3.3.3 Final Evaluation of Alternatives

3.3.3 Final Evaluation of Alternatives

A. Summary of Alternatives (including cost and schedule)

Multiple construction alternatives for a grade 9-12 high school with enrollment of 1,395 students were developed and evaluated as part of the final evaluation of alternatives, including a base code upgrade option, three renovation and addition options, and one new construction alternative – that has a version both with and without a new stand-alone natatorium as required by MSBA Project Advisory 96. The alternatives explore opportunities and constraints of building on the existing Medford High School site and the surrounding athletic fields. The following sections provide a description of each construction alternative advanced through the PSR phase. A cost estimate, provided by AM Fogarty is included in Appendix G.

	A. Code Upgrade	B. Reno & Addition	C. Reno & Addition			D. New Const. Multi-Phase	
	A.1	B.1.2	C.2.2A	C.2.2A-HS	C.3.4A	D.1.1	D.1.1NP
Total Project Cost	$529M	$811M	$795M	$697M	$807M	$766M	$742M
Construction Duration (Months)	60	90	80	80	80	81	81
# of Phases	3	3	3	3	3	3	3
Building Location	Existing Footprint	Existing Footprint	Existing Footprint & Fields	Existing Footprint & Fields	Existing Footprint & Fields	Parking Lot & Existing Footprint	Parking Lot & Existing Footprint
Modulars Required	56	56	0	0	0	0	0
							

Summary of Construction Alternatives and Project Cost

All Project Costs identified below are for the School Building Educational Program and site. The Code Upgrade Alternative only includes a replication of the existing program spaces. All Addition / Renovation and New Construction Alternatives aside from C.2.2A-HS include gross floor area and costs to support all programs associated with Grades 9-12 curriculum, as well as the program elements in the "Other" space category from the Summary of Spaces. The C.2.2A-HS Alternative includes only those program elements associated with Grades 9-12 curriculum.

Alt. A Code Upgrade	A.1
Total Project Cost	$529M
	

Alt. B Reno & Addition	B.1.2
Total Project Cost	$811M
	

Alt. C Reno & Addition	C.2.2A	C.2.2A-HS	C.3.4A
Total Project Cost	$795M	$697M	$807M
			

Alt. D New Const. Multi-Phase	D.1.1	D.1.1NP
Total Project Cost	$766M	$742M
		

B. Code Upgrade (No-New Build)

Construction Alternative A.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 four-story high school is approximately 522,200 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:

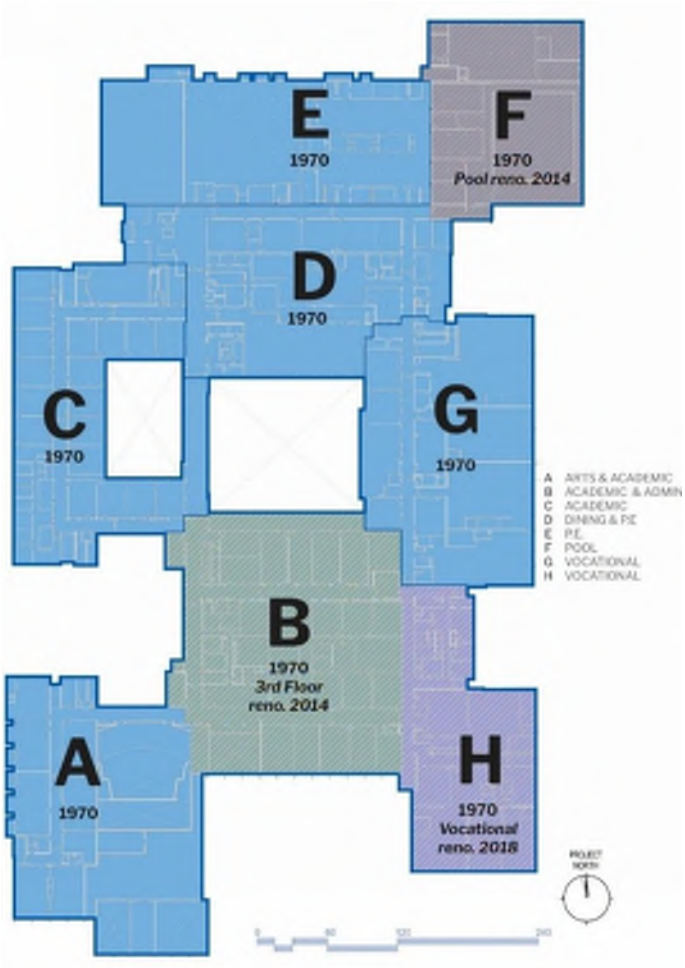
- Life safety code compliance
- Accessibility code limitations
- Energy code compliance
- Physical plant deterioration
- Hazardous materials
- Capacity constraints

Life Safety Code Compliance

Stair guardrails do not meet minimum opening size requirements, nor require heights, nor provide adequate edge protection 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.

Accessibility Code Limitations

- In general, the following items will be addressed in this alternative:
- Lower than required guardrails and handrails for ramps and stairs, without proper extensions
- Insufficient push/pull floor clearances at some doors
- Lack of ADA Door operators at most exterior entry doors
- Inaccessible seating locations in the theater and lecture halls
- Most drinking fountains are non-compliant (aside from those located in the 3rd floor B Wing science renovated area)
- Most toilet fixtures, lavatories and sinks are non-compliant (aside from those located in the 3rd floor B Wing science renovated area)
- Insufficient grab bars at most toilet rooms and all showers
- Exposed piping below sinks has neither compliant aprons nor pipe protections
- Lack of 5'-0" clear turning circle at some toilet rooms
- Non-accessible lavatory and sink faucets
- Non-compliant height at some urinals



Key Plan. High School Wings and Dates of Renovations

Energy Code Compliance

The City of Medford has adopted the Massachusetts Stretch Energy Code's Specialized Opt-In Code. The Code Upgrade option would require compliance with the Stretch Energy Code (Standard), as the Specialized Code does not apply to existing buildings. Enclosure Upgrades, MEP Systems upgrades will be required to comply with the Stretch Energy Code, with an Energy Use Intensity (EUI) target of 35 KBtu/SF/Yr. Building Enclosure upgrades will include mitigation of thermal bridges.

Site

Site work in this option focuses on meeting current accessibility codes. This includes providing an accessible walkway or ramp with a code compliant landing at the main entry doors. Existing walkways, ramps, guardrails, and handrails that do not meet current ADA standards would be replaced. Accessible routes from the designated accessible parking spaces to the main entrance would also be provided. Bituminous paving in the parking lot would need to be resurfaced. Stormwater systems would need to be brought into compliance with the Medford Stormwater Management Rules and Regulations, including water quality units and treatment practices to remove pollutants.

Architectural

On the exterior of the building, localized repointing and general cleaning of exterior masonry brick and exposed cast in place concrete will occur. Replacement of all exterior windows will be required with triple-glazed energy efficient units. Replacement of all exterior hollow metal doors and frames. Complete replacement of all membrane roofing (including different vintages), providing a high-albedo membrane roof with an energy code-compliant thickness of insulation. Given the lack of thermal insulation in the exterior walls, insulation will be added to the interior face of the exterior walls, mounted between the interior face of the exterior walls and added interior metal stud furring with a painted gypsum board finish and a "smart" one way vapor barrier behind it.

Any non-code compliant door hardware will be replaced with compliant hardware. Any non-code compliant door clearances will be addressed through the use of powered operators and actuator buttons.

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.

Interior masonry partitions that are located along structural grid lines (assume 30% throughout the building) will need to be demolished to allow for the installation of lateral system braces that need to be added to the existing structural frames. The partitions will be rebuilt as double stud interior partitions, each with two layers of gypsum board on each side of the partition, and with acoustic batt insulation within the stud cavities.

As noted in the Accessibility Code Limitations portion of this section, several spaces located throughout the school have inaccessible seating areas, due to tiers in the original lecture halls and inaccessible slopes and a balcony without dedicated elevator access in the auditorium. Cut-outs will be added in the front row of tiers to create inclusive seating positions down low, and ramps, a limited use limited access lift (LULA) and elevated seating positions will be added in the auditorium. 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

Existing foundations and floor and roof framing will typically remain. At areas of steel framing at the roof, the tectum roof panels will be replaced with steel roof deck. Any areas of local slab on grade settlement will be reviewed further after geotechnical investigations and repaired. All exterior precast façade cracks and exposed rebar will be repaired. All cracks in interior non-load bearing CMU walls will be repaired. Any unreniforced masonry chimney or parpet extending 4 feet above the roof structure will be removed, have bracing installed, or anchored as needed to resist out-of-plane seismic forces. The weight of any new rooftop equipment (including PV panels) will be compared to the removal of old equipment to determine if structural reinforcement of the roof framing is required. Without existing drawings for the majority of the building, field testing and signficant structural measurements of existing members is required.

All infill non-load bearing masonry walls will be seismically braced at the top of walls. New steel framing for floor and roof openings will be required at any new MEP shafts.

The pool deck concrete slab with exposed rebar requires repair, as well as other concrete beam and masonry wall cracks in the building.

The majority of the structural upgrades includes providing a new lateral system, as there is currently not a defined lateral system indicated in the existing drawings. Each Wing of the building requires multiple lateral frames in both directions. The expansion joints between the Wings will be increased to allow for proper movementment between isolated Wings. The lateral system will be either steel braced frames and/or infill concrete/CMU shear walls. New foundations below the new shear walls or modifications of existing foundations below the new lateral members is expected. The seismic upgrade will require thorough field investigations of the existing structure as existing drawings for most of the building are not available.

HVAC

The existing HVAC systems will be replaced with new, all-electric systems to comply with the current Massachusetts Stretch Energy Specialized Opt-In Code, as adopted by the City of Medford. A specific system approach is represented below, but alternative space heating and cooling approaches will be assessed to determine the preferred system.

Phased construction will require ongoing operation of portions of the existing HVAC systems to support the continued occupancy of existing building areas. Temporary measures will be included to ensure proper indoor air quality of existing spaces while construction occurs in nearby areas of the site (e.g., added filtration at outdoor air intakes or extending existing outdoor air intakes to be clear of construction zones).

The new heating and cooling systems will be based on a ground source geothermal system utilizing vertical boreholes. The geothermal loop will be 40% propylene glycol with distribution from a system of variable volume pumps in a mechanical room. Plate and frame heat exchangers will separate the ground source loop from the interior water loop and associated pumping system, which will support mechanical heating and cooling systems. Space heating and cooling will utilize above-ceiling heat pumps for classrooms and support spaces. Larger spaces will be supported by AHUs with water-source heat pumps.

Ventilation will be provided with rooftop DOAS units, configured with water-source heat pumps for conditioning of outdoor air to the classrooms and support spaces. VAV terminal units will manage ventilation to individual rooms based on CO2 control. Specialty systems will be included for ventilation of Science Labs, Kitchens, Kilns, Vocational spaces and other such installations. A new DDC building management system will provide control and monitoring of the HVAC systems and monitoring of selected Plumbing and Electrical equipment and metering. The Pool Building will be supported with a new electric boiler.

Plumbing

Most of the original plumbing systems installed are nearing the end of life although some of the systems/equipment have been upgraded or replaced over the years. The major piping systems from visual inspection appear in working conditions although they appear original to the building. Many of the fixtures appear to be in fair condition; however, they are dated and do not meet current ADA accessibility requirements.

Water piping in general appears to be in fair to poor condition. Due to the pipe age, there is a strong probability that the water service includes lead-containing solder. Water quality should be tested for lead contamination. If presence of lead is confirmed the domestic water system would require replacement throughout to meet current lead-free requirements. Portions of domestic water system that are not insulated will need to be insulated to meet the current Massachusetts Energy Code.

All the domestic heating equipment will be electric; no fossil fuel will be used. The natural gas system for domestic hot water will be removed and replaced with electric equipment. Strategic phasing will be required to ensure hot water systems stay operational for all currently used spaces. Natural gas to kitchen and science classrooms will remain. An automatic shutdown with manual reset gas valve and interlocked with CO detectors will be installed in kitchen to comply with current code.

Sanitary and vent pipe will be flushed and pressure jet to clean all piping from debris. Provide video inspection for the integrity of all under slab sewer piping. Repair any aged or corroded pipe. All the indoor grease interceptors will be replaced.

Secondary roof drains (emergency overflow) or scuppers will be provided where roof perimeter construction extends above the roof. All the roof drains' bodies will be replaced. Provide video inspection for the integrity of all under slab sewer piping. Repair any aged or corroded pipe.

Most of the plumbing fixtures throughout the facility do not employ current water saving features. All lavatories qualifying as "public" lavatories will need to be provided with individual mixing valves below the fixture to reduce hot water discharge temperature to 110°F maximum per 248CMR.

All the fixtures that are non-ADA compliant will be replaced with ADA compliant fixtures. All the fixtures, including handicap-accessible fixtures, will be replaced with water conserving handicap-accessible fixtures throughout the building in compliance with current code. Replace all mop receptors and janitor sinks with new fixtures and provide backflow protection for soap dispensers to comply with code. Replace all electric water coolers with new ADA water cooler and bottle filling station.

Fire Protection

The existing 8" fire water service with 8" backflow preventer and 8" wet alarm check valve will remain. The entire building shall be protected throughout with a wet automatic fire suppression system and fed from the existing 8" Wet Riser Check Valve in the mechanical room Area G. The system will be a wet sprinkler system with control valve assemblies in multiple standpipe risers to limit the sprinkler area controlled to less than 52,000 s.f. as required by NFPA 13-2019. Each floor control station consists of a monitored shut-off valve, flow switch and an Inspector's test valve and sight glass.

Construction of the project will take place in phases. The fire protection system installation shall be carefully coordinated with each phase to ensure that life safety protection is maintained throughout construction.

System tie-ins, shutdowns, and transitions will be planned and coordinated with the Owner and the local Fire Department to avoid unnecessary disruption and to maintain compliance at all times.

A Manual Class I standpipe system shall be installed in accordance with NFPA Standard 14, 2019, and local Fire Department requirements. Standpipes will be located in each required egress stairway, and adjacent to the Stage. 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.

A new hydrant flow test was conducted, and based on the results, a Fire pump is not required.

Elevator Machine rooms and hoist ways will not be protected with automatic sprinklers in accordance with 780 CMR.

Sprinkler heads in areas with finished ceilings will be 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 Gym will be provided with Wire guards. Dry pipe system will be provided in areas subject to freezing.

A roof manifold will be provided at each roof level with a two-story or greater height.

Electrical

Utility Interconnection

The existing utility service will be replaced and upgraded to accommodate the new program, which includes an all-electric HVAC system, electric vehicle (EV) charging stations in a minimum of 10% of the total new off-street parking spaces (per zoning bylaws), provisions for future installation of EV charging stations for a minimum of 20% of the total new off-street parking spaces (per zoning bylaws), code required provisions for photovoltaic arrays, and battery energy storage systems (BESS). The electrical infrastructure to interconnect these systems will require additional coordination with utility, however early assumptions can include:

Utility reclosure cabinet

All this equipment will be located on site, pad-mounted with underground conduit pathways. A screen wall to visually separate the electrical gear from street views will be required per zoning bylaws.

- CT / Metering cabinet (upstream of entire campus electrical interconnections)
- 15,000 Volt switchgear (owned by the school, operated by utility)
- Provisions for four (4) transformers (owned and operated by the school)
- Provisions for solar system interconnect switchboard for the photovoltaic panels and battery storage units.

Renewable Energy System

Based on a target EUI of 35, early estimates suggest the size of the total solar system shall be 6.5 Megawatts, along with 4.8-Megawatt-hour battery energy storage systems (BESS). The total system will be made up of both roof-mounted photovoltaic (PV) panels, and ground-mounted PV canopies.

One transformer is dedicated to the photovoltaic (PV) system, feeding a 8000 Amp 277/480 V solar switchboard. The PV system and battery storage are anticipated to be designed as AC-coupled and will interconnect at the solar switchboard. This setup will allow for independent operation of the solar panel and battery storage for efficiency and reliability.

Power Distribution System

The existing electrical service will be replaced. The existing (3) services substations, 2400-Amp, 1200-Amp, and 600-Amp, 277/480 volt 3-phase 4 wire electrical services provide a power density of approximately 5.5 watts/sf, which is estimated to be significantly undersized for an all-electric code required program.

The new distribution system will consist of two (2) 4000 Amp, 277/480V 3-phase 4 wire switchboards with new underground secondary service conductors extended to pad-mounted transformers on site. Coordination with utility will be required, however at this time it is expected that two (2) transformers will be required for the demand of the high school.

Phased construction will require on-going operation of portions of the existing electrical systems to support the continued occupancy of existing building areas.

Temporary measures will be included to ensure existing areas remain fully operational while construction occurs.

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. In the new construction areas, a system of new panelboards separated by use will be provided, located in dedicated electrical rooms throughout the building. Generally, the separate uses are lighting, mechanical and branch circuit loads.

Energy sub-metering system will be provided for monitoring all individual energy end uses that represent 10% or more of the total annual consumption of the building. Sub-meters will be connected to the new building DDC system.

Life Safety/Emergency System

The existing (2) 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and generator distribution system is past it's usable life expectancy. The two generators have been noted to be non-functional and will be replaced with a new 1500kW 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and distribution system will be provided. A docking station for a temporary roll-up generator shall be installed to allow the life safety distribution system to remain active during routine maintenance or generator failure, as well as new control wiring and pathways to comply with latest signal and wiring integrity codes. This will require excavating, replacing, and re-working the existing underground conduit between the generator and the service entrance equipment.

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

- Egress emergency lighting.
- Fire alarm system.
- IT Rooms (power and A/C) including network, door access, intrusion detection, CCTV, PA, telephones.
- Heating system as required to freeze protect the building.

- Elevators.
- Resiliency Level:
- Level 3 for the majority of building.
- Level 2, not including food prep requirement, applied to select areas of the building, such as the Gym (plan for attaching portable generator for cooking).

Lighting & Lighting Control

All new interior light fixtures with new, high efficient LED light fixtures fitted with dimmable drivers. Replace all exterior light fixtures c0076with new, high efficient LED light fixtures fitted with dimmable drivers and full cut-off optics. A new lighting control system for a new, fully networked lighting control system compliant with the latest energy code. The lighting control system shall include the capability of communicating and controlling ON/OFF 120V power to receptacles in classrooms, offices, corridors, and other spaces required by energy code.

Fire Alarm

A fire alarm system is a fully addressable voice evacuation system consisting of up to four node panels throughout the building. All new initiation and notification devices such as smoke detectors and speaker strobes will be provided. The system to communicate to the Fire Department via an antenna mounted on the roof, and an auto dialer, which is compliant with latest building codes. A bi-directional antenna (BDA) system shall be installed to comply with latest building code.

The BDA system will have capabilities to boost fire department and police department radio communications within the building.

Lightning Protection System

The existing school does not have a lightning protection system. A lightning protection system is not required by code, although is recommended by NFPA Standards. A system should be assumed to be provided as part of code upgrade and any renovation options.

Telecommunications

The existing telecommunications copper and fiber optic cable infrastructure will be replaced to support data and voice transmission. CAT6A cable will be installed to the end points, with (12) strand OM4 multi-mode and (12) strand OS2 single-mode fiber optic cabling between the main telecommunications room (MTR) and intermediate telecommunication rooms(ITRs). Existing network infrastructure electronics spaces in classrooms and storage spaces will be replaced with secure and climate-controlled rooms to better protect and maintain network electronic equipment. The MDF and IDFs will be replaced with new equipment cabinets, patch panels, and overhead cable management components.

The MDF and IDFs will be replaced with new rooms fitted with new cooling systems, lighting, and generator-backed power.

The existing Public Address and Master Clock Systems will be replaced. Classrooms and other learning spaces will be equipped with two-way talkback IP speakers. Corridors and larger spaces will be equipped with analog one-way speakers. Clocks will be synchronized and powered via low-voltage wiring. The Public Address and Master Clock systems will be interfaced at the head end.

Classroom technology infrastructure will be upgraded to provide new data and voice communications with a potential wireless access point location in the ceiling. Audiovisual cabling will be installed to allow projection of content from the instructor's computer to the wall-mounted interactive flat panel monitor.

Speech reinforcement systems will be installed in instructional spaces to provide even distribution of instructor and student speech throughout the space, as well as being interfaced to the interactive flat panel monitor to perform the audio functions for audiovisual presentations in the space. Current wireless access points will be purchased at the time of occupancy.

Security

The district recently completed a security enhancements project that included the installation of new cameras, card readers, and associated access control infrastructure at Medford High School. As part of the preliminary evaluation of alternatives for a new high school facility, an existing conditions walkthrough was performed to document current device locations and distinguish recently installed equipment from older legacy systems.

This walkthrough has provided a clear understanding of where new cameras and card readers are deployed and allows the project team to quantify the number of devices that could potentially be salvaged and reused in the new building.

Based on this inventory, selective reuse of newer cameras, card readers, and related control hardware represents an opportunity for capital cost savings and reduced procurement time.

An early assessment of device age, condition, remaining useful life, and compatibility with the proposed security platform for the new facility will be essential to confirm which components are suitable for relocation. This information can be incorporated into the cost model to more accurately reflect potential reuse credits.

Any reuse strategy should be balanced against considerations such as warranty transferability, manufacturer support for redeployed equipment, cybersecurity standards, and the long-term maintenance implications of mixing reused and new devices. Coordination with district IT and security staff will be critical to develop a phased migration plan that maximizes reuse while maintaining system reliability, scalability, and overall campus security objectives.

Acoustics

New building utility equipment will incorporate sound attenuating measures, as necessary, for compliance with the community noise emissions requirements established in the Massachusetts Division of Air Quality Control (DAQC) Policy 90-001.

Additionally, new HVAC equipment and system components will be designed for compliance with the LEED Minimum Acoustics Performance prerequisite for HVAC background noise levels in core learning spaces.

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.

Capacity Constraints

The design capacity of 1,395 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.

Educational Program Requirements Fulfillment

A code-upgrade only renovation would not fulfill the Medford High School Educational Program and plan requirements, nor would it meet the projected enrollment capacity. While this option remedies life safety and accessibility concerns, the building would remain deficient in meeting the needs of the high school's educational delivery.

The current main entrance is neither near nor adjacent to the Main Administrative offices, which are located an entire level above the main entrance. Visitors check in at a Security desk in the main lobby, which is not secure.

The majority of the General Education classrooms and all of the Science Labs would remain undersized, compared to MSBA Guidelines. The spaces are too small for the type of collaborative and hands-on differentiated instruction that the District has outlined in their educational vision. The school would also continue to lack proper staff rooms and Teacher Planning Rooms for collaborative planning of curriculum.

As the classrooms are undersized, the code-upgrade renovation would not meet the Educational Program requirements for Special Education. Medford High School strives to deliver Special Education services in the least restrictive environments possible, primarily through a co-teaching model where a Special Education teacher pushes into the classroom alongside the General Education teacher. Co-teaching and differentiated instruction requires additional physical space for adults and instructional flexibility, and currently classrooms constrain the school's ability to consistently deliver inclusive support across all of the General Education classrooms.

MHS's goals include the right sizing of existing CTE Chapter 74 programs (in some cases, expansion of program enrollment) and the addition of four new programs. A code-upgrade only renovation would not satisfy this educational goal.

The school would not gain any informal break out or collaboration spaces that is part of the educational vision.

Students would continue to gather by sitting on the floors in corridors as there are no existing spaces that facilitate peer-to-peer connections (social or educational).

The quality of the existing Physical Education spaces (from the standpoint of finishes, athletic equipment, and MEP systems perspective) is inadequate to support the school's educational goals to offer more variety in personal and lifetime fitness courses.

With only 333 seats (some of which are in need of repair and are currently unusable), the existing Auditorium would remain significantly undersized in its ability to adequately serve the current student population and the District's educational goal of 1,000 seats. The current Auditorium is well below the area outlined for this space in the MSBA Guidelines. This Alternative would also not allow for the inclusion of a Large Group Instructional spaces that could be used as a Black Box space, which is necessary to meet the District's educational goal of offering Performing and Technical Drama courses.

This Alternative would not change the lack of differentiated spaces within the footprint of the Media Center and would not support the school's goals for varied learning and seating opportunities within the space.

A code-upgrade only renovation would not meet the school's desire to expand offerings of hands-on and varied course offerings, such as Media and Technology, Digital Art/Photography or Nutrition classes, as these spaces are often larger and have specialized technology for different kinds of curriculum.

This Alternative would also retain an undersized Medical Suite, inadequate in serving the student population size.

This option would also not remedy the school's goal to consolidate the multiple Dining Commons into one centralized Dining Commons.

The Alternative would not meet the projected enrollment capacity agreed upon by MSBA and the City of Medford, as it would not be able to house programs targeted to move to the high school. As part of the Statement of Interest, and in agreement with the MSBA, the District has an educational goal of bringing the Curtis Tufts Therapuetic Day Program and the Medford Early Education Program (MEEP, an integrated Pre-K program) to the Medford High School site. A code-upgrade only option would not provide enough space to allow these programs to move into the building.

Additional space constraints are outlined in the Deficiency Plans which were provided in the PDP Report in 3.1.3 B.2.

Schedule Overview

Alternative A.1 would be implemented through multiple phases and intense summer phases over sixty (60) months.

Cost Overview

The estimated construction cost is:

$433,551,783

The estimated project cost is:

$528,933,175

Conclusion

The Pros and Cons are summarized as follows:

Pros

- Lower first costs when compared to other options which enhance the educational value of the building

Cons

Added cost and inconvenience due to modular classrooms

- The completed construction would not accommodate the future curriculum, nor the additional program elements that were identified in the Statement of Interest or envisioned in the Educational Program

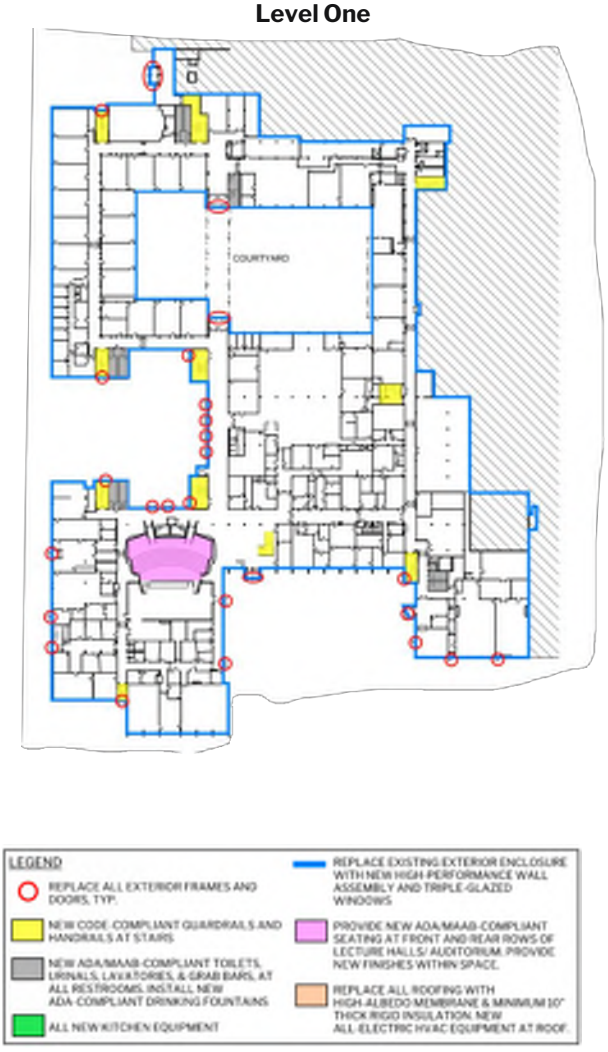
A.1 Code Upgrade Site Plan



A.1 Code Upgrade Plan Diagrams

(see Appendix H for larger diagrams and more detail)

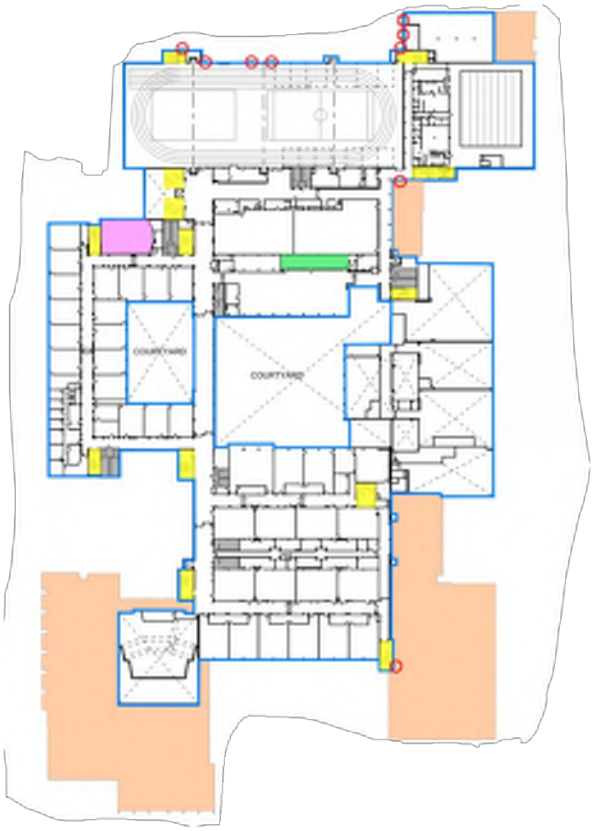
Level One



Level Two

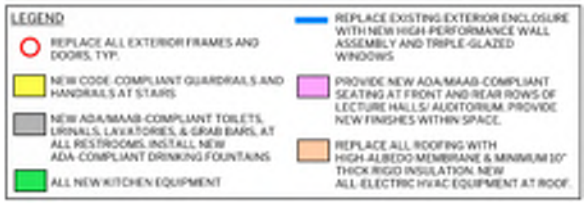


Level Three



Level Four





A.1 – Code Upgrade / Phasing

60 Months Total





Existing Building
- Site Prep / Enabling
- Existing building in use



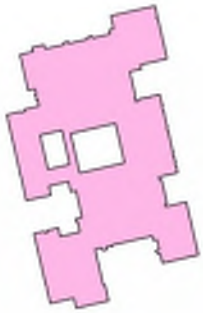
Phase 1
- Renovate C, D, E & F Wings (including Pool)
- Modular Classrooms and remainder of existing building in use



Phase 2
- Renovate G & H (Vocational) Wings
- Modular Classrooms, Phase 1 Renovation areas and remainder of existing building in use



Phase 3
- Renovate A & B Wings
- Modular Classrooms and Phase 1 & 2 Renovation areas in use



School Building Complete
- Sitework completed following building renovation
- Renovation fully occupied



0 200'

LEGEND

- STORM DRAIN TRUNK LINE
- SANITARY SEWER SERVICE TRUNK LINE
- WATER SERVICE
- GAS SERVICE

Utility Diagram| EXISTING

Medford High School, Medford MA

SMMA

SYMMES MAINI & McKEE ASSOCIATES
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C. Renovation(s) and Addition(s) to Existing Building(s)

Addition/Renovation Description (All Alternatives B and C)

The Renovations and Additions to Existing Buildings Alternatives will include compliance with the Massachusetts Specialized Stretch Energy Code with an energy target EUI of 35 kBtu/SF/yr., LEEDv5 for Schools Gold Certification goal, solar photovoltaic and battery storage systems, renewable energy, and embodied carbon reduction strategies such as low carbon concrete and building materials.

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 Compliance

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 additional portions of the building would be constructed in full compliance with current accessibility codes and standards.

Energy Code Compliance

The City of Medford has adopted the Massachusetts Specialized [Opt-in] Stretch Energy Code. The Renovations or Additions to Existing Buildings Alternative would require compliance with the Specialized [Opt-in] Stretch Energy Code, under the all-electric pathway and based on the major renovation/addition scope of work, with an Energy Use Intensity (EUI) target of 35 KBtu/SF/Yr.

MSBA Green School Policy

The Renovations or Additions to Existing Buildings Alternative would pursue LEEDv5 Certification under the MSBA Green School Policy, achieving a minimum of LEEDv5 Silver Certification.

The Renovations or Additions to Existing Buildings Alternative is planning to pursue a LEEDv5 Gold certification. The project will strive to meet the threshold of 60-69 points, equivalent to a LEEDv5 Gold rating. A Preliminary LEED scorecard is included as Appendix D.

In addition, the project plans to pursue the MSBA Green Policy additional reimbursement:

- Massachusetts Specialized Stretch Energy Code (3%)
- Optimization of LEED materials and EQ credit points (1%)
  - 5 points out of the following credits:
    - MRc3 – Low Emitting Materials
    - MRc4 – Building Product and Selection
    - EQc1 – Enhanced Air Quality
    - EQc5 – Air Quality Testing and Monitoring

Site

Site work within these addition/renovation alternatives redeveloped of all vehicular and pedestrian circulation systems. Separation between bus circulation, van circulation, car circulation, and delivery circulation wase studied, including separation of drop off and pick up areas for different modes of transportation. New outdoor student spaces, including entrance plazas, outdoor learning environments, outdoor courtyards, and connections to resource areas for education were developed for each alternative.

ADA access was studied across the site through circulation systems and outdoor gathering spaces. Emergency access around the building was a design priority.

The new parking areas will incorporate ADA and MAAB compliant accessibility from accessible parking and loading zones to all accessible building entrances.

Under Construction Alternative A.1 and B.1.2 feature nearly identical surface parking layouts as exist today, meeting the current number of parking on site currently. Most of the current on-site roads will remain as they are. Edgerly Field and the nearby practice fields will not be altered.

Construction Alternative C.2.2A, C.2.2A-HS, and C.3.4A all feature one large parking lot and several small parking areas throughout the site, fitting at least 450 spaces. Roads will be redesigned to accommodate the proposed building and parking lot layouts. In all three schemes, a smaller practice field west of the school remains, a full-size track and field is installed in the place of Edgerly field, and an additional multi-use sports field is added south of the parking lot.

ADA access will be designed across the site through circulation systems and outdoor gathering spaces. Emergency access around the building will be a priority. Site furnishings and plantings will be installed to complement the new building and site. All disturbed existing mature tree canopy will be replaced on the site with native tree species.

A new water main and sewer trunk in Steve Miller Drive will serve the new additions. Hydrants and the building will be served from the on-site distribution system. Sanitary waste will discharge via gravity to existing services in the streets. Kitchen waste will discharge via exterior grease traps sized per Title 5. A new stormwater management system will be incorporated to comply with town and state standards to improve runoff quality and mitigate runoff quantity. Utility exhibits for B1.2 and C3.4 Alternatives are included at the end of this section. Utility exhibit for Alternative C2.2A is included in section 3.3.4.

Permitting Requirements

Federal

01 Environmental Protection Agency

A Construction General Permit would be required for the B and C alternatives due to the area/size of construction activities on the site. It will be filed with the Environmental Protection Agency prior to the start of any construction activities on the site but not less than 14 days before construction begins.

State

01 Article 97 Legislature

Article 97 Legislature is not required for the B and C alternatives because there are no permanent changes to the protected portions of the site.

Alterations to the deed restricted areas, such as new parking spaces and access roads to facilitate athletic use, geothermal wells, and temporary construction uses, will be constructed with DCR's coordination and consent.

02 Massachusetts Environmental Protection Act

The review thresholds of Massachusetts Environmental Protection Act are not exceeded for the B and C alternatives.

03 Massachusetts Historic Commission

A Project Notification Form was submitted to Massachusetts Historic Commission (MHC) on June 19, 2026.

Local

01 Demolition Permit

A Demolition Permit is required for the B and C alternatives and will be filed with the city of Medford prior to the start of construction.

02 Building Permit

A Building Permit for New Construction will be for the B and C alternatives and will be filed with the city of Medford prior to the start of construction.

03 Community Development Board

Subject to site plan review by the Community Development Board. This is anticipated to occur at the beginning of Design Development and may take 8-12 weeks.

04 Conservation Commission

A Notice of Intent is required for the B and C alternatives due to the proposed disturbances within the 100-foot buffer zones of the wetlands on and around the project site. It will be filed with the City of Medford Conservation Commission during the Design Development phase, and it is anticipated to take approximately two months to complete and receive an Order of Conditions.

05 City of Medford Engineering

Steve Miller Drive and Winthrop St are public ways within the City of Medford jurisdiction. There will be ongoing coordination through Schematic Design on the storm water, water, sanitary sewer and street design.

Architectural

All exterior envelope assemblies within the areas of new construction will be designed to meet the robust thermal requirements of the Specialized Stretch Energy Code. Exterior assemblies in renovated areas of the building will be cleaned, repaired and augmented to also meet current energy code requirements. Interior assemblies and materials will be selected to provide the necessary level of durability for the expected 50 year life span of the school.

Pool Renovations

The existing walk-around pool basin would remain. A scan of the existing pool basin concrete shell will be conducted over the course of the summer when the pool is drained to determine if there are any voids in the shell due to corroded rebar. The concrete will be cut and replaced at any voids that are identified, and rebar will be replaced with new epoxy coated rebar as part of the concrete patching.

The existing mosaic tile around the pool basin will be completely re-grouted. Trench drain covers around the perimeter of the existing pool deck will be replaced. Existing ceramic wall tile around the perimeter of the pool deck will be removed and replaced with new ceramic tile, as the existing tile is cracking and delaminating in many locations. All remaining exposed surfaces in the pool space will be prepped and painted with high performance paint coatings.

Pool equipment to be replaced includes eight (8) starting blocks, seven (7) lane dividers, one (1) electronic scoreboard and one (1) heat exchanger. The existing EPD pool filtration system tanks will be rebuilt – including the replacement of the sand, sacrificial nodes, gaskets and laterals. Existing painted hollow metal doors, and both door and borrowed lite frames around the perimeter of the pool space will be replaced with Type 316 stainless steel versions of the same.

Structural

Modifications to the existing building will require thorough field investigations of the existing structure as existing drawings for most of the building are not available.

All new roof top units will require new supporting roof grillage frames constructed 3 to 4 feet above the existing finished roof. Reinforcement of the existing structure (beams, columns, and/or foundations) may also be required to support the new units.

All new roof and floor penetrations for ductwork and piping will require supplemental framing to support the existing roof and floor framing.

Any replacement or additions to utilities under the existing ground floor slab will require cutting out the existing concrete slab, excavating out and replacing utilities, and pouring a new slab. The existing ground floor slab is a combination of slab on grade and framed slabs. A larger area of removed and replaced slab at new utility locations will be required at locations of the framed ground floor slab.

Options for new stories on the existing wings will require concrete column and foundation reinforcements as well as more significant lateral upgrades for the increased building height.

An expansion joint will be located between the existing structure and addition. The existing structure will be analyzed and reinforced for gravity and lateral loads from the current building code. Refer to Code Upgrade (No-New Build) for additional information for modifications of the existing structure. The addition shall be designed for all loads mandated by the current Massachusetts Building Code at the time of permitting.

For the addition, the new foundation systems will consist of isolated reinforced concrete spread footings bearing on bedrock at column locations and conventional reinforced concrete foundation walls with continuous strip footings around the perimeter. At locations of shallow bedrock, the new ground floor level will be 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 6” slab-on-grade in the new mechanical and electrical rooms.

Framed reinforced structural slabs will be included at locations of deeper bedrock. Elevator pits will be 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 framing to wide flange steel columns. The floor slabs will be 2" x 18 gage galvanized composite steel deck with 3-1/4" of lightweight concrete topping (5-1/4" total thickness) reinforced with welded wire fabric. All steel beams, girders, and columns will be spray fireproofed.

New roof framing will be wide flange steel beams and girders supported by wide flange steel columns. Steel joists will support the roof at the gymnasium, auditorium, and any other large column-free spaces. The roof framing will be 1-1/2" deep 18 gage wide-rib metal roof deck. Roof framing below new rooftop mechanical units will be composite steel beams and girders supporting a 2" galvanized composite deck with 4" of normal weight concrete topping (6" total thickness) reinforced with welded wire fabric. The concrete pads under the units will extend at least 5 feet beyond the footprint of the unit on all sides.

Galvanized HSS framing will support screenwalls to hide mechanical units from view. The lateral system of the new addition will be diagonal braced frames, composed of HSS steel sections.

All new concrete will use low carbon mixes requiring Supplemental Cementious Materials (SCMs) and/or Type IL cement to meet or exceed a 10% reduction in Global Warming Potential (GWP) from the regional benchmark. All steel will require a high reycled content and, to the best extent possible, be fabricated at a manufacturering plant utilizing an Electric Arc Furnace.

HVAC

The existing HVAC systems in the renovated buildings will be replaced and the new additions will be provided with new, all-electric systems to comply with the current Massachusetts Energy Code, including the Specialized Stretch Energy Code adopted by the City of Medford. A specific system approach is represented below, but alternative space heating and cooling approaches will be assessed to determine the preferred system.

Phased construction will require on-going operation of portions of the existing HVAC systems to support the continued occupancy of existing building areas. Temporary measures will be included to ensure proper indoor air quality of existing spaces while construction occurs in nearby areas of the site (e.g., added filtration at outdoor air intakes or extending existing outdoor air intakes to be clear of construction zones).

The heating and cooling systems will be based on a ground source geothermal system utilizing vertical boreholes. The geothermal loop will be 40% propylene glycol with distribution from a system of variable volume pumps in a mechanical room. Plate and frame heat exchangers will separate the ground source loop from the interior water loop and associated pumping system, which will support mechanical heating and cooling systems. Space heating and cooling will utilize above-ceiling heat pumps for classrooms and support spaces.

Larger spaces will be supported by AHUs with watersource heat pumps.

Ventilation will be provided with rooftop DOAS units, configured with water source heat pumps for conditioning of outdoor air to the classrooms, support spaces, administration, and vocational spaces. VAV terminal units will manage ventilation to individual rooms based on CO2 control.

Specialty systems will be included for ventilation of Science Labs, Kitchens, Kilns, specific vocational classrooms and other such installations.

A new DDC building management system will provide control and monitoring of the HVAC systems and monitoring of selected Plumbing and Electrical equipment and metering. A new electric boiler will support the Pool Building.

Plumbing

The existing plumbing systems in the renovated buildings will be replaced throughout the building and the new additions will be provided with new plumbing systems to comply with the current edition of Commonwealth of Massachusetts Building Code (780 CMR) and 248 CMR Fuel Gas and Plumbing Code . Phased construction will require on-going operation of portions of the existing plumbing systems to support the continued occupancy of existing building areas.

New domestic cold service tied from the main water service and a new hot water systems will be provided throughout the facility. A domestic water booster will be required for buildings with high-rise designation however, a hydrant flow test is required to confirm. The entire systems will be replaced, including reduced pressure backflow preventers pipe insulation, pipe labels with flow arrows and valve tags. Domestic hot water supply will be generated through central hot water heaters in mechanical room. The water source heat pump tied to the geothermal loop will be used to generate hot water and meet the domestic water demand. Four 500 gallon storage tanks will be used to meet peak demand.

A 120KW electrical water heater will be connected to the same loop to offset any temperature swing in the storage tank and shall meet the highest hourly demand.

Domestic hot water demand for multiple sinks and in science labs will be provided by 24KW tankless water heaters located in each classroom of the science wing. An electrical water heater (approx. 90KW) will be dedicated for the pool heating system.

Sanitary, waste and vent systems will be provided throughout the facility and will connect by gravity to the new exterior site sewer system. Where lower level/basement fixtures cannot be drained by gravity, duplex waste ejectors will be provided. Any existing underground piping to be reused will be evaluated for its integrity.

A kitchen waste system will be provided and will connect to a new exterior grease trap in the site by gravity. Point-of-use grease traps will be provided to receive the waste discharge at the triple pot sink, dishwasher, tilting kettle and other grease producing kitchen equipment and floor drains.

The kitchen waste main will run to an exterior grease interceptor. Vent piping will be installed from the exterior grease trap back into the building and to the roof independently.

Tepid water emergency wash systems will be provided throughout all science lab areas and any areas that are subjected to chemical spillage. Equipment will include new ADA compliant emergency shower/eyewash stations.

All emergency shower and eyewash units will include a thermostatic mixing valve set for 60 deg. F, fed from the domestic potable hot and cold-water distribution systems. Hot water will be recirculated to within 15 ft. of each mixing valve.

New above ground storm drainage systems will be provided throughout the facility, including primary and secondary roof drainage systems for each roof area. Primary storm drainage systems will connect to the exterior site storm drainage system by gravity. Overflow (secondary) drains or scuppers shall be installed and discharge independently to 18" above finished exterior grade. The rainwater system will be sized to handle a rainfall rate of 4 inches per hour, with a total runoff from the main roof and the roof deck of just under 1 cubic foot per second. The condition of existing underground storm piping will be evaluated for its integrity. The storm system will be installed in cast iron piping with all horizontal piping insulated to prevent condensation. The storm system will exit at various locations of the building and connect to the municipal storm system.

Waste outlets to accept HVAC condensate and sprinkler discharge shall be provided as needed and connect to the storm water piping system.

Acid waste/vent from the Science room laboratory sinks will be discharged to an acid-neutralizing tank prior to the connection to the sewer connection. The acid-neutralizing tank will be placed outside in a concrete vault with pH monitoring system. Laboratory waste piping shall be polypropylene with fused joints. Lab waste Venting will combine and vent through the roof independently from the sanitary vent system. New compressed air distribution will be provided to some science rooms and vocational training areas. The compressed air unit will consist of duplex compressors, air receiver tank and refrigerated dryer unit. Dedicated compressed air unit will be used for vocational training areas.

New plumbing fixtures will be provided throughout the facility. ADA compliant fixtures will be provided throughout in locations and quantities in accordance with MAAB requirements. Low flow fixtures meeting the requirements of 248 CMR will be provided throughout. 1.28 gal/flush water closets will be provided utilizing hands free and hard wired sensor type flush valves. Urinals will utilize 0.125 gal/flush hands free and hard wired sensor type flush valves.

Lavatories will likewise utilize hands free and hard wired sensor operated 0.35 gpm faucets. Sinks will utilize 1.5 gpm flow restrictors and showers will utilize 1.5 gpm flow shower heads.

Fire Protection

For High Rise Construction Options

The building will be served by the new 8" fire service line from the campus hydrant line. Cross connection control shall be provided by using a supervised double check valve assembly backflow preventer on the fire service as it enters the building in the Fire pump room adjacent to the exterior building wall.

Construction of the project will take place in phases. The fire protection system installation will be carefully coordinated with each phase to ensure that life safety protection is maintained throughout construction.

System tie-ins, shutdowns, and transitions will be planned and coordinated with the Owner and the local Fire Department to avoid unnecessary disruption and to maintain compliance at all times.

A new fire pump will be required for the combination of sprinkler/standpipe systems. The fire pump room shall have direct access to the exterior, or a 2-hour fire-rated passageway to the exterior. The fire pump room shall be 2-hour fire resistance rated and shall be dedicated to fire pump equipment only. The fire pump room shall be minimum 200 sq. ft. The fire pump room should be located on the ground floor of the building. The new fire pump shall be an automatic electric driven horizontal split case fire pump with an automatic transfer switch.

The fire pump will be 1000 GPM @ 90 PSI with a 75 HP motor and controller with ATS. A jockey pump will be 20 GPM @95 PSI with a 3 HP motor and controller.

The entire building shall be protected throughout with a wet automatic fire suppression system and fed from an 8" Wet Riser Check Valve in the fire pump room. The system will be a wet sprinkler system with control valve assemblies to limit the sprinkler area controlled to less than 52,000 s.f. as required by NFPA 13-2019. Each floor control station consists of a monitored shut-off valve, flow switch and an Inspector's test valve and sight glass.

A fire department Storz pumper connection will be provided at the exterior wall near site hydrant. The FDC will either be wall-mount or free-standing, depending on the final details and the preference of the Fire Department AHJ. The system will be designed in accordance with NFPA Standard 13, 2019, the latest Massachusetts State Building Code and local jurisdiction.

Furnish and install all Supervisory Switches, Flow Switches, Pressure Switches, and other Alarm Devices. Install all such devices on the piping and coordinate with the Electrical Subcontractor who shall wire all such devices to the Fire Alarm System. Every shutoff valve installed on this project shall have a supervisory trouble switch wired to the Fire Alarm Panel.

At the Stage, fire department valves will be provided on each side of the stage with a 2 1/2" fire department hose valve with 1 1/2" reducer, cap and chain.

An 8" electric bell will be provided on the exterior.

Automatic Class I standpipe system in the high-rise building `shall be hydraulically designed to provide 100 psi at the topmost hydraulically most remote fire department hose valve. The design flow shall be 500 gpm for the hydraulically remote standpipe system riser and 250 gpm for each additional standpipe system riser. The total design flow does not need to exceed 1000gpm for this fully sprinklered building. Standpipes would be designed in accordance with NFPA Standard 14, 2019, and local Fire Department requirements. Standpipes will be located in each required egress stairway, and adjacent to the Stage. 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.

Sprinkler heads in areas with finished ceilings will be 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 Gym will be provided with Wire guards.

Elevator machine rooms and hoist ways will not be protected with automatic sprinklers in accordance with 780 CMR.

For non-High Rise Construction Option

The scope of the renovation and addition option is to replace the existing sprinkler system throughout and extend the new system into a new addition.

The building will be served by the new 8" fire service line from the campus hydrant line. Cross connection control shall be provided by using a supervised double check valve assembly backflow preventer on the fire service as it enters the building in the Fire pump room adjacent to the exterior building wall.

Construction of the project will take place in phases. The fire protection system installation will be carefully coordinated with each phase to ensure that life safety protection is maintained throughout construction. System tie-ins, shutdowns, and transitions will be planned and coordinated with the Owner and the local Fire Department to avoid unnecessary disruption and to maintain compliance at all times.

A new fire hydrant flow test was conducted, and a fire pump will be required for this option. The fire pump will be 750 GPM @ 60 PSI with a 50 HP motor and controller with ATS. A jockey pump will be 20 GPM @65 PSI with a 2 HP motor and controller.

The entire building shall be protected throughout with a wet automatic fire suppression system and fed from an 8" Wet Riser Check Valve in the fire pump room. The system will be a wet sprinkler system with control valve assemblies to limit the sprinkler area controlled to less than 52,000 s.f. as required by NFPA 13-2019. Each floor control station consists of a monitored shut-off valve, flow switch and an Inspector's test valve and sight glass.

A fire department Storz pumper connection will be provided at the exterior wall near site hydrant. The FDC will either be wall-mount or free-standing, depending on the final details and the preference of the Fire Department AHJ.

The system will be designed in accordance with NFPA Standard 13, 2019, the latest Massachusetts State Building Code and local jurisdiction.

Furnish and install all Supervisory Switches, Flow Switches, Pressure Switches, and other Alarm Devices. Install all such devices on the piping and coordinate with the Electrical Subcontractor who shall wire all such devices to the Fire Alarm System.

Every shutoff valve installed on this project shall have a supervisory trouble switch wired to the Fire Alarm Panel. At the Stage, fire department valves will be provided on each side of the stage with a 2 1/2" fire department hose valve with 1 1/2" reducer, cap and chain. An 8" electric bell will be provided on the exterior.

Class 1 manual standpipe system will be supplied in all new required egress stairs. The standpipe system will be designed in accordance with NFPA Standard 14, 2019, and local Fire Department requirements. Standpipes will be located in each required egress stairway, and adjacent to the Stage. 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.

At the Stage, fire department valves will be provided on each side of the stage with 1 1/2" hose and nozzle. Sprinkler heads in areas with finished ceilings will be 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 Gym will be provided with Wire guards.

Elevator machine rooms and hoist ways will not be protected with automatic sprinklers in accordance with 780 CMR. A roof manifold will be provided at each roof level with a two-story or greater height.

Electrical

The existing utility service will be replaced and upgraded to accommodate the new program, which includes an all-electric HVAC system, electric vehicle (EV) charging stations in a minimum of 10% of the total new off-street parking spaces (per zoning bylaws), provisions for future installation of EV charging stations for a minimum of 20% of the total new off-street parking spaces (per zoning bylaws), code required provisions for photovoltaic arrays, and battery energy storage systems (BESS). The electrical infrastructure to interconnect these systems will require additional coordination with utility, however early assumptions can include:

Utility reclosure cabinet

- CT / Metering cabinet (upstream of entire campus electrical interconnections)
- 4,160 Volt switchgear (owned by the school, operated by utility)
- Provisions for four (4) transformers (owned and operated by the school)

- Provisions for solar system interconnect switchboard for photovoltaic panels and battery storage units.

All this equipment will be located on site, pad-mounted with underground conduit pathways. A screen wall to visually separate the electrical gear from street views will be required per zoning bylaws.

Renewable Energy System

Based on a target EUI of 35, early estimates suggest the size of the total solar system should be 6.5 Megawatts, along with 4.8-Megawatt-hour battery energy storage systems (BESS).

The total system will be made up of both roof-mounted photovoltaic (PV) panels, and ground-mounted PV canopies. One transformer is dedicated to the photovoltaic (PV) system, feeding a 8000 Amp 277/480 V solar switchboard. The PV system and battery storage are anticipated to be designed as AC-coupled and will interconnect at the solar switchboard. This setup will allow for independent operation of the solar panel and battery storage for efficiency and reliability.

Power Distribution System

The existing electrical service will be replaced. The existing (3) services substations, 2400-Amp, 1200-Amp, and 600-Amp, 277/480 volt 3-phase 4 wire electrical services provide a power density of approximately 5.5 watts/sf, which is estimated to be significantly undersized for an all-electric code required program.

The new distribution system will consist of two (2) 4000 Amp, 277/480V 3-phase 4 wire switchboards with new underground secondary service conductors extended to pad-mounted transformers on site. Coordination with utility will be required, however at this time it is expected that two (2) transformers will be required for the demand of the high school. Phased construction will require on-going operation of portions of the existing electrical systems to support the continued occupancy of existing building areas. Temporary measures will be included to ensure existing areas remain fully operational while construction occurs.

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.

In the new construction areas, a system of new panelboards separated by use will be provided, located in dedicated electrical rooms throughout the building. Generally, the separate uses are lighting, mechanical and branch circuit loads.

Energy sub-metering system will be provided for monitoring all individual energy end uses that represent 10% or more of the total annual consumption of the building. Sub-meters will be connected to the new building DDC system.

Life Safety/Emergency System

The existing (2) 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and generator distribution system is past it's usable life expectancy. The two generators have been noted to be non-functional and will be replaced with a new 1500kW 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and distribution system will be provided. A docking station for a temporary roll-up generator shall be installed to allow the life safety distribution system to remain active during routine maintenance or generator failure, as well as new control wiring and pathways to comply with latest signal and wiring integrity codes. This will require excavating, replacing, and re-working the existing underground conduit between the generator and the service entrance equipment.

- It is estimated that the following items will be connected to the generator system: freeze protection
- Additional client requested loads

Lighting & Lighting Control

All new interior light fixtures with new, high efficient LED light fixtures fitted with dimmable drivers.

Replace all exterior light fixtures with new, high efficient LED light fixtures fitted with dimmable drivers and full cut-off optics.

A new lighting control system for a new, fully networked lighting control system compliant with the latest energy code. The lighting control system shall include the capability of communicating and controlling ON/OFF 120V power to receptacles in classrooms, offices, corridors, and other spaces required by energy code.

Fire Alarm

A fire alarm system is a fully addressable voice evacuation system consisting of four node panels throughout the campus.

All new initiation and notification devices such as smoke detectors and speaker strobes will be provided.

The system to communicate to the Fire Department via an antenna mounted on the roof, and an auto dialer, which is compliant with latest building codes.

A bi-directional antenna (BDA) system shall be installed to comply with latest building code. The BDA system will have capabilities to boost fire department and police department radio communications within the building.

Lightning Protection System

The existing school does not have a lightning protection system. A lightning protection system is not required by code, although it is recommended by NFPA Standards. A system should be assumed to be provided as part of code upgrade and any renovation options.

Telecommunications

The existing telecommunications copper and fiber optic cable infrastructure will be replaced to support data and voice transmission. CAT6A cable will be installed to the end points, with (12) strand OM4 multi-mode and (6) strand OS2 single-mode fiber optic cabling between the MDF and the IDFs. Existing network infrastructure electronics spaces in classrooms and storage spaces will be replaced with secure and climate-controlled rooms to better protect and maintain network electronic equipment. The MDF and IDFs will be replaced with new equipment cabinets, patch panels and overhead cable management components. The MDF and IDFs will be replaced with new rooms fitted with a new cooling systems, lighting, and generator backed power.

The existing Public Address and Master 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 synchronized and powered via low-voltage wiring.

The Public Address and Master Clock systems will be interfaced at the head end.

Classroom technology infrastructure will be upgraded to provide new data and voice communications with a potential wireless access point location in the ceiling. Audiovisual cabling will be installed to allow projection of content from the instructor's computer to the wall-mounted interactive flat panel monitor.

Speech reinforcement systems will be installed in instructional spaces to provide even distribution of instructor and student speech throughout the space, as well as being interfaced to the interactive flat panel monitor to perform the audio functions for audiovisual presentations in the space. Current wireless access points will be purchased at the time of occupancy.

Security

The district recently completed a security enhancements project that included the installation of new cameras, card readers, and associated access control infrastructure at Medford High School. As part of the preliminary evaluation of alternatives for a new high school facility, an existing conditions walkthrough was performed to document current device locations and distinguish recently installed equipment from older legacy systems. This walkthrough has provided a clear understanding of where new cameras and card readers are deployed and allows the project team to quantify the number of devices that could potentially be salvaged and reused in the new building. Based on this inventory, selective reuse of newer cameras, card readers, and related control hardware represents an opportunity for capital cost savings and reduced procurement time. An early assessment of device age, condition, remaining useful life, and compatibility with the proposed security platform for the new facility will be essential to confirm which components are suitable for relocation. This information can be incorporated into the cost model to more accurately reflect potential reuse credits.

Any reuse strategy should be balanced against considerations such as warranty transferability, manufacturer support for redeployed equipment, cybersecurity standards, and the long-term maintenance implications of mixing reused and new devices. Coordination with district IT and security staff will be critical to develop a phased migration

plan that maximizes reuse while maintaining system reliability, scalability, and overall campus security objectives.

Audio / Visual

New audiovisual systems will be provided for the Auditorium (including backstage support spaces), music classrooms (including the Band, Chorus, and General Music Classroom), fitness areas (including the Gymnasium, Fitness Room, and Gymnastics Gym), Cafeteria and Large Group Instruction rooms. Where applicable, the systems will be provided with high-resolution video displays/projection, sound systems for speech reinforcement and audio playback, ADA-compliant assistive listening, and integrated AV controls. In addition, broadcast recording equipment will be provided for use by the students in the TV & Film CTE program.

Acoustics

New building utility equipment will incorporate sound attenuating measures, as necessary, for compliance with the community noise emissions requirements established in the Massachusetts Division of Air Quality Control (DAQC) Policy 90-001. New HVAC equipment and system components and room finishes will be designed for compliance with the LEED Minimum Acoustics Performance prerequisite for HVAC background noise and reverberation time in renovated core learning spaces. Specialty spaces, such as the auditorium, music classrooms, fitness areas, gymnasia, and large lecture rooms will incorporate room shaping, sizing, finish material strategies, and sound isolating surrounding construction to appropriately suit the acoustic needs of the users.

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. Hazardous material abatement is required for both renovated sections of the existing building to remain, as well as portions of the existing building that are to be demolished.

Capacity Constraints

The design capacity of 1,395 students plus the addition of district-wide Pre-K noted in the MSBA Enrollment Projection, and the corresponding educational space needs will be provided by the additions and renovations of these alternatives.

Educational Program Requirements Fulfillment

The Addition/Renovation Alternatives will fulfill Medford High School's Educational Program requirements and the enrollment capacity. However, adjacencies and positioning of some program functions may have limited ability to be optimized in comparison with new construction alternatives.

All elements of Medford High School's robust curriculum are accommodated in spaces that meet current standards by these renovations and additions. Depending on the level and extents of the renovation areas, existing low ceiling heights may remain in renovated sections of the building due to structural constraints. Lack of space above ceilings may place constraints on HVAC system design in those same areas, potentially affecting classroom layout and design in renovation areas.

Schedule Overview

The Addition and Renovation alternatives would require between eighty (80) and ninety (90) months to implement; and would all include multiple phases.

For the Addition and Renovation alternatives, portions of the building would come online as soon as two years into the construction process and students would rotate into those new or renovated portions while other areas of the buildings come offline. The existing B and C Wings cannot be taken offline at the same time given the high quantity of classrooms located in those two wings. There will be a need to have temporary accommodations for many spaces including classrooms, the auditorium and the gymnasium during the course of construction. The costs for modular classrooms have been included as the specific alternative requires. Larger functions such as the auditorium and gymnasium will need to occur in other City buildings/locations or be unavailable for some amount of time.

Cost Overview

The estimated construction cost* is:	
B.1.2	$669,157,748
C.2.2A	$675,914,566
C.2.2A-HS	$581,107,825
C.3.4A	$685,640,538

The estimated total project cost* is:	
B.1.2	$810,728,236
C.2.2A	$795,451,553
C.2.2A-HS	$697,085,861
C.3.4A	$807,317,239

*All pricing is based on the total Gross Square Foot (GSF) listed in the Summary of Spaces, which does include costs for all of the spaces listed in the "Other" category in the Summary of Spaces.

Conclusion

The Pros and Cons are summarized as follows:

Pros

- Capitalizes on the embodied carbon and cultural significance of some portion of the existing structure by salvaging it.
- Students, staff and the community may get quicker access to a new or renovated portion of the building during an initial phase, rather than having to wait for the entirety of a new school to be completed.
- Renovating existing high value asset spaces such as the Gymnasium will allow Medford High School to maintain the large size of that existing facility rather than reducing it.
- Allows for the renovation of the pool to be considered as a potential scoping option.

Cons

- Existing structural bays in the B and C wings are undersized for appropriately sized classrooms and labs, requiring potentially inefficient layouts of new spaces in Alternative B.1.2 that renovates those existing wings.
- These alternatives are generally the most costly due to overhead costs incurred over increased durations of time and temporary accommodations associated with construction logistics.
- Having to work with and match low existing floor-to-floor heights will result in fewer options for HVAC systems.
- The B.1.2 alternative will incur added costs and inconvenience due to modular classroom buildings, which are unavoidable in that option.

Construction Alternative B

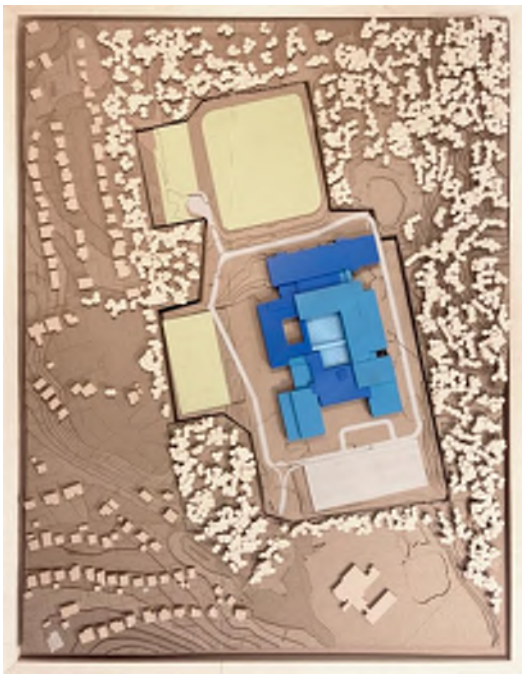
Alternative B.1.2

B.1.2: Addition/Renovation of existing building (existing footprint) with spatial reconfigurations, high-rise building designation

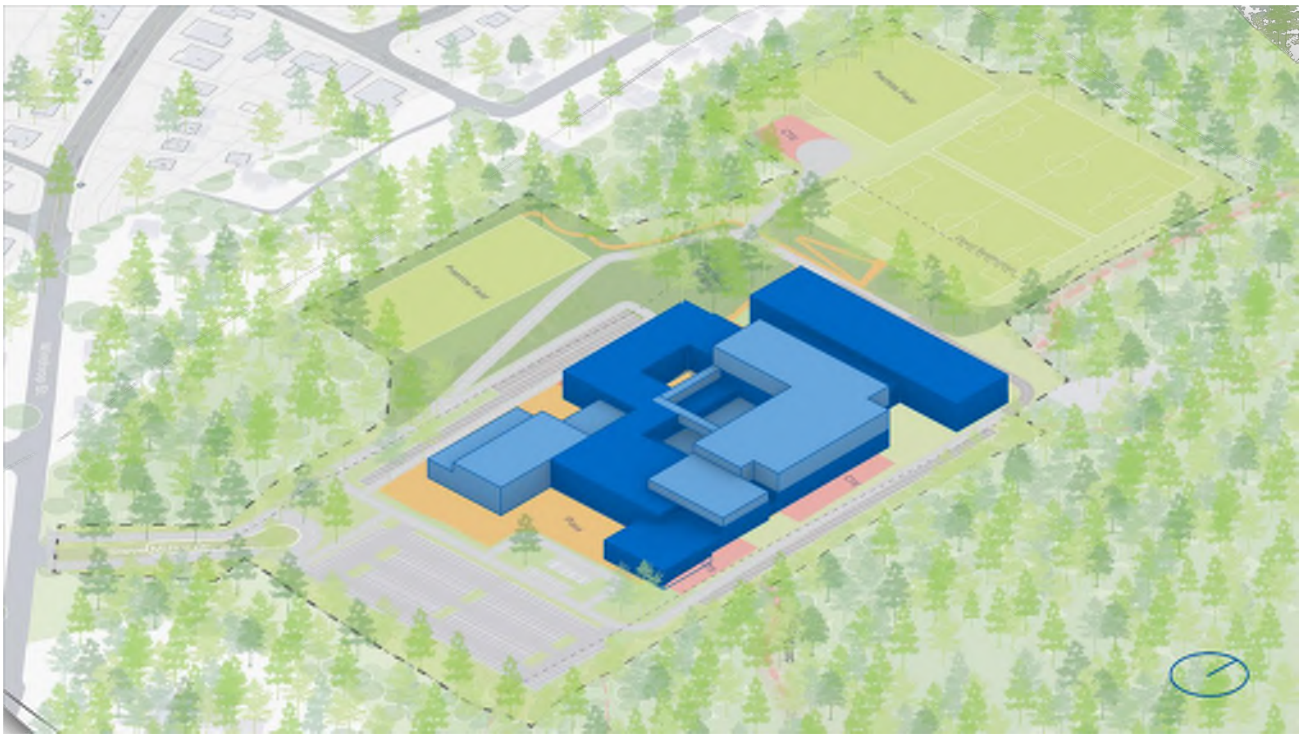
Partial Demolition of 20,838 GSF of floor area on the top two floors of Wing B to create a light well. Full demolition of Wing A to make way for a larger auditorium. Construction of 169,571 GSF of new area added as a new Wing A and two new stories above the B, E, G and H Wings .

Light Renovation of the Pool Wing F at 36,902 GSF and Heavy Renovation of the remaining 413,863 Gross Square Feet (GSF) of Wings B, C, D, E, G and H. 58,211 SF of tectum roof deck to be replaced with metal roof deck.

Alternative B.1.2 would be implemented through multiple phases over ninety (90) months.



Alternative B.1.2



Alternative B.1.2 – Aerial View



Alternative B.1.2 – Site Plan


B.1.2
Level 1
+83.55
Dining Commons
Main Entry (PG)
Auditorium
Plaza


B.1.2
Level 2
+96.33
PROGRAM LEGEND (ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curie-Tuffa
Art & Music
Vocations & Technology Non-Chapter 74 Programs
Vocations & Technology Chapter 74 Programs
Health & Physical Education (Including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (Including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
Media Center
Main Street
Loading
Electrical
Automotive Tech
Carpentry
N


B.1.2
Level 3
+109.21
Gymnasium
Pool
Planted Slope
Practice Field
Mustang Loop


B.1.2
Level 4
+125
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology Non-Chapter 74 Programs
Vocations & Technology Chapter 74 Programs
Health & Physical Education (Including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (Including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
Planted Slope
Practice Field
Expansion area
Mustang Loop


B.1.2
Level 5
+141
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
(Including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (Including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
N
Expansion area

B.1.2 – Phasing

90 Months Total





Existing Building
- Site Prep / Enabling
- Existing building in use



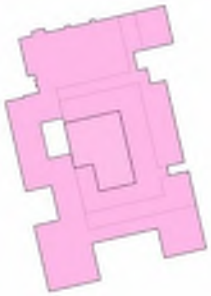
Phase 1
- Demolish existing mechanical room, renovate C, D, E & F Wings (including Pool), build New Addition above D Wing
- Modular Classrooms and remainder of existing building in use



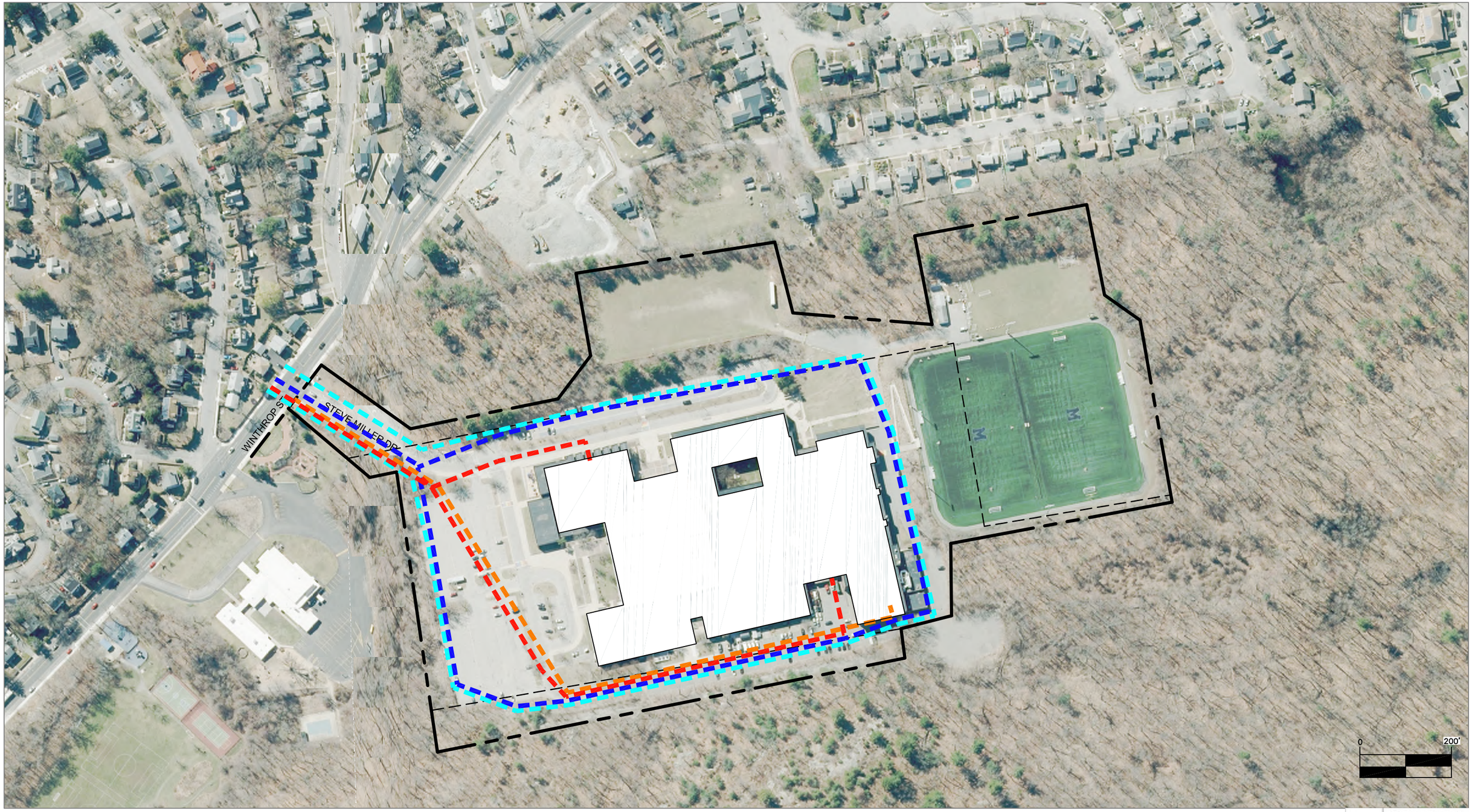
Phase 2
- Renovate G & H (Vocational) Wings, build New Addition above both G & H Wings
- Modular Classrooms, remainder of existing building and Phase 1 Renovation & Addition in use.



Phase 3
- Renovate B Wing, demolish and replace A Wing with New Addition
- Modular Classrooms and Phase 1 & 2 Renovation & Addition areas in use



School Building Complete
- Sitework completed following building renovation
- Renovation & Additions fully occupied



Utility Diagram| B.1.2

Medford High School, Medford MA

LEGEND

- STORM DRAIN TRUNK LINE
- SANITARY SEWER SERVICE TRUNK LINE
- WATER SERVICE
- GAS SERVICE

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Construction Alternatives C

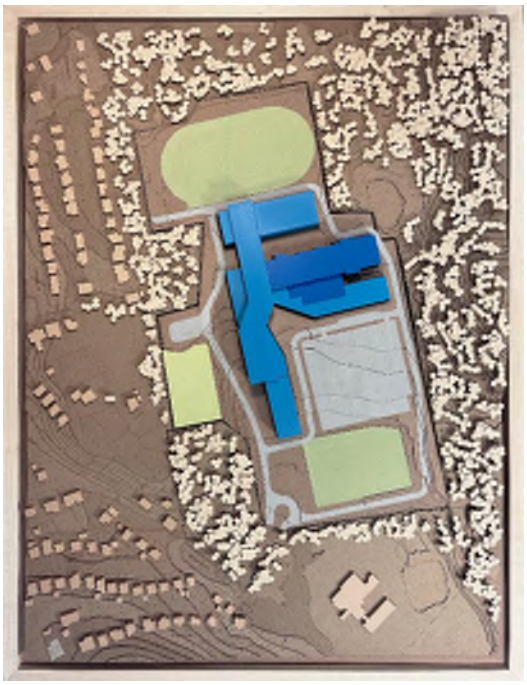
Alternative C.2.2A

C.2.2A: Gym, Pool and Wing E Renovation. New Addition on Site 2 (Hybrid of Parking Lot & Edgerly Field Sites)

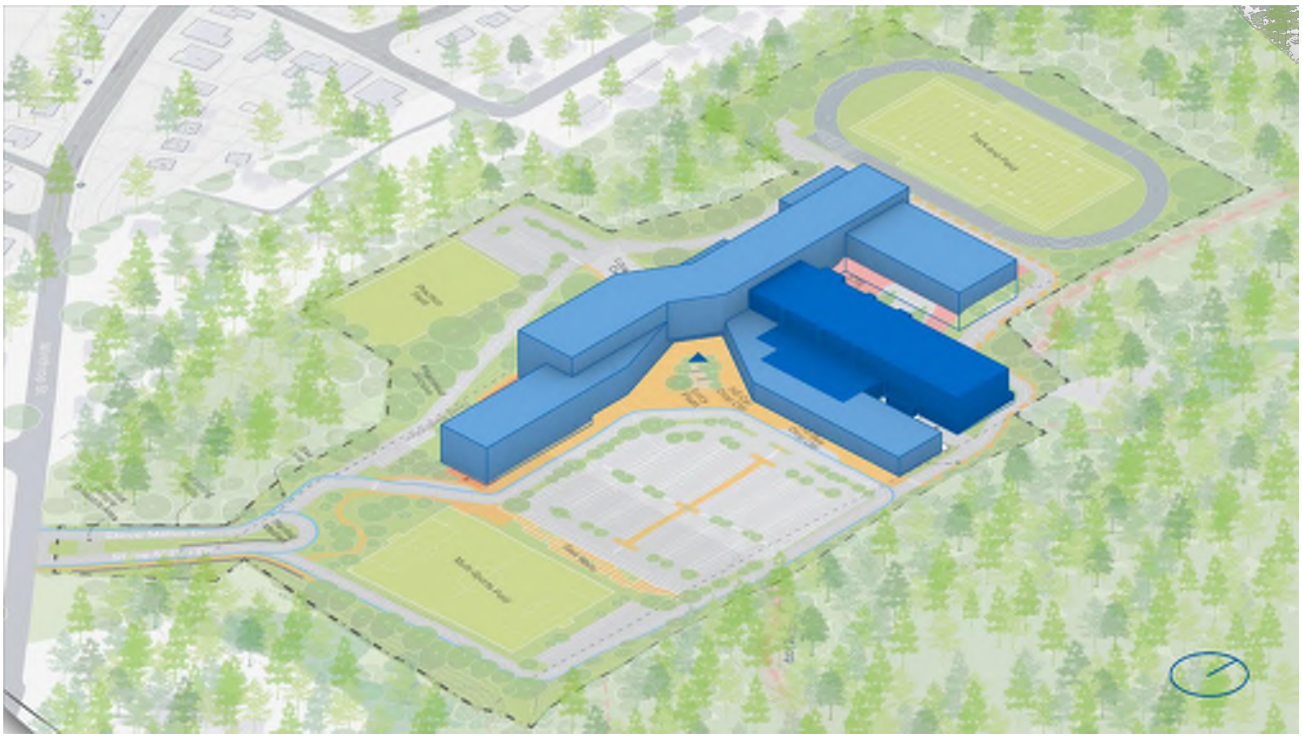
Full Demolition of Wing A, B, C, G & H . Selective demolition of 46,102 SF of Wing E. Construction of 493,109 GSF of new area in the following configuration:

Alt C.2.2A – 6 Stories, 155,665 SF of New Footprint (high-rise building designation)

Light Renovation of the Pool Wing F at 36,902 GSF and Heavy Renovation of the remaining 90,325 GSF of Wings D & E. 64,983 SF of Tectum roof deck above Wings D, E & F to be replaced.



Alternative C.2.2A



Alternative C.2.2A - Aerial View



Alternative C.2.2A – Site Plan


C.2.2A
Level 1
+80


C.2.2A
Level 2
+96.33
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis-Tufts
Art & Music
Vocations & Technology Non-Chapter 74 Programs
Vocations & Technology Chapter 74 Programs
Health & Physical Education (including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (Including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
Mechanical
Auditorium & Support
Fitness Center
Band
Chorus
Admin
Entry
Culinary Arts
Main Entry
Curtis-Tufts Entry
Event Entry
Pool Basin & Support

C.2.2A
Level 3
+109.21



C.2.2A
Level 4
+125




C.2.2A
Level 5
+141


C.2.2A
Level 6
+157
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis-Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
(including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
Expansion area

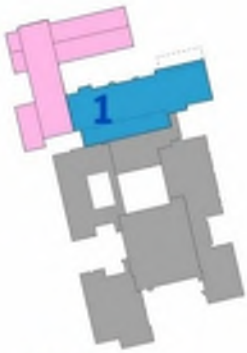
C.2.2A – Phasing

80 Months Total





Existing Building
- Site Prep / Enabling
- Existing building in use



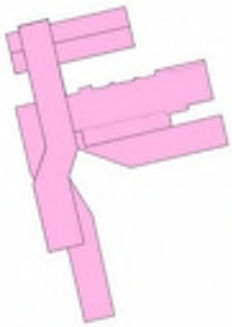
Phase 1
- Demolish existing mechanical room, renovate D, E & F Wings (including Pool), build northern part of New Addition.
- Existing building (without pool and gym) in use



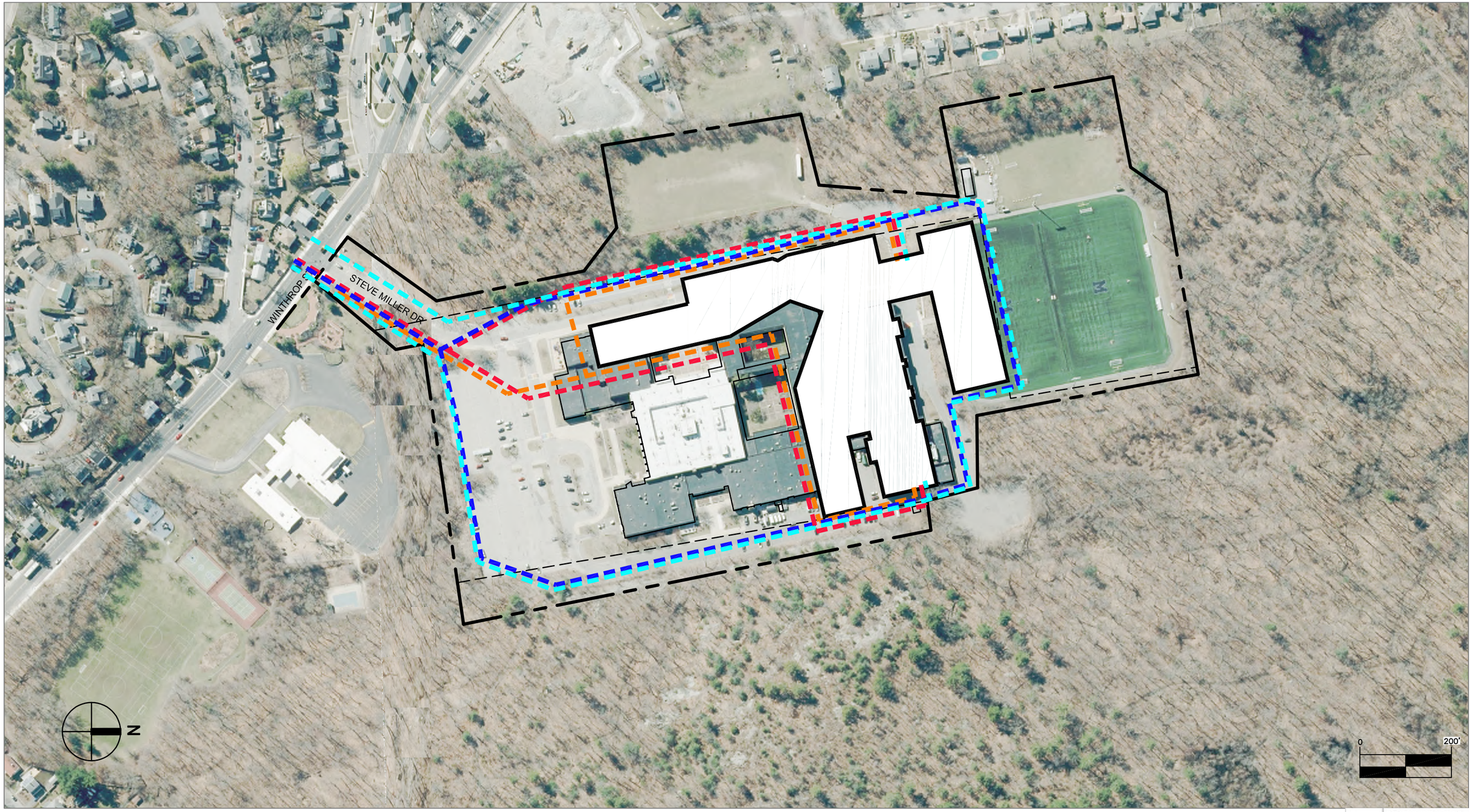
Phase 2
- Demolish A, C and part of G Wings. Renovate remainder of D Wing, build remaining New Addition.
- Phase 1 Renovation & Addition areas in use



Phase 3
- Demolish remainder of existing building.
- Renovation & Addition fully occupied.



School Building Complete
- Sitework completed following existing building demolition.



Utility Diagram| C.2.2A

Medford High School, Medford MA

LEGEND

- STORM DRAIN TRUNK LINE
- SANITARY SEWER SERVICE TRUNK LINE
- WATER SERVICE
- GAS SERVICE

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Construction Alternatives C

Alternative C.2.2A HS

Construction Alternative C.2.2A-HS:
Gym, Pool and Wing E Renovation. New Addition on Site 2 (Hybrid of Parking Lot & Edgerly Field Sites).

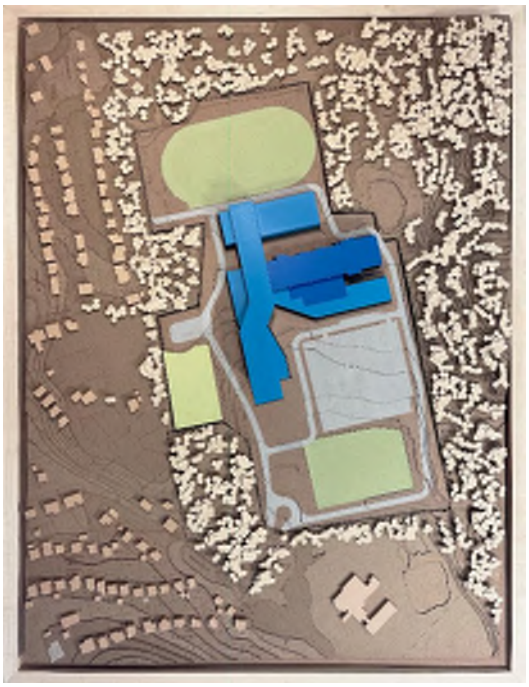
This Option Contains Only High School Program Elements.

Full Demolition of Wing A, B, C, G & H . Selective demolition of 46,102 SF of Wing E. Construction of 405,051 GSF of new area in the following configuration:

Alt C.2.2A-HS – 5 Stories, 125,632 SF of New Footprint (high-rise building designation)

Light Renovation of the Pool Wing F at 36,902 GSF and Heavy Renovation of the remaining 90,325 GSF of Wings D & E. 64,983 SF of Tectum roof deck above Wings D, E & F to be replaced.

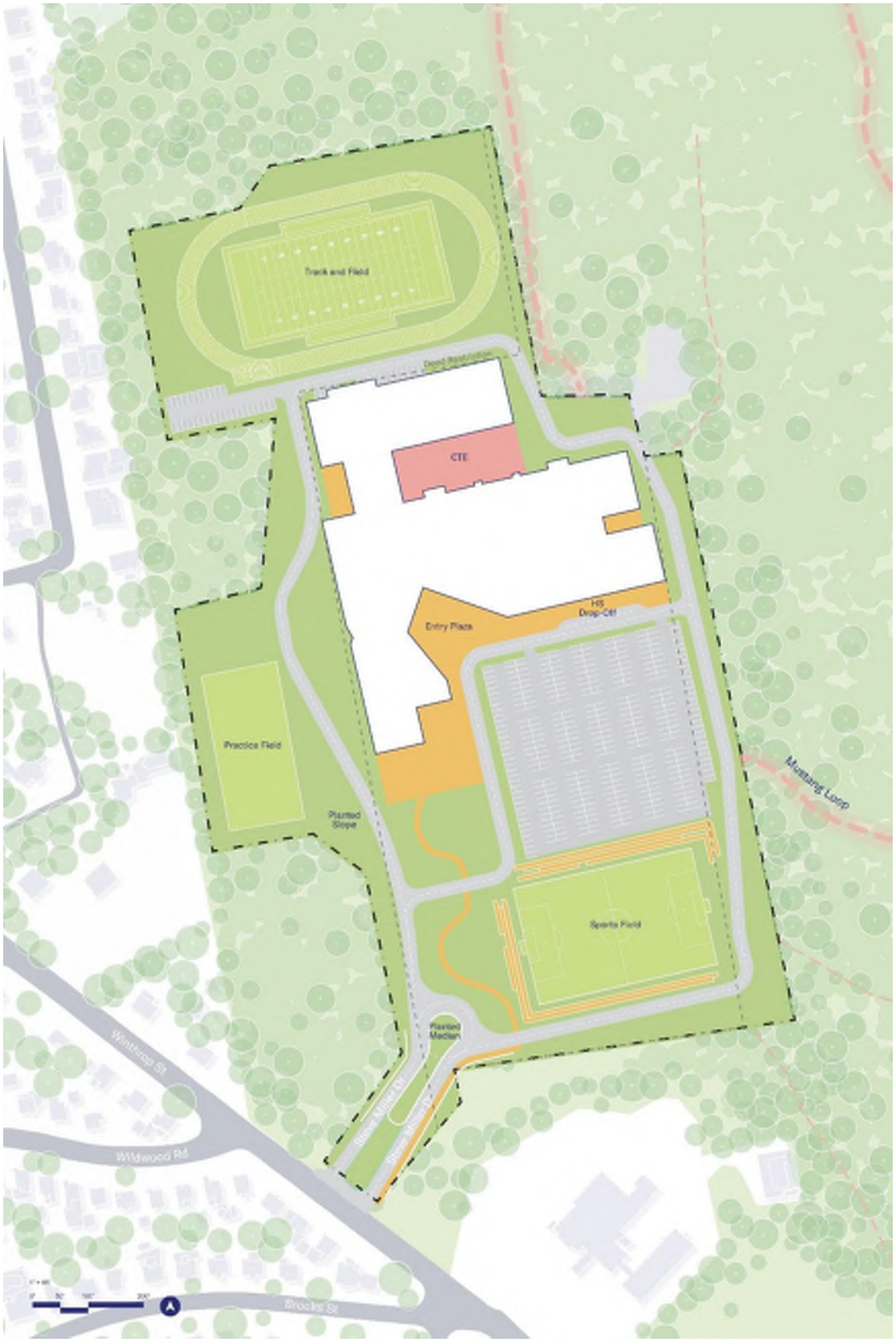
The C.2 alternatives would both be implemented through multiple phases over eighty (80) months.



Alternative C.2.2A-HS



Alternative C.2.2A-HS – Aerial View



Alternative C.2.2A-HS – Site Plan


C.2.2A-HS
Level 1
+96.33
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tuffs
Art & Music
Vocations & Technology Non-Chapter 74 Programs
Vocations & Technology Chapter 74 Programs
Health & Physical Education (including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
N
Mechanical
Auditorium & Support
Fitness Center
Classrooms
Band
Chorus
Admin
Entry
HS Drop-Off
Entry Plaza
Culinary Arts
Bistro


C.2.2A-HS
Level 2
+109.21
Electrical +105
Carpentry +105
Construction Craft Laborers +105
LGI
CTE Yard +105
Gym +109
Pool
Kitchen
Dining Commons
Loading +109
Gymnastics Gym
Practice Field
Planted Slope
Mustang Loop


C.2.2A-HS
Level 3
+125
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
(including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
N
Track and Field
Metal Fabrication
Automotive Tech
Engineering & Robotics
Media Center
Practice Field
Planted Slope
Mustang Loop


C.2.2A-HS
Level 4
+141
Health Assisting


C.2.2A-HS
Level 5
+157
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
(including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
Expansion area
N

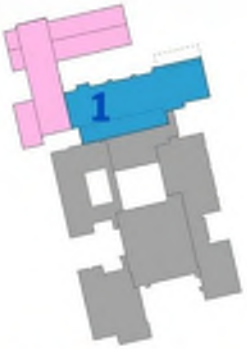
C.2.2A-HS – Phasing

80 Months Total





Existing Building
- Site Prep / Enabling
- Existing building in use



Phase 1
- Demolish existing mechanical room, renovate D, E & F Wings (including Pool), build northern part of New Addition.
- Existing building (without pool and gym) in use



Phase 2
- Demolish C and part of G Wings. Renovate remainder of D Wing, build remaining New Addition.
- Phase 1 Renovation & Addition areas in use



Phase 3
- Demolish remainder of existing building.
- Renovation & Addition fully occupied.



School Building Complete
- Sitework completed following existing building demolition.

Construction Alternatives C

Alternative C.3.4A

Construction Alternative C.3.4A:
Gym, Pool and Wing E Renovation. New Addition on Edgerly Field

Full Demolition of Wing A, B, C, E, G & H .
Construction of 525,072 GSF of new area in the following configuration:

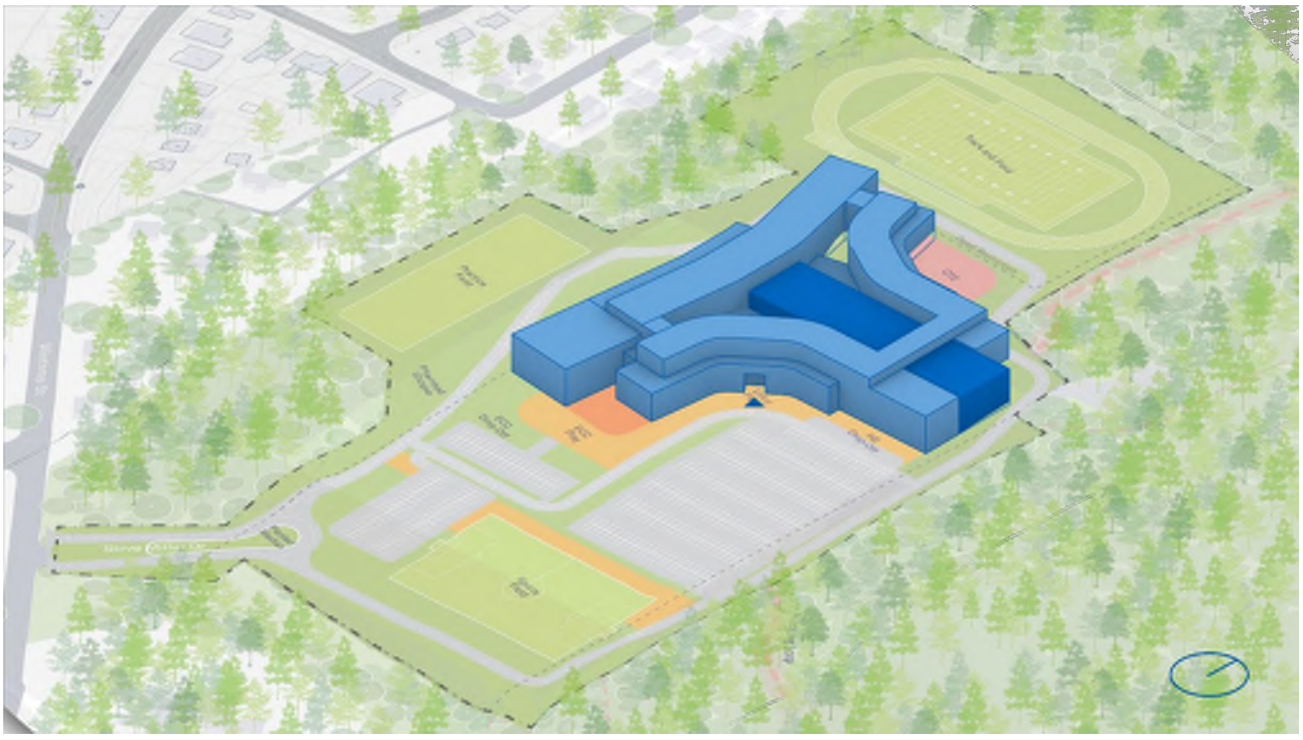
Alt C.3.4 - 5 Stories, 173,253 SF of New Footprint (high-rise building designation)

Light Renovation of the Pool Wing F at 36,902 GSF and Heavy Renovation of the remaining 58,362 GSF of Wing D. 39,778 SF of Tectum roof deck above Wings D & F to be replaced.

The C.3.4A alternative would be implemented through multiple phases over eighty (80) months.



Alternative C.3.4A



Alternative C.3.4A – Aerial View



Alternative C.3.4A – Site Plan


C.3.4A
Level 1
+96.33
Kitchen
Admin
Central Office Storage
Custodial & Maintenance
Pool Support
Pool Basin
Servery
Culinary Arts
Bistro
Admin
Counseling
Dining Commons
Entry Plaza
Band
Chorus
Auditorium & Support
ECC
ECC Play
ECC Drop-Off
Drop-Off


C.3.4A
Level 2
+109.21
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology Non-Chapter 74 Programs
Vocations & Technology Chapter 74 Programs
Health & Physical Education (Including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (Including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
N
Locker Room
Locker Room
P.E. Alts
Pool
Gym
Electrical
Metal Fabrication
Graphic Comm.
Early Ed. & Care
Engineering & Robotics
CTE
Practice Field
Planted Slope

C.3.4A
Level 3
+125



C.3.4A
Level 4
+141




C.3.4A
Level 5
+157
PROGRAM LEGEND
(ADDITION/RENOVATION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
(including Pool)
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Renovated Area
N
Business Marketing
Criminal Justice
Expansion Area

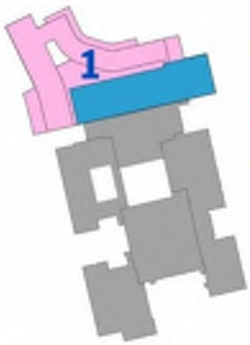
C.3.4A - Phasing

80 Months Total





Existing Building
- Site Prep / Enabling
- Existing building in use



Phase 1
- Demolish existing mechanical room, renovate E & F Wings (including Pool), build northern part of New Addition.
- Existing building (without pool and gym) in use



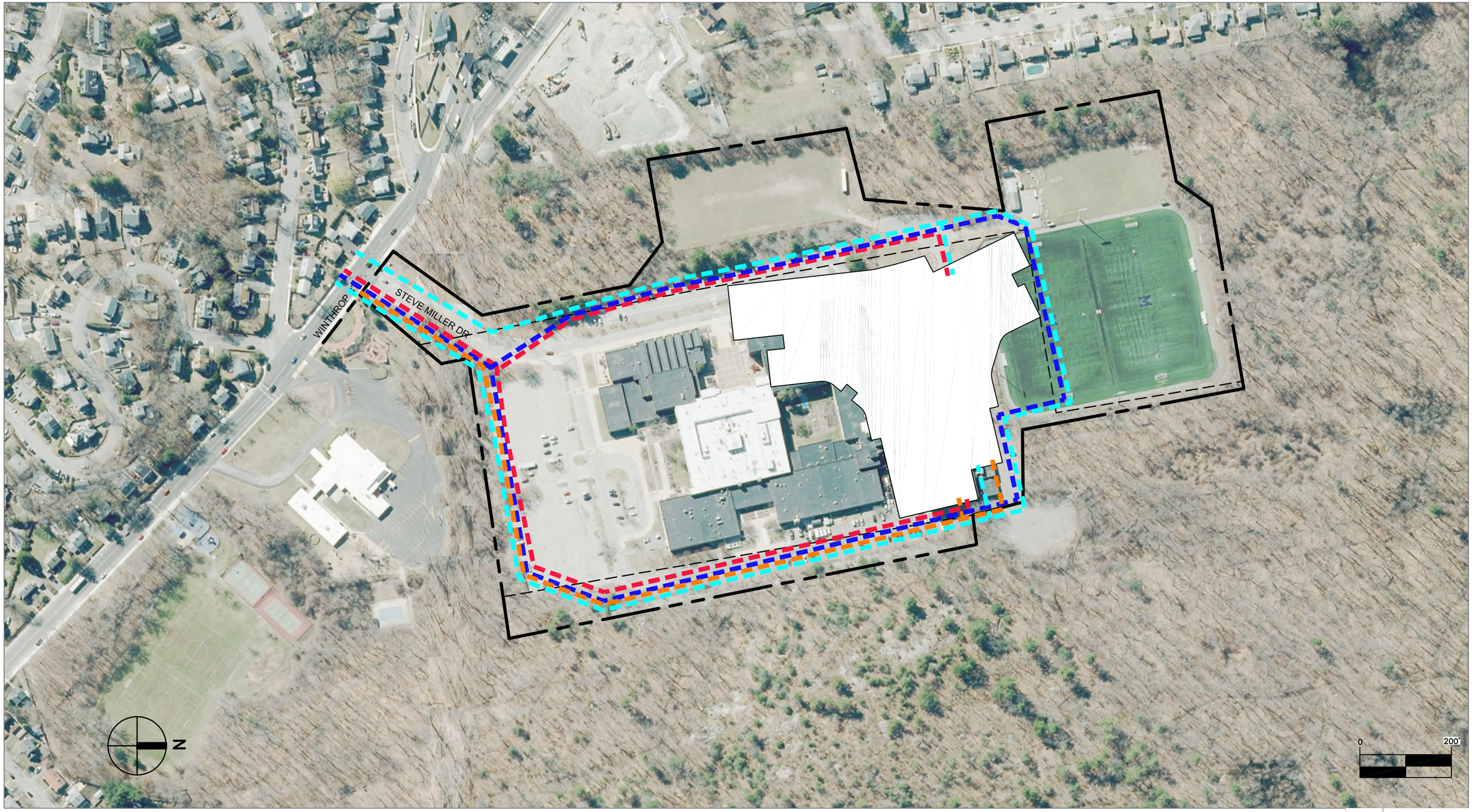
Phase 2
- Demolish existing C & D Wings, build remaining New Addition
- Remainder of existing building and Phase 1 Renovation & Addition areas in use



Phase 3
- Demolish remainder of existing building
- Renovation & Addition fully occupied



School Building Complete
- Sitework completed following existing building demolition.



Utility Diagram| C.3.4A

Medford High School, Medford MA

LEGEND

- STORM DRAIN TRUNK LINE
- SANITARY SEWER SERVICE TRUNK LINE
- WATER SERVICE
- GAS SERVICE

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D. New Building Construction

New Construction Description

Alternatives D.1.1 and D.1.1 NP include all New Construction on the southern parking lot, as well as on a portion of the existing building footprint. These alternatives enable the majority of the new school building to be constructed free of the existing high school footprint, which will mitigate impacts to the ongoing functioning of the existing school and minimizes the amount of time that will be required to have a portion of the new building up and running. The configuration of the new construction will feature preferred interdisciplinary programmatic adjacencies within a five-story academic building and beneficial academic adjacencies.

All New Construction options feature a Health, Wellness and Athletics wing with an 18,000 NSF gymnasium, which represents a reduction of approximately 12,000 NSF from the current gymnasium size.

For school and community use the major public access spaces primarily within Performing Arts and Health and Wellness wings have the potential of being organized with direct connection to a central Commons space. This would allow academic wings to be compartmentalized and more easily secured after hours. The Media Center is also a primary public use space and together with the Auditorium and Gymnasium could be organized to connect to the Cafeteria/Commons as a major community gathering space.

The New Construction Alternative will include compliance with the Massachusetts Specialized Stretch Energy Code with an energy target EUI of 35 kBtu/SF/yr., LEEDv5 for Schools Gold Certification goal, solar photovoltaic and battery storage systems, renewable energy, and embodied carbon reduction strategies such as low carbon concrete and building materials.

Life Safety Code Compliance

The new building would be designed and constructed in full compliance with current life safety codes and standards.

Accessibility Code Compliance

The new building would be designed and constructed to meet all accessibility codes and requirements.

Energy Code Compliance

The City of Medford has adopted the Massachusetts Specialized [Opt-in] Stretch Energy Code. The New Building Construction Alternative would require compliance with the Specialized [Opt-in] Stretch Energy Code, under the all-electric pathway and based on the new construction alternative scope of work, with an Energy Use Intensity (EUI) target of 35 KBtu/SF/Yr.

MSBA Green school Policy

The New Building Construction Alternative will pursue LEEDv5 Certification under the MSBA Green School Policy, achieving a minimum of LEEDv5 Silver Certification.

The New Building Construction Alternative is planning to pursue a LEEDv5 Gold certification. The project will strive to meet the threshold of 60-69 points, equivalent to a LEEDv5 Gold rating. A Preliminary LEED scorecard is included as Appendix D.

In addition, the project plans to pursue the MSBA Green Policy additional reimbursement:

- Massachusetts Specialized Stretch Energy Code (3%)
- Optimization of LEED materials and EQ credit points (1%)
    - 5 points out of the following credits:
        - MRc3 – Low Emitting Materials
        - MRc4 – Building Product and Selection
        - EQc1 – Enhanced Air Quality
        - EQc5 – Air Quality Testing and Monitoring

Site

Site work with a new building construction would include new vehicular and pedestrian circulation systems. Separation between bus circulation, van circulation, car circulation, and delivery circulation will be studied. Separation of drop off and pick up areas for buses, vans and cars was studied.

New outdoor student spaces, including entrance plazas, outdoor learning environments, outdoor courtyards, and connections to resource areas for education were developed. Many pedestrian circulation systems and outdoor gathering areas will meet ADA and MAAB accessibility requirements. Emergency access around the building was a design priority.

The new parking areas will incorporate ADA and MAAB compliant accessibility from accessible parking and loading zones to all accessible building entrances.

Construction Alternative D.1.1. features a large parking lot north of the building, with small additional parking areas throughout the site. Site roadways are nearly entirely reorganized to accommodate parking entry and exit access. All gathering space and CTE yards are encouraged to hug adjacent areas of the proposed building footprint. The western practice field remains unchanged. A full size track and field with replace Edgerly field, and an additional multi-use sports field is proposed north of the building.

ADA access will be designed across the site through circulation systems and outdoor gathering spaces. Emergency access around the building will be a priority.

Site furnishings and plantings will be installed to compliment the new building and site. All disturbed existing mature tree canopy will be replaced on the site with native tree species.

A new water main and sewer trunk in Steve Miller Drive will serve the new additions. Hydrants and the building will be served from the on-site distribution system. Sanitary waste will discharge via gravity to existing services in the streets. Kitchen waste will discharge via exterior grease traps sized per Title 5. A new stormwater management system will be incorporated to comply with town and state standards to improve runoff quality and mitigate runoff quantity. A utility exhibit for this Alternative is included at the end of this section.

Permitting Requirements

Permitting for this option would be the same as for the B and C alternatives.

Architectural

New construction architectural scope will be similar to the new addition architectural scope that was described for the Addition and Renovation alternatives.

New Stand-Alone Natatorium (Pool Building)

A new stand-alone Natatorium building is planned as part of the D.1.1 Alternative. The base systems and construction type of the Natatorium will be similar to the new addition building scope that was described for the Addition and Renovation alternatives.

The size and functionality of the Natatorium will match that of the existing pool, including the number of lanes – eight (8) – and the dimensions of the decks surrounding the pool. Spectator seating for the pool would be located at the deck level at the long side of the pool basin. Locker rooms, toilet rooms, pool equipment space, an electrical room and a mechanical room would be located adjacent to the pool at deck level. The pool would be an in-ground type of construction, with the concrete shell of the pool recessed into the surrounding earth.

Structural

New construction structural systems will be similar to the new addition structural scope that was described for the Addition and Renovation alternatives.

HVAC

The new HVAC system will be similar to the Add/Reno scope with the exception that a temporary installation may be required to support the systems within the school if the geothermal field is located where the existing school is and cannot come online until this demo work is complete. This would entail the use of a boiler and cooling tower (or chiller).

Plumbing

New construction plumbing systems will be similar to the new addition plumbing scope that was described for the Addition and Renovation alternatives.

Fire Protection

New construction fire protection systems will be similar to the new addition fire protection scope that was described for the Addition and Renovation alternatives.

Electrical

The description for all Electrical, Telecommunications, Security and AV systems is similar to that provided for the Addition/Renovation scope.

Acoustics

New building utility equipment will incorporate sound attenuating measures, as necessary, for compliance with the community noise emissions requirements established in the Massachusetts Division of Air Quality Control (DAQC) Policy 90-001.

New HVAC equipment and system components and room finishes will be designed for compliance with the LEED Minimum Acoustics Performance prerequisite for HVAC background noise and reverberation time in renovated core learning spaces.

Specialty spaces, such as the auditorium, music classrooms, fitness areas, gymnasium, and large lecture rooms will incorporate room shaping, sizing, finish material strategies, and sound isolating surrounding construction to appropriately suit the acoustic needs of the users.

Educational Program Requirements Fulfillment

The New Construction Alternatives will fulfill Medford High School's Educational Program requirements and enrollment capacity.

All elements of Medford High School's educational and curriculum goals are accommodated in new spaces that meet current standards.

Schedule Overview

The New Construction alternative would require eighty-one (81) months to implement; involving multiple phases.

No temporary modular classrooms would be required by the D.1.1 nor D.1.1NP alternatives, as the phasing approach allows for a new portion of the building to be operational before demolition of similar spaces in the existing building would need to happen.

In these alternatives there will be a need to have temporary accommodations for many spaces including classrooms, the auditorium and the gymnasium during the course of construction. Larger functions such as the auditorium and gymnasium will need to occur in other City buildings/locations or be unavailable for some amount of time.

Cost Overview

The estimated construction cost* is:

D.1.1: $651,407,445

D.1.1NP:$632,343,945

The estimated total project cost* is:

D.1.1: $765,552,866

D.1.1NP:$742,295,396

The Pros and Cons of the D.1.1 option are summarized as follows:

Conclusion

Pros

- Most freedom of educational planning and adjacencies
- No modulars is a potential with these alternatives

Cons

- Considerable reduction in the size of the gymnasium space at the school.
- Eliminates the potential of maintaining and renovating the existing pool building.
- Largest amount of congestion on site during construction due to the need to use site area for both the existing building and new building footprints concurrently.
- Requires construction of the new building to be at the one extreme end of the site which does not have a deed restriction, which presents access challenges and limits site design optionality.
- The Medford Police and Fire Departments advised that the new construction options were not desirable from a public safety perspective given that the building obscures the view of the rest of the site upon arrival given its proximity to the top of the entrance driveway.

Construction Alternative D

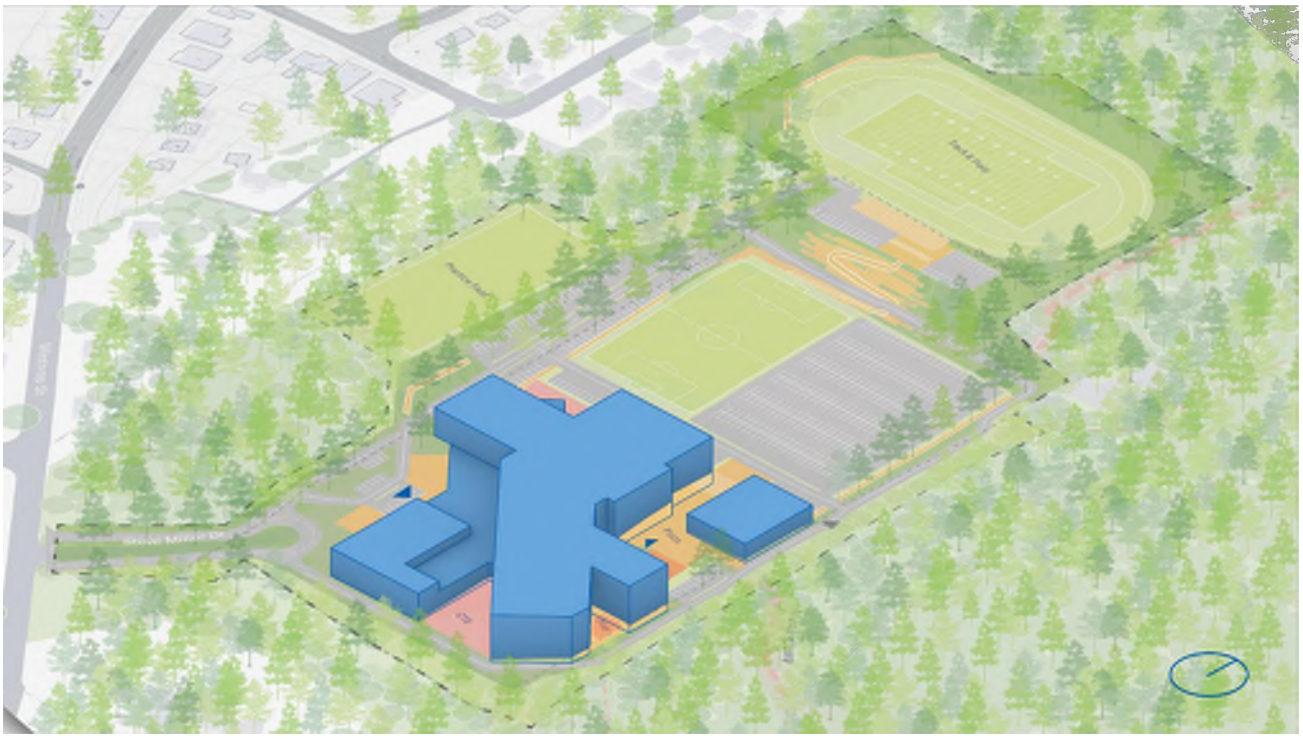
Alternative D.1.1

D.1.1: New Building on the Parking Lot and a portion of the Existing Building Footprint, High Rise Building designation

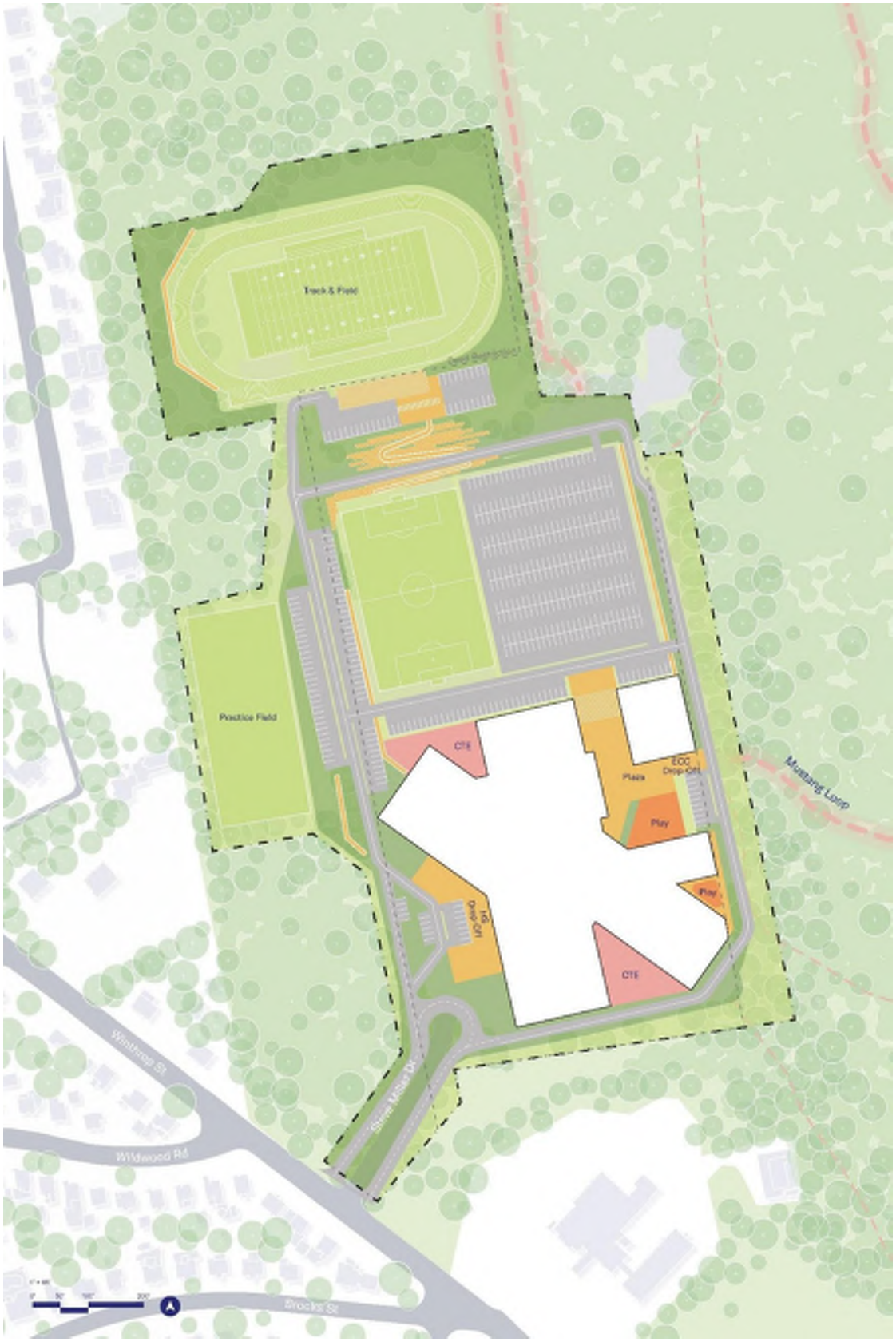
Full Demolition of Existing Facility. Construction of 577,663 GSF of new area across 5 Stories.



Alternative D.1.1



Alternative D.1.1 – Aerial View



Alternative D.1.1 – Site Plan


D.1.1
Level 1
+73
CTE
Plaza
Play
Gym
Mustang Loop
Wildwood Rd
Winthrop St


D.1.1
Level 2
+89
PROGRAM LEGEND
(NEW CONSTRUCTION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curie-Tuffs
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Mustang Loop
Wildwood Rd
Winthrop St


D.1.1
Level 3
+105
Practice Field
Auditorium
Media Center
Mustang Loop
Wildwood Rd


D.1.1
Level 4
+121
PROGRAM LEGEND
(NEW CONSTRUCTION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tuffs
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including Debbit Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed


D.1.1
Level 5
+137
PROGRAM LEGEND
(NEW CONSTRUCTION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curie-Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
Chapter 74 Programs
Health & Physical Education
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Health Assist
Dental

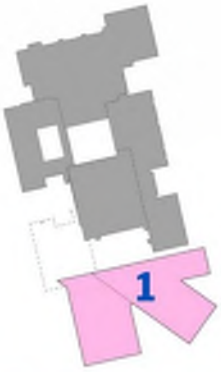
D.1.1 - Phasing

81 Months Total

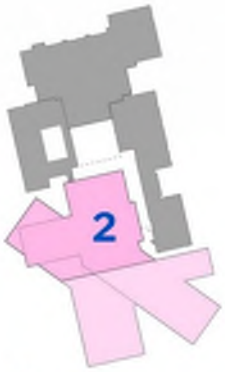




Existing Building
- Site Prep / Enabling
- Existing building in use



Phase 1
- Demolish A Wing and build southern half of new School building
- Remainder of existing building in use



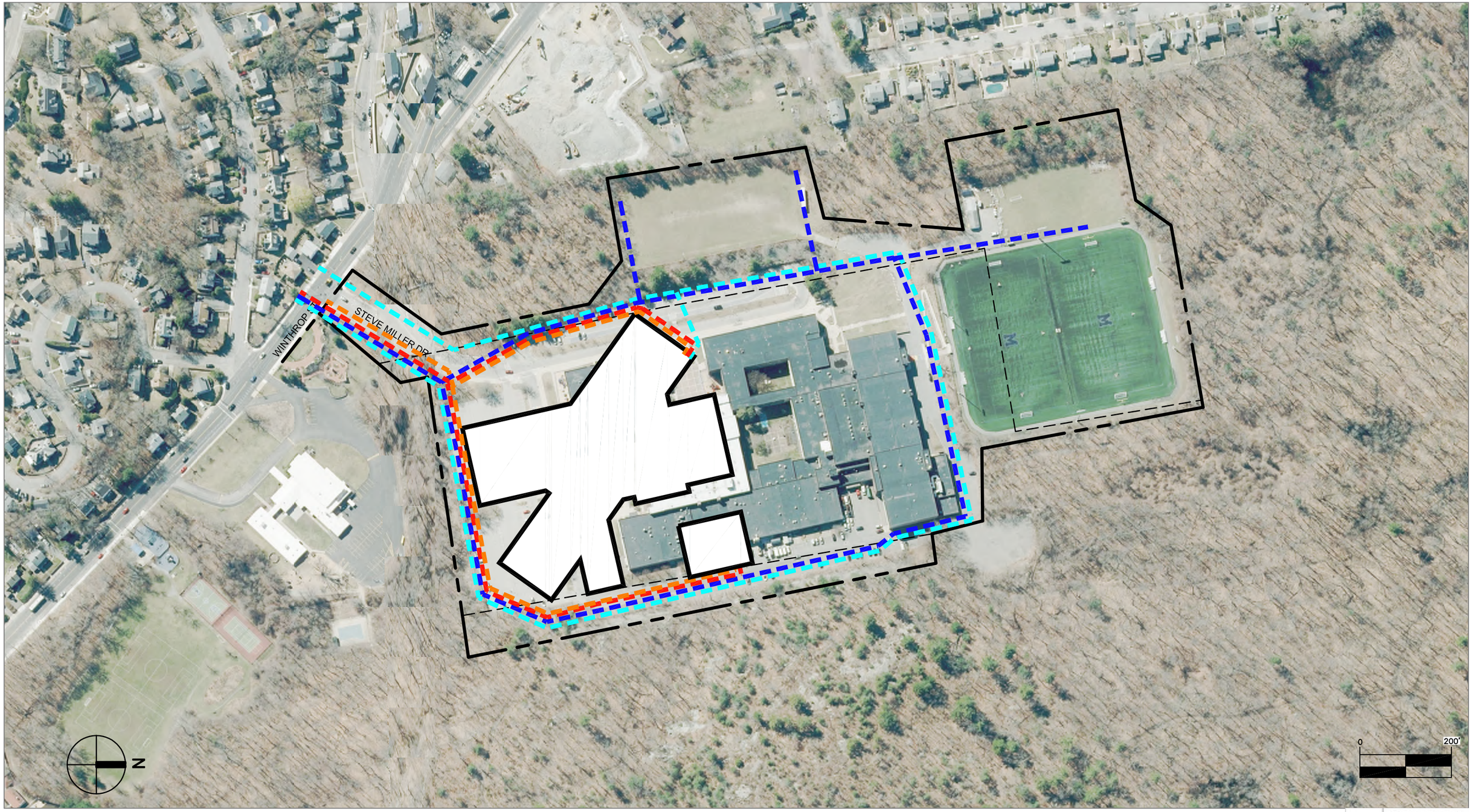
Phase 2
- Demolish B Wing and building northern half of new School building
- Southern half of new school building occupied
- Remainder of existing building in use



Phase 3
- Demolish remainder of existing building and build new Pool building
- Completed New School building fully occupied



School Building Complete
- Sitework completed existing building demolition
- New Pool building occupied



Utility Diagram| D.1.1

Medford High School, Medford MA

LEGEND

- STORM DRAIN TRUNK LINE
- SANITARY SEWER SERVICE TRUNK LINE
- WATER SERVICE
- GAS SERVICE

SMMA
SYMMES MAINI & McKEE ASSOCIATES
1000 Massachusetts Avenue
Cambridge, Massachusetts 02138
P:617.547.5400 F:617.648.4920

Construction Alternative D

Alternative D.1.1 NP

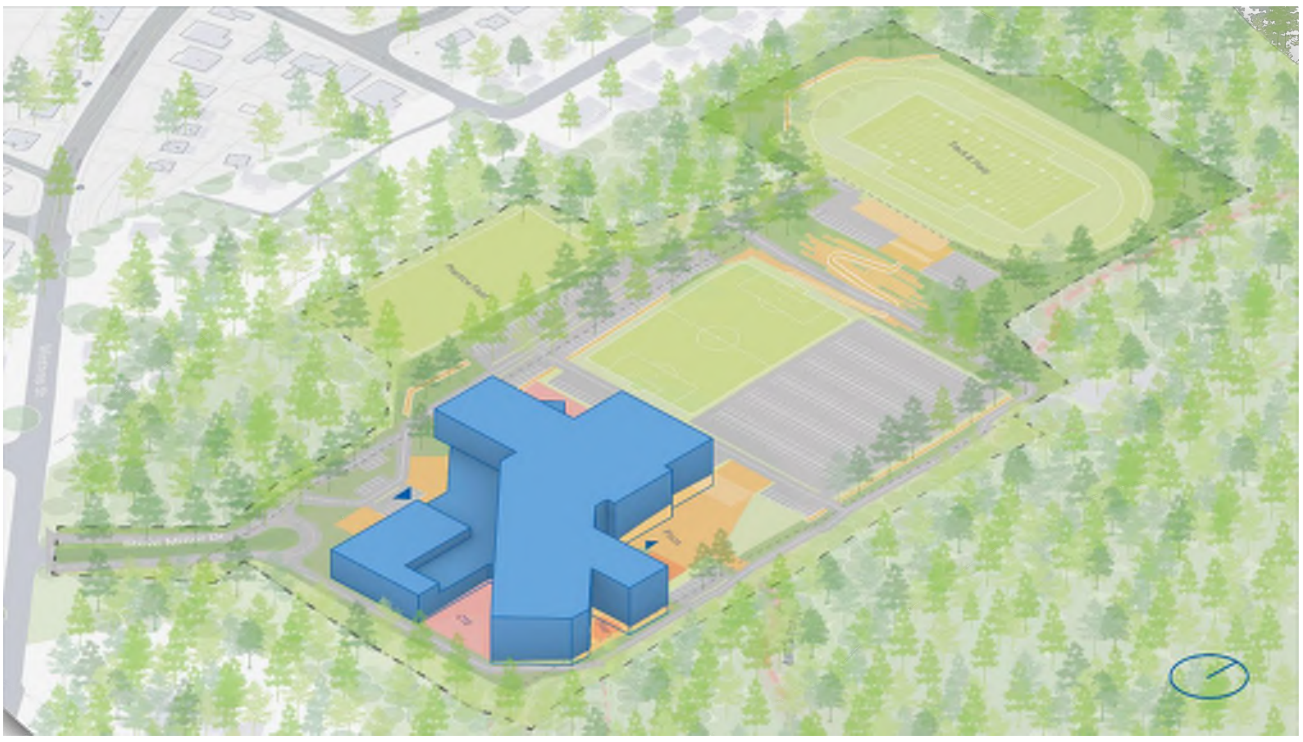
D.1.1 NP: New Building on the Parking Lot and a portion of the Existing Building Footprint, High Rise Building designation. No new Natatorium included with the project

Full Demolition of Existing Facility. Construction of 559,763 GSF of new area across 5 Stories.

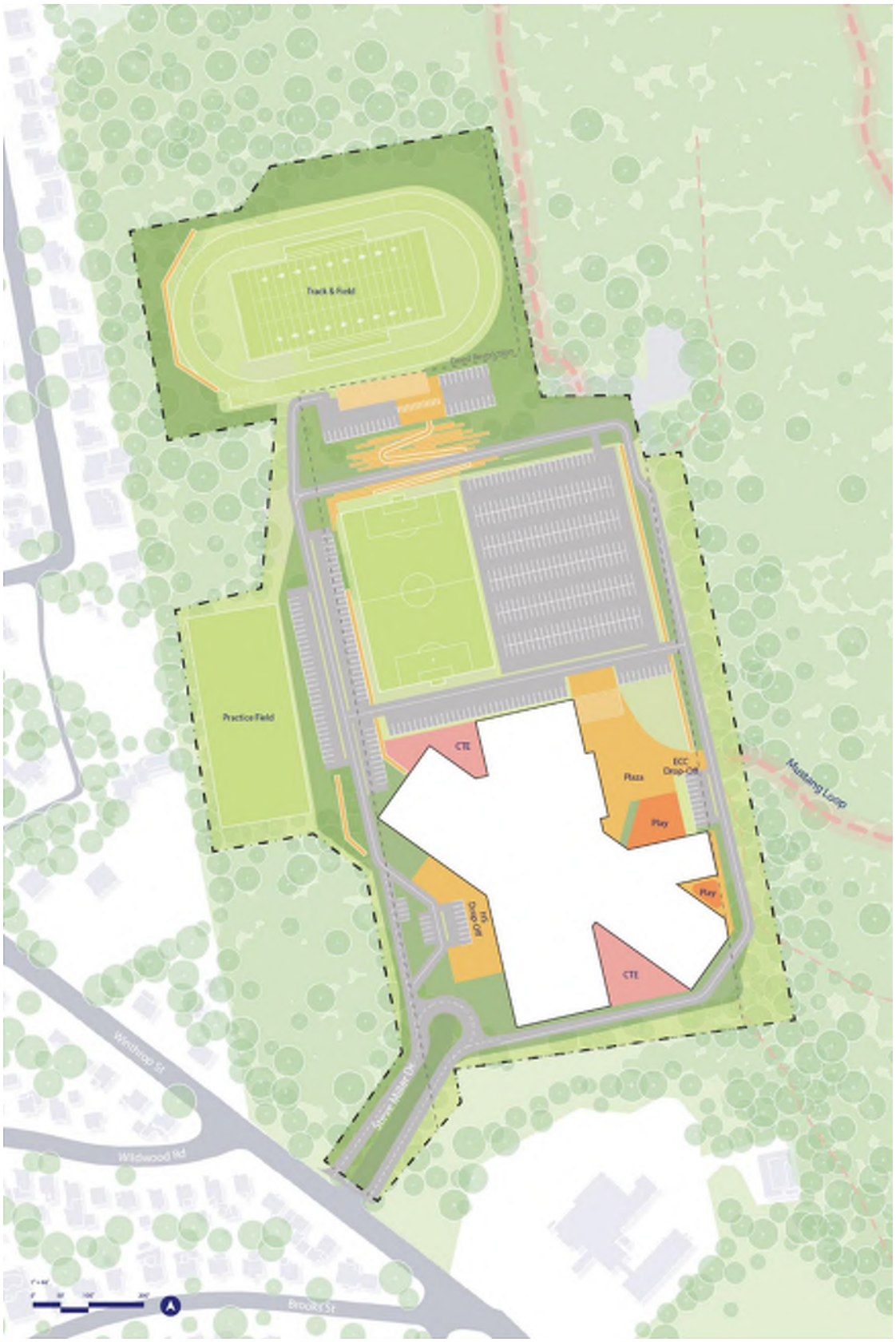
Alternatives D.1.1 and D.1.1NP would both be implemented through multiple phases over eighty-one (81) months



Alternative D.1.1 NP



Alternative D.1.1 NP



Alternative D.1.1 NP – Site Plan


D.1.1 NP
Level 1
+73
Mustang Loop
Wildwood Rd
Winthrop St
Plaza
Play
CTE
Gym
Locker Room
Locker Room
Corridor
Construction Trade Classroom
Automotive
Cosmetology
Culinary
Electrical
Plumbing
Kitchen
Servery
Dining Commons
Engineering & Robotics
Admin
LGI
ECC
Kids Express
Play


D.1.1 NP
Level 2
+89
PROGRAM LEGEND
(NEW CONSTRUCTION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tuffs
Art & Music
Vocations & Technology Non-Chapter 74 Programs
Vocations & Technology Chapter 74 Programs
Health & Physical Education
Media Center
Auditorium / Drama
Dining Commons
Food Service
Medical
Administration & Guidance
Custodial & Maintenance
Other (including District Wide Services)
Mechanical / Non-programmed space
Primary Entry
Secondary Entry
Unexcavated / Below Grade
Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Mustang Loop
Wildwood Rd
Winthrop St
Central Offices
Community Multipurpose
Welcome Center
Gallery
Family
Community Partner
MEP
Twin Shafts
PE 64
ET
PE 64
Mailbox
STEPS
PE 64

D.1.1 NP
Level 3
+105



D.1.1 NP
Level 4
+121




D.1.1 NP
Level 5
+137
PROGRAM LEGEND
(NEW CONSTRUCTION)
Core Academic
Teacher Planning
Science & Support
Special Education
Curtis Tufts
Art & Music
Vocations & Technology
Non-Chapter 74 Programs
Vocations & Technology
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Outdoor Learning
Roof / PV Area
Expansion Area
Existing Building to be removed
Dental
Health Assist.

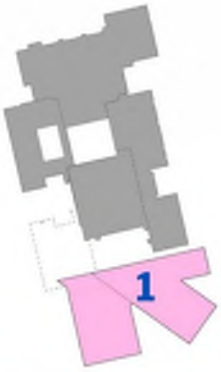
D.1.1NP - Phasing

81 Months Total

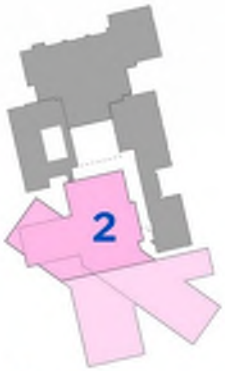




Existing Building
- Site Prep / Enabling
- Existing building in use



Phase 1
- Demolish A Wing and build southern half of new School building
- Remainder of existing building in use



Phase 2
- Demolish B Wing and building northern half of new School building
- Southern half of new school building occupied
- Remainder of existing building in use



Phase 3
- Demolish remainder of existing building
- Completed New School building fully occupied



School Building Complete
- Sitework completed existing building demolition

E. Evaluation and Conclusions

Throughout the PSR phase, the design team and MCHSBC analyzed and reviewed in detail the opportunities and constraints offered by each of the final seven alternatives. To assist the decision-making process, the building committee utilized a detailed Evaluation Criteria Matrix. This rubric was first created during the PDP phase of the feasibility study when 29 different options were being considered, and its focus was narrowed when the smaller collection of final options was being considered during the PSR phase. The Evaluation Criteria Matrix includes a wide variety of both qualitative and quantitative topics that range from an ability to achieve the guiding principles of the education program to cost and schedule implications. The PSR version of this evaluation document is attached as Appendix J.

It is important to note that in the Criteria Matrix, while Alternative C.2.2A did not achieve the overall highest score – its point total was in the top three scores which is indicative of the many project goals that C.2.2A achieves. The Criteria Matrix was never intended to be a single absolute method of selecting an alternative, but rather a document that helps frame the relative ability of the different alternatives to achieve the large and diverse variety of project goals.

In summary, the Medford Comprehensive High School Building Committee cited five major criteria in which the preferred alternative offers key advantages:

Educational Experience – the building massing and geometry will provide increased visibility and sightlines throughout the interior environments to enhance school operations and facilitate supervision. The massing also maximizes access to daylight for educational environments.

Preservation of Valued Resources – renovation of the existing large gymnasium, pool and several alternative PE spaces such as the Gymnastics Gym preserves resources that hold high value for the school and larger Medford community.

Support of City Public Safety – both the Medford Police and Medford Fire Departments indicated their support for the C.2.2A Alternative given the location of the building on the site and full perimeter vehicular circulation around the building footprint.

Cost Effectiveness – The cost of Alternative C.2.2A was the lowest of the full-program Addition & Renovation options being considered as part of the Final Evaluation of Alternatives. While the "high school only" C.2.2A-HS option did represent a lower first cost, the MCHSBC was uncomfortable un-housing non-high school programs currently located in the building without having a valid plan for where these programs might be relocated to. Over the course of the summer the City of Medford will be conducting a space availability study across the City to determine if viable alternative locations exist, and what it might cost the City to relocate non-high school programs. The MCHSBC will decide at their October 6, 2026 meeting to confirm which (if any) non-high school programs will not continue to be located at Medford High School in the future.

Minimized Disruption - Alternative C.2.2A can avoid the use of modular classroom buildings during construction, which mitigates impacts to learning during construction and avoids non-reimbursable costs. It also avoids the potential environmental impact of using "disposable" resources.

The following section 3.3.4 Preferred Solution details the addition renovation option which renovates the Gym, Pool and a portion of the PE/Dining wings while adding to the north, west and south - Alternative C.2.2A – which was chosen by the MCHSBC to move into Schematic Design.