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ACKNOWLEDGMENTS

Dore & Whittier Architects would like to acknowledge the following individuals for their dedication to the Town of Chelmsford School Department and for their assistance to the Design Team.

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INTRODUCTION & BACKGROUND

In October 2015, the Town of Chelmsford, MA issued a Request for Proposal (RFP) for the comprehensive facilities assessment and master plan study. The study included Chelmsford High School, McCarthy and Parker Middle Schools, the four elementary schools, Westland's Community Center, the School Administration facility, and the property of 101 Mill Road. Dore & Whittier Architects responded to this request and was chosen by the Facilities Working Group and School Committee to perform this study. Our study includes a comprehensive assessment of each of the facilities, educational visioning, and the development of a ten year Master Plan. The Master Plan includes options to resolve the districts' key issues including relieve from overcrowding in the elementary schools, provisions for full-day kindergarten, and the ongoing maintenance and facility improvements needed to provide sound educational learning environments for Chelmsford's Pre-K through grade 12 students.

The Chelmsford Public School District serves approximately 4,981 students in grades Pre-K thru 12. Currently there are four elementary schools serving the district's 1,760 K-4 student population. Two middle schools accommodate 1,581 students in grades 5-8 students, and the high school population of 1,509 9th-12th grade students. The District currently offers ½ day kindergarten at each of the elementary schools. The Chelmsford Integrated Preschool program is located at the former Westlands Elementary School which currently serves as the Community Center. The Westlands Community Center offers classes and programs to the Town's youth, adults, and senior citizens. These programs occur throughout the day and evening and utilize several of Westlands classroom spaces, the cafeteria, and the recreation room. Special education programs for grades K-12 are provided at each school within the District. The Lion's Den is a part-time Pre-school program is located at the High School. High school students in the Family Consumer Science program assist in the Lion's Den as part of the Exploring Early Childhood class curriculum.

As part of this study the District conducted a review of past district wide enrollments to help determine the future student population. This enrollment review projected student population up through year 2026. This information, along with the educational visioning, facility assessment, and an outline of the District's goals helped to shape the options and recommendations found in this report. When projecting space needs for students the highest enrollment figures were used for each grade grouping. This methodology is further explained in the educational visioning sections of this report.

This Study provides the following:

1. Documentation of existing conditions and physical assessment of each building and site with recommendations to address findings;

2. Review of the District's Enrollment Projections and consideration of their impact on future needs;

3. An identification of Educational Program needs, goals, strengths and deficiencies, including a Space Utilization Analysis;

4. The options to provide full-day kindergarten in the short term until a full master plan option is recognized;

5. Conceptual design options and master plan developed to address District-wide facility and educational needs;

6. Cost estimates associated with District-wide conceptual options, facility needs and capital improvements.

Facility assessments for this study were based solely on visual assessments and the historic documentation or notes provided to the Architects and their consultants at the time of the study. No investigative demolition or research was conducted for this study. All long term building renovation recommendations developed during the course of this study encourage the integration of sustainable design components including energy efficiency, recycling of materials, water conservation, renewable energy technology and environmentally friendly materials to the extent feasible.

DOCUMENTATION

This report is based on information gathered by visual observations of each facility and site conducted by Dore & Whittier Architects, Inc. and its consultants, as well as a review of the available existing building drawings, documents, reports and enrollment projections that were provided to the Design Team from the Town of Chelmsford. The extent and accuracy of the documentation available varies with each of the buildings. Little documentation was available for 101 Mill Road facility and site.

Existing Buildings:

Building	Address	Year built / Renovated	Total Sq. Ft	Grade Configuration Total Enrollment / FTE Staff
Chelmsford High School	200 Richardson Rd North Chelmsford, MA. 01863 (978)251-5111	Original building: 1974 Add/Reno: 2008	305,810 sf	Grades: 9-12 Students:1508 FTE:
McCarthy Middle School	250 North Rd Chelmsford, MA. 01824 (978)251-5122	Original building: 1959 Add/Reno: 2006	147,954 sf	Grades: 5-8 Students: 864 FTE: 114.5
Parker Middle School	75 Graniteville Rd Chelmsford, MA. 01824 (978)251-5133	Original building: 1965 Add/Reno: 2006	105,000 sf	Grades: 5-8 Students: 717 FTE: 45.5
Byam Elementary School	25 Maple Rd Chelmsford, MA. 01824	Original building: 1969 Add/Reno: 2004	60,442 sf	Grades: ½ K -4 Students: 473 FTE: 67.5

	(978)251-5144			
Center Elementary School	84 Billerica Rd. Chelmsford, MA. 01824 (978) 251-5155	Original building: 1953 Add/Reno: 1999	52,300 sf	Grades: ½ K -4 Students: 430 FTE: 60
Harrington Elementary School	120 Richardson Rd North Chelmsford, MA. 01862 (978)251-5170	Original building: 1968 Add/Reno: 2004	30,221 sf	Grades: ½ K -4 Students: 465 FTE: 67.5
South Row Elementary School	250 Boston Rd Chelmsford, MA. 01824 (978) 251-5177	Original building: 1961 Add/Reno:	42,000 sf	Grades: ½ K -4 Students: 392 FTE: 55
Westland's Community Center	170 Dalton Rd Chelmsford, MA. 01824 (978)251-5188	Original building: 1967 Add/Reno: 2004	37,100 sf	Grades: ½ K -4 Students: 132 FTE: 42.5
School Administration Building	230 North Rd Chelmsford, MA. 01824 (978)251-5100	Original building: Add/Reno: 2005		Grades: NA Students: NA FTE:
101 Mill Road	101 Mill Rd Chelmsford, MA	Original building: 1800s Add/Reno: 1980s		Grades: NA Students: NA FTE: NA

- **Build sq. ft. does not include temporary modular buildings**
- **Student population is as of October 2015**
- **FTE Staff refers to "Full Time Equivalent"**

EXECUTIVE SUMMARY

Introduction

This Report provides an independent architectural and engineering assessment of each of the school facilities in the Chelmsford Public School District. The report outlines long and short term goals for the district's educational program, identifies facility space needs to support the educational program, and provides options to achieve those goals over a period of ten years.

Dore & Whittier used the following method to develop this report:

A. Data gathering and analysis
B. Facility Assessments and Capital Improvement Plans
C. Educational Visioning
D. Development and Prioritization of Goals
E. Development and Assessment of Options

Throughout the study the Team met regularly with the facility managers, district administration and the Working Group to identify facility and educational space needs, to prioritize the space needs, and to develop and assess the options. The result of this work includes facility assessment reports, capital improvement plans (CIP) and options for building additions, renovation or replacement over the course of a ten-year period.

A - DATA GATHERING AND ANALYSIS

The District provided the Design Team with existing building plans, prior capital improvement project documents, reports, and the current value of each facility. When reviewing the scope of work proposed for repairs or renovations it is important to review the current value of the facility, as a percentage of this value is used to trigger other code related work such as seismic or accessibility upgrades. The current value of each building and site is included in Appendix B1. Data was also provided regarding enrollment projections. This information was developed by NESDEC and included an enrollment projection for each grade level for ten years. The NESDEC projections are included in Appendix C of this report.

B - FACILITY ASSESSMENTS AND CAPITAL IMPROVEMENT PLANS

The Facility Assessment Reports were developed by the architectural and consultant teams and involved visual assessment of the building and the site. No destructive or investigative work was conducted. These reports include seven to nine reports, depending on the facility. These reports include the Architectural

Report, Civil and Site Report, Structural Report, Mechanical, Electrical, Plumbing, and Fire Protection (where applicable) Reports, Kitchen Equipment Assessment Report, and a Hazardous Materials Report. These reports identify existing conditions, note specific issues, and make recommendations for repairs or replacements.

The CIPs record each of the specific issues and recommendations noted in the facility assessment reports. As part of the prioritizing of each of the specific issues and recommendations, each item is checked against seven categories:

1) Health, Safety, & Welfare,
2) Code Compliance (based on current codes),
3) Functional Use of Building or Site,
4) Handicap Accessibility,
5) Extending the Life of the Building (Maintenance),
6) Energy Efficiency / Energy, Water Saving, and
7) Hazardous Material Abatement.

Items that fall under Health, Safety, & Welfare often receive the highest priority.

Items are not typically noted under Hazardous Materials Abatement unless the item includes pre-disturbed or damaged material thought to contain asbestos. In most cases, material in good condition is best left in place. The assessment report, that is included with each of the facility assessments, reviews the existing condition of the building under the assumption of a proposed renovation or demolition of the building. Bulk samples from "suspect" materials are taken from the site and tested. The cost estimate noted in the CIP spread sheet and in the summary on page A2-7 (Image 2), is an estimated cost to remove all hazardous materials from the building under a complete renovation or demolition of the building. Any proposed repair project may encounter hazardous materials that will need to be removed and properly disposed of as part of the scope of work. This cost of the removal and disposal is not included in the cost estimates for the specific issues and line items note in the CIP. The Chelmsford School District has developed an asbestos abatement plan as part of the Asbestos Hazard Emergency Response Act (AHERA) and has been following the prescribed removal timeline outlined in the AHERA plan prepared by Terracon Consultants, dated November 12, 2015. This report is included in Appendix A of this report.

Once items have been categorized they are then prioritized. For Chelmsford, four sections were developed; High, Medium, Low, and Ongoing Maintenance. High Priority items are scheduled to be addressed in one to three years, Medium Priority items in four to six years, and Low Priority items in seven to ten years. Ongoing Maintenance items have been identified and, while some of these have been noted as High, Medium, or Low Priority, most have not received a timeframe and should be addressed as needed.

Cost estimates, in today's dollars, have been noted in the CIP for each line item. These costs are developed based on an approximate quantity or area of work. The Estimated Project Costs (reflected in the CIP) include: estimated designer contingency of 10%, owner's contingency of 10%, and soft cost of 20%. Escalation of +/- 4% should be added to the project cost based on the proposed time of bid. Items shown in the Ongoing Maintenance column also include the above noted contingencies and soft cost, however these items may be performed by the District at lower costs.

C - EDUCATIONAL VISIONING

Visioning sessions that included a broad spectrum of constituents (teachers, students, parents, school committee members, senior citizens, and other members of the community) set the educational goals that informed the development of options. Four visioning sessions were held, each lasting approximately four hours. These meetings included presentations, interactive small and large group exercises, and round table discussions that were facilitated and guided by Dore & Whittier. Presentations and meeting results are included in the Appendix.

A Summary of the key issues from the Visioning Sessions (listed below) were used as goals when evaluating the Master Plan Options.

Key Issues Identified in Visioning Sessions:

- Accommodation for Full-day kindergarten (starting 2017-18)
- Consideration of alternative locations for Pre-K (CHIPS) program; attached to another school or with the Kindergarten program
- Resolve overcrowding and space needs at the elementary, middle, and high schools
- Resolve the missing and/or inappropriate spaces including special education, art, and music at the elementary and middle schools, and upgrade of the middle school science rooms
- Replace the "temporary construction" or "pods" that exists at South Row Elementary School, and both Parker and McCarthy Middle Schools
- Investment is needed in the facility conditions

D – DEVELOPMENT AND PRIORITIZATION OF GOALS

The prioritization of districtwide full-day kindergarten in the near term is the basis for the options that include both a short-term temporary solution for full-day kindergarten and the development of long term master plan options that provides permanent construction to support the full-day program and increased enrollment at the elementary school level. In total eight goals were established to assess the options. These goals were weighted on a percentage of 100 based on their priority. The goals and their weights are noted below.

1)	Ability to provide full-day kindergarten	20 pts
2)	Location of Pre-K with another program / school	11 pts
3)	Ability to reduce / eliminate overcrowding	20 pts

4)	Provide a building that is not t0o large for the population "Under crowding"	4 pts
5)	Provide the missing or educationally inappropriate spaces. These spaces were noted as a) Special Education spaces, b) Middle School Science Labs, c) Elementary School specials (ie. art, music, gym, technology, library).	20 pts
6)	Eliminate temporary construction	10 pts
7)	Time to completion	5 pts
	SUB-TOTAL	100 points

A second 100 points was given to costs which were broken down into four evaluation categories.

1)	Construction	75 pts
2)	Continued Capital Investment Needs	10 pts
3)	Staffing and Administration Cost (more cost = less points)	5 pts
4)	Transportation (greater transportation cost or distance = less points)	10 pts
	SUB-TOTAL	100 points

Once the options developed were complete each option was scored on a scale of 1-5 for each of the criteria noted above. The weights were applied to each score and the options that scored the highest in the first seven categories were then scored for cost. The results are the short list of options that are included in the Master Plan.

E– DEVELOPMENT AND ASSESSMENT OF OPTIONS

The Design Team developed sixteen options based on the results of the visioning sessions, the educational program needs and the facility assessments. These options are noted in the diagrams below (Image 1). In this diagram the red squares indicate facilities that do not meet the space requirements for the student population, yellow squares indicate facilities that are correctly sized for the population and educational programs, and green indicates facilities that are oversized (under crowded) for projected enrollment and educational programs.

Tiles that have a bold outlined gray block below them indicate temporary building additions. Bold outlined yellow boxes below the square tiles indicate a permanent addition to the building to right size the facility and accommodate the program needs. Yellow tiles with a bold outline around them indicate a new building. White squares indicated facilities that are not needed to meet the District's needs or enrollment.

The Westlands Community Center facility size and need was based solely on the use of the building for the Pre-K program. In several options this facility appears green (oversized). This assumes that the Community Education program is relocated elsewhere in the district, or the program space needs for Community Education are greatly reduced due to the institution of full-day K throughout the District. The Community Education program space needs were not a part of this study.

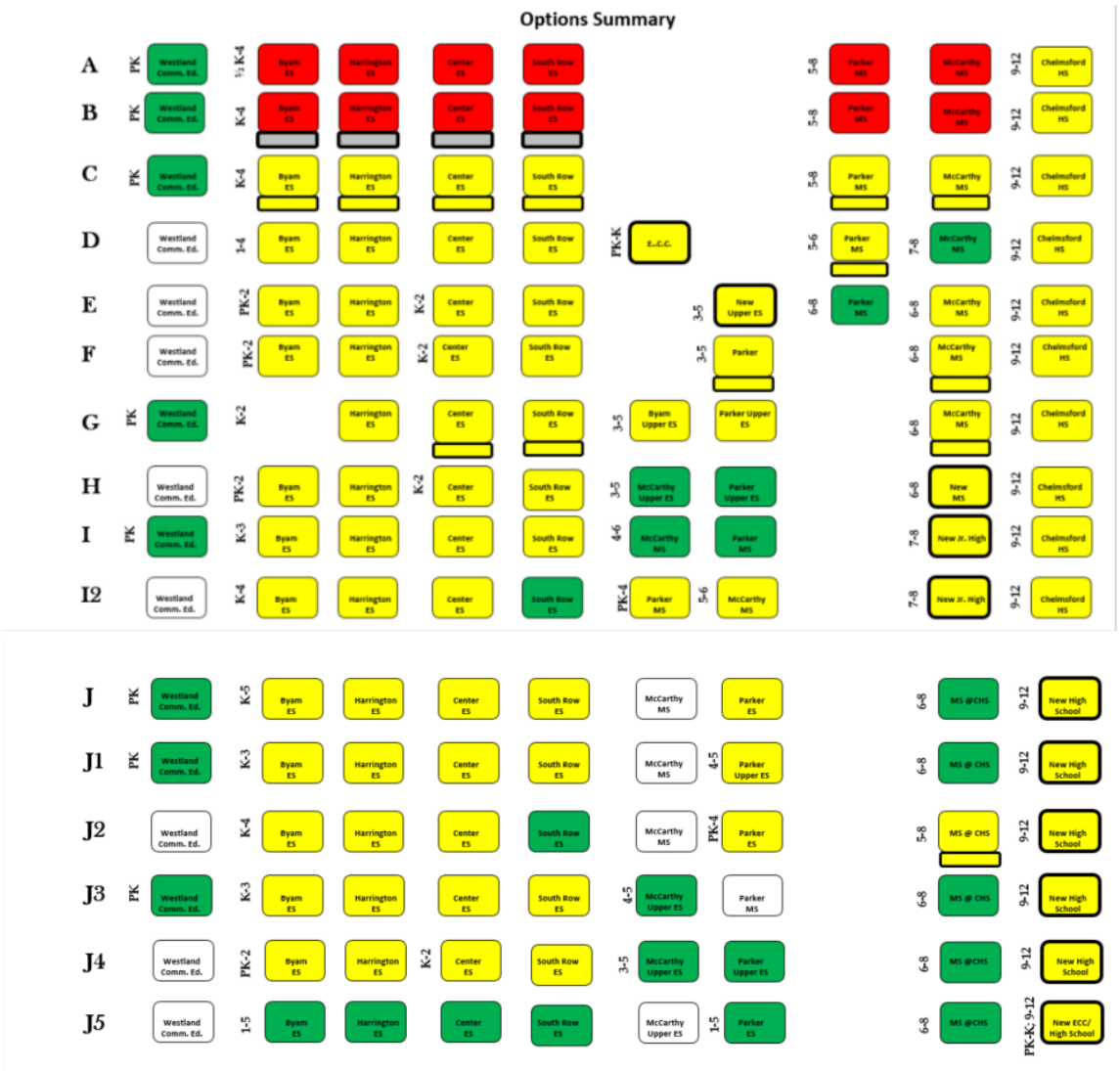

Image 1: Summary Initial Master Plan Options

A general description of the options is outlined below and given in greater detail in Section IV Conceptual Options.

Option A : Capital Improvements Only - this option is used as the base line for cost estimates. This option does not response to space or educational program needs

Option B: Modular Classroom Addition -modulars at each of the elementary schools and the McCarthy Middle School to address space needs.

Option C: Permanent Additions – additions at each elementary school and McCarthy Middle School to resolve the space and programmatic needs.

Option D: New Early Childhood Center (ECC) – new building and grade reconfiguration for grades K-8.

Option E: New Upper Elementary School- new grade 3-5 school and grade reconfiguration for grades PK-8.

Option F: Major Additions to Schools – additions at two middle schools and grade reconfiguration for PK-8.

Option G: Major Addition to Center, South Row and McCarthy Schools – major additions and grade reconfiguration of K-8.

Option H: New Middle School -new 6-8 school and grade reconfiguration of PK-8.

Option I: New Jr. High School – new 7 & 8 school and grade reconfiguration of K-8.

Option I2: New Jr. High School – new 7&8 school, repurpose of Parker School as an elementary school (PK-4), McCarthy to serve grades 5 & 6.

Option J: New High School - new High School, existing HS is renovated for grades 6-8, Parker is renovated for K-5, discontinued use of the McCarthy School.

Option J1: **New High School** - new High School, existing HS is renovated for grades 6-8, Parker serves grades 4-5, discontinued use of the McCarthy School.

Option J2: **New High School** - new High School, existing HS is renovated for grades 5-8, Parker serves grades PK-4, discontinued use of the McCarthy School and Westlands.

Option J3: **New High School** - new High School, existing HS is renovated for grades 6-8, McCarthy serves grades 4-5, discontinued use of the Parker School.

Option J4: **New High School** - new High School, existing HS is renovated for grades 6-8, McCarthy and Parker serve grades 3-5, elementary schools are Pk-2, discontinued use of the Westlands School.

Option J5: **New High** School with ECC - new High School / ECC, existing HS is renovated for grades 6-8, Parker School and the elementary schools serve grades 1-5, discontinued use of the Westlands and McCarthy Schools.

Scoring of each option was conducted based on the prioritization of the goals and the weighted score of each goal as noted above. Cost estimates were developed for the five options that scored the highest in the top seven categories. These options were D, E, H, I2, and J5. A Master Plan time line was developed outlining the steps needed to fully achieve each option.

SHORT TERM FULL- DAY KINDERGARTEN OPTIONS

All options noted above provide accommodations to serve full day kindergarten at each of the elementary schools. However, depending on the option the District choses the provisions for full day kindergarten could take six to ten years. With this in mind the District requested that D&W explore options to provide districtwide full day kindergarten in the near term until a full master plan option could be realized.

D&W explored options that would provide full-day Kindergarten in the near future, one to three years. The options developed are not intended to be a long term solution to the full day kindergarten program, as this solution is provided for in the Master Plan. These explorations included providing modular classrooms at one or all of the elementary schools, renovating Westlands School to serve the additional kindergarten classroom needs, renting and renovating a facility to serve a portion or all of the kindergarten classrooms, and grade reconfiguration (8th grade to High School, 4th grade to Middle School) to allow classroom space in the existing elementary schools.

The grade reconfiguration required changes to the High School Schedule to provide an 85% utilization rate and changes to the grade 8 schedule to coordinate with the High School schedule to accommodate specials such as gym, art and music as well as coordination of the lunch schedule. The option also called for the addition of eight to eleven modular classrooms to serve the additional population. Other changes required by this option included Middle School grade reconfiguration. The Parker School would be changed to serve grades four and five only and McCarthy would serve grades six through eight. A full presentation of this exploration was given to the Working Group and due to the magnitude of changes required at every level of education this option was not explored beyond this initial concept.

The Option to rent space to serve a portion or all of the kindergarten program was explored. While cost estimates to implement this option were discussed, research for this option did not yield appropriate available space within the town.

The chart below indicates the two major options that were explored, A and B. Option A proposes the addition of modular classrooms to each of the elementary schools. Option A1 proposes attaching the classrooms to the existing building and Option A2 places the modular classrooms on the site, detached and separated by ten to fifteen feet from the exiting building. Under Option A1 the attachment of the modular classrooms will trigger a variety of issues that are not in compliance with today's building codes. This includes the addition of a fully automatic fire suppression system (sprinklers) in each of the elementary schools with the exception of Center School where sprinklers already exist. The extent of work necessary to meet this requirement would then trigger other code issues that are currently "grandfathered" but not in compliance with today's codes.

Option A2 provides the same number of modular classrooms at each of the elementary schools. In Option A2 the classrooms are not attached to the existing building, this separation from the existing facility allows the District to provide the needed space without triggering the code upgrades required in option A1.

Options A1 and A2 require a minimum of two modular classrooms at each school to meet the kindergarten enrollment projected for the next ten years or until the master plan is fully realized.

Option B also has three subsections. B1 proposes the addition of four modular classrooms to the Center School, the conversion of Westlands School to a PK & K school. The addition of four modular classrooms in this location accounts for the expansion of the PK program and the addition of the classrooms necessary to meet the full-day K enrollment. In B1 the modular classrooms are attached to both the Center School and to the Westlands School. In this case the attachment of the modular classrooms would trigger code required upgrades, similar to Option A1.

In B2 the four modular classrooms added to the Westlands School would not be attached to the existing facility. In both B1 and B2 the Community Education program would be relocated. Provisions for relocation were not included in this study or cost estimate.

Option D expands the number of modular classrooms added to the Westlands School site to provide space for Community Education administration and a reduced number of Community Ed. programs.

Option	Number of Modulars	Existing Building Upgrades Req'd	Cost Estimate
Option A1 (Connected)	12	√	$58M
Option A2 (Disconnected)	12		$7.9M
Option B 1& 2 (Center School)	4		$2.6M
Option B1 (Westlands School, Connected)	4	√	$13.7M
Option B 2 (Westlands School, Disconnected)	4		$2.9M
Option C (Rental)			NA
Option D (Extra mods for Comm Ed)	10		$5.5M

Image 2: Summary Temporary Kindergarten Options

The Report

This Master Plan report reflects the work, data, and analysis that led to the development of the options. The report is broken into five sections: Section I - This section, provides a summary of the Work and Options that are found in the subsequent sections of this report.

Section II-Facility Assessments includes an in-depth report of the physical condition of each of the school facilities and a Capital Improvement Plan for each facility. In addition to the District's school facilities, this section includes the study and assessment of the Westlands School facility, the School Administration Building and 101 Mill Road, a converted farmhouse that is managed by the School Department. The Westlands School is a shared facility with the Chelmsford Integrated Pre- School (CHIPS) program and the Community Education program. The pre-school program is a District supported program and, as such, the space needs for this program are included in the development of the Options and Master Plan. Long term considerations of the space needs for the Community Education programs were not included in this study. However, most options allow for Community Education to remain at the Westlands School. The two non-school facilities included in this study, 101 Mill Road and the School Administration building are not included in the Options for the Master Plan. It is assumed that school administration will remain in its current location and this facility will receive capital improvements as needed to maintain the facility. 101 Mill Road is not a suitable facility for a school and is not required for the administration needs of the district. The long-term needs or use of this facility were not identified in this report. The capital improvement plan outlines specific issues regarding the existing conditions and repairs needed to maintain the building.

Section III – Educational Program and Visioning provides the background and data that informed the development of the options. This includes capacity and space needs analysis, educational program analysis, educational visioning which includes both the public visioning sessions and the results of the meetings and presentations to the Working Group.

Section IV – Conceptual Options reports the options that were developed to address the needs and goals identified in the educational visioning or facility assessments. This section outlines the sixteen options that were developed, provides the methodology used for evaluation of the options and identifies the "short list" of options that were chosen to move forward into the Master Plan.

Section V- Master Plan is a summary of the master plan alternatives and provides a timeline with steps to implement the option(s) over a ten-year period. Each Master Plan alternative starts with the implementation of full-day kindergarten. The next step in implementing the Master Plan will require the District to assess the value of each of the alternatives, establish consensus, and implement the first phase of the plan by submitting a Statement of Interest to the Massachusetts School Board Authority.

Facilities Overview

It is obvious that the facilities have been maintained well and proactive measures by the District have addressed ongoing maintenance items. Improvements have been made to mechanical and electrical equipment, fire alarm systems, windows, doors, roofing, and energy efficiency. The level of maintenance needs and required upgrades noted in the facility assessment reports vary in each of the buildings, with some facilities requiring extensive work and others needing only minor repairs and on-going maintenance. Outlined below is a general overview of our findings.

It is important to note that throughout this report, references have been made to the current building codes. It is assumed that at the time of construction, each facility met the existing building codes and that existing conditions have been grandfathered. Upgrades for compliance with current building codes are suggested in all areas of life safety and accessibility. It is also important to note that in areas where the need for immediate repair or replacement is noted in the report, these concerns were brought to the attention of the District and were addressed prior to the completion of this report. The notes remain in the report and in the Capital Improvement Plans where they are identified as “completed”.

Where repairs and replacements are noted in the reports all new work and renovations to existing conditions must comply with current building codes. In some instances, new repair or renovation work may trigger facility upgrades such as the addition of sprinklers, seismic bracing, or ADA / MAAB (handicap accessibility) compliance. A full, detailed scope of work must be developed along with a complete code review and updated cost estimate prior to the start of any repair, renovation, or new construction project. A Code Review Summary is provided in Section I A-3. This Code Summary is based on current building codes which were used as a basis in the development and identification of facility needs. Where repairs and replacement of building conditions extend over time, the Work will need to be in compliance with the building codes in effect at the time of permitting.

The chart below (Image 3) is a summary of the facility assessment needs. The column on the left indicates the twelve categories that were used in the assessments. Red dots indicate areas in poor condition or, as in the case of fire protection systems, missing. Where two dots are sharing the same square this means the condition is mixed. This case is recorded in the mechanical, electrical, and plumbing systems where repairs and improvements may have been done to fixtures but the distribution systems are in need of repair or replacement. A review of the chart indicates the Westlands School in need of the most upgrades followed by South Row, and Harrington Schools.

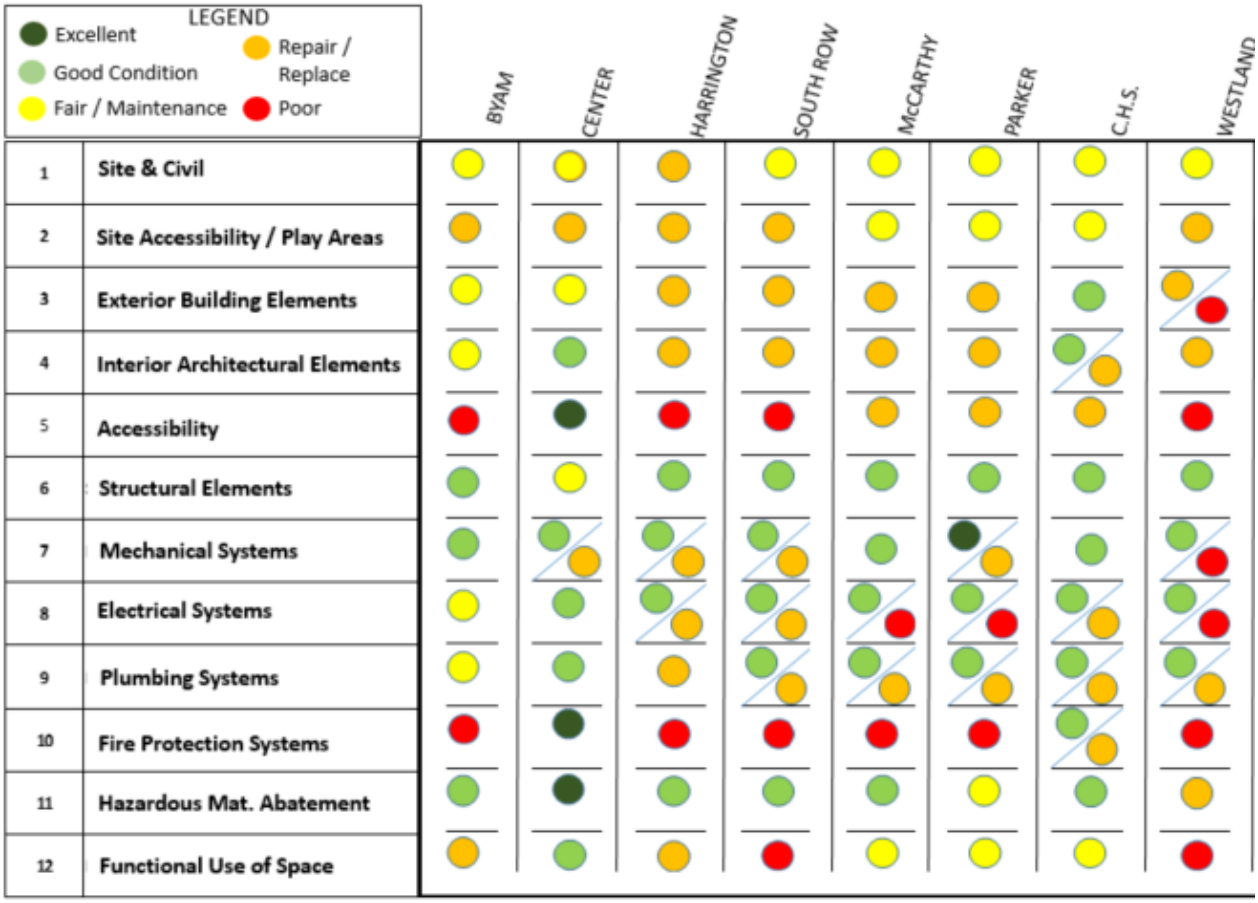

Image 3: Summary Facility Assessment Needs

The 'Functional Use of Space', line item 12 on the chart Facility Assessment Needs Chart, identifies spaces within the facility that are either undersized for their current use or were not designed for the function that is taking place within that space. An example of this is the use of vestibules and corridors for teaching spaces. With the exception of the Center School, each of the elementary schools scored low in this category. A detailed look at each school, the size of the classrooms, the number of teaching and support spaces, and the overall capacity of the school based on classroom count is provided in Section III – B Space Needs Assessment. The capacity analysis below (Image 4) compares the gross square feet of each school to the MSBA guidelines using the current student enrollment. This analysis provides an overview of where potential space issues might exist. Schools shown in red are undersized, those in yellow are right sized, and green indicates a school that is potentially oversized. This comparison to the MSBA guidelines does not include modular classrooms, as these are viewed as temporary spaces.

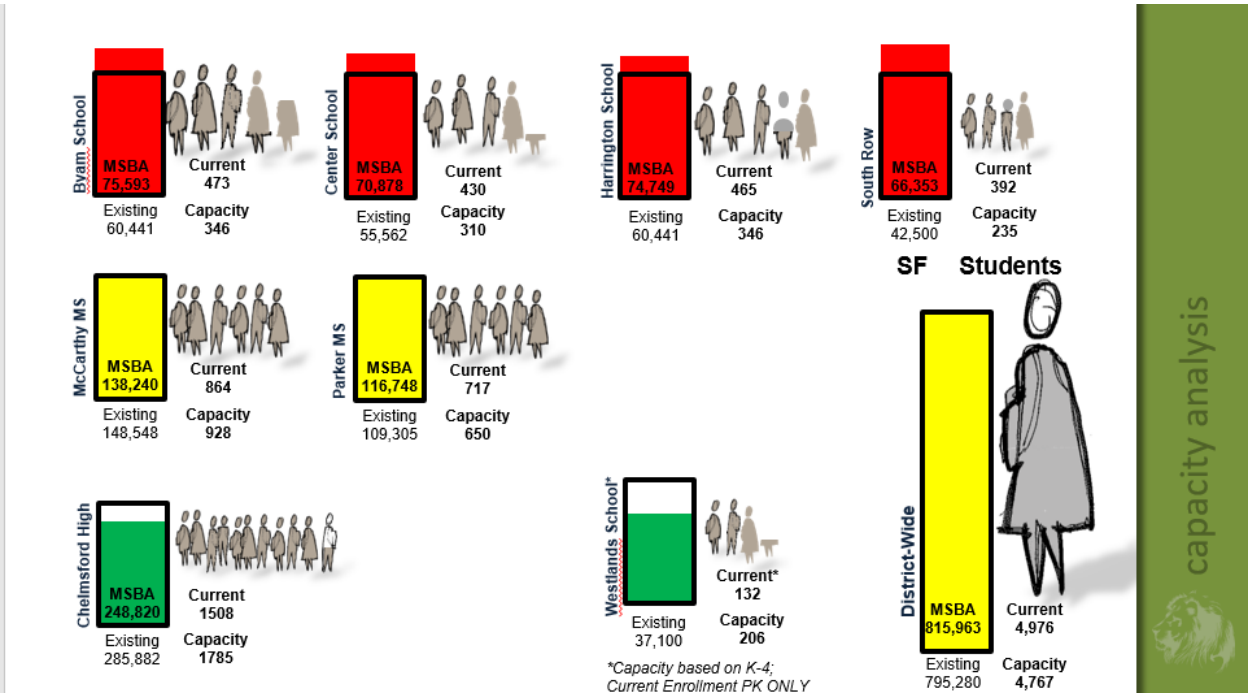

Image 4: Summary of Building Capacity and MSBA Guidelines

ELEMENTARY SCHOOLS

A broad overview of the school facilities indicates that, in general, the District's elementary schools are overcrowded. The best example of this condition is the conversion of non-educational spaces into teaching areas. These conversions include former storage rooms, hallways and alcoves. Based on MSBA guidelines, the elementary schools have classrooms of adequate size (with the exception of South Row School) but are often missing special education classrooms, administrative spaces such as conference rooms, and teacher work rooms. The classrooms at South Row School are all undersized by more than 10% of the MSBA guidelines for elementary school classrooms. The gymnasiums and cafeterias in each of the elementary schools are undersized per current MSBA guidelines. This guideline is based on current school population. The Center School underwent a major renovation in 1999 which brought much of the school facility into compliance with building and accessibility codes, with this exception there have been no other major renovations to the elementary schools in the District. The remaining elementary schools are all nearing or over fifty years old. Despite the ongoing maintenance and system upgrades building envelopes and infrastructure do not meet the requirements of 21st Century Schools. Each of these schools are in need of many upgrades and capital improvements to continue to serve the students and the community. It is important to note that any renovations or additions to these buildings, including modular classrooms, will likely trigger other code required upgrades to the entire facility including the addition of sprinklers, full handicap accessibility upgrades, and structural upgrades to meet current seismic code requirements.

MIDDLE SCHOOLS

There are two middle schools in Chelmsford, the Parker Middle School and the McCarthy Middle School. The schools are located within a mile of each other and separated by Richardson Road and the High School. Both of the middle schools have adequate gross square footage for their population, based on the MSBA guidelines for middle schools. Per interviews and observation of the schools there are many spaces within each of these buildings that are not used or are under-utilized. Despite the adequate overall square footage of the McCarthy Middle School, there are many undersized classrooms and based on the number of students, the cafeteria is undersized per MSBA guidelines. However, there are extra spaces within this building that are not found in a typical middle school such as the large auditorium, a second gym, lecture halls and large locker rooms. At the Parker Middle School about 50% of the general classrooms are undersized. Here there are several classrooms that are connected and require students to pass through one to access another. Large areas, such as locker rooms, are not used by students as these areas are either empty or used for storage. Both middle schools have had ongoing upgrades to interior finishes and recent upgrades to restrooms. There continues to be some accessibility needs in each of the facilities but in general these buildings are in good condition and serve the needs of their population. Both schools have temporary classroom pods that have reached the end of their useful life, permanent solutions should be sought to meet the space needs.

CHELMSFORD HIGH SCHOOL

Chelmsford High School is, in general, oversized for the current high school population per MSBA guidelines. In general, this is due to the large auditorium space, four oversized cafeterias, the kitchen, library, locker rooms and gymnasiums, and lecture spaces. Most classrooms are undersized per MSBA guidelines. The Lion's Den, a part-time Pre-school program, is located at the High School where high school students in the Family Consumer Science program assist in the Den as part of their curriculum. The facility provides a state of the art performance theater, a large competition size gym, a wrestling gym / practice room, several locker rooms and team rooms (some are not used), a weight room, wood shop, foreign language lab, t.v. studio, large and small lecture halls, and teacher collaboration areas. At the time of the study several restrooms were being upgraded including improved accessibility to fixtures however, there are several areas and conditions that do not meet accessibility requirements and upgrades to these areas are noted in the report. The High School facility has a fire sprinkler system in a portion of the building but most areas are unprotected.

WESTLANDS SCHOOL

The Westlands School serves the District's integrated pre-school program. The facility also supports the Community Education programs which includes the Lion's Pride, an extended day program for students in the ½ K program, and several community education programs for both children and adults. The building includes a gym, cafeteria space with a stage, and recreation / community room that is shared by all groups that use the facility. The current pre-school program uses approximately halfof the classrooms in the

building (the upper floor), but is at capacity and does not have room for expansion of the program. Given the specialized program the enrollment for CHIPs fluctuates throughout the school year. The current facility is not designed to serve the specific needs of the CHIPs students, restrooms are located outside of the classrooms and in general the facility is not handicap accessible.

SCHOOL ADMINISTRATION BUILDING

In general, the school administration building is in good condition and serves the needs of the district administration. A large conference room has been recently renovated and serves as the public meeting space for the School Committee. The meeting room itself is accessible; however, there are no accessible restrooms available to the public. Accessible restrooms are provided for staff.

101 MILL ROAD

101 Mill Road is a former residence that was converted to office space. Currently the building is unoccupied. This facility would not be appropriate for use as a school, and would require major renovations to serve as the school administration building. The building is not sprinklered, does not meet the requirements of ADA or MAAB, and is not designed to meet the space needs required by many public buildings. A careful analysis of building codes in relationship to the proposed use of the building will need to be developed and was not included as part of this report. The facility assessment report notes issues and areas that are in need of repair to maintain the current condition of the building. Should any public use of the building be considered, an elevator will be required to provide access to all floors. Additionally, neither of the existing stairways meet code requirements. The front hall stair could potentially remain given the historical nature of the building, but two code compliant stairways are required to provide access and egress from the third floor.

Capital Improvement Plan Summary

The Capital Improvement Plan (CIP) section of this study summarizes the recommendations for each building along with itemized costs. The CIP is designed to assist in the planning and management of capital and maintenance improvements for District facilities. In the CIP spreadsheet, building needs and recommendations are organized into seven categories: Health, Safety, and Welfare; Code Compliance; Functional Use of the Building; Handicap Accessibility; Maintenance – Extending the Life of the Facility; Energy Efficiency; and Hazardous Materials Abatement. Estimated cost of the repairs, replacement, or work noted is developed based on the current cost of the work (present value) and the items are prioritized in terms of when repairs should occur; immediate needs (1-3 years), short-term needs (4-6 years) and long-term needs (7-10 years). The School District and Dore & Whittier (D&W) worked together to organize the building needs, recommendations and priority levels.

The CIP should be considered a “working document” for the District to use as a guide for future improvements and can/should be modified as needs and changes arise. The CIP may also serve as a baseline of comparison for other options to be considered.

		SCHOOL	CHELMSFORD HIGH SCHOOL	McCARTHY MIDDLE SCHOOL	PARKER MIDDLE SCHOOL	BYAM ELEMENTARY SCHOOL	CENTER ELEMENTARY SCHOOL	HARRINGTON ELEMENTARY SCHOOL	SOUTH ROW ELEMENTARY SCHOOL	WETLANDS COMMUNITY CENTER	SCHOOL ADMINSTRATION BUILDING	101 MILL ROAD	TOTAL Estimated Project Cost	High Priority (1-3 yrs)	Medium Priority (4-6 yrs)	Low Priority (7-10 yrs)	On Going Maintenance
1	Site & Civil																
	1.01		$130,548	$22,391	$22,770	$260,337	$82,944	$227,700	$121,288				$ 867,977	$101,554	$ 372,289.50	$ 306,787.80	$ 114,821.52
	1.02									$28,842		$68,614	$ 97,455.60				
2	Structural Elements																
	2.01		$2,277	$0	$0	$ -	$22,770	$11,385	$ 43,263.00				$ 79,695	$11,385	$15,180	$0	$53,130
	2.02									$94,116		$249,772	$343,888				
3	Exterior Architectural Elements																
	3.01		$140,066	$733,164	$257,438	$ 997,553.70	$ 17,464.59	$1,956,429	$203,549				$ 4,305,663	$ 1,806,617.34	$ 780,707.40	$ 96,544.80	$ 1,892,908
	3.02									$153,166		$225,347	$378,513				
4	Interior Architectural Elements																
	4.01		$4,349,879	$2,883,821	$1,877,113	$1,354,559	$ 41,782.95	$3,204,774	$1,812,686				$ 15,524,614	$ 6,041,817	$ 3,984,026	$ 3,219,276	$ 2,752,046
	4.02									$1,681,724		$959,133	$2,640,857				
5	Mechanical - HVAC																
	5.01		$330,165	$370,696	$974,567	$ 1,602,249.00	$77,722	$ 1,631,091.00	$592,324				$ 5,578,812	$ 2,224,629	$ 1,185,558	$ 2,021,976	$ 819,882
	5.02									$1,090,683		$184,805	$1,275,488				
6	Electrical																
	6.01		$1,357,502	$3,172,263	$9,889,499	$2,344,096	$7,590	$1,460,240	$1,491,890				$ 19,723,080	$3,612,822	$4,283,203	$12,639,817	$105,628
	6.02									$893,798		$59,405	$953,203				
7	Plumbing																
	7.01		$101,706	$16,698	$159,390	$435,970	$5,313	$654,258	$48,576				$ 1,421,911	$394,984	$45,540	$960,894	$257,301
	7.02									$497,904		$288,420	$786,324				
8	Fire Protection																
	8.01		$3,027,519	$1,837,579	$1,249,053	$598,376	$ -	$0	$415,800				$ 7,128,327	$0	$3,027,519	$4,699,184	$0
	8.02									$367,290		$19,287	$386,577				
		SUB-TOTAL	$ 9,439,662	$ 9,036,610	$ 14,429,830	$ 7,593,140	$ 255,586	$ 9,145,876	$ 4,729,376	$ 4,807,523	$ -	$ 2,054,782	$ 61,492,385	$ 14,193,808	$ 13,694,023	$ 23,944,479	$ 5,995,717
9	Hazardous Material																
	9.01		$2,790,000	$1,752,000	$2,640,000	$1,276,500	$0	$1,153,680	$1,035,000				$ 10,647,180				$ 8,458,500
	9.02									$744,000		$48,300	$792,300				
		TOTAL	$ 12,229,662	$ 10,788,610	$ 17,069,830	$ 8,869,640	$ 255,586	$ 10,299,556	$ 5,764,376	$ 4,807,523	$ -	$ 2,054,782	$ 72,931,865	$ 14,193,808	$ 13,694,023	$ 23,944,479	$ 14,454,217

GENERAL NOTES

1. Refer to each section of the Report for more detailed information. Before moving forward with a specific project, a detailed review of the scope of work and a re-assessment of the cost estimate for that scope should be performed.
2. Some items should be completed in combination with other items. Some of these suggestions may be noted above. We recommend that once a scope of work is desired to be pursued, a mini-study should be done to confirm which work should be done together. See the next general note below for additional information.
3. Due to the conceptual nature of these recommendations and estimates and the complexity of existing conditions, several solutions may be provided to achieve the end result. Existing conditions in some areas may limit the ability to fully implement the proposed scope of work. Part or all of this work may trigger other renovation requirements related to code, seismic, sprinklers or handicap accessibility.

The costs used in the estimates are for publicly-funded construction in Massachusetts and are given in 2016 dollars. Costs for temporary facilities, phasing, or for increased escalation beyond this date are not included. These estimates were prepared for budgetary purposes, are preliminary and conceptual in nature based on limited investigations. These estimates are identified as "Project Costs" and include contingencies as well as allowances for architect/engineering services, permitting, etc. Further refinement of costs will be necessary after a detailed scope of work is developed for each capital improvement undertaken.

Below is a summary of the Capital Improvement Plan cost estimates. These costs assume that the work will be publicly bid. Use of School District Facilities staff to address certain maintenance items (that are within limits of MGL) could result in significant savings. The District has qualified staff and items that can be addressed by District staff are indicated in the detailed CIP under the 'Maintenance' category.

SCHOOL	CAPITAL IMPROVEMENTS	HAZ / MAT ABATEMENT	TOTAL	BLDG SQ.FT.	CIP COST / SQ.FT (not including Haz / Mat abatement)
CHELMSFORD HIGH SCHOOL	$ 9,439,662	$ 2,790,000	$ 12,229,662	305,810.00	$ 30.87
McCARTHY MIDDLE SCHOOL	$ 9,036,610	$ 1,752,000	$ 10,788,610	185,614.00	$ 48.68
PARKER MIDDLE SCHOOL	$ 14,429,830	$ 2,640,000	$ 17,069,830	126,167.00	$ 114.37
BYAM ELEMENTARY SCHOOL	$ 7,593,140	$ 1,276,500	$ 8,869,640	60,442.00	$ 125.63
CENTER ELEMENTARY SCHOOL	$ 255,586	$ -	$ 255,586	52,300.00	$ 4.89
HARRINGTON ELEMENTARY SCHOOL	$ 9,145,876	$ 1,153,680	$ 10,299,556	60,442.00	$ 151.32
SOUTH ROW ELEMENTARY SCHOOL	$ 4,729,376	$ 1,035,000	$ 5,764,376	42,000.00	$ 112.60
WESTLANDS COMMUNITY CENTER	$ 4,807,523	$ 744,000	$ 5,551,523	37,100.00	$ 129.58
CHELMSFORD ADMINISTRATION BLDG	$ -	$ -	$ -		
101 MILL ROAD FACILITY	$ 2,054,782	$ 48,300	$ 2,103,082		
Total	**$ 61,492,385**	**$ 11,439,480**	**$ 72,931,865**		

Image 5: Capital Improvements Plan Cost Estimates Summary

It is important to note that the capital improvement items address the building conditions only and do not reflect the functional use of the space, or the educational programming needs. The addition or renovation of space to meet the educational program is addressed in the Master Plan Options.

Summary of Options

Of the sixteen options that were developed five options were chosen to move forward for pricing and inclusion in the master plan. These options provided a wide range of alternative to resolve the District's goals of providing full-day kindergarten and resolving the overcrowding at the elementary schools. A brief summary of each of the options is listed below. For a full understanding of each of the options please refer to Section IV – Conceptual Options.

Option A is a 'Capital Improvements Only' option and is used as a base line when weighing the value of each of the additional options provided.

Option D identifies a new freestanding Pk-K Early Child Center and an addition and renovation to the Parker School. Under this plan capital improvements would continue at each of the four elementary schools and the High School. Westlands School would move off line or be turned over to Community Education for their program use. The McCarthy Middle School would receive upgrades to the science rooms and Parker Middle school would receive an addition and renovation. Under this option all Pk-K students would attend the ECC which would provide additional classroom space in the existing elementary schools.

Option E identifies a new upper elementary grade 3-5 school which moves students out of the elementary schools and provides room for the full day kindergarten program. The PK program would be relocated to two of the elementary schools and Westlands School would be turned over to Community Education for their program use. All schools in the District would follow the Capital Improvement Plan.

Option H proposes a new grade 6-8 school and converts both middle schools into upper elementary grade 3-5 schools. This provides room for the full day kindergarten program in the elementary schools. The PK program would be relocated to two of the elementary schools and Westlands School would be turned over to Community Education for their program use. All schools in the District would follow the Capital Improvement Plan.

Option I2 proposes a new jr. high school (grades 7 and 8). McCarthy Middle School would serve grades 5 & 6 while Parker, with renovations, would become a Pk-4 elementary school. All schools would receive capital improvements and Westlands School would be turned over to Community Education for their program use.

Option J5 proposes the construction of a new high school that includes an early childhood center (PK-K) school. The existing high school would become a grade 6-8 middle school. The Parker School as well as the existing elementary schools would serve grades 1-4. The Westlands School would be turned over to Community Education for their program use and the McCarthy School would be taken off line, sold or demolished for additional field or building space.

The estimated cost of each of these options including the identified capital improvement costs over a ten-year period is noted in the chart below. A detailed chart of the cost of the options is provided in Section V – Master Plan and Cost of Options.

OPTION	NEW CONSTRUCTION	COST OF OPTION (Includes Additions, Renovations, and CIP)
OPTION A - CIP ONLY	$ -	$ 61,492,385
OPTION D - NEW ECC + ADD / RENO TO PARKER	$ 103,494,960	$ 143,695,210
OPTION E - NEW 3-5 SCHOOL	$ 92,784,300	$ 147,414,379
OPTION H - NEW 6-8 SCHOOL	$ 102,531,600	$ 157,161,679
OPTION I2 - NEW 7-8 SCHOOL	$ 74,875,200	$ 159,270,679
OPTION J5 - NEW HS + ECC	$ 203,405,520	$ 319,606,288

Image 6: Estimated Cost of Options

Summary of the Master Plan

The Master Plan includes the steps needed in each of the Options noted above to achieve the full option; these are more specifically outlined in Section V. In reviewing and assessing the temporary solutions to providing full-day kindergarten in the near-term, Option A2 (disconnected modular classrooms at each of the elementary schools) best met the District's needs and goals.

As noted in the 'Master Plan Timeline' (Image 7), the first phase of the Master Plan is the Design and Construction of the modular classrooms for full-day K. The time line for implementing this project is outlined in the 'Timeline for Full-day K' (Image 8). Early in 2017 the District will chose the preferred Option and begin the process for submitting a Statement of Interest (SOI) to the MSBA based on the first major project as noted in the detailed timelines included in Section V. Provided the District is invited into the MSBA process within twelve to eighteen months of the SOI submission, the estimated time to occupancy of the first building project is six years.

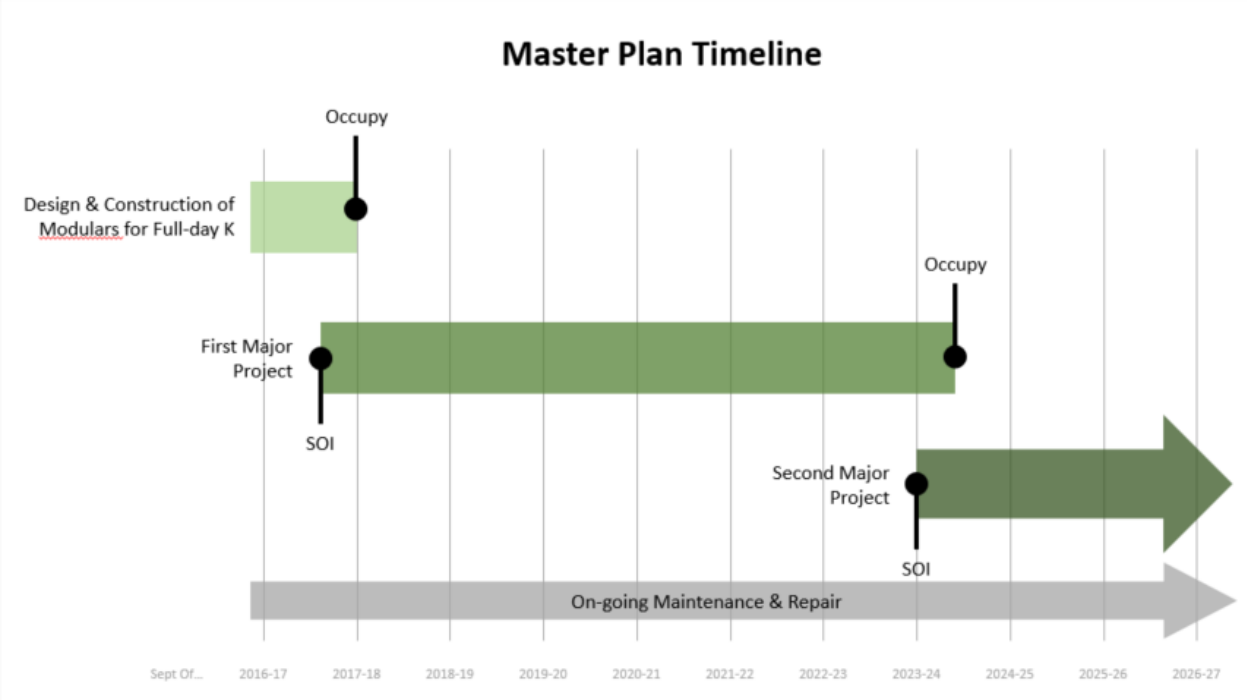

Image 7: Proposed Master Plan Timeline

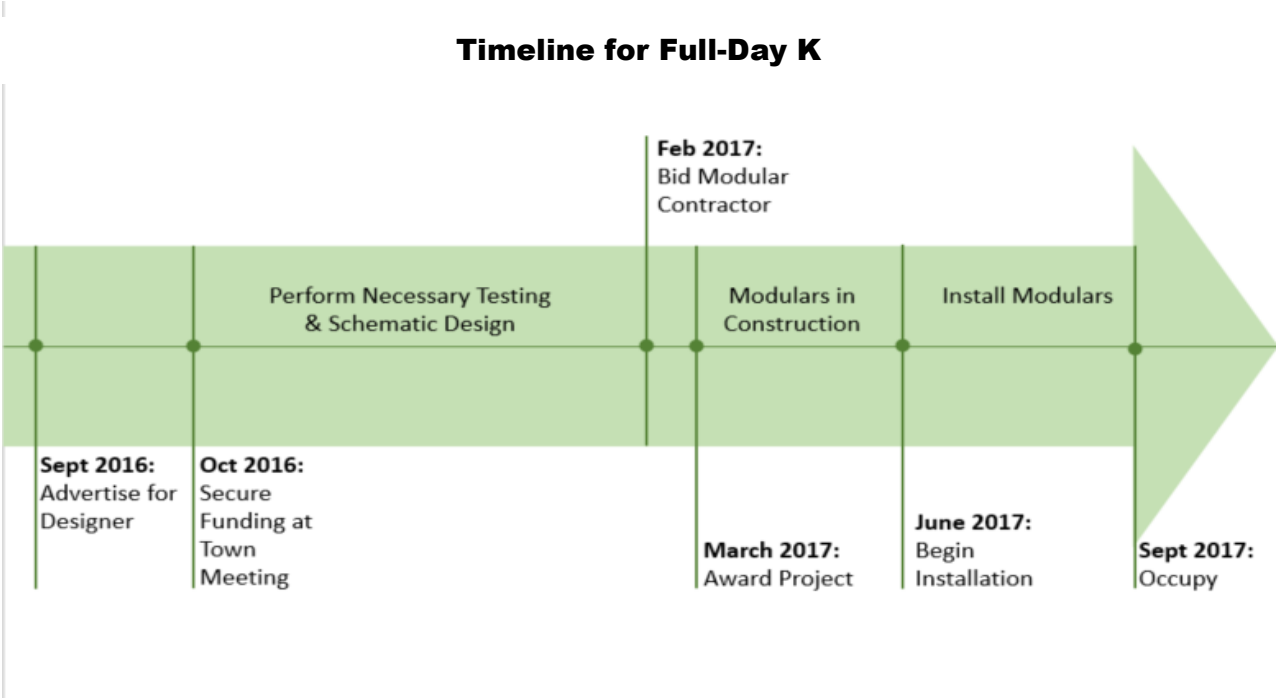

Image 8: Proposed Full-day K Timeline

SUMMARY OF CODES

The Regulatory Overview for Massachusetts outlines the current building codes that the facility assessments were measured against. This document in combination with the Massachusetts School Board Authority (MSBA) space guidelines assisted the team in determining both the facility and space needs for each of the school buildings. A detailed evaluation of the space needs is included in Section III B. The facility assessments for each building are found in Section II.

The Capital Improvements Plan (CIP) included in each facility assessment outlines the cost of improvements. It is important to note that a complete scope of work must be developed and coordinated with other trades and improvements including hazardous material abatement for each line item in the CIP. Each improvement has a potential impact on the code compliance of the existing facility and on previously grandfathered code compliant issues including accessibility and life safety. Improvements and renovations of any amount may trigger the need for additional work to meet the current code. These may include, the addition of sprinklers, upgrades to handicap accessibility, and upgrades to the building structural system to meet seismic requirements. The regulatory overview noted below is applicable to each building assessment. It is also noted that it may be in the best interest of the school department to group several capital improvements together to save the cost of replicating work, for example: ceiling renovations should be combined with the replacement of light fixtures and the installation of any above ceiling work such as sprinklers and hvac ductwork. A full scope of work should be developed and reviewed in coordination with the applicable regulations to assess the potential of code required upgrades triggered by cost, square footage, or general nature of the of the improvement project.

REGULATORY OVERVIEW FOR MASSACHUSETTS

Applicable Regulations

Buildings undergoing repairs, alterations, additions, changes in use, or relocation will be permitted under the 9th edition of the Massachusetts State Building Code (780 CMR). The base code for the 9th Edition is comprised of the following 2015 International Code Council family of codes with Massachusetts amendments:

- International Building Code (IBC)
- International Energy Conservation Code (IECC)
- International Existing Building Code(IEBC)
- International Mechanical Code (IMC)

Additional building regulations, included by reference in the base code or enforceable under Massachusetts General Law include:

- Massachusetts Fire Code (527CMR)

- Massachusetts Elevator Code (524 CMR)
- Massachusetts Plumbing Code (248 CMR)
- Massachusetts Electrical Code (NFPA 70 – NEC)

Accessibility regulations applicable to the project are the Massachusetts Architectural Access Board Rules (MAAB) (521 CMR), and the 2010 Americans with Disabilities Act Architectural Guidelines. Where these two regulations are in conflict, the regulation that provides the greater accessibility should be provided.

Finally, in addition to the sprinkler protection requirement found in the building codes, certain Massachusetts General Laws (M.G.L.s) require sprinkler protection in certain types of new and existing non-residential buildings over 7,500 gross square feet.

Scoping Requirements and Thresholds for Compliance

Of the regulations described above, three of them require special consideration since they contain specific thresholds for full compliance with the regulation. These threshold-defining regulations are:

- The International Existing Building Code (IEBC)
- 521 CMR, or the Architectural Access Board (MAAB)
- M.G.L. c.148 s.26G, or the Automatic Sprinkler System Requirements

Compliance thresholds are based on either the area or cost of proposed work in comparison the existing building area or building value and are defined in greater detail under each specific regulation description below. Generally, when the proposed scope of work does not exceed a defined threshold, only the work being performed is required to comply with the current edition of the codes. The Americans with Disabilities Act (ADA) also contains requirements for incorporating improvements to an accessible path to Primary Function areas where alterations to that area are undertaken.

International Existing Building Code (IEBC)

When considering changes to an existing building, the principal guiding regulation is the International Existing Building Code (IEBC), which is enforced by the local building official. The IEBC requires that any proposed work on an existing building or portion thereof first undergo an evaluation to determine the effect of the proposed work on at least the following systems: structural, means of egress, fire protection, energy conservation, lighting, hazardous materials, accessibility, and ventilation for the space under consideration. Because no specific scope of work is being proposed as part of an existing conditions survey, this report includes a Regulatory Assessment for each building under consideration in order to determine to what degree the existing building[s] and systems comply with current regulations. It should be understood that non-compliance with current regulations does not compel corrective action. Only when a scope of work is defined can the Existing Building Code be applied to determine the applicable requirements.

Following completion of an evaluation for a proposed scope of work, a *compliance path* needs to be selected for the application of building code requirements. Owners must choose either the Prescriptive, Work Area, or Performance Compliance path and apply only the provisions of the chosen compliance path to the project. *The Prescriptive Compliance Path* provides a broad-brush approach to existing buildings and could result in requiring additional work that may not be necessary under the other compliance paths and will not be employed for this assessment.

The *Performance Compliance Path* uses a calculation based methodology to determine the general level of life safety of a building. This path assigns numeric values to various life safety features of a building to arrive at an overall building "score". Different building types require different scores to determine compliance or non-compliance with this path. This numeric value approach can be useful to evaluate the general life safety performance of an existing building as compared to current building regulations; because of this the Performance Compliance Path will be used to evaluate the general life safety condition of the existing facilities. Again, it should be noted that a non-compliant score does not compel corrective action – this methodology will be used to convey only how the existing building compares to current regulations.

The *Work Area Compliance* path typically offers the most advantageous approach to defining the code requirements for each portion of a building undergoing a scope of work because it most closely correlates the required upgrades to building systems and components to that specific defined scope of work; for this reason, the Work Area compliance path will be the assumed compliance path for sake of any proposed work on the facilities, should they be pursued.

Work Area Compliance relies on identifying the type of work that is occurring throughout the building, and then applying the requirements for that type of work to the *Work Area*. The *Work Area*, as defined by the IEBC is:

> *That portion or portions of a building consisting of all reconfigured spaces as indicated in the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed...*

Using the definitions provided in the Code, the scope of work identified for existing buildings or portions thereof is categorized as follows:

Repairs:"...include the patching or restoration or replacement of damaged materials, elements, equipment, or fixtures for the purpose of maintaining such components in good or sound conditions with respect to loads or performance requirements..."(IEBC s. 502.1) Examples of repair would be repair or replacement of damaged plaster finishes, tiled or wood floors, replacement of wood trim, replacement of door hardware, replacement of any plumbing, heating, electrical ventilating, air conditioning, refrigerating, and fire protection equipment as well as the repair of any exterior masonry or roofing system, and repair of damaged structural elements with "in kind" elements or equipment. Chapter 6 of the IEBC is applicable to all Repairs.

Level 1 Alterations: "...include the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose." This classification could be described as replacement with different systems, materials, or equipment, but providing the same function. Replacing wood flooring with a tile floor system, or proving all new kitchen equipment to replace outdated equipment would be considered Level 1 Alterations. (IEBC s. 503.1). Chapter 7 of the IEBC is applicable to all Level 1 alterations.

Level 2 Alterations: "...include 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." (IEBC s. 503.1). Chapter 7 and Chapter 8 of the IEBC is applicable to all Level 2alterations.

Level 3 Alterations: "...apply where the work area exceeds 50 percent of the *building area*."

Change of Occupancy: "A change in the use of the building or a portion of the building. A change of occupancy shall include any change of occupancy classification, any change from one group to another group within an occupancy classification or any change in use within a group for a specific occupancy classification."

Additions: "An extension or increase in floor area, number of stories, or height of a building structure."

Under the work area compliance path, each of the classifications of work described above require increasing levels of compliance with the building code. Repairs have the least restrictive requirements, essentially permitting replacement-in-kind for any repaired elements. Additions require the highest level of compliance and require that the addition comply with the building code as for new construction. The other classifications require increasing compliance and, for each classification, define prescriptive requirements for specific systems and elements such as means of egress, mechanical, electrical and fire protection systems, building materials, fire resistance ratings, and structural systems.

Work Areas, including Level 2 Alterations and Additions would be required to be identified on the construction documents. Repairs and Level 1 alterations, because they do not include reconfigured spaces, are not considered part of the "Work Area" defined by the code. Although there may be substantial repairs and Level 1 alterations throughout the building, this distinction is important; when the Work Area exceeds 50% of the floor area, the provisions for Level 3 alterations become applicable.

In addition to alterations that affect the building spaces and areas, it is necessary to understand how alterations affect the building structural system and elements. Where alterations change individual gravity or lateral load resisting elements, each element requires evaluation to determine if the alteration will result in additional loads and, if so, the element must be altered or replaced. For buildings with concrete or unreinforced masonry walls, when the work area exceeds 50 percent of the floor area, than all of the structural concrete or masonry walls (both gravity and lateral load resisting walls) are required to be secured to the floor or roof deck above.

Sprinkler Protection Requirements

There are two separate regulations that govern the requirements for sprinkler protection: the IEBC and M.G.L. c.148 s.26G.

IEBC requirements, enforced by the building official, would require sprinklers where the *work area* (defined previously) exceeds 50 percent of the floor area and the work area is required to be provided with sprinklers in accordance with the International Building Code, Chapter 9.

M.G.L. c.148 s.26G, which is enforced by the fire official, requires enhanced sprinkler protection in certain buildings which total more than 7,500 gross square feet in aggregate (adding all stories) floor area. This requirement is applicable when "major" alterations or modifications are occurring to a building. Because the statue is not specific about the definition of a "major" alteration, a memo issued on October 14, 2009 by the Fire Safety Commission's Automatic Sprinkler Appeals Board provides additional guidance on this subject.

This memo indicates two factors that are used to determine whether "major" alterations are taking place: a Nature of Work factor and a Scope of Work factor.

If the **Nature of the Work** is such that the effort to install sprinklers is substantially less than if the building was intact, or is the nature of work merely minor repairs and cosmetic work, or is the Nature of the Work "major" in its scope. There is no specific definition of "major", but the memo offers examples including: the demolition of existing ceiling or installation of suspended ceilings; the removal and installation of subflooring, exposing the building framing (not merely the replacement of finished flooring); the reconstruction or repositioning of walls; and the removal or relocation of a significant portion of the buildings HVAC, plumbing, or electrical systems involving penetrations of walls, floors, or ceilings.

If the **Scope of Work** affects a substantial portion of the building, or the cost of work is moderate in comparison to the total cost of work, then the Scope of Work criteria would be applicable to a project. The Scope of Work Thresholds defined in the memo are as follows:

1. Alterations or modifications are reasonably considered major when the work affects ***33 percent or more of the total gross square footage of the building*** (all floor levels combined). Again, no specific definition of alterations or modifications is provided, but we can infer from other codes and definitions that alterations relate specifically to the reconfiguration of spaces, or the "major" Nature of Work examples above.
2. Alterations or modifications are reasonably considered major when the total cost of the work (excluding costs related to sprinkler expenditure) is equal to or greater than ***33 percent of the assessed value of the subject building.***

The memo then indicates that if the Nature and Scope of work criteria and the Scope of Work (either 1 or 2) is satisfied, then the Board would consider the alterations "major" and thus require the installation of a sprinkler system.

Accessibility

In Massachusetts, the state developed Architectural Access Board Regulations (521 CMR) replace the accessibility provisions of the building code. Like the other sections of the building code, the accessibility regulations are enforced by the building official. However, waivers or variances to 521 CMR cannot be granted by the building official. Rather, any such appeal or variance request needs to be reviewed and accepted by the Architectural Access Board.

Chapter 3 of the Architectural Access Board Regulations outlines the scoping thresholds for the applicability of accessibility guidelines for a project. Specifically, section 3.3 describes three different dollar value thresholds for any proposed *additions to, reconstruction, remodeling*, and *alterations* or *repairs* to existing buildings as compared to the buildings "full and fair cash value". The full and fair cash value is generally the assessed value of the building as recorded with the town assessor's office. This section then lists the applicability requirements for each dollar value threshold:

- For work costing less than $100,000, only the work being performed is required to comply with Accessibility regulations.
- A scope of work that is more than $100,000, but less than 30% of the full and fair cash value requires the incorporation of an accessible public entrance, toilet, telephone, and drinking fountain.
- When a scope of work costing more than 30% of the full and fair cash value is proposed, the entire facility is required to be brought into compliance with the accessibility guidelines. This threshold also clarifies that additions costing more than 30% of the current building value would require the entire existing facility to be brought into compliance.

Two additional sections in Chapter 3 require special consideration. Section 3.4 requires that when a building undergoes a change from a private use to a public use, an accessible entrance must be provided, even if no work is being performed. This is significant because it is the *only compulsory requirement* found in the building or accessibility codes when no other work is proposed or anticipated.

Finally, 521 CMR section 3.9 allows for variances to the accessibility guidelines for Historic Structures listed on the State or National Register of historic places. The process of documenting and being granted variances for a broad range of accessibility requirements based on historic status is a complicated and nuanced process that requires careful coordination with the Access Board. The Board reviews the proposed variances to ensure that people with disabilities are granted dignified access to the primary function spaces of the building with as little influence on the historic fabric of the building as is feasible.

The Americans with Disabilities Act Architectural Guidelines (ADAAG 2010) is part of a federal civil rights regulation that is also applicable to work on existing buildings depending on their intended users. ADA applicability would be under Title II for any state or local government entity, program, service, or facility whereas Title III is applicable for any places of public accommodation or commercial facilities that fall into specifically defined categories. The requirements for buildings under the ADA are enforced by the US Department of Justice, and enforcement is typically through investigations or civil lawsuits resulting

from complaints filed by individuals or organizations for perceived violations of the Act. These actions can be brought against a building Owner at any time, as opposed to building codes which are typically enforced when an building permit is granted for a proposed scope of work.

Title II (State and Local Governments) of the ADA requires that all services, programs, and activities provided by state and local government entities be accessible to people with disabilities. This does not require that all existing facilities be brought into compliance, but that barriers be removed in existing buildings such that all public services or programs, when viewed in their entirety, are accessible. Any proposed work on an existing building under Title II would be required to comply with ADA guidelines to the maximum extent feasible and new facilities would be required to comply completely with the guidelines. Additionally, when work is proposed that affects a primary function of an existing facility, the path of travel to that area, including the bathrooms, drinking fountain, and telephones on that path would need be made accessible as well. There are exceptions in Title II for structural impracticability, historic buildings, certain types of spaces, and disproportionality of cost for alterations to an accessible path serving a primary function area which all require close consideration for each scope of work in each building under consideration.

Title III facilities are privately owned buildings that are either defined as places of public accommodation (business open to the public and fall into one of 12 categories listed in the ADA) or as commercial facilities (non-residential facilities that are not defined as places of public accommodation). The requirements for alterations to these facilities are similar to those as for Title II facilities, including the provisions for an accessible path serving a space that is considered a primary function. The most significant difference is that Title III existing facilities are not held to the same "removal of existing barriers" standard or program and service access standards as Title II facilities. Still, any proposed work in a Title III building would be required to comply to the maximum extent feasible, taking all of the applicable exceptions into consideration.

Energy Conservation

The 2015 International Energy Conservation Code (IECC) replaces the Chapter 13 requirements of the building code. This specialized code, also enforced by the building official, is intended to regulate the design and construction of facilities with respect to the use and conservation of energy over the life of the building. Chapter 5 of the IECC controls the alteration, repair, addition, and change of occupancy of existing buildings and has no authority to require the removal, alteration, or prevent the continued use of any existing buildings. For communities that have adopted the Massachusetts STRETCH Code, increased reductions in energy consumption beyond the baseline thresholds established in the 2009 IECC would be required for new buildings and additions to existing buildings only. Alterations to existing buildings in these communities would be subject to the requirements of Chapter 5 of the 2015 IECC, described below.

Section C501.6, states that no provisions of the code relating to the repair, alteration, restoration or change of occupancy shall be mandatory for historic structures provided a report is submitted to the

building official demonstrating that compliance with the provision would threaten, degrade, or destroy the historic fabric function of the building. While this is not a categorical exemption to the energy conservation code, it does place a high degree of value on the historic fabric of the building.

Proposed additions to existing structures would be required to comply with the IECC as for new construction. Alterations to existing buildings also need to comply with the IECC as for new construction and cannot make the existing building less conforming to the code than it was prior to the alteration. In general, this means that when a building envelope or mechanical system or piece of equipment is modified as part of a scope of work, the replacement elements or systems are required to comply with the IECC for new construction. There is no provision, based on the work area or dollar value of alterations, which would require an existing facility to be brought into full compliance with the energy code.

Certain specific scopes of work that may be limited to one portion of the building, whether considered as additions or alterations to existing facilities, are required to consider the effect on the entire facility. The addition of windows or other fenestration, including skylights, needs to incorporate all of the building fenestration areas in the total allowable fenestration area. Alternatively, a project could pursue the Total Building Performance method, requiring energy modeling, but would then need to demonstrate full compliance with the IECC as for new construction. Otherwise, alteration and addition compliance requirements are limited to the work performed.

Although not part of the energy conservation code, it is important to note that in Massachusetts, M.G.L. chapter 7C, section 29 requires that for any new construction or renovation of a public facility where the cost exceeds $25,000 and includes systems or elements that affect energy or water consumption, a life-cycle cost analysis (LCCA) would be required to be performed. This analysis is required to determine the short and long term costs and feasibility of different technologies or systems considered as part of the scope of work. These systems and components would include both energy consuming equipment as well as building envelope elements or systems, since all of these elements affect energy consumption.

Fire Safety Code

In addition to the building code (780 CMR), there is also a Massachusetts Comprehensive Fire Safety Code (527) which is enforced by the local Fire Official. The Fire Code is generally enforced as a safety maintenance code, intended to prevent or remedy any conditions that may be fire hazards and to provide safety requirements to protect the public in the event of a fire. This code also regulates the installation and maintenance of fire safety equipment such as sprinkler systems and fire detection systems.

The Fire Code does apply to both new and existing conditions, but this code states that all installations of equipment completed prior to the adoption of the code are deemed to be in compliance. However, the fire official still has the authority to require compliance with the code for any condition which constitutes an imminent danger.

For the purposes of this report, it is important to note that the Fire Code also states that any provision related to the construction, alteration, movement, enlargement, replacement, repair, equipment, use, occupancy, removal, or demolition of buildings shall effectively be regulated by the building code and is subject to the jurisdiction of the Building Official. As such, this report contains minimal references to the Fire Code and will rely on the IEBC requirements outlines above for evaluation and consideration of existing conditions and any proposed scope of work.

Historic Structures

Massachusetts General Laws require that any project that requires funding, licensing, or permitting from a state agency to be reviewed by the Massachusetts Historical Commission (MHC). This review and the regulations that guide the review are designed to identify historic properties, evaluate the impact of a proposed project, and consult with the invested parties to avoid, minimize, or mitigate any adverse effects of the project. Once a general scope of work is defined, a Project Notification Form should be filed with the MHC to determine if any historical or archeological considerations will need to be addressed as part of the project.

Beyond the State of Massachusetts regulations, the US Department of the Interior has developed a set of standards and guidelines related to the maintenance, repair, replacement of historic materials, and the design of alterations or additions to historic structures. The *Standards* are a set of concepts related to these different treatments, whereas the Guidelines offer design and technical recommendations in applying the Standards.

In order to determine which Standards and Guidelines are applicable, it is necessary to determine which treatment of a historic structure would be pursued for a given facility. A proposed scope of work outlined in a Capital Improvements Plan generally falls into work that could be classified as one of the following Treatments:

- **Preservation**: the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time.
- **Rehabilitation**: recognizing the need to alter or add to a historic property to meet continuing or changing uses while retaining the properties historic character.

In working to develop a defined scope of work as well as a sustainable capital improvement plan for the future, the Standards for Preservation and Rehabilitation as well as the Guidelines for the Treatment of Historic Properties will serve as guiding documents in the development of such plans. Compliance with the Guidelines is not obligatory, but will provide the best practice approach to both maintaining the building and allowing for alterations to serve the intended end use. It also serves to demonstrate that the Owner values and wishes to maintain the historic integrity of a building, reinforcing the appropriate application of any historic structure exceptions to accessibility and building code regulations.