

Appendices

Appendix A

MEP Engineer's Report

Griffith & Vary, Inc.

Feasibility Study Update for the Burgess Elementary School

Appendix A MEP Engineer's Report

Fire Protection

The school presently is not protected by a sprinkler system.

Potential Problems/Recommendations

The school should have complete sprinkler protection. Two (2) six-inch (6") size fire water services would supply a wet pipe system, which would be used to protect the entire school. Each six-inch (6") service would supply each side of the school, through a series of branches and mains.

Plumbing

Domestic Water

A municipal four-inch (4") domestic water service enters the building in the boiler room of the North Building and then runs through a three-inch (3") compound water meter. From the service, the domestic water system feeds out to all fixtures and equipment in the North and Center Buildings, requiring domestic hot or cold water in a system of branches and mains.

Another municipal four-inch (4") domestic water service enters the building in the mechanical room, of the South Building and runs through a two-inch (2") compound water meter. From this service, the domestic water system feeds out to all fixtures and equipment in the South Building requiring domestic hot or cold water in a series of branches and mains.

The piping systems appear mostly original and are made up of copper tubing with sweat fittings and steel piping with threaded fittings. Some of the water piping may have joints containing lead. The pipe insulation is mostly original and may contain asbestos.

The North Building's domestic hot water is generated by an original boiler fed 800 gallon storage tank/heater serving the North Kitchen and five (5) electric water heaters serving multiple toilet room groups.

The South Building's domestic hot water is generated by an original boiler fed storage tank/heater serving the South Kitchen and all fixtures requiring hot water in the South Building.

Potential Problems/Recommendations

The existing water piping system is original with only very minor improvements. This system is over thirty (30) years old and is close to the end of its useful life. The entire water system should be replaced, including new materials, insulation and equipment.

Feasibility Study Update for the Burgess Elementary School

The hot water heater is beyond its normal life expectancy and should be replaced with a new higher efficiency water heater and tempering system.

Sanitary, Waste and Vent Systems

The majority of the building's sanitary and waste system appears to drain by gravity to a municipal system tied together at the rear of the school.

Both the North Building and the South Building mechanical rooms have a sump pit with pump that collects all discharge from each boiler rooms floor drains and raises it. The piping systems in the school appear to be primarily of cast iron with some sections of copper and galvanized steel vent piping. Both Kitchens have two (2) interior grease traps and this waste is directed to the main drain system.

Potential Problems/Recommendations

The Kitchen drains offer very little protection from excessive grease discharge. Adequately sized, interior protection of all grease producing sinks is necessary under current codes, as well as exterior protection for all drains and sinks of the Kitchen.

Storm System

The school's storm system appears to drain by gravity and a series of mains from the building's interior is collected onto a site storm system.

The piping appears to be entirely of cast iron and has little pipe insulation.

Potential Problems/Recommendations

The storm system around the school should be replaced with new cast iron where necessary and entirely insulated as required.

Gas

Presently, there is no natural gas to the building. There is one (1) propane tank on the site, which provided L.P. gas to the boiler pilots in the North Building mechanical room.

Potential Problems/Recommendations

The possibility of extending natural gas to the building should be reviewed by the local utility company. If available, natural gas should be run to all the equipment in the boiler room and Kitchens.

Feasibility Study Update for the Burgess Elementary School

Plumbing Fixtures

The school presently has flush valve water closets and urinals. These fixtures are mostly original and operate with approximately 6.0 gallons per flush for each water closet and 3.0 gallons per flush for each urinal.

Most lavatories in toilet rooms have faucets, which are manually opened and closed, some with metering faucets. The classroom sinks are original.

Potential Problems/Recommendations

All plumbing fixtures should be replaced with new handicapped accessible type fixtures, as required by code. New water closets would operate on 1.6 gallons per flush and urinals would operate on 1.0 gallon per flush. New lavatories would have metering faucets, as required by Code, to limit their time of operation, and mixing valves to reduce the water temperature to 110°F. New classroom sinks would have flow controls to limit water flow to 1.5 gpm maximum.

HVAC

Boiler Rooms

The Burgess elementary school features three (3) separate boiler rooms that produce steam and hot water for heat. For identification purposes these boiler rooms have been identified as the North Side Boiler Room, South Gym Boiler Room, and South Office Boiler Room.

North Side Boiler Room:

The North Side Boiler Room is furnished with two (2) sectional cast iron boilers that produce hot water for heating. Each boiler is a model 350 Mills type manufactured by H.B. Smith and has an output of 1,686 MBH. Boiler #2 is original and was installed in 1971. Boiler #1 was replaced approximately ten (10) years ago with a new boiler of the same manufacturer and model as the original.

The existing boilers in the North Side Boiler Room fire on No. 2 oil that is contained within a 15,000-gallon single wall underground storage tank. The existing fuel oil level gauge is present but tank quantity is determined by measuring the level in the tank with a rod. The fuel oil tank and piping system is not furnished with any leak detection or monitoring equipment.

South Gym Boiler Room:

The South Gym Boiler Room is furnished with two (2) sectional cast iron boilers that produce low-pressure steam for heating. Boiler #1 is the original model 450 Mills type boiler

Feasibility Study Update for the Burgess Elementary School

manufactured by H.B. Smith. This boiler has been abandoned in place due to its age and condition. Boiler #2 was installed approximately fifteen (15) years ago and is a model V11 manufactured by Burnham Company and has an output 1,893 MBH. Control of this boiler is accomplished with a Heat Timer Company boiler control panel that appears to have been installed in recent years. Boiler #2 is the primary source for heating steam in section of the building.

Condensate is handled by a duplex condensate pump manufactured by Skidmore. This pump set appears to be in fair condition and is fully operational.

The existing boilers in the South Gym Boiler Room fire on No. 2 oil that is contained within a 6,800-gallon single wall underground storage tank. The existing fuel oil level gauge is present but tank quantity is determined by measuring the level in the tank with a rod. The fuel oil tank and piping system is not furnished with any leak detection or monitoring equipment.

South Office Boiler Room:

The South Office Boiler Room is furnished with a single sectional cast iron boiler that produces low-pressure steam for heating. This boiler is a series 28A-8 manufactured by the H.B. Smith Company and was installed in the early 1980's and has an output of 1,526 MBH. Control of this boiler is accomplished with a Heat Timer Company boiler control panel that appears to have been installed in 1994.

Condensate is handled by a duplex condensate pump set that appears to be in fair condition and is fully operational.

The existing boiler in the South Office Boiler Room fires on No. 2 oil that is contained within a 7,600-gallon single wall underground storage tank. The existing fuel oil level gauge is present but tank quantity is determined by measuring the level in the tank with a rod. The fuel oil tank and piping system is not furnished with any leak detection or monitoring equipment.

Recommendations

The existing boilers are inefficient, cannot be easily maintained and have outlived their useful economic life. It is recommended that these boilers be replaced with modern, high efficiency, hot water boilers. The only exception might be Boiler #1 in the North Side Boiler Room, which is nine (9) years old. However, this boiler is still considered inefficient by current standards.

Any major renovation should include the conversion from steam to hot water for heating. Steam systems are generally more expensive to operate and maintain due to the complexity in their design when compared to a hot water system of equivalent heating capacity.

Feasibility Study Update for the Burgess Elementary School

The existing underground storage tanks do not comply with current Department of Environmental Protection (DEP) standards and should be replaced with new double wall tanks outfitted with leak detection and monitoring equipment as required.

Administration

A central station air-handling unit located in a mechanical penthouse space identified as fan room #B2 meets the heating and cooling needs of the administration area. The air-handling unit was furnished with a hot water coil for heating and a DX coil for cooling. Coupled with this unit is an air-cooled condensing unit. The air-handling unit is original and is approximately thirty two (32) years old. The air-cooled condensing unit is not original and appears to have been replaced within the last ten years. Conditioned air is distributed to the individual spaces by a system of ductwork and diffusers. Temperature control is provided by means of one centrally located thermostat.

Recommendations

The air-handling unit has outlived its useful economic life and should be replaced. Typically the heating and air conditioning needs of administration areas are handled by a variable air volume (VAV) system. An air handling unit (either rooftop or indoor) supplies conditioned air that is distributed via ductwork, terminal boxes with hot water reheat coils and ceiling diffusers. Individual spaces should be equipped with thermostats to provide the occupants with a means of controlling the temperature of their space.

Classrooms

Because the Burgess Elementary School has two (2) distinctly different types of classrooms, there are two (2) different types of classroom HVAC systems.

The more traditional classrooms in the older portion of the school are furnished with classroom unit ventilators. In general, these classroom unit ventilators are original vintage and are furnished with steam heating coils. There is no provision for air conditioning.

Temperature control is provided by means of pneumatic thermostats.

The original general exhaust system is also present in this area of the school. This system consists of roof mounted exhaust fans, ductwork and exhaust grilles.

The open classrooms in the 1971 section of the school have been provided with a constant volume HVAC system. This system consists of central station air-handling units located in mechanical penthouse spaces identified as fan room #B1 and #B2. The air-handling units were furnished with a hot water coils for heating and a DX coils for cooling. Coupled with each air-handling unit is an air-cooled condensing unit. The air-handling units are original

Feasibility Study Update for the Burgess Elementary School

and are approximately thirty two (32) years old. The air-cooled condensing units for air handling units #B1 and #B3 are original. The air-cooled condensing unit for air handling unit #B2 appears to have been replaced within the last ten years. Conditioned air is distributed to the open classroom area by a system of ductwork and diffusers. The perimeter areas of the open classroom area have been provided with duct mounted hot water reheat coils controlled by space mounted pneumatic thermostats in order to provide some means of zone temperature control.

Recommendations

The HVAC systems for either classroom type are original, over thirty years of age and have outlived their useful economic life. It is recommended that these systems be replaced in their entirety.

North Cafetorium

A central station air-handling unit located in a mechanical penthouse space identified as fan room #1 meets the heating and ventilating needs of the Cafetorium. The air-handling unit was furnished with a hot water coil for heating. The air-handling unit is original and is approximately thirty two (32) years old. Conditioned air is distributed to the individual spaces by a system of ductwork and diffusers.

Temperature control is provided by means of one centrally located pneumatic thermostat.

Recommendations

The air-handling unit and return fan has outlived their useful economic life and should be replaced in their entirety with new equipment sized to meet the current ventilation codes.

North Gymnasium

The heating and ventilating needs of the gymnasium is met by four (4) horizontal unit ventilators and two (2) roof mounted exhaust fans. The horizontal unit ventilators were furnished with hot water reheat coils for heat.

Temperature control is provided by means of a space mounted pneumatic thermostat.

Recommendations

The horizontal unit ventilators and exhaust fans are over thirty years old, have outlived their useful economic life and should be replaced in their entirety with new equipment designed to provide code required ventilation.

Feasibility Study Update for the Burgess Elementary School

South Gymnasium

This space is furnished with original vintage air-handling units manufactured by Nesbitt. These units were furnished with steam heating coils to meet the heating needs of the space.

Additional heat is provided in the South Gymnasium by means of fintube radiation installed high on the wall.

Temperature control is provided by means of a space mounted pneumatic thermostat.

Recommendations

The air-handling units have outlived their useful economic life and should be replaced in their entirety with new equipment designed to provide code required ventilation.

Corridors and Toilets

The corridors are not provided with any type of ventilation as required by code. The exhaust system for the toilet rooms is original does not appear to performs well.

Recommendations:

The corridors should be provided with some means of ventilation. The code requires a minimum of 0.10 CFM of outside air per square foot. The toilet exhaust systems should be completely replaced with new grilles, ductwork and exhaust fans.

Electrical

Power Distribution

The building is provided with two (2) electrical services. Both services run overhead onto the site from Burgess School Road, then underground to pad-mounted transformers located near the building. The south side is provided with a 120/208 volt, three phase service and is furnished with a 600 ampere circuit breaker type main distribution panel located in the basement electrical room. The main distribution panel is manufactured by Square D and is in fair condition. The north side is provided with a 277/480 volt, three phase service and is furnished with a 1600 ampere switchboard located in the basement adjacent to the boiler room. The switchboard is manufactured by FPE (Federal Pacific Electric) and is in fair condition. The capacity of the services appear to be adequate for present needs, but would not offer much room for expansion if proper technology power or a substantial amount of air conditioning were added to the building. Circuit breaker type panelboards are provided throughout the building to serve branch circuit wiring. The panelboards are manufactured by a variety of manufacturers, such as FPE, Kelek, Square D and Challenger. Some of the panelboards, such as the FPE and Kelek panelboards appear to be original equipment and are in fair to poor condition. FPE and Kelek are no longer manufactured, making replacement

Feasibility Study Update for the Burgess Elementary School

parts very difficult to find. The Square D and Challenger panelboards appear to be replacement or additional equipment and are in fair condition. The distribution equipment should be replaced with modern equipment, particularly the original FPE and Kelek manufactured equipment.

The building is not provided with an emergency generator.

Recommendations

Provide a new electric service and replace existing distribution equipment with new equipment sized adequately to provide power for additional loads as required.

Provide an emergency generator with automatic transfer switch. The generator could be installed outdoors and be self-contained with a base mounted diesel fuel tank and weather enclosure. The generator would provide power for emergency and exit lighting, as well as the primary heating source and Kitchen refrigerators and freezers.

Receptacles

General purpose receptacles are provided throughout the building. Receptacles are of the grounding type and are sparsely located. Some receptacles for general use have been added throughout as the needs were warranted. Receptacles are not adequately provided in the classrooms for technology.

Recommendations

Add receptacles throughout the building for general use and technology. Provide a minimum of three (3) quad receptacles for student computers and one (1) quad receptacle for teacher's computer in each classroom.

Lighting

Lighting is mostly fluorescent. Some incandescent specialty lighting is provided at the Cafetorium platforms. The south side Cafetorium and the two (2) Gymnasium are provided with high intensity discharge metal halide light fixtures. The light fixtures located in the south side classrooms are surface mounted wraparound style light fixtures or recessed 2x4 lensed troffers. The light fixtures located in the north side classrooms are mostly pendant mounted wraparound style light fixtures. Corridors are provided with surface mounted wraparound style light fixtures. Many of the light fixtures have tarnished or broken lenses. The light fixtures in the south side utilize energy efficient T-8 lamps with electronic ballasts. The light fixtures in the north side utilize T-12 lamps and magnetic ballasts, which are not as energy efficient. Lighting is controlled by wall switches.

Feasibility Study Update for the Burgess Elementary School

Illuminated exit signs are provided in the building. The exit signs are provided with battery back-up. Some of the signs are replacement signs. Some of the signs have lamps that are not working. Most of the exit signs are in poor condition.

Emergency lighting is provided by battery units, low voltage lighting heads and individual recessed lighting fixtures. The age and condition of the emergency lighting was not determined.

Exterior lighting is provided through building and utility pole mounted spot and flood lights. Exterior lighting appears minimal.

Recommendations

Replace all the fluorescent light fixtures located in the building with new fluorescent light fixtures utilizing energy efficient T-8 ocrton lamps and electronic ballasts.

Replace and add (if necessary) the exit signs with new low energy LED illuminated exit signs to properly identify all means of egress, as required by the latest edition of the Massachusetts State Building Code. Exit signs would be provided with battery back-up or wired to the emergency generator, if one is provided.

Replace and add (if necessary) the low voltage emergency lighting fixtures with new equipment with proper coverage as required by the latest edition of the Massachusetts State Building Code. If a generator is provided, the normal corridor lighting circuits could be wired to the generator, eliminating the need for low voltage emergency lighting.

Fire Alarm

Currently, a new state-of-the-art, addressable fire alarm system, manufactured by Notifier, is being installed with complete coverage throughout the building. The new system is provided with A.D.A. (Americans with Disabilities Act) compliant audio/visual devices, manual pull stations located within five-feet (5') of all egress doors, as required by the latest edition of the Massachusetts State Building Code, magnetic door holders and smoke or heat detectors in each space within the building.

Recommendations

Maintain the new fire alarm system as installed.

Communication System

The building is equipped with a Lucent telephone switch and telephones provided in all Administration and staff locations.

The building is provided with a Rauland-Borg intercom system, which appears to be a replacement system. Each classroom is provided with a wall handset and speaker. The open

Feasibility Study Update for the Burgess Elementary School

classroom in the north side is provided with ceiling speakers and handsets located on every other column. The age and condition of the system was not determined, although the system appears to be in good condition and operational.

The north side Cafetorium is provided with a local sound system. The two (2) Gymnasiums do not appear to be provided with local sound systems.

Recommendations

Maintain the existing communication system.

Security System

The building is provided with a hard-wired security system. Door contacts and motion sensors are provided. Four (4) entry keypads are provided. The security system control panel is located in the Teacher's Dining Room and is manufactured by I.T.I.

Recommendations

Provide a new addressable security system with door contacts at every exterior door and motion sensors in all rooms with windows and in corridors. Provide keypad entry stations at locations designed by the Owner.

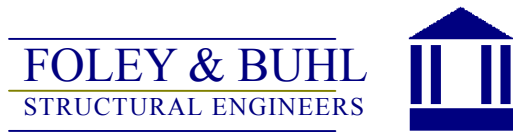
Appendix B

Structural Engineer's Report

Foley & Buhl
Engineering, Inc.

Feasibility Study Update for the Burgess Elementary School

Appendix B Structural Engineer's Report



Introduction

Foley & Buhl Engineering, Inc. collaborated with Drummey Rosane Anderson, Inc. in the evaluation of existing conditions and the study of various planning options for the Burgess Elementary School in Sturbridge, Massachusetts.

Structural aspects of this facility were reviewed during a visit to the site on April 7, 2004. School personnel were not available at the time of our visit; accordingly, it was not possible to discuss structural or structurally related issues. We were unable to enter certain spaces and did not gain access the roof during our visit.

Architectural and Structural Drawings for the 1972 additions to the school were provided, as noted below. Drawings for the original building and 1952/1960's additions were not available.

- *Architectural Drawings* A-1 to A-9, prepared by Warren H. Ashley, AIA, West Hartford, CT, dated October 7, 1970.
- *Structural Drawings* S-1 to S-5, prepared by Pepin Associates, Bloomfield, CT, dated October 7, 1970.

No other structural/structurally related drawings or documents were available.

The purpose of this report is to identify and to describe the structural systems of the Burgess Elementary School as well as to comment on the condition and live load capacity of the structure. Structural issues relating to potential alterations and additions are also addressed.

Structural Systems Description

The Burgess Elementary School is a one-story, steel framed facility, constructed on a relatively level site (grades drop sharply at the southeast corner, but otherwise vary gradually across the site). The original school was constructed in 1950; there have been a number of subsequent additions to the facility. Classrooms were added when a new wing was constructed to the west of the original school building. Classrooms and a new Gymnasium

Feasibility Study Update for the Burgess Elementary School

were constructed on the east side of the original school in 1963; a boiler room (with outside access) was built below the Gymnasium (taking advantage of the original, sloping grades in that area). Four more classrooms were provided by a 1968 addition, constructed to the north of the 1963 classrooms. A major expansion of the school occurred in 1972, with the construction (at the northern part of the site) of new offices, an open classroom space, new Gymnasium and Cafetorium spaces, a Basement Mechanical Room (to the east of the Cafetorium) and special needs classrooms.

Roof Construction over the 1972 Gymnasium and Cafetorium spaces (Unit A) consists of a 9" deep, acoustical metal deck spanning 12+/- feet to 27 and 24 inch deep steel beams, respectively. Lower roofs to the east and west of these spaces are framed with 1½" deep metal roof deck, spanning 4+/- feet to open web steel joists (16 to 22 inches deep). Framing is typically supported by 8" or 12" CMU bearing walls. Steel framing for the open classroom area (Unit B) spans a 30'-0" x 36'-0" typical structural bay, with 22 inch deep, open web steel joists spanning 36 feet to 24 inch deep steel beams. A 1½" deep metal roof deck spans 4+/- feet, between steel joists. Steel beams span 30 feet to interior, 6-inch wide flange steel columns and to 8" CMU bearing walls at the building perimeter. Roof framing for the special needs classroom wing (Unit C) is similar, with 1½" metal roof deck and 8" or 22" deep steel joists, supported by steel beams and CMU bearing walls. All roofs are basically flat; the steel has been pitched for drainage purposes.

The roof of the original (1950) building is steel framed, with wood decking supported by steel beams, supporting the mono-pitched, shed roof on the north side. The high, flat roof of the original Gym/Cafeteria and the lower flat roof on the south side are similarly framed.

Roofs of the 1958, 1963 (including the Gymnasium) and 1968, one-story additions are framed with tectum roof deck and steel bulb tees, supported by open web steel joists.

Floor Construction in all sections is typically a concrete slab on grade. The slab is 4" thick, reinforced with welded wire fabric at the 1972 addition (6" thick at the Basement Mechanical Room); the thickness and reinforcing of the slab at the original building and the 1950's/1960's additions are unknown. Floor construction over the Basement Mechanical Room of the 1972 addition is a 4" thick, reinforced concrete, one-way slab, supported by 18" deep, concrete encased steel beams. Gymnasium floor construction over the Boiler Room (1963 addition) is a concrete slab, supported by concrete encased steel beams and (unprotected) steel pipe columns.

Foundations for the 1972 additions consist of individual spread footings at interior columns and continuous strip footings at interior and perimeter bearing walls. The design allowable soil bearing pressure is noted to be 4000 psf (two tons per square foot). Foundation construction at the original building and the 1950's/1960's additions is unknown, but expected to be similar.

Feasibility Study Update for the Burgess Elementary School

would be indicative of significantly overstressed or failed structural elements. There were no signs of significant, total or differential settlements; foundations generally appear to be performing satisfactorily (see comments below). Specific comments relating to structural conditions are noted below:

Observations include the following:

- Vertical cracks in the masonry veneer were observed (from outside) in a number of locations at corners of the 1972 addition. This type of cracking generally results from volumetric changes in the veneer (due to shrinkage, temperature and moisture effects) being restrained at building corners. It is more commonly observed when little or no vertical control joints have been provided in the veneer. In this case however, control joints have been provided; accordingly, we would not expect to see cracking to the extent observed. The porosity or original moisture content of the split face block veneer could be contributing factors. Typically, there are no embedded steel columns at building corners; accordingly, rust-jacking of embedded steel cannot be a contributing factor. These veneer cracks are of no structural concern; however, repair is necessary to stop further deterioration.
- Lateral stability in the east-west direction of the 1972 open classroom area (Unit B) is somewhat questionable, as there is no masonry wall along the northern edge of this wing (there is an expansion joint at this location; the masonry wall is actually part of the Gymnasium/Cafetorium wing (Unit A). This issue should be evaluated and addressed (as appropriate) in conjunction with future improvements to the facility. Refer to *Section V* of this narrative for related comments.
- Step cracking in the masonry was observed (from inside) at several locations along the south wall of Unit A (1972 addition). These cracks may be due to some minor foundation settlements, but do not present a structural concern.
- Cracks in the exterior wall masonry backup was observed (from inside) at several locations at windows on the east and west walls of Unit B. These are likely due to normal shrinkage stresses and are not a structural concern.
- Cracks were observed (from inside) in the masonry walls of the original Cafetorium. These cracks have likely been present for a considerable length of time and do not present a structural concern.
- Minor (surficial) rusting of steel bulb tees at the tectum roof overhangs of the 1950's and 1960's additions was observed; there are no structural concerns.
- Minor (surficial) rusting of exterior, steel loose lintels (over window and door openings) was observed; there are no structural concerns.

Feasibility Study Update for the Burgess Elementary School

- There did not appear to be any significant water damage to roof structural elements (to the extent that this could be observed). The age and condition of the roofs at the various sections of the facility are not known.

Alterations, Renovations And Additions – General Comments

Future alterations, renovations and additions to the Burgess Elementary School will be subject to the provisions of Chapter 34, *Repair, Alteration, Addition and Change of Use of Existing Buildings*, of the Massachusetts State Building Code (780 CMR – 6th Edition). Generally speaking, the following provisions will be applicable:

- The lateral force resisting systems of the original building and the subsequent additions do not meet current code requirements; alterations must not reduce the lateral load capacity of the building as a whole (*Section 3408.3.5*).
- The structure-as-a-whole must be able to withstand wind loads specified for Exposure A in 780 CMR (*Sections 3408.4.2.1 and 3408.5.3*), if the facility undergoes a major renovation, alteration or addition in the future. This may be an issue at Unit B of the 1972 addition, as there is no east-west masonry wall at the north end of this wing. An east-west, lateral tie to the south, masonry wall of Unit A or the construction of additional walls may be required.
- It is recommend that any future additions be structurally separated from the exiting buildings; in particular, those additions that would increase the area or weight (mass) of the existing building by more than 10% (*Sections 3408.4.3.1 and 3408.4.3.2*).
- Special seismic hazards would need to be evaluated, in conjunction with a future (major) alterations, renovations or additions. Unreinforced masonry parapets and the lateral support of interior masonry partitions would need to be evaluated and appropriately addressed (*Section 3408.6.3*).
- Loading from drifting/sliding snow and/or or ponded water should be evaluated and appropriately addressed, in conjunction with a future (major) alteration, renovation or addition to the facility.
- The structural aspects of the exterior wall construction should be investigated, in conjunction with future modifications, upgrades or window replacement.

Appendix C

Environmental Engineer's Report

ATC Associates Inc.

Feasibility Study Update for the Burgess Elementary School

Appendix C Environmental Engineer's Report

Hazardous Materials Assessment

ATC Associates Inc. (ATC) was retained by Drummey Rosane Anderson, Inc. (DRA) to perform a Hazardous Materials Assessment regarding remediation of environmental hazards at the following school located in Sturbridge, Massachusetts:

Burgess Elementary School

ATC's representatives performed a site review to determine the locations of hazardous materials that may be affected by the forthcoming proposed renovation work at the school.

Note: ATC's Hazardous Materials Assessment did not include any sampling and analysis of materials as part of this study.

ATC's Scope of Work for this project included a cursory review of the following hazardous materials typically found in school buildings:

Lead Paint

Asbestos

Underground Storage Tanks (UST)

Miscellaneous Hazardous Materials (i.e. PCB light ballast's, disposal drums, chemical storage, etc.)

Outlined below is a summary of ATC's findings:

Site Background

The original building was constructed in 1950-1951 consisting of six (6) rooms, offices and a cafeteria. A 2nd addition of eight (8) rooms was added in 1958. In 1963, five (5) more rooms were added along with a second boiler room. In 1963, four (4) kindergarten rooms were added. Finally, in 1972, the building was expanded again adding open classroom learning areas, offices, media center, special education rooms, gymnasium and second cafeteria. An additional boiler room was also added at this time.

Lead Paint Materials

Based on the initial date of construction as well as the dates of subsequent completed renovations, lead-containing paint will most likely be present due to the fact that the Consumer Product Safety Commission (CPSC) did not ban the sale of commercial paint that contained greater than 0.006% lead until 1976.

Feasibility Study Update for the Burgess Elementary School

The Occupational Safety and Health Administration (OSHA) under their 29 CFR 1926.62 Regulation, consider elemental lead (i.e. >0.0) to be considered lead containing and subject to their worker protection regulations. Therefore, ATC recommends that appropriate lead testing be performed within the building and all results disclosed to the Contractor as part of the Bid Documents.

In addition, any building components that are found to contain any detectable lead will also be subject to federal Resource Conservation and Recovery Act (RCRA) regulations with regards to disposal. Appropriate Toxicity Characteristic Leaching Procedure (TCLP) sampling shall be required of the waste streams to determine if the material is considered hazardous waste for lead. ATC does recommend that representative TCLP samples be collected of the building components subject to disposal and the results be provided to the Contractor as part of the Bid Documents.

Asbestos-Containing Materials

ATC performed a cursory review for suspect asbestos-containing materials (ACM) located in accessible areas of the building. The school's Asbestos Emergency Response Act (AHERA) plan was available for review at the time of inspection as well as the schools most recent AHERA Three-Year Reinspection Survey. The AHERA plan indicated the following materials to contain asbestos and require in-place management:

- Breeching Insulation in the Boiler Room (1964 Section)
- Breeching Insulation in the Boiler Room (1972 Section)
- Hot Water Tank Insulation in the Boiler Room (1964 Section)
- Oven Vent Insulation
- Aircell Pipe Insulation
- Pipe Fittings on Fiberglass Lines
- Pipe Fittings on Layered Paper Lines
- Chimney Flue Packing Material
- Acoustic Plaster (Girls/Boys 1951 Section)
- 2' x 4' Ceiling Tiles
- 9" x 9" Floor Tiles
- Linoleum Flooring
- Lab Tops

ATC also reviewed documentation regarding an AHERA Compliance Audit performed by the Massachusetts Department of Workforce Development (DLWD) on March 22, 2002. The audit specified both corrective measures as well as record keeping items as being deficient. On May 24, 2002, Mr., Rick Wetherbee was appointed the Designated Person responsible for upkeep and administration of the schools AHERA Program. Since that time, the deficient items noted by DLWD's inspection on March 22, 2002 appear to have been corrected. The following information was observed by ATC to be present with the AHERA Plan:

Feasibility Study Update for the Burgess Elementary School

Updated Management Plan
Training Certificates for Custodial Staff
Response Actions Documented within the Plan
Abatement Actions Documented within the Plan
6-Month Surveillance Documented within the Plan
Copies of Notification to Parents Documented within the Plan

ATC would like to also point out that at the time of the initial AHERA plan development (1988), the known list of suspect asbestos-containing materials required to be identified were far less than what is required by today standards. In addition, the amount of samples collected and analyzed for each suspect material by the original AHERA plan was completed to minimal standards as well.

Therefore, the following suspect asbestos-containing materials were observed by ATC that will require sampling to confirm asbestos content:

Window Glazing Compound (Interior/Exterior)
Window Caulking (Interior/Exterior)
Cove base and Mastic
Carpet Mastic
Wall Panel Mastic
Ceramic Tile Grout
Sink Coating
Door Caulking (Interior/Exterior)
Felt Paper Under Gym Floor
1' x 1' Spline Ceiling Tiles
Wallboard/Chalkboard Glue or Mastic
Sheetrock/Joint Compound
Boiler Unit Components (firebrick, soot, packing, gaskets, etc.)
Gaskets on Piping
Seam Caulking/Expansion Joints

In accordance with federal Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations, all materials found to be asbestos-containing in the building must be abated prior to renovation/demolition activities. Therefore, ATC recommends that a comprehensive survey be performed in the school buildings that will (1) identify all suspect ACM subject to potential impact by forthcoming renovation activities, which will comply with NESHAP Regulations; and (2) update the overall current AHERA plan for the school.

Underground Storage Tanks (UST's), Oil & Hazardous Materials

ATC performed an assessment as to the presence and locations of UST's and oil and other hazardous materials (OHM) at the site. ATC's review included a preliminary site

Feasibility Study Update for the Burgess Elementary School

investigation as well as discussions with school personnel and custodial staff on past practices and handling of OHM at the site.

The following is a summary of ATC's findings:

Three (3) No. 2 fuel oil underground storage tanks (USTs) are currently active at the school, one associated with each of the three (3) boiler rooms. Each boiler room has one (1) active boiler, and one inactive boiler.

The oldest UST is associated with the South Office Boiler Room and has a capacity of 7,200-gallons. Installed at the time of initial construction (1950-1951). Fill port is located in a concrete pad in the garden outside the South Cafeteria. Vent was observed along the side of the school building. Active UST has exceeded its useful life expectancy.

The South Boiler Room was constructed in 1963 and a 6,800-gallon UST was installed adjacent to boiler room. Fill and vent were both observed to be in good condition. Active UST has exceeded its useful life expectancy.

The North Boiler Room was constructed in late 1960's and a 15,000-gallon UST was installed in the paved area utilized as basketball and hopscotch courts. The fill was observed in good condition, the vent could not be located. Active UST has exceeded its useful life expectancy.

Recommend removal and disposal of the USTs, including soil screening and sampling to confirm that no releases have occurred. Assume 1 day excavation for each tank. If contamination is observed, assume additional excavation will be required.

A 500-gallon No. 2 fuel oil UST utilized for operating the hot-water heater was removed in the summer 2002. According to Maintenance personnel, the UST was in good condition and no evidence of releases was observed. The UST has been replaced with a 275-gallon aboveground storage tank (AST) located in the same room as the hot-water heater. The AST has secondary containment and appeared in good condition. Recommend obtaining documentation on this UST removal in the event that contamination is observed during demolition and/or construction in that area of the school. No recommendations regarding the AST.

Grease trap associated with kitchen in the North Side of the school is located beneath the floor of the kitchen and was observed suspended from the ceiling in the basement leading to the North Boiler Room. The trap appeared to be in good condition. Installed during construction of the North Side in 1972. The South Cafeteria is no longer active, and no grease trap is present. Grease from the North Cafeteria grease trap will need to be disposed of properly. Assume one 55-gallon drum of grease.

Two (2) pad-mounted electrical transformers owned by Massachusetts Electric Company are present on the school grounds. The main electrical panel is located in the basement

Feasibility Study Update for the Burgess Elementary School

immediately adjacent to the North Boiler Room. The presence of oils within the transformers and PCB content of any oils has not been determined; however there is no indication that these transformers contain PCB oils. If transformers are to be removed as part of building demolition or renovation, proper removal and disposal is recommended as part of building demolition or renovation.

Fluorescent lighting was observed throughout the school building. According to documentation reviewed by ATC, lighting throughout the building was converted to energy-efficient fixtures within the last few years. However, some older fixtures were observed in select areas of the building that may contain PCBs. Recommend proper removal and disposal as part of building demolition or renovation.

Thermostats were observed throughout the school building. Based on the age of the building, the thermostats may contain mercury switches. Recommend proper removal and disposal as part of building demolition or renovation.

Small quantities of gasoline are stored in the Maintenance Garage on the North Side of the school building in 5-gallon containers. No bulk storage of hazardous materials was observed.

The North Boiler Room contained a sump. Standing water was observed in the sump. No sheens or odors were noted. A hose from the boiler discharges to the sump, most likely for condensate collected within the boiler. Recommend testing water in sump prior to removal and off-site disposal.

The South Boiler Room and South Office Boiler Room each had a floor drain. A hose from the boiler discharges to the floor drain in each room. No staining, sheens or odors were noted associated with the drain. Recommend verifying that the floor drains are connected to municipal sewer and not a dry well. If they are connected to a drywell, recommend excavation and removal of drywell and impacted soils, if present. Assume disposal of drywell materials as building wastes, and 25 cubic yards of non hazardous soils.

The aforementioned information represents ATC's preliminary site investigation work relating to the feasibility study. As noted, additional sampling and investigation may be required in some instances to further determine the extent of the remediation activities required.

Appendix D

Enrollment Projections

Merrimack Education Center

Feasibility Study Update for the Burgess Elementary School

Appendix D Enrollment Projections

Introduction

Enrollment forecasting and demographic analysis are two of the basic components utilized in school planning and construction. Forecasting is the projection of specified future events within a certain time frame based upon available, if often incomplete, information. The future event in this case being long-range student enrollments in the Sturbridge Public Schools.

Demographic analysis is the process used to examine the environmental context of the school district that may affect student enrollment. As in most cases birth data, in-out migration, rate of building, available building lots and future development are all instrumental in establishing the demographics of a community.

The cohort survival method is the basic method utilized in this projection to analyze enrollment trends and subsequent results. It is the most frequently utilized method of enrollment forecasting. In the cohort survival method, the number of students is calculated based on the survival rates of students as they move from one grade to the next and is upgraded as actual enrollment data becomes available. The result is a linear forecast projected from the last data point. The cohort survival technique of forecasting provides a limited assessment of future enrollments, but when combined with the demographic data noted above, together they provide a more balanced and accurate projection of anticipated enrollments

Merrimack Education Center was commissioned to do a ten-year enrollment projection for the Sturbridge Public Schools. To accomplish this we reviewed data and spoke to Town and School Officials who have supplied data that enables us to draw significant conclusions relative to future school enrollments and school space needs in the Town of Sturbridge.

For the purpose of this report the following information was reviewed:

- 1) October 1 Enrollment Reports from FY1990 through FY2004, supplied by the Massachusetts Department of Education and the Sturbridge Public Schools
- 2) Birth data: i.e. births to Sturbridge residents supplied by the Office of Town Clerk and by the Commonwealth of Massachusetts, Dept. of Public Health
- 3) Number of housing units annually from 2001 through 2004, supplied by the Town of Sturbridge Building Department
- 4) Lawrence Adams, Sturbridge Town Planner, supplied information relative to current and potential housing developments and sub-divisions.
- 5) The Massachusetts Executive Office of Elder Affairs supplied information on Sturbridge's senior population
- 6) Real estate agents supplied information relative to the Sturbridge real estate market and relevant market data was gleaned from the web sites of both the Warren Group & Banker & Tradesman

Feasibility Study Update for the Burgess Elementary School

My thanks to Larry Adams, Town Planner, and Jeff Bonja, Town Building Inspector, for taking time to discuss building history in Sturbridge and potential housing and development scenarios and for providing statistical data for use in this study.

Birth Data

The Town Clerk's Office and the Commonwealth of Massachusetts, Department of Public Health provided the birth data utilized in this analysis. It is complete through December 31, 2003. It reflects births to residents of Sturbridge, whose children might be expected to attend the Sturbridge Public Schools. (Table I)

From January 1990 through December 31, 2003 there were a total of 1,318 children born to residents of Sturbridge, an average of 94 births per year. For the purpose of estimating future enrollments, births from 2004 through 2012 were estimated by using the average of each of the previous five years of birth data. (Rolling 5 yr. average)

Feasibility Study Update for the Burgess Elementary School

TABLE I

BIRTHS TO RESIDENTS OF THE TOWN OF STURBRIDGE

<u>YEAR</u>	<u>BIRTHS</u>
	ACTUAL
1990	110
1991	98
1992	102
1993	91
1994	85
1995	87
1996	83
1997	86
1998	98
1999	91
2000	91
2001	74
2002	98
2003	124
Total Actual	1318
Avg. / Yr.	94.1
	PROJECTED
2004	96
2005	97
2006	98
2007	102
2008	103
2009	99
2010	100
2011	100
2012	101
Total Projected	896
Avg. / Yr.	99.5

- Notes:** 1) Births from 1990 to 2002 were obtained from the Commonwealth of Massachusetts Community Health Information Profile.
2) Births for 2003 were obtained from the Town Clerk's Office
3) Births for 2004 through 2012 were projected by using a rolling five year average of births to residents of the Town of Sturbridge

Feasibility Study Update for the Burgess Elementary School

The 124 births to Town residents in 2003 reported by the Town Clerk was the highest number of births in a single year during the period studied. Other years with high birth totals were 1990 -110 and 1992 -102 births. 74 births were reported in 2001, the lowest annual birth rate since prior to 1990. In 2002 the annual number of births rose to 98.

For the purpose of this study, using a rolling five-year average of births to Sturbridge residents, we made the assumption that birth rates will rise from an average of 94.1 for the period 1990 through 2003 to an average of 99.5 for the projected period 2004 through 2012.

Housing Permits & New Development

The Sturbridge Building Department was able to provide comprehensive information relative to permits issued for single family housing units only from 2001 through 2004 but records of housing starts were obtained from Town records going back as far as 1980. (Table II)

From January 2000 through 2004 (projected for a full year) a total of 475 permits for single and multi-family housing units were issued. or an average of 95 per year. Through June 1, 2004, 32 permits had been issued with 59 permits projected for the remainder of the year fewer than the previous two years. This may reflect the weaker economy, and will likely rebound as the economy recovers. We anticipate development will continue at a rate more consistent with what we have seen in 2002 and 2003 rather than the lower numbers we observed prior to 2002.. We note that in the three years 2001 through 2003 a total of 311 permits were issued for new housing compared with a total of 268 issued in the 11 years from 1990 to 2000.

It is significant that young families, looking for more affordable housing, have continued to push further west from the metropolitan Boston area and that the Sturbridge housing market has become an attractive area for those employed in the Rt. 495 belt.

Feasibility Study Update for the Burgess Elementary School

TABLE II

YEAR (calendar)	Sturbridge-Units of Housing per Year # UNITS (permits issued)			% Change
	Single Family	Condos	Total	
1980	25		25	
1981	46		46	84.0%
1982	13	50	63	37.0%
1983	56		56	-11.1%
1984	62		62	10.7%
1985	108		108	74.2%
1986	116		116	7.4%
1987	75		75	-35.3%
1988	53		53	-29.3%
1989	30		30	-43.4%
1990	18	10	28	-6.7%
1991	17		17	-39.3%
1992	13	30	43	152.9%
1993	15	10	25	-41.9%
1994	23	13	36	44.0%
1995	29		29	-19.4%
1996	27	25	52	79.3%
1997	21		21	-59.6%
1998	25		25	19.0%
1999	27	4	31	24.0%
2000	53	20	73	135.5%
2001	63		63	-13.7%
2002	117		117	85.7%
2003	131		131	12.0%
2004	91	32 (thru 6/1)	91	-30.5%
Projected for 12 months				
Total Permits 1980 - 2004		1416	Avg. per year	62
Total Permits 1990 - 2004		782	Avg. per year	52
Total Permits 2000 - 2004		475	Avg. per year	95
Total Sturbridge Households 1990		2795	Total Sturbridge Households 2000	3336
1990 Elementary School Enrollment		832	2000 Elementary School Enrollment	796
# Elem. Students/Household		0.29	# Elem. Students /household	0.24

Notes:

- 1) Data for 2004 supplied by Sturbridge Building Inspector projected for a full 12 months
- 2) Housing permit information 2001-2004 supplied by Sturbridge Building Inspector
- 3) Housing permit information 1980 - 2000 from Town records
- 4) Household Data 1990 & 2000 from U.S. Census Bureau

Feasibility Study Update for the Burgess Elementary School

A comparison of housing units to student enrollment shows a ratio of .29 children per household in the 1990 census dropping to .24 in the 2000 census (Table II). This can be explained by examining the change in Sturbridge demographics in the 10-year period. During these years the Sturbridge population of residents under 18 (including school age children) fell from 27.3% to 25.5% while the population of residents over 60 years of age rose by 21.6% resulting in a lower ratio of children per household.

The national demographic multiplier for school children in standard housing types in the northeast is .4235 for a three-bedroom home and .4756 for a four-bedroom home (.45 average). In anticipation of a greater numbers of younger families being drawn to the Town we are using a multiplier of .35 children per household. While this is still below the national average it is preferable to be conservative in this matter. Our use of a number higher than Sturbridge's historically low child per household number is reinforced by data from newly developed areas of Town wherein the ratio is .42 of children per household. (Table III)

A report created by the Sturbridge Planning Department shows that from 2001 to 2002 a total of 260 units were approved in eight housing developments. Completion dates for the various projects ranged from 2003 through 2008. The projection for 2003-2004 shows four developments with a total of 243 housing units either approved or pending. (Table III) Two proposed developments with a total of 159 units are planned as over 55 housing and are not included in these projections.

TABLE III

Major Sturbridge Development -New & Proposed			New Development - Children per Household			
Approved Housing 2001-2002			Street	Number Households	No. Children	Ratio- Children Per Household
Estimated Completion Date	No. Units	Est. # Children @.0.35				
			Lauren Lane	12	2	0.17
2003	53	18.6	Tannery Rd.	7	1	0.14
2004	160	56.0	Old Towne	18	13	0.72
2006	23	8.1	Old Farm-new	7	4	0.57
2007	8	2.8	Audubon	5	0	0.00
2008	16	5.6	Brook Hill	3	2	0.67
Total	260	91.0	Total	52	22	0.42
Approved or Pending Housing 2003-2004						
Estimated Completion Date	No. Units	Est. # Children @.0.35				
2004	35	12.3				
2005	66	23.1				
2006	62	21.7				
2007	50	17.5				
2008	30	10.5				
Total	243	85.1				
Total Approved & Pending Housing	503					
Project. # Children/Home	0.35					
Total Projected Children	176.1					

NOTES:

- 1) Information supplied by Sturbridge Town Planner a/o April 2004 and Building Inspector's Office
- 2) Number of children/home is projected at .35 which is lower than national avg. of .45 but higher than Sturbridge 2000 census number of .24. New development indicates this ratio at .42 children per household.
- 3) These are multi-unit developments. It is likely there will be construction of a number of individual homes

Feasibility Study Update for the Burgess Elementary School

Population Data

Figures from the U.S. Census Bureau for the 2000 census show Sturbridge's population at 7837, 62 residents over the 1990 census figure of 7775 or 0.8%. As noted earlier, information from the 1990 and 2000 U.S. Census shows the percentage of Sturbridge's population under 18 years of age shrinking from 27.3% to 25.5% of the total population. (Table IV)

A review of Sturbridge's senior population indicates the number of residents 60 years and older expanded from 1277 in 1990 to 1553 in 2000, an increase of 276 or 21.6%. Seniors comprised 16.4% of the general population in 1990. In 2000 that percentage increased to 19.8%. The proportion of seniors as a percentage of the total population is projected by the Massachusetts Office of Elder Affairs to expand to 25.4% of the total population by 2010. The Profile of General Demographic Characteristics from the U.S. Census 2000 counted 299 households or 9.8% of the total households in Town with householders 65 years of age or older. It can be assumed that within the scope of years covered by this study, a portion of these residents will alter their living arrangements and many who live in single residences will have sold or moved out of their current homes. These homes will normally be older, smaller and somewhat less expensive and well suited to younger families who are more likely to have school age children. At the present time, however, real estate agents report few senior owned homes on the market indicating a willingness of senior home owners to 'stay put' for the foreseeable future.

Information from MISER, the Massachusetts Institute for Social and Economic Research Development, shows a mid-level population projection of 8323 for 2010 or an increase of 6.2%. This is a substantial increase in the rate of population growth from the 1980 – 1990 period that saw only 0.8% of growth. MISER also projects a further increase to 8847 or 6.3% for 2020. (See also low and high projections for the same periods, Table IVa)

These projections reflect an expanding birth rate and increased housing starts that will likely produce an in-migration of new families and families with school age children. This will create an expanding student population in the Sturbridge Public Schools for the foreseeable future.

Feasibility Study Update for the Burgess Elementary School

TABLE IV

STURBRIDGE GENERAL POPULATION

Year	# Residents	Change	% Change	Pop. Over 18 Yrs.	% Pop. Over 18 Yrs.	Pop. Under 18 yrs.	% Pop. Under 18 Yrs.
1990	7775	----	----	5652	72.7%	2123	27.3%
2000	7837	62	0.8%	5841	74.5%	1996	25.5%

Note: Source, U.S. Bureau of Census 1990-2000

STURBRIDGE SENIOR POPULATION

Age 60 & Over

Year	# Seniors	Change	% Change	Senior % of Tot. Pop.
1980	868			
1990	1277	409	47.1%	16.4%
2000	1553	276	21.6%	19.8%
2010 projected	2112	559	36.0%	25.4%
Total	Inc. since 1980	1244	143.3%	

Note: Information supplied by the Massachusetts Executive Office of Elder Affairs

TABLE IVa

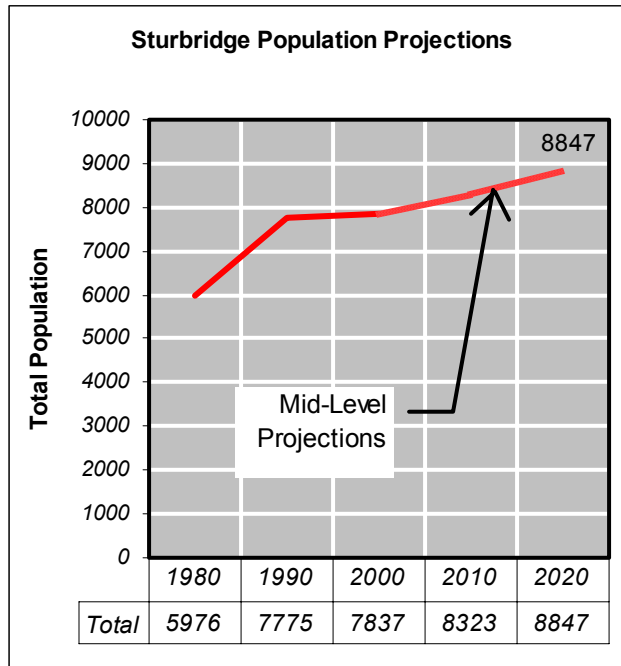
MISER Population Projections-Sturbridge

	Low Projection				Mid Projection				High Projection			
	Ages 0-19	19 plus	Total	% Inc.	Ages 0-19	19 plus	Total	% Inc.	Ages 0-19	19 plus	Total	% Inc.
1980	2055	3921	5976		2055	3921	5976		2055	3921	5976	
1990	2309	5466	7775	30.1%	2309	5466	7775	30.1%	2309	5466	7775	30.1%
2000	2145	5692	7837	0.8%	2145	5692	7837	0.8%	2145	5692	7837	0.8%
2010	1871	6192	8063	2.9%	2014	6309	8323	6.2%	2164	6428	8592	9.6%
2020	1556	6675	8231	2.1%	1874	6978	8847	6.3%	2218	7279	9497	10.5%
Project. Change 2000-2020	-27.5%	17.3%	5.0%		-12.6%	22.6%	12.9%		3.4%	27.9%	21.2%	

Note: MISER is the Massachusetts Institute for Social & Economic Research at the Univ. of Mass. at Amherst

Feasibility Study Update for the Burgess Elementary School

MISER Mid-Level Projection



SOURCE: Mass. Institute for Social and Economic Research (MISER)

Sturbridge Real Estate Market

Sturbridge has traditionally been considered a good location for first time homebuyers because it has been possible to get a “lot for your money” and there was an inventory of lower priced homes. That scenario has changed dramatically and buyers now represent all classes of homeowner. Low mortgage rates and the desirability of the Town have kept the real estate market active although sales of higher priced homes are remaining on the market for longer periods.

A conversation with Lorraine Herbert, broker, owner of RE/MAX Professional Associates of Sturbridge indicated that the market is very active with new homes in the \$400,000 to \$500,000 range selling well. She noted that many buyers are older with no school age children (or children who have completed school) on the one hand and young families with children not yet of school age on the other.

Diana Heagney of Old Village Realty Partners indicated the home market was very active. Her inventory of homes in the \$350,000 - \$400,000 price range is selling briskly with many younger buyers since the Sturbridge area is more affordable for them.

Linda Wadden of Coldwell Banker Real Estate made the point that home resales are not as strong as sales of new homes indicating most residents are staying in their homes and perhaps using equity to add or improve their properties. She also noted that most homes she is selling are being sold to young families with small children who are moving to Sturbridge “from the east”. New homes, starting in the \$350,000 range, offer more of a bargain than what is available closer to the metropolitan Boston area.

Feasibility Study Update for the Burgess Elementary School

Based on information supplied by The Warren Group and Banker & Tradesman we find in 1988 there were 63 home sales, and 2 condo sales in Sturbridge and the median price for a single family home was \$140,000. In 2003 there were 133 sales of single-family homes and 23 condo units. By 2003 the median price for a single-family home had risen to \$240,000 an increase of 71.4%. The median price of single-family home in January 2004 rose to \$267,900. These figures indicate rising property values as well as new buyers purchasing more expensive homes. (Table V)

Table V

Year	Months	1 - Family	Condo
2004	January	\$267,900	\$0
2003	Jan - Dec.	\$240,000	\$205,000
2002	Jan - Dec.	\$199,000	\$194,700
2001	Jan - Sep.	\$172,700	\$172,000
2000	Jan - Dec.	\$153,900	\$130,587
1999	Jan - Dec.	\$140,000	\$115,000
1998	Jan - Dec.	\$126,000	\$110,000
1997	Jan - Dec.	\$118,000	\$123,169
1996	Jan - Dec.	\$108,250	\$124,900
1995	Jan - Dec.	\$117,500	\$109,900
1994	Jan - Dec.	\$122,750	\$114,900
1993	Jan - Dec.	\$116,000	\$110,000
1992	Jan - Dec.	\$121,500	\$99,900
1991	Jan - Dec.	\$118,000	\$0
1990	Jan - Dec.	\$127,500	\$119,500
1989	Jan - Dec.	\$135,000	\$133,900
1988	Jan - Dec.	\$140,000	\$0

Note: Data supplied by The Warren Group; Boston, Massachusetts

Sturbridge offers unique attributes for its residents. Sturbridge's proximity to metropolitan areas such as Worcester, Springfield, Boston, Hartford and Providence and access to major highways such as state routes 9, 20 and interstate routes 84, 90, 91 and 495 encourage residential and commercial development. Large areas of Sturbridge remain to be developed and there is a rural character to the Town. The Town retains the aura of a small historic New England community that is appealing to both families with school age children and older residents seeking a 'gentler' pace of life. This is exemplified by historic Old Sturbridge Village, a re-creation of a seventeenth century New England Village. A history of small industry has gradually faded away from Sturbridge, Southbridge and the surrounding area, leaving Sturbridge more dependent on tax revenues from homes and new home development.

The attractiveness of the Town is reflected in new home construction and rising property values. It is reasonable to expect this trend to continue into the foreseeable future in line with low interest rates and the expansion or contraction of the economy

Feasibility Study Update for the Burgess Elementary School

Analysis of Data

Formulating long-range enrollment projections requires the development of a set of assumptions around which we build a statistical framework. We have developed a list of assumptions on birth rates, housing development, population, and other factors we believe are essential to an accurate analysis.

Sturbridge Assumptions

- 1) Birth rates have been projected based upon previous history and projected development. From 2004 forward we used an average birth rate based on the average of each of the previous five years.
- 2) Historic student enrollments from FY 1990 through FY2004 as reported to the Massachusetts Dept .of Education on October 1 of each school year have been used as the basis for the cohort survival method of school population projection.
- 3) From 2001 through June 1, 2004 we use the actual number of permits issued for new dwellings. Two projections are developed from this data. The first has future housing development projected at 80 housing units annually, which is the average of permits issued since 2001 to date and permits projected to be issued through 2008. The second projection uses 50 new dwelling permits annually. This is the average of housing permits issued by the Town from 1990 to 2004 and incorporates housing data factored into the cohort survival projection.
- 4) Information supplied by the Planning Department projects current and future development of 503 housing units through 2008. These have been factored into our projections.
- 4) We assume, based upon census data and population projections, the population of the Town will expand at a rate higher than during the 1990 – 2000 period.
- 5) We are assuming a population of .35 children per housing unit constructed in Sturbridge. (See rationale in section, “Housing and New Development”) This figure yields 35 children for every 100 homes; 28 students for 80 households and 17.5 (18) for 50 households.

Using only the cohort survival analysis of historical data, based upon known birth rates, enrollments, in-out migration, grade retention and the projected survival of children from grade to grade, plus the demographic information derived from the sources noted earlier, it appears **the total number of students in the system in 2014 will increase by 105.**

We are estimating that from a PK - 5 enrollment of 830 in 2004 to a projected enrollment of 935 in 2014, **the number of students in the Sturbridge Schools will increase by 12.7% based solely upon cohort survival.** For comparison, the enrollment in 1990 was 832, rose to a peak of 937 in 1995; fell to a low of 796 in 2000 before climbing to its present level of 830. (Table VI) To put it into another context, in the 15 years between 1990 and 2004, school enrollment has remained relatively flat.

Feasibility Study Update for the Burgess Elementary School

When new development and in-migration are factored into the formula, however, there is a substantial cumulative increase in enrollments. We have developed two models based upon what we deem to be high and low estimates of future growth. Projecting an average of **80 new housing units per year and using a factor of .35 students per household**, 28 additional students per year will be added to school enrollment within the time period covered within this study. **This projection indicates that by 2014 enrollment will expand from its current 830 students to 1218, an increase of 388 students or 46.7%** (Table VIIa). A projection of **50 additional housing units per year and using the same factor of .35 students per household**, yields 18 additional students per year to school enrollment within the time period covered within this study. **Using this projection we predict that by 2014 enrollment will expand from its current 830 students to 1117, an increase of 287 students or 34.6%** (Table VIIb).

When the number of births to Town residents and the number of children registering for Kindergarten five years later is compared, there is a consistent pattern of a higher number of children registering for kindergarten than were born to residents of Sturbridge. This is true for each year with the exception of 2007 when we project a slight decline. The lowest actual percentage was 84.7% (2003) and the highest 126.5% (2001). This indicates a pattern of children born in Sturbridge enrolling in kindergarten and continuing through the Sturbridge Schools as well as in-migration of children in the primary grades. (Table VIII)

Table VI

Year	STURBRIDGE ENROLLMENT PROJECTIONS								Cohort Survival Only	
	PreK	Kind	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Total	Annual % Chng
	ACTUAL									
1990	0	122	142	126	105	111	118	108	832	
1991	25	126	129	126	125	102	109	124	866	4.09%
1992	40	135	120	131	121	117	102	108	874	0.92%
1993	40	128	129	120	131	126	121	102	897	2.63%
1994	56	116	124	129	114	128	118	120	905	0.89%
1995	58	124	131	130	130	117	126	121	937	3.54%
1996	44	122	121	127	135	126	121	128	924	-1.39%
1997	39	98	119	114	124	135	124	109	862	-6.71%
1998	44	100	104	118	114	123	137	126	866	0.46%
1999	44	99	109	100	114	114	116	131	827	-4.50%
2000	40	90	108	112	105	117	113	111	796	-3.75%
2001	39	105	119	119	117	105	125	116	845	6.16%
2002	49	90	107	113	122	118	114	135	848	0.36%
2003	53	83	103	109	115	129	122	117	831	-2.00%
2004	51	105	89	102	110	116	129	128	830	-0.12%
	PROJECTED									
2005	51	102	113	88	104	113	121	136	828	-0.24%
2006	41	102	110	111	89	107	118	127	805	-2.78%
2007	55	82	110	108	113	91	111	124	794	-1.37%
2008	69	110	88	108	110	116	95	117	813	2.39%
2009	53	138	119	87	110	113	121	100	841	3.44%
2010	54	106	149	117	88	113	118	127	872	3.69%
2011	55	108	114	147	119	90	118	124	875	0.34%
2012	57	110	116	112	149	122	94	124	884	1.03%
2013	57	114	119	114	114	153	127	99	897	1.47%
2014	55	114	123	117	116	117	159	134	935	4.24%

Feasibility Study Update for the Burgess Elementary School

Table VIIA

Projected Sturbridge Student Enrollment With New Housing Development									80 housing units @.35=28 added students/yr.	
Year	PreK	Kind	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Total	% Incr. Yr. to Yr.
2005	53	105	117	91	108	117	125	141	856	
2006	44	109	118	119	95	114	126	136	860	0.47%
2007	61	91	121	119	125	101	123	137	877	1.98%
2008	79	125	100	123	125	132	108	133	925	5.47%
2009	62	161	139	101	128	132	141	117	981	6.05%
2010	64	127	178	140	105	135	141	152	1041	6.12%
2011	67	132	140	180	146	110	145	152	1072	2.98%
2012	72	138	146	141	187	153	118	156	1109	3.45%
2013	73	146	153	146	146	196	163	127	1151	3.79%
2014	72	149	160	152	151	152	207	175	1218	5.82%

Notes: 1) Assumes an additional 80 units of housing each year with 0.35 students per household yielding 28 additional students each year
 2) Survival factor +/- applied to each successive year's enrollment

Table VIIB

Projected Sturbridge Student Enrollment With New Housing Development									50 housing units @.35 =18 added students/yr.	
Year	PreK	Kind	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Total	Annual % Chng
2005	52	104	115	90	106	115	124	139	846	1.89%
2006	43	106	115	116	93	112	123	133	841	-0.65%
2007	59	87	117	115	121	97	118	132	847	0.80%
2008	75	120	96	118	120	126	103	127	885	4.42%
2009	59	153	132	96	122	125	134	111	931	5.27%
2010	61	119	168	132	99	127	133	143	981	5.33%
2011	63	124	131	168	136	103	135	142	1002	2.15%
2012	66	128	135	130	173	142	109	144	1029	2.71%
2013	67	135	141	135	135	181	150	117	1060	3.04%
2014	66	136	147	140	139	140	190	160	1117	5.35%

Notes: 1) Assumes an additional 50 units of housing each year with 0.35 students per household yielding 18 additional students each year
 2) Survival factor +/- applied to each successive year's enrollment

Feasibility Study Update for the Burgess Elementary School

TABLE VIII

RELATIONSHIP OF CHILDREN BORN IN STURBRIDGE TO KINDERGARTEN ENROLLMENTS

Year (calendar)	Births (actual)	Proj. Kind. Entrance Year	Kind. Students Enrolled & Proj.	Diff. (+/-)	%Entering Kind.	Kind. Students Projected	Diff. (+/-)	%Entering Kind.
1990	110	1995	124	14	112.7%			
1991	98	1996	122	24	124.5%			
1992	102	1997	98	-4	96.1%			
1993	91	1998	100	9	109.9%			
1994	85	1999	99	14	116.5%			
1995	87	2000	90	3	103.4%			
1996	83	2001	105	22	126.5%			
1997	86	2002	90	4	104.7%			
1998	98	2003	83	-15	84.7%			
1999	91	2004	105	14	115.4%			
			80 Housing Units/Yr.			50 Housing Units/Yr.		
2000	91	2005	105 Proj	14	115.4%	104	13	114.3%
2001	74	2006	109 Proj	35	147.3%	106	32	143.2%
2002	98	2007	91 Proj	-7	92.9%	87	-11	88.8%
2003	124	2008	125 Proj	1	100.8%	120	-4	96.8%
2004	Proj. 96	2009	161 Proj	65	167.7%	153	57	159.4%
2005	Proj. 97	2010	127 Proj	30	130.9%	119	22	122.7%
2006	Proj. 98	2011	132 Proj	34	134.7%	124	26	126.5%
2007	Proj. 102	2012	138 Proj	36	135.3%	128	26	125.5%
2008	Proj. 103	2013	146 Proj	43	141.7%	135	32	131.1%
2009	Proj. 99	2014	149 Proj	50	150.5%	136	37	137.4%

Note: Students enrolled in kindergarten through 2004 include children from in-migration, prior development, and births to Town residents.

A further comparison of births to first grade enrollments six years later tends to be more indicative of actual enrollments. (Table IX) Our analysis shows first grade enrollments, with only one exception (2004), consistently exceed the number of births to residents. This represents a pattern of substantial in-migration of students from outside Sturbridge. We anticipate this trend will continue with few exceptions as new housing development continues.

Feasibility Study Update for the Burgess Elementary School

Table IX

RELATIONSHIP OF CHILDREN BORN IN STURBRIDGE TO GRADE 1 ENROLLMENTS

Year (calendar)	Births (actual)	Proj. Grade 1 Entrance Year	Grade 1 Students Enrolled & Proj.	Diff. (+/-)	%Entering Grade 1	Grade 1 Students Projected	Diff. (+/-)	%Entering Grade 1
1990	110	1996	121	11	110.0%			
1991	98	1997	119	21	121.4%			
1992	102	1998	104	2	102.0%			
1993	91	1999	109	18	119.8%			
1994	85	2000	108	23	127.1%			
1995	87	2001	119	32	136.8%			
1996	83	2002	107	24	128.9%			
1997	86	2003	103	17	119.8%			
1998	98	2004	89	-9	90.8%			
80 Housing Units/Yr								
1999	91	2005	117	Proj 26	128.6%	115	24	126.4%
2000	91	2006	118	Proj 27	129.7%	115	24	126.4%
2001	74	2007	121	Proj 47	163.5%	117	43	158.1%
2002	98	2008	100	Proj 2	102.0%	96	-2	98.0%
2003	124	2009	139	Proj 15	112.1%	132	8	106.5%
2004	Proj 96	2010	178	Proj 82	185.4%	168	72	175.0%
2005	Proj 97	2011	140	Proj 43	144.3%	131	34	135.1%
2006	Proj 98	2012	146	Proj 48	149.0%	135	37	137.8%
2007	Proj 102	2013	153	Proj 51	150.0%	141	39	138.2%
2008	Proj 103	2014	160	Proj 57	155.3%	147	44	142.7%

Note: Students enrolled in grade 1 through 2004 include children from in-migration, prior development and births to Town residents.

Various scenarios including a projection for 50 housing units @.24 students per household are provided in Table X. Since we believe this is not a true representation of Sturbridge's future we have not put this forward as a viable projection. Chart I has plotted the various scenarios to visually display the differences between each of the projections.

Table X

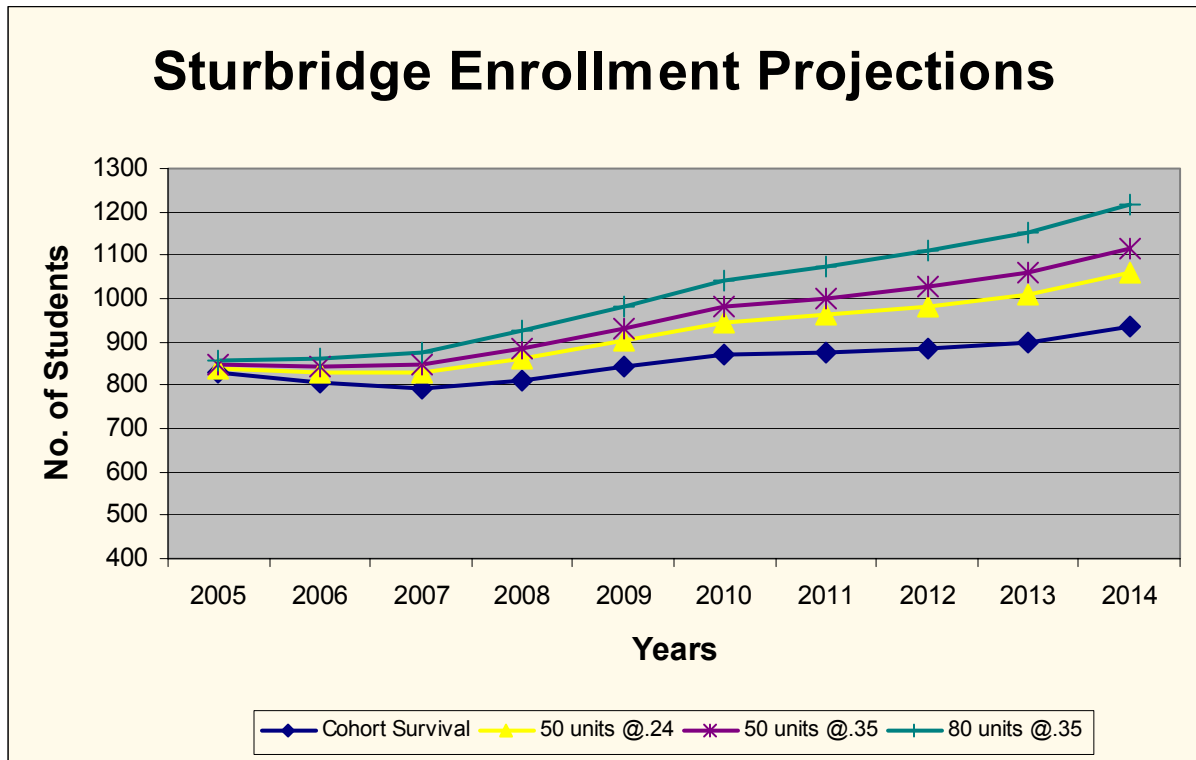
Sturbridge Enrollment Projections

Comparison Based upon Various Scenarios

Years	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Cohort Survival	828	805	794	813	841	872	875	884	897	935
50 units @.24	840	829	829	861	902	945	961	982	1007	1058
50 units @.35	846	841	847	885	931	981	1002	1029	1060	1117
80 units @.35	856	860	877	925	981	1041	1072	1109	1151	1218

Feasibility Study Update for the Burgess Elementary School

Chart I



Summary

Our projections, based upon data from a variety of sources, are open to interpretation, as are all such projections. We cannot predict the birth rate of future residents with complete accuracy although births to Town residents can be expected to show a continuing upward trend as the average age of residents falls. With the historic tendency of students born in the community to enroll in the public schools, the continuing development of more land for housing, an active real estate market and anticipated in-migration of students from outside the Town, school enrollments can be expected to expand.

This projection is intended to put into perspective the space needs of the Sturbridge Public Schools based upon enrollments, birth rates, in/out migration, housing development and other relevant demographic data. In a projection of this type there are always unforeseen factors that cannot be anticipated. It is based upon the most reliable data available at the time of the study. If some of the factors on which our assumptions are based change then of course the number of anticipated students will change. Therefore, it is recommended this document and the enrollments forecast for specific years should be considered a guideline rather than a firm forecast and that subsequent annual or bi-annual follow-ups are made to track the accuracy of these numbers.

Feasibility Study Update for the Burgess Elementary School

In addition to the ability of a school to accommodate its student population other questions must be answered such as the condition of existing space, whether such space meets state standards and how space requirements will impact the quality of education and the ability of the school system to support a diversified educational program. In our estimation Sturbridge's Burgess Elementary School will not be sufficient to house the anticipated influx of new students being projected. It is apparent that either a major addition to the current facility or an additional school building will be needed.

The School Department is acting wisely as it examines options to accommodate its growing student population and its existing facilities. To do less will ultimately limit the ability of the Sturbridge School Dept. to maintain the high quality of its educational program.

Appendix E

School Building Authority Guidelines

Feasibility Study Update for the Burgess Elementary School

Appendix E School Building Authority Guidelines

On July 26, 2004, the Massachusetts School Building Assistance program, which had enacted a moratorium on new school project funding applications, was replaced with a new agency. The legislation was enacted by *Chapter 208 of the Acts of 2004, an Act Relative to School Building Assistance*. This act makes significant changes to Chapter 70B of the General Laws, 2002 Official Edition, of the Commonwealth of Massachusetts.

Confusingly, this new agency shares the same initials as the old agency—the Massachusetts School Building Authority, known informally as the SBA.

The “new” SBA is charged with clearing the waiting list for the funding of some 450 school construction projects. No new applications for the school building assistance program will be accepted until after July 1, 2007. New regulations for school design will be published by July 1, 2006.

According to Section 53 of Act 208, eligible applicants may undertake, at some risk, design and construction of school projects based on old SBA guidelines (those in place prior to June 30, 2004). If a project commences construction between July 1, 2004, and June 30, 2006, the SBA will consider reimbursement based on regulations in effect on June 30, 2004. If a project commences construction between July 1, 2006, and June 30, 2007, the SBA will consider reimbursement based on regulations to be published on July 1, 2006.

Therefore, the Town of Sturbridge has the option to pursue design and construction prior to July 1, 2007, when new applications for reimbursement will be accepted at the new SBA. However, the start date of construction is critical in determining which regulations to apply to the project; prior to July 1, 2006, the old regulations will govern the design, and after July 1, 2006, the forthcoming regulations will govern the design.

Appendix F

Renovation List

Feasibility Study Update for the Burgess Elementary School

Appendix F Renovation List

Part of the initial charge of the Feasibility Study was to identify a list of needed renovations and repairs to be accomplished in a systematic and prioritized process. Although it is recognized that these renovations and repairs do not begin to address the long-term issues identified in this document, they are important for the operation of the building over the next few years. Because significant costs are associated with these items, it is recommended that they be undertaken only as needed, since the costs will not be recoverable in a new building project.

1. ADA improvements to parking, establish accessible route, at least one toilet room made compliant—this should be undertaken this year
2. Hazardous materials removal, especially underground storage tanks
3. Patch roof—replace roof if new construction is 5 or more years away
4. Expand electrical and data systems
5. Renovate south kitchen and south cafeteria for new uses
6. Site improvements: increase parking, improve bus loop, add / replace play areas
7. Replace thermostats
8. Replace HVAC in '72 portion
9. Replace boilers in '50-'68 portion
10. Replace door hardware
11. Replace and add to casework for storage needs
12. Replace plumbing fixtures with low water usage models
13. Replace windows if new construction is 5 or more years away

Appendix G
2004
Design Options

Appendix H

2007 Preliminary Design Options