3.1.6 Preliminary Evaluation of Alternatives

1. Analysis of School District Student School Assignment Practices and Available Space in other Schools in the District

The Wakefield Public School District consists of the following:

- Doyle Early Childhood Center, 18 Paul Avenue, Wakefield
  Pre-Kindergarten, Enrollment 102
- Dolbeare Elementary School, 340 Lowell Street, Wakefield
  Grade K-4, Enrollment 449
- Greenwood Elementary School, 1030 Main Street, Wakefield
  Grade K-4 Enrollment 221
- Walton Elementary School, 18 Davidson Road, Wakefield
  Grade 1-4 Enrollment 218
- Woodville Elementary School, 30 Farm Street, Wakefield
  Grade K-4, Enrollment 425
- P.O.S.T (Purposeful Opportunities for Successful Transitions) Academy, 5 Oak Street, Wakefield
  Enrollment 10
- Galvin Middle School, 525 Main Street, Wakefield
  Grade 5-8, Enrollment 1,059
- Wakefield Memorial High School, 60 Farm Street, Wakefield
  Grade 9-12, Enrollment 841

All schools are currently at or beyond capacity.

2. Tuition Agreement with Adjacent School Districts

Wakefield Public Schools currently has tuition agreements with SEEM, Reading Public and Stoneham Public Schools for P.O.S.T.

3. Rental or Acquisition of Existing Buildings

There is no property of sufficient size within the Town of Wakefield that is available for acquisition or lease to accommodate students.

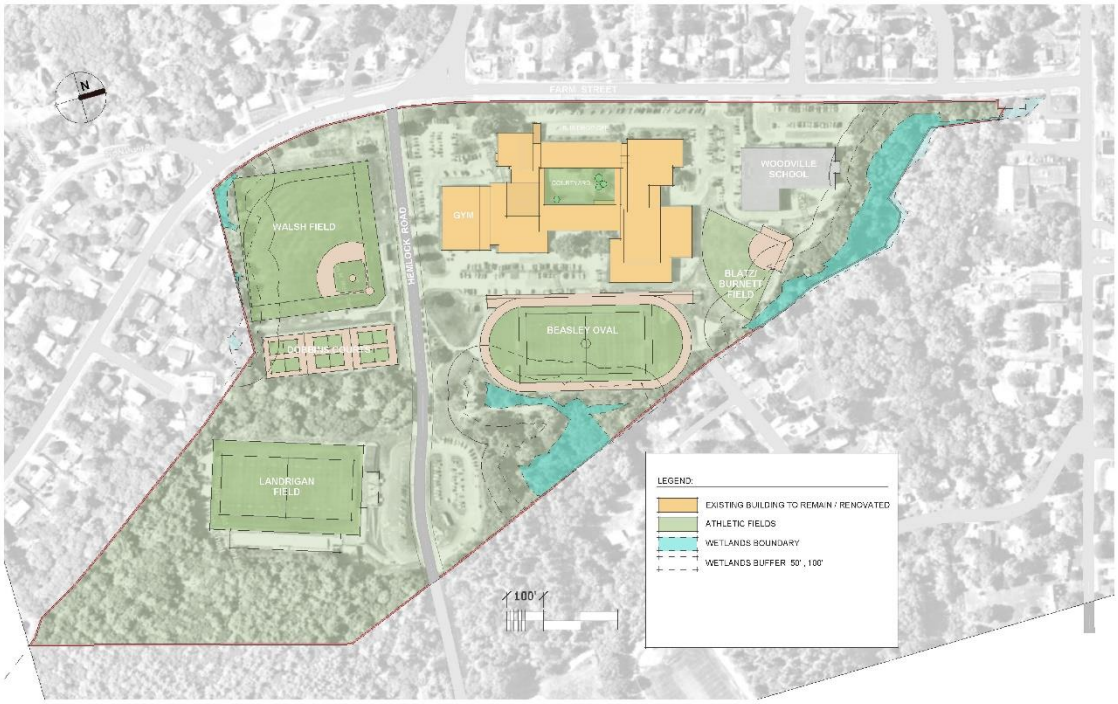
Construction Alternatives Including Cost Estimate and Schedules

Multiple construction alternatives for a grade 9-12 high school with enrollment of 1,000 students were developed, including a base code upgrade option, four renovation and addition options and six entirely new construction alternatives. The alternatives explore opportunities and constraints of building on the existing Wakefield Memorial High School site and two adjacent athletic field sites. The following sections provide a description of each construction alternative as well as an evaluation of each alternative. A cost estimate, provided by PM&C, is included in the Appendix of this report.

4. Code Upgrade (No-New Build)

Alternative 1: Code Upgrade and Repair

The base repair and code upgrade alternative with no modification of existing spaces or their function meets neither the educational program nor the projected growth in student population. The existing three-story high school is approximately 250,430 square feet.



Description

The code upgrade and repair alternative requires an assessment of the impact and cost of addressing the following deficiencies, without a major building project:

- Accessibility Code Limitations
- Energy Code Compliance
- Life Safety Code Compliance
- Kitchen and Cafeteria Code Compliance
- Building Systems Code Compliance
- Hazardous Materials
- Program Delivery Impediments

Accessibility Code Limitations

In general, the following items will be addressed in this alternative:

- Lack of handrails at ramps and stairs
- Lack of ramps at some exterior doors
- Insufficient push/pull clearances at some doors
- Lack of ADA Door operators at all entry doors
- Inaccessible seating locations in the theater, science lab lecture hall and music spaces where tiered floor seating exists
- Non-compliant drinking fountains
- Non-compliant toilet fixtures and sinks
- Insufficient grab bars at toilets
- Exposed piping below sinks (neither apron nor pipe protection)
- Lack of 5'-0" clear turning circle at some toilet rooms
- Non-accessible sink faucets
  Non-compliant height at some urinals

Energy Code Compliance

As noted in the Architecture portion of this section, all exterior windows and doors will be replaced with energy efficient units, exterior wall construction will be insulated on the interior face, including the addition of new interior finishes and air/vapor barriers to meet energy code requirements and insulation will be added to the roof when it is replaced. These upgrades will increase the overall thermal performance of the exterior envelope reducing the energy demand for heating and cooling.

Life Safety Code Compliance

Stair guardrails do meet minimum opening size requirements, nor required heights nor incorporate a separate handrail in many locations. Infill panels and vertical extensions will be provided at all stair guardrails to make them code compliant, and handrails will be added as required to meet code.

Site

Site work in this option is focused on meeting current accessibility Codes. An accessible ramp with compliant landing size at main entry doors is required. Existing non-compliant ramps, guardrails and handrails would be replaced. Accessible routes from the accessible parking spaces to the main entrance would also be provided.

Architectural

On the exterior of the building, localized repointing and general cleaning of exterior masonry brick will occur. Replacement of all exterior windows with energy efficient units. Replacement of all exterior HM doors as well as the overhead wooden door. Complete replacement of the roofing, providing an energy code-compliant thickness of insulation as well as the complete replacement of all gutters and downspouts.

Any non-code compliant door hardware will be replaced with compliant hardware. Any non-code compliant door clearances will be addressed. All interior glazing that is potentially subject to impact will be replaced with laminated or tempered glass. Interior finishes such as flooring, wall tiles, and acoustic ceiling tiles will be replaced where damaged or deteriorated.

As noted in the Accessibility Code Limitations portion of this section, several spaces located throughout the school incorporate tiered seating areas which render them inaccessible. Cut-outs will be added in

the front row of tiers to create inclusive seating positions down low, and ramps and elevated seating positions will be added as well. Added accessibility elements in these spaces will reduce the seating capacity slightly. All finishes in these spaces will be renovated to accommodate this alteration. In general, repairs to or replacement of finishes will occur wherever system upgrades are required.

Structural

The base repair and code upgrade should have limited structural impact. Under this alternative, these repairs will be evaluated and areas that need additional repairs will be identified. At a minimum, it will be recommended that the existing conditions continue to be monitored periodically in order to identify any changes to the integrity of the existing conditions.

HVAC

All new HVAC systems will be provided in the renovated portions of the building in accordance with all applicable Massachusetts Codes and ASHRAE Standards.

Heating and cooling will be provided by the air-source Variable Refrigerant Flow (VRF) heat exchange energy recovery systems that will serve ducted indoor heat pumps (ACU) installed above ceilings and DX heat pump cooling/heating coils in the Direct Outdoor Air Systems (DOAS) and Air Handling Units (AHU).

The Air-Cooled Condensing units (ACCU) serving indoor VRF heat pumps will be modular style, roof or ground mounted.

DOAS units will provide ventilation to the classrooms and AHUs will support large, single-zone spaces. Both unit types (DOAS and AHU) will be provided with DX heat pump heating/cooling coils. The dedicated VRF air cooled condensing units (ACCU) will serve the DOAS and AHU DX heat pump cooling/heating coils. The ACCUs serving DOASs, and AHUs will be modular style, roof or ground mounted.

Air-source VRF heat recovery system configured with modular outdoor air-cooled condensing units, branch distribution control units and distributed indoor heat pump units will provide heating and cooling.

Outdoor air-source condensing units (ACCU) will be configured with compressors with inverter control technology and will support simultaneous heating and cooling of the zones served.

Branch Distribution Control Units will provide multi-zone distribution and control of refrigerant from the common outdoor ACCUs to the indoor heat pump units (ACU) to provide simultaneous heating and cooling amongst the zones served. Refrigerant piping and control wiring will be provided between the ACCUs and Branch Distribution Control Units and between the Branch Distribution Control Units and indoor heat pumps (ACU). Condensate drain piping will be provided for ACUs and Branch Distribution Control Units.

Variable Air Volume (VAV) terminals will be provided before each heat pump unit (ACU).

All auxiliary heating terminals will be electric.

New building management system (BMS) will be provided to support the proposed HVAC systems. The BMS will be integrated into the Town's networked system for energy management and monitoring.

Plumbing

Storm drainage piping, and kitchen waste piping are still operational but appear to be original and in fair to poor condition. Some of the domestic water piping has been replaced, yet most of the piping appears

original to the building and should be replaced along with all of the plumbing fixtures throughout the school to eliminate possible sources of lead in drinking water. New reduced pressure backflow preventers shall be installed at each of the water service entrances to protect the water supply. Janitor sinks shall be equipped with backflow prevention devices to protect the building supply from backflow from janitor sinks (per the DEP regulation 310 CMR 22). All domestic water piping (hot, cold, hot water recirculation piping) shall be insulated in accordance with the Energy Code.

The two existing domestic hot water heaters will be reused under this option. New thermostatic mixing valves will be installed at each hot water heater main supply near the water heaters.

The roof drains all seem to be relatively in good to fair condition. The drains consist of cast metal dome tops, flashing clamps/ gravel stops and cast-iron bodies. Most of the roof drains and piping will be reused. Underground storm piping will be video inspected for its condition and will be addressed accordingly.

The existing underground piping will be video inspected for its condition and, if functional, most of it will be reused. The existing sanitary waste piping will be modified to accommodate the repair work. Vacuum breakers for kitchen equipment will be provided.

Some modifications to the existing gas piping may be required to accommodate any updated HVAC gas-fired equipment and kitchen equipment. A number of plumbing fixtures will be added to accommodate the population of students and shall be in accordance with 248 CMR Paragraph 10.10, Table 1.

Replacement water closets and urinals will be commercial vitreous china, wall hung, water saving type and ADA/MAAB compliant where required. Lavatories will be wall mounted china with concealed arm fixture carriers. Each floor will include a janitor's closet with a corner mop service basin. Toilet cores on each floor will include floor drains in the toilet rooms and will include alcove-recessed electric water coolers, in a high-low handicapped accessible configuration to meet MAAB requirements. Emergency shower/eyewash will be provided in mechanical/boiler rooms. Deck mounted emergency eyewash will be provided in art rooms and exam room/nurse's suite.

Fire Protection

If the existing building is renovated to any substantial degree, to meet current Code regulations, the existing building fire protection sprinkler system needs to be upgraded per latest Massachusetts Building Code 780 CMR Chapter 9 and per NFPA-13 standard. Existing sprinkler system shall be replaced with a new code compliant sprinkler system to meet new architectural layout. Floor control valve assemblies shall be provided at each floor to limit the sprinkler area controlled by each valve to less than 52,000 s.f. as required by NFPA 13-2013. Control valve assemblies shall consist of a supervised shutoff valve, check valve, flow switch and test connection with drain. Unheated area will require a dry system.

Latest hydrant flow test (performed/conducted no more than 12 months prior to working plan) is required to determine or verify if a fire pump is required. If the incoming pressure cannot accommodate the required pressure to activate the most remote sprinkler demand, then a fire pump is required. A. Horizontal double check valve assembly will be provided at the fire water service entrance and the wet alarm check valve shall be replaced with new. Fire pump and all related equipment shall be located in a dedicated room per NFPA 20 and enclosed with not less than two hours fire resistive construction. Access to the fire pump room shall be directly from an exterior door at grade or through fire resistance rated enclosures. Any egress stairs will have standpipe system with 2-1/2" hose valve. Additionally, standpipes will be located so that no part of the building is more than 200 feet from a standpipe valve.

Sprinkler heads in areas with finished and suspended ceilings will have concealed pendant type and in areas with no suspended ceilings will be upright sprinkler heads. All sprinklers will be quick response heads. Sprinkler heads in mechanical rooms and the Gymnasium will be provided with Wire guards.

The administrative office spaces, Cafeteria, Gym, Auditorium, Corridors, rest rooms and general classrooms will be hydraulically designed for Light Hazard occupancy requirements with a design criteria of 0.10 gpm/sf over 1,500 sf with 100 gpm hose allowance. Maximum sprinkler spacing will be 225sf.

The physics/chemistry/biology labs, Kitchen area and the mechanical and electrical rooms will be hydraulically designed for Ordinary Hazard Group I occupancy requirements with a design criteria of 0.15 gpm/sf over 1,500sf with 250gpm hose allowance. Maximum sprinkler spacing will be 130sf.

Stage will be hydraulically designed for Ordinary Hazard Group II occupancy requirements with a design criteria of 0.2 gpm/sf over 1,500sf with 250gpm hose allowance. Maximum sprinkler spacing will be 130sf.

Elevator shafts and elevator machine rooms will not be sprinkler protected. Roof manifolds would be provided at each two story or greater roof area.

The fire protection piping will be schedule 40 piping with threaded fittings for any piping sized 1½" and less. For sizes over 2", schedule 10 piping with roll grooved fittings and couplings will be used. All valves controlling the flow of water will be equipped with supervisory devices that report to the Fire Alarm system. Kitchen hood will be protected with a dry agent "Ansul R-102" packaged hood suppression system.

Electrical

Power Distribution

There are two electrical services to the existing building. The original 1960 building has a 1600amp, 120/208V, 3Ø, 4 wire switchboard and the 1972 addition has 4000amp, 120/208V, 3Ø, 4 wire switchboard. The service equipment is over 50 years old, and it is past its life expectancy. The existing service and power distribution equipment should be removed and replaced with a new. The new distribution system will consist of a 3000A, 277/480V, 3ϕ, 4w switchboard with new underground secondary service conductors extended to a new utility transformer. New electrical branch circuit panelboards will be provided in dedicated electrical rooms. Lighting loads, the elevator, large mechanical equipment and large kitchen electrical loads will be connected to 277/480V panelboards, and all other loads will be connected to 120/208V panelboards.

Life Safety/Emergency System

There are two auxiliary generator systems which are original to the construction. The existing generator systems are in poor condition and past its life expectancy. Furthermore, the existing systems do not meet current code requirements for life safety distribution. The existing generator system should be replaced with a new generator systems. The new generator system will consist of a 350kW 480/277-volt generator, automatic transfer switch and distribution equipment to serve Life Safety and Standby loads. Dedicated 2hr emergency electrical rooms will be provided for the emergency lighting panelboards and automatic transfer switch. The optional standby panel and ATS can be located in the main electrical room. An exterior mounted manual transfer switch will be provided to bypass permanent generator and allow connection of a temporary generator. The generator will have a radiator mounted load bank to ensure the generator is exercised with a load at least 30% of rating.

It is estimated that the following items will be connected to the generator system.

- Boilers and pumps for heating system to freeze protect the building.
- Emergency lighting.
- IT rooms (power & A/C) including network, door access, intrusion detection, CCTV, PA, telephones.
- Fire alarm.
- Kitchen freezers/coolers.
- Sewage ejector pumps.

Lighting

Lighting throughout the building is predominantly linear fluorescent type and most fixtures have been retrofitted with T8/electronic ballast lamp technologies. The systems are functional but do not meet current standards for lighting quality. Furthermore, lighting controls do not meet current energy code requirements. All existing lighting and lighting controls should be replaced. New lighting systems will consist of energy efficient LED fixtures using the suggested below approaches:

Location	Illumination Level	Notes
Corridors	5-10 FC	1'x4' or 2'x 2' recessed "indirect" style LED fixtures.
Private offices, small conference rooms	35-45 FC	Suspended direct/indirect LED fixtures.
Gymnasium	35-45 FC	High bay linear LED fixtures.
Auditorium	10-20FC	Recessed downlighting or suspended cylinders between clouds connected to a theatrical dimming system
Auditorium Performance	N/A	Theatrical lighting and border lights connected to a theatrical dimming system
Classrooms	30-35 FC	Suspended direct/indirect LED fixtures.
Bathrooms	10-20 FC	LED Slot fixtures over mirror supplemented with recessed LED downlights
Mechanical and electrical rooms	30+ FC	LED strips, pendant or surface.
Stairway	10-15 FC	Wall-mounted direct/indirect LED fixtures, high impact polycarb lens.
Site Lighting	1 FC	Pole mounted LED area fixture throughout parking area and driveway access road.

All lighting will be automatically controlled using a combination of ceiling occupancy sensors in classrooms, offices and smaller spaces and network programmable relays for larger spaces such as

corridors and gymnasium. Perimeter spaces will have closed loop light level sensors 12' from window for 2 zone dimming control of primary and secondary daylight zones. Selected fixtures in egress paths will be connected to emergency panels and new exit signs, connected to emergency circuits, will be provide throughout.

Fire Alarm

The original fire alarm systems for the 1960 and 1972 buildings consisted of hardwired, zoned fire alarm systems. The existing systems is beyond its useful life and does not meet current code requirements. The existing fire alarm system should be replaced with a new fire alarm and voice evacuation system. The new system will consist of an addressable voice evacuation fire alarm control panel, automatic smoke and heat detectors, manual pull stations, audible and visible alarm signals, elevator recall, connections to automatic fire suppression systems, and connection to the Fire Department. The new fire alarm system will report to the Fire Department through a radio master box with a remote 5dB antenna located on the roof. The fire alarm control panel will be located in the main electric room with an LCD remote annunciator located at the Main entrance where the fire department responds to an alarm condition. Audio speakers and visual high intensity strobes alarm devices will be installed per NFPA-72. Since the building will be covered by a sprinkler system, fully automatic detection is not required. Smoke detectors will be provided only where required by Code. Fire suppression systems shall be tied to the fire alarm control panel. Interface & control modules will be provided for elevator recall, air handling unit shut down, gas shut off, door hold release, door hardware bypass and any other systems requiring control under an alarm condition. The building will be provided with a Bi-Directional Amplifier (BDA) system for emergency responders. The BDA system will have capabilities to boost fire department and police department radio communications within the building.

Lightning Protection System

A lightning protection system is not required by code. A system can be installed if desired by the town.

Telecommunications and Security

The existing telecommunications copper and fiber optic cable infrastructure will be replaced to support 21st Century data and voice transmission. Existing telecommunications spaces in classrooms and storage spaces will be replaced with secure and climate-controlled cabinets to better protect and maintain network electronic equipment. The existing MDF will be replaced with new equipment cabinets, patch panels and overhead cable management components. The MDF will be fitted with a new cooling system and lighting.

An office/staging room equipped with desks and workbenches has been requested to support IT staff operations and equipment maintenance.

The existing Public Address and Clock Systems will be replaced. Classrooms and other learning spaces will be equipped with two-way talkback speakers. Corridors and larger spaces will be equipped with one-way speakers. Clocks will be wirelessly controlled. Further investigation will determine whether clocks will be powered by battery or electrical receptacles at each location.

Classroom technology infrastructure will be upgraded to provide new data and voice communications as well as audio visual raceways to enable signal transmissions to electronic displays (projectors or wall mounted TVs).

The existing wireless access points will be evaluated for extent of coverage throughout the facility. More devices will be considered to further support 21st Century Wi-Fi needs.

The Existing CCTV cameras will be evaluated for location, coverage and potential upgrades or additional devices to provide adequate surveillance of public spaces and locations where students congregate. Access Control (card readers and video intercom stations) will be added to better secure entrances and spaces within the building such as elevators and where sensitive equipment and documents are stored.

Audio Visual equipment in the cafeteria, athletic facilities and black box spaces will be upgraded to provide a rich sound experience in each space and high-resolution video projection in the cafeteria and black box space.

Hazardous Materials

As expected for a building of this age, there are significant hazardous materials present, despite prior abatement activities that have occurred over the years. For a detailed report on the materials to be abated, see Section 3.1.4.10.

Capacity Constraints

The design capacity of 1,000 students noted in the MSBA Enrollment Projection, and the corresponding educational space needs cannot be adequately provided by a no-build option. No work related to increasing the capacity of the facility is included in the scope of this option.

Program Delivery Impediments

A 1960's to 1970's educational facility, the Wakefield Memorial High School exhibits many features that no longer meet the pedagogical requirements of a modern high school. Many classrooms are significantly undersized, some spaces including the media center are without access to windows, and many modifications over the decades have resulted in duplicate or disconnected spaces and extended travel distances with challenging control and security issues.

School Requirements

Wakefield Memorial High School delivers a robust curriculum which is dependent on the size, quality and quantity of the general classrooms. However, these classrooms are on average undersized, with an average size of 769 sf, which compare poorly with the accepted norm of 825 to 950 sf for high school use.

Science is taught in ten small labs with the original outdated equipment, with five prep rooms, three of which are undersized. Programming indicates that the curriculum offered requires nine modern laboratory spaces and two lecture rooms.

The school offers a very strong and growing music program which the community is greatly invested in. The Band and Piano Lab currently share a space that was originally designed as a cafeteria. The chorus room is not adjacent, being located behind the auditorium. Two separate offices are provided which hinders collaboration. The auditorium is significantly smaller than required, and the stage is slightly undersized. Both lack sufficient support spaces and have poor lighting and acoustics. The current art classrooms are well located for natural light and have sufficient storage space but are slightly undersized.

There is one teacher planning room, but this space is rarely used due to it being an unappealing space and due to travel distance issues. There is one staff lunchroom, but it is only used by a small portion of the faculty due to travel distance issues. Most teachers spend their prep/lunch time in their classroom which hinders collaboration.

As a result of the school originally being designed as a middle school and then being converted to a high school via addition, there are two separate gymnasiums in the building. Both gymnasiums are currently being fully used, but the original gym is undersized, and the larger gym (field house) is insufficient in size to accommodate indoor track competitions.

The vocational programs are operating in spaces which are out of date and poorly equipped. The Engineering, Computer Science, Design Center and Culinary classes all inhabit spaces that are ill suited towards supporting the curriculum. The School Bank which is an active resource and supports the Business curriculum reflects an outdated model of the banking industry.

Other deficiencies are outlined in the Space Summary found in Section 3.1.3.3 of this report.

Schedule Overview

Alternative 1 would be implemented over thirty-six (36) months; and would be phased over potentially three and a half (3.5) school years. This Alternative would allow the project to be completed by Fall of 2027.

Cost Overview

The estimated construction cost for Alternative 1 is:

$119,778,967

The estimated project cost for Alternative 1 is:

$154,160,928

Conclusion

The Pros and Cons of Alternative 1 are summarized as follows:

Pros

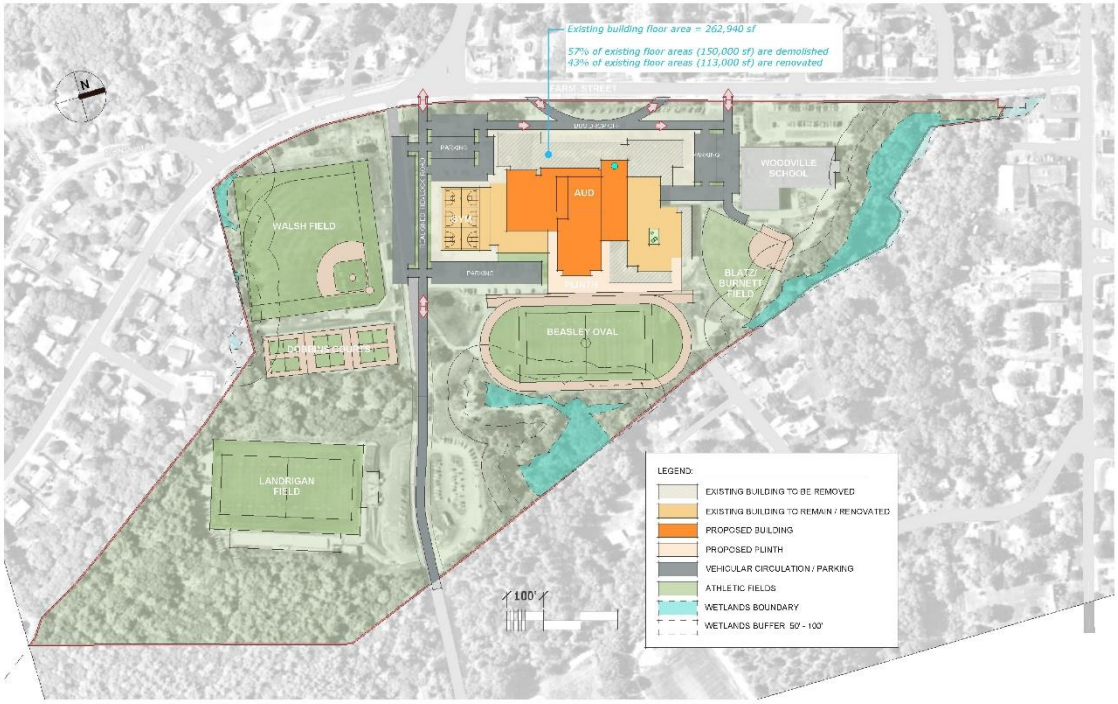
- Lower costs when compared to other options which enhance the educational value of the building.
- Higher potential reimbursement percentage than new construction options
- Athletic field resources remain largely unchanged

Cons

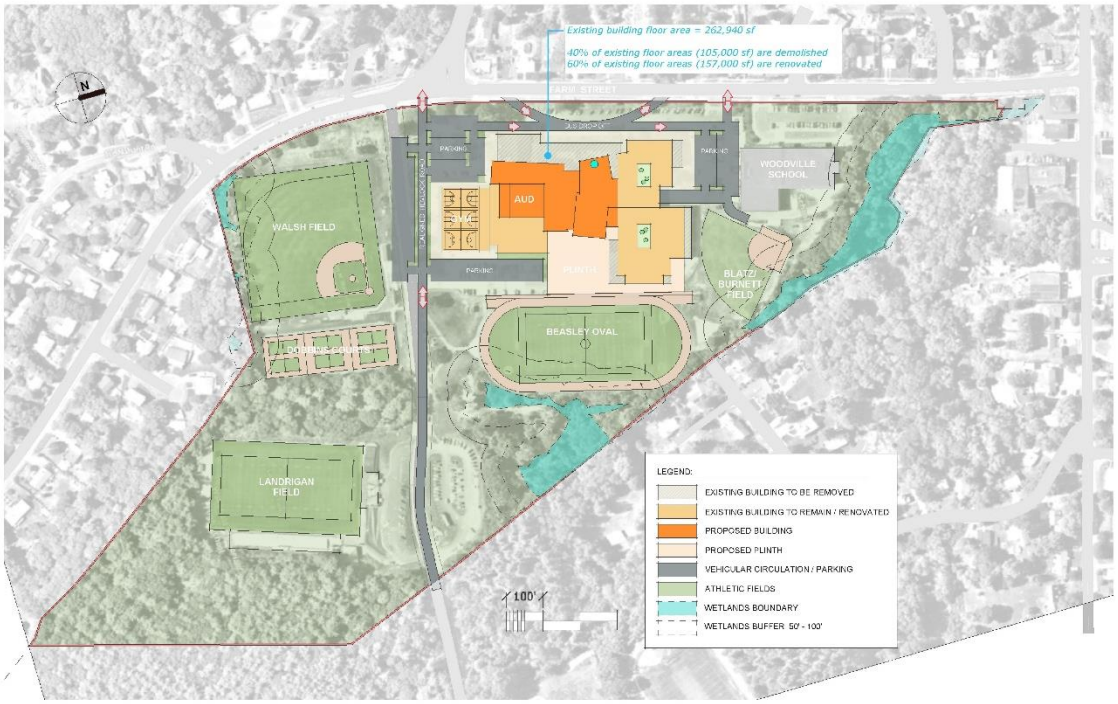
- The completed construction would not accommodate the future curriculum envisioned in the educational program.
- Significantly lower impact on energy conservation and operating costs than that of other options.
- Space impacts of code upgrades to existing infrastructure.
- Many duplicate and poorly utilized spaces remain.
- Isolated and inefficient corridors remain difficult to negotiate and disorienting.
- Multiple-year disruption due to phased construction
- Added cost and inconvenience of modular classrooms

5. Renovation(s) and/or Addition(s) to Existing Building(s)

Alternatives 2a and 2b: Addition/Renovation on Existing Footprint



2a – Addition/Renovation on Existing Footprint



2b – Addition/Renovation on Existing Footprint

Description

The majority of the existing 1960's and 1970's building will be renovated including the existing field house, with additions for a new centralized administration block, auditorium and classrooms (humanities and STEM). A new dining commons space created at the center of the school in place of the existing courtyard connects through from front to rear entrances while mitigating the 10'-15' grade change between the school entry and Beasley Oval to the east. A plinth component provides a raised outdoor terrace condition overlooking the playing fields with the potential for service traffic to utilize the space below the structural plinth. The viability of this approach will be further evaluated for the Preferred Schematic Report. Alternative 2a maintains the main entry on the west side, with a more generous entry plaza and gathering space that accommodates multiple modes of transportation and also helps to alleviate traffic congestion along the Farm Street corridor.

The existing building is 250,430 square feet. The 2a option results in demolition totals of 144,056 square feet, renovation totals of 106,373 square feet, and addition totals of 150,527 square feet, for a gross square foot total of 256,900 square feet.

The 2b option results in demolition totals of 108,085 square feet, renovation totals of 142,345 square feet, and addition totals of 114,555 square feet, for a gross square foot total of 256,900 square feet.

Life Safety Code Compliance

All existing spaces and systems to remain will be reorganized, upgraded and/or constructed new to meet current life safety codes and standards. New addition portions of the building would be constructed in full compliance with current life safety codes and standards.

Accessibility Code Limitations

All existing spaces, systems, fixtures and equipment to remain will be renovated, reorganized and/or constructed new to meet current accessibility codes and standards. New addition portions of the building would be constructed in full compliance with current accessibility codes and standards.

Energy Code Compliance

All existing roofs, walls, windows and doors will be replaced or renovated to meet current energy codes and standards. All new addition construction will be constructed in full compliance with the same, including the exterior envelope, HVAC and lighting systems.

Site

Refer to Section 3.1.5, Site Development Requirements.

Structural

Structural systems for renovations to existing construction will be as follows:

All new roof top units located over the existing renovated areas will require a new supporting roof structure. This will require roof top grillage frames to be constructed 3 to 4 feet above the existing finished roof. This may also require reinforcing the existing steel girders, columns, and foundations.

All new roof penetrations for ductwork and piping will require supplemental framing to support the existing metal deck or tectum roof panels. This may be done with standard angle frames between the existing roof joists and beams.

All new floor penetrations for ductwork and piping will require supplemental framing of the existing concrete floor slab with standard angle frames between the existing floor joists and beams.

Any replacement of existing utilities under the ground floor slab-on-grade will require cutting out the existing concrete slab, excavating out the old and replacing with new.

The scope of work required for the renovation work in Alternative 2a & 2b is classified as Level 3 Work per the IEBC building code. This level of renovation will require a full upgrade of the entire remaining structure for lateral seismic and wind forces, as there is no current verifiable lateral force resisting system, (LFRS). This is best achieved by adding new diagonal braced frames constructed of HSS square tubular sections, framed between existing columns. These braced frames will be required throughout the individual building wings. This will require reinforcing some of the existing beams, columns and foundations as well.

Structural systems for new construction will be as follows:

New foundation systems will consist of conventional reinforced concrete foundation walls at the perimeter of the buildings and isolated reinforced concrete spread footings in the interior. All footings will rest on shallow undisturbed natural soils or ledge.

The new ground floor level will include a conventional 4" slab-on-grade reinforced with welded wire fabric in the classroom spaces, 5" slab-on-grade in the vocational and common spaces, and a 6" slab-on-grade in the new mechanical and electrical rooms.

Elevator pits will consist of 10” thick reinforced concrete foundation walls supported on a continuous 12" thick reinforced concrete mat foundation.

Structural floor framing systems for new construction will consist of composite steel beams and girders framed into wide flange steel or tubular shaped steel columns. These members will support will a 2"x 20 gage galvanized composite steel deck with 5 1/4" of lightweight concrete topping reinforced with welded wire fabric. All steel beams and girders will be spray fireproofed. The metal floor deck will not need to be fireproofed.

New roof framing will consist of wide flange steel beams and girders supported on wide flange or tubular steel columns. The roof framing will be decked with a 1.5” deep wide rib metal roof deck.

Diagonal braced frames, composed of HSS tubular steel sections, will be incorporated into the steel framing at the demising walls of the new construction for lateral force resistance.

The roof framing under the new rooftop mechanical units will consist of composite steel beams and girders supporting a 2" galvanized composite deck with 6" of normal weight concrete topping reinforced with welded wire fabric. The concrete pads under the units will extend at least 5’ beyond the footprint of unit on all sides.

HVAC

All new HVAC systems will be provided in the renovated portions and in the new additions of the building in accordance with all applicable Massachusetts Codes and ASHRAE Standards.

All new HVAC systems will be provided in the renovated portions of the building in accordance with all applicable Massachusetts Codes and ASHRAE Standards.

Heating and cooling will be provided by the air-source Variable Refrigerant Flow (VRF) heat exchange energy recovery systems that will serve ducted indoor heat pumps (ACU) installed above ceilings and DX heat pump cooling/heating coils in the Direct Outdoor Air Systems (DOAS) and Air Handling Units (AHU).

The Air-Cooled Condensing units (ACCU) serving indoor VRF heat pumps will be modular style, roof or ground mounted.

DOAS units will provide ventilation to the classrooms and AHUs will support large, single-zone spaces. Both unit types (DOAS and AHU) will be provided with DX heat pump heating/cooling coils. The dedicated VRF air cooled condensing units (ACCU) will serve the DOAS and AHU DX heat pump cooling/heating coils. The ACCUs serving DOASs, and AHUs will be modular style, roof or ground mounted.

Air-source VRF heat recovery system configured with modular outdoor air-cooled condensing units, branch distribution control units and distributed indoor heat pump units will provide heating and cooling.

Outdoor air-source condensing units (ACCU) will be configured with compressors with inverter control technology and will support simultaneous heating and cooling of the zones served.

Branch Distribution Control Units will provide multi-zone distribution and control of refrigerant from the common outdoor ACCUs to the indoor heat pump units (ACU) to provide simultaneous heating and cooling amongst the zones served. Refrigerant piping and control wiring will be provided between the ACCUs and Branch Distribution Control Units and between the Branch Distribution Control Units and indoor heat pumps (ACU). Condensate drain piping will be provided for ACUs and Branch Distribution Control Units.

Variable Air Volume (VAV) terminals will be provided before each heat pump unit (ACU).

All auxiliary heating terminals will be electric.

New building management system (BMS) will be provided to support the proposed HVAC systems. The BMS will be integrated into the Town's networked system for energy management and monitoring.

Plumbing

While portions of the existing building are being renovated in this alternative, all plumbing systems within the renovated spaces will be removed. The new plumbing system will be designed in accordance with the 9th Edition of the Commonwealth of Massachusetts Building Code, 248 CMR Fuel Gas and Plumbing Code, Latest addition of National Fuel Gas Code NFPA 54.

The existing domestic water services to the building will be removed and a new 6" domestic water supply will enter into the facility through mechanical room or water service room and. The new domestic water supply will accommodate the new addition and renovated areas. Reduced Pressure Backflow Preventer will be provided to the main domestic water supply to protect the service (per the DEP regulation 310 CMR 22). Domestic booster pump system will be provided. Potable water will meet both NSF 61 and NSF 372 standards for lead free safe drinking water act. Any mechanical water feed, water make-up, or any other mechanical system supplies will be routed through reduced pressure-principle backflow preventers. Domestic cold water inside the building will be "L" type copper tube with wrought or cast copper fittings. All cold-water piping will be insulated to prevent condensation. Any exposed insulation will be covered with a plenum-rated PVC jacket.

The existing hot water heater shall be reused and relocated to the new location of the mechanical room a third central hot water heater shall be added for the addition and shall include at a minimum 200

kBTUH high efficiency water heater with at least 200 gallons of storage as manufactured by HTP, Lochinvar, or A.O. Smith. The kitchen will be provided with a new dedicated hot water system minimum 200 kBTUH high efficiency water heater with at least 100 gallons of storage as manufactured by HTP, Lochinvar, or A.O. Smith. The kitchen hot water system shall have master mixing valves to provide dual temperatures loops. One loop at 140°F and to serve the kitchen dishwasher and 3-compartment sinks. The other system loop will operate at 120°F and will serve other kitchen appliances, hand sinks, dedicated kitchen toilet room lavatories, and dedicated janitor sink. All lavatory faucets throughout the building will have thermostatic mixing valves to temper water supply. Domestic hot water will be distributed in "L" type copper tube with wrought- or cast-copper fittings. All domestic hot water and hot water recirculating piping shall be insulated in accordance with the Energy Code.

Primary and secondary roof drainage systems will be provided for all roof areas for the addition and renovated areas. Roof drains will be all cast-iron and factory-coated with epoxy paint. Secondary roof drainage systems will be extended to exterior walls with nozzles minimum 18" above grade. Each storm drainage system will be sized to handle a rainfall rate of four inches per hour. Storm drainage piping will consist of cast iron piping. All horizontal piping will be insulated to prevent condensation. Storm drainage systems will exit at various location of the building and connect to the site storm water drainage system.

Sanitary drainage for the building will drain by gravity and will connect to the site sanitary sewer system. A dedicated grease (kitchen) waste line will be installed to collect grease laden waste water from the kitchen appliances and fixtures. Grease traps will be recessed in the floor and will be provided to receive the waste discharge at the dishwasher, triple pot sink, tilting kettles, tilting skillets as well as other grease producing equipment and floor drains/sinks. The grease line will exit the building and will be connected to an exterior grease trap outside the building. Grease (kitchen) waste piping to exterior grease traps will be provided by the plumbing contractor. Chamber vents from the exterior grease interceptor will be provided by the plumbing contractor and will be routed to the roof independent from the rest of the sanitary vent system. Art room sinks will be provided with solids interceptors. Above ground sanitary drainage and vent will be piped in cast iron with "no-hub" joints (3" or larger). Piping smaller than 3-inch will be piped in copper. The below slab piping shall be video inspected and shall be reused where in good condition and replaced if found to be in poor condition. Below slab piping shall be service-weight cast iron hub-and-spigot with neoprene gasket joints.

A new 6" gas service will enter the mechanical room and will be regulated to low pressure (12" W.C.) inside the building. The exterior pressure regulator and gas meter will be mounted on an outdoor steel rack. The gas meter and regulator will be by the gas utility company. The gas supply will be piped to the heating boilers, gas-fired water heaters, make-up air unit, food service equipment and the kitchen area. The gas piping will be distributed in ASTM A53 schedule 40 black steel pipes.

Plumbing fixtures will be provided in the school to accommodate the population of male students, female students, male teachers and staff, and female teachers and staff. Fixture counts will be in accordance with 248 CMR Paragraph 10.10, Table 1. Plumbing fixtures will be equipped with the following water-conserving features (for 30% indoor water use reduction-LEED-V4, Credit 2).

Water Closet	Urinals	Lavatory
Electronic sensor operated, recharging battery type, 1.28 gpf flush valve (Sloan Solis or equal)	Electronic sensor operated, recharging battery type, ultra-low flow flush valve type-0.125gpf (Sloan Solis or equal)	Sloan Solis or equal sensor activated, recharging battery type, hand washing faucet with above deck temperature mixer, 0.5 gpm flow restricting aerator spray head and field adjustable run time limit setting.

Water closets and urinals will be commercial vitreous china, wall hung (ADA compliant). Lavatories will be undermount, or wall-mounted china. Each floor will include a custodian's closet with a corner mop service basin and associated fittings to accommodate cleaning system. Toilet cores on each floor will include alcove-recessed electric water cooler, in a high-low handicapped accessible configuration to meet MAAB requirements. All toilet and mechanical rooms will have floor drains complete with trap primers. All art rooms will include undermount stainless-steel sink with gooseneck type faucets (Chicago#786-GN. Plumbing roughing connections and faucets will be provided to each kitchen appliances requiring plumbing work. Non-freeze wall hydrants will be provided along the exterior wall of school at strategic locations.

Emergency shower/eyewash will be provided in mechanical/boiler rooms. Deck mounted emergency eyewash will be provided in art rooms and exam room/nurse's suite.

Fire Protection

The new addition renovated spaces and all other areas shall be protected throughout with a Class 1 combined wet automatic sprinkler/standpipe system. A fire department connection will be provided at the exterior wall near a site hydrant. The fire department connection will either be flush-type polished brass wall-mount or free-standing, depending on the final details, preference and in accordance with Wakefield Fire Department requirements. Roof manifolds would be provided at each two story or greater roof area. Total number of fire department connections and roof manifolds shall be in accordance with local fire department requirements. The sprinkler system will be designed in accordance with NFPA 13, 2013 Edition, the in-force Massachusetts State Building Code and local jurisdictional requirements. Latest hydrant flow test (performed/conducted no more than 12 months prior to working plan) is required to determine or verify if a fire pump is required. If the incoming pressure cannot accommodate the required pressure to activate the most remote sprinkler demand, then a fire pump is required. A new 8" fire service main from the street will be installed in a dedicated Fire Pump Room/Fire Service Room.

The room will have a supervised double check valve assembly backflow preventer and wet alarm check valves. The facility will also include an electric fire pump on emergency power with secondary electrical power and will be installed in a dedicated Fire Pump Room per NFPA 20 and enclosed with not less than two hours fire resistive construction. The fire pump room will be located on the first-floor level and access to the room shall be directly from an exterior door at grade or through fire resistance rated enclosures. The fire pump controller will include a factory assembled Wye Delta Controller with Automatic Transfer Switch. A jockey pump will be installed to maintain system pressure. From the fire pump room, fire protection piping will run to each stairway, and up through the stairways as standpipes. Sprinklers will be supplied from the standpipes in the stairs. Floor control valve stations (consisting of a monitored shut-off valve, flow switch and an inspector's test valve with sight glass) will be provided at multiple stairs at each floor, fed from the standpipe system.

Standpipes will be provided in all required egress stairs. Standpipes will be designed and installed in accordance with NFPA 14, 2013 Edition, and local Fire Department requirements. Additionally,

standpipes will be located so that no part of the building is more than 200 feet from a standpipe valve. Each standpipe will be equipped with a 2-1/2" fire department hose valve with 1-1/2" reducer at the stair floor landing. Because the building is not a high rise, there is no minimum pressure requirement for the standpipes.

The administrative office spaces, Cafeteria, Gym, Auditorium, Corridors, rest rooms and general classrooms will be hydraulically designed for Light Hazard occupancy requirements with a design criteria of 0.10 gpm/sf over 1,500 sf with 100 gpm hose allowance. Maximum sprinkler spacing will be 225sf.

The physics/chemistry/biology labs, Kitchen area and the mechanical and electrical rooms will be hydraulically designed for Ordinary Hazard Group I occupancy requirements with a design criteria of 0.15 gpm/sf over 1,500sf with 250gpm hose allowance. Maximum sprinkler spacing will be 130sf.

Stage will be hydraulically designed for Ordinary Hazard Group II occupancy requirements with a design criteria of 0.2 gpm/sf over 1,500sf with 250gpm hose allowance. Maximum sprinkler spacing will be 130sf.

Sprinkler heads in areas with finished (gypsum) and suspended ceilings will be concealed pendant type. Mechanical rooms and other unfinished areas with no suspended ceilings, upright or exposed brass finish sprinkler heads will be provided. Sprinkler heads in mechanical rooms, storage rooms and gymnasium will be provided with wire guards. Sprinklers for areas subject to freezing shall be dry type, including but not limited to: Walk-in coolers and freezers. The outdoor loading dock area will be provided with dry sidewall type sprinklers, fed from the adjacent interior sprinkler system. All sprinklers will be quick response type.

Fire protection piping will consist of schedule 40 piping with threaded fittings for piping sized 1-1/2" and smaller. For sizes 2" and larger, schedule 10 piping with roll grooved fittings and couplings will be provided. All valves controlling the flow of water will be equipped with supervisory devices that report to the Fire Alarm System.

Electrical

Power Distribution

There are two electrical services to the existing building. The original 1960 building has a 1600amp, 120/208V, 3Ø, 4 wire switchboard and the 1972 addition has 4000amp, 120/208V, 3Ø, 4 wire switchboard. The service equipment is over 50 years old, and it is past its life expectancy. The existing service and power distribution equipment should be removed and replaced with a new. The new distribution system will consist of a 3000A, 277/480V, 3ϕ, 4w switchboard with new underground secondary service conductors extended to a new utility transformer. New electrical branch circuit panelboards will be provided in dedicated electrical rooms. Lighting loads, the elevator, large mechanical equipment and large kitchen electrical loads will be connected to 277/480V panelboards, and all other loads will be connected to 120/208V panelboards.

Life Safety/Emergency System

There are two auxiliary generator systems which are original to the construction. The existing generator systems are in poor condition and past its life expectancy. Furthermore, the existing systems do not meet current code requirements for life safety distribution. The existing generator system should be replaced with a new generator systems. The new generator system will consist of a 350kW 480/277-volt generator, automatic transfer switch and distribution equipment to serve Life Safety and Standby loads. Dedicated 2hr emergency electrical rooms will be provided for the emergency lighting panelboards and automatic transfer switch. The optional standby panel and ATS can be located in the main electrical

room. An exterior mounted manual transfer switch will be provided to bypass permanent generator and allow connection of a temporary generator. The generator will have a radiator mounted load bank to ensure the generator is exercised with a load at least 30% of rating.

It is estimated that the following items will be connected to the generator system.

- Boilers and pumps for heating system to freeze protect the building.
- Emergency lighting.
- IT rooms (power & A/C) including network, door access, intrusion detection, CCTV, PA, telephones.
- Fire alarm.
- Kitchen freezers/coolers.
- Sewage ejector pumps.

Lighting

Lighting throughout the building is predominantly linear fluorescent type and most fixtures have been retrofitted with T8/electronic ballast lamp technologies. The systems are functional but do not meet current standards for lighting quality. Furthermore, lighting controls do not meet current energy code requirements. All existing lighting and lighting controls should be replaced. New lighting systems will consist of energy efficient LED fixtures using the suggested below approaches:

Location	Illumination Level	Notes
Corridors	5-10 FC	1'x4' or 2'x 2' recessed "indirect" style LED fixtures.
Private offices, small conference rooms	35-45 FC	Suspended direct/indirect LED fixtures.
Gymnasium	35-45 FC	High bay linear LED fixtures.
Auditorium	10-20FC	Recessed downlighting or suspended cylinders between clouds connected to a theatrical dimming system
Auditorium Performance	N/A	Theatrical lighting and border lights connected to a theatrical dimming system
Classrooms	30-35 FC	Suspended direct/indirect LED fixtures.
Bathrooms	10-20 FC	LED Slot fixtures over mirror supplemented with recessed LED downlights
Mechanical and electrical rooms	30+ FC	LED strips, pendant or surface.
Stairway	10-15 FC	Wall-mounted direct/indirect LED fixtures, high impact polycarb lens.
Site Lighting	1 FC	Pole mounted LED area fixture throughout parking area and driveway access road.

All lighting will be automatically controlled using a combination of ceiling occupancy sensors in classrooms, offices and smaller spaces and network programmable relays for larger spaces such as corridors and gymnasium. Perimeter spaces will have closed loop light level sensors 12' from window for 2 zone dimming control of primary and secondary daylight zones. Selected fixtures in egress paths will be connected to emergency panels and new exit signs, connected to emergency circuits, will be provide throughout.

Fire Alarm

The original fire alarm systems for the 1960 and 1972 buildings consisted of hardwired, zoned fire alarm systems. The existing systems is beyond its useful life and does not meet current code requirements. The existing fire alarm system should be replaced with a new fire alarm and voice evacuation system. The new system will consist of an addressable voice evacuation fire alarm control panel, automatic smoke and heat detectors, manual pull stations, audible and visible alarm signals, elevator recall, connections to automatic fire suppression systems, and connection to the Fire Department. The new fire alarm system will report to the Fire Department through a radio master box with a remote 5dB antenna located on the roof. The fire alarm control panel will be located in the main electric room with an LCD remote annunciator located at the Main entrance where the fire department responds to an alarm condition. Audio speakers and visual high intensity strobes alarm devices will be installed per NFPA-72. Since the building will be covered by a sprinkler system, fully automatic detection is not required. Smoke detectors will be provided only where required by Code. Fire suppression systems shall be tied to the fire alarm control panel. Interface & control modules will be provided for elevator recall, air handling unit shut down, gas shut off, door hold release, door hardware bypass and any other systems requiring control under an alarm condition. The building will be provided with a Bi-Directional Amplifier (BDA) system for emergency responders. The BDA system will have capabilities to boost fire department and police department radio communications within the building.

Telecommunications and Security

The existing telecommunications copper and fiber optic cable infrastructure will be replaced to support data and voice transmission. Existing telecommunications spaces in classrooms and storage spaces will be replaced with secure and climate-controlled rooms to better protect and maintain network electronic equipment. The existing MDF will be replaced with new equipment cabinets, patch panels and overhead cable management components. The MDF will be replaced with a new room fitted with a new cooling system and lighting.

An office/staging room equipped with desks and workbenches has been requested to support IT staff operations and equipment maintenance.

The existing Public Address and Clock Systems will be replaced. Classrooms and other learning spaces will be equipped with two-way talkback speakers. Corridors and larger spaces will be equipped with one-way speakers. Clocks will be wirelessly controlled. Further investigation will determine whether clocks will be powered by battery or electrical receptacles at each location.

Classroom technology infrastructure will be upgraded to provide new data and voice communications as well as audio visual raceways to enable signal transmissions to electronic displays (projectors or wall mounted TVs).

The existing wireless access points will be evaluated for extent of coverage throughout the facility. More devices will be considered to further support 21st Century Wi-Fi needs.

The Existing CCTV cameras will be evaluated for location, coverage and potential upgrades or additional devices to provide adequate surveillance of public spaces and locations where students congregate.

Access Control (card readers and video intercom stations) will be added to better secure entrances and spaces within the building such as elevators and where sensitive equipment and documents are stored.

Audio Visual equipment in the cafeteria, athletic facilities and black box spaces will be upgraded to provide a rich sound experience in each space and high-resolution video projection in the cafeteria and black box space.

Hazardous Materials

As expected for a building of this age, there are significant hazardous materials present, despite prior abatement activities that have occurred over the years. For a detailed report on the materials to be abated, see Section 3.1.4.10.

Capacity Constraints

The design capacity of 1,000 students noted in the MSBA Enrollment Projection, and the corresponding educational space needs will be provided by the additions and renovations of this option.

Program Delivery Impediments

The pedagogical requirements of a modern high school will be provided for by the renovations and additions of these options, however adjacencies and positioning of community-based functions have limited ability to be optimized in comparison with new construction alternatives.

High School Requirements

All elements of Wakefield Memorial High School's robust curriculum are accommodated in spaces that meet current standards by these renovations and additions. Existing low ceiling heights will remain due to structural constraints. Lack of space above ceilings will place many constraints on HVAC system design, likely affecting classroom layout and design in renovation areas.

Schedule Overview

Alternatives 2a and 2b would each be implemented over thirty-six (36) months; and would be phased over potentially three and a half (3.5) school years. These Alternatives would allow the project to be completed by Fall of 2027.

Cost Overview

The estimated construction costs are:

2a: $169,843,682

2b: $169,234,757

The estimated project costs are:

2a: $218,091,166

2b: $217,336,055

Conclusion

The Pros and Cons of Alternatives 2a and 2b are summarized as follows:

Pros

- Largely renewed school, leveraging existing construction on site for renovation economy
- Utilizes most desirable building site available, maintaining highly visible location fronting Farm Street
- More compact plan with core functions more centrally located
- Potential energy conservation and lower operating costs
- Responds to current educational programming needs
- Accommodation of current and future curriculum
- Space and flexibility are provided for the projected growth in student population
- Potential for meeting community design and image goals
- Alleviates some of the congestion on Farm Street

Cons

- Swing space is required
- Maximum disruption to the students and education delivery, given the extended phased schedule that will be required to build additions across the entire footprint of the remaining construction.
- Loss of construction value, efficiency and ideal adjacencies due to retrofit
- Low ceiling height impacts on HVAC system and classroom design in renovation areas.
- Existing two-story structure would require significant structural upgrades to add a third floor or to introduce new high-bay space to support the educational program
- Community functions and educational clusters have limited ability to be optimally centralized around the dining commons due to the renovation in place of the existing field house at the extreme south end of the building footprint.

Alternative 2a is preferred over 2b due to the potential for its cluster organization to translate to a building with greater clarity of form and expression of its community space and major circulation.

Alternatives 2c and 2d: Field House Renovations with Additions on Walsh Field

2c – Field House Renovation with Bridge-linked Addition on Walsh Field

2d – Field House Renovation with Contiguous Addition on Walsh Field

Description

Alternatives 2c and 2d include renovation of the 1970's field house structure and supporting adjacent space, and addition of new construction on Walsh Field. Alt 2c has a connecting sky bridge over a relocated Hemlock Road that allows preferred programmatic adjacencies with the exception of the gym and PE facilities which are accessed via a new skybridge over Hemlock. Alt 2d has a contiguous addition, providing more desirable adjacencies to the existing field house but requires the relocation of Hemlock Road around the building. The main entrance is facing Farm Street at the bend in the road, with significant modifications to current traffic patterns. Both alternatives feature three-story academic pods.

Alternatives 2c and 2d result in demolition totals of 215,855 square feet, renovation totals of 34,575 square feet, and addition totals of 222,325 square feet, for a gross square foot total of 256,900 square feet.

Life Safety Code Compliance

All spaces and systems will be designed to meet current life safety codes and standards.

Accessibility Code Limitations

All spaces, systems, fixtures and equipment will be new, and designed to meet current accessibility codes and standards.

Energy Code Compliance

All roofs, walls, windows, doors and systems will be new, and designed to meet current energy codes and standards.

See Alternative 2a for a detailed description of the following: Site, Structural, HVAC, Plumbing, Fire Protection, Electrical, Fire Alarm, Hazardous Materials, Capacity Constraints, and Program Delivery Impediments.

Schedule Overview

Alternatives 2c and 2d would be implemented over thirty (30) months; and would be phased over potentially two and a half (2.5) school years. This Alternative would allow the project to be completed by Fall of 2026.

Cost Overview

The estimated construction costs are:

2c: $173,902,325

2d: $169,082,906

The estimated project costs are:

2c: $224,563,883

2d: $218,587,803

Conclusion

The Pros and Cons of Alternatives 2c and 2d are summarized as follows:

Pros

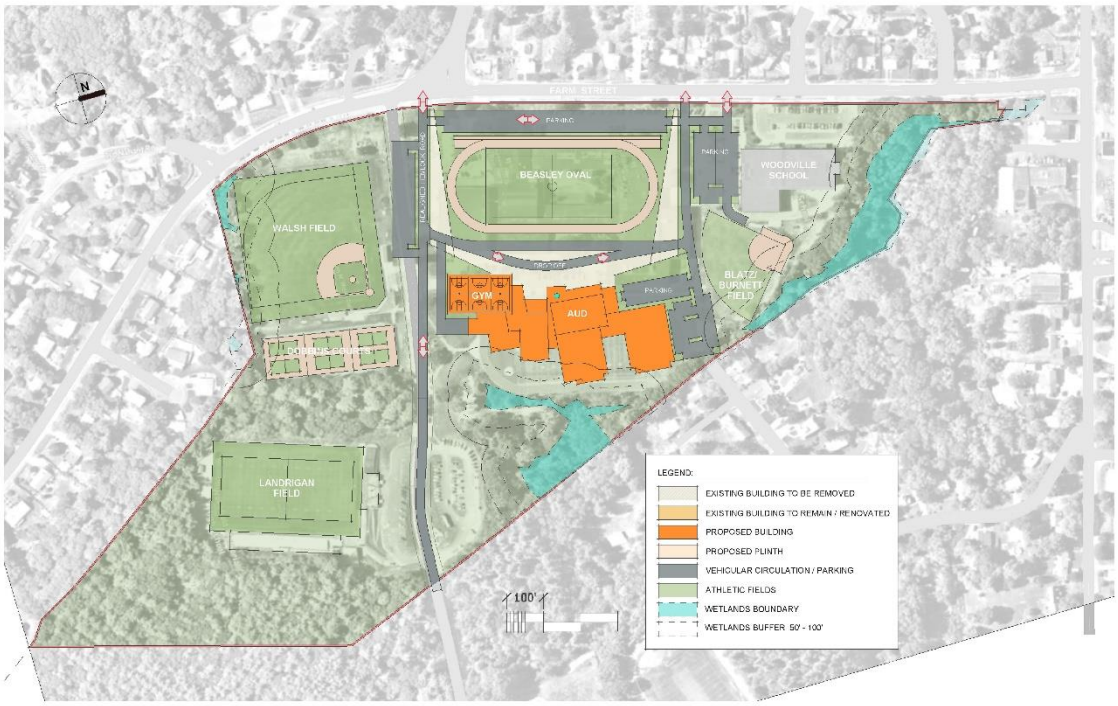
- Largely renewed school, leveraging some existing construction on site for renovation economy
- Potential energy conservation and lower operating costs
- Responds to current educational programming needs, with all but PE/athletics wing being housed in new construction
- Accommodation of current and future curriculum
- Space and flexibility are provided for the projected growth in student population
- Potential for meeting community design and image goals

Cons

- Swing space is required for the field house, locker rooms and environs
- Moderate disruption to the students and education delivery, given the need for displacement of field house activities during renovations
- Added cost of roadway modifications and long-span bridge component
- Added approvals and phasing complexity with significant roadway modifications

6. New Building Construction and Evaluation of Potential Locations

Alternative 3a: New Construction (Model School) on Beasley Oval



3a – Model School Construction on Beasley Oval

Description

New construction on Beasley Oval of a model school based on Grafton High School, with enlargements to accommodate enrollment of 1,000 students and an 18,000 sf gymnasium. The building is rotated for best fit to avoid phased construction. The configuration of the new construction will feature three-story academic pods organized to support interdepartmental communication and collaboration. For school and community use the major public use spaces would be located towards the front with athletics and Physical Education with their required support spaces in one wing and the fine and performing arts co-located around the Auditorium in another wing. The library media center is also a primary public use space and together with the auditorium and Gymnasium can be organized to connect to the cafeteria/commons as a major community gathering space.

The primary entry elevation in this option faces Farm Street, although at a greater distance than the current school which provides greater opportunities to alleviate vehicular traffic congestion. In this alternative, Beasley Oval will be reconstructed on the current high school footprint, with significant regrading and retaining walls to negotiate the approximately 10-foot drop in grade from Farm Street to Beasley Oval. Access to the rear of the building is limited by the presence of wetland resources.

Life Safety Code Compliance

All spaces and systems will be designed to meet current life safety codes and standards.

Accessibility Code Limitations

All spaces, systems, fixtures and equipment will be new, and designed to meet current accessibility codes and standards.

Energy Code Compliance

All roofs, walls, windows, doors and systems will be new, and designed to meet current energy codes and standards.

Site

Refer to Section 3.1.5, Site Development Requirements.

Structural

Structural systems for new construction will be as follows:

New foundation systems will consist of conventional reinforced concrete foundation walls at the perimeter of the buildings and isolated reinforced concrete spread footings in the interior. All footings will rest on shallow undisturbed natural soils or ledge.

The new ground floor level will include a conventional 4" slab-on-grade reinforced with welded wire fabric in the classroom spaces, 5" slab-on-grade in the vocational and common spaces, and a 6" slab-on-grade in the new mechanical and electrical rooms.

Elevator pits will consist of 10” thick reinforced concrete foundation walls supported on a continuous 12" thick reinforced concrete mat foundation.

Structural floor framing systems for new construction will consist of composite steel beams and girders framed into wide flange steel or tubular shaped steel columns. These members will support will a 2"x 20 gage galvanized composite steel deck with 5 1/4" of lightweight concrete topping reinforced with welded wire fabric. All steel beams and girders will be spray fireproofed. The metal floor deck will not need to be fireproofed.

New roof framing will consist of wide flange steel beams and girders supported on wide flange or tubular steel columns. The roof framing will be decked with a 1.5” deep wide rib metal roof deck.

Diagonal braced frames, composed of HSS tubular steel sections, will be incorporated into the steel framing at the demising walls of the new construction for lateral force resistance.

The roof framing under the new rooftop mechanical units will consist of composite steel beams and girders supporting a 2" galvanized composite deck with 6" of normal weight concrete topping reinforced with welded wire fabric. The concrete pads under the units will extend at least 5’ beyond the footprint of unit on all sides.

HVAC

New HVAC systems will be provided in accordance with all applicable Massachusetts Codes and ASHRAE Standards.

All new HVAC systems will be provided in the renovated portions of the building in accordance with all applicable Massachusetts Codes and ASHRAE Standards.

Heating and cooling will be provided by the air-source Variable Refrigerant Flow (VRF) heat exchange energy recovery systems that will serve ducted indoor heat pumps (ACU) installed above ceilings and DX heat pump cooling/heating coils in the Direct Outdoor Air Systems (DOAS) and Air Handling Units (AHU).

The Air-Cooled Condensing units (ACCU) serving indoor VRF heat pumps will be modular style, roof or ground mounted.

DOAS units will provide ventilation to the classrooms and AHUs will support large, single-zone spaces. Both unit types (DOAS and AHU) will be provided with DX heat pump heating/cooling coils. The dedicated VRF air cooled condensing units (ACCU) will serve the DOAS and AHU heat pump DX cooling/heating coils. The ACCUs serving DOASs, and AHUs will be modular style, roof or ground mounted.

Air-source VRF heat recovery system configured with modular outdoor air-cooled condensing units, branch distribution control units and distributed indoor heat pump units will provide heating and cooling.

Outdoor air-source condensing units (ACCU) will be configured with compressors with inverter control technology and will support simultaneous heating and cooling of the zones served.

Branch Distribution Control Units will provide multi-zone distribution and control of refrigerant from the common outdoor ACCUs to the indoor heat pump units (ACU) to provide simultaneous heating and cooling amongst the zones served. Refrigerant piping and control wiring will be provided between the ACCUs and Branch Distribution Control Units and between the Branch Distribution Control Units and indoor heat pumps (ACU). Condensate drain piping will be provided for ACUs and Branch Distribution Control Units.

Variable Air Volume (VAV) terminals will be provided before each heat pump unit (ACU).

All auxiliary heating terminals will be electric.

New building management system (BMS) will be provided to support the proposed HVAC systems. The BMS will be integrated into the Town's networked system for energy management and monitoring.

Plumbing

All plumbing systems will be designed and installed in accordance with the 9th Edition of the Commonwealth of Massachusetts Building Code and 248 CMR Plumbing Code.

The building will include a new 6" domestic water supply and water meter, which will enter into the facility through the water service room/mechanical room. A reduced pressure backflow preventer will be provided to the main domestic water supply to protect the service (per DEP regulation 310 CMR 22). Domestic booster pump system will also be provided. Potable water will meet both the NSF 61 and NSF 372 standards for lead-free safe drinking water. Any mechanical water feed, water make-up, or any other mechanical system supplies will be routed through reduced pressure-principal backflow preventers.

Domestic cold water inside the building will be "L" type copper tube with wrought or cast copper fittings. All cold-water piping will be insulated to prevent condensation. Any exposed insulation will be covered with a plenum-rated PVC jacket.

For new construction, the project would most likely be all-electric for reduced CO2 emissions in compliance with State Net Zero emissions goals. The hot water system will include high capacity (minimum 100 kW) manifolded tankless water heaters (Equal to Hubbell, Stiebel Eltron, Eamax, or equal) to supply the hot water for the building. The kitchen shall have dedicated electric hot water heaters with minimum 100 gallons of storage. The kitchen hot water system shall have master mixing valves to provide dual temperatures loops. One loop at 140°F and to serve the kitchen dishwasher and 3-compartment sinks. The other system loop will operate at 120°F and will serve other kitchen appliances, hand sinks, dedicated kitchen toilet room lavatories, and dedicated janitor sink. All lavatory faucets throughout the building will have thermostatic mixing valves to temper water supply. Domestic hot water will be distributed in "L" type copper tube with wrought- or cast-copper fittings. All domestic hot water and hot water recirculating piping shall be insulated in accordance with the Energy Code.

Primary and secondary roof drainage systems will be provided for all roof areas. Roof drains will be all cast-iron and factory-coated with epoxy paint. Secondary roof drainage systems will be extended to exterior walls with nozzles minimum 18" above grade. Each storm drainage system will be sized to handle a rainfall rate of four inches per hour. Storm drainage piping will consist of cast iron piping. All horizontal piping will be insulated to prevent condensation. Storm drainage systems will exit at various location of the building and connect to the site storm water drainage system.

Sanitary drainage for the building will drain by gravity and will connect to the site sanitary sewer system. A dedicated grease (kitchen) waste line will be installed to collect grease laden waste water from the kitchen appliances and fixtures. Grease traps will be recessed in the floor and will be provided to receive the waste discharge at the dishwasher, triple pot sink, tilting kettles, tilting skillets as well as other grease producing equipment and floor drains/sinks. The grease line will exit the building and will be connected to an exterior grease trap outside the building. Grease (kitchen) waste piping to exterior grease traps will be provided by the plumbing contractor. The exterior grease interceptor will be placed on site to intercept grease laden waste prior connection to site sewer system. Chamber vents from the exterior grease interceptor will be provided by the plumbing contractor and will be routed to the roof independent from the rest of the sanitary vent system. Art room sinks will be provided with solids interceptors. Above ground sanitary drainage and vent will be piped in cast iron with "no-hub" joints (3" or larger). Piping smaller than 3-inch will be piped in copper. Piping below slabs will be service-weight cast iron hub-and-spigot with neoprene gasket joints.

Plumbing fixtures will be provided in the school to accommodate the population of male students, female students, male teachers and staff, and female teachers and staff.

Fixture counts will be in accordance with 248 CMR Paragraph 10.10, Table 1. Plumbing fixtures will be equipped with the following water-conserving features (for 30% indoor water use reduction-LEED-V4, Credit 2).

Water Closet	Urinals	Lavatory
Electronic sensor operated, recharging battery type, 1.28 gpf flush valve (Sloan Solis or equal)	Electronic sensor operated, recharging battery type, ultra-low flow flush valve type-0.125gpf (Sloan Solis or equal)	Sloan Solis or equal sensor activated, recharging battery type, hand washing faucet with above deck temperature mixer, 0.5 gpm flow restricting aerator spray head and field adjustable run time limit setting.

Water closets and urinals will be commercial vitreous china, wall hung (ADA compliant). Lavatories will be undermount, or wall-mounted china. Each floor will include a custodian's closet with a corner mop service basin and associated fittings to accommodate cleaning system. Toilet cores on each floor will include alcove-recessed electric water cooler, in a high-low handicapped accessible configuration to meet MAAB requirements. All toilet and mechanical rooms will have floor drains complete with trap primers. All art rooms will include undermount stainless-steel sink with gooseneck type faucets (Chicago#786-GN). Plumbing roughing connections and faucets will be provided to each kitchen appliances requiring plumbing work. Non-freeze wall hydrants will be provided along the exterior wall of school at strategic locations.

Emergency shower/eyewash will be provided in mechanical/boiler rooms. Deck mounted emergency eyewash will be provided in art rooms and exam room/nurse's suite.

Fire Protection

The entire building shall be protected throughout with a Class 1 combined wet automatic sprinkler/standpipe system. A fire department connection will be provided at the exterior wall near a site hydrant. The fire department connection will either be flush-type polished brass wall-mount or free-standing, depending on the final details, preference and in accordance with Wakefield Fire Department requirements. Roof manifolds would be provided at each two story or greater roof area. Total number of fire department connections and roof manifolds shall be in accordance with local fire department requirements. The sprinkler system will be designed in accordance with NFPA 13, 2013 Edition, the in-force Massachusetts State Building Code and local jurisdictional requirements. Latest hydrant flow test (performed/conducted no more than 12 months prior to working plan) is required to determine or verify if a fire pump is required. If the incoming pressure cannot accommodate the required pressure to activate the most remote sprinkler demand, then a fire pump is required. A new 8" fire service main from the street will be installed in a dedicated Fire Pump Room/Fire Service Room. The room will have a supervised double check valve assembly backflow preventer and wet alarm check valves. The facility will also include an electric fire pump on emergency power with secondary electrical power and will be installed in a dedicated Fire Pump Room per NFPA 20 and enclosed with not less than two hours fire resistive construction. The fire pump room will be located on the first-floor level and access to the room shall be directly from an exterior door at grade or through fire resistance rated enclosures.

The fire pump controller will include a factory assembled Wye Delta Controller with Automatic Transfer Switch. A jockey pump will be installed to maintain system pressure. From the fire pump room, fire protection piping will run to each stairway, and up through the stairways as standpipes. Sprinklers will be supplied from the standpipes in the stairs. Floor control valve stations (consisting of a monitored shut-off valve, flow switch and an inspector's test valve with sight glass) will be provided at multiple stairs at each floor fed from the standpipe system.

Standpipes will be provided in all required egress stairs. Standpipes will be designed and installed in accordance with NFPA 14, 2013 Edition, and local Fire Department requirements. Additionally, standpipes will be located so that no part of the building is more than 200 feet from a standpipe valve. Each standpipe will be equipped with a 2-1/2" fire department hose valve with 1-1/2" reducer at the stair floor landing. Because the building is not a high rise, there is no minimum pressure requirement for the standpipes.

The administrative office spaces, Cafeteria, Gym, Auditorium, Corridors, rest rooms and general classrooms will be hydraulically designed for Light Hazard occupancy requirements with a design criteria of 0.10 gpm/sf over 1,500 sf with 100 gpm hose allowance. Maximum sprinkler spacing will be 225sf.

The physics/chemistry/biology labs, Kitchen area and the mechanical and electrical rooms will be hydraulically designed for Ordinary Hazard Group I occupancy requirements with a design criteria of 0.15 gpm/sf over 1,500sf with 250gpm hose allowance. Maximum sprinkler spacing will be 130sf.

Stage will be hydraulically designed for Ordinary Hazard Group II occupancy requirements with a design criteria of 0.2 gpm/sf over 1,500sf with 250gpm hose allowance. Maximum sprinkler spacing will be 130sf.

Sprinkler heads in areas with finished (gypsum) and suspended ceilings will be concealed pendant type. Mechanical rooms and other unfinished areas with no suspended ceilings, upright or exposed brass finish sprinkler heads will be provided. Sprinkler heads in mechanical rooms, storage rooms and gymnasium will be provided with wire guards. Sprinklers for areas subject to freezing shall be dry type, including but not limited to: Walk-in coolers and freezers. The outdoor loading dock area will be provided with dry sidewall type sprinklers, fed from the adjacent interior sprinkler system. All sprinklers will be quick response type.

Fire protection piping will consist of schedule 40 piping with threaded fittings for piping sized 1-1/2" and smaller. For sizes 2" and larger, schedule 10 piping with roll grooved fittings and couplings will be provided. All valves controlling the flow of water will be equipped with supervisory devices that report to the Fire Alarm system.

Electrical

Power Distribution

The new distribution system will consist of a 3000A, 277/480V, 3ϕ, 4w switchboard with new underground secondary service conductors extended to a new utility transformer. New electrical branch circuit panelboards will be provided in dedicated electrical rooms. Lighting loads, the elevator, large mechanical equipment and large kitchen electrical loads will be connected to 277/480V panelboards, and all other loads will be connected to 120/208V panelboards.

Life Safety/Emergency System

The new generator system will consist of a 350kW 480/277-volt generator, automatic transfer switch and distribution equipment to serve Life Safety and Standby loads. Dedicated 2hr emergency electrical rooms will be provided for the emergency lighting panelboards and automatic transfer switch. The optional standby panel and ATS can be located in the main electrical room. An exterior mounted manual transfer switch will be provided to bypass permanent generator and allow connection of a temporary generator. The generator will have a radiator mounted load bank to ensure the generator is exercised with a load at least 30% of rating.

It is estimated that the following items will be connected to the generator system.

- Boilers and pumps for heating system to freeze protect the building.
- Emergency lighting.
- IT rooms (power & A/C) including network, door access, intrusion detection, CCTV, PA, telephones.
- Fire alarm.
- Kitchen freezers/coolers.
- Sewage ejector pumps.

Lighting

New lighting systems will consist of energy efficient LED fixtures using the suggested below approaches:

Location	Illumination Level	Notes
Corridors	5-10 FC	1'x4' or 2'x 2' recessed "indirect" style LED fixtures.
Private offices, small conference rooms	35-45 FC	Suspended direct/indirect LED fixtures.
Gymnasium	35-45 FC	High bay linear LED fixtures.
Auditorium	10-20FC	Recessed downlighting or suspended cylinders between clouds connected to a theatrical dimming system
Auditorium Performance	N/A	Theatrical lighting and border lights connected to a theatrical dimming system
Classrooms	30-35 FC	Suspended direct/indirect LED fixtures.
Bathrooms	10-20 FC	LED Slot fixtures over mirror supplemented with recessed LED downlights
Mechanical and electrical rooms	30+ FC	LED strips, pendant or surface.
Stairway	10-15 FC	Wall-mounted direct/indirect LED fixtures, high impact polycarb lens.
Site Lighting	1 FC	Pole mounted LED area fixture throughout parking area and driveway access road.

All lighting will be automatically controlled using a combination of ceiling occupancy sensors in classrooms, offices and smaller spaces and network programmable relays for larger spaces such as corridors and gymnasium. Perimeter spaces will have closed loop light level sensors 12' from window for 2 zone dimming control of primary and secondary daylight zones. Selected fixtures in egress paths will be connected to emergency panels and new exit signs, connected to emergency circuits, will be provide throughout.

Fire Alarm

The new fire alarm system will consist of an addressable voice evacuation fire alarm control panel, automatic smoke and heat detectors, manual pull stations, audible and visible alarm signals, elevator recall, connections to automatic fire suppression systems, and connection to the Fire Department. The new fire alarm system will report to the Fire Department through a radio master box with a remote 5dB antenna located on the roof. The fire alarm control panel will be in the main electric room with an LCD remote annunciator located at the Main entrance where the fire department responds to an alarm condition. Audio speakers and visual high intensity strobes alarm devices will be installed per NFPA-72. Since the building will be covered by a sprinkler system, fully automatic detection is not required. Smoke detectors will be provided only where required by Code. Fire suppression systems shall be tied to the fire alarm control panel. Interface & control modules will be provided for elevator recall, air handling unit shut down, gas shut off, door hold release, door hardware bypass and any other systems requiring control under an alarm condition. The building will be provided with a Bi-Directional Amplifier (BDA) system for emergency responders. The BDA system will have capabilities to boost fire department and police department radio communications within the building.

Telecommunications

Telecommunications services will be brought to the new school building via a new underground duct bank system consisting of buried conduits and manholes and/or hand holes to facilitate cable pulling and provide a secure cable path from the street to the new telecommunications entrance facility.

Hazardous Materials

As expected for a building of this age, there are significant hazardous materials present, despite prior abatement activities that have occurred over the years. For a detailed report on the materials to be abated prior to building demolition, see Section 3.1.4.10.

Capacity Constraints

The capacity noted in the MSBA Enrollment Projection indicates a base design capacity of 1,000 students. This total enrollment and the corresponding space will be provided for within the new construction of this Alternative.

Program Delivery Impediments

The pedagogical requirements of a modern comprehensive high school will be provided for within the new construction of this Alternative.

Schedule Overview

Alternative 3a would be implemented over twenty-four (24) months; and would be phased over potentially two and a half (2.5x) school years. This Alternative would allow the project to be completed by Fall of 2026.

Cost Overview

The estimated construction cost for Alternative 3a is:

$142,776,664

The estimated project cost for Alternative 3a is:

$181,684,763

Conclusion

The Pros and Cons of Alternative 3a are summarized as follows:

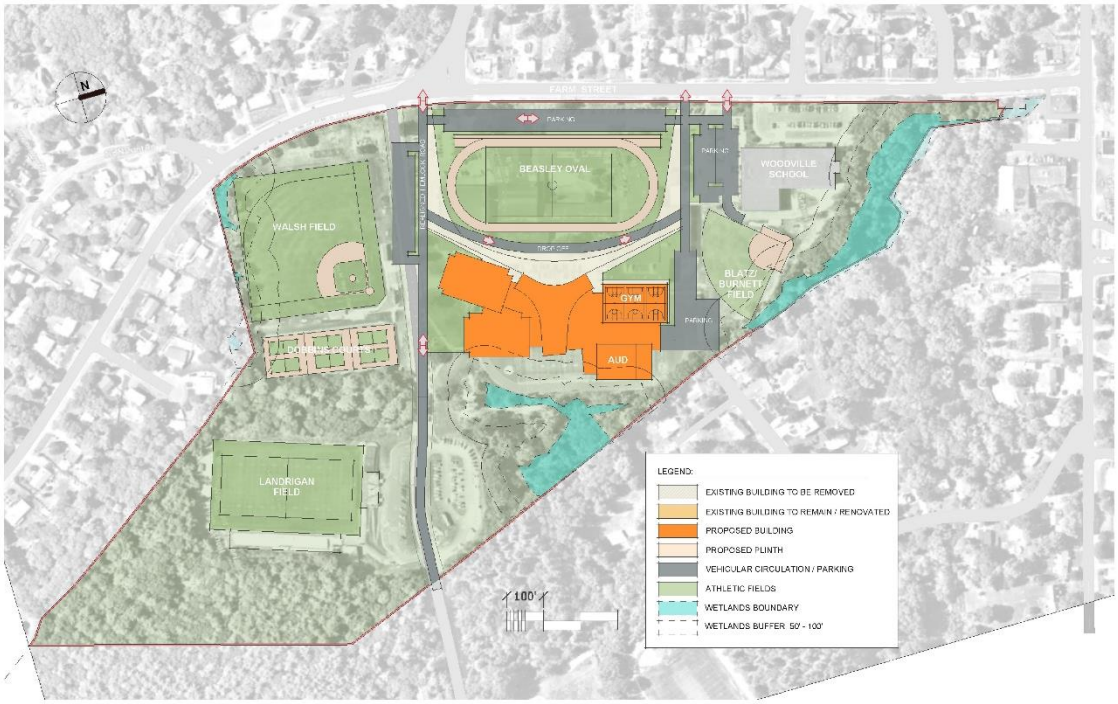
Pros

- All new school
- All new track and field facilities
- Requires no swing space or temporary mods
- High potential for meeting community design and image goals
- Greatest potential energy conservation and lower operating costs
- Provides many educational programming needs
- Space and flexibility is provided for possible growth in student population
- Model program results in reduced design fees and schedule

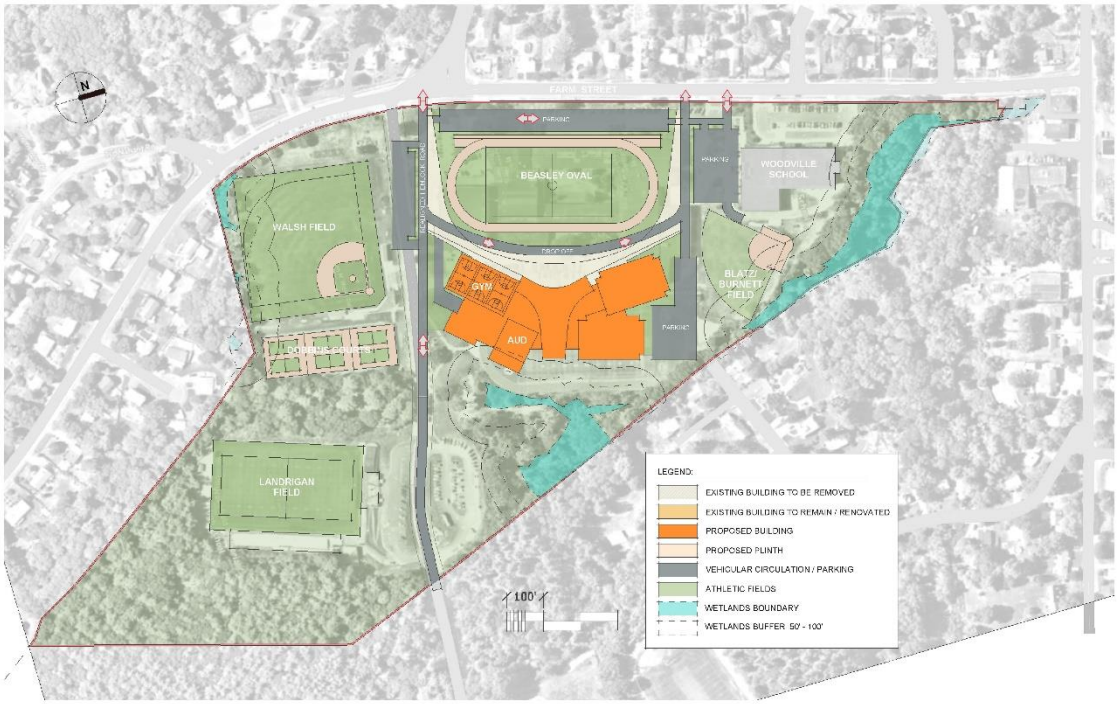
Cons

- Model school does not provide all aspects of the desired program
- Slightly less prominent school presence from Farm Street

Alternatives 3b and 3c: New Construction on Beasley Oval



3b – New School Construction on Beasley Oval



3c – New School Construction on Beasley Oval

Description

Alternatives 3b and 3c include new construction of approximately 275,900 gross square feet on Beasley Oval. The configuration of the new construction will feature preferred programmatic adjacencies with three-story academic pods, optimized for best fit to avoid phased construction. For school and community use the major public use spaces would be located towards the front with athletics and Physical Education with their required support spaces in one wing and the fine and performing arts co-located around the Auditorium in another wing. The library media center is also a primary public use space and together with the auditorium and Gymnasium can be organized to connect to the cafeteria/commons as a major community gathering space.

The primary entry elevation in these options faces Farm Street, although at a greater distance than the current school. The gym in Alt 3b is located on the northwest corner of the building to be adjacent to Beasley Oval, which will be reconstructed on the current high school footprint. Alt 3c moves the gym to the southwest corner to be more central to all fields. The schemes entail significant regrading and retaining walls to negotiate the approximately 10-foot drop in grade from Farm Street to Beasley Oval. Access to the rear of the building is limited by the presence of wetland resources.

Life Safety Code Compliance

All spaces and systems will be designed to meet current life safety codes and standards.

Accessibility Code Limitations

All spaces, systems, fixtures and equipment will be new, and designed to meet current accessibility codes and standards.

Energy Code Compliance

All roofs, walls, windows, doors and systems will be new, and designed to meet current energy codes and standards.

See Alternative 3a for a detailed description of the following: Site, Structural, HVAC, Plumbing, Fire Protection, Electrical, Fire Alarm, Hazardous Materials, Capacity Constraints, and Program Delivery Impediments.

Schedule Overview

Alternatives 3b and 3c would each be implemented over twenty-four (24) months; and would be phased over potentially two and a half (2.5x) school years. This Alternative would allow the project to be completed by Fall of 2026.

Cost Overview

The estimated construction costs for Alternatives 3b and 3c alternatives are:

$179,320,511

The estimated project costs for Alternatives 3b and 3c are:

$225,902,818

Conclusion

The Pros and Cons of Alternatives 3b and 3c are summarized as follows:

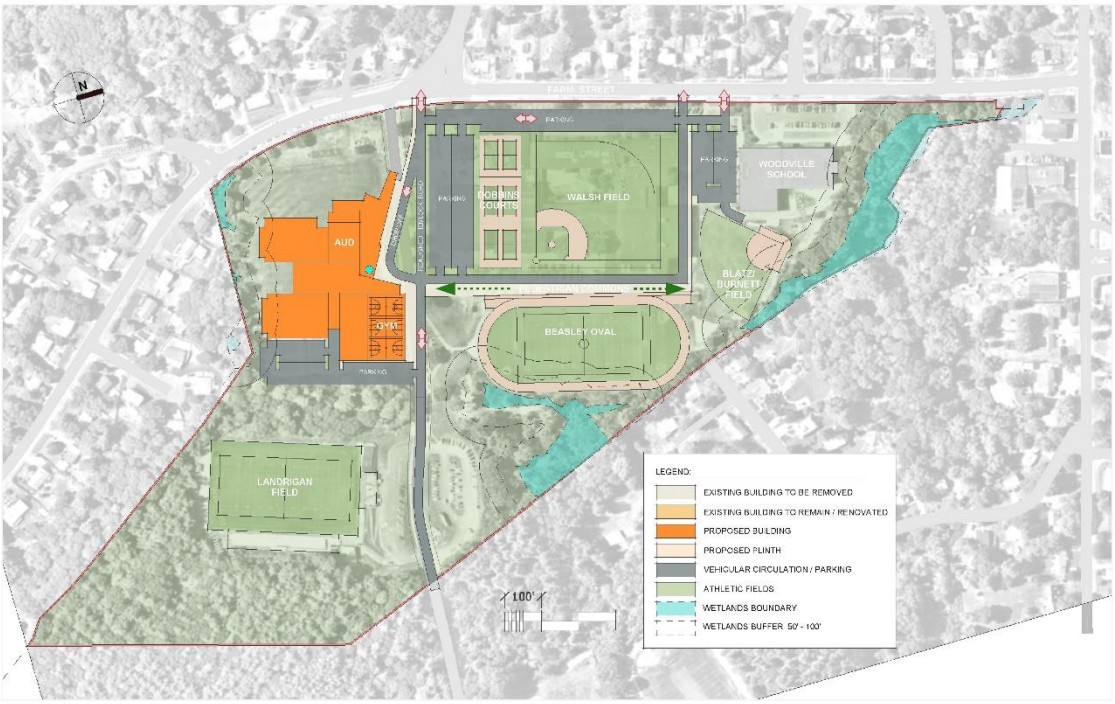
Pros

- All new school
- All new track and field facilities
- Requires no swing space or temporary mods
- Best potential for meeting community design and image goals
- Greatest potential energy conservation and lower operating costs
- Best response to educational programming needs
- Space and flexibility is provided for possible growth in student population
- Most economical cost per square foot of construction

Cons

- Proximity to wetland resource area limits access to rear of building
- Higher project cost than renovation or model school options
- Available site proportions not conducive to highly optimized solar orientation

Alternative 4a: New Construction (Model School) on Walsh Field



4a – Model School Construction on Walsh Field

Description

New construction on Walsh Field of a model school based on North Middlesex Regional High School, with enlargements to accommodate enrollment of 1,000 students and an 18,000 sf gymnasium. The building is placed for best fit on a site constrained by the existing Hemlock Road to the north and wetland resources to the south. The configuration of the new construction will feature three-story academic pods organized to support interdepartmental communication and collaboration. The primary entry elevation in this option faces north but is still highly visible from Farm Street. Walsh Field and Dobbins Tennis Courts will be reconstructed on the current high school footprint, with significant regrading and retaining walls to negotiate the approximately 10-foot drop in grade from Farm Street to Beasley Oval. Access to the rear of the building is limited by the presence of wetland resources.

Life Safety Code Compliance

All spaces and systems will be designed to meet current life safety codes and standards.

Accessibility Code Limitations

All spaces, systems, fixtures and equipment will be new, and designed to meet current accessibility codes and standards.

Energy Code Compliance

All roofs, walls, windows, doors and systems will be new, and designed to meet current energy codes and standards.

See Alternative 3a for a detailed description of the following: Structural, HVAC, Plumbing, Fire Protection, Electrical, Fire Alarm, Hazardous Materials, Capacity Constraints, and Program Delivery Impediments.

Site

Refer to Section 3.1.5, Site Development Requirements.

Schedule Overview

Alternative 4a would be implemented over twenty-four (24) months; and would be phased over potentially two and a half (2.5x) school years. This Alternative would allow the project to be completed by Fall of 2026.

Cost Overview

The estimated construction cost for Alternative 4a is:

$141,449,352

The estimated project cost for Alternative 4a is:

$180,078,716

Conclusion

The Pros and Cons of Alternative 4a are summarized as follows:

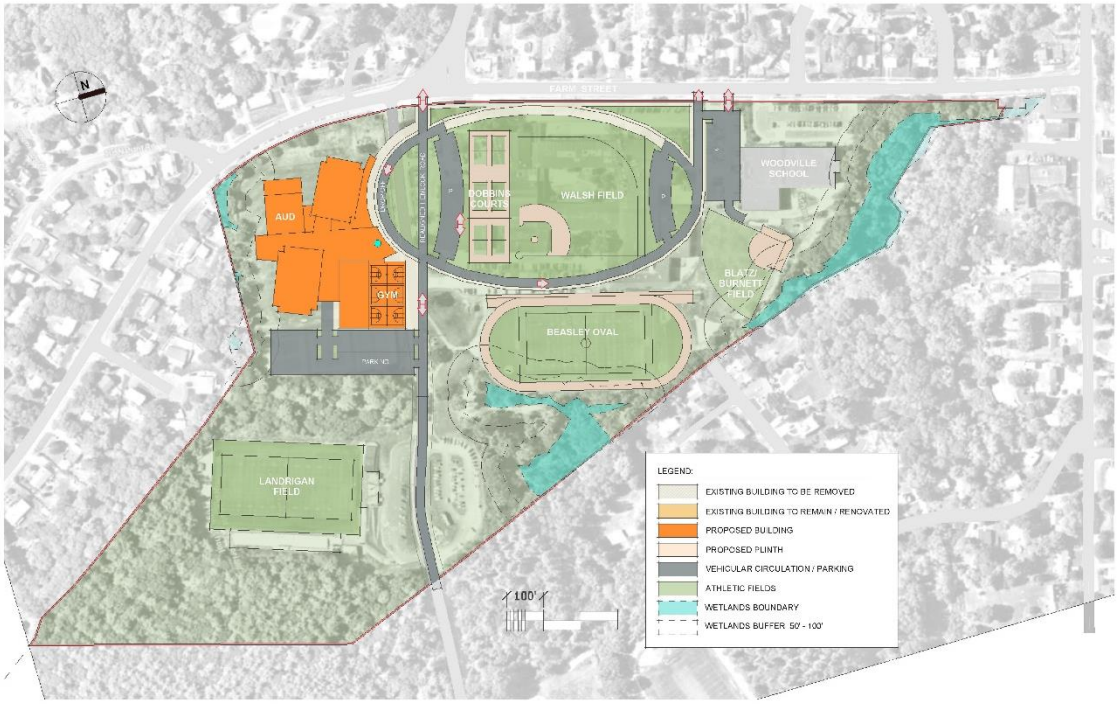
Pros

- All new school
- Requires no swing space or temporary mods
- High potential for meeting community design and image goals
- Increased energy conservation and lower operating costs
- Provides many educational programming needs
- Model program results in reduced design fees and schedule

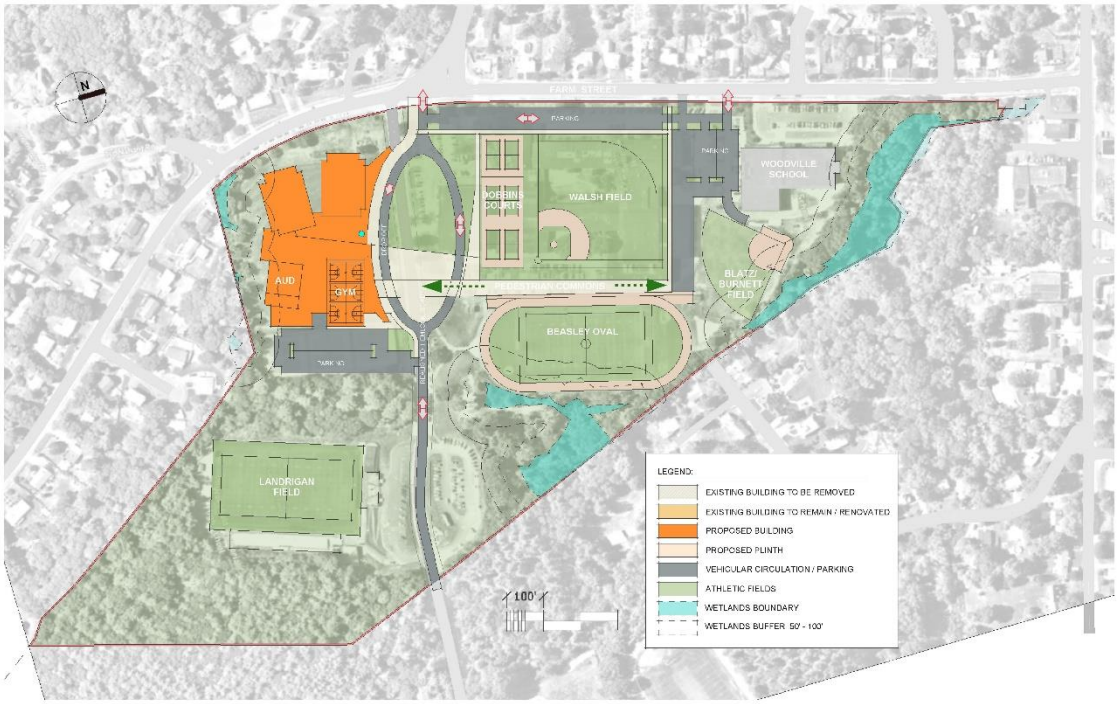
Cons

- Model school does not provide all aspects of the desired program
- Constrained site with little capacity for vehicular queuing off Farm Street
- Proximity to wetland resource area limits service access to rear of building
- Diminished school presence from Farm Street
- More investigation needed to understand geotechnical factors and potential impact of existing culvert under Walsh Field

Alternatives 4b and 4c: New Construction on Walsh Field



4b – New School Construction on Walsh Field



4c – New School Construction on Walsh Field

Description

Alternatives 4b and 4c include new construction of approximately 275,900 gross square feet on Beasley Oval. The configuration of the new construction will feature preferred programmatic adjacencies with three-story academic pods, optimized for best fit on a constrained site. For school and community use the major public use spaces would be located towards the front with athletics and Physical Education with their required support spaces in one wing and the fine and performing arts co-located around the Auditorium in another wing. The library media center is also a primary public use space and together with the auditorium and Gymnasium can be organized to connect to the cafeteria/commons as a major community gathering space.

The primary entry elevation in this option faces north, although it is highly visible from Farm Street. The gym is located on the northeast corner of the building to be central to athletic fields. Walsh Field and Dobbins Tennis Courts will be reconstructed on the current high school footprint, with significant regrading and retaining walls to negotiate the approximately 10-foot drop in grade from Farm Street to Beasley Oval. Access to the rear of the building is limited in both alternatives by the presence of wetland resources. Alternative 4c incorporates an elongated driveway along Hemlock Road to maximize queuing length and alleviate traffic congestion at the Farm Street intersection.

Life Safety Code Compliance

All spaces and systems will be designed to meet current life safety codes and standards.

Accessibility Code Limitations

All spaces, systems, fixtures and equipment will be new, and designed to meet current accessibility codes and standards.

Energy Code Compliance

All roofs, walls, windows, doors and systems will be new, and designed to meet current energy codes and standards.

See Alternative 3a for a detailed description of the following: Structural, HVAC, Plumbing, Fire Protection, Electrical, Fire Alarm, Hazardous Materials, Capacity Constraints, and Program Delivery Impediments.

See Alternative 4a for a detailed description of Site considerations.

Alternative 4b would be implemented over twenty-four (24) months; and would be phased over potentially two and a half (2.5x) school years. This Alternative would allow the project to be completed by Fall of 2026.

Cost Overview

The estimated construction cost for Alternatives 4b and 4c is:

$184,179,848

The estimated project cost for Alternatives 4b and 4c is:

$231,782,616

Conclusion

The Pros and Cons of Alternatives 4b and 4c are summarized as follows:

Pros

- All new school
- Requires no swing space or temporary mods
- Best potential for meeting community design and image goals
- Greatest potential energy conservation and lower operating costs
- Best response to educational programming needs
- Space and flexibility is provided for possible growth in student population
- Most economical cost per square foot of construction

Cons

- Constrained site with little space for vehicular queuing off Farm Street
- Proximity to wetland resource area limits access to rear of building
- Higher project cost than renovation or model school options

7. 3 Distinct Alternatives

Table of Alternatives

All eleven construction alternatives were developed to understand scope and schedule and then were evaluated with cost estimates.

Alternative	Description	WMHS School Site	Beasley Oval Site	Walsh Field Site
1	Code Upgrade and Repair	250,430 gsf	Remains in use	Remains in use
2a	Addition/Renovation	256,900 gsf	Modulars, then returns to use	Remains in use
2b	Addition/Renovation	256,900 gsf	Modulars, then returns to use	Remains in use
2c	Addition/Renovation	Field House Renovation	Remains in use	256,900 gsf
2d	Addition/Renovation	Field House Renovation	Remains in use	256,900 gsf
3a	New Construction*	Replace Beasley Oval	209,228 gsf	Remains in use
3b	New Construction	Replace Beasley Oval	275,900 gsf	Remains in use
3c	New Construction	Replace Beasley Oval	275,900 gsf	Remains in use
4a	New Construction*	Replace Walsh Field	Remains in use	198,126 gsf
4b	New Construction	Replace Walsh Field	Remains in use	275,900 gsf
4c	New Construction	Replace Walsh Field	Remains in use	275,900 gsf

*Model school option

Cost Summary Table

Option		Description	Approx. Area	Construction Cost Cost per Sq Ft.	Estimated Project Cost
BASE	1	Repair Only	250,430 SF	$119,778,967 $478.29	$154,160,928
RENOVATION/ADDITION	2a	Renovation/Addition	256,900 SF	$169,843,682 $661/SF	$218,091,166
	2b	Renovation/Addition	256,900 SF	$169,234,757 $659/SF	$217,336,055
	2c	Renovation/Addition Walsh Field + Existing Gym	256,900 SF	$173,902,325 $677/SF	$224,563,883
	2d	Renovation/Addition Walsh Field + Existing Gym	256,900 SF	$169,082,906 $658/SF	$218,587,803
NEW CONSTRUCTION	3a	New Construction Beasley Oval - Model School	209,228 SF	$142,776,664 $682/SF	$181,684,763
	3b	New Construction Beasley Oval	275,900 SF	$179,320,511 $650/SF	$225,902,818
	3c	New Construction Beasley Oval	275,900 SF	$179,320,511 $650/SF	$225,902,818
	4a	New Construction Walsh Field - Model School	198,126 SF	$141,449,352 $714/SF	$180,078,716
	4b	New Construction Walsh Field	275,900 SF	$184,179,848 $668/SF	$231,782,616
	4c	New Construction Walsh Field	275,900 SF	$184,179,848 $668/SF	$231,782,616

Evaluation Matrix

Twenty-one distinct criteria were developed by the PBC/SBC and design team to identify the efficacy of each of the eleven alternatives in delivering educational, building performance, community use, site, sustainability and schedule goals.

EDUCATIONAL	
MEETS EDUCATION NEEDS FOR ALL STUDENTS	Provides all spaces outlined in the Education Plan and Space Summary to accommodate educational, social, emotional, and physical needs of all building users.
OPTIMAL CONFIGURATION & ADJACENCIES	Building plan meets needs for desired agencies as expressed by WPS.
PROVIDES FLEXIBILITY FOR FUTURE GROWTH	Building can be expanded at a later time.
ABILITY TO MEET EDUCATIONAL VISIONING GUIDING PRINCIPLES	1. Integration & Synergy 2. STEM/STEAM 3. Visible Learning 4. Adaptability, Flexibility & Utility 5. School as a Community Resource 5. Indoor/Outdoor Connections
BUILDING	
OPTIMAL SOLAR ORIENTATION FOR CLASSROOMS	Optimal layout for classrooms is to access north or south light (classroom bar that is east/west)
BUILDING SYSTEMS & ENVELOPE EFFICIENCY	Will building design accommodate systems and envelope efficiency to achieve low operating costs (relative to baseline)
SCHOOL PRESENCE ON FARM STREET	School building is easily visible from the main roadway
COMMUNITY	
PROVIDES SPACE FOR COMMUNITY USE & SEPARATE ACCESS	Ease with which portions of the school building can be secured for use after hours
DISRUPTIONS TO NEIGHBORS AND ABUTTERS (CONSTRUCTION)	How does proposed design impact neighbors and abutters?
SITE AREA AVAILABLE FOR FUTURE 30,000 SF FIELD HOUSE	Site can accommodate a 30,000 SF field house
SITE	
SUFFICIENT NUMBER OF PARKING SPACES PROVIDED	Does proposed parking count meet or exceed existing?
PARKING IS LOCATED WHERE NEEDED	Spaces are dispersed to serve all building and site amenities
ALLOWS FOR HEMLOCK RE-ALIGNMENT	Plan includes Hemlock re-alignment
ADDITIONAL BUILDING/SITE INFRASTRUCTURE REQUIRED	Refers to accommodations such as a bridge over Hemlock (Option 2c) and the structured plinth in (Options 2b, 2c)
PROXIMITY TO RESOURCE AREA	May require wetlands replication to accommodate building in this location and/or impacts the ability to layout program spaces optimally
ALLOWS FOR ADEQUATE VEHICULAR ACCESS	For emergency vehicle assess.
ATHLETIC FIELD RE-CREATION REQUIRED	Required in Options 3 and 4.
SUSTAINABILITY	
ENERGY EFFICIENT	Meets code requirements and meets MSBA criteria for additional reimbursement
OPTIMIZES PASSIVE SOLAR ORIENTATION	Optimizes north and south facing spaces that require natural light and ventilation which can optimize passive heating and cooling.
SCHEDULE	
REQUIRES SWING SPACE (MODULAR CLASSROOMS)	Requires the use of temporary modular classrooms
REQUIRES PHASING	Longer construction timeframe due to phasing complexity

NOTE: The attached matrix uses GREEN (favorable), YELLOW (neutral) and RED (unfavorable) color coded fields to provide a visual indication of the identified “pros and cons” for each alternative that was refined through thoughtful discussion and debate by the building committee, leading to a preference for three distinct alternatives.

SMMA

WAKEFIELD MEMORIAL HIGH SCHOOL
OPTIONS MATRIX

OPTION	1	2a	2b	2c	2d	3a	3b	3c	4a	4b	4c
SITE	Existing HS	Existing HS	Existing HS	Walsh Field + Exist. Field House	Walsh Field + Exist. Field House	Beasley Oval	Beasley Oval	Beasley Oval	Walsh Field	Walsh Field	Walsh Field
EDUCATIONAL											
MEETS EDUCATION NEEDS FOR ALL STUDENTS											
ALLOWS FOR OPTIMAL CONFIGURATION & ADJACENCIES											
PROVIDES FLEXIBILITY FOR FUTURE GROWTH											
ABILITY TO MEET EDUCATIONAL VISIONING GUIDING PRINCIPLES											
BUILDING											
OPTIMAL SOLAR ORIENTATION FOR CLASSROOMS											
BUILDING SYSTEMS & ENVELOPE EFFICIENCY											
SCHOOL PRESENCE ON FARM STREET											
COMMUNITY											
PROVIDES SPACE FOR COMMUNITY USE & SEPARATE ACCESS											
DISRUPTIONS TO NEIGHBORS AND ABUTTERS (CONSTRUCTION)											
SITE AREA AVAILABLE FOR FUTURE 30,000 SF FIELD HOUSE											
SITE											
SUFFICIENT NUMBER OF PARKING SPACES PROVIDED											
PARKING IS LOCATED WHERE NEEDED											
ALLOWS FOR HEMLOCK RE-ALIGNMENT											
ADDITIONAL BUILDING/SITE INFRASTRUCTURE REQUIRED											
PROXIMITY TO RESOURCE AREA											
ALLOWS FOR ADEQUATE VEHICULAR ACCESS											
ATHLETIC FIELD RE-CREATION REQUIRED											

SMMA

WAKEFIELD MEMORIAL HIGH SCHOOL
OPTIONS MATRIX

OPTION	1	2a	2b	2c	2d	3a	3b	3c	4a	4b	4c
SUSTAINABILITY											
ENERGY EFFICIENT											
OPTIMIZES PASSIVE SOLAR ORIENTATION											
SCHEDULE											
REQUIRES SWING SPACE (MODULAR CLASSROOMS)											
REQUIRES PHASING											
	KEY:		FAVORABLE		NEUTRAL		UNFAVORABLE				

Overall Conclusions

The addition/renovation Alternative 2a and new construction Alternative 3b represent the best and most cost-effective opportunities to meet the project goals and educational program. Alternative 1 is proposed to also be advanced into the Preferred Schematic Report as a significantly lower cost option. Therefore, the Town has determined that the following 3 distinct alternatives will continue to be explored:

- Alternative 1 Code Upgrade & Repair
- Alternative 2a Addition/Renovation on Existing Footprint
- Alternative 3b New Construction on Beasley Oval