would be necessary to bring the building into compliance with the other discrepancies.
Other issues that are to be either discussed or remedied with any renovation project (with their applicable Code chapters) are as follows:

Chapter 3 & 6: Several conditions were readily observable in which Fire Separation Assemblies were either violated by penetrations, or unverifiable due to age of materials.

Chapter 7: Several floor openings and annular spaces that were not appropriately protected.

Chapter 8: Finish requirements possibly not met due to Class level of finish materials being unverifiable.

Chapter 10: Egress issues, not complied with completely due to guard and handrail height requirements in the stairwells, minimum widths in access corridor doors not being met, and doors not correctly equipped or missing labels (for Fire Protection).

Chapter 11: Accessibility issues, the building is entirely non-compliant – including all entries into building, no elevator, double doors in corridors are not wide enough, entry into classrooms, door hardware, auditorium, cafeteria, library, stage, and toilet rooms.

Code Analysis *(items in italics do not appear to be in compliance)*

1. **Building Code:** 780 CMR: 6th Edition.

2. **Construction Type: 3B** – Noncombustible/Combustible – Unprotected. Load bearing masonry interior and exterior walls, wood framed roof, some wood framed and decked floors

3. **Ch.3: Use or Occupancy:**
   302.1 Classifications w/ minimum separation rating:

Primary Classification:	Educational, **E**	**2-hour fire**
Cafeteria:/Multi-purpose	*Assembly, **A-3***	***2-hour fire***
Gymnasium:	Assembly, **A-3**	**2-hour fire**
Library:	*Assembly, **A-3***	***2-hour fire***
Auditorium:	*Assembly, **A-3***	***2-hour fire***

302.1.1 Specific Occupancy Areas w/ minimum separation rating:
Boiler and furnace room: 1-hour or AFSS
Storage rooms: <100sf 1-hour or AFSS and Smoke partitions
>100sf AFSS and Smoke partitions
Kitchen: Smoke partitions
Maintenance: 2-hour or 1-hour and AFSS
302.1.2 Accessory areas: no separation needed if <10% of separated area.
302.2 Mixed use: Comply with 313.0
313.0 Mixed use:
313.1.2 Separate use groups: To be determined.
313.1.3 Separate buildings: To be determined.

4. Ch.4: Special Use or Occupancy:
412.0 Stages and Platforms: Stage is part of Auditorium.

5. Ch.5: General Building Limitations:
503 Table: Height and Area Limitations
Use group **E** (educational); type **3B** combustible /non-combustible unprotected construction.
Two stories; 30 feet in height; 14,400sf
Use group **A-3** (assembly); type **3B** combustible /non-combustible unprotected construction.
Two stories; 30 feet in height; 8,400sf
504 Height Modifications:
504.2 Automatic Sprinkler System: Does not apply to partially sprinklered buildings.
504.3 Auditorium in use group **E** increase height limit to 45 feet.

506 Area Modifications:
506.2 Accessible perimeter increase: See below
506.3 Automatic Sprinkler: Does not apply.
506.4 Multi-story building: N/A.
Area Calculations (preliminary, perimeter ratio will vary as design changes)

Basement:

Use group **E**:

Basic area [table 503]:	14,400sf	14,400sf
Accessible Perimeter [506.2]: (73%-25% [506.2]: 48%		
Increase 2% for every 1% of excess Footage [506.2]:	96%	13,824sf
Total Allowable Square Footage:		**28,244sf**
Current Square Footage:		*7,886sf*

Use group **A-3**:

Basic area [table 503]:	8,400sf	8,400sf
Accessible Perimeter [506.2]: (62%-25% [506.2]: 37%		
Increase 2% for every 1% of excess Footage [506.2]:	74%	6,216sf
Total Allowable Square Footage:		**14,616sf**
Current Square Footage:		*2,656sf*

First Floor:

Use group **E**:

Basic area [table 503]:	14,400sf	14,400sf
Accessible Perimeter [506.2]: (82%-25% [506.2]: 57%		

Increase 2% for every 1% of excess Footage [506.2]:	114%	16,416sf
Total Allowable Square Footage:		**30,816sf**
Current Square Footage:		*9,960sf*

Use group **A-3**:

Basic area [table 503]:	8,400sf	8,400sf
Accessible Perimeter [506.2]: (62%-25% [506.2]: 37%		
Increase 2% for every 1% of excess Footage [506.2]:	74%	6,216sf
Total Allowable Square Footage:		**14,616sf**
Current Square Footage:		*3,172sf*

Second Floor:

Use group **E**:

Basic area [table 503]:	14,400sf	14,400sf
Accessible Perimeter [506.2]: (61%-25% [506.2]: 36%		
Increase 2% for every 1% of excess Footage [506.2]:	72%	10,368sf
Total Allowable Square Footage:		**24,7684**
Current Square Footage:		*7,260sf*

Use group **A-3 (library)**:

Basic area [table 503]:	8,400sf	8,400sf
Accessible Perimeter [506.2]: (52%-25% [506.2]: 27%		
Increase 2% for every 1% of excess Footage [506.2]:	54%	4,536sf
Total Allowable Square Footage:		**12,936sf**
Current Square Footage:		*1,929sf*

6. Ch.6: Types of Construction:

602 Table: Fire Resistance Rating of Structural Elements.

1. Exterior walls:
   - Load bearing: **2-hours**
2. Firewalls (707.0) **2-hours**
3. Fire separation assembly:
   - *Exits (1014.11, 709.0)* ***2-hour***
   - Shafts and hoistways (709.0, 710.0) **2-hour** (three stories or less)
   - *Mixed use (313) Assembly/Education* ***2-hour***
   - Other separations **1-hour**
4. Fire partitions (711.0):
   - Exit access corridors (711.4, 712.2, 1011.4) **1-hour**
5. Smoke barrier (711.4, 712.0, 712.2) **1-hour**
6. Other non-load bearing partitions **0-hour**
7. Interior load bearing partitions **0-hour**
8. Structural members supporting walls (715.0) **0-hour**
9. *Floor construction (713.0)* ***0-hour*** *(1-hour below Level of Exit Discharge)*
10. Roof construction (714.0) ***1-hour***

7. Ch.7: Fire Resistant Materials and Construction:

705 Exterior Walls

705.2 Exterior wall fire resistance ratings at 30 feet: **0-hour**

705.3 Exterior wall openings at greater than 30 feet: **no limit**

707 Fire Walls
707.1 Allows for collapse of construction on either side.
707.1 Table
Use group **E**: **2-hours**
Use group **A-3**: **2-hours**
709 Fire Separation Assemblies
709.3 Openings in exit enclosures, other than unexposed exterior openings, shall be limited to those necessary for exit access to the enclosure from normally occupied spaces and for egress from the enclosure.
709.4 All vertical fire separation assemblies shall extend from the top of the floor/ceiling assembly below to the underside of the floor or roof deck above. These walls shall be continuous through all concealed spaces such as the space above a suspended ceiling.

710 Vertical Shafts
710.3 Openings other than those necessary for the purpose of the shaft shall not be permitted. Fire resistance rating is **2-hour** (more than four stories).
710.4 A shaft that does not extend to the underside of the roof deck of the building shall be enclosed at the top with a fire separation assembly with a rating not less than that required for the shaft enclosure walls.
713 Floor/Ceiling and Roof/Ceiling
713.2 Rated assemblies to be continuous without openings or penetrations.
713.3 All floor openings connecting two or more stories shall be protected by a shaft enclosure (2-hour rated). (Note: exceptions exist)
716 Fire Door Assemblies
716.1 Opening protective fire protection rating: **1½-hour** in a **2-hour or a 1 1/2 -hour** assembly.
Shaft and exit wall enclosure rating: **1-hour** (min. opening rating **1-hour**)
Other fire separation assemblies: **1-hour** (min. opening rating **¾-hour**)
716.5 Fire doors shall be self-closing or automatic closing. Swinging fore doors shall be self-latching.
719 Wired Glass
719.1 Limiting size of wired glass panels.
Maximum area per opening fire protection rating:

1 ½ -hour (in Exterior Walls):	0 sq. in.
1 ½ & 1-hour:	100 sq.in.
¾-hour:	1,296 sq. in.

8. Ch.8: Interior Finishes
803 Interior Finishes and Trim
803.4 Interior finish requirements :
Use group: **E**
Vertical Exits: Class I
Exit Corridors: Class II **(Class I in use group A3)**
Rooms: Class III

9. Ch.9: Fire Protection Services
904 Fire Suppression
904.4 An automatic fire suppression system shall be provided throughout all buildings having use group classification **E** where fire area exceeds 12,000sf.
914 Standpipe Systems
914.2.4 Standpipe systems shall be installed in stages in accordance with section 412.7 (see exception for sprinkler).
915 Fire Department
915.1 Required.

916 Yard Hydrants
As directed by Fire Department.
917 Fire Alarm System
917.4.1 A fire alarm system per NFPA 72 shall be installed and maintained.
918 Automatic Fire Detection Systems
918.5 Not required in buildings equipped with an automatic sprinkler system and fire alarm system.
919 Smoke Detection
Not required.
920 Fire Extinguishers
920.2 Install in accordance with NFiPA 10 and at locations listed in this section.

10. Ch.10: Means of Egress

1006 Types and Locations of Means of Egress
1006.2.1 Egress from a room shall not pass through adjoining rooms, except where such adjoining rooms are accessory to the area served, are not a high hazard occupancy, and provide a discernable path of travel to an exit.
1006.2.2 An assembly area main entrance shall have egress capacity for ½ occupant load.
1006.3 All exits shall discharge directly to a public way.
1006.4 Exits shall be as remote as possible, greater than ¼ the maximum diagonal in sprinklered buildings.
1006.5 Length of exits access travel with sprinkler system is 250 feet (use group **E**).
1006.6 Elevators conforming to section 1007.3 shall be permitted as an accessible means of egress.
1007 Accessible Means of Egress
1007.1 All spaces required to be accessible shall be provided with not less than one accessible means of egress. Where more than one means of egress is required, each accessible portion of the space shall be served by not less than two accessible means of egress.
1008 Occupant Load
1008.1.2

Library:	50 net s.f./person (100 gross s.f./person in reading areas)
Assembly without fixed seats:	7 net s.f./person
Assembly – unconcentrated:	15 net s.f./person
Educational- classroom	20 net s.f./person
Educational- shop/vocational	50 net s.f./person
Storage & Mechanical room	300 gross s.f./person

1009 Capacity of Means of Egress
1009.2 Egress width per person with sprinkler system:

Stairways:	0.2”/person
Doors, ramps, corridors:	0.15”/person

1010 Number of Exits
1010.2 Minimum number of exits per floor for occupant load:

500 or less:	2
501-1000	3
over 1000	4

1011 Access and Corridors
1011.2 The length of a dead end corridor shall not exceed 20 feet or 2 ½ times its least width.
1011.3 Most restrictive of:
1: Minimum corridor width is 44 inches where serving an occupant load greater than 50.
2: Minimum corridor width is 36 inches where serving an occupant load less than 50.
4: Minimum corridor width is 72 inches where serving an occupant load greater than 100.
5: Width required for capacity by section 1009.0.
1011.4 Corridor rating is ½ hour in sprinklered buildings.
1011.4.2 Doors into rated corridors shall be fire doors complying with 716.0.
1012 Assembly Aisles
1012.1 Provide aisle access per requirements of this section. See section 1012 for detailed requirements.

1014 Stairways
1014.3 Minimum means of egress stairway width is 44 inches.
1014.3.2 The minimum dimensions of landings shall not be less than the required width of the stairway. Landing dimension in the direction of travel is not required to be greater than 4 feet for straight run stairs. Egress capacity per 1009.0.
1014.4 Minimum headroom in all parts of a means of egress stairway is 80" from landing or leading edge of tread.
1014.5 Maximum rise between landings of a means of egress stairway is 12' vertically.
1014.6 Minimum tread depth is 11 inches and the maximum riser height is 7 inches. (exception for existing stairs)
1016 Ramps
1016.2 The minimum width of a ramp shall not be less than that required for corridors (1011.3).
1016.3 The maximum slope shall be 1 in 12 except for aisles in use group **A** (assembly).
1016.4 Ramps shall have landings at the top, bottom, all points of turning, entrance and exit, and doors. Ramps shall not have a vertical rise greater than 30 inches.
1017 Means of Egress Doorways
1017.1.1 The floor surface on both sides of a door shall be at the same elevation. The floor surface shall extend from the door in the closed position a distance equal to the door width. Exceptions: (1) Exterior doors which are not on an accessible route, and (2) variations in elevation due to finish materials, but not more than ½ inch.
1017.2 Each occupant of a room shall have access to at least two exits from the room where the occupant load exceeds 50 or the travel distance exceeds 75 feet. Where the occupant load is between 501 and 1,000, a minimum of three exits shall be provided. Where the occupant load exceeds 1,000, a minimum of four exits shall be provided.
Exception: Boiler rooms shall be provided with two egress doors where the area exceeds 500s.f. A fixed ladder access out of the room shall be permitted in lieu of one door.
1017.4 Doors shall swing in the direction of egress in rooms with greater than 50 occupants.
1021 Guards
1021.2 Guards shall be at least 42 inches high.
1021.3 Open guards shall be such that a sphere having a diameter of 4 inches cannot pass through any opening.
1022 Handrails
1022.2.2 Handrail height shall be between 34 and 38 inches.

11. Ch.11: Accessibility
1101 Conform to Mass. Architectural Access Board Rules and Regulations. (521 CMR 1.00 – 47.00)

12. Ch.13: Energy Conservation
1300 Revised Ch.13 effective Jan.1, 2001. This new code applies to permits acquired after June 30, 2001.

13. Ch. 34: Repair, Alteration, Addition, and Change of Use of Existing Structures
3400 Scope
Alterations are possible without full compliance with the code for new construction. Where 3400 calls for compliance and it is impractical, see section 3406.0 for compliance alternatives.
3402 Implementation
3402.1.1 Existing building is to be evaluated in accordance with 780 CMR 34 (see appendix F). (Note: Part Two provides examples of compliance alternatives) This evaluation requires identification of all existing items which do not currently comply with the requirements of section 34 and compliance alternatives to be provided.
3403 Hazard Index
3403.1 Hazard index for no change in use is zero.
3404 Requirements for Continuation of Use

3404.3 New systems to meet requirements of new construction.
3404.4 Alterations and repairs which maintain or improve performance of the building can be made.
3404.5 Number of means of egress meet 3400.4 (Generally, requirements for new construction).

End of Code Data