3.1.6 Preliminary Evaluation of Alternatives

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

The Lexington School District consists of the following:

- Lexington Children's Place, 20 Pelham Road, Lexington MA 02421
    - Grade PK, Enrollment 76
- Bowman Elementary School, 9 Philip Road, Lexington MA 02421
    - Grades K-5, Enrollment 428
- Bridge Elementary School, 55 Middleby Road, Lexington MA 02421
    - Grades K-5, Enrollment 365
- Fiske Elementary School, 55 Adams Street, Lexington MA 02420
    - Grades K-5, Enrollment 335
- Harrington Elementary School, 328 Lowell Street, Lexington MA 02420
    - Grades K-5, Enrollment 378
- Joseph Estabrook Elementary School, 117 Grove Street, Lexington MA 02420
    - Grades K-5, Enrollment 537
- Maria Hastings Elementary School, 7 Crosby Road, Lexington MA 02421
    - Grades K-5, Enrollment 631
- Jonas Clarke Middle School, 17 Stedman Road, Lexington MA 02421
    - Grades 6-8, Enrollment 810
- Wm Diamond Middle School, 99 Hancock Street, Lexington MA 02420
    - Grades 6-8, Enrollment 927
- Lexington High School, 251 Waltham Street, Lexington MA 02421
    - Grades 9-12, Enrollment 2,318
- Minuteman Regional High School, 758 Marrett Road, Lexington MA 02421
    - Grades 9-12, Enrollment 683

B. Tuition Agreement with Adjacent School Districts

Lexington Public Schools do not have tuition agreements with adjacent school districts. Per Massachusetts General Law, the School Committee must vote annually to determine whether the school district will participate in the School Choice Program. This vote must be submitted to the Department of Elementary and Secondary Education. Given persistent overcrowding in the Lexington Public Schools, the School Committee voted unanimously that they would not participate in the School Choice Program for the 2024-2025 school year.

C. Rental or Acquisition of Existing Buildings

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

Construction Alternatives Including Cost Estimate and Schedules

Multiple construction alternatives for a grade 9-12 high school with enrollment of 2,395 students were developed, including a base code upgrade option, three renovation and addition options and fifteen entirely new construction alternatives. The alternatives explore opportunities and constraints of building on the existing Lexington High School site and the surrounding athletic fields.

The following sections provide a description of each construction alternative as well as an evaluation of each alternative. A cost estimate, provided by AM Fogarty is included as an Appendix to this report.

Summary of Construction Alternatives

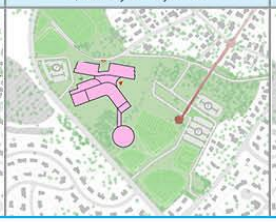
	A. Code Upgrade	B. Renovation & Addition			C. New Construction					
Alternative	A.1	B.1	B.2	B.3	C.1a	C.1b	C.1c	C.1d	C.2a	C.2b
Description	No Changes to Architecture	2-4 Floors Phased-in-Place Retain Building G & J Structure	2-4 Floors Addition on Athletic Fields Retain Building G & J Structure	4 Floors Phased-in-Place Retain Building C & D	3 Floors On Fields 1 Phase	4 Floors On Fields 1 Phase	5 Floors On Fields 1 Phase	4 Floors On Fields 1 Phase Reduced wetland impact	3 Floors On Fields 1 Phase	4 Floors On Fields 1 Phase

	C. New Construction							D. New - Multi Phase	
Alternative	C.3a	C.4a	C.4b	C.4c	C.5a	C.5b	C.6	D.1	D.2
Description	3 Floors On Fields 1 Phase	3 Floors On Fields 1 Phase	4 Floors On Fields 1 Phase	4 Floors On Fields 1 Phase Reduced wetland impact	4 Floors On Fields 1 Phase	4 Floors On Fields 1 Phase Reduced wetland impact	4 Floors On existing footprint Multiple Phases Reduced wetland impact Reduced Art 97 impact	4 Floors On Fields Multiple phases	4 Floors Phased-in-Place Reduced wetland impact Reduced Art 97 impact

Summary of Construction Alternatives and Project Cost

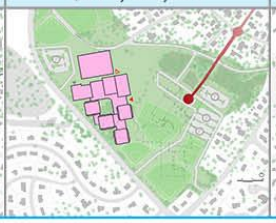
All project costs identified below are for the **School Building Educational Program ONLY** and do not include extra functions such as the Central Office, Field House or Natatorium.

	A. Code Upgrade	B. Renovation & Additions		
Alternative	A.1	B.1	B.2	B.3
Project Cost	$300,000,000	$635,000,000	$595,000,000	$665,000.000
Costs are school building only NO Alternatives included.				

	C. New Construction			
Alternative	C.1a	C.1b	C.1c	C.1d
Project Cost	$610,000,000	$600,000,000	$600,000,000	$625,000,000
				

	C. New Construction			
Alternative	C.2a	C.2b	C.3a	C.4a
Project Cost	$610,000,000	$600,000,000	$605,000,000	$615,000,000
				

	C. New Construction			
Alternative	C.4b	C.4c	C.5a	C.5b
Project Cost	$605,000,000	$630,000,000	$600,000,000	$620,000,000
				

		D. New - Multi Phase	
Alternative	C.6	D.1	D.2
Project Cost	$615,000,000	$610,000,000	$621,300,000
			

D. Code Upgrade (No-New Build)

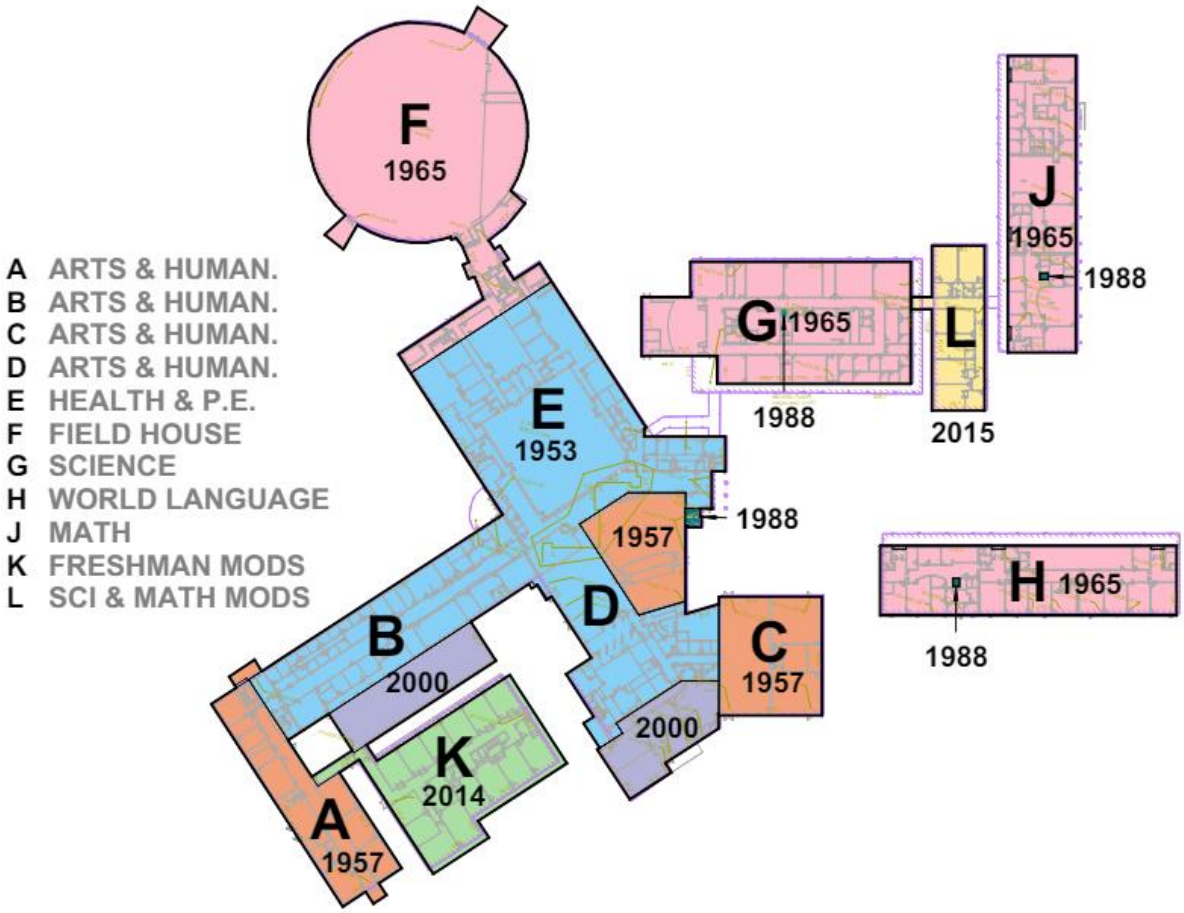
Construction Alternative A: Code Upgrade and Repair

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 two-story high school is approximately 352,000 square feet, including 320,720 gross square feet of base educational program and 31,280 gross square feet of existing Field House building. Upgrades would take approximately 4 years to complete over multiple phases.

Description

The code upgrade and repair alternative require 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



Program Delivery Impediments

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 clearances at some doors
- Lack of ADA Door operators at all entry doors
- Inaccessible seating locations in the theater and lecture hall
- Non-compliant drinking fountains
- Non-compliant toilet fixtures, lavatories and sinks
- Insufficient grab bars at some toilet rooms and showers
- Exposed piping below sinks (neither apron nor pipe protection)
- Lack of 5'-0" clear turning circle at some toilet rooms
- Non-accessible lavatory and sink faucets
- Non-compliant height at some urinals

Energy Code Compliance

The Town of Lexington 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. Building Enclosure upgrades will include mitigation of thermal bridges.

Life Safety Code Compliance

Stair guardrails do not meet minimum opening size requirements, nor required 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.

Site

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

Architectural

On the exterior of the building, localized repointing and general cleaning of exterior masonry brick and exposed cast in place concrete will occur. Replacement of all exterior windows will be required with energy efficient units. Replacement of all exterior HM doors. Complete replacement of the roofing, providing a high-albedo membrane roof with energy code-compliant thickness of insulation. Complete repalcement of exterior wood soffits with energy-code compliant thickness of insulation.

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.

As noted in the Accessibility Code Limitations portion of this section, several spaces located throughout the school incorporate inaccessible seating areas, due to tiers in the lecture hall and inaccessible slopes in the auditorium. Cut-outs will be added in the front row of tiers to create inclusive seating positions down low, and ramps and elevated seating positions will be added in the auditoirum. 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, floor and roof framing to remain. It is anticipated that the required structural work will be minor, and the seismic upgrade requirement will not be triggered per IEBC. For a voluntary upgrade to the current code, a new lateral system would need to be introduced as there is none defined in the existing drawings. This can include steel braced frames or infill concrete/CMU shear walls. Furthermore, each of the CMU walls will need to be attached to their respective floor and roof diaphragms, which is further complicated by the presence of clerestory windows in the interior partitions. New steel framing for floor and roof openings is required at any new MEP shafts.

HVAC

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

Phased constructrion 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 ourdoor 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 watersource heat pumps.

Ventilation will be provided with rooftop DOAS units, configured with watersource 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 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.

Plumbing

The plumbing systems in general appear to be in adequate working condition, however all plumbing systems are either at or beyond the end of their useful life expectancy. The major piping systems from visual inspection appear in fair to poor condition. In general, plumbing fixtures were replaced during renovations, but some conditions do not fully meet current ADA/MAAB 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. Lead free options for valves and fittings were limited at the time of construction. The domestic water system would require replacement throughout to meet current lead-free requirements.

Fixtures in general do not conform to current water saving standards (LEED). Fixtures to be replaced with low flow fixtures to meet the sustainability requirements. Kitchen equipment will also need to be replaced with low flow equipment in accordance with LEED requirements.

In order to meet the current Massachusetts Energy Code, including the Specialized Stretch Energy Code adopted by the Town of Lexington, the existing gas fired equipment will be removed and replaced with electric equipment. The existing HVAC systems will be replaced with new, all-electric systems.

The natural gas systems will be removed in their entirety. This includes gas to mechanical units, domestic water heaters, kitchen equipment, and science/lab classrooms. The natural gas piping within the laboratories will be demolished. Electric hot plates would be required within the laboratory spaces. Gas fired kitchen equipment will be replaced with electric equipment.

The gas fired water heaters will be replaced with electric water heaters. Final configuration/coordination would be required during design. The installation would not be as simple as a one for one replacement. The systems would need to be redesigned.

All non-ADA fixtures that are required to be ADA compliant shall be replaced with ADA compliant fixtures and pre-formed pipe insulations. Repair or replace all drinking fountains that are not operational. Replace non-accessible drinking fountains with ADA compliant fixtures where required to be accessible.

Overflow (secondary) drains or scuppers will be installed in parapets on the roof and where required by 780 CMR.

Replace existing emergency eyewashes with new eyewashes and provide new emergency showers. Eyewashes and showers shall be located and installed in accordance with 248 CMR and ANSI.

Observations of underground sanitary, vent, and storm piping is not possible. Testing, flushing, and possibly video inspection is required to determine the life expectantly left in the underground piping. Underground piping will be replaced unless proven to be fully functional.

Fire Protection

The building is provided with automatic sprinklers throughout with the following exceptions: The field house (building F) and connecting entrance corridor is not protected by sprinklers. Previous additions and renovations did not provide sprinklers within these areas. In addition, the smaller modular building (2015 Building L) drawings do not show sprinklers. Based on the square footage, sprinklers may not have been required.

Sprinkler protection for the field house needs to be evaluated. Massachusetts General Law Section 26G requires sprinkler protection in additions/renovations that are greater than 7,500 square feet. Final coordination and acceptance to be by Lexington Fire and building code official.

There are four (4) 8” fire water service entrances to the buildings that will remain during the code upgrade. Currently, the system does not include a fire pump. It is assumed that a fire pump is not required for the code upgrade. Final confirmation requires a hydrant flow test to confirm the water supply has not decreased through the years.

Quick response sprinklers will be replaced where they have been in operation for more than 20 years in accordance with NFPA requirements. If representative testing is performed and the sprinklers are proved to be fully functional, the sprinklers can be left in place.

To accommodate the HVAC, Plumbing, and Electrical modifications included in the code upgrades, fire protection work includes modifying the existing sprinkler and standpipe systems. In areas where ceilings are removed, upright sprinklers shall be provided for temporary protection. Upon ceiling installation, new sprinklers will be installed in the center of tiles.

Some valves and sprinklers appear antiquated and are near the end of their life expectancy. Also, availability of parts will be difficult for any major maintenance to the system. This option includes recommendation to replace sprinkler control valves, double check valves, fire department valves to ensure longer life of the system.

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

Electrical

Utility Interconnection

The existing utility service will be upgraded to accommodate the new program, which includes an all-electric HVAC system, electric vehicle (EV) charging stations in a minimum of 4% of the total new off-street parking spaces (per zoning bylaws), provisions for future installation of EV charging stations for a minimum of 50% 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)
- 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.

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.

Power Distribution System

The existing electrical service will be replaced. The existing 2400-Amp, 277/480 volt 3-phase 4 wire electrical service provides a power density of approximately 6 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.

The existing electrical distribution system, including the existing 2400A main switchboard, downstream distribution panelboards, and most branch panelboards were replaced approximately 24 years ago, and appear to be in good working condition. It is recommended to maintain as much of the existing distribution system as possible in the renovation area.

Modifications to the existing electrical distribution may include additional panelboards, replacing panelboards and feeders with higher ampere ratings to handle increased loads, and replacing existing main overcurrent protections to include arc energy reduction methods and ground fault protection per latest electrical code requirements.

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.

Life Safety/Emergency System

The existing 600-kW 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and generator distribution system is approximately 24 years old and will require modifications to the system to be brought up to code. 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.

The system is likely also undersized for the code compliant program. A second generator will likely be required to energize the various loads. 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:
    1) Level 3 for the majority of building.
    2) Level 2, not including food prep requirement, applied to select areas of the building, such as the Fieldhouse/Gym (plan for attaching portable generator for cooking.

Lighting & Lighting Control

Replace all existing interior light fixtures with new, high efficient LED light fixtures fitted with dimmable drivers.

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

Replace the existing 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

The existing fire alarm system is a fully addressable voice evacuation system consisting of four (4) node panels throughout the campus. The system head end is approximately 24 years old, and appears to be in working order.

All existing initiation and notification devices however, such as smoke detectors and speaker strobes should be replaced.

The system communicates 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.

Phased construction will require on-going operation of portions of the existing fire alarm 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.

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 can be installed if desired by the town.

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 instuctor'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

After careful consideration and in alignment with best practices and the recommendations outlined in Executive Order 548, which established a Cross-Secretariat Task Force on School Safety and Security, it has been determined that the existing security system will require a comprehensive replacement. While there are no explicit code requirements mandating such action, adhering to the directives and insights provided by the Task Force is paramount in ensuring the utmost safety and security measures are in place within our institution.

The school's security infrastructure is designed with multiple layers, incorporating both active and passive security measures. These layers encompass various aspects such as perimeter security, surveillance cameras deployed both indoors and outdoors, controlled, and secure entry points, access control mechanisms at key interior doors, intrusion detection systems featuring multiple zones, intercommunication systems, the ability to initiate lockdowns for classroom wings, and the capability for individual classroom lockdowns.

Acoustics

New building utility equipment will incorporate sound attenuating measures, as necessary, for compliance with the community noise emissions summarized in the Town of Lexington General Bylaws, Chapter 80: Noise Control. These requirements are consistent with the noise emission 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. For a detailed report on the materials to be abated, see Section 3.1.4.M.

Capacity Constraints

The design capacity of 2,395 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.

Program Delivery Impediments

An educational facility that was built over the course of many years, from 1953 to 2015, the existing Lexington High School exhibits many features that no longer meet the pedagogical requirements of a modern high school.

Many classrooms are significantly undersized, students are required to go outside to get from building to building, and many modifications over the decades have resulted in duplicate or disconnected spaces and extended travel distances with challenging control and security issues.

School Requirements

Lexington High School delivers a robust curriculum which is dependent on the size, quality and quantity of the general classrooms. However, these classrooms are on average undersized, with an average size of 699 SF, which compare poorly with the accepted norm of 825 to 950 sf for high school use.

Science is taught in 22 small labs at an average size of 1,069 SF with fixed benches that limit flexibility, with ten prep rooms, which are also undersized.

There is a separate gymnasium and field house space in the building. Both spaces are currently being fully utilized, but the gym is undersized, and the field house is insufficient in size to accommodate indoor track competitions.

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

Schedule Overview

Alternative A.1 would be implemented through multiple phases and and intense summer phases over fourty-eight (48) months.

Cost Overview

The estimated construction cost is:

$222,000,000

The estimated project cost is:

$300,000,000

Conclusion

The Pros and Cons are summarized as follows:

Pros

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

Cons

- The completed construction would not accommodate the future curriculum envisioned in the educational program
- Significantly lower impact on energy conservation and operating costs than that of other options
- Does nothing to address overcrowding, and would incur space reduction impacts due to code upgrades to existing infrastructure
- Many duplicate and poorly utilized spaces remain
- Separated buildings will be maintained, forcing students to move outside between buildings and perpetuating security concerns associated with this condition
- Isolated and inefficient corridors remain difficult to negotiate and are disorienting
- Multiple-year disruption due to phased construction
- Added cost and inconvenience due to modular classrooms

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

Construction Alternative B.1: Multi-Phased Addition/Renovation on Existing Footprint

Includes phased demolition of 232,747 gross square feet of Buildings A, B, C, D, E, H, K and L, and 87,973 gross square feet of gut renovations at two-story Buildings G and J with their existing concrete structures retained and absorbed into new construction. New construction additions totaling 355,563 gross square feet occur in multiple phases over 5 years within the general footprint of the existing school.

Renovation of the existing 31,280 sf Field House shall be carried as an option with this Alternative.

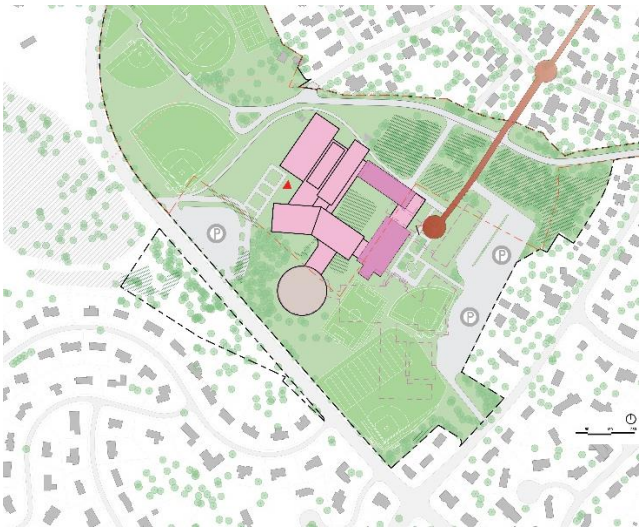
B.1

Construction Alternative B.2: Addition/Renovation

Construction of 355,563 gross square feet of new construction addition, in one phase, on existing athletic fields, followed by 87,973 gross square feet of gut renovations at two-story Buildings G and J with their existing concrete structures retained and connected to the new construction. Total estimated construction duration of 4 years.

Demolition of Buildings A, B, C, D, E, H, K and L totaling 232,747 gross square feet.

Renovation of the existing 31,280 sf Field House could be carried as an option with this Alternative.



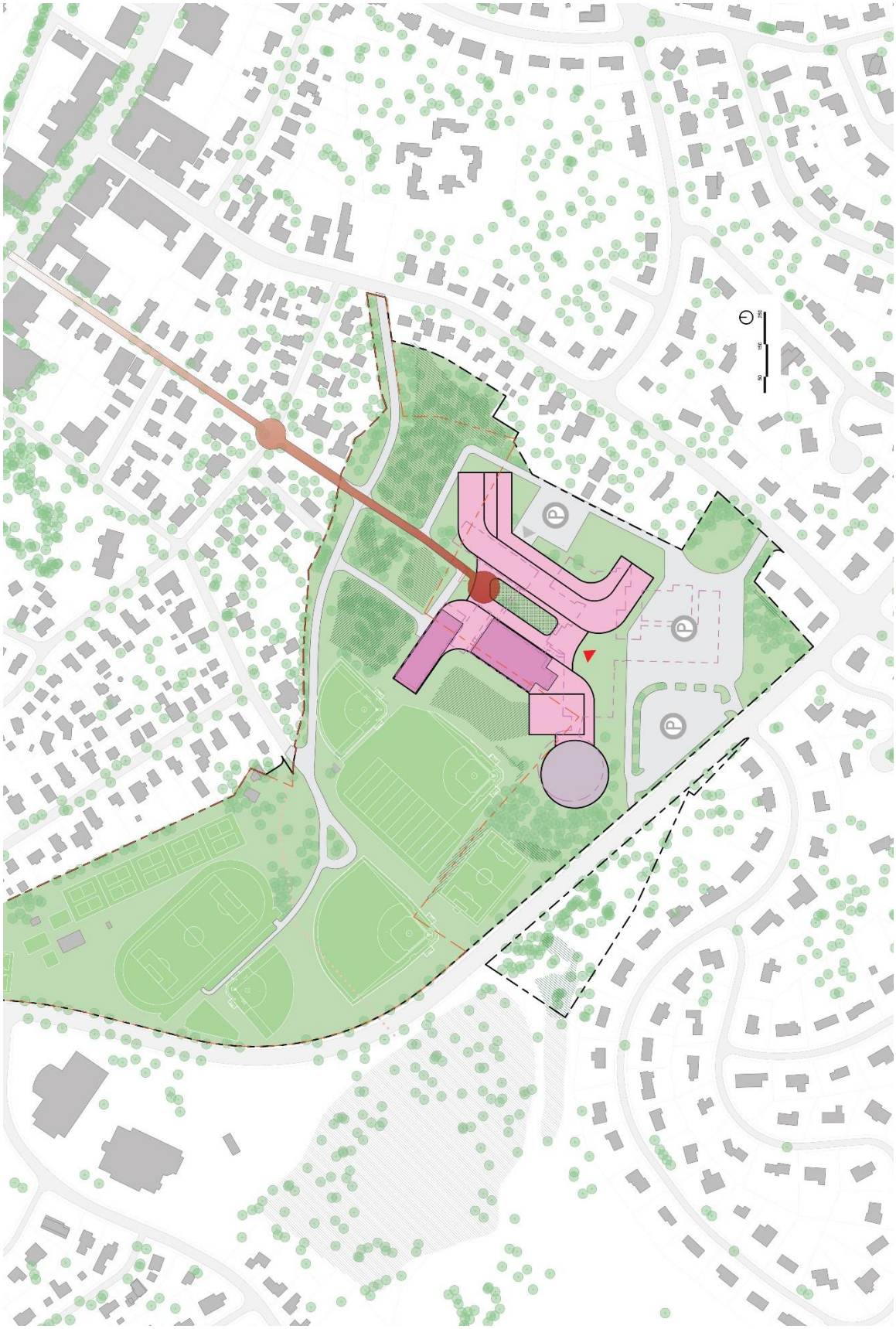
B.2

Construction Alternative B.3: Addition/Renovation

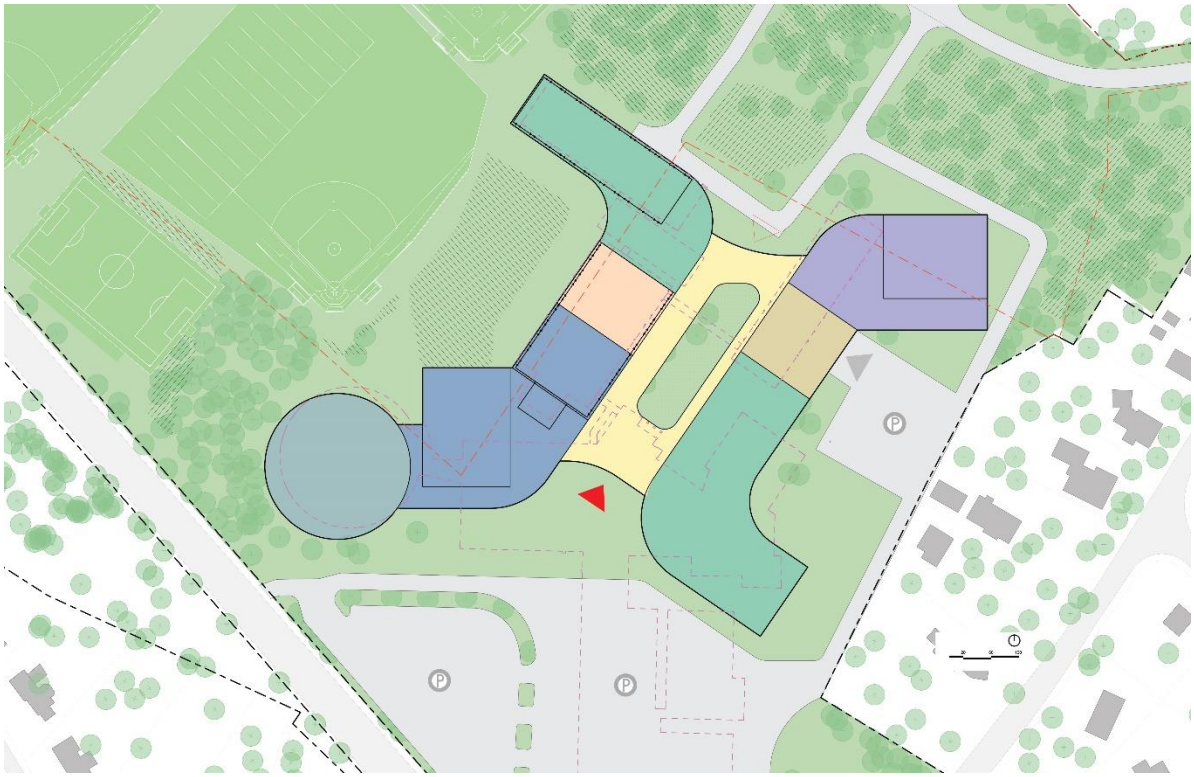
Includes phased demolition of 279,606 gross square feet of Buildings A, B, E, F, G, H, J, K and L, and 71,394 gross square feet of gut renovations at two-story Buildings C and D with their existing concrete structures retained and connected to the new construction. Total estimated construction duration of 5 years.

Construction of a new 36,000 gross square feet Field House could be carried with this option.

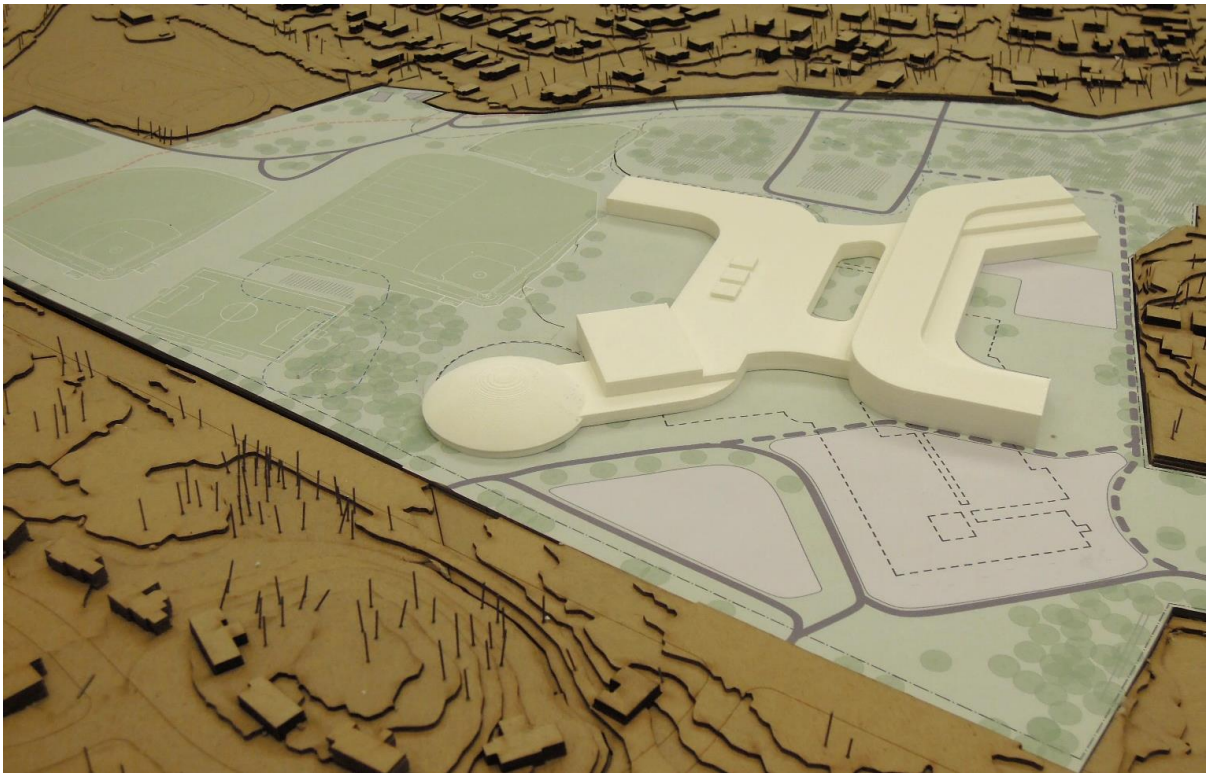
B.3



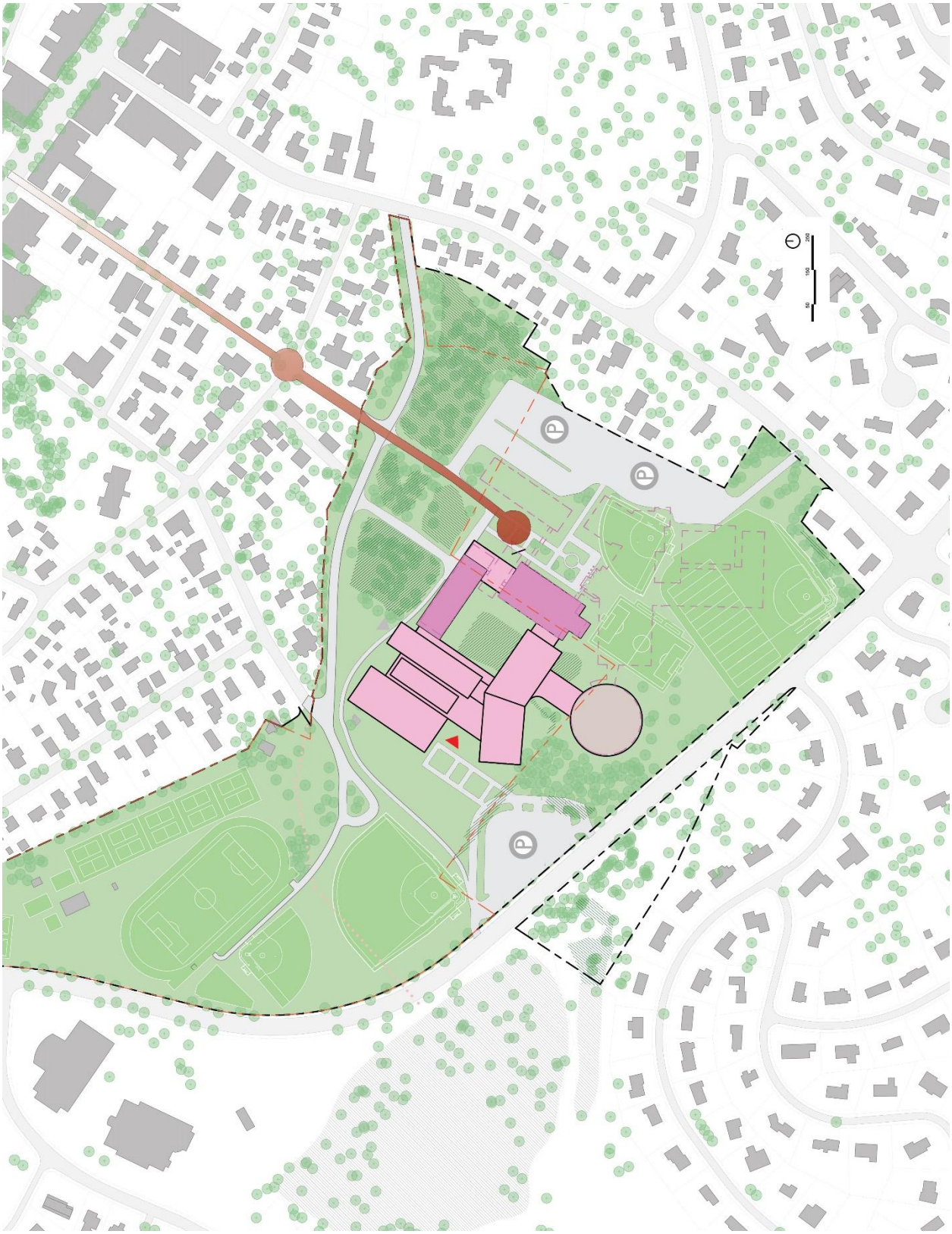
Alternative B.1 Site Plan Diagram



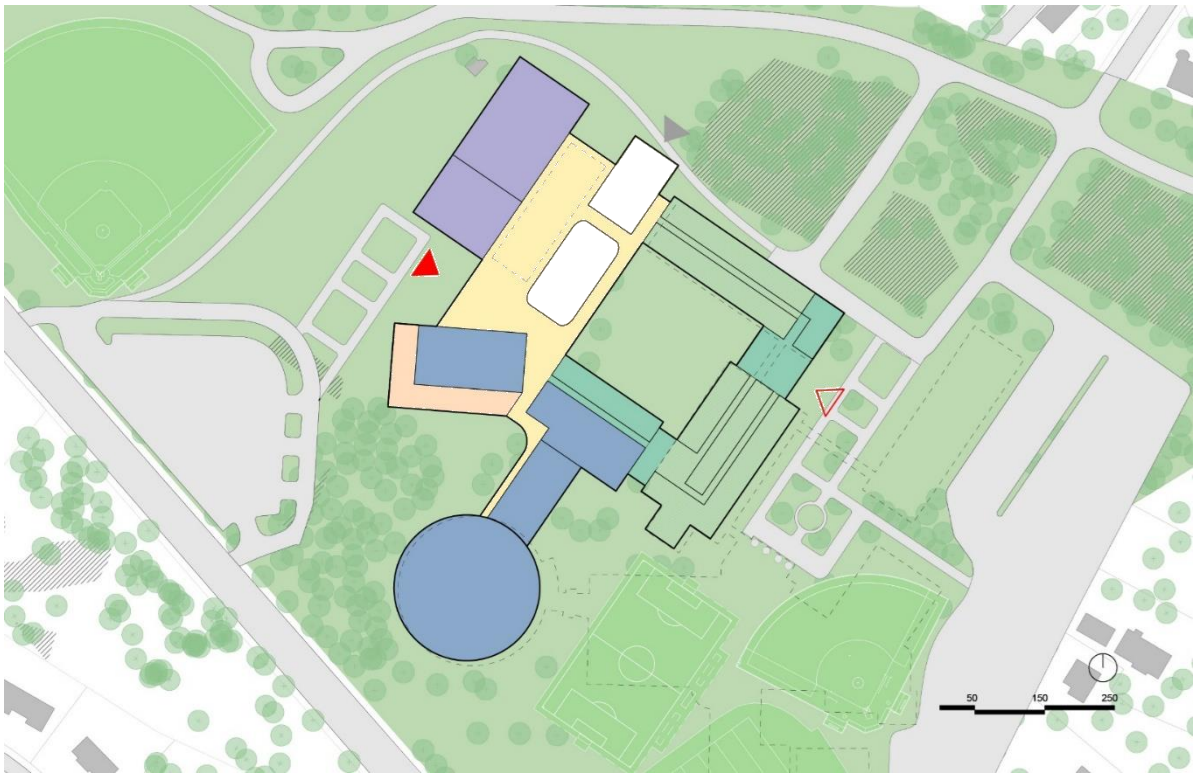
Alternative B.1 – Level 1 Program Diagram



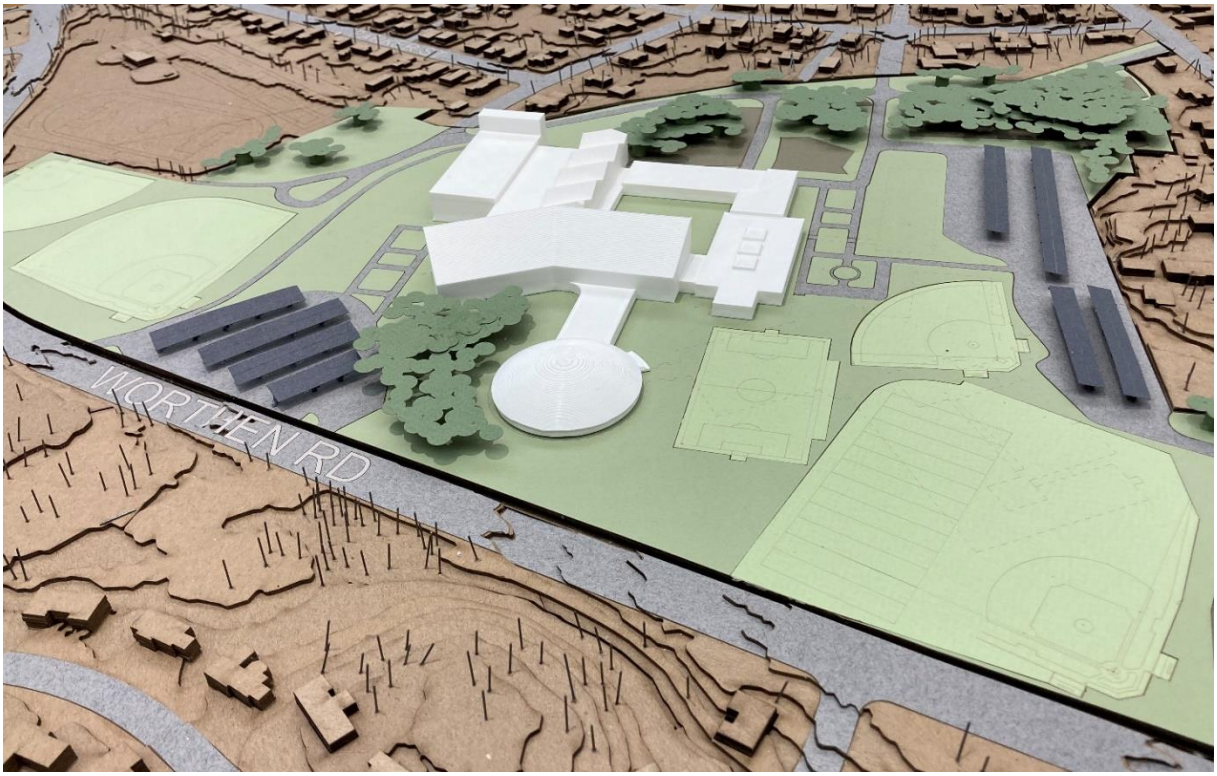
Alternative B.1 – Massing



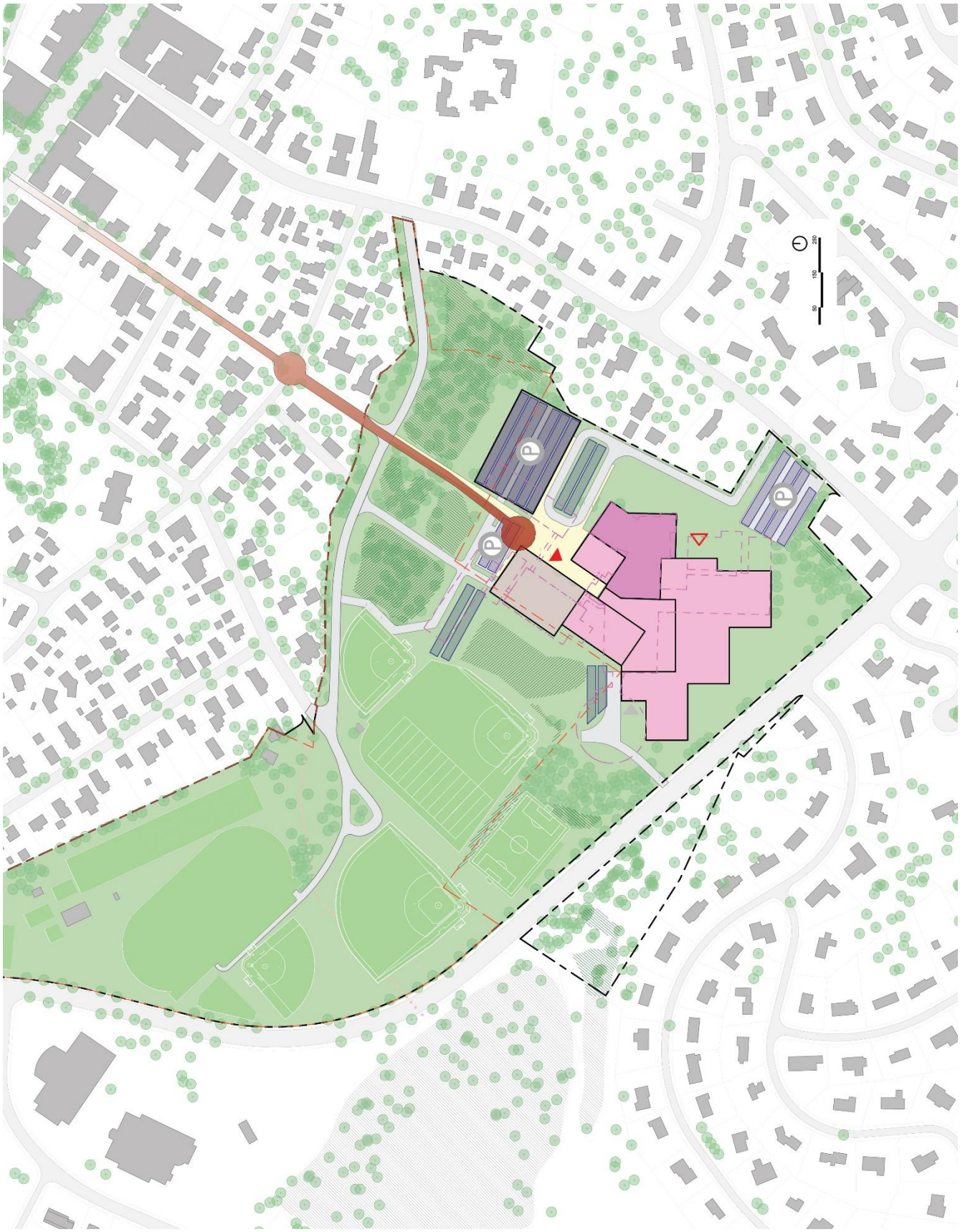
Alternative B.2 Site Plan Diagram



Alternative B.2 – Level 1 Program Diagram

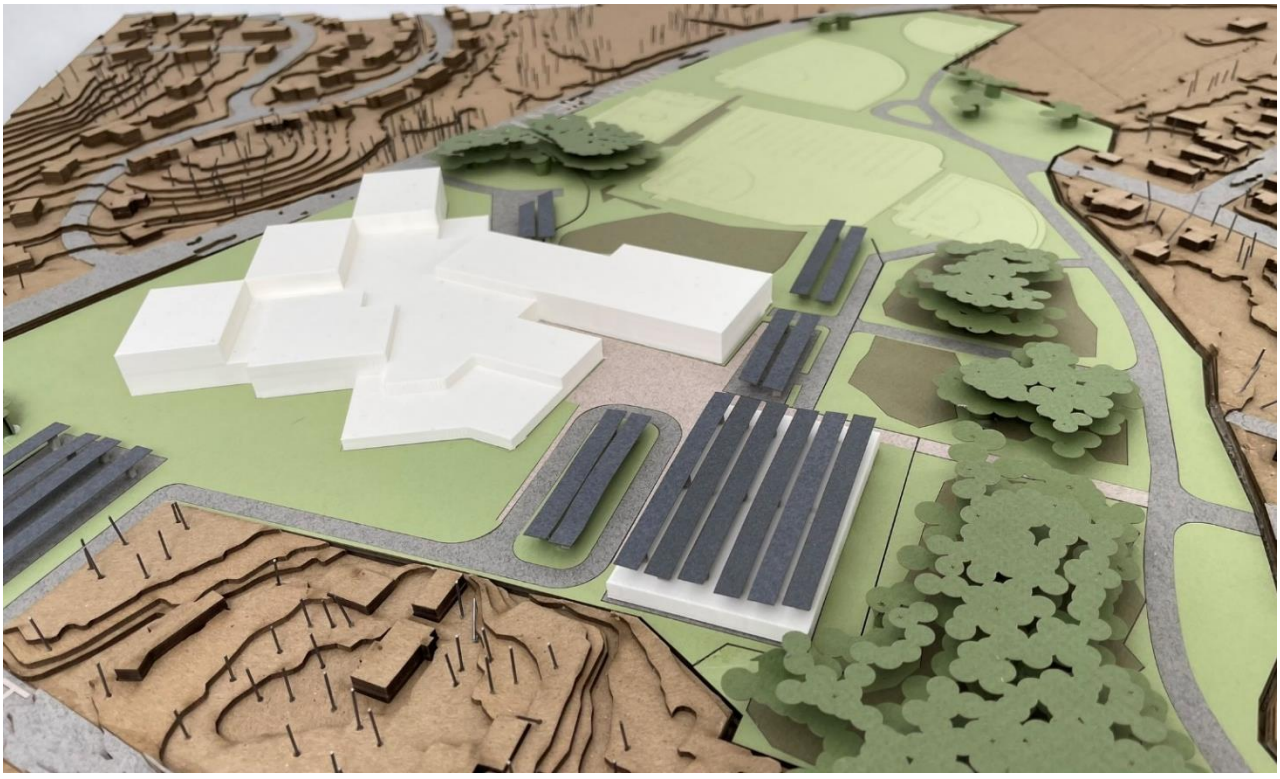


Alternative B.2 – Massing



Alternative B.3 Site Plan Diagram

Alternative B.3 – Level 1 Program Diagram



Alternative B.3 - Massing

Description

The Renovations and Addtions to Existing Buildings Alternative will include compliance with the Lexington Integrated Design Policy, a Net Zero Energy school building with an energy target EUI of 25 kBtu/SF/yr. or 30% better than ASHRAE 90.1-2019 whichever is lower, LEEDv4 for Schools Gold Certification with a goal for Platinum, and embodied carbon reduction strategies such as low carbon concrete and materials such as structural wood components.

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 Town of Lexington has adopted the Massachusetts Stretch Energy Code's Specialized Code. The Renovations or Addtions to Existing Buildings Alternative would require compliance with the Stretch Energy Specialized Code, based on the major renovation/addition scope of work.

Site

Site work within these addition/renovation alternatives will include the redevelopment of all vehicular and pedestrian circulation systems. Separation between bus circulation, van circulation, car circulation, and delivery circulation will be developed. Drop off and pick up areas for buses, vans and cars will be separated. New outdoor student spaces, including entrance plazas, outdoor learning environments, outdoor courtyards, and connections to resource areas for education will be developed. All pedestrian circulation systems and outdoor gathering areas will meet ADA and MAAB accessibility requirements.

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.

Parking for an assumed 450 vehicles will be developed for the purposes of these alternatives. A final parking count will be developed and incorporated as the alternatives evolve.

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 B.1 and B.3: Multi-Phased Addition/Renovation on Existing Footprint, there will be no permanent changes to the locations of existing athletic fields. Under Construction Alternative B.2: Addition/Renovation, the C3 baseball field, the C4 baseball field, the Crumb football field, and the practice field will be impacted. The impacted fields will be reconstructed elsewhere on the property to the same quantity, quality, solar orientation and size of the fields as they currently exist. These options currently anticipate that the C1 baseball field, C2 softball field, Center Track and Field, Center Playground, Gallagher Tennis Courts, Skate Park, Town Pool, and Farias Basketball Courts will not be impacted by these options and are all outside the Limit of Work.

Wetland replication on the projec site will be required to off-set direct impacts to the wetlands at a ratio of at least 2:1.

All new underground utilities will serve the school and redeveloped site. On-site water distribution will be provided from the existing mains in Waltham Street and Worthen Road. Hydrants and the building will be served from the new 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 minitigate runoff quantity.

Architectural

All exterior envelope assemblies within the areas of new construction will be designed to meet the robust thermal requirements of the Stretch Energy Specialized Code. Exterior assemblies in renovated areas of the building will be cleaned, repaired and augmented to also meet current code requirements. Interior assemblies and materials will be selected to provide the necessary level of durability for the expected 50-75 year life span of the school.

Structural

Existing foundations are to remain at Buildings G & J in both options B.1 and B.2. In option B.3, existing foundations are to remain at Buildings C & D. Additions shall receive new spread footings on rigid inclusions.

Assume a 30'x30' column grid.

- Three-story additions shall have 9'x9'x2' with 6 PSF of rebar
- Four-story additions shall have 10'x10'x2' with 6 PSF rebar

Existing floor and roof construction to remain in Buildings G & J in option B.1 and B.2. For Option B.3, the existing floor and roof construction is to remain in Buildings C & D. Scope to match option A. Provide an expansion joint between existing structure and addition. The existing structure will not be analyzed or reinforced for gravity and lateral loads from the current building code unless modifying existing framing or it is voluntarily upgraded. The addition shall be designed for all loads mandated by the current Massachusetts Building Code at the time of permitting.

Additions shall be as described in the New Building Construction Alternatives.

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 Town of Lexington. 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 ourdoor 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 watersource 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 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.

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. During the phased construction options, the existing systems will remain operational while the renovation/ addition systems are installed. Refer to descriptions below for new work associated with this option.

New domestic cold and hot water systems will be provided throughout the facility. A domestic water booster is not antipated, however, a hydrant flow test is required to confirm. The entire sytems will be replaced including, reduced pressure backflow preventers pipe insulation, pipe labels with flow arrows and valve tags. Electric storage type domestic water heaters will be provided.

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.

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 lab areas, pH adjustment room, Nurse's room and boiler room. 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 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. A new foundation drainage system will be provided. The discharge from the foundation drainage system will exit the building independently from the primary storm drainage systems and connect to exterior storm drainage manholes with backwater valves. Storm drainage piping from each level of roof area will be provided with backwater valves for each level.

Due to the electrification requirements, natural gas is not anticipated. Kitchen equipment will be electric. Hot plates will be utilized within the lab classrooms. Two new acid waste chip tanks will be provided. One for each science wing. 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. Each drain from chip tanks will drain independently from the building by gravity and connect to the site sewer system 10 feet outside the foundation wall.

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 battery-operated sensor type flush valves. Urinals will utilize 0.125 gal/flush self-regenerating battery-operated sensor type flush valves.

Lavatories will likewise utilize self-regenerating battery-operated 0.35 gpm sensor operated faucets. Sinks will utilize 1.5 gpm flow restrictors and showers will utilize 1.5 gpm flow shower heads.

Fire Protection

The scope of the renovation and addition option is to replace the existing sprinkler system throughout and extend the new system into the new addition. Since the existing building does not have a fire pump, it is assumed that the renovation/addition will not require a fire pump. The layout of the addition (height, number of stories) is required to confirm.

It is important to note that the phased construction will require on-going operation of portions of the existing automatic sprinkler system. The new system(s) will be as outlined below:

It is anticipated that the new addition can be fed from the existing building. The exisitng spirnkler systems and service are to replaced with new piping systems and valves/components. The new system will include new double check valve assemblies, wet alarm check valves, floor control valve assemblies, sprinklers, flow switches, tamper and pressure switches and all associated piping. The system will be hydraulically calculated in accordance with NFPA requirements. Sprinkler mains will be equipped with control valves, inspector test stations, and flow switches. Sprinkler spacing will comply with NFPA-13 requirements. Separate sprinkler zones will be provided for each floor and each wing.

New standpipes meeting the requirements of 780 CMR and NFPA 14 will be installed. A standpipe isolation valve will be provided at each standpipe feed. Each standpipe will meet the requirements of a Class 1 standpipe system in accordance with 780 CMR and NFPA 14 requirements. Each will be provided with 2 ½-inch fire department valves with 1 ½-inch reducers and caps. The standpipes will be interconnected at the ceiling of the first floor.

New fire department connections and electric bells shall be provided in the quantities and locations as required per the local fire department. The new fire department connection will be arranged to serve all sprinklers and standpipes within the building. The fire department connection threads will match Fire Department requirements. Where required due to travel distances and local fire department requirements, intermediate standpipes will be provided in additional locations.

Sprinklers for areas with ceilings will be factory painted gloss white, concealed type. Mechanical rooms and other unfinished areas are to be provided with brass finish, exposed sprinklers. Sprinklers that are subject to damage will be provided with sprinkler guards. Sprinklers subject to higher temperatures will be intermediate or high temperature sprinklers in accordance with NFPA 13 requirements. Sprinklers for areas subject to freezing, including loading dock areas, shall be dry type.

Elevator machine rooms and hoistways 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

Utility Interconnection

The existing utility service will be upgraded to accommodate the new program, which includes an all-electric HVAC system, electric vehicle (EV) charging stations in a minimum of 4% of the total new off-street parking spaces (per zoning bylaws), provisions for future installation of EV charging stations for a minimum of 50% 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)
- 15,000 Volt switchgear (owned by the school, operated by utility)
- Provisions for four (4) transformers (owned and operated by the school)
- Solar interconnect switchboard for the 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 25, early estimates suggest the size of the total solar system shall be 3.5 Megawatts, along with 2-Megawatt/4-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 3750 kVA transformer is dedicated to the photovoltaic (PV) system, feeding a 5000 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 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 utility. 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.

The existing electrical distribution system, including the existing 2400A main switchboard, downstream distribution panelboards, and most branch panelboards were replaced approximately 24 years ago, and appear to be in good working condition. It is recommended to maintain as much of the existing distribution system as possible in the renovation area. Modifications to the existing electrical distribution may include additional panelboards, replacing panelboards and feeders with higher ampere ratings to handle increased loads, and replacing existing main overcurrent protections to include arc energy reduction methods and ground fault protection per latest electrical code requirements.

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.

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 600-kW 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and generator distribution system is approximately 24 years old and will require modifications to the system to be brought up to code. 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.

The system is likely also undersized for the code compliant program. A second generator will likely be required to energize the various loads. 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:
    1) Level 3 for the majority of building.
    2) Level 2, not including food prep requirement, applied to select areas of the building, such as the Fieldhouse/Gym (plan for attaching portable generator for cooking.

Lighting & Lighting Control

Replace all existing interior light fixtures with new, high effieicnet LED light fixtures fitted with dimmable drivers.

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

Replace the existing 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

The exisitng fire alarm system is a fully addressable voice evaculation system consisting of four (4) node panels throughout the campus. The system head end is approximately 24 years old, and appears to be in working order.

New node panels will be provided as required to provide complete coverage to new construction areas. A network backbone will be extended from the new node panels to communicate with the existing.

All existing initiation and notification devices, such as smoke detectors and speaker strobes should be replaced.

The system communicates 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.

Phased construction will require on-going operation of portions of the existing fire alarm 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.

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 can be installed if desired by the town.

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 instuctor'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

After careful consideration and in alignment with best practices and the recommendations outlined in Executive Order 548, which established a Cross-Secretariat Task Force on School Safety and Security, it has been determined that the existing security system will require a comprehensive replacement. While there are no explicit code requirements mandating such action, adhering to the directives and insights provided by the Task Force is paramount in ensuring the utmost safety and security measures are in place within our institution.

The school's security infrastructure is designed with multiple layers, incorporating both active and passive security measures. These layers encompass various aspects such as perimeter security, surveillance cameras deployed both indoors and outdoors, controlled and secure entry points, access control mechanisms at key interior doors, intrusion detection systems featuring multiple zones, intercommunication systems, the ability to initiate lockdowns for classroom wings, and the capability for individual classroom lockdowns.

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), the Fitness area (including the Gymnasium, Fitness Room, Multipurpose Room, and Dance Studio), Cafeteria, Large Group Instruction room, and the Lecture Hall. 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 Production Room.

Acoustics

New building utility equipment will incorporate sound attenuating measures, as necessary, for compliance with the community noise emissions summarized in the Town of Lexington General Bylaws, Chapter 80: Noise Control. These requirements are consistent with the noise emission 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. For a detailed report on the materials to be abated, see Section 3.1.4.M. 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 2,395 students noted in the MSBA Enrollment Projection, and the corresponding educational space needs will be provided by the additions and renovations of these alternatives.

Program Delivery Impediments

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

School Requirements

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

Schedule Overview

Alternatives B.1 & B.3 would be implemented over sixty (60) months; and would include multiple phases.

Alternative B.2 would be implemented over fourty-eight (48) months in multiple phases.

For the Addition and Renovation alternatives portions of the building would come online over the course of the four or five years and students would rotate into those renovated portions while other areas of the buildings come offline. There will be a need to temporary accommodations for many functions including classrooms, auditorium and gymnasium functions during this time. The costs for modulars classrooms have been included as the alternative requires. Larger functions such as Auditorium and Gymnasium will need to occur in other Town buildings.

Cost Overview

The estimated construction cost* is:

B.1: $493,000,000
B.2: $475,000,000
B.3: $523,000,000

The estimated project cost* is:

B.1: $635,000,000
B.2: $595,000,000
B.3: $665,000,000

*All pricing is based on Gross Square Foot (GSF) of educational program only. It does not include costs for additional functions such as Central Office, Field House or a Natatorium

Conclusion

The Pros and Cons are summarized as follows:

Pros

- Maintains general location of the current school
- Preserves Existing Building G and J Concrete Structures for B.1 and B.2. Preserves Existing Building C and D Concrete Structures for B.3.
- Initial construction of additions in Options B.2 and B.3 may reduce number of required temporary modular classrooms
- May mitigate Article 97 impacts

Cons

- All options temporarily displace some athletic fields. Option B.2 permanently relocates fields and may require significant wetland replication.
- Existing structural bays in Buildings A, B, H and J are undersized for appropriately sized classrooms
- New wall enclosures would require extensive rework and underpinning of existing foundations – not economical.
- Existing structural frame not able to accommodate additional floor levels – limits efficient planning on available site
- Existing floor-to-floor heights may result in low headroom in classrooms due to HVAC renovations
- Multiple-year disruption due to phased construction
- Added cost and inconvenience due to modular classrooms

F. New Building Construction and Evaluation of Potential Locations

Construction Alternative C.1
New Building in One Phase

Construction of 443,536 gross square feet of new building in one phase on existing athletic fields, followed by demolition of the 320,720 gross square foot existing high school. Total estimated construction duration of 4 years.

Alt C.1a – 3 Stories
Alt C.1b – 4 Stories
Alt C.1c – 5 Stories
Alt C.1d – 4 Stories, minimized wetland impact

Renovation of the existing 31,280 sf Field House could be carried as an option with these Alternatives.

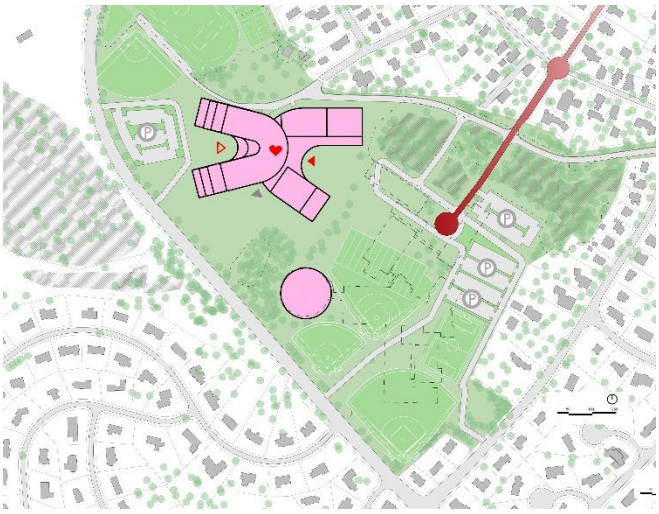
C.1d

Construction Alternative C.2
New Building in One Phase

Construction of 443,536 gross square feet of new building in one phase on existing athletic fields, followed by demolition of the 320,720 gross square foot existing high school. Total estimated construction duration of 4 years.

Alt C.2a – 3 Stories
Alt C.2b – 4 Stories

Renovation and Addition of the existing Field House to create a 48,000 gross square foot facility could be carried as an option with these Alternatives.

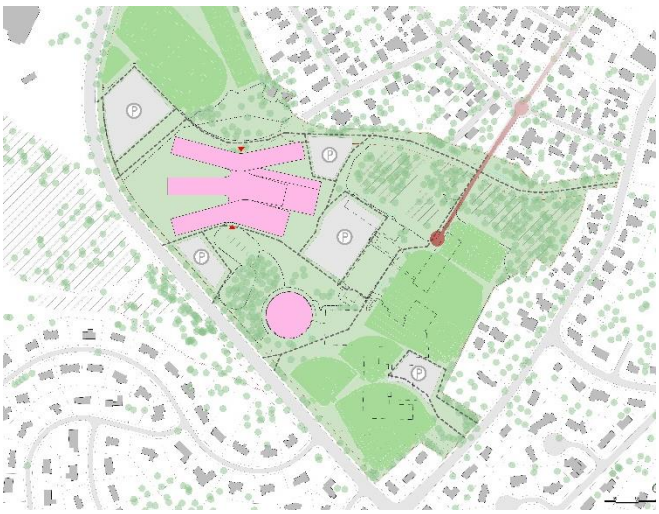


C.2b

Construction Alternative C.3
New Building in One Phase

Construction of 443,536 gross square feet of new 3-story building in one phase on existing athletic fields, followed by demolition of the 320,720 gross square foot existing high school. Total estimated construction duration of 4 years.

Renovation and Addition of the existing Field House to create a 48,000 gross square foot facility could be carried as an option with this Alternative.



C.3a

Construction Alternative C.4
New Building in One Phase

Construction of 443,536 gross square feet of new building in one phase on existing athletic fields, followed by demolition of the 320,720 gross square foot existing high school. Total estimated construction duration of 4 years.

Alt C.1a – 3 Stories
Alt C.1b – 4 Stories
Alt C.1c – 4 Stories, minimized wetland impact

Renovation of the existing 31,280 sf Field House could be carried as an option with these Alternatives.

C.4c

Construction Alternative C.5
New Building and New Field House

Similar to Alts C.1-C.4 except construction of a new 36,000 sf Field House on the footprint of the existing Field House could be carried as an option with these Alternatives. Total estimated construction duration of 4 years.

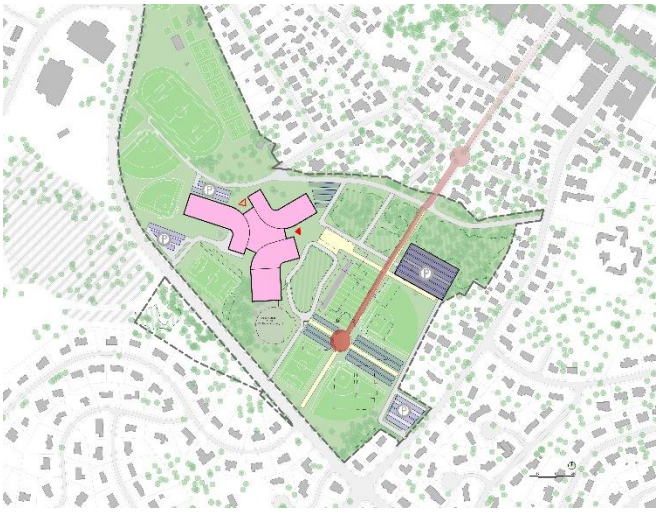
Alt C.5a – 3 Stories
Alt C.5b – 4 Stories

C.5c

Construction Alternative C.6
New Building and New Field House in Multiple Phases

Building Construction similar to Alt C.5 except sited on top of parts of the existing Building footprint. Total estimated construction duration of 5 years.

Construction of a new 36,000 sf Field House could be carried as an option with this Alternative.



C.6

Description

Alternative options C.1 -C.6 include New Construction on existing athletic fields, enabling the entire new school building to be constructed free of the existing high school footprint, and with minimal impacts to the ongoing functioning of the school. Alternative option C.6 includes new construction on the existing building footprint, resulting in no direct impact to wetlands or parkland. The configuration of the new construction will feature preferred interdisciplinary programmatic adjacencies within three-to-five-story academic pods, optimized for best fit, beneficial academic adjacencies, minimal impacts to natural resources, and ideal solar orientation.

Due to space constraints, all New Construction options feature a Health, Wellness and Athletics wing with the 18,000 sf gymnasium stacked on Level 2 above locker rooms, PE alternatives, storage and other noise-tolerant programs.

For school and community use the major public access spaces primarily within Performing Arts and Health and Wellness wings would be organized with direct connection to a central Commons space, while allowing academic wings to be compartmentalized and secured after hours. The Media Center is also a primary public use space and together with the auditorium and Gymnasium can be organized to connect to the cafeteria/commons as a major community gathering space.

The primary entry elevation in many C options faces east toward the open space at new athletic fields, and a new vehicular circulation system extending south from Muzzey Street/Park Drive and north from Worthen Road. In other C options, the primary entry faces Muzzey Street, providing a pedestrian connection for students and the community to downtown Lexington.

The Pros and Cons of options C.1 -C.6 are summarized as follows:

General – Options C.1 – C.5

Pros

- Current Building Remains in Use Throughout Construction, resulting in mimized disruption to ongoing LHS building uses
- Best opportunity for site access and lay-down space for construction
- Single, economical construction phase
- Most freedom of educational planning and adjacencies
- No modulars required

Cons

- Athletic fields taken offline for duration of construction. Final location may be physically separated from Center Rec Complex
- Requires Article 97 legislation

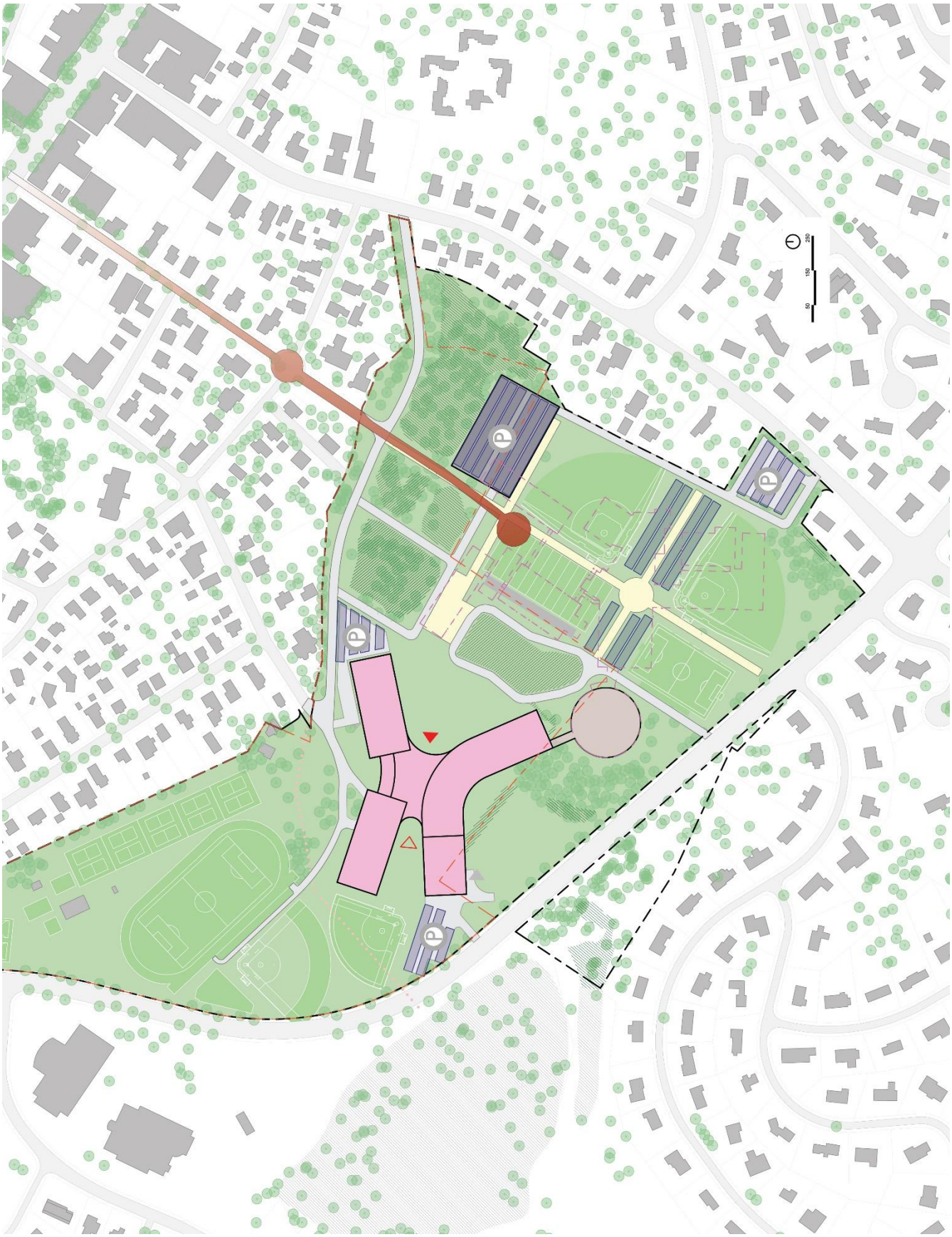
C.6

Pros

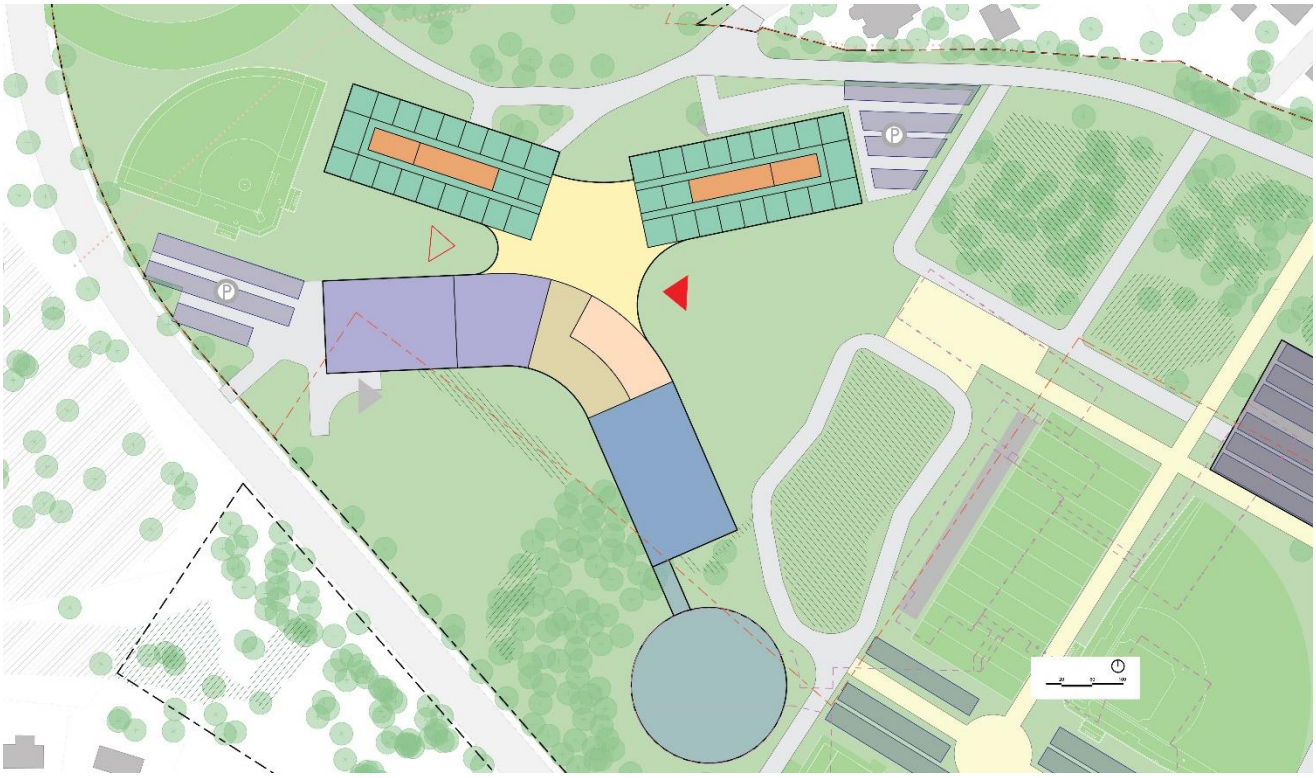
- Reduced site scope
- No direct impact to wetlands
- May mitigate Article 97 impacts
- Initial addition phase may reduce number of modular classrooms needed

Cons

- Added cost and inconvenience due to longer construction duration and need for modular classrooms
- Requires Multi-Phased Construction, causing migration of students to new building over multiple phases.
- Massing toward Worthen Road may complicate desired vehicular traffic patterns

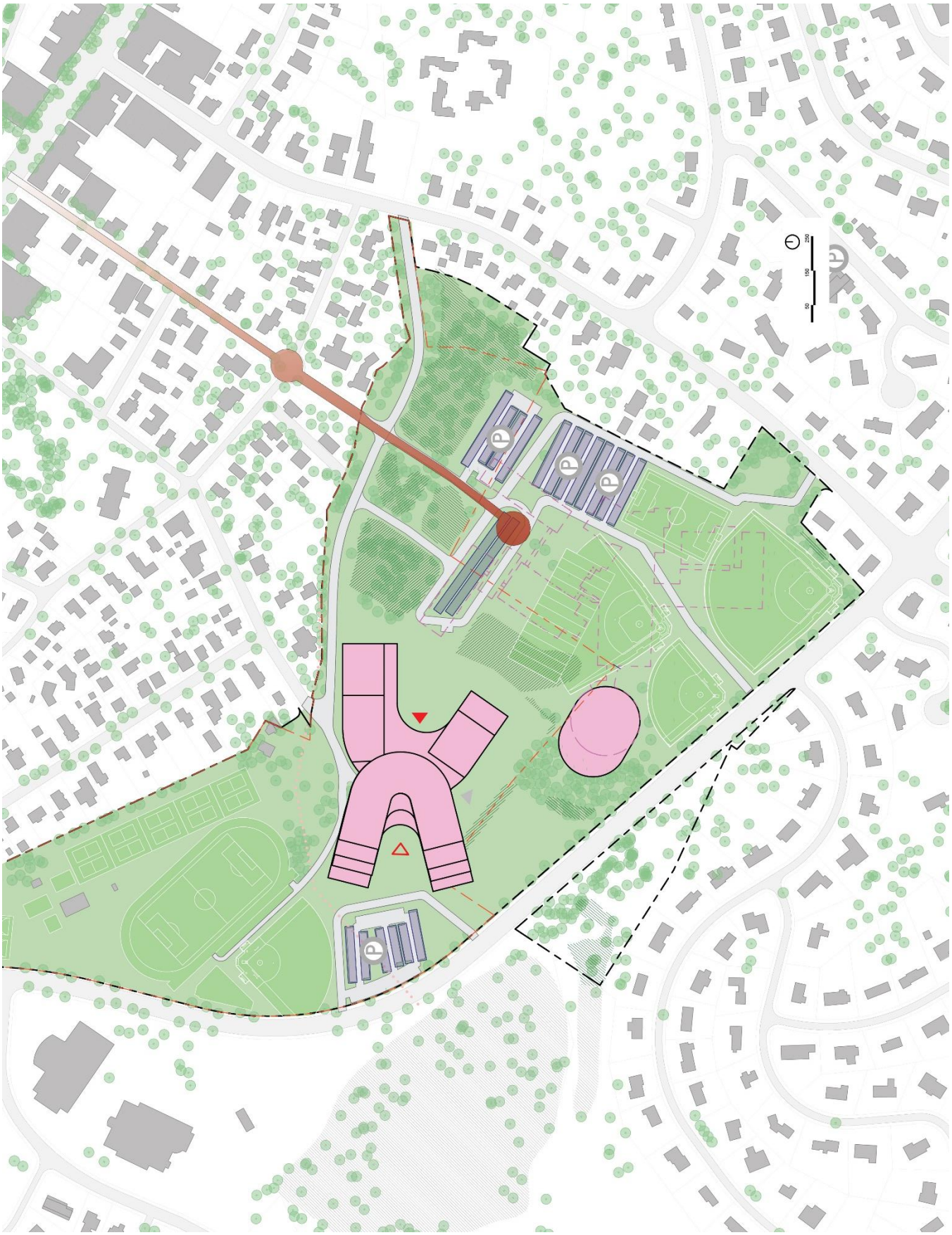


Alternative C.1d Site Plan Diagram

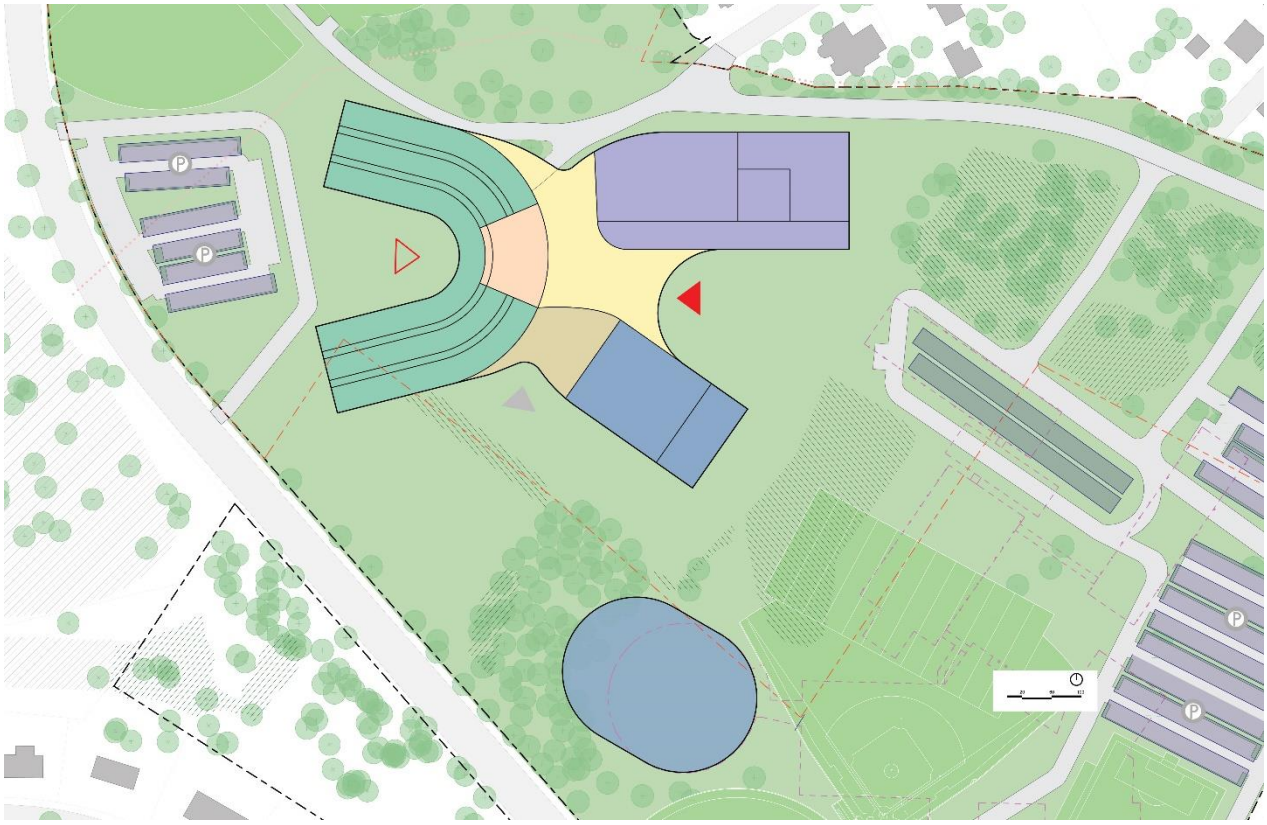


Alternative C.1d – Level 1 Program Diagram

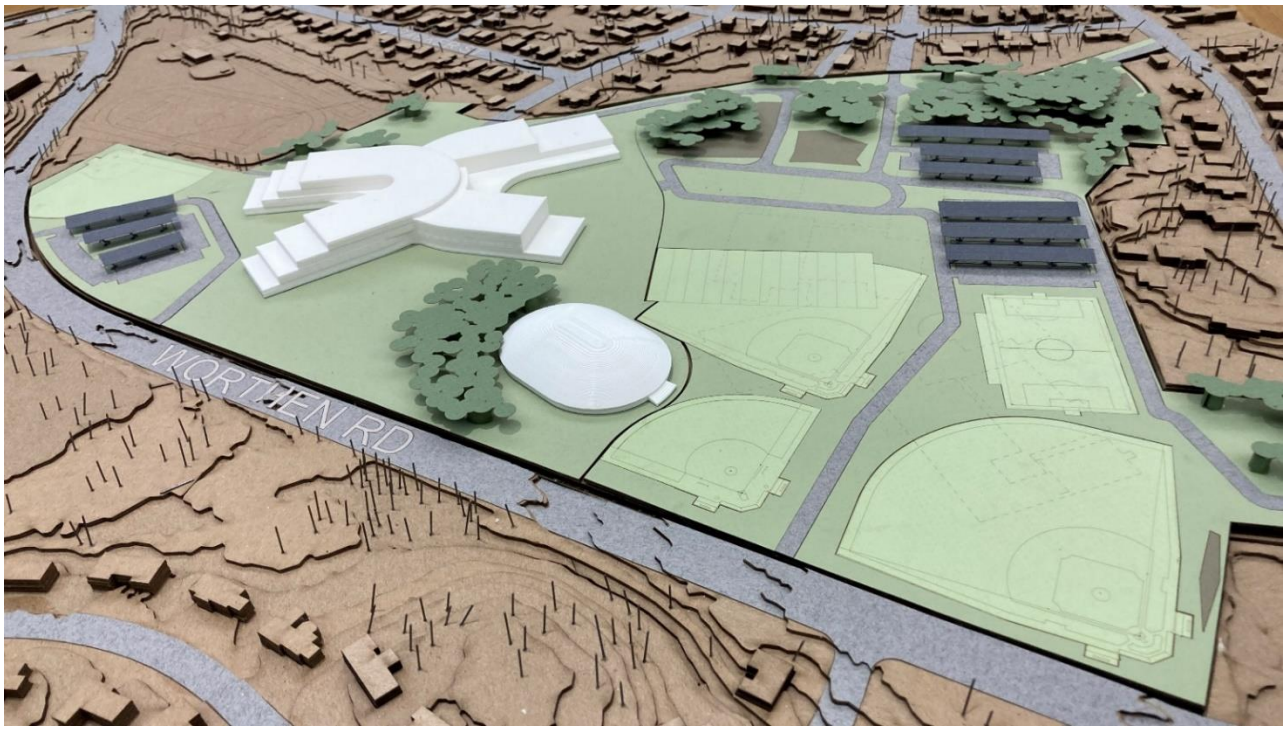
Alternative C.1d - Massing



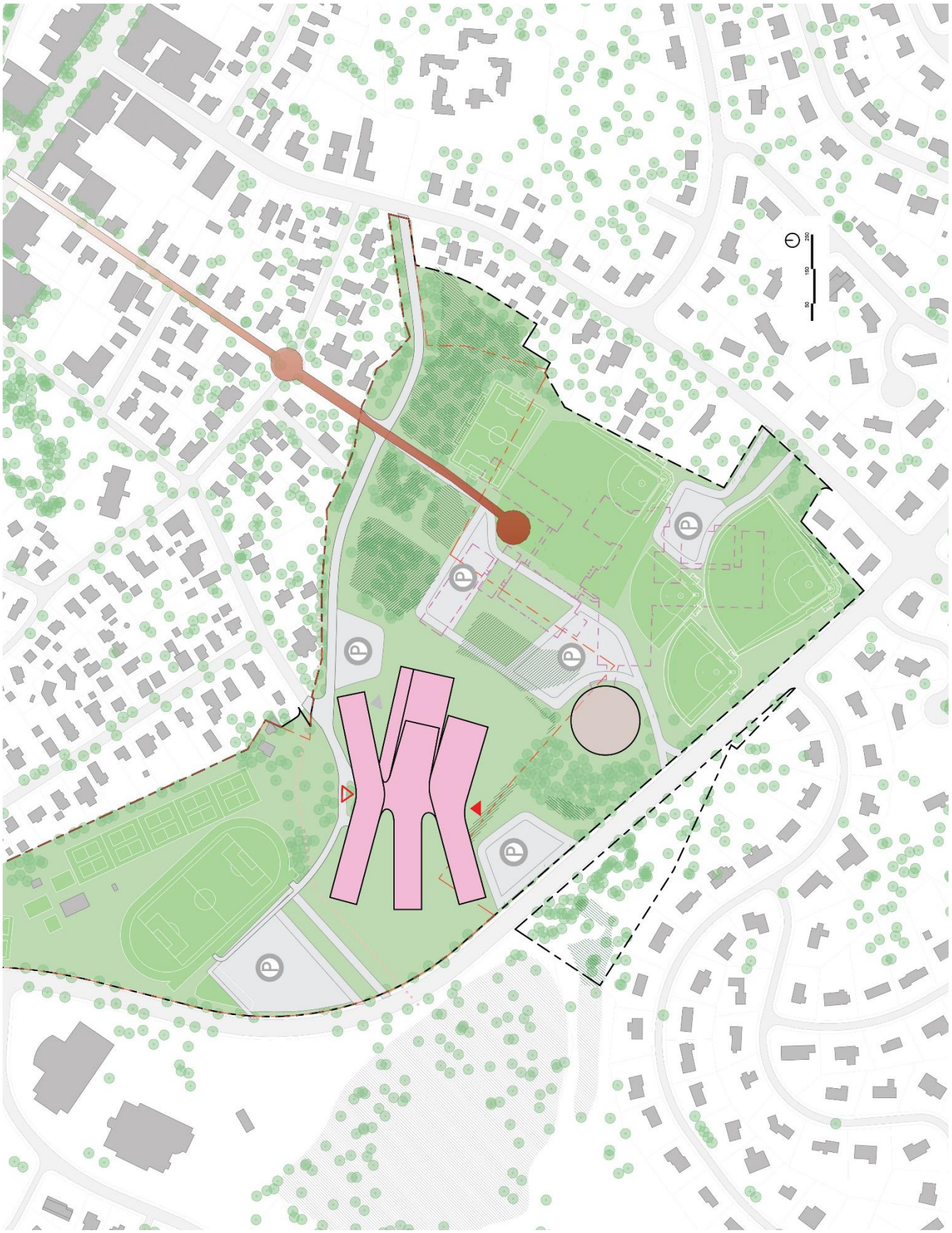
Alternative C.2b Site Plan Diagram



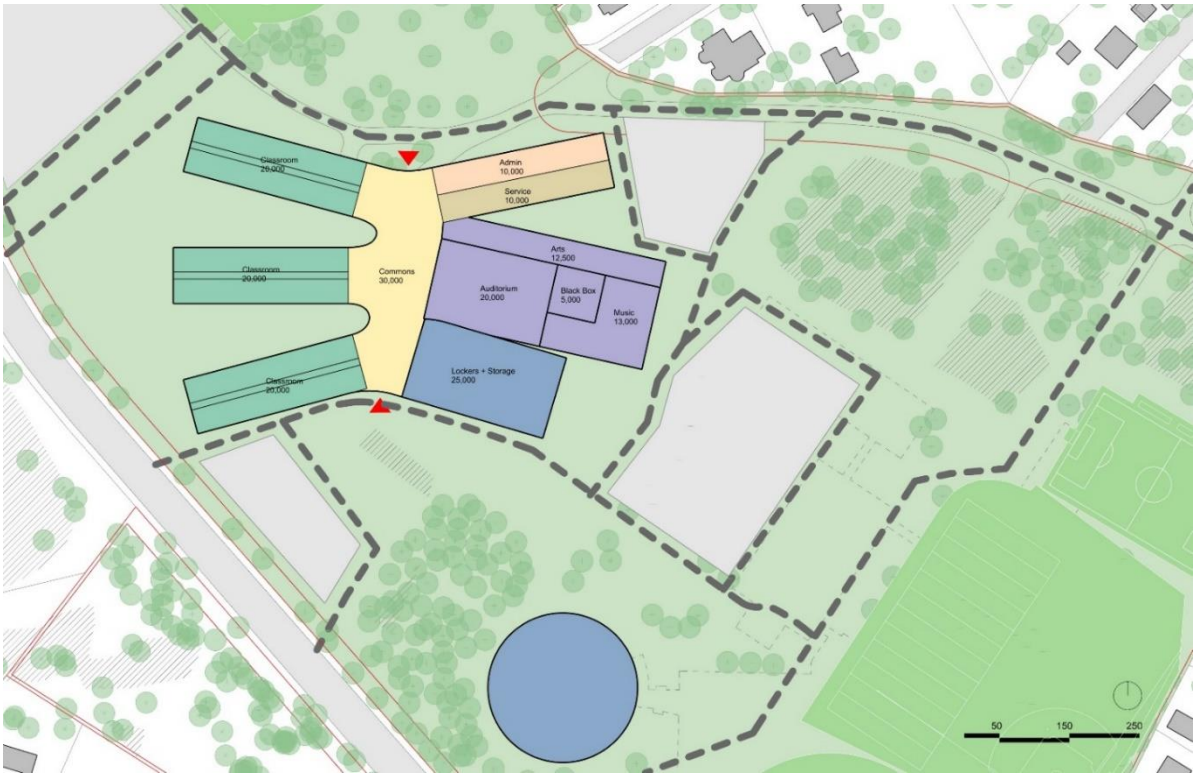
Alternative C.2b – Level 1 Program Diagram



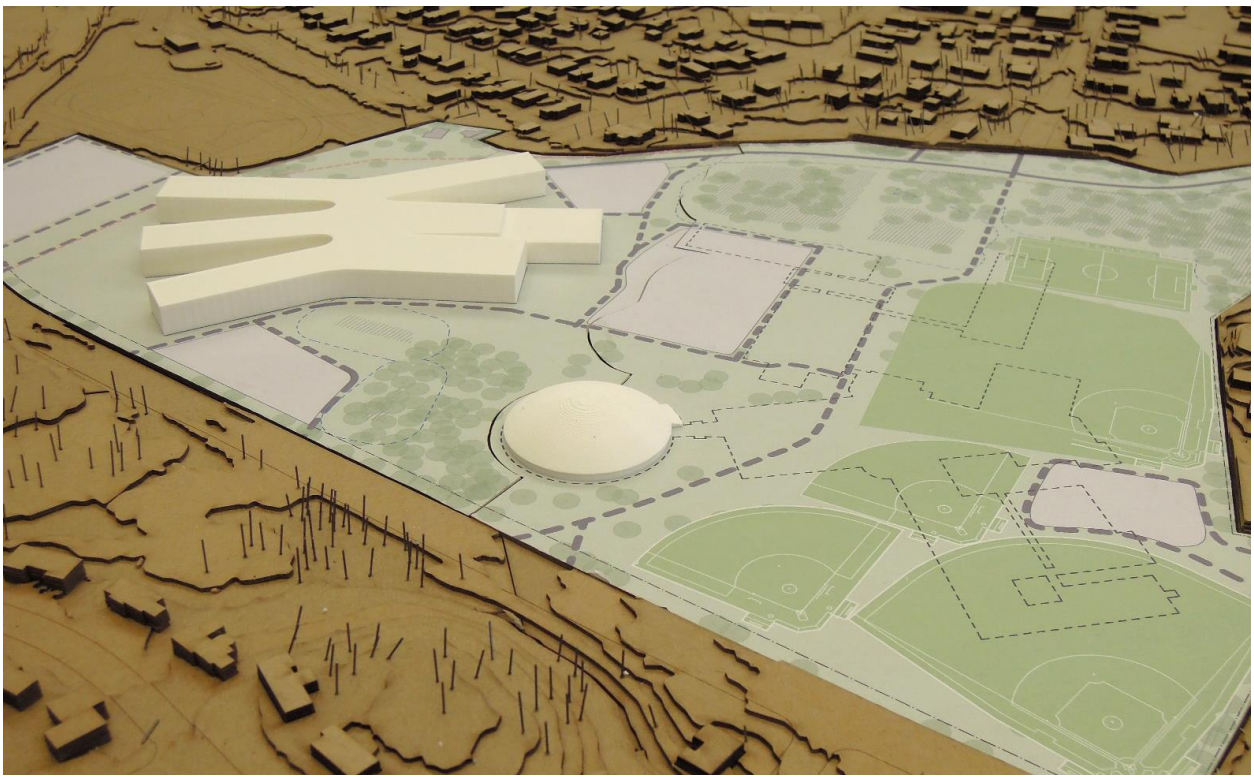
Alternative C.2b - Massing



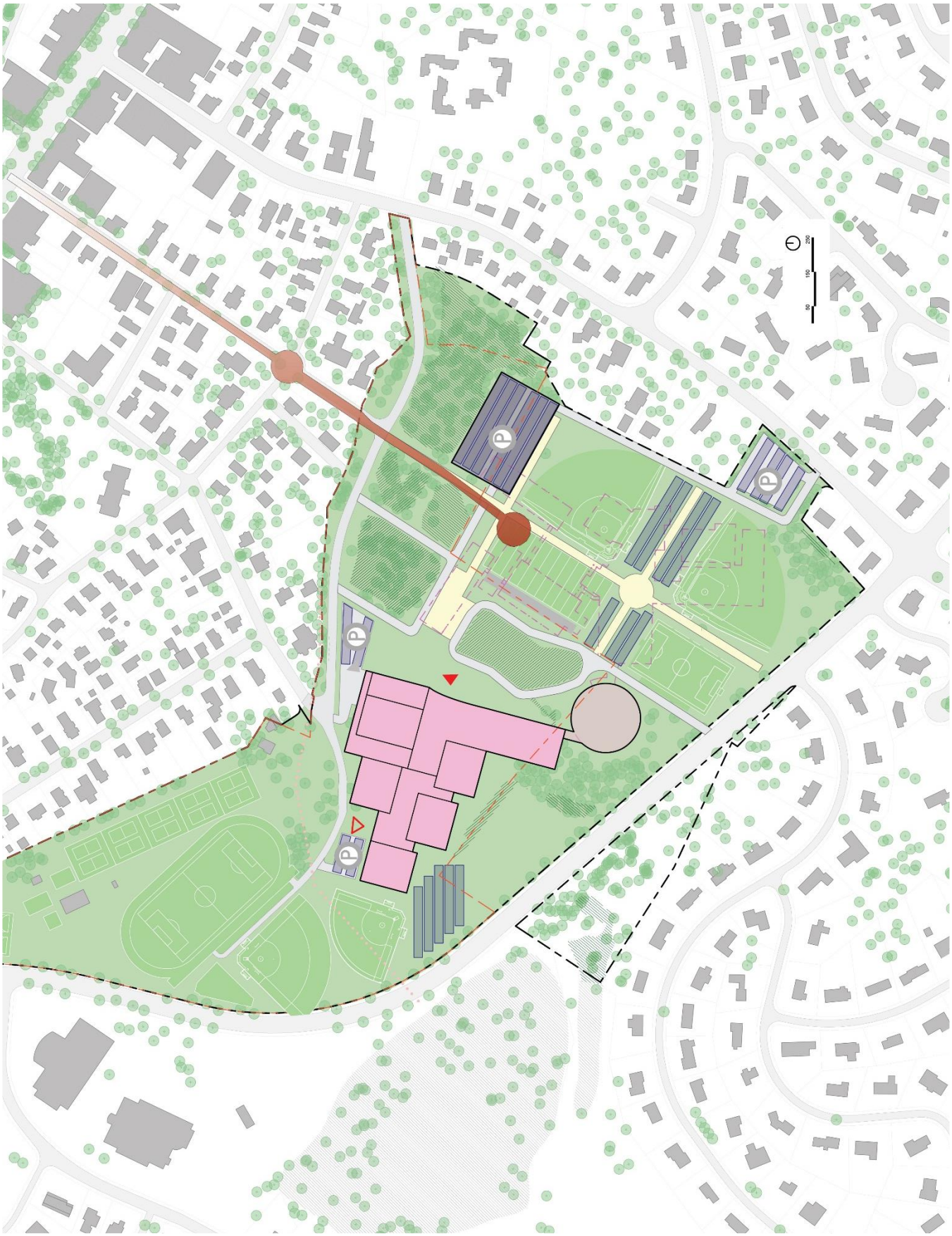
Alternative C.3 Site Plan Diagram



Alternative C.3 – Level 1 Program Diagram



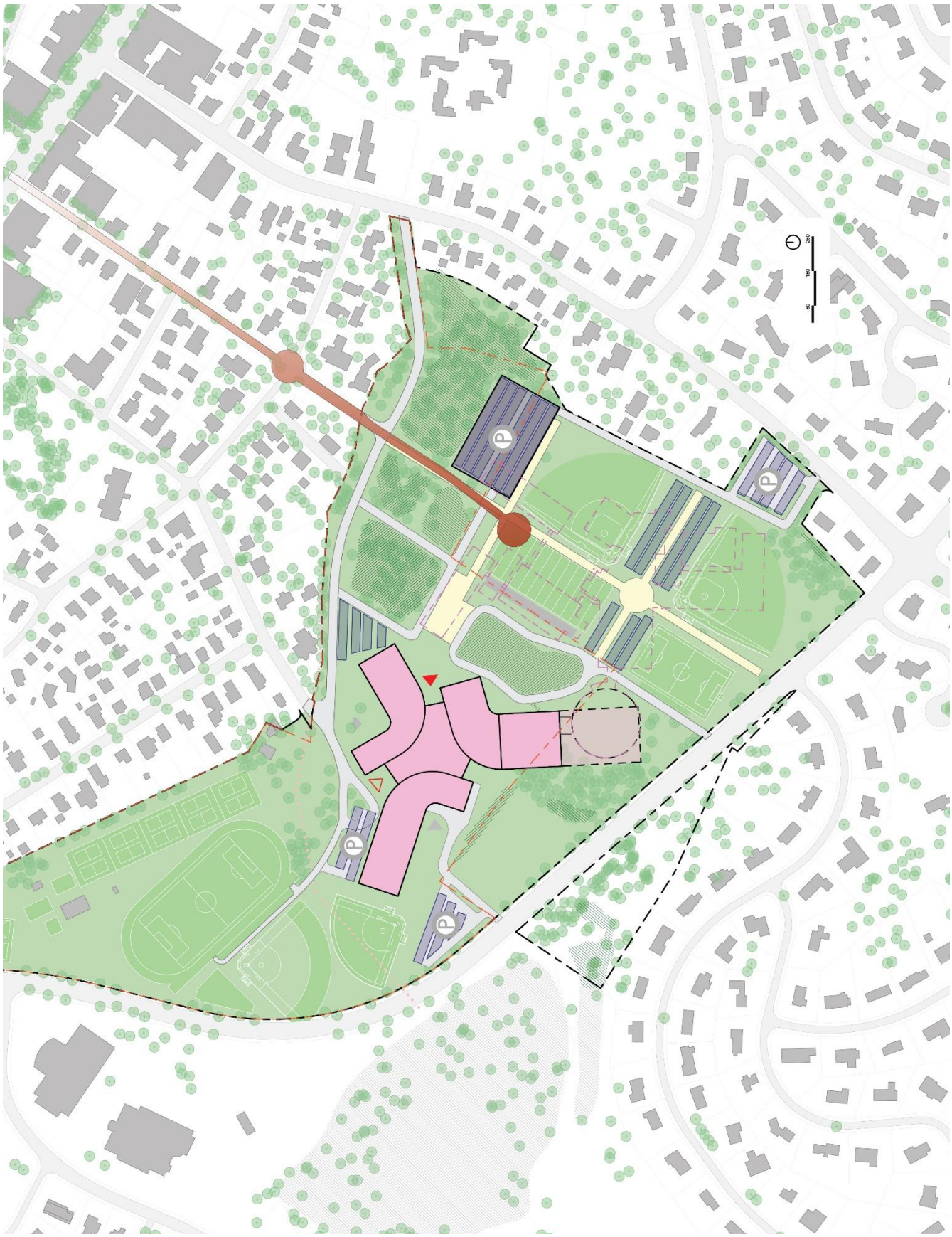
Alternative C.3 - Massing



Alternative C.4c Site Plan Diagram

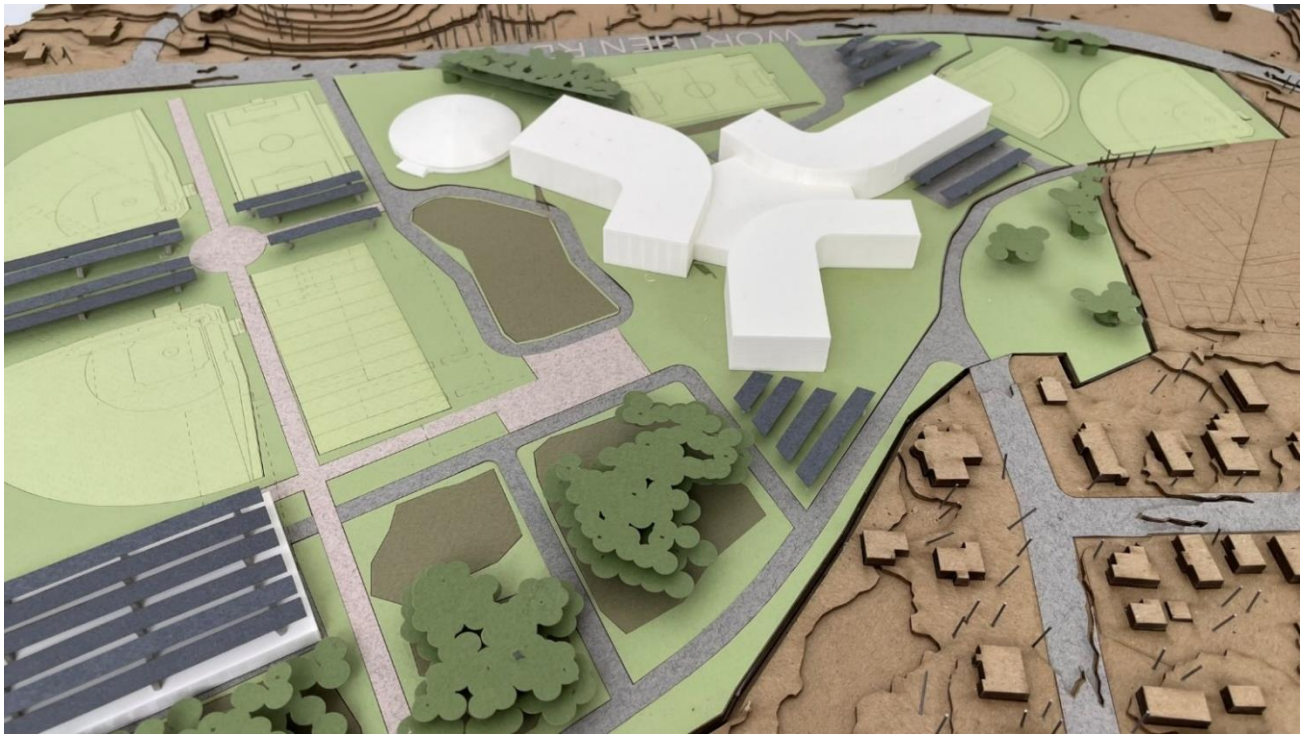
Alternative C.4 – Level 1 Program Diagram

Alternative C.4 - Massing

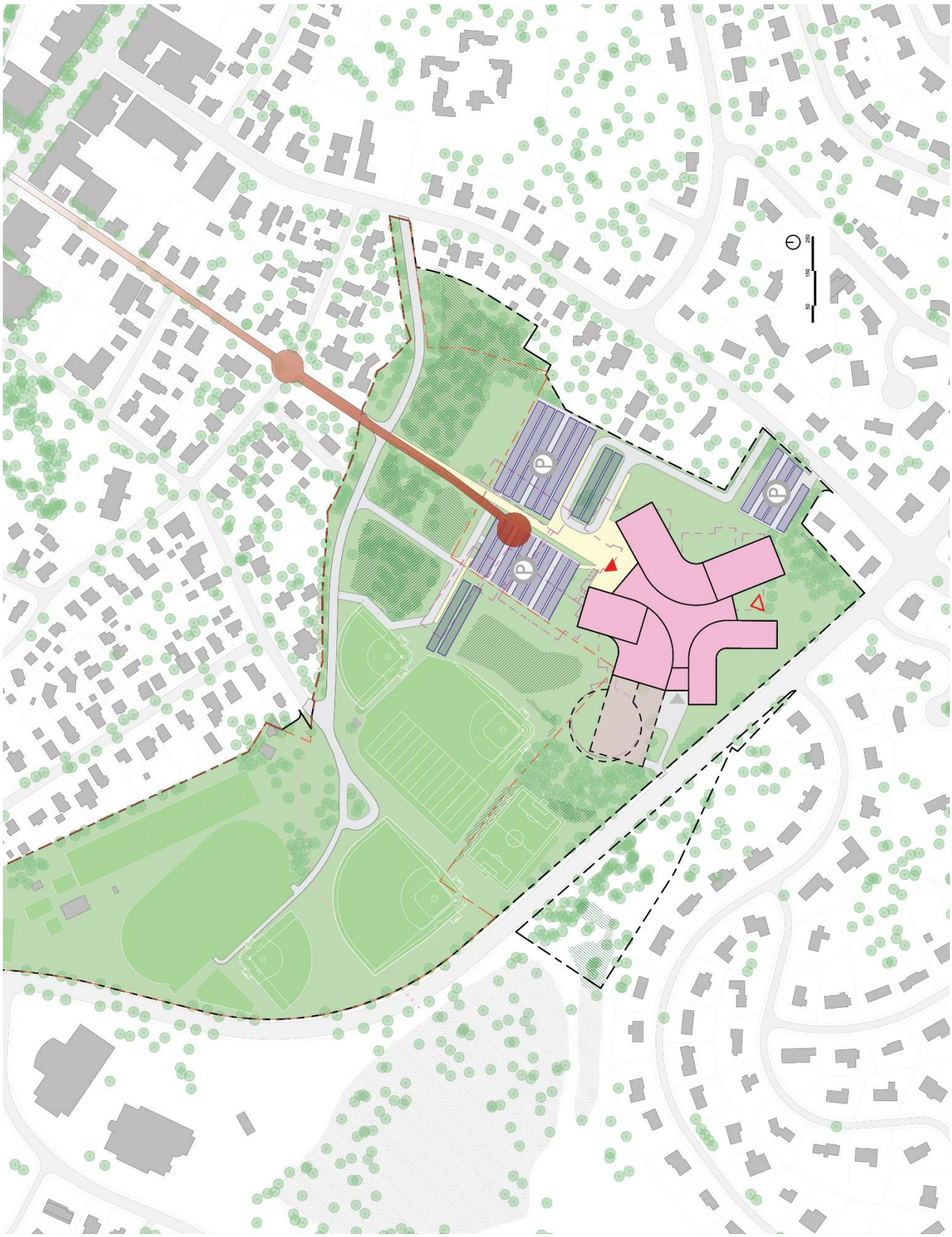


Alternative C.5 Site Plan Diagram

Alternative C.5 – Level 1 Program Diagram

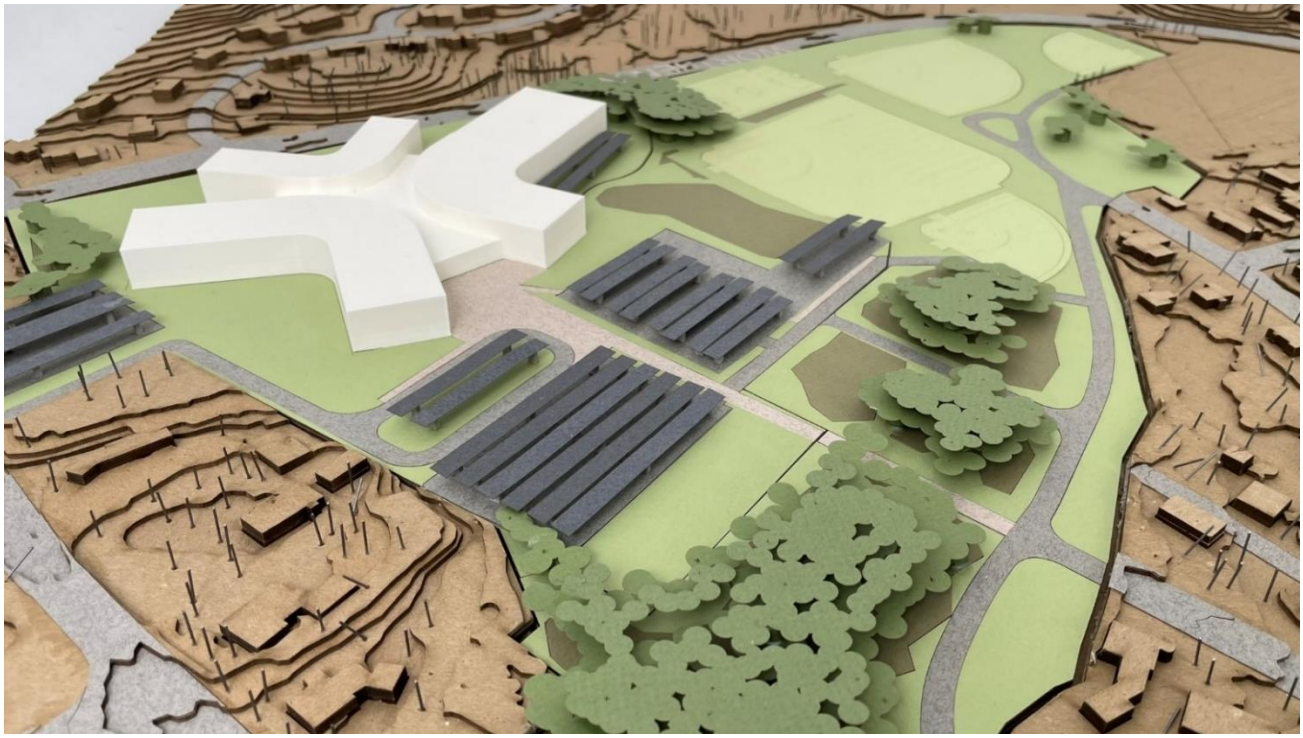


Alternative C.5 - Massing



Alternative C.6 Site Plan Diagram

Alternative C.6 – Level 1 Program Diagram

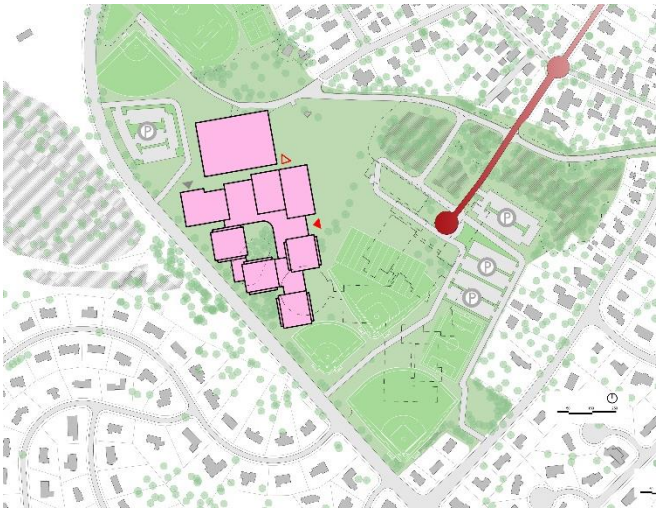


Alternative C.6 - Massing

Construction Alternative D.1: New Building and New Field House in Multiple Phases on Fields

Building construction similar to Alt C.4b except sited adjacent to Worthen Road on the existing Field House footprint. Allows for Field House to be replaced on existing athletic fields prior to demolition of the existing Field House building. Total estimated construction duration of 4 years.

Construction of a new 72,000 sf Field House on the existing athletic fields could be carried as an option with this Alternative.



D.1

Description

Alternative D.1 is sited differently than the C Alts, locating the new building on the footprint of the existing Field House and adjacent wooded knoll, to maximize the use of frontage along Worthen Road, and to enable a more substantially sized Field House, or other site utilizations to be considered.

Access to the rear of the building is limited by the presence of wetland resources. The New Construction Alternative will include compliance with the Lexington Integrated Design Policy, a Net Zero Energy school building with an energy target EUI of 25 kBtu/SF/yr. or 30% better than ASHRAE 90.1-2019 whichever is lower, LEEDv4 for Schools Gold Certification with a goal for Platinum, an embodied carbon reduction strategies such as low carbon concrete and materials such as structural wood components.

The Pros and Cons of option D.1 are summarized as follows:

Pros

- Current Building Remains in Use Throughout Construction
- Generous Entry Possible at East or facing Muzzey Street
- Includes Field House with 200m track
- Includes enclosed courtyard

Cons

- High Cost
- Requires early demolition of existing Field House
- Requires Article 97 legislation
- Field relocation separate from Center Rec Complex
- Wetland and tree replication required

Construction Alternative D.2: New Building and Renovated Field House in Multiple Phases on Existing High School Site

Building construction similar to Alt B.1 except with all new construction phased in place on the footprint of the existing building.

Renovation of the existing 31,280 sf Field House could be carried as an option with this Alternative.

Description

This scheme emerged at the request of the School Building Committee in response to the practical limitations of Renovation and Addition Alternative B.1, which utilizes the structural framework of Buildings G and J. By creating a similar footprint to B.1 that uses phased demolition and construction, the scheme is able to preserve desirable vehicular access and parking on the southern Worthen Road side of the building. Making the scheme all new construction then affords the ability to build classroom wings more compactly and efficiently up to a four-story height, and to reduce potential impacts on wetlands and Article 97 land. The scheme also improves orientation of the academic wings compared with Alternative B.1 once reuse of existing structures is removed.

The New Construction Alternative will include compliance with the Lexington Integrated Design Policy, a Net Zero Energy school building with an energy target EUI of 25 kBtu/SF/yr. or 30% better than ASHRAE 90.1-2019 whichever is lower, LEEDv4 for Schools Gold Certification with a goal for Platinum, an embodied carbon reduction strategies such as low carbon concrete and materials such as structural wood components.

The Pros and Cons of option D.2 are summarized as follows:

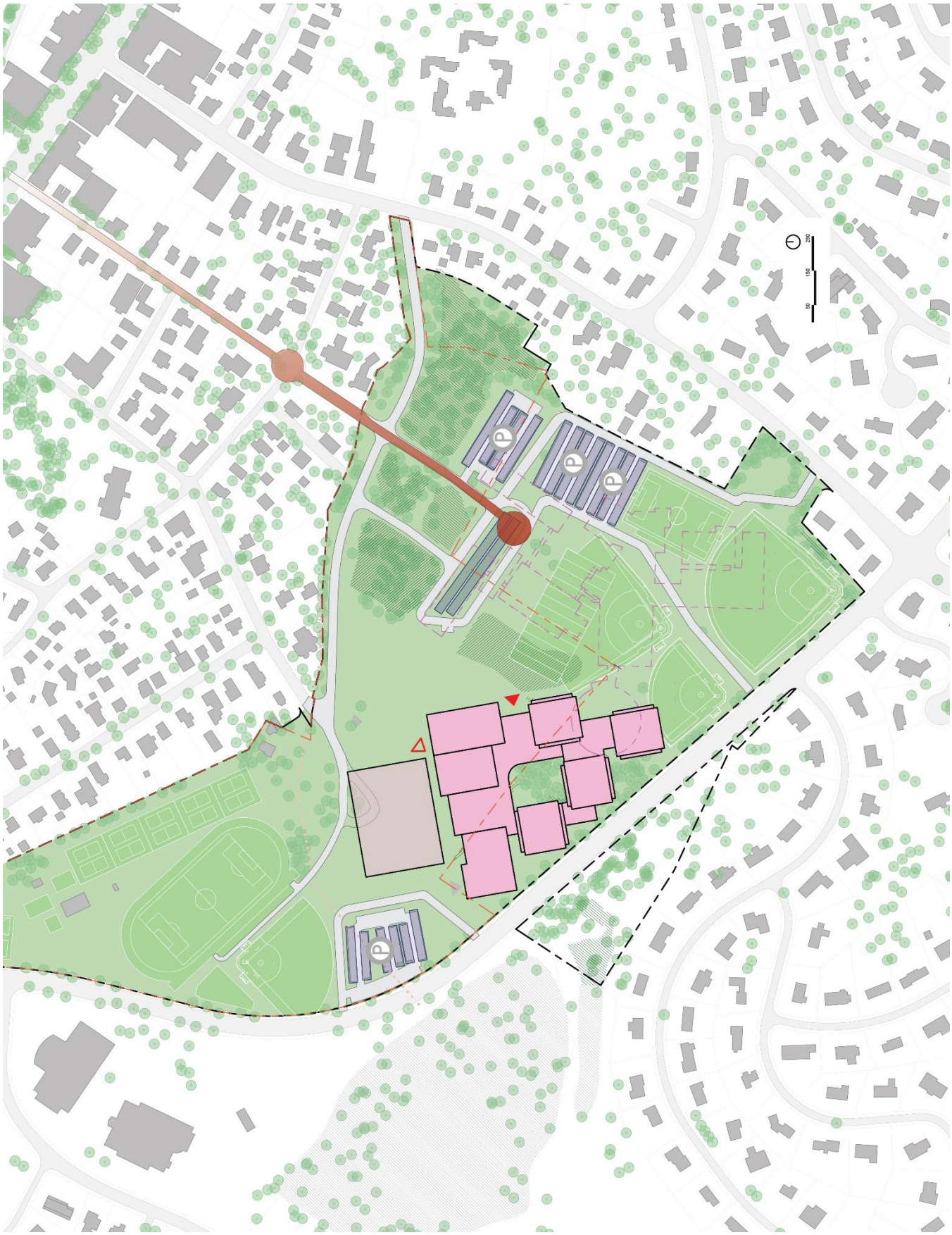
Pros

- Reduced site scope
- Maintains general location of the current school and its relationship to Muzzey Street
- May mitigate Article 97 impacts

Cons

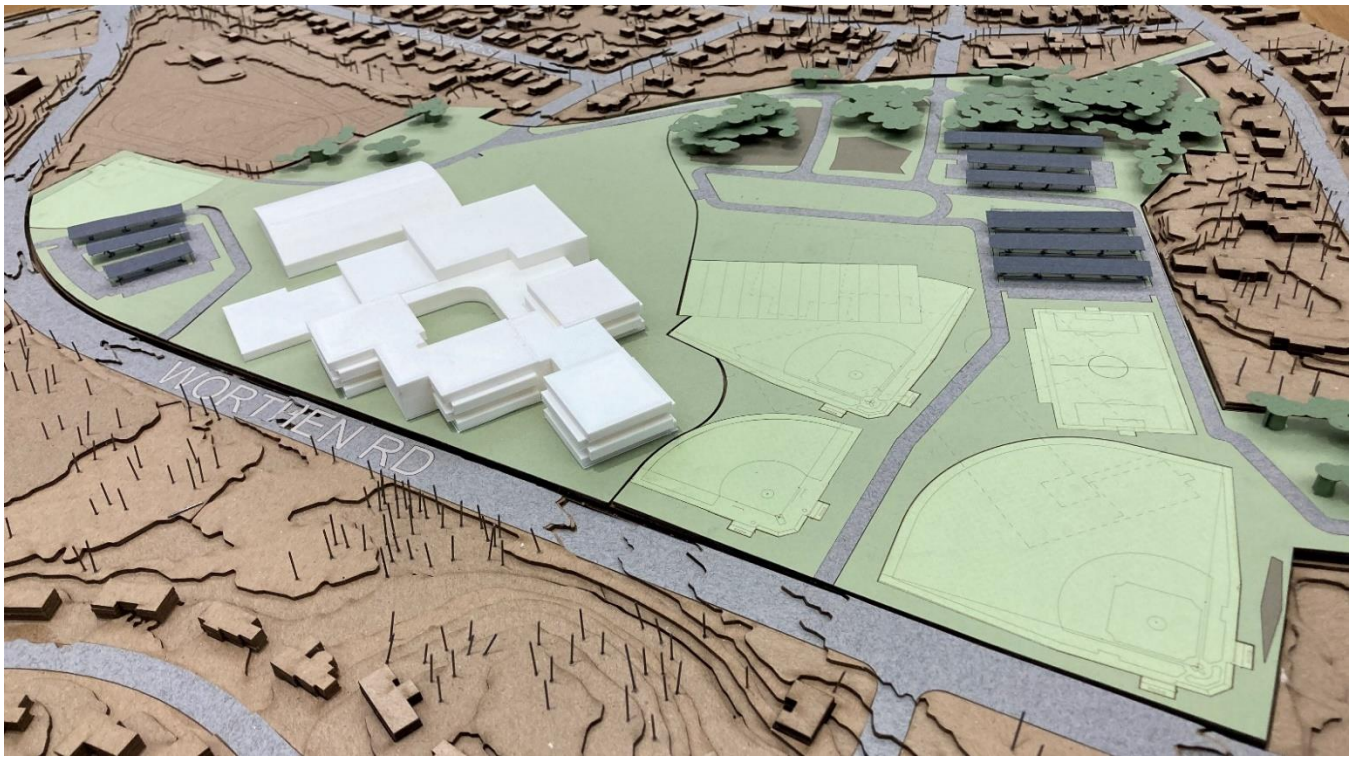
- Added cost and inconvenience due to longer construction duration and need for modular classrooms.
- Requires Multi-Phased Construction, causing extended disruption and migration of students to new building over multiple phases.
- Temporary disruption and displacement of some existing fields

D.2

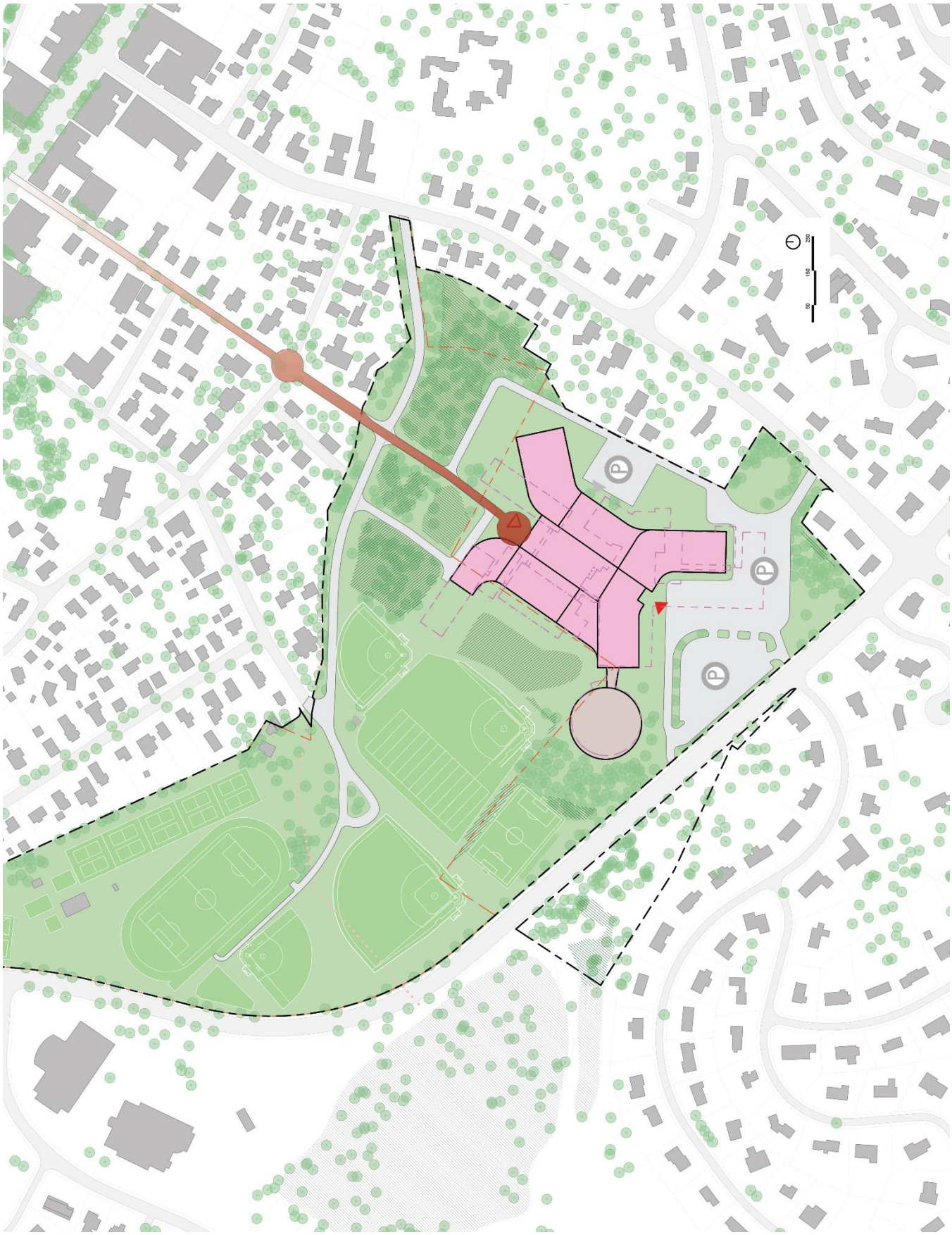


Alternative D.1 Site Plan Diagram

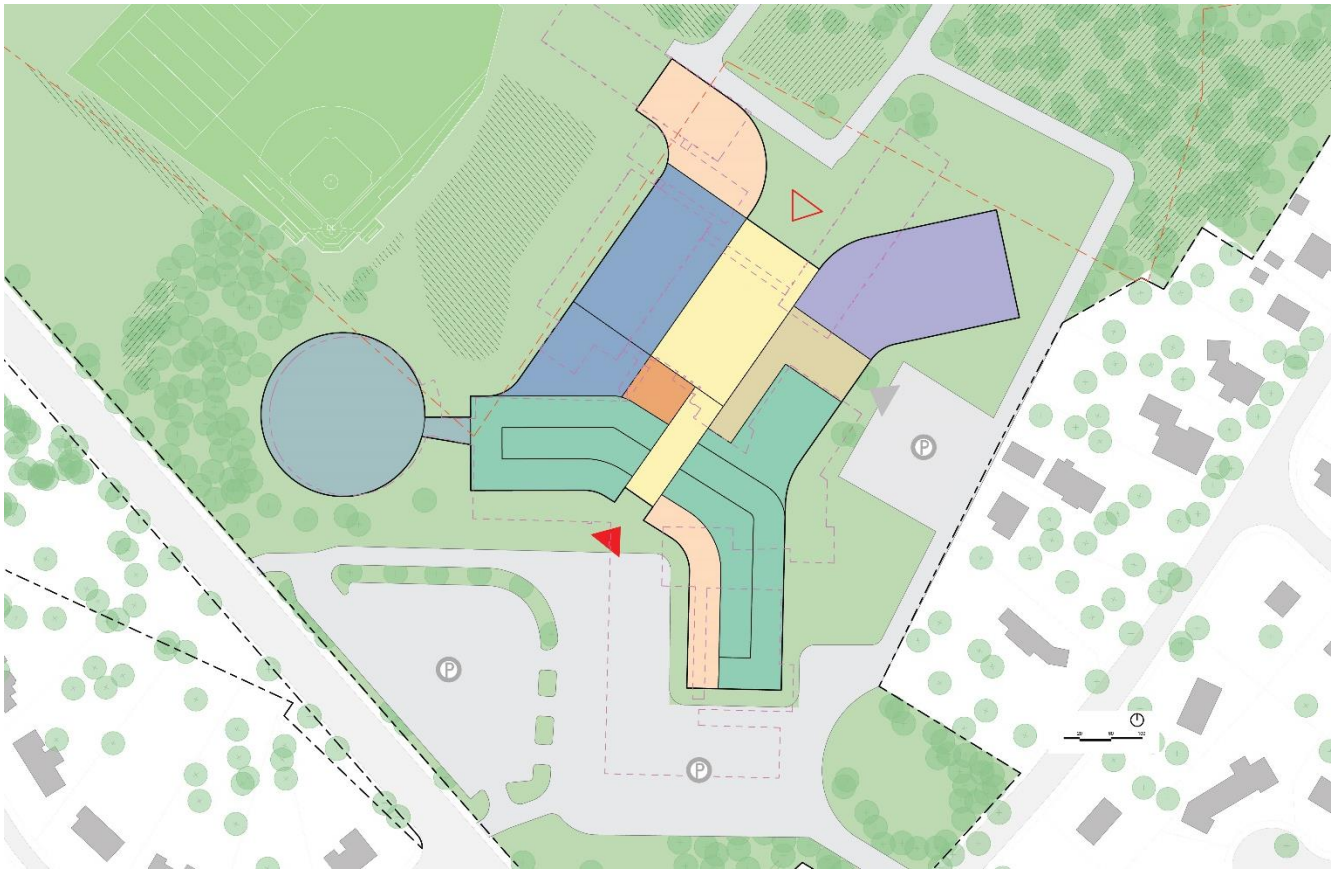
Alternative D.1 – Level 1 Program Diagram



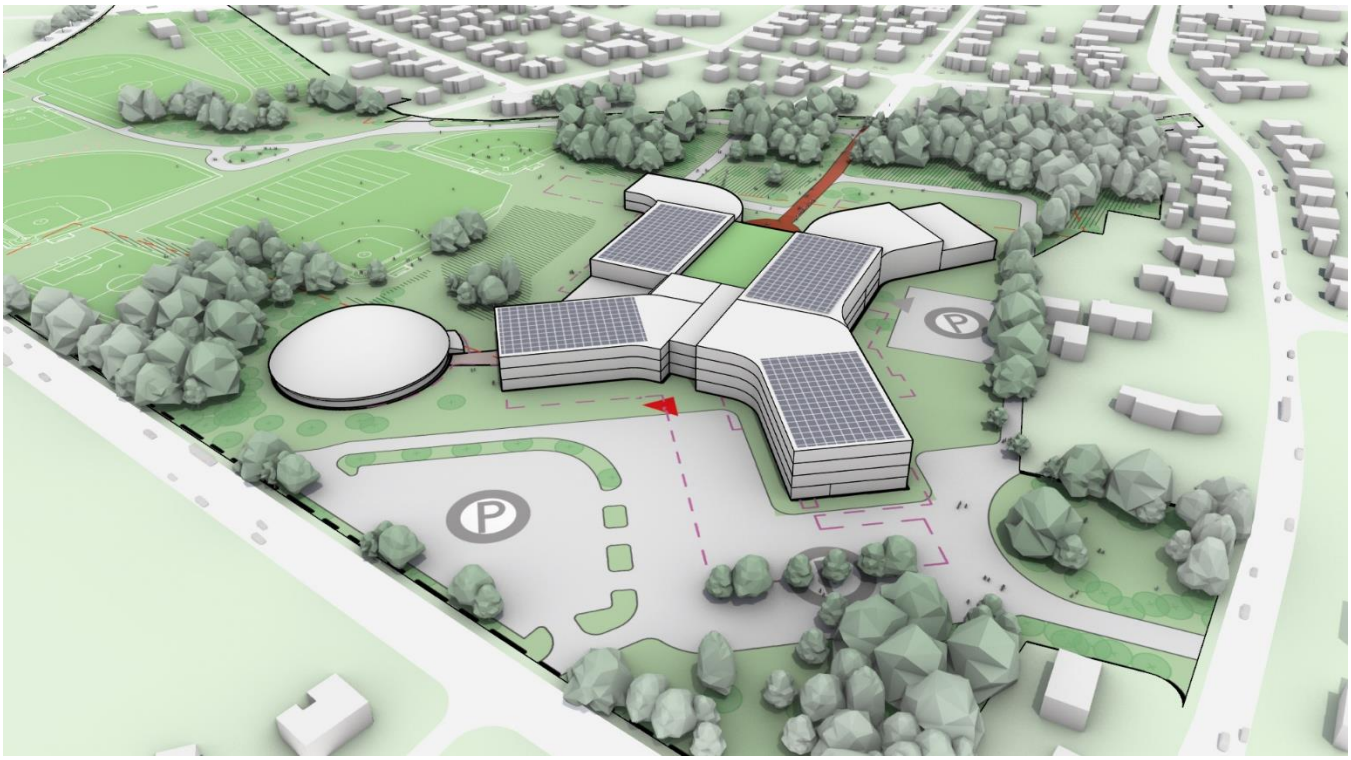
Alternative D.1 - Massing



Alternative D.2 Site Plan Diagram



Alternative D.2 – Level 1 Program Diagram



Alternative D.2 - Massing

Life Safety Code Compliance

New construction building alternatives will be designed and constructed in full compliance with current life safety codes and standards.

Accessibility Code Limitations

New construction building alternatives will be designed and constructed in full compliance with current accessibility codes and standards.

Energy Code Compliance

The Town of Lexington has adopted the Massachusetts Stretch Energy Code's Specialized Code. The New Building Construction Alternative would require compliance with the Stretch Energy Specialized Code,

Site

Site work within these new construction alternatives will include the redevelopment of all vehicular and pedestrian circulation systems. Separation between bus circulation, van circulation, car circulation, and delivery circulation will be developed. Drop off and pick up areas for buses, vans and cars will be separated. New outdoor student spaces, including entrance plazas, outdoor learning environments, outdoor courtyards, and connections to resource areas for education will be developed. All pedestrian circulation systems and outdoor gathering areas will meet ADA and MAAB accessibility requirements.

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.

Parking for an assumed 450 vehicles will be developed for the purposes of these alternatives. A final parking count will be developed and incorporated as the alternatives evolve. The new parking areas will incorporate ADA and MAAB compliant accessibility from accessible parking and loading zones to all accessible building entrances.

Multiple existing natural turf fields will be disrupted under these alternatives. All disturbed fields will be reconstructed elsewhere on the Center Recreation Facility property to the same quantity, quality, solar orientation and size of the fields to be disturbed. Most of these options currently anticipate that the C1 baseball field, the C2 softball field, the C3 baseball field, the C4 baseball field, the Crumb football field, and the practice field will all be impacted. The Center Track and Field, Center Playground, Gallagher Tennis Courts, Skate Park, Town Pool, and Farias Basketball Courts will not be impacted by these options and are all outside the Limit of Work.

An Article 97 land swap will be required for the new building alternatives that encroach upon the existing protected parkland. The impacted parkland will be relocated on the campus so there is no loss of area or programs.

Wetland replication will be required to off-set direct impacts to the isolated wetlands at a ratio of at least 2:1.

All new underground utilities will serve the school and redeveloped site. On-site water distribution will be provided from the existing mains in Waltham Street and Worthen Road. Hydrants and the building will be served from the new 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 minitigate runoff quantity.

Architectural

All exterior envelope assemblies within the areas of new construction will be designed to meet the robust thermal requirements of the Stretch Energy Specialized Code. Interior assemblies and materials will be selected to provide the necessary level of durability for the expected 50-75 year life span of the school.

Structural

Foundation recommendations are based on the Preliminary Geotechnical Report by OTO dated March 22, 2024. The presence of an organic soil layer on the site will require additional site-specific analysis to determine seismic parameters. Footings and slab shall bear on soil improved with reinforced rigid inclusions ground improvement designed for 5 KSF allowable bearing capacity (footings) and 100 PSF live load (slab). A 12" crushed stone layer below the entire building footprint will be provided.

New foundations consist of cast-in-place, reinforced concrete shallow spread footings with cast-in-place, reinforced concrete frost walls. Concrete pilasters at exterior columns.

Assuming a column spacing of 30'x30':

- 3-story buildings: 9'x9'x2' with 6 PSF of rebar
- 4-story buildings: 10'x10'x2' with 6 PSF rebar
- 5-story buildings: 12'x12'x2' with 6 PSF of rebar

A continuous footing 3'-0"x1'-0" with 4 PSF of rebar will be placed along the perimeter of the building. Frost walls will be 3'-6" x 20" with 5 PSF of rebar. Assume 2'x2' pilasters under perimeter columns. New slabs will be 5" concrete slab on grade with 6x6 W2.9x2.9 WWF over 15 mil vapor barrier over 12" of crushed stone. 12" thickened slab with rebar to support non-load bearing CMU wall partitions. Assume 5' deep reinforced concrete elevator pit with sump pit, and both perimeter and underslab drains.

Structural Steel recycled content shall consist of a minimum of 95% recycled steel.

New floors shall be supported by steel columns and composite steel beams supporting of a 3¼" lightweight concrete slab over 3" composite metal deck. Slab to be reinforced with 6x6 W2.1x2.1 WWF. Assume ¾" diameter x 4 ½" headed shear studs per foot of beam length. Assume steel weight of 13 PSF. Add 10% for connections and 1 PSF for miscellaneous steel such as kickers, bent plates, relieving angles, and girts.

New typical roofs shall be galvanized 3" metal roof deck spanning between wide flange steel beams and girders. Assume steel weight of 11 PSF. Add 10% for connections and 1 PSF for miscellaneous steel such as kickers, bent plates, relieving angles, and girts. Add concrete slab under rooftop mechanical units – increase steel weight to 13 PSF. New Auditorium and Gymnasium Roof: acoustic, galvanized 3" metal roof deck spanning between long span open web steel joists with an estimated weight of 11 PSF. Bridging at quarter points.

The lateral system will be steel braced frames. Due to organic soils, lateral forces will be high and require an additional 1 PSF of steel weight to be assumed for lateral system. Assume 12" reinforced CMU walls in Auditorium, 8" reinforced CMU walls in the elevator shafts. Optional 12" reinforced CMU walls at the gymnasium. Roof to be designed as PV-ready for a ballasted system.

Miscellaneous steel (see 1 PSF allowance above):

- Galvanized brick relieving angles at the second, third, and fourth floors
- Canopy structure
- Gym equipment support
- Theater equipment support in Auditorium
- Mechanical screen enclosures (allowance of 10 PSF on vertical screen area)
- Hung partition support beams

Provide isolation pads or floating slab at vibrating equipment.

Fireproofing of primary frame members for a 2-hour rating (columns, beams, braces). Assume 5% of members receive intumescent paint. Floor slabs do not require additional fireproofing due to the 2-hour rating of the concrete slab. Spray underside of roof deck for a 1-hour rating.

For Add/Reno Field House on existing footings:

- Test pits required to determine existing foundations type and size.
- Demo existing wood dome structure and slab on grade.
- New 5" slab on grade on ground improvement
- New steel-framed superstructure (steel columns, spandrel beams, long-span trusses and 3" acoustic deck)

For New Field House on new footings:

- New 12" concrete frost wall on 3'x1' continuous footing on ground improvement along perimeter.
- New 5" slab on grade on ground improvement
- New steel-framed superstructure (steel columns, spandrel beams, long-span trusses and 3" acoustic deck)

HVAC

New, all-electric HVAC systems will be provided to comply with the current Massachusetts Energy Code, including the Specialized Stretch Energy Code adopted by the Town of Lexington. A specific system approach is represented below, but alternative space heating and cooling approaches will be assessed to determine the preferred system.

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.

The geothermal field for the New Construction options would likely need to be located where the existing school is. Therefore, the system installation would occur after construction of the new school and demolition of the existing school. A temporary installation would be required to support the systems within the school.

This would entail the use of a boiler and cooling tower (or chiller).

Ventilation will be provided with rooftop DOAS units, configured with watersource 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 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.

Plumbing

New domestic cold and hot water systems will be provided throughout the facility, including a domestic water booster system with VFD drives, reduced pressure backflow preventers, new water meter, pipe insulation, pipe labels with flow arrows and valve tags. Electric storage type domestic water heaters will be provided.

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.

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 lab areas, pH adjustment room, Nurse's room and boiler room. 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 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. A new foundation drainage system will be provided. The discharge from the foundation drainage system will exit the building independently from the primary storm drainage systems and connect to exterior storm drainage manholes with backwater valves. Storm drainage piping from each level of roof area will be provided with backwater valves for each level.

Due to the electrification requirements, natural gas is not anticipated. Kitchen equipment will be electric. Hot plates will be utilized within the lab classrooms.

Two new acid waste chip tanks will be provided. One for each science wing. 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. Each drain from chip tanks will drain independently from the building by gravity and connect to the site sewer system 10 feet outside the foundation wall.

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 battery-operated sensor type flush valves. Urinals will utilize 0.125 gal/flush self-regenerating battery-operated sensor type flush valves. Lavatories will likewise utilize self-regenerating battery-operated 0.35 gpm sensor operated faucets. Sinks will utilize 1.5 gpm flow restrictors and showers will utilize 1.5 gpm flow shower heads.

Fire Protection

A new combination standpipe/sprinkler system will include a new fire pump, jockey pump, fire pump controller, jockey pump controller, double check valve assembly, wet alarm check valves, floor control valve assemblies, sprinklers, flow switches, tamper and pressure switches and all associated piping. The system will be hydraulically calculated in accordance with NFPA requirements. Sprinkler mains will be equipped with control valves, inspector test stations, and flow switches. Sprinkler spacing will comply with NFPA-13 requirements. Separate sprinkler zones will be provided for each floor and each wing.

It is assumed that a fire pump is required to meet the automatic sprinkler system demand based on the existing school. However, the new building will be three, four, or five levels high, as opposed to two. A hydrant flow test is required to confirm the available water supply. If required, the fire pump will be located in a rated room with direct access to the exterior in accordance with 780 CMR and

NFPA 20. An approved double check valve assembly will be provided on the fire service.

New standpipes meeting the requirements of 780 CMR and NFPA 14 will be installed. A standpipe isolation valve will be provided at each standpipe feed. Each standpipe will meet the requirements of a Class 1 standpipe system in accordance with 780 CMR and NFPA 14 requirements. Each will be provided with 2 ½-inch fire department valves with 1 ½-inch reducers and caps. The standpipes will be interconnected at the ceiling of the first floor.

New fire department connections and electric bells shall be provided in the quantities and locations as required per the local fire department. The new fire department connection will be arranged to serve all sprinklers and standpipes within the building. The fire department connection threads will match Fire Department requirements. Where required due to travel distances and local fire department requirements, intermediate standpipes will be provided in additional locations.

Sprinklers for areas with ceilings will be factory painted gloss white, concealed type. Mechanical rooms and other unfinished areas are to be provided with brass finish, exposed sprinklers. Sprinklers that are subject to damage will be provided with sprinkler guards. Sprinklers subject to higher temperatures will be intermediate or high temperature sprinklers in accordance with NFPA 13 requirements. Sprinklers for areas subject to freezing, including loading dock areas, shall be dry type.

Elevator machine rooms and hoistways 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

Utility Interconnection

The existing utility service will be upgraded to accommodate the new program, which includes an all-electric HVAC system, electric vehicle (EV) charging stations in a minimum of 4% of the total new off-street parking spaces (per zoning bylaws), provisions for future installation of EV charging stations for a minimum of 50% 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)
- 15,000 Volt switchgear (owned by the school, operated by utility)
- Provisions for four (4) transformers (owned and operated by the school)
- Solar interconnect switchboard for the 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 25, early estimates suggest the size of the total solar array system shall be 3.5 Megawatts, along with 2-Megawatt/4-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 3750 kVA transformer is dedicated to the photovoltaic (PV) system, feeding a 5000 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 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 utility. 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.

A system of new panelboards separated by use; lighting, mechanical and general power will be provided in dedicated electrical rooms throughout the building to serve equipment, lighting 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 emergency system will be replaced with a new 277/480 volt 3-phase, 4 wire diesel fueled emergency generator and generator distribution system. Preliminary calculations suggest a generator sized at 1250kW.

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

Lighting & Lighting Control

All lighting will be new, high efficient LED light fixtures.

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

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

The new fire alarm system will consist of an addressable voice evacuation fire alarm control panel, automatic smoke and heat detectors, manual pull stations, audible and visible alarm signals, elevator recall, connections to automatic fire suppression systems, and connection to the Fire Department. The new fire alarm system will report to the Fire Department through a radio master box with a remote 5dB antenna located on the roof, as well as an auto dialer for supervisory and trouble signals.

The fire alarm control panel will be in a dedicated fire command center with an LCD remote annunciator located at the Main entrance where the fire department responds to an alarm condition. Audio speakers and visual high intensity strobes alarm devices will be installed per NFPA-72. The building will be covered by a sprinkler system, and smoke detectors will be provided throughout all corridors, and selective spaces.

Fire suppression systems shall be tied to the fire alarm control panel. Interface & control modules will be provided for elevator recall, air handling unit shut down, gas shut off, door hold release, door hardware bypass and any other systems requiring control under an alarm condition.

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 can be installed if desired by the town.

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 instuctor'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 school's security infrastructure is designed with multiple layers, incorporating both active and passive security measures. These layers encompass various aspects such as perimeter security, surveillance cameras deployed both indoors and outdoors, controlled and secure entry points, access control mechanisms at key interior doors, intrusion detection systems featuring multiple zones, intercommunication systems, the ability to initiate lockdowns for classroom wings, and the capability for individual classroom lockdowns.

Security

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

Audio / Visual

New audiovisual systems will be provided for the Auditorium (including backstage support spaces), music classrooms (including the Band, Chorus, and General Music Classroom), the Fitness area (including the Gymnasium, Fitness Room, Multipurpose Room, and Dance Studio), Cafeteria, Large Group Instruction room, and the Lecture Hall. 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 Production Room.

Acoustics

New building utility equipment will incorporate sound attenuating measures, as necessary, for compliance with the community noise emissions summarized in the Town of Lexington General Bylaws, Chapter 80: Noise Control. These requirements are consistent with the noise emission 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 an existing building of this age, there are significant hazardous materials present, despite prior abatement activities that have occurred over the years. For a detailed report on the materials to be abated, see Section 3.1.4.M. For the new construction alternatives, hazardous material abatement is required for the existing building that will be completely demolished.

Capacity Constraints

The design capacity of 2,395 students noted in the MSBA Enrollment Projection, and the corresponding educational space needs will be provided by the design of the new construction in these alternatives.

Program Delivery Impediments

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

School Requirements

All elements of Lexington High School's robust curriculum are accommodated in spaces that meet current standards by the new construction

Schedule Overview

The majority of the new construction Alternatives would be implemented over fourty-eight (48) months. These Alternatives would allow the new builing to be complated and occupied in thiry-six (36) months and the demolition and sitework to follow in the last year. The exceptions would be Alternatives C.6 and D.2, which would be implemented over sixty (60) months.

Cost Overview

The estimated construction cost* is:

C.1a:	$ 487,000,000	C.1b:	$ 479,000,000
C.1c	$ 478,000,000	C.1d	$ 498,000,000
C.2a	$ 485,000,000	C.2b	$ 478,000,000
C.3a	$ 484,000,000	C.4a	$ 489,000,000
C.4b	$ 481,000,000	C.4c	$ 502,000,000
C.5a	$ 477,000,000	C.5b	$ 495,000,000
C.6	$ 481,000,000		
D.1	$ 486,000,000	D.2	$481,000,000

The estimated project cost* is:

C.1a:	$ 610,000,000	C.1b:	$ 600,000,000
C.1c	$ 600,000,000	C.1d	$ 625,000,000
C.2a	$ 610,000,000	C.2b	$ 600,000,000
C.3a	$ 605,000,000	C.4a	$ 615,000,000
C.4b	$ 605,000,000	C.4c	$ 630,000,000
C.5a	$ 600,000,000	C.5b	$ 620,000,000
C.6	$ 615,000,000		
D.1	$ 610,000,000	D.2	$621,300,000**

*All pricing is based on Gross Square Foot (GSF) of educational program only. It does not include costs for additional functions such as Central Office, Field House or a Natatorium

**Approximate cost based on hybrid of C.6 and B.1 options

Overall Conclusions

Many considerations were discussed among the project team in the process of reducing the original 19 Alternatives studied to a smaller group that could support further evaluation of site and program study topics throughout the Preferred Schematic Report phase of the feasibility study. Considerations for continued study in early stages of the PSR phase include whether a 3-story academic building is possible on the available site, as well as whether a more pod-based approach to educational planning might be preferred.

The **five Alternatives** whose further study would provide the best and most cost-effective opportunities to meet the project goals and educational program are the following:

Alternative B.1 Renovation and Addition, Phased in Place

Alternative C.1d New Construction on Fields

Alternative C.2b New Construction on Fields

Alternative C.5b New Construction on Fields

Alternative D.2 New Construction, Phased in Place

Construction Alternatives Including Cost Estimate for other functions.

As part of the analysis during PDP, the SBC and Design team included various other functions in the planning and estimating process. These items are not included in the costs or schedules for the Educational Program School Building and would be in addition to those costs if selected. The estimated project cost is:

Central Office:	20,700 GSF	$ 23,000,000
Natatorium:	16,400 GSF	$ 25,000,000
Field House:	24,400 GSF	$ 30,000,000 (Reno)
Field House:	36,000 GSF	$ 41,000,000 (New)
Field House:	48,000 GSF	$ 51,000,000 (Add/Reno
Field House	72,000 GSF	$ 79,000,000 (New)