New Construction vs. Renovation Analysis

Introduction

Harriman, Architects + Engineers, of Auburn has been retained by the Auburn School Department to evaluate the existing Edward Little High School, including the site, to determine the feasibility of expanding and renovating the existing school vs. constructing a new school either on the existing site or on a new site. The evaluation was prepared by Jeff Larimer, AIA, with the assistance of Tom Morrill, Superintendent; Jude Cyr, Business Manager; and James Miller III, Principal.

The criteria used to evaluate the school were derived from the Maine Department of Education's Major Capital School Construction Project Workbook, Section 5, "New Construction vs. Renovation."

In addition, the following tasks were performed:

1. Harriman architectural and engineering staff toured the existing high school and site to verify existing conditions.
2. Distributed questionnaires to all school administrators, faculty and staff and conducted interviews with same to evaluate the educational needs of the school relative to existing conditions.
3. Generated a program of existing and proposed spaces for the school.
4. Prepared an analysis of the existing site and building.
5. Identified potential areas for expanding the building.
6. Evaluated and identified current code and physical plant deficiencies utilizing the VFA report commissioned by the school department.
7. Developed a comparative cost analysis to evaluate renovation costs versus new construction costs.
8. Developed a summary and recommendation for the use of the building and site.

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Goals

A Facilities Master Plan subcommittee, established by the Auburn School Department in late 2007, was charged with evaluating all of the school facilities in Auburn. In a report dated March 19, 2008, it was the recommendation of the subcommittee that the "repair, renovation and/or replacement" of Edward Little High School be given the "highest priority" on the school department's five-year facility master plan. Many deficiencies were identified by the subcommittee in their evaluation. Refer to Tab 5 for a copy of the subcommittee's evaluation and recommendations.

In accordance with the recommendations of the Facilities Master Plan subcommittee, the objective of the school department is to upgrade and renovate the existing 48 year old high school to not only meet current building and educational standards but to provide a facility that is flexible enough to meet the instructional and community needs of Auburn students and residents for many years.

To that end, the primary goal is to provide equal access, for all students, to the educational programs offered by the school department. To meet the goal requires providing a space for every program that is appropriately sized, properly designed and adequately equipped for that specific program.

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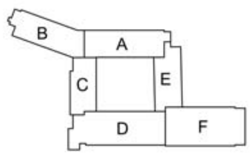
History of the Building



Key Plan

The current Edward Little High School was opened in 1961 on a newly acquired 56 ± acre site, known as the Franklin-Keene site, which is centrally located near downtown in the city of Auburn. The original building was designed for 1,200 students in grades 10, 11 and 12 and for many years not only served the students of Auburn, but the students of Mechanic Falls, Minot and Poland as well.

The building consisted of a single story wing (C Wing) that housed the main entrance, the administrative offices and the library, two 2-story classroom wings (A and B Wings) and a single story multi-purpose wing (D Wing) with a daylight basement vocational wing. The original building did not include a gymnasium or a cafeteria and kitchen. Gym classes were held in the multi-purpose space located on the first floor of D wing.

In 1965, a new 2-story wing (F Wing) was added that included a gymnasium with a stage and a partial daylight basement that aligned with the original vocational wing. In 1969, a portion of the basement under the gymnasium that was originally unfinished was renovated into a cafeteria and kitchen. Although the cafeteria and kitchen are deficient by today's standards for size and function, they are still in use today.

After two failed applications to the State in the 90's for possibly funding an expansion of the high school, a locally funded 2-story classroom wing (E Wing) was added 1998, which connected A and D Wings and created an interior courtyard. With the addition of this classroom wing, the facility was converted to a four year high school for Auburn students only. At the same time, the students tuitioned from Mechanic Falls, Minot and Poland were no longer permitted to attend Edward Little so they had to leave to attend their own high school that was constructed in Poland.

Although originally designed for 1,200 students, the population at Edward Little has reached as high as 1,700 students in the 70's. The number of students has declined in recent years with the current population at about 1,050 students with a staff of about 165. In addition, there are about 100 students who attend alternative high school programs at either the Merrill Hill School on Western Avenue or the Franklin School on High Street.

The student population is expected to increase over the next few years to about 1,200 students.

Refer to Tab 2 for plans of the building as it exists today.

New Construction vs. Renovation Analysis

Educational Adequacy

Overview

The Auburn School Department strives to provide a comprehensive education, through the structure of the Maine Learning Results, to all students at all grade levels, regardless of their learning abilities. A recent Facilities Master Plan looked at all of the school facilities in the city to evaluate their adequacy to educate the students of Auburn. Over the past decade, most of the elementary schools have been upgraded, renovated or even replaced. The middle school has been identified for future expansion and reorganization to make it a three grade school instead of the current two. However, Edward Little High School was identified by the Facilities Master Plan to be the one school in the city needing the most help to bring it into the 21st century. The educational and physical plant deficiencies of Edward Little High School have also been documented in the last NEASC Self-Report dated August 6, 2004. Refer to Tab 4 for a copy of the report.

The administration and staff at Edward Little High School are dedicated to providing the students with a safe learning environment and a varied, all-inclusive educational experience to prepare them for a post-secondary education or other career opportunities. This is done despite the fact that the existing facility is lacking adequate or appropriate space for a number of important and necessary educational programs.

Administration/Guidance

The administrative and guidance offices do not provide adequate space for the principals, counselors and administrative staff. Privacy and confidentiality is compromised because of the lack of private offices or conference rooms that have appropriate sound isolation. Records storage is limited, supply storage is non-existent and there is no separate work space for the administrative staff. There is no reception or waiting areas for students, parents or visitors. The reception window for the main office is located along the main corridor of the building. A security window and vestibule were added a few years ago but overall visibility and the monitoring of people arriving and leaving the facility could be improved.

Library

The existing library is very linear and difficult to monitor. It is also undersized for student usable space by about 1,000 sf. The student usable space includes such spaces as stack space, reading areas, and reference and research areas. The main entry point of the library is controlled by the circulation desk and a book security system. Furthermore, there is no secure library office, work room or storage room. The size of the non-student areas should be about 1,350 sf according to the State Board of Education published Library guidelines.

New Construction vs. Renovation Analysis

General Classrooms

The general classroom spaces are satisfactory in terms of size, average of 800 sf, but are deficient in many of the features and services found in modern classrooms, such as up-to-date technology, adequate electrical service, functioning heating and ventilation systems, proper educational equipment and adequate storage space. Refer to the "Facility Analysis" section of the narrative for a detailed description of the building features. In addition, there is a lack of collaborative work space or department meeting space to allow teachers in each department to develop projects and assignments. There is also a need for additional general classroom space for Social Studies, Math and Foreign Language.

Science Classrooms

The size and number of science classrooms are insufficient for a modern high school. Most of the rooms are only the size of a standard classroom, about 800 sf, which does not allow for lecture space and lab space within the same room. A traditional science classroom should be about 1,200 sf. There are only two full size traditional science classrooms for the entire student body. The remaining rooms allow for lecture space only. In addition, the science department lacks appropriate storage and prep space for all of the sciences as well as a collaborative meeting space for the science staff. As a consequence, the school is not able to provide a full science curriculum.

Special Education

Special Education services have had a significant impact on general education classroom space over the years, as it has with all schools, as adjustments have been made to provide appropriate instructional space for students with learning disabilities. Special education was not a consideration when the school was originally designed so many rooms have been carved up and subdivided to provide space for a variety of special education services. These spaces were created by taking away general or specialty classrooms. The offering of special education programs is adequate but the needs of the programs are always increasing as more and more students are being identified with various learning and behavioral disabilities. Most, if not all, of the existing program offerings could use larger spaces that are appropriately equipped to address the needs of the students.

Fine & Performing Arts

The fine arts department, which includes art, music and drama, is lacking in rooms that are of sufficient size and number. All of the existing art classrooms are undersized and lack any kind of storage for supplies or student work. The band and chorus rooms are also undersized for the number of students in each of the programs and the location of the rooms within the building are a concern due to the noise generated and a lack of adequate sound isolation. There is virtually no storage available for the music department for instruments and uniforms. And as in the other departments, there is no space for the fine arts staff to meet or collaborate. The drama program has no dedicated space. The school also lacks an auditorium that would be beneficial for both the music and drama programs. As a result they have to seek alternative space elsewhere in the community that is very limited and difficult to schedule.

New Construction vs. Renovation Analysis

Cafeteria

A cafeteria and kitchen were not included when the original building was constructed. Although a cafeteria and kitchen was added in the basement under the gymnasium in the late 1960's, the small kitchen has never been able to provide a full service lunch program. The existing kitchen is less than one quarter the size it should be. It is not considered a full production kitchen because it does not include a full cooking line and prep area, a walk-in cooler and freezer, dry storage, a dishwashing area and an appropriately sized serving area. Only within the last few months was a reduced lunch added to the menu for the first time. Most schools see, on average, an 80% student participation in the lunch program. As a result of the undersized kitchen and the limited menu, the participation rate for Edward Little students is only between 25% and 30%.

Physical Education

The existing gymnasium is well maintained and is of adequate size. The gym includes a full size regulation basketball court with a wood floor that was replaced within the last few years. There is bleacher seating for 1,600 people but the bleachers are original to the building and may need to be replaced. There is a stage off of the gym for performances and assemblies, but the arrangement of the bleachers to the sides of the gym is problematic for all school assemblies. For the Phys Ed Department, the biggest deficiency is the lack of appropriately sized locker and shower facilities for both girls and boys PE classes and varsity sports. Although the locker facilities on the first floor were recently renovated, they are not connected directly to the gym. Students traveling between the lockers and the gym or the lockers and the athletic fields have no direct access to either and must walk through the corridors of the school. Athletic storage for both PE and Varsity athletics is also insufficient for the number and type of sport activities offered.

Athletic Fields

Most of the outdoor varsity sports programs for both boys and girls take place at a variety of remote sites due to the lack of on-site athletic fields. The only developed field is a regulation soccer field that includes a paved running track. There is one multi-use practice field to the south of the gymnasium and there are 6 tennis courts to the south of the soccer field. Football is played at Walton Field and baseball is played at Pettingill Park. Other fields throughout the city are used as needed for other sports

Space Program

A space program has been developed that provides a comprehensive listing of all of the existing spaces in the high school. The space program also includes a listing of proposed spaces that would compensate for the deficiencies in the educational program. Please refer to Tab 2 for a copy of the Space Programming document that summarizes the listing of existing and proposed spaces and a copy of the floor plans of the existing building.

New Construction vs. Renovation Analysis

Site Analysis

Physical Characteristics

Exhibits A & B

Edward Little High School is located on 56.23 acres in the city of Auburn. The property is bound by residential development to the north, west, and south. The eastern boundary of the property is defined by the Minot Avenue right-of-way.

Paved residential roadways, Harris Street, Fairmont Avenue and Forest Avenue, connect the school to Court Street to the north and by Auburn Heights to Western Avenue to the west.

Paved walkways exist at the main entrance to the building and at various locations immediately adjacent to the building. A sidewalk exists along the westerly edge of Harris Street providing a pedestrian way from Court Street to the school main entrance. Walking pathways exist to the east side of the property connecting the school site to Minot Avenue, South Goff Street, and Prospect Street.

Parking areas are located at the main entrance to the school building, adjacent to the west side of the building and east of the track/soccer field, north and west of the tennis courts, south of the building, and along most roadways/access drives.

The paved areas on site are mostly cracked and damaged by frost or age. There are several large potholes along the parking and drive area to the west of the building.

Sloping topography and the presence of ledge dictate a terraced site design. The school building main entrance is positioned nearest the highest elevation of Goff Hill with the southern gymnasium drive, western faculty parking, tennis courts, and the track/soccer field with parking defining five terraces respectively.

Vegetation exists in areas that are undeveloped and steeply sloped. A common mix of deciduous and coniferous trees is present. Typical understory growth exists in these areas.

Primary utilities are located above ground and enter the site from Harris Street. One 20,000 gallon underground fuel tank is located outside the boiler room on the west side of the building on the sloped hill side. Miscellaneous data/communication lines are present above ground.

Access/Circulation Issues

Exhibit E

Vehicular access is provided from Court Street (north) and Western Avenue (west) via the residential streets mentioned below. The school site may be accessed from four different routes. From Court Street access is possible by Harris Street, Fairmount Street, and Forest Avenue. From Western Avenue access is along Auburn Heights.

New Construction vs. Renovation Analysis

Harris Street is the primary means of ingress/egress for passenger vehicles. A lesser number of vehicles use Fairmont Avenue and Forest Avenue. Buses access the site from Western Avenue via Auburn Heights. Passenger vehicles also utilize this route.

The intersection of Court Street and Harris Street is not a feasible pathway for bus traffic. Therefore, the intersection of Western Avenue and Auburn Heights serves all bus traffic and appears to operate adequately under existing conditions. From Western Avenue, buses can go either north to Court Street or south to the rotary at Minot Avenue. Both of these areas have been identified for possible improvement.

Onsite vehicular circulation is configured to allow buses direct access from Western Avenue to the gymnasium drop-off/loop located at the far south end of the school building via Auburn Heights. Buses exit the site along the same route. Passenger vehicles travel from Court Street and Western Avenue with the Court Street entrance/exit, along Harris Street, having the highest volume. Harris Street is the primary access route to and from the school's main entrance loop and associated parking.

Pedestrians are able to access the school facility at the main entrance and the lower level of the gymnasium area. The main school entrance is nearly the most northerly point of the building and the gymnasium is nearly the most southerly point of the building, thus being the farthest from the main entrance and office area. Bused students are dropped off and picked up at the south end of the gymnasium and must walk to the west side, lower level of the gym area to access or egress the building.

ADA access to the gymnasium is indirect and is from the south loop, to the east side entrance of the building, through corridors around the lower level to a stair lift. Students arriving in a passenger vehicle to be dropped off may use the main entrance loop. Students utilizing the lower parking area walk up exterior steps to the west side of the building and then must walk up additional steps around the building to the main entrance. A sidewalk is provided along Harris Street allowing pedestrian access from Court Street to the main entrance. Fairmount Street, Forest Avenue, and Auburn Heights do not have sidewalks.

Access/Circulation Findings

In a June 2000 study prepared by Deluca Hoffman Associates, Inc. it was determined that Forest, Fairmount and Harris all have marginal or deficient sight lines at Court Street. A consideration to avoid these deficient exits and entrances would be to prohibit school traffic from exiting through the residential streets onto Court Street and have the main entrance to the site at the Western Avenue/Auburn Heights intersection. However, per the Deluca Hoffman Associates, Inc. study, this option would require the construction of a traffic light at Western Avenue and Court Street, which would be an added cost to the project if the existing building is renovated and expanded.

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A bus loop that is separate from the parent drop-off/pick-up traffic is a desired feature for all schools. However, the dual operation of the main entrance and the lower level entrance below the gym during the morning and afternoon drop-off/pick-up periods requires two open entrances and does not create an ideal situation for building security and monitoring.

Several options could be considered to maintain the separation of parent drop-off traffic and bus traffic, while eliminating the need for a second entryway. An addition/renovation to the south side of the school to relocate the main entrance would direct the bus and student parking to a new parking/drop-off area. The parking and access drive at the existing main entrance could be reconfigured with access off Western Avenue to allow for separate loops for buses and cars at the main entrance. Auburn Heights could be re-aligned along the westerly side of the building to provide a bus drop-off route and maintain bus access off of Western Avenue and the existing configuration at the main entrance.

It has been mentioned that traffic speeds through parking and pedestrian areas on site and there are safety concerns about the lack of separation between parking and drives throughout the site, especially along Auburn Heights. Portions of the on-site parking are located a significant distance or elevation change from the existing main entrance which results in parking above capacity at the main entrance, which in turn increases the pedestrian/parking and traffic conflict in these areas.

Realigning Auburn Heights to displace the parking to just one side of the road could reduce the conflict of through traffic and parking, or the parking areas could be reconfigured with islands for separation and definition of one pedestrian route to cross the road.

The front area could be reconfigured with additional parking and redefined parent drop-off and/or bus drop-off loops. Placing a large parking area at the main entrance to the building will help relieve some of the congestion issues along the drives and relocate pedestrians to the same elevation and vicinity of the main entrance.

Pedestrian access on site to the main entrance is challenging due to the severe topography and location of the parking lots. A possible solution is adding, reconfiguring and relocating parking nearer the building entrances. ADA access to the gym as described above is not ideal. One option may be to add a ramp at this location to provide acceptable ADA access to the main gym entrance.

Parking Issues

Head-in parking is located along the main entrance loop and the south end of Forest Avenue near the loop. Parallel parking is evident along the loop and the access drive to the lower parking area adjacent to the track/soccer field. This access drive bisects the lower parking and becomes Auburn Heights, intersecting with Western Avenue. There is no physical or perceived separation between parking and the travelled way in this area.

New Construction vs. Renovation Analysis

Student and visitor parking are primarily served by the lower parking area and available parallel parking. Dedicated visitor parking near the main entrance is non-existent. Designated staff parking is located at the loop, west side of the building, and north side of the tennis courts. Maintenance staff parking is located to the southeast of the building although maintenance vehicles are frequently observed parking on the walkway leading to the main entrance because of the convenience and the lack of parking elsewhere. The School Resource Officer also uses the walkway at the secondary main entrance for his own personal parking space.

The parking designated for the staff totals 148 spaces which is short of the 165 staff members working in the building. Total parking on the school site is estimated to be between 300-325 spaces. These spaces are located throughout the site and it is common to find the 60 spaces in the large parking area by the tennis courts vacant with the lower parking lot below capacity, while the parking in the front of the main entrance is above capacity and vehicles line the streets outside of designated parking spaces.

The City of Auburn requires four parking spaces per classroom. There are currently 70 classrooms which yields 280 parking spaces required for normal school day use. The City also requires 1 space for every four seats in the gymnasium. There are 1,600 bleacher seats in the gym, which yields 400 parking spaces required to meet city ordinances. The quantity of parking for on-site athletic activities such as track, soccer, and tennis also needs to be considered. The scheduling of all activities occurring at the school is critical to the management of parking.

Parking Findings

Although the parking on site does meet Auburn's minimum requirements for use during the normal school day, the parking areas by the tennis courts and along Auburn Heights are often underutilized by students and staff while other parking is often above capacity. This underutilization is a direct result of the distance and elevation change from these parking areas to the building entrances.

The on-site parking currently does not meet Auburn's parking requirements for the gym. If an auditorium or other assembly type space were to be added, the existing parking would be even less in compliance. A few considerations for addressing the on-site parking problems include 1) adding a parking lot at the main entrance and reconfiguring and expanding the existing parking lots along Auburn Heights, 2) adding parking at the south side of the building at the existing bus loop and parking to the east of the gym wing and 3) relocate the main entrance to the south side of the building and construct a large parking lot or lots at this entrance while limiting access and parking off the residential streets to the north.

New Construction vs. Renovation Analysis

Usable Acreage

Exhibit C

- 56.23± acres total site
- 32± acres gross developable area
- 21± acres existing developed area
- 11± acres net developable area remaining

Proximity to Services

Exhibit D

The site is within close proximity to the following services:

- Downtown Auburn:
  - Post Office (0.5 miles)
  - City Offices (0.5 miles)
  - Auburn Police Department (.25 miles)
  - Auburn Fire Department on Minot Avenue (1.2 miles)
- Lewiston Fire Department off College Street (1.5 miles)
- Central Maine Medical Center off Main Street. (1.5 miles)

Health, environmental and security risks

As mentioned previously, the use of two entrances for access to the building does create a building security risk due to the inability to properly monitor staff and students in the morning. In addition, the configuration of the existing on-site parking areas does result in traffic and pedestrian conflicts.

The heating system for the building is served by one underground fuel storage tank that is located just outside the boiler room on the west side of the building. The tank is inspected annually.

Opportunities for recreation/community use

The site includes a soccer field/track complex west of the building and six tennis courts toward the south of the site. There is also an existing trail network and outdoor amphitheater to the east between the building and Minot Avenue. The site does not adequately provide practice or game facilities for football, baseball, softball, field hockey, etc.

Drainage of the soccer field has been an ongoing problem. On rainy days it has been reported that a puddle forms on the playing field requiring pumping and draining about four hours in advance of a game in order for the field to be ready. Drainage is also reported to be poor in the team area. In addition, areas in front of the goals are void of any grass. An access gate in the fence is broken and needs to be repaired.

In 2002 the existing track surface was scraped off and replaced with a standard high school surface by Maine Tennis and Track. At the time, it was recommended that the track be re-painted every 5-7 years. The track is due for repainting. It has been reported that the track does have some holes that need to be filled or repaired.

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The tennis courts apparently were constructed in the late 1960's. There is evidence of several large weed filled cracks in the surface that can interfere with play. The tennis courts should be resurfaced. New fencing was installed around the courts in 2005.

The grass on the practice field has been reported to be in poor condition despite frequent watering during the spring and summer months. An indication that the soil is not retaining the water. The field should be reloamed with a proper mixture to help retain water and then reseeded and fertilized.

Utilizing the area to the south of the building and converting the soccer field to a multipurpose field may enable the desired athletic fields to be constructed on site. Another consideration would be to convert the soccer field to a football field and add bleachers and lighting. If the main entrance and parking were relocated to the south or west side of the building, the area to the north of the building could possibly be utilized for playfields.

The proximity and number of parking for such events is not ideal at many of these locations.

Local/regional tournaments, fundraisers, open air markets/festivals/shows could be considered while the challenge of quantity and location of parking will need to be resolved.

Adequacy of Utilities

Water:

- Observations/recommendations of Auburn Water and Sewer District:
  - Minimum water pressure in building sprinkler and domestic services.
    - Consider adding 8" service off main in Western Avenue.
  - Three existing water meters at building entrance.
    - Should be a single water meter for building.
  - Two hydrants at front (north face) of building.
    - Consider new service off Western and place additional hydrant at south face of building.

Sanitary Sewer:

- Observations/recommendations of Auburn Water and Sewer District.
  - Sewer service extends down Auburn Heights to a cross country line south of tennis courts towards Dana Avenue.
  - Portions of the on-site sewer lines are Combined Sewer Overflows (sewer and storm runoff drain in same line).
    - The goal of City and State would be to separate sanitary sewer and storm drains. This may be required by Maine DEP, which would be an added cost to the project.

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Storm Sewer:

- New storm sewer was recently constructed for the track and soccer field area.
- Storm drain off southeast side of property is 20' down and "vintage".
  - Further review will be required to determine if it may need to be repaired or replaced.
- Additional impervious areas that, in combination with the additional wing constructed in 1997/98, total more than one acre will require permitting from the Maine DEP at an added cost to the project. This will include.
  - Water quantity and quality control.
    - May include upgrades to existing storm drains.
    - Treatment basins or underground treatment chambers.

Utilities:

- Electric
  - Overhead service off Court St. down Harris Street, underground into building from last pole.
  - Poles owned by CMP, in good condition.
  - Transformer is maxed out, any additional capacity will require larger transformer and pad outside building.
- Telephone and Technology
  - Recent renovations to both services.
- Site lighting is in good condition and appears to be adequately spaced

Expandability of Site

Exhibit F

Expansion of the building could potentially take place in several areas:

A) To the north in the area of the existing parking loop
B) Along the northeast slope
C) South into maintenance parking area and practice field

The maintenance parking area and practice field were previously a steep slope that has been filled with unknown materials and will need to be tested prior to consideration for expansion. An alternative would be to expand to the northeast that could be a terraced, daylight expansion to accommodate the slope.

Most of the remaining areas around the building are either developed as parking or contain steep slopes that would be costly to develop.

New Construction vs. Renovation Analysis

Acquisition of Additional Property

Exhibit G

The size of the current site is adequate to accommodate the existing building and some additions without the need to acquire additional property. Increased parking can also be accommodated on the existing site. The real need for expanding the site is based on the desire to provide additional athletic fields on site. Expansion of the building and parking would diminish the area left for additional athletic fields due to the limited usable acreage remaining for development.

To accumulate additional land suitable for expanding the site would require the purchase of multiple small residential lots which abut the school property. To accomplish this would be cost prohibitive as well as extremely difficult since it would require 100% participation from the owners of those properties that were to be acquired. Furthermore, the topography of the site discourages the possibility of expanding to and beyond the property line in most directions and acquiring these properties offers little benefit to the existing school property.

New Construction vs. Renovation Analysis

Facility Analysis

Overview

A VFA report prepared in 2005 and updated in 2008 (See Tab 3) provides a broad analysis of the building systems (structural, mechanical, plumbing, electrical and interior and exterior finishes), building structure and other code compliance deficiencies. Briefly summarizing the report, some of the critical or potentially critical items that have been identified are attributable to the age and intense use of the building. Some of the items include asbestos flooring, lack of emergency lighting, inadequate wiring, poor ventilation contributable to old mechanical systems such as unit ventilators, old steam piping, worn out plumbing fixtures and piping, roofs needing replacement, multiple level building with no handicap access, toilet rooms that are not accessible, and interior and exterior building finishes that are beyond their rated life.

On the following pages an analysis has been prepared that provides a general overview of the existing architectural features, structural systems, fire protection and plumbing systems, mechanical systems and electrical systems.

Architectural

Building Envelope

The exterior of the building is predominately of brick and curtainwall construction. A major feature for most of the building is the curtainwall system that runs from floor to roof and the full length of the original classroom wings, the administrative wing and portions of the vocational wing. The existing curtainwall system consists of a non-thermal break aluminum frame that is infilled with single glazed windows or insulating panels. The amount of glass area was significantly reduced from what was originally installed when most of the glass was replaced with insulating panels during the energy crisis in the 1970's. Unfortunately, this change reduced the amount of natural daylight coming into the building, which is something that is strongly desired today. On the other hand, the added insulating panels were intended to improve the insulating value of the exterior skin, but in light of today's higher fuel costs the overall construction of the curtainwall is not energy efficient and should be replaced with an exterior wall and window construction that has a higher insulating value.

The exterior portions of the original building not covered by the curtainwall system are primarily of masonry construction – typically brick with concrete block backup – that are not insulated. The exterior walls of the 1998 classroom addition are of brick veneer with an air space and an insulated stud wall backup.

Except for the main entrances, many of the exterior metal doors and hardware are original to the building and should be reviewed for possible replacement, to not only improve building security but to improve energy efficiency.

Refer to the electrical section of this analysis for additional information on the existing security systems installed in the building.

The roof material on the original building (A, B, C and D wings) was tar & gravel over a 1 ½" layer of rigid insulation. The gym addition (F wing) had a built-up roof over a 1 ½" layer of rigid insulation. The original roof materials were replaced in the late 1980's and early 1990's with an EPDM membrane. Reportedly, the original rigid insulation on A and B wings was replaced but matched the original thickness. The overall thickness of the new insulation on C and D wings was increased from the original thickness. The roof on the 1998 classroom addition is an EPDM membrane roof over tapered rigid insulation. All roofs drain internally to roof drains. The roof material and insulation on the gym was replaced in the early 2000's but there is no documentation to indicate what was actually installed. To reduce overall heat loss and to increase the energy efficiency of the building, consideration should be given to increasing the thickness of the insulation on those portions of the building that have not been upgraded to provide a minimum 'R' value of 30. The 'R' value of the original insulation is probably less than 10.

Building Interior

In general, the interior of the building consists of plaster on steel studs, vinyl tile, carpeting or exposed concrete floors, wood or metal doors, and suspended acoustical tile ceilings or exposed construction.

The plaster and steel stud interior partitions that separate the main exit corridors from adjoining spaces are required to be smoke partitions that are continuous from the floor to the underside of the floor or roof structure above. It appears that the partitions do not provide that continuous separation above the ceiling line in the original portions of the building. To be code compliant, the partitions will need to be finished from the ceiling line to the floor or roof structure above.

The original tile floors contained asbestos and although some still remains, most of it has been removed and replaced with vinyl tile. Any remaining asbestos containing tile floors should be removed and replaced with an alternate flooring material. Areas that are carpeted, such as the corridors, are worn and should be replaced with new carpet or an alternate flooring material.

Some of the interior doors in the original building have been replaced in recent years with new wood doors and ADA compliant hardware. All other existing doors and hardware should be reviewed for possible replacement or upgrade to insure proper operation and code compliance. The doors is in the 1998 addition are in satisfactory condition.

New Construction vs. Renovation Analysis

Accessibility

The high school consists of three floors – ground, first and second. Although technically on the first floor, the gymnasium is actually about 3' lower to allow for the difference in the stage height. The first and second floors are connected by an elevator located at the far northern end of B wing. This elevator is not original to the building. The first and ground floors are connected by an elevator located approximately two-thirds down the D wing corridor from the intersection with C wing. This elevator is also not original to the building. A stair lift has been added at the stairs in F wing to access the gym from the first floor.

The configuration of the two elevators makes it very difficult for any disabled student or staff member to travel between classes on the second floor and the cafeteria on the ground floor.

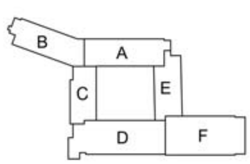
The main entrance to the building is relatively level without elevation changes making it easily accessible for those with disabilities. However, the entrance to the gym is not accessible due to the significant grade changes. A person in a wheelchair would be required to enter the gym on the east side rather than through the main entrance.

Except for the recently renovated toilets and locker rooms on the first floor of D wing, the remaining student and staff toilet rooms throughout the building are generally not ADA compliant. All of the remaining toilet rooms need to be renovated. Single user toilet rooms would need to be enlarged to make them accessible and meet current standards.

There are other areas throughout the building that need to be evaluated further, and potentially upgraded, to bring them into compliance with current ADA requirements. Some of those items include such things as cabinetry access, counter heights, plumbing fixtures and fittings, toilet partitions, door clearances, door hardware, etc.

Structural

Structural Review General



The Edward Little High School building is composed of six wings. The wings were constructed in three different time periods. Wings "A", "B", "C" and "D" were the original portion of the school, designed in 1959. These were arranged in a south-oriented "winged-C" configuration. The A- and B-wings are joined end-to-end, and run approximately north-south. The C-wing runs west from the A-B intersection, to link to the northern end of the D-wing. The D-wing runs south from the junction with the C-wing. The north side of the C-wing serves as the main entrance to the school. Later, the "E" and "F" (gymnasium) wings were designed, in 1964. F-wing/gymnasium extends south from the end of the D-wing. The E-wing was designed to close-off the south side of a courtyard bound by the A-, C- and D-wings. The 1964 version of the E-wing is not the E-wing that exists today; the current E-wing addition was designed in 1997.

The roofs on C- and D- Wings were re-roofed with new membrane and insulation in the late 1980's according to drawings dated 1987. It has been reported that the Gymnasium roof was also renovated and re-roofed, but no documentation for this work has been located or reviewed at the time of this writing. In addition, it has been reported that A- and B- Wings have been re-roofed with new membrane and insulation equal in thickness to the original insulation.

For the purpose of this report, the building code used as the "current" reference code is BOCA 1999, as adopted by the City of Auburn, with additional cross-reference to the State of Maine-preferred IBC 2003. Reference "current" snow loads are based upon a "Basic Ground Snow" of 80 pounds per square foot (psf).

A & B Wings

Structural Review

The A-wing and the B-wing (1959) are classroom wings that are structurally similar, and match floor and roof levels, and so can be dealt with as a unit. They are two-story steel-framed structures. The first floor is concrete a slab-on-grade. The slab base is consolidated soil fill, restrained by cast-in-place concrete retaining walls along the east length, and standard foundation walls typically. Interior steel columns are supported by concrete piers on footings. According to the existing structural drawings, all foundations and footings bear on rock ledge.

The first floor is shown on the original design drawings to be a 4-inch thick concrete slab on grade, and as such, should be adequate to carry imposed live loads in excess of 100 psf.

The second floor is a 2 ½" thick concrete slab on open-web steel joists. The steel joists are supported by a line of steel beams and columns along the exterior walls and each wall of the central corridor. A numerical analysis indicates that the typical framing for the classroom spans is adequate to carry an imposed live load of 40 psf. Framing for the corridors is adequate to carry an imposed live load of 100 psf. This is consistent with the building code requirements of the original design period, and is sufficient to meet current building code requirements (BOCA 1999/IBC 2003), which are 40 psf for classroom space and 80 psf for corridors at levels above the First Floor.

The roof typically consists of 1 ½" deep steel decking over open-web steel joists. The steel joists are supported by a line of beams and columns running longitudinally along the exterior walls and both sides of the central corridor. A numerical analysis indicates that the typical roof framing is adequate to carry an imposed live load of approximately 50 psf. This is consistent with the original design loads, but is less than the load required to meet current building code requirements.

It has been reported that the roof material and insulation of the A- and B- Wings were replaced but no documentation covering this work was available for review at the time of this writing. It is understood that the original tar and gravel roof material and rigid insulation were removed and replaced with new EPDM membrane and rigid insulation equal in thickness to the original. Apparently, no structural upgrade was performed at that time of this work. Therefore, it is unlikely that the roof framing has sufficient load capacity to meet the snow-load requirements of the current building code.

The roofs of the A- and B-wings are the highest in the east portion of the building, and so were not designed to have capacity to carry the additional weight of drifted snow. This is important to keep in mind when considering any upgrades to the existing roof systems, e.g. additional insulation, or the addition of new rooftop mechanical equipment. Any such improvements will likely require extensive structural upgrade to the roof framing, and could affect columns through to lower levels as well.

C-Wing

Structural Review

The C-wing (1959) is a single-story, steel-framed structure, and houses the administration offices and library. At each end of the C-wing are the taller A/B- and D-wings. (The extreme west end of the C-D-wing junction is the two-story boiler room facility, occupying basement and first floor levels.)

The first floor is constructed of a 4" thick concrete slab-on-grade, and as such, should be adequate to carry imposed live loads in excess of 100 psf. The slab base is consolidated soil fill, restrained by cast-in-place concrete foundation walls, typically. Interior steel columns are supported by concrete piers on footings.

According to the existing structural drawings, all foundations and footings bear on rock ledge.

The Roof typically consists of 1 ½" deep steel decking over open-web steel joists or steel beams. The steel joists/beams are supported by line of beams and columns running longitudinally along the exterior walls and both sides of the central corridor. A numerical analysis indicates that the typical roof framing is adequate to carry an imposed live load of approximately 50 psf. This is consistent with the original design loads, but is less than the load required to meet current building code requirements. The existing framing was not designed originally to carry the additional weight of drifted snow, as would be necessary to meet current building code load requirements. This is important to keep in mind when considering any upgrades to the existing roof systems, e.g. additional insulation, or the addition of new rooftop mechanical equipment. Any such improvements will likely require extensive structural upgrade to the roof framing.

Drawings dated 1987 indicate that a re-roofing was undertaken, including an upgrade of the insulation on the roof. To accommodate this, and the resulting additional snow loads imposed by the then-prevailing building code, the eastern 38 feet at the end of C-Wing was re-structured. Steel framing was added to support the increased snow load, including that due to drifting, along the junction with A- and B- wings. According to design load information listed on the drawings, the load capacity of this east end is sufficient to meet the 1987 code, and also the current building code. However, the balance of the roof, which was re-roofed and re-insulated, was not structurally improved, and so does not have the capacity to meet the snow load requirements of the current building code.

The 1987 drawings also indicate that the roof over the Boiler Room of C-Wing was re-roofed, and re-insulated, and that the structure of that roof was improved to 1987 standards by building-over the old roof with a new, higher roof structure. Because the roof of the boiler room wing is higher than the surrounding roofs, there is no requirement to consider snow-drift effects on that added framing, in the present configuration.

The current version of the building code now requires an increased value of snow loading compared to the 1987 standard. Therefore, the 1987 re-roof structure over the Boiler Room Wing does not meet the full snow load capacity requirement of the current code. The addition of new rooftop mechanical units, or new improvements to the existing roof insulation, would require further structural upgrading to the framing of the roof structure.

D-Wing

Structural Review

The D-wing (1959) is a classroom wing that consists of a two-story steel-framed structure over a basement level at the west side, and a First Floor slab-on-grade for the east side. The Basement-level was originally intended to serve as shop and technical training facilities, so the floor is a concrete slab-on-grade. The First Floor level slab is the floor of the original Multipurpose room. The upper slab base is consolidated soil fill, restrained by cast-in-place concrete retaining walls along the west length, and standard foundation walls typically. The lower slab base is consolidated soil fill, restrained by cast-in-place concrete foundation walls, typically. Interior steel columns are supported by concrete piers on footings. According to the existing structural drawings, all foundations and footings bear on rock ledge.

The east first floor and the basement slabs are indicated on the original design drawings to be a 4-inch thick concrete slab on grade, and as such, should be adequate to carry imposed live loads in excess of 100 pounds per square foot (psf).

New Construction vs. Renovation Analysis

The west portion of the first floor was originally used for industrial arts, music and shower rooms. The west side of the first floor, including the corridor, is a 2 ½" thick concrete slab on open-web steel joists. The steel joists are supported by a concrete retaining wall along the east corridor wall, and a line of steel beams and columns along the west wall of the central corridor and the west, exterior wall. A numerical analysis indicates that the typical framing for the classroom spans is adequate to carry an imposed live load of 90 psf. Framing for the corridor is adequate to carry an imposed live load of 100 psf. This is consistent with the building code requirements of the original design period, and is sufficient to meet current building code requirements, which are 40 psf for classroom space and 100 psf for corridors at the first floor level.

The roof typically consists of 1 ½" deep steel decking over open-web steel joists. The steel joists are supported by a line of beams and columns running longitudinally along the exterior walls and both sides of the central corridor. A numerical analysis indicates that the typical roof framing is adequate to carry an imposed live load of approximately 50 psf. This is consistent with the original design loads, but is less than the load required to meet current building code requirements.

The roof of the D-wing was not originally designed to have capacity to carry the additional weight of drifted snow, including that resulting from the adjacent construction of the F-wing and gymnasium (1964).

Drawings dated 1987 indicate that a re-roofing was undertaken, including an upgrade of the insulation of the roof. To accommodate this, and the resulting additional snow load imposed to meet the then-prevailing building code, the southern 24 feet at the end of D-Wing was built-over and elevated with a new roof structure to support the increased snow load, including that due to drifting along the junction with the F- and Gymnasium wings. According to design load information listed on the drawings, the load capacity of this south end is sufficient to meet the 1987 code, and also the current building code. However, the balance of the roof, which was re-roofed and re-insulated, was not structurally improved, and so does not have the capacity to meet the snow load requirements of the current building code. This is important to keep in mind when considering any upgrades to the existing roof systems, e.g. additional insulation, or the addition of new rooftop mechanical equipment. Any such improvements will likely require extensive structural upgrade to the roof framing, and could affect columns through to lower levels as well.

New Construction vs. Renovation Analysis

E-Wing

Structural Review

The E-wing (1997) is a classroom wing that consists of a two-story steel-framed structure on a first floor slab-on-grade. The slab base is consolidated soil fill, restrained by cast-in-place concrete foundation walls, typically. Interior steel columns are supported by concrete piers on footings. According to the existing structural drawings, foundations and footings bear on either rock ledge or soil.

The first floor slab is indicated on the original design drawings to be a 4-inch thick concrete slab on grade, and as such, should be adequate to carry imposed live loads in excess of 100 pounds per square foot (psf).

The Second Floor is a 3" thick concrete slab over 1-inch deep corrugated metal deck on open-web steel joists. The steel joists are supported by a line of steel beams and columns along each exterior wall and the walls of the central corridor. A numerical analysis indicates that the typical framing for the classroom spans is adequate to carry an imposed live load of 50 psf. Framing for the corridors is adequate to carry an imposed live load of 100 psf. This is consistent with the building code requirements of the original design period, and is sufficient to meet current building code requirements, which are 40 psf for Classroom space and 80 psf for Corridors at levels above the First Floor.

It was noted, during a visit to the site, that there was a noticeable vibration occurring in the floor when walking the corridor of the E-wing second floor. The vibration causes the steel hall lockers to rattle and the sound of footfalls to be transmitted both through the floor to the space below and into the classrooms adjacent to the corridor. This is not indicative of a lack of structural capacity, but it can be an issue of comfort and serviceability for the occupants. It is probably the result of light-weight construction methods and a wider corridor width, resulting in insufficient damping mass to the floor structure.

The roof typically consists of 1 ½" deep steel decking over open-web steel joists. The steel joists are supported by a line of beams and columns running longitudinally along the exterior walls and both sides of the central corridor. Original structural drawings indicate that the typical roof framing is adequate to carry an imposed live load of approximately 56 psf "flat roof snow". This is consistent with the original design loads, BOCA 1990 and is essentially the same as the load required to meet current building code requirements.

Because this roof is one of the highest, there was, and is currently, no requirement to design for added loads due to drifting snow, based on the existing configuration and construction. Upgrading this roof by increasing insulation values should have minor implications to the existing structure. However, the addition of new mechanical units would require further investigations.

F-Wing & Gymnasium

Structural Review

The F-wing and gymnasium are the same structure. It consists of the gymnasium and stage on the first floor level, and classroom, cafeteria, locker room and storage spaces in a basement level. The basement level opens to a grade-level arcade along the west side, and is below ground to the east. At the south end of the gymnasium, there is a formal, one-story entrance at the first floor level. The balance of the addition is two stories tall above the first floor, as appropriate for stage and gymnasium spaces.

The basement level floor is concrete slab-on-grade. The slab base is consolidated soil fill, restrained by cast-in-place concrete foundation walls, typically. Interior steel columns are supported by concrete piers on footings. According to the existing structural drawings, foundations and footings bear on rock ledge. The basement slab is indicated on the original design drawings to be a 4" thick concrete slab on grade, and as such, should be adequate to carry imposed live loads in excess of 100 psf.

The first floor, which comprises the main gymnasium floor, is constructed using pre-cast, pre-stressed concrete double-tees supported by structural steel beams and columns typically. A two-inch thick concrete topping slab was placed over the pre-cast tees, to level the floor to receive the wood finish-floor system. The pre-cast tees are supported by cast-in-place concrete beams and columns along both the inside and outside of the run of the arcade. The entrance foyer floor is composed of 4" thick pre-cast, pre-stressed concrete plank framing with a two-inch topping slab, supported by cast-in-place concrete beams and foundation walls. The existing structural drawings indicate that the design total load for the gymnasium is 200 psf. This should be approximately equivalent to an allowable uniform live load of 100 psf. This loading is adequate to meet current building code requirement which is 100 psf for this use. Similarly, the entrance "Foyer" is listed as being designed to support a total uniform load of 180 psf, which again results in an allowable live load of approximately 100 psf, adequate to meet current building code requirements.

The entrance foyer roof is constructed using pre-cast, pre-stressed concrete plank over pre-cast, pre-stressed concrete beams. The pre-cast beams are supported by cast-in-place concrete columns along the south, exterior wall, and by pre-cast, pre-stressed concrete beams on load-bearing masonry along the north foyer wall. The existing structural drawings indicate that the design total load for the foyer roof is 100 psf. This results in an allowable imposed live load of approximately 40 psf, which is consistent with the original period building code, but is insufficient to meet current building code requirements.

New Construction vs. Renovation Analysis

Due to the great difference in roof height between that of the gymnasium, which is the highest roof, and that of the foyer, which is one of the lowest, the current code would require that significant values of additional live load be considered, to account for snow drift build-up, in the event that there is work other than simple repair performed. In that case, there would result the need to make major structural upgrades to the existing roof.

The gymnasium roof is constructed using 1 ½" deep corrugated steel decking over wide-flange steel purlins. The purlins are carried by fabricated steel plate-girders spanning the full width of the gymnasium wing, approximately 100 feet. The plate-girders are supported at each end by cast-in-place concrete columns to the foundation. The existing structural drawings indicate that the design total load for the gymnasium roof is 60 psf. This results in an allowable imposed live load of approximately 40 psf, which is consistent with the original period building code, but is insufficient to meet current building code requirements.

It has been reported that the roofing and insulation of the Gymnasium was replaced and upgraded subsequent to the 1987 re-roof, but no documentation covering this was available at the time of this writing. A structural upgrade was said to have been performed at that time but, again, no documentation was available for review. Therefore, it is undetermined whether the roof framing has sufficient load capacity to meet the snow-load requirements of the current building code. A plan for upgrading or otherwise modifying this roof will require investigations into the actual state of the roof framing, and will likely necessitate significant improvements to the existing structure, in order to meet the requirements of the current building code.

Overall, based on a limited, visual review, the condition of the existing structure is good.

Fire Protection Systems

Existing System Summary

A wet-type fire protection system is installed throughout the building. The system was designed by Eastern Fire Protection in compliance with NFPA and state standards in effect in 1998.

System Descriptions

The fire protection (sprinkler) system consists of steel piping with threaded and grooved couplings and fittings. The sprinkler system was installed throughout the existing building in 1998. The water entrance enters on the north wall of the Boiler Room. An electric fire pump is located along the east wall of the boiler room to boost the incoming water pressure. A double check valve backflow preventer is installed downstream of the fire pump. The fire pump has a 20 horsepower motor with a rating of 300 gallons per minute at 65 psi. Sprinkler heads are glass bulb design with temperature ratings suitable for the hazard.

Sprinklers in ceilings are white color two-piece semi-recessed type; sprinklers in rooms without ceilings are brass finish.

The system is checked and maintained on a regular schedule as required by NFPA 25 by High Tech Fire Protection. The system and equipment looks to be in good condition.

The system can accommodate changes in the existing room layouts as well as additions to the system. Major additions to the building will require reviewing the total connected square footages on each fire protection zone (currently three zones).

Plumbing Systems

Existing System Summary

The original school was built in 1961 and has much of the original piping systems intact. The gym was added in 1965 and the classroom wing added in 1998.

The plumbing system consists of cast iron storm and sewer drainage piping and insulated copper supply piping. The pipe insulation is pre-formed fiberglass insulation with a reinforced vapor retardant paper jacket. The majority of the piping systems are original to the building. Upgrades to the domestic hot water generation system have been made in the Boiler Room as well as upgrades to the water meters. Many of the restrooms remain original to the building. Upgrades were made to the locker rooms in 2007/2008 utilizing water conserving manually operated single temperature metered showers, electronic activated faucets and flushometers for water closets and urinals. The plumbing system in general appears to operate as designed except for some complaints in not receiving hot water to the science rooms on the second floor.

Storm System

Systems Descriptions

The building was designed with a combination storm/sewer piping system. Roof drainage is collected through multiple roof drains with leaders dropping into the floor at several locations. The roof drainage connects to the sewer piping within the building. The combined storm/sewer pipe exits the building through a 15” cast iron pipe in the boiler room.

Sewer System

The sewer drainage system is combined with the storm as discussed above. Boiler room floor drainage is piped to a sump pump in the boiler room. The sump pump discharges to the building drain prior to exiting the boiler sidewall. Underfloor drainage piping exists under the graphic arts room (formerly

"Automotive") which leads to a pit with an oil interceptor and sump pump. The drains and pump system in graphic arts are currently not in service.

Domestic Hot Water

The original elevated domestic hot water storage tank installed with the building has been taken out of service but is abandoned in place. Hot water is generated through a TeledyneLaars, 1.1 million btuh input, natural gas fired boiler. The age of the boiler is unknown but it may well be 25 years old. The flue is connected to the flue from the building boilers before exiting up through the brick chimney. The boiler heats hydronic water and pumps it through indirect heating coils in two Vaughn 120 gallon cement lined tanks with indirect heating coils. The tank on the left was manufactured in 2004. The tank on the right was manufactured in 2007. Both tanks have a five year warranty and typically last for ten years. Hot water from the two tanks pass through a thermostatic mixing valve adjusted to deliver a set temperature to the building. A 15-year-old stand alone electric water heater is located in the kitchen area to serve the local fixtures.

Domestic Cold Water

Cold water enters the building through a 6" ductile iron water main entering the north wall of the boiler room. The water service passes through three water meters before being distributed to the building. The three water meters are located high above the floor and are not easily accessible. Several iron gate valves on the cold water piping at the water entrance leak and are in need of replacement. An existing in-line water pressure booster pump is no longer used and should be removed.

Compressed Air

Compressed air is generated in the boiler room and is delivered to the Graphic Arts Dept. (formerly "Automotive") through threaded steel piping. Compressed air piping and drops are located on the perimeter walls and the air outlets do not work as designed. A second air compressor and air dryer is located on the mezzanine in the boiler room to serve the pneumatic temperature control system. The second system looks to be fairly new.

Natural Gas

The natural gas service enters the boiler room through a four inch schedule 40 steel pipe. The low pressure gas piping system serves the domestic hot water gas boiler, gas pilots for the building boilers and gas turrets located in the science rooms.

New Construction vs. Renovation Analysis

Fixtures

Toilets: Vitreous china wall hung, flushometer valve with flow rates of approximately five gallons per flush (lower flows in the renovated locker rooms).

Urinals: Vitreous china wall hung, flushometer valve with flow rate approximately 1-1/2" gallons per flush.

Lavatories: Vitreous china, manually operated faucets.

Sinks: Stainless steel with manual faucets.

Plumbing System Findings

Domestic Water Piping

Complete removal of the domestic water piping system should be done to remove the potential for lead from leaching into the building potable water supply from existing soldered fittings.

Related note: Water coolers produced prior to 1988 also contained small amounts of lead internal to the unit and should be replaced.

Domestic Water Heating

The existing approach to the domestic hot water system is a viable method to produce hot water. It is sized for the current demand which does not include a fully operational cooking kitchen with dishwashing facilities.

The gas fired water heater is old and should be replaced and updated. The two indirect fired water storage tanks have several predicted years of life left. The abandoned water storage tank should be removed from the boiler room.

If a kitchen is added to the building, the hot water system sizing would have to be re-evaluated.

Other options of domestic water heating could also be reviewed as upgrades to the system. One method of water heating includes using two instantaneous gas fired water heaters which would require no hot water storage. The heaters operate on demand as needed creating energy savings. Partial domestic water heating could also be achieved by investigating the use of solar panels and a water storage tank.

Temperature maintenance cable can be applied to hot water piping to replace the need for hot water recirculation piping and circulating pumps and flow control valves. Temperature maintenance cable provides less waiting for hot water at the fixtures and allows less water wasted.

Compressed Air System

The compressed air system serving the building (other than controls) should be removed in its entirety.

Natural Gas Piping

The natural gas piping within the building can be maintained and extended as needed with little modifications to the existing system.

Plumbing Fixtures

All of the original plumbing fixtures within the building should be replaced with water saving, ADA accessible fixtures in all locations. The toilets should flush on 1.28 gallons per flush or dual flush 1.1/1.6 gallons per flush. Lavatory faucets should operate between 1.5 gpm and 0.5 gpm. Controls for faucets and flushometers should be electronic battery powered self generating type units that assure proper flushing and provide a more sanitary environment.

Mechanical Systems

System Summary

The mechanical system currently serving the high school is a system that would be typically found in a school built in the early 1960s. Energy was not the concern that it is today. The system is quite simple in its approach to heat and ventilate the facility. Yet it is quite inefficient as illustrated by the 2007-2008 oil energy numbers of 0.433 gallons of oil per square foot per year. Numbers in new schools that utilize oil typically see numbers ranging from 0.23 to 0.28 gallons per square foot per year depending on systems being implemented in the school design and the operational profile of the facility.

Systems Descriptions

The existing school was built in 1961 and most of the original mechanical equipment is still in use. The main boiler plant consists of two HB Smith, 17 section, cast-iron boilers. The current boilers were installed in the early 1980s. The boilers produce low pressure steam which is distributed throughout the entire facility, excluding the 1998 classroom addition which hot water. The steam supply distribution system and condensate return piping systems show their age and experience numerous failures. Particularly in the condensate return piping system. Induced draft fans are located at the rear of each boiler to assist with boiler draft control. Each boiler is equipped with a Preferred Utilities rotary cup burner which burns number 2 heating oil. There is one existing 20,000 gallon double wall jacketed steel underground storage tank with interstitial monitoring and double wall fiberglass piping located just outside the boiler room. A duplex fuel oil transfer pump set located in the boiler room brings the oil in from the tanks and circulates it through a pressurized distribution loop. Each burner pulls oil off the distribution loop at a quantity matching the burners firing rate.

Systems Descriptions (continued)

The primary heating and ventilating in each of the classrooms in the existing facility is handled by a dedicated unit ventilator. The unit ventilator is equipped with a steam coil, integral dampers controlling outside air quantities and pneumatic action for valves and dampers. Proper damper control throughout the school appears to be sporadic. The systems that relieve/exhaust air out of the building are more centralized systems. Centralized, non-integrated systems such as these do not typically provide satisfactory ventilation effectiveness in all spaces.

Common spaces like stairways, vestibules and entryways are being heated by convectors or multi-row steam fin tube radiation.

A steam to hot water, shell and tube heat exchanger with a set of redundant base mounted circulating pumps is located in the boiler room which serves the 1998 classroom addition. The classroom addition's heating and ventilation requirements are being served by hot water unit ventilators, similar to those located in the original classrooms.

The temperature controls in the facility are pneumatic and do not provide consistent temperature control throughout the facility. Some areas are quite warm while others can be quite cool.

The two cast iron boilers are almost 30 years old and are showing their age. It is understood that these boiler/burners, for various reasons, fail quite often. As mentioned above, the steam supply and condensate return piping distribution system is also showing its age which is evidenced by numerous piping failures.

While on site, it was noticed that live steam was being discharged under pressure to the atmosphere. This is a clear indication that steam traps within the facility have failed. This is an obvious waste of valuable energy.

The unit ventilators located in the original classrooms are all original units. That makes these units close to 50 years old. Although these units still provide heat and marginal ventilation effectiveness to the classrooms, it must be understood that these units are well past their life expectancy and should at a minimum be considered for replacement.

The existing pneumatic control system in the facility is also clearly showing its age. Although pneumatic control systems was virtually the only control option available when the school was originally designed and constructed, these systems have proven overtime to be quite inefficient and difficult to control.

Mechanical System Findings

Boiler replacement:

Remove both of the existing 17 section cast iron steam boilers, all steam supply and condensate return piping, condensate receivers and boiler feed systems, steam system accessories, passive combustion air system, breeching for both boilers, steam to hot water heat exchanger feeding 1998 wing and all of its associated hydronic accessories and all associated controls. Provide two new cast iron hot water sectional boilers, insulated hot water supply and return system

New Construction vs. Renovation Analysis

within boiler room sized to feed entire facility, mechanical combustion air system, insulated breeching for both boilers, two-100% capacity end suction pumps with variable speed drives and all required hydronic accessories. Main pump variable speed drives would be controlled by differential pressure between the supply and return mains out in the system. New equipment and piping distribution systems would be sized for future expansion capability.

Hot Water Supply and Return Piping Distribution System:

Remove all existing insulated and un-insulated steam supply and condensate return piping throughout the facility and all associated accessories and controls. Provide insulated hot water supply and return piping distribution system to run throughout the entire facility that will be connected to all replaced terminal units. This section shall also include the replacement of all steam baseboard radiation, convectors and cabinet unit heaters. Hot water supply and return temperatures shall be reset to meet heating requirements of spaces based on outside air temperature.

Typical Classroom Ventilation:

Remove all existing steam unit ventilators (this excludes UVs that were installed in the 1998 addition), associated controls branch piping and intake louvers. Provide hot water unit ventilators that would be mounted in same area of classrooms. UVs would be provided with face and bypass dampers, adaptor backs and insulated piping channels. Any hot water supply and return branch piping that cannot be concealed would be run in empty baseboard radiation cover.

Air Handling Unit Replacement:

Remove all existing air handler units (AHUs) serving the gym, locker area, cafeteria area and all existing branch piping, controls and all associated accessories. Provide replacement air handlers with variable speed fans, hot water coils, economizer cooling capacity, filter sections and mixing sections. Existing duct distribution systems shall be modified to accommodate installation of AHUs. All new AHUs will be tied into the DDC system.

Controls:

Remove all existing pneumatic controls throughout the entire facility. This shall include tubing, controllers, sensors, control panels compressor and all associated accessories. Provide Direct Digital Control (DDC) system for the automatic temperature control of the entire facility. The head end system would be located in the primary custodian's office and tied back to a station located in the school districts Facility Manager's office.

Electrical Service and Distribution Systems

Electrical Systems

Power is supplied to the building underground to a transformer vault controlled by the power company utility (Central Maine Power). The transformer vault containing three 100kVA transformers is located in D-wing. The system voltage is 120/208V three phase. Two sets of secondary exits the vault high into a pullbox with conduits dropping down to an 800amp GE self enclosed circuit breaker and with a wireway dropping down and into a Westinghouse 600amp self enclosed circuit breaker. The 800amp CB feeds a GE 1200amp 120/208 volt two section distribution panelboard located next to it. This GE panel distributes power throughout the 1961 building (wings A, B, C, D) and supplies power to an enclosed shunt trip circuit breaker for the "north wing elevator". The 600amp circuit breaker feeds the gymnasium addition (F-wing). The 600amp Westinghouse circuit breaker feeds a disconnect switch and distribution panelboard located in a storage room (the ledge room) in the basement. The gym addition distribution panelboard provides power throughout this wing. The E-wing is the newest wing, built in 1998. This wing derives its power from the gymnasium wing by tapping the disconnect switch on the line side to feed two Square-D self enclosed circuit breakers (a third circuit breaker was used to feed mobile/portable classrooms).The Square-D enclosed CBs feed panelboards located on the first and second floor of the classroom wing.

Building Power Demand

The power demand of the building fluctuates depending on the time of year. This particularly building has a higher demand in the winter months than in the summer months. Based upon the highest demand in 2008 there is no effective spare capacity available.

The building will require a rework of the service entrance to allow for the higher power demand this building will require for the increase in program and technology. The vault transformers will have to be replaced with a pad mounted transformer. The main service switch board will be required to be updated with a new switchboard.

The electrical distribution which would include additional panelboards and the associated feeders to allow for increased technology additional receptacles in the classrooms, power for ceiling projectors, and similar loads.

New Construction vs. Renovation Analysis

Emergency power

The building does not have an emergency generator.

Adding an emergency generator (250kW) would allow operation of the general building heating, kitchen refrigeration loads, partial lighting throughout the corridors, cafeteria, gymnasium, and select other electrical loads during times of power interruption.

Branch circuits

There have been reports of circuit breakers for unit ventilators tripping on a cold startup of the boilers. The electrical circuits in the individual classrooms are typically shared between multiple classrooms. The lack of dedicated circuits for the classrooms limits the technology that can be added.

Lighting

The basic building lighting fixture consists of 2 x 4 lay-in fixtures, with retrofit ballasts. Lenses are in acceptable condition. The building service spaces, including janitor closets and mechanical spaces, use industrial type fixtures with T8 lamps and electronic ballasts. Exterior lighting consists of building and pole mounted HID fixtures.

Staff reports retrofit of lamps & lighting fixtures during a 2007/2008 project. Classrooms have occupancy sensors with switches to force the lighting off. Corridors are equipped with wall mounted occupancy sensors. The older wings have classrooms with two rows of three fixtures (total of six fixtures) The lighting level in these rooms are lower than E-wing's classrooms which have three rows of three fixtures.

The calculated values for the general classrooms (approx. 28'x 26') are as follows: A-wing 40+ foot candles, E-wing 60+ foot candles. The lighting in the original part of the building with two rows of lighting is not as even as the newer wing with three rows of fixtures.

The gymnasium has been renovated with four lamp high bay T5 fluorescent lamp fixtures.

Emergency Lighting and Exit signage

Emergency lighting is accomplished with emergency battery units located throughout the facility.

Exit lights are generally showing their age and many are damaged. The exit signs appear to be an incandescent type with a retrofit LED strip. Some of the signs are not evenly lit.

Fire Alarm System

The building is equipped with a Notifier, addressable fire alarm system, located in the front entrance vestibule. The Notifier control panel was upgraded to an NFS-640 in November 2007. The system monitors sprinkler water-flow switches, sprinkler valve tamper-switches, smoke detectors, duct detectors, and pull stations.

The classrooms are equipped with a fire alarm notification visual appliance (strobe). The corridors have audible and visual notification appliance. The candela rating of the strobes did not appear to be visible. It appears the fire alarm system was upgraded to meet ADA requirements with visible appliances located in corridors and meeting rooms, etc. Stairwell doors were observed to be magnetically held open with smoke detectors in the vicinity.

Data/CATV/Security/Intercom System/Program Bell/Telephone systems

Telephone

The building telecommunications system headend is on the first floor in a data closet. The telephone system is a Mitel System VoIP. From this room the system is routed to the individual desktop, work areas, and other data rooms. The desk top phones are generally Mitel 5201 IP phones some areas have the Mitel 5202 IP phones.

CATV

CATV enters into the first floor data room (near the main office). The cable TV is distributed from this room. The classrooms are equipped with cable television.

Security

Limited card access & hardware was added to the building. Security cameras are located both interior and exterior. Generally the interior cameras monitor the corridors.

Intercom/ Program Bell

The buildings two-way intercom system was replaced with a Dukane Star Call intercom system in 2007/2008. An interface module was added to allow communication between the Mitel telephone system and the intercom system. There are call buttons in the classroom which were tied into the new intercom system but these switches only call into the Dukane intercom console. The Mitel phone system can be used to make announcements. The intercom system is used for time zone.

Data

Data system and fiber optic cabling should be upgraded. The intercom system, program bell system and data system should be expanded throughout the school. The telephone system was installed around 2007. The hand sets are Mitel units and can be reused. The locations of the phones are not ideal for several of the teachers and the location may need to change to accommodate different space programming. Additional security cameras should be added throughout the corridors to improve supervision.

Site Utilities

Power, Telephone and Fiber Optic

The site electrical power comes in from Harris Street overhead on utility poles. The electrical lines run to a pole on the school site, then underground to the transformer vault. The transformer vault is located in the D-wing boiler room. Telephone, Cable TV and fiber service also run comes into the site from Harris Street.

Sports Field Lighting

The existing soccer field/track and tennis courts do not have any lighting which does not allow for any night time activities. One option being considered is to convert the soccer field to a football field so that varsity games could be held on site. If this option were implemented, then adding lighting would allow for night games to be held at this site.

New Construction vs. Renovation Analysis

Green Design/Energy Efficiency

It is the desire of the building committee to consider and incorporate Green design and energy efficient features into the renovation of Edward Little to the extent that it is practical, reasonable and cost effective. The following is only a partial list of features or systems that may be investigated for possible incorporation into this project regardless of whether it is a renovation or new construction.

- Geothermal heating/cooling systems
- Wind turbines
- Biomass fuel sources – wood chips/wood pellets
- High efficiency heating systems
- Demand controlled ventilation
- Digital controls
- Vertical displacement ventilation systems
- Radiant floor heating systems (new construction only)
- Energy recovery
- CO_2 monitoring of ventilation systems
- Solar water systems to generate hot water
- Photovoltaic solar panels to generate electricity
- Daylight harvesting dimmable controls
- Exterior sun shades/Interior light shelves
- Rain water collection & reuse systems
- High output light fixtures
- Low-flow plumbing fixtures
- Using locally produced products
- Using products with recycled content
- Using low VOC products
- Light reflective roofing
- Low-impact stormwater treatment

New Construction vs. Renovation Analysis

Expandability

Overview

There are two basic questions to be considered when expandability is discussed. The first question is "Can the building be expanded?" and the second is "Can the site be expanded?" But before those two questions can be answered it must be determined if either the building or site need to be expanded.

Building

An analysis of the existing program space has determined that the types, quantities and sizes of educational spaces are inadequate and, in most instances, inappropriate for the current student population. When a projected increase in the student population is taken into account, the lack of proper program space is exacerbated.

A space program was developed that compares what types of spaces currently exist and what types of spaces are required to meet the present and future educational needs of the school. The required spaces are identified under the "Proposed Facility" in the space program (See Tab 2). If all the proposed spaces are included, then one or more additions, totally approximately 66,000 sf, would need to be added to the existing facility, although, the actual footprint of the addition or additions could be less depending on whether they are one, two or more stories in height. Renovating and adding on to an existing building does impact the efficiency of the overall design and may result in additions that are somewhat larger than what is proposed in the program.

If all of the space recommended above is added, several areas around the existing building have been identified where one or more additions could be constructed. Refer to the "Site Analysis" section and Exhibit F for potential developable areas around the existing building. While three primary development areas have been identified, other areas could be considered but at an increased cost. The three primary areas are the most reasonable locations for additions because of existing conditions and topography. If other areas are considered for additions, the existing topography of the site will have the biggest impact on the cost of constructing those additions.

The above options assume constructing additions at the same level and approximately the same finish floor elevations of the existing building. The question always gets asked "What about adding another floor?" Neither the original building nor any of the earlier additions were designed to accept the addition of another floor. While that does not necessarily rule out adding another floor, it does make it impractical and very expensive to do so. Therefore, adding additional floors is not a reasonable option.

New Construction vs. Renovation Analysis

So in answer to the first question "Can the building be expanded?" Yes, there are several areas around the existing building that could reasonably accommodate one or more additions.

Site

In accordance with Department of Education guidelines, a high school for 1,200± students should have a minimum site of 27 usable acres. The existing Edward Little site is approximately 56± acres. However, because of the existing topography, almost 43% of the site is not usable. Most of the unusable portions of the site are along the eastern boundary with Minot Avenue where the site has a relatively steep downward slope. From the first floor of the school to Minot Avenue, the elevation change is approximately 130'.

As shown on Exhibit F in the "Site Analysis" section, only 32± acres of the existing 56± acres are potentially developable. Of the developable 32± acres, only about 21± acres are currently developed. That leaves about another 11± for possible future development.

There are three primary elements that need to be accommodated when considering possible expansion for this project – building area, parking and athletic fields. Adding on to the building and expansion of the parking are critical to the function of the facility. Athletic fields for varsity sports have been accommodated at multiple off-site locations and the desire to them on the high school campus is strong. However, the amount of land available to develop would probably not be able to accommodate the addition of more than one or two additional fields.

Expanding the site to accommodate a full complement of varsity athletic fields for such sports as football and baseball would be difficult at best. As stated in the "Site Analysis" section, all the abutting properties on three sides of the high school site are fully developed residential properties that would be difficult and expensive to acquire, if they all of those that would be needed could be acquired.

Based on the need or desire to add athletic fields on the existing campus, the answer to the question "Does the site need to be expanded?" is yes because despite its overall size, a good portion of the site cannot be developed which means there is inadequate land for the athletic fields. On the other hand, the answer to the question "Can the site be expanded?" is no because the abutting properties are already developed and acquiring them would be cost prohibitive to the project.

New Construction vs. Renovation Analysis

Comparative Cost Analysis

Comparative budgets have been prepared to evaluate the costs of renovating and adding on to Edward Little High School to meet current and future facility and programming needs verses building a new building on a new site. Option 1 is for a renovated and expanded facility and Option 2 is for new construction.

Keep in mind that the two options considered and evaluated were not based on any specific plans but on a comprehensive analysis of the existing facilities current conditions and the educational and programmatic deficiencies. The renovation option assumes that all physical plant and educational deficiencies will be addressed. To be considered equal, the new option compares a new facility of the same size to that of the existing facility if fully expanded.

The following describes some of the advantages and disadvantages of both options.

Option 1

Renovations and Additions
Estimated Construction Cost: $37, 626,286
Estimated Project Cost: $48,780,456

The first option would keep the present building as it currently exists, but would bring the building into compliance with current building and life safety codes, handicap accessibility requirements and provide updates to the building envelope and building systems as described in previous sections of this report. It would also add approximately 66,000 sf of new area to the building to address the educational deficiencies outlined in the "Educational Adequacy" section of this report. This option would maintain an existing structure while enhancing it for continued use in the future.

Advantages

- Reuses an existing building on an existing site.
- Avoids sprawl.
- Less costly than building a new facility on a new site.
- Updates the building systems and building envelope to improve its overall energy efficiency and air quality.
- Upgrades the electrical service and updates electrical systems throughout the building.
- Updates the building to eliminate existing building and life safety code deficiencies.
- Updates all general education classrooms to incorporate new technology systems.
- Provides new and updated science classrooms.

- Provides additional program space for art, music and drama including a new auditorium.
- Provides additional program space for special services.
- Provides additional space for administration and guidance.
- Provides for an enlarged library.
- Develops a new cafeteria and full-service kitchen.
- Improves on-site circulation and parking.

Disadvantages

- The existing site is limited due to the location of the existing building, soccer field/track and the topography of part of the site.
- Construction work must be done in multiple phases while maintaining the school in full operation.
- The construction schedule would be longer.
- The overall design may be less efficient than that of a new building.
- Limits the incorporation of some "Green" design features because of the design, configuration and orientation of the existing building and site.
- Despite being renovated and updated throughout, it would still be an older building.

Option 2

<u>New Construction</u>
Estimated Construction Cost: $47,760,320
Estimated Project Cost: $61,153,214

The second option would consider abandoning the existing building and site while procuring a new site elsewhere in the city to construct a new, state-of-the-art high school that would include sufficient on-site athletic fields, separated circulation for buses and cars and adequate staff and student parking. The challenge would be finding a relatively open and flat site of 27+ usable acres that is within a reasonable distance from the center of Auburn to accommodate the majority of the student population.

Advantages

- Provides for a new state-of the art building on a more open, usable site.
- A new building that is energy efficient, code compliant and fully handicap accessible.
- A new building would probably be more efficient in area than a renovated and expanded building.
- Anticipates a larger site that would allow for all athletic fields to be on one site.
- Better site circulation with separation of bus and vehicular traffic.
- Improved parking for staff, students and visitors with dedicated handicap accessible spaces.

New Construction vs. Renovation Analysis

- Avoids the conflict between construction and an occupied building.
- Greater potential for incorporating "Green" design features and along with LEED certification.

Disadvantages
- More costly than renovating and adding on to the existing school.
- Availability of a large open site that is centrally located is unknown.
- Added cost of acquiring a new site.
- The city would be faced with finding a new use for the old building and site.
- Any reuse of the facility by either the school department or the city would still require some upgrades and renovations.

Project Budget

Option 1
Renovations & Additions

Auburn School Department
Edward Little High School
Grades 9-12 Capacity 1,200 Students

Harriman Architects+Engineers
Pre-Design Budget
April 30, 2009

			Total	
A NEW CONSTRUCTION				
1 New Construction	65,700 sf		$13,231,917	
2 Renovations	168,560 sf		$20,760,351	
3 Site Development			$2,621,947	
4 Sports Fields			$1,012,071	
		Subtotal	**$37,626,286**	$160.62
B ADMINISTRATIVE COSTS & RESERVE				
5 Land (Existing Site)			$0	
6 Moveable Equipment 6%			$2,039,536	
7 Technology 3%			$1,019,768	
8 Advertising/Insurance/Legal			$75,000	
9 Bid Contingency 5%			$1,881,314	
10 Construction Contingency 5%			$1,881,314	
		Subtotal	**$6,896,933**	$29.44
C FEES AND SERVICES				
11 Architect/Engineer - New (7%)			$1,027,198	
12 Architect/Engineer - Renovation (9.3%)			$2,134,539	
13 A/E Reimbursable			$25,000	
14 Hazardous Abatement			$250,000 *	
15 Portables			$150,000 *	
16 Permitting (DEP/Planning Bd)			$75,000	
17 Commissioning			$95,000	
18 Construction Testing & Allowances			$75,000	
19 Surveys/Soils/Traffic			$75,000	
20 Owners Representative			$142,000	
21 Clerk of the Works			$208,500	
		Subtotal	**$4,257,237**	$18.17
D PROJECT TOTALS			**$48,780,456**	$208.23

Notes:

1 *Estimate is based on Design/Bid/Build Delivery Method. Alternative delivery methods may impact costs.*
2 *Construction Costs based on average costs for Summer 2009 with bidding anticipated for Spring 2011.*

* *The exact cost for hazardous abatement and the leasing of portables has not been determined.*

Project Budget

Option 2
New Construction

Auburn School Department
Edward Little High School
Grades 9-12 Capacity 1,200 Students

Harriman Architects+Engineers
Pre-Design Budget
April 30, 2009

			Total	
A NEW CONSTRUCTION				
1 New Construction	234,000 sf		$40,793,562	
2 Site Development			$6,601,758	
3 Off Site Improvements			$365,000	
	Subtotal		**$47,760,320**	$204.10
B ADMINISTRATIVE COSTS & RESERVE				
4 Land			$1,000,000 *	
5 Moveable Equipment 6%			$2,447,614	
6 Technology 3%			$1,223,807	
7 Advertising/Insurance/legal			$75,000	
8 Bid Contingency 5%			$2,388,016	
9 Construction Contingency 5%			$2,388,016	
	Subtotal		**$9,522,453**	$40.70
C FEES AND SERVICES				
10 Architect/Engineer (6.7%)			$3,199,941	
11 A/E Reimbursable			$25,000	
12 Permitting (DEP/Planning Bd)			$75,000	
13 Commissioning			$95,000	
14 Construction Testing & Allowances			$100,000	
15 Surveys/Soils/Traffic			$80,000	
16 Owners Representative			$120,000	
17 Clerk of the Works			$175,500	
	Subtotal		**$3,870,441**	$16.54
D PROJECT TOTALS			**$61,153,214**	$261.34

Notes:

1 *Estimate is based on Design/Bid/Build Delivery Method. Alternative delivery methods may impact costs.*
2 *Construction Costs based on average costs for Summer 2009 with bidding anticipated for Spring 2011.*

* *Availability and actual cost of land is unkown.*

New Construction vs. Renovation Analysis

Summary & Recommendations

Edward Little High School is approaching 50 years old. It has served the residents of Auburn well over the years. But many of the systems in the building have reached the end of their usable life. By today's standards and considering today's higher cost of energy, the existing building and its systems are not energy efficient. Educationally and programmatically, the building does not provide the type, size and number of spaces that are required to educate today's students. The students have changed, the teaching methods have changed and the program requirements have changed dramatically since the current Edward Little High School first opened its doors in 1961.

Despite its deficiencies and shortcomings, the existing facility can continue to be used for many years to come with the appropriate renovations and additions. The comparative cost analysis of the two options presented in the previous section - renovating and adding on verses constructing a new building on a new site – clearly shows a distinct cost advantage to keeping the existing building, upgrading it and expanding it. While there may be some advantages to building a completely new building over the renovation of a 50 year old building, maintaining the existing site and upgrading an existing structure should be considered the more desirable option.