

**Memorandum**

Date:	March 11, 2024	Project#:	241005
To:	Katy Lillich - Arrowstreet		
From:	Kevin N. Lynch - Code Red Consultants		
Re:	Southborough Neary School Code Narrative		
Cc:	Andy Rodrigue - Arrowstreet	Matthew Nicastro - Code Red Consultants	
	Larry Spang - Arrowstreet	Paul Moan - Code Red Consultants	

Code Red Consultants has prepared this memorandum as part of the feasibility study for the Neary Elementary School project located at 53 Parkerville Road in Southborough, MA. This memorandum is intended to summarize major fire and life safety requirements associated with the project, and facilitate the development of the Preliminary Design Program (PDP). A comprehensive Chapter 34 Investigation & Evaluation Report will be developed as the proposed project becomes further refined.

The information included within this memo is based on existing drawings and a building survey conducted by Code Red Consultants on February 22, 2024, which included a review of the major fire and life safety features within the building. Accessibility features were not evaluated as part of the survey.

**Applicable Codes**

Code references in this memo are from the Massachusetts State Building Code (780 CMR), the Massachusetts State Existing Building Code (MEBC), and the Massachusetts Comprehensive Fire Safety Code (527 CMR 1.00).

The 10<sup>th</sup> Edition of the **Massachusetts State Building Code** effective date is tentatively planned for Q2 of 2024 with a 6-month concurrency period. Any project filing for permit after this date will require compliance with the 10<sup>th</sup> Edition of 780 CMR. This new state code is based on the 2021 editions of the I-Codes with state-specific amendments. The code considerations outlined within this report are based on the 9<sup>th</sup> Edition of 780 CMR currently in effect.

**Existing Building Description**

The Neary Elementary School building is 1-story in height and has a footprint of approximately 60,000 square feet. The building was originally constructed in 1968. Two small modular classrooms were constructed as an addition following original construction MEP renovations occurred within the building in 2009, including upgrades to the HVAC and electrical systems.

A building separation was not observed between the original building and the modular addition, so both portions are considered a single building from a code perspective. The school contains classrooms, offices, a cafeteria, a library, and two recreational gymnasium spaces and serves students in grades 1 through 5. It is our understanding that the school also functions as a day care. Table 1 summarizes additional existing building information. Figure 1 includes an aerial view of the building.



TABLE 1: EXISTING BUILDING SUMMARY

<b>Use and Occupancy:</b>	Group E, Educational <sup>1</sup> , Group A-2, Assembly, and Group A-3, Assembly
<b>Construction Type:</b>	The building consists of masonry exterior walls, CMU interior walls and steel structural components. The original 1968 drawings indicate wood as part of portions of floor assemblies and the roof deck. Combustible construction was also observed in the floor assembly of small MEP spaces and in a nonbearing partition. The construction type of the defaults to Type IIIB construction.
<b>Height &amp; Area:</b>	1 story above grade and a footprint of 60,000 square feet.
<b>Automatic Sprinkler System:</b>	The building is not protected with an automatic sprinkler system or standpipe system.
<b>Fire Alarm System:</b>	The building is equipped with a fire alarm and detection system consisting of the following components: <ul style="list-style-type: none"> <li>• Visual &amp; audible notification,</li> <li>• Smoke detection, and</li> <li>• Manual pull stations.</li> </ul>
<b>Means of Egress:</b>	Exits are provided to the exterior serving common spaces/corridors throughout the building.
<b>Exit Signage and Emergency Lighting:</b>	Emergency lighting and illuminated exit signs were observed to be provided in the building.

1. It is assumed that the day care program does not include children younger than 2.9 years, which would otherwise result in a Group E, Day Care Facility (780 CMR 308.6.1).



FIGURE 1: BUILDING SITE OVERVIEW

### Project Description

As part of the feasibility study for the project, new construction and renovation options are being considered:

1. *Renovation & Addition*: Major renovations throughout the existing building that could consist of the construction of an addition providing uses consistent with that of the existing building.
2. *New Construction*: Demolition of the existing building and construction of a new elementary school.

### Classification of Work

The following details work classifications under consideration for the renovation option (MEBC – Work Area Method).

#### *Renovation & Addition*

This scope of work is classified as a **Level 2 Alteration** and an **Addition**. If the renovation scope of work includes work areas that make up more than 50% of the building area, the project would be classified as a **Level 3 Alteration** (MEBC Chapter 9). It is our understanding that no change of occupancy is planned.

- **Level 2 Alteration** – Includes the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment in less than 50% of the aggregate building area.
- **Level 3 Alteration** – Apply where the work area exceeds 50% of the aggregate building area.
- **Addition** – Includes an extension or increase in floor area, number of stories, or height of a building structure.

### Use and Occupancy

The building consists of classrooms, gymnasiums, a library, offices, and building support spaces. The posted certificate of inspection indicates that the building contains **Group E, Educational, Group A-2, Assembly, and Group A-3, Assembly** occupancies.

It is our understanding that the day care uses in the building are classified as part of the Group E, Educational occupancy in accordance with 780 CMR 305.2.

The building has a non-separated mixed use occupancy approach.

### Construction Type

#### *Renovation & Addition*

The 1968 original drawings indicate that the building is constructed with masonry exterior walls and steel framing, which is consistent with what was observed on site. Corridors are generally constructed with CMU throughout. Combustible construction was observed in small MEP spaces and the 1968 drawings indicate plywood at select locations. A small modular structure constructed as an addition consists of masonry exterior walls and noncombustible structure. A building separation was not observed between the existing building and the modular addition. The construction type of the building defaults to **Type IIIB** construction due to the combustible construction. However, if the wood construction is removed, the building would be permitted to be classified as **Type IIB** construction under the current edition of 780 CMR.



FIGURE 2: MASONRY EXTERIOR WALLS



FIGURE 3: PLYWOOD ROOF AND STEEL STRUCTURE

The following table outlines the minimum fire resistance rating for building elements throughout Type IIIB construction.

TABLE 2: FIRE RESISTANCE RATINGS OF BUILDING ELEMENTS (TYPE IIIB)

Building Element	Type IIIB (Existing)
Primary Structural Frame	0 Hour
Interior Bearing Walls	0 Hour
Exterior Bearing Walls	2 Hours
Exterior Nonbearing Walls	Refer to the Exterior Walls Section
Floor Construction and Secondary Members	0 Hour
Roof Construction and Secondary Members	0 Hour

*New Construction*

The construction type of the new building option is required to be based on the proposed height and area. Refer to the following section for limitations to consider for Type IIB construction (unprotected, noncombustible construction).

**Height and Area**

If an Addition is proposed to be constructed, evaluation of height and area limitations applicable to new construction is required (MEBC 1102).

The footprint of the existing building is 60,000 square feet and one story in height.

Table 3 outlines the area limitations for sprinklered and unsprinklered Type IIIB/ IIB buildings containing Group A-2, Group A-3, and Group E Occupancies. Area increases for 100% open frontage are included.

TABLE 3: NEW CONSTRUCTION AREA LIMITATIONS - TYPE IIB & IIIB

Use Group	Allowable Height [Unsprinklered]	Allowable Height [Sprinklered]	Allowable Footprint Area [Unsprinklered]	Allowable Footprint Area [Sprinklered]
A-2/A-3	2 stories/ 55 ft.	3 stories/ 75 ft.	16,625 ft <sup>2</sup>	45,125 ft <sup>2</sup>
E	2 stories/ 55 ft.	3 stories/ 75 ft.	25,375 ft <sup>2</sup>	68,875 ft <sup>2</sup>

**The existing building does not comply with the height and area limitations since it is not sprinklered throughout. If an addition is proposed for the building, sprinklers are required to be provided throughout the existing and new portions of the building to comply with the height and**

area limitations, or a compliant building separation (i.e. fire wall or pedestrian walkway) is required between the existing building and new addition.

A separated, mixed-use approach could be applied to the building to increase the allowable footprint. This approach would not require a rated separation between Group A and Group E occupancies (780 CMR Table 508.4).

**Exterior Walls**

New or altered exterior walls as a result of any renovation or addition are required to be evaluated in accordance with 780 CMR 602 & 705.8.

The following table indicates the fire-resistance ratings and unprotected opening limitations for nonbearing exterior walls based on fire separation distance (780 CMR 602 & 705.8):

TABLE 4: EXTERIOR WALL RATINGS AND UNPROTECTED OPENINGS PERMITTED BASED ON FSD  
TYPE IIIB (NONSPRINKLERED)

Fire Separation Distance (ft.)	Fire-Resistance Rating	Allowable area
0 ≤ X < 5	1 Hour	Not Permitted
5 ≤ X < 10	1 Hour	10%
10 ≤ X < 15	1 Hour	15%
15 ≤ X < 20	1 Hour	25%
20 ≤ X < 25	1 Hour	45%
25 ≤ X < 30	1 Hour	70%
X ≥ 30	0 Hours	No Limit

1. 20 ft. of fire separation distance is required for unlimited openings and nonrated exterior walls for Type IIIB buildings that are sprinklered throughout.
2. 10 ft. of fire separation distance is required for unlimited openings and nonrated exterior walls for Type IIB buildings.

For the purposes of applying the above table, fire separation distance is measured to one of the following: (1) closest interior lot line, (2) centerline of a street, alley, or public way, or (3) an imaginary line between two buildings on the property.

**Based on GIS mapping, a minimum of 280 feet of fire separation distance is maintained to adjacent lot lines around the perimeter of the building. No structures on the same lot are located such that the fire separation distance would be reduced.**

**Interior Finishes**

New interior finishes are required to comply with 780 CMR Chapter 8. All existing interior finishes within the exits/ corridors in the work area in the existing building are required to comply with the code for new construction (MEBC 803.4). If the proposed work area exceeds 50% of the floor area, all interior finishes within exits/ corridors serving the work area are required to comply with 780 CMR (MEBC 803.4.1).

**On site, decorations were observed to be mounted on walls in classrooms and corridors. Regardless of the scope of work, it is recommended that paper decorations be reviewed throughout to ensure these materials are within the allowable limits and locations.**

- Paper materials displayed in classrooms are not permitted to exceed 50% of the total wall area where buildings are sprinklered throughout (527 CMR 20.2.4.4.3). Otherwise, paper materials are permitted for up to 20% of the total wall area.

- Paper materials displayed in corridors are not permitted to exceed 50% of the surface area of any wall in buildings sprinklered throughout, or 10% if the building is not sprinklered (527 CMR 20.2.4.4.4).
  - Paper materials are required to be positioned in such manner to avoid concentration of materials to reduce flame spread in the event of a fire.
  - Groupings of materials are not permitted to exceed a maximum horizontal measurement of 12 feet and a maximum vertical measurement of six feet.
  - Groups of paper material are permitted as long as there is space between each group equal to at least 1/2 the horizontal width of the largest adjacent group.
- Paper materials are not permitted to cover an egress door or be placed within 5 ft. of an egress door (527 CMR 20.2.4.4.).



FIGURE 4: CLASSROOM WALL DECORATIONS



FIGURE 5: CORRIDOR WALL DECORATIONS

### Fire Protection Systems

The existing building is not equipped with a sprinkler system. Sprinkler protection is required as part of the project as outlined below:

- A new building is constructed with any of the following (780 CMR Table 903.2)
  - Group E fire area that exceeds 12,000 sf, or an area below the level of exit discharge.
  - Group A-2 fire area that exceeds 5,000 sf, 100 occupants, or an area below the level of exit discharge.
  - Group A-3 fire area that exceeds 5,000 sf, 300 occupants, or an area below the level of exit discharge.
- If an addition is constructed to the existing building without a compliant building separation, an automatic sprinkler system is required to meet the area limitations (780 CMR 506.2).
- If the work area exceeds 50% of the area on a given floor, the work area is required to be provided with sprinklers (MEBC 804.2.2).
- If the scope of work is considered a 'major alteration' based on MGL Ch. 148 Sec. 28G. Massachusetts General Law Ch. 148 Sec. 26G requires every building or structure, including major alterations thereto, which totals more than 7,500 gross square feet, to be protected throughout with an automatic sprinkler system. The law does not implicitly define what constitutes a 'major alteration.' An advisory document published by the Sprinkler Appeals Board in 2009 expands upon the application of this MGL to existing buildings, i.e. what should constitute 'major alterations.' This document summarizes that an existing building is

required to be protected with sprinklers where all of the following four conditions are satisfied:

1. Building gross square footage is more than 7,500 sf;
2. Sufficient water and water pressure exist to serve the system;
3. The nature of work to the building is considered as “major”, including any one or more of the following:
  - a. The demolition or reconstruction of existing ceilings or installation of suspended ceilings;
  - b. The removal and/or installation of sub flooring, not merely the installation or replacement of carpeting or finished flooring;
  - c. The demolition and/or reconstruction or repositioning of walls or stairways or doors; or
  - d. The removal or relocation of a significant portion of the building’s HVAC, plumbing, or electrical systems involving the penetration of walls, floors, or ceilings.
4. The scope of work is proportional to the cost/benefit of sprinkler installation. To evaluate whether this is satisfied, the advisory document lists either of the following as thresholds for requiring sprinkler protection (evaluated over a 5-year period):
  - a. Work affects 33% or more of the total gross square footage; or
  - b. Total cost of the work (excluding cost to install a sprinkler system) is equal to or greater than 33% of the assessed value of the building, as of the date of permit application.

**The 2020 advisory document by the Sprinkler Appeals board notes that buildings owned by the Commonwealth are generally not subject to the provisions of 26G. However, buildings that are owned by state authorities or other similar entities created by Legislature, may not necessarily be considered “state owned”.**

### **Fire Alarm & Detection System**

The building is equipped with a zoned fire alarm and detection system. The fire alarm control panel (FACP) is located in the office space adjacent to the main entrance vestibule from the parking lot. Fire alarm devices observed throughout the building include smoke detection, manual pull stations adjacent to exits, and audible/visual notification appliances. The system is not provided with emergency voice/ alarm capabilities. The fire alarm and detection system is required to be extended/ reconfigured to provide full coverage as part of any renovation (780 CMR 907.2.3 Exception 1 & 527 CMR 1.00, 13.7.2.3.1.2).

All new fire alarm devices and any modifications to the existing fire alarm system are required to meet new construction requirements of NFPA 72 (2013 Edition) and 527 CMR relative to their installation. Group E buildings are also required to be provided with an emergency voice/ alarm communication system (780 CMR 907.2.3).

### **Means of Egress**

Existing means of egress are required to be maintained in accordance with 527 CMR 1.00 & 780 CMR 102.8.

**Deficiencies observed relative to the existing means of egress serving the building are outlined below. These existing conditions are permitted to remain unless deemed hazardous by the**

building official or otherwise required to be corrected per 521 CMR or the MEBC. Note that this is not an exhaustive list of all existing egress deficiencies in the building.

- Portions of the corridors and most doors serving the corridors are not provided with a fire resistance rating, latch, and closer. For unsprinklered educational buildings, corridors are required to be 1-hour rated (780 CMR 1020.1).
- Exit doors are not provided with the required level landings on both sides, and slopes were observed on the exterior sides of doors (780 CMR 1010.1.6).
- Egress doors throughout the building have clear openings less than the required 32 inches (780 CMR 1010).
- Missing or noncompliant/nongraspable handrails serving exterior ramps and stairs were observed (780 CMR 1014.1 & 1014.3).

Alterations to the means of egress are required to comply with the code for new construction (MEBC 702.6). Where an addition to the existing building is constructed, the new and existing means of egress or egress components serving the addition are required to comply with 780 CMR Chapter 10 for new construction. The following include some of the major requirements, based on the building being fully sprinkler protected:

- The means of egress is required to be sized using 0.2" per occupant for stairs and 0.15" per occupant for other egress components (780 CMR 1005.3.1 & 1005.3.2). This assumes the building is being sprinklered and provided with an emergency voice/ alarm communication system as part of the renovation scope. **With these factors, the existing exit doors serving the building provide an egress capacity of 2,126 occupants. If either of the systems are not installed, the egress capacity is limited to 1,595 occupants.**
- The number of occupants required to be calculated in accordance with 780 CMR Table 1004.1.2. Factors anticipated to be used on this project are listed in Table 5. The occupant load is permitted to be increased from the occupant load established for the given use where all other requirements of 780 CMR are met (780 CMR 1004.2).

TABLE 5: OCCUPANT LOAD FACTORS

Function of Space	Occupant Load Factor
Assembly, Unconcentrated (Tables & Chairs)	15 net
Classrooms	20 net
Vocational Shops/Labs & Library Reading Rooms	50 net
Fitness Space/Lockers	50 gross
Office & Library Stacks	100 gross
Commercial Kitchen	200 gross
Storage Areas/ MEP Rooms	300 gross

As the scope of work for the project is developed, egress capacity is required to be maintained in accordance with 780 CMR Chapter 10.

- A single means of egress is permitted from any space where the occupant load or common path of travel distances are less than that specified in the following table (780 CMR 1006.2.1):

TABLE 6: SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

Occupancy	Maximum Occupant Load	Maximum Common Path of Travel Distance
A/E	49	75 feet

- Exit access travel distances are not permitted to exceed 250 ft. (780 CMR 1017.2).
- Where two exits or exit access doorways are required from any portion of the exit access as outlined above, the exit doors or exit access doorways are required to be placed a distance apart equal to not less than 1/3 of the length of the maximum overall diagonal dimension of the building or area served in a building that is sprinklered throughout (780 CMR 1007.1.1 Exception 2). The separation distance increases to at least 1/2 the length of the maximum overall diagonal dimension for buildings that are not sprinklered throughout.
- Corridors serving Group E occupancies on a floor with an occupant load of 100 or more are required to have a clear width of at least 72" (780 CMR Table 1020.2).
- Dead-end corridors are not permitted to exceed 20 ft. for Group A occupancies and 50 ft. for Group E occupancies (780 CMR 1020.4).

**Plumbing**

248 CMR 10.00, *Uniform State Plumbing Code*, regulates the minimum number of plumbing fixtures. The requirements set forth in 248 CMR 10.10(15) Table 1 apply to plumbing system installation, alteration, or extension projects where a plumbing permit is required. The minimum number of plumbing fixtures are based upon the use and occupancy classification of the building or space and the population as established by the authority having jurisdiction.

TABLE 7: PLUMBING FIXTURE FACTORS

Use Group	Toilets		Urinals	Lavatories Each Sex	
	Female	Male		Female	Male
Elementary Students	≤100: 1 per 25 >100: add 1 per 50	≤100: 1 per 25 >100: add 1 per 50	50% max. substitution	1 per 25	
Educational Staff	1 per 20	1 per 25	33% max. substitution	1 per 20	
Assembly (Gathering/Gymnasium)	≤200: 1 per 25 201-500: 1 per 50 >500: 1 per 100	≤200: 1 per 50 201-500: 1 per 100 >500: 1 per 100	50% max. substitution	1 per 50	

One drinking fountain per restroom set and one service sink per floor is also required.

The posted certificate of inspection for the school indicates that the maximum program load is 600 educational occupants throughout the facility. The gymnasium and cafeteria are each limited to 180 occupants. **Table 8 outlines the required number of plumbing fixtures for students based on the anticipated enrollment. As the scope of work is further developed, the maximum program load of the building should be confirmed, including staff and after-hours events, to determine the number of required plumbing fixtures.**

TABLE 8: PLUMBING FIXTURE CALCULATIONS

Classification	Number of Occupants	Water Closets		Male Urinals <sup>1</sup>	Lavatories	
		Female	Male		Female	Male
K-12 School (Student)	305	5.05	5.05	2.53	6.10	6.10
<b>Total Required Fixtures</b>		<b>6</b>	<b>6</b>	<b>3</b>	<b>7</b>	<b>7</b>
K-12 School (Student)	450	6.50	6.50	3.25	9.00	9.00
<b>Total Required Fixtures</b>		<b>7</b>	<b>7</b>	<b>3</b>	<b>9</b>	<b>9</b>
K-12 School (Student)	610	8.10	8.10	4.05	12.20	12.20
<b>Total Required Fixtures</b>		<b>9</b>	<b>9</b>	<b>4</b>	<b>13</b>	<b>13</b>

1. Permitted to be substituted for required male water closets.

**Fire Department Access**

Fire Department access roads are required to be provided and maintained such that any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building (527 CMR 18.2.3.2.2). This is permitted to be increased to 250 feet if the building is fully sprinklered.

The design of the access road is required to comply with the following:

- Have an unobstructed width of not less than 20 feet and vertical clearance of 13 feet 6 inches (527 CMR 18.2.3.5.1).
- Have a minimum inside turning radius of at least 25 feet unless otherwise required by the fire official (527 CMR 18.2.3.5.3.1).
- Have a gradient that does not exceed 10% (527 CMR 18.2.3.5.6.1).
- Dead-ends in excess of 150 feet in length are required to be provided with approved provisions for the fire apparatus to turn around.
- Required to be capable of supporting the imposed loads of fire apparatus and provided with an all-weather driving surface (527 CMR 18.2.2.1.1).

**Accessibility**

Buildings in Massachusetts are subject to compliance with the 521 CMR and the ADA.

**ADA Standards**

ADA requires altered portions of an existing building to be readily accessible to and usable by individuals with disabilities to the maximum extent feasible (ADA 36.402(a)(1)). Further, alterations to primary function areas should be made such that the level of accessibility, including the path of travel to the space, is made accessible to the maximum extent feasible. When determining if the upgrade is feasible, the ADA requirements state that the upgrade to the path of travel is disproportionate to the project *when the cost to perform the work exceeds 20% of the cost of the alteration to the primary function area*. Primary function areas are not limited to public use areas and may include lobbies, offices, meeting rooms, etc. In choosing which accessible elements to provide if the cost is disproportionate, priority should be given to those elements that will provide the greatest access, in the following order:

- An accessible entrance
- An accessible route to the altered area
- At least one accessible restroom for each sex or a single unisex restroom

- Accessible drinking fountains
- Accessible telephones

521 CMR

521 CMR Section 3.3 contains the following scoping requirements for work occurring in existing buildings. The costs referred to the scoping requirements below are cumulative for all work to the building within a rolling 36-month period:

1. If the work occurring within the building is less than \$100,000, then only the work being performed is required to comply with 521 CMR.
2. If the work costs more than \$100,000 but less than 30% of the full and fair cash value of the building then in addition to the work being performed, the following accessible features are also required to be provided in the building:
  - a. Accessible entrance
  - b. Accessible toilet room
  - c. Accessible drinking fountain (if provided)
  - d. Accessible public telephone (if provided)
3. If the work, and all permitted work within a 36 month rolling window, costs more than 30% of the full and fair cash value of the building (prorated based on public spaces), then all public portions of the building are subject to the requirements of 521 CMR.

If you have any comments or questions on the contents of this letter, please do not hesitate to contact us.

Prepared By:



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Reviewed By:



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