Summary of Maine School Building Inventory Data

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Overview

In the 2023-24 school year, the Maine Department of Education's (MDOE) School Facility team led a large-scale project to inventory the condition of Maine's 594 public school buildings.[1] Members of the team visited each school site in person and collected nearly 100 data points in collaboration with school-based staff. The result was an extensive amount of information that was compiled into a database created for this purpose. MEPRI was contracted to summarize the data and conduct preliminary analyses on areas of particular interest to stakeholders.

The school facility inventory tool grouped data points into ten categories, which are used to organize this report:

1. Name, Location and Grade Span (8 items)
2. Site and infrastructure (8 items)
3. Building features (11 items)
4. HVAC and Air Quality (15 items)
5. Building structure type (7 items)
6. ADA Accessibility (14 items)
7. Environmental Conditions (9 items)
8. Program & Planning (17 items)
9. Fire Protection (5 items)
10. Security & Safety (5 items)

This report highlights selected data points that were identified as most salient to general audiences interested in the overall condition of Maine's public school building stock.

Several of the school building features described in this report have more relevance to certain grade levels. It is helpful to describe those data points broken down by grade level so that readers can focus on the schools of interest. We therefore grouped each Maine public school into a broader grade range category to facilitate

[1] Includes all public schools open on June 30, 2024. The data presented in this report do not include the administrative facilities for Maine's two virtual charter schools (Maine Connections Academy and Maine Virtual Academy), which are analogous to district central office buildings.

reporting. Within these categories, schools have a variety of actual grade spans as there are many different configurations across the state. Table 1 below describes the grade spans used in the body of this report, and Table 2 highlights several key characteristics.

Table 1. Location and Grade Spans of 594 Public School Buildings in Maine

Grade Range Category	Typical Grade Span Examples	Central & Mid-Coast Kennebec Knox Lincoln Sagadahoc Waldo	Northern & Downeast Aroostook Hancock Penobscot Piscataquis Washington	Southern Cumberland York	Western Androscoggin Franklin Oxford Somerset
Elementary		66	57	89	62
Early Childhood	Pre-K, K	3	2	2	4
Early Elementary	pK-2	6	12	24	9
Elementary	pK-5, pK-6	50	36	47	43
Intermediate	3-5	7	7	16	6
Middle	5-8, 6-8	18	19	27	15
High		22	40	29	22
High school	9-12	20	27	28	18
Middle & High	6-12	2	13	1	4
Other Types:					
Elementary & Middle	pK-8	21	58	4	9
All Grades	pK-12	3	4	0	2
CTE	9-12	5	11	6	5
TOTAL		**135**	**189**	**155**	**115**

Table 2. Key Public School Features

Grade Range Category	Number of Schools	Average Enrollment	Average Year Constructed	Average Age (Years)	10-year SAU plan to close, consolidate, or replace
Elementary	274	249	1969	55	68 (25%)
Middle	79	377	1976	48	14 (18%)
High Schools	113	458	1970	54	16 (14%)
pK-8	92	187	1967	57	10 (11%)
pK-12 (All Grades)	9	170	1972	52	1 (11%)
CTE	27	353	1979	45	5 (19%)
Total (All schools)	594	299	1970	54	114 (19%)

Table 2 demonstrates that the buildings with combined elementary and middle grades (grades PreK-8, K-8, or similar) have the oldest average age. However, within each category there is a wide range and the differences between grade spans are not large. Maine's oldest building in operation, Whiting Village School, was built in 1804.

Site and Infrastructure

Table 3. Summary of School Site Features

Feature	Number of Schools	Percent of Schools
Separate Bus Traffic Loop	316	53%
Public sidewalk connection	316	53%
Public / Municipal Water Supply	415	70%
Public / Municipal Sewer	357	60%
Located outside 100-year floodplain	554	93%

Schools with a separate **dedicated loop for buses** and a walking pathway that connects to **public sidewalks** are safer for children as they arrive and exit the school. Students arriving by bus or on foot (walking) are separated from parents' cars, and those arriving by car are kept out of the way of buses. These features are related; the schools with a separate bus loop also had a connection to public sidewalks, and there were no schools that had one but not the other. Schools with elementary grade levels

(including pK-5, pK-8, and pK-12 configuration types) are no more likely to have these features. Only 51% of these schools have separate loops and connected sidewalks. Combined elementary and middle schools (pre-K to grade 8 or similar) were the least likely to have these, at only 32%.

Having a **public water supply** is advantageous for two reasons: there are more resources for monitoring water quality, and the water supply is more robust in the event of a fire. The number cited above includes 8 schools with hybrid systems (both public water and a well(s)); three of these rely on the private system, not their public supply, for fire suppression. **Public sewer** is also preferred to septic systems. Of the 40% of schools without a sewer connection, 5 sites encompassing 9 schools have an onsite treatment plant and the rest use a septic system.

Location within a **100-year floodplain** is a growing concern. Only 13 schools (2%) are known to be in a 100-year floodplain; another 27 (5%) have an unknown floodplain status.

In addition to the elements reported above in Table 3, data were also collected on each site's total acreage, and whether it has recreational areas funded by the U.S. Department of the Interior's Land and Water Conservation Fund (LWCF) program. Images were taken as part of each school's profile.

General Building Features

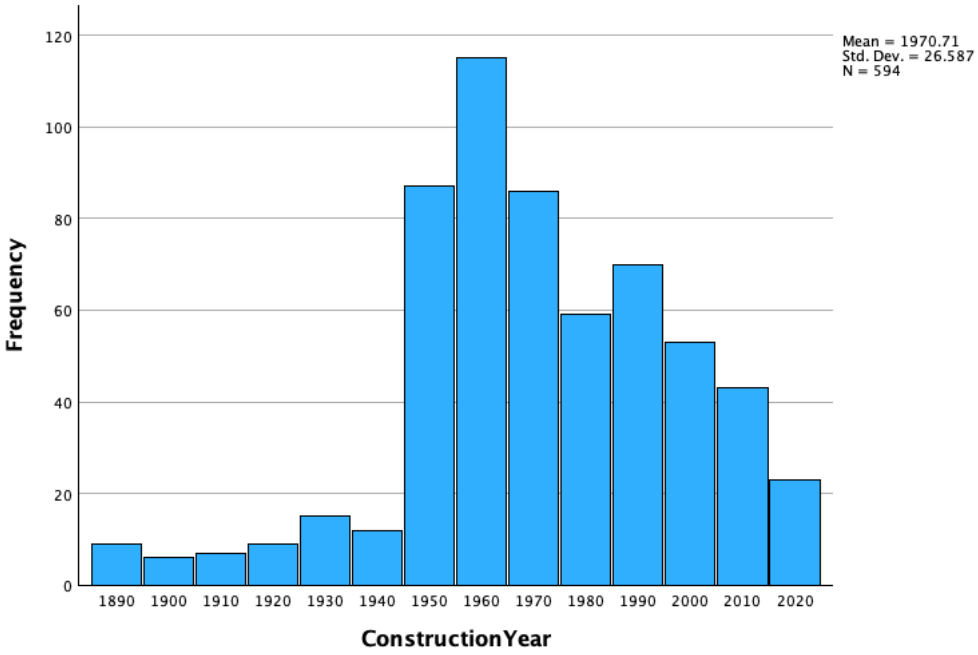
Building Age

Maine's school buildings range in age from 1 to 220 years, averaging 54 years old (i.e. built in 1970). About 40% (236) of Maine's school buildings were constructed between 1950 and 1970. This can be partially attributed to district consolidations following the Sinclair Act of 1957, but the construction boom began sooner. There are 122 schools that were built in the post-war years of 1947 to 1957.

Age is only one factor in determining building quality. Some older buildings are quite sturdy, and some newer facilities suffer from subpar construction. Some facilities have undergone extensive renovations after their initial construction that have brought them up to more modern standards. However, in general older buildings were built for a

different era and are less likely to have the types of spaces that accommodate 21st century expectations for instruction.

Figure 1. Number Schools by Year of Construction



Most building equipment and assemblies have about a 40-year life expectancy[2]. As seen in Table 4 below, about two-thirds (68%) of Maine's schools are older than that.

Table 4. Age of Maine Public School Buildings (Based on year of initial construction)

	Number of Schools	Percent
20 years or less	73	12%
21 to 40 years	118	20%
41 to 60 years	152	26%
61 to 80 years	194	33%
Greater than 80 years	57	10%
Total	594	

[2] https://nces.ed.gov/surveys/frss/publications/1999048

Many of Maine's older schools have had renovations, additions, or other major updates to their systems to replace aging components. To depict that, another way to describe the age of school buildings is by the "functional age". This is described by the National Center for Educational Statistics as the age since the last major renovation.[3]

Table 5. Functional Age of Maine Public School Buildings (Based on year of most recent substantial renovation[4])

	Number of Schools	Percent
20 years or less	170	29%
21 to 40 years	174	29%
41 to 60 years	113	19%
61 to 80 years	98	16%
Greater than 80 years	39	7%
Total	594	

This picture is somewhat more positive, with the number of schools last renovated more than 40 years ago reduced to 250 (42%). Furthermore, about half of those older buildings (132) have had additions built within the past 40 years (since 1984). It is possible that essential systems in the original building were updated at the same time; this data element was not collected. If so, this would reduce the number of older schools with neither a major renovation nor an addition in the past 40 years to 118 (20% of all schools).

Square Footage per Student

Schools vary widely in the amount of space per enrolled student. The mean square footage per student for all schools in the state is 232 sq ft, with a minimum of 42 and a maximum of 3,796.

[3] https://nces.ed.gov/surveys/frss/publications/2000032/index.asp?sectionid=7
[4] "Substantial renovation" is defined in MDOE Rule Chapter 61 as one in which the cost exceeds 50% of the building's current value prior to renovation.

Because student enrollment in Maine has been declining over the past two decades, many school buildings currently enroll fewer students than in the past. As a result, most schools have more space per student than the state recommends for newly constructed buildings.

Table 6. Square Feet per Student Compared to State Guidelines

Grade Range	State Recommended	Average (Median) Sq. Feet Per Student	Percent of Schools Above Guidelines
Elementary	135 - 145	203 (181)	75%
Middle	155 - 165	212 (206)	81%
High	180 - 190	263 (231)	74%
pK-8	135 - 165	295 (219)	82%
pK-12 (All Grades)	135 - 190	381 (375)	100%
CTE	250	199 (166)	See note
Total (All schools)	--	263 (200)	--

Notes:

1. Table 6 excludes Arthur Gould / Long Creek YDC (18,444 sq. ft. per student).
2. Five of 27 CTEs have more than 250 sq ft per enrolled student. However, enrolled students attend at different times. Over half (15) are also co-located at a high school. Thus, the total square footage attributed to each CTE student may not be directly comparable to other building types.

Maine's demographic pattern of declining enrollments is not evenly distributed across the state. As Table 7 illustrates, those with the most excess capacity (defined here as having roughly double the state recommended square feet per student) are more prevalent in northern and coastal counties. The number of CTE buildings in each county is included for context and general information, but CTEs are not included in the calculation of under-enrolled schools.

Table 7. Underenrolled Schools by County (excluding CTEs)

	Total # Schools	CTE Schools	Schools >300 Sq Ft per Student (Non-CTE)	% of Schools >300 Sq Ft per Student
Knox	21	1	8	40%
Aroostook	42	5	17	38%
Washington	35	2	11	33%
Hancock	35	1	11	32%
Waldo	26	1	6	24%
Somerset	31	1	7	23%
Franklin	17	1	3	19%
Lincoln	18	0	3	17%
Oxford	31	2	5	14%
Piscataquis	8	0	1	13%
Kennebec	52	2	6	12%
York	61	2	7	12%
Sagadahoc	18	1	2	12%
Penobscot	69	3	7	11%
Cumberland	94	4	9	9%
Androscoggin	36	1	1	3%
Total	594	27	104	17%

Other Building Features

Table 8. Other Selected Attributes

	Number (%) of Schools
Listed on Historic registry	7 (1%)
Building shared by more than one school	72 (12%)
More than one story in building	342 (58%)
Additional learning spaces	179 (30%)

Inclusion on the **National Registry of Historic Buildings** is relevant for school construction considerations as this generally affects the types of renovations and additions that are allowed. When a building houses more than one school organization – such as a CTE co-located with a high school, or middle and high schools that are

connected – this also has implications for construction projects (i.e. renovations or additions affect more than one school).

Schools with more than one story can be built on a smaller parcel of land. However, they require additional infrastructure to ensure fire and life safety as well as overall ADA accessibility.

Additional learning spaces are accessory areas that are physically separated from the main school building, such as portable classrooms. Their presence is generally an indicator of insufficient or inadequate space in the primary school building. They are typically intended to be temporary although many of them have seen long-term use.

In addition to the data elements summarized above, data was also collected about major additions and renovations since the initial construction, and total square footage of additional learning spaces.

HVAC and Air Quality Systems

Heating, Ventilation, and Air Conditioning (HVAC) are key elements of building comfort and efficiency. Schools with older equipment have higher operating costs and generally need more ongoing repairs and maintenance.

Air quality and air filtration systems have become an area of heightened attention due to the recent pandemic. The presence (or lack) of air-conditioned spaces is also a concern with rising average temperatures and increasing interest in providing extended academic programming in summer months. LED lighting, which is substantially more energy efficient than older incandescent or fluorescent technologies, is also included in this section.

Table 9. Building Coverage for Selected HVAC Capabilities

(Percentages based on total square footage)

	None	1% to 33%	34% to 66%	67% to 100%
Mechanical ventilation	3%	4%	8%	85%
Air Conditioned	23%	54%	8%	15%
LED Lighting	27%	27%	11%	35%

Table 10. HVAC and Heating system Features

	Number of Schools	% of Schools
Heating system > 20 years old	454	76%
Backup generator	276	46%
Air filters with MERV >= 13	274	46%
Primary Heating system:		
Steam/Hot Water	525	88%
Forced Hot Air	30	5%
Heat Pumps – Geothermal, Air source, or Water to Air source	39	7%
Power Generation:		
Solar	28	5%
Wind	1	<1%

Table 11. Types of Fuel(s) used in School Heating Systems

	All schools	
	N	%
Oil	367	62%
Electric	178	30%
Propane	171	29%
Natural Gas	142	24%
Biomass - Wood Chip	44	7%
Biomass - Wood Pellet	26	4%
Kerosene	5	1%

Note: It is common for schools to have more than one fuel source; totals add up to more than 100%.

Schools with older heating systems were slightly more likely to have oil as a heat source. Of the 454 schools with systems greater than 20 years old, about two-thirds (66%) use oil. The proportion of other fuel types was comparable to the figures for all schools detailed in Table 11.

The full dataset also includes information on each school's type of mechanical ventilation, type of air conditioning, type of overall HVAC control system, types of lighting controls, and electrical power system (single vs. three-phase).

Building Structure Type

The structural components used in school buildings have changed over time as new materials and technologies have developed. The building shell plays a large role in buildings' HVAC efficiency, operating costs, and ongoing maintenance and repair costs. In addition, buildings with wooden structures are susceptible to greater damage (and risk to safety) in the event of a fire.

Table 12. School Structural Components

	Number of schools	Percent of Schools
Roof Structure		
Steel	407	69%
Wood	311	52%
Other	22	4%
Exterior Wall Structure		
Masonry block / Brick	456	77%
Wood frame	190	32%
Steel/Metal frame	185	31%
Other	15	3%
Interior wall framing		
Metal stud	382	64%
Wood stud	319	54%
Masonry block / Brick	232	39%
Other	4	1%

Table 13. Documented Structural Deficiencies

	Number of Schools	Percent
At Least One (1) Structural Deficiency	**65**	**11%**
Roof Load Capacity	30	5%
Wall Stress	28	5%
Foundation	11	2%
Column Stress	9	2%
Floor Load Capacity	8	1%
Unknown	**104**	**18%**
None	**425**	**72%**

There are 65 schools with structural deficiencies that have been documented by an engineer. Most of these schools (49) have only one deficiency, but 16 schools have problems in multiple areas. "Unknown" means that district administrators had no knowledge of any investigations into structural integrity; these buildings may or may not have issues.

Site & Building Accessibility

The Americans with Disabilities Act (ADA) of 1990 resulted in establishment of accessible design standards for all public buildings. These standards were updated in 2010.[5] As demonstrated in the tables in a preceding section, over three-quarters of Maine schools were built prior to the advent of these requirements. While many schools have been brought up to standards in subsequent renovations or updates, there remains work to be done. Some of the elements inventoried below are recommended (not required) design features.

[5] See https://www.ada.gov/law-and-regs/design-standards/

Table 14. ADA Accessibility of School Buildings

	Number of schools	Percent of Schools
Parking and Passenger Loading Zones - Adequate accessible parking spaces with aisles	365	61%
Building Approach/Ramps - At least 36 inches wide, edge protection and handrails on both sides	435	73%
Main Building Entrance/Front Entrance - At least one route from each site arrival point to main entrance that does not require use of step(s).	552	93%
Playgrounds - at least one route to the playground equipment that does not require the use of a step(s).*	288 of 445	65%
Ballfields: at least one route to the ball fields that does not require the use of a step(s).**	166 of 470	35%
Emergency Exit: at least one secondary accessible exit in addition to the accessible entrance	554	93%
Door Clearance: All doors provide a minimum of 32 inches of clear space with levers or pulls for hardware.	547	92%
Room and Exit Signs: All room and exit signs provide contrasting Braille and tactile text	189	32%
Interior Wayfinder Signs: All interior directional and informational signs provide contrasting braille and text	180	30%
Restrooms: restrooms available with maneuvering clearances and grab bars provided at a toilet	536	90%
Drinking Fountains: high and low drinking fountains provided in common areas out of the circulation path	353	59%
Water Bottle Filling Station	554	93%

*149 Schools were considered n/a and excluded
**124 schools were considered n/a and excluded

Of the 7% of schools that do not have an accessible main entrance, most (37, or 6% of all schools) also do not have “an alternative accessible entrance that can be used independently and during the same hours as the main entrance.”

Environmental Conditions

As part of the site visit, MDOE collected information about the extent to which each school building had known problems with several potential hazards that can pose an increased risk to health and safety.

Table 15. Condition of School Building Environments

	Not Surveyed or Unknown	Surveyed		
		Identified and Remediated	Identified and Not Remediated	Not Identified
Radon	488 (82%)	11	1	94
Mold	376 (63%)	97	5	116
Air quality issue	343 (58%)	114	6	131
Lead	442 (74%)	50	12	90
Asbestos	86 (14%)	145	186	177
PCBs	545 (92%)	9	6	34
PFAS	552 (93%)	2	4	36

With the exception of asbestos, which has been a topic of concerted effort for decades, it is noteworthy that most schools have not explicitly investigated the presence of these potential hazards. In particular, both mold and air quality were identified in nearly half of the buildings surveyed (102 of 218 or 47% found mold, and 120 of 251 or 48% found air quality concerns). This suggests that there are likely schools with hidden issues among the many schools that have not been surveyed. Table 15 refers to lead found in building materials such as walls or paint. It does not refer to drinking water, which is tested regularly for the presence of lead and was not included in this inventory project.

Program & 10-Year Planning

This section of data elements investigated the adequacy of current facilities to provide space for the districts' educational programs. It relies on self-reported information from school representatives and is not an independent judgment from the MDOE staff conducting the inventory. The numbers in Tables 16 and 17 are likely underestimates. Such decisions are contentious, and district administrators are unlikely to self-report future plans that are still in discussions and not yet public.

Table 16. Long-term (10-year) SAU plans for each school

	Frequency	Percent
Maintain	454	76%
Renovation	127	21%
Addition	70	12%
Consolidation	57	10%
Replacement	56	9%
Close	24	4%

Table 17. SAUs' Expected School Actions, by County

	Maintain	Renovate or Addition	Consolidate	Replace	Close	Total
Androscoggin	33 (92%)	7	1	1	0	36
Aroostook	27 (64%)	18	1	4	1	42
Cumberland	66 (70%)	37	7	11	3	94
Franklin	13 (76%)	1	4	0	0	17
Hancock	31 (89%)	21	0	3	0	35
Kennebec	35 (67%)	5	7	8	2	52
Knox	20 (95%)	12	0	0	0	21
Lincoln	18 (100%)	6	3	2	0	18
Oxford	24 (77%)	9	3	4	5	31
Penobscot	42 (61%)	36	15	6	4	69
Piscataquis	8 (100%)	3	1	0	0	8
Sagadahoc	16 (89%)	5	0	2	1	18
Somerset	25 (81%)	5	6	6	4	31
Waldo	22 (85%)	1	8	1	0	26
Washington	31 (89%)	15	0	1	2	35
York	43 (70%)	16	1	7	2	61
Total	454 (76%)	197	57	56	24	594

.

Table 18. SAUs Reporting Sufficient Program Space

Program	Number of applicable schools	Number of Schools Reporting Sufficient Space	Percent of Schools
Pre-K / Early Childhood	282	221	78%
General Classrooms	583	474	81%
Science Classrooms	352	279	79%
Special Education	567	379	67%
Health Clinics	570	385	68%
Kitchen/Cafeteria	573	398	70%
Physical Education	563	441	78%
Library	560	479	86%
Music	559	423	76%
Art	559	460	82%
STEM/STEAM	369	209	57%
Guidance/Career prep	548	407	74%

Fire Protection

All public school buildings are required to have a functioning fire protection system. All Maine public schools had at least partial building coverage with a fire alarm, smoke alarm, and/or sprinkler system.

Table 19. School Building Fire Protection Coverage

	None	1% to 33%	34% to 66%	67% to 100%
Fire alarm	1%	<1%	<1%	98%
Smoke alarm	3%	2%	2%	93%
Sprinkler system	28%	7%	3%	62%

In 591 of the 594 school buildings there was at least 2/3 building coverage (67% or more) with at least one protection system. However, there were three schools that had coverage in less than 67% of the building.

Security & Safety

Many Maine schools have building features that are intended to improve security and safety in the event of an unauthorized or potentially threatening visitor. This section inventoried the protective capabilities present at each school.

Table 20. School Security Infrastructure

Entry	N	%
Single point of entry for students/staff to enter the school building	444	75%
School office located at the main entrance of the building	529	89%
Main entrance security features		
Camera/Video Surveillance System	553	93%
Intercom Communications System	550	93%
Secure Entrance Vestibule	239	40%
Safety Glass	102	17%
Vertical Protection Bollards	54	9%
Schools with at least one of the above	***583***	***98%***
School building security features		
Classroom Doors with Lockable Hardware	556	94%
Exterior Security Video/Camera System	525	88%
Interior Security Video/Camera System	506	85%
School Emergency Alert/Panic Button	297	50%
Exterior Speaker System	293	49%
Exterior Door Numbering Clearly Visible from Inside & Outside of Door	289	49%
Electronically Monitored Exterior Doors	226	38%
Building Zoned & Able to be Electronically locked down	91	15%
Schools with at least one of the above	***587***	***99%***

Because it would be counter-productive to publicly advertise the types of security measures in place in each building, the safety and security data are not further disaggregated. It could potentially allow an individual with ill-intentions to guess a given school's infrastructure.